

FUTURE PERFECT

Discussion Paper for the Informal Meeting of
Ministers of Research (Competitiveness Council)

Budapest – Gödöllő, Hungary, 12 April 2011

$R(\varphi_0 + \pi) = R(\varphi_0)$
 maximum of R
 minimum of R
 $R(\varphi_0)$
 $R(\varphi, \theta)$
 sphere
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 $R(0, \theta)$
 $\varphi = \pi/2$
 $\varphi = \theta = 0$
 $\varphi = 0$
 $\theta = \pi$
 $R(\theta, \varphi, c, d) = (1 + d) \cdot \Delta R(\theta, \varphi, c)$
 $f_1(\varphi, c): (-\pi/2, \pi/2) \rightarrow (-\pi/2, \pi/2)$
 $f_2(\varphi, c) = \sin(f_1(\varphi, c))$ and $f_2(\varphi, c) = -f_1(-\varphi, c)$
 $f(\varphi, c) = \pi \cdot \left[\frac{e^{\left| \frac{\varphi}{\pi c} + \frac{1}{2c} \right|} - 1}{e^{1/c} - 1} - \frac{1}{2} \right]$
 $\Delta R(\theta, \varphi, c) = \begin{cases} a \cdot f_1 + (1 - a) \cdot f_2 & \text{if } \varphi < \pi/2 \\ 1 & \text{if } \varphi = \pi/2 \\ 1 & \text{if } \varphi > \pi/2 \end{cases}$
 $a(\theta, \varphi, c) = \frac{\cos^2(\theta) \cdot (1 - f_1^2)}{\cos^2(\theta)(1 - f_1^2) + \sin^2(\theta) \cdot (1 - f_2^2)} = (5)$
 where $\varphi < \pi/2$
 $= \frac{1}{1 + \tan^2(\theta) \frac{\cos^2(f_1(\varphi, c))}{\cos^2(f_2(\varphi, c))}}$
 $F = \sup_{\forall c, P_1, P_2} \left\{ \frac{\min(R_s)}{\max(R_d)} \right\}, T = \sup_{\forall c, P_1, P_2} \left\{ \frac{\min(R_t)}{\max(R_s)} \right\}$

Cover Picture:



The Gömböc (pronounced as "goemboets") is the first known convex, homogeneous object to have only two equilibrium points: one stable and one unstable. The Gömböc is a geometrical "stem-cell": the existence of objects in every equilibrium class can be deduced from the Gömböc.

The Gömböc was invented by two Hungarian architect-engineers, Gábor Domokos and Péter Várkonyi, from the Budapest University of Technology and Economics.

"A shape whose impossibility might have been an elegant theorem, but whose existence may be much more elegant."

(Chandler Davis, Editor-in-Chief,
The Mathematical Intelligencer)

Contents

1 INTRODUCTION.....	7
2 RESEARCH, DEVELOPMENT AND INNOVATION IN THE EU	8
2.1 Challenges	9
2.2 Rising to the challenges – Europe 2020 Strategy	10
2.3 Instruments – Common Strategic Framework.....	14
2.3.1 Scope of the Common Strategic Framework	14
2.3.2 Why a Common Strategic Framework?.....	15
3 NEW DIRECTIONS FOR EU RESEARCH, DEVELOPMENT AND INNOVATION FUNDING	16
3.1 Unleashing innovation	17
3.1.1 How best to support the full innovation cycle from research to market?	17
3.1.2 How best to leverage RDI via new financial instruments?	20
3.1.3 How best to deploy public procurement, standardisation and intellectual property rights as innovation tools?	21
3.2 Addressing the Grand Challenges	23
3.2.1 The Grand Challenges.....	23
3.2.2 How best to address the Grand Challenges through cooperation?.....	24
3.3 Strengthening Europe’s science base	26
3.3.1 How frontier research will support world-class excellence and strengthen Europe’s science base?	26
3.3.2 How frontier research will support first class research infrastructures and strengthen Europe’s science base?	28
3.4 Spreading excellence	30
3.4.1 How best to ensure that RDI excellence spreads through Europe to avoid a “research and innovation divide”?	30
4 THE CONTRIBUTION AND POTENTIAL OF HUNGARIAN INNOVATION.....	35
4.1 Research, development and innovation in Hungary.....	35
4.1.1 Overview.....	35
4.1.2 International outlook	35
4.1.3 European Research Area participation.....	38
4.1.4 Research, development and innovation in Hungary	38
4.1.5 Research, development and innovation institutional infrastructure	40
4.1.6 Research, development and innovation policy	42
4.2 Research, development and innovation projects in Hungary.....	42
4.2.1 Extreme Light Infrastructure project	42
4.2.2 Talents	43
4.2.3 European Institute for Innovation and Technology	43
4.3 Hungarian innovation award	45



Preface

Europe is vibrant, diverse, and rich in resources, and historically it has an extraordinary track record in social, political and scientific innovation. Yet, its competitive position on the global stage is fading, in particular as a result of the impact of the recent financial crisis and the rapid economic growth in Asia. Innovation and creativity are key drivers of economic growth and societal development, and for the EU to compete effectively in this rapidly changing global environment, it must develop a more focused, strategic, and integrated approach to research, development and innovation.

The challenges we are currently facing are increasingly familiar: climate change, security, demographic changes, migration, and social and cultural diversity. These are all issues which do not respect national borders, and as such our responses need to be collective and bold. We have embarked on this extraordinary journey of European cooperation and coordination and we need to continue by taking the necessary steps to create a European-wide marketplace for research and innovation. A market that will enable the countries, regions and peoples of Europe to pursue excellence in scientific research and innovate through both collaboration and competition, bringing to life the much needed responses to these global challenges.

Our priorities are fourfold. Firstly, we need to support the full innovation cycle, from research to market, ensuring that business, industry, government and the third sector join force with researchers, and scientists. We need to be creative in how we encourage innovation, for example by making use of public procurement policies and intellectual property rights. SMEs in particular remain an untapped source of innovation, currently under-resourced and overwhelmed with administrative tasks.

Second, innovations must address the challenges we are facing head on. We need to be focused, we need clear targets, we need to monitor what we are doing and what is being achieved, and we urgently need to simplify and streamline the institutional infrastructure and funding frameworks. Third, we need to create an infrastructure throughout the EU which supports the best and most creative scientists and researchers to pursue original research, taking risks and moving beyond the constraints of existing disciplinary boundaries.

And finally, we have a commitment to inclusivity across Europe. At the moment some countries are lagging behind in terms of their outputs from research and innovation. Nevertheless, we believe that all people and all countries have the potential to contribute to the overall success of the EU.

This paper is intended to provide a starting point for discussion of how to move forward in the light of Europe 2020. My wish is that in ten years time we are able to present a story of success and achievement within Europe, that we will have unleashed a new wave of creativity, scientific achievement and innovation, underpinning Europe's position as a leading global economic force.

A blue ink handwritten signature, appearing to be 'Zoltán Cséfalvai', written in a cursive style.

Prof. Dr. Cséfalvai Zoltán
Minister of State
Ministry for National Economy

List of Acronyms

Acronym	Explanation
CERN	European Organisation for Nuclear Research
CIP	Competitiveness and Innovation Framework Programme
CSF	Common Support Framework
EC	European Commission
EIS	European Innovation Scoreboard
EIT	European Institute for Innovation and Technology
EPO	European Patent Office
ERA	European Research Area
ERC	European Research Council
ESA	European Space Agency
ESFRI	European Strategy Forum on Research Infrastructures
ETP	European Technology Platforms
EU	European Union
Euratom	European Atomic Energy Community
FET	Future and Emerging Technologies
FP7	Seventh Framework Programme
GCI	Global Competitiveness Index of the World Economic Forum
HASc	Hungarian Academy of Sciences
HIO	Hungarian Innovation Office
ICT	Information and Communication Technologies
IPR	Intellectual Property Rights
ITDH	The Hungarian Investment and Trade Development Agency
IUS	Innovation Union Scoreboard
JTI	Joint Technology Initiatives
KICs	Knowledge and Innovation Communities
MS	Member State of the EU
RI	Research infrastructure
RDI	Research, development and innovation
RSFF	Risk Sharing Finance Facility
RTO	Research and Technology Organisation
SBIR	Small Business Innovation Research Programme
SIA	EIT's Strategic Innovation Agenda
SME	Small and medium sized enterprises
TNA	Trans-national Access
US	United States
VC	Venture Capital
WEF	World Economic Forum

1 Introduction

This report is presented by the Hungarian Presidency of the Council of the EU and will be put forward at the informal meeting of the Competitiveness Council on 12 April 2011. It has been prepared by the Hungarian Ministry for National Economy, with assistance from the Ministry of Foreign Affairs, the National Innovation Office and KPMG Advisory Ltd. Hungary. We wish to thank all participants for their contribution.

The purpose of this document is to set out an agenda for discussion and to provide an overview of the most recent official papers and draft reports concerning the fields of research, development and innovation in the EU. The four themes which have been identified are:

- Unleashing Innovation
- Addressing the Grand Challenges
- Strengthening Europe's Science Base
- Spreading Excellence

A wide variety of data sources have informed this report, and particular emphasis has been given to a number of key documents which contain the most important and substantiated conclusions and recommendations for the future of research, development and innovation (RDI) in the EU:

- Europe 2020: A strategy for smart, sustainable and inclusive growth (COM(2010) 2020 final, 3 March, 2010);
- Europe 2020 Flagship Initiative Innovation Union SEC(2010) 1161 (COM (2010) 546 final, 10 June 2010);
- Papers on experience gained through FP7 implementation;
 - Interim evaluation of FP7, report of the Expert Group (12 November 2010)
 - Conference conclusion and recommendations of the Half-time – Highway Hungarian EU Presidency conference on the interim evaluation of FP7 (24-25 February 2011, Budapest)
 - Council Conclusions of the interim evaluation of FP7 (7585/11, 10 March 2011)
- Green Paper: From Challenges to Opportunities: Towards a Common Strategic Framework for EU Research and Innovation funding (6528/11, 14 February 2011);
- Conclusions of the European Council EUCO 2/11 (4 February 2011);
- Annual Growth Survey: Advancing the EU's comprehensive response to the crisis COM(2011) 11 final (12 January 2011);
- Preliminary position papers of some of the Member States on future RDI programmes.

2 Research, development and innovation in the EU

Research, development and innovation (RDI) are key factors to the further development of the competitiveness of the European Union. In order to promote the competitive advantage of the European Union, it is **essential to invest strategically and purposively in RDI**. In order to bring this approach to life, the European Commission has introduced the concept of the European Research Area.

The **European Research Area (ERA)** is the fundamental concept underpinning the research, development and innovation policies of the European Commission.

The Member States' joint vision of ERA is one which offers the right conditions and incentives for high-impact research and RDI investments, adding European value by fostering healthy competition for **excellence**; allowing researchers, scientific knowledge and technology to circulate freely ('fifth freedom'), while supporting coordination between research funders and cooperation between industry and academia. According to the European Council conclusions of 4 February 2011, Europe needs a unified research area to attract talent and investment. Remaining gaps must therefore be addressed rapidly and the European Research Area must be completed **by 2014** in order to create a dynamic **single market for knowledge, research and innovation**. In particular, efforts should be made to improve the mobility and career prospects of researchers, the mobility of graduate students and the attractiveness of Europe for foreign researchers.

Table 1 – European Research Area

The European Research Area is composed of all research and development activities, programmes and policies in Europe which involve a trans-national perspective. Together, they enable researchers, research institutions and businesses to increasingly circulate, compete and co-operate across borders. The aim is to give them access to a Europe-wide space for knowledge and technologies in which trans-national synergies and complementarities are fully exploited.

ERA consists of activities, programmes and policies which are designed and operated at all levels: regional, national and European.

According to the Innovation Union flagship initiative, the ERA framework and the supporting measures should cover:

- Skills and researchers: quality of doctoral training, attractive employment conditions and gender balance in research careers; mobility of researchers across countries and sectors, including through open recruitment in public research institutions and comparable research career structures, and by facilitating the creation of European supplementary pension funds.
- Cross-border operation: Cross-border operation of research organisations, funding agencies and foundations, including ensuring simplicity and coherence of funding rules and procedures, and building on the work of stakeholders, funding agencies and their representative organisations.
- Infrastructure: opening of Member State research infrastructures to the whole European user community.
- Knowledge sharing and open access: dissemination, transfer and use of research results, including open access to publications and data from publicly funded research.

- International science and technology cooperation: consistency of EU and national strategies and actions for international cooperation in science and technology.

There are a number of fully integrated European-level structures and programmes: the EU RTD Framework Programmes, including the current Seventh Framework Programme (2007-2013), related European agencies and undertakings, as well as a number of intergovernmental infrastructures and research organisations. Some have existed for more than 50 years, such as the European Organisation for Nuclear Research (CERN) and the research activities of the European Atomic Energy Community (Euratom). Many were created in the 1970s and 1980s, such as the European Space Agency (ESA) and the first Framework Programmes. But there are also important new organisations which are changing the ERA 'landscape': notably, the European Research Council (ERC), the Joint Technology Initiatives (JTI) and the European Institute for Innovation and Technology (EIT).

Some public policies which have an important impact on research are defined at the European level. This is notably the case for state aid and competition law, as well as for many relevant internal market rules. The EU also develops and promotes voluntary guidelines and recommendations which serve as common European references. Examples can be found in areas such as researchers' careers and mobility, knowledge transfer, and co-operation between public research and industry. The EU also fosters a broad-based approach to innovation. With the launch of the Europe 2020 strategy and the Innovation Union Flagship Initiative, a strategic approach to innovation is now on the European agenda. The flagship initiatives Youth On the Move and Digital Agenda are important in this context.

