

» PEOPLE**OECD REPORT ON RESEARCH
INFRASTRUCTURES**

**Interview with Valerio Vercesi*, member of
the OECD Global Science Forum (GSF)
International Experts Group.****

Which reasons prompted the GSF to issue this report, approved by the OECD *Committee for Scientific and Technological Policy* last June?

The GSF was initially approached by CERN, which was interested in having an external perspective that could serve as a basis for further optimising its policies, as well as being of value to CERN member states. The GSF aimed then to address the potential economic and societal impacts of international research facilities, using examples from one of the largest global research infrastructures.

To achieve this goal, the GSF Secretariat staff carried out a small number of case studies, relying mainly on confidential interviews with the people most directly involved, and then the Forum worked out the outcome. Two of these investigations were addressed in detail: the development of the superconducting dipole magnets for the Large Hadron Collider (LHC), and CERN contribution to hadron cancer therapy using beams of carbon ions.

In both these investigations, the findings of the report attribute a relevant position to the Italian contribution through INFN.

The report stresses, of course, that the construction of the LHC has been a planetary enterprise with contributions from many research institutions and agencies. In that context, the INFN role is highly relevant on both the scientific and the foresight points of view. A major example is offered by the realization of the dipole magnets, one of the primary elements of the whole LHC accelerator complex, due to their high degree of novelty and risk. In the achievement of this high technological goal, the report underlines the importance of the existing collaboration between INFN and other Italian companies for research, development and production of high-field superconducting magnets. The largely positive test of two magnets "string", which were constructed thanks to the virtuous relationship with these companies, led directly to the final approval of the LHC by the CERN Council. We can say somehow that a little bit of the new CERN *motto* "Accelerating Science" stems also from this quick and timely decision by INFN.

The second case analyzed is the knowledge transfer from CERN to hadron cancer therapy.

Prior to the launch of the PIMMS (*Proton Ion Medical Machine Study*) project in 1996, which led to the development of the first design of a complete accelerator system, CERN had been active for ten years in the research on the use of hadron beams for cancer therapy. In the report one can find a detailed historical accounting on the different paths which brought this design to be adopted and transferred into the realization of the two existing European clinical treatment facilities with carbon ions, Heidelberg and Pavia (with a third one in

Wiener Neustadt nearing completion).

INFN was the principal technical partner of CERN for the Pavia infrastructure (CNAO, *National Centre for Oncological Hadron-therapy*), in the implementation of the synchrotron. The report acknowledges that the Institute was eminently able to do this work because of the half-century experience in nuclear and particle physics research. Besides this, the strong involvement of INFN in the construction of CNAO also allowed to highly limiting the costs of the structure.

The report also describes the fundamental role of CERN in the cases analyzed. Which aspects are highlighted?

The goal of this study was not a quantitative assessment, in the sense of praising or criticizing work done at CERN, or measuring the economic or social return on the financial investment by the member states. The goal was really to qualitatively identify characteristics of the laboratory that could be of interest to proponents of future large international scientific collaborations, specifically in terms of impacts on economic innovation and on society at large. The report recognizes that CERN is a reference point for accelerators science and the two cases studied in detail address two somewhat complementary facets of its developments. One common feature is the way CERN makes use of its status as a long-established, high-profile international research institution. Today CERN is one of the central nodes in a world-wide network of research organizations - institutions, agencies and industrial companies - that share and exchange knowledge, tools and people. With its merits in accelerators science CERN has made major contributions to this network and, at the same time, benefitted extensively from the work of participating institutions.

How could the OECD-GSF report be beneficial to the developments of future infrastructure?

The risks embedded in going beyond the current state of the art, due to the need to create new, original technological solutions and to generate innovation, can be managed or mitigated in different ways. In the case of the LHC dipoles – “core business” of the laboratory – it was important for CERN to maintain a full scientific and managerial coordination of the whole project, preserving locally almost all the added value resulting from the development of the project. In the case of hadron therapy facilities – “knowledge transfer” of the laboratory – the system was self-regulated to solving fundamental conceptual and design problems, without mangling with the considerable ancillary studies, engineering and certification efforts required to create a medical facility. Using a form of “subsidiarity” that is now a familiar concept in European science and innovation policy, this has been left to the nationally-funded institutions.

In both cases, issues of intellectual property arose as well, and people will find in the report hints on how this was addressed in the different situations.

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** The Global Science Forum (GSF - <http://www.oecd.org/sti/sci-tech/oecdglobalscienceforum.htm>) is a venue for consultations among science policy officials of the Organisation for Economic Co-operation and Development (OECD) countries, on matters relating to scientific research. Its goal is to produce findings and recommendations for actions by governments, international organizations, and the scientific community. OECD-GSF recently published a report on "The Impacts of Large Research Infrastructures on Economic Innovation and on Society: Case studies at CERN" (<http://www.oecd.org/sti/sci-tech/CERN-case-studies.pdf>). The former Italian member Sandro Bettini also contributed to the first draft of the report.