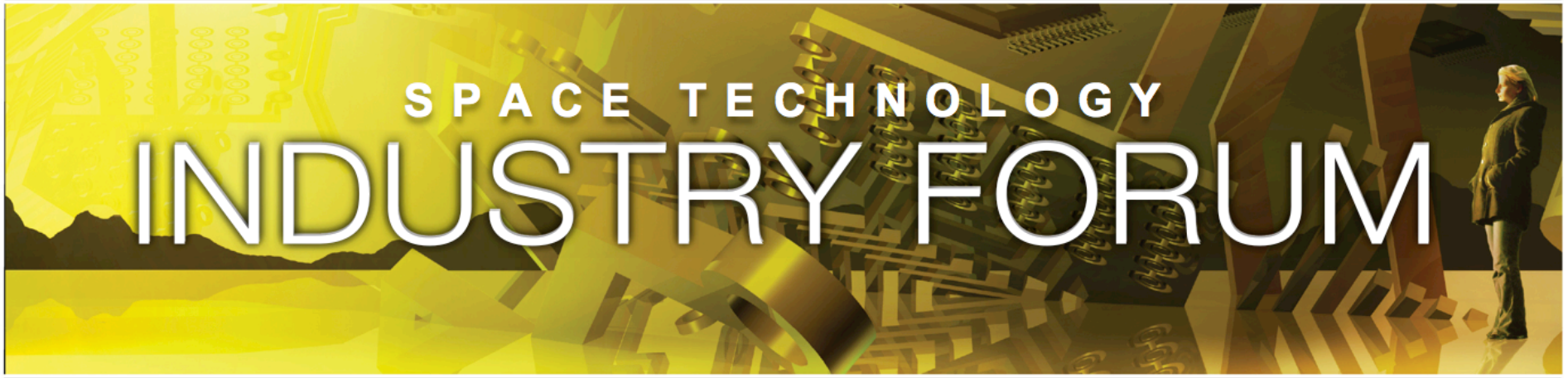
National Aeronautics and Space Administration

