

•International Space Data Systems standardization•

International Space Data Systems standardization: Overview

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AGENDA

- ◆ Overview of NASA Data Systems Standards Program (NDSSP)
 - ❖ Program Objectives
 - ❖ Program Methodology
 - ❖ Future Thrusts
- ◆ Space Data Systems Standardization as defined by the world's Space Agencies

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NDSSP Program Objectives

- ◆ Provide well-engineered solutions for most common space mission data handling needs.
 - ❖ Reduce mission risks
 - ❖ Reduce mission and support costs
 - ❖ Greater software and equipment reuse
 - ❖ Assured performance
 - ❖ Easier schedule compliance
 - ❖ Open integration of commercial products
 - ❖ Enhanced and strengthen interoperability and cross support
 - ◆ Intra NASA
 - ◆ Inter Agency
 - Military, Civil, Commercial space
 - ◆ International
 - ❖ ... and thus provide **MISSION ENABLING** capabilities

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NDSSP Program Methodology

- ◆ **ESTABLISH:** A Data Systems logical environment model.
- ◆ **IDENTIFY:** Areas where new data standards would improve future mission performance and provide economic benefits.
- ◆ **ADOPT:** Use proven (existing) technical standards from other organizations where applicable and beneficial
 - ❖ **Example:** Use of XML, IP, ...
- ◆ **ADAPT:** Select and tailor existing standards to meet specific mission needs
 - ❖ **Example:** Space Communications Protocol Standards (SCPS) are Internet protocols adapted to the space environment
- ◆ **DEVELOP:** Create new open space standards where no alternatives exist
 - ❖ **Example:** Space data link, coding and compression
- ◆ **CONSENSUS** is the “way of doing business”

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NASA's Future Thrusts and their Programmatic Drivers

◆ More Challenging Mission Scenarios

❖ Constellation and Formation Flying

- ◆ Inter Spacecraft Communications
- ◆ Relative Positioning

❖ Autonomous Exploration

- ◆ Less reliance on “Joystick Operations”
- ◆ Dynamic Response to Environment (Precision EDL, Rendezvous & Docking)

❖ Sensor Webs

- ◆ Re-configurable orbiting and landed sensors for in-situ, long-term and detailed observation, prediction and analysis.

❖ Highly distributed multi-organization operations teams

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SDS Standardization as defined by the world's Space Agencies

- ◆ Age of decreasing budgets
 - ❖ It is no longer violable for the Space Agencies and other space h/w and s/w providers to constantly change the infrastructure in pursuit of a better mouse trap.
 - ◆ Change and evolution are needed, but ..
 - all have to be fully understood
 - need to be justified (technically and/or programmatically)
 - eventually have to become a part of the infrastructure
 - ❖ Market place can no longer afford influx of non-standard components
 - ❖ Reduction in Per-Mission Cost is essential
 - ◆ Integrated end-to-end information handling architecture
 - ◆ Highly standardized set of operations services

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SDS Standardization as defined by the world's Space Agencies

◆ Major Thrusts

- ❖ Interoperability between Space Agencies and other service providers
- ❖ International Standardized Cross-Support

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SDS Standardization as defined by the world's Space Agencies

- ◆ Two organization provide for ideal forums to address and meet the outlined thrusts
 - ❖ Inter-agency Operations Advisory Group (IOAG)
 - ◆ IOAG is an international operations forum that links mission support infrastructure providers with their mission customers
 - Mission support infrastructure is built around standardized services:
 - » Services offered by infrastructure providers to mission customers
 - » Services offered by infrastructure providers to each other to extend the reach of international mission support, support infrastructure
 - ❖ Consultative Committee for Space Data Systems (CCSDS)
 - ◆ CCSDS is an international standards forum that develops the standards which help groups such as the IOAG develop standardized infrastructure and services
 - ◆ CCSDS also works in developing standardized architectural models that help define the scope and relevance of its standards

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SDS Standardization as defined by the world's Space Agencies

◆ Wide range of providers

- ❖ More and more companies world wide provide standardized space services and equipment

- ◆ By doing so vendors report an order-of-magnitude reduction in cost of support systems

- Space News Article, 1998 Int'l TLM Conf – by Mr. Michael Williams of Avtec

- ◆ Large number of companies are marketing CCSDS-compatible products and services

- Database created from results received from a NASA Questionnaire, internet and companies marketing brochures

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SDS Standardization as defined by the world's Space Agencies

- ◆ Wide range of CCSDS standard users
 - ❖ Over 300 space missions have **VOLUNTARILY** adopted NDSSP/CCSDS Standards
 - ❖ Other agencies adopted CCSDS
 - ◆ NOAA
 - ◆ US Military

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SDS Standardization as defined by the world's Space Agencies

- ◆ Standardization of products and services is the only way world Space Agencies and their providers can achieve substantial reduction in development and operations cost.
- ◆ Current and future CCSDS tasks will continue to center around providing tools for it to happen.
- ◆ NASA and other Space Agencies welcome efforts of companies and technology and standards organizations to provide our missions with even more tools to succeed.

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Major Space Communications Interoperability Points

