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EUROPEAN RESEARCH AND INNOVATION AREA BOARD

1st Position paper of the European Research and Innovation Area Board (ERIAB): "Stress-test" of the Innovation Union

Introduction: the "double" impact of the financial and economic crisis on the EU

As the financial crisis in Europe unfolds, the urgency to find and rapidly implement better growth enhancing policies is felt in all member states. Over the last decades the European Commission (EC), with the active support, sometimes of the business community, sometimes of the scientific community, has been a source of inspiration for new initiatives on structural reforms to create and expand the "European added value" – one may think of "the Single Market", the "Service Directive", the Lisbon 2010 Strategy, and the Europe 2020 Strategy. It should maintain and reinforce this role.

The international financial crisis and, in particular, the European sovereign debt euro-crisis, has led to a further realisation, also among national policy makers, that there is a need for further integration in areas underpinning the monetary union. In these areas current policy concerns appear to be driven by the understanding that a *deepening* of European integration is essential if one is to safeguard macro-economic stability within the monetary and, more broadly, economic union. Hence, the debates among member states' national policy makers about the further need for a fiscal "union" alongside the monetary union, or about the need of a banking union to enhance and, in some cases, even to guarantee the effectiveness of the financial support funds through the European Financial Stability Facility (EFSF) and the European Financial Stabilisation Mechanism (EFSM). Overall, the debate on macro-economic stability within Europe appears today to be increasingly dominated by questions surrounding the need for a deepening of European integration, enforced by the euro-crisis and going beyond traditional areas of economic integration but including more and more aspects of political integration.

A central question is to what extent the *Innovation Union* today might need to go through a similar *deepening* process. That for the *Innovation Union* to be effective, it is essential that member states further increase the integration and coordination of their national research and innovation policies with European research and innovation policies. In the field of fundamental research and the investment in large research infrastructures, this European integration deepening process is to some extent already well underway with, amongst others, the successful creation of the European Research Council (ERC), and the activities of the European Strategic Forum on Research Infrastructures (ESFRI). However, these new European organisations or institutions continue to operate alongside similar national and even regional research funding programmes. In areas of more applied technology support, most initiatives taken over the last years aimed at coordinating and at "joint programming" national research and innovation policies. One may think of the inauguration of the Knowledge and Innovation Communities (KICs) of the European Institute of Innovation and Technology (EIT) that address some of the grand societal challenges, such as energy and climate change, or the creation of Joint Technology Initiatives (JTIs) that have indirectly contributed to a further deepening strategy in particular technologies. But here too, the integration process has been slow and particularly complex in its legal implementation.

In many ways, the launch of the *Innovation Union* in 2010, broadening the concept of the European Research Area (ERA) to include now also innovation, called for a further deepening process of European integration in other areas which also appear crucial to knowledge creation and diffusion, and in particular innovation, such as entrepreneurship, higher education, access to (venture) capital, labour mobility, private-public sector partnerships in public sector innovation, and many more. While

a substantial degree of legal progress has been made in some of the 34 commitments identified in the *Innovation Union*, a deepening process also implies that new, unthought-of subjects are being added to the *Innovation Union* line of action. Today appears the right moment to do so. As in other cases, a crisis brings diagnostic clarity. It highlights often already well-known and well-studied structural weaknesses which can now become targets for policy action.

In line with what was argued above, it is, in the view of the ERIAB, the European Commission's role and task to come up with new inspiring initiatives on the necessary structural reforms to enhance the deepening, "European added value" of its own, *and* of its member states' research and innovation policies. Today the EU is in a very different environment than during the creation of the first framework programmes in the 70's, or of the ERA at the beginning of this Millennium. In short, the current crisis points to the need to bridge the gap between *Innovation Union* proposals and current reality.

In this short report, the ERIAB lists four areas whereby the current financial crisis appears to be directly challenging some of the European ambitions with respect to the *Innovation Union*:

(a) First and foremost, the financial sovereign debt crisis has further exacerbated some of the structural problems associated with Europe's global research and innovation position: in particular, Europe's lagging investment in research and higher education; its declining attractiveness to scientists, researchers and innovators alike; and its faltering international competitiveness in new products and services (as elaborated upon under point 1 below).

