

**Title**

The “Innovation Turn” in Policy for Large Scientific Facilities: reflections on introducing innovation support dimensions to the operation of scientific research infrastructure

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**Keywords**

Science policy, large scientific facilities, research infrastructure, innovation support, policy mix.

## Objective and Background

The objective of this paper is to explore and analyse the challenges of re-orienting policies and practices from science and research policy traditions to the recent imperatives of demonstrating the economic and industrial impacts of expenditure on large scientific research facilities. This is bringing about changes in several dimensions: shifting rationales from scientific excellence and discovery to more mixed ones including economic and industrial benefit, the emergence of evaluations using criteria of economic and social impacts of research facilities and schemes to promote industry engagement with said facilities. We see the proliferation of cost-benefit studies which attempt to measure the economic impacts of large scientific facilities, usually incorporating some heroic assumptions.

Large scale research facilities are vital components of research systems both nationally and within the European Research Area. The construction and operation of these facilities are funded by the national or regional research budgets and consequently they need to see a return on their investment. This return will be seen primarily through advances in scientific knowledge and training of highly skilled people, but it must increasingly also be achieved through an increase in benefit realised from industrial engagement and benefits from facilities.

Our research has been in the context of Europe, where there have been significant policy developments and results concerning investments and planning of research infrastructures, notably the European Strategy Forum on Research Infrastructures' (ESFRI) prioritisation. According to the ERID-Watch Market Study (2008)<sup>1</sup> the total annual budget for all European Research Infrastructures is in the range of €7.9bn-9.7bn. The vast majority, or 91%, of RIs' funding comes from national institutional bodies. The report also found that the level of income from industry is strongly determined by whether they do basic or applied research. European RIs spend on average almost 50% of their annual budget on instrumentation; however the spending patterns vary greatly between fields. The total annual instrumentation procurement all European RIs is estimated at €4.0bn. The ERID-Watch survey found that the RI market is seen as valuable to firms in that 56% of respondents reported that RI supply contracts have improved sales in other market segments.

The question of how to re-shape policy thinking and policy interventions in this area raises interesting issues for research policy and how it links to innovation and industry benefits using innovation policy instruments.

## The approach it takes

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<sup>1</sup> For further information see: [http://ec.europa.eu/research/infrastructures/pdf/bylander\\_erid.pdf](http://ec.europa.eu/research/infrastructures/pdf/bylander_erid.pdf)

Our approach involved reviewing major policy instruments available in EU Member States for supporting both R&D and commercialisation. These were R&D Tax Credits, R&D grants, Soft Loans, Networking, Business Advice plus European level instruments and mechanisms including EU support for SMEs, the EIB and Risk Sharing Finance Facilities. The role of procurement is also crucial and in order to explore this role we are examined the barriers and opportunities which current procurement regimes at RIs pose for instrumentation companies.

In addressing our research question reviewed the available literature on the financing and support of high technology firms, including private and public sources. We conducted interviews across a range of EU countries and international organisations to understand the rationales, operation and effects of different schemes and the barriers which they try to overcome.

## Results

We present an analysis of different types of policy intervention: demand side, including procurement, supply side including different kinds of financing and holistic, including support for networking and information provision. We relate these to the different barriers which exist to firms engaging with large research facilities. Understanding the policy mix is essential yet an aspect which stand alone schemes have missed. Within this framework, it becomes evident that the policies towards large scientific infrastructures need to shift in terms of rationale and embedding industry and innovation in partnership with scientific goals. Firms may take part to a limited degree in funding, networking and procurement schemes, but it is more about changing how receptive facilities are to having industry participation.

There is a reasonably strong evidence base to suggest that industry involvement in RIs requires public intervention, despite the fact that it can bring commercial benefits to firms. Financial mechanisms are important because these kinds of high-tech firms often take many years (even more than 10 years) to become profitable and they rely on different sources of finance to develop their products and markets. Conventional loans from banks and investments from traditional VC sources can be difficult to obtain due to the risky nature of the technology and the uncertainty of the RI market, for example delays in political decisions to build new RIs.

The existing EC schemes, which are Eureka, EUROSTARS, EIB finance and general national R&D support for industry schemes remain in the landscape for firms to apply to should they wish to develop technologies/advanced instrumentation for RIs. These schemes, although useful to SMEs are, however, not directly targeted at supporting SME interaction with RIs. If the EC were to introduce a funding scheme of this nature then to some extent it would duplicate schemes that could be used for this purpose. The issue seems to be around making firms aware of relevant funding opportunities and so the virtue of a European RI, technology specific, funding scheme would be to attract the relevant firms to take part. This could be done through an ERA-NET model. Any recommendation for supporting a scheme to help firms with R&D costs should be accompanied by road mapping or similar activities for strategic planning of research and technology needs of RIs.

If large scale research facilities are to contribute to innovation and economic impacts then the existing organizations would need to shift their modes of operating and their rationale for

receiving public funding: diverting some of their grant to industry participants, buying in expert project managers/industry network managers to mobilise the firms, running funding competitions and operating networks which could look similar to the KTNs in the UK or the IDEAS at Daresbury experiment. Communication, networking and facilitating applications to the existing schemes could be an important element of their work and it could also include road mapping activities.

Some of the tensions between a science and an innovation agenda can be seen to emerge as well as finding ways to operate effectively in the overall policy mix of procurement, financial support for R%D and innovation and networking.