Langley Research Center

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LANGLEY RESEARCH CENTER TECHNICAL AUTHORITY IMPLEMENTATION PLAN

National Aeronautics and Space Administration

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Langley Research Center

Technical Authority Implementation Plan

- January 16, 2007 -

Submitted by:		Approved by:	
Original signed on file	1/16/07	*Original signed on file*	1/22/07
Lesa B. Roe, Director Langley Research Center	Date	Christopher J. Scolese, Chief Engineer NASA	Date

Concurrence:

Original signed on file	1/16/07	*Original signed on file*	1/16/07
William L. Willshire, Director Aeronautics Research Directorate	Date	John B. Herrin, Director Exploration and Flight Projects Directorate	Date
Original signed on file	1/16/07	*Original signed on file*	1/16/07
Lelia B. Vann, Director Science Directorate	Date	Ajay Kumar, Director Systems Analysis and Concepts Directorate	Date
Original signed on file	1/16/07	*Original signed on file*	1/16/07
Howard J. Lewis, Director Research Services Directorate	Date	Stephen P. Sandford, Director Systems Engineering Directorate	Date
Original signed on file	1/16/07	*Original signed on file*	1/16/07
Charles E. Harris, Director Research and Technology Directorate	Date	George B. Finelli, Director Center Operations Directorate	Date
Original signed on file	1/16/07	*Original signed on file*	1/16/07
John B. Malone, Director Safety and Mission Assurance Office	Date	James E. Van Laak, Director Systems Management Office	Date

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Revision History

Version	Date	Description
1A	2007/01/16	Initial Release

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1.0 Purpose

NASA Policy Directive (NPD) 1000.0, “Strategic Management & Governance Handbook” sets up a “Checks and Balances” organization model and authorizes engineering to maintain technical purview over requirements and any deviations. NPD 1000.0 also assigns responsibility for policy direction for NASA engineering, as well as program and project management, to the NASA Chief Engineer.

The “Checks and Balances” organization model described in NPD 1000.0 will be put into practice through the implementation of the technical authority initiative developed by the NASA Chief Engineer.

Technical authority is the engineering parallel to program/project management and safety and mission assurance that is required to achieve balance in implementing safe and successful projects. Technical authority defines the delegation of responsibility for setting and enforcing institutional (make it safe) requirements, from the Office of the Administrator to the Center Director and then down through the Langley organization to an individual program or project. On technical matters, the assigned Technical Authority provides an organizationally and financially independent voice equal to programmatic authority.

This plan will document the implementation of the technical authority initiative at Langley Research Center.

2.0 Scope and Applicability

Technical authority will encompass large and small projects and activities in flight systems and ground support (FS&GS) projects, advanced technology development (ATD) projects with deliverables to FS&GS projects, applied research projects with deliverables to FS&GS, and research projects involving high risk ground systems. Technical authority will also encompass basic and applied research (BAR), other ATD projects, and analysis projects as designated by the Center Director, on a case by case basis as recommended by the Center Management Council.

3.0 Adherence to NPD 1000.0

A clear separation of programmatic and technical authority will be maintained. Each designated Technical Authority will be organizationally independent from the program/project programmatic authority. The Technical Authority will be matrixed to the program/project from an engineering organization; and will be a direct report of that engineering organization. Furthermore, the Technical Authority will be fully funded by Center institutional resources.

