Research infrastructures for Europe's scientists

The European Commission (EC) recently completed a public consultation process on the Common Strategic Framework for Future European Union Research and Innovation Funding (CSF). It will run from 2014 to 2020 and combines the Framework Programme (FP) for research with the Competitiveness and Innovation Programme and the European Institute of Innovation and Technology. The goal of the EC in restructuring the framework is to position Europe as a global leader in research and to improve its competitiveness. It is an integral part of its Innovation Union, one of the Commission's seven flagship strategies to improve the economy and create jobs over the next decade.

Although criticized on several counts, the FP remains the largest and perhaps the best tool for encouraging research across Europe. Funding, although not trivial, is relatively small; the future CSF fund, which covers all scientific disciplines, will probably be at least €70 billion over 7 years. It is useful to compare this budget with that of the US National Institutes of Health, which is \$30 billion per year for biomedical research alone, not to mention funding from the Departments of Energy or Defense, among others. Thus, it might be better to think about how the funds are being spent, rather than the absolute amounts. For example, FP7 launched the European Research Council, a popular and vital funding mechanism for individual researchers.

FP7 more than doubled the funding for research infrastructures from €715 million in FP6 to €1.715 billion. Part of the reason for this increase was recognition of the crucial need for research infrastructures. Credit is due to the EC for establishing the European Strategy Forum on Research Infrastructures (ESFRI), which instituted a roadmap that

defines the infrastructure needs of various research communities.

These infrastructures are essential for researchers (see Breithaupt, H. *EMBO Rep* doi:10.1038/embor.2011.113). Given the rapid rate of technological development and the high investment needed to upgrade complex instrumentation or databases, and given the importance of having highly trained, dedicated personnel to run infrastructures, there is a clear economy of scale in centralizing such services. Users of research infrastructures need never concern themselves with how the facility (for example, the Large Hadron Collider at CERN), resource (mutant mice) or service (sequence databases) is run. What scientists need to rely on is that the infrastructure is stable.

Underlying the quality of a research infrastructure are all of the unseen parts that make it run. A typical biomedical infrastructure might require hundreds of millions of Euros for its initial construction and tens of millions of Euros per year to operate. Even the budget increase in FP7 barely dents the amount of money needed for EU-wide infrastructures, and a significant amount of the Framework's research infrastructures budget must go to crucial efforts in coordination and policy development. Thus, the current EC allocation should perhaps be seen as money for establishing research infrastructures.

But this presents an acute problem: launching an infrastructure but then not having the money to run it is probably worse than not starting the project at all. An underlying assumption is that once an infrastructure is initiated, money from other sources will keep it going. For some infrastructures this is the case: charities, companies and countries might all find good reasons to provide funds for selected

projects and facilities. However, the sheer scale of these projects makes it difficult for one entity to be solely responsible for them, and there is the problem of coordinating efforts across 27 member states. Moreover, funding from a variety of sources, each with its own interests, does not guarantee long-term maintenance and operation of crucial research infrastructures.

Yet the value of these infrastructures is precisely in line with the goals and values of the EC and its member states. Beyond the discoveries that scientists make using them, other benefits are apparent. The availability of research infrastructures in Europe allows researchers in regions with less-developed science programmes to participate in high-quality research. This expands the base of European scientists who contribute to knowledge and excellence in research in Europe, and thus to innovation and competitiveness. To extend this idea further, if Europe aims to be a world leader in research, the EC should open these infrastructures to the global research community. This is particularly attractive as both a way to contribute to science generally and to create jobs in Europe.

In order to achieve the intertwined goals of making Europe a world leader in research, improving its economies and solving societal problems through knowledge, the EC and all European Union stakeholders must commit to those resources that are most likely to bring these goals to fruition. Research infrastructures are without question one means by which to accomplish this. At the same time, they might be pushed aside when budgets are limited. Deciding to keep an expensive programme with clear scientific value at the potential expense of other successful programmes is the type of difficult trade-off that policy-makers need to be prepared to make.

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