Technical Capability Assessment

NASA Advisory Committee
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- Background and Agency Actions

- Technical Capabilities Assessment Purpose

- Technical Capabilities Assessment Process

- Status and Next Steps

NEW AGENCY OPERATING MODEL

Program/ Project Planning

Other Assessments

Contract Assessment

Tech Capability Assessment

Business Capability Assessment

Mission Integration

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.

The Big Picture

30-years **1-10 years** **Make or Buy**

Future Mission Needs → Near Term Mission Needs ↔ Solutions ↔ Technical Capabilities (Assets, Workforce)
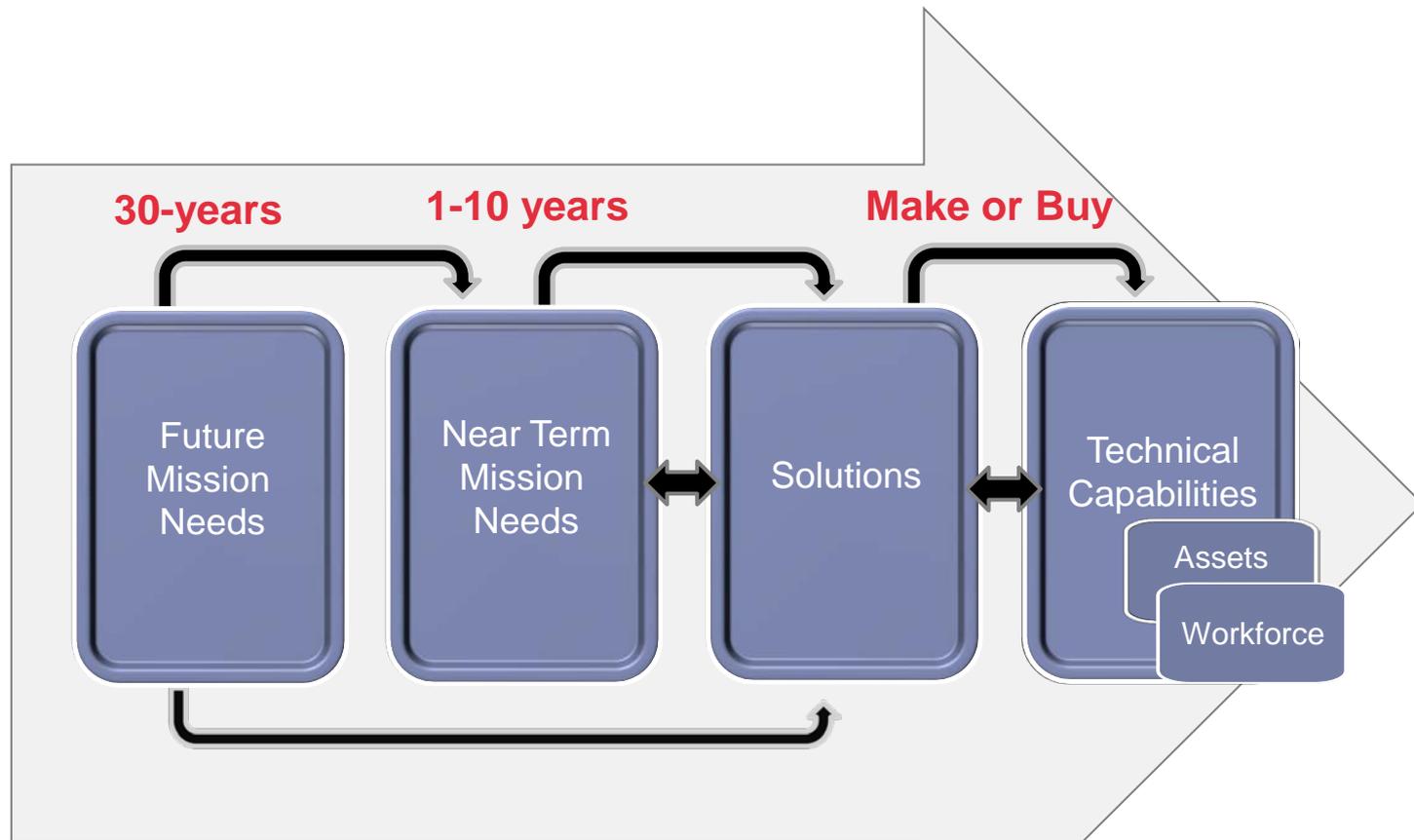
We want to make decisions about our capabilities and solutions based on future & current mission needs

