



NASA Facility Strategy

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Agenda

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- **Mission Support goal**
- **Contributions of Mission Support to NASA missions**
- **Facility status**
- **Facility strategy**
- **Capabilities management**
- **Facility master planning**
- **Summary**



Mission Support Goal

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- **Enable program and institutional capabilities to conduct NASA's aeronautics and space activities**
 - **Identify, cultivate, and sustain a diverse workforce and inclusive work environment that is needed to conduct NASA missions**
 - **Ensure vital assets are ready, available, and appropriately sized to conduct NASA's missions**
- **Capability = Workforce + Facilities/Labs + Funds**



Contributions to Aviation Safety

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NASA Facilities used to Study Ice Growth on Wing Leading Edge





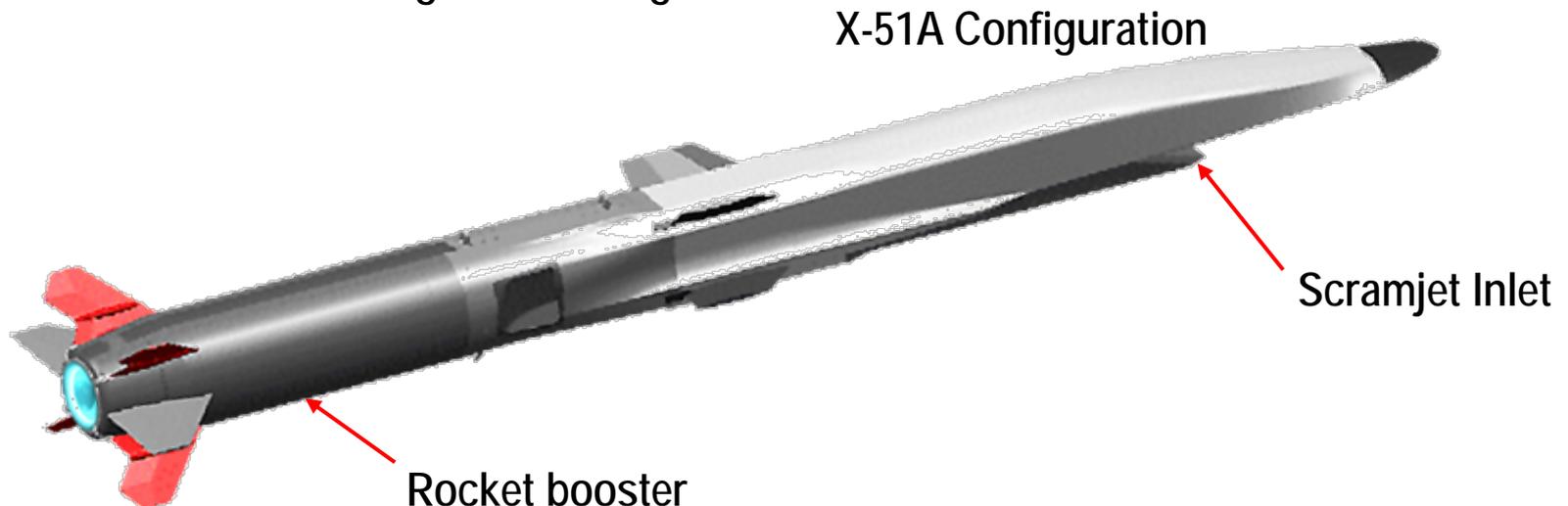
X-51A Scramjet Engine Demonstrator

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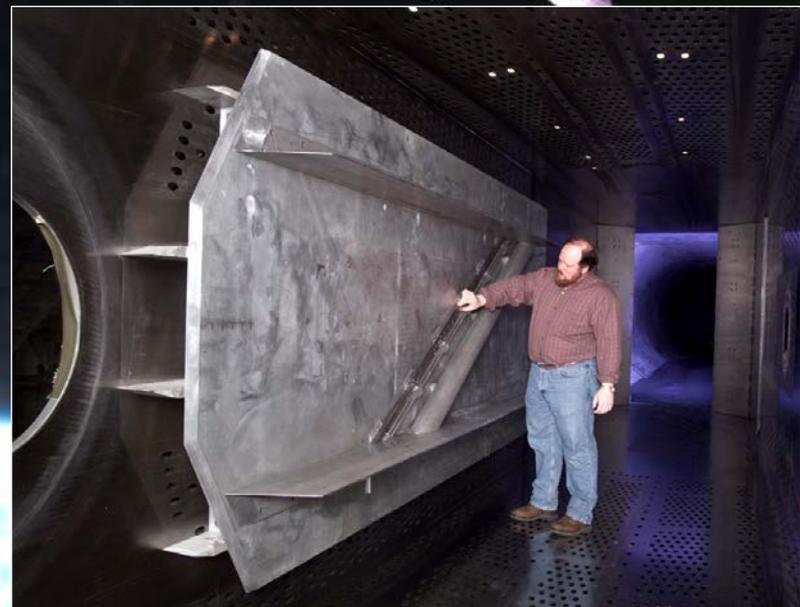
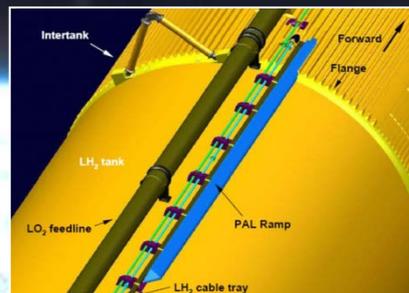
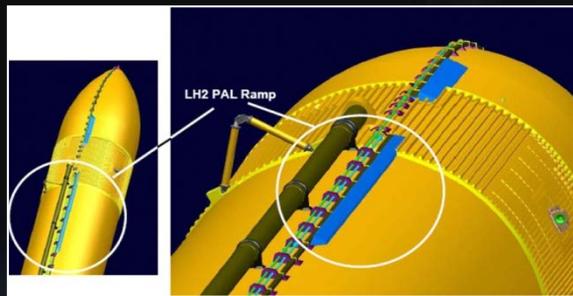
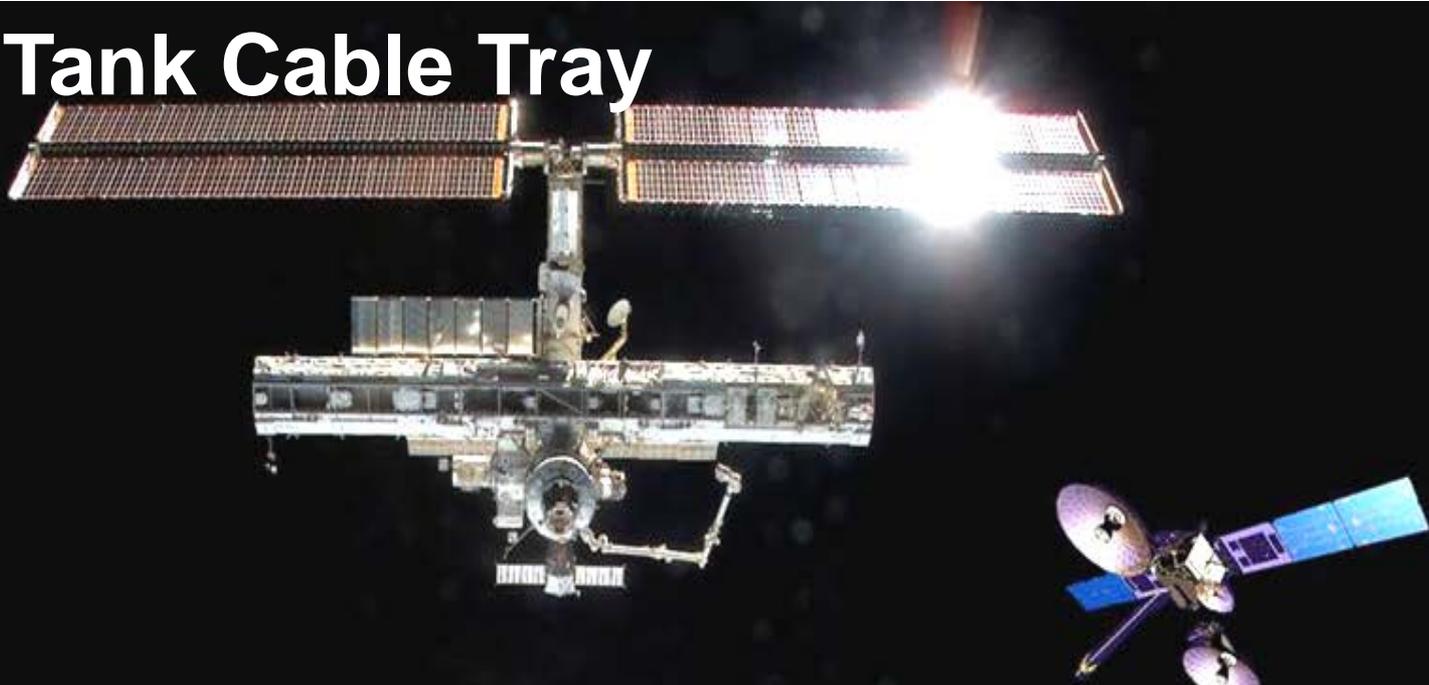


- Joint AFRL/DARPA/NASA flight demo
- Hydrocarbon-fueled and cooled scramjet
- Scramjet flight from Mach 4.5 to 6

