

Technology Development for NASA Space and Earth Science Missions

Presented at InterPACK '03

8 July 2003

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What is NASA All About?

- **Vision**
 - To improve life here
 - To extend life to there
 - To find life beyond
- **Mission**
 - To understand and protect our home planet
 - To explore the universe and search for life
 - To inspire the next generation of explorers

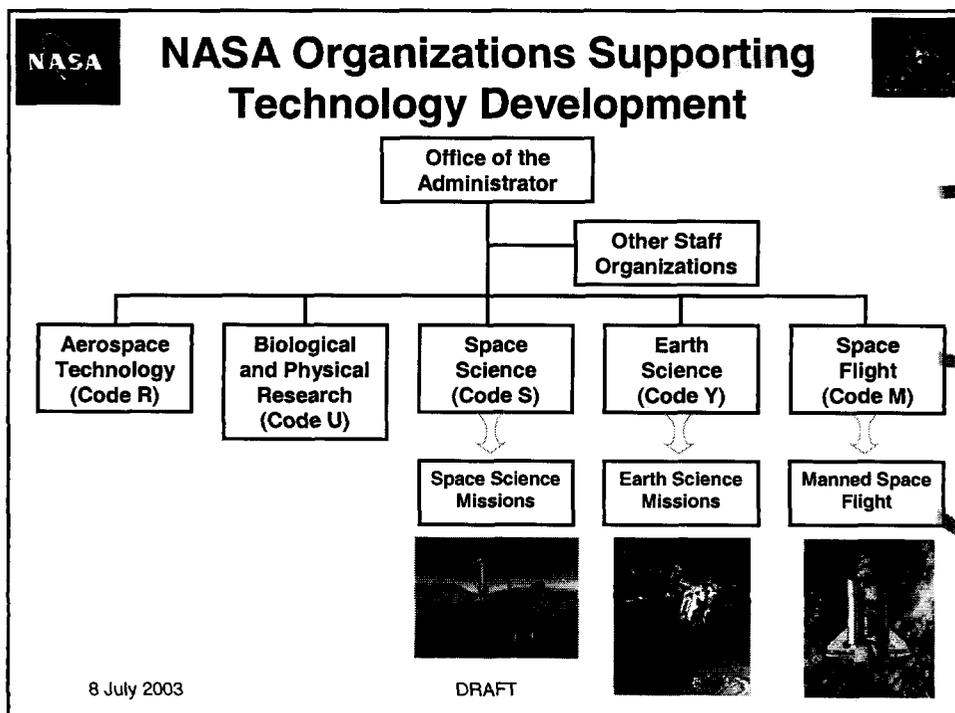


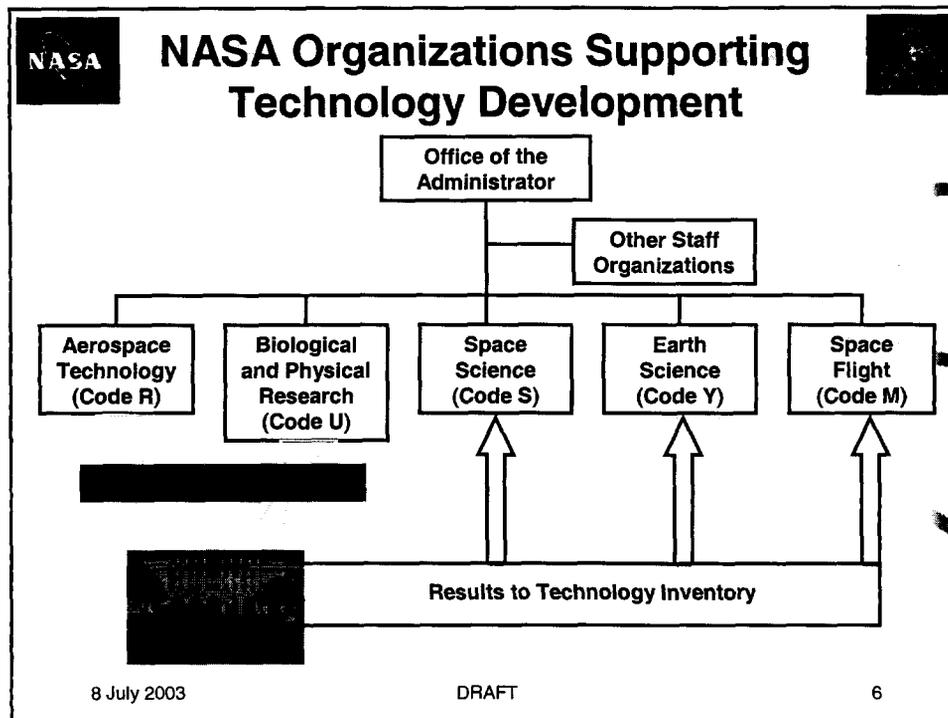
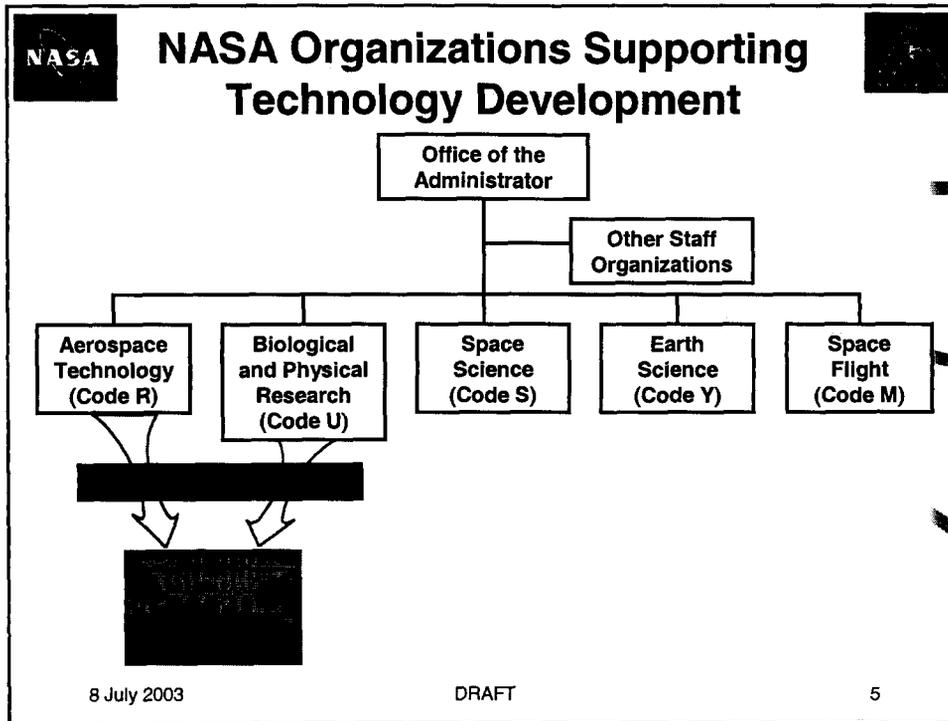
Technology's Role at NASA

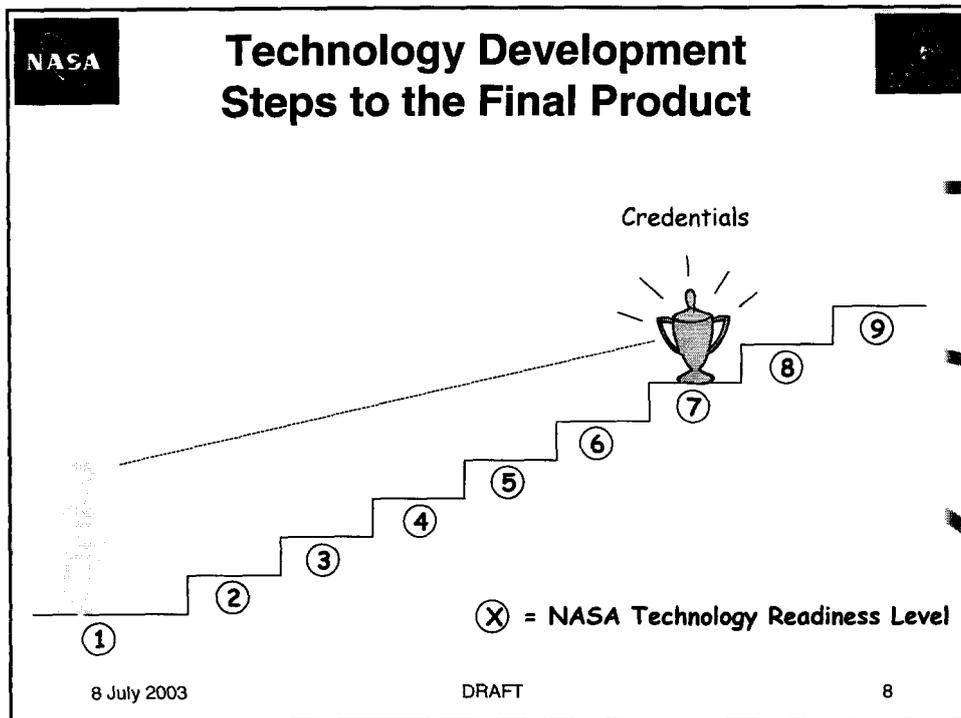
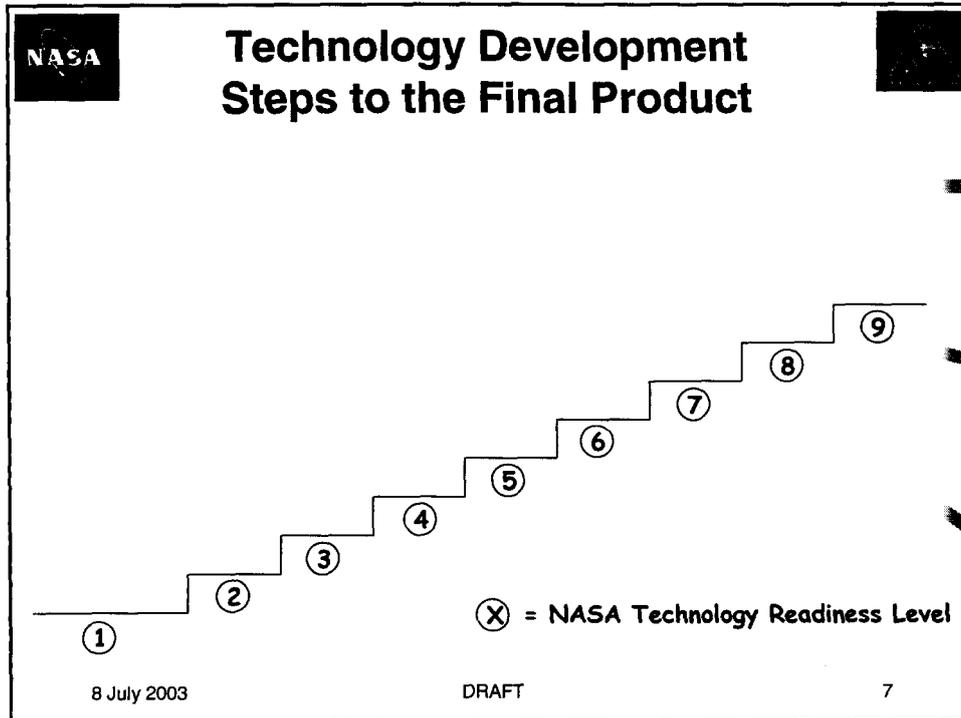