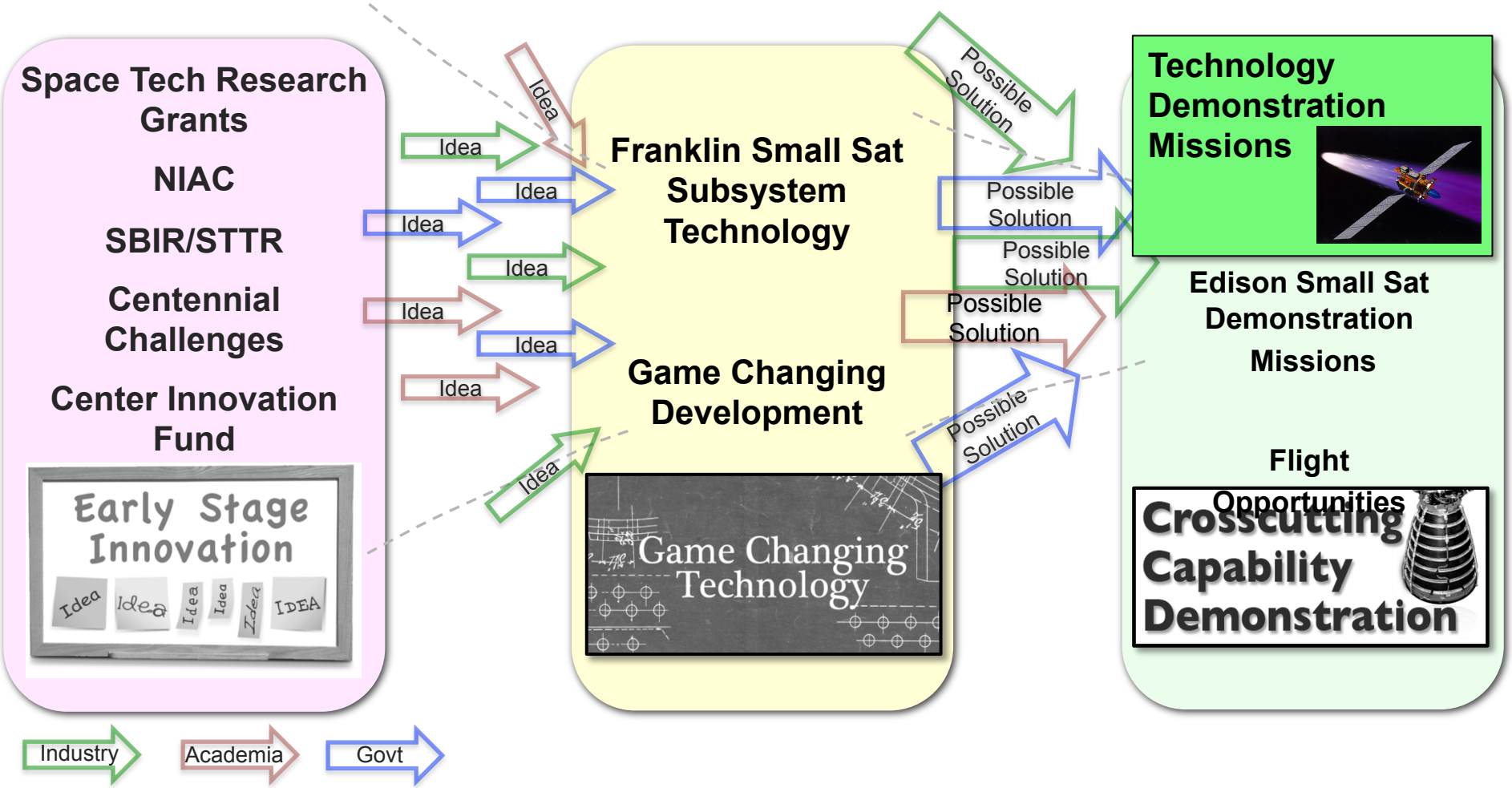
OFFICE OF THE CHIEF TECHNOLOGIST



Technology Demonstration Missions Program

Bonnie James
Program Executive (Acting)
July 13, 2010

OCT Program Overview



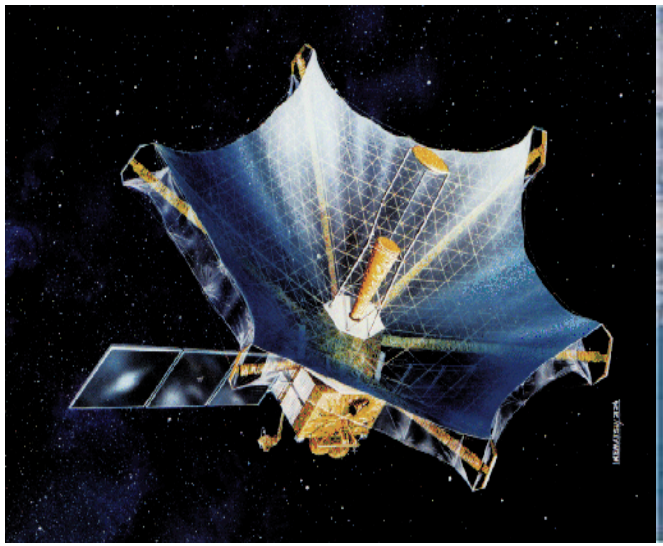
Technology Demonstration Missions Program

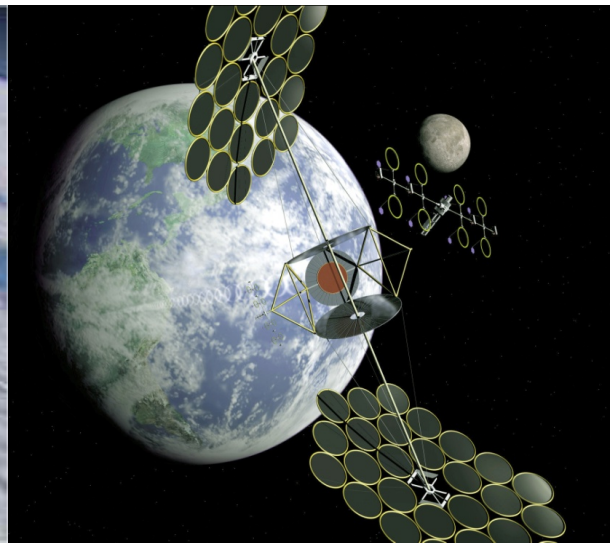
Bridging the Gap:

One of the greatest challenges that NASA faces in incorporating advanced technologies into future missions is bridging the gap between early development and mission infusion.

