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From : The Presidency
To : Delegations

Subject : Discussion note for the Ministerial seminar under the Swedish Presidency on 24 September 2009

Delegations will find attached a note from the Presidency concerning the Ministerial seminar under the Swedish Presidency on 24 September 2009.

Discussion note for the Ministerial Seminar under the Swedish Presidency
Brussels, 24 September 2009

This initiative of the Swedish presidency on the eve of the Competitiveness Council, gives EU ministers the occasion to discuss possible broad orientations for the research parts of the European Union's post-2010 strategy for which the next European Commission is expected to table proposals by early 2010. This discussion note proposes a focus for a ministerial debate on the development of national and EU research policies and policies for research-based innovation in the post-2010 period. It contains two strands:

- Firstly, it “sets the scene” for defining post-2010 orientations. The first part describes the main challenges that the EU will have to face in the coming decades. It builds on the analysis in the recent report "The World in 2025 – Rising Asia and socio-ecological transition", based on the work of a European foresight expert group initiated in 2008 by DG Research and the Bureau of European Policy Advisors (BEPA) of the European Commission,
- Secondly, it describes a number of overarching orientations for research policy and the further development of the European Research Area in the post-2010 period, relating them to other policies within the “knowledge triangle” (i.e. education and innovation). It takes into account recent policy debates initiated by the Swedish Presidency, notably the conference "New Worlds, New Solutions" (Lund, 7-8 July 2009) and “The Knowledge Triangle Shaping the Future” (Gothenburg, 31 August-2 September 2009), and the work of a number of expert groups initiated by the European Commission working on issues related to national and EU policies and R&D investment targets in the post-Lisbon period.¹

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¹ Expert groups chaired by Björn Von Sydow, Luc Soete and Rémi Barré.

1. World 2025: trends, tensions and challenges

The World 2025 forward looking exercise highlights the rise of Asia not only in terms of demography and GDP but also in terms of science, technology and innovation. Considering the increasing tensions on natural resources, research policies in Europe will need to be increasingly aimed at addressing more systematically societal challenges like climate change and energy security, improving the efficiency and effectiveness of the European research system, and at bringing about a transition to a more knowledge-intensive economy and society.

1.1. Rising Asia

Between now and 2025, the world population will increase by 20% to reach 8 billion inhabitants (from which 5 will live in cities and almost one third in slums). 97% of world population growth will occur in the developing countries (Asia, Africa). In 2025, nearly two thirds of the world population will live in Asia while the European Union will account for less than 7%. Without an important inflow of immigrants, the European population would start to decrease as from 2012. In terms of world production, the USA-EU-Japan triad will no longer dominate the world. The emerging and developing countries which accounted for 20% of the world's wealth in 2005 will account for 34% of it in 2025. The centre of gravity of world production will move towards Asia. Before 2025 China could become the second world economic power. The EU is no longer the first world exporter: the share of Asia increases from 29% to 35% while EU exports decrease from 39% to 32%.

1.2. Western Science and Technology power at stake

By 2025, the USA and Europe could lose their scientific and technological supremacy for the benefit of Asia in the global innovation networks. India and China could account for approximately 20% of the world's R&D, i.e. more than the double of their current share. Asia will be the main destination for the location of business R&D.

In many crucial areas to Europe's future welfare (energy saving technologies, sustainable development and climate change, health and the spreading of diseases, food safety, etc), it is the global access to such knowledge, the development of joint global standards and the rapid world-wide diffusion of such new technologies which is at stake.

One can imagine that we will move from today's "brain drain" (mainly towards the United States and the Anglo-Saxon countries) to a more balanced "brain circulation" of young researchers between regions of the world. It has been estimated that 645.000 Chinese students and 300.000 Indian students will study abroad in 2025, a sign that these countries are gaining ground in the global knowledge area.

1.3. Towards a socio-ecological transition

Considering the increasing scarcity of natural resources (potential "oil peak" and 3 billion people missing water by 2025) and the vulnerability of the planet (cf. potential Climate Change impacts), there will be increasing tensions between:

- production and consumption patterns;
- production/consumption patterns and natural resources (energy, water, agricultural land, materials resources)

From the demographic and resources challenges, a new "socio-ecological" production and consumption model will have to be reinvented. New technologies (renewable energy sources, capture and storage of CO₂, nuclear power and hydrogen and fuel cells) as well as changes in social behaviour supported by economic incentives can contribute to a drastic reduction in energy consumption (better house insulation, replacement of cars, increased use of public transport).

