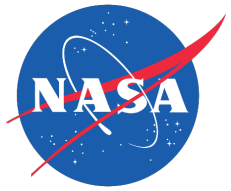
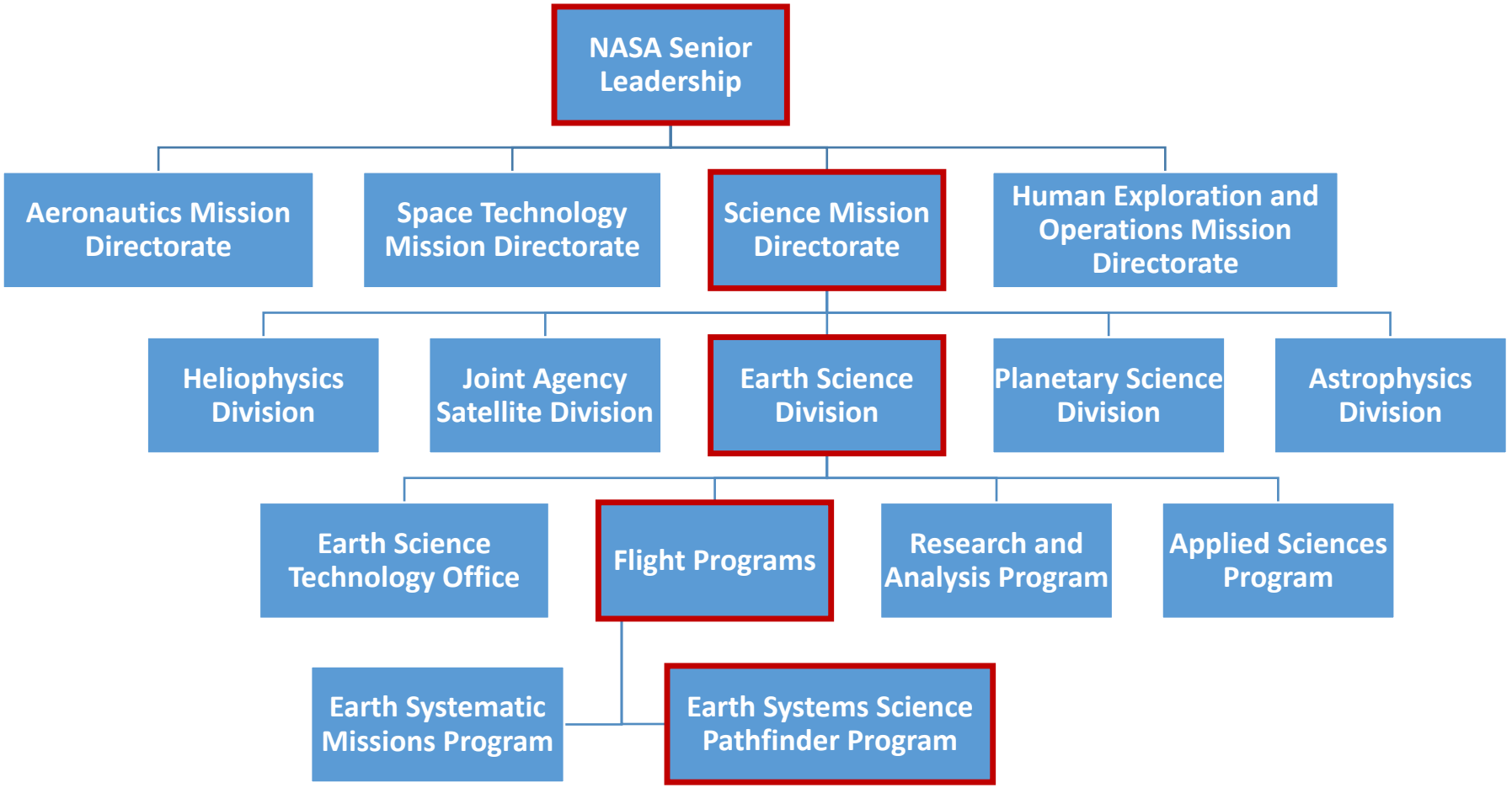