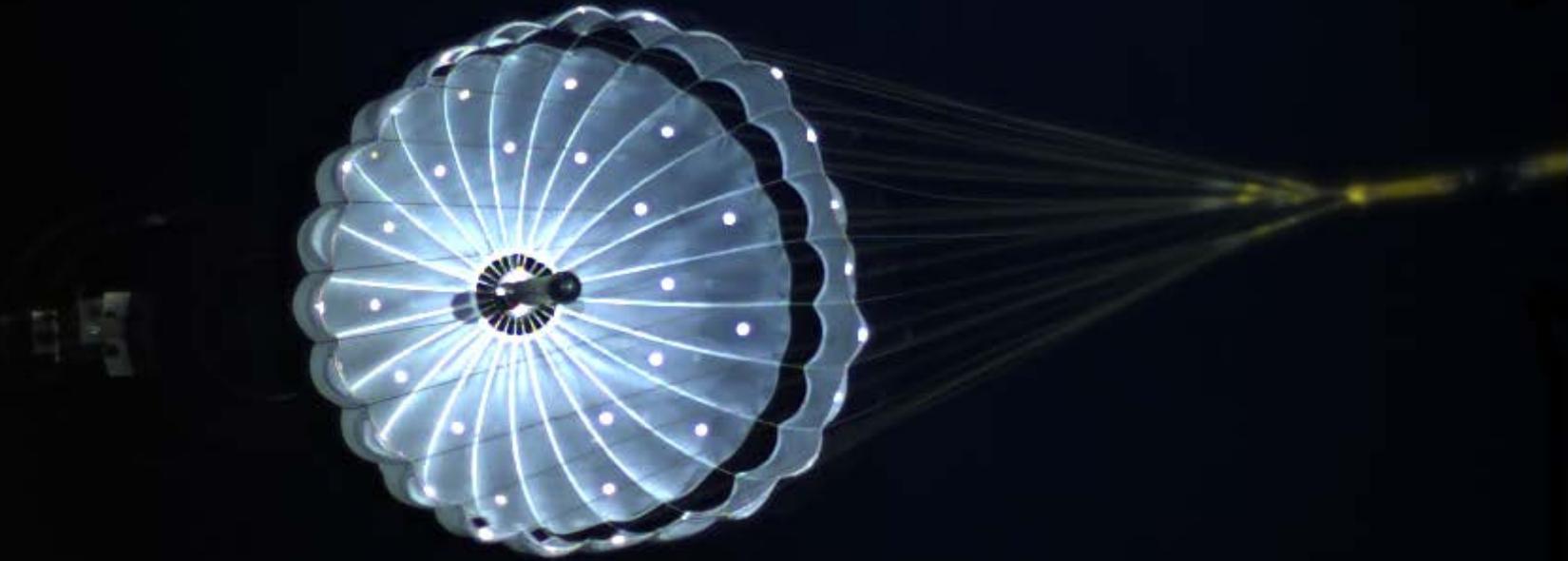
NASA Ground Demonstration Engine 2 Testing