Primary Objective:

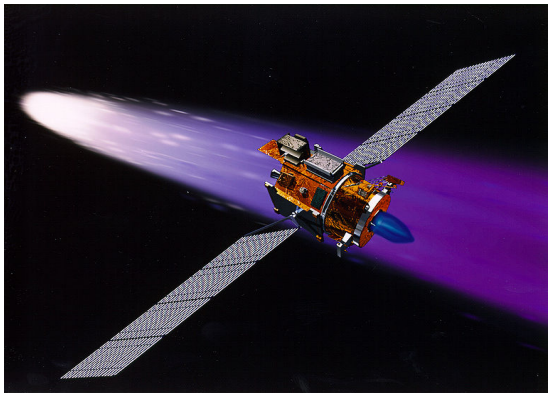
The primary objective of the Technology Demonstrations Program is to help "bridge the gap" by maturing system-level space technologies through flight readiness and mission infusion.





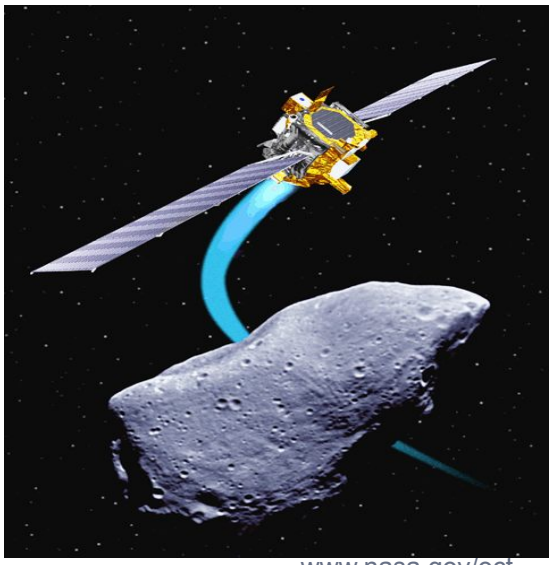
Ion Propulsion Technology

Bridging the Gap - Ion Propulsion Technology



1906: Robert Goddard theorizes about ion propulsion. Performs the first experiments with ion thrusters in 1916.
1959: A working ion thruster is built at NASA GRC.
1960's through 1990's: Many tests in the laboratory, but no mission uses the new technology as a primary propulsion system.

1998: The NASA New Millennium Program Deep Space 1 mission launches in 1998. DS1 is the first flight for NMP. DS1 was the first flight demonstration of an ion engine as the primary method of propulsion on a NASA spacecraft.



2001: NASA approves Dawn, as Discovery Program mission.

2007: Dawn launches. Dawn mission utilizes ion propulsion on journey to asteroid belt. Initially tested and proven successful on DS1 mission, this innovative technology is now applied for the first time in a dedicated science mission. Ion propulsion allows Dawn to undertake a mission that would be unaffordable—and even impossible—with a more conventional propulsion system.