While most research activities, programmes and policies take place at regional and national levels, no single country offers sufficient resources to be competitive on a global scale. To strengthen ERA, such activities and policies should increasingly be designed and operated from a trans-national perspective, including, where relevant, cross-border co-operation. But this does not mean that they should be centralised in Brussels. Trans-national co-operation helps make the most efficient and effective use of national and regional and European resources.

Source: European Research Area

2.1 Challenges

The economic and financial crisis has shown the need for **strengthened economic coordination and more effective regulation** in the European Union.

Europe and the world are faced with unprecedented challenges requiring an increasing variety of innovative responses, according to the Europe 2020 flagship initiative "Innovation Union" and the Green Paper "From Challenges to Opportunities: Towards a Common Strategic Framework for EU Research and Innovation funding" (14 February, 2011). Returning to growth and higher levels of **employment**, combating **climate change** and moving towards a **low-carbon society** require urgent and coordinated action. The impact of demographic developments is increasing and our natural resources need to be used more wisely. Our societies face security challenges, which are growing in scale and sophistication. Challenges such as our **ageing population** or our **dependence on fossil fuel** do, however, also provide powerful opportunities to develop innovative products and services, creating growth and jobs in Europe.

Europe also needs to meet the challenge of retaining and reinforcing its competitive position in the face of globalisation. The **emerging economies** are moving from cost competition and imitation towards strategies based on innovation. Other countries are investing more than ever to safeguard their future. On the other hand, rising living standards in these countries open new markets for European products and services and their growing capabilities create new opportunities for collaboration.

Apart from the **Grand Challenges** (i.e. energy, climate, resources, ageing) the **global financial downturn** has also had implications for research, development and innovation. The crisis led to the identification of the fact that RDI is a key to improving efficiency and hence, it should be promoted even in the years of financial constraints. According to a common European view, RDI is key to counteracting the impacts of the current crisis and also preparing for similar substantial changes in the socio-economic environment.¹

To address the challenges, the Commission has front-loaded all the measures and put forward new instruments that are to set the agenda for European policy-making over the coming years: the **Europe 2020** strategy for growth and jobs.

The Europe 2020 strategy is an integrated and coherent approach to support **smart, sustainable and inclusive growth** rooted in greater coordination of policies at the national and European levels.

The Europe 2020 strategy presents a **social market economy model**. In comparison with the Lisbon Strategy, the meaning of the European model has been better spelled out, with the already existing social and sustainability concerns now explicitly put at the service of growth as growth-enhancing factors (inclusive and sustainable growth). It is therefore made even clearer that the European model is about modernising social and environmental practices with a view to fostering growth, while adapting to and making the most out of the new economic realities (notably the information society) and thereby addressing the various challenges.

2.2 Rising to the challenges – Europe 2020 strategy

In order to rise to these challenges successfully, the **Europe 2020 strategy** has been developed. Europe 2020 strategy has identified new engines to boost growth and jobs and has put forward three mutually reinforcing priorities:

- **Smart growth:** developing an economy based on knowledge and innovation
- **Sustainable growth:** promoting a more resource efficient, greener and more competitive economy
- **Inclusive growth:** fostering a high-employment economy delivering social and territorial cohesion

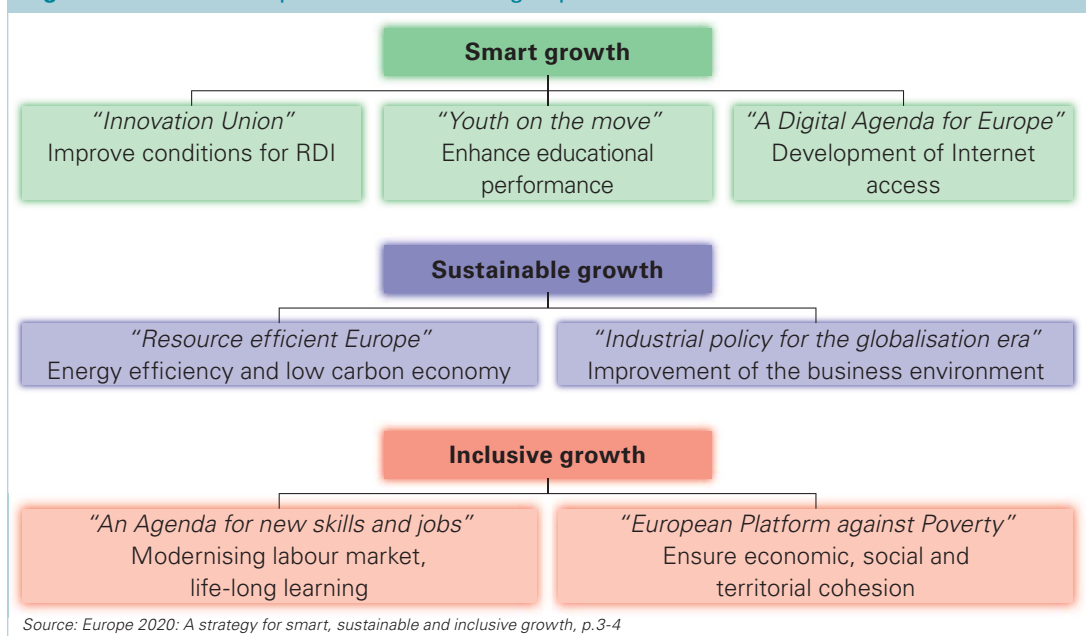
The EU needs to define where it wants to be by 2020. To this end, the Commission proposed the following EU headline targets:

- **3% of the EU's GDP should be invested in RDI**
- 75% of the population aged 20-64 should be employed
- The "20/20/20" climate/energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right)
- The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree
- 20 million fewer people should be at risk of poverty

The Commission put forward seven flagship initiatives to catalyse progress under each priority theme:

- **“Innovation Union”** to improve framework conditions and access to finance for research and innovation so as to ensure that innovative ideas can be turned into products and services that create growth and jobs.
- **“Youth On The Move”** to enhance the performance of education systems and to facilitate the entry of young people to the labour market.
- **“A Digital Agenda for Europe”** to speed up the roll-out of high-speed internet and reap the benefits of a digital single market for households and firms.
- **“Resource efficient Europe”** to help decouple economic growth from the use of resources, support the shift towards a low carbon economy, increase the use of renewable energy sources, modernise our transport sector and promote energy efficiency.
- **“An industrial policy for the globalisation era”** to improve the business environment, notably for small and medium sized enterprises (SMEs), and to support the development of a strong and sustainable industrial base able to compete globally.
- **“An agenda for new skills and jobs”** to modernise labour markets and empower people by developing their skills throughout the lifecycle with a view to increase labour participation and better match labour supply and demand, including through labour mobility.
- **“European platform against poverty”** to ensure social and territorial cohesion such that the benefits of growth and jobs are widely shared and people experiencing poverty and social exclusion are enabled to live in dignity and take an active part in society.

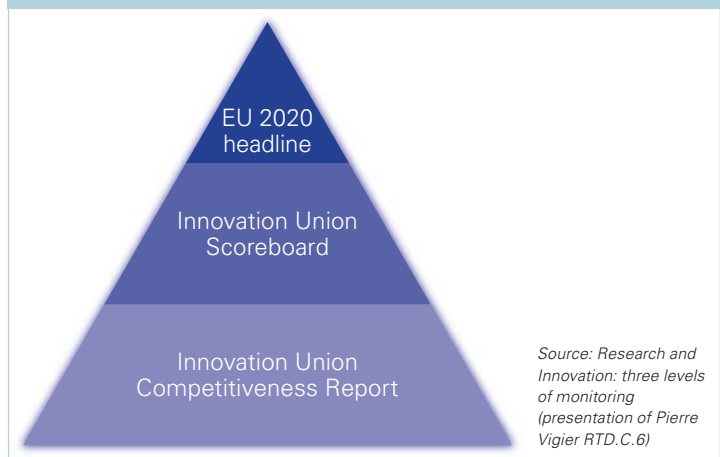
Figure 1 – Three main pillars and seven flagship initiatives



Within each initiative, both the EU and national authorities must coordinate their efforts so they are mutually reinforcing. Most of these initiatives were introduced by the Commission in 2010.

Europe’s competitiveness, our capacity to create millions of new jobs to replace those lost in the crisis and, overall, our future standard of living depends on our ability to **drive innovation in products, services, business and social processes and models**, especially at a time of public budget constraints, major demographic changes and increasing global competition, according to the **Europe 2020 flagship initiative the “Innovation Union”**. This is why innovation has been placed at the heart of the Europe 2020 strategy. Innovation is also our best means of successfully tackling major societal challenges, such as climate change, energy and resource scarcity, health and ageing, which are becoming more urgent by the day.²

Figure 2 – Reporting structure of Europe 2020 strategy



Europe has no shortage of potential. We have world leading researchers, entrepreneurs and companies and unique strengths in our values, traditions, creativity and diversity. We have made great strides in creating the largest home market in the world. European enterprises and civil society are actively engaged in emerging and developing economies around the world. Many world-changing innovations can be traced back to Europe. In a rapidly changing global economy, we must build on our strengths and decisively tackle our weaknesses:

- **Under-investment in our knowledge foundation.** Other countries, including the US and Japan, are out-investing us, and China is rapidly catching up.
- **Unsatisfactory framework conditions,** ranging from poor access to finance and high costs of intellectual property rights (IPR), to slow standardisation and ineffective use of public procurement. This is a serious handicap when companies can choose to invest and conduct research in many other parts of the world.
- **Too much fragmentation and costly duplication.** We must spend our resources more efficiently and achieve critical mass.

Perhaps the **biggest challenge** for the EU and its Member States is to adopt a much more **strategic approach to innovation**. An approach whereby innovation is an overarching policy objective, where we take a medium- to longer-term perspective, where all policy instruments, measures and funding are designed to contribute to innovation, where EU and national/regional policies are closely aligned and mutually reinforcing, and last but not least, where the highest political level sets a strategic agenda, monitors progress and tackles delays.

The Innovation Union sets out such a **bold, integrated and strategic approach**, exploiting and leveraging our strengths in new and productive ways – and thereby maintains the economic foundation that supports our quality of life and our social model as our population ages.

Investment in education, research, technology and innovation is a key driver of growth, and innovative ideas that can be turned into new marketable products and services help create growth

and quality jobs. The European Council called for the implementation of a strategic and integrated approach to boosting innovation and taking full advantage of Europe's intellectual capital, to the benefit of citizens, companies - in particular SMEs - and researchers. It will monitor progress in the framework of the follow up to the Europe 2020 strategy.

Table 2 – Conclusions of the European Council of 4 February 2011

- The European Council of 4 February 2011 attached particular importance to the role of innovation as the key driver for Europe's return to growth and global competitiveness.
- The conclusions point out the need for the implementation of a strategic and integrated approach to boosting innovation and taking full advantage of Europe's intellectual capital, to the benefit of citizens, companies - in particular SMEs – and researchers.
- Heads of Government acknowledged the role of innovation in tackling the grand challenges of society. In order to promote the quicker way of innovations to the market, co-operation and synergies between the EU and the Member States must be reinforced in particular through Joint Programming and European Innovation Partnerships. The launch of the pilot Innovation Partnership on active and healthy ageing is remarkable in this context.
- In the conclusions the Heads of Government concluded that the European Research Area and its single market of knowledge, research and innovation must be fully implemented by 2014.
- The conclusions stress the need for Member States to pursue “smart” fiscal consolidation by giving priority to sustainable growth-friendly expenditure in areas such as research and innovation, education and energy.
- The European Council supports the development of enhanced financial mechanisms aiming at fostering RDI, more effective and efficient use of public funding at national and EU levels, and the continued simplification of EU funding. To this end, the Commission has been invited to make proposals for a common strategic framework which embraces all research and innovation financing instruments.

Source: Conclusions of the European Council EUCO 2/11 (4 February 2011)

The Europe 2020 strategy specified the objective to **increase RDI expenditures of the EU to reach 3% of GDP by 2020**. The compilation of all provisional national targets indicates an aggregated level of 2.7 or 2.8% of GDP, which is below the target of 3% GDP invested in RDI. At the same time, it represents a significant effort, particularly given the current budgetary context.

Based on the Commission Communication on Annual Growth Survey of 12 January 2011, some **Member States have taken steps** to increase their public investment in research, innovation and education, recognising that these investments will promote future growth significantly. Some Member States indicated high but realistic targets, despite the difficulty of committing to the private component of their RDI target.

Another closely related aspect of the EU's performance in innovation is the share of **fast growing, innovative companies** in the economy. Member States need to start removing obstacles to the growth of innovative companies, especially by improving framework conditions and access to finance.

2.3 Instruments – Common Strategic Framework

The main developments during recent years relevant to the discussions on ERA-related instruments are the new Treaty, Europe 2020 and the Innovation Union Flagship Programme.

From 2007 to 2013, the main programme for funding the European RDI activities has been the **Seventh Framework Programme (FP7)**

for research, technological development and demonstration, with its budget of €53 billion. The FP7 covers four main programmes on Ideas, Cooperation, People and Capacities.

The implementation of the FP7 has provided many lessons, given its on-going role as one of the main vehicles for delivering current RDI policy, The **interim evaluation of FP7** shed light on a number of issues for further investigation and also provided recommendations that constitute a valuable, factual basis for the identification of potential areas for further development.