(b) Second, the severity of the sovereign debt crisis in some member states is likely to bring back, at least in the short run, growth divergence in knowledge accumulation, whether in terms of research investment, or in terms of innovation, as a dominant trend. This might well reinforce existing regional and national disparities between member states. These trends are likely to undermine some of the "union" cohesion aspects of the *Innovation Union* resulting in growth and innovation fragmentation between member states leading to a knowledge and innovation divide within the EU (elaborated under point 2 below).

(c) Third, the crisis is also challenging the way traditional business models deal with research and innovation as opposed to new, sometimes radically different business models dealing with – and the list is not exhaustive – the re-invention of production in close relationship with services, innovation in network services; in delivery; in small firms; in response to new societal challenges, involving private-public sector collaboration; etc. (elaborated under point 3 below).

(d) Fourth, the crisis raises issues about the speed of decision processes, in particular, an increased level of risk taking and a higher acceptance of failure are needed with respect to financing research and innovation, while private as well as public financial capital appear to have become increasingly risk averse (elaborated under point 4 below).

In short, for the ERIAB there is, given the all-encompassing impact of the present sovereign debt crisis, a need for more radical reflections on Europe's long term, sustainable knowledge-based growth strategy. In its first immediate impact, the crisis led to strong policy concerns about reductions in the private funding of research. With the shift of the financial crisis to member states' sovereign debt, one now is confronted with pressures on the public spending on research and innovation in those countries most directly confronted with achieving major fiscal consolidation. The long term result could well be a further widening in productivity growth levels between more and less wealthy member states exacerbating further the fiscal pressures within the euro-zone member states. From this perspective the current crisis points to the need to re-address the *Innovation Union* in a more radical fashion than originally proposed. This first stress test of the ERIAB provides some first hints as to what could be its main ingredients.

1. The boundaries of EU's R&D policies and the international dimension of global challenges

Looking back to Europe in the last few years various strategies, politics as well as legislatives have been delivered with respect to the implementation of the *Innovation Union*. Nevertheless, the overall competitiveness of Europe's R&D has not substantially been improved particularly because impacts on the demand side as well as in the real economy are still missing. The EU is still outperformed by global innovation leaders like the USA, Japan and South Korea although the gap as against Japan is getting smaller and it stabilizes in regard to the USA. The problem is even exacerbated by the increasing competition towards the fast growing BRIC countries. To compete with the emerging economies in terms of economies of scale could not be the solution. Europe has to take its diversity as its strength regarding the increasing complexity of global challenges and has to specialize even more in the delivery of specific solutions to demands. The *Innovation Union* could exploit the diversity of regions more strongly by fostering the smart specialization of regions or the development of smart cities. However, these clusters of smart specialization should not work in isolation but in the context of European and global networks.

The enlargement of the scope of European R&D policy and strategies that are reaching beyond Europe is becoming more coherent. Although, a widening of the collaboration with developing countries is a development rather than an innovation strategy on the short run, on the long run it can foster cooperation as well as market opportunities. The mobility and training of foreign students from e.g. the Mediterranean area and Africa can be a strong benefit for the EU. International cooperation in research and innovation helps in tackling the global societal challenges by optimising the use of research infrastructures. Joint capacities to address global challenges have to be improved to foster scientific cooperation beyond Europe. The coordination of research infrastructures on a global scale is beginning but the EU still fails in coordinating those infrastructures efficiently on a European level.

To raise the attractiveness of Europe for research and for researchers means avoiding brain drain as well as attracting talents from abroad. This is true for Europe as a whole, but accentuated for specific regions within the EU. One major objective of the realization of the ERA is to attract talents and investments to the EU. In July 2012, the commission has published a communication on how to reinforce the ERA. It identifies five key priorities that should be followed by actions on the European and national level as well as by research stakeholder organizations. At the moment it is too early to assess the effectiveness of these actions. ERIAB will provide its views on the impact of these activities in autumn 2013.

