Cover Sheet for Proposals ***(Please complete ALL sections)***	JISC **VRE Programme**

Name of Call Area Bidding For (tick ONE only):

- ☐ **Strand A1: Automated metadata generation and text mining**
- ☐ **Strand A2: Developing e-infrastructure to support research disciplines**
- ☐ **Strand A3: Repositories: start-up**
- ☐ **Strand A4: Repositories: rapid innovation**
- ☐ **Strand A5: Repositories: enhancement**
- ☐ **Strand A6: Preservation exemplars**
- ☑ **Strand B1: VRE Innovation: Tools and interoperability**
- ☐ **Strand B2: VRE Innovation: VRE Frameworks**
- ☐ **Strand B3: VRE Innovation: VRE National and Institutional Interoperability**

Name of Lead Institution:	University of Manchester
Name of Proposed Project:	Video Conversion for Virtual Research Environments (ViCo-VRE)
Name(s) of Project Partner(s):	

Full Contact Details for Primary Contact:

Name: Andrew Rowley Position: Senior Development Officer
Email: Andrew.Rowley@manchester.ac.uk
Tel: 0161 275 0685 Fax: 0161 275 6120
Address: Research Computing Services, Devonshire House, University of Manchester, Oxford Road, Manchester, M13 9PL

Length of Project:	**8 Months**		
Project Start Date:	01/04/09	**Project End Date:**	30/11/09
Total Funding Requested from JISC:	**£49,986.13**		

Funding Broken Down over Financial Years (April – March):

April 09 – March 10	April 10 – March 11	April 11 – March 12
£49,986.13	£0	£0

Total Institutional Contributions:	£18,441.50 (26.95%)

Outline Project Description:

Previous phases of the VRE programme have demonstrated a need for a video conversion tool for Access Grid recordings that can then be included in generic toolkits within various different virtual research environments. The VRE phase 1 project Memetic developed an Access Grid recording tool that was then used by other projects during this phase (namely, *VRE for the History of Political Discourse* and *CSAGE*); this software was also developed in the AHRC/EPSRC/JISC co-funded project e-Dance for the recording of dance performance.

Two diverse sets of users have requested functionality to convert recordings into common media formats to allow interoperation with standard video editing tools (such as Adobe Premier), standard media players (such as Microsoft Windows Media Player and RealPlayer), DVD players, and also to support replay directly from the web, rather than requiring use of the Access Grid software client. The VRE phase 2 project Collaborative Research Events on the Web (CREW) project went some way to supporting the last requirement, through provision of an interface for playing recordings of seminars using Flash via a web browser, but this was only limited to display of a particular format, that of a presentation.

We propose to develop the outputs of the Memetic and CREW projects to address the needs of a wider research audience by supporting interoperability with third party editing and playback software and enabling existing recorded material to be reused and repurposed in new recordings. Interfaces will be developed that allow the tool to interoperate within the e-Framework and, through the development of a service-oriented architecture, allow

interoperability with institutional systems and national infrastructures. The resulting web service can be widely and easily deployed to support research needs from many domains. The tool will be developed in close collaboration with researchers in the virtual research community to ensure high usability and maintain focus on the most useful requirements. These communities include the Virtual Research Group, a user group grown from the *VRE for the History of Political Discourse* project from phase 1 of the VRE programme, the ACM SIGGRAPH Manchester Professional Chapter, a user group from CREW, and choreographic researchers from the e-Dance project.		
I have looked at the example FOI form at Appendix B and included an FOI form in the attached bid (Tick Box)	**YES** ✓	**NO**
I have read the Call and associated Terms and Conditions of Grant at Appendix D (Tick Box)	**YES** ✓	**NO**

FOI Withheld Information Form

We would like JISC to consider withholding the following sections or paragraphs from disclosure, should the contents of this proposal be requested under the Freedom of Information Act, or if we are successful in our bid for funding and our project proposal is made available on JISC's website.

We acknowledge that the FOI Withheld Information Form is of indicative value only and that JISC may nevertheless be obliged to disclose this information in accordance with the requirements of the Act. We acknowledge that the final decision on disclosure rests with JISC.