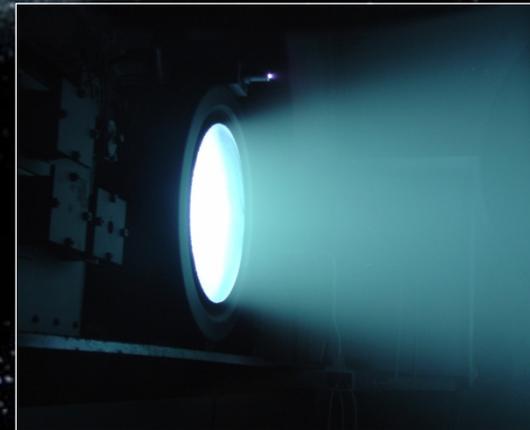
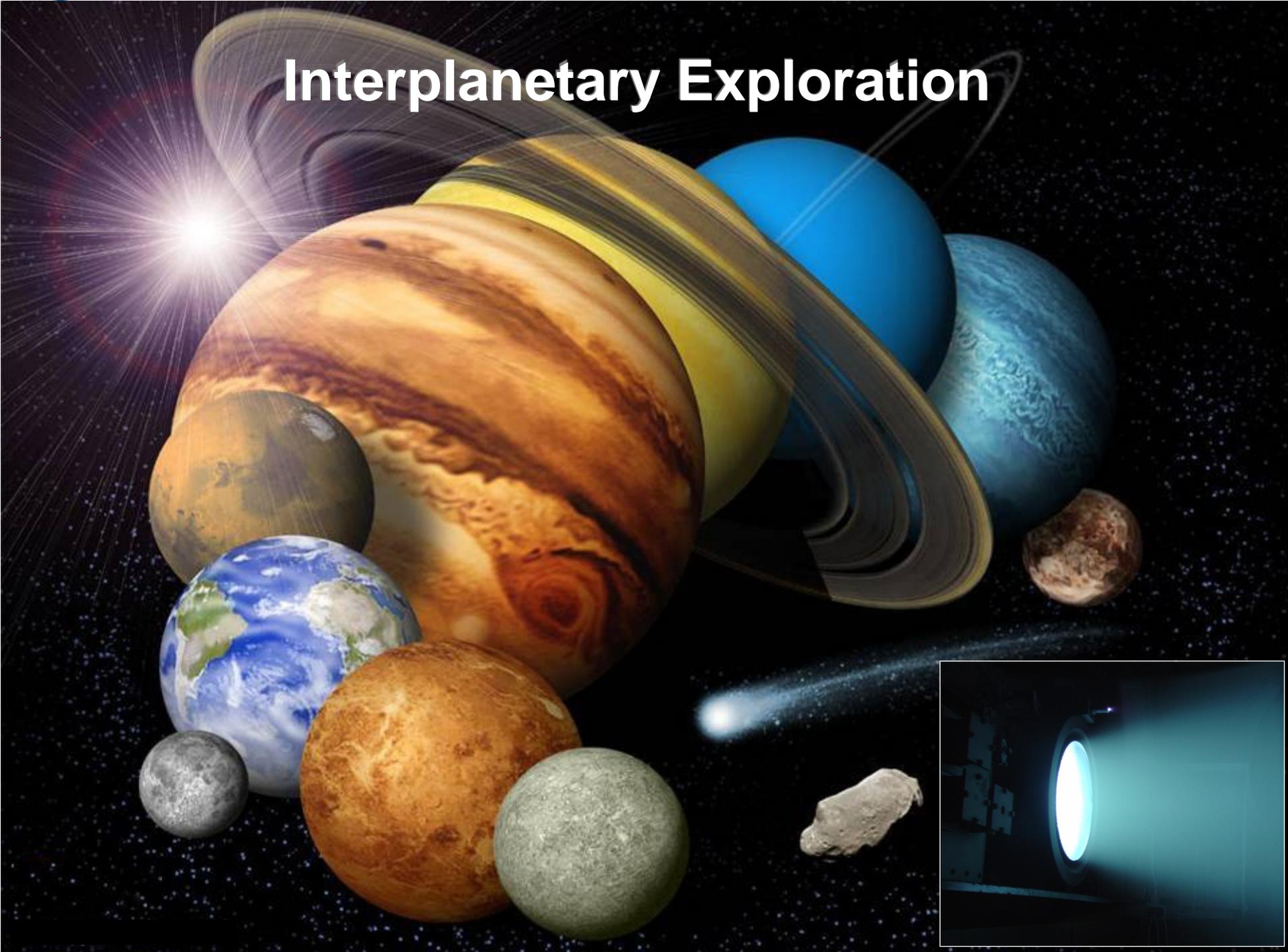
External Tank Cable Tray Test



Mars Science Lab Flexible Parachute Test



Interplanetary Exploration





Aging Infrastructure Poses Risk to Mission

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- **More than 80 percent of NASA's infrastructure and facilities by value are beyond their design life – thus more likely to be unsuitable for current and future missions.**
 - **Aging, Apollo-era legacy infrastructure is inefficient and costly to maintain and operate.**
 - **Assets over 40 years old (typical design life is 30 years) pose a risk to NASA's unique research and development mission.**
 - **Risk severity rises as assets age beyond 40.**
 - **To control risk, control share and average age of assets >40.**



Maintenance Backlog Continues to Grow

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- **Deferred Maintenance has been rising since FY 2005 at rate of ~ 9 percent per year.**
 - **Ratio of unplanned to planned maintenance continues to grow.**
 - **Unplanned maintenance is much more expensive, resulting in even more deferrals of planned maintenance activities.**
- **Unscheduled outages and closures have disrupted current missions.**
- **NASA is unable to meet higher mandates for energy efficiency.**
- **Common facility problems such as water leaks, working/walking surfaces, and facility objects contribute to reported safety incidents**



Sustainment of Laboratory and R&D Equipment

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Independent review has identified threats to NASA's laboratory capabilities:

“NASA is not providing sufficient laboratory equipment and support services to address immediate or long-term research needs...The facilities that house fundamental research activities at NASA are typically old and require more maintenance than funding permits...Over the past 5 years or more, the funding of fundamental research at NASA, including the funding of facilities and equipment, has declined dramatically, such that unless corrective action is taken soon, the fundamental research community at NASA will be unable to support the agency's long-term goals...”

