Newsletter Interview

THE ROLE OF EVALUATION FOR A COMPETITIVE SCIENCE

Interview with A. J. Stewart Smith, Professor emeritus at Princeton University, former President of the International Evaluation Committee of INFN

The INFN fully understands and values the importance of unbiased evaluation for it to remain a centre of excellence and maintain its competitive edge. For this reason, since 1997 its research activities have been evaluated by an International Evaluation Committee (Comitato di Valutazione Internazionale – CVI) made up of six international experts in the fields of economics, industry, and research. Each year the CVI issues a report on the INFN's research activities, along with its recommendations for improving overall performance. This report and the INFN three-year plan is sent to the Italian Ministry for Universities and Research. The last meeting of the CVI with the INFN's management and representatives was held on October 12-14 and was hosted by the Bari Division. It was also the last meeting to be chaired by Professor Smith, a senior particle physicist and an internationally renowned scientist, Professor Emeritus at Princeton University, who successfully led the BaBar experiment at SLAC National Accelerator Laboratory, in California, USA.

You served for eight years as Chair of the INFN International Evaluation Committee, and your mandate just ended, on December 31st. How was this experience, from a professional and personal point of view?

Simply sensational on both counts! Professionally it has been an honour and privilege to help INFN strengthen and hone its already outstanding science programs and advise its management on plans for the future. I loved learning about areas outside my experience as a traditional high-energy physicist: KM3Net, Virgo, Einstein Telescope, XENONnT, Eupraxia projects, to name a few.

My scientific career had reached a high point as spokesperson for the BaBar experiment when we discovered CP violation in B meson decays in 2001 and followed up with a wonderful set of measurements and discoveries. Our measurement was the first new discovery in CP violation in the 37 years since my Princeton colleagues Cronin and Fitch discovered the phenomenon in 1964. After the closure of the BaBar experiment, I was appointed as Princeton's Dean for Research, but I also wanted to keep working closely with physics. Thus, the then INFN President Fernando Ferroni's invitation to chair the INFN CVI came at a perfect time. With BaBar I had gathered the greatest respect for INFN, and the CVI experience has allowed me to work with INFN at a deeper level, and to continue the lasting friendships I made when we built the BaBar experiment.

What are the main criteria you applied in evaluating the INFN's research activities and how did you operate?

World-class discovery potential is most important. We also consider how well an activity leverages INFN's scientific expertise and technical capabilities: how well it entails reasonable costs and schedule, personnel demands, and level of risk; and finally, how it includes diversity and inclusion.

Concerning the evaluation procedure, the work is divided among the committee members depending on their expertise. For example, our fantastic economist Andrea Brandolini was responsible for evaluating central administration, technology transfer and CSN5, the INFN National Scientific Commission charged with translating discoveries into practical applications. Iris Dillman is a distinguished nuclear physicist, so she was given CSN3, the commission managing this research field, and so on.
Each year we begin by studying the report from the INFN internal working group on evaluation (GLV), and before our annual meeting we give INFN a set of questions and requests for information, to be discussed at the annual meeting. During the meeting itself, each CVI member was responsible for serving as rapporteur for his/her sections, taking notes during the presentations, leading the discussions, and preparing slides to be presented in the closeout at the end of the meeting. After the meeting the slides served as the basis for our written final report. I've found this to be the most efficient way to produce an accurate and comprehensive report in a short time.
The most important feedback we give to INFN is the recommendations, which we track in a midterm report from INFN and at the following annual meeting. To reiterate, it's a series: first we get the GLV document, next we digest it and formulate questions in advance of the meeting, and then listen to the presentations by the INFN representatives. The GLV report forms the foundation, but the beauty and fine architecture come during the presentations and discussions.

What could the INFN GLV do to better support the work of the CVI?
I have always been impressed by the useful GLV reports over the years. This is a huge amount of work, which comes at the end of summer, perhaps the most challenging time of the year. We've come to accept that the report wouldn't arrive till mid-September, but it would really help if we could receive it earlier. This would be possible if the contributions from the activities were due to the GLV before August, which would give the GLV coordinator time and flexibility to improve the coherence of the document and get it to us by the end of the first week of September.
It is vitally important to have the government read the GLV report, so they understand what INFN does and how well it does it. To this end I think it would be very helpful to start the report with an executive summary, written with that constituency in mind. The following sections would then appropriately delve into details that are only understandable to people working in the field.