Section / Paragraph No.	**Relevant exemption from disclosure under FOI**	**Justification**

Video Conversion for Virtual Research Environments (ViCo-VRE)

C1. Introduction

1. Virtual Research Environments (VREs) need to take account of significant differences between research practices across different disciplines. However, it has become clear that there is a need for the conversion of Access Grid recordings to more interoperable formats to support a broad range of different researchers' needs. The VRE phase 2 project Collaborative Research Events on the Web[1] (CREW) developed a system for recording and replaying research seminars, presentations and workshops. This built upon the VRE phase 1 project Memetic, which was primarily designed to record research meetings. In addition to the users of Memetic and CREW, the VRE phase 1 projects CSAGE[2] and the VRE for the History of Political Discourse also made use of Memetic[3], and since then, the concepts developed in Memetic have been reused by the joint AHRC, EPSRC and JISC funded e-Dance[4] project to document and help create dance performances. All these projects requested that the videos created be exportable to other common media formats for various use, from writing the recordings to DVD, to being able to play them back from a web page.

2. A flexible tool that allows recordings to be converted from and to common formats has therefore been shown to be a requirement in a generic research toolkit designed to support the development of the autonomous, collaborative researcher. This project will address this need by building on the lessons learned from CREW and Memetic. It is proposed to develop a video conversion tool that will be flexible enough to support recordings of different types of events, allowing them to be converted from and to common formats for different scenarios depending on the needs of the researchers. These needs will be evaluated using a user-driven approach and the tool will then be developed using participatory design and rapid application development, whereby the users are consulted before any code is written, and then the produced software is evaluated after each part of the tool is developed. This will ensure that the resulting tool is developed in an agile manner and meets their specific needs.

3. The use of standards in the access of this tool will ensure that it can be easily integrated into different systems, and that the recordings can be replayed and edited with a variety of third party software such as video editing tools (such as Adobe Premier), standard media players (such as Microsoft Windows Media Player and RealPlayer), DVD players, and also to support replay directly from the web, rather than requiring use of the Access Grid software client. The tool will also be deployed as a service using the service-oriented architecture (SOA) approach to allow the system to be used from within the e-Framework.

C2. Project Description

Key Project Building Block: Memetic

4. Memetic was funded as part of the first phase of the VRE programme. The purpose of the project was to develop an Access Grid recording and replay system that allows live annotations to be made alongside the recordings. These annotations are used to navigate around the recording, avoiding the need to watch everything. The project was designed to record meetings, but it was found that users wanted to record diverse events, from seminars and workshops to dance performances.

5. Access Grid communicates using the Real Time Protocol (RTP), and Memetic records this by storing these RTP packets directly, along with an index. This allows the recordings to be played back into another Access Grid meeting with very few changes. There are many benefits of this choice in storage including: the ability for the recordings to be started from any time point; allowing annotations to be made against any time point in the recording; and allowing the recordings to be edited without the original being changed.

6. One of the inconveniences of the format is that it cannot be played or edited with standard video or audio tools, making it more difficult to present the recordings on websites. During the first phase of the VRE programme, Memetic was successfully used by the VRE for the History of Political Discourse and CSAGE projects, and the Locating Grid Technologies workshops at the University of Bristol. These users requested that their recordings be exported to common file formats to allow them to be used for different purposes.

Key Project Building Blocks: CREW and e-Dance

7. CREW was funded as part of the second phase of the VRE programme with the aim of joining Memetic with another VRE phase 1 project Iugo[5]. The project was designed around the recording of seminars, allowing these events to be searched within the context of other information. CREW also added the ability to record events when network access is not available.

---

[1] http://www.crew-vre.net/

[2] http://www.rcs.manchester.ac.uk/research/collaborativestereoscopicaccessgridenvironment

[3] http://www.memetic-vre.net/

[4] http://projects.kmi.open.ac.uk/e-dance/

[5] http://iugo.ilrt.bris.ac.uk/

8. To allow recordings to be replayed within a web browser, the CREW project developed a Flash-based player. This required a converter to transform the files into Flash Video (FLV) streams. This allows a wider audience to access the recordings, but is still designed specifically for replaying presentations.