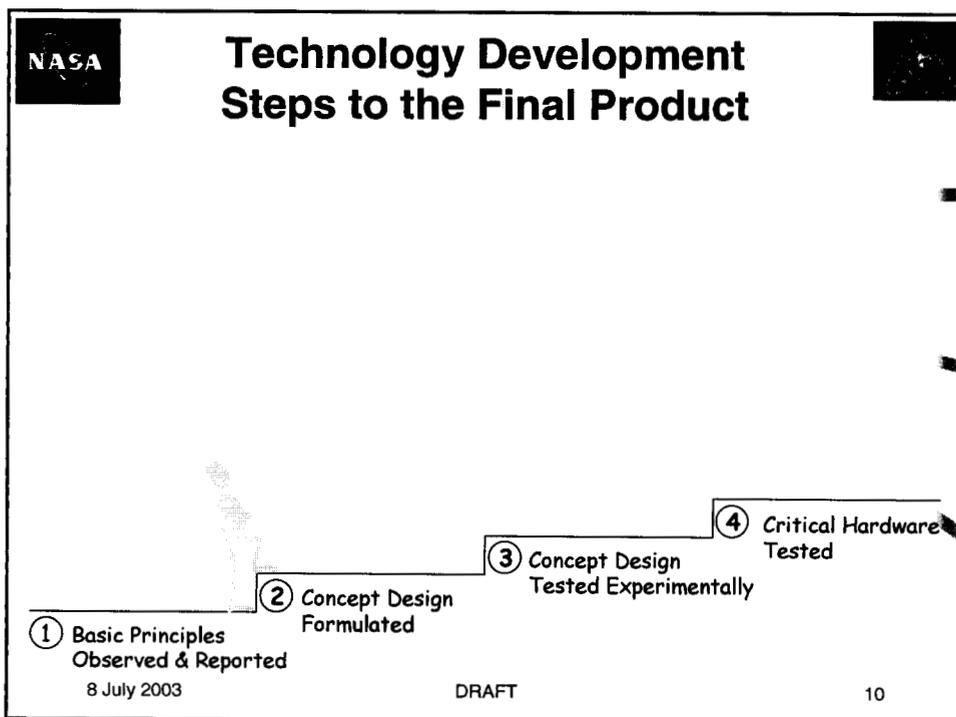
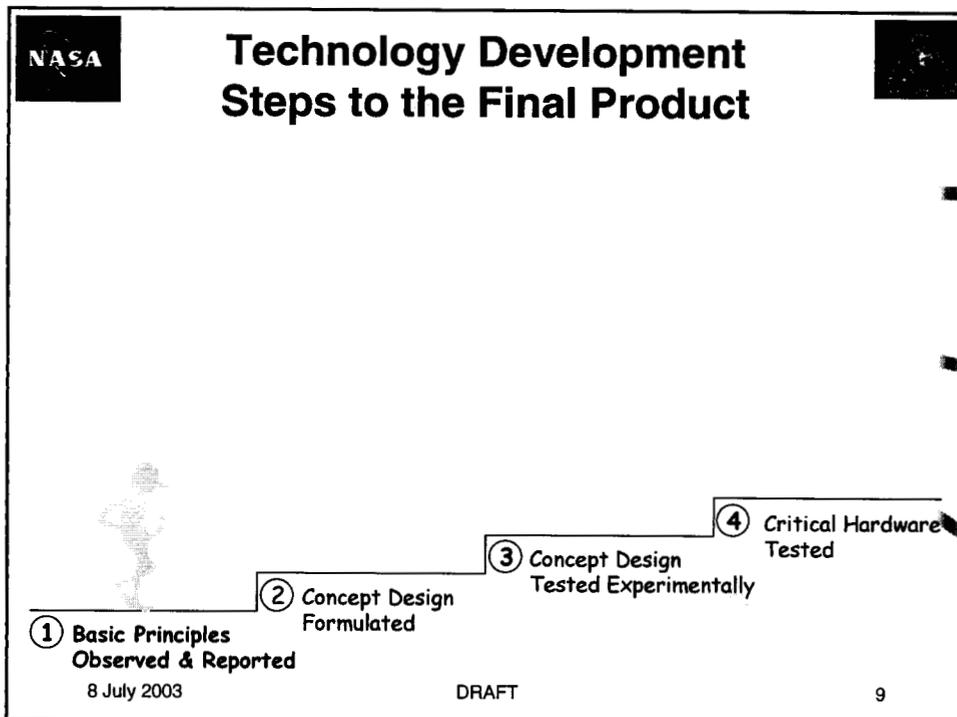
- Technology development organizations supporting the NASA vision and mission
- Steps in the technology development process
- The New Millennium Program (NMP)
 - Program objectives
 - NMP project planning process
 - Getting involved in NMP
 - Current NMP projects
- What happens to technology after NMP flights
- Staying in touch

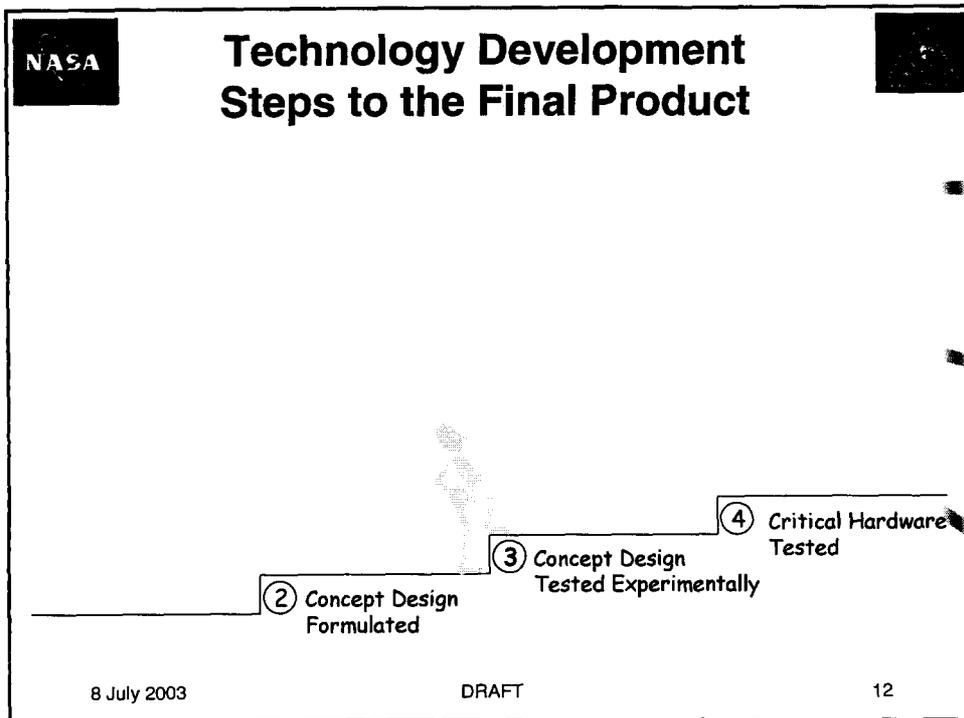
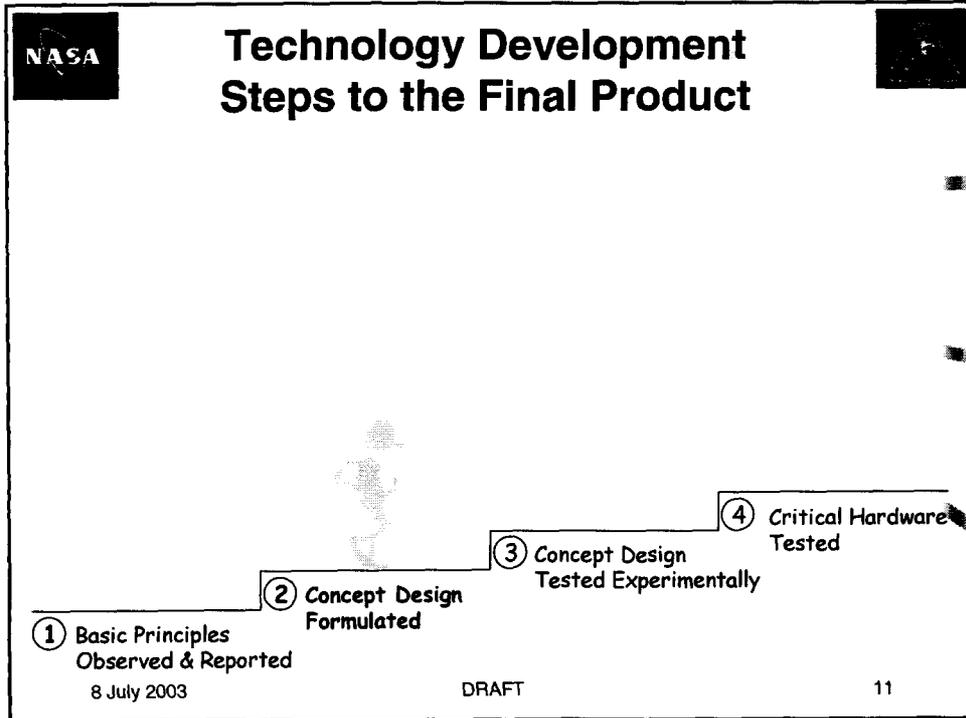
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Technology Development Steps to the Final Product

Project should pick up the tabl

③ Concept Design Tested Experimentally

④ Critical Hardware Tested

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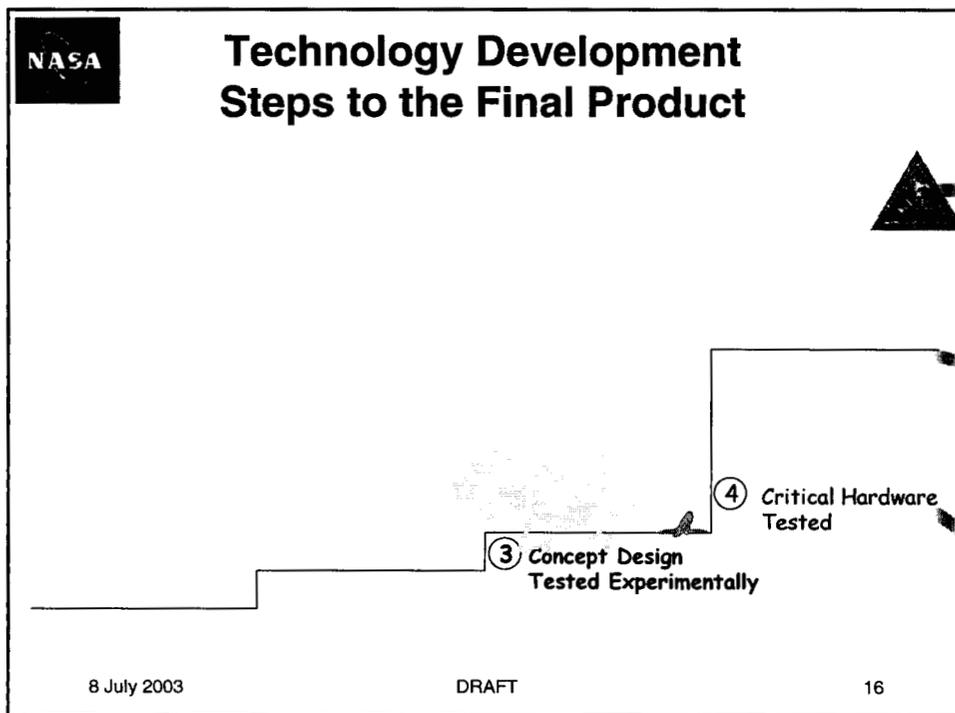
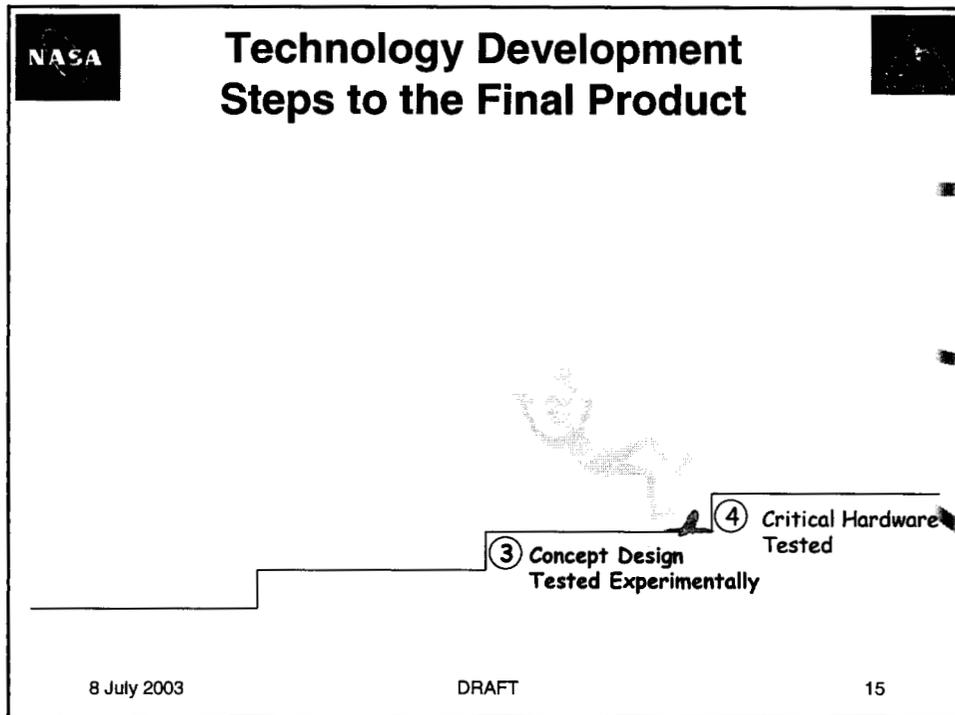
Technology Development Steps to the Final Product

