JISC

Building a Virtual Research Environment for the Humanities JISC Final Report

February 2007

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1. Acknowledgements

The BVREH was funded as part of the JISC Virtual Research Environments Programme stage one. The project wishes to acknowledge the participation and support of a number of key individuals including Maia Dimitrova the initial VRE Programme Manager along with the more recent support of Frederique van Till. The BVREH has also enjoyed the ongoing commitment of Dr Marina Jirotka as Requirements Consultant along with Dr Annamaria Carusi, both of the Oxford University Computing Laboratory. Our thanks also go to Dr Matthew Dovey, originally a Principal Investigator on the project before moving to the JISC and to Dr Matthew Mascord of the IBVRE project for their considerable input.

In carrying out the User Requirements Survey the project was indebted to all those who took the time to be interviewed, and who came along to the focus groups, meetings and workshops. In building the demonstrators the project would like to acknowledge the input of Dr Kathryn Sutherland of the English faculty at Oxford and Dr Anne Bowtell, Web Manager of the Medical Sciences Division.

2. Executive Summary

Aims and Objectives: 'Building a Virtual Research Environment for the Humanities' was an 18 month JISC funded project designed to scope the needs of humanities researchers at Oxford University. The core aims of the project were to understand the needs of the humanities community, build a number of demonstrators that show how those needs could be addressed and in the final stages to assess the effectiveness of the tools and to make recommendations as to what should be incorporated into a Humanities VRE. The project sought to inform both the future of humanities research at Oxford and those of the wider research community supported by the JISC.

Overall Approach: The BVREH project required the completion of 7 Work Packages including an extensive user requirements survey; the analysis and identification of user needs and existing tools and the development of a number of demonstrator applications. All of the above were supported with effective project management, evaluation and dissemination strategies.

Findings: The User Requirements Survey highlighted the need for a simple to use, easy to access interface which underpins all stages of the research life-cycle, emphasizing the need for tools and services to support:

- Research administration;
- Resource discovery;
- Data creation, use and analysis;
- Collaboration and communication;
- Publication, curation and preservation

Research administration: Interviewees want seamless access to information about events, including conferences, lectures and seminars; research and researcher interests of individuals within the institution and beyond; and information regarding grants and funding opportunities, all of the above accessible in one, easy to navigate environment.

Resource discovery: Interviewees wish to make the process of finding resources and research material more efficient by linking datasets and databases so that they can be cross searched with a single search term and the results returned to the personal area for future reference.

Data creation, use and analysis: Interviewees want a secure area in which they can store material such as saved searches, images and texts; create notes and annotations and use tools to enhance, manipulate and compare items.

Collaboration and communication: Interviewees want tools to enable them to work collaboratively on documents, to share material with collaborators and to view material simultaneously with colleagues wherever they might be based. At the same time interviewees want to communicate either through video conferencing or real time chat facilities and to enable a collaborator to point/highlight and annotate items throughout the discussion.

Publication, curation and preservation: Interviewees wish to store, publish and archive their work both on personal web pages for open access or in a more secure area for academic material. Interviewees want to be sure that their work and the work of those around them is preserved and made available both within Oxford and externally to promote the division and its work.

The demonstrators chosen to address some of the requirements highlighted by the survey were designed to show how the VRE might eventually accommodate different kinds of tools, information sources and research activities across the spectrum of research represented in the Humanities Division. The aims of the demonstrators were to provide researchers with tangible 'walk through' ideas of what functionality might be possible within a humanities VRE; they were not designed to be fully-functioning tools in their own right.

• A 'Virtual Workspace for the study of Ancient Documents'[1] is an interface allowing browsing and searching of multiple image collections, including tools to compare and annotate the researcher's personal collection. The Workspace has demonstrated that the collaborative study of documents and manuscripts is an area of great mutual interest across humanities research, which would benefit from VRE tools and services. The project received additional funding from the AHRC to continue to develop this proof of concept into a working demonstration once the first phase of VRE funding was complete.

• An Eighteenth Century Workspace; an environment that integrates resources related to a project in the English faculty working with Jane Austen's manuscripts. The environment would eventually enable cross searching of a number of data sources including ECCO (Eighteenth Century Collections Online), Chadwyck-Healy Literature Collections, Samuel Johnson 'A Dictionary of the English Language and British Fiction 1800 – 1829. The discussions and mock up versions of the system, together with talks with ECCO and other data sources, have proven that although there is a great deal of interest in providing cross-searching functionality, there still a number of obstacles to delivering such a system.

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[1] To be based at the Centre for the Study of Ancient Documents, Faculty of Classics, University of Oxford

• A Research Discovery Service[2], the demonstrator answered the need for further transparency in finding resources and information about research and research interests across the humanities division within Oxford.

• Physical tools such as communication and novel user interface devices such as digital pen and paper (Anoto)[3] and Personal Interface to the Access Grid (PIG) were trialled to see where such tools might be beneficial on an ongoing basis.

Achievements: The BVREH has achieved a great deal over and above the initial aims of the project and has adhered closely to its plan, milestones and deliverables. The User Requirements Survey found that there was a need to support all aspects of the research life cycle and proved that there was both interest and enthusiasm from researchers across the division and beyond.

As a result of the user requirements survey the BVREH received additional funding from the AHRC to hold a series of three workshops. The workshops were designed to highlight the need for User Requirements Gathering within the humanities, and to work with the humanities community to establish a best practice document for future reference. Details of this work will shortly be complete and available on the BVREH website.