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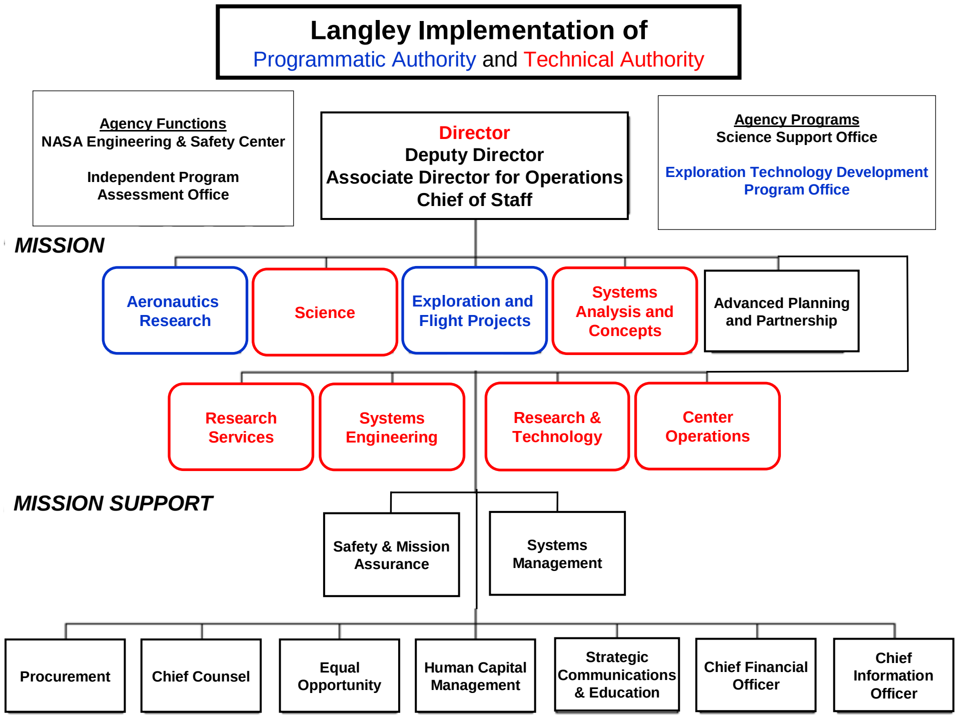

Figure One: Organizations maintaining technical authority are shown in red; organizations maintaining programmatic authority are shown in blue

4.0 Center Technical Authority

The Center Director is the Technical Authority for Langley Research Center. The Center Director will delegate specific technical authority responsibilities to members of the Langley engineering and technical communities. Only those individuals formally delegated as Technical Authorities can exercise technical authority.

The Center Management Council (CMC) has the primary responsibility for the technical content and performance of Center activities to assure their compliance with program, mission, and Agency objectives. As part of this responsibility the CMC will assess program and project compliance with technical authority; and provide recommendations to the Center Director for the application of technical authority to non-FS&GS activities that are outside the scope of this plan.

5.0 Flow of Technical Authority

Technical authority flows from the Office of the Administrator through the Center Director to each Engineering Director (the heads of the Center Operations, Research Services, Research and Technology, Science, Systems Analysis and Concepts, and Systems Engineering Directorates), to the designated Technical Authority for individual programs, projects, and disciplines when the program/project is hosted at Langley.

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When Langley is hosting a key element of the project the element will be “projectized”. For example, project elements such as the Service Module, Crew Module, or Launch Abort System for the Crew Exploration Vehicle (CEV) project. In these cases technical authority flows from the Office of the Administrator through the Center Director and Engineering Director to the designated Technical Authority for the project element. In addition, there is a second flow of technical authority from the Office of the Administrator through the Center Director and Engineering Director of the Center hosting the project, to the individual Technical Authority for the project, to the Langley Technical Authority for the project element. The Technical Authorities for the project and project element will integrate the appropriate institutional requirements from the two Centers. If a deviation is required it will be documented in the project files and the Technical Authority where the deviation is required will work the disposition per the documented procedures at their Center. The Project Manager, Element Manager, and the Engineering Directors for both Centers will be regularly updated on the process.