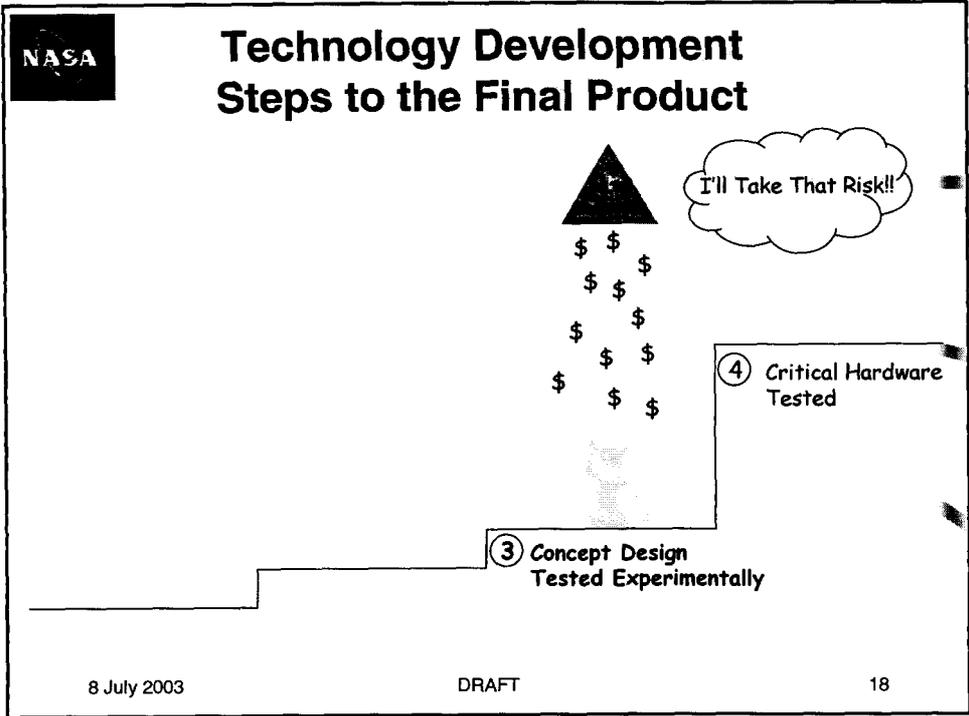
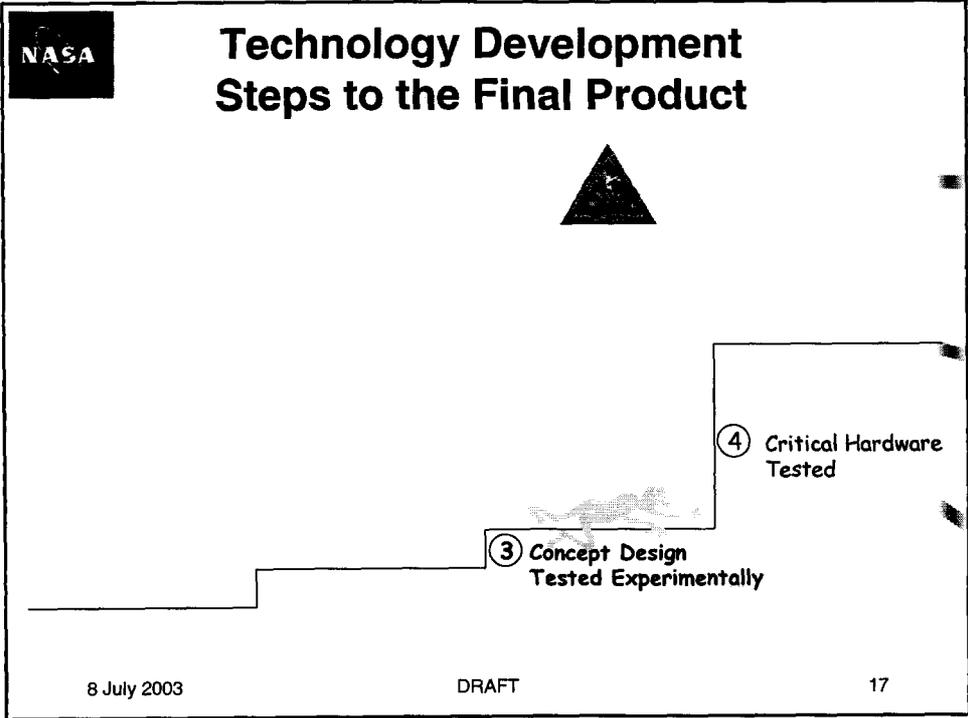
Not on my Project! To Risky!!

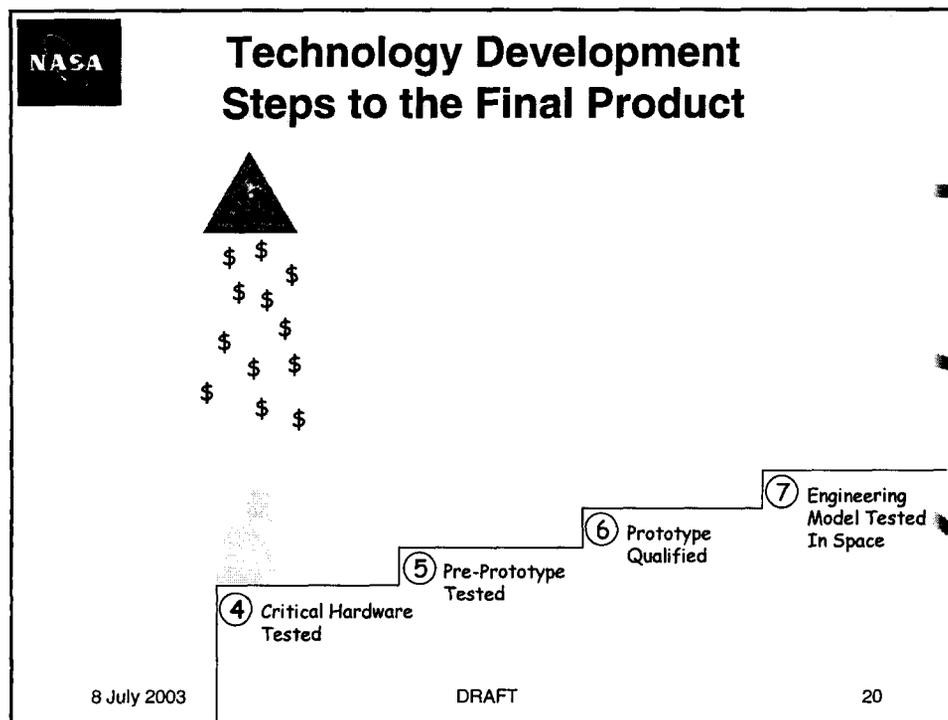
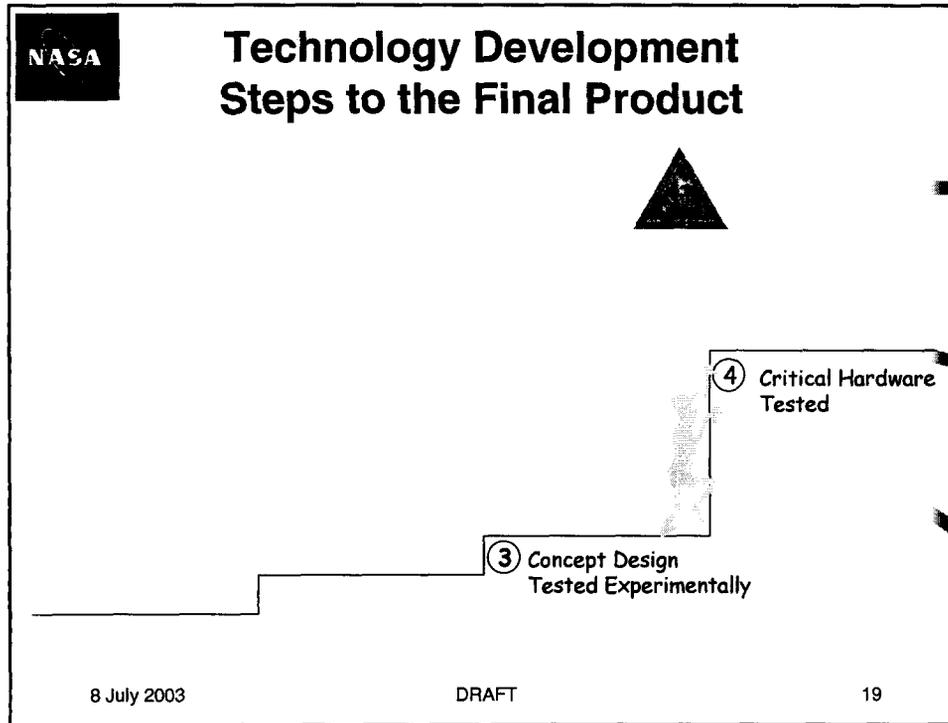
③ Concept Design Tested Experimentally

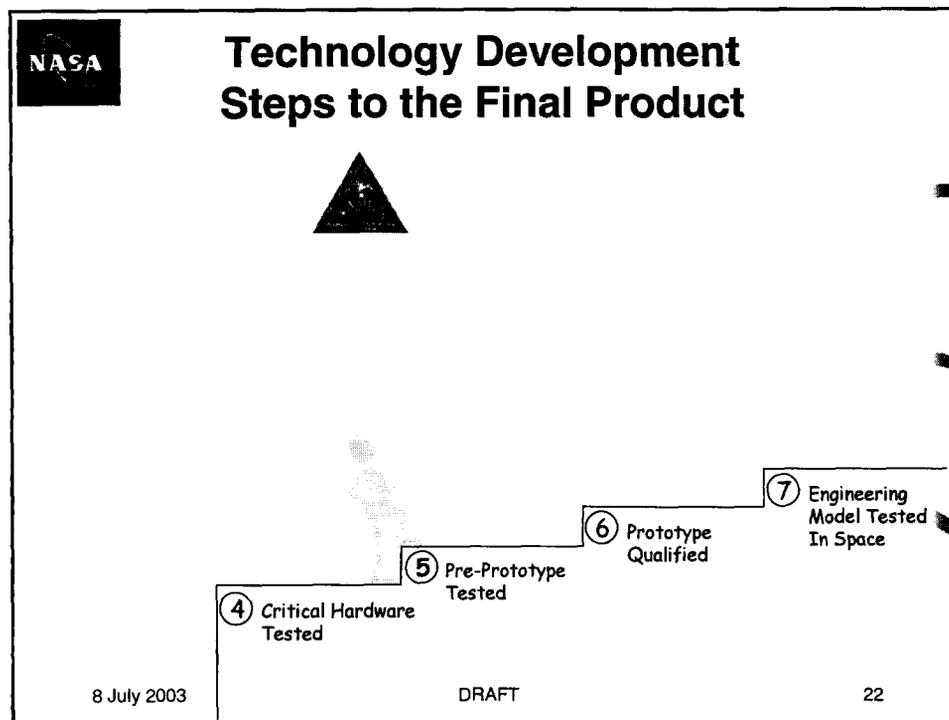
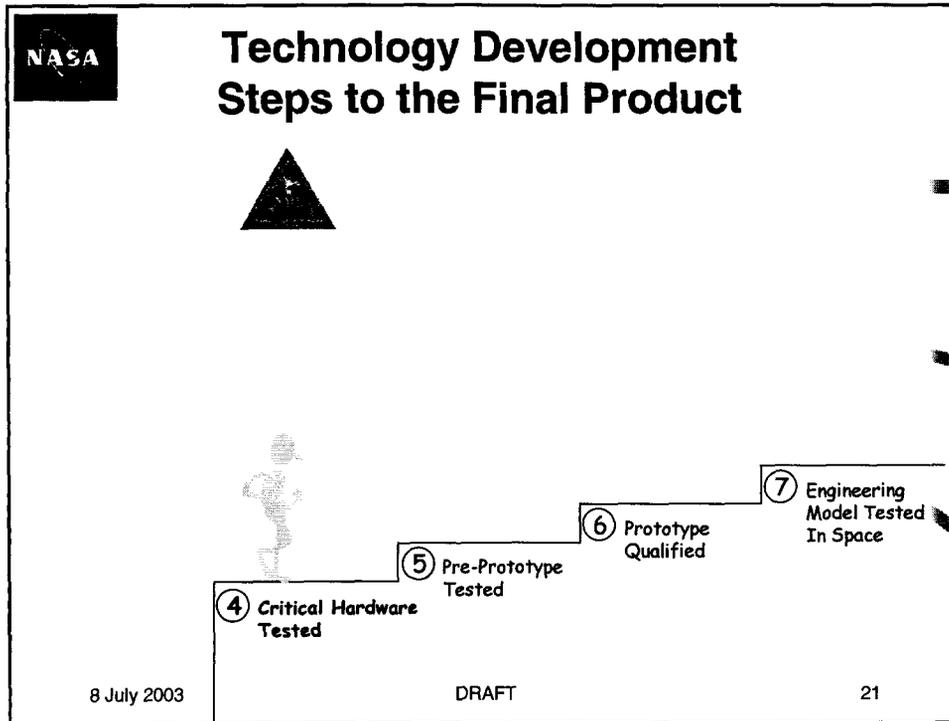
④ Critical Hardware Tested