The project has also received additional funding from the EPSRC to continue to develop the Virtual Workspace for the Study of Ancient Documents from a proof of concept into a fully demonstrable system. This project, currently underway, began as the VRE project ended.

3. Background

The BVREH aimed to extend the range and depth of a preliminary survey of ICT use within and outside Oxford in order to identify specific areas in which the benefits of deploying VRE tools were likely to be substantial (for example: communication, project management and design, efficiency, access to resources) and to define those where the benefits may be more marginal; on this basis to identify specific tools appropriate for deployment as demonstrators; and, in the final cycle of project activity, to implement the demonstrators and to assess their effectiveness.

4. Methodology

WORKPACKAGES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1 Project Management		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
2 VRE Survey				▓	▓	▓	▓	▓	▓	▓	▓	▓						
3 Analysis and identification of needs and tools				▓	▓	▓	▓	▓	▓	▓	▓	▓						
4 Identification of						▓	▓	▓	▓	▓	▓	▓						

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[2] This follows an initiative in the Medical Sciences Division, led by Dr Anne Bowtell and the Academic Computing Development Team at Oxford University Computing Services
[3] http://www.anoto.com/

existing tools						▓	▓	▓	▓	▓	▓	▓						
5 Development of Demonstrators								▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
6 Evaluation and Final Report						▓			▓		▓							▓
7 Dissemination		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓

Overall Approach: The project was structured around 7 workpackages and began with Workpackage 2, which was the VRE User Requirements Survey (Workpackage 1 was the overall project management of BVREH running the entire length of the project).

It was important that the survey methodology complemented the initial survey carried out by the Humanities Division in 2004. As such, it was felt that one-to-one interviews with research projects and individual researchers, was the next logical step from the 2004 online questionnaire. Some of the 2004 respondents were deemed to be a particularly good starting point a year on, due to their interest in technology either through a project that they had embarked on or ideas they had had for a humanities VRE. The project also organised a focus group to gather a group of researchers from different disciplines to discuss the BVREH preliminary findings and to prioritise ideas for potential demonstrators.

Analysis of the interviews and the focus group involved going through the notes and transcripts of the meetings and identifying commonalities and differences between the needs of researchers across the division. Each interview was written up using the headings detailed under 'Semi-structured Interviews' (below) and were compared to the others. Where possible the interviews were recorded, and when this was not possible extensive notes were taken.

Various methods were used whilst constructing the four demonstrators, including iterative design and prototyping for the Virtual Workspace together with html and paper mock ups for the Eighteenth Century demonstrator. The physical tools were demonstrated to an invited group of researchers at a 'demonstrator workshop' and interested individuals were given a digital pen to take away and use however they wished over a number of months. Finally the Research Discovery Service was already a working prototype in the Medical Sciences Division and the work of the BVREH at this stage has been to begin to adapt this database for humanities researchers and to demonstrate the existing system.

Greater detail of the methodologies used to complete the work within each workpackage, is given under Implementation.

Strengths and Weaknesses of Methodology and approach: The strongest aspect of the project has been in its 'bottom-up' approach, ensuring that researchers were asked what it is they do, how they do it and what might be useful to them. Throughout the user requirements survey, it was clear that humanities researchers did not want to have a technology or a system forced upon them; rather they wanted to be a part of a process finding out what might be beneficial to them. In implementing the demonstrators this same approach enabled the BVREH to look towards an iterative, prototyping approach, constantly allowing the project to go back to the researchers, learning from their experience and research processes.

Acknowledging these strengths, there were still some inevitable gaps in the range of researchers the project was able to interview. These gaps are both in the quantity of researchers interviewed in some faculties compared to others and that in a very small number of cases a faculty may not have been represented. A number of factors have contributed to this including sizeable term time and vacation commitments of researchers, along with some lack of response from faculties or individuals. Whilst the project has been fortunate to find a good number of enthusiastic participants, inevitably there are researchers who are less interested and from some areas no response was received.

5. Implementation

The BVREH project required the implementation of a user requirements survey across the Humanities Division at Oxford to identify areas in which VRE tools might be of use to Humanities researchers both within the institution and beyond. It also required the implementation of a number of small scale 'step through' demonstrators.

User Requirements Survey: Largely the choice of interviewee came through word of mouth and from recommendations born out of the initial survey carried out in summer 2004. At each interview the individual/s were asked to name others both within their own faculty and within the division who might provide valuable contributions, or who would not be averse to being part of the interview process.

At times it proved difficult to arrange interviews especially during the summer holiday period in 2005. To address the shortage the head of each faculty was contacted and asked to provide the project with 4-5 candidates whom the project might interview. A good proportion of these contacts were then asked to go forward to the focus group along with interviewees recommended by their colleagues and collaborators.

Faculty	Researchers and members of research projects interviewed	Researchers present at focus group	Researchers represented on the BVREH steering committee
American Institute, Rothermere	0		
History	1		1
Classics	6	4	3
English	4		1
Ruskin School of Drawing and Fine Art	1		
Medieval and Modern Languages	3	1	1
Linguistics and Phonetics	4		1
Philosophy	2		
Oriental Studies	3		1
Theology	0		
Libraries	5	1	
Museums	2		
Music	1	1	

Voltaire Foundation	0			

Unstructured Interviews: In order to progress the initial survey of Humanities ICT needs carried out in the summer of 2004, the BVREH visited a wide variety of research projects that currently exist within the Humanities at Oxford. Meetings with the research projects comprised unstructured interviews carried out in person with the lead individual/s on the project. The focus was on finding out about the specifics of each project, its content, scope, technology, funding, audience and possibilities for VRE benefit and collaboration.