1.4 Consequences for Europe

The fundamental question in the perspective outlined above is whether or not current policies at national and European levels are up to the challenge.

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2. National and EU Research Policies in the Post-2010 period

2.1. A mixed picture of progress achieved

As we approach the tenth anniversary of the Lisbon commitment to transform Europe into a leading knowledge-based society, it is time to face up once again to the fact that overall progress towards this goal has been less than anticipated, despite considerable policy efforts at various levels of governance.

Many Member States have implemented reforms to their R&D and innovation systems at national and regional levels, but progress in terms of innovation performance has still been mixed. In particular, it has been especially disappointing amongst those countries trying to catch up with the others. A recent report¹ notes that while 13 out of 14 ‘catching-up’ Member States have made considerable progress since the early 1990s in terms of reducing the gap between GDP per capita and the EU average, with four of them almost closing the gap completely, none have managed to close similar gaps in terms of R&D and other knowledge indicators. Of the 14, five have taken important steps towards the knowledge economy but considerable gaps vis-à-vis the EU-27 average still exist. At the other end of the spectrum, however, one has taken only small steps and three have actually fallen behind.

At a Community level, too, there have been many shifts of policy emphasis over the last ten years, all in line with the drive to develop a knowledge-based society. Policy efforts, for example, have shifted away from a primary focus on adding value via support for collaborative R&D projects. Instead, there has been a determined effort to raise research quality levels across the EU via the launch of the European Research Council (ERC), with its strong emphasis on competition and excellence. Also, there is an increased focus on attempts to catalyse activities at a Member State level, particularly those such as article 169 and Joint Technology Initiatives likely to lead to increased R&D investment by the public and private sectors and to the development of a truly integrated European Research Area (ERA). Of particular note was the launch in 2008 of five ERA partnership initiatives dealing with: career aspects and mobility for researchers; the management of intellectual property in knowledge-transfer activities; joint programming between the Member States; the establishment of pan-European research infrastructures; and international S&T cooperation.

¹ Veugelers, R. and Mrak, M., Catching-up Member States and the Knowledge Economy of the European Union, Policy Brief, 28 May 2009.

By 2005, however, it was obvious that efforts to speed up the pace of transformation were needed in the light of slow progress. This led in the first instance to the revamped Lisbon Strategy on Growth and Jobs and then to the launch of the Ljubljana Process, a new partnership approach between Member States, associated countries and the Commission that marked a new phase for research policy in the EU. The first deliverable of the Ljubljana Process was the articulation of the ERA Vision 2020, adopted by the Council in December 2008. This sketched out a future characterised by: the unfettered circulation of researchers, knowledge and technology across the EU; attractive conditions for performing and investing in research; a focus on scientific competition and excellence; a degree of cooperation and coordination amongst policymakers that would make the best use of existing resources; and a focus on research responsive to the needs of society and capable of contributing effectively to the sustainable development and competitiveness of Europe. During the Swedish Presidency two important aspects of the Ljubljana process will be taken forward through a resolution on the political governance of ERA and conclusions on future research priorities in post-Lisbon.

2.2. Three overarching orientations for future research policies

In working towards the realisation of this vision, the different starting points of individual Member States are likely to dictate the adoption of context-specific policy paths. Innovation leaders, innovation followers, moderate innovators and catching-up countries¹ in particular can be expected to develop quite different policy mixes and development strategies. There is still a need, however, for the articulation of a broad set of orientations for research policy that can inspire both individual Member States and the EU as a whole to work wholeheartedly towards the realisation of the ERA Vision 2020.

¹ The terminology used here is that used to describe relative performance in terms of the EU's Summary Innovation Index (see <http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=437&parentID=51>)

As the next stage in the Ljubljana Process as regards future research priorities, this discussion paper suggests three overarching orientations that Member States and the Community as a whole can use to drive things forward. Stated quite simply, these orientations can be summarised via the terms **bolder, better** and **bigger**:

- **Bolder** in the sense that the opportunity to exploit win-win situations by focusing research on areas likely to lead to both **the resolution of societal /grand challenges and the growth of new markets** for innovative goods and services should be grasped firmly and promptly;
- **Better** in the sense that existing resource utilisation needs to be improved, especially in the light of the current financial crisis, and **the performance of national research systems and the corresponding performance of the European research system as a whole** need to be improved;
- **Bigger** in the sense that **investment in research and research infrastructures needs to be expanded** if the EU is to continue to make headway in its attempt to become a leading knowledge-based society.

