Bringing Long-Tail Microscopy and Characterisation Data into the Light
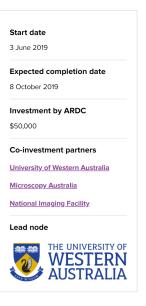
Characterisation is the general process of probing and measuring the structures and properties of materials at the micro, nano and atomic scales. It is essential across natural, agricultural, physical, life and biomedical sciences and engineering. The generated characterisation data is digital and much of it is "long-tail", i.e. it is relatively small, unstructured and un-curated. It is thus not easily shared and often does not see the light of day once a research project has been completed. In addition, continual advances and changes in technology mean that the data, and the software used to process and analyse it, can rapidly evolve and even disappear. Consequently, scientific results can be difficult or impossible to reproduce.

Research data management and stewardship based on the FAIR Data Principles offers a solution to these problems. The 2017/2018 National Imaging Facility (NIF) Trusted Data Repositories (TDR) project (funded by ANDS and RDS) addressed "F" and "A" for both preclinical MRI data and clinical ataxia MRI data, and to some extent the "I" and "R". This project will address the question: What is needed to extend the NIF TDR solution to include instrument data from Microscopy Australia and to achieve FAIR for both characterisation communities?

Start date

3 June 2019

Expected completion date

8 October 2019

Investment by ARDC

$50,000

Co-investment partners

University of Western Australia

Microscopy Australia

National Imaging Facility

Lead node

THE UNIVERSITY OF WESTERN AUSTRALIA

1. Flexible data model

Propose a sufficiently flexible data model to capture, curate, coordinate, correlate and distribute data from characterisation instruments to HPC cloud infrastructure.

2. Gap analysis

Identify gaps between standards (e.g. the OME standard) and metadata schemas and vocabularies for NIF and MA characterisation instruments, and gaps between standards (e.g. the OME bio-Formats library) and metadata extraction and file conversion tools and services for data from NIF and MA instruments.

3. Data packaging specifications

Propose a data packaging specification suitable for interoperability with analytical

4. Quality data protocol

Propose a standardised protocol for collecting quality data from characterisation instruments and curating and wrapping the data with extensive metadata in a trusted manner.

5. Matrix comparison

Do a matrix comparison of cloud-based repository platforms for characterisation instrument data.

6. Data publishing licences

Propose a suitable, community agreed, licenses for data publishing.

7. Project report

All project outcomes/documentation will be shared with all of Australia via Microscopy Australia, NIF and related websites.

8. Completion of project

Project outcomes will be presented at the ARDC Data & Services Summit in October 2019.

Core features

Quality data protocol

A standardised protocol for collecting quality data from characterisation instruments and curating and wrapping the data with extensive metadata in a trusted manner.

Matrix comparison

Matrix comparison of cloud-based repository platforms for characterisation instrument data

Who is this project for?

Microscopy Australia (MA) – formerly AMMRF

- Nodes at the Centre for Microscopy and Microanalysis (CMM) at the University of Queensland (UQ); Australian Centre for Microscopy & Microanalysis (ACMM) at the University of Sydney (USyd); and the Centre for Microscopy, Characterisation and Analysis (CMCA) at the University of Western Australia (UWA) National Imaging Facility (NIF)

- Nodes at the Centre for Advanced Imaging (CAI) at UQ; and CMCA at UWA

What does this project enable?

Project outcomes will facilitate the establishment, for the first time, of a national network of federated shared data repositories for MA (interoperable with the NIF network) for data acquired from >200 instruments. This would in turn support new research and industry opportunities for multi-instrument /multi-technique characterisation across both NIF and MA, as well as ANSTO (many NIF and MA users acquire Australian Synchrotron data). It would also support multi-site projects and the possibility for creating new, scientifically valuable, collections; e.g. a national digital repository of CT-scanned biological specimens from museums, or a national medical image skin cancer database.

Handy resources

- **Final Report** [PDF 147KB]
- **FAIR Assessment** [PDF 395KB]
- **Presentation** [PDF 1MB]
- **Microscopy Australia**
- **National Imaging Facility**

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