A Knowledge-intensive Future for Europe

EXPERT GROUP ON THE 3% OBJECTIVE: PROGRESS MADE AND POST-2010 POLICY SCENARIOS

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Our Mandate

Mandate given to us
The general objective of this Expert Group (the list of members is provided in the back) is to provide reflections on possible directions for the 3% objective and its related policies in the post-2010 period, based on an analysis of progress made on the 3% objective within the last five years.

- Identify the broader challenges facing Europe post-2010 relating to globalisation, productivity, sustainability and society and address the urgent need for a shift in strategic policy response to this new reality.
- Draw on current efforts to build a comprehensive long-term vision for European R&D policy integrating the current and emerging strategies for competitiveness and sustainable and social development.
- Define the main action lines of the European R&D Policy Strategy post-2010 focusing on the success factors (inputs, outputs, and framework conditions favouring structural change) for achieving a world-class, sustainable European Research System (ERS) based on a single market for research.
- Project (ERS/Lisbon) targets which reflect and respond to the diversity of Member States whilst capturing the collective ambition and enthusiasm of European policy-makers, business, academia and society.

Our mandate in perspective

The Group has focused its work and deliberations primarily on the Lisbon Agenda as an overarching and all-encompassing set of strategic policies for Europe, which provides a broader policy context to the European Research Area (ERA). The Lisbon Agenda is the key context for ERA, playing an important role since its launch in mobilising action at European level. It is easier to draw the attention of high-level policy-makers to the Lisbon process than to the ERA, as the latter is currently less widely understood. Moreover, in the current crisis, strategic policies which address the broader research and innovation policy context are being prioritized. In addressing the Lisbon agenda and the 3% target, the focus of responses is on a mix of EU and national competencies. The Group has tried to address this complexity by offering advice on the interaction/ balance of national specificities developed within an EU context.

The broad thrust of the recommendations, targeting Member State policies and EU-level coordination, reflects a core emphasis on

how Europe can be made more attractive to business and to its citizens and on the structural reforms around the knowledge infrastructure that are needed in this respect. The recommendations offer a means to configure and focus investments in the knowledge triangle. Research and innovation are major longer term factors contributing to progress in business success, productivity and employment. They are made even more relevant by the financial and industrial crises, which emphasize a shorter term horizon for political priorities, while pushing strategic thinking to the background.

The Expert Group, as a policy group, has sought to broaden the scope of the Lisbon Agenda 3% R&D objective by looking at the broader context of research and addressing the knowledge triangle (research, education, innovation). The Group focuses on the policies and strategies that Europe needs to put in place urgently if it is to survive in a global context of strong competition from the USA, Japan and, in particular, a few fast-emerging economies.

Chapter 1: Stocktaking of Lisbon Process

The EU is lagging behind the USA in all dimensions of competitiveness, R&D and education expenditures. Whilst certain progress has been made since 2000, the gap is still significant, with the EU standing at about 70% of the performance of the USA [cf. Figure 1].

In terms of ultimate 'output' of innovative activities and competitiveness, the EU's productivity level (GDP per capita) is currently around 72% of the USA level, against 63% in 2000. The relative efforts in knowledge generation (total R&D intensity) have also marginally improved over this time span, from 64% of the USA's relative efforts in R&D to 70% nowadays. For about 20 years, the EU area has had an R&D intensity fluctuating below the 2% threshold, far from its Lisbon target. At the same time the US fluctuated between 2.5% and 3%, whereas Japan reached an R&D intensity of 3.5%. China has entered into a dynamic catching-up process, nearly matching the EU in terms of business-funded R&D.

One important pillar of knowledge diffusion has, however, stayed at a very low level as compared to the USA. Tertiary education expenditure as a percentage of GDP has been characterized by a very poor performance throughout the period under review. In Europe, tertiary education expenditures as a percentage of GDP were estimated at 44% of the USA counterpart in 2000. Today the situation has barely changed. As a result, education performance indicators in terms of research (university ranking) or in terms of educational achievement are, by far; lower than in the USA, at 75% or less. Likewise, the ability of Europe to attract foreign brains is less effective than in the USA. This is worrying for the sustainability of European economic growth, because innovation, skills, information technologies and education expenditures are key drivers of knowledge creation, knowledge diffusion and of long-term growth.
Public and private sector R&D investment deserves a particular focus here. Indeed, in the early 2000s the EU Member States agreed that Europe had to become the "*world's most competitive and dynamic knowledge-based economy by 2010*". Their ambitious self-set Lisbon agenda included a precise target: 3% of

GDP had to be devoted to research and development (R&D) activities by 2010, one-third of which had to be funded by the government. Nearly ten years later, the evidence tends to show that, at most, limited progress has been achieved, but nothing significant when compared with the original objective. Yet, it is recognised that the targets have been useful, playing an important role in mobilising Member States to set and operationalise their own targets.

