Data and Services Discovery projects - Transformative Data Collections

Australian Brain Data Commons

Approach

Activities Undertaken & Participants
The ABDC project proposed to use a consultative process to determine the requirements for a coordinated and internationally compatible national brain science data framework. To this end, a Working Group including stakeholders representing a range of academic research disciplines in the neurosciences and the private sector was established. The ABDC Working Group terms of reference, established at the first meeting, specify the following objectives:

1) To map current data sharing standards in neuroscience research used by Australian laboratories.
2) To convene workshops and meetings to provide a forum for discussion and consensus building around identifying the infrastructure, technical and human resources required to develop a culture in Australia of neuroscience data standards and sharing that satisfies the FAIR principles.
3) To educate the neuroscience community on how to re-use data for maximum benefit and to promote and support data sharing and standards implementation in the neuroscience sector in Australia.
4) To provide a representative group for information sharing and international collaboration via the International Brain Initiative and other appropriate international organisations.
5) To provide advice, via the Australian Brain Alliance, to the Australian Research Data Commons and Australian Government on issues related to neuroscience data standards and sharing.

The ABDC Working Group comprises a member of the Executive Committee of the Australian Brain Alliance, two co-Chairs, a specialist in data infrastructure, and research experts with expertise covering Cognitive neuroscience and Psychology, MRI/PET/Molecular imaging (human and animal), EEG/MEG, Animal behaviour/Neuroethology data, Microscopy, Histology and gene expression, Molecular neuroscience, Electrophysiology and calcium imaging, Neurogenomics and clinical data, Computational neuroscience, and AI/Machine Learning.

Members of the ABDC working group:

Co-Chairs: Tony Hannan (The Florey Institute), Tom Johnston (Swinburn University)

Working Group Members:

- Amy Brodtmann (The Florey Institute)
- Andre van Schaik (Western Sydney University)
- Frederic Meunier (University of Queensland)
- Gary Egan (Centre for Integrative Brain Function)
- Geoff Goodhill (University of Queensland)
- Glenda Halliday (University of Sydney)
- Hsin-Hao Yu (IBM Research Australia)
- Jake Carroll (University of Queensland)
- Khaled Chakli (Australian Academy of Science)
- Laura Poole-Warren (University of New South Wales)
- Linda Richards (University of Queensland)
- Lindy Fitzgerald (Curtin University)
- Lucy Palmer (The Florey Institute)
- Sarah Medland (QIMR Berghofer Institute)
- Tom Johnstone (Swinburn University)
- Wojtek Goscinski (E-Research Centre)

The ABDC Working Group convened six times during the project period, via Zoom videoconference. During the period of the project, the Working Group compiled information on current data standards and data sharing practices in Australia, as well as the range of software platforms used in Australia for data sharing in the different neuroscience sub-disciplines. Assessments were made of the national barriers that prevent wider adoption of FAIR data sharing.

The Working Group also co-convened a national symposium on Data sharing: neuroscience, microscopy and experiments, on the 9th of October 2019 in Canberra (https://www.eventbrite.com.au/e/data-sharing-neuroscience-microscopy-and-experiments-symposium-tickets-71027441991). The symposium served to elicit input from the wider neuroscience research community and relevant stakeholders, including the ARDC and AARNet, and to establish the main requirements for addressing barriers to FAIR data sharing in neuroscience in Australia, and to outline the processes required to establish a national data standards framework for neuroscience.

Outputs
In addition to this report, a summary of the ABDC project was presented at the ARDC Data and Services Summit, Brisbane, on the 21st of October.

FAIR

The work of the ABDC on this project did not produce any quantitative or qualitative data. The Australian Brain Alliance and the Australian Brain Data Commons will work with the research community to facilitate compliance with FAIR practices across the brain sciences.

Collaboration and coverage

The ABDC's consultations drew national input by accessing Australian Brain Alliance's 33 member organizations and institutes, which are located across all states and territories (excluding the Northern Territory). This project also gained input from Early and Mid-Career Researchers, and researchers in industry such as IBM Research Australia.

The ABDC also worked closely with the Australian Neuroscience Microscopy Data Sharing and Best-Practice group, as well as the Australian Characterisation Informatics group.

Sustainability

The ABDC Working Group is an ongoing group managed and supported by the Australian Brain Alliance that will continue to meet on a regular basis via Zoom videoconferencing, as well as at conferences and on going meetings organised by the Australian Brain Alliance. The Working Group will provide continued expert advice on data sharing and standards across the different sectors of Australian neuroscience research. New members will be invited to join the Working Group as needed, for example to provide advice about specific initiatives or governmental priority programs.

The co-Chairs of the group will continue to represent Australian Neuroscience research as members of the International Brain Initiative data standards and data sharing working group. Following a successful Zoom planning meeting in October, the IBI Working Group will be holding the inaugural workshop and meeting in Tokyo, Japan, in mid-January, 2020 with representatives from member countries. One of the ABDC Working Group co-Chairs will attend. The objectives of this first meeting are to assess the state of the art in neuroscience data standards and practice, and to formulate an international approach to governance of data standards and data sharing under FAIR guidelines. In addition to IBI Working Group members, representatives from relevant international stakeholders, including major research funders, research institutes, and large-scale neuroscience projects, will be invited. Membership of the IBI Working Group will ensure that Australian Neuroscience can benefit maximally from international best practice, as well as contribute to development of new standards and data sharing platforms.

Learnings

Neuroscience research involves a wide range of subdisciplines, each using different methods and with disparate practices for data formats, data management and data sharing. There are no clear standards within or across subdisciplines
- Dependent on data acquisition equipment & software
- Sharing often ad hoc, using variety of means (from USB sticks to cloud storage)

Barriers (real and "perceived")
- Lack of appropriate sharing solutions (varies by discipline)

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- Too difficult/technical and no resources (varies by discipline)
- Legal & Ethical concerns, international data transfer, clinical data privacy
- Concerns about data ownership, "being scooped", assignment of credit, "parasites"
- Industry: lack of preparedness by academics & institutions

Open solutions exist overseas, vary in scope, can be adapted/extended
CONP: Canadian Open Neuroscience Platform
- Training, international partnerships, ethics & data governance, communications, analysis, interoperability, scalability & CBRAIN (compute)
GA4GH: Global Alliance for Genomics and Health
- Governance, technical, legal, ethical, data privacy
BIDS: Brain Imaging Data Structure
- Simple structured file system for imaging data & metadata
- Extendable with open community governance

Software platforms largely exist but not always user friendly or adapted to different types of data. Resourcing needed to:
- Make technology/informatics/platforms for sharing **EASY**
- Assemble data and meta data in standard formats & submit/upload

Provide incentives for adoption
- powerful & easy compute/analysis (e.g. CBRAIN, BIDS-Apps)
- Scientific Data publication: high quality dataset journals

National level but open/distributed governance of standards development and maintenance needed, in collaboration with international initiatives

Impact

Based on the consultations and evidence gathered during this project, the ABDC Working Group will be submitting a 3-year grant proposal through the Australian Brain Alliance to develop a comprehensive set of national standards and protocols for neuroscience data and data sharing in Australia. The project will leverage existing platforms in Australia and Internationally, adapting them to the requirements of different sectors of the neuroscience community. In a second phase of the proposed project, systems will be adapted to find, access, combine and manage data from different neuroscience sub-disciplines, thus making them interoperable.

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