The purpose of these visits was to get a thorough understanding of the project, the nature of the research and the databases/collections with which the project was involved. Through unstructured interviews it has been possible to allow the course of conversation to develop naturally, allowing the interviewees to discuss their projects openly, including their strengths and weaknesses, suggest ways in which a VRE might provide benefit to their projects and to consider what they have that might be beneficial to others.

The aims of the meetings were to discover how a VRE might enable access and perhaps provide greater visibility for humanities research projects but also to gain an understanding of the projects themselves and to gain insight into the support and functionality that might be provided for them through a Virtual Research Environment. It was also the intention to discover what tools and functionality the projects might already have which would be useful both to the VRE and to each other ensuring that no duplication of effort is undertaken at any stage.

Although it is acknowledged that the face-to-face approach took a great deal of time to organise and arrange over such a diverse range of projects, it is clear that this approach has been much appreciated. One project commented that 'it's lovely to be asked' and the hope is that through relatively informal meetings, excellent relations between the VRE project staff and the research projects can be built up and sustained through continued communication and collaboration.

Semi-structured Interviews: Interviews with individual researchers were approached from a more structured starting point. The aims of these interviews were to enable the VRE team to develop a thorough understanding of the 'research life-cycle' within the humanities and to discover exactly how, when, and where researchers carry out their work and to analyse a 'day in the life' of that individual. The basic framework was to establish the interviewee's specific research interests and to discover to what extent the following elements fit into their research and their average working day:

- Current work practice; use of/access to research materials (libraries etc), collaborative aspects, dissemination
- Current IT usage
- Collaboration specifically using IT
- Local and external tools/processes used to carry out research
- Interaction with all aspects of university services and administration such as support for grant applications, funding etc

Focus Group: In February 2006 the BVREH organised a workshop at the Oxford Internet Institute inviting various speakers from across the university to speak to humanities researchers. At the end of the event a focus group was staged to take advantage of the mix of interdisciplinary researchers gathered together.

Representatives of a broad range of disciplines were invited and those that attended discussed at length the interim findings of the BVREH using the following four categories as a rough guide; Discovery, Information Management, Communication and Working Collaboratively. Attendees were encouraged to consider potential tools from each of the areas by asking themselves 'what is the

applicability of this for humanities research and for my own research?', 'what would the required features be if it were applicable?' and 'what is the minimum limitation before such a tool or service would be of use to me?'. The representatives were also asked to state honestly if they thought that any of the potential tools and ideas were not of use or at odds with their methods of research and to state why they felt that way. Further definitions of the categories are as follows:

- Discovery:
Access to greater information about researchers and research interests along with searchable lists of conferences, lectures and seminars and centralised information regarding grants and funding

- Information Management:
The ability to search across multiple, distributed data sets, images and text. Seamless access to and integration of resources across humanities disciplines i.e. Personal storage and the ability to make annotations and create bibliographies together with access to Institutional Repositories and Digital Paper tools

- Communication:
Access to video conferencing/Access Grid technology; Chat Facilities and Voice over IP

- Working Collaboratively:
Assistance in publishing online and document editing tools

Demonstrators: The demonstrators were implemented using a variety of different techniques. The Research Discovery Service (RDS) which is being adapted for the Humanities has been implemented within the medical sciences division on top of the Plone4 content management system, running on the Zope5 application server. The data structures are modelled in UML, and the Plone XML Forest component is used to import/export data. The BVREH has this far worked to adapt the data structures to describe the research of humanities scholars, and has populated an instance of the system with data from Faculties within the Division.

The implementation of the 'Physical Tools' demonstrator has been in finding interested researchers and distributing the tools to them. This demonstrator hasn't involved any development of applications and as such the software that comes with the Anoto digital pens, and the 'PIG' have been used as is.

The 18th Century Workspace used both paper-based and HTML mock-ups, to provide an idea of how such a system might work and what obstacles there may be in implementing the fully working system. Similarly, the Virtual Workspace for the Study of Ancient Document began with drawing up a detailed list of user requirements, followed by ongoing testing of the 'proof-of-concept' system by researchers at the Centre for the Study of Ancient Documents. The project implemented a version of 'Giant Scalable Image Viewer' (GSIV)[6] for viewing digitized documents and inscriptions and investigated the use of Annotea[7] to store and retrieve annotations associated with the images.

Demonstrators Workshop: To showcase a number of the demonstrators the BVREH held a 'demonstrators workshop', inviting along researchers who had taken an interest in the project and who might benefit from the tools and services on show. The workshop was held during the lunchtime period and attendees came along and ate their lunch whilst looking at the Personal Interface to the Access Grid (PIG), the Research Discovery Service and the Anoto Pens. Each demonstrator was set up to be fully interactive and researchers were able to converse over the Access Grid, test the Medical Sciences version of the RDS and write and draw with the pens.

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[4] http://plone.org/

[5] http://www.zope.org/

[6] http://www.mojavelinux.com/projects/gsiv/

[7] http://www.w3.org/2001/Annotea/

6. Outputs and Results

User Requirements Survey: Respondents to the user requirements survey often focused on the types of generic functionality that a humanities VRE might provide. This type of functionality was perceived as benefiting the humanities community as a whole and alleviated the concern that tools might be both entrenched in and born out of technology, rather than arising from the needs of the humanities research community itself.

