



Technical Capability Assessment

**Update with NASA Industry Forum
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- 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

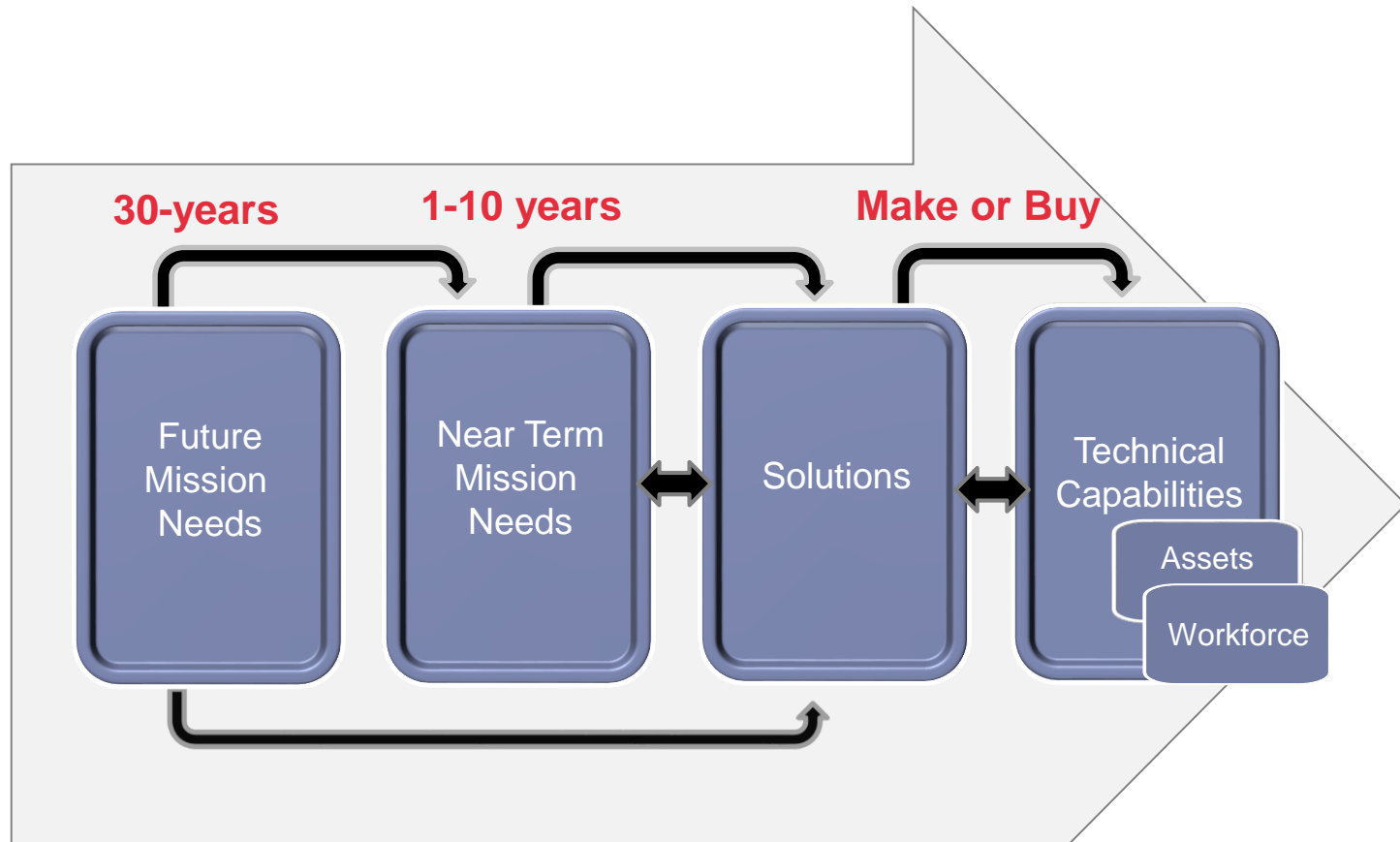
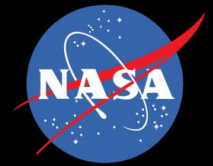
Purpose of the Technical Capabilities Assessment



