EU FUNDED PROJECT

Georgian Research and Development Policy Recommendations

Report

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Acknowledgements

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Executive summary

The proposed recommendations on the elaboration of a modern, coherent, and sustainable strategy for the reform of Georgian R&D policy system and for the improved management of the country's research and development activities derive from the EU supported project "Creating an effective model of science administration: review of EU best practices and elaboration of policy recommendations with the Ministry of Education and Science of Georgia". The overall objective of the project was to assist the ministry (MES) and the Georgian National Science Foundation (GNSF) in their endeavour to define a clear strategy and transparent policy for the modernisation of the overall R&D policy system in Georgia and to formulate recommendations to improve Georgian legislative framework towards EU standards. In other words, provide recommendations for establishing all the necessary institutional and legislative mechanisms needed to flourish and operate successfully within the international market environment.

The purposes of the contract was **first,** to support the MES and GNSF to achieve an open debate with relevant stakeholders and decision-makers to formulate recommendations for a comprehensive strategic and legislative setting for the introduction of a coherent research and development policy that constitutes a supportive and effective environment to foster excellent scientific research in Georgia, also by cooperating with foreign (esp. European) research institutions, and to successfully participate in the EU Framework Programmes for Research and Technological Development, and **secondly**, by means of participative approach, to raise capacities within the Georgian Government in close cooperation with a representative set of stakeholders (i.e. a critical mass) of all related institutions and industry, in the establishment of a R&D policy system supportive to the economic development of the country.

The selection of the problems to be solved was not accidental. Since gaining independence, R&D in Georgia have suffered from a lack of financial resources, weak or almost non-existent industrial investments in research, a mismatch between scientific capacities and the needs of the Georgian economy and society characterised by a vastly greater number of researchers than could be supported by the available resources which resulted in a drastic reduction of research activities. However, despite the long-standing unfavourable conditions some disciplines have maintained an international standing.

The focus of the proposed recommendations is to assist in solving a number of problems related to the introduction of a coherent R&D policy in Georgia, maintaining and strengthening the human research capacities in the country and provide new ideas in order to foster excellent scientific research in Georgia. The assessment of the current R&D policy situation in Georgia (presented in the "Assessment Report of Georgian R&D activities", May 2007) and the perspectives of its development enabled us to draw a quite representative picture of how the reorganisation and reform of the R&D system have proceeded, how they have already influenced and will continue influencing Georgian research community, and what steps and approaches to improving the R&D policy management should and could be taken in the future.

The recommendations put forward in this document are divided into 4 parts.

Part 1 **"Reorganizing the public R&D policy system"** includes recommendations on the following topics:

1. Steering of the R&D policy advocating the active role of the Government in setting the R&D policy goals, use of a long term research strategy as the basis for further integration of research and higher education, and a need for a national R&D coordinating body.
2. The need for continuing upgrading of Georgian R&D and HE legislation and its harmonisation across sectors.
3. Further elaboration of the R&D administrative structure, involving R&D support agencies, Georgian Academy of Sciences, universities and R&D institutes.
4. Diversification of the portfolio of R&D financing instruments and increasing the overall R&D financing.
5. Using different measures, both domestic and international, for improving the R&D infrastructure situation.
6. Elaborating a sustainable quality assurance system, including a national quality assurance agency, international evaluation of research, and improving the activities of the existing grant providing organisations.
7. Introducing measures to improve Georgian participation in EU framework and international programmes.
8. Creation of a national R&D&I monitoring system geared to the corresponding European standards.
9. The need to pay due attention to the emerging research ethics problems, sustainability of the research ethics committees and training in research ethics issues at HEIs.

Part 2 "**Human resource development and the status of researcher"** focuses on the issues of research career, researcher mobility, internationalisation of research, and professional training of research management staff:

1. It advocates the need to elaborate a system of research career planning, better system of information delivery about additional funding opportunities, and adoption and adherence to the European Charter for researchers and a Code of Conduct for the recruitment of researchers.
2. It also recommends launching a plan for selection and training of research managers, and using the available best practice provided by European and international professional research managers and administrators organisations.

Part 3 "**Fostering industry-university-R&D institutions partnership"** covers the following issues:

1. Long-term development of innovation and knowledge transfer policy, based of the corresponding strategic plan, supported by the relevant legislative acts and implementing agencies, both regional and at HEIs and R&D institutes.
2. Continuing upgrading the already quite efficient IPR protection system in Georgia, introducing measures for wider dissemination of IPR related information and developing the IPR support structures at HEIs and R&D institutes.
3. Increasing the share of sponsored research at universities and R&D institutes, better involvement of industry and private business in research commercialisation,

and launch specialised knowledge transfer institutions (science and technology parks, business incubators, etc)

Part 4 "**Increasing public awareness of the key role of R&D"** tackles a number of items:

1. The relationship of science, higher education and society bearing in and the new role of universities as entrepreneurial organisations in the market environment situation.
2. The interaction between science and private sector, possibilities for new forms of cooperation, public-private measures to better and faster implement research outcomes.

Methodology and methods

This document is the final one in a series of publications produced by the project and made available to the Georgian research and higher education community. There are 4 major parts in the document arranged around the topics of reorganizing the public R&D policy system, human resource development and the status of researcher, reinforcing the links between public and private sectors and fostering industry-university-R&D institutions partnerships, and increasing public awareness of the role of R&D in society.

In addition to this document, the following publications were prepared within the framework of the project:

1. European Union and international best practice report in research and development and innovation systems and their administration
2. Assessment Report of Georgian R&D activities
3. Annexes I-III of the Assessment Report
4. Four expert reports produced by Georgian short-term experts:
   M. Okujava: The Possibilities of Developing the Existing Legislative Base in Research and Higher Education
   D.Gabunia: Protection of Intellectual Property and Innovations in Georgia
   G. Kochoradze: Review of Georgian R&D activities in international programmes and projects
   S. Machavariani: The Analysis of Existing Georgian Key Technologies and Innovation Experience; Readiness of Georgian Business Community and Industry to Participate in the Commercialization of the R&D Outcomes

In order to guarantee a participative approach to the outcomes of the project, and to raise the awareness of the Georgian research community in the current issues of the R&D policy, six workshops were held in Georgia involving a representative set of stakeholders from all the related institutions. A very representative group of top-level Georgian R&D policy decision-makers made a 7-day visit to Finland and Estonia in order to obtain first-hand experience in reorganizing R&D policy in a post-Soviet country as well as to learn about the knowledge-transfer and innovation issues and activities for a successful linking of research and innovation in a very successful EU country.

The methods applied in preparing the recommendations were manifold.

First group of methods

A structured questionnaire of 19 questions was electronically administered to all the Georgian R&D institutions. More than 60 questionnaires were administered, of which 27 were returned and analysed. The questionnaires were answered by heads (directors) of the R&D institutes (22 institutes) and/or rectors of universities (5 universities) and thus reflect the point of view of institutions, not of individual persons.

The questionnaire contains of 5 blocks of questions:

1. General data about the institution over the period 2002-2005: legal form, number of research staff.
2. Financial situation: volume and sources of financing.

3. Research activities of the institution: total number of research papers, papers indexed by the ISI Web of Science, Georgian papers, patents, research awards received.
4. Present situation of the R&D system in Georgia.
5. Preconditions and basic requirements for developing a modern R&D policy system in Georgia.

The questions themselves were of different types:

1. unstructured questions which the respondents could fill in themselves without any prompts;
2. structured questions with answer variants provided;
3. structured two-dimensional questions;
4. continuous rating scales.

Table
List of respondents

1.	S Rustaveli State University	15.	Institute of Plant Immunology
2.	I. Chavchavadze State University	16.	Institute of Molecular Biology and Biological Physics
3.	Tbilisi I Javakhishvili State University	17.	Centre for Studying Productive Forces and Natural Resources
4.	Georgian Technical University, Tbilisi	18.	A Natishvili Institute of Experimental Morphology
5.	Georgian State Agricultural University	19.	Batumi N Berdzenishvili Scientific Research Institute
6.	A.Djanelidze Institute of Geology	20.	Institute of Food Industry
7.	G Tzulukidze Mining Institute	21.	Institute of Political Science
8.	Scientific Research Center of Radiobiology and Radiation Ecology	22.	I Beritashvili Institute of Physiology
9.	Institute of Water Management and Engineering Ecology	23.	P.Melikishvili Institute of Physical and Organic Chemistry
10.	G Tsereteli Institute of Oriental Studies	24.	A.Chikobava Institute of Linguistics
11.	N Muskhelishvili Institute of Computational Mathematics	25.	A. Razmadze Institute of Mathematics
12.	Scientific Research Sector of Biological Principles of Cattle-Breeding	26.	L Kanchaveli Institute of Plant Protection
13.	M.Nodia Institute of Geophysics	27.	Techinform Centre
14.	S Rustaveli Institute of Georgian Literature		

Second group of methods

Expert interviews combined with site visits. The experts were chosen by the project management team. They were the following:

1. The heads and staff of successful Georgian R&D institutions:

Gigi Tevzadze - I. Chavchavadze State University.
Merab Tsagareli – Institute of Physiology.
Revaz Adamia – Institute of Bacteriophages.
Nino Partsvania - Institute of Mathematics.
Theodore Dolidze – Georgian National Science Foundation.

2. Members of the Study Tour group to Estonia and Finland, 1-7 November 2006:

Gigi Tevzadze – Rector of the I. Chavchavadze State University.

Nino Partsvania – Acting Director of the A. Razmadze Institute of Mathematics.

Nugzar Ghlonti – Acting Director of the M.Nodia Institute of Geophysics.

Irma Ratiani – Acting Director of the Shota Rustaveli Institute of Georgian Literature.

George Ghvedashvili – Scientist, Department of Natural Sciences, I. Javakhishvili Tbilisi State University.

Archil Motsonelidze – Director of the Georgian National Science Foundation; later Rector of Georgian Technical University, Tbilisi.

Pridon Todua – Vice President of the Georgian Academy of Sciences.

Aleksandre Didebulidze – First Deputy Minister of Education and Science of Georgia.

Archil Samadashvili – Acting Head of the Department of Strategic Planning, Ministry of Education and Science of Georgia.

Third group of methods

Georgian short-term experts who prepared expert reports on the following topics:

Maia Okujava: "Institutional support to improve the use of R&D results in economy - review of legislation".

Shalva Machavariani: "Analysis of Existing Georgian Key Technologies and Innovation Experience; Readiness of Georgian Business Community and Industry to Participate in the Commercialization of the R&D Outcomes".

David Gabunia: "Intellectual property rights protection in Georgia".

Givi Kochoradze: "Georgian international cooperation in R&D".

Fourth group of methods

Estonian short-term experts who participated in workshops held in Georgia and provided feedback to the project management team in their reports:

Rein Vaikmäe – Vice-Rector for Research, Tallinn University of Technology.

Volli Kalm – University of Tartu, chairperson of Estonian Higher Education Quality Evaluation Council, member of Estonian Research Council.

Kristjan Haller - Deputy Secretary General for Higher Education and Research of the Estonian Ministry of Education and Research.

Peeter Saari – University of Tartu, former Chairperson of Estonian Science Foundation.

Firth group of methods

Feedback, comments and suggestions made by the project Steering Committee members:

Aleksander Lomaia - Minister of Education and Science of Georgia

Kakha Bendukidze - State Minister on Economic Reforms of Georgia

Archil Motsonelidze - Director of the Georgian National Science Foundation

Pridon Todua - Vice President of the Georgian Academy of Sciences

Gigi Tevzadze - Rector of the I. Chavchavadze State University

George Khubua - Rector of the I. Javakhishvili Tbilisi State University

Ramaz Chikhladze - Professor of Tbilisi State Medical University, Director of the Research Institute of TSMU

Revaz Makharoblidze - Professor of the Georgian State University of Agriculture

Sergo Esadze - Professor of the Georgian Technical University

Lasha Papashvili - President of the Bank Republic

Introduction: Georgian R&D policy context

As a result of a many-sided analysis of the situation in the area of research and development (R&D) and higher education (HE) in Georgia, as well as its management, a number of conclusions were drawn that underlie the present recommendations.

Serious changes have taken place in R&D and HE legislation, structure of the universities and R&D institutions and their financing in Georgia over the last 2-3 years. The time for such radical changes has been rather short. Georgian research community has formed its quite clear understanding on the outcomes of the reforms carried out and on the integration of Georgian science with world scientific community. The situation in research, its current status and the status of researcher in society are characteristics of current controversial attitudes.

The respondents assessed the changes in the share of Georgian R&D. A majority of them (68%) considered positive the increased opportunities for international cooperation. About one third (36%) positively noted the increase of support to R&D activities from different sources. The activities of Georgian National Science Foundation (GNSF) were also noted as a positive development. Thus, the respondents expressed a restrained optimism about the changes that have taken place so far. At the same time it must be noted that the degree of positive changes is quite low yet, and many-sided efforts are required in order to make the R&D activities the leading and especially influential factor in economy and society.

The negative outcomes of reorganisation have been especially noticeable in:

- Outflow of qualified personnel from R&D and HE.
- Decline of the status of intellectual labour and its social importance.
- Forming of negative public opinion about the image of research.

Thus it was confirmed that the social outcomes of the reforms have had serious impact on the status and image of researchers, their outflow from R&D is connected not with the attempt to increase the qualification but is a means of obtaining a better income.

Using the respondents' answers, a SWOT analysis of the Georgian R&D policy system was carried out.

The **strengths** of the present system that have to be taken into account in its further elaboration are:

1. Determination to carry out the reorganisation of the R&D institutes, desire for changes (desire for *positive changes*).
2. The competitive system of delivering state support for research.
3. Establishment of the Georgian GNSF and the grant system of financing research.

The **weaknesses** that have to be considered are as follows:

1. Unclear formulation of the objectives and stages of the R&D reform.
2. No priorities in the development of research have been set.

3. Insufficient coordination of the reform process by the Ministry of Education and Science, complicated relationships between MES and the R&D institutes.
4. Low level of involvement of the research community in the reorganisation of the R&D institutions.
5. Underdeveloped R&D infrastructure (libraries, ICT).
6. Outdated material base and its maintenance problems, lower level of scientific experiments.
7. Research is unattractive for the young.
8. Low salaries, absence of material incentives for research work.
9. Non-transparent peer-review process, underdeveloped grant system and methods of grant proposal evaluation.