A common request from both researchers and research projects was that a VRE should address the issue of the need for many different usernames and passwords for the wide variety of databases, email accounts, image libraries and systems that a researcher might want to access daily. A number of comments suggested that it would be preferable for the VRE automatically to recognise the rights and privileges of an individual through their 'herald'[8] username and password. This would allow the researcher to log in once and gain seamless entry to the areas in which they have rights of access.

Further support for a simplified log-in came through discussion of the VLE in which issues with "…passwords and corridors" were cited as being somewhat confusing, leading individuals to wonder "what's the point?" These researchers commented that potential users of a humanities VRE may have relatively low technical levels and in order to avoid alienation a research environment should be as simple and easy to use as possible.

The expectation that a research environment should be extremely user friendly and as accessible as possible was very apparent from speaking with those within the community. It was felt that the project should stay aware of the developments of the Google desktop interface, where possible emulating the ease of access that Google provides to its users. Specifically, simple, effective design, the connected nature of the tools and ease of access to information are elements that a VRE should provide for researchers at the university.

Generic VRE functionality: It was clear that many of those involved in the research process would see significant benefit in part of a humanities VRE being devoted to generic functionality which would benefit researchers across all faculties of the division. Supporting the 'Mechanism of Research' from funding applications to the 'bits and pieces' such as travel grants and easy access to expenses forms was seen by many as an essential element of a VRE and has the potential to gain researchers trust in providing a useful entry point into the virtual environment. Once a user is familiar with the generic support provided it is logical to suggest that they might then want to explore and utilise other available research tools and functionality within a VRE.

Potential types of generic functionality: A number of interviewees asked for better access to information about the wide array of research and research interests that exist across the University. Various research projects pointed out that their work is often multi-disciplinary and ways of finding other researchers with similar interests leading to the possibility of collaboration was thought to be most useful. In particular, many researchers spoke of the need for '…a database of people and their research interests' and noted that it would be of particular use to '…know what others in the faculty are doing'.

Closely related was the suggestion that searchable lists of conferences, lectures and seminars within faculties, across the University and beyond, would be very useful enabling users to pre-select their interests and have relevant information sent to them via their inbox or to their desktop. Ensuring that the service was both up-to-date and easily customisable was highlighted as essential elements in reassuring users that they could trust the information whilst feeling fully in control of the content that they receive.

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[8]Herald is Oxford University's email system. Login to the web interface uses a Single Sign On system based on webauth with an "Oxford username". Most users refer to the system as their "herald" username.

Each of the above services within a VRE would enable humanities researchers to be aware of the work and interests of those around them without expending a great deal of energy trawling through and finding the information for themselves. This type of service would provide benefit to all those involved in humanities research without requiring a high degree of IT literacy and would provide a fundamental basis for the individual to utilise the VRE.

In supporting the 'mechanism of research' there was also considerable interest from humanities researchers and research projects for an area in which individuals or groups might seek support and guidance for obtaining and applying for research grants. One individual commented;

"I warmly support the idea that the VRE can advise and support applications for research grants. This is linked to the more general need to facilitate contact and pooling of information and expertise by existing research groups - not so much by them depositing research in a central area but by there being a central directory of projects (possibly with reports) and project workers. It is important that a lot of contact be personal rather than virtual"

This comment pulls together a number of aspects of generic functionality that were acknowledged most frequently during interviews. Within Oxford there is a vast range of knowledge and expertise which cannot always be tapped by those who might benefit most. Humanities researchers do want to collaborate with one another, often across disciplines within Oxford, nationally and internationally. A Humanities VRE would be an entirely suitable place to collate, present and disseminate information which will enable researchers to make connections and become aware of new research and/or funding opportunities.

The comment also highlights the concern that a virtual environment might take away the more 'personal' side of research, replacing human interaction with purely 'virtual' interfacing. Through generic tools it is felt that a humanities VRE can both enable researchers to work collaboratively whilst creating avenues for meeting, discovering and gaining a better understanding of the work of those around them, benefiting from and contributing to a 'pool' of expertise.

Further examples of generic functionality discussed during interviews included the availability of individual/departmental space for papers and personal information along with a forum for aiding the recruitment process.

Tools and services to address the need for generic functionality: There are already a number of services, tools and software available that might begin to enable the VRE project to address the types of generic functionality detailed above.

Within the Medical Sciences division, the RDS (Research Discovery Service) project, currently being developed with the support of the ACDT (Academic Computing Development Team), is addressing the need for a database of research and researchers within the division. The BVREH project was in numerous discussions as to the possibility of extending the service to include the humanities and to this end the RDS service became one of the BVREH demonstrators.

Reaction to the Medical Sciences RDS demonstrator, which was shown to humanities researchers at the BVREH Demonstrators Workshop and at various one-to-one sessions, has been very positive. Later paper-based mock-ups, demonstrating how the system might adapt to the different structure and hierarchy in the humanities were very useful in demonstrating how a humanities RDS might work in practice and alleviated concerns that the structure of the existing system, designed for scientists, might be too rigid for information about humanities researchers.

Some potential users commented that although the system would be extremely beneficial in principle, they were concerned that the service might not be kept up to date and queried whose responsibility it might be to do this. Many researchers felt that if it was left to the individual researcher some would and others wouldn't keep their research details up to date and that the service could then be rather patchy. It was also felt that if the system was university wide and was linked to systems related to the RAE and those related to external publicity, individuals would have much greater incentive to update their details, or send their information to an administrator for input.