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

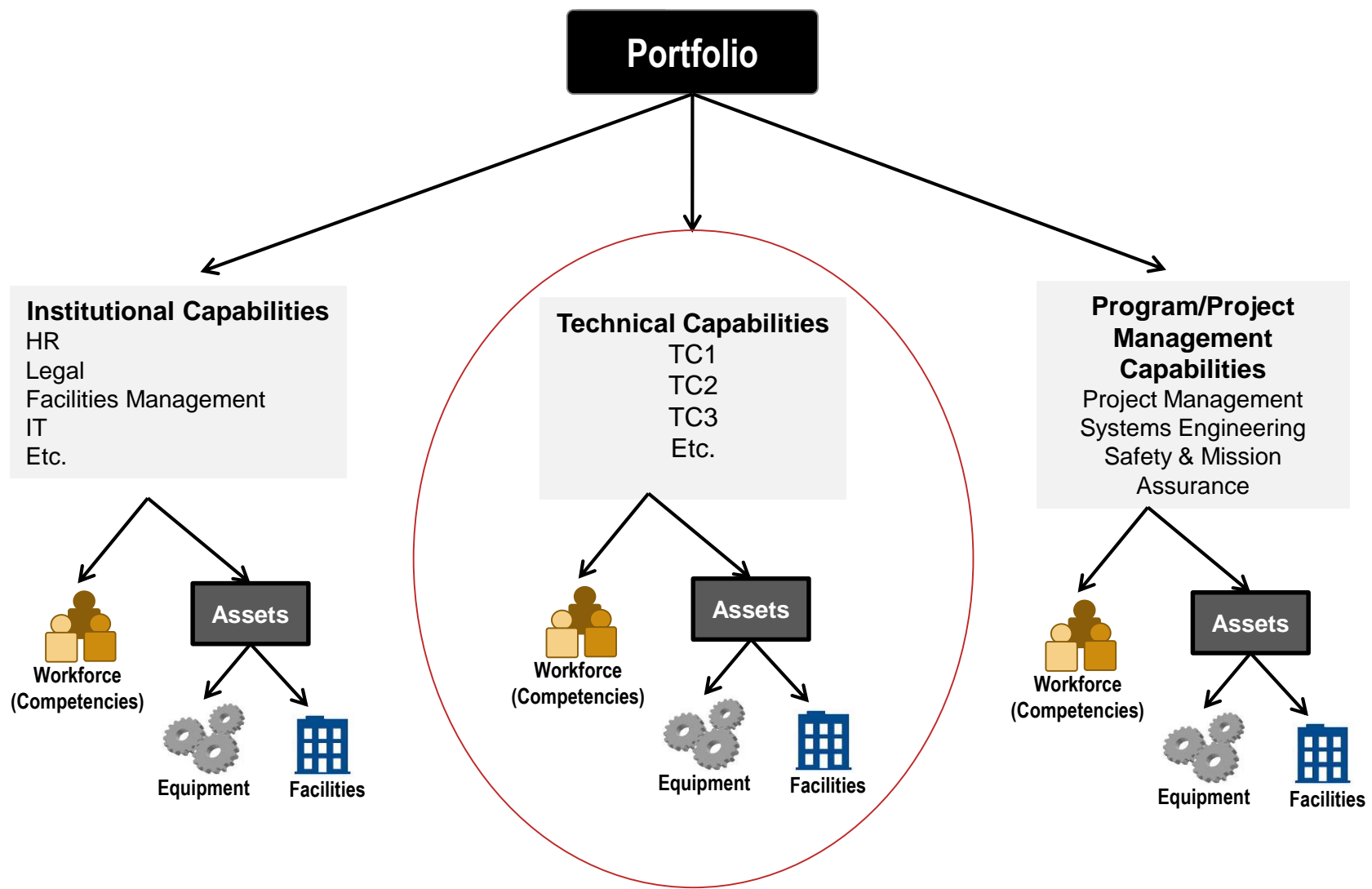
- NASA has a highly complex technical mission.
 - There are significant goal changes on a periodic basis.
 - Technical capabilities are vital to performing the mission.
- NASA has developed, maintains, and partners for technical capabilities.
 - There are many diverse capabilities across the Agency with 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.