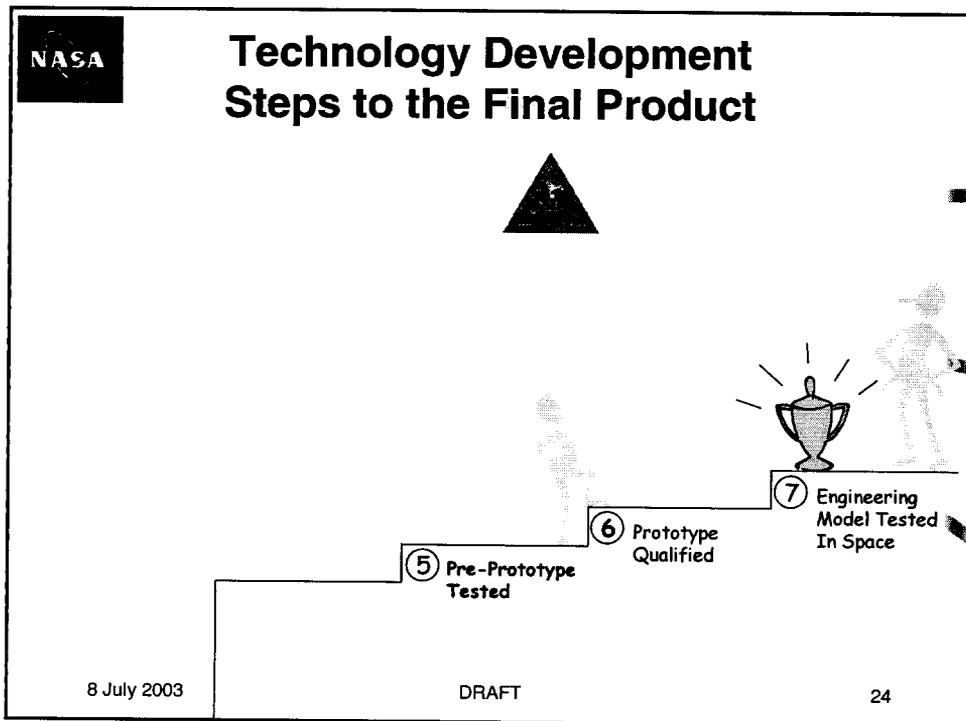
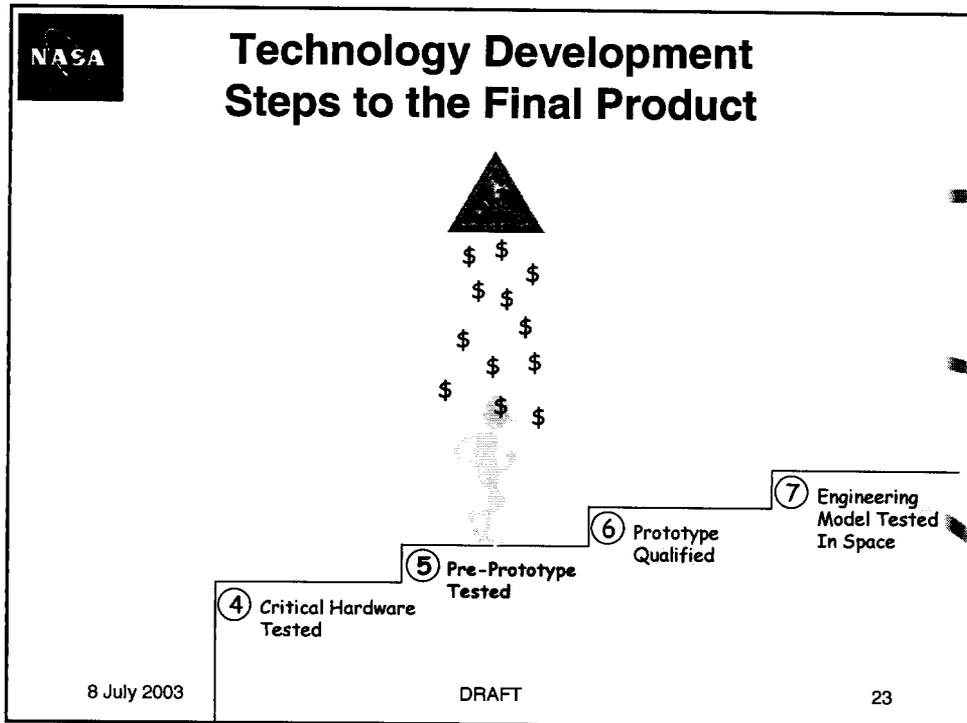
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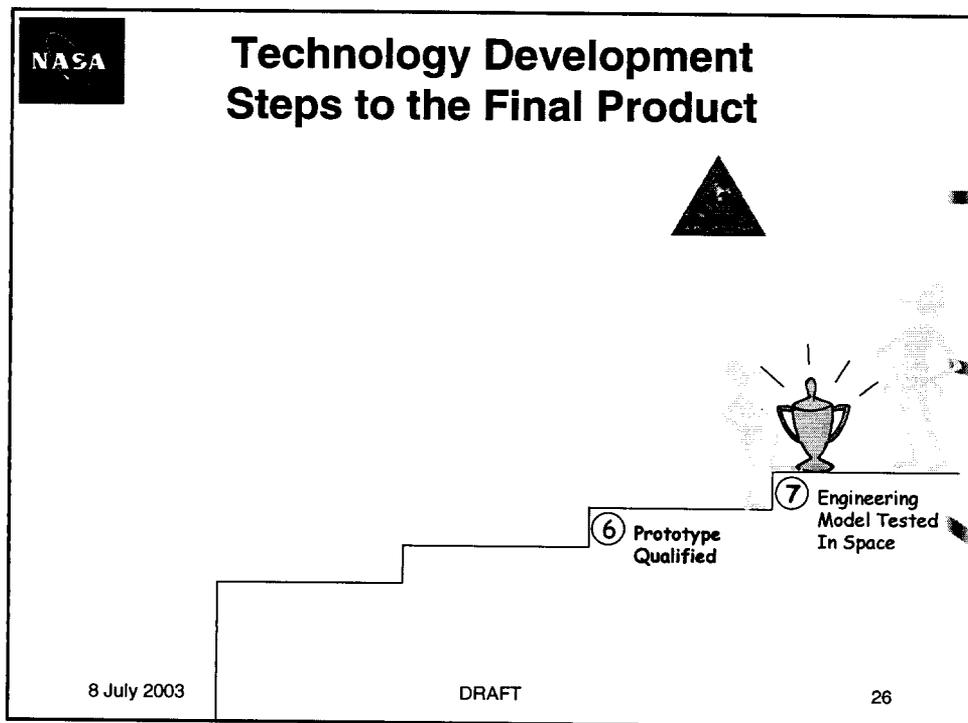
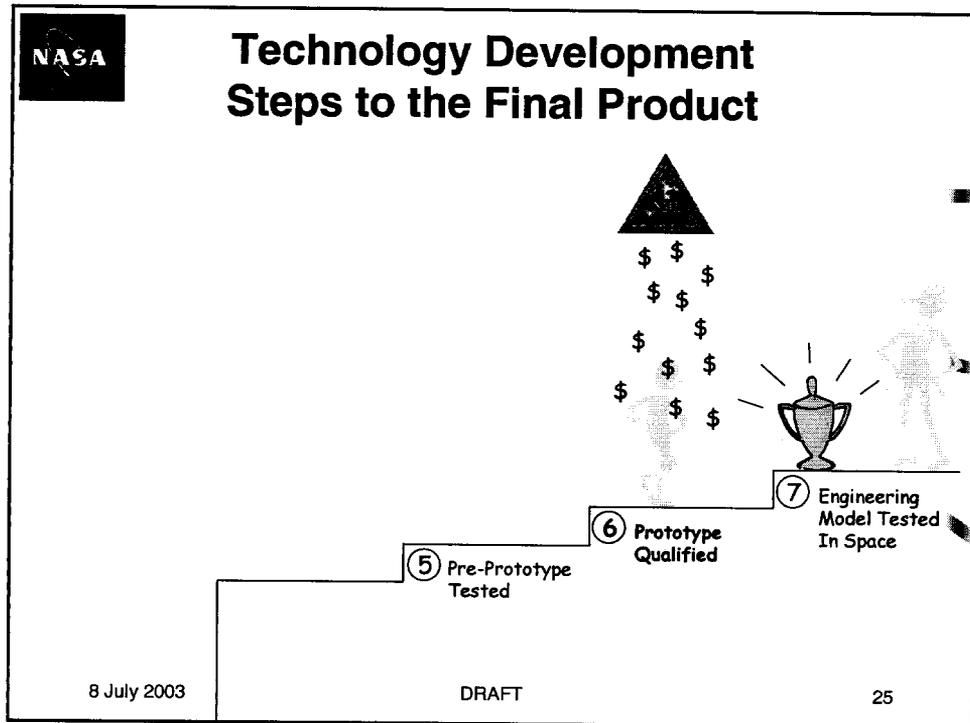












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Technology Development Steps to the Final Product

The New Millennium Program validates breakthrough technologies to retire risk of first use in future space science and Earth science missions

6 Prototype Qualified

7 Engineering Model Tested In Space

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Technology Development Steps to the Final Product

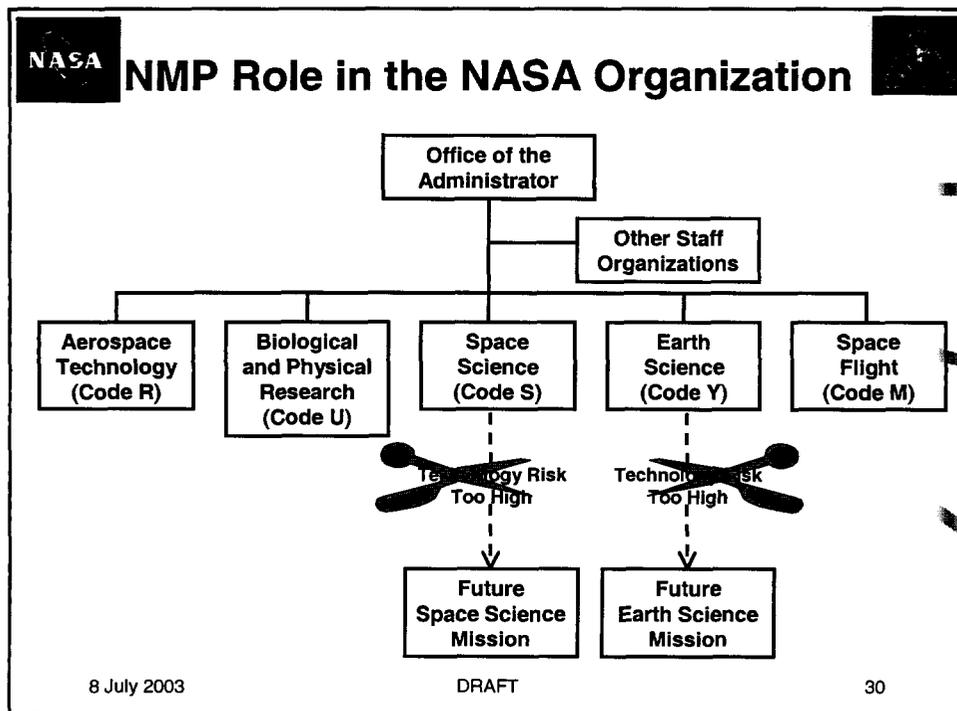
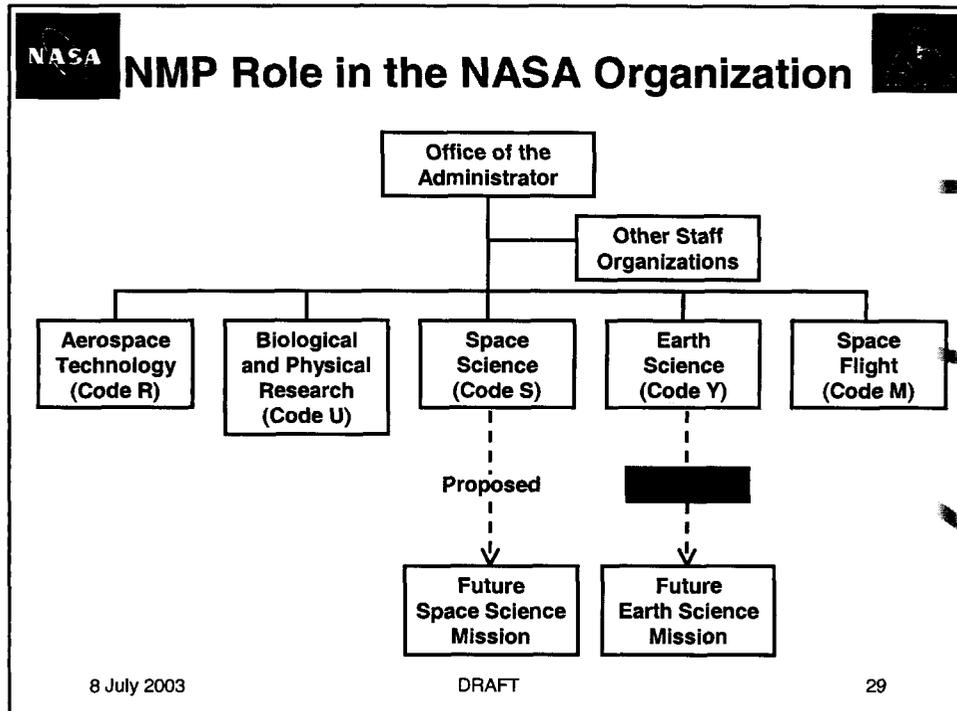
Now, go and get me some science data!