The main **opportunities** pointed out were:

1. Creation of a diversified portfolio of R&D financing.
2. Increasing the coordinating role of the Ministry of Education and Research and the Academy of Sciences.
3. The existing research potential of the qualified personnel.
4. Development of the system of research managers.

The main **threats** indicated were:

1. Low level of (private business) sponsored activities.
2. Eradication of the R&D-related information monitoring.
3. Planned separation of the R&D institutes from their experimental bases.
4. Lowering of the status of research.
5. Underestimation of the role of science in forming a full-fledged society.

The analysis demonstrated that the number of issues demanding an urgent solution is very wide. Generalising the issues we can say that the most imminent groups of problems demanding attention are the following:

1. Strengthening the material and technical basis of universities and R&D institutions.
2. Integration of academic research and higher education.
3. Cooperation of researchers, support to researcher mobility.
4. Support to access of R&D information by HEIS and R&D institutions.
5. Increase of salaries.
6. Increasing the financing of R&D institutions, support for human resource development.
7. Forming the national system of grants and scholarships and foundations and agencies delivering them.
8. Development of new branches of research important for Georgian economy, setting up of targeted programmes.
9. Commercialization of research outcomes.

The main aspects that should be borne in mind in the further development of the R&D policy system in Georgia include the following:

1. Integration of Georgian science with world science.
2. Rejection of politicised solutions when dealing with basic and applied research.
3. Support to research by the state.

4. The presence of an overall concept of the development of Georgian science.
5. Consideration of national research traditions and national values that have a potential for future development, development of R&D institutions that can provide support and strengthen Georgian economy, defining research priorities.
6. Integration of research in universities and R&D institutes.
7. Providing stimuli for the priority research fields.
8. Increasing the role of applied research, involving representative of applied research as national experts in certain fields (e.g. food industry).
9. Commercialisation of research outcomes, taking into account the interests of both outcome providers and outcome users.
10. Setting up a system to attract and retain young researchers.
11. Building flexibility in the system, taking into account the feedback from participants and the results of monitoring. Regular evaluation of the efficiency of the system.
12. On the executive level at R&D institutions, a clear demarcation of administrative and scientific functions would be desirable.

Depending on the dedication of the Georgian government to pursue the set R&D policy objectives, to obtain a wide support from all the stakeholders involved in implementing these objectives, three possible scenarios may be foreseen over the coming 10-15 years. Which of them will materialize will finally depend on the Georgian R&D policy makers and the Georgian research community.

Scenario 1 – business as usual future

Research and technological development (RTD) has moved up the agenda of national development and the government has the R&D and innovation strategies in place. RTD priorities are clearly identified but their implementation is sporadic and based mainly upon shifts in emphasis within existing institutional structures. Project-based competitive funding has been introduced and is now widely accepted as a part of the RTD funding landscape but still accounts for too small a share of the total expenditure. Subsequently, efforts to restructure the research system to take on board the new priorities are not given sufficient support or resources, slowing down the transition process. As a result, new research areas in general remain at a sub-critical level though a few teams succeeded in creating an international profile. To complicate matters, most national firms show little interest in engaging with the science base and instead prefer to source their technology off-the-shelf from abroad. The linkage of science to innovation therefore still remains rather weak.

Scenario 2 – things that could go wrong

Research and technological development (RTD) is not viewed as a national priority for development but rather as a hangover from the past and of little relevance to today – it is an expense that can no longer be afforded. Government shows little interest in seriously pursuing innovation strategies, preferring instead to focus economic development measures upon maximising the returns from resource extraction, a cheap labour force, and deregulated business environments. National firms avoid any form of the technology except that embodied in imported equipment, thereby providing little demand for the

products of local RTD activities. Foreign firms quickly exhaust the supply of those national scientific resources of use to industry, since these are not being renewed.

Scenario 3- potential changes in direction

National priorities for research and technological development (RTD) have been set as part of a national innovation strategy, and these are regularly reviewed to take account of emerging developments. Importantly, the corresponding budget for competitive funding is attached to national RTD priorities. Some major institutional changes have occurred: many of the institutions that were still in place in 2005 have since been shut down or merged into more efficient centres. These new centres must demonstrate a useful purpose and they depend upon competitive public and private funding for roughly half of their income. The other half is provided by the government and is used to maintain research capacity in the centres. As science comes to be seen as more and more useful, so the state budget allocation increases. Many countries look to Georgia for scientific cooperation. The state puts systems in place to attract and manage this influx of resources for RTD, building cooperation strategies with investors and ensuring that conditions are maintained for the renewal of capacity that has initially attracted foreign investment.

Creating an effective model of science administration: R&D policy governance - levels, stakeholders and outcomes

A country's research and development as well as innovation activities (henceforth R&D&I) and the ensuing R&D policy system involve different activity levels with corresponding stakeholders, different activity outcomes and time perspectives.

The highest activity level is the national **high-level cross-cutting policy design or making** carried out by **the Parliament, Government and R&D or S&T (Science and Technology) policy councils.** This activity results in **legislative acts and long-term strategies** having in mind a **long-term perspective (5-10 years).**

The second level of activities is that of **programme design and financing** implemented by **ministries, research councils, and national academies of sciences.** This level of activity produces **national R&D or S&T programmes, various grant programmes,** as well as **R&D&I support programmes,** and is designed for **mid-term perspective (3-5 years).**

The third level activities involve **programme administration and implementation** which have been set on the second level and carried out by **R&D&I promoting and supporting organisations and agencies, Science Foundations, and other similar bodies.** The outcomes on this level involve programme **implementation, monitoring and evaluation plans and reports,** set in **mid-term perspective (3-5 years**).

The fourth level of activities deals with **project preparation and implementation** by the R&D&I end-users – **higher education institutions, public and private R&D organisations, industry and private business companies**, usually set in **short to mid-term perspectives (1-3 years).**

In the presentation of our recommendations we shall follow this structure presenting for each set of recommendations the level of activity it has to be carried out, the stakeholders involved, and the time line for implementing the suggested recommendations.

Part 1. Reorganizing the public R&D system

The main challenges and issues for the R&D policy during the transformation process in Georgia concern at least the following issues:

- a redefinition of the role of the state in the R&D process, reforming the research governance and funding systems, the integration of research and higher education;
- human resource management and research career;
- building linkages between research and industry;
- the role of science in a changing society.

1.1. Steering of the R&D policy

General remarks

As pointed out in the EC communication **"Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines 2007-2013",** COM (2005) 0299, strengthening institutional capacities and governance where they are considered to be weak should be a key priority in less developed regions. Economic competitiveness and a stronger civil society depend not only on effective infrastructure networks, but also on the non-discriminatory, predictable and transparent enforcement of the law; the assignment and enforcement of tradable property rights, including intellectual property rights; an open public procurement system; and an administration which minimises the administrative burden on economic operators.

A typical R&D strategy for a country should involve at least the following keywords: governmental aims and initiatives, research for prosperity and welfare, quality in research is to be promoted and rewarded, international research co-operation, education and research, freedom and responsibility in research, structures and systems, funding targets and monitoring, evaluation. It means that the role of the Government as an investor, a catalyst, and a regulator should be clearly defined.

As an **investo**r, the Government must plan to invest more into the education and S&T, including basic and applied research and support to the infrastructure. As a **catalyst**, the Government must work out strategic plans for education, has to support collaboration between the various R&D actors, and must create favourable conditions (including taxation) for the private sector to use new knowledge for innovation. As a **regulator**, the Government must create and support a system for applied research and innovation, has to create and fund national programmes for supporting the key areas of R&D.

Current situation

The current situation in Georgia concerning the R&D policy system reorganisation can be characterized as very complex and contradictory at times but the R&D and HE institutions have realised a necessity of change, have understood the need to reorganise their activities and adapt to the new socio-economic situation. The research community has already elaborated their attitude towards the restructuring of the R&D system in Georgia as clearly demonstrated in the Assessment Report of Georgian R&D policy system carried out by the project.

Georgian research community has undergone serious quantitative and qualitative changes. These changes indicate that serious steps have to be taken in the personnel policy of the HEIs and R&D institutes – this policy must be based on the strategy of maintaining the existing R&D potential of the country and improving the professional status of researcher in Georgia.

The decline of the R&D system of the transition years has become only partially recovered in recent years, as a result of policy initiatives and increase in the public funding for R&D starting from 2003. Nevertheless, the system records low performance scores in terms of most R&D&I indicators and the gap to EU-27 member states is still significant in many respects.

A major characteristic of the current situation is that even after several years of reorganisation and reforms, the R&D policy debate is to a large extent still missing, quite similar to a missing innovation policy debate, and that no official R&D policy has yet been articulated. There is no concrete body that could determine the priorities of scientific and technological policy for the country. It may be summarized by saying that in developing the R&D in Georgia, tactics have so far replaced a clearly defined strategy.

In 2005, the total financing of R&D in Georgia was equal to 23.2 million GEL, or about 10.5 million euro which was 0.2% of the country's nominal GDP (compared to Estonia's 0.91% of GDP in 2004, and Finland's 3.51% or Sweden's 3.74% the same year). Finnish R&D investment in 2006 stood at a total of 5.7 billion euros. Enterprises in Finland accounted for 4 billion euros of the total sum, i.e. 70.7%, while public sector R&D spending totalled 566 million euros (9.9%).

The R&D&I activities in Georgia are regulated by 2 legal acts: "Law on Science and Technologies and their Development", and the "Law of Georgia on Higher Education". The Intellectual Property protection system effective at present in Georgia comprises all the elements necessary for its functioning. Georgia is also a party to all the main international agreements concerning IPR. Intellectual property occupies a significant place in the Partnership and Cooperation Agreement between Georgia and the European Union. Thus, despite a certain discord between separate legal acts, a favourable legal framework for successful development of R&D&I is being created.

The R&D infrastructure in Georgia is poorly developed, the number of well-equipped laboratories is not sufficient. Research is not attractive to the young leading to a considerable aging problem for the research system and brain drain.

The number of publications by Georgian researchers in leading international research journals indexed by the ISI Web of Science has increased (from 1216 for the period 1995-1999 to 1781 for the period 2000-2005, or from 240 papers per million population to 380 papers per million population). Nevertheless, this number is smaller than in Armenia (467 for the period 1995-1999 and 827 for the period 2000-2005), Lithuania (573 and 1221, respectively), and considerably smaller than in Estonia (1825 and 3085, respectively).

Recommendations

1. It is highly recommendable that the Government **continue pursuing its active role** of in restructuring and reforming the R&D policy system in the country and to integrate it in the global research community.

Stakeholders: Government, MES, HEIs, public and private R&D organisations.

Outcomes: the restructuring of Georgian R&D policy system has been carried out; the system is stable and sustainable; the Georgian research community is well integrated in the world research community.

Time line: mid to long-term.

2. It is advisable that the restructuring and reforming the R&D policy system in the country be **based on a long-term R&D development strategy** that will set up long-term clearly determined and quantified targets (both aims and funding) and guarantee a balanced development of different research areas, and will be harmonised with the would-be innovation development strategy of the country.

Stakeholders: Government, MES, Ministry of Economic Development, HEIs, public and private R&D organisations, Academy of Sciences, industry and private business organisations.

Outcomes:

- a long-term R&D development strategy has been elaborated, discussed with wide participation of all the stakeholder groups, and formally adopted;
- the strategy contains long-term clearly determined and quantified targets (e.g. Governments R&D spending of the GDP; GERD and BERD share in R&D spending, role of external funding (EU FP7, ERC, international funds), etc.

Time line: mid to long-term.

3. It is recommended to continue efforts for setting up a **well-organised administration of R&D activities** in Georgia that will guarantee setting R&D targets and priorities, will establish mechanisms for strategic allocation of funds and evaluation procedures, and will engage in long-range planning.

Stakeholders: Government, MES, HEIs, public and private R&D organisations, Academy of Sciences, industry and private business organisations.

Outcomes: the R&D administration structure has been discussed with wide participation of all the stakeholder groups and formally set up.

Time line: mid to long-term.

4. It would be necessary to strengthen the effect from **integrating the system of higher education and academic research**, from integrating the potential of HEIs and R&D by optimizing their functions and infrastructure use.

Stakeholders: Government, MES, HEIs, public and private R&D organisations, Academy of Sciences.

Outcomes: the integration of the higher education and academic research systems has been completed.

Time line: mid to long-term.

5. It is necessary to **make full use of the EU 7th framework programme and the European Neighbourhood Policy instruments** for the R&D capacity building in Georgia.

Stakeholders: Government, MES, HEIs, public and private R&D organisations.

Outcomes: the participation of Georgian researchers and research groups in FP7 has increased (both in number and volume of financing); ENPI are fully used for the benefit of Georgian R&D.

Time line: mid to long-term.

1.2. Legislative issues

Current situation

The R&D&I activities in Georgia are regulated by 2 legal acts: "Law on Science and Technologies and their Development" (LSTD), and the "Law of Georgia on Higher Education" (LGHE). The Intellectual Property protection system effective at present in Georgia comprises all the elements necessary for its functioning. Georgia is also a party to all the main international agreements concerning IPR. Intellectual property occupies a significant place in the Partnership and Cooperation Agreement between Georgia and the European Union. Thus, despite certain discord between separate legal acts, a favourable legal framework for successful development of R&D&I is being created.

Georgian law of November 22, 1994 number 603 "**On science, technologies and their development"** represents the legal base of the state policy in the areas of intellectual and technological progress. LSTD defines the basic goals and principles of the state policy in the sphere of science and technologies, the powers of the legislative and executive branches of the state power in carrying out such policy, the creative freedom and responsibility of a scientist, the legal rules and guarantees of activity. The State recognizes that the growth of science funding is its duty. Part II of LSTD fixes the participation of the state in the development of science and technologies: Article 13 foresees determination of state R&D priorities, article 14. provides for the implementation of state scientific and technological programs (projects); article 15^1 lays the foundation for setting up legal entities of public law – science foundations; and article 18 sets requirements for the protection of intellectual and industrial property.

On the basis of a comparative analysis of the legislative basis of R&D sector in Georgia with several other economically well-developing countries the following conclusions can be made:

- the development of the R&D strategic plan and the definition of priorities for development of this area are very important for the further development of a science and technologies in Georgia;
- the law of Georgia on " Science, Technologies and their Development " reflects the main endeavours connected with various directions of development of this area though in some cases it would be expedient to give more wide and exact definitions which should either be reflected in the Law or might be enforced by extra regulative acts;
- within the process of maintaining and making decisions concerning cooperation among the R&D governing structures, R&D sector, higher education, business and other interested organisations and to take into consideration points of view of all sides concerned, it is very interesting to reflect on the experience of R&D/S&T councils in various countries;.
- with the purpose of re-structuring of R&D institutions, optimization of functions and infrastructure, it is possible to carry out such activities as the optimization of

the funding system and the involvement, together with the Ministry of Education and Science, of those Ministries whose area also involves R&D, in the overall process of R&D management in Georgia.