Aerobraking Technology

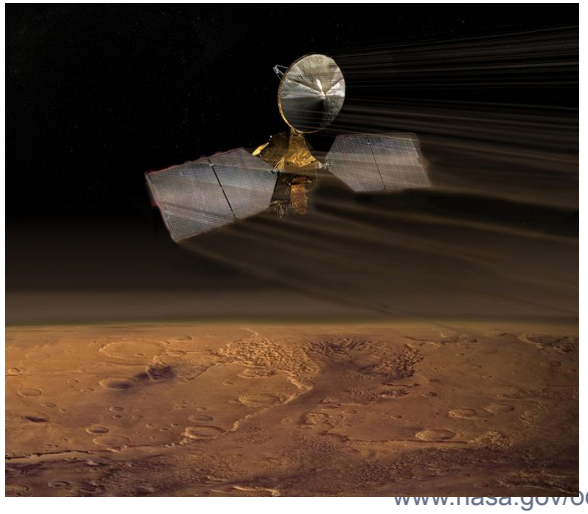
Bridging the Gap – Aerobraking Technology

- Science fiction writers referencing aerobraking in the 1940's
- Many technical references to aerobraking in the 1960', 70's, 80's

1993: NASA Magellan mission to Venus demonstrates aerobraking at the end of the primary science mission. The Magellan spacecraft at Venus was the first planetary spacecraft to try aerobraking, as a demonstration, in the summer of 1993. The success of this demonstration cleared the way for its implementation in the Mars Global Surveyor mission design.

1994: NASA decides to utilize aerobraking for the Mars Global Surveyor mission. Much like an airplane uses spoilers and flaps to slow down prior to landing, the MGS spacecraft uses the drag of the Martian atmosphere on its solar panels to slow down as an alternative to using thrusters which requires extra fuel and, therefore, extra weight and cost.

1996: MGS is launched, MGS orbiter is the first spacecraft to use aerobraking as the primary technique of orbit adjustment. The MGS aerobraking team used the data gathered from the Magellan mission to Venus.



2001: Mars Odyssey utilizes aerobraking.

2005: Mars Reconnaissance Orbiter utilizes aerobraking.

Technology Demonstration Missions Program

Key Elements of the OCT Technology Demonstration Missions Program:

Crosscutting: Defined as a technology with potential to benefit multiple NASA mission directorates, other government agencies, or the space industry.

System-level: Seeking system-level demonstrators, not component-level.

Technology Readiness: Must be mature technologies and the proposed flight demonstration must raise the Technology Readiness Level (TRL) of the candidate technology to a TRL of 6+, such that it may be infused into the critical path of future missions.

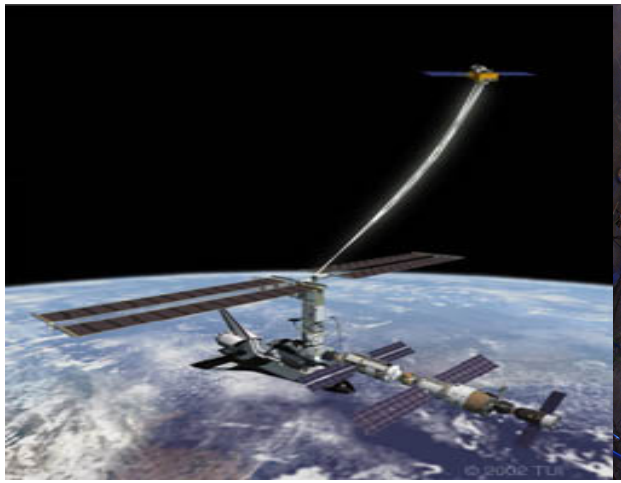
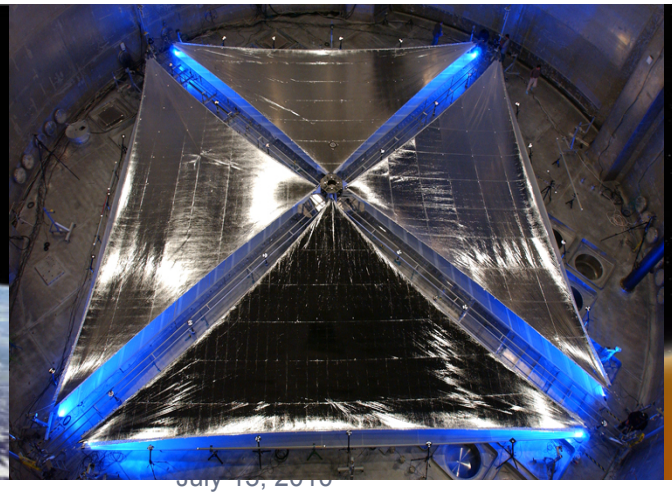
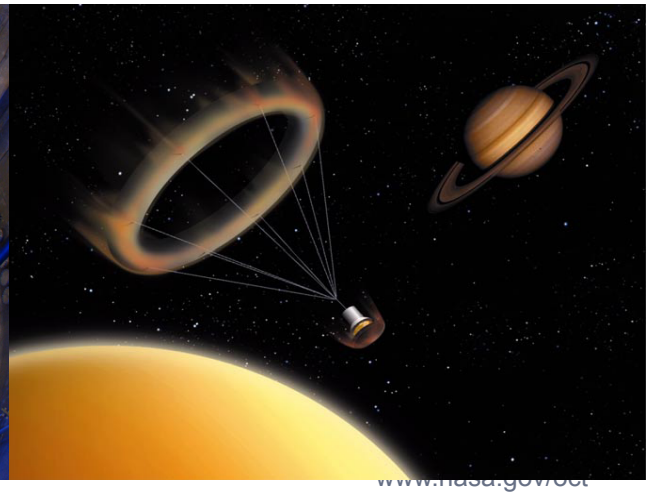
Project Life Cycle: Maximum of three year effort.