Mission Portfolio Risk Management

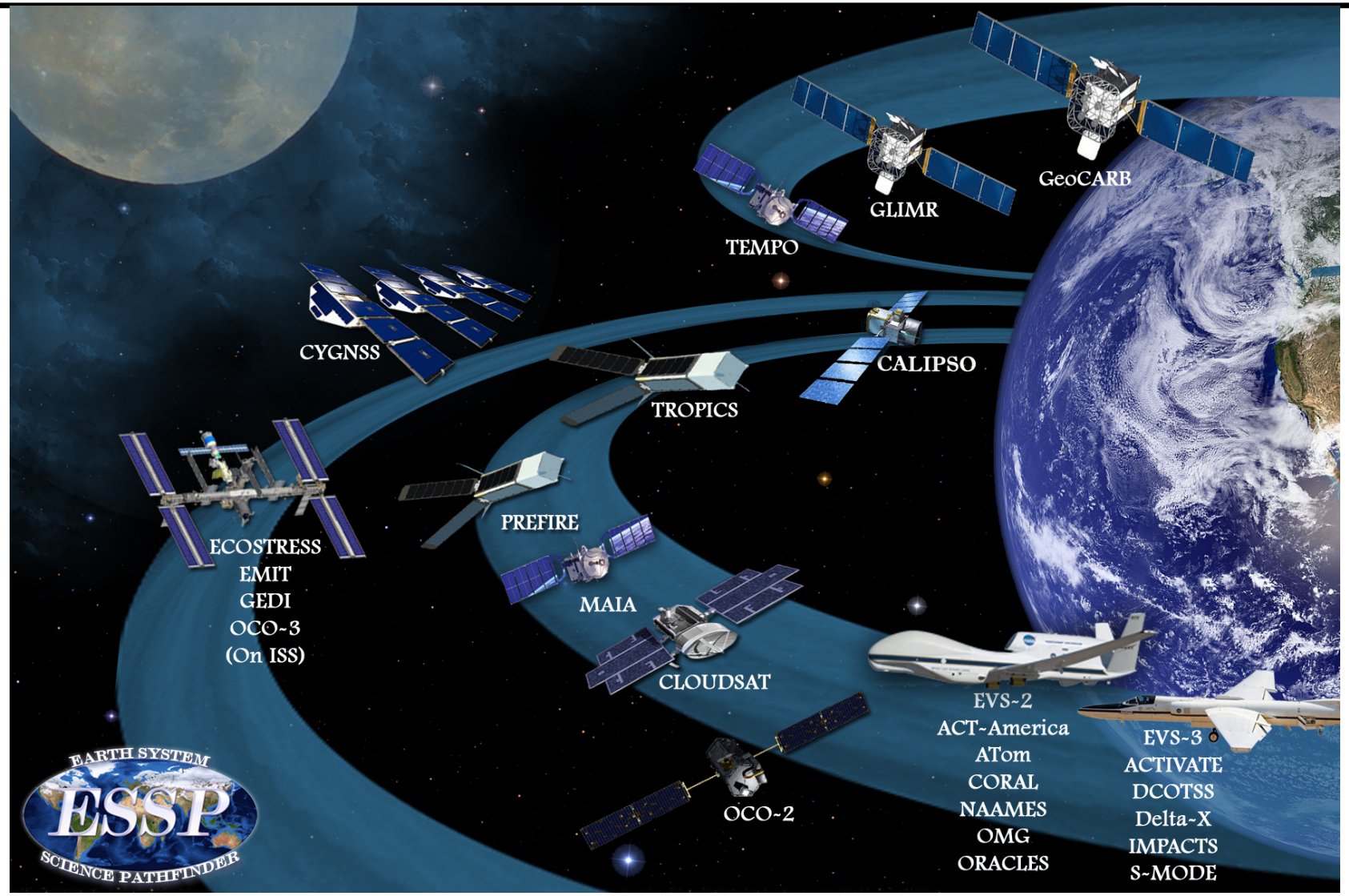
Greg Stover

March 11, 2021

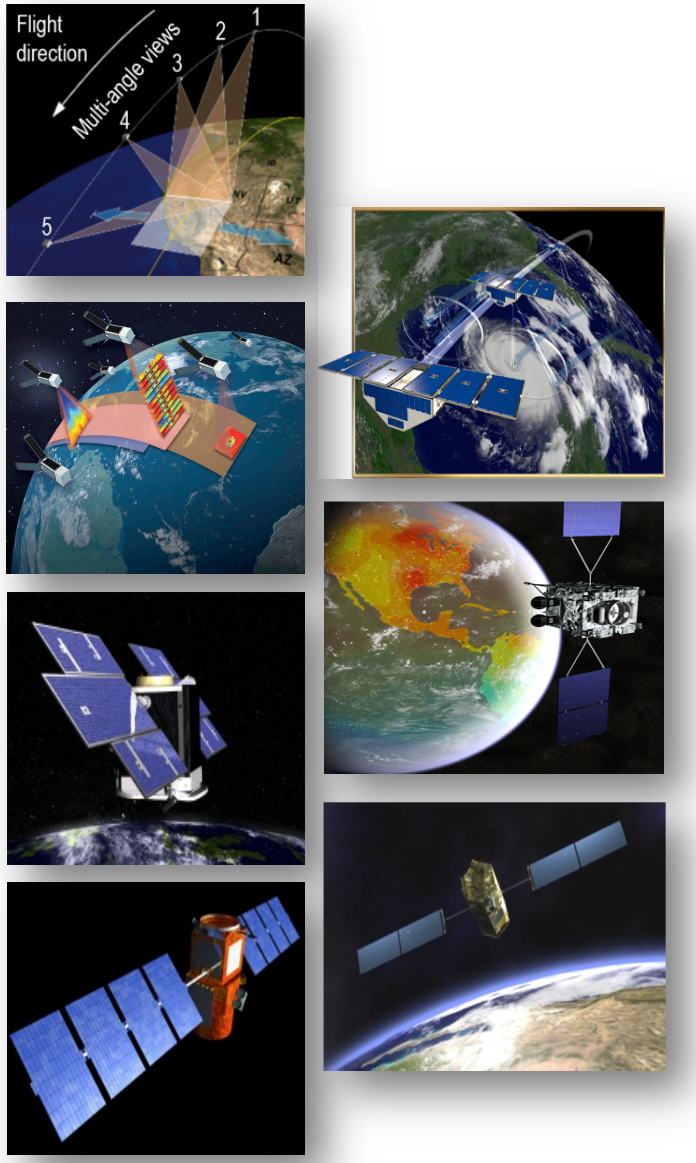
NASA Organizational Structure



ESSP Program Portfolio



ESSP Program Overview



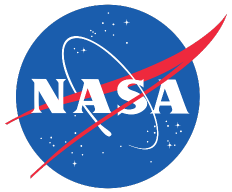
- The goal is to stimulate new scientific understanding of the global Earth system by:
  - developing and operating remote-sensing missions
  - conducting investigations using data from these missions
  - addressing unique, specific, highly focused requirements in Earth science research

- Projects in the ESSP portfolio are:
  - Science-driven
  - PI-led investigations
  - Competitively selected
  - Orbital or sub-orbital
  - Implemented within cost- and schedule-constraints
- https://essp.nasa.gov/latest-news/

Goals for our time together

- My goals are to:
  - share a summary of Science Mission Directorate leadership expectations with respect to streamlined Class D projects
  - provide context and observations of implementing Earth Venture Class D projects that consider Agency and SMD Class D guidance
  - participate in a dialog regarding considerations when implementing Class D principles for a portfolio of projects within a Program

