Technical Capability Assessment

NASA Advisory Committee
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Agenda

• Background and Agency Actions
• Technical Capabilities Assessment Purpose
• Technical Capabilities Assessment Process
• Status and Next Steps
Completing the Puzzle

NEW AGENCY OPERATING MODEL

**IMPERATIVE:** Establish a more efficient operating model that maintains critical capabilities AND meets current and future mission needs
Purpose of the Technical Capabilities Assessment

**Establish a more efficient operating model that maintains critical capabilities AND meets current and future mission needs**

- NASA has a highly complex technical mission.
  - There are significant goal changes on a periodic basis.
  - Technical capabilities are vital to performing the mission.

- NASA has developed, maintains, and partners for technical capabilities.
  - There are many diverse capabilities across the Agency with many customers and partners.

- Budget environment is challenging.
  - We must make informed changes in the way we operate, what we maintain, and where we invest.

- TCAT is developing a method to:
  - Strategically address the technical capabilities required to support Agency goals;
  - Enable decision makers to make informed decisions on investing/divesting strategically within the budget while strengthening innovation in critical areas needed to advance our mission.
We want to make decisions about our capabilities and solutions based on future & current mission needs.
Capability Groups (What are we assessing?)

Institutional Capabilities
- HR
- Legal
- Facilities Management
- IT
- Etc.

Technical Capabilities
- TC1
- TC2
- TC3
- Etc.

Program/Project Management Capabilities
- Project Management
- Systems Engineering
- Safety & Mission Assurance

Portfolio
What does NASA Langley Research Center do in support of Space Solutions?

Solution: Arrival Transportation

- Recovery
- Landing
- Descent
- Entry

NASA Langley

Capabilities

- Structures and Mechanisms
- Aerodynamics
- Flight Dynamics
- GN&C

What skills does NASA Langley use?
Linking Solutions to Technical Capabilities

Solutions

Basic Research
Space
Aero

Centers

ARC  DFRC  GRC  GSFC  JPL  JSC  KSC  LaRC  MSFC  SSC

Technical Capabilities

Assets

Workforce (Competencies)

Equipment
Facilities
Solutions

- Solutions are the systems, subsystems, and activities that result from the decomposition of Agency objectives, while being independent of budget, organization, and programs. These are grouped in levels known as “Tiers.”
- Solutions refer to both current and future portfolio content.

**Space Solution Example:**

<table>
<thead>
<tr>
<th>Arrival Transportation</th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Entry, Descent &amp; Landing</strong></td>
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<td></td>
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<tr>
<td>Entry</td>
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<td>Descent</td>
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<tr>
<td>Landing</td>
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<td>Aerobraking</td>
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<td>Aerocapture</td>
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<tr>
<td>Recovery</td>
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<tr>
<td><strong>Rendezvous Dock</strong></td>
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<tr>
<td>Acquisition &amp; Rendezvous</td>
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<tr>
<td>Docking</td>
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<tr>
<td>Berthing</td>
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</table>

**Numbers of Solutions:**

<table>
<thead>
<tr>
<th></th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
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</thead>
<tbody>
<tr>
<td>Research</td>
<td>1</td>
<td>9</td>
<td>43</td>
</tr>
<tr>
<td>Space</td>
<td>9</td>
<td>26</td>
<td>97</td>
</tr>
<tr>
<td>Aero</td>
<td>3</td>
<td>12</td>
<td>31</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13</strong></td>
<td><strong>47</strong></td>
<td><strong>171</strong></td>
</tr>
</tbody>
</table>
### Tier 1 and 2 Solutions List

#### General Space
- System Architecture

#### Ascent Transportation
- Vehicle
- Ground Support
- Propulsion

#### In-space Transportation
- Vehicle
- In-space Servicing
- Propulsion

#### Arrival Transportation
- Entry, Descent & Landing
- Rendezvous & Dock

#### Extraterrestrial Surface Systems
- Surface Transportation
- Off-surface Transportation
- Power & Energy
- In-situ Sample and/or Resource Access & Utilization
- Infrastructure Platform Bus
- In-situ Servicing
- Communications & Navigation

#### Human Sustainment (Space)
- Launch & EDL
- In-space
- Extraterrestrial

#### Instruments
- Sensor Systems
- Experiment Apparatus

#### Spacecraft (Bus)
- Instrument Platform
- Habitation Platform
- In-space Servicing

#### Specialized Systems
- Long Term Management
- Communications

### Science & Exploratory Technology
#### Earth
- Astrophysics
- Heliophysics
- Planetary Science
- Space Environments Characterization & Effects
- Life Science
- Physical Science
- Human Research
- Information Systems

#### Air Vehicles
- Systems Architecture
- Vehicle Platform
- Propulsion
- Ground Support
- Aviation Safety

#### Air Traffic Management
- Strategic Management
- Tactical Management
- Unmanned Aerial Systems
- ATM Human Systems Integration
- General Air Traffic Management

#### Human Sustainment (Aero)
- Air Crew & Passengers
- Ground Crew
The Next Steps and Status

Data Input
- Solutions Set Definition
- Center Solutions Set Participation
- Prioritization for: Center Identity, Near Term and Future Portfolios

Analysis
- Prioritization Analysis
- Center Technical Capability Mapping
- Capability Discussions
- Observations

DECISIONS
- Decisions on Individual Solutions
- Collective decision-making – Agency, Mission Directorates, Field Centers

Institutionalize
- Integrate into NASA existing planning process
- Portfolio/Capability Management
- Policy/Ownership
- Begin Right-sizing Activities – workforce & assets

We are here

1. Moving into decisions; transparency of data, analysis, and decisions is critical across the Agency, and with stakeholders.
2. Approach must be integrated with other initiatives: Improving how we operate (business model) as we right-size our capabilities.
When do we determine something to be an Agency Technical Capability:

- Based on technical nature, complexity, and criticality for the Agency,
- Where a short-term programmatic approach is not sufficient,
- Where greater coordination and alignment is needed,
- and/or where an integrated advancement approach is required to address future Agency objectives.
• Advises Agency and ensures *proper alignment* across Missions and Centers.
• Establishes *plans/roadmaps* to provide technical guidance to the Agency.
• Determine *gap areas* for advancement and strategic investment.
• Advises on capability *sizing and strategic hiring*, including contracting, across all Centers.
• Determines *investments and divestments* within capability scope, including advising Centers on assets.
• Solicits *innovative ideas* from outside the capability area.
• Establishes *standards and specifications* within capability scope.
Accomplishments to Date

1. Held All Hands at all ten NASA Centers to brief NASA Actions and Technical Capability Assessment plans for transparency to our workforce. Had sessions with all SES/ST/SL as part of the Virtual Executive Summit. Established an internal employee web site for transparency of process and decisions.

2. Briefed Authorization and Appropriations Congressional Committee staff and Congressional Member staff on NASA Technical Capability Assessment.

3. Reviewed and incorporated lessons learned from previous Agency decisions on capabilities, specifically meeting with Arc Jet teams at JSC and Ames.


Assessments that complete over the next three months:

- Nuclear Power and Propulsion
- Instrument & Sensors
- Aerosciences
- Materials
- Propulsion
- Ascent Transportation – Vehicle
- ET Surface Systems (e.g. ISRU)
- Entry, Descent, and Landing
- Acquisition, Rendezvous, & Docking
- Space Environments and Natural Environments Test