Ongoing discussions with Research Services proved that there is interest in providing more detailed information in the area of grant applications and research funding. The Research Services website and backend systems were recently upgraded and it is felt that a collaboration to provide resources for humanities researchers through a VRE could be a viable opportunity both to promote the support available from Research Services and to give researchers the specific information that they have asked for.

Actual and perceived difficulties in providing generic functionality: There may be some difficulties, both actual and perceived, in supplying the generic functionality discussed above through a VRE. Some of these may be easier to overcome than others; however perhaps the largest obstacle is the possibility that the community may not contribute enough to the expansion of the services provided. It is clear that for a fully searchable and personalised lecture or seminar list to work it must be kept up to date at all times; if users miss an important seminar due to the lack of accurate information they will quickly decide that the service is not reliable.

The need for accuracy, but also the importance of ensuring that researchers understand the benefits of a service such as the RDS will also be vital for its success. If the service relies on individuals adding their own research interests to the database, and there is insufficient user engagement, the service will, as stated above, seem rather patchy.

In discussions regarding the provision of personal space within a VRE, there were differing attitudes as to the benefit to the individual researcher. One individual pointed out that he wouldn't use the system as he couldn't guarantee that he would be staying at Oxford. This researcher felt that it would be much better to have an independent website which would hold information and papers regardless of which institution one was affiliated to. This is an understandable concern when considering that humanities research is clearly a national and international pursuit, not confining the individual within the bounds of a single university. Making it possible to export one's information from the VRE to a personal website or to another institution's VRE might begin to alleviate this fear.

Cross searching, collaboration and communication: The many and varied projects within the Humanities Division currently hold significant digitized collections including pottery, sculpture, photographs, manuscripts and more. Some of the larger projects are currently working on providing a more interactive, 'research enabling' experience with the premise of allowing the user not just to view the collection, but to save the images to a secure area, annotate, manipulate and compare copies, send the copy to and converse with other researchers and to return their research back to the archive, continuously growing and informing what is known about pieces within the collections.

Whilst this functionality is not currently available within all of the projects mentioned here, it is clear that there is a genuine desire to provide collaborative and interactive tools to humanities researchers, benefiting both the research process and the projects that make the collections available. Projects currently developing this type of functionality include the Classics-based Beazley Archive, the DIAMM project within the Music faculty and the Forster Project at the Pitt Rivers Museum.

A direct benefit of a Humanities VRE would be to provide smaller projects across the division with functionality that has been developed elsewhere. One project which is working on an interactive research area, commented that their work should not be repeated by other research projects or by the VRE. Discussions with many projects affirm that there is no desire for functionality to be replicated if the work has already been successfully carried out within the University.

Cross searching and linking databases and datasets: A consistent thread to come out of the user requirements survey was that researchers across the division often use and search across a broad range of disparate databases and datasets, located both within and outside the university on a regular basis. A source of frustration was the need to keep accessing each data source, one after the other, possibly logging in with new passwords, or accessing different systems and submitting the same search terms each time. One researcher suggested; 'I want to search across all the digital

datasets that are available and select [my] own personal portfolio', another pointed out; 'I'd like it to be seamless. So I haven't got to type in another password, just switch on my computer and have it there.'

These were common suggestions which would provide clear benefit to researchers in terms of time and functionality. The provision of an area in which a broad array of datasets could be selected from and subsequently searched across would greatly reduce the amount of time taken to search each database individually. Researchers pointed out that they were increasingly frustrated by the amount of sources they have to access for which they might want to submit the same search term time and again. Many called for an area in which one search term might be submitted to a variety of databases at once, bringing back an extremely useful selection of results from varied sources which could then be directly accessed if relevant. The benefit to the researcher might also be seen in efficiently finding datasets that they might previously have been unaware of.

Providing this sort of functionality was the starting point for the BVREH's 'Eighteenth Century' demonstrator, linked to a project in the English Faculty led by Professor Kathryn Sutherland. The AHRC-funded project is concerned with digitizing Jane Austen's manuscript fiction and creating an electronic environment in which to train graduate students in modern literary manuscript analysis and description. As part of this environment there is a need for integrated searches across a number of databases including ECCO (Eighteenth Century Collections Online), Chadwyck-Healy Literature Collections, and Samuel Johnson 'A Dictionary of the English Language and British Fiction 1800 – 1829.

In discussions with the Jane Austen project and representatives of ECCO utilizing paper-based mock up versions of the system, it became clear that although there is a great deal of interest in providing cross-searching functionality, there are a number of obstacles to delivering such a system. The differences between the databases themselves, their registration and log in differences, together with the differing structures and standards of each dataset present formidable issues to be solved before such a system could be implemented.

Collating research and annotations: Once a researcher has searched across various datasets and located relevant material it was widely suggested that it should be possible to collate this material into a private or 'personal' space for continued analysis and future reference. This personal space might include a mixture of saved searches, images and texts and a number of researchers suggested that it should also incorporate the ability to make and store notes together with the provision of tools allowing the researcher to make annotations directly onto the saved material.

Researchers expressed a desire to download digital material, make annotations and perhaps print the annotations visibly integrated with the digitised document. One individual commented that if publishers were not happy for researchers to annotate over or to print a document, it might be useful to be able to save annotations to an area within the VRE and 'whenever the digitised document is opened the 'layer' of saved annotations [would] also become available'.

