

Challenges for Science and Technology in Europe

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I have been asked to offer a view from the private sector about challenges for Science and Technology in Europe. Although I am most aware of how companies in Europe use R&D, my job exposes me routinely to initiatives worldwide involving companies, universities and public research organisations. I shall try to relate what I say to this global context and plan to focus on two main questions:

a) Effectiveness: How can we ensure that the science and technology system is really capable of meeting European objectives and priorities?

b) Engagement: how can we engage all of European society in what needs to be done?

10 I hope it goes without saying that the objectives of this meeting concern everyone's well-being. Even so, I must emphasise this point. There are many reasons why the future of science and technology matters for Europe. Just one of these concerns the continued success of our companies, the jobs they provide and the wealth they create.

All companies depend upon the products of science and technology and upon people trained in our universities and schools and working in all parts of the scientific system. But for many successful European companies, this dependency is extremely close and direct. The ability of companies like Nokia, Philips, Schlumberger and Novartis and many others to remain competitive depends upon maintaining a mastery of science which is as sophisticated as exists in any university department.

20 Nonetheless, from speaking to Minister Gago, and from discussions in other forums, I understand that some science ministries have become rather uncertain whether governments can really do anything which will materially change the situation in respect of private sector investment in R&D. After all, aggregate business sector R&D is the outcome of so many factors that are outside the direct control of the ministry. I can also understand that universities and national research facilities present very pressing and urgent concerns.

I hope that Europe's continued economic and social well-being is a sufficient reason for us all to take a broader view of the challenge. End of sermon!

I described aggregate private sector R&D as an outcome rather than an input. The industrial dynamics are quite complicated. We have to understand factors such as:

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- How many science-dependent companies there are and in which sectors; and how research and product development in these sectors is concentrated and carried out within the supply chains;

- Whether there are supportive conditions for their competitive success and profitability; and
- To what extent we need to think about highly knowledge-intensive activities that currently do not go under the banner of “R&D”, for example as the service sector develops.

The terms “industrial ecology” and “innovation ecosystem” capture these dynamics and reveal that different conditions will lead to different outcomes and require different nutrients.

40 Comparisons with parts of the world such as the USA are not always meaningful, the more so because the statistical data are less comparable than you might think and the indicators not always well suited to the job. This is not to say that no problem exists: just to warn of the need for care when making comparisons. This has been highlighted earlier this year in Mary O’Sullivan’s report for the Commissioner’s Expert Group on Knowledge for Growth, and by EU and OECD groups in which I participate on ways of monitoring industrial R&D and innovation.

50 As an aside, I do not think that there is yet a very widespread understanding of these points. I strongly encourage giving thought to how this might be remedied. One proposal is for a major push (which I think should be led by governments) towards developing some shared indicators which raise awareness of science and industry dynamics and move the focus from benchmarking to integration, from nation to region and knowledge supply chain, and from a linear model of research to innovation, intangibles and partnership.

There are some rather uncontentious observations that are relevant to our discussion today, and I organise these under six headings:

1. **Innovation process:** Innovation is changing significantly. What used to be a clearly-defined process, in which companies developed knowledge and used it to create products to sell, is being replaced by complex webs of relationships that bind companies to competitors, commerce to academia, and disparate disciplines to one another. The term “Open Innovation” captures some aspects of this change.
- 60 2. **Appropriate Scale:** Europe has profitable companies of all sizes in most key sectors, but a relative deficit of large companies in some highly science- and technology-intensive sectors such as IT, where the global leaders are often relatively young firms, which have grown large from their small beginning. Europe’s apparent R&D deficit is closely linked to patterns of sector distribution and company growth and acquisition. The whole chain is important in establishing appropriate scale. Company growth remains a key concern for Europe – it’s not sufficient just to encourage start-ups – and different countries will follow different routes.
- 70 3. **Location of Choice:** Many companies are thinking quite hard about the global balance of their activities, particularly in the emerging economies of China, India and Latin America. This has had some impact on the location of corporate R&D in Europe and in the US, but not as much as is sometimes imagined. It is part of the on-going processes of business development, and is made possible by the supply of talented people, growing demand for knowledge-intensive goods and services in the emerging economies, and by regional technical standards. Those who attended the recent OECD conference in Beijing will appreciate the efforts the Chinese government

is making to understand and construct an innovation and regulatory system that stands comparison with the best worldwide. Important points to consider are how these capabilities will develop; whether this can lead to useful complementarities within value chains or just competition between regions; and – most important – how our local interests and skills can be used to sustain some comparative advantages.

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4. **Interdependency:** I mentioned pharmaceuticals. Europe led the field in this sector in the early 1990s, but has since slipped back compared to the United States. This is a consequence of colliding forces. On the one hand, the very rapid developments in the biosciences have driven higher R&D investment, requiring new ways to access concentrated skills and resources. Overall, the US has proved better equipped to handle these developments than Europe. Differences in market opportunities and regulatory processes in the two regions are also very important. Again, it has proved more worthwhile to develop and market some expensive new drugs in the US. The key point for Europe is that no one actor can individually correct the situation. The problem can only be overcome through collective action. This is why, for example, the success of Joint Technology Initiatives like the Innovative Medicines Initiative is so important.

