Slovakia to the first league
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Introduction

The creation of a functional knowledge economy is a necessary precondition for a long-term increase of living standards and competitiveness of the economy in Slovakia

The Slovak economy is currently experiencing one of the highest growth rates in the European Union. We owe our present strong competitive position to a reform package adopted between 1999 and 2005; these reforms created the necessary preconditions for the economic growth today. However, if the economy is to continue to grow for at least the next decade, and if employment and wages are to grow with it, it is essential to initiate another wave of systemic and complex reform measures to support future economic competitiveness. Unlike past reforms though, we do not advocate further restrictive measures; on the contrary, today it is necessary to make good use of the existing economic growth and invest in the creation of a modern economy based on knowledge and innovation.

It is generally known that from a long-term perspective it is not possible to keep raising living standards and, at the same time, base the competitiveness of the economy on low input costs. The key to long-term competitiveness is therefore productivity growth based on innovation. The purpose of a knowledge economy is to create an environment in which education, research and development (R&D) and entrepreneurship sectors maximize their cooperation with a goal of not just generating new ideas, but also turning those ideas into more effective processes and new products.

The primary objective of the education system is therefore to train skilled and creative young people who are able to process new information, capable to work in teams, and willing to undergo certain risks. The research and development sector must attract some of these people and create an environment in which they can undertake cutting-edge basic and applied research. Educated people must also face the conditions which enable them to turn to entrepreneurship and transfer the ideas generated via R&D into practice and thus create globally competitive Slovak companies. Educated people who do not wish to become entrepreneurs must be prepared for employment in existing firms, where their skills can be used to improve existing processes and thus further increase the productive potential of the Slovak economy.

In other words, the goal of building a knowledge economy is to create an environment, in which people with high quality education could work on developing unique ideas, and their entrepreneurial colleagues could use these ideas to generate new job opportunities and improve living standards of their compatriots through innovative technological firms. Instead of serving as an assembly line reproducing the ideas of others, Slovakia should thus become a place where new production processes and products are developed to be assembled at home or in other, less developed, countries.
In the past, the rate and scope of structural reforms was significantly better in Slovakia than among its neighbors. We share the same ambition as we aim at creating a knowledge economy: leave behind countries like the Czech Republic, catch up with countries like Austria, and thus get Slovakia into the first league of countries with the highest standards of living.

What is the State of Knowledge Economy in Slovakia?

The need to develop innovative potential and to create a knowledge economy is not a new idea. The foundations for a knowledge economy were laid in 2005 by the Minerva competitiveness strategy, the goal of which was to set the course for the Slovak economy for the following electoral periods. Thanks to Minerva, knowledge economy became an important topic that drew the interest of leading figures from all political parties.

The initiatives aimed at supporting the development of a knowledge economy have then been incorporated into various strategic documents and activities of both national and local governments. Examples of such initiatives include the Innovation Strategy, the Modernization Program Slovakia 21, the National Strategic Reference Framework, the National Reform Program, and Regional Innovative Strategies.

Despite all this, the state of the knowledge economy in Slovakia remains rather miserable. Slovakia lags behind not only the most advanced OECD countries, but also behind Poland, Hungary and the Czech Republic in a number of areas of critical importance. We are the only Visegrad Four (V4) member with not a single university in any of the leading world university rankings.\(^1\) We have the lowest share of innovative firms in the economy of all V4 countries.\(^2\) In the ranking of top cited scientific articles we are lagging not only behind the V4, but also behind countries such as Brazil, Turkey or Mexico.\(^3\) Slovakia is far behind the leading performers in Europe and our long-term position is deteriorating despite the fact that Slovakia belongs to the group of five EU economies with the fastest growth.

Slovakia’s investments into education, research and development rank among the lowest in OECD. The number of foreign students in Slovakia is negligible, while the outflow of students from Slovakia is among the highest in OECD.\(^4\) In the innovation rankings of EU countries, Slovakia fell from the 18\(^{th}\) to the 23\(^{rd}\) position between 2009 and 2010.\(^5\) Even though a number of strategic documents refer to knowledge economy, high level political coordination and implementation support has been entirely absent until now.\(^6\)

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6. Since 2006 there had been a Government Commission for the Knowledge Society which was chaired by the Deputy Prime Minister responsible for the knowledge society, European affairs, human rights and minorities. However, this commission did not have an explicit goal and a clearly stated responsibility for the coordination of specific initiatives; the Chairperson was in charge of an extensive portfolio. This had gradually led to a decrease in effectiveness and importance and as a result the commission was replaced by the Office of the Plenipotentiary for Knowledge Economy via a Government Resolution no. 34/2011 (16 February 2011).
Our Approach to Building Knowledge Economy

Knowledge economy represents a complex ecosystem, in which the sectors of education, research, development and business are intertwined. It is not a static system, in which each element could be “fixed” independently, but a dynamic entity, in which all parts interact and further develop on the basis of such interactions. For example, companies base their decisions regarding the location of new branches and facilities on the availability of qualified workforce. If companies have access to the workforce with lower qualification, they build assembly lines or service centers, and cooperate with vocational schools and universities. If companies have access to highly skilled personnel, they establish R&D centers or high-tech manufacturing centers, which in turn cooperate and influence R&D institutions. It is not possible to plan everything centrally – it is only possible to aim at directing the whole ecosystem via incentives arising from interactions between all actors.

A modern knowledge economy requires a modern administrative framework, as well as high quality information and communication technologies (ICT). One of the reasons why past attempts to build a knowledge economy have been largely unsuccessful was that existing strategies underestimated the interconnectedness of the elements of the system and sought to resolve each issue or area independently often without actually connecting the national and the regional levels.

The goal of this document is to focus on the interconnections within the innovation ecosystem and instead of a long list of measures and national ambitions we identify the essential critical mass of specific steps, which will allow Slovakia to begin forming an effective innovation ecosystem and thus a true knowledge economy.

When creating this strategy we followed three basic principles:

- Focus only on the most important issues
- Explore the issues and their reasons in depth
- Suggest specific measures to resolve the problems identified

Since the main goal of Minerva 2.0 is to ensure adequate coordination among the activities of the most important actors involved in building a knowledge economy in Slovakia, the objective of this document is not to replace already existing strategies of individual ministries or local governments with our own alternatives. Instead, the objective of this document is to ensure that the activities of relevant authorities do not contradict each other and, if there are gaps between individual initiatives, to ensure that these gaps are filled in. Not all solutions suggested here are new. We have also included already existing and announced measures from other strategic documents where we believed it would be essential to ensure their compliance, coordination, excellence, and result-oriented nature in the process of building the innovation ecosystem in Slovakia.

Each of the areas identified in this document contains other urgent issues that require attention, such as the social inclusion of the Roma population in the education and the industry sectors. The development of a knowledge economy cannot be the sole priority of the government, but it has to be one of the most important ones. Innovation-driven growth is already one of the main priorities of the EU in its Europe 2020 strategy; therefore, the Slovak Republic cannot afford to keep falling behind in this area. Minerva 2.0 should thus become a framework document of the government of the Slovak Republic; Minerva 2.0 should serve as the basis for future National Reform Programs.
A key to a successful reform strategy lies in the ability to take into account the absorption and implementation capacity of the public sector. If a reform strategy contains too many different measures, it may face the problem of a loss of focus and momentum during the process of shaping and carrying out actual implementation plans. However, at the same time, it is crucial not to oversimplify the approach; if the reform strategy does not contain the essential critical mass of fundamental measures needed to make the whole ecosystem work, the entire reform effort will be wasted. For example, investing in grants and scholarships to attract and retain top young researchers at the Slovak research institutions will be unsuccessful without the construction of a sustainable funding model capable of supporting the young generation during both the initial stage and later periods.

This document therefore seeks to identify the essential set of measures that must be implemented to create a functioning innovation ecosystem. All the measures identified must be implemented together, and ignoring any of them may jeopardize the success of the whole wave of reforms.

For each measure we propose the ministries and/or government agencies that should be responsible for the implementation of suggested steps. At the first stage, the entities specified will prepare detailed work-plans which will include specific and measurable progress and performance indicators. Moreover, it will be necessary to identify resources and individuals/agencies responsible for implementation so that by 1 January 2012 it could be possible to:

- Begin implementing those measures that require no legislative changes, and
- Submit proposals for legislative changes necessary for the implementation of the remaining measures.

