



Brussels, 14/01/2010
ERC/AMC/ab/D(2009) 600282

Contribution of the Scientific Council of the ERC to the Consultation on the Future “EU 2020” Strategy.

The Scientific Council of the ERC congratulates the Commission for its ambition to set up an overarching strategic line that, in a creative manner, learns the lessons of the Lisbon strategy and, while taking note of current reality and making the necessary adjustments, intends to support its continuation. The Scientific Council has read the ‘Consultation of the Future “EU 2020” Strategy’ with great interest, and wishes to respond to the invitation to participate with a number of comments, that, to be concrete, are organized around an analysis of two central statements of the text proposed.

- I. The Agenda 2020 sets as its objective for Europe a *“new sustainable social market economy, a smarter, greener economy, where our prosperity will come from innovation and from using resources better and where the key input will be knowledge”* (page 2).

We agree that this is a most worthwhile target to strive for and that the statement captures in a nutshell the essential linkages among the forces that have to be brought to bear for success. Indeed:

I.1. The innovation performance of the European economy is far from optimal. We will not belabor this, unfortunately, very well known point. It is a major shortcoming. In this respect, our economy and our society need dramatic improvement on all fronts: in the numbers of technologically based start-ups, in the propensity of established firms to innovate, and in the emergence of new sectors arising from the development of new technologies. If we were to look back at the coming decades sometime in the future, we should be able to assert that the proportion of technological breakthroughs coming out of Europe - and have helped establish competitiveness and leadership in new sectors - has been substantially larger than it has been in the last decades.

I.2. Knowledge, and in particular scientific knowledge, is at the basis of innovation. It is, to be sure, not the sole factor. Entrepreneurship (of both people and institutions), IP legislation and the funding sources (powerful venture capital schemes are badly needed in Europe) are also important. Although not sufficient, the access to first-rate research, and to the institutions that make it possible, is a necessary condition for the vitality of innovation. An economy that

denies itself a cutting edge research system (which encompasses the entire complex web of the “Knowledge triangle”: universities, research and technology organizations, RTOs, innovation related institutions linked to enterprises, etc) is creating for itself an enormous handicap in the race for innovation. As illustration we mention four instances of a very different nature:

- (i) It has been argued by economic historians of the XVIII Century¹ that the eminently practical industrial revolution was made possible by, and in a sense emerged from the intellectual cauldron of the scientific revolution. As the sporadic, trial and error processes of earlier technological inventions gave way to more systematic scientific enquiry, the scope for science-based-technologies was considerably broadened.
- (ii) The year 2010 marks the 50th anniversary of the operation of the first optical laser. According to C. Townes², many in the scientific community viewed it then as "a solution looking for a problem".
- (iii) In the contemporary world, the explosive growth of the new technologies associated with communication and computation and of its corresponding economic sectors, underlines the fact that these technologies have been dependent in its progress from purely scientific advances in mathematical and physical sciences, such as the understanding of the fundamental electrical properties of materials (which lead to the invention of the transistor and the further development of large-scale integration, etc), and others³.
- (iv) It has been conclusively established that the emergence and growth of the biotechnology start-ups in the US after 1970 was, first and foremost, a consequence of scientific breakthroughs. Secondly and more surprisingly, that the leading explanatory factor for their location was the proximity to research institutions (overwhelmingly universities) where the advances took place⁴.

I.3. Knowledge is also at the basis of the possibility of a green economy. Regulation, including multilateral agreements, will play an indispensable role but it is by now well understood⁵ that this will not be enough. A massive research push, both in basic science and in technological development, will be essential. So, indeed, the economy of the future must be both *smarter* and *greener*, yet in that order: it will only be greener if it is smarter.

¹ See, for example, J. Mokyr: "The Intellectual Origins of Modern Economic Growth", *Journal of Economic History*, 65, 2005, reprinted in Alberto Quadrio Curzio and Marco Fotis, eds., *Research and Technological Innovation: the New Challenge for Europe*, Physica Verlag 2005. By the same author: "The Great Synergy: The European Enlightenment as a factor in Modern Economic Growth", Wilfried Dolfsma and Luc Soete, eds., *Understanding the Dynamics of a Knowledge Economy*, Edward Elgar, 2006.

