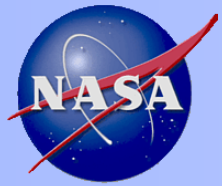




Office of the Chief Engineer Update

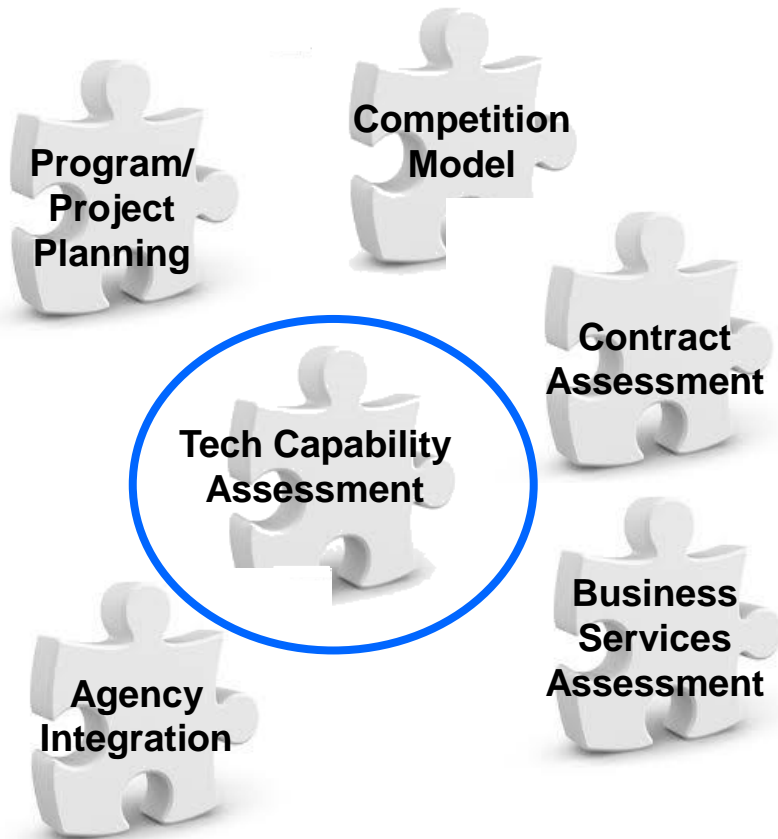
**Ralph R. Roe
Chief Engineer**

November 10, 2015

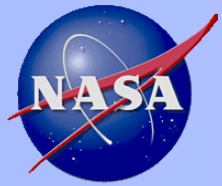


Completing the Puzzle

NEW AGENCY OPERATING MODEL



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

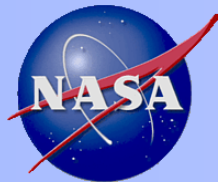


Technical Capability Assessment Introduction

- NASA Technical Fellows or designee served as Capability Leaders for their **Discipline** and/or **System** areas
 - Led Agency-wide Technical Capability Leadership Teams; accomplished the enduring, strategic work of the Capability Leadership Model
 - Technical capabilities designated as Agency capabilities, not Center or Mission capabilities; functioned as an aligned unit to advance the capability; represent Agency stewardship

- NASA Technical Fellows and their Capability Leadership Teams developed a scope, built a baseline from their initial Technical Assessment, and will refine/update the baseline as external or internal changes dictate.

- Process demonstrated the value of Agency-level Capability Leadership. Capability leaders are recognized as providing value-added support for related agency activities (e.g., partnership discussions, technology prioritization, etc...).



Current Technical Capability Area Leadership

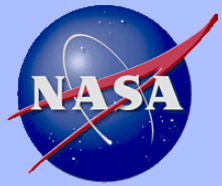
Discipline-level Technical Capability — OCE Leadership with NASA Technical Fellows

1. **Aerosciences**
2. **Avionics**
3. **Electrical Power**
4. **Flight Mechanics**
5. **GN&C**
6. **Human Factors**
7. **Life Support/Active Thermal**
8. **Loads and Dynamics**
9. **Materials**
10. **Mechanical Systems**
11. **NDE**
12. **Passive Thermal**
13. **Propulsion**
14. **Software**
15. **Structures**
16. **Systems Engineering (new)**
17. **Space Environments (new)**
18. **Cryogenics (new)**
19. **Instruments and Sensors (new)**

Note: (new) signifies that a Capability assessment has not been conducted or reviewed by the EMB

System-level Technical Capability — OCE Interim Leadership

1. **Entry, Descent, and Landing**
2. **In-Situ Resource Utilization**
3. **Rendezvous and Capture**
4. **Autonomous Systems (new)**



Technical Capability Assessment Current Status

- Completed 16 Discipline-level and 3 Systems-level Technical Capability Assessments
- Initial Technical Assessment and Annual State of the Capability presentations were first reviewed by the Extended-Engineering Management Board (EMB)
 - Reviewed the results from all disciplines in order to form Agency-wide engineering recommendations and to identify integrated or cross-discipline issues and opportunities
 - Alternate view points were documented and brought forward
- The teams made 161 recommendations which the EMB rolled up into 8 common strategic themes
 - Also identified additional specific tactical recommendations that could be addressed by the agency once the strategic themes are addressed
- The deliberations of the EMB resulted in 66 opportunities that integrated the strategic themes and the tactical recommendations that were brought forward for consideration at the Agency level.
 - The integrated strategic themes addressed Agency-wide topics such as the Agency operating model, program incentive and funding structures, workforce alignment/development, program risk assessments, and process overhead versus programmatic execution.



