Technical Authority

NPR 7120.5D

This is one of a series of training presentations covering important topics in NPR 7120.5D.

Rev. 9/5/07

Purpose

Provide an understanding of NPR 7120.5D requirements and principles related to the Technical Authority

Major Topics to be Covered

- Technical Authority Basics

  What is it?
  What is it's objective?
  Where does it fit in?
  Who has it?
  Organizational views of Technical Authority

- Role in program/project management
- Role in program/project and requirements management

Technical Authority Basics

Technical Authority Basics
What is it?

- **The technical authority process** provides a means for independent oversight of programs and projects through the selection of individuals at delegated levels of authority. These individuals are the **Technical Authorities**.

Three Technical Authorities: Engineering, Safety and Mission Assurance, and Health and Medical

Why have Technical Authority?

- NASA has historically held that safety (a Core Value) is more important than schedule.
- NASA has also had some notable examples where production pressure led to less focus on safety than was appropriate.

Two examples can be found in the Shuttle accidents.

Challenger – The decision to proceed with launch with concerns about cold O-ring failures in the SRB joints.

Columbia - The decision to decline to get on-orbit imagery to assess the severity of potential foam impact damage to the Orbiter's thermal protective system.

Why have Technical Authority? (Cont.)

Safety

and

Mission Success

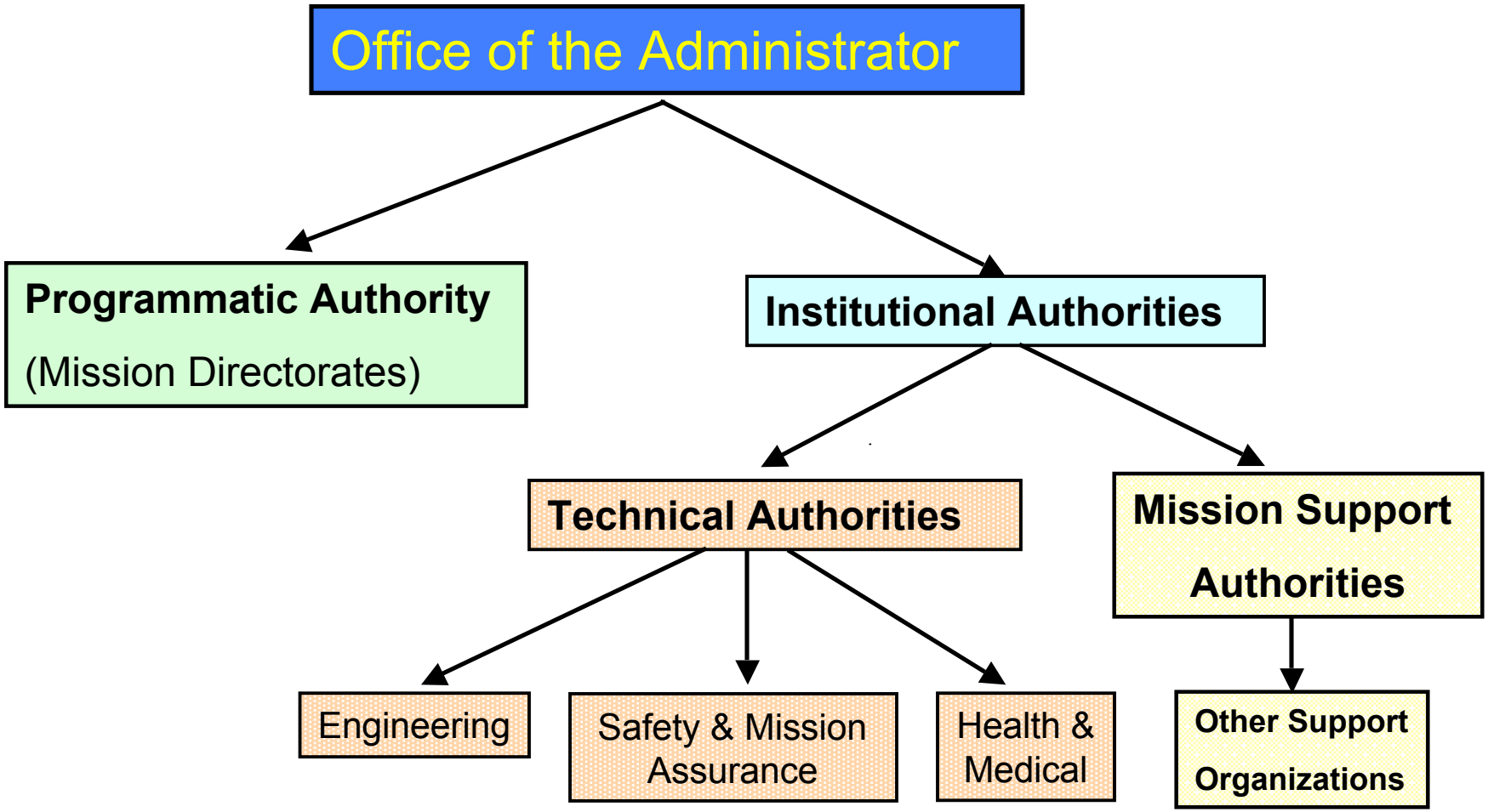
Technical Authority Basics
Foundation

NASA Governance Model (*NPD 1000.0*)

Establishes a management structure that employs checks and balances to provide a firm foundation for the balance of power between organizational elements.

This includes the organizational and financial separation of Programmatic and Institutional Authorities.

Governance Model
Separation of Authorities



Technical Authority Basics
Program/Project Manager Responsibilities

- The responsibilities of a Program or Project Manager have not been affected by the implementation of Technical Authority.

- The program or project manager is still ultimately responsible for the safe conduct and successful outcome of the program or project in accordance with governing requirements.

Technical Authority Basics
Who has Technical Authority ?

- Only individuals with formally delegated Technical Authority that is traceable to the Administrator have Technical Authority.

- These individuals are funded independently of a program or project.

  Engineers and S&MA personnel matrixed to *and funded* by the program or project can not have Technical Authority (Capital T and Capital A). They certainly have technical competence and the influence that comes from their expertise. They are critical for ensuring the safe conduct and successful outcome of the program or project.