- for involvement of young specialists into research activities it is very important to draw together research and higher education areas, to create new places for master and doctoral candidates, to increase possible sources of funding for master and doctoral candidates, to provide profitable conditions for post-doctoral students, to improve considerably the material and social welfare, to maintain the mobility, to establish research centres of excellence, etc.
- the innovation policy should be directed at the decision of such issues as the creation of the management system of innovative culture and activities, realization of regional and specialized innovative programs, creating different instruments for financing innovative projects, including venture and risk capital funds, etc.
- the current Law is also rather vague on the precise procedural issues related to the activities of the National Academy of Sciences. These issues will hopefully be dealt with in the law on Georgian National Academy of Science currently under preparation. .

Recommendations

1. It is advisable to continue further **elaboration of the legislation basis for the research and higher education** system in Georgia and to **harmonize it with the innovation-related legislation** in order to support the quality of research and commercialisation of research outcomes.

Stakeholders: Government, MES, Ministry of Economic development, HEIs, R&D institutions.

Outcomes: the legislation has been elaborated and adopted; the discrepancies between different legislative acts have been removed.

Time line: mid-term.

2. It is recommendable that the legislative acts **provide a clear outline of the emerging R&D policy structure of the country and the respective R&D funding mechanisms**.

Stakeholders: Government, MES, Ministry of Economic Development, Academy of Sciences, HEIs, R&D institutions.

Outcomes: the R&D management structure of the country has been discussed, agreed upon and the corresponding legislative acts have been adopted; the R&D and knowledge transfer funding mechanisms are in place.

Time line: mid-term.

3. It is recommendable that other ministries in addition to the Ministry of Education and Science, primarily the Ministry of Economic Affairs responsible for applied industry-related research and commercialisation of research outcomes, **will be involved in the research coordination and regulation system**, and that the corresponding coordinating high-level bodies will be set up.

Stakeholders: Government, MES, Ministry of Economic Development, Academy of Sciences.

Outcomes: a high-level governmental research advisory and coordination body has been set up.

Time line: short to mid-term.

1.3. Institutional management of R&D

Current situation

Like in most post-Soviet regime countries, the reorganization of the practically unlinked and separate university and academy of science research systems is complicated, especially considering the low level of funding. While planning their research, not all research leaders pay enough attention to two important aspects – the amount of the available finances (that determines the limits for the idealistic plans), and the need to set and follow priorities. Some research institutions outside of universities want to retain or obtain the right to award independent academic degrees, or even build their own parallel (partial) HE institutions, instead of joining their resources and efforts toward a common system.

Since 2003, the number of scientific research institutions has decreased 17% (from 120 in 2003 to 99 in 2005), and the number of scientific personnel 43% (from 16062 in 2003 to 9186 in 2005). At the same time the percentage of personnel with scientific degrees has increased considerably (from 46.4% in 2003 to 64.1% in 2005) which testifies to a strong Georgian human potential in research.

The Georgian National Science Foundation (GNSF), a Public Legal Entity, was established by the Presidential Decree number 653 in July 17, 2005. In 2006 GNSF funded 113 projects with an overall budget 11.13 million GEL (around 5 million euro).

Georgian Academy of Sciences in 2004 had 130 members, among them 66 academicians and 64 corresponding members.

Recommendations

1. For the coordination of the university and enterprise-oriented research system, as well as for the implementation of R&D and innovation strategies and setting R&D and innovation priorities, it would be advisable to consider **creating a top-level R&D policy advisory and co-ordination body** in Georgia.

Stakeholders: Government, MES, Ministry of Economic Development, Academy of Sciences, HEIs, R&D institutions, industrial and private business associations.

Outcomes: a high-level governmental R&D advisory and coordination body has been set up to implement at least the following functions:

- following international developments in research and technology
- addressing major matters relating to science and technology policy and preparing plans and proposals concerning them for the Government;
- addressing the overall development of scientific research and researcher training;
- addressing the development and utilization of technology and technology impact analysis;

- addressing important matters relating to international science and technology cooperation;
- addressing the development and allocation of public research and innovation funding;
- addressing important legislative questions concerning research, technology and scientific education.

Time line: short to mid-term.

2. It would be necessary to define the **new role and functions of the Georgian Academy of Sciences** relative to the other stakeholders in the overall R&D system in the law on Georgian National Academy of Science currently under preparation.

Stakeholders: Government, MES, Academy of Sciences, HEIs, R&D institutions.

Outcomes: the law has been drawn, discussed with the widest participation of the Georgian research community, and formally adopted; the role and functions of the Academy are clearly specified.

Time line: short to mid-term.

3. It would be advisable to continue implementing the provisions of the Law of Georgia on "Science, technologies and their development", Art 15^1 (Legal entities of public law – science foundations) and duly consider the need for **other science foundations provided in that article** and other instruments (e.g. national research programmes) that should function on the principles of on open competition, international peer review, scientific excellence and innovation.

Stakeholders: Government, MES, Academy of Sciences, HEIs, R&D institutions.

Outcomes: in addition to the GNSF, several other science and innovation foundations and/or agencies have been set up and are sustainable.

Time line: short to mid-term.

4. It is necessary to bear in mind that high-quality research merits special additional support. Therefore it would be advisable to **launch preparatory activities for establishing a Georgian Centres of Excellence in Research Programme.**

Stakeholders: Government, MES, Academy of Sciences, HEIs, R&D institutions.

Outcomes: the programme has been drawn, discussed with the widest participation of the Georgian research community and formally adopted; the necessary preparatory activities including the international evaluation of Georgian research have been carried out.

Time line: mid-term.

5. It would be advisable to consider establishing **regional knowledge transfer and commercialisation support structures**, and encourage setting up such **support structures in HEIs and R&D institutions.**

Stakeholders: Government, MES, Ministry of Economic Development, HEIs, R&D institutions, regional and local authorities.

Outcomes: the institutional structure of the innovation support structure in the country has been discussed with the participation of all the relevant stakeholders; the respective legislative acts have been adopted and funding provided.

Time line: short to mid-term.

6. The integration of research and higher education and the acquisition of new functions by universities will also set additional requirements to them in **adjusting their institutional structure to meet these new challenges.**

Stakeholders: MES, universities and R&D institutions.

Outcomes: the institutional structure of universities has been discussed, tailored in accordance with the new challenges and formally adopted.

Time line: mid-term.

1.4. R&D funding

General remarks

OECD has noted that recent years have seen an increasing number of national and regional governments establish explicit targets for levels of R&D spending. These targets are often expressed as a goal of increasing gross expenditures on R&D (GERD) to a specified level of GDP (i.e. **R&D intensity**) by a specified year, or as achieving a **specific ranking** among the OECD countries in R&D intensity. Such targets reflect the growing recognition of the linkages among R&D, innovation and economic growth and more widespread attempts to use science and technology policy (*e.g.* R&D funding policy) to meet economic objectives. Increased levels of R&D funding are viewed as an input to an innovation process that will improve economic performance, boost productivity and result in increased wages and standards of living. It has also been shown that high levels of R&D funding – and significant increases in R&D funding – are as much the end result of significant economic and policy restructuring as they are drivers of subsequent improvement in economic performance.

In the report **National Strategies of Research in Smaller European Countries,** 2002 by ALLEA, the European Federation of National Academies of Sciences and Humanities, it is stated that **„**The consolidation of national S&T strengths and the strengthening of a proper funding system for R&D is of primary importance for meeting national needs and for meeting the goal of a European research area". The report especially points out that **funding of national R&D at less than 1% of GDP can not influence the country's economy.**

Current situation

The decline of the R&D system of the transition years in Georgia has become only partially recovered in recent years, as a result of policy initiatives and increase in the public funding for R&D starting from 2003. Therefore, the system records low performance scores in terms of most R&D&I indicators and the gap to EU-27 member states is still significant in many respects.

In 2005, the total financing of research and development in Georgia was equal to 23.2 million GEL, or about 10.5 million euro which was 0.2% of the country's nominal GDP (compared to Estonia's 0.91% of GDP in 2004, and Finland's 3.51% or Sweden's 3.74% the same year). Until 2006, the bulk of research financing was channelled via Georgian National Academy of Sciences, starting from 2006 via the Ministry of Education and Research. MES provides the targeted financing of research. The fluctuations in the volume of research financing indicated by the respondents in the Assessment Report testify to the instability of this financing over the last years.

Research grants obtained from various international foundations or grant programmes, mostly from INTAS, ISTC, STCU, NATO, CRDF, GRDF, OSGF, EU framework programmes, have played a significant role in research funding of Georgian R&D institutions. 65% of the organisations interviewed indicated that research grants are a major income for their research funding.

Private business investments, either from Georgia or from abroad, currently do not constitute any significant source of research funding, which adds to the difficulties of obtaining financed for supporting research activities in the country. Neither is there any dedicated financing stream for innovation and knowledge transfer activities.

The situation is made even more complex by the lack of competent research managers, lack of necessary coordination of reforms between MES and R&D institutions, alleged non-transparent review procedures and grant administration system at the Georgian National Science Foundation. GNSF, a legal public body, was established on the basis of order of the President number 653 from 17 July 2005. The goal of GNSF is to allocate funding of research projects through state grants. The first grant competition was held in 2006, in the basis of which GNSF financed 113 scientific projects to the total amount of 11 129 721 GEL, or about 5 million euro. In 2006, GNSF delivered state science grants, travel grants (35,000 euro) and presidential grants for young scientists. Though the calls for equipment purchase grants and library grants were announced but these grants will be first time delivered in 2007.

Recommendations

1. In any funding policy initiative it would be advisable to consider the **criteria that will guide decisions** about how and to whom resources will be allocated – either fostering excellence through peer review and accountability; addressing national needs (for application to current challenges; for innovation and technology transfer; for capacity building, etc.), or addressing the feasibility of knowledge production; application and dissemination.

Stakeholders: Parliament, Government, MES, GNSF.

Outcomes: a long-term R&D funding strategy geared to the R&D as well as to the innovation development strategy has been elaborated, adopted and implemented.

Time line: long-term.

2. To increase the fairness and diversity of funding, it would be recommended to **diversify the portfolio of funding instruments.**

Stakeholders: Parliament, Government, MES, Ministry of Economic Development.

Outcomes: new funding instruments related to national research programmes, centres of excellence, R&D institutions' base-line funding, research infrastructure maintenance, knowledge transfer and commercialisation of research outcomes, etc have been introduced.

Time line: short to mid-term.

3. It would be highly advisable to introduce **special measures for supporting young talented scientists** (for example, first grant funding, post-doctoral fellowships, international mobility grants, etc.)

Stakeholders: Government, MES, GNSF, HEIs and R&D institutions.

Outcomes: special measures for supporting young talented scientists have been introduced.

Time line: short to mid-term.

4. In order to encourage participation of Georgian researchers in EU 7th framework programme, it would be advisable to **set up "matching funding"** for retained Georgian projects.

Stakeholders: Government, MES, universities and R&D institutions.

Outcomes: legislative acts, long-term strategies.

Time line: short –to long-term.

1.5. Research infrastructure

Current situation

The general dearth of funds for research activity, other than for salaries within the science sector has led to a gradual reduction in the availability of suitable and effective research equipment. The lack of top equipment is one the reasons why Georgian researchers can only be "minor partners" in EU projects.

The lack of appropriate research infrastructure is also a link to the problem of "brain drain": it is often the better facilities and better equipment abroad which attracts young Georgian scientist.

The Georgian National Science Foundation runs a special programme on equipment purchase grants and announced the first the calls in 2006 but the grants will be first time available from 2007. Launching this programme demonstrates that the Ministry for Education and Science understands the importance of this issue for the future of Georgian R&D activities but such calls should become annual together with a substantial increase in the programme financial volume.

Recommendations

1. It would be advisable to continue supporting the **equipment purchase grants programme at GNSF** by substantially increasing the programme's financing volume, and set the financing target indicators for the next 3-5 years.

Stakeholders: Government, MES, GNSF, HEIs, R&D institutions.

Outcomes: equipment purchase grants programme financing plan.

Time line: short to mid-term.

2. It would be highly recommendable to make full use of the **EU framework 7 and the European Neighbourhood Policy Instruments** for different capacity building activities, e.g. actions to promote the establishment of research infrastructures such as ENP support of a full connection to EU's GEANT research and education network and for its administration.

Stakeholders: Government, MES, HEIs and R&D institutions.

Outcomes: a full connection to the GEANT network has been made; a national organisation for its administration and management has been set up.

Time line: short to mid-term.

3. It is advisable to make use of the EU 7th framework programme and the European Neighbourhood Policy instruments for "survival actions", e.g. to **ensure the survival of the remaining international standing laboratories** (R&D facilities) till a normal social and economic context is restored.

Stakeholders: Government, MES, Academy of Sciences.

Outcomes: a priority list of international standing laboratories (R&D facilities) is compiled and approved; applications for ENP support are prepared.

Time line: short to mid-term.

4. It would be advisable to consider developing **interregional sharing of medium research facilities** with neighbouring countries and combining their use for education and innovation activities.

Stakeholders: MES, GNSF, universities and R&D institutes.

Outcomes: agreements for interregional sharing of medium research facilities with neighbouring countries have been negotiated and signed.

Time line: mid-term.

5. In close connection with the diversification of the portfolio of financing instruments to be introduced (c.f. p 1.4.2 R&D funding), it would be advisable to introduce **a formula-based financing mechanism to cover the maintenance expenses of R&D institutions' buildings**.

Stakeholders: MES, universities and R&D institutes.

Outcomes: the financing mechanism to cover the maintenance expenses of R&D institutions' buildings has been elaborated and adopted.

Time line: short to mid-term.

6. In optimising the structure of Georgian R&D institutions due attention should be paid to the **buildings and real estate becoming vacant after institutional mergers**. A clear-cut plan for the future actions concerning these assets elaborated with a full participation of the management of the R&D institutions would be of great assistance in this process.

Stakeholders: MES, universities and R&D institutes.

Outcomes: a plan for the future actions concerning the buildings and real estate of merging R&D institutions has been elaborated and implemented.

Time line: mid to long-term.