Status and Path to Next Steps

FY 15

FY 16

Pre-Assessment

Background:

- Scope
- Decomposition
- Definitions
- Team composition

**Baseline Assessment/
Initial Alignment**

Baseline:

- Center Characterization
- Mission Needs
- Workforce demographics
- Facilities and assets
- Technical challenges/
State of the Discipline
- Gaps/overlap analysis
- Recommendations

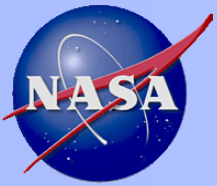
Governance:

- Agency strategic discussion on capability recommendations
- Collective decision-making- Agency, Mission Directorates, Field Centers
- Decisions feed into existing NASA planning process

**Annual Iterative
Process**

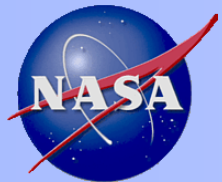
Sustainment:

- Changes from baseline as required
- Support NASA strategic planning process
- Initiate new discipline and system-level baseline assessments
- Execute/support Agency approved decisions



Summary

- The Office of the Chief Engineer demonstrated enduring integration and leadership for the Agency's discipline and system technical capabilities
 - Engineering Management Board provided integration and prioritization across multiple Technical Capability areas
- The current process will be reviewed and adjusted based upon lessons learned
 - Will refine the process before completing new capability area baseline assessments
- Outcomes from Agency-level discussions/decisions will be worked with the appropriate Capability Leadership Teams to ensure continued alignment
- A key to ensuring that the Technical Capability Leadership model takes hold is for the technical workforce to see action being taken as a result of their efforts

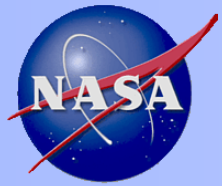


Backup



OCE Mission

1. Advise Agency leadership on the technical and programmatic readiness of NASA programs and projects
2. Execute Agency's Engineering Technical Authority
3. *Integrate and provide leadership for the Agency's technical capabilities*
4. Provide "value added" independent assessment across all of NASA's program
5. Steward Agency-level policy and standards for engineering and program and project management
6. Share program/project management and engineering best practices, and lessons learned
7. Support the workforce with training and knowledge management services needed to continuously improve program/project management and engineering skills

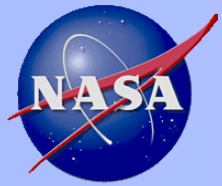


Why Technical Capability Leadership?

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

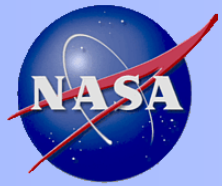
- Building a strong foundation to support Agency near and far term goals
- Advancing capabilities to meet long-term needs
- Optimizing deployment of capabilities across all Centers
- Stop doing work we no longer need to do

This is the essence of technical capability leadership



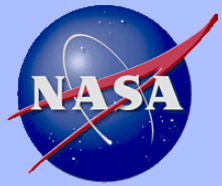
Role of OCE and NASA Technical Fellows in Technical Capability Leadership

- Institutionalizing Technical Capability Leadership:
 - NASA Technical Fellows have been designated as Technical Capability Leaders for their discipline areas
 - Future capability leaders will baseline their own areas
 - Use the Engineering Management Board (EMB) to review the results of all OCE/NASA Technical Fellow-led deep dives/technical assessments
 - NASA Technical Fellows/Capability Leaders and their respective agency-wide teams are responsible for developing recommendations to ensure their capability is ready to support current and future missions
 - Capability Leadership in service and research areas will be assigned as needed on a case-by-case basis



Technical Capability Leadership Roles

- Advises Agency and ensures *proper alignment* across Missions and Centers consistent with Agency and capability advancement needs.
- Establishes *plans based on Agency-Level roadmaps and strategic needs* to provide technical guidance to the Agency in the identification and prioritization of tasks necessary to enable discipline-level performance for future missions.
- Determine *gap areas* for advancement and strategic investment.
- Advises on *capability sizing and strategic hiring of FTE and WYE*, across all Centers, so as to avoid Agency excess capacity, duplication in a capability area, or excessive contracting of intrinsic NASA technical capability areas.
- Assesses opportunities for *investments and divestments* within capability scope, including advising Centers on *assets*, and coordinates with other capability areas so as not to duplicate scope between areas.
- Solicits *innovative ideas from outside the capability area*, related to such things as technical content, new approaches, workforce skills, asset use, and disposition.
- Establishes *standards and specifications* within capability scope.



Engineering Management Board Roles and Responsibilities

- For OCE/NASA Technical Fellow led deep dives, the EMB will review the results and form agency-wide engineering recommendations for presentation to Agency decision-making forums
 - EMB is chaired by the NASA Chief Engineer and membership includes the Engineering Directors/Chief Engineers at each Center
 - The EMB will provide a forum for coordination, integration and communication across Technical Capability (engineering) Leaders/areas
- Implementation is the responsibility of, and driven by, the Centers and their management teams