Recommendations:

- A long-term political commitment to be a global player is needed within the *Innovation Union*.
- The scope of European R&D policy must be enlarged beyond Europe.
- Investments in developing countries will become long-term investments in markets and opportunities. Thereby, particular attention should be given to the Mediterranean Region and Africa.
- Young talents have to be motivated to enter into a research career. The EU should thereby try to attract also talents from outside Europe (talents follow opportunities).
- Joint capacities to address global challenges as well as the coordination of research infrastructures on a global level must be further promoted.

2. The relationship between the objective of cohesion policy, the *Innovation Union* and its emphasis on excellence

The European aim of achieving inclusive growth is probably most directly challenged by the sovereign debt crisis. There is an obvious need to radically rethink the way structural funds are used to help peripheral and cohesion regions to unleash their growth potential. For new companies or start-ups, the notion of smart specialization will have to be broadened to include the public sector. Most public sectors, whether regional or national are directly or indirectly crucial for enhancing entrepreneurship, innovation and more broadly knowledge-based growth and development. One may think of education, both formal education and on-the-job training, ease of mobility including access to public transport, efficiency and speed of response from public administration, utilities as well as the health and social security services. As in the case of the knowledge intangibles production factor, most if not all of these sectors have remained by and large a national prerogative in Europe. Yet it is the widespread divergence in the efficacy and efficiency of the public sector in many of the peripheral regions which has been one of the most damaging bottlenecks towards higher growth and productivity.

At the same time, European research policy has been instrumental in enhancing spatial knowledge agglomeration. Economic geographers have highlighted the importance of the access to large pools of qualified human capital, the proximity to research centres, the attractiveness of urban environments, the active presence of financial intermediaries for such agglomeration effects to flourish. They have emphasized the particular importance of size, as in the case of large cities. Yet it is also recognized that the main causal relation does not flow from location to innovation but the other way round. It is because a pool of competences is created at a local or regional level, whatever the source (a set of large companies with their suppliers, a high quality public research institute, etc.), that other innovation actors decide to co-locate in the same place. In other words, at a certain threshold level of the supply of skilled production factors, agglomeration seems to act as an attractor to mobile production factors, exploiting further what economic geographers refer to as “localized dynamic economies of scale”. It is this process of attracting e.g. the best national or foreign scientists and engineers, students, entrepreneurs, building on the immobile, geographically fixed factors, which becomes then essential.

In a certain way, those immobile, specific geographically fixed assets give rise to rents which become the key in attracting the mobile factors: they serve as the “glue” retaining what would otherwise be footloose production factors. European research policies have focused in particular on the mobility of research excellence emphasizing the need for portability of grants for researchers. In this sense they have been complementary to national and/or regional innovation policies. Indeed it has been this “malleability” of spatial knowledge agglomeration which has been the basis for the rapid growth and pervasiveness of regional innovation policy, ignoring at the same time the complexity of this process in totally different regional economic, geographic, and institutional settings. Thus in some cases, the regional innovation policy focus has been on measures strengthening the research infrastructure, in other cases on reforms in the organisation and autonomy of research institutions, in yet other cases on the social infrastructure for immigrants or freeing up incentive structures for the launching and testing of new ideas.

In short for national or regional innovation policy variety is the name of the game. The immediate question which then can be raised is the extent to which the *Innovation Union* will just enhance this variety, enabling so to say regions to develop their own smart specialisation strategies, or whether a more common regional innovation policy would make more sense. E.g. it is sometimes claimed on

the basis of evidence both in the US and Finland that just building a high quality research university might well have a profound effect[1].

At this stage, the Commission will launch a study to find out more about how the *Innovation Union* could develop complimentary measures to regional innovation policies. ERIAB will subsequently issue an advice elaborating on ERAB's[2] earlier advice.

