



Formative Evaluation of the JISC VRE Programme

The VRE1 Programme:
achievements and lessons learnt
Summary report

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1. Introduction

This is an abbreviated version of the second programme-level report produced as part of the formative evaluation of the JISC's first Virtual Research Environments (VRE) Programme. The purpose is threefold:

- To make sense, from a social science perspective, of the developments and achievements of the VRE1 Programme.
- To surface the collective learning gains from the VRE1 Programme, focusing in particular around projects' experiences regarding institutional embedding, disciplinary embedding and execution of scholarly tasks.
- To arrive at an overall assessment of the VRE Programme and its value to the UK Higher Education Community and to make recommendations to JISC relating to the VRE2 Programme and beyond.

This report presents a succinct overview of the key learning from the VRE1 Programme. It is organised in chapters in the following manner: Chapter 2 highlights the key outcomes from the VRE1 Programme. Chapter 3 goes on to analyse the main lessons learnt from the research work under VRE1. Chapter 4 offers an overall assessment of the VRE1 Programme as a whole from the perspective of the formative evaluation and provides recommendations for the future.

This report should be read in conjunction with the formative evaluation's full second report on the VRE1 Programme which contains a comprehensive evidence base for the argument put forward and also provides a contextual overview of the Programme.

2. VRE1: six key achievements and a challenge

The review of the VRE1 Programme has surfaced seven main outcomes:

1. An emerging community of practice
2. Engagement with the wider academic community
3. Three emerging socio-technical systems
4. A transformational potential for research praxis.
5. An expanding user base
6. A better understanding of VREs
7. The sustainability challenge

2.1 *A Community of Practice around VREs*

VRE1 projects can be seen as an emerging and expanding community of practice. Either through formal Programme meetings or informal contacts, the projects developed productive ongoing working relationships with each other. We would argue that the development of this emergent, and in some ways hidden, community of practice had powerful impacts for the programme and the actors involved.

During Programme meetings, formal agendas offered projects an opportunity to learn about each other's work and get support for particular issues of their research and development work. However, projects gained most from these meetings by making full use of the opportunities to build and foster relationships and create powerful links with other projects and project actors. Thus, programme meetings assisted projects:

- To meet up and to get to know other project teams;
- To share information about their work, areas they are struggling with and 'contextual issues' (such as ethical, social and legal issues);
- And to help progress their work by getting suggestions from other projects about technologies they are developing or through some of the programme activities.

Programme meetings were also opportunities for projects to pick up informally what was on JISC's agenda for the development of VREs.

Importantly, projects also developed ongoing working relationships with each other outside these formal meeting settings. Many of these relationships were characterised by informal alliances which involved cross-site meetings, mutual help and assistance and in some cases led to more formal alliances for VRE2, which had concrete outcomes in the form of successful VRE2 bids. In particular, these relationships were instrumental in:

- *Sharing experience.* Learning from each others' experiences of applying particular development methods and using this learning for their own development work during VRE1.
- *Offering mutual help and assistance.* Feeding into each others' research, for instance by attending scoping workshops.
- *Providing a sounding board for VRE research.* Several VRE1 projects organised periodic meetings with each other for this purpose.
- *Building strategic alliances.* In order to develop joint bids for the VRE2 Programme, usually towards the end of the programme and occasionally after project work had been completed.

The experiences of Programme meetings and other interactions between projects indicate that the Programme and its stakeholders succeeded in contributing to the construction of an emergent 'community of practice' around virtual research environments. We see this emergent community of practice as a very valuable outcome of the programme and as a key mechanism for driving the programme forward.

2.2 Reaching out to the wider academic community

Apart from these collaborations within the context of the VRE1 programme, most projects reached out to the wider academic and research community by undertaking a wide range of dissemination activities. These included:

- Conference presentations and papers
- Attendance of workshops
- Demonstrations
- Articles in the media (e.g. Times Higher Education Supplement, New Scientist Magazine, BBC Radio 4)
- Articles in refereed journals.

Two projects in particular, undertook conscious efforts to go one step further and systematically marketed their technologies to potential users. The CSAGE project, for instance, undertook “over 80 events ranging from very small one-to-one meetings to presentations at 500+ auditoriums, each trying to present work, or test pieces with the aim of giving a vision of future use.”¹ Drawing on social marketing and engagement techniques, the SAKAI Education Research project made strong efforts to reach out to different user constituents.

