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Digital Research Infrastructure Supporting FAIR, Reproducible and Impactful Research: A Global Ecosystem of Tools, Resources and Skills

Thursday, October 16, 2025 11:00 AM (1h 30m)

As the volume and complexity of research data continue to grow, researchers increasingly rely on robust digital research infrastructure and interoperability across regional and disciplinary boundaries to achieve FAIR and reproducible data, and impactful results. Building new collaborations and extending the reach of digital research infrastructure initiatives will be crucial in fostering a global ecosystem of tools, resources, and skills that supports the inherently international and collaborative nature of research. This session presents examples from infrastructure providers, their value and use in practice, and also serves as an invitation and call to action for researchers, data managers, librarians, and IT professionals involved in supporting research data management and infrastructure across any discipline to consider their use and adoption, and/or engage in their development.

This session aims to showcase how some core resources and services assist research and professional communities to effectively manage, share, and reuse research data and other digital research assets, such as computational workflow descriptions and training materials, in a FAIR-enabling manner. The session will also present a showcase of successful collaborative efforts between Australian, European, and North American groups, highlighting some of the core challenges that researchers face, and corresponding digital research infrastructure systems designed to address them. The systems covered also illustrate how cross-disciplinary adoption have served to increase the utility and sustainability of solutions that began their journeys in support of biological research and have since been successfully redeployed, expanded and utilised in support of a diverse spectrum of research domains and disciplines.

The core challenges these resources and services aim to address are the lack of standardised data management practices, the fragmented landscape of informatics and data science training resources, the difficulty of navigating the thousands data and metadata standards essential to data stewardship, and the complexity of capturing and sharing computational workflows in a way that ensures reproducibility and discoverability. The session highlights four systems and their role in addressing the above-mentioned challenges:

- (1) The *Data Stewardship Wizard (DSW)* –a tool that facilitates the creation of machine-actionable FAIR-enabling data management plans.
- (2) *FAIRsharing* –a registry, a service and an educational resource to discover and use the right standards and the appropriate repositories, enabling a number of data management tasks.
- (3) The *Training eSupport System (TeSS)* –a comprehensive platform for discovering and accessing bioinformatics training events and materials, fostering skills development and knowledge dissemination.
- (4) *WorkflowHub* –a system for describing and sharing rich descriptions of computational workflows, enabling researchers to document, share, and reuse complex analysis pipelines, enhancing transparency and reproducibility.

The session combines a series of short presentations with questions and answers leading into a structured discussion as follows:

- *Introduction: Challenges and Collaborations* (10 minutes):
  An overview of the challenges in biological data management and workflow sharing, emphasising the global context and the importance of globally interoperable Digital Research Infrastructure, and efforts and collaborations across Europe, Australia and North America to address these challenges.

- *Showcase: Systems, Case Studies and Global Impact* (4 x 15 minutes):
  An introduction to the DSW, FAIRsharing, TeSS, and WorkflowHub, illustrating their features, functionalities, current and potential applications, as well as connections among these resources that, where relevant, are powered by each other's content. Highlighting real-world applications of these tools and infrastructure, showcasing their impact on research outcomes and data management practices across the globe.
- *Discussion: Future Directions and Wider Adoption* (20 minutes):
  A facilitated discussion on the future development and adoption of digital research infrastructure, with a focus on fostering collaboration and expanding the user community.

Speakers from partner institutions in Australia, Europe, and North America, each a leading expert on their respective topic, will present and participate in the discussions:

- The implementation of the DSW for machine-actionable data management plans within the European research landscape.
- The development and utilisation of FAIRsharing by humans and machines.
- The development and utilisation of TeSS for bioinformatics training resource discovery across Europe and how it has been modified to develop Digital Research Skills Australasia (DReSA), to support data science training across all disciplines.
- The development of WorkflowHub and its role in enhancing computational reproducibility.

We are excited to present our work, build new collaborations and engage with the broader data community at International Data Week 2025.

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