Between 2000 and 2007, EU R&D intensity remained flat at 1.85%, due to stagnation in the R&D spend of the four biggest research-performing countries (accounting for two-thirds of total EU R&D investment) and private sector investments (cf. Figure 2). The 3% objective has led to some positive impacts. Seventeen out of 27 Member States have registered growth in their R&D intensities, and public sector R&D intensity increased in nearly all Member States.

However, the rationale for Europe to step up its efforts to ensure a shift to the knowledge economy remains highly pertinent, and Europe should not in any way reduce its ambitions in this respect. In 2007, Japan and South Korea had R&D intensities of almost 3.5% of GDP, while the EU had achieved 1.85%, the USA 2.53% and China 1.5%. The gap with Japan and South Korea has been increasing since 2000. This is mainly due to the higher private expenditure on R&D in almost all developed regions that are competing with Europe (cf. Figure 3, Figure 4).

Figure 1. EU's Gap vis-à-vis the US, 2000 and 2007; USA=100

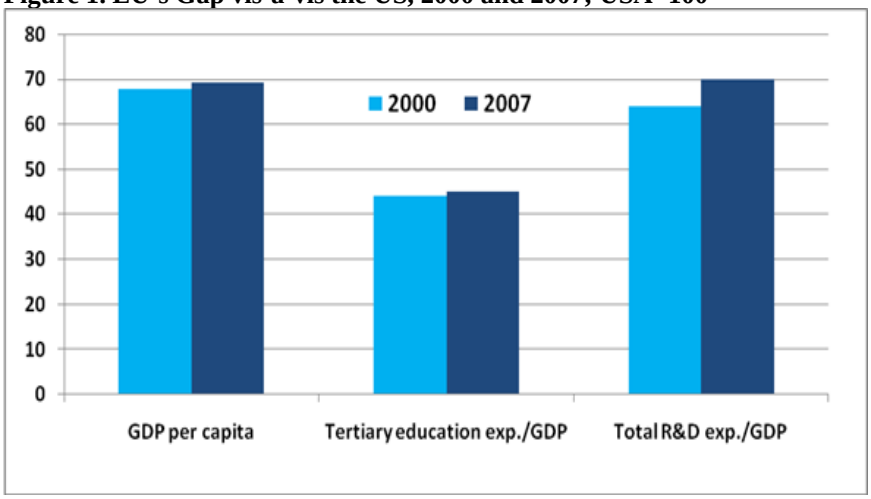


Figure 2. Evolution of R&D intensity in major economies, 1981-2007

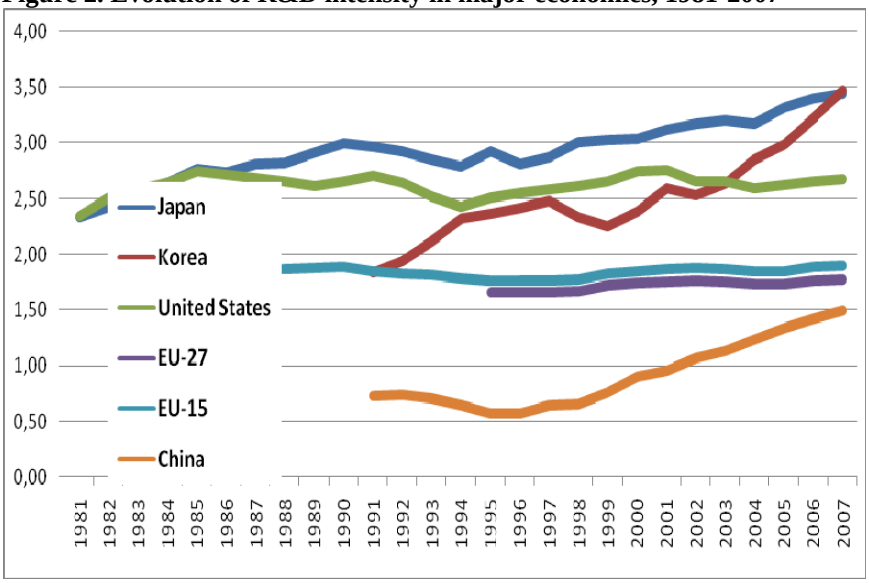
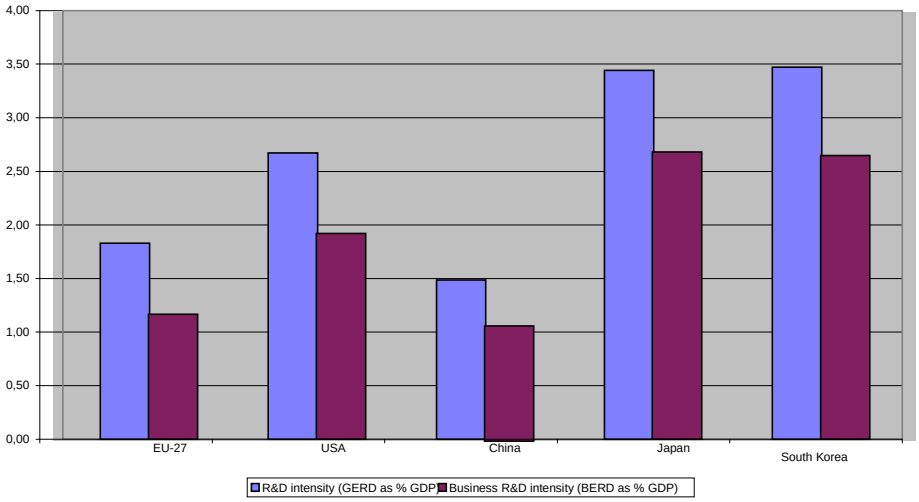
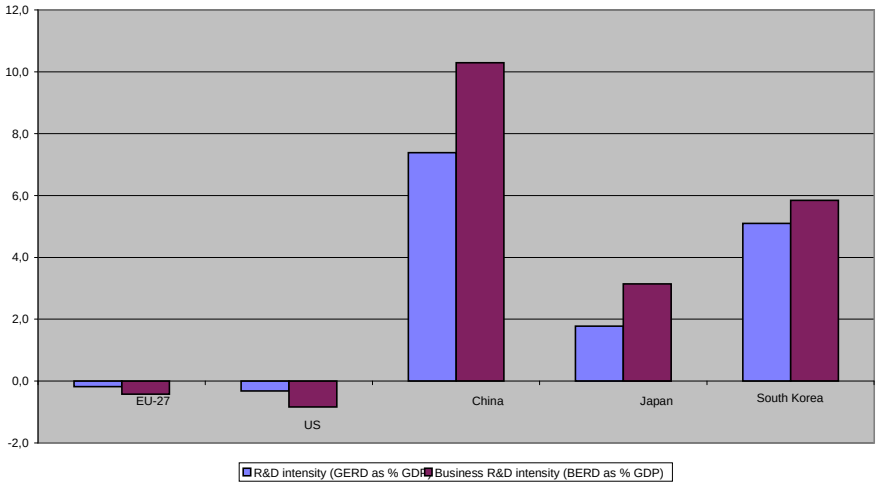


