ARCITECTA®

CASE STUDY:

UNIVERSITY OF MELBOURNE AND FLOREY NEUROSCIENCE INSTITUTE

OVERVIEW

The Centre for Neuroscience at the University of Melbourne and the Florey Neuroscience Institutes (FNI) are using Mediaflux to support more advanced data workflows that enhance collaboration across hundreds of researcher to find better treatments for brain disorders.

The Centre for Neuroscience at the University of Melbourne and the Florey Neuroscience Institutes (FNI) are amongst the world's leading brain research centres. Resources available include 300 research and support staff, comprising the largest neuroscience research team in Australia.

Its scientists are at the forefront of the neuroscience revolution that promises to improve individual and community health around the world. They are unravelling the brain's complex puzzles in an effort to develop better treatments for the millions of Australians affected by brain disorders every year.

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THE CHALLENGE

The institute runs a number of research programs and laboratories. The Neuroimaging and Neuroinformatics Group (NIG) is comprised of approximately thirty staff and students drawn from the FNI and the University of Melbourne (the Centre for Neuroscience and the Department of Electrical Engineering) and supports diverse research interests, falling into three main categories:

+ The use of human and animal brain imaging techniques such as Magnetic Resonance Imaging (MRI) to investigate clinical and basic neuroscience research questions
+ Development of neuroimaging methods and neuroimaging data analysis and modelling techniques for human and animal MRI data
+ Development of high-throughput computing and hardware and software technologies for managing and processing neuroimaging data.

THE SOLUTION

To support this research a data repository managed by Mediaflux was created. Much of the data is MR generated imagery. DICOM-encoded human MR images are received direct from MRI scanners at associated hospitals. Mediaflux is able to directly receive these images across the network. Other MR imagery is derived from a small animal scanner, utilising animals such as mice.

The system supports ingest via the DICOM & Bruker formats and the data is associated with various research projects and organised via a data model. Project information, such as experimental workflow parameters, is stored by Mediaflux. Image data can be transformed to other formats (e.g. NIFTI) and transferred as required to the HPC server for processing. In the future, processed and analysed results will also be stored in the repository. If required, metadata can be transformed to other standard XML schemas, such as those to be utilised by the Australian National Data Service (ANDS) Collections registry.

THE OUTCOME

Much of the science conducted by the Neuroimaging and Neuroinformatics Group follows a subject-centric scientific research methodology. In the NIG's case, the subjects are either humans or small animals. A specific workflow-enabled framework, called PSSD (project, subject, study, dataset) has been designed and implemented to facilitate this. The framework is described in a paper co-authored by Mr Jason Lohrey, Dr Neil Killeen, and Professor Gary Egan which appeared in the July 2009 issue of 'Frontiers of Neuroscience'. PSSD supports and documents the subject-centric process on a per project basis. Not only is the data captured, but also the workflow that generated it. 'Web 2.0' interfaces are driven by the PSSD data model so that the system can be deployed to a diverse range of research domains. This approach has resulted in some fundamental benefits:

+ Efficiency bottlenecks in previous ad-hoc data management were eliminated. By uploading data directly into the system from the source, it is available for team members as soon as they return to the laboratory; and
+ Data is now stored in a managed repository, rather than on DVDs. This allows FNI to enable access only for authorised users and to be able to curate, preserve and, where appropriate, re-use data in the future.

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