**From 2009 National Research Council study:
*Capabilities for the Future: An Assessment of NASA Laboratories for Basic Research***



NASA's Facility Status

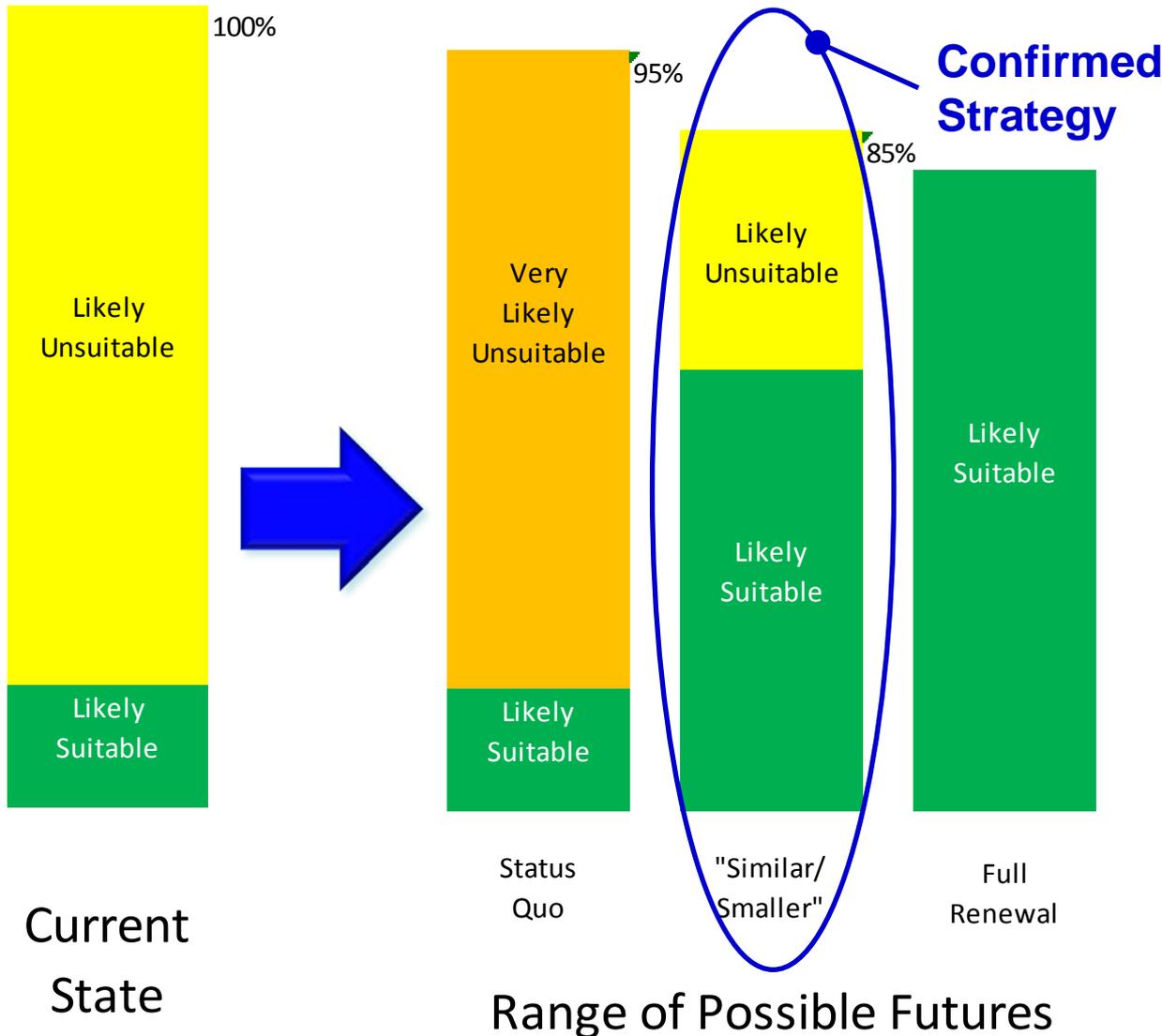
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- **To ensure that the Agency's facilities into the future can efficiently and effectively support its mission, NASA has undergone a comprehensive review of its facilities and implemented plans to reduce and renew these critical assets.**
- **NASA's plan is to renew and modernize its facilities to sustain its capabilities to meet current and future mission requirements, and to accommodate those capabilities in fewer, more efficient facilities.**
- **This Facility Strategy provides the foundation for all of the Agency's facilities planning activities.**



NASA's Facilities Strategy

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“NASA will renew and modernize its facilities to sustain its capabilities, and to accommodate those capabilities in the most efficient facilities set practical.”