Figure 3: **R&D intensity EU and major world competitors, 2007**



Source: DG RTD, STC report 2008/2009
Data: Eurostat;OECD

Figure 4: **Average annual growth of R&D intensity (%) in 2000-2007**



Source: DG RTD, STC report 2008/2009
Data: Eurostat;OECD

Chapter 2: Europe's key challenges in driving the post-2010 structural reform agenda

The world is becoming smaller as a consequence of globalization

The challenges experienced in Europe at the time when the Lisbon Process was launched, remain present today, and some have even intensified. Driven largely by worldwide processes of globalisation, the international economic environment is changing faster today than ever before. As is well known, due to rapid technological changes, particularly in the areas of information and communication technologies, transport, logistics and services, geographical distance is becoming less of an obstacle for a range of economic activities. This is stimulating processes of internationalisation and economic integration on a global scale. The world is simply becoming smaller.

For Europe, the globalisation challenges are of two types.

- The first challenge relates to how to replace jobs lost in traditional industries, and the relocation of certain activities outside Europe, with new, quality jobs. In the future, this challenge will become critical as exports from emerging economies will increase rapidly, not just in the segment of traditional, labour-intensive products, but also in product segments with higher added value.
- The second globalization challenge relates to how to stop Europe from lagging behind the USA and Japan in innovation in high-technology sectors and how to increase its long-term international competitiveness. With a marked increase of investments in R&D and education by China, India and other emerging economies, it is realistic to expect that these countries are well on their way towards becoming strong international competitors for Europe in various areas of innovation.

There are a range of other long-term challenges currently faced by Europe that are either entirely new or whose importance has strongly increased over this decade:

Transformation towards a multi-polar world

With the emergence of the BRIC countries (Brazil, Russia, India and China), we are moving towards a more multi-polar world, where the strategic importance of relatively large states or regional integrations, such as the EU, is increasing. Today, other economic and political powers in the world view the EU as a respected economic power, as an initiator of new political guidelines (e.g., in terms of the environment, climate, energy, etc.) and a model of regional cooperation. The perception of the EU's external strength is largely dependent on its internal strength and the coherence of its Member States.

Climate change and energy dependence

Environmental concerns and sustainable development issues now feature more prominently on the global agenda due to growing awareness of climate change together with evidence of its preliminary impacts. Unless there is a worldwide change in attitude to the environment and a determined reduction of greenhouse gas emissions, the entire population of the planet, including all Europeans, will encounter significant long-term negative consequences of atmospheric warming in the decades ahead. Challenges in the area of climate change are linked to potential food production problems and, even more so, to the challenges the world faces regarding energy. These challenges are further complicated by its current and continued heavy dependence on imported energy.

