

# Uniting Science — Can the European Union Lead the Future in Scientific Research?

Shreyas Mukund

For over half a century, the European Union has provided Europe with the political and economic framework for co-operation between her once warring states. Whilst there is much debate in the media over EU legislature, trade and foreign policy, discussions of European progress in science and technology are rare. The Lisbon Strategy, set out by the European Council in March 2000, aimed to develop a knowledge-based economy, to bring Europe out of its relative economic stagnancy in the 1990s. The Strategy set a focus on building a new Research and Development (R&D) regime for the EU, which was enacted in 2007 by the European Commission's *Seventh Research Framework Programme*. The question considered here is what model of EU intervention can lead to success.

Many of the most fêted historical achievements of European scientific co-operation have been in the arena of public projects on such a large scale that no single nation could offer sufficient funding and expertise. These projects have often evolved in the absence of significant intervention from the Commission, such as CERN, the European Space Agency and the European Synchrotron Radiation Facility.

Since its formation in 1954, CERN has been at the forefront of particle physics research, and has given the scientific community great insight into the subatomic structure and dynamics of matter. The latest generation particle accelerator at CERN, the Large Hadron Collider (LHC), is due to commence operations by early 2008. Projects like this fortify the pool of expertise in Europe and prevent 'brain-drain' of European scientists to the US and Japan. CERN's early successes may have led to the

foundation of the European Space Agency (ESA) in 1975. Unlike many other space programmes, the ESA has avoided manned spaceflight, and holds only a minor stake in the International Space Station. These two areas have required enormous expense on the part of other nations, and are arguably of less value to humans on earth than satellite technology and unmanned probes.

As is evident, both CERN and the ESA have arisen from a desire for results oriented research and, in particular, for operation outside of a military context. In spite of being flagship projects, their objectives are largely to attract international expertise, and to yield productive output, rather than national pride, as was sought in the Space Race or the nuclear arms race. In the process, both projects have spun out important technologies, such as the World Wide Web and advanced superconducting materials. For all of the many successes of CERN and the ESA, their pragmatic 'top-down' approach may be the key lesson that the EU can draw on and apply to its new endeavours.

In an attempt to attract more investment from private industry for a large project, the Galileo Positioning System, a European competitor to the American GPS, was to be developed by a private-public partnership. Galileo was originally supported by a business plan (6) seeking to recoup its investment by 2011 through the sale of positioning services. However, in 2007, the project was abandoned by the private consortium over fears of financial viability, leaving a €2.4 billion budget shortfall (7). Because of the near-term promise of breaking even on the system, the European Parliament endorsed an eleventh-hour funding

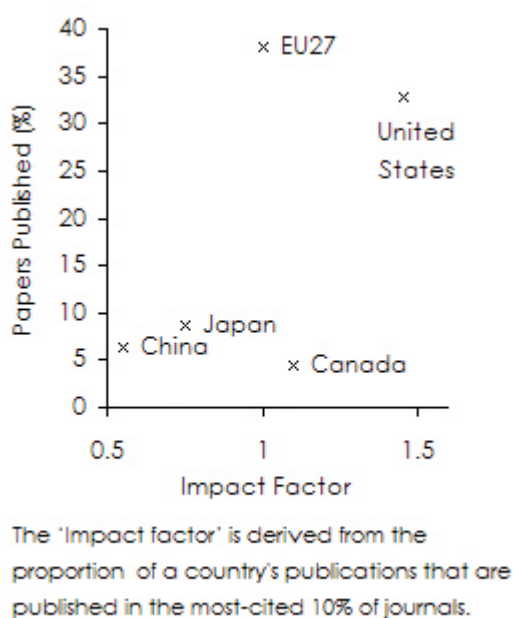


Figure 1: Share of global publications versus impact factor (12).