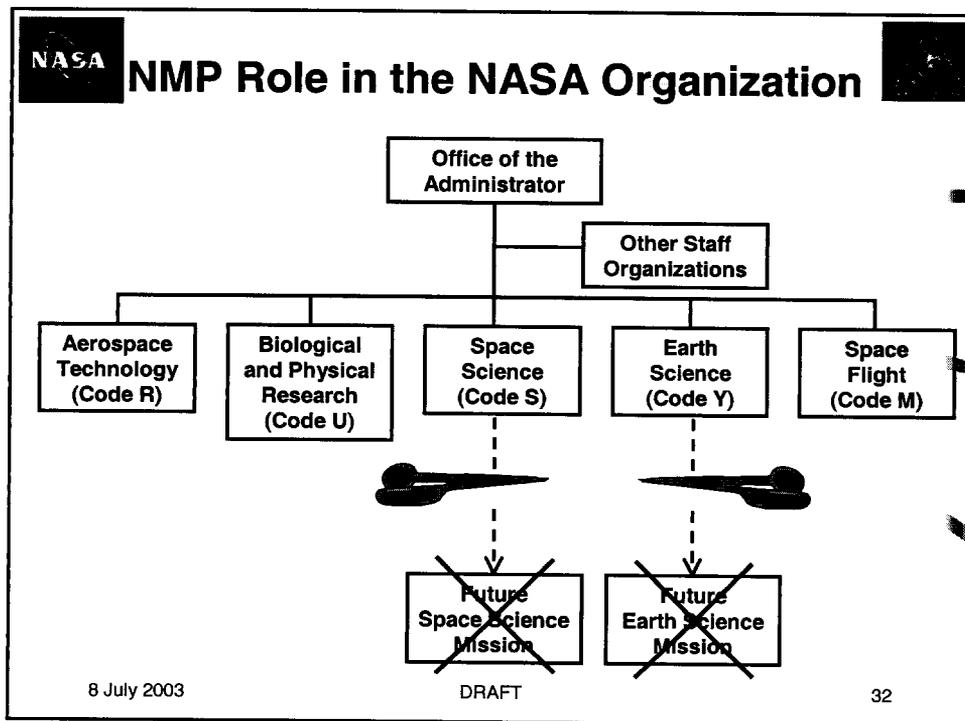
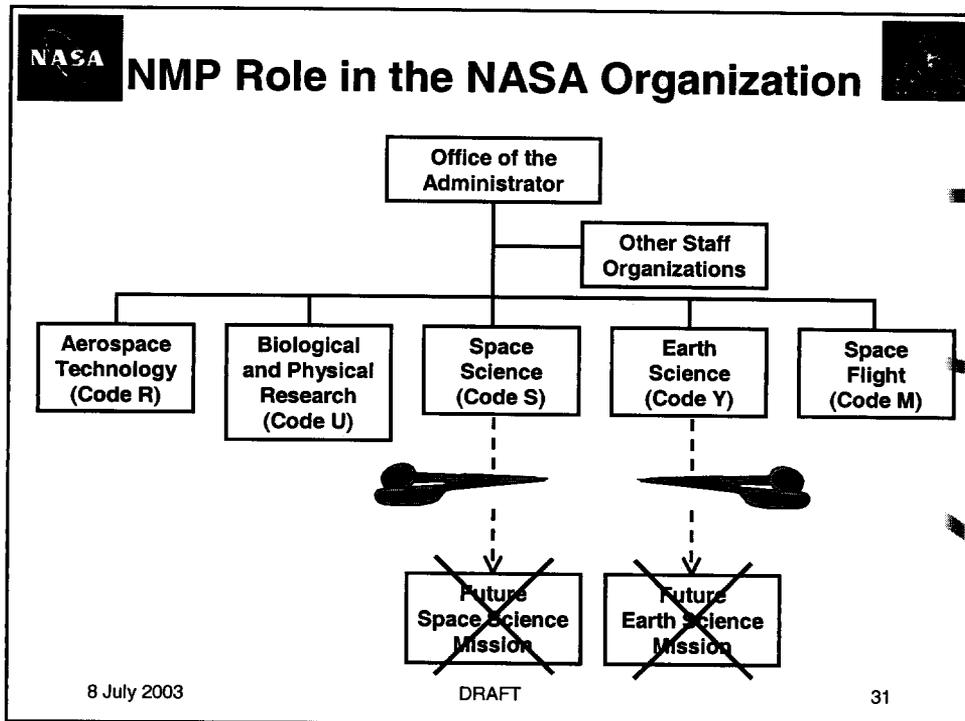
7 Engineering Model Tested In Space

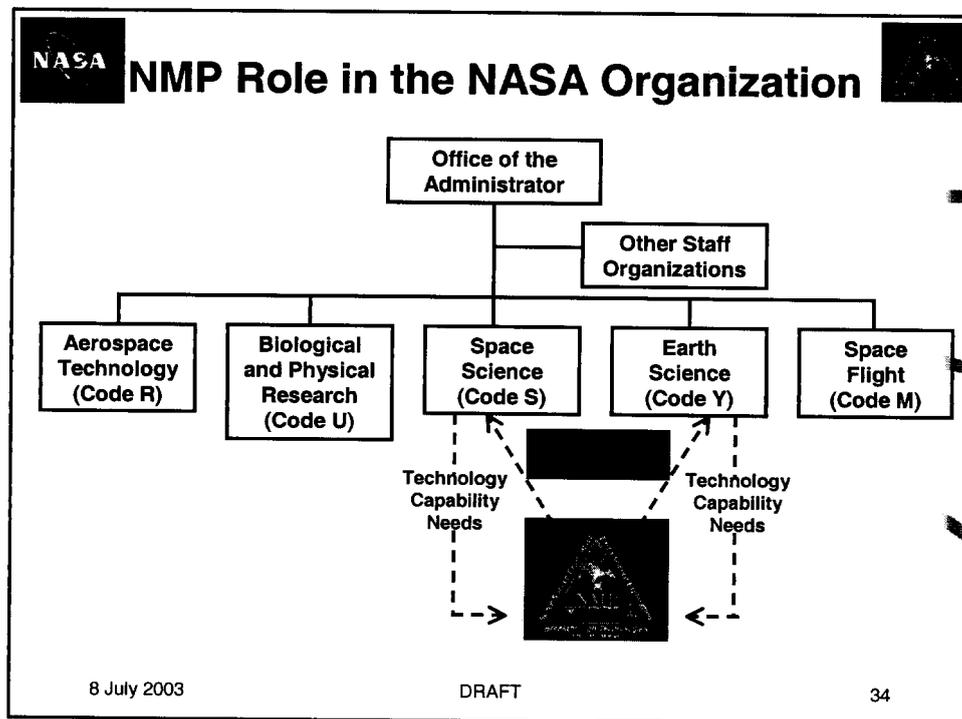
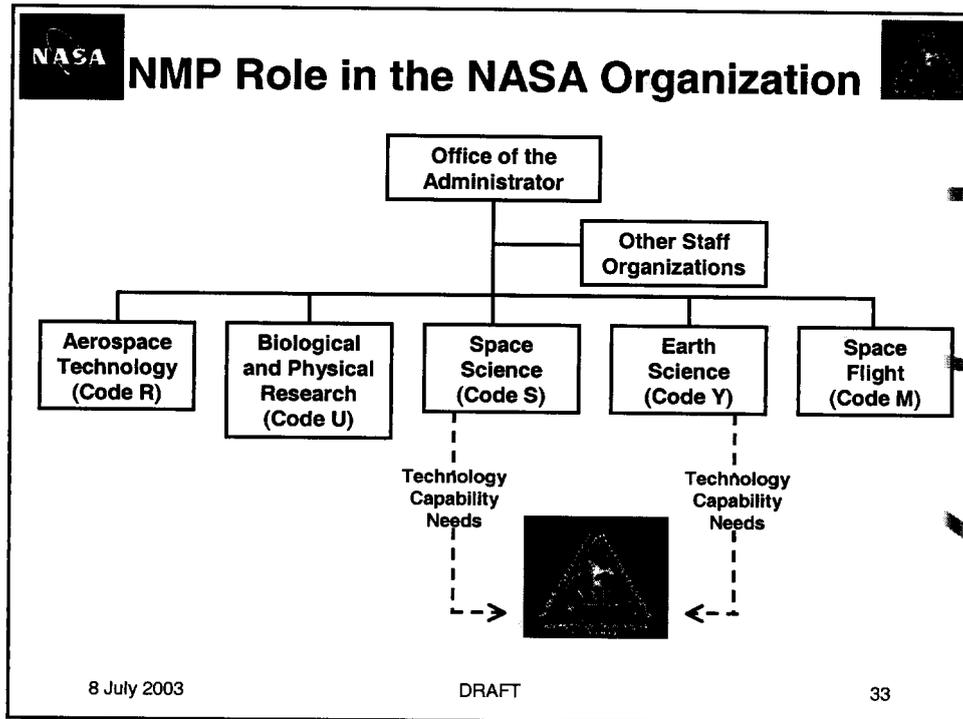
8 Actual System Flight Qualified

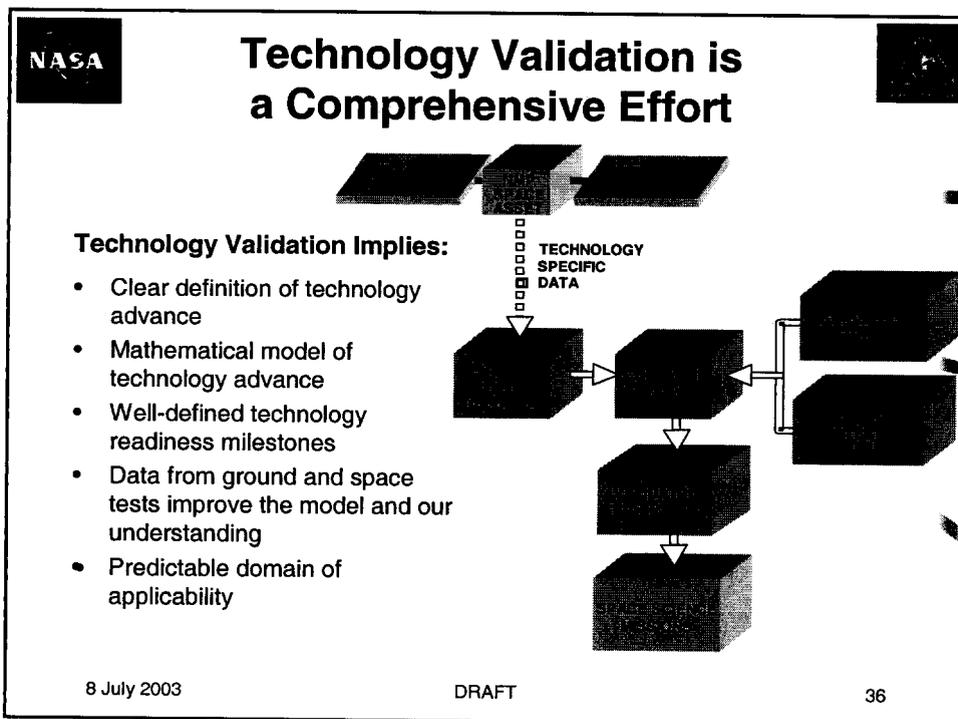
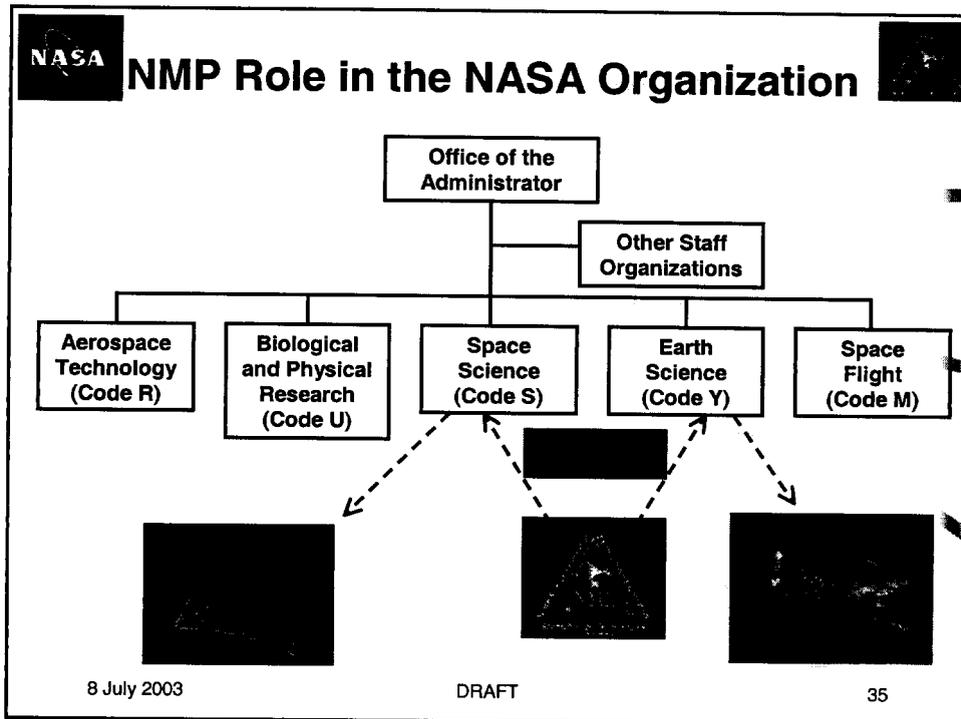
9 Flight Proven In Successful Mission Operation