All projects also had websites which, in September 2007, were easily accessible and usable across a range of browser platforms. However, accessibility is also about communicative clarity to a wide range of target audiences who may be interested in utilising findings, data and tools in their own work. A number of project websites were not available, from either the main JISC VRE website or at the project specific URL. There was also evidence that key internal projects links were down within one or two project sites (e.g. presentations). On occasion, it can also be challenging for the user to discern precisely what type of outputs have actually been produced by projects. And in the case of projects where demonstrators, tools or prototypes are deliverables these are sometimes not available or remain in development. Project websites are a primary vehicle for marketing, communications and dissemination, not only for existing user communities but for engaging potential new users as well. It would therefore seem that the websites of VRE projects have an untapped potential to be used for these purposes.

2.3 Three emerging socio-technical systems

The VREs developed broadly relate to three types of socio-technical systems:

- Accessing and combining data and computing resources
- Online collaboration
- Virtual research management.

Accessing and Combining Data and Computing Resources is linked to the ability to work with dispersed data sources, across databases, applications and legacy systems.

This socio-technical system focuses on accessing and combining data and computer resources, allowing researchers to work with dispersed data sources and across databases, applications and legacy systems. This, in turn, enables them to access a

¹ CSAGE Final Report

wealth of data situated in dispersed locations, variety of databases, and/or legacy applications, all of which would otherwise be either challenging or time-consuming to retrieve. This e-enabled resource recovery is further combined with an ability to both link various datasets and databases as well as conducting searches across databases and sites. The outcomes of the data search can also be archived for future reference. Consequently, part of the research lifecycle can be enhanced in terms of increased efficiency in resource retrieval and analysis, and more comprehensive scope in data gathering and elicitation. This socio-technical system can also contribute to data generation, for instance by facilitating multi-site trials and experiments.

Online Collaboration in terms of facilitating the (a)synchronous combination of expertise of dispersed researchers as well as promoting collaborative writing.

Online collaboration is a socio-technical system that is characterised by its ability to facilitate the synchronous and asynchronous combination of expertise of dispersed researchers. Asynchronous collaboration concerns online events for which all participants are not necessarily required to be logged in or active at the same time. They can access the information and add their comments/contribution in a self-paced way and when most convenient to them. Such online collaboration supports both online interaction and independence as to when the researcher engages with the community. In contrast, synchronous collaboration involves the simultaneous online presence and contribution of participants. It brings together in real time people based on different locations, so that they collaborate, (e.g. in experiments/trials), as well as attend virtual meetings and seminars. This can also involve collaborative writing.

Virtual Research Management which supports the whole research lifecycle and allows for the collecting and managing of institution-wide information.

The third socio-technical system which emerged from the VRE1 Programme encompasses whole institutions and research lifecycles. EVIE and ELVI developed virtual research management tools which **support the whole research lifecycle** from identifying funding opportunities and collaborators, to proposal writing to setting up budgets, to producing financial and management information, to report writing and publications. Overall, such VREs can result in greatly improved research processes and related management; increased transparency; improved communication flows between different departments/disciplines and between these and the University's administration; enhanced collaboration; more effective workflow planning, organisation and better informed decision-making.

The table overleaf summarises the three socio-technical systems and their key features.

Table 1: Summary of socio-technical systems and key features

Socio-technical system	Key feature	Project examples
Accessing and Combining Data and Computing Resources	Working with dispersed data sources, across databases, applications and legacy systems	ISME, CHESHIRE 3, MEMETIC, CORE, IBVRE, OGHAM, IUGO
Online Collaboration	Facilitating the (a)synchronous combination of expertise of dispersed researchers	CSAGE, IBVRE, ISME, ISME, CORE, MEMETIC, OGHAM, SAKAI Portal demonstrator, SAKAI Education, BVREH, Political Discourse.
Virtual Research Management	<ul style="list-style-type: none"> Supporting the whole research lifecycle Collecting and managing Information Crossing inter-departmental boundaries 	ELVI, EVIE

2.4 A potential for radically changing research praxis

In developing their various VRE configurations (and socio-technical systems), projects highlighted the potential of VREs to transform research praxis across disciplines and institutions:

- VREs can close the gap between research steps (such as data collection, data processing, data analysis, writing, publication) and therefore speed up the research process.
- VREs can enhance the transparency and reliability of research processes which, in turn, can lead to a better understanding of the research question. Moreover, projects proved how VREs can contribute to data generation, e.g. by facilitating multi-site trials and experiments, and in some cases, even leading to greater speed and accuracy of data capture and analysis.
- At the same time, projects showed how VREs can expand the boundaries of current research methods in a specific discipline as well as introduce new ways of doing research. In either case, the result has been both the generation of new knowledge and research paradigms.
- In addition to introducing a new way of conducting research, VREs also provide a different way of handling data and related documentation, thus making project management more effective.

2.5 An evolving user base

User groups encompassed by the 15 VRE1 projects are:

- Researchers and academic staff
- Students
- Developers
- Administrators/School managers

However, within the Programme the notion of the user was more comprehensive than the above list suggests and included organisations as well as application and tool developers. A general finding from the analysis of the VRE1 Programme is that take-up of a technology seems to be enhanced by participatory and co-constructive approaches to technology development.

Already during the lifespan of the VRE1 Programme the user base of the VRE technologies was evolving and expanding:

- In particular where projects had aimed to build technologies for particular target groups, their VREs were beginning to be used by these envisaged user communities.
- Some projects managed to attract user communities beyond those originally envisaged or targeted. This includes, for instance, the expansion of users from students to scholars (History of Political Discourse) or vice versa, from administrators to academics (ELVI) and increased use through incorporation of tools into systems such as SAKAI.

The user base of the VRE technologies developed is not only evolving in terms of quantity but also quality of use: already we can observe that users are using the technologies in novel or unexpected ways, thereby adapting what has been developed to their very own needs and contributing in their own way to the evolution of VREs. For instance, VREs based on SAKAI have unexpectedly been used for research purposes, CSAGE was used to develop dance methodologies and MEMETIC for ethnographic research.

This adaptation of VRE technologies by the user in turn also illustrates the dynamism of socio-technical systems developed by the projects, where the constant interaction between the technological artefacts and users can result in the latter claiming and adapting technology for their own needs and in new and unexpected ways. For example, the SAKAI platform is employed not only as an online collaboration but also as a research tool. Finally, a number of projects have also highlighted how VREs can be used to enhance the quality of teaching and training of students.

2.6 An improved understanding of VREs

The VRE1 Programme has also generated learning around VREs, in particular, the relationship between the user and the VRE technology. Several projects have gained a better insight into what users want from a VRE and how they use it.

The project work has also helped to improve the understanding of how VREs can be defined. What is interesting about the working definitions currently employed is that now understandings about VREs appears to revolve much more around a socio-technical view of what these technologies are used, and are usable for, rather than purely focusing on technical architectures.

2.7 The sustainability challenge

Finally, there remains an institutional challenge as regards involvement in and adoption of VREs by HEIs. Although the latter's awareness of VREs has increased significantly, not least due to the VRE1 projects, institutional support and buy-in varies considerably. Path dependency issues, including legacy system compatibility, pre-existing VLEs/MLEs, lack of clarity as to the added value of VREs and interest in competing solutions, combined with the projects' relative lack of social marketing and strategic communications strategies lie at the heart of this. Even when the institutional support is strong, this does not necessarily translate into availability of resources, including funding. The further development of VREs therefore continues to remain dependent on a complex web of sources, which projects are already tapping into, consisting of the research councils and BA, regional governments and the EU, private organisations and others.

3. The main lessons learnt from VRE1

The VRE1 Programme highlighted some important lessons about challenges and effective solutions to engaging users, developing VRE technologies and collaborating and managing within VRE projects and the programme.

3.1 Identifying end-users

Identifying end-users and having appropriate strategies for engaging with them is challenging but essential if the technologies to be developed are to meet their needs. VRE1 projects identified two effective methods of identifying and contacting end-users:

- *Going through intermediaries* to make introductions or pre-select potential end-users, e.g. people at other HEIs known by the project teams or people in a co-ordinating role in a school or department.
- *Disseminating information about the project through a variety of channels and in different formats early on.* This can help build interest in the project and recruit new participants.

