

A Web/Grid Services Approach for a Virtual Research Environment Implementation

**Y. W. Sim, C. Wang, L. A. Carr, H. C. Davies, L. Gilbert,
S. Grange, D. E. Millard and G. B. Wills**

School of Electronics and Computer Science
University of Southampton
United Kingdom

[Agenda]

- Motivation
- Proposed Solution
- The VOEU Approach
- The CORE Approach
- Requirement study
- Architecture
- Conclusions

[Motivation]

- Infrastructures to support increasing number of researchers in biomedical field
- Integration of data generated by diverse bio-informatics tools
- The need of collaborative research to reduce cost
- Grid focuses only upon the immediate aspects of science

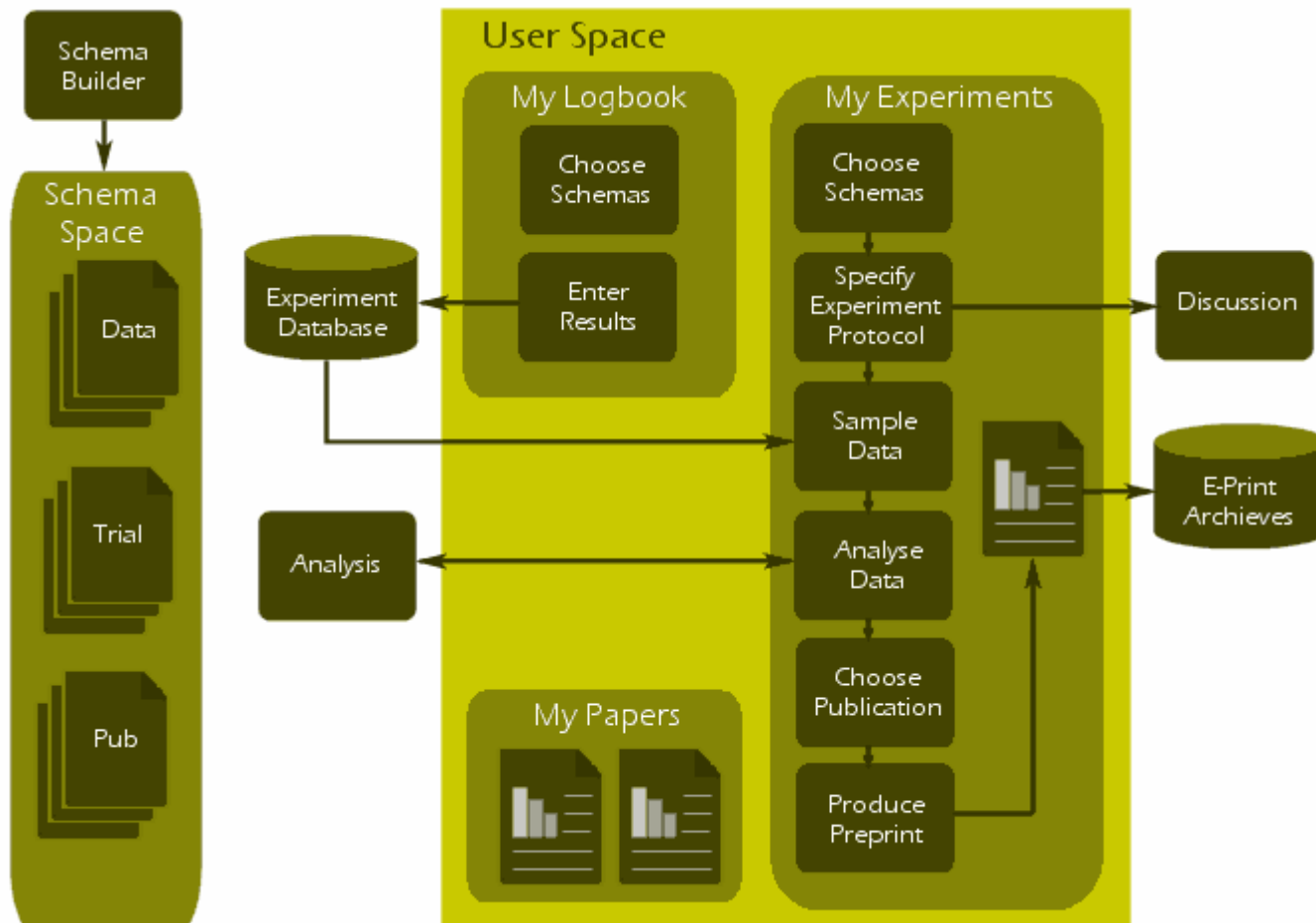
[Proposed Solution]

- Implement a Virtual Research Environment (VRE) using Service-Oriented Architecture (SOA) concepts and Grid/Web service technology
 - Ascertain the user requirements for a VRE
 - Develop an architecture based on a SOA
 - Build a demonstrator incorporating services that allow users to create, manage and discuss their clinical trials
 - Report on the evaluation process and results

[The VOEU Approach]

- The CORE is a follow-up project to VOEU, which supports the educational process and to aid surgeons in preparing findings for publications
- The VOEU VRE consists of schema space and user space

The VOEU Approach



[The CORE Approach]

- The VRE in VOEU is based on a tightly coupled architecture
- The CORE takes the foundations of VRE in VOEU and decomposes them into Grid/Web services within a SOA

