

JISC DEVELOPMENT PROGRAMMES

Project Document Cover Sheet

Completion report

Project

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Project Title	Collaborative Orthopaedic Research Environment		
Start Date	November 2006	End Date	December 2006
Lead Institution	University of Southampton		
Project Director	Dr Gary Wills		
Project Manager & contact details	Dr Gary Wills Learning Societies Lab Electronics and Computer Science University of Southampton SO18 5SRE		
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JISC Completion Report

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Project Sign-off

1. Project Outputs

All the following deliverables have been delivered to JISC and accepted.

1. Workpackage 1 Requirements Specification.
2. Workpackage 2 Report on Design of the SOA.
3. Workpackage 2 Software for implementing the SOA
4. Workpackage 3 Report on the Design of Services
5. Workpackage 3 Software for the services
6. Workpackage 4 Project Report on Demonstrator and user guide.

The outstanding deliverables will be delivered to JISC shortly.

7. WORKPACKAGE 5 Evaluation: Evaluation Report
8. WORKPACKAGE 5 Evaluation: Final Report

2. Intellectual Property Rights

There are no outstanding IPR issues that will prevent project outputs from being made available to the teaching, learning, and research communities when the project ends.

There were no third-party IPR issues from the CORE project.

3. Project Staff

The two main project workers, Dr YW Sim (1 FTE) and Ms C Wang (1 FTE), ended their work on the project 6 month before the end of the project, once they knew that there would be no follow on funding. Both members of staff moved to other projects within the School. Dr YW Sim moved to a DTI funded project (HYPARSYS) and Ms C Wang to a JISC funded project (Merlot). Both attended conferences to present their work on CORE and both attended a workshop on portals and portlets.

Due to the key staff leaving, the project filled the gap with temporary staff. The two main members of staff during this period were Ms P Zhang and Ms YD Senbanjo, both of whom have now moved on to other JISC projects. A member of the team attended the Practice and Experience workshop: Developing and Deploying Tools and Services in the Emerging Portal Frameworks, sponsored by the JISC funded Sakai VRE Demonstrator Project.

4. Dissemination Plan

There is a project website from which all documentation and software can be downloaded. The project Web site is <http://www.core.ecs.soton.ac.uk/>

Conferences and Workshops

- **Miles-Board, T., Carr, L., Wills, G., Power, G., Bailey, C., Hall, W., Stenning, M. and Grange, S. (2006)** [Extending the role of a healthcare digital library environment to support orthopaedic research](#). *Health Informatics Journal* 12(2) pp. 93-105.
- **Makola, D., Sim, Y. W., Wang, C., Gilbert, L., Grange, S. A. W. and Wills, G. B. (2006)** [A Service-Oriented Architecture for a Collaborative Orthopaedic Research Environment](#). In *Proceedings of 8th Annual Conference on WWW Applications*, Bloemfontein, Free State Province, South Africa.
- **Parker, M., Stofberg, C., De la Harpe, R., Venter, I. and Wills, G. (2006)** [Data Quality: How The Flow Of Data Influences Data Quality In A Small To Medium Medical Practice](#). In *Proceedings of Community informatics for developing countries: Understanding and organising for a participatory future information society*, Cape Town, South Africa.
- **Grange, S., Wang, C., Gilbert, L., Sim, Y. W., Millard, D. E., Hall, W., Gardner, E. and Wills, G. B. (2006)** [A Web/Grid Services Approach for Integration of Virtual Clinical & Research Environments](#). In *Proceedings of Integrated Health Records "Practice and Technologies"*, National eScience Centre (NeSC), Edinburgh.

