# Standardizing Standards Access (Summary)

- **<u>Problem Statement</u>**: SIF attempts to "harvest" standards descriptions annually from AIAA, ISO and CCSDS ***manually***; It's very time intensive (over a week of effort)
  - SIF's application is to compile a spreadsheet (our Mission Applicability Guide – MAG) that evaluates standards for mission types.
  - Sample on next chart.
  - Other standards users (NASA, ESA, etc.) need to do the same to integrate their standards evaluations.
- **<u>Recommend</u>** that major Standardization organization come to agreement on the way metadata about their standards are presented on the web.
- **<u>Minimum</u>**: Standard layout page that can use simple manual cut-and-paste
- **<u>Better</u>**: Restful machine-readable interface that applications can "harvest" for user organizations to build an integrated library/description.
- **<u>May be</u>** as simple as other SDOs adopting ISO's RSS Feed approach (to be confirmed)
- **<u>Next Step</u>**: Recommend AIAA, ISO and CCSDS (and others interested) have telecon to discuss this IT initiative to improve usability and "integrate-ability" of their websites.

# SIF's MAG product

- Other user orgs may vary, but all need some level of integration.
- Notice **inconsistent data** in "topic" and "book type" and others, as harvested from websites.
- Other fields are collected, but not shown here. It's a complex task.
- Far right (blue) columns are SIF evaluations of applicability to mission types