9. E-Dance is a JISC, EPSRC and AHRC joint funded project which is investigating the use of e-Science tools in practice-led dance research. This project has also developed a customised recording and playback system based on the Memetic software. In this instance, the playback is performed through a stand-alone program that allows the recording to be combined with a live performance. One issue with this program is that, because it was designed to play only Memetic recordings, it cannot play streams in standard video formats, and so older material recorded without Memetic cannot easily be used in the performance.

Generalising Memetic and CREW

10. There is clear benefit to be gained from providing a general video conversion tool. Autonomous researchers want to be able to record for various reasons. The proposed web service will allow these researchers to upload recordings in various formats, such as avi or mpg. These will then be converted into the Memetic file format, so that they can be combined with other recordings when using Memetic-based replay tools. This will also support the upload of recordings in the Memetic format for storage and use by the export interface. The web service will use the Simple Object Access Protocol (SOAP) for control and SOAP-with-attachments for the uploading of videos to ensure compatibility within the e-Framework.

11. A web service will also be created for exporting videos. This will allow users to download the streams of the recording in a variety of formats. The interface will allow the user to choose what combination of audio streams are included with each video stream, and will also allow basic editing such as the resizing of videos.

12. Further impact of the project is discussed in section E3.

C3. Value to JISC Community

13. The project outputs offer the following valuable contributions to the JISC community: a route to sustainability for the outputs from previous VRE projects Memetic and CREW; a reusable web service for video conversion that is interoperable within the JISC e-Framework; sample uses of the web service for others to utilize; and valuable interaction with the Virtual Research Community.

D1. Work Plan

14. **Work Package 1: Project Planning.** This work package will prepare a detailed work plan.

15. **Work Package 2: User Needs Analysis.** This work package will determine the requirements for each part of the tool through interaction with users via meetings, workshops and questionnaires.

16. **Work Package 3: Dissemination.** This work package will set up the mechanisms for sharing the developments with the community. This will then ensure that the software is released at appropriate points in the development cycle via the Google Code site as well as the project web site.

17. **Work Package 4: Import Web Service.** This work package will develop and deploy the web service for uploading videos in common formats, and for replaying them via Access Grid. The Memetic code will be repurposed for this service, but a SOAP front-end will be developed. SOAP with Attachments will be used to allow videos to be imported into sessions, allowing the upload of RTP recordings as well as different external formats, to be determined by the User Needs Analysis. This will be based on the reverse of the CREW video conversion code, converting the videos into Access Grid-compatible RTP packets. The SOAP interface will also allow the replay of recordings within secured Access Grid sessions.

18. **Work Package 5: Offline Recording Tool.** This work package will develop a simple user interface that will allow the recording of sessions where there is no network. This will be based on the CREW recording code, but will have a more basic interface, to be determined by the User Needs Analysis. This will also create a library from the CREW code for recording, which will be made available for download.

19. **Work Package 6: Import Demonstrator.** This work package will create the web site which will be used to control the recording web service, both for the uploading of video files and replaying them over Access Grid. This will be the way in which the user groups access the conversion service and so the exact nature of the demonstrator will be determined by the User Needs Analysis.

20. **Work Package 7: Export Web Service.** This work package will create a web service for exporting videos. This will be based on the CREW code, but will be expanded to support other formats. This will allow users to replay the videos in a player of their choice, or write the videos to DVD. The web service will use SOAP to direct the export and the file will be returned using SOAP with Attachments. The service will also be controllable by means of an HTTP URL with a query string in the application/x-www-form-urlencoded media format used as standard in web browsers. This will then return the file directly, with the content type of the returned file being determined by the chosen output file format. This will allow media players to play the content directly without having to first decode it from the SOAP attachment. The formats that will be supported by this service will be determined by the User Needs Analysis.

21. **Work Package 8: Export Demonstrator.** This work package will create the web site which will be used to export the recordings. A simple interface will allow users to select which streams are included in the

file, and will allow the selection of the format. A flash player will be developed that will allow the replay of the recordings based on the CREW player. This will use the web service for exporting videos to display replays of the recordings within a web page. This interface will be the way in which the user groups access the service, and so the exact nature of the interface will be determined by the User Needs Analysis.