3.2 Working with end-users

Working closely with end-users introduces an extra layer of unpredictability and complexity into the research and development process but is seen by projects as essential for the success of the technology to be produced. The VRE1 Programme generated rich findings on how to engage successfully with end-users:

- *Getting end-users involved in the project - early on.* This ensures that they buy into the project and that the system developed matches end-users' needs, but may mean investing more time at the start of the project to get users involved.
- *Choosing approaches and methodologies that support user engagement.* Within the VRE1 Programme methods such as participatory design, iterative development cycles, rapid data collection and prototyping were used successfully to engage users and find out what they need. However, employing these methods requires careful management so that user demands can be balanced with the development requirements.
- *Keeping users engaged throughout the project* is key if the benefits of the development work are to be reaped. Ongoing user engagement can be achieved by having users as partners in the project team to ensure they have a stake in what is being developed and therefore an interest in being engaged. Short iterative development cycles can also help maintain the interest of users and keep them engaged. Overall, the challenge here is to accommodate users' schedules with those of the development work.
- *Establishing trust between developers and end-users.* This trust needs to be earned rather than assumed to exist. The experience of the VRE1 Programme has highlighted two ways of achieving this:
 - spending time with end-users observing their work and discussing their needs; and
 - having a team member able to take a brokerage role between developers and academic domain experts so that the professional boundaries between these two constituencies can be bridged.
- *Providing 'start-up' support to end-users* (such as taking users through the technology step-by-step or running training sessions) are fruitful for familiarising end-users with new technologies – though cannot necessarily guarantee that people actually use new technologies as part of their work routine.

A meaningful user engagement must therefore be resourced and timed appropriately and is particularly labour intensive at the beginning of a project.

3.3 Developing and implementing technologies

Several of the tools developed under the VRE1 Programme succeeded in attracting interest from the wider research community. Different models for VREs emerged and have shown to be 'fit for purpose' for different user communities. Inevitably, developing and using the technologies developed came with a set of challenges, for instance where tools proved to be less robust or adaptable to working environments than expected. Projects also found they had to balance producing tools with making

them more usable or attractive for the end-user as well as show a degree of flexibility to balance development work with the time pressures of project work.

3.4 Team working

Projects worked well in teams, though at times technology and staffing issues added challenges. During the course of VRE1, some important lessons were learned, especially about communication within dispersed project teams:

- Multi-site projects require regular team meetings so that team members can get to know each other and their way of working.
- Access Grid meetings are useful but cannot totally replace personal, face-to-face contact.
- Commitment to, and getting on with, the project work helps team members build the trust essential for good team working.

3.5 Project management

Three key lessons for project management plans emerged from the VRE1 Programme:

- *Budget for sufficient time if co-participative approaches are being employed, in order to allow for the exploitation of their benefits and their proper management.*
- *Where input from other projects is sought this should enter into the project risk strategy since non-project staff may not have the time to contribute due to their own commitments.*
- *Project time plans and budgets need to be realistic and reflect the work planned. This includes budgeting realistically for items such as development work or travel.*

3.6 Programme management

Projects were generally complementary about the management of the VRE1 Programme and particularly appreciated:

- The Programme meetings as opportunities to meet other project teams, get to know each other and exchange ideas.
- The project visits as valuable opportunities to receive one-to-one support and advice
- Being kept informed of developments relating to JISC and the VRE Programme

The change of programme management towards the end of VRE1 did not have a major disruptive impact on the Programme.

As a result of their experience of the VRE1 Programme, projects offered the following suggestions for the management of the VRE Programme:

- Several projects felt strongly that regular project meetings and reviews were very valuable. These should be held every term or quarter in the form of face-to-face meetings including the project team and the programme manager. Projects felt that such meetings are important to keep projects on track, for projects to get uninterrupted time with the Programme management to discuss problems and deliverables in a ‘clearer and calmer atmosphere’ than is possible at Programme meetings.
- A peer review process for design and tools to encourage projects to share their problems and encourage projects to work together.
- Encourage sharing problems and working together
- Support on the ‘softer’ issues relating to VREs such as ethical issues (both research ethics and the ethics of using specific tools)
- Provision of ‘technical assistance’ to projects, for instance:
 - Drawing up standard collaboration agreements;
 - Appropriate licenses for the release of software;
 - Training on specific technologies relevant for projects’ development work