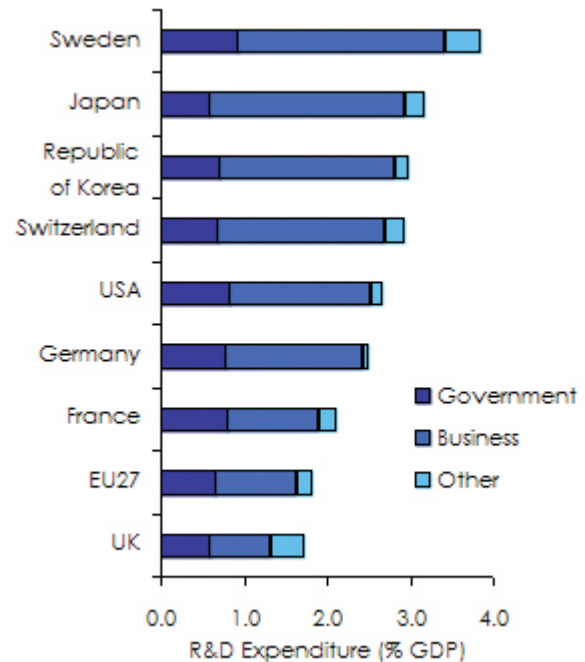


Figure 2: Research Expenditure in 2005 by Funding Source (12).

plan to rescue Galileo, converting it into a publicly owned flagship project.

European co-operation has also given individual states the incentive and negotiating power to secure leading roles in global projects, such as the International Thermonuclear Energy Reactor (ITER), which, after much negotiation, will be constructed in France over the next decade. Through this, the EU seeks to gain a technical advantage that may let it lead the commercial market for fusion energy, which is predicted to emerge by 2050 (8). The success of the French bid, albeit with some concessions to Japan, suggests that a united European research effort will be able to contribute

---

### Discussions of European progress in science and technology are rare

---

and gain more from future global endeavours.

With the 7th Framework Research Programme (FP7) coming into force at the beginning of 2007, the European Commission has significantly raised the level of centralised public investment in R&D, and aims to attract further investment from industry. However, there is a debate between the 'top-down' and 'bottom-up' approaches: should the Union continue to focus funding on larger projects like CERN, the ESA and ITER? Or should smaller, existing projects be prioritised, to allow innovative enterprises to develop with less bureaucracy?

Much criticism was levelled at previous Framework Programmes for their bias towards funding larger projects, rather than favouring competition and innovation. A proposal for another large project was made in 2005 by the President of the European Commission, José Manuel Barroso, for the European Institute of Technology (EIT). Largely modelled on MIT, the proposed institute would seek to bridge a perceived 'innovation gap', in which successful research fails to generate wealth. These plans have met

with substantial opposition from some sectors of the scientific community (9), who question the research quality that would be generated by a new institute designed by bureaucrats. They argue that EU funds should be used to accelerate research in its existing institutions, thereby boosting their impact, which has been shown to lag behind the US (Figure 1). In November 2007, the EU Competitiveness Council reached a compromise agreement to limit funding to €300 million over 5 years (10), a fraction of the billions of euros proposed by Barroso.

On the same day that the EIT was demoted by this funding mechanism, the 'bottom-up' approach of FP7 was formally announced, with a €7.6 billion (11) pledge for 'Joint Technology Initiatives' based on Private-Public Partnerships. Four initiatives will focus on building industry-led programmes in nanoelectronics, aeronautics, embedded computer systems and innovative medicine. To complement this approach in the private sector, public research grants for fundamental research are now overseen by a new European Research Council. In its inaugural year, the institution is in the process of awarding grants averaging over €1 million to approximately 300 young researchers who demonstrate the potential to become leaders in their fields.

Planning mass expenditure is all very well, but Figure 2 illustrates that governments in leading research nations spend similar proportions of GDP on research, and that a determining factor could be the contribution from private industry. If so, FP7 must focus on attracting private wealth to support its direct funding, as the Galileo project failed to accomplish using the 'top-down' approach, and the Joint Technology Initiatives are currently attempting to do 'bottom-up.'