Facility Goals

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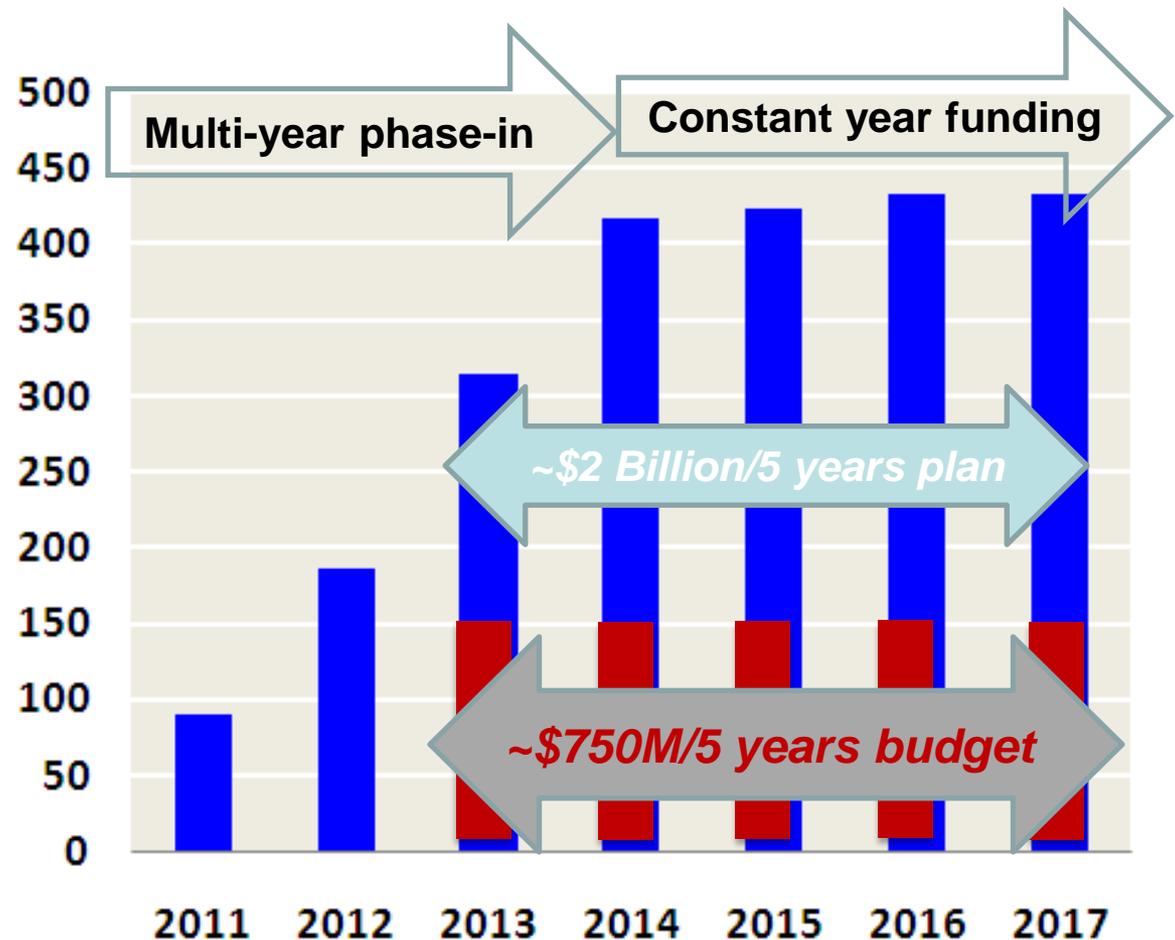
- **Reduce institutional size to reduce long-term facilities costs:**
 - 15% Reduction to CRV by 2055
- **Raise share of facilities under 40 years old:**
 - 19% < 40 yrs old by 2015
 - 32% < 40 yrs old by 2028
 - 63% < 40 yrs old by 2055
- **Goals can be achieved by renewing our infrastructure, including:**
 - **Demolition of excess capacity**
 - No longer required for mission use
 - Resulting from consolidation into a smaller, more efficient footprint
 - **Construction to reduce and renew facilities**
 - Repair by replacement/Rehabilitation
 - **Facility planning and design to support projects**



Recapitalization Funding

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- Recapitalization plans roughly tripled prior renewal rate
- **Current budget enables only about a third of this plan**
- **Impels new thinking about basic objectives**