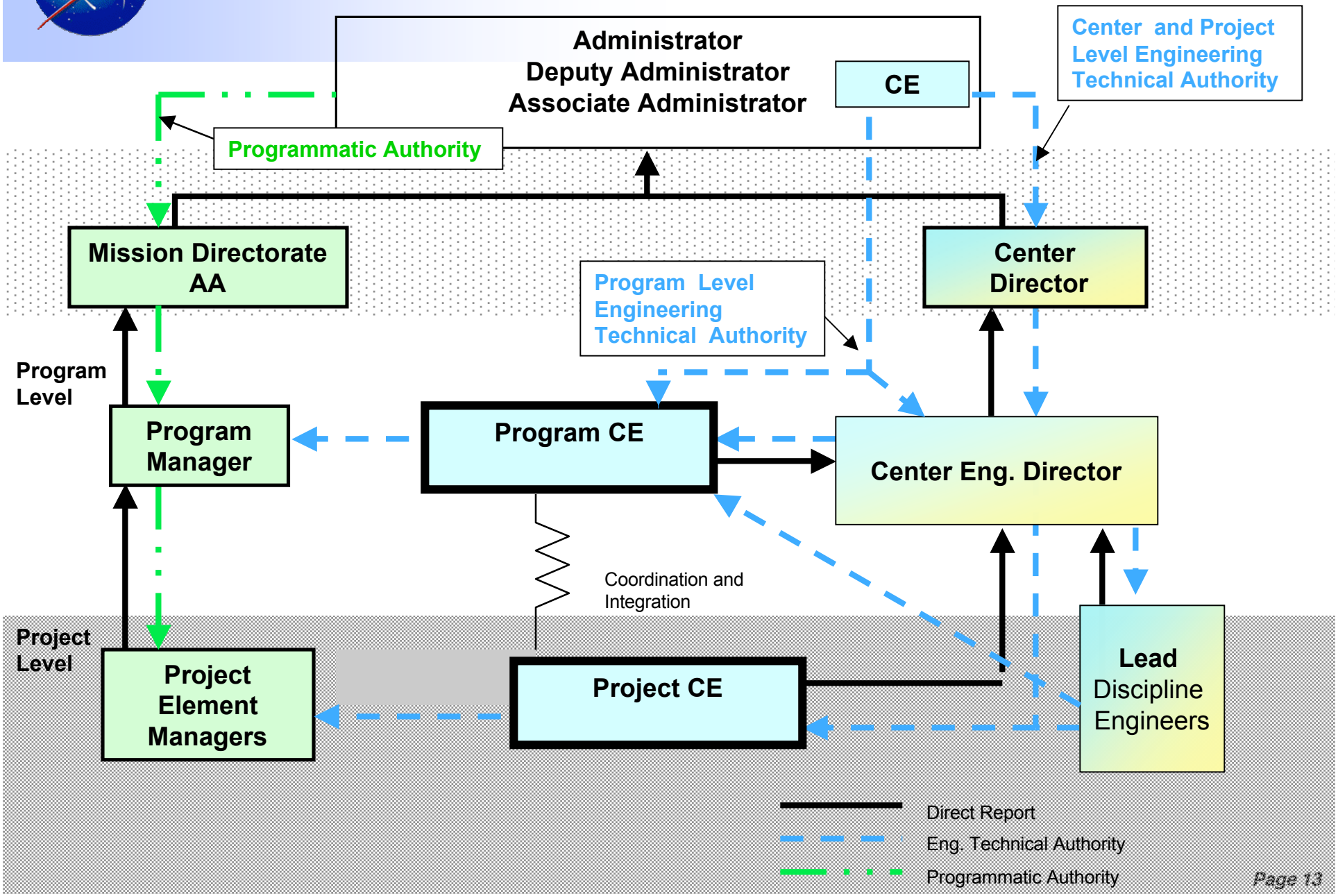
Organizational views of Technical Authority

Engineering

SMA

Health and Medical

Engineering Technical Authority



Engineering Technical Authority (Cont.)

- NPR 7120.5D Paragraph 3.4.2.2.a states:

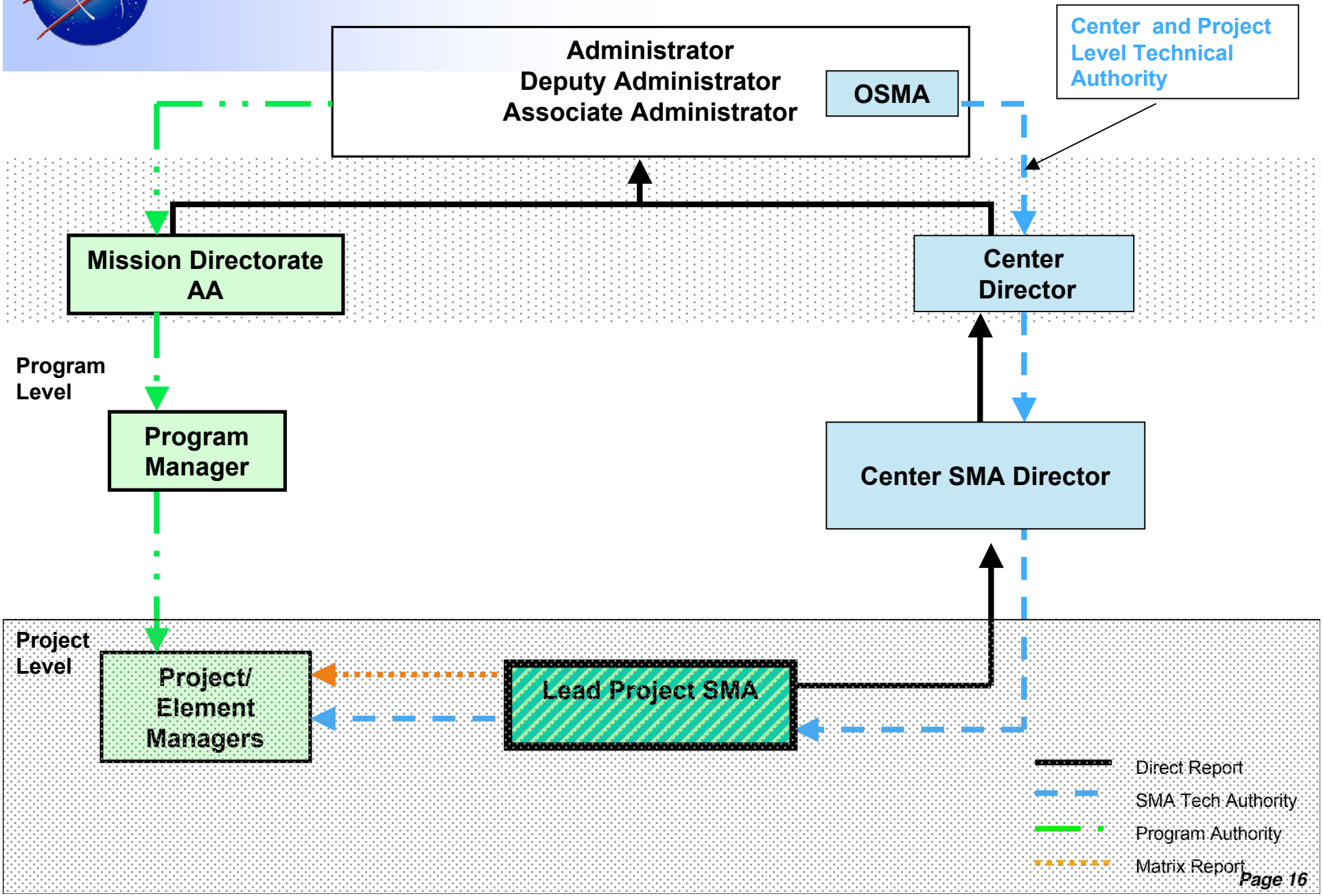
  "On some programs and projects the program- and project-level Engineering Technical Authority may also serve as the program or project Systems Engineering Manager or Systems Engineering and Integration Manager; in these instances, the Program or Project Manager concurs on the appointment of the Engineering Technical Authorities."

- With the inclusion of specific provisions in the Center Technical Authority Implementation Plan an Engineering Technical Authority with delegated authority at the program or project level can also serve as the Systems Engineering Manager or Systems Engineering and Integration Manager and still provide an effective check and balance. This concept is also compatible with the principle that "an individual cannot grade his or her own work".

Engineering Technical Authority (Cont.)