The Big Picture



We want to make decisions about our capabilities and solutions based on future & current mission needs

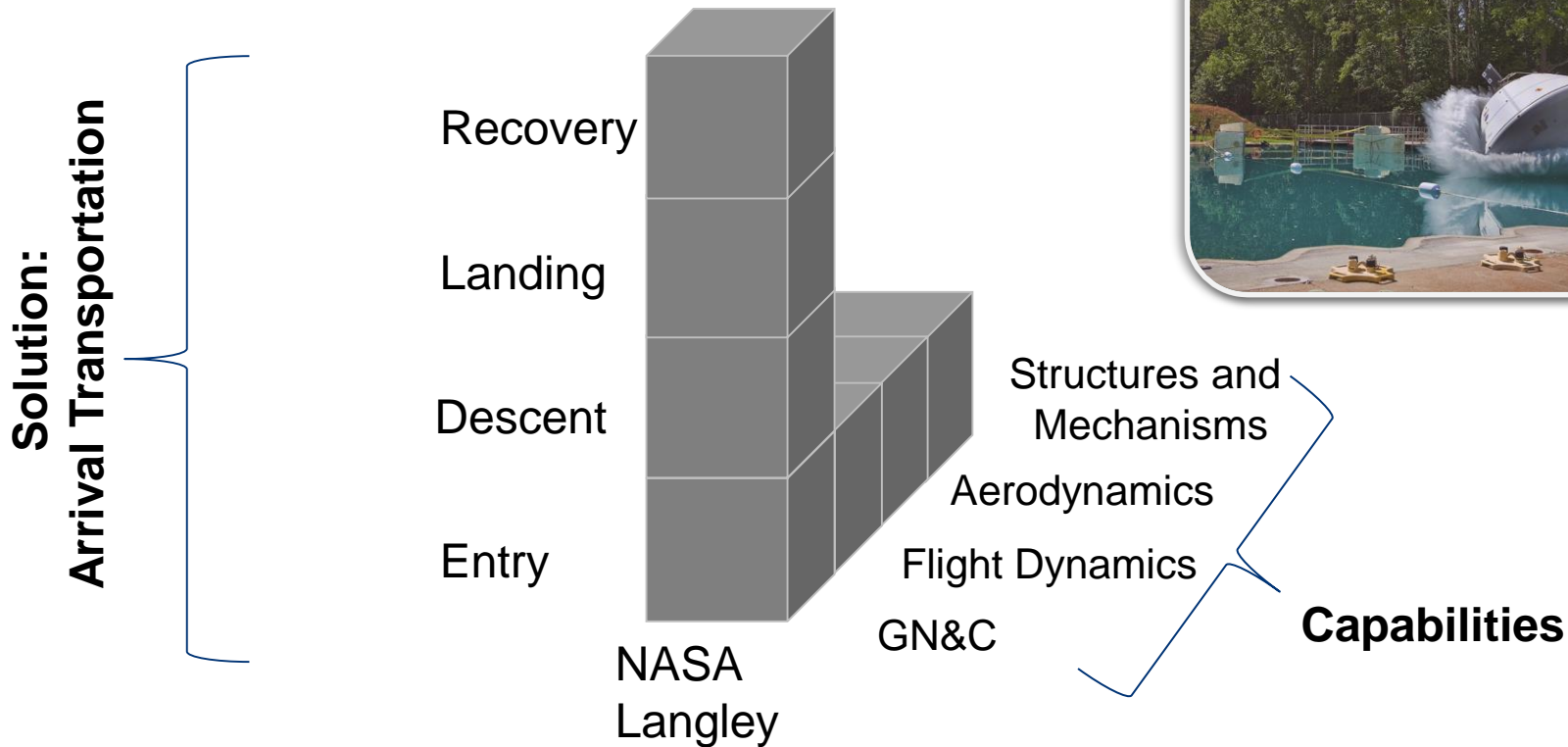
Capability Groups (What are we assessing?)