Funding of individual measures will be a priority of the government of the Slovak Republic.
An Overview of Problems of the Slovak Knowledge Economy and Proposed Solutions

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<td>2  Support of Self-Evaluation Processes</td>
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<td><strong>Connection between Education and Research and Development</strong></td>
<td>Lack of Top Experts</td>
<td>3  The Excellence Initiative – Grants and Awards for Attracting and Supporting Top International Scholars</td>
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<td>5  Science Popularization Program</td>
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<td>Connection between Education and Research and Development</td>
<td>6  Renovation of Buildings of Education and Research Institutions</td>
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<td><strong>Research and Development</strong></td>
<td>Weak Performance of Key Institutions</td>
<td>7  University Governance Reform</td>
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<td>8  Reform of the Slovak Academy of Sciences (SAV)</td>
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<tr>
<td><strong>Connection between Research and Development and Business</strong></td>
<td>Inefficient and Insufficient Financing of Research and Development</td>
<td>9  New Grant Scheme for Academic R&amp;D</td>
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<td>Low Level of Participation in International Cooperation Systems</td>
<td>S.6 Comprehensive Migration Policy Update</td>
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On the following pages, we describe each problem individually, list key causes and suggest solutions. We will develop specific action plans and budgets for implementing the solutions identified below no later than in September 2011.
Specific Measures Aimed to Develop a Knowledge Economy in Slovakia

Education

Problem: Low Quality of Education

An essential necessary condition for the development of a knowledge economy is a system of education capable of preparing individuals with independent and creative thinking. Today, in the information age, it is crucial for the education system to teach young people to effectively absorb, process and generate new information, instead of simply focusing on memorizing already existing information that rapidly becomes obsolete anyway. The current education system fails to reflect the needs of the world beyond the school desk and thus many employers express dissatisfaction with a lack of necessary skills and independence characteristic for university graduates.7

In the education sector, Slovak Republic lags behind other V4 members and the OECD average. While Poland and Hungary do manage to reach the OECD average in student rankings and their results are improving over time, Slovak students have been consistently ranked below the OECD average for the past six years.8 Slovak high school students do reach the OECD average in mathematics and information collection; however, they are substantially weaker in natural sciences and information evaluation. Our students’ main weaknesses lay in the areas which require critical thinking and are therefore most important for the development of a knowledge economy.

The need for a fundamental change in our approach to education is illustrated by the McKinsey study How do the Best Education Systems Keep Improving: “The systems on the way from average to good, in general characterized by less well trained teachers, strictly control the educational process because the minimization of differences among classes and schools is a key performance driver at this stage. On the contrary, systems moving from good to excellent, characterized by more experienced teachers, simply offer more general frameworks for teaching processes and syllabi, because the creativity of teachers, sharing of ideas and innovations within and among schools are the key to further improvements.”9 Slovakia has an ambition to create an excellent education system; however, it is trying to achieve this goal using the tools which are only adequate for systems with a lower overall quality.

Causes and Proposed Solutions

| Outdated educational methods and weak emphasis on the development of students’ key skills | 1: Curriculum Innovation and Structural Changes  
S.7: Internationalization of Education, Science and Innovative Entrepreneurship |
| Low quality of teachers | 2: Support of Self-Evaluation Processes  
S.7: Internationalization of Education, Science and Innovative Entrepreneurship |

7 See the Trend Analyses Survey (May 2010) – more than 60% of participating employers stated that they „always” or „very often” face two problems: graduates who lack the necessary skills and independence and a low number qualified potential employees.
Solution 1: Curriculum Innovation and Structural Changes

We will prepare a complex reform of the education system aimed to support the development of graduates’ key competencies, and to enable both further education of teachers, and better cooperation and teamwork of teachers within and between schools. Proposed changes will primarily focus on:

- Support and development of students’ key competencies and skills, which are necessary for practice and further education with a special emphasis on the reading, mathematics, natural science, finance and digital literacy.
- Special support for students with insufficient level of reading skills. Education of this group faces the risk that the weak ability to read could negatively affect students’ further education and their personal and professional lives. These students will receive special and systematic support from teaching assistants, experts, mentors, etc.
- Reduction of differences in quality of schools – we will create conditions for schools’ development paying special attention to schools with students from socially disadvantaged environments.
- Transformation of schools to organizations learning via cooperation of teams and experts in school and educational institutions. This will be achieved by searching for local solutions and supporting the transfer of best practice, involvement of practice experts in education, and the creation of the necessary conditions for learning within communities.
- Increase of the professionalism of school principals and management.

Responsible for implementation: Ministry of Education

Solution 2: Support of Self-Evaluation Processes

Today, schools, teachers, students and parents have limited information on the basis of which it could be possible to evaluate the quality of education and its value for further versatility. Thus, teachers and principals

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10 According to the PISA 2009 survey, ratio of students in this group in Slovakia is 22.3%; for comparison, this group of students represents 18.8% in the mean of OECD countries.
cannot easily identify needs and opportunities for improvement while parents and students cannot easily identify a suitable school. Therefore, we will support processes, which allow to collect the necessary information and to make that information accessible:

- We will support self-evaluation processes so that teachers’ experiences and creativity could have direct effect on schools’ management and specialization and could enable a progressive quality increase.
- We will support external evaluation and monitoring of schools’ quality – this will enable schools to receive objective feedback regarding the overall level of teaching and the trends at all levels of primary and secondary education – ISCED 1, ISCED 2 and ISCED 3.
- We will support collection and accessibility of information regarding the demand for graduates of different school-types and specializations as well as information on career prospects of graduates of specific schools (employment, further education).

**Responsible for implementation:** Ministry of Education in cooperation with the Ministry of Economy, and the Office of the Plenipotentiary for Knowledge Economy

### Links between Education, Research and Development

**Problem: Lack of Top Experts**

Best students leave to study abroad and top graduates move into the private sector which is usually completely remote from the research and innovation sector. As a result, universities lack a strong middle generation of professors and researchers. The overall quality is still maintained by aging professors, but they have no one to transfer their experience to. As a result, continuity is lost, and if the situation is not addressed the result could be an irreversible decline of higher education, followed by the rest of the economy.

There is no one to replace the students and professors who left because the mobility into the Slovak Republic is significantly restricted by visa and residency policies for foreigners, as well as by various administrative barriers created by the immigration authorities, ministries and embassies. According to OECD data, in 2007, 10.3% of Slovak students studied abroad (more than in Bulgaria, comparable with Uzbekistan and Morocco), but less than 1% of foreign students studied in Slovakia – this is one of the lowest numbers in OECD (comparable with Turkey and Poland, significantly below Hungary and the Czech Republic).\(^{11}\)

To reverse this process, we need to support high quality researchers and scientists so that they do not need to emigrate or move to unrelated areas within the private sector. Moreover, we need to attract top foreign scholars to Slovakia for a limited time or permanently.

The lack of top individuals is relevant not only for professional personnel; it also applies to top managers and administrative personnel, who could bring foreign innovative approaches to Slovakia, improve the student experience, and support university professors and scientists in their work.

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## Causes and Proposed Solutions

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<th>4: Installation Grants for Young Scholars * will cover the initial expenses on top teachers and scholars.</th>
<th>7: University Governance Reform Solution</th>
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<td>3: The Excellence Initiative – Grants and Awards for Attracting and Supporting Top International Scholars *</td>
<td>4: Installation Grants for Young Scholars * will cover the initial expenses on top teachers and scholars.</td>
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<td>8: Reform of the Slovak Academy of Sciences (SAV) will allow to evaluate quality</td>
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<tr>
<td>Infrastructure insufficient for sophisticated research</td>
<td>Some improvement due to EU structural funds, followed by 14: World-Class Infrastructure for Top Research</td>
<td>9: New Grant Scheme for Academic R&amp; D The Excellence Initiative – Grants and Awards for Attracting and Supporting Top International Scholars</td>
<td>10: Grant System for Applied Research</td>
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<td>Poor mental work environment</td>
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<tr>
<td>Access barriers for foreign students, qualified professionals, scholars and professors</td>
<td>5.6: Comprehensive Migration Policy Update</td>
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<td>7: University Governance Reform and 8: Reform of the Slovak Academy of Sciences (SAV) will create more space for initiatives and innovation.</td>
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*Several measures proposed in this document contain some form of a grant system. For the implementation of all these measures, the Recommendation of the European Commission regarding the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers (11 March 2005) will be followed to the maximum extent possible. The document is available at [http://ec.europa.eu/euraxess/pdf/brochure_rights/kina21620b9c_sk.pdf](http://ec.europa.eu/euraxess/pdf/brochure_rights/kina21620b9c_sk.pdf)

### Solution 3: The Excellence Initiative – Grants and Awards for Attracting and Supporting Top International Scholars

We will create a national system for supporting research, which will allow universities and academic research institutions to attract high quality professors from abroad and/or retain top Slovak scientists and professors.
The initiative is modeled after the successful foreign programs such as the *Canada Chairs* and the German *Excellenzinitiative*. An international call for proposals will be published periodically and will allow world class scholars to win a substantial financial grant to carry out research and tertiary education at a particular university or research institute in Slovakia.\(^\text{12}\) The grant may be used for superior remuneration of the holder, as well as for funding research teams and activities.