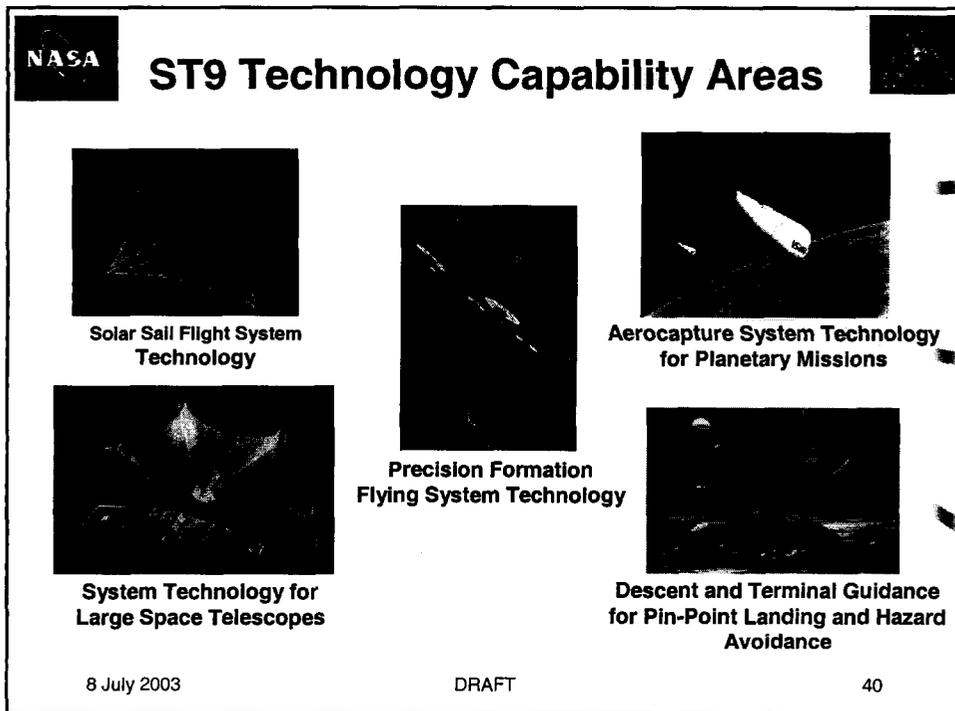
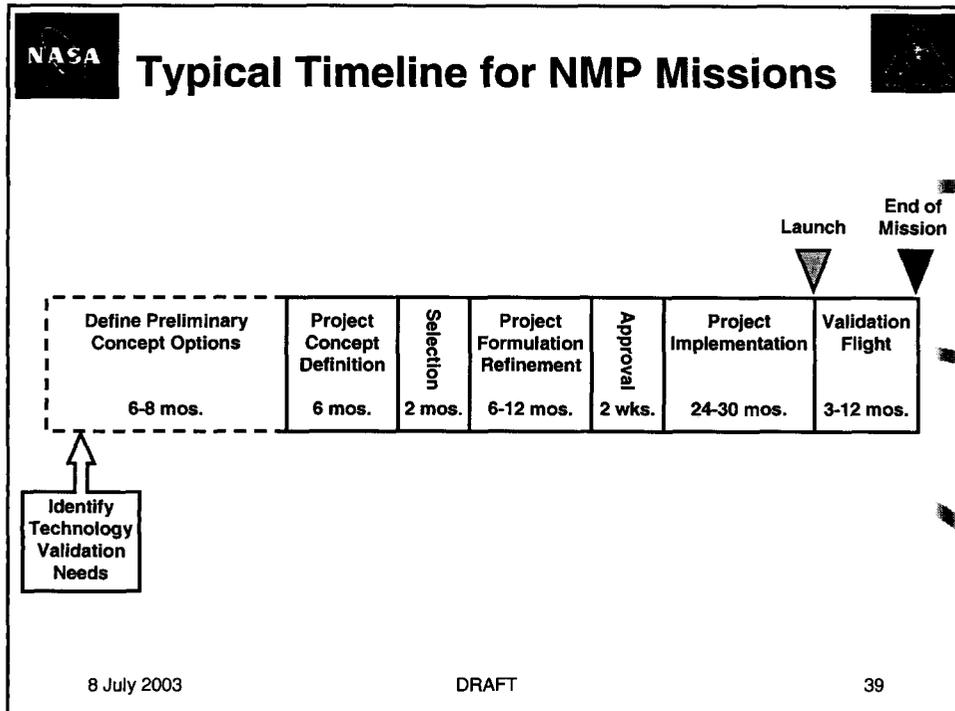
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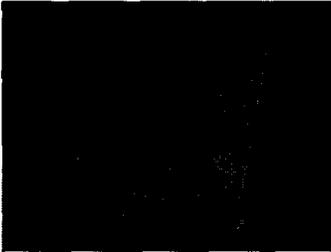








NASA Solar Sail Flight System Technology



Enterprise Goals:

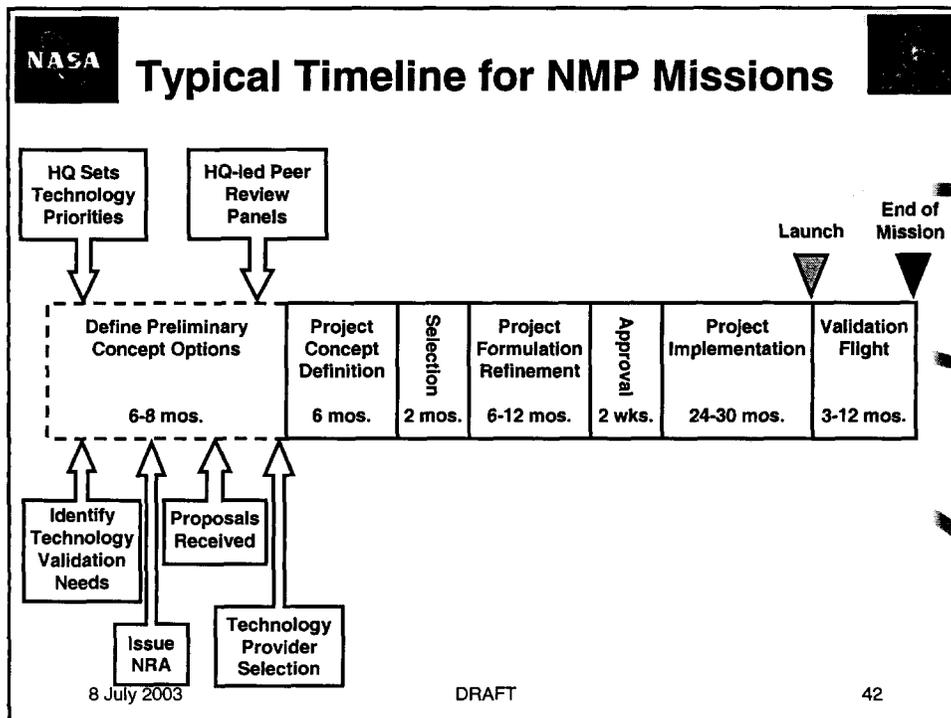
- Sails and supporting structures at kilometer scales
- Areal density < 0.5 g/m²
- > 5-year life
- Attitude control to maintain > 95% potential thrust

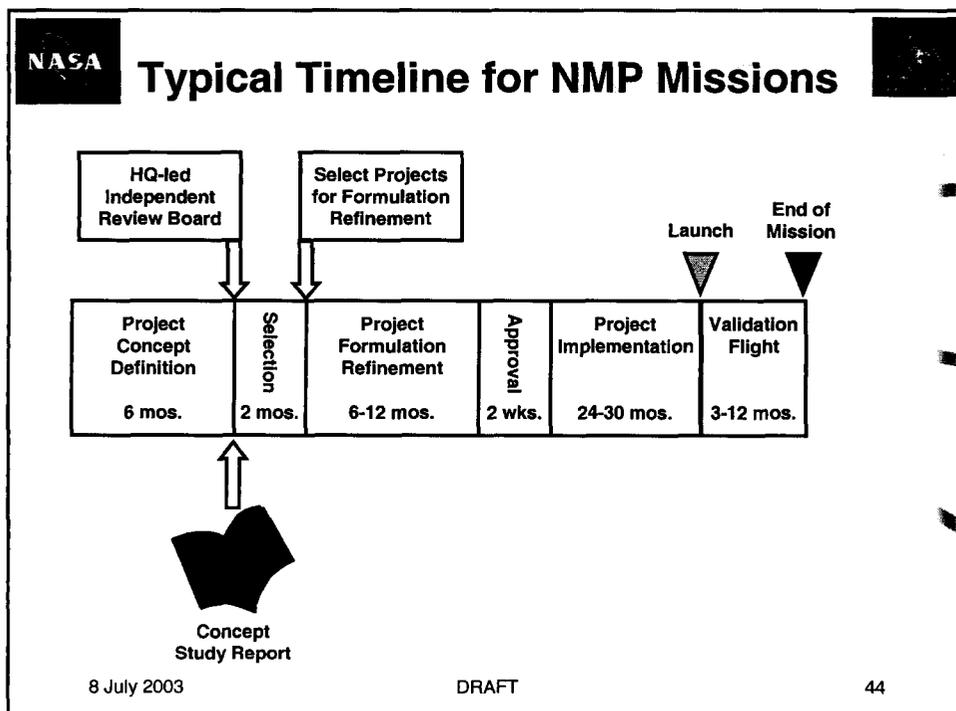
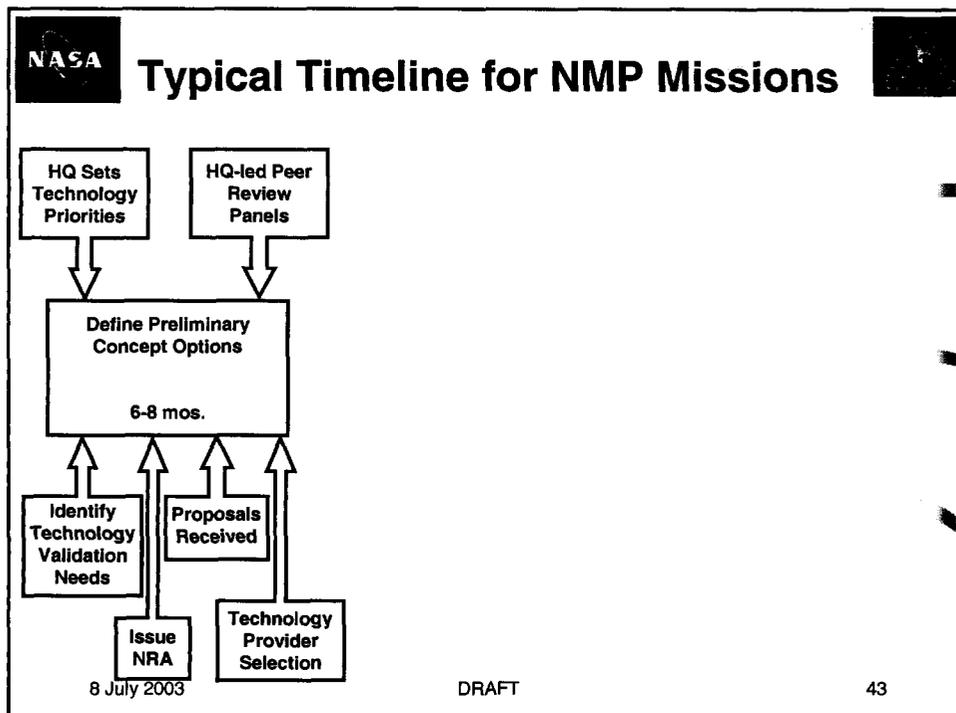
Current Capabilities:

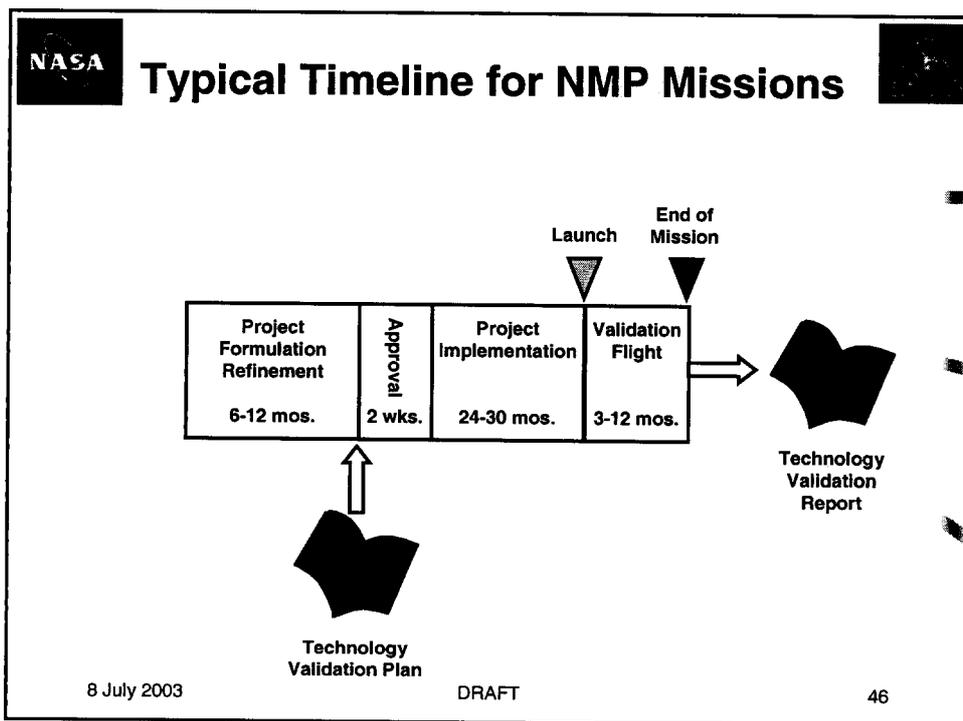
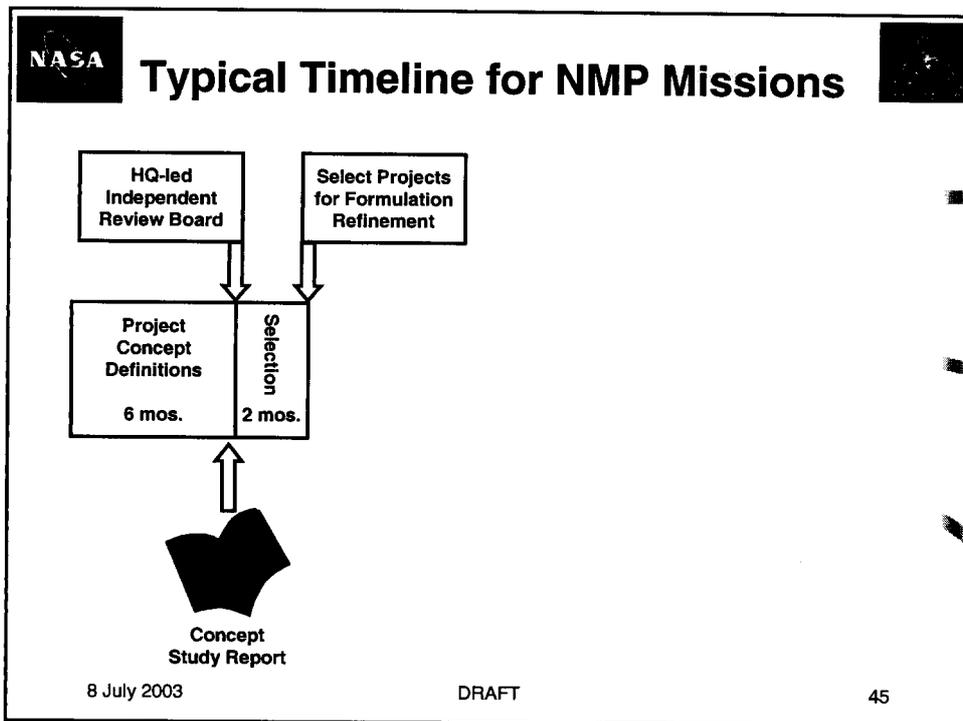
- Ground demonstration of 15-m sail with 3-5 μm polyimide film
- ≈15 μm-scale Film Thickness with Areal Density ≈ 30 g/m²
- 8 μm film on Cosmos-1 for Planetary society - launch late '04
- Successful analytical simulations of stability and pointing control

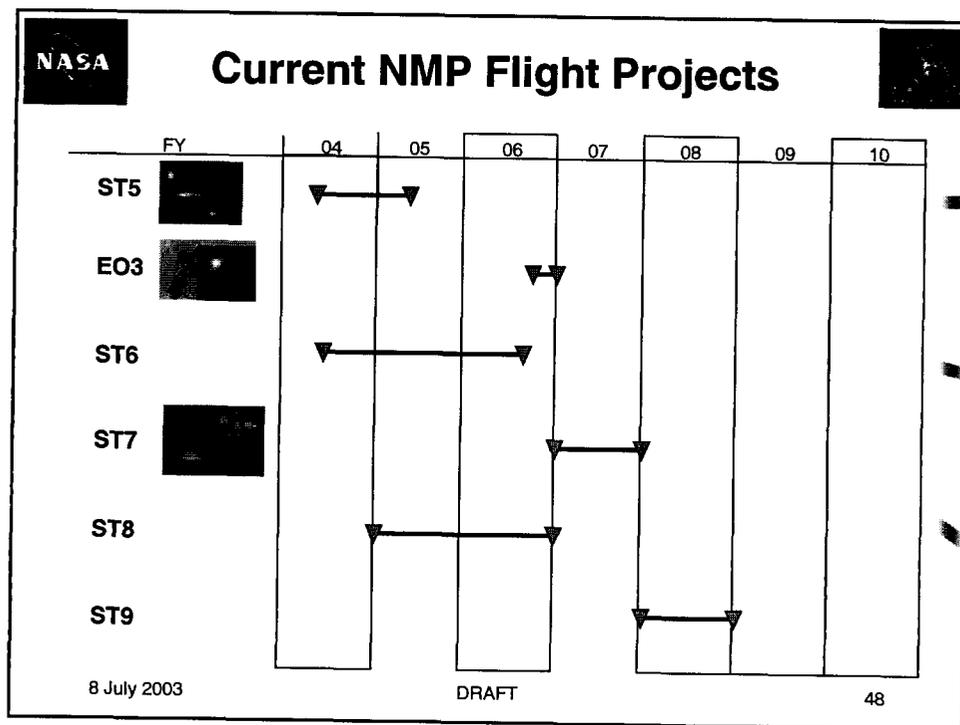
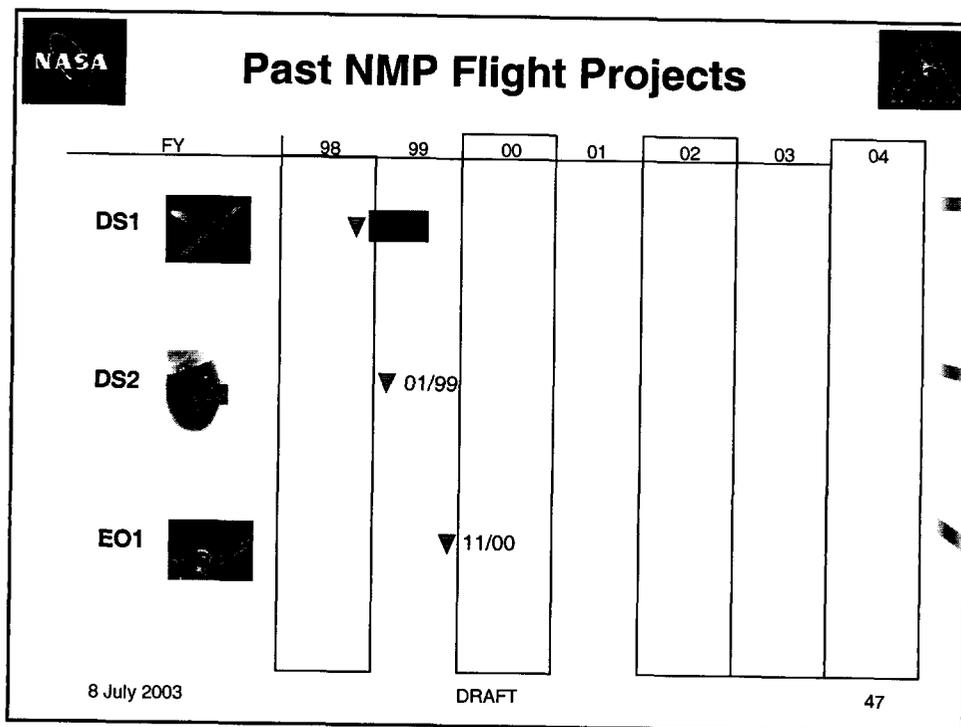


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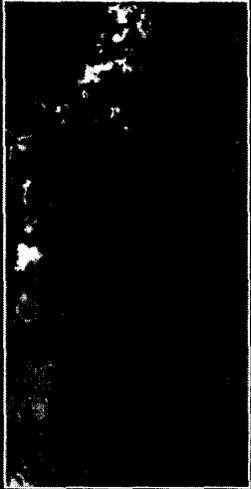






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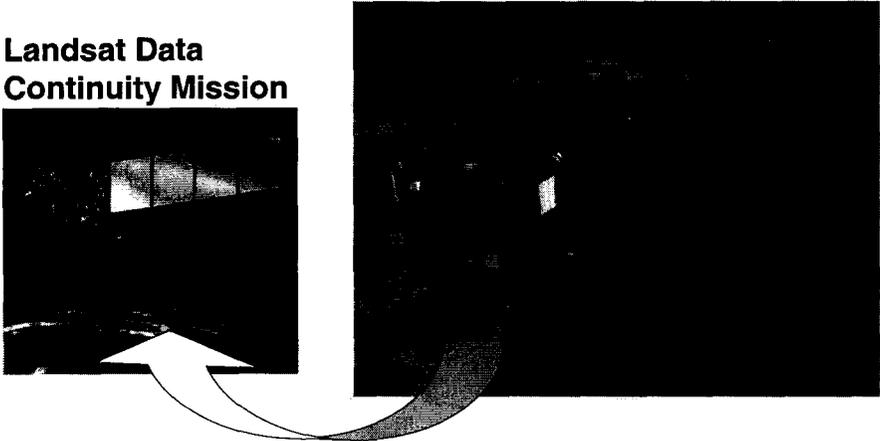
EO1 Images an Angry Mt. Etna

ALI Pan Enhanced Bands 3-2-1	Hyperion 7-5-4 Equivalent	EO-1 ALI Bands 7-5-5'
		
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What Happened to EO1 Technologies After NMP?

Landsat Data Continuity Mission



Advanced Land Imager

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What Happened to DS1 Technologies After NMP Flight?

The diagram features a central black rectangular area representing the NMP flight. Two white arrows originate from this area. One arrow points upwards and to the right towards a black box labeled "DAWN". The other arrow points downwards and to the right towards a black box labeled "JIMO". A white label "ION ENGINE" is positioned between the two arrows, with lines connecting it to both arrows, indicating that ion engine technology was transferred to both DAWN and JIMO.