According to the Green Paper, at the EU level various programmes support research and innovation, covering activities across the innovation cycle, yet often operating independently of each other. The Budget Review identified a way forward in this respect through the **development of a Common Strategic Framework (CSF)**. The Common Strategic Framework will focus on addressing societal challenges, encouraging the competitiveness of Europe’s industries and enhancing the excellence of its scientific and technological base.

The Common Strategic Framework would cover all relevant EU research and innovation funding currently provided through FP7, CIP and EU innovation initiatives such as the EIT on the basis of coherent goals and shared strategic objectives.

2.3.1 Scope of the Common Strategic Framework

The intention of the CSF is to integrate currently existing programmes and financial instruments in order to mitigate synergies of intervention, avoid overlaps and balance approaches according to policy objectives.

The official presentation of the Green Paper articulates the essence of this paradigm shift:

Figure 3 – CSF position



Source: Based on Europe 2020: A strategy for smart, sustainable and inclusive growth

Table 3 – Basis of the Common Strategic Framework

- The Seventh Framework Programme (FP7) for research, technological development and demonstration
 - €53 billion (2007-13). Four main programmes on Ideas, Cooperation, People and Capacities.
- The Competitiveness and Innovation Framework Programme (CIP)
 - €3.6 billion (2007-13). 3 programmes on enterprise & innovation, intelligent energy, and ICT policy support.
- The European Institute for Innovation and Technology (EIT)
 - Autonomous EU body bringing together higher education, research and business to stimulate Knowledge and Innovation Communities. EU budget contribution of €309 million (2007-13)

and strengthening complementarities with the Structural Funds – €86 billion allocated (2007-13) to RDI, entrepreneurship, ICT and human capital development

Source: CSF Green Paper presentation (Wolfgang Bartscher, Deputy Director General, DG Research and Innovation, European Commission) – in: Half-time – Highway: Conference on Interim evaluation of FP7 from different perspectives; February 24-25 2011, Budapest

2.3.2 Why a Common Strategic Framework?

The reason for the necessity of the formulation of a Common Strategic Framework is twofold: first, **increasing impact**, and second, **simplification**.

Table 4 – Reasons for a Common Strategic Framework

Increasing impact

- FROM different priorities in each programme and initiative
 - TO common strategic priorities, focusing on societal challenges, competitiveness and research excellence
- FROM gaps between the stages (RDI, demonstration, market take up, etc.)
 - TO coherent support for projects and organisations across the innovation cycle from research to retail
- FROM research results that are not used and focus on technologies
 - TO stronger support for innovation, including non-technological innovation and market take up

Simplification

- FROM different rules in each programme and initiative
 - TO more standardised rules across all initiatives – which meet the different needs and with flexibility where needed (e.g. for the EIT)
- FROM a large variety of funding schemes within and between programmes
 - TO a rationalised toolkit of schemes across the Common Strategic Framework
- FROM multiple websites, guidance documents, applications
 - TO common entry points, one stop shops, common IT platforms

Source: CSF Green Paper presentation (Wolfgang Bartscher, Deputy Director General, DG Research and Innovation, European Commission) – in: Half-time – Highway: Conference on Interim evaluation of FP7 from different perspectives; February 24-25 2011, Budapest

3 New Directions for EU research, development and innovation funding

The Innovation Union identifies the need to pursue a broader concept of innovation, **“achieving our target of 3% of EU GDP on RDI by 2020 could create 3.7 million jobs and increase annual GDP by close to €800 billion by 2025”**. It is difficult to highlight how this aspect is covered, because at present the innovation is based mostly on RDI elements.

At the informal Competitiveness Council meeting in April the discussion will be organised around the following 7 issues:

Table 5 – Questions for the informal Competitiveness Council meeting in April

- How best to support the full innovation cycle from research to market?
- How best to leverage RDI via new financial instruments?
- How best to deploy public procurement, standardisation and IPR as innovation tools?
- How best to address the Grand Challenges through cooperation?
- How frontier research will support world-class excellence and strengthen Europe’s science base?
- How frontier research will support first class research infrastructure and strengthen Europe’s science base?
- How best to ensure that RDI excellence spreads through Europe to avoid a “research and innovation divide”?

The **interim evaluation of FP7** put forward **10 recommendations** based on the performance of the programme:

Table 6 – Recommendations from the FP7 interim evaluation (simplified version)

1. Advance ERA and Innovation Union objectives, overcoming fragmentation in research. Concentrate resources on fewer topics (Grand Challenges) where critical mass is necessary.
2. Develop and implement high quality research infrastructures.
3. Maintain level of funding, both for FP7 in its latter stages and for a successor programme.
4. A well-articulated innovation strategy is needed.
5. Simplification needs a quantum leap. For FP7 implement proposed simplification measures. For future EU research and innovation funding programmes revise the Financial Regulations.
6. Mix of funding measures should strike a different balance between bottom-up and top-down approaches.
7. Consider a moratorium on new instruments until the existing ones have been sufficiently developed and adequately evaluated.
8. Take further steps to increase female participation.
9. Pave the way for increased participation from Member States that are under-represented.
10. Promote opening of the FP7 to international cooperation and review the strategy.

Source: Interim Evaluation of the Seventh Framework Programme, p.10-12

Apart from the mid-term review of FP7, there are a number of **evaluations, mid-term reviews related activities, and studies** which form an important input to the discussions about the EU RDI funding, for the Common Strategic Framework:

- CIP evaluation
- FP7 mid-term evaluation of COST 2010
- FP7 interim ICT evaluation
- Evaluation of ERA-NET + Scheme
- The interim reviews of JTI and article 185 AAL
- Studies and reports from the European parliament on FP-simplification and ERA governance
- Synthesis report of the 2000-2006 ERDF evaluation.

Based on the Green Paper, the conclusions and recommendations of the interim evaluation of FP7 and the Council conclusions on the interim evaluation of FP7 of 10 March 2011, **four major areas of potential intervention** can be identified. The Informal meeting of Ministers for Research (Competitiveness Council) 'Future Perfect' Programme in Budapest – Gödöllő on 12 April 2011 will also cover the main issues of the European RDI programmes after 2013. These areas are complex, multi-faceted and inter-linked in nature:

Table 7 – Thematic areas of development

- Unleashing innovation
- Addressing the Grand Challenges
- Strengthening Europe's science base
- Spreading excellence

3.1 Unleashing innovation

3.1.1 How best to support the full innovation cycle from research to market?

The Innovation Union recognises that too few of the European innovative SMEs grow into large companies. Access to funding, costly patenting, market fragmentation, outdated regulations and procedures, slow standard setting and the failure to use public procurement strategically are weaknesses that prevent good ideas and research results from successfully reaching the market. **The growth of innovative SMEs and the participation of industry in the innovation process require a coherent policy mix** that simultaneously addresses a series of issues (framework conditions, to remove fragmentations and investment barriers across the EU).

In many cases measures driving the markets for innovation are even more important for the growth of the economy than the stimulation of RDI.

Europe needs to improve its impact from research and innovation. **Obstacles remain in transferring research outcomes from the laboratory through to the development, commercialisation and application phases.** As indicated in the communication on the Innovation Union, there is an essential role for industry in setting priorities and through public private partnerships. It also involves broadening support across the full innovation cycle (including proof of concept, testing, piloting and demonstration), including covering issues such as post-project follow-up, pre-normative research for standard setting, patenting and non-technological innovation.³

³ Green Paper: From Challenges to Opportunities: Towards a Common Strategic Framework for EU Research and Innovation funding (6528/11, 14 February 2011)

The **participation of industry in the innovation process is critical** in determining the market potential of innovations and in bringing those innovations to the public. Without the involvement of industry, research may not follow market needs and research results may not achieve an economic return. In both cases, valuable financial and human resources risk being wasted.

FP7 introduced novel approaches to strengthen industry participation. The **European Technology Platforms (ETPs)** helped define industry relevant priorities. Moreover, the ETPs paved the way for the **Joint Technology Initiatives (JTIs)** which put industry in the driving seat through establishing formal public private partnerships. The European Economic Recovery Plan introduced more informal **public-private partnerships (PPPs)** in key sectors. Experience shows that their success depends on strong commitments from the stakeholders involved, and simple and efficient governance and implementation structures.

Issues concerning the involvement of industry in research and innovation programmes can be grouped into three main areas, based on the workshop summary on industry involvement at the “Half-time – Highway” conference on Interim evaluation of FP7 in Budapest.

Table 8 – Main questions of the involvement of industry in research and innovation

SMEs	<ul style="list-style-type: none"> • How can we encourage greater engagement of SMEs? • What roles should they play?
Innovation	<ul style="list-style-type: none"> • How should RTD programmes be extended to encompass industrial innovation?
Finance	<ul style="list-style-type: none"> • How could alternative forms of financing be used best in addition to Framework Programme grants? (see under 3.1.2)

Source: Industry involvement workshop (Bob Malcolm) at “Half-time – Highway: Conference on Interim evaluation of FP7 from different perspectives”, February 24-25 2011, Budapest

SMEs

In addition, and following the structure of Table 5, the Green Paper articulates the following in terms of **SMEs**:

- **Industry and SME participation is key** to unleashing innovation. The CIP aims to strengthen the competitiveness of Europe’s industry, with a particular focus on SMEs.
- SMEs are still finding it **challenging to participate**.
- **Broadening participation** in EU programmes: While there is important SME participation in the CIP, the FP7 interim evaluation highlighted the need to further stimulate industry and SME involvement.
- The **CIP** has been successful in reaching SMEs (100,000 SMEs received loan guarantees, 70% of beneficiaries of eco-innovation market replication projects are SMEs).
- A **strengthened approach to SMEs** could benefit from the experience gained by the current SME actions, taking into account the innovation and growth needs of different types of SMEs and the fact that the needs of many SMEs are best served through support provided at the regional level, including through the Cohesion policy Funds.
- **Open, light and fast implementation schemes** would enable SMEs and other stakeholders from industry and academia to explore new ideas and opportunities as they emerge, in a flexible way.
- This could build on the current use of **open calls and simplified application procedures**.

According to the Interim evaluation of FP7, however, there is even more to consider:

- **FP programmes** including FP7 **were not designed for SMEs**, so many features inhibit SME participation - not just bureaucracy, but even the selected research topics. Rather than trying to bolt SMEs onto existing FP programmes, programmes should be designed for SMEs, taking into account their specific needs and capacities.
- Programmes should be designed to **bridge the different value chains of societal challenges, research, and industrial product development**.
- A need exists for **better integration of EU & MS programmes**, including the use of Structural Funds dedicated to innovation, since much of 'Cohesion' supported activity is local, and national support for innovation goes beyond RTD.

Innovation

How to **support innovation** is a key issue identified in the Europe 2020 strategy. To this end, a number of relevant issues have been identified, including improving evaluation:

- innovation impact expectations clear in WP
- clarity of criteria with respect to innovation
- evaluators competent to judge innovation aspects

Different stages of innovation require different forms of financing which may depend on their different types and levels of risk, e.g.:

Table 9 – Main issues of the involvement of industry in research and innovation

Early stage RDI	grant
Development	co-financing (or for industries with 5-10 year development and late return on investment, grants)
Bringing to market	loan or equity for a company; loan for a project

Source: Industry involvement workshop (Bob Malcolm) at "Half-time – Highway: Conference on Interim evaluation of FP7 from different perspectives", February 24-25 2011, Budapest

Demand driven support measures should stimulate the use and demand for innovation, e.g. procurement initiatives to bring innovation into use, tax incentive framework conditions to stimulate deployment and usage of innovation. These require **linkages between pre-commercialised procurement, seed and venture capital schemes and incubation schemes**.

The Interim evaluation of FP7 summarises the main recommendations in relation to the involvement of industry and innovation, as follows:

Table 10 – Main issues of the involvement of industry in research and innovation

1. Increased participation of industry – especially that of SMEs – shall be encouraged in FP by taking further into account the needs of the industrial sector in the planning of the programmes.
2. Programmes shall be designed putting special emphasis on innovation impact, meeting market demands and moving towards a more flexible, trust-based and risk-tolerant approach.
3. When preparing the Common Strategic Framework, initiatives which contribute to enhancing the international competitiveness of European industry shall be considered.

4. The design of SME specific programmes shall take account of:
 - the wide variety of types of SME
 - their different needs
 - the role each might play in particular RDI areas.
5. To ensure actual innovation derives from RDI, there is a need to couple the research and user/ industry communities from the start and throughout the process so as to achieve mutual agreement and cross-fertilisation (match-making) that will facilitate project development aimed at innovation creation, e.g. through ETPs /NTPs.
6. Different stages of innovation require different forms of financing which may depend on their different types and levels of risk. Therefore an integrative approach is needed to take into account all of these aspects.

Source: Conclusions and Recommendations of Half-time – Highway: Conference on Interim evaluation of FP7 from different perspectives; February 24-25 2011, Budapest

3.1.2 How best to leverage RDI via new financial instruments?

According to Table 5 below, **finance** was identified as the third main issue affecting industry / SME participation. Latest official papers indicate that the approach to answering this question encompasses new financial instruments.

New financial instruments

The term “New financial instruments” is generally used in reference to the Common Strategic Framework (CSF). The aim of the CSF is to integrate the programmes, and their corresponding source of funding into one pool, acting as the single financing instrument for RDI projects.