| Document Data (Updated August 2018) | | | | | | | | | Mission Applicability By Mission Type | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SDO name | Document Number | Title | LInk | Topic (ICS for ISO) | Status Published or in Development | ISO Stage | Book Type | Date Published (or Estimated date) | Earth Observing | Other LEO missions | R |
| ISO | ISO/TS 18667:2018 | Space systems -- Capability-based Safety, Dependability, and Quality Assurance | ISO/TS 18667:201 | 43.14 | Pub | 60.6 | | | 3 | 3 | |
| ISO | ISO/TS 20991:2018 | Space systems -- Calibration requirements for satellite-based passive microwave | ISO/TS 20991:201 | 43.14 | Pub | 60.6 | | | | | |
| ISO | ISO/TS 21979 | Space environment (natural and artificial) -- Procedure for obtaining worst case a | ISO/TS 21979 | 43.14 | Dev | 60 | | | | | |
| ISO | ISO 10795:2011 | Space systems -- Programme management and quality -- Vocabulary | ISO 10795:2011 | 01.040.49 | Pub | 90.92 | | | | | |
| ISO | ISO 20188:2018 | Space systems -- Spacecraft and launch vehicle combined operation plan (COP | ISO 20188:2018 | 03.120.20 | Pub | 60.6 | | | | | |
| ISO | ISO 14624-3:2005 | Space systems -- Safety and compatibility of materials -- Part 3: Determination of | ISO 14624-3:200! | 13.220.40 | Pub | 90.93 | | | 3 | 3 | |
| ISO | ISO 14624-4:2003 | Space systems -- Safety and compatibility of materials -- Part 4: Determination of | ISO 14624-4:200: | 13.220.40 | Pub | 90.92 | | | 3 | 3 | |
| ISO | ISO 14624-6:2006 | Space systems -- Safety and compatibility of materials -- Part 6: Determination of | ISO 14624-6:200! | 13.220.40 | Pub | 90.92 | | | 3 | 3 | |
| ISO | ISO 16781:2013 | Space systems -- Simulation requirements for control system | ISO 16781:2013 | 13.220.40 | Pub | 60.6 | | | 3 | 3 | |
| ISO | ISO 14619:2003 | Space systems -- Space experiments -- General requirements | ISO 14619:2003 | 33.100.01 | Pub | 90.93 | | | | | |
| AIAA | AIAA G-003C-2010(2016) | Guide: Reference and Standard Atmosphere Models | Link | Atmospheric, Orbital and Space Environment Models | | | Guide | | | | |
| AIAA | AIAA G-065-1999 | Guide: Global Aerosol Models (GAM) | Link | Atmospheric, Orbital and Space Environment Models | | | Guide | | | | |
| AIAA | AIAA G-083-1999 | Guide: Modeling Earth's Trapped Radiation Environment | Link | Atmospheric, Orbital and Space Environment Models | | | Guide | | | | |
| AIAA | AIAA G-140-2015 | Guide: Terrestrial Environment Guidelines for Use in Aerospace Vehicle Developm | Link | Atmospheric, Orbital and Space Environment Models | | | Guide | | | | |
| AIAA | AIAA SP-016-1992 | Special Project: Orbital Debris Mitigation: Technical, Legal, and Economic Aspect | Link | Atmospheric, Orbital and Space Environment Models | | | Special Project | | | | |
| AIAA | AIAA SP-016-2-1999 | Special Project: MEO/LEO Constellations: U.S. Laws, Policies, and Regulations o | Link | Atmospheric, Orbital and Space Environment Models | | | Special Project | | | | |
| AIAA | AIAA SP-069-1994 | Special Project: Contemporary Models of the Orbital Environment | Link | Atmospheric, Orbital and Space Environment Models | | | Special Project | | | | |
| AIAA | AIAA SP-137-2012 | Special Project: Status of Inflight Icing Forecasting Products and Plans for Future | Link | Atmospheric, Orbital and Space Environment Models | | | Special Project | | | | |
| AIAA | ANSI_AIAA_G-034A-201 | Guide: Reference and Standard Ionosphere Models | Link | Atmospheric, Orbital and Space Environment Models | | | Guide | | | | |
| AIAA | ANSI/AIAA S-123-2007(2 | Adaptations and Conversions of CCSDS Space Link Extension Forward Communi | Link | CCSDS Space Link Extensions | | | Standard | | | | |
| AIAA | ANSI/AIAA S-124-2007(2 | Adaptations and Conversions of CCSDS Space Link Extension Return All Frames | Link | CCSDS Space Link Extensions | | | Standard | | | | |
| AIAA | AIAA G-077-1998(2002) | Guide: Verification and Validation of Computational Fluid Dynamics Simulations | Link | Computational Fluid Dynamics | | | Guide | | | | |
| AIAA | AIAA R-101A-2005 | Recommended Practice: The CFD General Notation System - Standard Interface | Link | Computational Fluid Dynamics | | | Recommended Practice | | | | |
| AIAA | ANSI/AIAA S-119-2011(20 | Standard: Flight Dynamics Model Exchange Standard | Link | Computational Fluid Dynamics | | | Standard | | | | |
| CCSDS | 902.12 | Cross Support Service Management -- Common Data Entities | Link | Cross Support (Ground Station) | Dev | | Magenta | Est-8/12/2019 | 5 | 5 | |
| CCSDS | 902.13 | Abstract Event Definition -- Data Format for Specifying Events | Link | Cross Support (Ground Station) | Dev | | Magenta | Est-8/12/2019 | 5 | 5 | |
| CCSDS | 902.2 | Cross Support Service Management: Planning Information Formats | Link | Cross Support (Ground Station) | Dev | | Blue | Est-8/30/2019 | 5 | 5 | |
| CCSDS | 902.4 | Cross Support Service Management: Service Package Data Formats | Link | Cross Support (Ground Station) | Dev | | Blue | Est-1/15/2020 | 5 | 5 | |
| CCSDS | 902.9 | Cross Support Service Management: Service Management Utilization Request Fo | Link | Cross Support (Ground Station) | Dev | | Blue | Est-10/10/2019 | 5 | 5 | |
| CCSDS | 920 | Cross-Support-Transfer Services Specification Framework Concept | Link | Cross Support (Ground Station) | Dev | | Green | Est-6/30/2018 | 5 | 5 | |
| CCSDS | 921.2 | Guidelines for Specification of Cross Support Transfer Services | Link | Cross Support (Ground Station) | Dev | | Magenta | Est-7/26/2018 | 5 | 5 | |
| CCSDS | 922.2 | Tracking Data Cross support Transfer Service | Link | Cross Support (Ground Station) | Dev | | Blue | Est-5/10/2018 | 5 | 5 | |
| CCSDS | 922.4 | Cross Support Transfer Services: Forward Frame CSTS | Link | Cross Support (Ground Station) | Dev | | Blue | Est-2/7/2020 | 5 | 5 | |
| CCSDS | 927.1 | Cross Support Service Management: File Transfer, Ground Segment, Recommen | Link | Cross Support (Ground Station) | Dev | | Blue | Est-11/1/2019 | 5 | 5 | |
| CCSDS | 901.0-G-1 | Space Communications Cross Support--Architecture Description Document | 901x0g1.pdf | Cross Support (Ground Station) | Pub | | Green | 11/1/2013 | 5 | 5 | |
| CCSDS | 901.1-M-1 | Space Communications Cross Support--Architecture Requirements Document | 901x1m1.pdf | Cross Support (Ground Station) | Pub | | Magenta | 5/1/2015 | 5 | 5 | |
| CCSDS | 902.0-G-1 | Extensible Space Communication Cross Support--Service Management--Conce | 902x0g1.pdf | Cross Support (Ground Station) | Pub | | Green | 9/1/2014 | 5 | 5 | |
| CCSDS | 902.1-B-1 | Cross Support Service Management--Simple Schedule | 902x1b1.pdf | Cross Support (Ground Station) | Pub | | Blue | 5/31/2018 | 5 | 5 | |
| CCSDS | 910.0-G-2 | Space Link Extension Services--Executive Summary | 910x0g2.pdf | Cross Support (Ground Station) | Pub | | Green | 3/1/2006 | | | |

