

Research in the physical sciences An overview of JISC activities

Briefing Paper

September 2007

The way research is undertaken is changing faster than ever. When was the last time you, as a physical sciences researcher, went into the library to find a document, rather than to get a coffee? Almost all of the information we need is now available for electronic delivery. However this does not mean that it is in a more flexible and re-useable form than the paper copy we would have found on the library shelves. JISC is providing a significant push towards meeting this challenge by funding research and demonstration projects to enable better documented, automated access and more flexible re-use and analysis of research data.

The following JISC programmes and services offer considerable support to research and dissemination in the physical sciences. Sources of further information are given overleaf.

The Network

JISC enables access to data sources by providing the Joint Academic NETwork, **JANET**. Network speed and reliability have increased dramatically and **UK Light**, a high speed optical network, is enabling even greater traffic, with better quality of service for those applications that need to move large amounts of data between source and computation. As JANET roaming becomes more widely adopted, access to the network while visiting other institutions is becoming much easier.

JISC Collections

The data has to be available on the network and commercial and administrative barriers can restrict access. JISC has negotiated access to a number of collections on behalf of the UK academic community which institutions subscribe to, including information search services such as ISI Web of Knowledge. The **Information Environment**, which JISC is developing, will provide seamless access to this information.

Keeping track of data

The JISC-funded e-Bank project has developed an open archive to enable all the data accumulated during the course of an experiment to be accessible from the electronic version of the final published article. Normally, only the processed results are available to a journal-article reader who is unable to examine their provenance or reliability. e-Bank developed semantic web technologies for automatic data capture and metadata generation, enabling experimental results to be traced back to their source data. In the present phase, e-Bank is investigating the feasibility of constructing a network of data repositories, the eCrystals Federation.

Physicists use UKLight

The UKLight high bandwidth optical network, linked to similar networks around the world, enables researchers to transfer far greater amounts of data directly from one remote location to another than would be feasible with conventional, packet-switched networks. UK particle physicists will use it to handle the huge amount of data expected when the Large Hadron Collider (LHC), the world's largest particle physics experiment, goes on line at CERN in Geneva in 2008. Other users include radio astronomers who can now transfer data from widely-dispersed radio telescopes to a centre for immediate processing, so dramatically increasing their responsiveness to rapidly changing celestial phenomena.

Collaboration

The move to communications beyond email is rapidly gaining pace and expectations of video conferencing are rising. JISC is developing the use of these new technologies for collaborative research under the **Virtual Research Environments** programme. The JISC-funded **Access Grid Support Centre** offers researchers advice on the use of the Access Grid advanced video conferencing facility as a collaborative tool. Under development are ways of integrating Access Grid technology with tools for visualising data. The VRE programme and other JISC programmes are also investigating the use of Web 2.0 applications for optimising communications and workflow across distributed research teams.

Computational models

Access to data and information is only the first part of the research story. Data analysis follows and JISC is playing a role by providing the **National Grid Service** which enables access to computational resources and databases, including the UK's High Performance Computing facilities. Under its **e-Infrastructure** programme, JISC is working closely with the Research Councils to deliver many of the facilities and tools needed to do e-science, which enables researchers to undertake computation and analysis of resources held on widely-dispersed computers as though they were on their own desktops.

Repositories and research data

The final part of the research cycle is the dissemination and curation of research data and here too JISC is playing a role of international significance via the development of components of the

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Information Environment, in particular through the **Repositories and Preservation** programme and the **Digital Curation Centre**. The Repositories programme, which addresses the storage of data as well as documents, is having a considerable impact on the drive towards making the results of research freely available to readers by means of Open Access publishing. Stored data needs to be easy

to re-discover and JISC is also making strides in implementing models for resource discovery and shared infrastructures to improve access to content.

See www.jisc.ac.uk for more information.

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Information and Resources

Services

JISC services provide facilities and advice to researchers and teachers in further and higher education. Some of these services are co-funded with the Higher Education Funding Council for England, the Engineering and Physical Sciences Research Council and other Research Councils.

Network

- **JANET** www.ja.net the UK's education and research network. JISC sets the strategy and provides funding for JANET. Associated services include JISCmail, JANET roaming and JANET video conferencing.
- **UKLight** www.uklight.ac.uk a network for transferring large volumes of research data from point to point
- **Dark fibre facility** for photonics research is under construction

Generic and e-Science services

- **National Grid Service** www.grid-support.ac.uk provides access to grid computing facilities
- **Access Grid Support Centre** www.agsc.ja.net offers advice on using the Access Grid video conferencing facility for collaborative research
- **Digital Curation Centre** www.dcc.ac.uk researches issues around data curation and promotes good practice
- **VizNeT** www.viznet.ac.uk supports researchers in the use of visualisation techniques.
- **OSS Watch** www.oss-watch.ac.uk Open Source Software Advisory Service

Collections

JISC negotiates on behalf of UK institutions to make collections of important material available at a reduced price. Access is via JISC Collections or the JISC-funded data centres, MIMAS and EDINA.

- **JISC Collections** www.jisc-collections.ac.uk
eg Institute of Physics Journals archive; Institution of Civil Engineers Virtual Library archive
- **EDINA** www.edina.ac.uk
eg Serial Union Catalogue (SUNCAT); Digimap Collections; Inspec abstracts database
- **MIMAS** www.mimas.ac.uk
eg ISI Web of Knowledge; Zetoc, British Library's electronic table of contents; Intute Science, Engineering and Technology; CrossFire database of chemical compounds; Satellite Image Data Service

Development

JISC funds research and development into new ways of using ICT in further and higher education and research.

- **e-Infrastructure** www.jisc.ac.uk/einfrastructure
JISC's support for the National Grid Service comes under this programme which is also developing solutions to issues of grid security, grid services and tools and knowledge organisation and semantic services. Projects include: GFIVO (Groupier to support Federated Identity for Virtual Organizations) and Shintau (Shib-Grid Integrated Authorization)
- **Repositories and Preservation** www.jisc.ac.uk/reppres
This programme supports institutions to set up and run their own repositories. Projects include: e-Bank Phase 3: transitioning to the eCrystals Federation; Overlay Journal Infrastructure for Meteorological Sciences; Repository Interface for Overlaid Journal Archives in collaboration with the arXiv e-prints repository in physics; An Open Journal of Astrophysics and Cosmology
- **Grid OGC collision** www.jisc.ac.uk/gridogccollision
This programme is working with the Open Geospatial Consortium to develop secure ways of accessing geospatial data across a grid. Projects include: SAW-GEO
- **Portals** www.jisc.ac.uk/portals
JISC is developing the use of portals which provide a common point of access to widely distributed information on a topic. Projects include: Subject Portals Project: Phase 2; Go-Geo! Geodata Portal
- **Virtual Research Environments** www.jisc.ac.uk/vre
This programme is developing frameworks to enable researchers to collaborate across boundaries in virtual organisations. Projects include: Integration and Steering of Multi-site Experiments to Assemble Engineering Body Scans; myExperiment to enable researchers to share and discuss scientific experiments

The Information Environment

JISC has a large portfolio of development programmes and projects aimed at delivering an Information Environment which will enable seamless access to the information academics need for research, teaching and learning and the tools they need to process that information and collaborate with others. www.jisc.ac.uk/whatwedo/themes/information_environment

This listing was compiled by the JISC Communications team. Alternative formats of this briefing paper can be found at: www.jisc.ac.uk/publications