There are three major issues of financing:⁴

- The **low level of private finance for research and innovation** is a major bottleneck in Europe. The FP7 Risk Sharing Finance Facility and CIP financial instruments have demonstrated how the EU budget in partnership with the European Investment Bank Group can succeed in overcoming market gaps in this area.
- Future EU research and innovation programmes should make full use of financial instruments (through the EU Equity and Risk Sharing Platform mechanisms proposed in the Budget Review) to **support the commercialisation of research results, the growth of innovative businesses and investments in major infrastructures**.
- **SME participation** could be severely hindered by the lack of financing.

In order to provide financing to RDI projects, several financial instruments could be used. The establishment of a dedicated European Venture Capital and Patent Fund could be one solution to this issue.

Venture capital

Access to capital – with the help of venture capital (VC) – is an important initiative that builds up the growth strategy of the European Union (“EU wide venture capital scheme”). The focus is on **raising private capital for both early stages and growth phases**. However, the early stages require more competence than money to make ventures investment ready. Risk levels require government investments combined with the experience of entrepreneurs.

According to some Member States, the proposed Venture Capital fund could operate at three levels, namely:

- through **support** given by the European Fund to Finance Innovative Companies **to large-scale private VC funds** operating on a European scale (pan-European market actors);
- through **joint support** by the European Fund to Finance Innovative Companies and national operators **for new or small seed capital or VC funds**, operating either at the national or the European level, in the form of joint investments through dedicated funds of funds managed by national public operators;
- through incentives to share **best practices** at the European level.

This initiative could also contribute to the emergence of a pan-European VC industry by encouraging national public operators of funds of funds to cooperate with each other, and to share their knowledge of national markets and practices. It would also facilitate cross-border investments by VC funds.

Based to the European Council conclusions of 4 February 2011 and the Council conclusions on the interim evaluation of FP7 of 10 March 2011, every effort should be pursued to **lift remaining legal and administrative obstacles to the cross-border operation of VC**. The Commission is due to present proposals by the end of 2011:

- for putting in place an EU-wide venture capital scheme building on the EIF and other relevant financial institutions and in cooperation with national operators;
- for scaling up the Risk Sharing Finance Facility; and
- for assessing how best to meet the needs of fast growing, innovative companies through a market-based approach. In connection with this, the Commission is also invited to explore the feasibility of a Small Business Innovation Research Scheme.

3.1.3 How best to deploy public procurement, standardisation and intellectual property rights as innovation tools?

Public procurement

Big customers play a crucial role in **stimulating and funding high technology companies**. The US spends at least \$49 billion per year on pre-commercial procurement (i.e. procurement of R&D), some of it via its Small Business Innovation Research (SBIR) programme. It spends even more on procurements of innovation beyond R&D (new technologies, products and services).⁵

Public procurement accounts for some 17% of the EU's GDP. It represents an important market, particularly in areas such as health, transport and energy. So, Europe has an enormous and overlooked opportunity to spur innovation by using procurement. Moreover, public procurement of innovative products and services is vital for **improving the quality and efficiency of public services at a time of budget constraints**. Yet little public procurement in Europe is aimed at innovation, despite the opportunities under the EU procurement directives. This is due to a range of factors, such as: incentives that favour low-risk solutions; a lack of knowledge and capabilities regarding successful procurement of new technologies and innovations; and a disconnect between public procurement and policy objectives. This can be better addressed through guidance and sharing of best practice, notably in the area of green public procurement. Moreover, because public procurement markets remain fragmented across Europe, procurements often fail to achieve the critical scale needed to trigger innovative investments.

Several Member States are pioneering ways to support innovation using **pre-commercial procurement** and approaches that adapt the successful US SBIR scheme to the EU context. The

⁵ Europe 2020 Flagship Initiative Innovation Union SEC(2010) 1161 (COM (2010) 546 final, 10 June 2010)

results have been encouraging, in particular for SMEs (although the procurements are not restricted to SMEs). If such an approach could be applied more widely and **combined with joint procurement** between different contracting entities, huge markets could be created that would boost innovation and new innovative businesses.

According to the recommendation of the Innovation Union flagship initiative, the Member States and regions should set aside **dedicated budgets for pre-commercial procurements and public procurements of innovative products and services** from 2011. This should create procurement markets across the EU starting from at least €10 billion a year for innovations that improve the efficiency and quality of public services, while addressing the major societal challenges. The aim should be to **achieve innovative procurement markets** equivalent to those in the US. The Commission will provide guidance and set up a (financial) support mechanism to help contracting authorities to implement these procurements in a non-discriminatory and open manner, to pool demand, to draw up common specifications, and to promote SME access. In addition, the Commission will offer guidance on implementing joint procurements between contracting entities under the current public procurement directives and use the ongoing general evaluation of the current directives to examine the opportunity to introduce additional rules to make cross border joint public procurements easier.

Standardisation

Standards play an important role for innovation. By codifying information on the state of the art of a particular technology, they enable dissemination of knowledge, interoperability between new products and services and provide a platform for further innovation. For example, the opening of the telecommunications market combined with the GSM standard laid the foundation for Europe's success in mobile phones. However, standards play this useful role only if they keep pace with the development of new technologies. The rapid **shortening of innovation cycles and the convergence of technologies across the boundaries of the three European standardisation organisations** are a particular challenge. If not able to adapt, the European standardisation system risks becoming irrelevant with companies turning instead to other instruments (as could be seen in the ICT sector) or, worse, could start to work as a brake on innovation. A dynamic standardisation system is also a precondition for the EU to maintain and further reinforce its impact on the setting of standards at global level, where other countries are increasingly seeking to set the rules.⁶

Intellectual Property Rights

The flagship initiative "Innovation Union" is an occasion to **strengthen the basis for an economy of intellectual property**. The European Commission issued a call for tender in the first half of 2010 for a study to explore ways to **create a European financial market for intellectual property rights** (IPR). In addition, a task force comprising the Caisse des Dépôts et Consignations (CDC), the European Investment Bank (EIB), KfW (Germany), the Cassa di depositi (Italy), Innovationsbrön (Sweden), Veraventure (Finland), and CDTI (Spain) was set up in June 2010 to lay the groundwork for a European patent fund.

Establishing an **intellectual property investment fund** like this would provide the same impetus to the knowledge-based economy as venture capital funds have done for business start ups. It would enable research laboratories to bring their inventions to market rapidly, enable patents to be organised by technological clusters, and would make the assembled IPR more widely available to enterprises. Such a fund could acquire IPR from:

- potentially interested universities, schools of engineering, medical faculties, and public sector research bodies, in association with their patent agents;

- potentially interested innovative firms, particularly those working in innovation clusters, SMEs and mid-cap companies;
- the international market, particularly in order to complete technological clusters.

The fund would license the resulting patent clusters:

- to European firms that need these in order to consolidate their innovation or guarantee their freedom to exploit it;
- to economies with which Europe cooperates and has formed partnerships.

The creation of a mechanism to **develop patents** in the service of European firms and research could provide a powerful boost to Europe's competitiveness.

Based on the European Council conclusions of 4 February 2011, private investment in innovative products and services should be encouraged, in particular by improving framework conditions. An **intellectual property rights valorisation instrument** should be set up at European level, in particular to ease SMEs' access to the knowledge market.

There has been a significant step forward under the Hungarian Presidency (via the Competitiveness Council meeting of 10 March 2011) concerning the call for an **enhanced cooperation procedure** among EU member states for **establishing a unitary patent**.

The use of an enhanced cooperation procedure has been requested by 25 out of 27 EU member states with the aim of establishing a single patent that would be valid across the territory of the participating member states. The European Parliament gave its consent for using this procedure on 15 February.

The main obstacle to agreeing unanimously on the creation of an EU patent is the number of languages in which the future unitary patent would be valid, hence the recourse to enhanced cooperation.

The language regime for the future unitary patent system would be based on the language regime of the European Patent Office (EPO), where the official languages are English, French and German.

The already existing European patent requires validation of the granted patent separately in each and every EPO member state, as well as a full translation of the patent in the official language(s) of that member state. The future unitary patent would be automatically valid throughout the territory of the EU member states participating in the enhanced cooperation in the (EPO) language in which it has been granted.

The **enhanced cooperation** would remain **open for non-participating countries**, and access to the unitary patent on the territory of participating Member States would also be available to businesses from non-participating Member States.

3.2 Addressing the Grand Challenges

3.2.1 The Grand Challenges

Europe 2020 strategy and its flagship initiatives formulated ambitious policy objectives in areas such as **climate change, energy security, demographic ageing** or **resource efficiency** (the "Grand Challenges"). The Innovation Union called for linking future EU funding programmes more closely to these objectives by putting a stronger focus on tackling societal challenges. However, careful consideration is needed to identify those challenges where EU level interventions can truly make a difference, while avoiding overly prescriptive scientific and technological choices.

Current EU funding programmes have put considerable effort into tackling societal challenges, predominately through a thematic technology push. Bringing researchers from across Europe together in collaborative networks has been at the heart of this approach and will continue to be vital in sustaining a thriving European research infrastructure. Experience has shown, however, the limitations of this approach in achieving the necessary flexibility, creativity and cross-disciplinary research needed.

Concentrating resources on the identified Grand Challenges where critical mass is necessary in order to boost the performance of European research and innovation, is recommended in the interim evaluation of the FP7.

Based on the European Council conclusions of 4 February 2011, **innovation contributes to tackling the most critical societal challenges** we are facing. Europe’s expertise and resources must be mobilised in a coherent manner and synergies between the EU and the Member States must be fostered in order to ensure that innovations with a societal benefit get to the market quicker. **Joint programming** should be continued. The launch of the pilot Innovation Partnership on active and healthy ageing is an important step in that context. Regular monitoring by the Council will be necessary in order to reach long term objectives as well as concrete goals to be fixed year by year.

3.2.2 How best to address the Grand Challenges through cooperation?

Forms of cooperation

Research and innovation activities and their support have been primarily the concern of the individual Member States. However, in the context of globalisation and the intensification of global competition, there has been a growing awareness in Europe of the existence of common societal challenges which no Member State is capable of resolving alone. Certain issues such as the Grand Challenges are now of such a magnitude that Europe needs to elaborate a stronger, better coordinated, more coherent and more global response to these challenges and wider co-operation is needed between the actors of RDI. The co-operation has been strengthened in the framework of FP7 with several fragmented programmes. Experiences with **pooling Member State resources** (through the Article 185 Initiatives, ERA-Nets and the first steps towards Joint Programming Initiatives) have demonstrated the potential impact and efficiencies offered by leveraging other public sources of funding. Their **effectiveness** does, however, **depend on strong commitments**, including financial support, from national and regional public authorities.

Nevertheless, in the future EU research and innovation funding programmes co-operation needs to be strengthened in a more systematic way in order to enable the EU to tackle the Grand Challenges. In order to address these challenges the following initiatives have been introduced:

- **Joint Programming** aims to **increase and improve coordination and integration of Member States’ publicly funded research programmes** in a limited number of strategic areas, and thus to help Europe boost the efficiency of its public research funding so as to better address major societal challenges. It also responds to stakeholders’ demands for a voluntary, bottom-up approach combined with strategic European-level guidance and their rejection of a “one-size-fits-all” method.
- Joint Programming offers a voluntary process for a revitalised partnership between the Member States based on clear principles and transparent high-level governance. By enhancing cooperation among those that develop and manage research programmes, it aims to increase the efficiency and impact of national public research funding in strategic areas. **Joint Programming** targets public research programmes first and foremost, which **means public-public cooperation**.

Hence it differs in nature from the public-private cooperation embodied in initiatives such as Joint Technology Initiatives. Nonetheless, industry – and other stakeholders - should play a role in the consultative process and in the implementation of specific Joint Programming Initiatives. They are also important beneficiaries of Joint Programming.

Joint Programming has the potential to become a mechanism that is at least as important as the Framework Programmes in the European research landscape, and to change the way in which Europeans think about research.

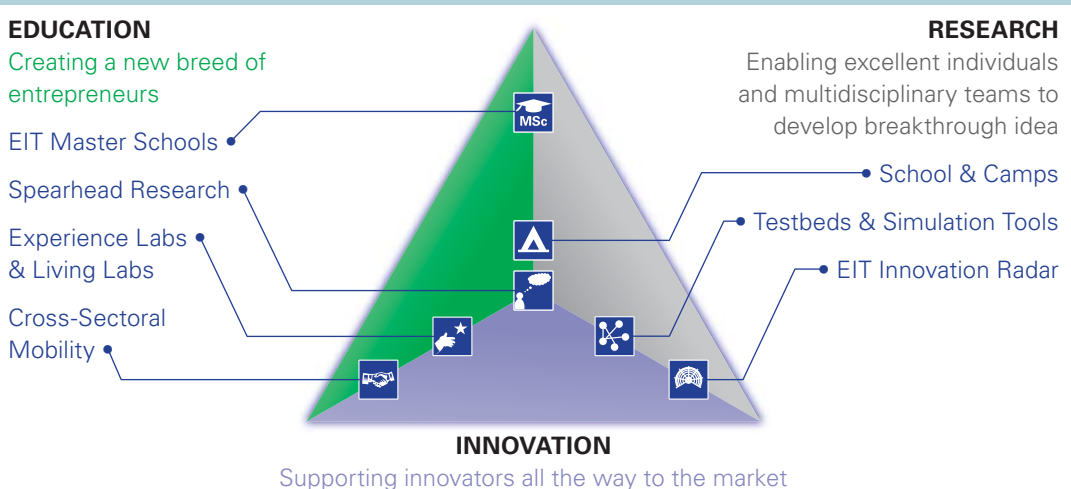
- The Innovation Union introduced the concept of **European Innovation Partnerships** to **bring together supply and demand side measures in addressing societal challenges, to foster synergies and mobilise expertise and resources across the EU**. They have an important role to play in better coordination of efforts and focusing activities across the innovation cycle, to get innovations with a societal benefit to market faster. The launch of the pilot Innovation Partnership on active and healthy ageing is an important step in that context.