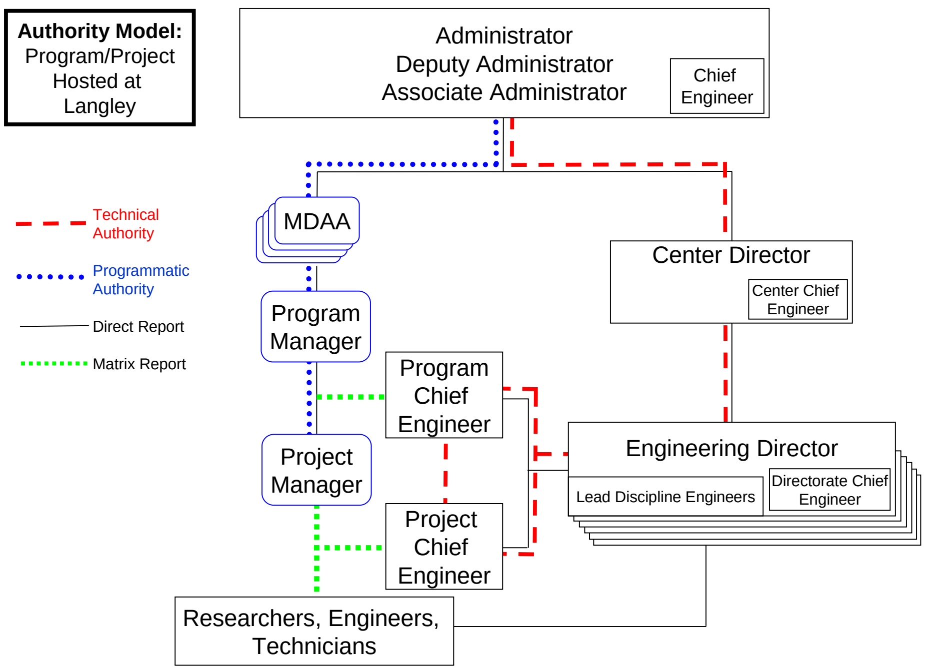

Figure Two: Flow of technical authority when the program/project is hosted at Langley

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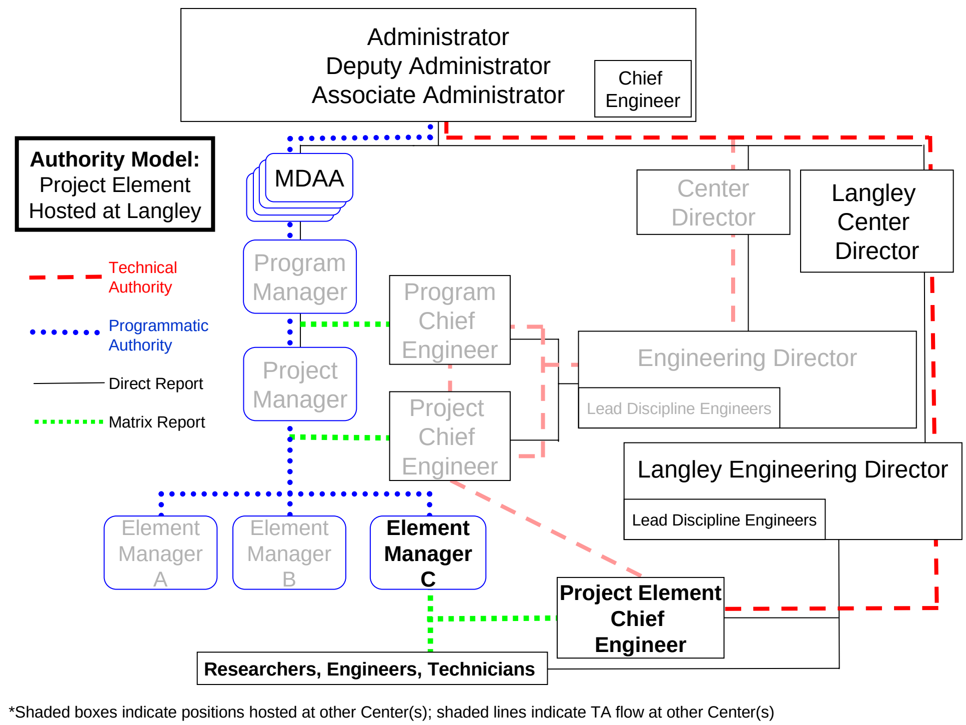

