NEXT Talking Points

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NASA Mission
To understand and protect our home planet
To explore the Universe and search for life
To inspire the next generation of explorers
… as only NASA can

- **To accomplish NASA's mission (addresses mission #2 and #3)**
  - NASA will build on its rich legacy of exploration, both robotic and human
    - International Space Station – an exploration platform for science, technology development, commercial development and advanced space engineering and operations - is being assembled and will be leveraged for the next decade
    - Robotic spacecraft have landed on Venus and Mars and studied the gas giants of the outer solar system
    - Hubble telescope has begun to unlock long held secrets of the Universe
    - Humans have conducted expeditions on the Moon

- **Taking the next steps**
  - Recent discoveries have excited scientists and the public alike
    - Large reservoirs of water trapped in ice on Mars and potentially the Moon
  - Through research conducted on the ISS, we can soon realistically plan for human explorers to venture beyond low Earth orbit
    - To build and service large telescopes and platforms in deep space
    - To lead expeditions to nearby planetary bodies

- **Science driven missions**
  - Destinations are not predetermined, but driven by the scientific questions implicit in our second mission
    - How did we get here? Where are we going? Are we alone?

- **Mission-Enabling Technologies**
  - NASA is looking across the scope of its activities, determining what is needed to enable future missions, identifying areas where breakthrough technologies will have the most impact
  - This approach has already been successful with new initiatives for in-space propulsion in FY02 (Nuclear Systems Initiative for nuclear propulsion) and two initiatives in the President's FY03 budget (nuclear power systems for solar system exploration and an initiative to protect astronauts from the radiation environment outside low-Earth orbit)

- **Long-term strategy**
  - Strategy is to build a sustainable infrastructure that provides progressively greater and greater human/robotic exploration capability

over time and as a byproduct supports the development of new markets using space

- Strategic framework is based on a series of stepping stones defined by science objectives and the capabilities required to achieve them
    - *Earth and Low Earth Orbit (LEO)* - Conduct research on human adaptability to the space environment and testing of human/robotic space systems, both on the ground and on a recently established foothold in space, the ISS. Continue robotic trailblazer missions to explore the solar system, conducting science missions, and identifying science targets which may guide future human/robotic exploration.
    - *Earth's Neighborhood* - Explore a region within one million miles of Earth which encompasses the Sun-Earth Lagrange points and the Moon, locations where NASA may undertake major scientific exploration. Large research platforms can be deployed along energy-efficient flight paths between Earth and the Lagrange points to support objectives including: the search for Earth-like planets with advanced astronomical facilities; scientific research of the Earth-Moon system; and testing of interplanetary space systems. As NASA explores this first stepping stone beyond LEO, human and robotic systems will prepare for deeper voyages in space, by executing more capable robotic missions and refining the characterization of planetary environments.
    - *Accessible Planetary Surfaces* - Explore beyond the immediate vicinity of Earth, including asteroids, comets, and Mars, where human and robotic systems will undertake the most ambitious of all of NASA's searches for life.
    - *Visionary goal* - to create the capability to go *anywhere, anytime*; when- and where-ever the scientific agenda takes us
- Laying out the strategy in this framework enables analysis to determine technology gaps, focuses leveraging opportunities and identifies areas for strategic investments

- **Five major challenges**
    - Space Transportation
        - Bring down cost and increase reliability for launch systems
            - Getting mass safely and reliably in orbit can also mitigate some of the other barriers to exploration by being able to engineer solutions, such as, radiation protection using large amounts of material carried from Earth
        - Being able to get around quickly in-space is important to robotic spacecraft and necessary for human missions
            - Permits robotic spacecraft to do more than fly by the outer planets: they can orbit them and their moons, also moving quickly through space toward destinations will decrease travel times and expose humans to less of the radiation
    - Safe and Affordable Power

    - Large and more capable robotic systems and future human systems require power both on planetary surfaces and for in-space propulsion
        - Solar power is a clean and efficient energy source for the inner solar systems but quickly drops off in efficiency the further out from the Sun the mission travels
        - Nuclear power is independent from an external source and can power large in-space electric propulsion thrusters to make possible robotic science missions to get to their destinations quicker, rendezvous with multiple targets, or orbit one of the outer planets
        - Nuclear power on planetary surfaces can change the lifetimes or robotic rovers from a few months to years and provide human systems with large amounts of reliable power.
- Crew Health and Safety
    - 55 critical risks have been identified for potential impacts to astronauts in space (critical path road map)
        - Two of the highest priority issues are radiation and bone loss
        - ISS research is critical into solving these problems
        - Many of the solutions to these problems will benefit the public
- Human and Robotic Partnerships
    - Because of the inherent risk to humans it is necessary to optimize the partnerships between robots and humans
        - Developing a methodology and technology to optimize the partnership
- Space Systems Performance
    - Spacecraft that will carry humans into deep space and conduct complex robotic missions to the outer solar system and beyond will not be able to be serviced for long periods of time
        - New technologies will allow spacecraft to determine for itself that things are not going correctly and to take steps to fix itself before major failures occur

• **Educational Inspiration**
- NASA is an inspiration to young and old
    - The Mars rover, Sojourner, captivated the hearts and minds of students—and their teachers and parents—all around the world
    - The new 3-D movie about the ISS hit $5 million mark in ticket sales faster than any other IMAX movie
    - Many of today's leading scientists and engineers trace their career decisions back to the excitement of the Moon race
- There is no space agency on Earth but NASA that can lead the expeditions that will inspire the next generation of explorers
- Science is a key component of an overall strategy to challenge youth, leverage our LEO experience and operations, direct technology

investments, move human boundaries beyond the planet, and achieve greater security
- Through high-definition television and other communications technologies NASA plans to give the public a front row seat on our deep space exploration

• **Starting Now**
- In the next decade, spacecraft will depart on missions to visit the outer planets and robot explorers will traverse the frozen Martian ice caps
- Astronauts will pilot ships to gateways in space beyond the International Space Station and there, they will build large telescopes capable of taking images of Earth-like planets in other solar systems, seeking to answer the question, "Are we alone?" and may return to the Moon to conduct important research on the history of the solar system, seeking to answer the question, "How did we get here?"

•At the decade's end, the technology will be ready for the Agency to make a decision about where humans will go next.

•In two decades, NASA will have the capability for humans to explore the surface of bodies beyond Earth's Moon…asteroids, Mars…

• NASA's missions are bold. The strategy is sound. The greatest adventure humanity has ever known will continue.

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