The support of top researchers will bring a number of benefits to hosting institutions: grant recipients will bring innovative research and teaching techniques thus increasing the motivation of teachers and students. Grant holders will also bring financial resources to support research teams and activities. As a result, potential host institutions will be interested in attracting grant recipients by, for example, weakening the administrative barriers and improving the working environment, which will in turn have a positive effect on all employees and students. Finally, the presence of top scholars will enable hosting institutions to become integrated into international activities and networks of grant recipients.

To remove the administrative burden for employment of grant recipients, we will simplify the relevant migration and labor legislation. Participation in the grant scheme will be based on the following conditions: previous research results of a potential recipient, availability of research in the focus area of an applicant at a potential hosting institution, commitment of a grant holder to participate in teaching activities at a hosting institution or a related university. The grants will be awarded by a committee primarily composed of foreign members who are capable of evaluating the quality of research and publications of applicants.

To further motivate top Slovak scholars and increase their public prestige we will introduce a “research award” for the best Slovak scholars’ project undertaken in the past five years. The prize will be awarded by a group of renowned foreign scholars and will have a value similar to the highest contribution of the Excellence Initiative. However, two conditions will be attached to the award: first, the recipient will invest the award into his or her personal research in Slovakia and second, scholar’s personal remuneration cannot exceed 20% of the award equally spread across the following five years.

*Responsible for implementation:* Ministry of Education in cooperation with the Ministry of Interior, Ministry of Labor and the Office of the Plenipotentiary for Knowledge Economy

**Solution 4: Installation Grants for Young Scholars**

We will create a system of installation grants, which will motivate particularly talented young scholars to continue their research activities beyond their doctoral studies. The grant may be used for superior remuneration of the holder, as well as for funding research teams and activities for the period of three to five years.

Eligible applicants would include graduates of Slovak universities as well as Slovak students who studied and remained abroad, but are interested in returning to Slovakia to continue their work.

The award of the grant will be based on the condition that the recipient remains in a Slovak research entity for the whole duration of funding, and will be awarded by a committee which will include international experts qualified to evaluate the quality of applicants’ research and publications.

*Responsible for implementation:* Ministry of Education in cooperation with the Office of the Plenipotentiary for Knowledge Economy

\(^\text{12}\)For example, in Germany, the grants are usually 5 mil. EUR for a period of 5 years.
Solution 5: Science Popularization Program

Slovakia is one of the few OECD countries, which pay minimum attention to attracting young people to technical disciplines and a scientific or a research carrier. As part of the proposed measures we will build a modern interactive science museum (or several smaller centers) modeled after the most effective and successful examples in OECD. These museums will serve as modern centers for science popularization and will aim at interactivity introducing science and its results to the public with a special focus on children and youth audiences.

According to the model of the EU’s Seventh Framework Program, science popularization will be a condition for the support within the framework of all grants and projects so that scholars do take into account the importance of their research for the society and make efforts to present their research in the best possible way.

In addition, we will create systematic programs and policies for science popularization, with substantial participation from private and non-governmental organizations and with private funding.

Responsibility for implementation: Ministry of Education in cooperation with the Office of the Plenipotentiary for Knowledge Economy

Solution 6: Renovation of Buildings of Education and Research Institutions

Buildings of many research and education institutions are in an appalling condition especially in the Bratislava region which was not eligible for EU structural funding for building renovation. In order to improve the physical working environment and to increase the attractiveness of Slovak universities it is necessary to renew the infrastructure (buildings used for research and education, student housing, dining halls and sport facilities).

Based on best European practices, we will therefore prepare projects for renewal of universities’ and research institutions’ infrastructure funded via innovative financial tools which will allow to avoid using the resources intended for the direct support of research and development.

Responsibility for implementation: Ministry of Education in cooperation with the Ministry of Finance and the Office of the Plenipotentiary for Knowledge Economy

Research and Development

Problem: Weak Performance of Key Institutions

Slovak research institutions are placed at the end of OECD productivity rankings. Not a single Slovak university made its way to any of the leading world university rankings. Producing less than one scientific article per year per person in 2008, Slovakia belonged to the least productive countries in OECD. The situation is even more...
alarming when it comes to the top 1% of cited articles – during the period between 2006 and 2008 Slovak institutions represented less than 0.1% within this category.\textsuperscript{14}

**Causes and Proposed Solutions**

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<td>Lack of incentives to produce high quality research publications</td>
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<td>Low quality management of academic institutions</td>
<td>7: University Governance Reform 8: Reform of the Slovak Academy of Sciences (SAV)</td>
</tr>
<tr>
<td>Lack of high quality individuals</td>
<td>3-6: The Excellence Initiative – Grants and Awards for Attracting and Supporting Top International Scholars and other measures</td>
</tr>
</tbody>
</table>

**Solution 7: University Governance Reform**

On the basis of an analysis of best practices of governance and institutional funding from abroad, we will prepare the second amendment to the University Act which will cover administration and funding of universities. The key element of the reform will be the change in the method of election or appointment, formation, allocation of responsibilities, assignment of a particular status and establishment of mutual relations between entities which participate in universities’ administration and governance. The proposed adjustments will aim at ensuring that the interests of the academic governing bodies are properly balanced with the interests of the science elite and external stakeholders of universities (cities, private partners, etc.).

In the funding area we will focus on analyzing and increasing the efficiency of a differentiated remuneration system based on key performance indicators and priorities set by the ministry. Evaluation criteria must include the cooperation with the private sector in education and research areas. We will also introduce rules for collecting and publishing the information regarding the operation of public universities in order to allow the public a higher level of control over the governance and operation of public universities. The same rules will apply to private universities, in case they are benefiting from public funds.

*Responsible for implementation:* Ministry of Education

\textsuperscript{14}Measuring Innovation, OECD 2010, pages 98-99.
Solution 8: Reform of the Slovak Academy of Sciences (SAV)

The current operation of the Slovak Academy of Sciences is problematic in several respects. First, there are significant differences between the quality of research and scope of educational activities among the individual institutes of the Academy. Second, various legal and administrative barriers serve as a hindrance for the development of the Academy. Third, if the state is expected to continue providing a decisive part of the Academy’s budget, it is necessary for the Academy’s employees to carry out activities that bring direct benefits to a wider public (when they are carrying out applied research and development), or to play a systematic role in the process of tertiary education (when they are carrying out basic research).

We will therefore carry out a fundamental reform of the Academy with the aim to better support top employees and institutes and to reform (and in the worst case eliminate) elements of the Academy that fail to meet the parameters specified above. As part of the reform, we will change the legislative acts governing the Academy, as well as the rules for the Academy’s financing, in order to increase pressure to deliver quality.

Among others, the following measures will be included in the reform:

- Reduction of budgetary institutional financing of the Academy in favor of financing based on measurable key performance indicators. The reform will specify the methods for both adjusting and measuring the criteria. Moreover, transitional arrangements will be included – these will ensure that in the short-term there is no reduction in the resources transferred to SAV, and in both the short- and the long-term there is no reduction in government spending on science and research.
- Introduction of conditions for institutional financing of the Academy; activities of the Academy will have to directly benefit the wider society and/or be a systemic element of the tertiary education system.
- Transformation of the Academy from a state organization into a public research institution entitled to form private enterprises, contribute to equity and lease intangible assets.
- Transfer of state property currently managed by the Academy to the ownership of the Academy or its individual institutes on the basis of an independent expert analysis which will evaluate options and propose measures to protect state property.
- Introduction of common procedures and binding rules in areas of administration, management of intellectual property, cooperation with the wider society, etc.