22. **Work Package 9: Reports and Documentation.** This work package will produce the final project report, as well as all the documentation for the tool. Appropriate documents will be submitted to the e-Framework and the Virtual Research Community web site as part of this work.

23. **Work Package 10: Evaluation and Testing:** This work package will evaluate and test the produced tools through interaction with the user groups via meetings, workshops and questionnaires. This information will then be gathered in a final evaluation report.

D2. Timetable

Work Package	Apr09		May09		Jun09		Jul09		Aug09		Sep09		Oct09		Nov09	
WP1: Project Planning																
WP2: User Needs Analysis																
WP3: Dissemination																
WP4: Import Web Service																
WP5: Offline Recording Tool																
WP6: Import Demonstrator																
WP7: Export Web Service																
WP8: Export Demonstrator																
WP9: Reports & Documentation																
WP10: Evaluation and Testing																

D3. Deliverables

24. Non-software deliverables will include:

- A detailed work plan within one month of the project start date, including the specification of the web services and applications to be developed and how they interact. The plan will also detail any additional users that arise from the other projects that are funded under the VRE programme. Finally, this plan will include the methodology to be used in trials of the software.
- Monthly meetings with the JISC programme management team and an interim report after six months from the project start.
- A project web site on which the demonstrator web applications will be hosted, as well as links to the other software produced and reports.
- Interaction with the Virtual Research Community Website, including the support forum, the FAQs, and the public blog for the project. Issues with the demonstrator will be summarised in a final report to the VRC website at the end of the project.
- A final project report that analyses the project in detail from development through to user engagement and evaluation.
- A Google Code website for the project that will enable interaction with other open-source developers. This site will remain available in perpetuity in line with the Google Code guidelines.
- A service description and documentation submitted to the e-Framework innovation knowledge base.
- An evaluation report detailing the issues encountered, lessons learned and indicated, and the future work to be carried out in the area of video conversion.

25. The work to be done to produce the software deliverables is described in the work plan. In summary, the software deliverables are a web service for importing and converting videos from a variety of popular media formats, a demonstrator offline recording tool, a demonstrator import web application to allow reuse of existing recordings, a web service for exporting videos to a variety of popular media formats and a demonstrator export web application.

D4. Project Management

26. This project will be managed and administered by the **Project Manager** (PM), Martin Turner, based at the University of Manchester. The role of the PM is to monitor progress of project activities; to initiate remedial action because of slippage or in the event of risks occurring; to provide a single point of contact for the project; to ensure the full engagement of all stakeholders through effective implementation of the dissemination strategy and internal procedures (i.e. co-attended sessions, meetings, collaboration tools, etc.); and to lead the production of JISC progress and final reports.

D5. Risk Assessment

Risk	Prob. (1-5)	Severity (1-5)	Score (PxS)	Action to Prevent/Manage Risk
Staffing	2	4	8	Expertise is shared between other members of staff at the University; these staff members could take over responsibilities as necessary.
Organisational	1	1	1	No external collaboration is involved.
Technical	3	3	9	The technologies involved are challenging. However, the developer involved is an expert and well known to appropriate user groups if external assistance is required.
Suppliers	1	1	1	No external suppliers involved.
Legal	3	3	9	Legal issues are a key topic in software that stores copyrighted data. These issues have been explicitly addressed in CREW via related organisations, and this project will ensure these recommendations are undertaken within the developed tools.
User stakeholders	2	4	8	Users are so highly integrated in this project that significant problems would occur were they not to be fully engaged. We have mitigated this risk through the use of consultancy fees for time spent in evaluation activities, which provides a higher obligation on the users' part. Additionally, the project team are in contact with many user groups that would make good replacements were any major user groups to opt out during the project due to unforeseen circumstances.

D6. Intellectual Property Rights

27. All software developed in this project will be available on an open source basis, licensed for free non-commercial use and development, and will be available to the UK HE and FE community in perpetuity.

