

What is a Virtual Research Environment?

Experience from the JISC VRE programme

Briefing paper

March 2010

Researchers from almost all disciplines now work extensively online, often in collaboration with colleagues from different institutions and disciplines. Most, no matter what their discipline, will perform several tasks in common, such as searching the literature, finding and communicating with collaborators, writing proposals, saving and analysing data, writing up and publishing results. The details of how those tasks are performed, however, as well as the research process itself, will vary not just between disciplines but also from group to group.

A virtual research environment (VRE) helps groups or teams of researchers to manage some or all of these tasks collaboratively, online. It must be designed to suit the particular needs of individual groups, so no two VREs are exactly the same, although all share certain key characteristics. According to the JISC-commissioned VRE Landscape Study, which has just reported, a VRE is an electronic web-based environment that typically serves at least two of the following functions:

- Provides access to data, tools or resources
- Enables cooperation or collaboration with other researchers at the same or different institutions
- Enables cooperation at the intra – and inter-institutional level
- Preserves or takes care of data and other outputs

Collaboratories, Science Gateways, Virtual Organisations . . . these are some of the terms used to describe VREs in countries other than the UK. The Landscape study, which set out to evaluate international developments in VREs, found that all these terms refer to 'identical or very similar environments'.

Why use a VRE?

A VRE makes most or all of the tasks researchers perform as part of their research lifecycle accessible to all the members of a team in one common interface. Collaborators, no matter where they are, have access to the same resources and are able to communicate easily with each other. The benefits of using a VRE include direct access to remote facilities, including supercomputers and databases, and easier working with international partners or in interdisciplinary teams. The consequence can be faster, more innovative research, as the following projects from the second phase of the JISC VRE programme found:

- The **VERA VRE** speeded up the publication of results from an archaeological dig by enabling data from finds to be entered into a database directly from the site, rather than from the archaeologist's institution after the dig had finished
- The **Study of Documents and Manuscripts VRE** led to a new interpretation of a Latin inscription by enabling widely-dispersed scholars to work simultaneously on a digitally-enhanced image of the inscription

VREs can also enable research that would otherwise be impossible. **HubLab**, a project based at the International Institute of Social History in the Netherlands, is mentioned in the Landscape study. It brings together globally-distributed social and economic data for analysis and comparison, the aim being to write global history. Such integrated analysis of widely-dispersed data would be impossible without the tools embedded in the VRE.

Researchers say that the need to share data with others is their main motivation for working in a VRE. Other important motivations include communication in a team, access to tools, services or an infrastructure, and to annotate, analyse and process data.

Tips for building a VRE

- Start with a good analysis of user requirements. The JISC-funded Building a Virtual Research Environment for the Humanities (BVREH) project developed a methodology for doing this. Alternatively, employ a social scientist to map the research process
- Analyse the resources available within your institution including the institutional systems and infrastructure you could build on
- Scan the literature for other VREs that might solve the main needs you have listed. The Landscape study, which lists most of the present international VREs, and the JISC VRE programme are good places to start
- Keep your users involved with developments throughout. You are growing the community surrounding the VRE, as well as building the technology

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VREs also benefit institutions. They can help overcome problems caused by a lack of easily available administrative information about who is doing what within an institution. 'Potential synergies are often not realised because information is lost or hard to find', says the Landscape study. VREs associate people with projects, tasks and research interests, enabling researchers to find internal as well as external collaborators. They can also increase the use of resources the institution has invested in, such as library services, and promote good research data management. By being interoperable with institutional administrative systems, they can also reduce the burden of project management and facilitate the preparation of grant proposals.

How to set about building a VRE

VREs have much in common with virtual learning environments (VLE) from which they are derived. The first phase of the JISC VRE programme in 2004 experimented with the use of VLEs for research, but came to the conclusion that, although a shared environment works well for research, researchers' requirements are too diverse for a single solution. One of the biggest differences between a learning and research environment is often the much greater diversity of specialised tasks and the need for security of research data and files. Researchers may also require an area in which they can experiment with the VRE.

Experience from the first two phases of the JISC VRE programme has shown that researchers and software developers need to cooperate very closely to build a successful VRE. An intermediary, such as a social scientist who can describe the steps in a research process, or specialist subject librarian who can speak the languages of researcher and developer, can also play a very useful role. Success is more likely when development is an iterative process, driven by user feedback.

The JISC VRE programme – third phase

Typically, a researcher will access a VRE via an interface which lays out all the resources available to the VRE members. Interfaces often make use of familiar platforms from VLEs such as Sakai and UPortal, or Sharepoint or a web-based portal.

Five major projects under the present phase of the JISC VRE programme are using these or similar platforms to develop frameworks on which the tools needed by a particular VRE can be added. The development of a framework will be guided as much by an institution's approach as by the technology itself. Some institutions are already well advanced in adopting central frameworks for teaching, learning or administrative use, which can be adapted for VREs.

The development of generic tools is the focus of another strand of the programme which includes a series of 'rapid innovation' projects to respond to the latest developments and build tools quickly for specific jobs. Finally, four major projects are

Some JISC VRE third phase projects

Building frameworks

Collaborative Research in Business supports management and business professionals in university departments and related organisations who are engaged in managing the process of Knowledge Exchange.

Cancer Imaging VRE is developing a framework to allow researchers and clinicians to share information, images and algorithms

Tools with rapid innovation

AMI is developing a speech interface to enable chemists to access files and archives when their hands are occupied in the lab

WattNames is developing ways of uniquely identifying researchers who may be known by different names or share names with others

Working with other infrastructures

LinkSphere is developing a single virtual interface for searching across all the repositories and collections at the University of Reading

TEXTvire is providing researchers with the tools to analyse text collaboratively

developing ways of ensuring that VREs are interoperable with other infrastructure both inside and outside an institution.

All of these projects are contributing to the programme's chief aim: to embed VREs in institutional and national infrastructures and design common frameworks that can be easily adapted to researchers' very specific needs.

This briefing paper was written by Frederick van Till, JISC Programme Manager for the Virtual Research Environment Programme, and Judy Redfearn.

Alternative formats of this briefing paper can be found at: www.jisc.ac.uk/publications

Further Information

The VRE Landscape Study
www.jisc.ac.uk/publications/reports/2010/vrelandscapestudy

The JISC VRE programme
www.jisc.ac.uk/whatwedo/programmes/vre
or <http://code.google.com/p/vreri/>

User requirements gathering
http://bvreh.humanities.ox.ac.uk/news/Survey_outcomes.html
http://bvreh.humanities.ox.ac.uk/news/Requirements_Gathering_Workshops.html