- **Sim, Y. W., Crowder, R. M. and Wills, G. B.** (2006) [Expert Finding by Capturing Organisational Knowledge from Legacy Documents](#). In Proceedings of IEEE International Conference on Computer & Communication Engineering (ICCCE '06), Kuala Lumpur, Malaysia.
- **Sim, Y. W., Wang, C., Carr, L.A., Davies, H. C., Gilbert, L., Grange, S., Millard, D. E., Wills, G. B.** (2005) [A Web/Grid Services Approach for a Virtual Research Environment Implementation](#) In Proceedings of the Workshop on Portals and Virtual Research Environments held in conjunction with the Fourth e-Science All Hands Meeting (AHM 2005), Nottingham, UK. [\[Presentation\]](#)
- **Sim, Y. W., Wang, C., Gilbert, L., Wills, G. B.** (2005) [Towards a Collaborative Orthopaedic Research Environment](#) In Proceedings of the 1st IEEE International Workshop on Service-Oriented Computing: Consequences for Engineering Requirements (SOCCER'05), Paris, France. [\[Presentation\]](#)
- **Wills, G. B., Gilbert, L., Gee, Q., Davis, H. C., Miles-Board, T., Millard, D. E., Carr, L. A., Hall, W. and Grange, S.** (2005) [Towards Grid Services for a Virtual Research Environments](#). In Proceedings of 5th IEEE International Conference on Advanced Learning Technologies (ICALT 2005), Kaohsiung, Taiwan.
- **Wills, G. B., Gilbert, L., Gee, Q., Davis, H. C., Miles-Board, T., Millard, D. E., Carr, L. A., Hall, W. and Grange, S.** (2005) [A Grid Services Implementation for a Virtual Research Environment](#). In Proceedings of 1st International ELeGI Conference on Advanced Technology for Enhanced Learning, Vico Equense - Napoli (Italy).
- **Gilbert, L., Wills, G. B., Sim, Y. W., Wang, C., and Stenning, M.** (2005) [e-Learning within a Collaborative Orthopaedic Research Environment \(CORE\)](#). In Proceedings of The 12th International Conference of the Association for Learning Technology (ALT-C 2005), Manchester, UK.

The project also received publicity in the Times Higher Educational Supplement.

- **Pothen, P.** (2005) [Leap from reality](#). In the Times Higher Education Supplement, 21 October 2005.

5. Exit Plan

The project website will remain 'live' at least until the end of 2010. On the project Web site the HE community can access the documentation and software from this project. All publications are available from the ECS e-prints repository at <http://eprints.ecs.soton.ac.uk/>

The lead institution (University of Southampton) will continue to host the project web site for 3 years after the project ends and assist JISC in archiving it subsequently.

6. Sustainability Plan

The Web services and basic architecture are being used in other JISC projects, such as mPlat and EFSCE.

The demonstrator is currently being used in 3 hospitals and the Wessex training region. Any maintenance of these systems will be negotiated separately and the project has not commitment to continue supporting them.

As a project team we are investigating other sources of funding, i.e. bio-medicine research companies, and to this end have had several meetings to discuss a prototype based on the CORE demonstrator.

7. Budget

The budget is shown in Appendix A. The expenditure followed very closely the original budget. There was a slight over spend on the project (£950) arising from sustainability. However, the school will make the short fall as the activity is seen to be in its interest.

During the course of the project no other sources of income was sought or awarded. However our main stakeholder and the project team viewed this project as a success and therefore are continuing to seek funding to continuing this work.

Lessons Learned

8. Aims and Objectives

The JISC circular specifically asked for '*lightweight, proof-of-concept VRE demonstrators appropriate to the needs and skills of specific communities.Specific attention should be given to the skills required to ensure effective exploitation within the target community and any associated training requirements.*' The CORE VRE aimed to and has successfully developed a Web-based portal environment with Web services for: the collation and analysis of clinical trial results, the organisation of internal project discussions, and the production of appropriate outline documents depending upon the requirements of conferences and journals selected for dissemination. Also the project investigated the use of Grid services using the OMII middleware. From the perspective of the main stakeholder, orthopaedic surgeons, this was also a success as a demonstrator.

9. Overall Approach

The main design approach undertaken for the VRE was that of participatory design. This was chosen because of the requirement of the contract for the surgeons to participate throughout the life of the project. Participatory design ensured that this main stakeholder group would be involved and engaged throughout the development lifecycle. We carried out a thorough stakeholder analysis and while this took some time, it was worth completing. We took particular care to interview widely not just surgeons, but people with digital library, information and learning technologies, and biomedical informatics background.

The team took a decision to use Microsoft's .Net platform to build its own portal. While this worked well, with the increased quality of and new standards for Portal Frameworks, this should not be necessary in future VREs.