D7. Sustainability

28. This project regards sustainability as a priority if full value is to be achieved from software development. The services produced will be hosted by Research Computing Services and the University of Manchester for the duration of the project and for an extended period of time after the project has completed. The project software will be hosted on a Google Code site, where the rest of the Virtual Research Community will be able to reuse and extend it. Interaction with users in the community is addressed as a work package of this project, and so there will be continuing demand beyond the end of the project. This will alleviate the risk of the users not using the product beyond the end of the funding period.

29. Some interest has already been expressed from the international Access Grid community for this tool. This community will also be given access to the Google Code site, and will then continue to enhance and support the tool beyond the funding period. This will keep the code up to date allowing future continuations of the work by the community in the future.

D8. Recruitment

30. All staff will be in place at the start of the project so it is unlikely that any recruitment will be required.

E1. Engagement with the Community

Engagement with Stakeholders and Practitioners

31. Three groups of users (described in E3) will be used in the project to pilot the tools produced. These groups have all actively agreed to help in the evaluation as well as exploit, in the short and long-term, the outputs of this project and help disseminate to a wider range of researchers.

32. The user stakeholders will be engaged through the user needs analysis and evaluation described in the work plan; this analysis will be part of the project work, and so will not be undertaken here.

Engagement with JISC Programme

33. 35 days per year will be allocated for engagement in programme level activities. As the timing of these activities is unknown, all activities described in the work plan will have a degree of flexibility in timing to ensure that time can be taken out to attend these events.

E2. Dissemination

34. We will develop a dissemination plan in order to reach the widest possible audience of potential users, service providers and other stakeholders. This plan will help us provide most value to the JISC community in terms of ensuring sustainability, a wide user base, and the most productive use of the

recording and replay tool by researchers and others developing research tools and frameworks. Work will be disseminated through the Virtual Research Community website, as well as through the project website and the project Google Code website. Other traditional dissemination activities will also be undertaken such as attendance at workshops and conferences and the production of relevant publications.

E3. Impact

Baseline Analysis

35. Currently, Access Grid users have little access to video conversion tools. Other than the aforementioned Memetic and CREW services, which are designed for specific purposes, the services available for recording Access Grid include an integrated recorder in the commercial IoCom software, and AG-VCR. The former provides only a basic interface for replaying meetings, in which no navigation of the recordings in possible, and requires that users purchase the IoCom software. The latter allows recording and replay, but this still only allows interaction with Access Grid. No AG recording tools exist that allow conversion to and from other formats.

Project Stakeholders

Stakeholder	Role	Involvement
University of Manchester Research Computing Services	Developer	High
Virtual Research Group	Customer	Medium
ACM SIGGRAPH Manchester Professional Chapter	Customer	Medium
e-Dance Project Partners	Customer	Medium
OMII-UK	Dissemination	Low
JISC	Funder, Dissemination	High

Impact on Project User Groups

36. The **Virtual Research Group** (contact Mark Knights at the University of Warwick) is a collection of academics using the AG to link colleagues who are geographically dispersed in the UK: the project started with a partnership between Warwick and Sheffield, but is actively expanding. The research undertaken varies across the field of early modern political studies. These users will benefit from being able to convert the recordings into a common format, allowing them to transfer the content on to DVDs to distribute to students who could not make the events, and who do not have immediate access to the internet.

37. The first UK Professional Chapter of **ACM's Special Interest Group on Graphics** and Interactive Techniques (SIGGRAPH) is based in Manchester (contact Mashhuda Glencross), and has previously used the Memetic and CREW recording systems to build up an archive of presentations of individual talks and tutorials. The approach of running distributed, repeatable, events has significantly widened the audience for this group. These users will benefit from being able to record their seminars and then connect the replay to a customised player directly on their web site. They will also gain access to previously recorded seminars.

38. **The e-Dance Project** (contact Helen Bailey at the University of Bedfordshire), funded jointly by AHRC, EPSRC and JISC as part of the Arts and Humanities e-Science Initiative, is currently exploring the use of e-Science technologies in the dance context building on experiences and software outputs from CSAGE and Memetic. eDance repurposes Access Grid as a creative environment for performance, focusing on the acquisition of data and its enhancement and reuse. These users will benefit from being able to use previously recorded material in new performance pieces.