7. It is recommended that all the R&D institutions elaborate a long-term **plan for improving their R&D infrastructure** deriving from the institution's strategic development plan and involving all the elements of the R&D infrastructure (buildings, teaching and laboratory facilities, ICT, information support, etc) as well as the possible cost-reduction measures.

Stakeholders: MES, universities and R&D institutes.

Outcomes: a plan for the R&D infrastructure improvement measures has been drawn, discussed, formally approved and implemented at R&D institutions.

Time line: short to mid-term.

8. Considering a special importance of information support to the overall sector development with reference to research quality, monitoring of research output, commercialization, research portal development, etc., it is highly recommended to elaborate the information support improvement plan, using the experience of already existing organisations in this sector.

Stakeholders: MES, universities and R&D institutes.

Outcomes: a plan for the improvement of information support measures has been drawn, discussed, formally approved and implemented.

Time line: short to mid-term.

1.6. Quality assurance

Current situation

It is commendable how much attention has been paid to the quality assurance and diploma recognition issues in Georgia since the very beginning of the reforms, but these issues still remain to be the problems that prevent the achievement of quicker success in research reform.

Internationally, research funding evaluation organisations and agencies mostly use either one-step and/or two-step external review practices to guarantee the transparency of the review process (see, for example the practices applied by 13 different research funding agencies in the Baltic Sea region: Guidelines for a common evaluation scheme for a Joint Baltic Research Programme. BONUS publication 4, 2004, http://www.balticsearesearch.net/uploads/4gybgd.pdf).

In developed countries, there exist different types of scientific umbrella organisations representing various types of associations and interest groups. These associations do not have a formal role in the governance of the research system but, rather, represent certain stakeholder groups influenced by research policy (for example, councils/conferences of university rectors, unions of researchers and academics, chambers of trade and industry, etc). The impact of these organisations on research policy may vary but they are an important forum for R&D policy discussions and are quite often consulted in the process of important R&D policy decisions.

Recommendations

1. In order to elaborate the Georgian national R&D strategy, to continue optimising the system of R&D institutions in the country as well as to set preconditions for the future national Centres of Excellence programme, it would be recommended to **carry out an international evaluation of research at the Georgian R&D institutions.**

Stakeholders: MES, Academy of Sciences, universities and R&D institutions.

Outcomes:

- The international evaluation of research at Georgian R&D institutions and HEIs has been carried out;
- The peer-review reports have been analysed and discussed by the relevant stakeholders.

Time line: mid-term.

2. It would be advisable to **establish a Georgian national quality assurance agency** proceeding from the principles laid down in the *Standards and Guidelines for Quality Assurance in the European Higher Education Area*, paying special attention to the following aspects:

2.1. Official status of the Agency: it should be formally recognised by competent public authorities in the Georgia as an agency with responsibilities for external quality assurance and should have its **established legal basis** complying with any requirements of the legislative jurisdictions within which they operate.

2.2. The Agency should be **independen**t to the extent both that it will have autonomous responsibility for its operations and that the conclusions and recommendations made in its reports cannot be influenced by third parties such as higher education institutions, ministries or other stakeholders.

2.3. The Agency should have **adequate and proportional resources, both human and financial**, to enable it to organise and run its external quality assurance process(es) in an effective and efficient manner.

2.4. The Agency should **undertake external quality assurance activities** (at institutional or programme level) on a regular basis.

2.5. External quality assurance **criteria, procedures and processes** used by the agency should be **pre-defined and publicly available**. External quality assurance of institutions and/or programmes should be undertaken on a cyclical basis. The **length of the cycle and the review procedures** to be used should be clearly defined and published in advance.

2.6. The Agency should have in place procedures for its **own accountability**.

2.7. The establishment of the Agency should be a **public process** involving all the relevant stakeholders at different levels.

2.8 The Agency should in due course **become member** of the European Register of Quality Assurance Agencies.

Stakeholders: Parliament, MES, HEIs and R&D institutions.

Outcomes: Georgian national quality assurance agency has been set up, is sustainable and functioning according to the European Standards and Guidelines for Quality Assurance.

Time line: mid-term, p. 2.8 – long-term.

3. It would be advisable **t**o continue establishing **European standards for internal quality assurance within higher education institutions** especially bearing in mind the following:

3.1. Higher education institutions should have a **policy and associated procedures** for the assurance of the quality and standards of their programmes and awards; should **develop and implement a strategy** for the continuous enhancement of quality. The strategy, policy and procedures should have a **formal status and be publicly available**. They should also include a **role for students and other stakeholders**.

3.2. Institutions should have **formal mechanisms** for the approval, periodic review and monitoring of their programmes and awards.

3.3. Students should be assessed using **published criteria, regulations and procedures** which are applied consistently.

3.4. **Quality assurance of teaching staff:** the institutions should have ways of satisfying themselves that staff involved in the teaching of students is qualified and competent with regard to teaching.

3.5. Institutions should ensure that they **collect, analyse and use relevant information** for the effective management of their programmes of study and other activities using appropriate information systems.

3.6. Institutions should regularly **publish up-to-date, impartial and objective information**, both quantitative and qualitative, about the programmes and awards they are offering

3.7. **External quality assurance** of institutions and/or programmes should be undertaken on a cyclical basis. The length of the cycle and the review procedures to be used should be clearly defined and published in advance.

Stakeholders: MES, Georgian national quality assurance agency, HEIs and R&D institutions.

Outcomes:

- Quality assurance strategy documents at the HEIs have been elaborated, formally adopted and publicly available.
- Formal quality assurance mechanisms at HEIs have been set up, are sustainable and carry out periodic review and monitoring of their programmes and awards.

Time line: mid-term.

4. It would be recommended to continue further elaboration of the grant award regulations and procedures at the **Georgian National Science Foundation** with a special reference to:

4.1. Adhering to the internationally accepted quality assurance criteria (open competition, international peer review, and scientific excellence).

4.2. Making the grant award procedure more transparent, i.e. making public the formal procedures of decision-making, guidelines for evaluators and lists of referees (e.g. on GNSF homepage).

4.3. Holding regular public meetings with representatives of R&D institutions in order to discuss and clarify issues of mutual interest and obtain feedback on programme call outcomes.

4.4. Establishing GNSF contact points at R&D institutions.

4.5. Continuously updating R&D institutions and the research community about oncoming programme calls.

4.6. Establishing a „help-desk" service at GNSF for assistance in preparing project proposals.

4.7. Using different means to inform the research community and society at large about the GNSF activities (e. g. by means of its annual report, etc.)

Stakeholders: GNSF, R&D institutions.

Outcome: the grant award procedures at Georgian National Science Foundation have become more transparent, the awareness of the research community has increased, and the number of disputed decisions has decreased.

Time line: short to mid-term.

5. It is highly recommendable to purchase for the Georgian research community **access to ISI Web of Science or Elsevier's Scopus** data bases which would not only

foster development of contemporary academic publishing habits and patterns but also is indispensable for project application evaluation process and elections to academic positions, for these procedures to be made as objective as possible.

Stakeholders: GNSF, universities, R&D institutions.

Outcome: the grant award procedures at Georgian National Science Foundation have become more transparent, the assessment quality criteria are uniform across the spectrum of research subjects; uniform criteria can be used for elections to academic positions.

Time line: short-term.

6. In order to **involve all the relevant stakeholders in quality assurance process**, it would be necessary to involve a wider representation of the Georgian research community in this process and increase the role of various scientific umbrella organisations, e.g.:

6.1. By stipulating the role and functions of Georgian Academy of Sciences in the overall quality assurance process.

6.2. Setting up the Council of Georgian university rectors to collectively represent the opinion of all Georgian universities.

6.3. Providing support to setting up professional unions or societies of Georgian researchers and academics.

Stakeholders: Academy of Sciences, HEIs, public and private R&D organisations.
Outcomes: different scientific umbrella organisations have been set up by bottom-up initiatives and are actively involved in elaborating quality assurance problems.
Time line: short to mid-term.

1.7. International cooperation

Current situation

Funding from international R&D support organisations is an additional and very important means for supporting R&D activities in Georgia. At the same time it is quite obvious that this funding line can only be complementary to the national funding of R&D and cannot replace it, considering its limited scope and project-based nature.

As pointed out in the report by G. Kochoradze “Review of Georgian R&D activities in international programmes and projects”, Georgian scientists have more successfully obtained support from foundations which conditionally have an assistance character and support the fundamental research projects targeted at former weapons specialists for conversion of science and technology (International Science and Technology Center (ISTC), Science and Technological Center in Ukraine (STCU), various NATO programmes).

During the activity in Georgia approximately 80 projects were supported by ISTC (joint and partner projects) with the total amount of 26 million USD, STCU has supported about 50 projects in Georgia with a total amount of about 5 million USD until 2007. Through INTAS, about 250 Georgian projects have been supported with total amount of about 4 million euro, including 35 fellowships totalling one million EUR NATO programmes have supported 88 projects in Georgia until 2007 with a total amount of funding about 7.7 million euro.

The United States Civilian Research and Development Foundation (CRDF) has contributed about 4 million USD to the support of Georgian programs, the Georgian Research and Development Foundation (GRDF) has contributed about 2.3 million USD.

In the EU 6th framework programme (2002-2006) Georgian scientific organisations participated in 93 submitted proposals, of which 17 projects were financed (success rate 19%, EC financing sum total exceeding 1.730.000 euro). The success level of proposals submitted to FP6 involving Georgian partners was similar to the average EU participant (20%). But considering only the projects addressing the core 7 thematic sub-programmes, the success rate was down to 11%. The retained Georgian projects were almost exclusively Specific Support Actions and Coordination Actions, i.e. not the cooperative research projects producing new knowledge. It also reflects the fact that most submitted proposals often had modest scientific ambitions.

A positive development for increasing international cooperation is that Georgia has paid its arrears to international scientific programmes and has started co-financing scientific programmes in which it participates.

Recommendations

1. It is recommended that the participation of Georgian R&D institutions in the EU 7th framework programme be fully supported at different levels focusing on the following issues:

a. To support the **strengthening of the national NCP structure** as well as establishing the FP7 support structures at Georgian universities in order to raise the awareness of Georgian researchers about the opportunities provided by this programme;

b. to provide **more training in FP7-related issues** in order to increase the amount of researchers participating in the programme.

Stakeholders: MES, GNSF, HEIs.

Outcomes: national NCPs responsible for the FP7 thematic areas are available and their activities are financially supported; FP7 contact persons are available at all HEIs.

Time line: short to mid-term.

2. It is recommended to support regular cooperative research projects in research fields where research excellence exists in Georgia for increasing the Georgian participation in the mainstream FP7 calls for proposals by introducing the **corresponding incentives** (e. g "matching funds" for successful projects).

Stakeholders: MES, GNSF, HEIs.

Outcomes: the corresponding matching funds have been allocated; Georgian participation in FP7 projects has increased.

Time line: short to mid-term.

3. It is strongly advisable to **introduce special measures for involving more Georgian SMEs** in FP7 and encourage their cooperation with Georgian HEIs for joint participation in EU FP7 and other international projects.

Stakeholders: MES, Ministry of Economic development, GNSF, HEIs, SMEs.

Outcomes: the corresponding funding has been allocated; Georgian participation in FP7 projects has increased.

Time line: short to mid-term.

1.8. R&D&I information monitoring

General remarks

Effective economic and political decision-making depends heavily on the regular supply of reliable information. Statistics are one of the principle sources of such information, providing essential quantitative support to the elaboration and implementation of policies. Statistics are also a powerful tool for communicating with the general public.

The European Commission has over and over again reiterated that there is a need for a sound base of **comparable and policy-relevant data** relating to research in Europe. In particular, it is important to have reliable indicators that can describe the science and technology performances of countries and regions and their dynamics. Indicators are also increasingly used as a starting point for exploring possible areas of best practice in S&T policy.

There are a number of sources of pan-European statistics available which provide information concerning R&D and innovation performance indicators:

1. SCIENCE AND TECHNOLOGY INDICATORS for the EUROPEAN RESEARCH AREA (ERA-STI) published in ERA-STI Key Figures publications. These publications use the following basic R&D indicators:

- Researchers (FTE) per 1000 workforce;
- New S&T PhDs per 1000 population aged 25-34 years;
- Total R&D Expenditure in % of GDP;
- Industry financed R&D as % of industrial output;
- Share of government budget allocated to R&D (GBAORD);
- Share of business budget allocated to R&D (BAORD);
- Share of SMEs in publicly funded R&D executed by the business sector (%);
- Venture capital-investment per 1000 GDP;
- Scientific publications per million population;
- Highly cited publications per million population;
- European patents per million population;
- US patents per million population.

2. The European Innovation Scoreboard provides an overview of Europe's innovation performance, analysing data on 17 indicators in four policy areas:

- Knowledge creation (public and business R&D expenditures, share of med-tech/high-tech R&D, business financed university R&D, science and engineering graduates, population with tertiary education, etc);
- Technology transfer (SMEs innovating in-house, employment in hi-tech services, exports of hi-tech products, sales new-to market products, etc);
- Innovation financing (innovation expenditures, early-stage venture capital, ICT expenditures;
- Innovation outputs (new patents, trademarks, and designs).

3. Eurostat yearbooks, especially their section “Science and technology” providing data collected every year from the national statistical offices. Data on scientific and technical R & D personnel provide indicators for useful international comparisons of

human resources devoted to R & D. Data on employment in high-technology and knowledge-intensive sectors and related derived indicators reflect a country's innovation capacity.

Government budget appropriations or outlays for research and development (GBAORD) are the amount governments allocate towards R & D activities. Comparisons of GBAORD across countries give an impression of the relative importance attached to state-funded R & D. It is also of utmost importance to see the R&D expenditures share by sector (business, government, HE).

Patents reflect part of a country's inventive capacity to exploit knowledge and translate it into potential economic gains. Indicators based on patent statistics are widely used as a measure of R&D output and serve to assess the inventive performance of countries, regions or industries.

Current situation

Current statistical information standards provide no possibility to define Georgia's innovation situation according to the EU standards. The European Commission is currently supporting 2 projects targeted specifically at strengthening the capacities of the Georgian Department of Statistics: "Reform of Official Statistics – Statistics 8" – to develop an official statistical system able to provide data meeting EU and international standards; "Supply of IT equipment for the National Statistical Committees – Statistics 8" aims to provide adequate IT infrastructure to the national statistics committees.