Ageing of the population and immigration

Another major challenge that Europe will encounter in the coming decades is the ageing of its population. This process will create fiscal pressures due to the increased health and pension spend, and may well lead to lower potential growth with significant implications for Europe’s socio-economic model, including attitudes towards immigration. Immigration may also be stimulated by other factors. Climate change, which according to assessments will have highly negative effects on countries located in South Asia (in particular Bangladesh) as well as in the Middle East, North Africa and sub-Saharan Africa, could result in the loss of livelihoods caused by rising sea levels, desertification, famine and even the outbreak of related regional conflicts in these territories. In the search for solutions to their existential problems, populations from the aforementioned areas will begin to emigrate.

It is realistic to expect that the EU will remain a very attractive destination for many of them.

Global financial and economic crisis

After several years of favourable growth, economic conditions in the EU Member States have deteriorated sharply. The Commission forecasts a contraction of the EU's GDP in the order of 4% in 2009. Investments between 2008 and 2009, as a driving force of economic growth declined substantially, reflecting the impact of multiple shocks, from weakening internal and external demand and a drop in investor confidence to higher savings of private households, a tightening of financing conditions and a reduction in credit availability.

The current crisis has created pressure in additional public spending with the aim of rescuing financial institutions and substituting lower private demand. This aggravates public budget problems, while the EU already has to contend with an ageing population and increasing pension and health spending. For the time being, the euro has acted as a strong stabilising factor, but government budgets are set to deteriorate considerably putting fiscal sustainability under further pressure.

Comprehensive structural reform strategy must include knowledge intensity

Europe needs to design and implement a comprehensive structural reform strategy for the post-2010 period that will address consistently not only the short-term challenges emerging from the current crisis but equally the long-run challenges faced by the EU, outlined above. Articulation and implementation of this reform strategy will not be successful in reaching long-term economic growth if it is not accompanied by a consistent mix of policy measures. Government should avoid measures that adversely impact on employment and productivity as in previous crises. Governments should boost employment through labour market reforms and embark on ambitious health care and pension reforms in order to keep public finances under control. At the EU level, effective functioning of the single market is of vital importance. When economic growth resumes, short-term support measures to prevent viable companies from collapse in the face of the crisis will need to be phased out as soon as possible.

Otherwise said: if Europe wants to emerge from the current crisis and increase its productivity, governments have to make tough choices. This report puts the spotlight on one of those tough choices: the need to invest in knowledge intensity

As we will argue in Chapter 3, comprehensive structural reform strategies based on increasing investments in the Knowledge Triangle are of crucial importance for Europe's long-term sustainable growth and competitiveness. It is important that governments develop policies leading to increased in knowledge creation and diffusion and to the improvement of the framework conditions for research and innovation.

Chapter 3: Towards a European Strategy 2020

As 2010 approaches, it is clear that the Lisbon process has failed in terms of Europe achieving the 3% R&D intensity target. None of the Member States have as yet achieved the 1% target of public sector financing of R&D (the closest are Sweden and Finland), and the private sector target of the remaining 2% of GDP has proven particularly intractable in most EU Member States.

Drawing on lessons learnt and in response to the identified challenges of structural reform, globalization, the economic crisis, climate change and ageing, this section takes a look at what a new vision for the Lisbon process could address. We highlight the need for a more proactive role for Member States as well as the EU as a whole (i) to create an environment for business to flourish both at national and European level and (ii) in designing and implementing this vision and the importance of the Knowledge Triangle.

Knowledge Triangle as the focal point of the European Strategy 2020

The EU's post-2010 strategy for structural reform – European Strategy 2020 – should, on the one hand, represent a continuation of the Lisbon Processes launched a decade ago. It should remain focused on increasing the EU's competitiveness in the world, but should, on the other hand, introduce knowledge and innovation into the very heart of its economic, social and environmental development. While the social dimension of the Lisbon strategy revised in 2005 has been clearly recognized, most visibly through the employment objectives, this has not been the case with its environmental dimension. Environmental objectives have regained their importance in the context of the growing importance of the integrated energy/ climate policy launched by the EU in recent years.

Europe's transformation towards a knowledge economy is the most effective response not only to the long-term challenges ahead but also to the challenges emerging from the ongoing crisis. Experience from similar crises indicates that Knowledge Triangle policies - addressing R&D, innovation and education - are essential for boosting the economy's long-term growth. The EU's sustained productivity growth depends largely on policies to

stimulate R&D and innovation systems. A high level of educational attainment is also positively correlated with a productive, skilled and adaptable workforce and is a precondition for lifelong learning as well as for higher labour-market participation rates. In short, Knowledge Triangle policies represent the cornerstone of the European Strategy 2020.

Increasing the long-term potential of the EU's economy by focusing on the Knowledge Triangle involves considerable investments in R&D, education and innovation. In circumstances of tighter public finance, the achievement of these objectives will depend on three equally important factors: increased prioritization, efficiency and effectiveness of public spending and efforts to ensure a stronger role for the private sector in these areas.