Impact on National and International Researchers

39. The immediate impact of the project outputs is that various researchers in the VRE community will benefit by having a tool that allows them to intuitively convert videos to and from Access Grid as part of their active research lifecycle. As this tool is a web service, it will also be easy to deploy nationally, and so be available to researchers in general. There has also been interest in this project from the international research community, through the Access Grid Toolkit mailing list (AG-Tech). Initial responses indicate that this tool could be used internationally, and that developers from the international Access Grid community would help to contribute to the open source product.

40. In the longer term, future users of the VRE community will benefit by having available a tool for video conversion. This will widen the access to existing and future recordings, and will also aid in data migration, allowing the recordings to be converted into new formats as they become available.

Sustainability

41. Sustainability is addressed in section D7.

Evaluation

42. An evaluation work package is described in the work plan. This will compare the state of Access Grid video conversion to the baseline analysis given above. This will be aimed at determining if the tool developed has made an impact on the research community compared to before the project had started.

F. Budget

Directly Incurred Staff		**Apr09 – Mar10**	**TOTAL £**
Project Manager, Grade 8, 10% FTE		£3,454.11	£3,454.11
Developer and Evaluator, Grade 6, 100% FTE		£21,240.52	£21,240.52
Total Directly Incurred Staff (A)		**£24,694.63**	**£24,694.63**
Non-Staff		**Apr09 – Mar10**	**TOTAL £**
Travel and expenses		£1000.00	£1000.00
Dissemination		£850.00	£850.00
Evaluation		£5000.00	£5000.00
Total Directly Incurred Non-Staff (B)		**£6850.00**	**£6850.00**
Directly Incurred Total (C) (A+B=C)		**£31,554.63**	**£31,554.63**
Directly Allocated		**Apr09– Mar10**	**TOTAL £**
Estates		£9,979.20	£9,979.20
Directly Allocated Total (D)		**£9,979.20**	**£9,979.20**
Indirect Costs (E)		**£26,903.80**	**£26,903.80**
Total Project Cost (C+D+E)		**£68,427.63**	**£68,427.63**
Amount Requested from JISC		**£49,986.13**	**£49,986.13**
Institutional Contributions		**£18,441.50**	**£18,441.50**
Percentage Contributions over the life of the project		**Partners 26.95%**	**Total 100%**
No. FTEs used to calculate indirect and estates charges, and staff included	**No FTEs** 110%	**Which Staff:** Project Manager, Developer and Evaluator	

Institutional Benefits

43. The University of Manchester is keen to benefit from the prestige that will naturally accrue from hosting this development project. Research Computing Services provides leading edge research services to the University and in order to do this, we maintain contact with the research community so that research services can be moved from the research domain into use by the teaching and research staff at the University. This project will help maintain this link with the virtual research community from which future services can be offered to the staff at the University.

G. Previous Experience of the Project Team

44. The University of Manchester is the UK's largest university. Research Computing Services (RCS) provides advanced computing expertise, services and facilities for research and teaching use throughout the University of Manchester with research and development activities to innovate and enhance these services.

45. **Dr. Martin Turner** is a team leader within RCS, and has worked as project manager for various visualization and video based projects including CSAGE and CREW, PI for the EPSRC OMII-UK funded Portal Access Grid project and is manager of the NW spoke for the JISC funded vizNET programme.

46. **Dr. Andrew Rowley** is a Senior Software Developer within RCS at the University of Manchester. He has worked recently on the CREW project and the precursor VRE Phase One project Memetic, as well as the AHRC e-Dance project. He has skills in software development using Java and C/C++ and in web development using JSP, HTML, JavaScript and Flash. He has experience of evaluation of software from his PhD, and through the previously mentioned experience of the VRE programme, in which he was heavily involved with user analysis and evaluation activities.

H. Supporting Letters

47. A supporting letter from RCS is attached; others will be obtained during the first month of the project as required in paragraph 138 of the call for proposals, although the users mentioned have indicated via e-mail their intent to participate in the project.