Figure Three: Flow of technical authority when only an element of a project is hosted at Langley

6.0 Roles and Responsibilities for Technical Authority

Center Director

The Technical Authority for Langley Research Center as designated by the NASA Administrator; responsible for implementing technical authority at Langley in accordance with NPD 1000.0 and guidance from the Office of the Chief Engineer; responsible for developing, maintaining, and assuring compliance to institutional requirements for the safe operation of programs, projects, and project elements at Langley; responsible for the resolution of requests for deviations from institutional requirements; responsible for the resolution of dissenting opinions; and responsible for funding allocated by NASA Headquarters for independent technical authority.

Center Chief Engineer

Responsible for overall leadership of the technical authority process for Langley Research Center hosted programs, projects, project elements, and activities (as defined in section 2.0) to include policy direction and technical authority process implementation; and advises the Center Director on the resolution of deviations to institutional requirements and the resolution of dissenting opinions.

Engineering Director (the heads of the Center Operations, Research Services, Research and Technology, Science, Systems Analysis and Concepts, and Systems Engineering Directorates)

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The formally delegated Technical Authority for specific technical authority responsibilities in the engineering directorate as designated by the Center Director; responsible for selecting or recommending program/project Technical Authorities and discipline Technical Authorities; responsible for implementing technical authority in the Engineering Directorate; responsible for developing, maintaining, and assuring compliance to institutional requirements for safe operations; and as delegated, responsible for the resolution of requests for deviations from institutional requirements and the resolution of dissenting opinions.

Directorate Chief Engineer

Responsible for the guidance of the technical authority process in the Directorate to include organizational procedures and the verification of technical authority implementation in the Directorate; and advises the Engineering Director on deviations of institutional requirements and resolution of dissenting opinions.

SMA Director

Responsible for assuring compliance with the established institutional requirements for safe program, project, and project element operations.

Program/Project Managers

Responsible for the overall success of their program/project (make it work, make it affordable) to include cost, schedule, and program/project requirements within the constraints of institutional requirements for safe operations; and for implementing and recognizing technical authority in their program/project

Lead Discipline Engineer (LDE)

The formally delegated Technical Authority for a particular discipline as designated by the Center Director (or Engineering Director); responsible for the application of discipline specific standards; and as delegated, responsible for the resolution of requests for deviations from discipline specific requirements. The LDE is also responsible for supporting the review of processes/activities such as trend analysis, risk analysis, hazard analysis, and Failure Mode and Effect Analysis (FMEA) for their discipline.

Program/Project Chief Engineer (PCE)

The formally delegated Technical Authority for a program/project as designated by the Center Director (or Engineering Director); responsible for delivering a safe product by applying and ensuring the application of institutional requirements; and responsible for the development and disposition of program/project deviations and dissenting opinions. The PCE is also responsible for the review and approval of processes/activities such as trend analysis, risk analysis, hazard analysis, and Failure Mode and Effect Analysis (FMEA) for their program or project; and for documenting the results of the review (peer, SME, etc) in the program/project files.

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Researcher, Engineer, Technician

Responsible for delivering safe systems, subsystems, and/or components to the program/project.

7.0 Selection and Identification of Technical Authorities

Technical authority will be formally delegated (flow down) as described in Section 5.0. A listing of all Langley Technical Authorities will be maintained in the Office of the Center Director by the Center Chief Engineer.

The selection of Engineering Directors, Program Technical Authorities, and category 1 (as described in NPR 7120.5) Project Technical Authorities will be approved by the NASA Chief Engineer. The NASA Chief Engineer will be provided an initial listing of all Langley Technical Authorities and notified of any changes to the Langley listing of Technical Authorities.