The Knowledge Triangle is not only determined by economic necessity and competitiveness (a link that is recognised today), but in a more general way these policies are the central vehicle for Europe's future advancement in the broadest sense: economic, social and ecological. So far the Lisbon strategy has not been sufficiently successful in integrating these aspects and in giving the Knowledge Triangle a central role in achieving our common ambitions.

The European Strategy 2020 should give priority to the knowledge-based society by offering its citizens ample opportunity for self-development through education and further training. In this sense, knowledge and education contribute to the resilience of people in a society where a plethora of information sources, complex choices and risks have to be assessed and dealt with. More knowledge and different competences are needed to thrive in the labour market as well as in 'normal' social life. Education, research and innovation also provide the know-how and skills for addressing the societal challenges we face: safety, mobility, environment and climate, social cohesion and integration of minorities, the development of our cities and rural areas, to name just a few. By deploying knowledge and innovation (through well educated people) on issues like these, the rationality of political processes and public discourse is likely to be enhanced.

Risks of not implementing the European Strategy 2020

Limited or insufficient investment in the Knowledge Triangle holds unacceptable risks for Europe, including a loss of valuable human capital (brain drain towards other developed regions), the departure of high-quality production activities and R&D (off shoring), a worsening of the business climate, a weakening of the international position of European research, and the undermining of the absorptive capacity for new knowledge. The quality of society is likely to suffer, and Europe will become a less attractive region to work and live in.

There is the tendency to debate endlessly the magnitude of what is happening in terms of the potential damage to Europe's long-term growth, productivity and competitiveness. What is the risk that Europe will not attract enough new investments? How great is the risk that a substantial share of corporate R&D will move out of Europe? Or in the opposite direction: What is the yield from investment in knowledge, and how large are the spillovers? There is no firm or definitive answer to these types of questions. Whatever the case, it is advisable to pursue a no-regrets policy. Neither the benefits of investment in knowledge nor the risks of underinvestment are completely measurable. That is why we must make sure that (public) investments in education, research and innovation are sufficiently generous.

Differing perspectives of transition to the knowledge economy

The transition towards the knowledge economy has different implications for EU Member States with different levels and stages of economic development and wide-ranging socio-economic models and structures. For the more technologically advanced Member States with enhanced capacity for absorbing and adapting existing technologies, economic growth in the coming years will depend primarily on internally generated innovation (growth based on innovation which is driven by knowledge creation).

In contrast, for less developed Member States in transition, growth and economic convergence depends to a lesser extent on Knowledge Triangle investments. In their case, the emphasis is on conditions determining investments in infrastructure as well as the institutional setting conducive to creating a favourable business environment, and the effective absorption and use of technological and organizational knowledge (growth based on

innovation which is driven by the use of knowledge). Empirical evidence suggests that the knowledge economy catch-up process does not follow a simple “old/new” Member State divide. Several “new” EU Member States have made significant advances in reducing the knowledge economy gap and have outperformed certain “old” EU countries in terms of R&D intensity. This approach of differentiating between more and less advanced states to develop more tailored approaches, could also be extended to differentiate between large and small Member States. The end goal of these policies is to increase productivity growth through investments in R&D and, more broadly, the Knowledge Triangle.

Chapter 4: Recommendations and Conclusions

Based on the analysis from the previous chapters, the European Strategy 2020 needs to give priority to the Knowledge Triangle, by implementing serious processes of structural change and improving the general framework conditions, in order to stimulate increased R&D expenditure especially by the corporate sector.

In this chapter, the general orientations for the European Strategy 2020 are outlined followed by a set of more detailed recommendations to strengthen and target the Knowledge Triangle investments.

4.1 General Orientations for the European Strategy 2020

Our European Strategy 2020 introduces the following new orientations:

Our European Strategy 2020:
Knowledge Triangle Targets

Quantitative target: Europe will achieve a total spend of 5% of GDP by 2020 on combined investments in R&D and higher education This will include investment both at Member State and EU levels. Member States will be able to define the appropriate balance for these investments in relation to their national context and set their own targets.

Qualitative Target: Europe will complement the quantitative target for R&D and higher education by introducing a qualitative target to improve the conditions for successful innovations (i.e. the share of inventions that actually reach the market). Europe will spearhead and drive major structural reforms in the Knowledge Triangle that will address the completion of the internal market, the Community patent and improve regulation. The European level reforms will also be implemented at national level. Member States will define their own package of structural reforms linked to their investment model. This roadmap will address three levels of reforms relating to:
- Higher education
- R&D

- Innovation

- **Effective linkages in three pillars of the Knowledge Triangle**
  The new strategy not only sets a quantitative target but combines this with a qualitative target to ensure that investments in R&D, education and innovation are rendered optimally effective by improving the framework conditions. It is the effective inter-linkage of all three pillars that makes the difference.