Responsible for implementation: The Slovak Academy of Sciences in cooperation with the Ministry of Education and the Office of the Plenipotentiary for Knowledge Economy

Links between R&D and Businesses

Problem: Inefficient and Insufficient Financing of Research and Development

The volume and structure of private and public funding of R&D in Slovakia significantly lags behind the needs of a modern knowledge economy. Volume-wise, Slovakia is at the tail end of EU and OECD countries. Although the overall volume of planned public R&D funding is growing rapidly thanks to EU structural funds, the structuring and expenditure rules are absolutely inadequate. In the last three years, more than one billion EUR was invested into science without any clear strategy (from the point of view of public expenditure and obligations). On the other hand, Slovakia lacks a number of key mechanisms for providing essential state support during the particular stages of R&D, necessary due to standard market failures such as positive externalities. In particular,
there is no support for private research that leads to new technologies or solutions for specified economic or societal problems.

The vast majority of public R&D expenditure outside the scope of EU structural funds in Slovakia takes place in the form of non-competitive institutional financing; in other words, it is not allocated through the competition of specific research teams and specific research proposals, but as a financial package for entire institutions. Decisions regarding further redistribution and allocation of these funds are made by universities and SAV; most of these funds flow into basic research.\(^\text{15}\)

### Causes and Proposed Solutions

<table>
<thead>
<tr>
<th>Cause</th>
<th>Proposed Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low national investment into R&amp;D</td>
<td>The implementation of the majority of proposed measures generates room for a more effective funding of R&amp;D</td>
</tr>
</tbody>
</table>
| Low private sector investment into R&D and a lack of developed risk capital market | 16: Innovative R&D Funding Program (SBIR)  
17: Stimuli for industrial R&D  
JEREMIE Program                                                           |
| Existing funding schemes take little account of quality and results   | 9: New Grant Scheme for Academic R&D                                                                                       |
| Too many resources are directed towards generic institutional support  | 7: University Governance Reform and  
8: Reform of the Slovak Academy of Sciences (SAV) will change the funding system for R&D at these institutions |
| Undirected and uncoordinated use of research institutes run by ministries | 10: Grant System for Applied Research                                                                                      |
| Inefficient use of the EU structural funds                            | 14: World-Class Infrastructure for Top Research                                                                            |
| Weak participation of Slovak institutions in international programs   | 9: New Grant Scheme for Academic R&D will also include measures which will strengthen APVV’s (Agency for the Support of Research and Development) function to gather and share information regarding international opportunities.  
10: Grant System for Applied Research will contain specific measures for supporting bilateral cooperation. |
| No funding from universities’ own resources                           | 9: New Grant Scheme for Academic R&D and solutions 10-14 will allow universities to profit from their own research activities and will enable re-investment into R&D |

15 See Higher Education to 2030, Volume 2: Globalization. OECD, 2009, pages 152 and 155: In 2006, 94% of resources directed towards research and development came from the budgetary institutional sources and 80% flowed into basic research – this proportion is substantially higher than the OECD average.
Solution 9: New Grant Scheme for Academic R&D

Slovakia does have a specialized state agency for competitive R&D funding (Agency for the Support of Research and Development/Agentúra pre vedu a výskum - APVV), but it does not work efficiently. It currently fails to generate optimal financing programs or pick high-quality projects transparently. Its existing grants have suboptimal administrative and substantive rules. Moreover, the financing of APVV from public sources is very unstable. We will therefore carry out a systematic reform of APVV aimed at removing the existing inefficiencies; we will revise internal processes and the project evaluation system.

The research projects of Slovak institutions will also enable financing of foreign partners (partnerships with foreign institutions) under the condition that it will help protect intellectual property created in Slovakia. We will also establish conditions for increasing the participation of as many top foreign scientists and science management professionals as possible in the management and administration of APVV. We will create a system of guaranteed funding, which stabilizes the base rate of funding for APVV from public sources. Moreover, we will develop a system of regular evaluation of economic and social benefits. We will also strengthen the information gathering and sharing functions of APVV to support the participation of Slovak subjects in European research structures and grant schemes.

In the basic and applied research sectors, we will take into account the different needs and financial demands of research in the sectors of natural or social sciences and develop different grant schemes or proposals which match their specific needs. We will make specific calls aimed at assessing public policies and social experimentations which aim to support national research satisfying the specific needs of the Slovak society.

A part of the reform will also be responsible for the creation of a multistage funding scheme for supporting basic and applied research with the following parameters:

- Initial small scale funding assigned through a transparent selection process involving public reviews of applications by a committee of experts
- Follow-up larger scale financing awarded on the basis of a public review of the progress achieved. Such a procedure is to be carried out by an independent public committee with a majority of foreign reviewers.

Responsible for implementation: Ministry of Education in cooperation with the Office of the Plenipotentiary for Knowledge Economy

Solution 10: Grant System for Applied Research

At the moment, there is no effective, transparent and stable grant scheme for supporting applied R&D reflecting the needs of the economy and the wider society in Slovakia. Even though Slovakia has signed over 20 bilateral treaties on international cooperation in the field of research and development, the real possibilities for cooperation are limited. Except for supporting mobility of researchers, no specific policies or funding schemes are available for the support of long-term cooperation on R&D activities between Slovak companies or institutions and their foreign partners. Given that many countries invest significant resources into bilateral cooperation, for a modest investment, Slovakia could use such bilateral treaties to assist innovative firms and research institutions in finding interesting partners with strong domestic financial and institutional support.

Following up on the reform of APVV, we will create a new demand-based grant scheme for supporting applied R&D and will review the allocation of grant funds between basic and applied research to ensure proper balance.
The system will be based on similar principles of transparency and efficiency as the grant scheme for academic R&D. In this case however, we will only fund projects based on the demands of the economy or the wider society and aimed at generating new, directly applicable, products, technologies, processes, services or policies usable in Slovakia and showing a global potential.

In addition to direct research activities, the system will also contribute to the financing of indirect activities supporting research collaboration between the industrial sector and academia – a practice generally undertaken by the state even in the most advanced OECD countries. The system will also allow the financing of foreign partners (partnerships with foreign institutions) and will create opportunities for the national support of internationally highly rated projects developed under the EU Framework Programs.

*Responsible for implementation:* Ministry of Education in cooperation with the Ministry of Economy and the Office of the Plenipotentiary for Knowledge Economy after consultations with the Ministry of Agriculture and Rural Development

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**Solution 11: Radical Efficiency Improvements in the Use of EU Structural Funds for R&D and Innovation**

Innovation-based growth is one of the key priorities of the European Union declared in the Europe 2020 strategy. It is therefore quite likely that in line with the strategic priorities of the EU, Slovakia will have at its disposal an increased amount of structural funds aimed at supporting research and development in the 2014-2020 programming period compared to the previous cycle.

These funds can significantly improve the quality of science and the global competitiveness of the Slovak economy. However, such improvements will materialize if and only if we use the funds in a dramatically more efficient manner than up to date. In other words, in the future, structural funds need to be used in accordance with a well prepared and thought out systemic strategy, and the focus has to be transferred from the current control of formal processes (reports, validation and documentation) to useful outputs of projects.

We will therefore develop such a systemic strategy, including the relevant operational programs. Towards this aim we shall carry out systematic and detailed analyses (midterm reviews) of the current working of the Operational Program “Research and Development, Education and Competitiveness and Economic Growth”. We will compare the programs to relevant international benchmarks, identify gaps in existing programs, and carry out feasibility studies for the main priorities identified so that the future setting of these programs and their calls for proposals grow out of the actual needs and capabilities of Slovak science, the wider economic and social practice, and in accordance with the innovative needs of self-governing regions identified in regional innovation strategies.

*Responsible for implementation:* Ministry of Education in cooperation with the Ministry of Economy, Ministry of Transportation, Ministry of Finance, Ministry of Healthcare, Ministry of Agriculture and Rural Development and the Office of the Plenipotentiary for Knowledge Economy

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Problem: Ineffective Transfer of Knowledge to Practice

Thanks to the adoption of the Bayh-Dole Act in the USA in 1980, US universities were granted the right and responsibility to patent the results of research financed from federal funds. The universities have thus gained an ability to license the results of their research and profit from its commercialization. The universities have responded by forming a well thought out professional system of specialized policies and offices, whose role is to protect the intellectual property of universities and facilitate the transfer of knowledge and ideas to the commercial sector. Many European countries such as Great Britain, Germany, Denmark and Belgium followed the US example. In 2004, the income of universities from licensing rights exceeded 900 million USD in the USA, 80 million dollars in Australia, and 3 million EUR in Switzerland.17

Slovakia fails to properly motivate universities to actively assist its students, teachers and scientists to commercialize the results of their work. The legal status of universities and research institutes funded by the state and the rules governing their asset management create barriers for cooperation with entrepreneurs. Despite low equipment utilization rates, institutions are often not allowed to make this equipment available to entrepreneurs who are interested in using the equipment for applied R&D and are willing to provide the institution with a share in the benefits of the research.