8.0 Deviations to Requirements

The evaluation and disposition of deviations to institutional requirements is the responsibility of the Technical Authority. The Technical Authority must approve deviations from requirements at their level. The organizational level and organizations that agreed with the establishment of the requirement must agree to the deviation from the requirement. The Technical Authority granting a deviation from the requirement must notify the Program/Project Manager, the Engineering Director, and SMA Director to maintain a common understanding and proper documentation of the requirements. Once the deviation is agreed to as described above, the Program/Project Manager must also approve the deviation consistent with their responsibility to implement technical authority requirements.

The next higher level of technical and programmatic authority must be informed in a timely manner of each deviation request and the subsequent action taken.

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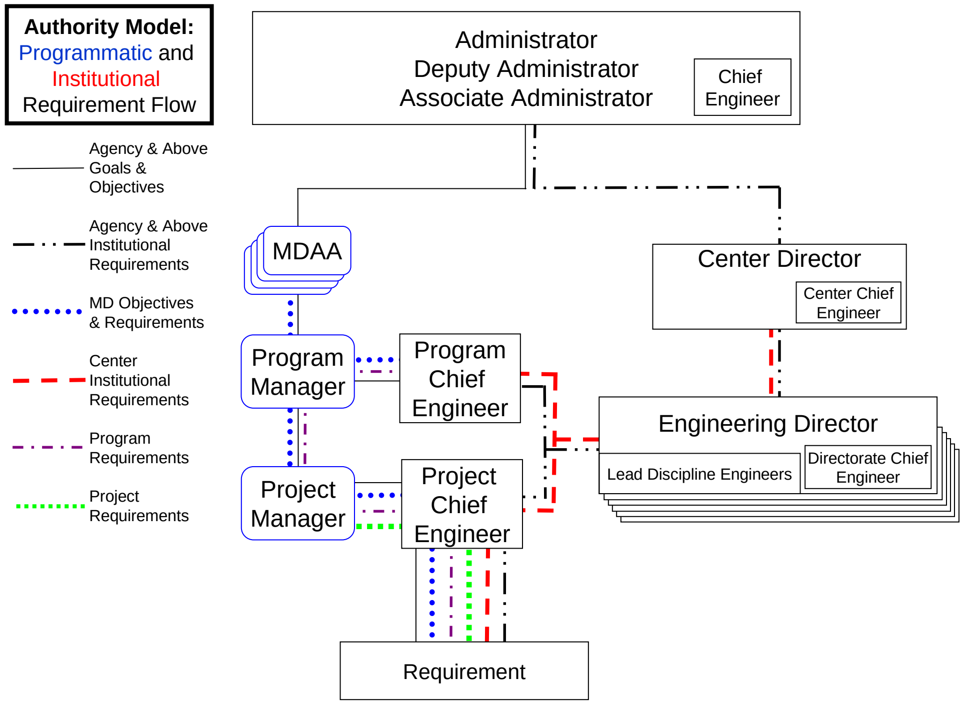

Figure Four: The flow of goals, objectives, and requirements

Figure four illustrates the flow of goals, objectives, and requirements through the programmatic and institutional chains of command. The technical authority to deviate from an Agency or above institutional requirement is at the Administrator or above. The technical authority to deviate from Center institutional requirements is at the Center Director.

Requirements	Level Of Deviation Decision	Examples
Agency & Above Institutional Requirements	Administrator and above	Executive Orders, Human-Rating Requirements for Space Systems (NPR 8705.2A), Planetary Protection Provisions for Robotic Extraterrestrial Missions (NPR 8020.12C), and Systems Engineering Procedural Requirements (NPR 7123.1)
Center Institutional Requirements	Center Director	Wind-Tunnel Model Systems Criteria (LPR 1710.15), Langley Research Center Pressure Systems Handbook (LPR 1710.40), and Design, Verification/Validation, and Operations Principles for Space Flight Systems (LPR 8705.1).