The primary question for consideration at the Ministerial Seminar is thus:

Do you consider that the three overarching orientations suggested should inform and guide simultaneously the development of research policy at both national and EU levels over the coming years?

"Bolder": Orienting research to the resolution of societal/grand problems and the development of new markets

Relatively slow progress in Europe towards the goal of establishing a leading knowledge-based society, together with growing competition from other parts of the world for the human resources, knowledge and markets needed for these countries and regions to attain similar goals, make it imperative that Europe steps on the accelerator and finds a way of stimulating both knowledge-for-growth strategies and resultant growth-through-knowledge.

Research for new markets

Innovation-led growth, however, is dependent not only on the knowledge inputs needed to fuel this growth, but also on the untapped potential of new markets and the ability to diffuse innovations within them. Supply-push policies therefore need to be complemented by demand stimulation policies, preferably in areas where the untapped market potential is huge. Lessons can be learnt from successful experiences with the Lead Market Initiative, which was the first successful attempt to develop at European level a demand side policy for innovation pull through regulation, standardisation and public procurement.

Research for societal challenges

There is an important opportunity, however, to support research that is not only likely to lead to innovations in areas with large market potential, thus fuelling an overall increase in the performance of research and innovation systems in Europe, but also for this research to help tackle some of the great or 'grand' societal challenges that now confront us. Energy security and supply, climate change, the general health of the population, ageing, and sustainable development to name just some of the more obvious challenges, all necessitate a considerable amount of research if they are to be confronted successfully, and most if not all constitute areas where the potential for the widespread diffusion of innovative goods and services and the development of new markets is vast. It should be stressed that research related to these societal challenges, not only helps to provide concrete answers to concrete problems, but can also help to reduce costs including areas of large public expenditure (e.g. health, energy, infrastructures). Furthermore, the important role that research plays in the realisation of related diplomatic and development goals should not be underestimated.

If this opportunity is to be grasped, it will call for a remarkable degree of coordination between the Member States of the EU not only in order to establish the coherent strategies needed to formulate and implement the necessary research agendas, but also on the demand side to create lead markets and launch the complementary innovation-friendly procurement strategies needed to ensure that market potential is tapped at an EU scale rather than solely at a national level. It will also require a considerable focus on attempts to mobilise resources and stimulate markets on a scale greater even than that of the EU, since some of the most important societal challenges we face are global in nature and will require global efforts to resolve them.

The nature and scale of the efforts needed to tackle major societal challenges are daunting, but the potential rewards and societal benefits of pooling resources to tackle them are huge. Identifying and responding to these challenges should also involve stakeholders from both public and private sectors in transparent processes taking into account the global dimension. The imperative to act now to counter the most critical societal challenges is also growing day by day, since the threat many of them pose is also considerable and, in some instances, irreversible unless action is taken quickly. A start in terms of developing the research agendas needed to confront some problems has in some instances already been made, witness the creation in Europe of the SET plan in the field of energy and the current process of formulating Joint Programmes of research in areas of potential relevance to key societal challenges, but further action on other fronts is now urgent.

The main questions for debate do not concern the wisdom of attempts to coordinate efforts on the supply and demand sides to tackle societal problems at EU and even global levels, but relate to the urgency of such attempts and to whether or not we have the forward looking approaches needed to build shared visions for the future European challenges driving research and innovation, and for preparing common European research and innovation policies and approaches such as "Joint Programming".

"Better": Improving the efficiency and effectiveness of national research systems and the European Research Area

It is increasingly necessary to make more efficient use of scarce resources and improve the overall efficiency and effectiveness of national research systems and the operation and functioning of the ERA as a whole. This is in particular relevant given the current global economic situation, now there is the possibility in the short- to medium-term that the resources needed to continue the drive towards the development of knowledge-based economies will be limited in some quarters, if not all.

A higher degree of coordination between what is done at the EU level, and what is done at national levels, is needed without compromising on the diversity of approaches that we also need. Many of the measures or instruments we have are subject to national or regional factors, the intended target groups, and the particular problems they are designed to tackle. This pluralism is a strength of the research we carry out in the Community.

At the same time, we believe that better coordination of research at the European level would increase the usefulness and benefits from the investments we are making. These reforms and improvements can be made at a number of different levels. For a successful implementation of ERA it is essential that Member States take clear leadership and responsibility in partnership with the Commission.