The result is an extremely low patent activity of universities. Out of more than 4 thousand patent applications filed by EU member-states and over 16 thousand in the whole OECD between 2004 and 2006, only two applications originated from Slovak universities, while Czechs and Austrians submitted 13 and 124 applications respectively.

Causes and Proposed Solutions

| Lack of incentives for scholars and institutions | 12: National Technology Transfer System |
| Lack of awareness about the benefits of commercialization among scientists | 12: National Technology Transfer System |
| Problematic intellectual property (IP) legislation | 13: Legislation and Procedures Influencing Intellectual Property |
| Problematic legislation related to public asset management and management of assets financed by public or European funds | 13: Legislation and Procedures Influencing Intellectual Property |
| Lacking infrastructure | 14: World-Class Infrastructure for Top Research |
| Lack of qualified personnel who could manage the transfer | 12: National Technology Transfer System |

Solution 12: National Technology Transfer System

We will form a unified national system for technology transfer (TT), designed to efficiently support and manage the commercialization of intellectual property generated in academia. The system will focus on technology transfers through licensing and formation of spin-off enterprises and will be based on long-term self-financing.

The system will be created in such a way as to allow every research university and research institution to achieve their goals optimally, i.e. to commercialize the outputs of their R&D activities most efficiently. The system will have two tiers: (1) independent technology transfer offices at individual universities or research institutions; and (2) a common office (National TT Center), which will carry out strategic and support activities with significant economies of scale. In other words, activities that could be carried out in a better and a more effective way in a centralized manner will be carried out together.

The national center should be an independent legal body. Members of this center would be selected universities and public research institutes, the Center of Scientific and Technical Information (Centrum vedecko-technických informácií – CVTI) and potentially an external non-profit partner with international know-how and TT expertise. The center will offer its services through its own employees, specialized external expert partners and the business community.

**Responsible for implementation:** The Office of the Plenipotentiary for Knowledge Economy in cooperation with the Ministry of Education, Ministry of Economy, and the Slovak Academy of Sciences after a consultation with the Ministry of Agriculture and Rural Development

Solution 13: Legislation and Procedures Influencing Intellectual Property

Intellectual property rights for the results of research and development at universities and research institutes are often unclear under the current legal and contractual relations. The rules and methods of protecting intellectual property thus fail to generate sufficient incentives for research institutions and their employees to focus on applied research and commercialization of its results.

In cooperation with a specialized international expert institution we shall prepare a detailed analysis of the legal environment of the Slovak Republic concerning the intellectual property in the academic and research spheres. As a part of the analysis, we will compare the relevant Slovak legislation (interaction of IP law, acts governing the management of state property, acts governing the operations of universities, etc.) with best foreign practice. On the basis of this analysis, we will prepare a new, unified legislative framework including specific legislative changes needed to remove the barriers identified.

We will also compare internal IP rules, employment and other contracts between universities, their employees and related firms to best foreign TT practice and will prepare model guidelines and contracts that will motivate Slovak universities and their employees to support applied research and technology transfer.

**Responsible for implementation:** Ministry of Culture in cooperation with the Industrial Property Office of the Slovak Republic, Ministry of Finance, Ministry of Education, Ministry of Economy and the Office of the Plenipotentiary for Knowledge Economy
Solution 14: World-Class Infrastructure for Top Research

World-class research that also leads to practical economic applications requires a superior research infrastructure. We will therefore start the development of research and technology parks (in the form of university science parks) and world-class national research centers in the vicinity of existing universities.

University Research Parks (Univerzitné výskumné parky – UVP) combine the physical infrastructure (buildings and equipment) for academic and commercially oriented research and the support services for the formation of innovative technology firms and the transfer of knowledge and technology into practice. Specific technology transfer tools, such as technology incubators and shared infrastructure for innovative companies will therefore be an integral part of UVPs. The activity of UVPs will be managed by professionals and designed to operate sustainably and efficiently. In practice, this requires financing from sources other than grant schemes and public funding, i.e., via the participation of private capital.

We will also build a network of national science centers within the largest UVPs and in cooperation with universities in smaller cities using the capacities of already existing research facilities. These centers will focus on world-class research in such fields as biotechnology and biomedicine, IT, materials and energy.

Responsible for implementation: Ministry of Education in cooperation with the Office of the Plenipotentiary for Knowledge Economy, Ministry of Economy, Ministry of Healthcare, and Ministry of Finance after a consultation with the Ministry of Agriculture and Rural Development

Entrepreneurship

Problem: Few and Weak Domestic Technological Firms

In all developed economies, newly formed companies represent the main source of economic competitiveness and long-term job creation. However, too few truly innovative firms are formed and manage to actually flourish in Slovakia. If the structure of the work environment is taken into account, Slovak firms belong amongst the least innovative in OECD.18 The number of small and medium enterprises (SMEs) that introduce innovations in products or processes is deeply below the EU average and keeps falling. Moreover, companies’ R&D expenditure is declining as well, and the number of SMEs dedicated to or cooperating in innovation is falling.19

The JEREMIE Initiative is aimed at bridging the gap in financing of newly formed SMEs in the EU. Although the necessary contracts for launching JEREMIE have been signed in 2009, no financial intermediaries have been selected up to date and therefore no funds have been made available in Slovakia. It is therefore necessary to make use of the recent initiative of the Ministries of Economy and Education and re-launch the program to promptly allocate and use the resources to support innovative SMEs in Slovakia.

Causes and Proposed Solutions

<table>
<thead>
<tr>
<th>Lack of entrepreneurial spirit</th>
<th>15: International System of Technology Incubators</th>
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<tbody>
<tr>
<td>Lack of capital</td>
<td>16: Innovative R&amp;D Funding Program (SBIR)</td>
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<table>
<thead>
<tr>
<th>Legislative barriers</th>
<th>12: National Technology Transfer System</th>
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<tbody>
<tr>
<td></td>
<td>13: Legislation and Procedures Influencing Intellectual Property</td>
</tr>
<tr>
<td>Legislative barriers for foreign entrepreneurs</td>
<td>5.6: Comprehensive Migration Policy Update</td>
</tr>
<tr>
<td>Weak technology transfer</td>
<td>12: National Technology Transfer System</td>
</tr>
<tr>
<td>Weak access to international knowledge and resources</td>
<td>15: International System of Technology Incubators</td>
</tr>
</tbody>
</table>

**Solution 15: International System of Technology Incubators**

We will adopt best practices from other European countries to create an incubation program aimed at effectively supporting newly formed Slovak technology-oriented companies. The program will seek to kick-off the innovative drive of such firms via facilitating their access to international business networks and high value-added international capital, capital which brings investors with valuable contacts and management experience.

At the core of the system we will create a program that will allow the most promising firms to make short-term visits to the best foreign incubators in key technology areas such as the Silicon Valley. At the same time, we will form domestic technology incubators within the UVPs, which will provide access to highly sophisticated technological equipment (R&D equipment) as well as high value-added services (management coaching, legal services in the field of IP law, training and support in the areas of business planning and development, facilitation of access to foreign venture capital, technology and innovation clusters, customers and business partners).

By focusing on the supply of services and the facilitation of contacts with the attached research institutions, the local technology incubators will be able to avoid all the mistakes made by the currently existing but dysfunctional “entrepreneurship incubators”.

*Responsible for implementation:* The Ministry of Economy in cooperation with the Ministry of Education and the Office of the Plenipotentiary for Knowledge Economy

**Solution 16: Innovative R&D Funding Program (SBIR)**

While APVV shall provide grants for basic and applied research, the task of the SBIR program is to finance enterprises that will transfer the results of applied research into practice. The SBIR program thus fills-in a significant gap in the financing of newly formed innovative companies. If a firm can provide a functioning prototype, it will be able to obtain venture capital for further development. However, the majority of venture capital funds are not ready to finance new companies during an important development stage, in which they carry out a proof of concept and develop the first prototype. The SBIR program, originally created in the USA and successfully introduced in many OECD countries, removes this critical financing gap caused by a market failure and capable of destroying a number of publicly beneficial innovative companies.
Just like APVV grants, SBIR grants will have two stages and will be evaluated by an independent committee with a majority of foreign members. During the first stage, enterprises will be awarded grants of approximately 100,000 EUR to finance the proof of concept. Firms that present a successful proof of concept will be eligible for a second stage award of 1 million EUR for the development of a commercially viable prototype.