At the same time it is quite evident that in order to improve the country's R&D policy system and to gear it to the needs of the innovation process, there is an urgent need for various other R&D-related data than currently provided by the Department of Statistics that would be consistent, reliable and also harmonised to the EU standards. These data shall serve as an input for future decision-making and policy forming in R&D as well as in higher education sectors for various stakeholder groups, including MES, other ministries, GNSF, universities and other R&D institutions as well as Georgian private business organisations.

Recommendations

1. For elaborating a strategy for R&D policy management, and even more for its implementation and evaluation of the outcomes it is necessary to **carry out a complex analysis of the current situation concerning the Georgian R&D and knowledge transfer and commercialisation related information management** (data collecting processes and procedures at different levels, institutions involved, data bases and collections available, reporting routines, etc).

Stakeholders: Government, MES, Ministry of Economic Development, Academy of Sciences, GNSF, HEIs, R&D institutes and organisations, industry and private business.

Outcomes: the analysis has been done and the data flow chart has been compiled.

Time line: short to mid-term.

2. Based on the analysis indicated in p1, a **system of constant monitoring** of the situation in the country's R&D activities harmonized to EU standards should be

established, including the adoption of corresponding legislative acts and allocation of targeted financial support.

Stakeholders: Government, MES, Ministry of Economic Development, Academy of Sciences, GNSF, HEIs, R&D institutes and organisations, industry and private business.

Outcomes: the monitoring system has been established and harmonised to the EU standards, the necessary legal acts have been adopted, and the financial allocations have been introduced.

The monitoring system should enable collect data at least about the following S&T indicators harmonized to the EU standards:

- Share of R&D expenditure in % of GDP (total and by sectors);
- The trends, dynamics and structure of R&D personnel in HEIs, R&D institutes and in business sector;
- Patent applications submitted and patents obtained (domestic and abroad);
- Share of use of ICT in R&D institutions, application of new ICT solutions;
- Selective support of S&T by the number of implemented long-term national targeted programmes;
- Share of business expenditure in % of GDP (total and by sectors);
- Share of innovative enterprises (from the total number as well as from the total number enterprises in a sector);
- Structure of innovation expenditure in industry and private business according to the type of innovation activity (R&D, investments in R&D infrastructure, expenditure on new equipment and machinery, obtaining new technologies, marketing, personnel development, etc.);
- Number of research papers published in international leading peer-reviewed journals;
- Number of research-active people and their share per 1000 labour force (FTE);
- New S&T PhDs per 1000 population aged 25-34 years.

3. It is recommended to continue efforts to fully implement the requirement of the "Law of Georgia on science, technologies and their development ", Art 5^1 clause i) so that the Government submit to the President of Georgia an **annual report on the scientific and technological development of the country**. It would also be advisable to introduce a mechanism of public discussion of that report by the Georgian R&D community.

Stakeholders: Government, MES, Academy of Sciences, GNSF, HEIs, R&D institutes and organisations, non-governmental associations of scientists.

Outcomes: a unified annual report is compiled, presented and publicly discussed with the widest participatory approach.

Time line: short to mid-term.

4. Research output needs to be much better quantified and assessed according to international standards. It is highly recommendable to purchase for the Georgian research community **access to ISI Web of Science or Elsevier's Scopus** data bases. .

Stakeholders: MES, GNSF, HEIs and R&D institutes.

Outcomes: access to these databases is available; the quantitative information is used for application evaluation at GNSF and other funding organisations; the quantitative information is used for academic competitions in all Georgian HEIs; this information is

reflected in the annual report on the scientific and technological development of the country.

Time line: mid-term.

5. It would be recommendable to make steps towards **creating an electronic national research portal** in order to increase the international visibility of Georgian research activities, research products and researchers, and provide both domestic and international stakeholder groups access to relevant R&D-related information and data. In the long-run this portal could be used for submitting grant applications for R&D funding bodies as well.

Stakeholders: MES, GNSF, HEIs, R&D institutes and organisations, private business.

Outcomes: the electronic portal has been created and is sustainable; the international visibility of Georgian research community has increased; electronic grant submission contributes to the transparency of activities of public grant funding bodies.

Time line: mid to long-term.

1.9. Research ethics

General remarks

Ethical issues and principles in research involving human subjects are common across the social sciences and humanities, the natural sciences and engineering, and the health sciences. They reflect shared fundamental values that are expressed in the duties, rights, and norms of those involved in research. Research subjects reasonably expect that their rights shall be equally recognized and respected, regardless of the researcher's discipline.

In fact, in the EU 7 framework programme the ethical issues are even more important than they were in FP6 at the proposal stage. The implications of the new FP7 stance on ethical issues is that all consortia submitting proposals under FP7 have to ensure that their proposal's ethical concerns must be identified and addressed within the proposal. Proposals that ignore ethical concerns will be rejected. The same concerns apply to the proposals submitted to the European Research Council under FP7– both the Starting Grants and the Advanced Grants include an ethical issues form addressing such issues as informed consent; data protection; use of animals; human embryos, human embryonic stem cells and human foetal tissue; and research involving developing countries.

Internationally, the practice of establishing research ethics agencies varies significantly from country to country but all the developed countries have a well-established system for dealing with ethics issues in research. For example, a new central agency for research ethics was established in Sweden in 2004 which decides upon appeals about research ethics received by local ethics boards. Finland has 4 major national ethics committees concerning biomedicine and research. The Board for Gene Technology, the Advisory Board for Biotechnology, and the Advisory Board on Health Care Ethics function under the Ministry of Social Affairs and Health whereas the National Research Ethics Council is subordinate to the Ministry of Education. The functions and the scope of activity of these committees are mainly based on governmental legislation. In addition to the national committees, there is a wide network of regional and

institutional ethics committees, especially in the field of biomedical research and animal research. The Finnish National Advisory Board on Research Ethics is an expert body appointed by the Ministry of Education to make proposals and issue opinions on legislative and other matters concerning research ethics. In Hungary, there are 3 tiers of ethical review: national, regional and locally at healthcare institutions.

Current situation

The legal framework outlining the general principles for conducting biomedical research involving human subjects has been created (Law of Georgia on Health Care adopted by the Parliament of Georgia in December, 1997). The law includes a separate chapter – Chapter XIX "Biomedical Research" in which the basic principles regulating biomedical research are set out. The law also outlines the general principles for the protection of incapable persons and minorities in the context of biomedical research. It lays down the legal basis for the establishment of the research ethics committees which shall carry out ethical review ***of all research protocols*** (Article 107).

COE Convention on Human Rights and Biomedicine was signed by Georgia in May 2000 and entered into force on 1 March, 2001. The general requirements for organizing drug trials have been specified (Law of Georgia on Drug and Pharmaceutical Activity 1996; updated in 2001);

First research (institutional) ethics committees for internationally sponsored drug trials in Georgia were introduced about 5-6 years ago. About 15 research ethics committees were established during the last 5-6 years, from which about 6 function at the moment. The number of REC members varies between 5 to 11 (mostly 5 as stipulated in the law).These RECs were created at the institutions that used to participate in the multi-centre trans-national drug trials. Only few RECs have their own regulations/bylaws.

A specific law on biomedical research involving human subjects drafted in 1998-2000 and submitted to the Parliament of Georgia by the President in 2001 will be the fourth and the most comprehensive document regulating research on human subjects.

Also, the concept on the establishment of the two-tiered network of research ethics committees on the regional level has been drafted (i.e. the central research ethics committee and regional research ethics committees). Georgian national council on bioethics has stressed the importance of strengthening the system of ethical review of research protocols and advocated speeding up of the process of adoption of the specific law on biomedical research.

Recommendations

1. It would be highly recommendable to speed up the process of **ratification of the law on biomedical research** involving human subjects.

Stakeholders: Parliament, Ministry of Health, MES.

Outcome: the law is ratified and the implementing provisions are adopted.

Time line: short to mid–term.

2. It would be advisable to **introduce amendments** in the administrative and criminal code of Georgia for the infringement of the principles set out in the legislation related to the protection of research subjects.

Stakeholders: Parliament, Ministry of Health, MES, Ministry of Justice.
Outcome: the amendments to legal acts have been introduced.
Time line: short to mid–term.

3. It would be recommended to fully enforce the above mentioned **concept of ethics committees** and to **establish central and regional ethics committees.**
Stakeholders: Ministry of Health, MES, regional authorities.
Outcome: central and regional ethics committees have been established.
Time line: short to mid–term.

4. It would be necessary to set up a **quality assurance system for research ethics committees** and provide regular training for potential members of these committees.
Stakeholders: Ministry of Health, MES, regional and local authorities.
Outcomes: the quality assurance system for research ethics committees is in place and sustainable.
Time line: mid –term.

5. It would be advisable to introduce research ethics concepts in the **undergraduate and postgraduate education curricula.**
Stakeholders: HEIs.
Outcome: the undergraduate and postgraduate education curricula contain a module dealing with research ethics issues.
Time line: mid-term.

Part 2. Human resource development and the status of researcher

2.1. Research career, mobility and internationalization

General remarks

There have been a number of important developments recently that bear a direct influence on the human resource development in R&D and higher education.

First, the EC communication **„Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines 2007-2013",** COM(2005) 0299, 2005 considers human resource management one of the key elements economic growth and development. It stresses the need for investing in the **drivers of growth and employment by** focusing on investments in human and physical capital that are critical to growth and employment potential, including physical and ICT infrastructure, research capacity and innovation, education and training and adaptability of workers.

Secondly, on 14 September 2006 the European Commission launched an ambitious 10 point innovation plan, calling for urgent action at regional, national and European levels. One of the 10 points addresses calls for the **development of a single European labour market for researchers.**

Thirdly, one of the main goals of Bologna process is to draw together the education and scientific research areas. In accordance with the Berlin Communiqué (2003) the measures should be taken to provide close links between education and scientific research activities. According to the Gratz Declaration (2003 – "The Role of Universities till 2010 and in Future", close relationship between higher education and research segment is of great importance for European higher education and serves as a main determining factor for European Universities. The governments should take into consideration this relationship and support strengthening the links between higher education and scientific-research. Consequently they should recognize the level of Doctoral study completely as the third level of education within the Bologna process. The universities should focus their attention on research-based education and education in Europe as a whole. Students should be involved and participate in scientific-research activities and research-based teaching to meet the requirements of European (as the educated society) standards. The above-mentioned objectives of the Bologna process are completely reflected in the "Law of Georgia on Higher Education" and the doctoral program is accepted as the third level of higher education. The possibility of funding scientific research work of master and doctoral candidates by a state research grant is determined by the same Law as well.

Fourthly, the European Commission has adopted two special documents, a **European Charter for Researchers** and a **Code of Conduct for the Recruitment of Researchers** which are key elements in the European Union's policy to make research an attractive career, which is a vital feature of its strategy to stimulate economic and employment growth. Giving individual researchers the same rights and obligations wherever they may work throughout the European Union should help counter the fact that research careers in Europe are fragmented at local, regional, national or sectoral level, and allow Europe to make the most of its scientific potential. The European Charter for Researchers is a set of general principles and requirements which specifies the roles, responsibilities and entitlements of researchers as well as of employers and/or funders of researchers. The Code of Conduct for the Recruitment of Researchers aims to improve

recruitment, to make selection procedures fairer and more transparent and proposes different means of judging merit. Merit should not just be measured on the number of publications but on a wider range of evaluation criteria, such as teaching, supervision, teamwork, knowledge transfer, management and public awareness activities.

Current situation

The outcomes of our analysis testify to the fact that the emergence of opportunities for cooperation with colleagues from abroad and the establishment of ties with the world research community is assessed by the Georgian research community as one of the most important positive changes that has taken place over the last period of reorganising the R&D activities in Georgia. Therefore it would be of utmost importance to pay great attention to the efficiency of international contacts, opportunities to get access to various data bases, encourage joint projects and publications in order to make these contacts mutually beneficial. All this will contribute to the increase of international visibility of Georgian science.

Special attention should be paid to the alarming tendency that in Georgia, scientific research is not attractive to the young leading to a considerable aging problem for the research system and brain drain. Science and technology are not a static situation but in a process that needs special attention to young researchers involving such elements as launch of graduate schools, establishing of PhD scholarships, encouraging researcher mobility, establishment of post-doc positions at HEIs and R&D institutes, etc. Although the Law of Georgia on "Science, Technologies and their Development declares that "For integrating higher education and research, the state establishes a system of selection of talented youth, their continuous preparation for future creative research activity; creates favourable conditions for the organizations engaged in the selection and education of future generation; assists leading higher educational institutions, academies of sciences, and other scientific centers in developing a network of training-industrial complexes, as well as other forms of training highly skilled specialists", few practical steps have been taken in this direction yet.

The long-term human scientific capacity needs of academia and society should be determined as well. In 10-15 years the present relatively small cohort of young researchers will be decisive for the training of new generations of researchers, for the organisation of research activities and for scientific outcomes. Therefore it is paramount to stick to the principles expressed in the Law of Georgia on "Science, Technologies and their Development" that the training of scientific and scientific-technical personnel is carried out through continuous education by using diverse methods and forms, and that the state guarantees the training of scientific and scientific-technical personnel at higher educational institutions and other public scientific organizations, the allocation of necessary funding from the state budget for the purpose, and the acknowledgement of academic degrees obtained abroad.

In 1995, there were 21,497 persons engaged in R&D in Georgia, the number dropped to 16,062 in 2003 and to 9,186 in 2005. In other words, the number of people engaged in R&D has dropped 2.3 times over the last 10 years. Since 2003 the number of scientific research institutions has decreased 17% (120 in 2003, 99 in 2005 and it continues decreasing due to various mergers and liquidations of R&D institutions; the number of R&D institutes has dropped from 97 in 2003 to 80 in 2005, and the number of

HEIs from 23 in 2003 to 19 in 2005). The number of scientific personnel has also decreased considerably – from 21,497 in 1995 to 16,062 in 2003, and 9186 in 2005, or 43% over the last 3 years. On the other hand, the percentage of personnel with scientific degrees has over the last 3 years increased considerably (from 46.4% to 64.1%) which testifies to a strong Georgian human potential in research. Year 2006 also saw a great upsurge of the new "candidate of science" holders – total 911 compared to 414 in 2005, 382 in 2004 and 327 in 2003.

Recommendations

1. It is highly advisable to fully **implement the legislatively already adopted measures** for guaranteeing a genuine human resource development in Georgia (for example, state budget allocated funding for encouraging the training and qualification of scientific and scientific-technical personnel at leading scientific centers abroad, for creating necessary conditions to attract funds from overseas foundations, institutions and individuals for this purpose) as stipulated in the Law on "Science, Technologies and their Development".