² "The first Laser", in Laura Garwin and Tim Lincoln, eds., *A Century of Nature, Twenty-one discoveries that changed Science and the World*, University of Chicago Press, 2003.

³ For good non-scholarly account, of the historical development of the technologies underlying the IT industry, see [http://www.utdallas.edu/~jblee/EE3310/History%20of%20microelectronics.pdf] and [http://computerhistory.org/semiconductor/welcome.html]. For relations with basic science, see "European competitiveness in Information Technology and long term scientific performance" by Andrea Bonaccorsi, Short paper for Expert Group chaired by L. Soete on "The role of the Community research policy in the knowledge-based economy", January 2009 (see footnote 7).

⁴ See the classical paper on “Intellectual Human Capital and the Birth of U.S Biotechnology Enterprises” by L.G. Zucker, M.R. Darby and AM.B. Brewer - published in *American Economic Review*, 1998. Also J. Lerner: *Boulevard of Broken Dreams*, 2009, Princeton University Press.

⁵ See, for example, P. Aghion and R. Veugelers: "No Green Growth Without Innovation", Bruegel Policy Brief, November 2009.

I.4. The link between scientific knowledge on the one hand and innovation and the renewal of our economy on the other, raises a challenge for Europe. Yet, it is a hopeful one. It is a challenge because as good as the level of our science is, we often find it wanting, at least in some of the more ‘recent’ research fields, in comparison to the peaks of world excellence⁶. Clearly, we must aspire to our science being second to none (“*raising research quality to world leading standards*” in the apt way the text upon consultation puts it, page 5). We are not there yet. We face a hopeful challenge because there is, in spite of everything, an aspect of good news in the diagnosis of this situation. Science from classical Greece to the present time, and by way of the scientific revolution, has been an integral part of European civilization. It is at the heart of our historical heritage, and of our current reality. It is deeply engrained in European culture - and it has worked well for us. Indeed, it has been one of our leading comparative advantages in the world. It should not be difficult, if we set to it, to reinvigorate our ambition and to attain the second-to-none standard. It can be done, even if we take into account that other areas of the world are engaging in many sizable, exemplary and bold initiatives. As for the will, we cannot afford not to have it. We must be determined to be leaders in building the new versions of the knowledge society. Demographically and economically, Europe is fated to become a much smaller part of the world. There is no reason why this should also apply to the generation of knowledge. The influence of Europe in the world, the prevalence of our values (including the value of safeguarding free scientific inquiry), our attitudes and our interests, as well as our competitiveness, depend significantly on preserving, in relative terms, this source of knowledge aspect of our European identity.

- II. *“The aim for 2020 is to achieve a genuine European Knowledge Area underpinned by a world-class knowledge infrastructure, in which all actors (students, teachers, researchers, education and research institutions and enterprises) benefit from the free circulation of people, knowledge and technology (the 5th freedom)”* (page 6).

We applaud this aim and would like to elaborate on the meaning of “world-class knowledge infrastructure”, and on the actors, especially the one actor that is of special concern to the Scientific Council of the ERC: the researchers. More generally we would like to call attention to the many good ideas being generated in the current debate on European scientific policy for the Knowledge Economy⁷.

We must, first of all, reaffirm the obvious: the construction of the ERA will require collaboration between the EU, the MS and the research institutions of Europe, most notably universities and research centers. In this task we believe that the EU can play a singular role because its unique vantage point provides an ability to both stir and steer that goes much beyond its strict financial weight.

⁶ See, for example, L. Bauwens, G. Mion and J. Thisse, “The Resistible Decline of European Science”, Core Discussion paper 2007/92, Université de Louvain, or G.P. Dosi, P. Llerena and M. Sylos-Labini, “The relationships between science, technologies and their industrial exploitation: An illustration through the myths and realities of the so-called ‘European paradox’”, *Research Policy* 35, 2006.