One important step will be for Member States to prioritise the modernisation of European universities and the development of world-class centres of research and educational excellence. This will involve a greater focus on efforts to increase the autonomy and accountability of universities; to enhance their access to diversified sources of funding; to improve their research infrastructures; and to nurture their links with other stakeholders, especially industry and – furthermore – to develop a European strategy for European knowledge-building institution promoting excellent environments and cross-border cooperation between institutions

Another will be to develop better mechanisms allowing public investment in research and research-related activities to leverage R&D investment by the private sector. This will involve much more than a focus on mechanisms nurturing university-industry collaborations. It will also involve improvements in the framework conditions governing IPR and access to finance, both for R&D and the establishment of spin-offs and high-tech start-ups. It may also necessitate changes in the State Aid regulations.

Improvements in governance structures and processes at regional, national and EU levels will be needed to improve the levels of communication and coordination necessary for the formulation and implementation of coherent policy mixes capable of improving the performance of the research and innovation systems. Across countries, too, current efforts to reduce fragmentation and nurture the development of critical masses via the opening-up of national programmes and the initiation of joint calls, programmes and other activities will have to be accelerated. There is also a clear need and interest in realising a European approach to the establishment and operation of increasingly expensive new research infrastructures.

Greater efforts will also be needed to foster the free circulation of researchers, knowledge and technologies across the EU as a whole, which again will call for sustained efforts by Member States to remove barriers to the attainment of this 'fifth freedom' and the realisation of the ERA.

Continuing the drive to create a fully functional ERA that rectifies the fragmentation that exists at the level of policy formulation and implementation across Europe and reinforces the drive to create critical masses of research effort within the research community is probably the most important way in which the efficiency and effectiveness of the European research system as a whole can be improved. Trends such as globalisation, concentration and improved knowledge flows are diminishing the significance of national boundaries for the practice of research and the impact that the policies of individual Member States can have on it. The need for countries to act collectively to eliminate redundancies and maximise synergies between all the policies and policy instruments that impact on the development of the ERA is thus now critical. In this context it is very important to ensure systematic and continuous interaction between the areas in the knowledge triangle – education, research and innovation – which also would contribute to improving impact of investment.

More sophisticated approaches needed in formulation of national research strategies

Key to many of the changes that are needed will be the further development and improvement of strategic intelligence capabilities, including enhanced competences in forward looking activities paying particular attention to developing a pan-European approach based on cooperation of policy makers and experts. Also strategic analysis and planning, monitoring, evaluation and impact assessment should be improved. These competences will also be needed to inform difficult choices at regional, national and EU levels concerning the increasingly important issues of specialisation and concentration. The desire to make the best use of scarce research resources often implies that a focus on particular research areas, technologies, sectors, institutions, societal issues, etc. is inevitable, with the focus chosen often differing considerably from one country to another and dependent upon existing, and potential, strengths, weaknesses, opportunities and threats. Choosing appropriate options (smart specialisation) and ways of achieving them (often via attempts to concentrate resources in centres of excellence and potential growth poles) will require far more sophisticated approaches to goal setting and the formulation of national research strategies than has often been the case in the past. The choices made by Member States should also ideally be informed by the choices made by other Member States, in order to make wise decisions concerning when to compete, when to pool resources and when to differentiate research profiles. A major challenge is to ensure that long-term visions are better articulated with short and medium term strategies and especially that they be taken into account in the post-2010 strategy and, in this context, to integrate the consequences the socio-ecological transition must have for research and innovation policies.

But better research and innovation policies alone not enough

Critically, changes across a much broader front will also be required. Recent research¹ on the conditions necessary for countries to establish 'knowledge-for-growth' trajectories, where growth relies upon improved innovation performance, indicates that success is dependent upon improvements in a large number of framework conditions (spanning macro-economic stability, well functioning markets, adequate supplies of capital and human resources etc.). This in itself should come as no surprise, but the research also reveals that, for catching-up countries, improvements in all these framework conditions are needed if innovation performance is to be enhanced.

¹ See Veugelers and Mrak (2009, *op cit.*)

"Bigger": Expanding the research base as a way of bringing about the transition to a knowledge-based economy

Research is not the only spur to innovation, but it is the primary way of generating the new knowledge needed to fuel innovation-driven growth. It is also a vital ingredient of the drive to underpin policies with a robust evidence base and an intrinsic cultural pursuit in any society keen to call itself knowledge-based.