Linking Solutions to Technical Capabilities

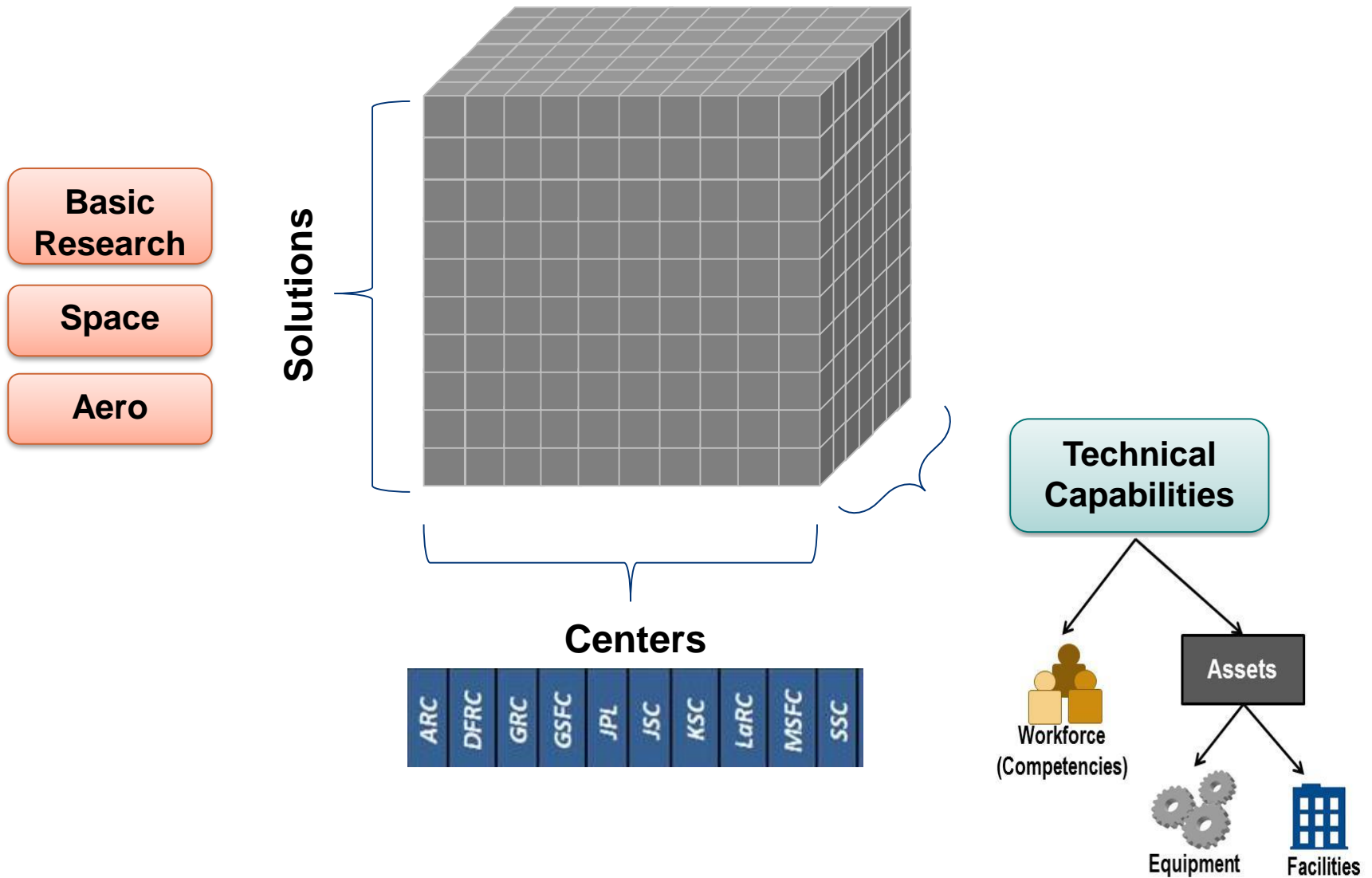


What does NASA Langley Research Center do in support of Space Solutions?



What skills does NASA Langley use?