The SBIR program provides welfare gains over and above the firms, that manage to successfully present their prototype, obtain external financing and start generating jobs and taxable income. Even projects that ultimately fail can be beneficial for the society at large, because they help spread information and skills that can be used by the recipients or their successors in future projects.

*Responsible for implementation:* The Ministry of Economy, in cooperation with the Ministry of Finance and the Office of the Plenipotentiary for Knowledge Economy after a consultation with the Ministry of Agriculture and Rural Development

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**Problem: Weak Involvement of International Companies in R&D**

Despite the presence of a large number of technologically advanced multinational corporations such as CISCO, IBM, Volkswagen, Kia and so forth, these corporations have neither significant development centers in Slovakia nor do they invest substantially in R&D. On the contrary, the most inventive and capable employees are often transferred abroad. In Slovakia, industrial investment into R&D had fallen from 0.5% to 0.25% of GDP between 1998 and 2008, in stark contrast to the EU average of 1%, the OECD average of 1.5% or Austria, where industrial investment in R&D grew during the same period from 1% to almost 2% of GDP.\(^\text{20}\)

In contrast to Bratislava, many Central European cities, such as Brno, Wroclaw, Krakow, Budapest and Plzeň – Bory, are experiencing the development of concentrated technological sites. Slovakia is not using this potential almost at all. R&D centers of large corporations play a vital role in the economy not only because they provide additional employment, but also because they help to anchor the related manufacturing processes. While an assembly line can in principle be moved rather easily, it is much more difficult to relocate major R&D centers, because the number of suitable locations is restricted.

There is almost no direct or indirect governmental support for industrial R&D (IR&D) in Slovakia. While Austria, the Czech Republic, and Hungary invest between 0.1% and 0.2% of GDP into government support for IR&D and as many as 22 EU member states offer fiscal stimuli for this purpose, funding of IR&D in Slovakia flounders around 0.025% of GDP.\(^\text{21}\)

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**Causes and Proposed Solutions**

<table>
<thead>
<tr>
<th>Lack of incentives</th>
<th>14: World-Class Infrastructure for Top Research will generate an environment attractive for private research centers 17: Stimuli for industrial R&amp;D will provide additional funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative barriers</td>
<td>5.2: De-Bureaucratization of EU Structural Funds 5.4: Amendment of the Public Procurement Act</td>
</tr>
</tbody>
</table>

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\(^\text{21}\) Ibid, page 77.
Solution 17: Stimuli for Industrial R&D

The current division of responsibilities in areas of investment and non-investment stimuli leads to the fact that there are no uniform, systematic, effective and reliable rules for providing investment stimuli for research and development. Existing investment stimuli focus primarily on attracting foreign investors and creating jobs, regardless of the impact of investments on R&D. The Act on Incentives for R&D does lay down rules for the provision of non-investment incentives; its actual use however is unpredictable and inconsistent.

We will therefore design clear rules for providing investment and non-investment stimuli for notable research and development projects, including the requisite benefits of the investment for the Slovak R&D and especially for projects with a clear application in practice. At the same time, we will propose the rules for supporting large demand driven projects of business R&D. These rules will be published in order to allow large Slovak and foreign companies to take the rules into account during the planning process and to make Slovakia more attractive for large business R&D.

Responsible for implementation: The Ministry of Economy in cooperation with the Ministry of Education, Ministry of Finance and the Office of the Plenipotentiary for Knowledge Economy after a consultation with the Ministry of Agriculture and Rural Development

Links between Entrepreneurship and Education

Problem: Education Disconnected from Practice

The supply of existing professional training does not adequately match the current practice demands of the economy. Even though a strategy for lifelong learning was adopted in 2007 and was followed by the 2009 Act on Lifelong Learning, systematic implementation is still absent especially when it comes to the acceptance of informal professional training.

The growth of a knowledge economy does not depend only on high-tech innovation. The spread of existing technologies and processes throughout the economy plays an equally important role. A large number of productivity improving innovations can be well known in the country or within a sector, and yet these innovations may still remain unknown to most firms.

Causes and Proposed Solutions

<table>
<thead>
<tr>
<th>Conservative school management</th>
<th>18: Lifelong Education System will serve as a source of motivation for opening the system to companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative barriers preventing firms from providing training on the basis of their own technology</td>
<td>18: Lifelong Education System</td>
</tr>
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</table>
**Solution 18: Lifelong Education System**

In a modern economy, innovation spreads not only from academia and newly formed technological firms, but also via employees of individual companies. The innovative potential of countries such as Great Britain or Finland is multiplied by a system of lifelong education that allows employees to get acquainted with the newest procedures and processes relevant for their professions.

A lifelong education system also provides an additional source of funding for the best performing vocational schools and universities and thus motivates such institutions to keep pace with the latest developments in the educational field and to cooperate with leading innovative enterprises.

We will modify the Slovak legislation to bring it in line with the best performing systems of lifelong learning available abroad and we will create conditions that will provide incentives for universities, professional schools and certified bodies for specialized education to form lifelong education programs, and, at the same time, motivate companies and public institutions to make such programs available to their employees.

*Responsible for implementation:* The Ministry of Education in cooperation with the Ministry of Economy

**Problem: Lack of Entrepreneurial Skills Training**

Even though proficient scientists and researchers are very important for the knowledge economy, innovative enterprises are still needed to develop ideas and bring them into practice. But such companies need well trained managers as much as proficient researchers. However, educational programs focusing on the development of entrepreneurial spirit (as opposed to a purely academic study of management or accounting) do not exist in Slovakia.

**Causes and Proposed Solutions**

<table>
<thead>
<tr>
<th>Causes</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| Outdated educational methods | 1: Curriculum Innovation and Structural Changes  
19: Support for Practice Oriented Entrepreneurship Training |
| Low quality of teachers | 1: Curriculum Innovation and Structural Changes |

**Solution 19: Support for Practice Oriented Entrepreneurship Training**

We will review and update educational programs for teaching entrepreneurial skills at primary and secondary schools and will support this type of training at all school levels. The programs will focus not only on the procedural aspects of forming and running companies, but also on developing such skills as initiative, entrepreneurship, creativity, risk acceptance, and the ability to plan and run projects with clear objectives.

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22 See for example Phillip Toner, *Workforce Skills and Innovation*. OECD, 2011, page 21. Toner shows that in 2004 and 2005, only 2% of Australian innovative companies were looking for additional researchers, while 22% needed employees with entrepreneurial skills.
On the basis of prepared guidelines we will provide teaching materials and training for teachers. As part of the support of best practice transfers we will provide funding for teachers’ training in the sector under consideration. We will also support or create student competitions in this field. Moreover, we will provide students an opportunity to gain practical experience via internships within the UVPs’ and the companies’ frameworks.

*Responsible for implementation:* The Ministry of Education in cooperation with the Ministry of Economy

### Systemic Failures

#### Problem: Lack of Political Coordination

Even though a number of strategies have been formulated to build an innovation system or a knowledge economy in Slovakia, none were implemented successfully. To maintain the reform momentum and to overcome the natural institutional resistance, it is crucial to ensure that the process of building a knowledge economy receives sufficient attention and support from both the national and the regional levels. Moreover, it is essential to coordinate and drive all initiatives not only at the time when the action plans are prepared, but also throughout the entire implementation process.

### Causes and Proposed Solutions

<table>
<thead>
<tr>
<th>Lack of top level political coordination</th>
<th>S.1: Government Innovation Council</th>
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<tbody>
<tr>
<td>Lack of mechanisms for the collection and evaluation of information concerning the implementation of planned measures and the actual impact of steps undertaken</td>
<td>Action plans formulated on the basis of this strategy will contain clearly specified objectives; S.1: Government Innovation Council shall monitor the progress made</td>
</tr>
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</table>

#### Solution S.1: Government Innovation Council

We will form the innovation council which will be responsible for coordinating and supervising the implementation of Minerva 2.0; moreover, the council will coordinate the implementation of Minerva with the relevant departmental strategies (e.g., the Innovation Policy, Strategy Fénix, etc.). The Council will be chaired by the Deputy Prime Minister and the Minister of Finance and will consist of the Minister of Economy, the Minister of Education and the Plenipotentiaries for Knowledge Economy and Informatization. The Innovation Council will be responsible for coordinating the development of action plans for building a knowledge economy, overseeing their implementation, monitoring key qualitative and quantitative performance indicators and making decisions regarding the path of the innovation policy of the Slovak Republic.