The FP has to have close connections with the **agenda of the Europe 2020 strategy** and to ensure that it addresses all three elements of the **‘Knowledge Triangle’**. Europe 2020 strategy also entails close connections between Member States and EU policy levels. This involves competition and collaboration, with competition between Member States and between research performers that would facilitate stronger prioritisation and specialisation. From the point of view of the realisation of the ERA both the FP and the flagship initiatives – especially the Innovation union flagship initiative – have an important role to play.

The European Institute for Innovation and Technology (EIT), through its first **Knowledge and Innovation Communities (KICs)**, is addressing societal challenges (climate change, energy and ICT) and pioneering new innovation governance models. The EIT is due to present its Strategic Innovation Agenda by mid-2011, through which it plans to expand its activities as a showcase for innovation in Europe and map out its future activities.

Knowledge triangle: *The mission of the EIT is to grow and capitalise on the innovation capacity and capability of actors from higher education, research, business and entrepreneurship from the EU and beyond through the creation of highly integrated Knowledge and Innovation Communities (KICs).*

Figure 4 – Knowledge Triangle



Source: European Institute for Innovation and Technology

Approach: Top-down vs. Bottom-up

The Expert Group recommended in the FP7 interim evaluation that the **“Mix of funding measures should strike a different balance between bottom-up and top-down approaches”**. The European Commission responded that significant parts of FP7 provide **bottom-up support** (MCA, ERC, FET, etc.) and proper balance is needed in order to tackle major challenges.

3.3 Strengthening Europe’s Science Base

3.3.1 How frontier research will support world-class excellence and strengthen Europe’s science base?

Frontier research based solely on excellence is an open competition of outstanding individuals (talents) of all nationalities and ages willing to move, stay and do research in Europe.

Table 11 – Frontier Research
<p>Why “Frontier Research”?</p> <p>Traditional terminology (“basic” / “applied” research “science” vs. “technology”) is no longer appropriate</p> <ul style="list-style-type: none"> • Research at the frontiers is characterised by the absence of disciplinary boundaries • New discoveries are often triggered by real world problems (and vice-versa) • Progress in understanding phenomena and techniques for investigation go hand in hand <p><small>Source: Frontier Research through ERC grants presentation (Kroó Norbert, Member of the Scientific Council of ERC and the Vice President of the Hungarian Academy of Sciences)</small></p>

In addition, according to the findings of the FP7 interim evaluation:

- Frontier research is an important driver for long-term growth.
- High-calibre research must allow for risk and, on occasion, the prospect of failure, so that the balance between risk and the scope for highly innovative results should be tilted more towards **riskier projects**.

The **European Research Council (ERC)** is the first European funding body set up to support investigator-driven frontier research. Its main aim is to stimulate scientific excellence by supporting and encouraging the very best, truly creative scientists, scholars and engineers to be adventurous and take risks in their research. The scientists are encouraged to go beyond established frontiers of knowledge and disciplinary boundaries.

European Research Council

The main principles of the ERC are as follows:

Table 12 – ERC Principles
<ul style="list-style-type: none"> • Generous funding for ambitious projects (up to €1.5 mil / €3.5 mil) • No quotas per country/region, gender, etc. • All fields supported: 3 Domains from humanities to engineering • Pan-European (and global) competition to advance excellent ideas

- Free up excellent researchers to push the frontiers of science competing at regular intervals
- Collaborations are fruitful as long as they arise naturally
- Projects do not exclusively produce European Added Value

Source: Frontier Research through ERC grants presentation (Kroó Norbert, Member of the Scientific Council of ERC and the Vice President of the Hungarian Academy of Sciences)

In addition, the FP7 interim evaluation articulated the following findings:

- The principle of excellence in project selection has largely been achieved. Despite being a new, and thus untried, instrument, the European Research Council has manifestly succeeded in attracting and funding world-class research and is playing an important role in anchoring research talent. While excellence is, correctly, the crucial principle for funding research, it is also important to foster the development and spread of excellence.
- A **strengthened role for the ERC** is an important instrument for increasing the science base needed for addressing innovation and societal challenges.

For the creation of new initiatives and to have successful breakthroughs in innovation **high quality basic research is needed**. The ERC has succeeded in stimulating scientific excellence by supporting identification of new opportunities and directions in any field of frontier research, its nature being “investigator-driven” and “bottom up”.

The setting up of the **ERC** was a major step forward in **raising the excellence of Europe’s science base**. A strengthening of its role could involve both the weight it occupies and the instruments it uses. Important lessons must be drawn from the experience of those regions and countries which have managed to nurture the world’s most excellent public research institutions, through concentration of funding and a combination of project grants and institutional support schemes.

In the long term, **world-class excellence** can only thrive in a system in which all researchers across the EU are provided with the means to develop into excellence and eventually compete for the top spots. This requires Member States to pursue ambitious modernisation agendas for their public research base and sustain public funding. EU funding, including through the Cohesion policy Funds, should assist to build up excellence where and as appropriate.

It is **important to continue the ERC approach** with the ongoing and already approved practices, to assure the autonomy of the Scientific Council – the highest executive body of the ERC.⁷

According to some Member States **the financial resources allocated to the ERC are inadequate** and grant requests which are fully substantiated scientifically have had to be turned down due to oversubscription in the programme, that goes together with a waste of resources in failed applications that are deemed worthy of funding but miss the cut-off threshold. The discussions about the future of the next common strategic framework provide a good opportunity to **increase the funding for the ERC**. Financing basic research is risky, but it is a necessary investment in the future. It would be more regrettable if the economic crisis hitting the EU States curtailed even further the financing of free and strategic research, both of which are cornerstones of future economic and financial prosperity.

Not increasing the level of funding for high-level researchers within the ERC has implications for the future of the ERA and the potential of scientific research to produce a real “lighthouse effect” within this new strategic initiative. **The development of more active and adventurous networks, by bringing together high quality researchers and research teams, is essential to support**

⁷ Green Paper: From Challenges to Opportunities: Towards a Common Strategic Framework for EU Research and Innovation funding (6528/11, 14 February 2011)

excellence in European RDI. In the framework of such networking specialised skills may be obtained and developed - like science management, governance capability, system knowledge – that are needed for excellent researchers and their institutions in the convergence regions as well. **Networking may be promoted** through the Knowledge and Innovation Communities within the framework of EIT, or in the structure of research potential programmes supporting knowledge transfer and capacity building to strengthen excellence in the ERA.

Marie Curie Actions

A major achievement in **training and transfer of knowledge** are the EU Marie Curie Actions, which have boosted cross-border mobility and research collaboration by many thousands of researchers. Marie Curie Actions have also played an important role in equipping the next generation of researchers with innovative skills, in particular through industry-academia exchanges.⁸

Additionally, mobility and training of researchers continues to be underpinned by the Marie Curie Actions under the specific programme “People” and is making a valuable contribution to the development of the human capital of researchers. However, the low success rates in some of the Marie Curie Actions suggest that some **rebalancing of resources** within the specific programme could enhance its impact. The evaluators also conclude that the training and mobility of researchers enhances capacity building and research infrastructures, which can help to improve research performance.⁹

Youth on the move

Youth on the Move is one of the EU’s Europe 2020 seven flagship initiatives which was developed to **respond to the challenges young people face and to help them succeed in the knowledge economy.** It is a framework agenda announcing key new actions, reinforcing existing activities and ensuring the implementation of others at EU and national levels, while respecting the subsidiarity principle. Candidate countries should also benefit from this initiative, through the appropriate mechanisms. It will harness the financial support of the relevant EU programmes on education, youth, and learning mobility, as well as the Structural Funds. All existing programmes will be reviewed to develop a more integrated approach to support the Youth on the Move initiative under the next Financial Framework. Youth on the Move will be implemented in close synergy with the ‘Agenda for New Skills and Jobs’ flagship initiative, announced in Europe 2020 strategy.

3.3.2 How frontier research will support first class research infrastructure and strengthen Europe’s science base?

Research infrastructures

Research infrastructures (RIs) are key elements of Europe’s competitiveness in the global economic arena and in addressing the Grand Challenges. It is particularly true for RIs that European countries need to act in a more collaborative and coherent manner. **Much research and innovation require** more and more sophisticated (as well as more expensive) methods and **tools mostly available or realisable at large scale facilities.**

Establishing the **European Strategy Forum for Research Infrastructures (ESFRI) Roadmap**, initiating the preparation of national research infrastructure roadmaps at member states, creating the ERI legal framework structure and even the construction of new facilities (a striking example is the X-FEL) are great achievements of FP6 and FP7. On this basis further development and various improvements of the RI programme can be projected for the Common Strategic Framework.

Through the actions of the research infrastructures programme and building on the work of the ESFRI, a strong impetus has been given to planning, preparation and construction large-scale research infrastructures, and to ensuring access to existing infrastructures. In this context, the further deployment of e-Infrastructures is important to allow remote and virtual access to research facilities and to scientific information.

The goals of the ERA and its benefits will only be achieved by the broad collaboration and shared efforts of all countries in the European Union. The development of a balanced network of European research infrastructures should be a key component of the next Common Strategic framework.

- It is a crucial task of the **Common Strategic Framework** to **achieve coherence** in planning and implementation of national, regional and European programmes, legal and financial measures.
- Research infrastructures are key components of the scientific and technology development and innovation activity of society, but they should also be considered as drivers of national and regional economies. It is suggested that the future Common Strategic Framework helps potential providers of RIs with economic and financial analysis to explore the economic impact of these activities and thus supporting governments in infrastructure decisions.
- A major component of RI has been the support of facilities by the **trans-national access (TNA) instrument**. It is crucial to continue this support, because it is a very efficient tool in facilitating researcher mobility, and in contributing to European integration.
- It is necessary to take actions to enhance interaction between RI providers and potential industrial partners.
- RIs at national and pan-European level will enhance the necessary conditions for pooling talent, maximising resources and ensuring the best outcome of RI investments in a given region and at the same time provide a way to **optimise the geographic balance of infrastructures in Europe**. The setting up of the **ESFRI Roadmap** has inspired the elaboration of **national roadmaps**, which bear particular importance in smaller countries and especially for new member states with structural funds available for RI developments. This provides a solid basis to elaborate a **national strategy**, and foresight to target necessary funds and mandate agencies to advance integration at the European level. This can also serve as a model for further harmonisation of the ESFRI Roadmap and national initiatives.
- For a more balanced construction of the infrastructures and to increase the involvement of smaller member states at affordable investment efforts, it is advisable to create sub-units or outstations of a given large scale facility according to the given players' competences – whenever the scientific nature of the given RI allows for it. The creation of a **“research infrastructure technology platform”** with a high tech industrial base would promote local strengths, interests, resources and cost efficiency at various partners of the consortium.
- More work needs to be done on the implementation, on the budgetary commitments (political support and on developing a methodology that will allow for the evaluation and prioritisation of the various new and existing Research Infrastructures across Europe).

3.4 Spreading Excellence

3.4.1 How best to ensure that RDI excellence spreads through Europe to avoid a “research and innovation divide”?

Broadening participation

There has been progress on **increasing the participation of women** in FP7 and the pressure to include women in different roles has been instrumental in raising the salience of female participation rates, but the conclusion of the Expert Group is that more needs to be done. The Commission could do more to push for a greater inclusion of women in the FP and should exercise leadership in this regard.

The **success rates of researchers from some Member States** are systematically **lower than for others**, raising questions about whether the application of the excellence criterion allow sufficient scope for developing the undoubted potential of researchers from these countries. The relative success of a comparatively small number of leading Research and Technology Organisations (RTOs) and (to a lesser extent) major universities raises awkward question about concentration versus spread and scope for new entrants.¹⁰

The EU programmes for research, technological development and demonstration activities are designed to make a significant contribution to European science and to the development of the integrated ERA by complementing a variety of funding activities across the EU. At the same time RDI constitutes a substantial part of the Europe 2020 strategy, which is strongly oriented towards accelerating the growth of Europe’s competitiveness and economic capacity.

As of 2007 the EU consists of 27 Member States. This gives the EU a significant increase in its critical mass, in size, and in human potential, making the EU a key player on the global scene and contributing to the success of the Europe 2020 strategy goals. Ambitious European objectives in a continuous competition on a global level can only be attained if the whole internal European potential, including the intellectual capital of Europe, is used effectively and if common efforts and an inclusive approach are applied.

The present situation in the field of RDI, which has a direct link to EU economic growth, does not fully reflect the **capabilities and potential** as far as the **involvement of the new Member States in FP7** is concerned. This is clearly substantiated by different statistics and the interim evaluation of FP7.

The Green Paper lists the following items in this regard:

- **World-class excellence** can only thrive in a system in which **all researchers across the EU** are provided with the means to develop into excellence and eventually compete for the top spots.
- This requires **Member States** to pursue ambitious **modernisation** agendas for their **public research base** and sustain **public funding**.
- **EU funding**, including through the Cohesion policy Funds, should assist to **build up excellence** where and as appropriate.