Table One: Level of deviation decision authority for institutional requirements

Similarly, the authority to deviate from Agency & above, Mission Directorate, Program, and Project goals, objectives, and requirements is at the programmatic level that the goal, objective, or requirement was established.

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Goals, Objectives, & Requirements	Examples	Level Goal, Objective, or Requirement Established By
Agency & Above Goals & Objectives	Presidential Policy; Executive Orders; and the Vision for Space Exploration	President, Congress
MD Objectives & Requirements	Return the Space Shuttle to flight; Enable Human Travel Beyond Low Earth Orbit; Conduct scientific exploration of the Earth, Moon, Mars and beyond; Advance the science of subsonic, supersonic, and hypersonic flight	Administrator
Program Requirements	The program shall develop a system to carry humans beyond low earth orbit; The program shall conduct scientific exploration of the Earth	Mission Directorate
Project Requirements	The CEV shall have a crew-to-crew communication system that covers the mission envelope; The crew-to-crew communication system shall cover a volume of N km around the CEV; The crew-to-crew communication system shall remain attached to the crew member; The crew-to-crew communication system shall provide simultaneous N-way communications	Program Project

Table Two: Examples and notional programmatic goals, objectives, and requirements

9.0 Dissenting Opinions

Dissenting opinions will be presented to the appropriate Technical Authority in a timely manner with all relevant facts, the technical rationale for the differing views, and the recommendations resulting from each view. Management in the technical authority, project/program, and safety and mission assurance chains will be informed in a timely manner of the existence of a dissenting view and the disposition of the dissent.

Teams shall have full and open discussions with all the facts made available to understand and assess issues. Issues unresolved within a team should be quickly elevated to achieve resolution at the appropriate level. At the discretion of the dissenting person(s) (level n), a dissenting view is identified and presented to the appropriate Technical Authority (level n+1). The standard approach will be to document the concern in a memorandum. The memorandum is signed by the representative of each view and concurred on by all affected parties. This memorandum is provided to the appropriate Technical Authority for action. In parallel, copies of the memorandum are provided to the next level Technical Authority (level n+2), Program/Project Manager, and the managers of involved SMA and management oversight organizations for their information or action as they deem appropriate.

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The memorandum shall contain three primary components to assist the Technical Authority in making an objective, timely, and correct technical decision: 1) facts that are agreed to by all parties, 2) discussion of the differing positions, rationale, and implications, and 3) the recommendations of each party.

The Technical Authority's decision/action on the memorandum will be documented and provided to the dissenter and to the managers who were notified of the dissent as noted above. This documentation becomes part of the project record.

If urgent resolution of the issue is required, a team member representing the base recommendation and a team member advocating the dissenting position will make an oral presentation to the next higher level of Technical Authority (level n+1). The program or project managers, as well as the managers of other involved organizations at the next level (level n+2) are to be notified of the need for urgent resolution of the dissenting opinion and when/where the presentation will be held. In this urgent mode, the oral presentation follows the document format discussed above. Representatives of the affected organizations are in attendance, and their positions are heard. The presentation and resulting actions are documented and are distributed as noted above.
This documentation becomes part of the project record.

In either the normal or urgent process, if the dissenting team member is not satisfied with the process or the outcome, the dissenter may request the issue be referred to the next level of Technical Authority. Ultimately the dissenting team member has the right to take the issue up the organization for resolution including to the NASA Administrator, if necessary.

10.0 Center Policy and Procedures Supporting Technical Authority

Center policies and procedures for institutional requirements are documented in the Langley Management System (LMS). Additional procedures will be developed or modified to support the long-term execution of technical authority.