  - learn from you and hear your ideas that enable Class D projects to provide higher science return by accepting a higher risk posture



NPR 8705.4
Effective Date:
June 14, 2004
Expiration Date:
March 14, 2021

Characterization	Class A	Class B	Class C	Class D
Priority (Criticality to Agency Strategic Plan)	High priority	High priority	Medium priority	Low priority
National significance	Very high	High	Medium	Low to medium
Complexity	Very high to high	High to medium	Medium to low	Medium to low
Mission Lifetime (Primary Baseline Mission)	Long, > 5 years	Medium, 2-5 years	Short, < 2 years	Short, < 2 years
Cost	High	High to medium	Medium to low	Low
Launch Constraints	Critical	Medium	Few	Few to none
In-Flight Maintenance	N/A	Not feasible or difficult	Maybe feasible	May be feasible and planned
Alternative Research Opportunities or Re-flight Opportunities	No alternative or re-flight opportunities	Few or no alternative or re-flight opportunities	Some or few alternative or re-flight opportunities	Significant alternative or re-flight opportunities
Examples	HST, Cassini, JIMO, JWST	MER, MRO, Discovery payloads, ISS Facility Class Payloads, Attached ISS payloads	ESSP, Explorer Payloads, MIDEX, ISS complex subrack payloads	SPARTAN, GAS Can, technology demonstrators, simple ISS, express middeck and subrack payloads, SMEX