Life Cycle Costs: Typical project costs: $150M. Funding includes all elements of the flight test demonstration: planning, hardware development, software development, launch costs, ground ops, post test.

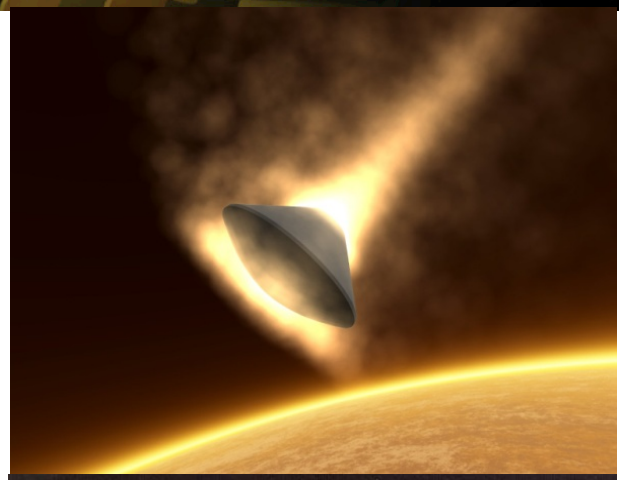
Cost Sharing Partnerships: To demonstrate a potential infusion path, teams will be required to have a sponsor (or sponsors) to cost share the proposed demonstration. A minimum of 25% of the total Life Cycle Cost (LCC) must be contributed by another source outside the OCT.

Opportunities for Participation

- Yearly calls for proposed system-level flight test demonstrators
- Goal: several proposals selected each year
- Open competition: NASA Centers, other government agencies, academia, industry, international participation
- Working flexibilities on issues such as intellectual property, data rights, title to rights and property
- Request for Information (RFI) followed by Request for Proposals (RFP)
- RFP approach will be Broad Area Announcement (BAA)