Researchers also expressed a desire to share the annotations that they had made to a digitised document with colleagues and collaborators. The functionality to provide both 'private' and 'shared' annotations was considered particularly desirable, humanities researchers are often keen to work alone on a document, image or text in the first instance, formulating thoughts and readings of a text or manuscript, but quite often they will then want to share their thoughts with their project team or collaborators. Providing a space in which digitised items could be saved, annotated and through which sections could be opened up for trusted access would be a significant step towards providing an effective, research-enabling environment.

Support for Collaborative work: Throughout the survey the idea of tools to support collaborative document editing became a recurrent theme. When asked how collaborative written work was carried out on a daily basis many researchers across different disciplines talked about the same process of producing a document in Word, sending it to their colleague and waiting for the document to be sent back to them before they could continue themselves. Some researchers would use email for this process and a number were using the university's VLE as a secure place to save the document,

allowing a colleague to access and edit it. For the purposes of version control, a few researchers were using the 'track changes' facility in Word, whilst many would highlight the additions they had made in bold or a different colour.

What became clear as researchers discussed collaborative document editing was that there was no well defined route for researchers to follow. They either used the functionality within Word, forcing users of other word processing packages to conform to this standard, emailing the document back and forth. Or they created an ad hoc route in which resources, not designed for such a function can be used to save and distribute the document however it was created. Interestingly, it is clear that users across various disciplines find the same limitations with the options currently available. Attendees at the JISC VRE Programme meetings held in January and July 2006 formed a working group to discuss the requirements of collaborative document editing with representatives spanning the humanities, medical research and institutional research environments.

As detailed in the previous section, some researchers wished to take the collaborative possibilities further, desiring tools to view and manipulate images and texts which they might store in a personalised or 'virtual' workspace. Support for the ability to work collaboratively with others regardless of their location, sharing the same view of an image or digitized object and annotating and pointing to items of interest was seen as a benefit across a number of disciplines which work with images, historical objects, manuscripts and digitised texts. One researcher commented:

'you need to be able to look at a document together, to have the same view… if you're sharing with someone else, the ability to actually draw and point and write and interact with the document is good'

The need for tools to support collaborative work in this way is characterised by the fact that the physical objects of research are often in widely dispersed locations, as are the researchers themselves. Whilst in many cases researchers can already view digitized images of ancient documents, music manuscripts, pottery, sculptures etc, there is an emerging desire to enable interactive participation by researchers who might work in dispersed environments, or interdisciplinary groups, providing the tools to enable them to work in different countries on the same material simultaneously forming a 'virtual gathering' without being unnecessarily constrained by time, money or travel.

Communication support: Support for communication tools was also evident in the findings of the survey, though there were very different ideas as to what form these tools should take. Interviewees most interested in the provision of a personal or 'virtual' workspace, those that envisage an area to store, manipulate and annotate a personal collection saw great benefit in incorporated communication facilities through which they might share their thoughts and ideas whilst having real time discussions and meetings. These researchers were most likely to appreciate the benefit of Access Grid technologies, video conferencing and to some extent chat facilities.

Researchers who work in distributed teams working collaboratively on written documents and publications were often more inclined to see the benefit of chat or Voice over IP technologies. One researcher working with a colleague in the US on a joint publication was greatly impressed with an IRC Chat meeting that she had recently had. New to the technology, she felt it was useful to be able to see when her colleague was online and available to talk. On a few occasions when the notion of 'chat' facilities came up interviewees seemed somewhat put off by the inherent meaning of the word 'chat'. '…you don't want to chat! You have to get on with your work.' was one reaction. But others saw the benefit not only in real-time communication but also in that it would be useful to 'track what has been said in a Chat meeting through an archiving system', to be able to keep an ongoing and comprehensive log of a conversation and its elements that may otherwise get lost in a telephone call.

Those more interested in a video conferencing solution also had reservations even though they could see the overall benefit of having access to such facilities. A number of interviewees suggested that they would be very interested in finding out about and utilising the Access Grid, but felt concerned that their colleagues in other countries and other institutions might not have access to the same tools and equally importantly that they may not have the IT personnel to support them effectively. It was

strongly felt that any solution would have to be very simple to use and that all parties would need good access to the technology.

In discussing the potential drawbacks and benefits of the Access Grid in particular, there was wide concern that a researcher's process of working might be significantly disrupted if it were necessary to have to book and then to physically visit the Access Grid node every time a meeting was to be held. A number of researchers pointed out that they often need to have primary resources such as books, manuscripts, texts and notes around them when meeting with colleagues and felt that it would be impossible to transport everything they needed to an Access Grid room. Equally, as Oxford is such a distributed university with departments, divisions and colleges scattered across the city, the obstacles to transporting one's research materials to an Access Grid node seem even greater. As above, researchers were also concerned about the level of technical support available to them and one individual who had some experience of Access Grid commented:

'…somebody next to the microphone would be shouting and somebody at the back really quiet. The images were poor; it was hardly the experience that we're led to believe the Access Grid can deliver.'

However others did see the long term benefits of the evolving technology, one researcher suggested:

'…something like the Access Grid would, in time become normal, like email or the telephone'

The drawbacks of the Access Grid environment in its current form seem to prevent popular take-up of the technology amongst humanities researchers. But the notion of video conferencing and the suggestion that 'something like' the Access Grid would become normal and indeed would be useful to the collaborative process was a widely held belief. One interviewee could clearly see the benefit of a hands-free environment 'preferably at one's desk with books and notes etc at hand', enabling him to hold meetings with colleagues whilst surrounded by all of his research notes and materials. Others envisaged using video conferencing within the 'virtual workspace' (mentioned previously), fully integrating interactive and collaborative tools with face to face communication across the 'Grid' or web.