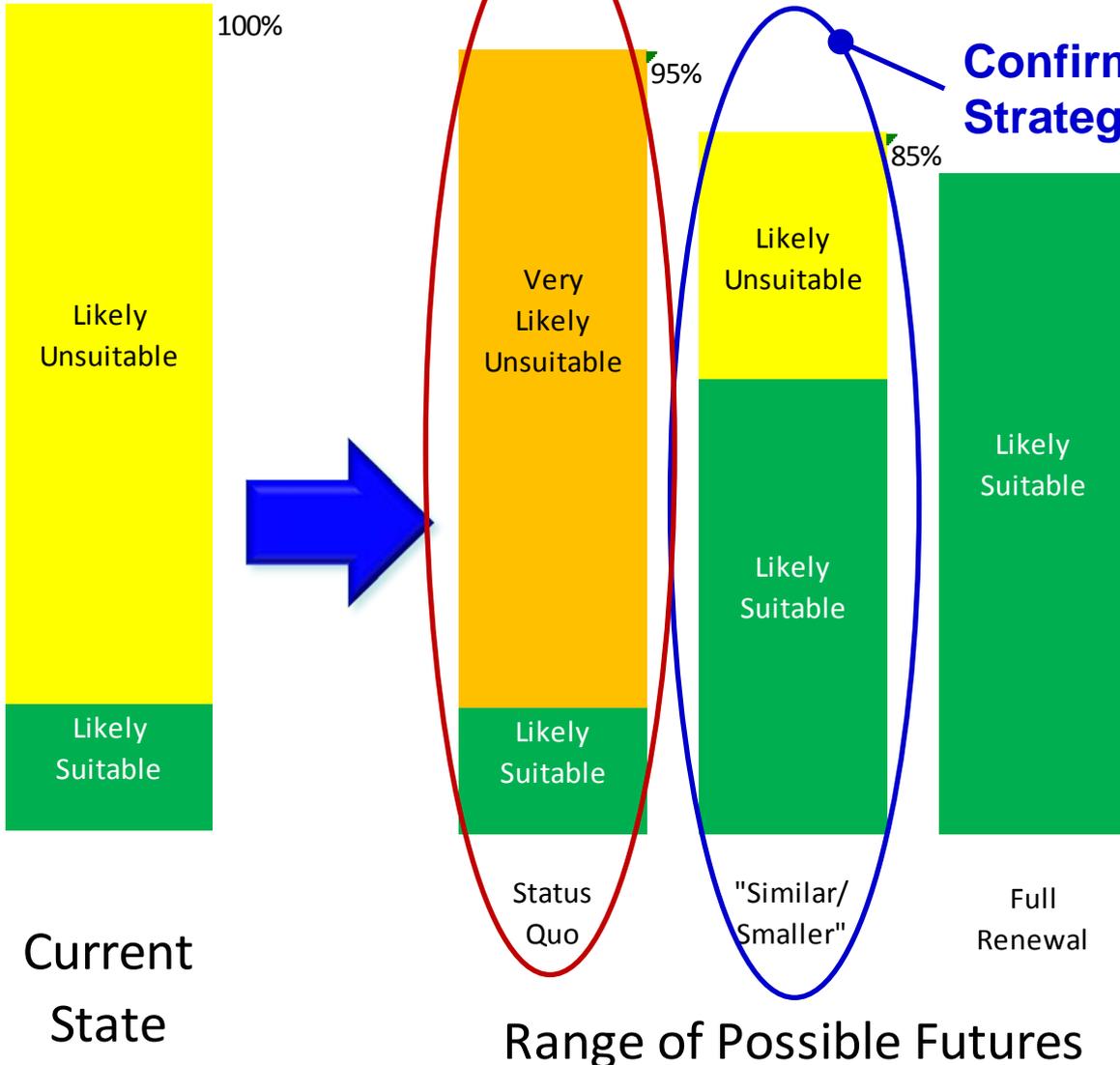
NASA's Facilities Strategy

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Funding Reality: riskier and larger?

