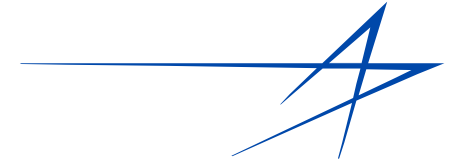


NASA SMD PI Forum

Industry Role in PI Led Missions

Nick Smith
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Outline



- **Background**
 - Importance of PI Led Missions
 - Value of Industry Involvement
- **Mission Life Cycle Examples**
 - Concept Definition
 - Phase B
 - Phase C/D
 - Phase E

Importance of PI Led Missions



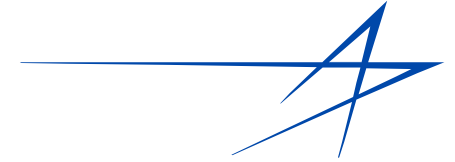
- **Enables High-Payoff Science**
 - Focused Mission, Outside Directed Programs
- **Builds Science Community Ownership**
 - Buy-In from Competitive Process
- **Early Science & Engineering Connection**
 - Science & Eng Interact Early in Process
 - Science & Eng Develop Integrated Products

Value of Industry Involvement



- Risk / Reward Motive
 - Early Science Requirements Definition & Flowdown
 - Balance Complexity & Cost
 - New Technology Only If Well-Developed and Significant Payoff
 - Fee-Based Incentives Unique to Industry
- Additional Perspective
 - Culture Driven by Different Experience Base
 - Independent from Govt & Science Team
- Leverage Internal Funding and Experience
 - Apply IR&D Results
 - Feed-Forward from Developments Funded by DOD, NOAA, etc.

Concept Definition



- Industrial Contractor Support
 - Help Balance Science Return with Mission & Spacecraft Complexity and Total Cost
 - Help Define Flowdown of Science Requirements into Mission & Spacecraft Designs
- Examples
 - Stardust:
 - Low-Cost Sample Return Capsule Concept [*Different Culture, IR&D*]
 - Encourage Use of NAVCAM for Flyby NAV and Comet Imaging [*Balance Complexity and Cost*]
 - Genesis:
 - Low-Cost Sun-Pointed Spinner [*Leverage Corporate Experience*]
 - Expanded Sample Return Capsule [*Early Science Flowdown*]
 - Phoenix:
 - Soft-Lander (versus Airbags) [*Balance Complexity and Cost*]
 - Deployable High-Area Compact Solar Arrays for Power Robustness [*New Technology Well-Developed and Significant Payoff*]

Phase B



- Industrial Contractor Support
 - Diligent Risk Management
 - Allocation of Requirements to Spacecraft & Other Project Elements
- Examples
 - Stardust: Early Science Requirements Document and Interface Control Documents
[Early Science Flowdown]
 - Genesis: Parallel Path for C-C Heatshield
[Risk Management, IR&D]
 - Phoenix: Determine Accessible Volume prior to Instrument Proposals; Providing a PEB (thermally controlled volume) for Instrument Electronics
[Early Science Flowdown]

Phase C/D



- Industrial Contractor Support
 - Diligent Risk Management
 - Input into Management of Project Resources
 - Cost & Schedule Reserves
 - Technical Margins
- Examples
 - Stardust: Cost-Effective Contamination Control Techniques
[Leverage Corporate Experience]
 - Genesis: Accommodated Late-Breaking Magnetic and Software Requirements of Charged-Particle Instrumentation *[Integrated Science & Engineering Team, Risk Management, Project Reserves]*
 - Phoenix: Accommodated Late Delivery of 2 Instruments
[Integrated Science & Engineering Team, Project Reserves]
 - Overall: No Significant Instrument Descopes
[Early Science Flowdown, Risk Manage, Project Reserves]

Phase E



- Industrial Contractor Support
 - Efficient Nominal Spacecraft Operations
 - Quick Resolution of Flight Challenges
- Examples
 - Stardust: Low-Cost Ops by Mission-Sharing; Active Participation in Flyby Risk Management
[Balance Complexity & Cost, Risk Management]
 - Genesis: Early Detection of Thermal Paint Problem; Finding a Solution for Full Length Mission via Battery Environmental Testing
[Risk Management, Project Reserves]
 - Phoenix / All Missions: Spacecraft Ops in Same Location with Development Engineering Team
[Balance Complexity & Cost, Quick Resolution]

Summary



- PI-Led Missions Fill Important Role in Space Science Program
 - Enables High-Payoff Science
 - Builds Science Community Ownership
 - Establishes Early Connection between Science & Engineering
- Industry Involvement Adds Value to PI-Led Missions
 - Unique Risk / Reward Perspective
 - Additional Perspective & Experience Base
 - Leverage Internal Funding & Non-NASA Developments