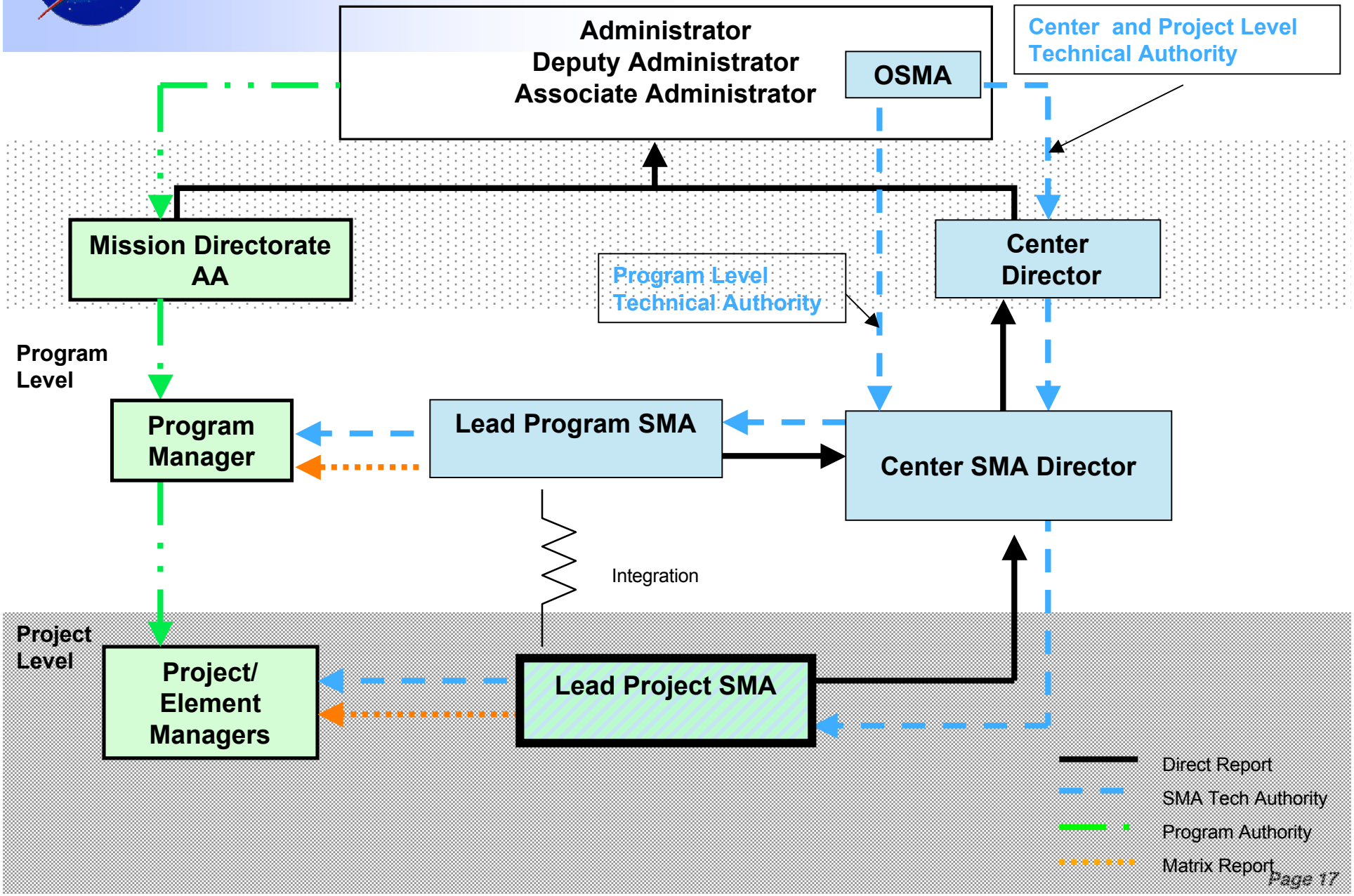
- Until the appropriate changes to NPR 7120.5D are made, the following provisions must be included in the formal Technical Authority delegation and Center implementation plans.
  - A prohibition against the Engineering Technical Authority being or acting as the decision authority on any board (or equivalent) that establishes, waives, or changes requirements derived at the level of delegated Technical Authority unless another Engineering Technical Authority such as the Lead Discipline Engineer who does not have dual Technical Authority/Programmatic responsibility concurs in the change or waiver.
  - A prohibition against the delegation of change or waiver authority for Agency or Center level requirements to an Engineering Technical Authority who will also serve as the program or project Systems Engineering Manager or Systems Engineering and Integration Manager.