Capability Groups (What are we assessing?)
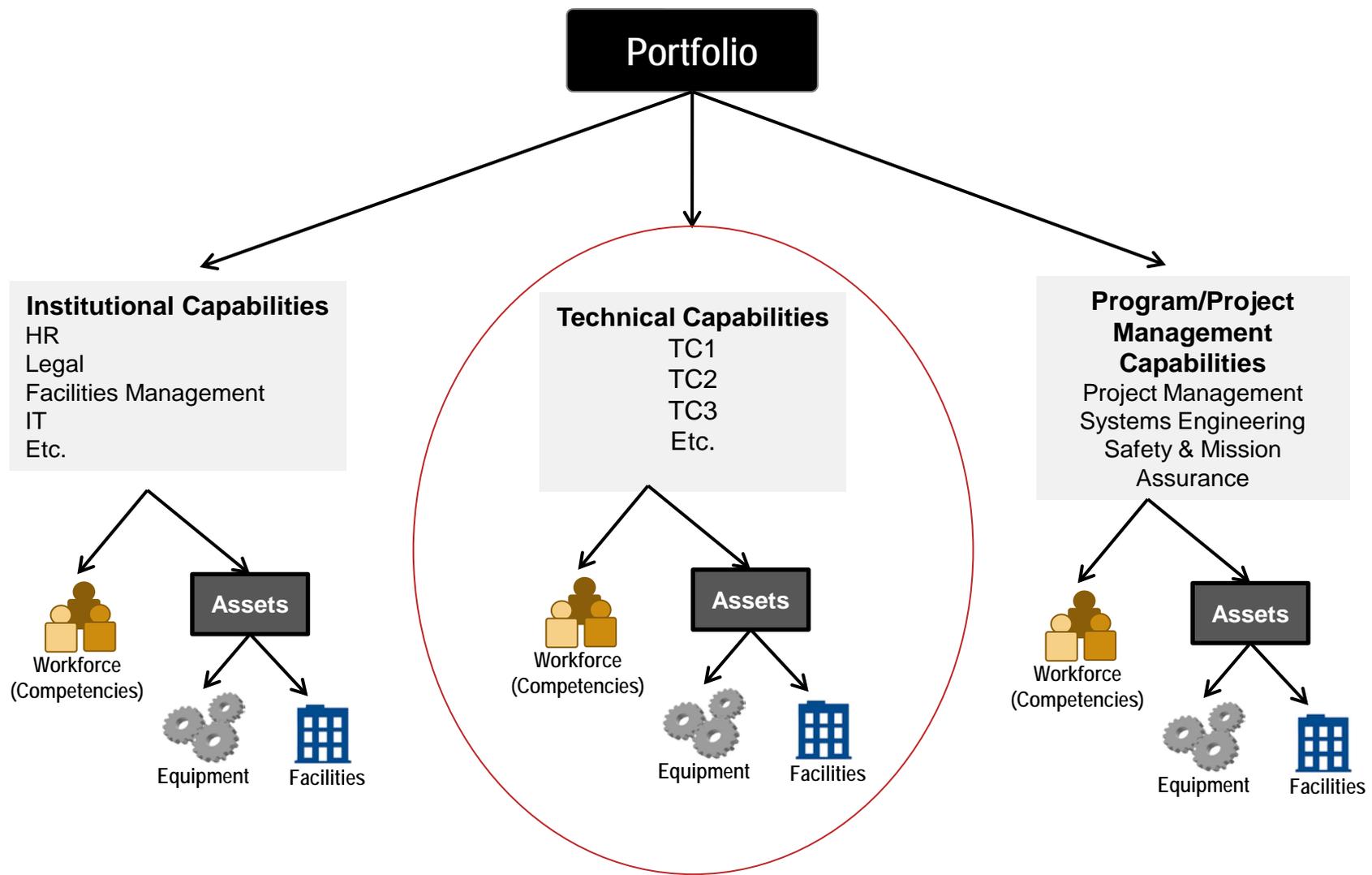
**What does NASA Langley Research Center
do in support of Space Solutions?**