Services to address collaboration, cross searching and communication: In order to support the collaborative aspects of researchers' work it will be important to coherently pull together virtual 'workspaces' such as those described above with communication tools and access to the distributed datasets and databases discussed previously. The culmination of these services should come together as one researcher stated, to:

'…mediate the flow of work through the research cycle, from the capture of primary data through decipherment, initial analysis and identification of comparanda, discussion and review with colleagues and collaborators, to reintegration of acquired knowledge and its application to new primary data.'

Through a VRE it would be plausible, where possible, to pool resources, making databases, communication and annotation tools openly available to all, benefiting researchers by providing a consistent interface to commonly desired functionality. During the requirements gathering survey the following key elements of a 'Virtual Workspace' were identified by researchers as those most needed to support their work successfully enabling them to:

- Search across multiple, distributed data sets, images and text
- Select, store and organise items from the above, in a 'personal workspace'
- Add annotations to these items to store personal thoughts and responses
- Support collaboration by allowing multiple researchers in separate locations to share a common view of the workspace, in conjunction with real time communication via Chat, VoIP or desktop integration with Access Grid
- Allow a collaborator to comment, point/highlight, discuss and annotate the items in the shared workspace

The above actions form the basis of the 'Virtual Workspace' demonstrator, designed in the first instance for the study of ancient documents, working closely with the Centre for the Study of Ancient Documents at Oxford University. The Workspace forms a step towards being wholly applicable or at

least in part useful to a diverse group of researchers across the different faculties of the division. Through the VRE, the workspace demonstrator has shown that it would be feasible to adapt existing services, build new components as necessary and to pull together tools which would enable a broad range of researchers to:

- Access high-quality images and images of documents in remote locations which have not been hitherto available to him or her
- Reassemble individual documents and images which have been fragmented and dispersed and, as far as possible to reconstruct their original context
- Compare and collate related documents or corpora of texts
- Access all the bibliographical and other research tools necessary for understanding the document
- Use sophisticated IT tools and applications which allow the user to manipulate texts and images, in particular to enhance the images of damaged, abraded and otherwise illegible texts to the point where they can be read
- Communicate with other researchers virtually, in an environment which allows direct consultation and interaction between documents and scholars
- Collate and publish drafts of texts which can be linked to images of original documents and made widely available to scholars and the general public where appropriate
- Enhance the environment by contributing his or her own tools, knowledge and data for use by other scholars (subject to normal constraints of copyright, intellectual property etc.)

The demonstrator version of the workspace used the 'Giant Scalable Image Viewer' (GSIV)[9] for viewing digitized documents and inscriptions and investigated the use of Annotea[10] to store and retrieve annotations associated with the images. The BVREH also researched the different options for Chat, VoIP and Personal Interface to the Access Grid (PIG) and invited humanities researchers to test out the PIG's for themselves. The desktop PIG was met with a muted response as many researchers felt that whilst the system seemed useful, they were unsure that their colleagues in different countries and institutions had access to desktop technology able to handle video conferencing. This uncertainty led to very low take up of the PIG demonstrator and the project continues to have a list of researchers who are interested, but are not quite ready to trial the PIG.

Along with the PIG, the BVREH also trialled the Anoto Digital Pen and found great enthusiasm for the concept right across the Humanities Division. Trialled earlier by mathematicians and computational biologists as part of the Integrative Biology VRE, the BVREH was keen to find out whether the pens would also be of use to humanities researchers who frequently work in libraries, travel to conferences or who may spend time working onsite at excavations or in museums. When the BVREH project demonstrated the pens at the 'demonstrators' workshop' it was clear that the pens caught the imagination of those present straight away. From the workshop five individuals each took a pen and were asked to keep a diary of when and why they used it over a couple of months. The trial was fairly informal, but emphasized an enthusiasm for the pens due to their portability and that they write on paper as normal, providing the added functionality of storing the writing electronically along with hand writing recognition and integrated short cuts to create email and to-do lists. As a proof of concept the pens were a real success; however it was recognised by most of the participants that there are a number of issues that need to be ironed out before the pens could be fully integrated into a humanities researcher's tool kit.

Archiving, repositories and dissemination: Many interviewees felt that there should be enhanced support for storing, publishing and archiving their work either on faculty web pages for open access or in a more secure area for their academic material. A number of interviewees felt that there was no ongoing support if they created their own web page and that it was a bit 'hit and miss' as to whether their faculty provided personal web space for researchers. One individual pointed out that the web could be used to good effect to 'create a virtual community', but currently many researchers have little or no information about themselves and their work on the web.

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[9] http://www.mojavelinux.com/projects/gsiv/
[10] http://www.w3.org/2001/Annotea/

Whilst some of these issues are very similar to those mentioned in section 4.2.1 of this report (Potential types of generic functionality), the survey showed that there is a further desire for researchers to have the option of putting material and publications onto their own personal space within the their faculty website and/or the VRE. Services addressing the more generic requirements could then draw supplementary information from these personal spaces as they are updated.