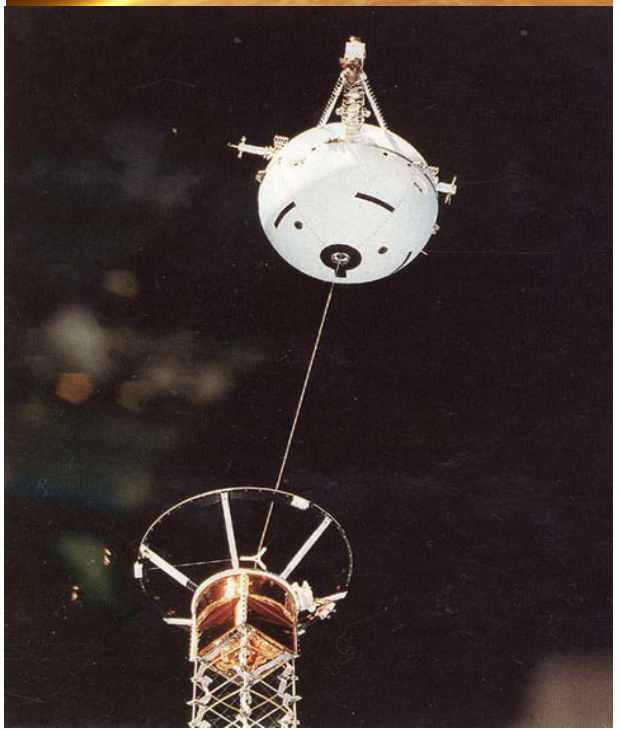




Technology Demonstration Missions RFI



Request for Information (RFI):

- RFI released May 27th
- RFI closed June 30th



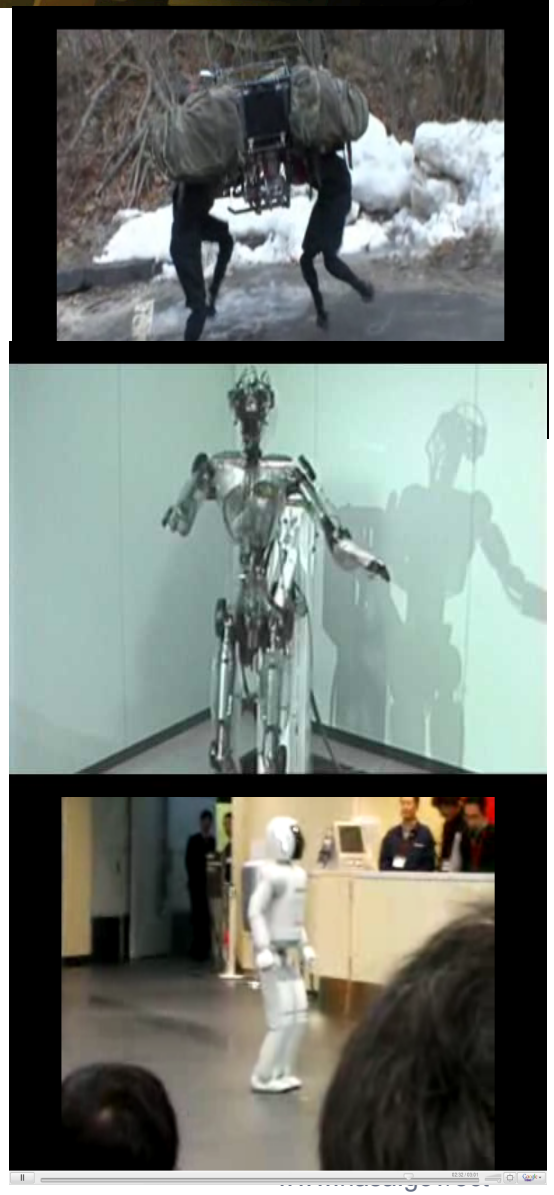
Summary of Technology Demonstrations RFI Results:

- Over 200 responses received
- Broad participation: NASA, other government organizations, industry, academia
- Diverse technology capability areas represented
- RFI responses are being used to formulate BAA

Proposal Process

Two step proposal process:

- **Release BAA - Step One/Screening Proposal**
  - Step One proposal must provide: crosscutting proof, preferred carrier, ROM cost, cost sharing source(s)
  - 10 pages or less
  - Two months to formulate team/prepare submit
  - OCT establishes a review team (OCT, MDs, external reviewers) to determine which proposals move to Step Two
- **Release BAA - Step Two/Flight Demonstration Proposal**
  - Full flight demonstration proposal
  - 50 pages or less
  - Three months for full proposal preparation/submit
  - Same review panelists as in Step One
  - Selection Official: NASA Chief Technologist
- **BAA release currently targeted for October** 1



Technology Demonstration Missions Program

The OCT Technology Demonstration Missions Program will allow flight qualification and infusion of a range of advanced space technology systems, “bridging the gap”, enabling new capabilities and exciting new missions.