Interoperable Data Sharing for Diverse Scientific Disciplines

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For diverse scientific disciplines to interoperate they must be able to exchange information based on a shared understanding. To capture this shared understanding, we have developed a knowledge representation framework using ontologies and ISO level archive and metadata registry reference models. This framework provides multi-level governance, evolves independent of implementation technologies, and promotes agile development, namely adaptive planning, evolutionary development, early delivery, continuous improvement, and rapid and flexible response to change.

The knowledge representation framework is populated through knowledge acquisition from discipline experts. It is also extended to meet specific discipline requirements. The result is a formalized and rigorous knowledge base that addresses data representation, integrity, provenance, context, quantity, and their relationships within the community. The contents of the knowledge base is translated and written to files in appropriate formats to configure system software and services, provide user documentation, validate ingested data, and support data analytics.

This presentation will provide an overview of the framework, present the Planetary Data System's PDS4 as a use case that has been adopted by the international planetary science community, describe how the framework is being applied to other disciplines, and share some important lessons learned.