Success rates for applicants located in several of the Member States that acceded to the EU in 2004 and 2007 are distinctly lower than for the EU15, although relatively low success rates are also found for other Member States. Having **‘scientific excellence’** as the principal criterion for research funding will inevitably see some **concentration of research funding in favoured locations**. But a possible corollary is that the **FP should be complemented with other EU instruments** (such as the Structural and Cohesion Funds), to foster capacity building in these areas.¹¹

But it is important also to consider ‘next stages’ once some of the basic capacity is in place, suggesting that countering deficiencies in infrastructures at the regional level should be a more prominent objective in future programmes.

Table 13 – Participation of the Member States in RDI programmes

Facts

Statistical analysis supported the general finding of the Evaluation report: “the ‘performance’ of the new Member States as a whole falls short of that of the old Member States (EU15).” But there are differences among the low participation countries.

Reasons behind the facts at national level:

The specialties of the Structural Funds:

- Determined by the priorities of the beneficiary Member States
- The use of Structural Funds can make a strong contribution to develop physical (research) infrastructure and companies’ innovation capacities, but much less to develop human capital (especially mobility).

Conclusions/recommendations at national level:

- Prioritise RDI at national level to assure better participation in large scale international RDI programmes
- Use the Structural Funds for improving research infrastructure and strengthening the research capacities
- Maximising the benefits of the SF and FP requires well functioning co-ordination and harmonisation efforts at national level.

Reasons behind the facts at EU level:

- Country size vs. excellence in all thematic areas and instruments
- “Too narrow focus on ‘research excellence’ can overshadow the benefits of full-scale involvement of low participation member states in the FP and this should not be neglected”
- Structural Funds should facilitate more FP participation from the low participation member states.

Conclusions/recommendations for the EU:

- Specific action could be envisaged to assess the reasons behind the lower performance of most of the new member states
- Synergies between FP and Structural Funds need to be better exploited to contribute to the increased participation of underrepresented countries in FP
- During the remaining years of FP7 and certainly in future EU research and innovation funding programmes, special attention should be paid to creating research capacity in terms of both human and physical capital (not only in low participation member states)
- Address better the needs of all EU Member States in designing future EU research and innovation funding programmes
- Keep excellence as a key factor, but reconsider the meaning of “European added value” and “European dimension”

- Capacity building should remain an important pillar in FP7 and future EU research and innovation funding programmes
- Geographically better balanced selection of evaluators
- More synergies between FP and SFs – simplicity and coherence

Source: Participation of the EU-12 Countries in FP7 workshop (Nyíri Lajos) at “Half-time – Highway: Conference on Interim evaluation of FP7 from different perspectives”, 24-25 February 2011, Budapest

Following the recommendation of the interim evaluation of FP7, the **Common Strategic Framework** should pave the way for **increased participation from Member States that are under-represented**. The participants of the high-level conference on the interim evaluation of the FP7 (Budapest, 24-25 February 2011) have agreed on **six recommendations** towards the enhanced involvement in the FP7 of the **low participation countries**.

Table 14 – Enhancing the participation of under-represented countries in FP7

- Specific actions should be envisaged to better analyse the reasons for under representation of Member States in FP7 projects.
- Synergies between FP and Structural Funds shall be better exploited to contribute to the increased participation of under-represented countries in FP. In order to facilitate this process, efforts shall be taken to align the different governance modes of FP7 and the Structural Funds. Well-functioning co-ordination and harmonisation efforts at national level would also be essential.
- The Common Strategic Framework should address the needs of all EU Member States by boosting excellence and unlocking the full potential of all the regions and Member States in the EU. Promoting the internal dimension of ERA by raising the capacity and the competitiveness of the EU-12 Member States and identifying more inclusive and flexible instruments shall be taken into account in the preparation of the Common Strategic Framework.
- During the remaining years of FP7 and certainly in the future Common Strategic Framework, special attention should be paid to creating research capacity in terms of both human and physical capital (not only in low participation member states). Making better use of networking would also contribute to developing these capacities.
- The principle of excellence should be a key factor in the future as well, but the meaning of “European added value” and “European dimension” should be reconsidered.
- It is strongly recommended that RDI is prioritised at the national level to ensure better participation in the next RDI programmes, with special attention given to large scale international programmes.

Source: Conclusions and Recommendations of “Half-time – Highway: Conference on Interim evaluation of FP7 from different perspectives”, 24-25 February 2011, Budapest

The statistics on FP7 suggest that the ‘performance’ of most of the new Member States falls short of that of most of the old Member States (EU15). There are many possible explanations and it is important to analyse why the shortfall has occurred. In the excellence-building system of FPs the “performance” problem of the low participation member states is a new problem, while for those catching up, the cohesion politics constitute traditional elements of the European Union. In this respect the Cohesion policies aim to reduce disparities between more and less developed areas of the EU and are built on per capita gross national product, while in the case of the knowledge based path (to FPs) the approach is more complex, and the GDP is only one determining factor.

The Council also reflected on the low participation issue in its conclusions on the interim evaluation of FP7 on 10 March 2011. In its paper, the Council recalls that **raising the competitiveness of European research** requires that the **potential across the whole European Research Area is fully unlocked**, and that projects aiming at providing scientific excellence should be managed optimally with particular regard to the use of resources. **Synergies** and connections between the **Structural Funds and the FP** should be **further improved**. The work of the ERAC ad-hoc working group on Synergies should be taken into consideration. The Commission, in consultation with the Member States, is invited to analyse the reasons of low participation rates from certain Member States and report back to the Council as soon as possible but before the end of 2011, and put forward appropriate actions in this regard, aiming at spreading scientific excellence.

Simplification

As a conclusion of the Green Paper, open, light and fast implementation schemes would enable SMEs and other stakeholders from industry and academia to explore **new ideas and opportunities** as they emerge, in a flexible way, hereby opening new avenues for innovation. This could for example build on the current use of **open calls** and **simplified application procedures** in the Future and Emerging Technologies (FET) actions in the FP7 ICT theme as well as on the CIP eco-innovation market replication projects.

The “simplification” terms cover in a broader sense simplifying participation by lowering administrative burdens, reducing time to grant and time to payment and achieving a better balance between cost and trust based approaches. According to the European Council conclusions of 4 February 2011, it is crucial that **EU instruments** aimed at **fostering RDI** be **simplified** in order to facilitate their take-up by the best scientists and the most innovative companies, in particular by agreeing between the relevant institutions a new balance between trust and control and between risk taking and risk avoidance.

In its conclusions on the interim evaluation of FP7 on 10 March 2011, the Council recalls its conclusions of 12 October 2010 requesting removal of the requirement to open interest-bearing bank accounts for pre-financing and notes the proposals made by the Commission in this respect and on an appropriate tolerable risk of error. It emphasises the urgent need to **reduce time-to-grant period** as well as the need to **accept usual accounting practice** of the beneficiaries. Coherence of procedures and approaches across Commission services and the Executive Agencies responsible for administering FP7 is of crucial importance. The Council invited the Commission to utilise the present revision of the Financial Regulation and its implementing modalities as an opportunity to contribute to a common strategic framework with harmonised and more flexible conditions for research, including as regards Joint Technology Initiatives.

Table 15 – More effective implementation of FP7 – the simplification process

- The simplification process has to be continued facilitating to a greater extent the participation of future applicants with special focus on industrial participants (particularly that of SMEs) and on low participation countries. The harmonisation of the modalities of the different instruments can contribute to reach the desired effect.
- In the framework of this process, Member States are invited to facilitate the participation in FP by means of national legislations.
- There shall be a stronger focus on research and innovation results than on financial and administrative issues. More extended use of lump sum or flat rate payments shall be encouraged in FP instead of the reimbursement of actual costs.

- A common interpretation of all participation rules from application to reporting would be highly welcome.
- When preparing the Common Strategic Framework it shall be considered how the increased complexity of the framework by encompassing EIT and parts of CIP will affect the simplification process. Simplification shall be regarded as one of the key principles of the future framework for EU research and innovation funding.

Source: Conclusions and Recommendations of "Half-time – Highway: Conference on Interim evaluation of FP7 from different perspectives", 24-25 February 2011, Budapest

Instrument synergies

Tackling the potential synergies deriving from diverse sources of funding and programmes of different character could give impetus to intervention efficiency and impact.

Table 16 – Maximising synergies between the structural funds and the European Union's FP for research

How the Structural Funds can stimulate RDI investment in European regions:

- Fund RDI infrastructure and equipment (conventional approach – still valid)
- Favouring the establishment of medium and long term RDI investment strategies through Smart Specialisation (coupled with increased conditionality and clear thematic priorities)
- Help create the appropriate framework conditions for stimulating RDI especially in connecting academia and industry
- Stimulate the emergence of clusters of technological competence / excellence, especially involving SMEs
- Favouring peer review via international expertise to raise quality in terms of strategy and delivery

How to ensure complementarity between FP and the New Structural Funds:

- Need for fine tuning of national and regional Research investment priorities at short, medium and long term in the future SF Strategic National Reference Frameworks / Operational Programmes (Development and Investment Contracts with MS and Regions)
- Guiding principles: the Seventh Framework Programme (2007-2013) strategic research priorities and its future successor CSF, the developing ERA process, the recent Strategic Commission Communications (notably Innovation Union)
- Main responsibility lies with the national / regional authorities
- No co-funding of the same costs - but complementary funding always possible.

Source: "Maximising synergies between the Structural Funds and the Union's FP for Research" presentation (Dr. Dimitri Corpakis, Head of Unit for Regional Dimension of Innovation, DG Research and Innovation, European Commission) at "Half-time – Highway: Conference on Interim evaluation of FP7 from different perspectives", 24-25 February 2011, Budapest

4 The contribution and potential of Hungarian innovation

4.1 Research, development and innovation in Hungary

4.1.1 Overview

Hungary has had a long and well-respected tradition in research, development and innovation. Despite the relatively under-financed innovation system, **Hungarian researchers and research institutes are widely acknowledged for their expertise and impact all over the world.** Historically, **Hungarian scientists have provided the world with a number of significant inventions.** A priority for Hungary today is to build on these foundations and renew its position as a hub of world-class research and innovation.

The OECD Reviews on Innovation Policy – Hungary (2009) identified the following characteristics, both strengths and weaknesses of the Hungarian innovation system.

Table 17 – Main features of RDI in Hungary (2009)

Strengths

- Openness of the economy
- Rich portfolio of RDI support
- High quality research infrastructure
- Great research performance and results in physics, mathematics, biology, clinical medicine and engineering
- High research productivity in terms of number of publications and citation indices
- Adequate regulatory framework in place for science technology and innovation policy

Weaknesses

- Low innovation activity of the private sector, low patent activities
- Regional imbalance of RDI activities
- Low share of innovative SMEs
- Lack of mobility and cooperation
- Low human resources in RDI – low share of graduates in engineering and natural sciences.

Source: Based on OECD Innovation Policy Study - Hungary (2009)

4.1.2 International outlook

The first edition of the Innovation Union Scoreboard (IUS) categorizes all EU Member States to groups based on their innovation performance: innovation leaders, innovation followers, moderate innovators and modest innovators. **Hungary belongs to the group of moderate innovators,** with a figure lower than the EU-27 average, however, with a rate of increase exceeding that of the EU average.

There is some **improvement in human resources** in science and technology such as the employment rate in knowledge intensive activities as a percentage of total employment is very close to the EU average. Also noticeable are the excellent performance of Hungary as regards the licence and patent revenues from abroad and the contribution of high-tech and medium-high-tech manufactured goods to the trade balance. This demonstrates a good positioning in new sectors as well as a progressive structural change towards higher intensive sectors as illustrated below.