When prompted, some projects also expressed the view that a VRE support service could be useful, but that it would need to be based on an interest and need in the community and would need to be properly marketed. “It really needs an ambassador or mediator in the institution who is the link between the project and the VRE advisory service”. One interviewee made the point that a support service would have to be about active support, rather than passive. “It’s also important that people experience it as help rather than a bureaucratic process”

4. Conclusions and recommendations

The VRE1 Programme has clearly demonstrated the potential to have a major impact on changing research practices in the academic community. It has clarified viable routes for conceptualising and implementing VREs. Moreover, the Programme has also helped to clarify what is important and what is less important in the development and deployment of these new technologies: building technologies that are ‘fit for purpose’ of their user communities, rather than follow an abstract idea or concept of what a VRE might or should be. As a result, there is evidence that research practices are already being influenced. At the same time, in HEIs there is considerably more awareness of VREs, with a number beginning to show a real interest in their potential value. Furthermore, across the Programme, a community of practice has begun to emerge – the evolution of which could help to drive VRE2 and any subsequent incarnations of the programme forward.

However, challenges do remain and despite the scale of the opportunity that is currently presented by VREs, institutional buy-in and embedding remains an enormous challenge. Significantly, key and critical players in institutions have not

tended to have been involved in or engaged with these projects consistently and this has been to the detriment of the projects' institutional success and sustainability. A number of projects have been left in a state of ambivalence and insularity, within the HEI (though in the rare exceptions where institutions have been involved, this has made a huge contribution). At the same time, many projects have simply not had the resources, especially in terms of staff time and money, to engage with the wider environment of their HEIs effectively.

VREs are not only technical innovations *per se*, they are also practice-led innovations which are designed to function in context. In order to encourage the take-up and institutional adoption of VREs the innovation will need to offer clear strategic or research added value to the institution and discipline and will necessarily require an effective communications and social marketing strategy.

In the light of these considerations, we recommend the following actions:

On the basis of the programme outcomes JISC should consider scaling up activities in this area and continue to remain actively involved in steering the VRE development process. We would concur with the view that it may be productive to keep the technology options open at this stage and that it is productive to further explore technology developments, rather than commit to particular technological paradigms.

JISC could assist projects in marketing and disseminating their innovations by helping them make an appropriate business case for VREs, in particular in terms of their potential to enhance RAE profiles, the quality improvement of research and teaching. However, the business case needs to be made at several levels. Firstly, the case for VREs needs to be made more consistently across disciplines to alert broad spectrums of researchers to the added-value of these technologies. Secondly, the case for VREs needs to be made within and across HEIs themselves in order to maximise the potential strategic value of VREs.

JISC can assist projects to both build the business plan and employ social marketing and communication techniques to increase institutional buy-in and user take up. This could, for instance, involve peer consulting: setting up a rolling action learning programme drawing on social marketing and communications to capitalise on the expertise that already exists within the Programme and maximise the knowledge that already exists in this community. Potentially, specialists outside the VRE project teams could work with individual projects in a focused manner to develop plans. The deployment of social marketing techniques as part of an overall strategy for dissemination and awareness raising can also be instrumental in engaging key stakeholders and user communities. Creating the conditions for increased take up and use of VRE technologies is also about building and sustaining dialogues amongst projects, within disciplines and HEIs and within JISC.

Considering that VREs are also practice-led innovations we recommend that more support and resources is allocated to users and user communities. For users to move to new socio-technical solutions, VREs will be required to be robust, intuitive and offer clear added value, as well as being tailored to defined ways of working. Users have high expectations of technological solutions and will tend to use only those

systems which will offer a clear instrumental return. To facilitate take-up and adoption users will need to be provided with dedicated technical support; especially in the early start-up and take-up phases as well as longer-term training. We also argue that for the pilots of “VRE2.5” to be successful they will need to be organically embedded in the discipline and have emerged from the bottom up rather than the top down and this will often involve a project or user champion.

Overall, our main recommendation to JISC is to scale up its work on VREs whilst simultaneously providing additional funding for communications and social marketing as well as user support activities.