Request, evaluation, and disposition of deviations

- This procedure will be developed as described in section eight

Identification, evaluation, and disposition of dissenting opinions

- This procedure will be developed as described in section nine

Institutional requirements for safe operation

- Existing policies and procedures will be modified as required

A check list of institutional requirements with the deviation approval authority identified will be developed and documented in the Langley Management System.

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11.0 Configuration Control of Technical Authority Implementation Plan

Once signed by the signatories on the front page this implementation plan will be put under configuration control and maintained in the Langley Management System. Any major changes to the plan will be approved by the NASA Chief Engineer and the Langley Center Director prior to implementation by the Center Chief Engineer.

12.0 Milestone Schedule for Technical Authority Implementation

Milestone	Expected Completion Date
Center roll out of TA Implementation Plan	Complete
Personnel Reassignments for TA/PA independence	Complete
Procedure Modification & Development Request, evaluation, and disposition of deviations Identification, evaluation, and disposition of dissenting opinions Modification of institutional requirements	6/01/07

13.0 Technical Authority Budget

	FY07	FY08	FY09	FY10	FY11	FY12
Total TA Budget ($K)	$15,007	$15,517	$16,045	$16,590	$17,154	$17,738
Total FTEs	94	94	94	94	94	94

14.0 Listing of Langley Technical Authorities

Name	Organization	Position
Stephen P. Sandford	Systems Engineering Directorate (SED)	Engineering Director
Mark A. Hutchinson	Aeronautics Systems Engineering Branch, SED	Lead Discipline Engineer
Drew J. Hope	Mechanical Systems Branch, SED	Lead Discipline Engineer
Curtis R. Regan	Electronic Systems Branch, SED	Lead Discipline Engineer
Michael J. Gazarik	Remote Sensing Flight Systems Branch, SED	Lead Discipline Engineer
Walter C. Engelund	Atmospheric Flight and Entry Systems Branch, SED	Lead Discipline Engineer
David M. McGown	Structural & Thermal Systems Branch, SED	Lead Discipline Engineer
Kathryn Stacy	Flight Software Systems Branch, SED	Lead Discipline Engineer
William B. Cook	Laser Remote Systems Branch, SED	Lead Discipline Engineer
William C. Edwards	Systems Engineering and Integration Office, SED	Lead Discipline Engineer
Richard A. Foss	Systems Integration & Test Branch, SED	Lead Discipline Engineer
Ronnie E. Gillian	Advanced Engineering Environments Branch, SED	Lead Discipline Engineer
Bruce M. Adderholdt	Metals Application Technology Branch, SED	Lead Discipline Engineer
James E. Bell	Fabrication Technology Development Branch, SED	Lead Discipline Engineer
Carl J. Voglewede	Fabrication Business & Contracts Management Office, SED	Lead Discipline Engineer
Charles E. Harris	Research & Technology Directorate (RTD)	Engineering Director
Larry D. Leavitt	Configuration Aerodynamics Branch, RTD	Lead Discipline Engineer
Mujeeb R. Malik	Computational Aero sciences Branch, RTD	Lead Discipline Engineer