Figure 5 – IUS comparison (2010)

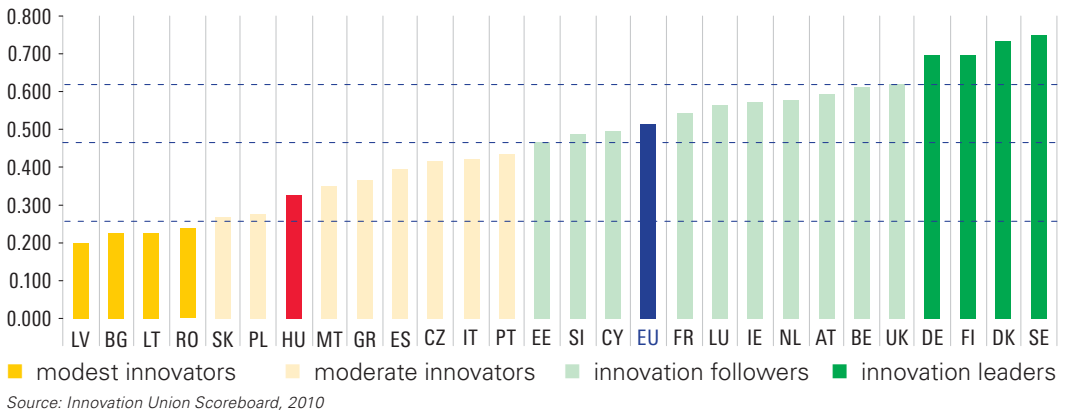
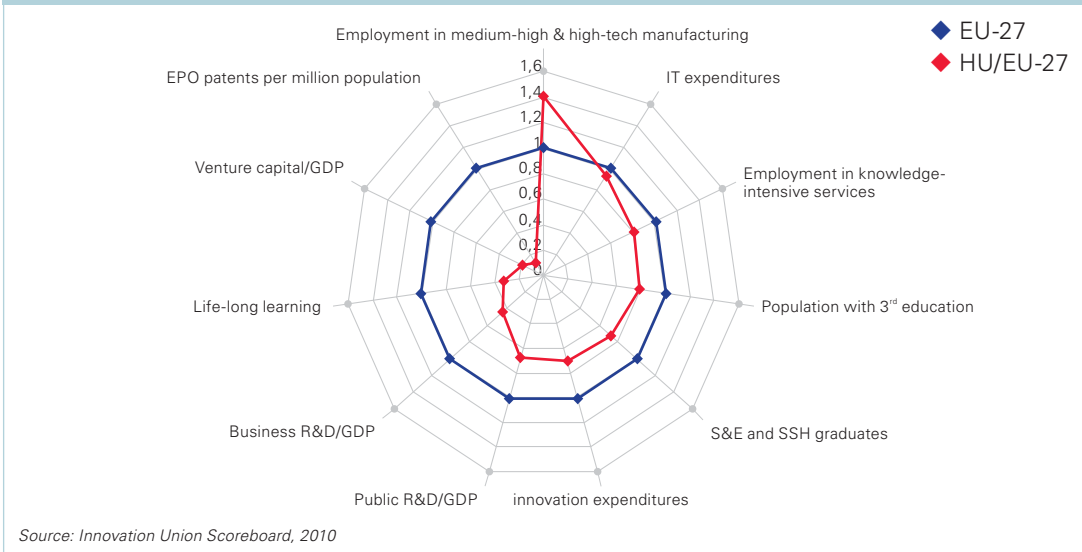


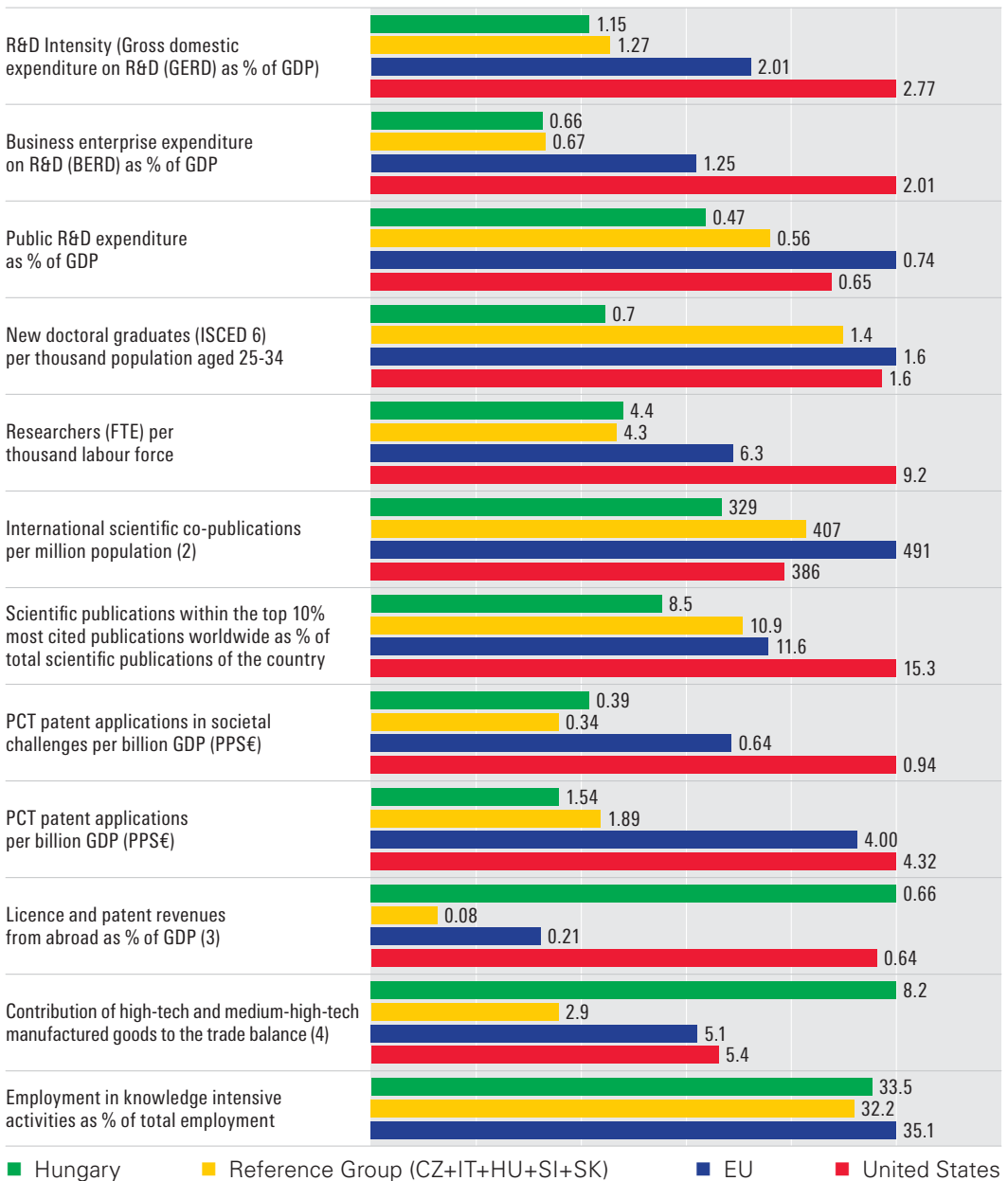
Figure 6 – IUS scores for Hungary (2010)



Also according to the IUS main indicators, Hungary shows a performance level that falls short of EU-27 average in the fields of:

- Non-EU doctorate students
- Venture capital / GDP
- Community designs
- Number of PCT patent applications
- SMEs innovating in-house

Figure 7 – Hungary R&D profile (2009)



Source: DG Research and innovation

As another relevant international comparison, **Hungary has been ranked 52 at the concise Global Competitiveness Index (GCI)** of the World Economic Forum (WEF). As sub-index to CGI, the WEF identifies “Innovation” (Hungary ranked 51) which comprises two indices, “Business sophistication”

and “Innovation”. In the 2010-11 report, Hungary stands as number 41 in the Innovation sub-index (Index C12). The most remarkable indicators are as follows:

- Quality of scientific research institutes (Rank 18)
- University-industry collaboration (Rank 32)
- Utility patents per million population (Rank 32)

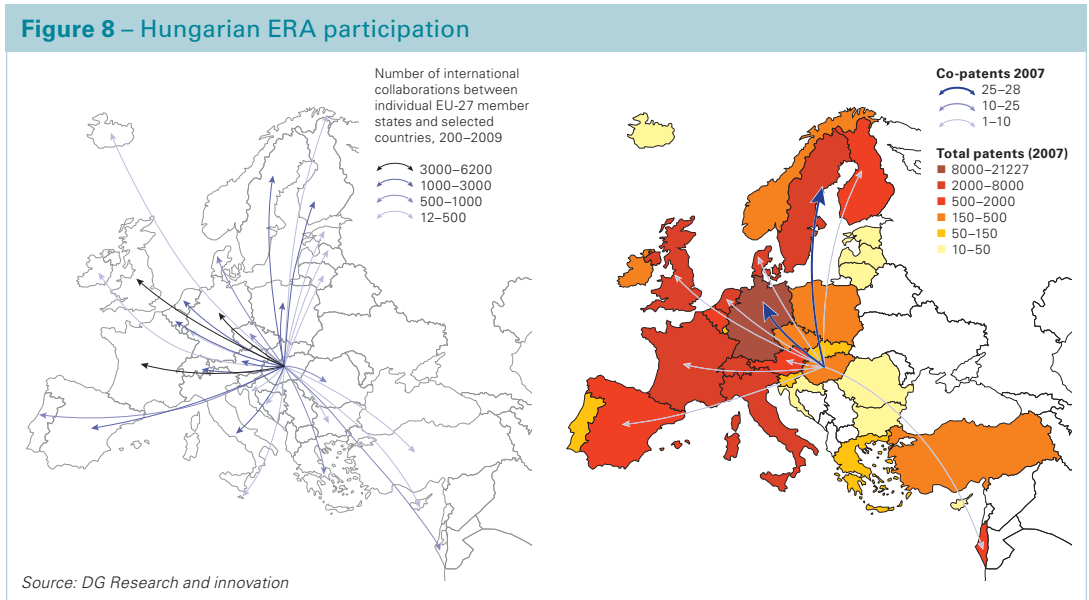
The different results of the IUS and WEF surveys clearly indicate that it is mostly developed European countries that are ranked higher than Hungary in the EIS ranking.

As a conclusion, Hungary has a sound basis for innovation (regulatory environment, research infrastructure, and current human resources), though there are challenges to address in terms of number of patents, industry involvement and education.

4.1.3 European Research Area participation

Hungary is well connected in terms of co-publications with Germany, the United Kingdom and France. Its interconnections in terms of co-invented patent applications are more limited, though it has good links with Germany and Sweden,.

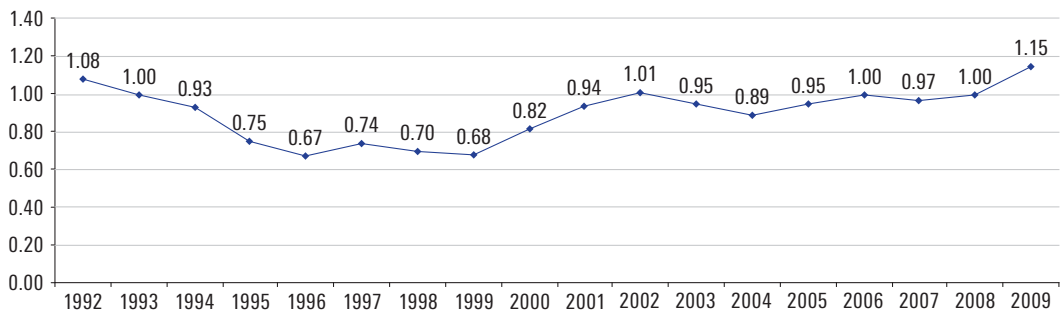
Moreover, the share of international scientific co-publications per million population and respectively, the patent applications per billion GDP are under the EU average.



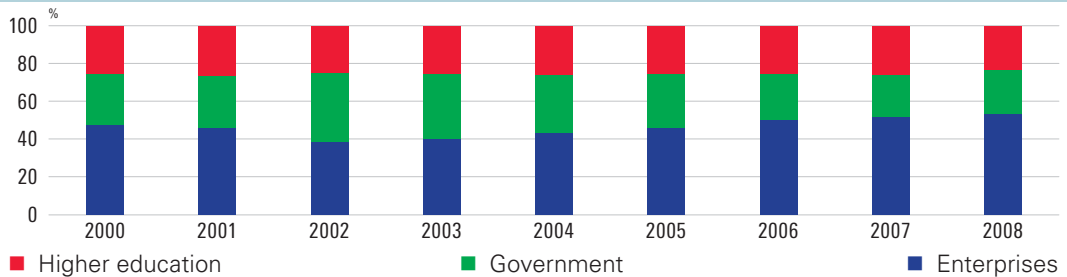
4.1.4 Research, development and innovation in Hungary

RDI related expenditure in Hungary has remained close to 1% of the GDP since 2001 (maximum: 1.15% in 2009). The compilation of the Hungarian national target indicates a level of 1.8% of GDP by 2020.

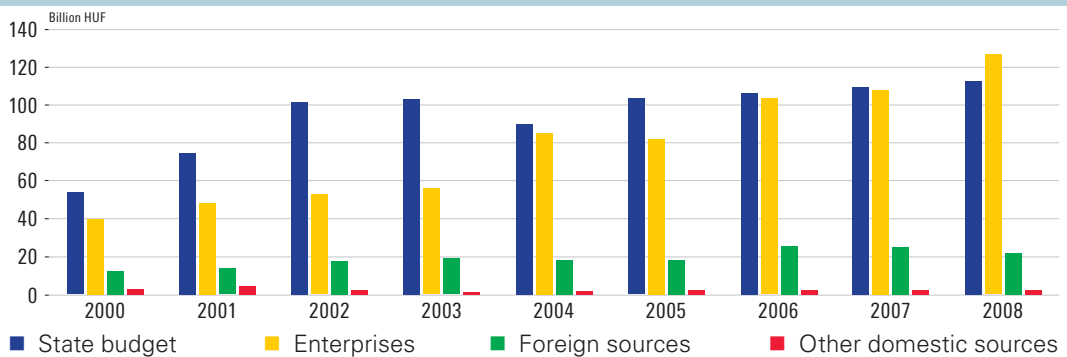
The internal share of **business enterprise research and development expenditure** showed a steady increase from 2004, reaching 46% in 2009. Still, this figure is lower than many developed countries, where the share is around two thirds of the total.

