

Invest in instrumentation or fail to measure up

Europe is not doing enough to ensure that its scientific infrastructure remains world class. A strategy is needed to boost collaboration with industry and encourage young talent, argues the chair of an organisation representing eight of the continent's largest research institutions.

Europe's global strength in physics and engineering is built on its record in developing advanced instrumentation such as high-performance detectors, optical sensors and cooling apparatus. Researchers once built their own instruments but, as requirements for the next breakthrough became more sophisticated, the task passed to instrument specialists, be they scientists or engineers.

The number of graduates pursuing a career in this specialism is falling. If Europe is to remain at the forefront of science, it must do more to maintain the infrastructure and technical expertise that underpin discovery.

That is why EIROforum has called on the European Council to devise a strategy on scientific instrumentation, to be incorporated within the EU's Horizon 2020 framework programme. EIROforum is the umbrella organisation representing eight institutions, including Cern and the European Space Agency, that provide much of the research infrastructure for European science. We have outlined a three-pronged approach, based on improved cooperation between intergovernmental research infrastructures, improved collaboration between research and industry, and re-focusing researcher education and training.

The move towards better cooperation must begin with EIROforum's members. At present, efforts to develop instruments are fragmented, and measures should be taken to prevent parallel, redundant or competing programmes. Larger institutions often possess a range of expertise that could be shared across projects.

Working together more effectively will also aid institutions' efforts to work with industry. Academic research relies on long-term government support, but this funding also helps sustain the R&D programmes of European industry. EIROforum institutions have been responsible for many technological advances with an impact far beyond research—most obviously the World Wide Web.

Industry brings the resources necessary for commercialisation, and a broader vision of technology's commercial potential, resulting in applications that a narrowly focused researcher would never dream of. Encouraging knowledge exchange between research and industry can nurture innovation and create opportunities for expansion into larger markets.

For industry, however, cooperation on leading-edge technology is risky. Exploring the limits of what can be measured requires high-performance products that are only likely to be needed once: high initial costs and long timelines reduce the opportunities for small businesses.

There are hurdles on the academic side, too. Relationships with industrial partners can be time-consuming, research institutions may lack the human resources, and work may conflict with core activities.

EIROforum has identified technologies that are critical for the development of scientific instrumentation and have potential for the wider market. A strategy to bring these through, reducing the risk faced by potential industrial partners and brokering links between research institutions and companies, would make a significant contribution to economic growth and job creation in Europe.

All of our member organisations have, for example, investments in detectors that depend on partnerships with industry. The Institut Laue-Langevin has traditionally used helium 3 gas detectors, but the global shortage of that isotope has driven us to develop alternatives. This work will benefit both neutron science and industrial uses of helium 3, such as in radiation detectors for the security industry.

Another goal should be reversing the decline in X-ray optics in European industry. Commercial manufacture of high-quality equipment is poorly developed; we must boost efforts to create advanced metrology tools and more efficient manufacturing processes.

Any instrumentation strategy will depend on attracting and training young people to operate across science, engineering and business. Scientists must be able to integrate research choices with societal challenges and work with industrial partners on instrument development, experimental design and the application of results. That is why EIROforum's third recommendation is the creation of specialised training programmes and improved networking opportunities. The EU's Marie Curie Actions for research training and mobility would be an ideal vehicle for this.

Our proposals carry a cost, but support for ground-breaking instrumentation is essential. If we do not meet this challenge, Japan, the US or an emerging scientific power such as China will take the lead. Europe's heritage in instrumentation counts for little in a globalised scientific world where every region must run to stand still.

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