Research as the engine of knowledge-driven growth and reforms

The importance of research means that progress towards the ambitious target set at Barcelona in 2002 as part of the Lisbon Strategy, namely an R&D investment level of 3% of GDP by 2010, has become one of the foremost indicators of the extent to which countries are making the transition to knowledge-based economies and societies.

Current statistics, however, reveal a mixed picture concerning progress. On the one hand, overall R&D expenditure in Europe has increased by 14.4% in real terms since the target was set and 17 Member States (mainly the 14 catching-up countries mentioned earlier) have increased their R&D intensities since 2000. On the other hand, aggregate R&D investments in the EU-27 are stagnating at 1.85% of GDP, well behind the 2.61% level in the USA and even below the known aggregate level for the EU-15 when the target of 3% (for the EU-15) was set in Barcelona. Overall, the structural transformation of the European economy towards more knowledge-intensive activities is progressing slowly and policy efforts need to be intensified if the overall aggregate figure is to rise in line with expectations.

Without this intensification of effort, there is also a danger that the gap between innovation leaders, moderate innovators and catching-up countries will widen. Country responses to the current economic crisis, undertaken as part of the European Economic Recovery Plan (EERP), indicate that while virtually all of the innovation leaders and five out of six innovation followers are implementing additional R&D measures, three moderate innovators and three catching-up countries have announced no measures.¹

¹ ECFIN, Assessing Progress with the European Economic Recovery Plan (EERP): A Closer Look at Measures to Support Investment and R&D Activity, ECFIN/B4/B1 REP 52197, Brussels, 20 May 2009

Higher levels of investment in R&D will also be required if the 'bolder' and 'better' paths outlined earlier are followed. Solving major social challenges will require a great deal of additional research and research funding, not just the redistribution of research funding from one field of enquiry to another. Establishing research as the engine of knowledge-driven growth will also involve not only efforts to build a better, more efficient and integrated European research system (a case of fine-tuning the engine), but also increased levels of investment in the research system as a whole (a case of making the engine as powerful as possible).

Furthermore, an expansion of investment in research, and the consequent creation of an engine for knowledge-driven growth, will necessarily involve a structural transformation of the European economy, with R&D intensive sectors occupying a much more dominant position than hitherto in the overall composition of the industrial base. Policy efforts across a broad front will be needed, therefore, to facilitate this type of restructuring, for research policy alone will not be sufficient. Innovation policy, (higher) education policy, other sectoral policies, competition policy, regional policies, human capital policy etc. will all need to be aligned and leveraged to bring about the necessary industrial restructuring.

The pros and cons of a European R&D target

Shifting the focus back to research policy, however, there continues to be a debate about the desirability of maintaining a specific target for R&D expenditure across the EU as part of the effort to raise R&D intensity. The strongest argument against the continued use of a target is that it can unduly focus the attention of policymakers on policy instruments with direct but short-term implications for R&D levels rather than on the broader set of policies needed to improve overall research and innovation system performance. Another argument is that a target for aggregate expenditure can also lead to unrealistic attempts to reach this average level rather than to efforts to reach more realistic targets given the different starting conditions of countries.

In contrast, there are many arguments for maintaining a specific target. One of the strongest is that dropping the use of a target at this stage (or even lowering it) might send out the wrong signals to both policymakers and society at large concerning the commitment to transform the EU into a leading knowledge-based society. Another argument for retention is that, so far, the setting of a target has successfully raised the profile of research in many national settings, as demonstrated by the inclusion of national R&D investment strategies in Member States' National Reform Programmes. Similarly, it has also raised the profile of the position of research in an EU policy context (witness the earmarking of funds for R&D in the Structural Funds).

In future, if the use of a target is retained, it will be imperative to ensure that its use fuels a common understanding that investing in R&D is a key element of the EU's drive to become a globally competitive and knowledge-based economy characterised by sustainable and inclusive economic growth.

R&D targets alone not sufficient

Equally, it will also be necessary to ensure widespread understanding of the fact that focusing on R&D alone will not be sufficient to realise this ambition. Broader sets of policies are needed to establish the right framework conditions and incentives for investing in the generation, diffusion and use of knowledge. In turn, this should help improve the performance of both research and innovation systems at Member State and EU levels. In the long-run, it should also allow industry to generate the resources needed to raise R&D investment levels across the board. Consideration should thus be given not only to the use of R&D intensity targets, but also to the use of complementary targets related to the development of human resources, to the creation and diffusion of innovations, and to many other indicators of innovation system performance.