- **Complementing knowledge generation with knowledge diffusion and absorption**
  The new strategy, while emphasizing the need for increasing investments in knowledge generation, also implies the need for Member States to give more attention to knowledge diffusion and absorption, output and framework conditions. The vision emphasizes the need for stepping up efforts required to ensure the streaming and translation of knowledge into tangible applications. If Europe is to become the most globally competitive knowledge society, there is a critical need to ensure that public and private investments in knowledge generation are complemented by appropriate and effective investments in knowledge diffusion and absorption. In turn, the better the use made of R&D, the more likely is future growth in knowledge expenditure and investment. Progress on knowledge diffusion could be tracked through the growth of new technology and innovative firms, number of patents registered by SMEs and improvements in job creation and increases in productivity.

- **5% Target for knowledge intensity**
  This concern with both the inputs and outputs of knowledge, as well as the dynamics of the diffusion process, broadens the scope of the Lisbon process to focus on the design and implementation of a well-functioning Knowledge Triangle. A new 5% target is proposed, combining R&D and higher education expenditure/investment, “knowledge intensity”, which should be reached by 2020. It is important to note that the 5% target does not render the 3% target invalid; rather, it reinforces the effectiveness and impact of the R&D investments by supplementing them with investments in

higher education. Furthermore, the 5% target is meant as an average at the level of the EU as whole (as a few EU Member States have already reached that target).

- **Member States define appropriate balance of Knowledge Triangle investments**
  A key advantage of the 5% Knowledge Triangle target is that it encourages Member States to define the appropriate balance of investments in R&D, education and innovation based on their national context, absorptive capacity and priorities. It is envisaged that Member States will thus be motivated to engage more effectively in the Lisbon process as part of an effort to determine where their particular strengths in the research-innovation-education cycle lie, and how to invest more effectively in improving their competitiveness.

- **Mutually reinforcing Knowledge Triangle policies**
  A key advantage of combining quantitative and qualitative targets is that it encourages Member States to place a complementary emphasis on Knowledge Triangle investments with policies to improve the effectiveness of their R&D, higher education and innovation systems, including ways in which they may mutually reinforce each other.

- **Integration of targets in the Member States' knowledge development strategies and roadmaps**
  Member State implementation of the targets should be based on a well-defined approach entailing an assessment of the national situation in relation to structural change and the integration of the national research system at the European and global level. Based on this assessment, Member States will design a comprehensive strategy that will define the balance of specialization in terms of knowledge generation, diffusion and application, set national Knowledge Triangle targets and identify expected outputs. The strategy will be implemented through the introduction of a 5-year roadmap for its Knowledge Triangle investments, outlining serious structural reforms. The roadmap will set intermediate targets in order to track progress in implementation and will be updated on a bi-annual basis. The advantage of this approach is that it will ensure a higher level of commitment on the part of successive governments while offering more flexibility.

- **Mutual learning and fine-tuned approaches**
  Rather than having their performance 'evaluated', a more learning–driven approach is recommended, whereby Member States receive European-level support in implementing the roadmaps. The mutual learning process could be geared to provide more fine-tuned approaches to policy design based on the country's size and level of development.

Even though major competences for the articulation and implementation of Knowledge Triangle policies are at the Member State level, the EU-level can nevertheless play an important role in complementing these policies.

- **Improving the conditions for innovation**
  The new strategy sets a new qualitative target that emphasizes the need to create a more innovation-friendly and competitive environment for business by providing attractive conditions for corporate research, innovation and entrepreneurship. There is an urgent need to accelerate current efforts to implement the Single Market and Community patent and improve regulation, as a means of reducing the costs of doing business in Europe and thereby stimulating investment from both within and outside Europe. A more supportive environment for new technology and innovative spin-offs and start-ups has become a matter of priority

- **Improved governance of Knowledge Triangle policies**
  Implementation of the Lisbon strategy has revealed several governance weaknesses at the EU level. The European Strategy 2020 governance should include improvement in the Commission's process of the evaluation of national strategies and roadmaps through an improved methodology for assessing these programmes and through more systematic benchmarking and peer pressure. Furthermore, these activities should be closely coordinated with macroeconomic policy coordination at the EU level.

- **EU budget review**
  The ongoing EU budget review and the forthcoming EU budget negotiations for the 2013+ period will have critical importance for the success of the European Strategy 2020.

The EU budget review should make a clear recommendation for a substantially increased EU-level funding of knowledge-economy measures. The review, should, furthermore, design an effective protection against the erosion of funding for these purposes as experienced in the most recent EU budget negotiations. Finally, the trend of growing participation of Knowledge Triangle investments in overall cohesion policy expenditures of the EU budget is a positive development, and the EU budget review should recommend continuation of this trend.

4.2 Recommendations

In this section a set of more detailed recommendations are elaborated addressing (a) the Higher Education Agenda, (b) the Research Agenda, and (c) the Innovation Agenda.