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5. **Competition and Collaboration:** In fact, the wider balance between competition and collaboration in R&D has changed quite sharply in recent years for many reasons. Effective collaborative R&D and knowledge transfer between companies and with public research, should be one of our highest priorities. The bad news is that we have a long way to go. This is true in terms of managing individual collaborative projects and intellectual property from public research. It is also true in terms of establishing and then implementing useful and effective Strategic Research Agendas. Some of the obvious solutions have not proved to be the best. (The good news is that other regions are facing the same difficulty. Do not be misled into believing that the US has solved this problem – in some respect, such as negotiating IP rights, the situation is worse.) I think that the main requirement is to raise the professional skills and experience of those who must handle these activities.

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6. **Training and Skills:** The remark I made earlier about the service economy highlights one aspect of training and skills. Currently, our economy is built upon an education and research system that takes people through successive levels of specialisation, up to PhD level and beyond. This system seems from the outside to be quite effective in meeting the needs of academic research based on publications and peer review. We have really quite limited insight into its effectiveness in meeting the broader requirements of knowledge-intensive economies and future career paths. I will not concentrate further on this today, except to mention one important skill that is in short supply for a world of more Open Innovation – the ability to meet objectives by working easily and effectively with people in different environments.

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Effectiveness

I wrap these points up in my question about “effectiveness.” What really matters is whether Europe’s science and technology system is sufficiently effective to meet all our collective needs. I do not believe that this is the case, and I do not believe that lack of money is always the significant reason. A greater challenge is, to use a musical metaphor, “to get the rhythm right” so that organisation and administration reflect the desired purpose and outcome. We

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must all accept responsibility for this. I think it requires further empowerment and differentiation of institutions such as universities, and far less centralised management.

About the European Research Area

My second question was about engagement. How can we engage all of European society in what needs to be done?

Let me examine this by considering the European Research Area. I like and support much of the recent Green Paper consultation on the future of ERA. However, I do not think that the approach as laid out is sufficient to correct the current situation.

130 I am sure that the Commissioner and his colleagues are heartily tired of hearing business people say that the Green Paper fails to give sufficient emphasis to innovation. I sympathise because I know that it is necessary to break problems up into manageable pieces. I also know that the Commission has other initiatives underway. But this misses the point.

We are moving rapidly into a situation where Europe will require far greater public engagement across a wide field of knowledge-rich activities, not just R&D. This is what we must be aiming to remedy and this is why we must insist that the knowledge triangle of research, education and innovation forms an integral whole.

140 Furthermore, I fear that the political momentum being built up behind ERA will falter if governments continue to fail to deliver the overarching objectives of the Lisbon process. It is quite possible that a mood may emerge that says the quite small steps already taken for Reserarch - approving the seventh Framework Programme, authorising the establishment of the European Research Council, and setting up two or three pilot Joint Technology Initiatives - have been sufficient, and that new priorities now exist, such as in health, energy, security and the environment.

This is where the question of effectiveness begins to overlap with my second priority, which is public engagement. How shall we ensure that there is sufficient public recognition and interest in the central role that Science and Technology play in meeting these new European priorities?

150 Here I think that the emphasis has to be on delivering those wealth-creating knowledge-based skills and activities that are relevant to the public's expectations and needs. We cannot build a big fence around science and technology and expect that the public will support us.

Later in this meeting, in the session on the rationale for the European Research Area, our Expert Group will explain why we believe it is necessary to develop and promote a new brand for ERA, centred upon Grand Challenge projects with obvious relevance to public interests and needs, and to use this brand for existing actions such as Joint Technology Initiatives and Technology Platforms. This is part of projecting a much wider sense of "added value" for Europeans as a whole, capable of focusing on jobs and quality of life, with relevance in terms of actions that individual companies, institutions, and people can understand and address.

160 In business language, we need to establish and project a stronger "business case" for the European Research Area and ensure that this is recognised everywhere in the world. This will mean accepting that different regions and fields of science and industry have their own requirements, and focusing limited European resources on those parts of the system that will

clearly benefit from scale and cooperation beyond the norm. The choices of approach cannot be limited to “national” and “European”. We must develop governance systems that can work flexibly and effectively at an appropriate scale. These systems will surely emphasise coherency rather than harmonisation of policy.

170 There are some “totem poles” of effectiveness that we need to sort out quite quickly if this agenda is to have any credibility. Without labouring this point too much, the basic conditions for managing intellectual property rights competitively in Europe have to be fit for purpose for today’s global economy. Public-private partnerships must be efficient, useful and effective. A greater number of talented people from around the world must want to live and work in Europe because they recognise this is the best place to meet their ambitions in science and technology. We need a better balance between creating attractive careers in research which protect academic freedom and the ability to do long term research and facilitating mobility into other knowledge-intensive activities in business and public service. We must reduce bureaucracy to the absolute minimum level required, and demonstrate that this administration is focused on better meeting user needs.

180 These points involve providing the right incentives; accepting that knowledge creation will be concentrated and focusing on access to this knowledge; and using resources such as structural funds to build the new agglomerations and clusters in cities and regions where they are most likely to succeed.

190 In conclusion, coming back to Minister Gago’s question to me, what does this mean for those of you who are working in and around the national science ministries? I think that your greatest challenge is to demonstrate that the effectiveness of European science and technology is important for everyone, to convince your colleagues that improved effectiveness requires working together on common economic and social objectives that engage the public mood. It is no longer sufficient for each of us to do our own job well. We also have to help others do their job well if we are to achieve our common objectives. Returning to my musical metaphor, we have to get the rhythm right, and I suspect that it is the rhythm of the jazz band rather than the symphony orchestra.

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