While developing the demonstrator using the participatory design approach ensured end user involvement, it also caused some tension. The difficulty was that the users wanted the system quickly and were mainly concerned with developing the user interface. However, with only a team of two developers, time had to be given to explore alternative technologies and to develop the underlying infrastructure. In future, some of this infrastructure could be completed before co-design. In the main, the broad user requirements are set out in the bid and are sufficient to complete the desired infrastructure and to assess alternative technologies.

The use of the Grid for simulation of cell/bone growth proved problematic. The main problems were technical, since we were the first to use the OMII middleware for an application on the University's Grid clusters. Hence there was a steep learning curve for a number of departments. This could not have been started any earlier as the OMII product was and still is going through a number of release cycles. However the components we required are now stable. So while we recommend the use of the OMII middleware software, we do suggest that time needs to be given for the project team and the people running the clusters in the university to learn how to use it.

10. Project Outcomes

The key project outcomes and impacts on the research communities are:

- The project met and in some cases exceeded the initial requirements, in that it has produced a demonstrator for a VRE that the target community of orthopaedic surgeons can use.
- From the user's perspective they can collaboratively: set up a trial, collate the findings, analyse the findings, and develop either an academic publication or a set of training materials.
- The resulting Web services are available to the community to use. Particular interest has focused on the e-prints and the Forum Web services. All the web services tried to be agnostic in their use and were designed for anyone undertaking experiments, not just clinicians.

The main lessons learned are:

- The project developed its own portal, but if it were to start again today it would use one of the many portal frameworks.
- The quality of the open source portal frameworks has increased over the last two years and with the new portlet standard (JSR286) it may not be necessary for a project to develop its own portal framework.

- Embedding wikis and especially semantic wikis into collaborative authoring tools may be more effective than developing traditional Web based systems.
- A lesson learnt from managing this project was that the use of participatory and co-design approaches are effective in ensuring participation, but require careful management to ensure the hidden (from the point of view of the user) technical work is also completed (i.e. the infrastructure).
- The portal and Grid work using OMII would be useful to anyone outside large e-Science projects who need to have a portal interface to Grid applications. However, there is steep learning curve for those who first implement it in their institution.

11. Stakeholders

As a result of this project all Higher Surgical Trainees (HSTs) in the Wessex region and many of the consultants have been exposed to the potential benefits of having a collaborative research environment. In addition the resulting Web services are available to the community to use.

12. Project Partners

There were no official partners in the CORE project. However, we did work with a number of Hospitals.

We found this very productive and the surgeons were very keen to have the system implemented as they could see the benefits from a collaborative research environment.

13. Project Management

The lessons about project planning or project management we would pass on to other JISC development projects are:

- It was useful to set up a steering group for a project such as this of 2 years duration.
- It was useful to set up midterm reviews. They forced the project to reflect at several stages and allowed the management team to solicit and consider ideas from people not caught up in the day-to-day running of the project.
- If a deliverable is an artefact (software, website, etc), that should be the deliverable and not a report about the artefact.
- The use of participatory and co-design approaches are effective in ensuring participation, but require careful management to ensure the hidden technical work is also completed (i.e. the infrastructure).

14. Programme Support

The project team had very good support from the programme manger.

Members of the CORE project team attended the mandatory project meeting which we found very useful. This let the team know what other projects were doing, and enabled us to explore alternatives together.

The project team also actively engaged with the Tavistock Institute who are evaluating the programme, again we found this very useful.

A member of the team attended the Practice and Experience: Developing and Deploying Tools and Services in the Emerging Portal Frameworks, sponsored by the JISC funded Sakai VRE Demonstrator Project.

15. Future Work

There are a number of issues that have emerged from the project which merit further investigation or future development work by JISC or other organisations:

- The issues surrounding the lack of ease of connecting a desktop PC user to the Grid still needs further investigation.
- The use of wikis, and especially semantic wikis, for a collaborative authoring environment should be explored. This will have further interest in the teaching and learning domain as well as the research domain.

- The interface issue still needs attention, how complicated or extensive data can be efficiently and effectively entered in a busy working environment by non-data input specialists.