

The emerging 'e' component of research infrastructure

"The Nordic countries have led the way here in understanding that eInfrastructure is an important component of a national research system"

– John Womersley, Chair of ESFRI



Since 2006 the European Strategy Forum on Research Infrastructures (ESFRI) has been drawing up roadmaps to assist in setting political priorities for large-scale research infrastructures in Europe. The next roadmap will be published in early 2016.

But the landscape is changing: Many research infrastructures are now producing vast amounts of data whose processing requires extensive resources. These data represent major new scientific opportunities, provided this wealth of information can be properly structured and coordinated via e-infrastructure. This means that ESFRI will be attaching increasing importance to eInfrastructures in its list of priority research infrastructures. With this in mind, ESFRI is establishing closer cooperation with the eInfrastructure Reflection Group (e-IRG), which specialises in the vital field of electronic infrastructure.

“New technology is changing everything that we do: changing our lives, changing the way governments work, changing the way science is done,” says Professor John Womersley, who chairs ESFRI and is CEO of the Science and Technology Facilities Council (STFC). From

his office at the STFC Rutherford Appleton Laboratory, near Oxford, he describes how the development of eInfrastructures has opened up new ways to conduct research. Astronomers, for instance, no longer need to physically travel to the world’s best mountaintop telescopes. Instead, they can access data from many different sources and carry out new kinds of calculations and experiments from their home institutions.

As Professor Womersley explains, “A lot of the research infrastructures are really data infrastructures or networks that bring together datasets from existing facilities or large single-sited infrastructures that generate very, very large amounts of data. It is no longer possible or sensible to simply look at the facility without also considering the data handling.”

Greater integration of research infrastructure and eInfrastructure

For this reason, ESFRI is seeking closer collaboration with the e-IRG, which is chaired by Sverker Holmgren, Professor in Scientific Computing at Uppsala University.

“We have involved the e-IRG experts in the construction of ESFRI’s next roadmap (in 2016),” continues Professor Womersley, “since this is a direction which is growing in importance, and the need for a common approach to eInfrastructure across Europe is becoming clear. It means that the e-IRG and ESFRI need to work very closely together. You can no longer say that a facility generates the data, and then, the e-IRG

will give advice about what happens to the data. It has to be integrated.”

Dealing with big data from research infrastructures is challenging not only in terms of the science and technology involved, but also in financial terms.

“Now the challenge is that eInfrastructures place new demands on national funding systems,” says Professor Womersley. “So part of ESFRI’s role here is to raise the awareness of the governments and of funding agencies, that you cannot build a research infrastructure without thinking about the eInfrastructure aspects of it. So the two key questions are: How is this infrastructure to be managed, and how is it to be funded? And I do not have answers to those questions yet. But I think the Nordic countries have led the way here in understanding that eInfrastructure is an important component of a national research system, perhaps a little bit sooner than other countries have done. You may not have all the answers either, but the questions have been asked.”

Towards an ‘eInfrastructure commons’

Finding the right solutions may take time, but John Womersley’s ambition is clear: “We want a common approach to scientific data from many sorts of large facilities. We cannot support five or six different eInfrastructures for five or six science areas. It’s challenging, but we need to be much more general-purpose. We have to have a European approach to eInfrastructure



John Womersley

CEO of the Science and Technology Facilities Council (STFC) and Chair of ESFRI
Photo: NordForsk/Kim Wendt

commons', as you could call it, which will serve the entire research community, including all of the research infrastructures." Creating a comprehensive solution for data processing for all research areas under the new research infrastructures carries political challenges as well. Creation of common capacity in Europe will mean that eInfrastructure centres would have to be located far away from some of the funding sources.

"Many countries are willing to support activities in their own national infrastructure," explains Professor Womersley, "but they are less willing to support a computing hub if it is not located within their country. But without the central data hub you could not do the science. And so we need to raise the awareness and to integrate these activities between different science areas.

Within ESFRI we see the Nordic countries have already adopted a coherent and strategy-led approach in discussing research infrastructure needs and capabilities in a sensible way. I know that NordForsk does not have a large budget. It's much about coordination and bringing people together, and that's exactly what we need to replicate across the whole of Europe, which is challenging because of the diverse economies and research portfolios, but it shows how this can be done," says the ESFRI chair.

eInfrastructures on coming roadmaps

Will eInfrastructure projects be a part of the coming roadmaps?

"Yes, already in the 2016 roadmap," confirms Professor Womersley. "When we are assessing new projects, we are looking at their state of readiness as well as their scientific priority. Part of the state of readiness is if they have planned for the eInfrastructure. But those are the needs of the particular projects, they are not the common, underpinning capability."

"In the 2018 roadmap," he adds, "we want to include a serious consideration of the common, underpinning capability based on this vision of a science eInfrastructure that has a common approach to serving the needs of all European scientists across all research areas. Transversal eInfrastructures like networking, authentication and science cloud are currently not included in ESFRI's roadmap. But in 2018, we will need to find a way to include underpinning eInfrastructures projects in the roadmap, and working closely with the e-IRG is the obvious way to do it."

A number of challenges remain and the bar is set high, but John Womersley is clear about the ultimate goal for ESFRI:

"Integrating eInfrastructures and infrastructures is a challenge for us in science, it is a challenge for us to get the funding, it is a challenge for us to figure out how to do this, but if we can do it right, it can really be a way that big research infrastructures will impact the life of every European citizen."

The European Strategy Forum on Research Infrastructures (**ESFRI**) and the e-Infrastructure Reflection Group (**e-IRG**) are both comprised of national delegations from the EU member states and associated states.

● **ESFRI** is set up to support a strategy-led approach to policy-making for research infrastructures in Europe and regularly produces a European Roadmap listing initiatives of pan-European interest.

● **e-IRG** acts as a strategic instrument encouraging integration of European eInfrastructures and produces recommendations aimed at facilitating and harmonising eInfrastructure development in Europe and globally.