**Solution:
Arrival Transportation**

Recovery

Landing

Descent

Entry

NASA
Langley

Structures and
Mechanisms

Aerodynamics

Flight Dynamics

GN&C
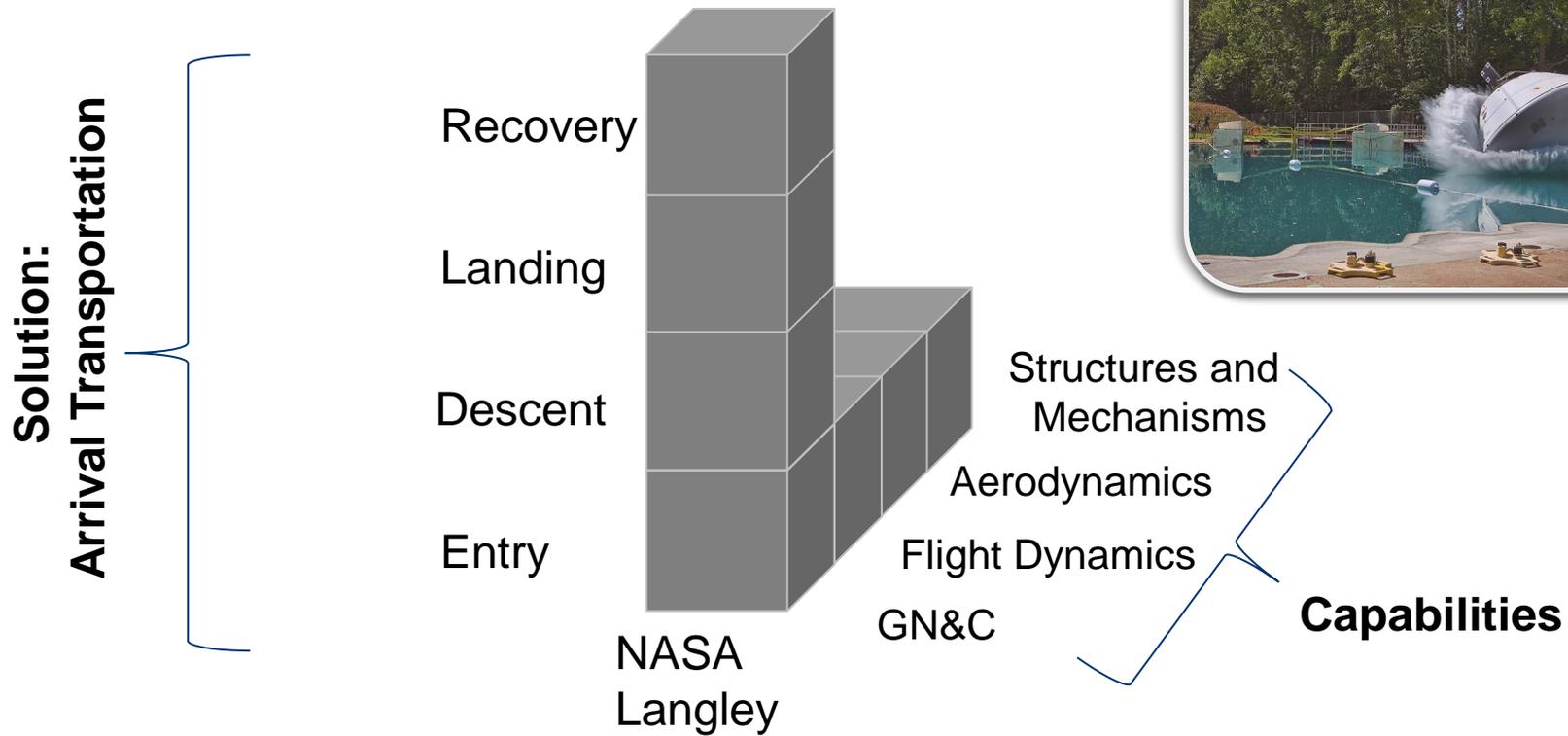
Capabilities

What skills does NASA Langley use?