Due attention will also have to be paid to the way information and communication technologies (ICTs) have altered the exchange of knowledge and hence altered the internal and external organisation of research, the scope of possible national versus international spill-over effects, the locational advantages and more broadly the role of national and regional innovation policy making. In so far as national and regional innovation policies are rooted in the vision that the domestic or "local" efficiency/productivity problems are of an internal structural nature, such competitiveness visions have become increasingly challenged by the way ICTs have broken down nationally and internationally, the distinctions between high and low tech sectors. The policy challenge is now how to deal with the increasing fragmentation of value chains and the increasing heterogeneity of required knowledge inputs. This requires strong international cooperation in research and a stronger focus on the deployment of ICT based technologies.

At the same time, the drive within the EU (and most national member states' research policies) at the research level towards "excellence" in research undoubtedly benefits from Europe's regional cultural diversity and autonomy. However, such excellence assessment demands that no consideration is given to the region of origin of the researcher. For the typical "social cohesion" countries and regions that are in need of qualified human capital for their own catching up effort and which are not in a position to match the working conditions and real income levels of the rich "excellent" regions, this represents a major "brain drain" problem. Surprisingly given the importance of the "social cohesion" dimension in European economic integration, the regional implications of the European and national research policies towards research excellence have not really been studied, not have they been recognized as a specific issue of concern within the *Innovation Union*. The regional social cohesion innovation policy focus emerged from a desire to assist less-favoured regions to increase their technological level, while the ERA dimension of the *Innovation Union* shifted gradually away from any "territorialisation" of research. In short, regional innovation policy might well have to play a more central role in Europe in compensating, and possibly off-setting, regional trends towards talent brain drain from Europe's less-favoured regions towards Europe's research excellence hotspots.

The financial crisis is further exacerbating these structural problems associated with globalisation and spatial knowledge agglomeration. To some extent the impact of the fiscal crisis is at the opposite end of the enlargement and ICT revolution of the last two decades. It is likely to bring back, at least in the short run, growth divergence features in knowledge accumulation reinforcing existing regional and national disparities in Europe.

[1] "That is the conclusion reached in the study of individual Finnish inventors by Otto Toivanen and Lotta Väänänen. According to Toivanan and Väänänen's, the construction of three technical universities over the course of three decades increased the number of inventions in Finland by 20 percent from what it would have otherwise been. The reason, they argue, is that the location of these universities encouraged more people living near them to study engineering. It also increased the country's capacity to educate more engineers."

[2] ERAB = European Research Area Board, predecessor of ERIAB, 2008-2012.

Recommendations:

- Smart regional policies going beyond smart specialisation

  There is a need for a radical rethinking of regional policies going beyond the current notions of smart specialization, but including new concepts and notions such as:

  - smart public sector specialisation,
  - smart university and higher education specialisation prioritizing e.g. science and technology studies with a strong innovation/entrepreneurship dimension,
  - smart mobility including double career programmes, etc.

- The increasing fragmentation of value chains and the increasing heterogeneity of required knowledge inputs require strong international cooperation in research and a stronger focus on the deployment of ICT based technologies.

3. Problems with the delivery of innovation – supply and demand, new business models, prototypes

The European Union currently faces multiple obstacles in getting ideas from research as products and services to the market. To remove these obstacles, in general, the Flagship Initiatives strategies of EU are coherent and their measures are progressing. However, progress has been slow due to the current crisis. The *Innovation Union* initiatives and instruments have yet to mature.

The supply-side of research and innovation (and the ERA issues concerned) contains the elements currently provided by academia, regulators and industry to provide better or new products and services. The demand-side contains the elements desired to facilitate and accelerate the development of better or new products and services.

To improve the supply-side the *Innovation Union* has to address the low attractiveness for engineering careers in Europe. The demand for well-trained scientists and engineers still outweighs the supply from European universities and this gap is increasing: by the end of 2020 Europe needs at least one million new researchers and engineers. Entrepreneurial training needs to be also strengthened in curricula. Managerial skills should be integrated into the education of scientists and engineers so teach them e.g. how to transform an idea into a good project, manage this project well, protect IPR and exploit them. In addition to centres of research excellence Europe also needs centres of teaching excellence which perform teaching on both bachelor/master and PhD level.