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Name	Organization	Position
Anthony E. Washburn	Flow Physics and Controls Branch, RTD	Lead Discipline Engineer
Kenneth D. Wright	Advanced Sensing and Optical Measurements Branch, RTD	Lead Discipline Engineer
N. Roland Merski	Aerothermodynamics Branch, RTD	Lead Discipline Engineer
Kenneth E. Rock	Hypersonic Airbreathing Propulsion Branch, RTD	Lead Discipline Engineer
Joycelyn S. Harrison	Advanced Materials and Processing Branch, RTD	Lead Discipline Engineer
Stanley R. Cole	Aeroelasticity Branch, RTD	Lead Discipline Engineer
Jonathan B. Ransom	Durability, Damage Tolerance, and Reliability Branch, RTD	Lead Discipline Engineer
Lynn D. Curtis	Gas, Fluid and Acoustics Research Support Branch, RTD	Lead Discipline Engineer
H. Kevin Rivers	Structural Mechanics and Concepts Branch, RTD	Lead Discipline Engineer
William P. Winfree	Nondestructive Evaluation Sciences Branch, RTD	Lead Discipline Engineer
Charlotte E. Whitfield	Aeroacoustics Branch, RTD	Lead Discipline Engineer
Carey S. Butrill	Dynamic Systems and Control Branch, RTD	Lead Discipline Engineer
Daniel G. Murri	Flight Dynamics Branch, RTD	Lead Discipline Engineer
Lisa O. Rippy	Crew Systems Branch and Aviation Operations, RTD	Lead Discipline Engineer
Harry F. Benz	Electromagnetics and Sensors Branch, RTD	Lead Discipline Engineer
Raymond S. Calloway	Safety-Critical Avionics Systems Branch, RTD	Lead Discipline Engineer
Kevin P. Shepherd	Structural Acoustics Branch, RTD	Lead Discipline Engineer
Jill M. Marlowe	Structural Dynamics Branch, RTD	Lead Discipline Engineer
Charles A. Poupard	Applied Technologies and Testing Branch, RTD	Lead Discipline Engineer
Ajay Kumar	Systems Analysis and Concepts Directorate (SACD)	Engineering Director
John J. Korte	Vehicle Analysis Branch, SACD	Lead Discipline Engineer
Laura M. Brewer	Space Mission Analysis Branch, SACD	Lead Discipline Engineer
William M. Kimmel	Aeronautics Systems Analysis Branch, SACD	Lead Discipline Engineer
Thomas M. Moul	Advanced Aerospace Systems Branch, SACD	Lead Discipline Engineer
Howard J. Lewis	Research Services Directorate (RSD)	Engineering Director
Richard J. Yasky	Operations and Engineering Branch, RSD	Lead Discipline Engineer
Elbert W. Lee	Research Systems Integration Branch, RSD	Lead Discipline Engineer
Lelia B. Vann	Science Directorate (SD)	Engineering Director
Gary Gibson	Climate Science Branch, SD	Lead Discipline Engineer
Bruce Doddridge	Chemistry & Dynamics Branch, SD	Lead Discipline Engineer
George B. Finelli	Center Operations Directorate (COD)	Engineering Director
E. Ann Bare	Supersonic/Hypersonic Testing Branch, COD	Lead Discipline Engineer
David A. Dress	Aerospace Testing Branch, COD	Lead Discipline Engineer
Michael A. Chapman	Data Acq & Test Tech Branch, COD	Lead Discipline Engineer
Gregory F. Sullivan	Environmental and Engineering Branch, COD	Lead Discipline Engineer
Chris A. Mouring	Project and Systems Engineering Branch, COD	Lead Discipline Engineer

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Project Chief Engineer	Project
James Corliss	CEV Landing System
Craig Jones	CEV Thermal Protection System (TPS) Advanced Development Project (ADP) Heatshield Structure
John Stadler	CEV Launch Abort System
Robert Dillman	CEV Abort Flight Test (AFT) Flight Test Article (FTA)
Paul Moses	Ares I-1 (formally CLV Advanced Development Flight Test-0)
Bob Hall	CLV Aerodynamic System
Steve Hughes	Inflatable Reentry Vehicle Experiment (IRVE)
Mike Alexander	Hypersonic Boundary Layer Transition (Hy-BoLT)
Vernon Watkins	Integrated Resilient Aircraft Control Project: Airborne Subscale Transport Aircraft Research (AirStar)
TBD	Morphing Aircraft Structures Project (DARPA)
TBD	Shuttle Return To Flight
Mike Cisewski	Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO)
Mike Little	Clouds and the Earth's Radiant Energy System (CERES)
Joe Zawodny	Solar Occultation Satellite Science Team (SOSST)
To Be Named	Pending/Mid Year Start Project
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