

NASA Life Sciences Portal (NLSP): Supporting Scientific Transparency and Reproducibility

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ABSTRACT

NASA's Life Sciences Ports (NLSP) serves the scientific community by providing curated data from space life science experiment. The Human Research Program (HRP) with the help of NLSP is currently transforming their life sciences data archive systems and processes to improve compliance with the FAIR principles [1]. Some of these improvements will at the same time support the twin pillars of Open Science [2]: transparency of methods and reproducibility of results. Scientific transparency is marked by the easily intelligible communication of what has been investigated: what were the procedures for collecting sample and the characteristics of samples collected? what kinds of measurements were made, what were the environmental conditions of the measurements? What were the analysis techniques of the collected data? Reproducibility of the results and findings from the investigation requires a high level of transparency for all but the simplest investigations; the slightest deviation in communicating and replicating complex experimental procedures or data analyses can often yield quite different data and even findings, thwarting their validation.

One of the ways the NLSP is aiming to improve the communication of scientific information is through the use of ontology-driven *metadata*. Ontologies are powerful, graph-based knowledge representation structures, which can be leveraged to increase data interoperability, the area of the FAIR principles in which many data systems most lack compliance. Over the past decade, there has been a concerted effort in the biomedical community to develop modular and narrowly focused domain and application-specific ontologies in a common, open-source framework, the Open Biological and Biomedical Ontology (OBO) Foundry [3]. The open sharing and modular nature of this effort promises huge increases in harmonized data sharing for systems that leverage these models.

Which is in line with the FAIR Data Principles of Findability, Accessibility, Interoperability, and Reuse for scientific data management and stewardship.

1. Wilkinson, M.D., et al., *The FAIR Guiding Principles for scientific data management and stewardship*. *Sci Data*, 2016. **3**: p. 160018.
2. National Academies of Sciences, E. and Medicine, *Open Science by Design: Realizing a Vision for 21st Century Research*. 2018, Washington, DC: The National Academies Press. 232.
3. Smith, B., et al., *The OBO Foundry: coordinated evolution of ontologies to support biomedical data integration*. *Nat Biotechnol*, 2007. **25**(11): p. 1251-5.