Confirmed Strategy

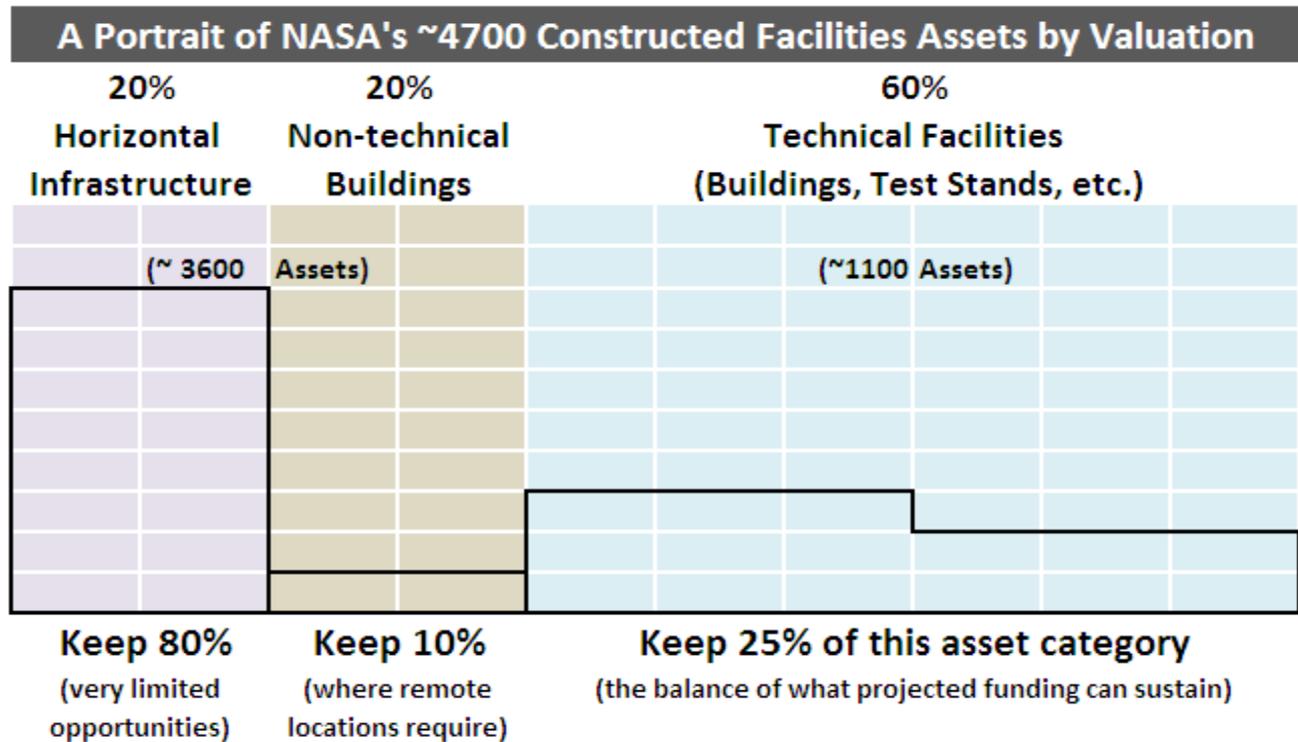
“NASA will renew and modernize its facilities to sustain its capabilities, and to accommodate those capabilities in the most efficient facilities set practical.”





What Can a \$150M/year Recapitalization Budget Sustain?

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Each box in this table reflects ~\$300M (1%) of our ~\$30B constructed facilities

- With ~33% of funding, 33 boxes (~\$10B in facilities value) could be sustained
 - Horizontal infrastructure would have to be renewed
 - Admin/support buildings unavoidable if near-site rental can't work
 - Remaining resources could sustain only about 25% of technical assets (~\$4.5B)



NASA Capabilities

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- **NASA has undertaken a focused effort to examine funding gaps for all technical capabilities due to the retirement of the Space Shuttle Program (SSP), the proposed termination of the Constellation Program (CxP), and the redirection of Exploration and other Agency technical portfolios.**
- **Assessed supply versus demand and the necessity to maintain capabilities at a certain state of readiness based on near- and anticipated long-term mission requirements**
- **Will continue to assess capabilities and develop plans to ensure that the technical capabilities are the right size and type to meet current and emerging requirements**



Corporate Portfolio Management

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- **A comprehensive framework to provide an integrated, corporate awareness of a capability's value, criticality, state of care, and resource requirement for sustainment**
 - **Implementing a process to manage Agency strategic capabilities as corporate portfolios**
 - **Implementation will be phased over several years to manage the degree of change and associated risk**
 - **NASA Technical Capabilities Assessment task begun to assess the supply of Center technical capabilities against the projected mission requirements.**
- **The Agency will assess the progress that can be made on these areas as part of the FY13 budget process.**



Planning the Future of NASA Facilities

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- **As required by the 2010 Authorization Act, NASA is preparing a comprehensive study that “...identifies a strategy to evolve toward the most efficient retention, sizing, and distribution of facilities, laboratories, test capabilities, and other infrastructure consistent with NASA’s missions and mandates.”**
 - **Study is underway with completion scheduled within one-year of enactment of the Authorization Act**
 - **Upon completion of study, NASA is to establish an independent panel to examine alternative management models for NASA’s workforce, centers, and related facilities.**



Facilities Master Planning

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- **Facility Master Planning is integral to achieving NASA's facilities goals.**
- **NASA is updating Center Facility Master Plans to include a Capital Investment Program Plan consistent with:**
 - **Agency goal to reduce infrastructure.**
 - **Desire to make progress towards energy and water initiatives.**
- **The Capital Investment Program Plan provides the five-year framework for the Agency's facility planning, including facility demolition and reduction plans.**
- **Integration of the Center plans will result in a comprehensive Agency-level Master Plan.**



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NASA Facility Planning





Summary

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- **Mission Support is critical to the achievement of NASA's program objectives.**
- **Aging, Apollo-era legacy infrastructure is inefficient, costly to maintain and operate, and an increasing risk to mission success.**
- **Maintenance backlog continues to grow.**
- **NASA's plan to address these Mission Support challenges is to:**
 - **Right-size the workforce and infrastructure;**
 - **Reduce and modernize its facilities in fewer and more efficient and sustainable facilities.**