Stakeholders: Government, MES, universities, R&D institutes.

Outcomes: respective allocations have been made in the state budget; a special education fund for this purpose has been set up.

Time line: short to mid-term.

2. It would be advisable to **elaborate a system of research career planning** with the aim of recruiting and retaining as many young talented researchers as possible as well as providing for them the opportunities of life long learning.

Stakeholders: universities, R&D institutes, MES, scientific umbrella organisations.

Outcomes:

- Human resource development plans at HEIs and R&D institutes (including activities targeted at researchers at different stages, their professional training and retraining, etc) have been elaborated, formally adopted and implemented.
- The necessary support structures to implement these plans are in place and sustainable.
- It is highly advisable the necessary financial means for human resource development are foreseen both in the national budget as well as in the budgets of HEIs and R&D institutes.
- A system of professional training and retraining of research and academic staff has been implemented and is sustainable.

Time line: short to mid-term

3. It is highly advisable to launch a **programme for creating post-doctoral places** at HEIs and R&D institutes, first of all in the prioritised R&D areas, in order to improve the career opportunities of young specialists willing to lead the scientific-research activities and to be involved in independent scientific work.

Stakeholders: universities, R&D institutes, MES.

Outcomes: a programme has been elaborated, the corresponding funding has been allocated, and first post-docs have been recruited.

Time line: short to mid-term.

4. It would be advisable to create a **robust and well-functioning system of promotion of information about the opportunities of additional funding** (grants, scholarships, requests for co-operation, etc) and raise the awareness of the research community about it.

Stakeholders: MES, GNSF, Academy of Sciences, HEIs, R&D institutes.

Outcomes:

- A transparent process of grant and scholarship administration based on open competition, international peer review, scientific excellence and innovation is in place in GNSF.
- The end-users (researchers, academics, doctoral students, etc) have an easy access to the additional funding opportunities from the electronic homepages of R&D institutions.
- Electronic information delivery networks exist at R&D institutions and information is regularly delivered to the end-users.
- Well-functioning networks of information delivery exist between MES, GNSF, and HEIs and R&D institutes.
- The professional mobility of researchers and academics has increased; additional possibilities are created for participation in international research groups and networks.
- The opportunities for international cooperation have increased as well as the volume of Georgian international publications.

Time line: short to mid-term.

5. It would be recommended to continue wider **participation in the EU and international programmes** of research and academic mobility and exchange by making mobility an indispensable component of research career development.

Stakeholders: MES, GNSF, HEIs, R&D institutes.

Outcomes:

- Mobility has been made an indispensable indicator of research and academic career quality.
- The number of mobility grants received by Georgian researchers has increased as well as the number of foreign researchers in Georgian R&D institutions.

Time line: mid to long-term.

6. It is recommended that Georgia **sign the European Charter for Researchers and a Code of Conduct for the Recruitment of Researchers**, and that Georgian universities and R&D institutes should adhere to them in all interactions with public and private institutions both at home and abroad.

Stakeholders: Government, MES, HEIs, R&D institutes, private business.

Outcomes:

- the European Charter for Researchers and a Code of Conduct for the Recruitment of Researchers have been signed.
- these documents are available to all researchers and academics.
- HEIs and R&D institutes adhere to them in all interactions with public and private institutions both at home and abroad.

Time line: mid-term.

2.2. Professional training of research management staff

Current situation

In order to bring the level of Georgian R&D activities to the European standards it is necessary to increase the competence and qualification of the personnel involved in R&D activities with a special reference to training a new professional group of research administrators and managers. Their main function lies in mediating in the framework of the chain „science-technology-commercialisation", guaranteeing the liaison of research activities with industry, private business and society at large and includes carrying out at least the following functions: updating the R&D institutions about new cooperation opportunities, partner research both at home and abroad, consultancy and assistance in preparing project proposals, and project management.

Recommendations

1. It is advisable to elaborate a **plan for the selection and training of researchers and academic staff** with administrative and managerial capacities for R&D management.

Stakeholders: HEIs, R&D institutes, GNSF.

Outcomes:

- A plan for the selection and training of researchers and academics with administrative and managerial capacities is elaborated, formally adopted and implemented by HEIs and R&D institutes.
- Professional research administrators and managers have been trained and are employed by the R&D and innovation support structures at HEIs.
- The volume of research as well as cooperation with industry and private business has increased.

Time line: mid-term.

2. It is recommended to encourage the creation of **national professional unions and/or associations of research administrators and managers** as well as for their cooperation with the corresponding European professional organisations (e.g. European Association of Research Managers & Administrators (EARMA), European Association of Research and Technology Organisations (EARTO), etc):

Stakeholders: MES, R&D institutes, HEIs

Outcomes:

- The cooperation and exchange of experience between Georgian and European organisations concerning training of research administrators and managers has increased.
- Joint activities (trainings, seminars, etc) are designed and launched.
- International standards for evaluating the activities of research administrators and managers have been introduced.

Time line: mid-term.

Part 3. Fostering industry-university-R&D institutions partnership

The third challenge facing restructuring of Georgia's policy system is to reinforce the links between public and private sectors, to foster industry-university-R&D institutions partnerships and the involvement of the private sector in R&D activities.

General remarks

On 14 September 2006 the European Commission launched an ambitious 10 point innovation plan, calling for urgent action at regional, national and European levels. The plan was produced following a request from Heads of State or Government for an innovation strategy that would '*translate investments in knowledge into products and services*'. The 10 points in full are:

- establish innovation-friendly education systems;
- establish a European Institute of Technology;
- develop a single labour market for researchers;
- strengthen links between researchers and industry;
- nurture regional innovation through new cohesion policy programmes;
- reform State aid rules for R & D and innovation and provide better guidance for R & D tax incentives;
- improve protection for intellectual property rights;
- introduce copyright levies for digital products and services;
- develop a strategy for innovation-friendly lead-markets;
- stimulate innovation through public and private procurement.

This challenge is a key to accelerating the process of technology transfer to industry and increasing the R&D capacity of domestic firms. Improvements in the technology base of domestic firms, although notable over the recent years, have arisen mostly from imported technology supported by Foreign Direct Investment and are only marginally related to the local R&D. Meeting this challenge requires a **better correlation of R&D policies with industrial policy at national and regional level, based on an evaluation of economic strengths and weaknesses and research priorities.** In addition, R&D policies have to be accompanied by a coherent package of fiscal incentives, financial support schemes (including risk capital funds and venture capital) and channelling of higher shares of the state aid to the R&D activities of economic agents.

A country will need a certain level of institutional, human, and physical capacity to implement knowledge transfer (KT) and innovation. **Institutional capacity** includes the quality and reach of governance in a country, a banking and financial system that works, an honest and functioning judiciary, and working educational and health systems. **Human capacity** covers the quality and quantity of educated and skilled personnel available in a society. **Physical capacity** includes the quality and quantity of roads, airports, seaports, schools, hospitals, research laboratories and libraries, water treatment plants, grid electricity, and other infrastructure. A society's institutional, human, and physical capacity is reflected in the drivers and barriers to KT and innovation. For example, a society that is short of laws to

promote technology use, of financial mechanisms to enable technology acquisition, and of political stability and good governance to reduce uncertainties in economic

decision-making would present a very hostile environment for technology implementation.

3.1. Strategic development of the innovation and knowledge transfer policy

General remarks

The successful transfer to the innovative model of development of research and economics depends on a great extent on the efficient functioning of scientific research and its outcomes, first of all on the speed and quality of knowledge transfer from research to its implementation and exploitation. In the contemporary extensively complex world interdisciplinary and multi-disciplinary research and its outcomes have become of utmost importance and most perspective. More and more often new ideas and inventions crop up in the crossroad of different research fields.

Current situation

The Law of Georgia on "Science, Technologies and their Development" stipulates several ways in which the state shall support innovation activity in Georgia (Art 21):

- The state shall guarantee the protection of innovative activity irrespective of the form of ownership for all the institutions and organizations engaged in the science and technologies development sphere.
- Ministries, state departments and inspection boards, other government authorities shall establish departmental science and technologies development funds, whereas the local self-government bodies, where necessary – regional funds.
- The implementation of state innovation policy shall be encouraged by legal entities established in a manner prescribed by Georgian legislation.
- The executive authorities, natural and legal persons shall be authorized to establish non-entrepreneurial (non-commercial) legal entities of private law supporting the development of science and scientists.

Although these measures are listed in the law, they are only separate fragments of a whole innovation picture. Currently, even these fragments are implemented very weakly or not at all. In addition to that it is quite understandable that only healthy private property legislation might attract investors to invest in the commercialisation of research outputs in Georgia.

In 2006 Georgia's real GDP growth rate reached 8.8%, making Georgia one of the fastest growing economies in Eastern Europe. The World Bank's *Doing Business in 2007* report dubbed Georgia "the number one economic reformer in the world" because it has in one year improved from rank 112th to 37th in terms of *ease of doing business* (out of 175 countries surveyed). Foreign Direct Investment doubled thanks to the country's liberalized business climate and improved tax and customs policies.

Georgia's economy is becoming more dependent on services (now representing over 50% of GDP), moving away from agricultural sector (14.8% in 2005). Georgian lari's rate of inflation spiked to 10% in 2006. However, the high inflation rate was offset in part by a high investment rate (30% of 2006 GDP) and the country maintained a solid credit in international market securities.

In 2005, the total financing of research and development in Georgia was equal to 23.2 million GEL, or about 10.5 million euro which was 0.2% of the country's nominal GDP (compared to Estonia's 0.91% of GDP in 2004, and Finland's 3.51% or Sweden's 3.74% the same year). Finnish R&D investment in 2006 stood at a total of 5.7 billion euros. Enterprises accounted for 4 billion euros of the total sum, i.e. 70.7 per cent, while public sector R&D spending totalled 566 million euros (9.9%).

Georgia also has high unemployment rate of 12.6% (2006) and fairly low median income compared to other European countries. The nominal GDP per capita in 2005 was 36% higher than in 2003 but still very low, at 1415.6 USD.

Last but not least, similar to a large extent missing policy debate on R&D policy issues, the innovation policy debate is in its very embryonic stage.

Recommendations

1. In order to achieve a much better correlation of the R&D policy with the innovation and knowledge transfer policy at national and regional level, based on an evaluation of economic strengths and weaknesses and research priorities, it would be advisable to set up a national coordinating body (R&D or S&T policy council) which shall **coordinate these activities at the highest governmental level,** shall formulate and promote basic guidelines for the Government, and shall coordinate the science and technology policy-related tasks handled by different ministries via its R&D and innovation sub-committees.

Stakeholders: Parliament, Government, political parties, industrial and business organisations.

Outcomes: the national R&D (or S&T) policy council and its innovation sub-committee are established; innovation activities are better coordinated and supported by relevant ministries.

Time line: mid-term.

2. It is highly recommendable to **launch a national debate**, similar to that of the R&D policy issues debate, on the national innovation and knowledge transfer strategic issues with the widest participatory approach involving all the stakeholders, directed to the decision of such issues as the implementation of regional and specialized innovation programs, creation of different instruments for financing innovative projects, including venture and risk capital.

Stakeholders: Parliament, Government, political parties, industrial and private business organisations and associations, HEIs, scientific umbrella organisations.

Outcomes:

- The national innovation strategy has been discussed, elaborated and formally adopted at the highest level possible.
- The elaboration of the strategy has enabled to set R&D and innovation priorities for Georgia.
- The management system of innovative culture and activities has been created.
- Industrial and business organisations and associations are actively participating in the elaboration of innovation-related plans and activities.

Time line: mid to long-term.

3. It is important to **continue elaboration of the coherent legislative base** for R&D and innovation in Georgian order to accommodate the new emerging innovation and knowledge transfer support structures into the existing legislation, **increase the innovation drivers and reduce the barriers** to implementing innovative and knowledge transfer activities**,** and provide guarantees for attracting private investors.

Stakeholders: Parliament, Government, political parties, industrial and private business organisations and associations, HEIs.

Outcomes:

- The required legislative acts have been elaborated and formally accepted.
- A favourable legislative base for attracting private investments into R&D and innovation has been created.

Time line: mid-term.

4. It would be advisable that the R&D policies targeted at enhancing innovation activities be accompanied by a **coherent package of fiscal incentives (**such as tax allowances for small and medium-sized enterprises, tax stimulation of the venture capital for R&D, customs free imports of R&D, etc.) **and financial support schemes** (both direct and indirect, including establishing risk capital funds and attracting venture capital) to signal of a pro-innovation climate in the country and to stimulate private business activities.

Stakeholders: Parliament, Government, ministries, industrial and private business organisations and associations, HEIs.

Outcomes: a package of fiscal incentives has been elaborated and adopted; financial support schemes have been approved.

Time line: mid-term.

3.2. Innovation and knowledge transfer organisation and management

Current situation

The main direction in which the state and science have to elaborate mutually beneficial approaches lies in stipulating a clear-cut legal framework within which science can participate in market relationships. In the conditions of undeveloped hi-tech industry, the entrance of science into the marked may lead to the cheap sell-out of a country's research potential. Therefore such legal approaches must be found that satisfy both the state and the research community. Art 5^1 clause 3 of the "Law of Georgia on science, technologies and their development" stipulates that Georgian government agencies shall be responsible for carrying out the state policy of science and technologies development in the respective sphere of state administration" but until now only the Ministry of Education and Science is involved in regulating the system of R&D and innovation activities. Other ministries, first and foremost the Ministry of Economic Development, must be involved in the innovation process and be responsible for carrying out innovation and knowledge transfer activities in the country. Without an active participation of the other ministries it would be very difficult to reorganise the currently existing R&D system dominated by theoretical and fundamental research.

Art 21 clause 1 of the same Law declares that "The State shall guarantee the protection of innovative activity irrespective of the form of ownership for all the institutions and organizations engaged in the science and technologies development sphere" which provides a good prerequisite for further elaboration of legal acts for attracting private investments into commercialising research outcomes.

Recommendations

1. It would be recommended that knowledge transfer and innovation development be **strengthened through appropriate national and regional innovation structures.**

Stakeholders: Parliament, Government, ministries, HEIs, regional and local governments.

Outcomes: a national innovation support and promotion agency has been set up and is sustainable; regional innovation support structures have been set up with the support from regional and local governments.

Time line: mid-term.

2. It would be advisable to **invest in research infrastructure and knowledge transfer institutions** (e.g. science and technology parks, business incubators, business advisory and consultancy organisations, etc.) in order to build research capacity and provide access to business solutions.