A. Higher Education Agenda

The prospect of increased global competition in the higher education sector post-2010, and the shift to the open research and innovation ecosystem, underlines the need for speed, strategic focus and broad engagement in the ongoing efforts to modernize Europe's universities to compete effectively in the global knowledge society. This calls for the direct engagement of universities, higher education institutions and users in defining the modernization agenda. Universities have a critical role to play. Their core mission is to educate graduates and to ensure they are equipped: to engage in the process of new knowledge production and the diffusion and application of knowledge. At the same time, universities and other institutes of higher education are a key instrument for the generation of new knowledge, either through the efforts of their own researchers or in collaboration with other research performers, and private firms, in particular start-ups.

This agenda needs to focus primarily on two key elements:

Increased investments

Rationale: While the EU compares favourably with the US in terms of its spending on primary education, it compares less well in terms of secondary and tertiary education. The gap in relation to the USA in both investment in higher education and the proportion of the population with higher education is clearly displayed, with the USA devoting 3% of its GDP to higher

education, compared to 1.4% in EU-27 as a whole. While Europe's objective to play a leading role in global knowledge production processes depends on increasing the volume and quality of research, the key challenge is to ensure that universities enhance their capacity to generate and share knowledge through two-way flows with users. More effective mechanisms for knowledge diffusion and application are needed to ensure engagement with economic and social actors while not compromising the freedom and creativity of university research.

Implementation: The Group highlights the urgent need to close the gap with the US and a number of fast-emerging economies, through increased public and private sector investments in universities and other higher education institutions, for knowledge generation and diffusion. The aim is, first, to increase the level and quantity of excellence and, second, to build and improve the effectiveness of knowledge flows (across disciplines, sectors, institutions and borders) and networks (linking universities, research teams, public and private, and research providers and users) with global impact through increased investments in higher education and research. In order to meet this ambition, there is a need for intensification and diversification of the way in which funding is raised. Higher education institutions should be engaged and incentivized to pursue multiple forms of funding, public and private, national and international. Universities have to be responsible and accountable for their successes and failures.

Quality assurance

Rationale: While the development of university ranking systems is important, these tend to be somewhat mono-dimensional (focused primarily on research) and do not fully cover dimensions such as teaching and learning quality or knowledge transfer. They also tend to use indicators that discriminate only among the most research-intensive institutions and hence do not always provide useful feedback on ways forward for the majority of European universities. Thus, there is a more urgent need for the introduction and implementation of clear and robust quality assurance systems Europe-wide. Quality assurance systems are critical for introducing changes in universities from within. They provide the main mechanism for guiding the distribution of public investments in universities and higher education institutions, since they are aimed at assessing and ensuring excellence in research, education and training as well as in co-operation with third-parties

(in particular industry links). More broadly, quality assurance also depends on governance, funding, and curricular reforms, as well as on a greater emphasis on accountability at all levels.

Implementation: Given the diversity of higher education models in the Member States, the Report highlights the fact there is no one ideal type of governance and quality assurance, since this depends on who the universities are accountable to. The Group is in favour of a plurality of approaches, as long as governance is rational and free of unnecessary external interferences and improves the excellence and global competitiveness of Europe's universities.

B. Research agenda

Europe's relatively weak presence in fast emerging scientific fields with high promise, and the lack of effective science and technology linkages in science-intensive technologies largely explain why the USA has more patents than the EU in high-tech areas. Europe needs to step up its investments at European and Member State level in basic science and key technologies to keep up with its global competitors and partners. Through such investments Europe can develop broad capabilities, which can be rapidly configured and mobilized. The emergence of the open innovation system is significant for firms as it allows them to take advantage of different sources of knowledge and the best brains wherever they can be accessed, Europe-wide and world-wide.

Stepping up investments in key technologies

Rationale: Key technologies (e.g. biotechnology, neurosciences, nanotechnology, computing sciences) and combinations of these technologies are set to completely transform daily life, with a more profound and unsettling impact than even the Information and Communications Technologies had in the twentieth century. The transformative potential of these technologies cannot be overestimated with potentially destabilizing effects due to increasing social and global divides. This raises concerns in terms of defining an appropriate balance in providing a supportive or well-regulated environment in which these technologies can flourish. Europe has an advantage and needs to sustain and increase it through complementary investments in basic research and key technologies. In order to inspire greater investments in research, Europe needs to develop a vision for its role in

advancing the global research frontiers, based on its traditional research strengths and competencies. This vision should be developed by Europe's research community in consultation with other stakeholders, in particular the business community. However, this Group identifies key technologies and their growing interface as an area where Europe could take the global lead.

Implementation: A strategic review of Europe's research strengths needs to be launched at Member State level in order to identify areas of top research excellence. This review can serve as the basis for developing a vision for targeting Europe's investments into strategic areas of research where Europe can take the lead. The Group recommends that Europe support the development of multi-technology-based clusters, by developing capacities in these areas, and networking to bring top multi-disciplinary teams together. Europe's public and private sectors need to be able to attract and retain the best brains worldwide, and the Blue Card is an important, yet insufficient means for making this a reality.