Linking Solutions to Technical Capabilities





- 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

Air Traffic Management

Strategic Management

Tactical Management

Unmanned Aerial Systems

ATM Human Systems Integration

General Air Traffic Management

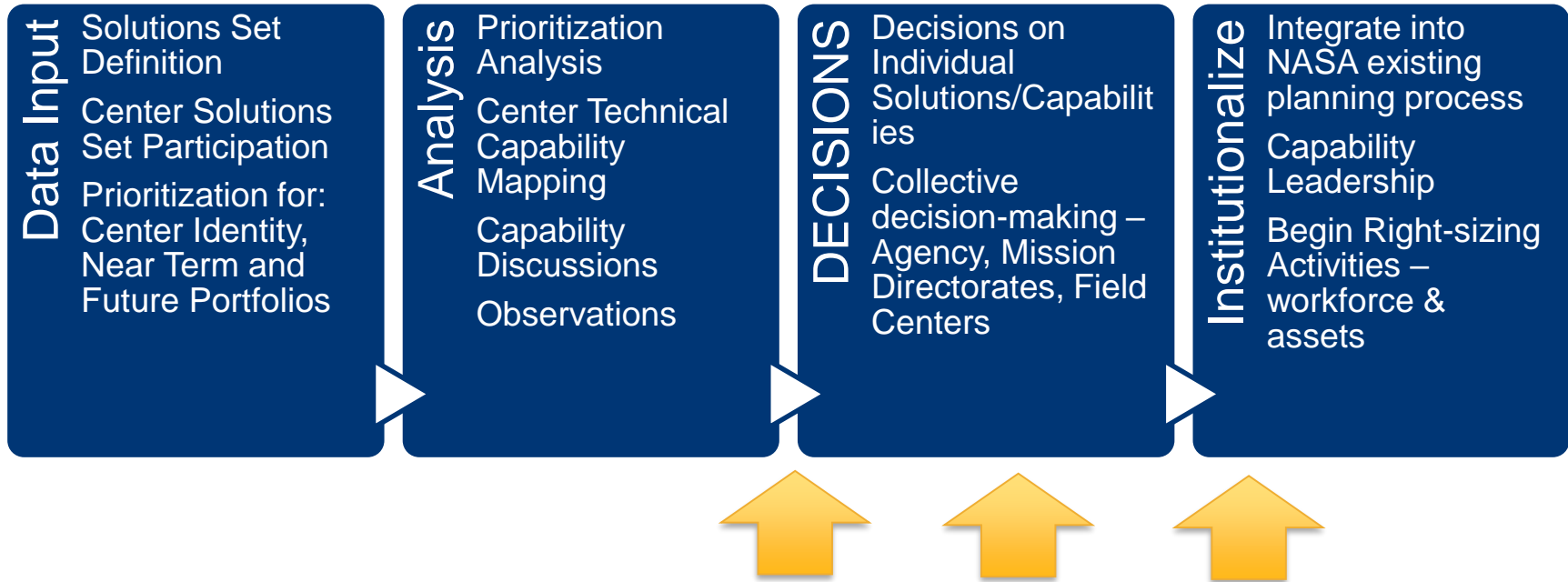
Human Sustainment (Aero)

Air Crew & Passengers

Ground Crew

Aero

Progress and Plan



We are here

1. **Making 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.**



As we formulate missions and we move to strategically address workforce and infrastructure, there are four key areas we need to address....

- Building a strong foundation to support Agency near and far term goals
- Advancing capabilities to meet long-term needs
- Optimizing deployment of capabilities across all Centers
- Stop doing work we no longer need to do

These 4 bullets are the essence of capability leadership.