Stakeholders: Ministries, HEIs, regional and local governments, industry and private business companies.

Outcomes: the R&D infrastructure has been improved; new knowledge transfer institutions have been set up jointly by business organisations, HEIs and regional and local governments.

Time line: mid-term.

3. It would be recommended to elaborate **innovation awareness raising plans** of researchers and academic staff at the universities and R&D institutes, as well as for regional and local governments and create **appropriate innovation and knowledge transfer support organisational structures** at HEIs and R&D institutes (e.g. innovation and entrepreneurship centres, etc.)

Stakeholders: HEIs, regional and local governments, industry and private business companies.

Outcomes: the institutional awareness raising plans have been elaborated and formally adopted; innovation and knowledge transfer support structures have been set up.

Time line: mid-term.

3.3. Intellectual Property issues

General remarks

One of the most important elements of the commercialisation of knowledge is patenting. It plays a crucial role in creating innovation and dissemination of new technologies. Over the last 20 years, patenting has been increasing in the developed countries, the latest decade has been characterised as a „patent boom" period. Patenting of research outcomes

and technological results in public sector is considered as a means of protecting intellectual work, and the ensuing trade in patents and licences is considered a feature of the commercial activity of public research systems. Increasing the patenting activity and capitalising the research outcomes have to be defined as target indicators of implementing the strategy of R&D and innovation development.

Current situation

The intellectual property (IP) protection system effective at present in Georgia comprises all the elements necessary for its functioning, according to the report by D. Gabunia "Protection of Intellectual Property and Innovations In Georgia". The legislative base which is in compliance with the international standards is in force, the national offices and organizations responsible for the acquisition and enforcement of IP rights are functioning.

On 5 February 1999 the Parliament of Georgia adopted the Patent Law and the Law on Trademarks; on 22 June 1999 the Law on Appellations of Origin and Geographical Indications of Goods was adopted which established the legal protection of the objects important for Georgia; the same day the Parliament also adopted the special Law on Topographies of Integrated Circuits.

Georgia is a party to all the main international agreements concerning intellectual property. Intellectual property occupies a significant place in the Partnership and Cooperation Agreement between Georgia and the European Union and represents one of the priorities of bilateral cooperation in the scope of the European Union new neighbourhood policy.

National Intellectual Property Center of Georgia (Sakpatenti), established in 1993, had in 2006 approximately 150 employees. Sakpatenti has conducted extensive work aimed at implementing a modernized automated system for performing examination procedures and handling the applications filed with the Center. The information system includes also searchable databases of national patent and trademark data which is provided to the expert users via a local area network.

At present, an agreement between Sakpatenti and the Georgian Research and Development Fund (GRDF) has been achieved on patent search for all those projects that will participate in competition for obtaining the GRDF financing.

Recommendations

1. It is recommended to **continue elaboration of the existing intellectual property legislation** with a focus on the following issues:

1.1. Preparing draft amendments to the Patent Law of Georgia, which shall provide for: extension of 20 years term of the Georgian patent by 5 years for medicinal products, with the purpose of harmonization with the EC Regulation 1768/92; increasing of the utility model term up to 10 years; changes concerning the patent owners' rights and procedures of compulsory licensing, with the purpose of bringing in conformity with Articles 28 and 31 of the TRIPS Agreement effective in the scope of the World Trade Organization.

1.2. Framing a separate law on the protection of industrial designs.

1.3. Preparing draft amendments for the Law on Appellations of Origin and Geographical Indications of Goods.

Stakeholders: Parliament, ministries, Sakpatenti.

Outcome: the above-mentioned legislative acts or their amendments are adopted.

Time line: short to mid-term.

2. It is highly advisable to **employ IPR and patent-information specialist** in the knowledge transfer and innovation support structures in R&D institutions in order to raise the general awareness of IPR issues among the research community, to consult and assist researchers and academics on IPR issues.

Stakeholders: universities, R&D institutes.

Outcome: highly qualified IPR specialists are employed at universities and other R&D institutions; general awareness of the research community in IPR issues has increased; the number of patents and licences has increased.

Time line: mid to long-term.

3. It is necessary to introduce a **compulsory IPR module in the study curricula**, first of all in the faculties of natural sciences and technology, in order to increase the intellectual property awareness in public and private universities, and use teaching in various forms (short-term courses, internet tutorials, etc) for that purposes.

Stakeholders: HEIs, Sakpatenti.

Outcome: IPR modules are included in study curricula; students (first of all in the faculties of natural sciences and technology) have bee trained in IPR issues.

Time line: mid–term

4. It is necessary to **widen the publication of original as well as translated IPR literature**, information brochures and booklets and the use of other media channels for different target groups (businessmen, scientists, students, law professionals).

Stakeholders: Sakpatenti, HEIs, electronic media.

Outcome: a concerted action plan has been elaborated and implemented.

Time line: mid-term.

5. It is necessary to continue support for **outreaching Sakpatenti consulting services** and creating a "help-desk" where any interested person either by internet or by direct consultation shall be able to receive the required information on different issues of IP protection, as well as to create a special **training center** on the basis of Sakpatenti where IPR training for interested stakeholders (government employees, researchers and academics, private business organisations, etc) shall be organized.

Stakeholders: Sakpatenti, HEIs, industry and private business organisations.

Outcome: an IPR "help-desk" and an IPR training center are set up at Sakpatenti; the number of patents and licences has increased.

Time line: short to mid-term.

3.4. Commercialisation of research output

Current situation

Research output, especially in view of its commercial applicability, is poor in Georgia; there are limited opportunities as well as skills for the commercialisation of knowledge. Georgia's absorption capacity to implement the emerging new technology applications has been estimated very low by international experts. There is a very the low number of patent applications in comparison to the EU average and lack of patents in high-tech sectors.

As a result of the study carried out within the framework of this project, the respondents considered biotechnology, food (processing) industry, ICT, medicine, ecology, geophysics and energy industry as the most perspective areas of R&D activity, including applied research. On the other hand, supporting innovation in these branches involves great expenditure, especially considering the fact that the innovation chain is quite long. Greatest problems arise if any node in this innovation chain turns out to be weak or unmanageable. Currently, the weakest nodes in the chain are financial support, commercialisation of ideas, and business analysis and feasibility study of new applications.

The commercialisation of research outcomes entails a number of advantages in different areas:

- Academic – accumulation of scientific knowledge, improvement of personnel qualification, maintenance of research groups, serving as a scientific base for diploma projects and dissertations, etc.
- Economic – improving the material and technical base of research, increasing the income level of researchers, obtaining fund-raising and organisational skills, etc.
- Social – increasing the status of research in society, new career opportunities, acquiring the world business culture and scientific results, etc.

Recommendation

1. It is of utmost importance to **involve private business and investors in financing applied research programmes and projects** using the fiscal and other incentives indicated in part 3.1 Article 4.

Stakeholders: ministries, HEIs, industrial and private business companies.

Outcomes:

- Targeted applied research programmes are elaborated and approved; the share of business organisations in financing R&D and innovation in Georgia has increased.
- The overall support by industrial and business organisations to innovation activities has considerably increased.

Time scale: mid to long-term

2. It would be necessary to considerably **increase the volume of industry and private business sponsored projects** at HEIs and R&D institutes, to increase the number

of **diploma projects done in or for industrial and private business companies**, to promote the **exchange of personnel between industry/private business and HEIs.**

Stakeholders: HEIs, industry and private business companies.

Outcomes:

- The volume of industry and private business sponsored projects at HEIs and R&D institutes has increased and created additional income for R&D institutions.
- The number diploma projects done in or for industrial and private business companies has increased fostering the links between R&D institutions and industry/private business.
- Personnel exchange between HEIs and industry/private business takes place.

Time scale: mid to long-term.

3. It would be recommended to involve the Ministry of Economic Development and other ministries in the **regulation and implementation of research commercialisation activities** (see also part 1.2 Art 3).

Stakeholders: Government, MES, Ministry of Economic Development and other ministries, HEIs, industry and private business.

Outcomes: support for implementing the innovation chain is being provided by relevant ministries; research outcome commercialisation has increased in priority areas.

Time scale: mid-term.

4. The research output commercialisation should provide good ground for **increasing the patenting and licensing activity** and contribute to the implementing of the innovation and knowledge transfer chain.

Stakeholders: ministries, HEIs, industry and private business companies.

Outcomes:

- The number of patent applications and obtained patents has increased.
- IPR are well protected; the innovation chain is fully implemented and sustainable.
- Additional funding is provided to HEIs via their commercialisation activities.

Time scale: mid to long-term.

Part 4. Increasing public awareness of the key role of R&D

The fourth challenge facing Georgian R&D policy-makers is to increase the public awareness of the key role of R&D for sustainable development and economic competitiveness and include R&D policies in national and sectoral development priorities and public investment plans in a situation where science has been deprived of prestige whilst the status of scientists has gradually eroded, too.

4.1. Science, higher education and society

Current situation

An important task of R&D and HE is to procure a stable development and competitiveness of the state and its regions. It is of utmost importance to reduce the political risks in carrying out reforms by involving politicians more and more in solving such issues as providing constitutional rights for intellectual work and the improvement of legislative framework which determines the structure of R&D in the country. Science and technology are rarely presented by the state as drivers for sustainable development. The lack of a clear science policy is responsible for the continuous marginalisation of research and technological development (RTD) work. Even more, RTD policy needs to be more public and open to public debate and criticism because it is only in this way that a social perception of science can emerge as a key element of social and overall national development.

DEAN, the Deans' European Academic Network, has concluded recently that many states are unable to maintain the research infrastructure on the level required for competitive research work. This in turn will lead to the gradual loss of the leading position of universities in research, and the centre of applied research is more and more shifting to major companies. Competition will also increase from private sector accompanied by a well-known problem of „brain drain", „man-hunting" of young talented graduates who are attracted to big companies due to higher salaries and much better research environment.

A serious key problem is also the impact of market that will dictate the profound changes in demand with a focus on practical application of the acquired knowledge, education and life long training. The market pressure on universities will gradually lead to a situation where HEIs lose their status of a social institution, and the same rules that regulate the behaviour of industrial and commercial enterprises will more and more penetrate the academic institutions.

An important impact on the new status of universities is made by political decisions targeted at harmonizing the level of economic development of regions. Universities are made socially responsible for their regions and their active cooperation with regional authorities, public organizations and industry and private business. The responsibilities of universities as major regional players lie in three areas:

1. Universities as major employers in promoting regional development.
2. Universities as technology transfer providers for regional industry.
3. Universities as providers of professional training, re-training and improvement of labour qualification.

It should be stressed again that RTD policy needs to be more public and open to public debate and criticism because it is only in this way that a social perception of science can emerge as a key element of social and overall national development.

Recommendations

1. The **active role of research community and academics** in elaborating the reforms and restructuring plans of Georgia should be increased as stipulated in the Law of Georgia on "Science, Technologies and their Development", Article 7 which declares that the state shall create favourable conditions for activities of scientific and scientific-technical non-governmental associations and draw them in the drafting and implementation of basic decisions in the sphere of science and technologies development.

Stakeholders: Parliament, Government, MES, HEIs and R&D institutes, associations of researchers and academics.

Outcomes:

- Representatives of research community and academics are included in all the bodies and organisations drawing the development plans and programmes of the country.
- A consultancy mechanism has been introduced whereby representatives of research community are involved in the process of making strategic decisions.
- Research and technological development issues are prioritised in national socio-economic development plans.

Time line: mid-term.

2. It is of utmost importance to launch debates and discussions of the **role of universities in the new socio-economic situation and market environment situation**, to discuss the notion of universities as entrepreneurial institutions.

Stakeholders: MES, Ministry of Economy and Development, universities, Academy of Sciences, industry and business associations.

Outcomes:

- Conditions for implementing the strategy of self-development of universities have been created.
- A programme for the development of their corporate identity has been debated and formally adopted by universities.
- The infrastructure and support structures at HEIs and R&D institutions for commercialisation of knowledge outcomes have been created and are sustainable.

Time line: long-term.

3. It is advisable to increase a **wider participation of society at large in discussions about the role of** science and technology and their relation with society and culture.

Stakeholders: MES, HEIs, non-governmental and non-commercial organisations, mass media, private business organisations.

Outcomes:

- A programme for supporting formal and informal science education in schools as well as through science centres and museums and other relevant means has been elaborated, approved and implemented.
- Conditions for an informed debate on ethics, science and technology, about the reciprocal influence of science and culture have been created and the debate is sustainable.
- The role of non-governmental and non-commercial organisations has increased in setting the agenda for R&D policy issues.
- The public awareness about the role of science and technology and their relation with society and culture has increased, the status of researcher in society has improved.

Time line: mid-term.

4.2. Science and private sector

Current situation

The balanced development of different sectors of R&D is possible only when different social players participate in the process. For a number of sectors the involvement of private business will play a special role.

The investments of private business in R&D cannot be considered as a significant financial source in Georgia at the moment. The interaction between academic R&D and private business is minimal and in most cases incidental. Therefore, a serious problem for universities is access to private investments, more generally – elaborating a sustainable relationship between research, higher education and the private sector. In order to establish this relationship, active participation of the state, HEIs and private business is necessary.

Recommendations

1. It would be advisable to **introduce new forms of cooperation** between academic research, HEIs and private business, e.g. involving researchers and academics as consultants in industry and private business companies, involving representatives of industry and private business in carrying out master classes and practical assignments, reading lectures at universities, etc.

Stakeholders: MES, universities, R&D institutions, industry and private business.

Outcomes: a trusty partnership between universities, R&D institutions and private business organisations has been created; the share of industry and business-oriented diploma papers and theses at the universities has increased.

Time line: short to mid-term.

2. It would be necessary to organise **joint research programmes** between universities, R&D institutions and private business organisations and considerably increase the share of sponsored research projects.

Stakeholders: MES, universities, R&D institutions, industry and private business.

Outcomes: new directions of research have been introduced; joint programmes have been elaborated and launched, the number of sponsored projects has increased.

Time line: mid- to long term.

3. It would be recommendable **to introduce a set of joint public-private measures** to advocate best practice results in implementing research outcomes, successful joint projects and academia-industry cooperation.

Stakeholders: MES, universities, R&D institutions, industry and private business associations, regional authorities.

Outcomes: various awards to advocate the best innovative practice results have been introduced (e.g. to best innovative enterprises and to best innovative SMEs, regional cooperation awards, annual state innovation prizes, etc.

Time line: mid-term.