Goals and clearly defined reporting mechanisms will be part of individual action plans. The innovation council will receive performance and implementation reports for each individual measure at least twice a year, and will decide on further steps.
**Problem: Administrative Burden and Administrative Barriers**

Whether we examine the system of school inspection, the organizations managing the EU structural funds, or the public procurement act, we will discover a common trait in the rules and institutions involved: suspicion towards citizens and a desire not only to evaluate the outputs of individuals’ activities, but also to control and manage in detail the entire process used to achieve such outputs.

In the name of fighting corruption, managing quality and ensuring efficiency in the use of public funds, the state attempts to create the strictest rules possible to limit the powers of bureaucrats, and to dictate in as much detail as possible how public officials, citizens and firms should act.

The results are counterproductive. The resulting net of rules has two basic effects. First, the interplay of the huge set of rules often requires public officials to interpret the requirements, and as a result public officials with little or no real world implementation experience build up on the already burgeoning set of laws and rules using additional instructions and requirements. On the other hand, the vast array of rules creates a disincentive for public employees to make decisions, because they risk being penalized for violations. As a result, many officials hide behind the rules and request endless series of explanations, confirmations and proofs to avoid having to make hard decisions.

Instead of evaluating the results achieved, review procedures often focus on a purely formal control of the processes of filing applications, public procurement, spending or proceeding in accordance with administrative procedural rules (e.g., hourly timesheets for work carried out on projects, hundreds of documents required in public procurement, or a correctly filed attendance report). As a result, for example, a project manager could be forced to procure outdated and overpriced equipment simply because a particular machine was listed in the initial budget proposal, even though more advanced and cheaper machines came to market in the meantime; at the same time, projects could be deemed ineligible for a particular tender because of a couple of signatures missing or simply due to the fact that someone did not manage to fulfill insignificant administrative requirements during the holiday or the vacation seasons.

The administrative decisions and practice of the Public Procurement Office severely restrict a contracting authority or a procurer to choose criteria to evaluate the most economically advantageous tender and procure not only on the basis of price but also with quality of the final product in mind. Since the current interpretation practice of the Public Procurement Act often strikes down qualitative criteria as discriminatory, project managers have little control over the firms bidding. The interpretation of the Act by public officials, for example, gives advantage to suppliers with low price and low quality products.

Similarly, the annual financing cycles increase the exposure of research institutions to short-term fluctuations and reduce incentives to make long-term plans.

The entire system of regulation and governance deforms both its administrators and users who eventually learn to adapt and start losing interest in the quality of their outputs at the expense of fulfilling often meaningless procedural criteria.
Causes and Proposed Solutions

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**Solution S.2: De-Bureaucratization of EU Structural Funds**

During the period between 2007 and 2013, Slovakia had the opportunity to obtain about 1.8 billion EUR from the EU structural funds purely in the fields of education, research and development (the amount specified does not include the contribution from the state budget of the Slovak Republic). Even though more than half of the current programming period has passed, the rate at which those funds are used remains below 18% (as of 13 May 2011). One of the main reasons for such a low proportion is an extremely burdensome system of EU structural funds’ administration which instead of using available mechanisms to simplify grant-giving processes imposes a number of complicated rules rooted in domestic legislation and requirements set by the administrating and facilitating agencies. Both project implementers and the governing agencies are overburdened by administrative activities to such an extent that delays in the processing and evaluation of payment requests often lead to the fact that project managers have to face existential problems arising from the need to settle loan and invoice payables. A reduction of the administrative burden to the minimum required by the EU is therefore of critical importance, along with an increase in the efficiency of practical implementation of simplified rules.

We will review the system of EU funds’ management with the support of an external consultant who has the necessary fund management and public sector reform experience. We will propose a new system for EU funds’ management based upon international best practice; this system will cover the rules for simplifying the administration procedures and receiving support and will describe the incentive system for administrators, a dispute resolution system and a monitoring system which will allow the managing authorities to respond to the current needs of the recipients.

Our analysis and the resulting proposals will take into account the evaluation results of the setup of the whole system of control and administration of the EU structural funds and the EU cohesive funds for the 2007-2013 program period, the effectiveness and efficiency of its operation and the evaluation of the setup of governance systems and of the control mechanism of operative programs of the National Strategic Reference Framework (Národný strategický referenčný rámec – NSRR) which will be realized in line with the document approved by the government (Problematic areas of Implementation of Operative Programs and Horizontal Priorities of NSSR – New Version). The following elements will be evaluated: the current setup of rules and processes of structural and cohesive funds implementation systems at the CKO and CO levels compared to the implementation rules of the EU structural and cohesive funds, the structural and the cohesive funds implementation legislation available in Slovakia and best practice of the structural and the cohesive funds implementation from the EU member states. The most crucial implementation processes will be identified and the changes necessary for a more efficient implementation of structural and cohesive funds will be prepared. The evaluation will be undertaken...
by an independent reviewer. Proposed recommendations will be reflected in the existing systems of structural and cohesive funds administration and control, as well as in the preparation of implementation systems for the 2014-2020 program period.

**Responsible for implementation:** The Office of the Plenipotentiary for Knowledge Economy in cooperation with the Ministry of Transportation, Ministry of Education, Ministry of Economy, Ministry of Finance, and the Government Office of the Slovak Republic.

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**Solution S.3: Reduction of the Regulatory Burden**

We will analyze the existing regulatory burden in areas with high innovation potential (i.e., areas which proved to be capable of providing innovative and sophisticated services in other countries), such as education, R&D, healthcare or social services. We will ask regulators to prove the necessity and cost-effectiveness of their regulatory measures. Based on the results of the analysis, we will prepare a de-regulation package.

**Responsible for implementation:** The Ministry of Economy in cooperation with the Ministry of Healthcare, Ministry of Labor, Ministry of Education, Ministry of Finance, the Antimonopoly Office, and the Office of the Plenipotentiary for Knowledge Economy

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**Solution S.4: Amendment of the Public Procurement Act**

Economic growth inevitably increases the level of sophistication of problems which the public sector has to address and services which the public sector has to provide to citizens. In order to be able to address these trends, public institutions, just like the private sector, must be able to rely on externally provided highly specialized and complex services. In the procurement of such services, quality plays a paramount role.

Private companies and large international institutions such as, for example, the World Bank therefore procure paper or toners by selecting the lowest price offered; however, sophisticated services are procured via negotiations or competitive dialogues which allow to take into account both quality and price. The institutional practice in the Slovak public procurement *de facto* obliges state institutions to make decisions only on the basis of the price offer and the Slovak public sector is thus incapable of procuring quality.

In cooperation with the Public Procurement Office (UVO) we will amend the Public Procurement Act and/or the UVO’s internal manuals to ensure that the criterion of highest economic value and the method of competitive dialogue can be used for procurement of high quality equipment and services.

In cooperation with UVO we will prepare process manuals for procurement of high quality services (e.g. consulting, legal services) and equipment; the manual will contain UVO’s binding decisions regarding the compliance of the manual with the available public procurement legislation and will be regularly updated with recent opinions along the lines of e.g. the “no action letters” of the American Securities Exchange Commission.

**Responsible for implementation:** The Public Procurement Office in cooperation with the Ministry of Justice and the Office of the Plenipotentiary for Knowledge Economy
Solution S.5: Štefánik Scholarship

We restored the scholarship program design to allow everyone to study at top foreign universities regardless of their economic background and to attract graduates to public service in Slovakia. The scholarship will offer five stipends every year for studying at top universities in exchange for a commitment to spend three years working for a public institution in Slovakia. We will form a high-quality analytical unit at the Government Office of the Slovak Republic to employ graduates and to direct their skills to the most pressing issues in the public sector. We will also allow graduates to move to other public sector institutions if possible and necessary.

Responsible for implementation: The Government Office of the Slovak Republic in cooperation with the Ministry of Education and the Office of the Plenipotentiary for Knowledge Economy

Problem: Lacking Support for and Administrative Barriers in International Mobility

A clear migration strategy capable of active contribution to economic and social development is currently absent in Slovakia. An immigration policy that creates the conditions for entry of highly qualified workers, including university students, researchers, scientists, or entrepreneurs in the innovation and the knowledge practice transfer sectors, can significantly contribute to the development of the working, scientific and educational environments, support the exchange of ideas and processes, and generate new job opportunities. The demographic situation in Slovakia and Europe indicates that the Slovak job market depends on foreign human capital.

Slovakia also lags behind in integration policy, which is a necessary part of a successful migration policy. It is therefore important to make parallel investments into programs supporting the integration of both short- and long-term migrants into the Slovak society.