Basic Research

Space

Aero

Solutions

Centers

ARC DFRC GRC GSFC JPL JSC KSC LaRC MSFC SSC

Technical Capabilities

Assets

Workforce (Competencies)

Equipment

Facilities
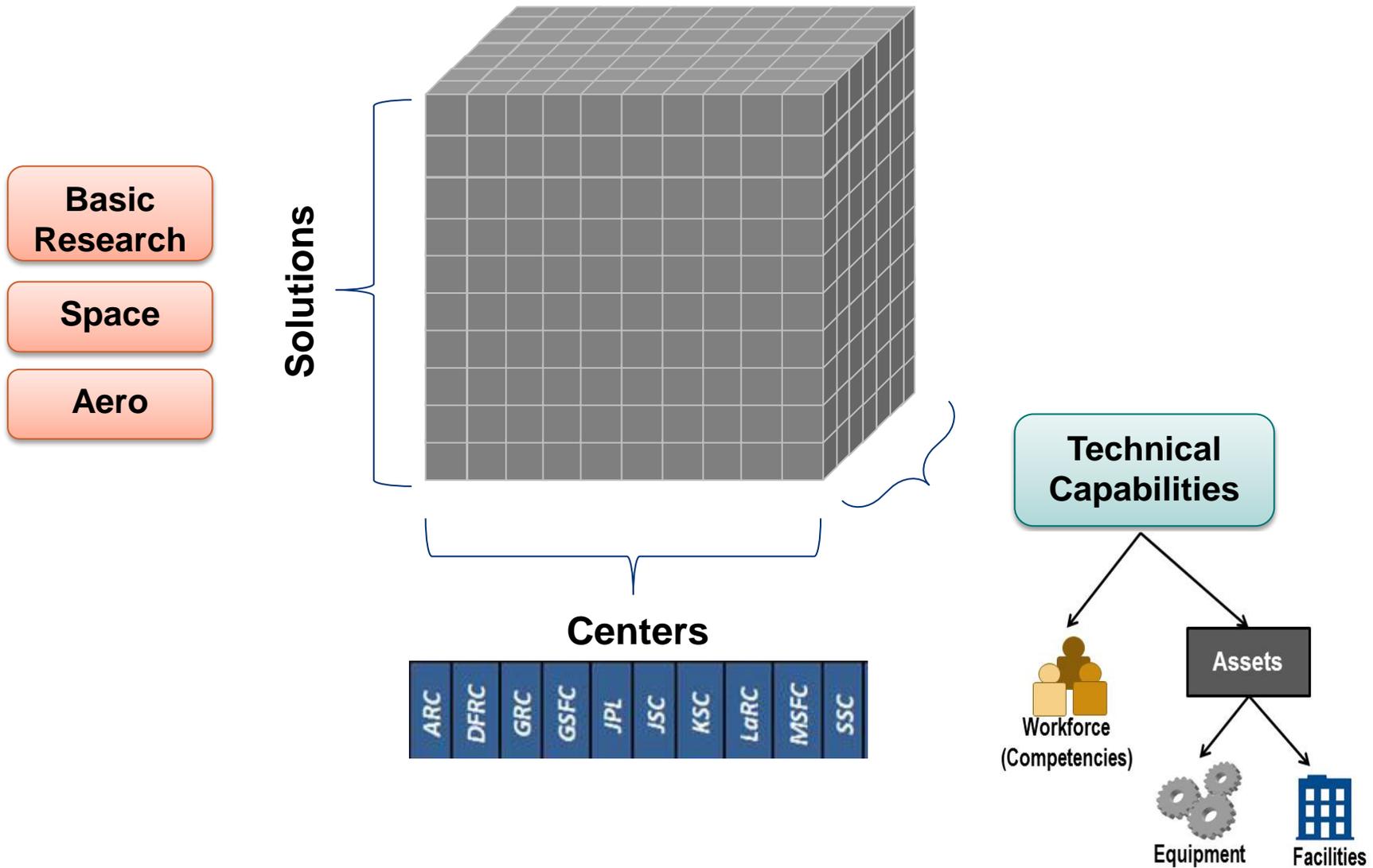
Solutions

- 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:

Arrival Transportation	
Entry, Descent & Landing	Entry
	Descent
	Landing
	Aerobraking
	Aerocapture
	Recovery
Rendezvous Dock	Acquisition & Rendezvous
	Docking
	Berthing