Increased investments in basic research are critical in supporting this strategy. This will entail sustained, significant increases in the funding for the European Research Council (based on regular reviews of its performance). Member States should also pursue enhanced links and synergies between national research councils and ERC. National research councils should be encouraged to increase their budget for cross-border collaborative efforts focused on European research and innovation priorities based on clear benefit. ERC and national research councils need to focus on the application of basic research results and exploiting the potential of innovations from basic research. The Group recommends the continuation of various efforts at European level to increase the EU's budget for research, and supports the process of EU budgetary reform towards greater knowledge spending and the growing complementary use of Structural Funds with research and innovation funding.

Designing open research infrastructures

Rationale: A major factor accounting for the EU-USA gap in research relates to the fact that Europe has no equivalent counterpart to the USA defense research setup. The massive investments in research that have been made by the USA defense system are difficult to replicate in Europe, since the European

security and defense policy cannot muster this kind of spending. The Group recommends that in order to address this shortfall, Europe needs to invest in the European Strategic Forum on Research Infrastructures (ESFRI) and to develop the mechanisms for mobilizing large-scale research funding, to bring together significant, multinational teams of top researchers and address the chain of translation of research results into industry applications. Efforts should also be invested in developing research infrastructures in humanities and social sciences.

Implementation: Europe needs to provide ESFRI with the power and resources to develop close working links with the national authorities responsible for research infrastructures with a view to implementing the roadmaps.

C. Innovation Agenda

Europe needs to create the general framework conditions for stimulating private sector R&D investments. Efforts should focus on the drivers that stimulate growth, including the completion of the internal market, the development of a common European patent and harmonized regulatory environment, as well as fostering a culture for innovation and entrepreneurship. The Group highlights the need for urgent action on two fronts: to encourage young people to take up careers as innovators and entrepreneurs; and to provide a more supportive environment for new entrants.

Investing in young entrepreneurs and innovators

Rationale: The European ecosystem for research and open innovation requires a new mindset as well as dramatically new and innovative approaches to research, innovation, education and entrepreneurship. Europe is not well prepared for this paradigm shift; as in many European cultures there is still a stigma attached to taking the plunge and becoming an entrepreneur. Young people, in Europe, are often influenced by parents and society to opt for “safe” career options, by working for government or an established firm, rather than embarking on a more risky career path of setting up their own ventures.

Implementation: Europe needs to take action to instill a culture in favour of innovation. This will entail action at various levels, in particular changes in education and teaching to ensure more

innovation-friendly curricula, teaching attitudes and career advice to young people. Tangible actions could include the launch of national campaigns to promote a positive image of entrepreneurship and innovation. Young people need to perceive entrepreneurship and innovation venturing as “cool/ attractive” through the launch of different forms of recognition for both successful and failed startups.

Lowering the barriers to new entrants

Rationale: 85% of the EU-USA gap is due to much lower business R&D expenditure (BERD) in Europe. ICT, commercial services and the pharmaceutical sectors account for four-fifths of this gap, and the gap is stronger in services than manufacturing. Large enterprises in Europe invest less than their counterparts in the USA, and European firms invest more of their R&D spending in the USA than the other way around. There is also a growing gap in technological performance with a decrease in patents particularly in high-tech areas. One of the key factors that accounts for the growing gap are lower numbers of new entrants with higher levels of R&D intensity in Europe as compared to the USA.

Implementation: Europe needs to take urgent action to lower the barriers to new entrants, in particular innovative start-ups and young entrepreneurs. It is important that action is taken to ensure that the conditions for new entrants are not onerous and punishing and that, where necessary they receive support to remain in business. The social stigma of failure in Europe needs to be removed and the high probability of failure before success accepted, especially in high-risk ventures.

This will entail a review of the fiscal policy approach, which places a disproportionately heavy burden on small businesses. Efforts are also needed to remove the regulatory obstacles to entrepreneurship and market entry into Europe, which deter potential entrepreneurs from starting up new companies or investing in innovation.

The Way Forward

A year before the deadline of the Lisbon Strategy, Europe is poised at an important crossroads. In the face of growing competition in a multi-polar world and a range of global challenges, Europe needs to step up its efforts in making the transition to the knowledge economy, if it is not to be relegated to low tech growth and jobs.

Combined efforts to boost knowledge intensity and provide the framework conditions for innovation through structural reform are a sine qua non in this new European Strategy 2020. The lack of a fully functioning Single Market and an EU wide Community patent are key factors preventing Europe's corporate sector from maximizing their profitability.

This carries the negative consequence of reduced corporate resources for research and the re-location of European business to more profitable areas outside Europe. Foreign corporate R&D investment in Europe will also be affected.

Europe needs to be in a position where its knowledge and business environment is attractive and conducive to the European and global corporate sector and the world's best brains. By not investing in this European Strategy 2020, the alternative scenario is bleak as Europe faces a downward spiral towards diminishing knowledge intensity and poor innovation performance.

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