

Human Brain Mapping 2006

[Print](#)

Abstract Number: 425
Last Modified: December 22 2005

Submitted By: Silvia Olabbarriaga

A Virtual Laboratory for fMRI Data Management and Analysis

Silvia D. Olabbarriaga¹, Aart Nederveen², Jeroen G. Snel², Robert G. Belleman¹

¹Informatics Institute, University of Amsterdam, NL

²Dept. of Radiology, Amsterdam Medical Center, University of Amsterdam, NL

From a computational perspective, fMRI studies involve acquisition, storage, analysis and sharing of data.

``Data" here refers to a large variety of information and measurements acquired or generated during a study, including images, signals, information about subjects, parameter settings, analysis results, annotations, etc.

These data are generated by different types of physically dispersed equipments and image analysis utilities, requiring a significant amount of time and effort for adequate management.

Such effort is likely to increase as the amount of data grows in response to developments in scanning techniques, analysis methods, and collaborative research.

In the Virtual Laboratory of e-Sciences project (www.vl-e.com) we aim to implement a computational infrastructure based on grid technology to facilitate data handling in fMRI studies.

In the initial phase the following issues will be addressed:

- + Facilitate data gathering from heterogeneous equipments.
- + Facilitate data storage and archival by providing access to large and long-term storage resources.
- + Facilitate data analysis by providing access to high performance computing resources.
- + Facilitate data access and sharing by providing infrastructure for data annotation, remote data retrieval with query mechanisms, and flexible data access control.

The strategy adopted in the first pilot implementation is illustrated in figure 1. In the proposed scenario:

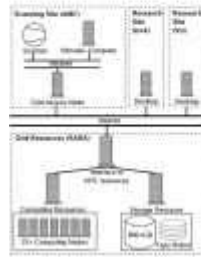
- + fMRI scans are acquired at the "Scanning Site" (Amsterdam Medical Center, AMC) with a PHILIPS 3T Intera MRI scanner;
- + data are collected from the scanner and the stimulus computer, anonymised, and transferred to a "Grid Access Node" that is connected to the public network and grid resources.
- + from the grid-access node, the data are transferred to the "Storage Resource" (SR) located at SARA (Dutch Supercomputing Center), which provides services such as backup and on/off-line accessibility;
- + data analysis can be initiated by the user, or be automatically triggered upon upload of the data. Analysis is executed at the "Computing Resources" (CR) provided by SARA. The following steps are performed automatically: the data is downloaded from the SR, the analysis is performed in the CR, and the results are uploaded back into the SR;
- + the data stored at the server can be retrieved by any registered user, from any "Research Site" with internet access;

+ data access is controlled by the researcher, who can indicate access privileges to other users and organizations; and

+ metadata can be associated manually or in automated fashion to the stored data and used as a catalog for data query and retrieval.

The implementation of this infrastructure is in its early stage. The acquired data are transferred to the SR in a semi-automated manner: images are transferred directly, while stimulus data require manual intervention. Data analysis is performed with FSL FEAT (www.fmrib.ox.ac.uk/fsl), with input parameters automatically generated based on templates. The analysis is started manually and can be performed in parallel for several scans, one per computing node. Users can retrieve data and control access to the SR using a web interface (mySRB, <http://www.sdsc.edu/srb/mySRB/mySRB.html>).

We are currently addressing technical challenges to make this infrastructure as transparent as possible to the end user, as well as assessing its added value to facilitate neuroscience research.



Close this window