Figure 9 – Gross domestic R&D expenditure as per cent of the GDP


Source: European Innovation Scoreboard, 2009

Figure 10 – Internal structure of RDI expenditure


Source: Hungarian Central Statistical Office, 2009

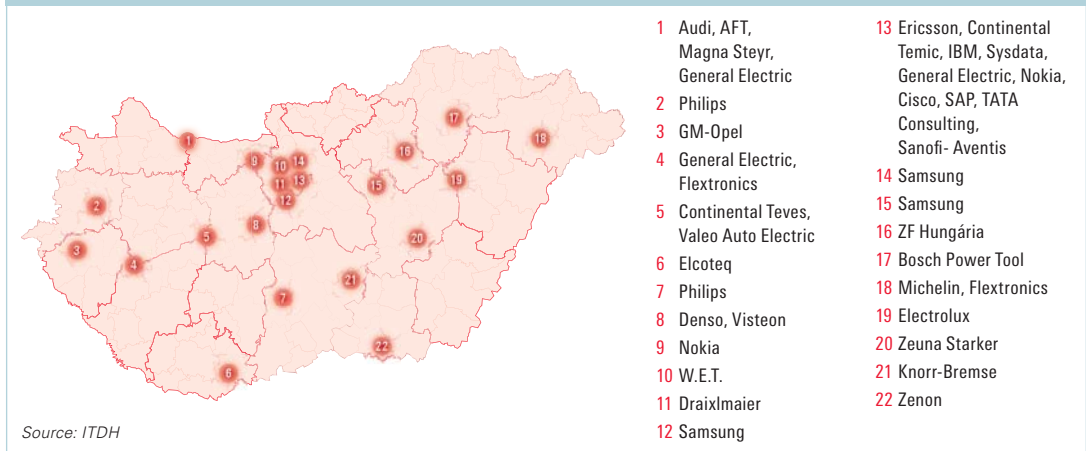
Figure 11 – RDI expenditure by source of funds


Source: Hungarian Central Statistical Office, 2009

According to recent research by the Hungarian Statistical Office, the structure of **R&D expenditure by sectors did not change significantly** between 2000 and 2008. The weight of business enterprises' R&D units, representing the largest share, increased continuously from 2003 after a fall at the beginning of the period and reached nearly 54% by 2008. The expenditure of research units in the government and higher education sectors remained stable during these years.

Data of the Central Statistical Office also show that contrary to earlier years, **business enterprises financed most R&D expenditure** in 2008 but the government sector remained the second most significant source of funds. Business enterprises usually financed their own R&D activities, while the state budget was the most important source of funds for R&D activities performed by research institutes and other research units in the government sector, and R&D within the higher education sector.¹²

Figure 12 – R&D units of multinational companies in Hungary



Nearly two thirds of the funds from abroad were utilized by enterprises, while their share did not reach 10% in either of the other two sectors. Non-profit institutions backed R&D activities mainly in the higher education sector. Almost 70% of their sources were received by higher education institutions.

There are **many multinationals** that **have established RDI units** in Hungary, as shown in the map.

In summary, the main challenges of RDI in Hungary are as follows:

- Low number of globally marketable products and services
- Low innovation intensity of companies (especially SMEs) GERD/GDP 1.15% (2009) and ratio of companies R&D expenditure within was 48 %
- Strong academic background but inadequate linkages to industry
- Weak commercialisation and exploitation of R&D results
- Low number of professionals in the fields of engineering and natural sciences (one third of EU average)
- Very low intensity of patent activity (in case of USPTO 9% of EU average, in case of EPO 12% of EU average)

4.1.5 Research, development and innovation institutional infrastructure¹³

The new government of Hungary, which took office in May 2010, introduced significant changes in the institutional system of innovation. **The government considers this area as a key contributor to economic growth.** It also considers innovation as a tool for setting the domestic economy back on track to sustainable growth. In this context, innovative small and medium-sized enterprises (SMEs) are in focus in terms of their job-creating potential, original products, and the conscious exports of intellectual goods. In addition, it is an important goal to broaden the corporate base of innovation, including various forms of non-technological innovation.

Figure 13 – RDI institutional structure in Hungary



The government has launched measures for a comprehensive review of support programs, launching new programs, restructuring the management and institutional system and relevant regulatory environment.

The two main stakeholders of the national innovation system are the following entities:

- **National Research, Innovation and Science Council (NKITT).** NKITT is responsible for RDI related strategic, finance issues and is acting as a consultative, commenting and decision preparation body to the government.
- **National Innovation Office (NIH).** NIH is responsible for pursuing the following objectives:
 - Promoting the achievement of national RDI strategic objectives and the effective operation and balanced development of the national RDI system, through coordination between actors, and strengthening of evidence-based strategic planning.
 - Assisting national RDI players in acquiring domestic and international resources and their utilization, and contributing to the international organisations and working groups engaged with the elaboration of strategic resources, following national interest and position.
 - Assisting the development of innovation activities of enterprises through the development of innovation services, support tools for achieving improvement and strengthening RDI cooperation.

RDI related strategic planning, the elaboration of action plans (government, sectoral, international) and the harmonization of these strategic plans to policy documents is clearly separated from the different available state financial resources (EU and national funds) allocation management. As a result:

- Strategic level activities belong to the Ministry for National Economy
- Implementation and EU funds allocation belongs to Ministry of National Development
- RDI related science policy and human resources issues belong to the Ministry of National Resources

4.1.6 Research, development and innovation policy

There are basically three tasks for the forthcoming period in order to promote RDI in Hungary:

- **The R&D and knowledge intensity of the Hungarian economy must be expanded** by supporting innovative companies with high growth potential operating in the processing and service sectors, increasing the innovation and absorption capacity of SME's, developing innovative clusters and joining national and international knowledge sources and markets necessary for innovation.
- **Hungary's knowledge infrastructures** (research institutes, universities) **must be strengthened** and their competences must be improved in order to contribute to the strategic realization of national economic goals substantially and in a measurable way.
- To ensure the **favourable** economic, financial and legal **conditions for the competitiveness of domestic-owned SMEs and Young Innovative Companies** (access to credits, financial sources, markets, strengthen the entrepreneurial skills and competencies).

4.2 Research, development and innovation projects in Hungary¹⁴

4.2.1 Extreme Light Infrastructure project

Extreme Light Infrastructure (ELI) is a European Project, involving **nearly 40 research and academic institutions from 13 EU Members Countries**, forming a pan-European Laser facility that aims to host the most intense lasers world-wide.

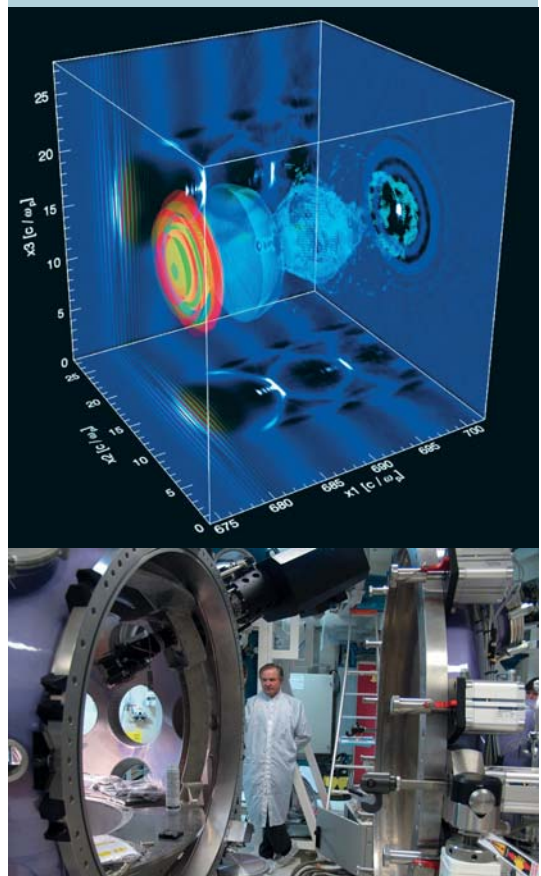
The facility, based on **four sites**, will be the first large scale infrastructure based on the Eastern part of the European Community and has obtained a financial commitment **exceeding 700 M€**.

The first three sites will be situated in Prague (Czech Republic), Szeged (Hungary) and Magurele (Romania) and will **be operational in 2015**. The fourth site will be selected in 2012 and is scheduled for commissioning in 2017.

ELI will be a new scientific infrastructure devoted to **scientific research in lasers' field**, dedicated to the investigation and applications of laser-matter interaction at the highest intensity level (more than 6 orders of magnitude higher than today's laser intensity). The ELI project, will comprise three branches:

- **Ultra High Field Science** that will explore laser-matter interaction in an energy range where relativistic laws could stop to be valid;

Figure 14 – ELI illustration



- **Attosecond Laser Science** designed to conduct temporal investigation of electron dynamics in atoms, molecules, plasmas and solids at attosecond scale (10-18 sec.: a billion of billions of a second);
- **High Energy Beam Science** devoted to the development and usage of dedicated beam lines with ultra short pulses of high energy radiation and particles reaching almost the speed of light (100 GeV).

4.2.2 Talentis

The aim of establishing the **first Central and Eastern European “Silicon Valley”** was what called for the Talentis Group. If we consider the intellectual potential of the region – including Hungary – based on the scientific successes achieved so far, it becomes evident that this part of the continent is particularly in need of modern, multifaceted knowledge centres, where those with talent, beyond being offered modern education and training, are treated as “capital”, representing the largest added value not only from the point of view of business associations but from that of the whole country’s development.

The Talentis Program is a **knowledge-based regional development concept and an innovation cluster** established in the Zsámbék Region close to Budapest. It primarily builds upon applying human resources and high technology, and aims at exploiting intellectual capital effectively. It is unique in Central Europe, aiming to follow the trends in the world economy that recognising and exploiting the intellectual potential leads to multiplying the economic performance of the country and the region. Talentis is currently developing the following RDI related projects:

- Developing a **Space Technology Test Centre**, the first Hungarian satellite integration laboratory (building permit and LOI with IABG and Bonn Hungary in 2008) – 7500 m², value: 20 million EUR
- **Talentis University and Campus** first phase on 15ha, later on 100 ha, Talentis Educational Centre
- **Recipient University** – organisation of university partial training between universities with international lecturers
- **Talentis Technology Centre** industrial and technological park of 350 ha in total
- **Talentis Data Park** 30,000m², server park, value: 220 million EUR

4.2.3 European Institute for Innovation and Technology

The Budapest-based European Institute for Innovation and Technology (EIT) has been established to reshape the European innovation landscape and to provide solutions to bridge the innovation gap. The EIT’s organisational set up will allow it to meet these challenges through action at two complimentary levels:

- The **Governing Board** will set the strategic priorities of the EIT. They will be laid down in a seven-year “Strategic Innovation Agendas” (SIA) outlining the EIT’s long-term priorities and financial needs. The first SIA will be presented by the Commission to the Council and the European Parliament by the 31 December 2011 at the latest, on the basis of a draft prepared by the Governing Board.
- The **Knowledge and Innovation Communities (KICs)** will be selected by the EIT Governing Board on a strategic basis as responses to the foremost challenges currently facing the European Union. The themes of the first three KICs address the climate change adaptation and mitigation, renewable energy and the future information and communication society

One of the EIT’s main objectives is therefore to create a favourable framework for promoting a fresh **entrepreneurial culture** in Europe. Through its business-oriented approach as well as through its educational component, the EIT will help to train a new generation of entrepreneurs with the right

skills and knowledge to turn ideas into new business opportunities

Until now, **higher education** has notoriously been the absent member of innovation partnerships. However, new skills and talents will be crucial to the concrete exploitation of Europe's innovation potential and the EIT will advocate the change of mindset required to make this possible. Participating higher education institutions will offer prestigious Masters and PhD degrees which will be encouraged to bear an "EIT" label in order to reflect their high quality and innovative character. Business partners will benefit directly from new education programmes integrating entrepreneurship, innovation and risk management as core modules.

Businesses stand to gain as they will be given fresh opportunities to commercialise the most up-to-date and relevant research findings, with the aim of giving Europe first-mover advantage in the latest technological and non-technological fields and in open innovation. In return, research organisations will benefit from additional resources, an enhanced networking capacity and new research perspectives stressing interdisciplinary approaches in areas with strong societal and economic importance.

An initial Community **budget contribution** of over EUR 300 million will help to launch the EIT during 2008-2013 and will provide the support structure and the conditions necessary for integrated knowledge transfer and networking. In turn, in order to profit from the considerable returns which the initiative is likely to generate, businesses will be expected to buy into the EIT and be willing to lead the way in the unleashing of Europe's innovation potential.

The EIT represents a **novel approach** to innovation at the EU level. For this reason it needs to be set up gradually, with a phased implementation, and an eye to the future.. During the first phase, three KICs have been established. Subsequent partnerships will follow after the adoption of the first SIA.

4.3 Hungarian innovation award

In 1991 the 3rd general assembly of the Hungarian Association for Innovation decided to launch the annual Hungarian Innovation Award. The award is made to a company which is **registered in Hungary and which has realized a meaningful and profitable innovation** in the previous year. The Hungarian Innovation Foundation (MIA) was established to develop the tender system and make the Award,

Since then more than 146 different innovations have been honoured. The Award continues to attract media attention, as well as the commitment of the Hungarian Government and high-ranking experts and professionals.

Year	Winner
1992	MOL Plc.
1993	Kiskun Commercial and Ennobling Ltd.
1994	KÜRT Co.
1995	Rába Automotive Group
1996	Nitrokémia 2000 Co.
1997	Cereal Research Non-profit Co.
1998	Jura Trade Ltd.
1999	Innomed Medical, Inc.
2000	'77 Elektronika Ltd.
2001	ComGenex, Inc.
2002	Richter Gedeon Co.
2003	3DHISTECH Ltd.
2004	Solvo Biotechnology, Inc.
2005	Richter Gedeon Co.
2006	MEDISO Medical Equipment Developer & Service Ltd.
2007	Research Institute for Soil Science and Agricultural Chemistry of the Hungarian Academy of Sciences, Agricultural Research Institute of the Hungarian Academy of Sciences, Pro Planta 3M Agricultural Consulting Partnership Company
2008	Robert Bosch Power Tool Ltd.
2009	Paks Nuclear Power Plant