As the situation stands, European cooperation has always offered great promise, but, except in the case of larger, high-profile projects, it has yet to mature and deliver. With innovation becoming a key part of the 21<sup>st</sup> century economy, and research bills rising, the European community is divided over the approach to remedy this.

Ultimately, the EU has opted for a two-pronged approach in the Seventh Research Framework Programme—both 'top-down' and 'bottom-up'. It remains to be seen which model will get the support of the private sector in the decade to come, and whether it will lead Europe to a golden age of science or leave her trailing behind an increasingly competitive world.

*Shreyas Mukund is a 4<sup>th</sup> year at Christ's College reading Physical Natural Sciences and specialising in Chemistry.*

#### References:

1. EADS, *Annual Report and Registration Document 2006* [www.reports.eads.com/2006/en/s/welcome.html](http://www.reports.eads.com/2006/en/s/welcome.html)
2. The Guardian *France wants to tear up EADS ownership pact, 2006* [www.guardian.co.uk/business/2006/jun/21/theairlineindustry](http://www.guardian.co.uk/business/2006/jun/21/theairlineindustry)
3. International Herald Tribune, *French merger pushes risk of German anger, 2004* [www.ihf.com/articles/2004/11/16/eads\\_ed3\\_0.php](http://www.ihf.com/articles/2004/11/16/eads_ed3_0.php)
4. The Times, *Milestone for BAE as its trade with America outstrips MoD business, 2007* [business.timesonline.co.uk/tol/business/industry\\_sectors/industrials/article2231494.ece](http://business.timesonline.co.uk/tol/business/industry_sectors/industrials/article2231494.ece)
5. Atomic Weapons Establishment [www.awe.co.uk/main\\_site/about\\_awe/the\\_company](http://www.awe.co.uk/main_site/about_awe/the_company)
6. PriceWaterhouseCoopers, *Inception Study to Support the Development of a Business Plan for the GALILEO Programme, 2007* [ec.europa.eu/dgs/energy\\_transport/galileo/doc/gal\\_exec\\_summ\\_final\\_report\\_v1\\_7.pdf](http://ec.europa.eu/dgs/energy_transport/galileo/doc/gal_exec_summ_final_report_v1_7.pdf)
7. Reuters, *EU haggles over satellite navigation project, 2007* [www.reuters.com/article/scienceNews/idUSL2937381020071129](http://www.reuters.com/article/scienceNews/idUSL2937381020071129)
8. Clery, D. *Science* **2006**, 314, 238-242.
9. European Research Advisory Board, *Second EURAB Opinion on the European Commission Proposal for an EIT, 2006* [ec.europa.eu/research/eurab/pdf/eurab\\_06\\_033\\_2nd\\_opinion\\_proposal\\_eit\\_en.pdf](http://ec.europa.eu/research/eurab/pdf/eurab_06_033_2nd_opinion_proposal_eit_en.pdf)
10. European Parliament Press Service, *2008 Budget: Parliament and Council reach agreement on funding of Galileo, 2007* [www.europarl.europa.eu/news/expert/infopress\\_page/034-13581-325-11-47-905-20071126IPR13580-21-11-2007-2007-false/default\\_en.htm](http://www.europarl.europa.eu/news/expert/infopress_page/034-13581-325-11-47-905-20071126IPR13580-21-11-2007-2007-false/default_en.htm)
11. Community R&D Information Service, *Competitiveness Council further strengthens research in EU, 2007* [www.eubusiness.com/Rd/eu-research.43/](http://www.eubusiness.com/Rd/eu-research.43/)
12. European Commission, *Towards a European Research Area. Science Technology and Innovation. Key Figures 2007* [ec.europa.eu/invest-in-research/pdf/download\\_en/keyfigures\\_071030\\_web.pdf](http://ec.europa.eu/invest-in-research/pdf/download_en/keyfigures_071030_web.pdf)
13. European Commission, *FP7: the future of European Union research policy* [ec.europa.eu/research/fp7/index\\_en.cfm](http://ec.europa.eu/research/fp7/index_en.cfm)

---

### European cooperation has always offered great promise

---