Numbers of Solutions:

	Tier 1	Tier 2	Tier 3
Research	1	9	43
Space	9	26	97
Aero	3	12	31
Total	**13**	**47**	**171**

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

Space

Science & Exploratory Technology

Earth

Astrophysics

Heliophysics

Planetary Science

Space Environments Characterization & Effects

Life Science

Physical Science

Human Research

Information Systems

Research

Air Vehicles

Systems Architecture

Vehicle Platform

Propulsion

Ground Support

Aviation Safety

Aero

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.**

Mission Directorate A   Mission Directorate B

Project 1   Project 2   Project 3   Project 4   Project X

*Tech Capability Leadership Area 1

Tech Capability Leadership Area 2

Tech Capability Leadership Area 3

Tech Capability Leadership Area 4

Tech Capability Leadership Area X
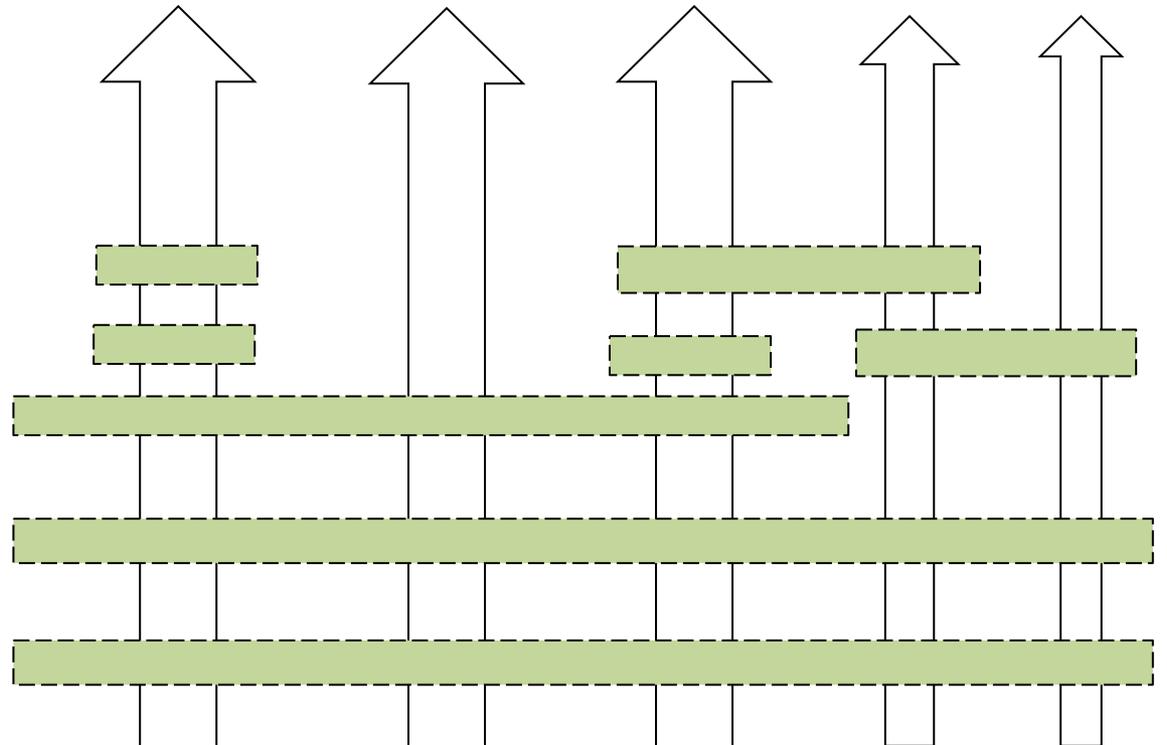
*Technical Capability Leadership can be discipline, research, service, or systems level

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.**

4. **Provided Agency direction on next steps for institutionalizing technical capability assessment and management approach.**

5. **Made NASA Council decisions on Microgravity Flight Services, Balloon Services, Aircraft Operations, Life Sciences, Earth Sciences, Human Factors, and Mission Operations. Established Aircraft Operations, Earth Science Research, Life Sciences Research, and Human Factors as Agency technical capabilities to be managed under new model.**

Assessments Plan

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