NASA'S STANDARDS PROCESS FOR EARTH SCIENCE DATA SYSTEMS

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1. INTRODUCTION

NASA's Earth Science Data Systems Standards Process Group (SPG) facilitates the approval of proposed standards that have proven implementation and operational benefit for use in NASA's Earth science data systems. The SPG is one of four Earth Science Data Systems Working Groups (ES-DSWG) that were chartered after deployment of the initial Earth Observing System (EOS) Data Information System (EOSDIS) to provide agency leadership with recommendations on continuing development of specific aspects of data system development. Each of the working groups is chartered to be forward-looking and to draw from experience across the agency in making recommendations.

2. STANDARDS ADOPTION PROCESS PRINCIPLES

Through the trials of reviewing a number of proposed standards and considering the unique challenges to develop recommendations concerning their use, the SPG has tailored its Standards Process from our initial concept of a stepwise tiered approach involving specification, implementation, and use to a much more flexible situational method. This adaptive approach has the ability to shorten the review process and to focus our standards inquiry on the most pragmatic aspects of the proposed standard. Our premise is that the SPG Process can accelerate the evolution of practices through better communication from successful practice in a specific community to broader community adoption to community-recognized standards. For each endorsed standard, the availability of high quality documentation for the standard, available reusable software, and information about successful operational experience with the use of the standard will help bridge the technology adoption chasm from innovative use by practitioners with a visionary agenda to pragmatic use by and users prioritized by mission success criteria.[1]

3. APPLICATION OF THE PROCESS TO NASA'S DECADAL SURVEY MISSIONS

NASA's Tier 1 Earth Science Decadal Survey Missions include the Soil Moisture Active Passive (SMAP) Mission; the Ice, Cloud, and land Elevation Satellite 2 (ICESat 2), the Climate Absolute Radiance and Refractivity Observatory (CLARREO), and the Deformation, Ecosystem Structure, and Dynamics of Ice (DESDynI) Mission. The Tier 1 missions are mandated to work with the ES-DSWGs, including the SPG in order to explicitly assure that the mission data system solutions draw on the consensus-built lessons of agency experience. These are the first group of missions to be formulated since the agency chartered the SPG and they afford an opportunity to demonstrate the benefit of having a repository of endorsed Earth science data systems standards that have been successfully implemented and used within the NASA environment.

The initial feedback from the Tier 1 missions is positive. The mission planners have recognized the benefit of choosing standards that already have the recommendation of NASA stakeholder communities and critically have the endorsement from NASA leadership. For both the mission planners and the NASA leadership, the endorsed standards give greater confidence that mission products will be interoperable with heritage and current NASA data holdings. The stakeholder community, by participating in the standards, also benefits because their preferences and opinions are available to the mission planners. The adoption of the standard lowers the barriers to entry and use of NASA data by external discipline communities within NASA and outside NASA. [2]

4. THE NASA EARTH SCIENCE DATA SYSTEM REFERENCE ARCHITECTURE

As the SPG began to work with the Tier 1 mission planners and to concentrate on their needs, it soon became apparent that a documented reference architecture of a NASA Earth science mission data system could be a key tool, useful to the SPG in assuring the comprehensiveness and relevancy of standards recommendations. The successful use of the Open Archival Information System (OAIS) reference architecture by data centers has pointed the way toward having a similar framework for a NASA agency consensus of the elements and interfaces common to NASA missions. The SPG, in concert with the other ES-DSWGs has begun work to developing this key reference. [3]

3. ABSTRACT PROPOSAL

We will discuss real examples of the different types of candidate standards that have been proposed and endorsed (i.e. OPeNDAP's Data Access Protocol, Open Geospatial Consortium's Web Map Server, the Hierarchical Data Format, Global Change Master Directory's Directory Interchange Format, NetCDF Classic, the NetCDF4 API, the Climate and Forecast CF conventions and ECHO metadata API). We will also discuss real examples of the different types of best practices and implementation experiences that have been documented and endorsed as Technical Notes (i.e. Interoperability between OGC CS/W and WCS Protocols, Lessons Learned Regarding WCS Server Design and Implementation, Mapping HDF5 to DAP2, Creating File Format Guidelines – The Aura Experience) We will discuss our work with NASA's Tier 1 Decadal Survey Missions to facilitate the use of NASA's endorsed standards in these future mission data systems. And we will discuss progress toward our development of a NASA Earth Science Mission Data System reference architecture.

11. REFERENCES

[1] R.E. Ullman, Y. Enloe. "Accelerating Technology Adoption Through Community Endorsement." *Standard-Based Data and Information Systems for Earth Observation*. Springer-Verlag. Berlin Heidelberg. pp. 227-248. 2009.

[2] R. E. Ullman. "Standards Process Group Presentations". *8th ESDSWG Conference Agenda and Downloads*. Website: http://esdswg.eosdis.nasa.gov. October 23, 2009.

[3] NASA Earth Science Data Systems Program. "Decadal Survey Era Workshop Report." *Science Data Systems in the Decadal Survey Era, Workshop Report*. Website: http://dsds.nasa.gov/DSDS_Reports.shtml. August 24 2009.