Project management team

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Annex

SUMMARY TABLE OF STAKEHOLDERS (17) INVOLVED IN DIFFERENT ACTIVITIES OF SUGGESTED RECOMMENDATIONS

No of group	Set of recommendations	Activities of each set of recommendation*
1. GOVERNMENT		
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	1.1.1, 1.1.2, 1.1.3, 1.1.4., 1.1.5
1.2.	Legislative issues	1.2.1, 1.2.2, 1.2.3
1.3.	Institutional management of R&D	1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.5
1.4.	R&D funding	1.4.1, 1.4.2, 1.4.3, 1.4.4
1.5.	Research infrastructure	1.5.1, 1.5.2, 1.5.3
1.6.	Quality assurance	
1.7.	International cooperation	
1.8.	R&D&I information monitoring	1.8.1, 1.8.2, 1.8.3
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	2.1.1, 2.1.6.
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	3.1.1, 3.1.2, 3.1.3, 3.1.4
3.2.	Innovation and knowledge transfer organisation and management	3.2.1
3.3.	Intellectual property issues	
3.4.	Commercialization of research output	3.4.3
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	4.1.1,
4.2.	Science and private sector	
***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set		
2. PARLIAMENT		
No of group	**Set of recommendations**	**Activities of each set of recommendation***
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	1.1.2
1.2.	Legislative issues	1.2.1, 1.2.2
1.3.	Institutional management of R&D	1.3.2
1.4.	R&D funding	1.4.1, 1.4.2
1.5.	Research infrastructure	
1.6.	Quality assurance	1.6.2
1.7.	International cooperation	
1.8.	R&D&I information monitoring	1.8.3
1.9.	Research ethics	1.9.1, 1.9.2

2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	3.1.1, 3.1.2, 3.1.3, 3.1.4
3.2.	Innovation and knowledge transfer organisation and management	3.2.1
3.3.	Intellectual property issues	3.3.1
3.4.	Commercialization of research output	
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	
4.2.	Science and private sector	

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

3. MINISTRY OF EDUCATION AND SCIENCE

No of group	**Set of recommendations**	**Activities of each set of recommendation***
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5
1.2.	Legislative issues	1.2.1, 1.2.2, 1.2.3
1.3.	Institutional management of R&D	1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.5, 1.3.6
1.4.	R&D funding	1.4.1, 1.4.2, 1.4.3, 1.4.4
1.5.	Research infrastructure	1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.5, 1.5.6, 1.5.7, 1.5.8
1.6.	Quality assurance	1.6.1, 1.6.2, 1.6.3
1.7.	International cooperation	1.7.1, 1.7.2, 1.7.3
1.8.	R&D&I information monitoring	1.8.1, 1.8.2, 1.8.3, 1.8.4, 1.8.5
1.9.	Research ethics	1.9.1, 1.9.2, 1.9.3, 1.9.4
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6
2.2.	Professional training of research management staff	2.2.2
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	
3.2.	Innovation and knowledge transfer organisation and management	3.2.2
3.3.	Intellectual property issues	
3.4.	Commercialization of research output	3.4.1, 3.4.4
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	4.1.1., 4.1.2, 4.1.3
4.2.	Science and private sector	4.2.1, 4.2.2, 4.2.3

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

4. MINISTRY OF ECONOMIC DEVELOPMENT		
No of group	**Set of recommendations**	**Activities of each set of recommendation***
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	1.1.2
1.2.	Legislative issues	1.2.1, 1.2.2, 1.2.3
1.3.	Institutional management of R&D	1.3.1, 1.3.5
1.4.	R&D funding	1.4.2
1.5.	Research infrastructure	
1.6.	Quality assurance	
1.7.	International cooperation	1.7.3
1.8.	R&D&I information monitoring	1.8.1, 1.8.2
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	
3.2.	Innovation and knowledge transfer organisation and management	3.2.2
3.3.	Intellectual property issues	3.3.1,
3.4.	Commercialization of research output	3.4.1, 3.4.3, 3.4.4
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	4.1.2
4.2.	Science and private sector	

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

5. MINISTRY OF JUSTICE		
No of group	**Set of recommendations**	**Activities of each set of recommendation***
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	
1.2.	Legislative issues	
1.3.	Institutional management of R&D	
1.4.	R&D funding	
1.5.	Research infrastructure	
1.6.	Quality assurance	
1.7.	International cooperation	
1.8.	R&D&I information monitoring	
1.9.	Research ethics	1.9.2
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	

3.1.	Strategic development of innovation and knowledge transfer policy	
3.2.	Innovation and knowledge transfer organisation and management	3.2.1, 3.2.2
3.3.	Intellectual property issues	3.3.1
3.4.	Commercialization of research output	3.4.1, 3.4.3, 3.4.4
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	
4.2.	Science and private sector	

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

6. MINISTRY OF HEALTH

No of group	**Set of recommendations**	**Activities of each set of recommendation***
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	
1.2.	Legislative issues	
1.3.	Institutional management of R&D	
1.4.	R&D funding	
1.5.	Research infrastructure	
1.6.	Quality assurance	
1.7.	International cooperation	
1.8.	R&D&I information monitoring	
1.9.	Research ethics	1.9.1, 1.9.2, 1.9.3, 1.9.4
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	
3.2.	Innovation and knowledge transfer organisation and management	
3.3.	Intellectual property issues	
3.4.	Commercialization of research output	
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	
4.2.	Science and private sector	

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

7. HIGHER EDUCATION INSTITUTIONS

No of group	**Set of recommendations**	**Activities of each set of recommendation***
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5
1.2.	Legislative issues	1.2.1, 1.2.2

1.3.	Institutional management of R&D	1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.5, 1.3.6
1.4.	R&D funding	1.4.3
1.5.	Research infrastructure	1.5.1, 1.5.2, 1.5.8
1.6.	Quality assurance	1.6.2, 1.6.3, 1.6.6
1.7.	International cooperation	1.7.1, 1.7.2, 1.7.3
1.8.	R&D&I information monitoring	1.8.1, 1.8.2, 1.8.3, 1.8.4, 1.8.5
1.9.	Research ethics	1.9.5
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6
2.2.	Professional training of research management staff	2.2.1, 2.2.2
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	3.1.3, 3.1.4
3.2.	Innovation and knowledge transfer organisation and management	3.2.1, 3.2.2, 3.2.3
3.3.	Intellectual property issues	3.3.2, 3.3.3, 3.3.4, 3.3.5
3.4.	Commercialization of research output	3.4.1, 3.4.2, 3.4.3, 3.4.4,
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	4.1.1, 4.1.3
4.2.	Science and private sector	4.2.1, 4.2.2, 4.2.3

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

8. ACADEMY OF SCIENCES

No of group	Set of recommendations	Activities of each set of recommendation*
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	1.1.2, 1.1.3, 1.1.4
1.2.	Legislative issues	1.2.2, 1.2.3
1.3.	Institutional management of R&D	1.3.1, 1.3.2, 1.3.3, 1.3.4
1.4.	R&D funding	
1.5.	Research infrastructure	1.5.3
1.6.	Quality assurance	1.6.1, 1.6.6
1.7.	International cooperation	
1.8.	R&D&I information monitoring	1.8.1, 1.8.2, 1.8.3
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	2.1.4
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	
3.2.	Innovation and knowledge transfer organisation and management	
3.3.	Intellectual property issues	
3.4.	Commercialization of research output	

4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	4.1.2
4.2.	Science and private sector	

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

9. PUBLIC AND PRIVATE R&D INSTITUTES (ORGANIZATIONS)

No of group	Set of recommendations	Activities of each set of recommendation*
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5
1.2.	Legislative issues	1.2.1, 1.2.2
1.3.	Institutional management of R&D	1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.5, 1.3.6
1.4.	R&D funding	1.4.3, 1.4.4
1.5.	Research infrastructure	1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.6, 1.5.7, 1.5.8
1.6.	Quality assurance	1.6.1, 1.6.2, 1.6.3, 1.6.4, 1.6.5, 1.6.6
1.7.	International cooperation	
1.8.	R&D&I information monitoring	1.8.1, 1.8.2, 1.8.3, 1.8.4, 1.8.5
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6
2.2.	Professional training of research management staff	2.2.1, 2.2.2
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	
3.2.	Innovation and knowledge transfer organisation and management	
3.3.	Intellectual property issues	
3.4.	Commercialization of research output	
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	4.1.1
4.2.	Science and private sector	4.2.1, 4.2.2, 4.2.3

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

10. GEORGIAN NATIONAL SCIENCE FOUNDATION

No of group	Set of recommendations	Activities of each set of recommendation*
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	
1.2.	Legislative issues	
1.3.	Institutional management of R&D	
1.4.	R&D funding	1.4.1, 1.4.3
1.5.	Research infrastructure	1.5.1, 1.5.4

1.6.	Quality assurance	1.6.4, 1.6.5
1.7.	International cooperation	1.7.1, 1.7.2, 1.7.3
1.8.	R&D&I information monitoring	1.8.1, 1.8.2, 1.8.3, 1.8.4, 1.8.5
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	2.1.4, 2.1.5
2.2.	Professional training of research management staff	2.2.1
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	
3.2.	Innovation and knowledge transfer organisation and management	
3.3.	Intellectual property issues	
3.4.	Commercialization of research output	
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	
4.2.	Science and private sector	

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

11. INDUSTRY AND PRIVATE BUSINESS ORGANISATIONS

No of group	Set of recommendations	Activities of each set of recommendation*
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	1.1.2, 1.1.3
1.2.	Legislative issues	
1.3.	Institutional management of R&D	
1.4.	R&D funding	
1.5.	Research infrastructure	
1.6.	Quality assurance	
1.7.	International cooperation	
1.8.	R&D&I information monitoring	1.8.1, 1.8.2, 1.8.5
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	2.1.6
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	3.1.1, 3.1.2, 3.1.3, 3.1.4
3.2.	Innovation and knowledge transfer organisation and management	3.2.2, 3.2.3
3.3.	Intellectual property issues	3.3.5
3.4.	Commercialization of research output	3.4.1, 3.4.2, 3.4.3, 3.4.4
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	4.1.3
4.2.	Science and private sector	4.2.1, 4.2.2

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

12. INDUSTRY AND PRIVATE BUSINESS ASSOCIATIONS		
No of group	**Set of recommendations**	**Activities of each set of recommendation***
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	
1.2.	Legislative issues	
1.3.	Institutional management of R&D	1.3.1
1.4.	R&D funding	
1.5.	Research infrastructure	
1.6.	Quality assurance	
1.7.	International cooperation	
1.8.	R&D&I information monitoring	
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	3.1.2, 3.1.3, 3.1.4
3.2.	Innovation and knowledge transfer organisation and management	
3.3.	Intellectual property issues	
3.4.	Commercialization of research output	
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	4.1.2
4.2.	Science and private sector	4.2.3

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

13. REGIONAL AND LOCAL AUTHORITIES		
No of group	**Set of recommendations**	**Activities of each set of recommendation***
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	
1.2.	Legislative issues	
1.3.	Institutional management of R&D	1.3.5
1.4.	R&D funding	
1.5.	Research infrastructure	
1.6.	Quality assurance	
1.7.	International cooperation	
1.8.	R&D&I information monitoring	
1.9.	Research ethics	1.9.3, 1.9.4
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	

3.1.	Strategic development of innovation and knowledge transfer policy	
3.2.	Innovation and knowledge transfer organisation and management	3.2.1, 3.2.2, 3.2.3
3.3.	Intellectual property issues	
3.4.	Commercialization of research output	
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	
4.2.	Science and private sector	4.2.3

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

14. SAKPATENTI

No of group	Set of recommendations	Activities of each set of recommendation*
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	
1.2.	Legislative issues	
1.3.	Institutional management of R&D	
1.4.	R&D funding	
1.5.	Research infrastructure	
1.6.	Quality assurance	
1.7.	International cooperation	
1.8.	R&D&I information monitoring	
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	
3.2.	Innovation and knowledge transfer organisation and management	
3.3.	Intellectual property issues	3.3.1, 3.3.3, 3.3.4, 3.3.5
3.4.	Commercialization of research output	
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	
4.2.	Science and private sector	

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

15. NON-GOVERNMENTAL ASSOCIATIONS OF SCIENTISTS

No of group	Set of recommendations	Activities of each set of recommendation*
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	
1.2.	Legislative issues	
1.3.	Institutional management of R&D	

1.4.	R&D funding	
1.5.	Research infrastructure	
1.6.	Quality assurance	
1.7.	International cooperation	
1.8.	R&D&I information monitoring	1.8.3
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	2.1.2
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	3.1.2
3.2.	Innovation and knowledge transfer organisation and management	
3.3.	Intellectual property issues	3.3.1, 3.3.3, 3.3.4, 3.3.5
3.4.	Commercialization of research output	
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	4.1.1, 4.1.3
4.2.	Science and private sector	

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

16. MEDIA

No of group	**Set of recommendations**	**Activities of each set of recommendation***
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	
1.2.	Legislative issues	
1.3.	Institutional management of R&D	
1.4.	R&D funding	
1.5.	Research infrastructure	
1.6.	Quality assurance	
1.7.	International cooperation	
1.8.	R&D&I information monitoring	
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	
3.2.	Innovation and knowledge transfer organisation and management	
3.3.	Intellectual property issues	3.3.4
3.4.	Commercialization of research output	
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	4.1.3
4.2.	Science and private sector	

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set

17. POLITICAL PARTIES

No of group	Set of recommendations	Activities of each set of recommendation*
1.	**Reorganizing the public R&D policy system**	
1.1.	Steering of the R&D policy	
1.2.	Legislative issues	
1.3.	Institutional management of R&D	
1.4.	R&D funding	
1.5.	Research infrastructure	
1.6.	Quality assurance	
1.7.	International cooperation	
1.8.	R&D&I information monitoring	
1.9.	Research ethics	
2.	**Human resource development and the status of researcher**	
2.1.	Research career, mobility and internationalization	
2.2.	Professional training of research management staff	
3.	**Fostering industry-university-R&D institution partnership**	
3.1.	Strategic development of innovation and knowledge transfer policy	3.1.1, 3.1.2, 3.1.3
3.2.	Innovation and knowledge transfer organisation and management	
3.3.	Intellectual property issues	
3.4.	Commercialization of research output	
4.	**Increasing public awareness of the role of R&D**	
4.1.	Science, higher education and society	
4.2.	Science and private sector	

***Activities of each set of recommendation –** each point indicated in this column corresponds to the number of recommendation within the set