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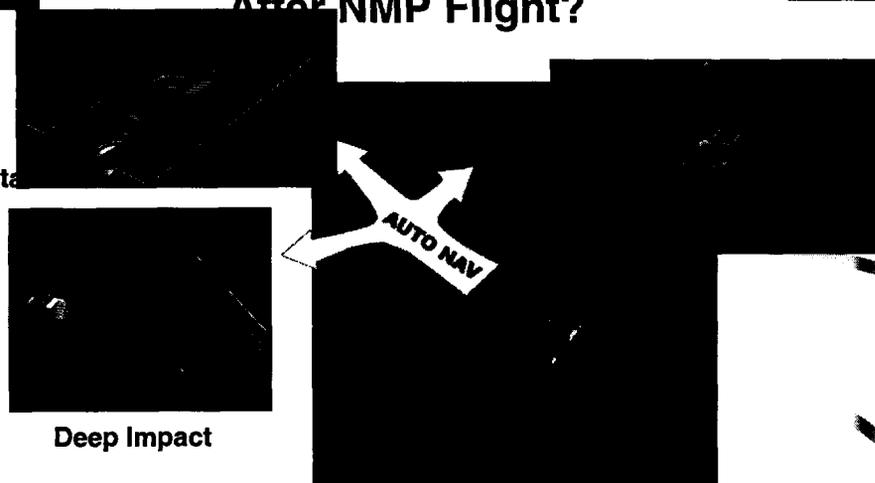
What Happened to DS1 Technologies After NMP Flight?

The diagram shows a central black square representing the NMP flight. Eight arrows radiate outwards from this central square to eight surrounding black rectangular boxes, each representing a different technology area. The boxes contain various images: a probe, a satellite, a spacecraft, a camera lens, a sensor, a camera, a camera, and a camera. The word "Force" is partially visible on the right side of the diagram.

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NASA **What Happened to DS1 Technologies After NMP Flight?**

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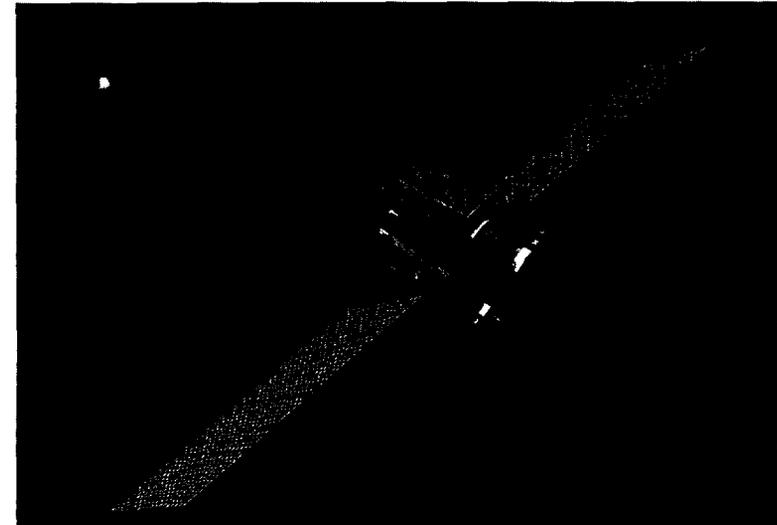


Deep Impact

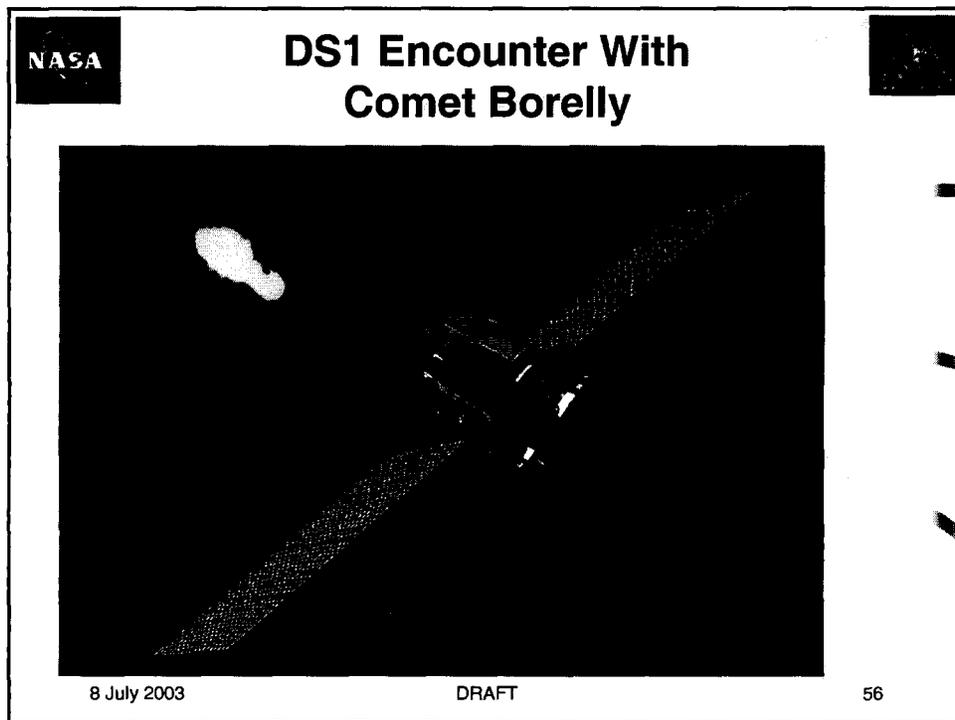
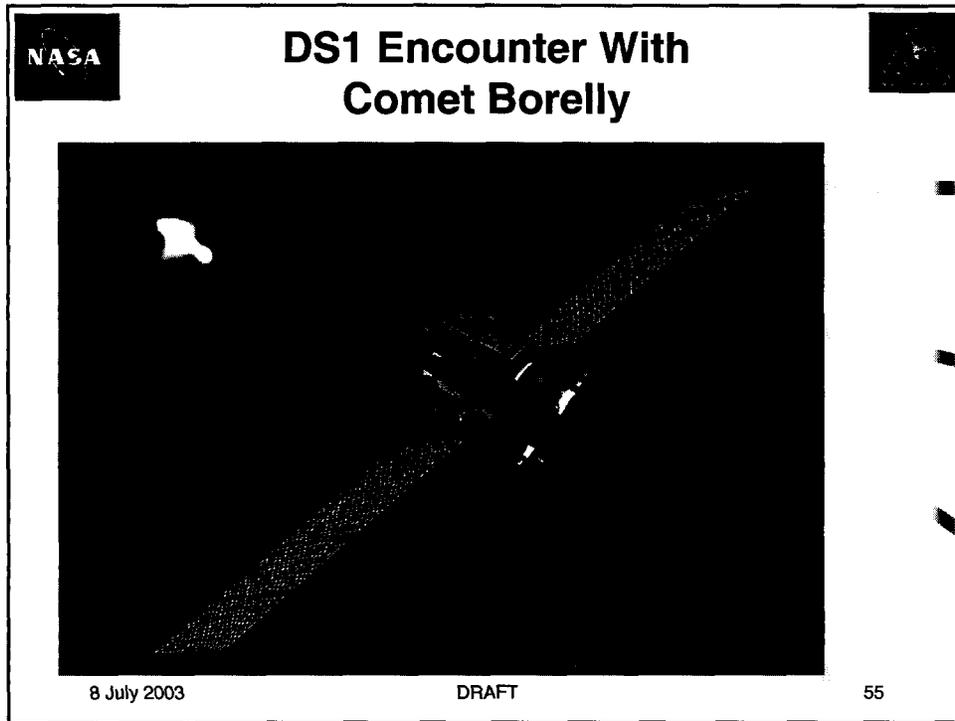
Success of NMP Depends on Infusion of Validated Technologies into NASA Science Missions

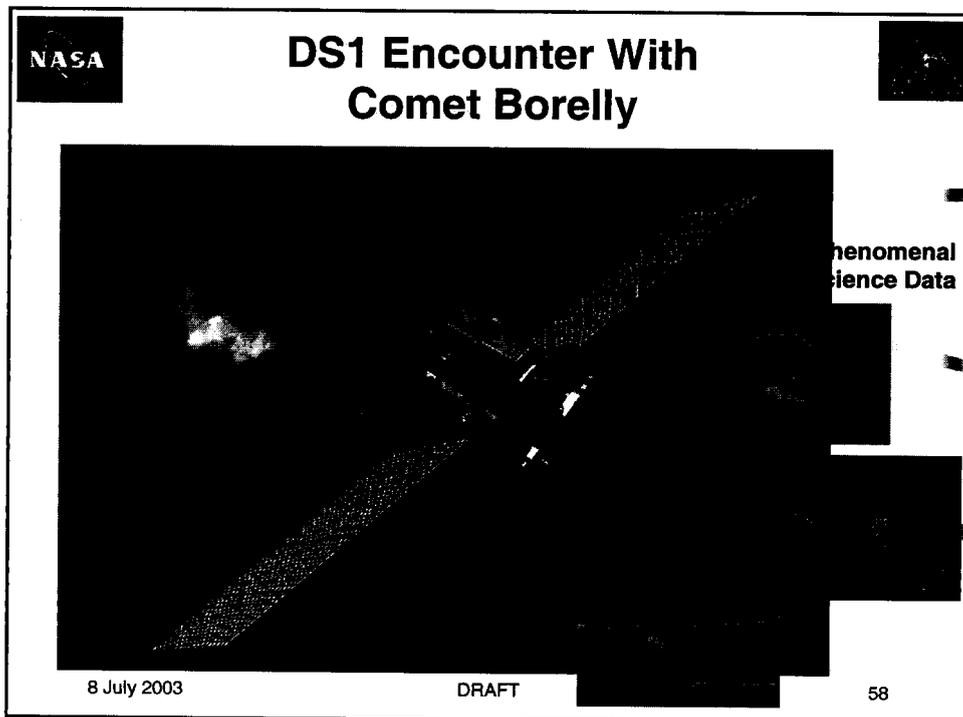
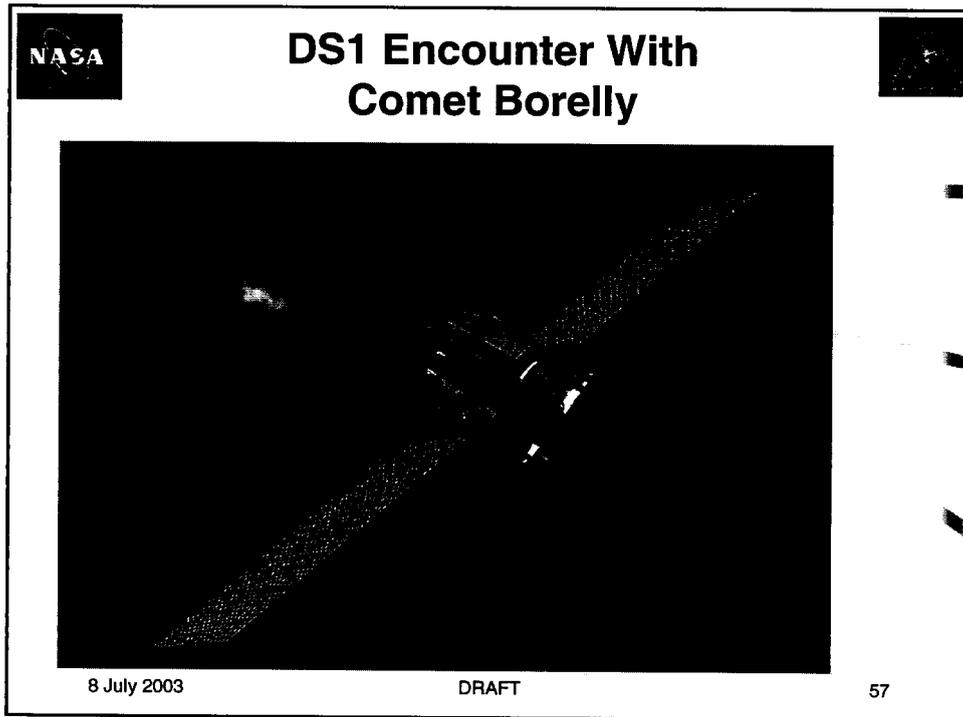
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NASA **DS1 Encounter With Comet Borely**



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Stay in Touch

- Research opportunities
<http://research.hq.nasa.gov/research.cfm>
- Basic research
<http://www.aero-space.nasa.gov>
<http://spacerearch.nasa.gov>
- NASA Office of Space Science
<http://spacescience.nasa.gov>
- NASA Office of Earth Science
<http://www.earth.nasa.gov>
- New Millennium Program
<http://nmp.jpl.nasa.gov>

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Questions?

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