Europe's world-class scientific-academic achievements are disconnected to its output in terms of technology-based innovation, i.e. products and services. The academic landscape in the EU is characterized by a stronger decentralized specialization compared to e.g. the USA. To capture this specialization a more discipline-based ranking of universities, research centres and technological institutions are desirable to highlight the academic specialization. The aim should be to implement a smart academic specialization by a stronger horizontal collaboration between universities and industrial technology developers to merge *excellence* with *relevance* in research and education. Academic education should help establish the "*entrepreneur-engineer*" career track. University curricula should include entrepreneurship training *dedicated to engineers and scientists* (and not just additional business and administration courses *for all*) and collaborative projects in technology firms for engineering students.

There exists a "valley-of-death" between publicly funded R&D and commercially financed product development and competitive production. During the technology transfer and start-up phase, new companies face a crucial period where public research grants stop and it is not possible to attract private finance. The EU needs better instruments to fill this gap, to dilute financial risk, and to facilitate access to capital. The idea of a new European venture capital regime to be presented end 2012 as well as the current Risk Sharing Finance Facility (RSFF) and the financial instruments under the Competitiveness and Innovation Programme (2007-2013) have attracted and will probably further attract a significant increase in private finance. An expansion of these instruments in future R&D policies is necessary to further bridge the "valley-of-death". As identified in the "High Level Group Report on Key Enabling Technologies"[3] Europe needs a dedicated instrument to co-construct small scale production demonstrators based on new technologies through public-private joint-ventures. Such joint-ventures should provide public co-funding for the pilot line installations (prototyping) to reduce the upfront private investment in exchange for production and employment guarantees for facilities based on new and validated technologies.

The access to high-technology infrastructures and facilities for technology development within the EU is deficient. Measures are needed to grant EU-wide access to R&D facilities for public - private technology development, in a similar manner as large-scale scientific research facilities are open for external access. Open Innovation models offer a promising framework for EU-wide cooperation for new technologies.

To achieve a better exploitation of new ideas and to bring them to the market innovations in business models are often necessary. Over the recent decade business environment has evolved to one with profoundly more complex industry dynamics and to some extent fading of the industries' boundaries. We see extended enterprises in which virtual integration, partnerships, strategic alliances and joint ventures are becoming common parts of competitive strategies. Furthermore, technology, especially information and communication technology, has radically altered the requirements for building and managing a successful business. The today's basis of competition is on capabilities and knowledge.

In order to secure that there are opportunities for both development of new technology/products and solutions as well as for new business models and services the wording in the relevant parts of the *Innovation Union* needs to be more explicit concerning the importance of new business models and services. It is clear that each relevant part of the *Innovation Union* needs to ensure that a considerable variety of stakeholders is involved with diversity in backgrounds, expertise, organizational size, age etc. in order to develop new business models.

In at least two of the three main pillars of Horizon 2020 (industrial leadership and grand challenges) these issues need to be addressed. Furthermore, simplification of administrative procedures is necessary to secure an increasing participation of smaller sized organisations. Start-ups and SMEs are crucial when it comes to propose new solutions and to bring new concepts to the market.

In order to successfully tackle the grand challenges, one needs to include the possibilities opened up by services and new ways of expanding business and adaptation of solutions. The solutions to many of these challenges lie not only in developing new technology but also to get the results widely adopted and thus generating maximum benefit to society.

It is also clear that to make a long term impact also these subjects need to a larger extent be included more widely in the educational parts of the *Innovation Union*. For example, the EIT and the Knowledge Alliance programs are two good possibilities to ensure that topics related to business models and services are being increasingly adopted in curricula of educational institutions.

[3] Final report of the High Level Group on Key Enabling Technologies, European Commission 2011.