Changing expectations for NASA Class D projects

- NASA Associate Administrator Memo (2014)
  - Guidance and Expectations for Small Category 3, Risk Classification D (Cat3/ClassD) Space Flight Projects with Life-Cycle Cost Under $150M (9/26/2014)
- SMD Class-D Tailoring/Streamlining DM (12/7/2017)
  - Expectations and Guidance from SMD AA for SMD Programs and Projects
- Request (3/23/2018) and Approval (6/27/2018) for Deviation from the FAR and the NFS 1834.201 EVMS Policy for SMD Class-D Tailored/Streamlined Missions $150M or less
- SMD Class-D Tailoring/Streamlining Implementation Plan and Class-D MAR (November 2019)

SMD Class-D Tailoring/Streamlining Implementation Plan (context)

- The goal of streamlining the approach to formulating and developing Class D projects is to reduce the management overhead costs, to encourage innovation, and to allow for more risk by increased relaxation of the formal NASA program management, engineering and mission assurance requirements for this classification of projects within NASA's framework of standard processes and best practices.

- SMD aims to achieve an 80% success rate for Class D projects in Phases A-D (i.e. complete development within cost/schedule MA) and able to achieve Level-1 Threshold Science Requirements) and an 80% success rate for projects in Phase E. (i.e. meets Mission Success Criteria).

- The designation of a project as Class D should not be solely based on cost, but should consider all the factors identified in NPR 8705.4. Risks can include technical risk (such as mission failure) or programmatic risks (such as cost/schedule overrun). Either or both types of risks can be accepted for a Class D project.

Overarching Principles and Intent of Streamlining Earth Venture Class D projects

- Accept more programmatic and technical risks to apply resources to scientific return
  - Reduced programmatic reporting and deliverables while maintaining NASA technical expectations
- Flexibility in project management is achieved through tailoring the requirements in NPRs
  - Tailoring is both expected and accepted.
  - In general, tailoring is easier to get approved than a waiver
- PI/PM are empowered and held accountable for the timely and efficient execution of the project
- Establish a low-overhead environment – streamlined reporting chain (avoid excessively layered reporting), minimal reporting across all facets of the project.
- Keep the team small - team members perform multiple functions/roles.
  - Team is focused on products and not process; requires the team to be experienced in the various processes.

The Intent Doesn't Always Match the Current Reality

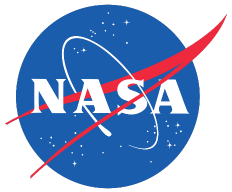
- NASA Subject Matter Experts (SME), Independent Review Teams (IRT), and Technical Authorities review and evaluate projects based on legacy expectations, bad lessons learned, and generally hold projects to high standards regardless of Risk Classification
- Industry and NASA Centers want to avoid the stigma of failures and sometimes focus on exceeding life and performance requirements than accepting risk
- Reduced programmatic reporting has limited impact to cost while reducing insight into risks due to disproportionate amount of project costs occurring in the hardware development and test
- External teams (and sometimes internal) are often not experienced with NASA expectations for Class D Mission and Instrument development

Class D: Mission Assurance Areas Considered in EV Implementation Approach

- Approach:
  - In ESSP, started with a Class C MAR and assessed each requirement to identify areas that could be relaxed and potential changes.
  - Next coordinated potential areas/changes with S&MA and Contracts.
- Results:
  - Biggest change was to not require formal delivery for specific products, but to make the data available to NASA – parts stress analysis, monthly parts list, MIUL, Type II NCRs, Program Approved Parts List,
  - Rather than have separate inputs, combined things into the Monthly Project Status Report – summary of Type II NCRs, .
  - Limited reliability analyses to safety critical items and interfaces.
  - PRA/FTA limited to safety critical items only.
  - No changes in safety requirements.

To summarize: Class-D is targeted at lower cost, higher risk projects

- SMD has defined acceptable risk as 80% success rate throughout portfolio
  - Risk includes technical and programmatic.
  - Failure defined as not meeting requirements and/or cost schedule overruns that lead to cancellation
- SMD Class-D Tailoring/Streamlining Implementation Plan key areas addressed include:
  - Streamlined Documentation and Convening Authority Delegation
  - Combined Reviews and Reduced Key Decision Points
- Appropriate Mission Assurance requirements are documented in a SMD Class D MAR
- Current Class D Missions include:
  - CLARREO Pathfinder, TSIS-2
  - ECOSTRESS, CYGNSS, TROPICS, GEOCARB, PREFIRE, GLIMR



Questions?