Mission Directorate A

Mission Directorate B

Project 1

Project 2

Project 3

Project 4

Project X

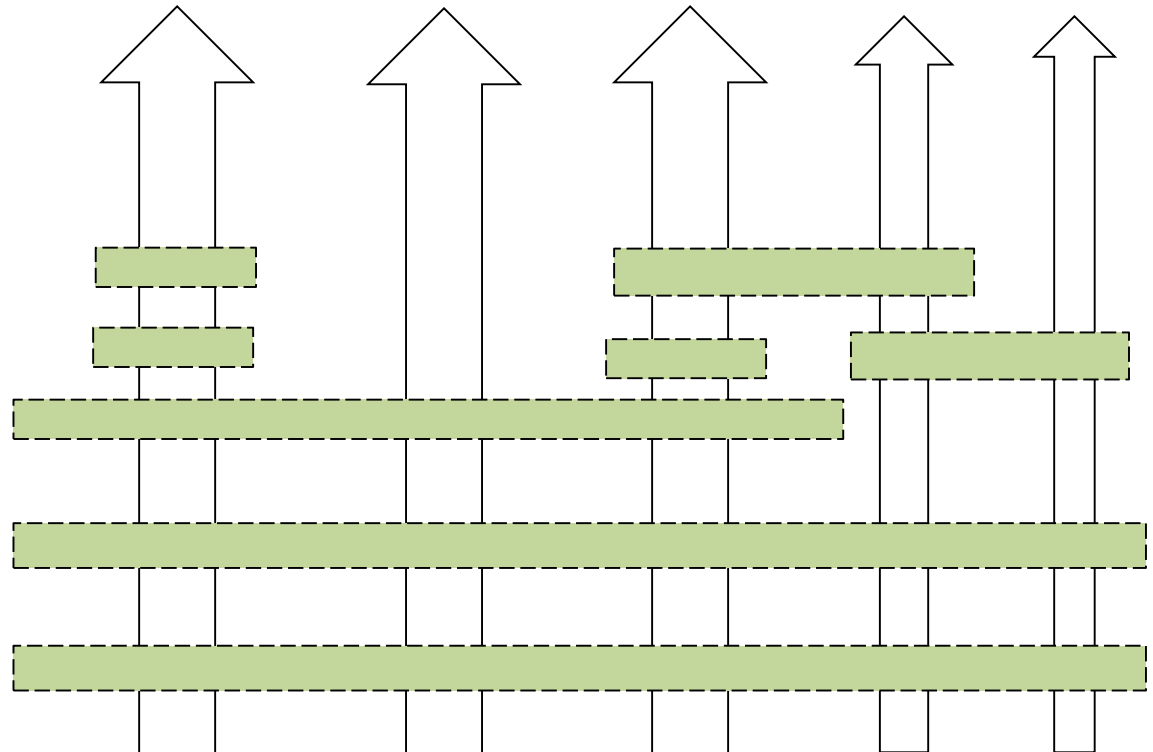
*Tech Capability Leadership Area 1

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.

Current NASA Capability Areas



Discipline Areas:

1. Aerosciences
2. Avionics
3. Electrical Power
4. Flight Mechanics
5. Guidance Navigation & Control (GNC)
6. Human Factors
7. Life Support/Active Thermal
8. Loads and Dynamics
9. Materials
10. Mechanical Systems
11. Non-Destructive Evaluation (NDE)
12. Passive Thermal
13. Propulsion
14. Software
15. Structures
16. Systems Engineering (recently filled)
17. Space Environments (not yet filled)
18. Cryogenics (not yet filled)
19. Instruments and Sensors (not yet filled)

Research Areas:

1. Life Sciences
2. Earth Science
3. Heliophysics (on hold pending Earth Science approach)
4. Planetary (on hold pending Earth Science approach)
5. Astrophysics (on hold pending Earth Science approach)

Technical Service Areas:

1. Aircraft Operations
2. Environmental Test Facilities (tiger team in work)
3. Mission Operations (tiger team in work)

Agency Capability Leadership Area Roles



- 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 leadership.**
- 5. Made NASA Council decisions on Microgravity Flight Services, Balloon Services, Aircraft Operations, Life Sciences, Earth Sciences, Human Factors, Mission Operations, Nuclear Power and Propulsion, Environments Test. Established Aircraft Operations, Earth Science Research, Life Sciences Research, and Agency discipline technical capabilities to be managed under new model.**

Technical Assessments Schedule for 2015



Assessments/Decisions that are underway:

- Entry, Descent, and Landing
- Rendezvous and Capture
- Extraterrestrial Surface Systems
- Ascent Transportation – Vehicle
- Aerosciences
- Materials
- Propulsion
- Human Factors

February:

- Software
- Structures
- Avionics
- Electrical Power

March:

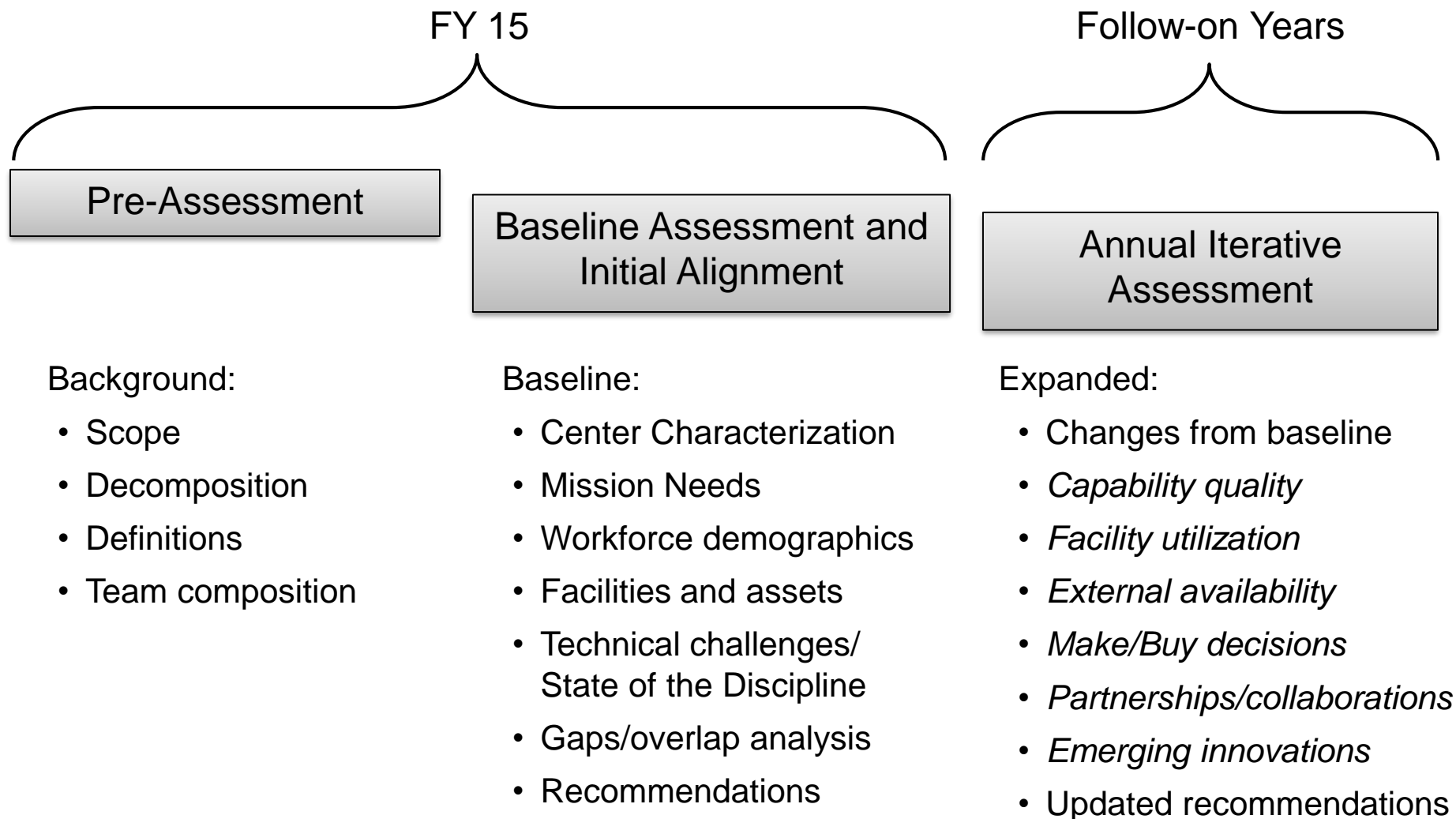
- Guidance Navigation & Control (GNC)
- Flight Mechanics
- Life Support
- Active Thermal
- Mechanical Systems

April:

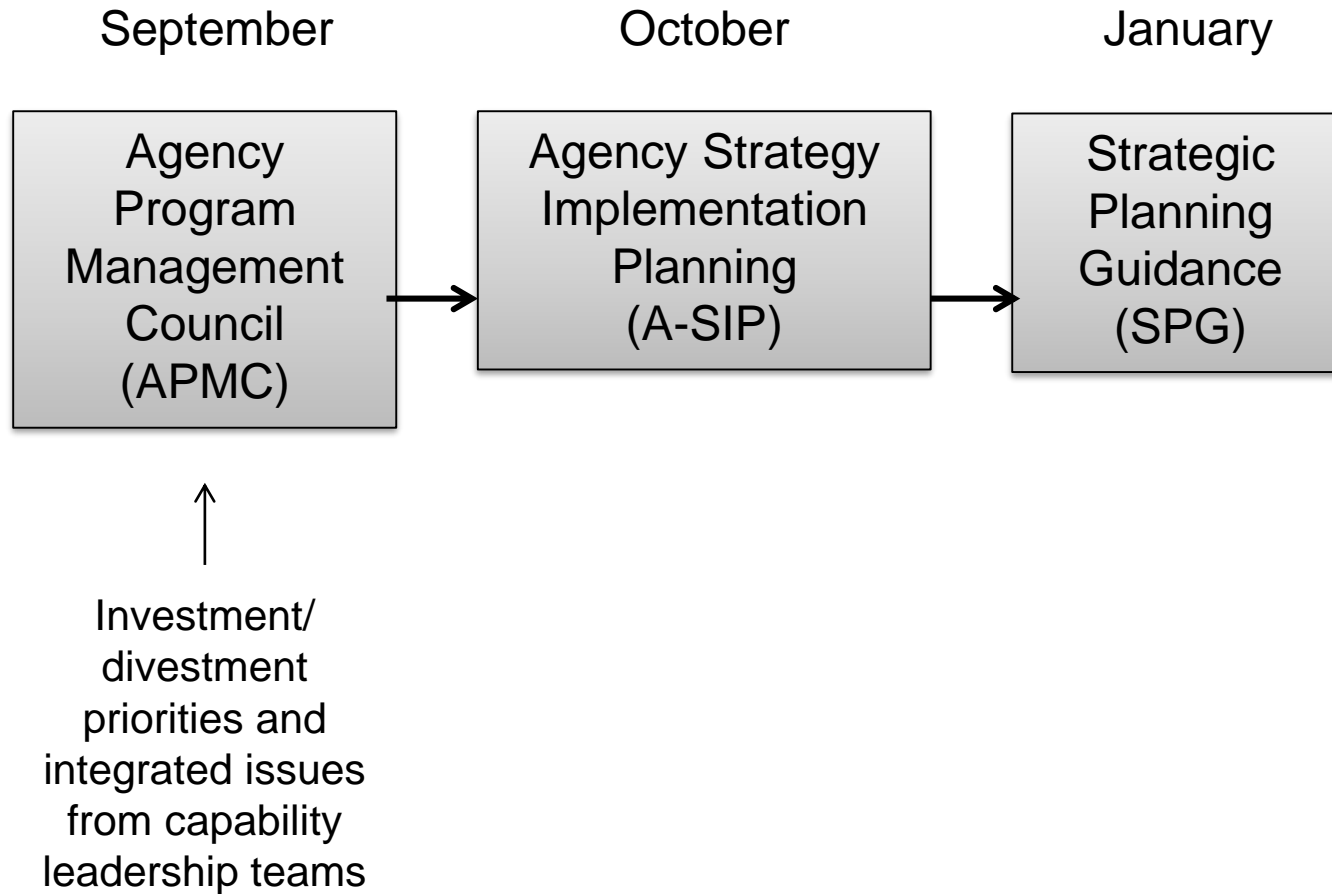
- Non-Destructive Evaluation (NDE)
- Passive Thermal
- Loads and Dynamics

All Technical Assessment result in decisions in the Annual Agency Program Management Council

Technical Assessments/State of the Capability



Annual Path for Integrating Capability Leadership



BACKUP