⁷ This is very well exemplified in documents such as “Preparing Europe for a New Renaissance - A Strategic View of the European Research Area” issued by ERAB, or the Report to the European Commission “The Role of Community Research Policy in the Knowledge-Based Economy”, elaborated by an Expert Group chaired by L. Soete, both released in the fall of 2009.

Europe also needs a “world-class knowledge infrastructure”. Without it, the ERA will not become a powerful reality. With the document under consultation, we also understand that the term “infrastructure” does not refer only to equipments (physical or virtual), but also to institutions and to the human-resources base of the scientific enterprise.

We want to point out that the world-class demand will require both specialization and concentration of resources. Not every MS can or should be strong in everything. We will not reach the desired peaks if we had this as a desideratum. But we must also be as emphatic in asserting that specialization, concentration and excellence are fully compatible with cohesion. Not every university can be excellent at everything but every university can be excellent at something. We have good experiences at the MS level of the application of this concept.

In complete congruity with the world class aspiration formulated in the document, the EU gave the ERC the mission “*to put excellence at the heart of European research*”. More concretely, “*its main aim is to stimulate scientific excellence by supporting and encompassing the very best, truly creative scientists, scholars and engineers to be adventurous and take risks in their research*” (and with this intention promotes “*wholly investigator-driven, or ‘bottom-up’, frontier research*”). Indeed, our objectives (“*In the long-term the ERC looks to substantially strengthen and shape the European Research System*” “*Ultimately, the ERC aims to make the European Research base more prepared to respond to the needs of a knowledge-based society and provide Europe with the capabilities in frontier research necessary to meet global challenges*”) align themselves very well with the aims of the proposed “EU 2020 Agenda”⁸.

We believe that the wish to make Europe a world-class, second-to-none knowledge society demands that Europe becomes a hotbed of top talent. This requires retaining – or repatriating - European scientists and scholars to a much larger extent that we do now (our brain drain⁹ is substantial and a sure index that not everything is well in our kingdom), as well as attracting talent from abroad, to work with us but also, and most crucially for the visibility of Europe, to train with us (which, in particular, implies that we should carry a major effort to strengthen and open up our doctoral education – e.g. not restricting scholarships to the nationals of any particular MS). To enhance the ability of Europe to retain and attract, we strongly recommend policies to foster the empowerment of researchers, especially of the younger ones (of putting “*people and responsibility first*”, in terms used by the document under consultation, page 1). With this purpose the granting schemes of the ERC encourage the early independence of the individual researchers. Key to the empowerment is the elimination of barriers to mobility. We are convinced, for example, that the general portability of grants (a practice of the ERC, but not yet a universal practice) would be a significant advance.

There are many types of Grand Challenges, all of them requiring knowledge. There are those that are critical, meaning that they have only recently been recognized, or arisen, and that will get worse if nothing is done about them (global warming, energy). There are those that in a sense have always been with us but that now jump to our attention because the progress in science makes them more understandable and raises the hope that a dedicated effort can lead

⁸ All the italicized statements can be found in the mission part of the web page of the ERC.

⁹ See the report from NSF: *Doctorate Recipients from U.S. Universities, SED: Survey of Earned Doctorates*, <http://www.nsf.gov/statistics/nsf10309/>, Division of Science Resources Statistics, Directorate for Social, Behavioral, and Economic Sciences, December 2009. See also the report of OECD: by Laudeline Auriol, “Labour Market Characteristics and International Mobility of Doctorate Holders: Results for Seven Countries”, STI Working Paper 2007/2, Statistical Analysis of Science, document DSTI/DOC(2007)2, 7 February 2007.

to advances (many challenges related to health or space are of this sort). Most of these thematic challenges are of interest to all countries in the world, although as Europeans we logically want to contribute significantly and singularly to their solution. But there is another category, which includes those we have spelled out above, that has a generic and transversal character. Make no mistake about it: raising the European Scientific Infrastructure, in the inclusive sense we adopt in this text, to the best world class level shall not be an easy task and it is in itself also a Grand Challenge. And in contrast to all the others, this one is specifically European: nobody will do it for us.