[Requirement study]

- Objectives of the study:
 - To identify the requirements of users for a VRE
 - To discover developments that would enhance the planned functionalities in the CORE
 - To assess the current practice of users in discovering, locating and using research findings to inform the enhancement of such processes through the VRE

[Requirement study]

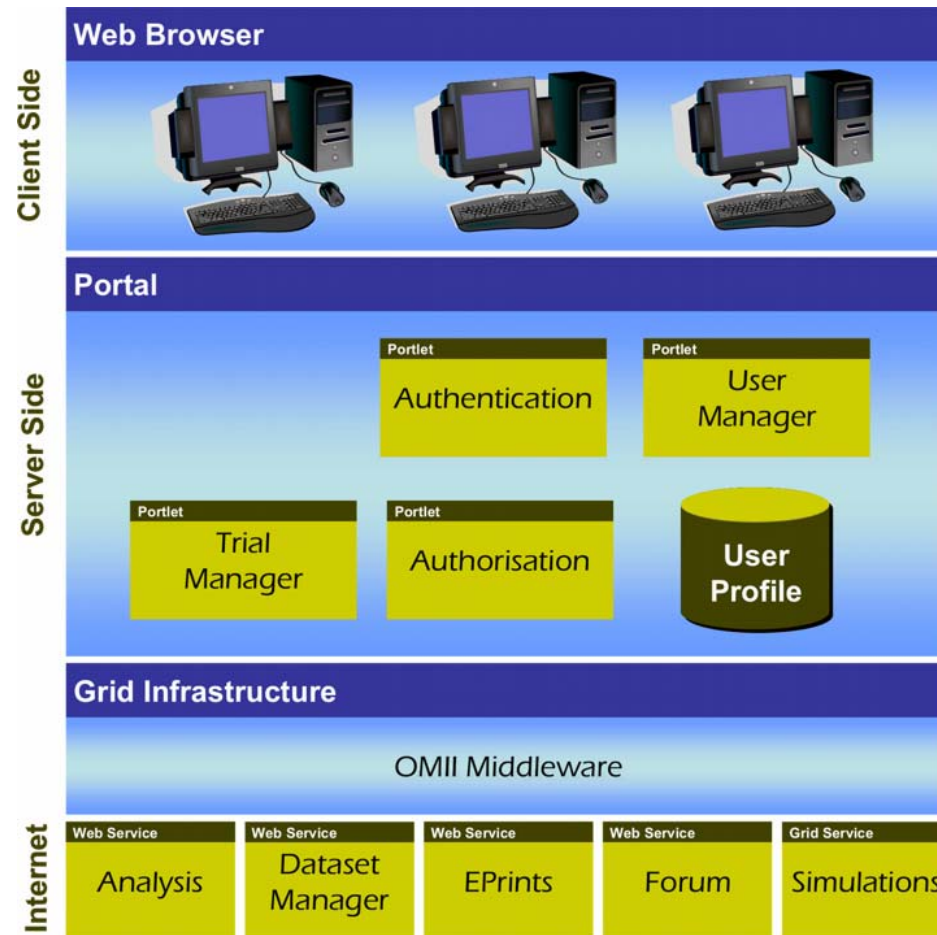
- Major findings:
 - Majority of the participants welcomed the idea of sharing research resources
 - Contextualise resources and data presentation
 - Users would like to utilise Grid in running large scale simulations
 - Toolkit in the VRE should be made easy to use
 - Inclusion of statistical analysis tools and authoring tools is essential in the VRE
 - Majority of the participants use Google and PubMed to locate research materials
 - Flexibility in adding tools (services)
 - Some participants are concerned with the issues of intellectual capital

[Requirement study]

■ Recommendations:

- A portal is an appropriate technology to construct a VRE
- The accessible resources should be made easy to browse, upload and download
- There is a need to develop a Grid/Web service based research environment, which can adapt to changing user requirements
- All participants agreed that the planned functionalities in the VRE are essential
- Grid infrastructure should be included in the VRE as it provides secure access to resources
- Metadata in VRE should be utilized effectively so that resources in the portal can be retrieved via search engines

Architecture



Architecture

- Portal
 - Act as a presentation layer which aggregates, integrates, personalises and presents information, transactions and applications to users
- OMII middleware
 - It allows end users to access Grid resources and applications in a trusted and secure environment
- Services
 - Analysis
 - A web service to perform analysis on dataset using statistical method
 - EPrints
 - A web service to help submit, disseminate articles for reviewing between researchers
 - Forum
 - A web service to support discussions between researchers
 - Data Set Manager
 - A web service to handle trial related data
 - Grid Simulation
 - A grid service to provide users with functionalities in running their simulations

[Conclusions]

- VRE in VOEU is being re-engineered as a loosely coupled system using SOA concepts and Grid/Web service technology
- The VRE supports sharing and dissemination of research findings, i.e. data and publications
- The use of Grid services for distributed computation means that powerful analysis and modelling tools can be made accessible to individual researchers
- Building a VRE demonstrator and conduct a evaluation

[Questions]

Contact:

Gary Wills (Project Manager)

School of Electronics and Computer Science

University of Southampton

SO17 1BJ, United Kingdom

Email: gbw@ecs.soton.ac.uk



Project Web site:

<http://www.core.ecs.soton.ac.uk/>