Causes and Proposed Solutions

| Absence of a comprehensive migration policy | S.6: Comprehensive Migration Policy Update |
| Administrative barriers to mobility of researchers, students and selected groups of foreigners (employment law issues, social support, temporary residence permit problems for foreign researchers, etc.) | S.6: Comprehensive Migration Policy Update |

Solution S.6: Comprehensive Migration Policy Update

We will suggest an update of an active immigration policy when it comes to highly qualified workers, as well as new immigration legislation in this area. The actualization of an active migration policy will be based on an analysis of the current state of migration to Slovakia; we will define Slovakia’s priorities in this area, and will suggest tools for carrying out an active migration policy. At the same time, a new framework of institutional support for the migration policy will be created. The new actualization of an active migration policy will be
founded on the awareness of the fact that migration is a problem that transcends the competences of a single ministry and therefore requires active communication and participation of multiple sectors, state institutions, and economic and social organizations, including the Ministry of Interior, the immigration police, the Ministry of Labor, the Ministry of Education, the Ministry of Foreign Affairs, the Ministry of Economy, as well as universities, the Slovak Academy of Sciences, students and organizations dealing with academic mobility.

Until a complex institutional framework is designed and implemented for managing migration, a permanent working group incorporating the representatives of the above mentioned groups and institutions needs to be formed. This working group would be responsible for monitoring barriers to mobility and international cooperation and would submit proposals for removing such barriers to the relevant institutions. Meetings of the working group will be initiated by the Plenipotentiary for Knowledge Economy.

Past experience with migration in Slovakia and abroad allows us to define some of the tools which could improve Slovakia’s migration policy and enable the entry of highly qualified migrants and migrants who can contribute to the development of a knowledge economy in Slovakia. Such tools may include:

- Introduction of a “Slovak Card,” which would simplify entrance and residency of migrants which Slovakia considers worth attracting and retaining. Such migrants could include students, teachers, scientists, researchers, entrepreneurs who already have or are interested in founding innovative companies and companies focusing on the transfer of applied research into practice, etc.
- Introduction of a point-based system, which would enable entry to immigrants meeting Slovakia’s specific preferences (the highest level of education achieved, specialization, the amount of potential investments, etc.)

We will simplify the rules for entry and residence for the holders of the “Slovak Card” and for foreigners entering within the point-based system; we will provide for communication with the relevant institutions in English (rather than only Slovak); we will simplify and speed up the visa and residence permit proceedings; we will remove barriers to employment; we will simplify the transfer of company employees between Slovakia and other countries; we will simplify the integration process for foreigners via enabling them to obtain permanent residency and citizenship sooner and via guaranteeing their equal standing in the society (e.g., access to the job market, social and health insurance, etc.).

We will also increase the level of coordination among embassies and the immigration police in order to provide foreigners with all the relevant information concerning the requirements for visas and residency permits in Slovakia. It is also necessary to gradually improve the language skills of the immigration police officials who come into direct contact with foreigners.

In particular, we will support the improvements in the speed and efficiency of the exchange of information regarding the entry applicants between embassies and the police. The timeframe of handling applications for entry can be significantly shrunk by introducing a system for an electronic exchange of documents via a separate, secure channel. We will therefore provide the necessary investments into the software and hardware at the embassies and the relevant immigration police bureaus.

**Responsible for implementation:** The Ministry of Interior in cooperation with the Ministry of Education, Ministry of Economy, Ministry of Labor, Ministry of Foreign Affairs, Ministry of Healthcare and the Office of the Plenipotentiary for Knowledge Economy
Problem: Low Level of Participation in International Cooperation Systems

Slovak students, teachers and scientists participate in international cooperation projects only to a minimum extent. As a result, modern foreign trends get to Slovakia rather slowly. Less than 1% of Slovak students participate in official mobility programs (LLP, bilateral agreements, CEEPUS, NŠP, etc.) every year despite the fact, that more than 90% of teachers state that foreign exchanges help to increase the quality of students (ARRA Survey). In a survey, only 10% of university graduates stated that they participated in a foreign exchange while only approximately 6% of them participated in an exchange with a duration of at least one semester (more than 3 months). When it comes to the inflow of foreign students to Slovakia, only 0.5% of the total amount of students at all the three levels are represented by foreigners participating in student mobility programs.

While the minimum number of students joins short-term exchange programs which could bring knowledge to Slovakia, more than 26,000 Slovak citizens undertake their full studies abroad (more than 20,000 in the Czech Republic) – that is more than 11% of the total number of students in Slovakia. On the other hand, only approximately 8,400 foreign students undertake their regular studies at Slovak universities at one of the three levels – that is 3.6% of the total number of students in Slovakia. Therefore, the Slovak Republic exports its human potential and is clearly not able to attract the interest of foreigners as a promising location for university level education.

In the area of scientific cooperation, Slovakia has long occupied the last positions within the EU Excellent Community Initiatives in the Seventh Framework Program. Despite the support of science and research provided by the EU structural funds, the situation continues to deteriorate. This fact confirms that the EU structural funds are not properly set up – they do not tend to support excellence and often lead to administrative overload of institutions. Therefore, from the financial perspective, Slovakia is a donor of the mean European program for the support of research and innovations (the Seventh Framework Program)23; however, Slovakia participates in first-class European research and innovation projects only minimally.

Causes and Proposed Solutions

| Missing awareness and support of international project preparation | S.7: Internationalization of Education, Science and Innovative Entrepreneurship |
| Administrative barriers for the mobility of scholars and students | S.6: Comprehensive Migration Policy Update |
| Insufficient promotion of opportunities available in Slovakia | S.7: Internationalization of Education, Science and Innovative Entrepreneurship |

Solution S.7: Internationalization of Education, Science and Innovative Entrepreneurship

High-quality and financially sufficient support of the Slovak scientific, research and innovative business subjects at the national level is a necessary, but not a sufficient factor in reaching long-term competitiveness and growth of the Slovak economy. Slovakia is far from being an isolated island; we are closely connected to other economies within and beyond the EU. Today, we compete in these areas with not only the traditional leaders

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23 The contribution of Slovakia towards the EU budget and thus to the FP 7 budget is 0.37%. This represents a FP7 contribution of approximately 187 mil. EUR during the 2007-2013. As of 3 June 2011, Slovak subjects received 33,24 mil. EUR from FP7 resources, which places Slovakia on the 24th place relative to other member-states.
such as USA and Germany, but also with the new rapidly growing economies such as China, South Korea or Malaysia. Therefore, international cooperation and continuous confrontation with the world leaders in areas specified above is a necessary precondition for reaching quality and success.

We will renew and extend the support of project preparation for the Seventh Framework Program, the Competitiveness and Innovation Program and other community programs (this support was provided by APVV in the past). We will improve the awareness regarding the European Technological Platforms and Common Technological Initiatives, and we will support both the national technological platforms and participation of Slovak entities in European platforms.

We will analyze the existing bilateral cooperation agreements available in the sectors of education, science and technology and the implementation of these agreements. Moreover, we will evaluate the opportunities offered by the membership in the Eureka and the Eurostars programs. We will compare the amount of resources invested by Slovakia into bilateral and international cooperation agreements to the level of contributions received from other countries. Consequently, we will suggest systemic rules, tools and the amount of financial resources which should be devoted to the international cooperation of Slovak companies, and research and education institutions.

We will also use high-quality evaluation methods of framework projects. In case there are initiatives with a high level of participation of Slovak entities which manage to reach sufficiently high ranking in Brussels but fail to receive support due to competition on the international level, we will consider the option of funding such initiatives via the national grant schemes.

To increase the quality of educational activities and science in Slovakia it is essential to support the openness of Slovak institutions to the rest of the world and to make these institutions more attractive for foreign countries. Moreover, we need to extend the opportunities for the mobility of students, teachers, and scholars. We will therefore create a strategy for internationalization of education in Slovakia, within which we:

- Will support the coordination of presentation of Slovak universities abroad with the aim of making the Slovak university environment more attractive for foreign students. Furthermore, we will create conditions for the professionalization of services provided by universities in the internationalization sector. We will also introduce the obligation to announce the information regarding the available grants and open teaching and research positions at least via the EURAXESS portal of the European Commission.
- Will stabilize funding of the National Scholarship Program for Mobility Support and will increase the Slovak contribution to the international CEEPUS program.
- Will support teachers in gaining foreign experience and will make sure such experience is acknowledged in Slovakia.
- Will support the creation of study programs in foreign languages and common study programs.

Responsible for implementation: Ministry of Education in cooperation with the Ministry of Economy, Ministry of Foreign Affairs and the Office of the Plenipotentiary for Knowledge Economy