Seeking synergies in Switzerland

'CRISP', is a European project established to help encourage and enable collaborating partners to combine their know-how and complementary expertise in the field of physics research in an effective manner. iSGTW reports from their 2nd Annual meeting, which was held at the Paul Scherrer Institute last week.

Last

The Paul Scherrer Institute operates large scientific research facilities, such as the SINQ neutron source, the Swiss Light Source (SLS) and the SμS muon source. To find out more, visit the visit the

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week, iSGTW attended the CRISP 2nd Annual Meeting in Villigen, Switzerland. CRISP, or 'The Cluster of Research Infrastructures for Synergies in Physics' is a European FP7 project established to help encourage and enable collaborating partners to combine their know-how and complementary expertise in the field of physics research in an effective manner. The event was hosted by the Paul Scherrer Institute (PSI), a multi-disciplinary research center running several particle accelerators, including the Swiss Light Source.

Ian Lishman, a member of the CRISP coordination team, spoke about the project's development over the first year and a half of its existence during the welcome session on the first day of the meeting. "We've now achieved cruising speed," he says, pointing out that CRISP has already produced 13 major publications. "We've contributed to reinforcing the European Research Area through generation and dissemination of new knowledge, knowledge transfer to industry, increasing mobility of researchers, and supplying a driving force in a multidisciplinary network of networks," he explains. "We're asking suppliers to develop technology beyond the state of the art and that has to be good for the European research community."

Horizon 2020 on the horizon

Bernard Fabianek of the European Commission's Directorate General for Research and Innovation,

also spoke at last week's event about research infrastructures from a public funding perspective. "Horizon 2020 is on the horizon," he warns. "Things are becoming concrete, even if we don't really know the budget yet."

However, he had praise for the CRISP project, calling it "a breeding ground for new ideas" and citing its ability to bring together research infrastructures and industry as a point of particular significance. Fabianek also spoke about the importance of managing exponentially growing sets of data and using top-of-the-range high-performance computers to perform *in silico* experimentation in order for science in Europe to remain globally competitive.

At the recent IT requirements for the next generation of research infrastructures workshop, Kostantinos Glinos, head of the European Commission's eInfrastructure unit, highlighted the importance of co-design and pre-commercial procurement in putting the IT systems in place to support the next generation of scientific research infrastructures. However, Fabianek, also suggested that public procurement of innovation could be a highly effective method of creating future research infrastructures of all kinds. He says: "Pre-commercial procurement is complicated, but public procurement of innovation is something the British have been doing for years and they have been very successful."

During the event, presentations were given covering a range of physics research

infrastructures, many of which are reliant upon leading-edge e-infrastructures to support them in their scientific activities.

For example, Bojan Nikolic from the University of Cambridge, UK, spoke about the Square Kilometre Array radio telescope, which he describes as "taking the current generation of telescopes to a new level", adding that it will have "one hundred times better sensitivity than the current best telescopes". However, he warns: "the Square Kilometre Array will require unprecedented use of computing... It will require exascale computing to form the images and analyze them." He explains that he is now part of a team at the University of Cambridge which is organizing a large consortium to work on the development and design of the Science Data Processor, which he says will be "the numerical heart of the telescope."

Laurence Field and Ivan Calvet also spoke at the event about the IT challenges CERN faces in dealing with the huge amounts of data produced by the various experiments using its Large Hadron Collider (LHC). Calvet gave audience members a brief rundown of the Worldwide LHC Computing Grid, which is a global collaboration of more than 170 computing centres in 36 countries, linking up national and international grid infrastructures. Launched in 2002, the WLCG now manages over 25 petabytes of data per year, says Calvet. Field, who is the IT and data management topic leader for the CRISP project, also spoke about the challenges faced by IT infrastructure in facilitating scientific

research at large physics research organisations like CERN at last month's IT requirements for the next generation of research infrastructures workshop. "As we go towards 2020, we're looking at data rates of terabytes per second," said Field at the workshop. "We really have to understand how we can deal with these increasing data rates."

In addition, Joël Mesot, director of PSI, spoke at last week's event about some of the challenges his institute faces in the future. Top among these, he cites big data, saying: "For the short-to-medium term, big data is the biggest challenge for us; we have to deal with storage, analysis and visualization." Mesot explains that while the Swiss Light Source already currently produces enormous volumes of data (over 50 megabytes of compressed data per second per beam line), the Swiss X-ray free-electron laser, currently under construction at PSI and set to start routine operation around mid-2017, will produce a staggering 45 gigabytes of data per second.

Finally, CERN's Field also expanded further on the challenges of big data during a presentation he gave on IT and data management, wrapping up a series of progress reports given by each of CRISP's topic leaders on the second day of the event. "Big data is a topic which comes up every ten years or so," he says. "The question is just *how big is big?*" Field went on to argue the importance of working together with parallel European cluster projects in other scientific domains, namely DASHISH, ENVRI and BioMedBridges. "There's a lot of synergy

between the cluster projects," he says. "We have common problems - they all have data management issues, too, for instance."

"Data-archiving and preservation is extremely important for everybody," says Field. "Data on its own is not enough; you also need to maintain the algorithms to analyze it. Equally, if you want to repurpose data, you also need to ensure that there are common ways to access it in place. So, there are lots of things which we can collaborate on."

"IT & data managment has the largest common denominator across CRISP's eleven participating research infrastructure projects... and it reaches out to the other three cluster projects [ENVRI, DASISH and BioMed Bridges]." says Michael Krisch, CRISP project coordinator. "This is not surprising as data handling and storage is of central importance in all fields of science and in business life in general. It does not matter whether the data are generated by a particle collision at CERN or by a massive poll producing statistical data on aging and migration, *etc*."

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