Concerns were also raised regarding the transient nature of websites and resources which might be cited in a researcher's work only to disappear, or to be edited or altered at some stage in the future. Some researchers felt reluctant to use electronic journals, resources and some electronic formats as they might disappear over time, or the formats might not be readable in ten or twenty years time. One individual pointed out that humanities researchers are very different to those within the sciences where the emphasis is on publishing research quickly, with the likelihood that new research will supersede it within a relatively short period of time. The nature of humanities research makes it much more likely to be relevant over a broader timeframe and so the provenance of the citations and the longevity of the format are of great concern to the humanities researcher. Within the survey there was support both from library sources and academic researchers for more sites to be archived at regular intervals in order that provenance of a citation is not lost

A number of times individuals asked about institutional repositories, or the subject of repositories came up in interviews. Although many researchers were unaware of the university's current standing on the issue, many were interested by the idea that an institutional repository might be available in the future to store and archive their research material and felt that a humanities-based VRE should provide them with an uncomplicated entry point into such a system. Benefits of a repository were seen to be in promoting the division's research material both to those within Oxford and externally. Equally a number of researchers felt that a repository would be beneficial to those researchers moving between universities and to those who might want to track an individual's work.

7. Outcomes and Lessons Learned

The approach of user requirements survey allowed the BVREH to get a good understanding of the needs of the humanities community and to make solid recommendations as to what should be incorporated into a Humanities VRE. The user requirements survey itself unexpectedly uncovered a lack of such surveys in humanities IT projects and as such the project used its experience to set up a number of workshops to establish 'best practice' in this area. It is hoped that the outcome of these workshops will be of particular benefit to the community long term and will continue to inform the BVREH as the project moves on from VRE stage one.

The BVREH project also benefited from the experience of the IB VRE project and, in particular, the methodologies the IB project developed for the rapid development cycle of requirements analysis, prototyping, feedback and deployment of pilot services. Although the BVREH was only building demonstrators during this funding period the ongoing interaction with researchers allowed the project to constantly monitor and where necessary improve/edit the early prototypes to gain agreement as to how these services should eventually function.

The BVREH experience has been an extremely valuable one. The project has enjoyed a high profile amongst humanities researchers both at Oxford and beyond and has had significant input into the future of humanities research through identifying areas in which VRE tools and services will be beneficial to the wider humanities community. In part due to the findings of the project, the Humanities Division at Oxford has made a strong commitment to maintain VRE activities as a key element in the development of its own research and ICT strategies and the BVREH has secured VRE stage two funding to broaden the scope of its work and to create a VRE for the Study of Documents and Manuscripts.

8. Dissemination

The BVREH website is at http://bvreh.humanities.ox.ac.uk/ and includes a great deal of information about the project including project reports, Project Manager and Technical blogs as well as RSS feeds and the opportunity to sign up for project newsletters via email. Many of those contacted during the project, or who have expressed an interest in keeping up to date with the project have joined the mailing list and have received newsletters over the past two years. Alongside this the project has continued to keep in touch with researchers, passing on any relevant knowledge to individuals gained during the user requirements survey.

As much humanities research involves collaboration across many different institutions, dissemination and communication through presentations at conferences, meetings and workshops were extremely important in confirming that requirements highlighted at Oxford were often complementary to the needs of humanities researchers elsewhere. Consequently, the BVREH was keen to work with solutions which formed the basis of a common framework, enabling researchers to communicate effectively, share their work and collaborate across institutional boundaries.

The BVREH presented or displayed posters at the following events:

- Oxford University IT Support Staff Conference - 22nd June 2006 (Presentation)

- Presentation for the Digital Classicist at University College London - 4th August 2006 (Presentation)

- Digital Resources for the Humanities and Arts (DRHA) – September 2005 and 2006 (Presentations)

- All Hands Meeting (AHM) - September 2005 and 2006 (Posters)

- The international Computers, Literature and Philology (CLiP) conference - 28 June - 1st July 2006 (Poster)

- JISC Programme meetings - June 2005, January 2006, July 2006 (Presentations)

The presentations and posters for the above events can be found at:
http://bvreh.humanities.ox.ac.uk/recent_presentations

9. Conclusions

The BVREH project has upheld the original 2004 survey findings and concludes that there is a strong need for VRE tools to support humanities research both at Oxford and beyond. Specifically, VRE tools and services should support and enhance the entire research life cycle from resource discovery and funding applications through data creation and analysis to the dissemination and preservation of the work of a project or individual.

There is clearly still a long way to go in implementing such tools and services and the project has demonstrated that a bottom-up approach, keeping users engaged and getting humanities researchers interested at an early stage is the way to continue building on and maintaining enthusiasm in the project. Long term, as the project builds further momentum and starts to implement services, this relationship with the end user will be paramount in driving the aims of a humanities VRE forward.

10. Implications and Sustainability

The BVREH project continues to fit within an overall Divisional strategy at Oxford to establish support for ICT and helps to develop an initiative sponsored by the Division to investigate potentials for the construction of a VRE within the Humanities. The University has committed bridging funding to enable

retention of key personnel between the conclusion of funding for the VRE stage one project and the start of VRE stage two projects in spring 2007. The Humanities Division has made a further commitment to maintain VRE activities as a key element in the development of its own research and ICT strategies.

The project funded under the VRE stage two strand, extends the activities of the BVREH project by building on experience gained in user requirements elicitation, and forms the basis for a productive working relationship with the established user group of documentary and textual specialists. The BVREH project highlighted the common needs of users across different disciplines, languages, cultures and periods within the humanities who all work with texts in various forms. It has demonstrated that the collaborative study of documents and manuscripts is an area of central and shared interest across humanities research which is likely to benefit from the deployment of VRE tools and services.