# Basic Concept

# Full Proposal to SDOs
# "Standardized" Standards Access

**January 31, 2020**

## Space Infrastructure Foundation

# In a nutshell…

- ✦ SIF had a need to "harvest" some data about standards documents from the ISO, AIAA and CCSDS websites.
  - ◆ In support of developing a class on Space Standards
- ✦ It was not easy.  Different formats, different tables of data, different definitions for terms, etc.
- ✦ Result:  This is a proposal for "standardized" access to "metadata" about your standards documents.
- ✦ Example data:
  - ◆ PUBLISHED:  Title, Number, Date published, keywords…
  - ◆ IN DEVELOPMENT:  Title, Draft number, stage, scheduled pub date
- ✦ Example usage:
  - ◆ Companies'/Missions' access dates for their development schedules
  - ◆ Missions have integrated view across the "Space Standards Framework"
  - ◆ Educational entities like SIF developing a class
- ✦ Example *possible* implementations
  - ◆ Standard table format for easy cut-and-paste of lists of documents
  - ◆ An API for programmatic access (RESTful, HTML5, etc?)
  - ◆ May work hand-in-hand with XML formatted standards documents
    - ✦ (That's a subject for another time)

# Proposal for "Standardized" Standards Access

✦ Currently Space Standards are developed and published by ISO, CCSDS and AIAA.

✦ Each organization presents a different human-readable interface to the external world, with different "metadata" in different formats.  Examples:

- ◆ ISO's ICS classification
- ◆ CCSDS's Blue/Green/Magenta book classification
- ◆ Publication dates in different formats

✦ None of the SDO's online access allows programmatic interfaces (yet).

✦ Programmatic interfaces would allow external organizations to develop applications that integrate standards listings and access for a technical domain (like "space standards"), adding value and capability for the industry.

# SIF Background; Efforts Towards Integration

✦ Space Infrastructure Foundation (SIF) develops class and online materials to help spaceflight missions and projects to understand and utilize space-related standards from major SDOs.

✦ We have executed this exercise several times.

  ◆ Used cut-and-paste from website into spreadsheet

  ◆ Totals 500+ standards documents

  ◆ Extremely labor intensive process, quickly out-of-date

✦ In doing this, SIF adds value to SDO-published metadata

  ◆ Assessment of applicability to certain mission types (LEO, GEO, Exploration, etc.) and domains (onboard, ground, etc.)

  ◆ Assessment of priority and value based on future needs of missions.

# Benefits

✦ Programmatic, "standardized" metadata presentation of standards documents would be valuable to:

◆ External organizations (like SIF) that can add value to users, increasing user adoption.

   ✦ Encourages advocacy of standardization by non-profit or commercial organizations with external resources

◆ Agencies that need to develop their own integration tools

   ✦ e.g. ECSS drawing from ISO, CCSDS and potentially other websites).

   ✦ e.g. NASA-internal NESP Technical Standards Website

◆ Could be adopted by other standards organizations eventually (IEEE, OMG, etc.?) and become a "viral" approach allowing broad standards integration capabilities.

◆ Increase adoption of standards worldwide.

# Basic Concept

**AIAA**

**CCSDS**

**ISO**

**Query**

**Response**

**Query**

**Response**

**Query**

**Response**

**Integration Website**

# Organizational Approach

✦ A "lead" organizes some telecons with SDOs and SIF
  - ◆ SIF represents a non-SDO invested external customer
  - ◆ Others, also, if SDO's know of other interested parties
✦ Agenda for the telecon:
  - ◆ Walk through this proposal to answer questions
  - ◆ Discussion of technical options for programmatic interfaces
  - ◆ Discussion about feasibility from each SDO
  - ◆ If agreement to explore this is reached, develop forward plan for follow-on telecons.
✦ Organizational working group should address what subset of metadata needs to be shared (doc title, doc name, pub date, etc.)

# Proposed Technical Approach

✦ The general technical approach should be for the SDO websites to allow programmatic access via a ***RESTful*** interface.

- ◆ Widely accepted across the WWW
- ◆ CCSDS SharePoint system easily adapted to it.
- ◆ Perhaps AIAA SharePoint as well (?)

✦ Visual layout should also accommodate cut-and-paste.

✦ Technical working group will need to confer by telecon to discuss this… details of REST (REpresentational State Transfer) approach need to be specified (version, etc.?)

✦ Probably will need to document these technical details in an Interface Control Document that can be published by the SDOs, so externals can access the public data programmatically.

✦ Name? Space Standards Integration Team?

# Action for now

✦ Simply need agreement to organize a telecon discussion, with one of the SDOs as the telecon organizer.

✦ This effort needs both organizational folks (content owners, deciding what metadata to share) and technical folks (web developers) at the outset.

  ◆ They can possibly branch off to separate telecons or direct one-on-one coordination later

✦ SIF volunteers to start the conversation by walking through this presentation.

  ◆ Or an updated version, or something completely different if the SDOs (ISO/CCSDS/AIAA) have new suggestions on how to proceed.

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