What are the points on which INFN can still improve, and what are its strengths, from a scientific and a general point of view?
I have been working with INFN for more than 25 years, and I constantly remain in awe of its unique and effective governance, run at all levels by leading practicing scientists. INFN doesn't need any major fixes. That said, the following ideas might be worth considering: include and/or increase the number of non-INFN members of experimental advisory and oversight committees; institute a more-rigorous formal approval process for major non-accelerator experiments, along the lines of the process used in the Phase II upgrades of LHC experiments; give the INFN Laboratory directors a greater role in evaluating proposals for experiments to take place in their facilities; invite the Laboratories to provide impact statements to help scientific review committees and INFN central management conduct a cost-benefit analysis.

How does INFN place itself internationally?
INFN is outstanding in its ability to provide leaders in the most important experiments in Europe and around the world, and its theorists also punch well above their weight. I see no reason that its prominence will not continue, to a large extent because of its responsible governance and exceptional historical successes. The thing that is amazing about INFN is that the leaders and scientists are strongly motivated by the science and are therefore able to solve a lot of problems internally and present a united front. If you come in a fragmented way to an international collaboration and said "well, we might do this or we might do that", then you are much less likely to prevail than if you come, as does INFN, with strong scientists and say "look, we have worked on this, we have done studies and here is our idea". People from other scientific communities respect INFN, and as a result INFN researchers win a lot of leadership positions. For

example, if you look at the major experiments at CERN but also around Europe and the world, I guess that 30% or 40% of leadership positions have been held by Italians. And It's crucial to recognize the important roles of INFN's four National Laboratories, each of which is a center for world class research and the source of technological expertise and facilities for all INFN.

How do you see the future of INFN?

A huge issue in HEP today is the lack of a roadmap to the next breakthrough discoveries. When we built the LHC, we were looking for the Higgs boson, that was the gold at the end of the rainbow, but no such priceless target is yet in sight to motivate the scale of the successor to the LHC. This is very challenging because the next project will be very expensive and take decades to accomplish.

INFN is fully engaged in this new challenge and at the same time is also committed to a strong and diverse portfolio of scientific projects all over the world: at CERN, at Fermilab with the g-2 experiment, with underground experiments at the Gran Sasso National Laboratory and the KM3NeT project; and with the Einstein Telescope wherever it takes place. These projects constitute a very promising future and must be INFN's highest priority. The competition to host the Einstein Telescope is very hard, and it would be great if Italy wins it, but even if not, INFN will be a major player thanks to the scientific and technological experience gained with the Virgo project. Without Virgo many of the discoveries on gravitational waves would have been much weaker and maybe even impossible. INFN was there, and INFN is going to remain at the centers of action, be they kilometers under the sea, up in a satellite, or wherever the science takes them.

What is the role of evaluation for scientific research and how we can enhance it?

As research in fundamental physics becomes ever more expensive and involves larger collaborations, careful evaluations become even more important, to guide the funding agencies and host laboratories in selecting the most exciting activities with the greatest discovery potential, and ensuring that their schedules and cost estimates are conservative and credible.

This may not answer directly the second part of the question, but I'd like to quote a recommendation from this year's CVI report: "INFN has a great story to tell and should make sure to transmit it in a way that resonates with the government, industry and the public". New governments come in all the time so you cannot assume that there's continuity, and it's essential to keep INFN in the mind of the public as well.

In your opinion, which is nowadays the sector of fundamental physics with the highest discovery potential?

I'm a particle physicist and I don't want to speculate much outside of my field, but I think astroparticle physics and cosmology have many surprises in store for us, thanks to the underground experiments, multimessenger astronomy, and continuing insight from cosmic background radiation studies.

Let me end by remarking on the new National Recovery and Resilience Plan (NRRP). This is a great opportunity for INFN in many ways, but also a big risk because three years is a very short time, probably too short a time, to accomplish something really new. Accordingly, INFN has wisely chosen NRRP projects that are symbiotic with its research priorities and capabilities.