Access to finance is still a bottle neck for SMEs and slows down the process of getting new ideas to the market. In many parts of Europe the lack of capitalization of SMEs puts restrictions to the development of new innovative service solutions. Public procurement as a way of driving innovation also needs to have a larger focus on i.e. services.

The Eco innovation part presents an area where certainly a stronger focus on service concepts is needed in order to fully take advantage of both new technologies and the benefits supplied by natural ecosystems, i.e. ecosystem services.

Recommendations:

- Managerial training needs strengthening in scientific curricula. Issues related to innovations in business models and services should be more widely included in academic education. The attractiveness of scientific and engineering careers in general has to be improved in Europe.
- By giving more awareness to *relevance* as a criterion of equal importance as *excellence* in research and education, the linkage between Europe's world-class scientific-academic achievements and its output in terms of technology-based innovation could be strengthened.
- Europe needs to use the budget allocated in the projects for dissemination more efficiently and to push for joint exploitation of results as well as new instruments to support proof of concept and prototyping. Furthermore, financial risk has to be diluted, and access to capital has to be facilitated.
- An EU-wide access to R&D facilities for public - private technology development, in a similar manner as large-scale scientific research facilities open for external access is needed to improve the sharing of high-technology infrastructures and facilities within the EU. Open Innovation models offer a promising framework for EU-wide cooperation for new technologies.
- The creation of a marketing oriented repository for unexploited European patents should be considered.
- The participation of SME's in EU research projects as well as the number of start-ups has to be further increased by i.e. a further simplification of administrative requirements.
- To increase the chance that also innovative business models will be developed the joint involvement of large companies, SMEs and research institutions in EU research projects must be ensured.
- Grants should be allocated to research and innovation projects concerning innovations in Business Models.
- Public procurement should be used to drive innovation. Member states should reconsider their public procurement regulations by introducing innovation as a key element.
- Services in relation to innovations which address the grand challenges must be developed, i.e. such as Eco-Innovation.

4. Problem of speed and velocity

The speed at which decisions around capital allocation are made needs to be improved. In the globalised internet world, the speed of information exchange, background checking, competitive analysis, team formation has accelerated by many folds. While an adequate level of thoroughness is required in the expenditure of public funds – the goal of the *Innovation Union* funding processes should be to consistently improve turnaround time in all aspects of its delivery. Web portals and interfaces are central to the implementation of these velocity improvements. The *Innovation Union* should commit to agreed turnaround times on contract awards (a bit like the FDA in the US) and then monitor, report and problem solve if these are not met.

The higher velocity of positive decision-making (i.e. planned support for initiatives) must also be matched by high velocity negative decision-making – the willingness to stop initiatives and projects that are failing and are not on a trajectory that looks likely to lead to a positive outcome.

Recommendations:

- The application timeframe and bidding process should be proportionate to the size of funds and timescale of grant being offered.
- A metric of turnaround time could be developed and monitored to ensure that there is constant improvement in the speed of access to funds.
- A clear stratification of grants should be offered, with a "fast-track" process for some high impact and urgent grants that will be allocated in a matter of weeks (e.g. for prototypes) rather than months or years.

Tolerance of failure

Embedded in the concept of higher velocity decision-making is the expectation of 'failure' for some proportion of projects. The probability of failure needs to be made explicit and measured, not scape-goated, and accepted as part of risk-taking and innovation. Importantly the level of exposure to failure (funding risk, political risk, security risk etc.) needs to be quantified, but not eliminated. Small failures should be tolerated and adapted to quickly. The acceptable number of failed projects should be higher, but the amount of allocated capital should be low. This would illustrate increased capital allocation to winning projects which is a sign of good risk management.

Recommendations:

- The European Court of Auditors should be asked to comment on budget spending rates and on the relevance of the expenditure, and refrain from commenting on outcomes.
- The termination of non-successful projects should be encouraged and funds specifically reallocated to more successful projects.
- A proportion of the budget should be reserved to more risky projects. Scientific failure is accepted. This tolerance for failure should be assigned also to more risky innovation-orientated projects.