

The Characterisation Virtual Laboratory

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In 2014, Monash University, through the Multimodal Australian ScienceS Imaging and Visualisation Environment (MASSIVE), and project partners, completed development of the NeCTAR-funded Characterisation Virtual Laboratory (CVL), a project to develop online environments for researchers using advanced imaging techniques, and demonstrate the impact of connecting national instruments with computing and data storage infrastructure.

The CVL is a collaboration between Monash University, Australian Microscopy & Microanalysis Research Facility (AMMRF), Australian Nuclear Science and Technology Organisation (ANSTO), Australian Synchrotron, National Imaging Facility (NIF), Australian National University, the University of Sydney, and the University of Queensland.

The partners joined together around the CVL project with three major goals:

1. To integrate Australia's imaging equipment with specialised HPC capabilities provided by MASSIVE and National Computational Infrastructure (NCI) and with data collections provided by Research Data Storage Infrastructure (RDSI) nodes.

More than 450 registered researchers have used and benefited from the technology developed by the CVL project, providing them with an easier mechanism to capture instrument data and process that data on centralised cloud and HPC infrastructure, including MASSIVE and NCI.

2. To provide scientists with a common cloud-based environment for analysis and collaboration.

The CVL has been deployed across clouds at the University of Melbourne, Monash University, and QCIF. CVL technology has been used to provide easier access to HPC facilities at MASSIVE, University of Sydney BMRI, the Pawsey Centre, NCI and Central Queensland University.

3. To produce four exemplar platforms, called Workbenches, for multi-modal or large-scale imaging in Neuroimaging, Structural Biology, Energy Materials (X-ray), and Energy Materials (Atom Probe).

The CVL environment now contains 103 tools for specialised data analysis and visualisation in Workbenches. Over 20 imaging instruments have been integrated so that data automatically flows into the cloud for management and analysis. In addition, a number of specialised workflows have been developed and integrated, including atom probe data processing using galaxy, and automatic brain MRI and histology registration.

The newly developed infrastructure is also having an impact beyond the four workbenches. For example, HPC facilities across Australia, including facilities at MASSIVE, NCI, Central Queensland University, the Brain and Mind Research Institute at University of Sydney and the Pawsey Centre, use software developed by the CVL to help a wider range of researchers access imaging and visualisation services. The technology developed under the CVL provides simple access to HPC resources by newcomers and inexperienced HPC users.

The Characterisation Virtual Laboratory is one of a number of initiatives led by Monash University to develop tailored environments for research communities. This presentation will introduce those initiatives, with a specific focus on the CVL.

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