SMA Projects

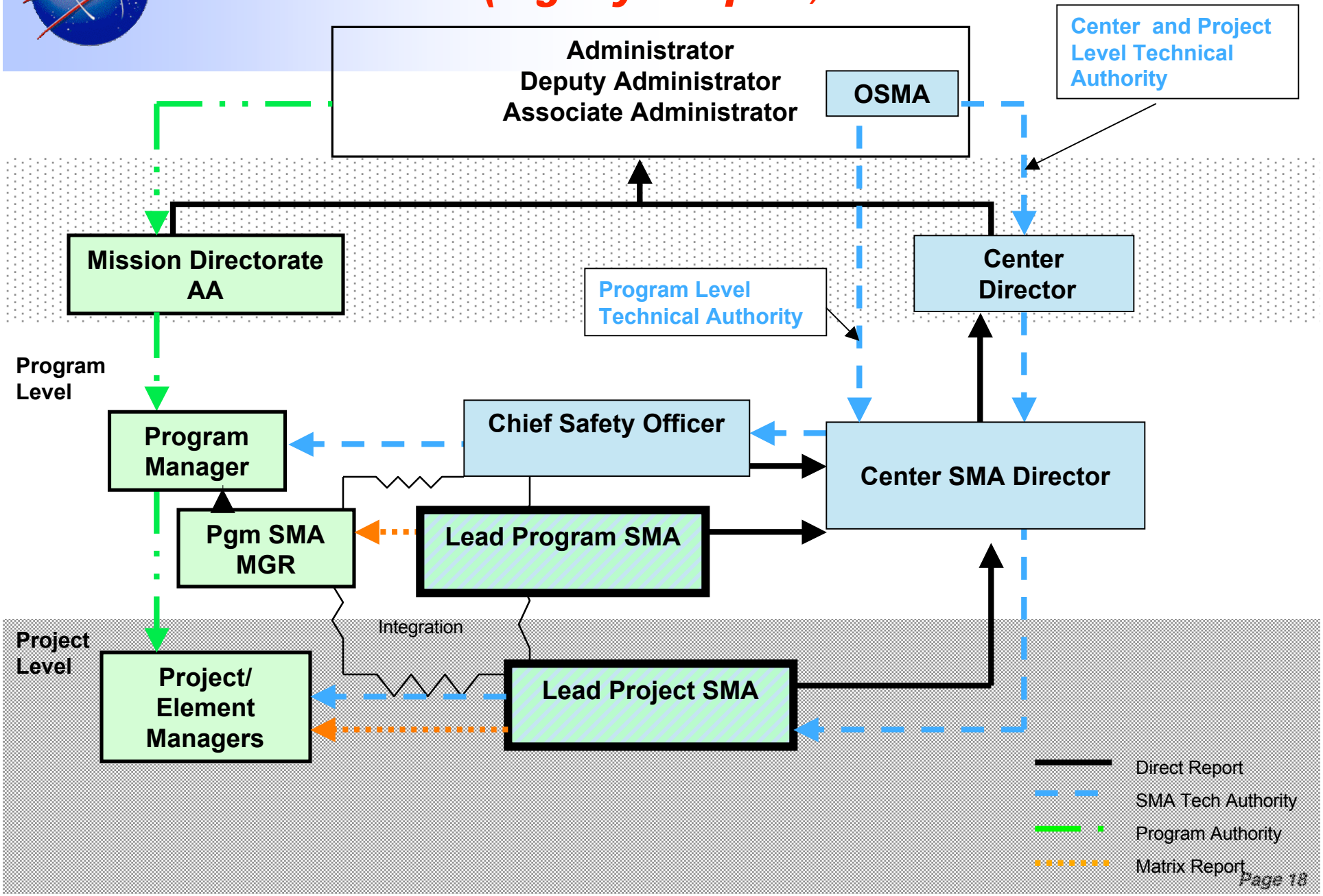


OSMA Programs (Non-tightly Coupled)

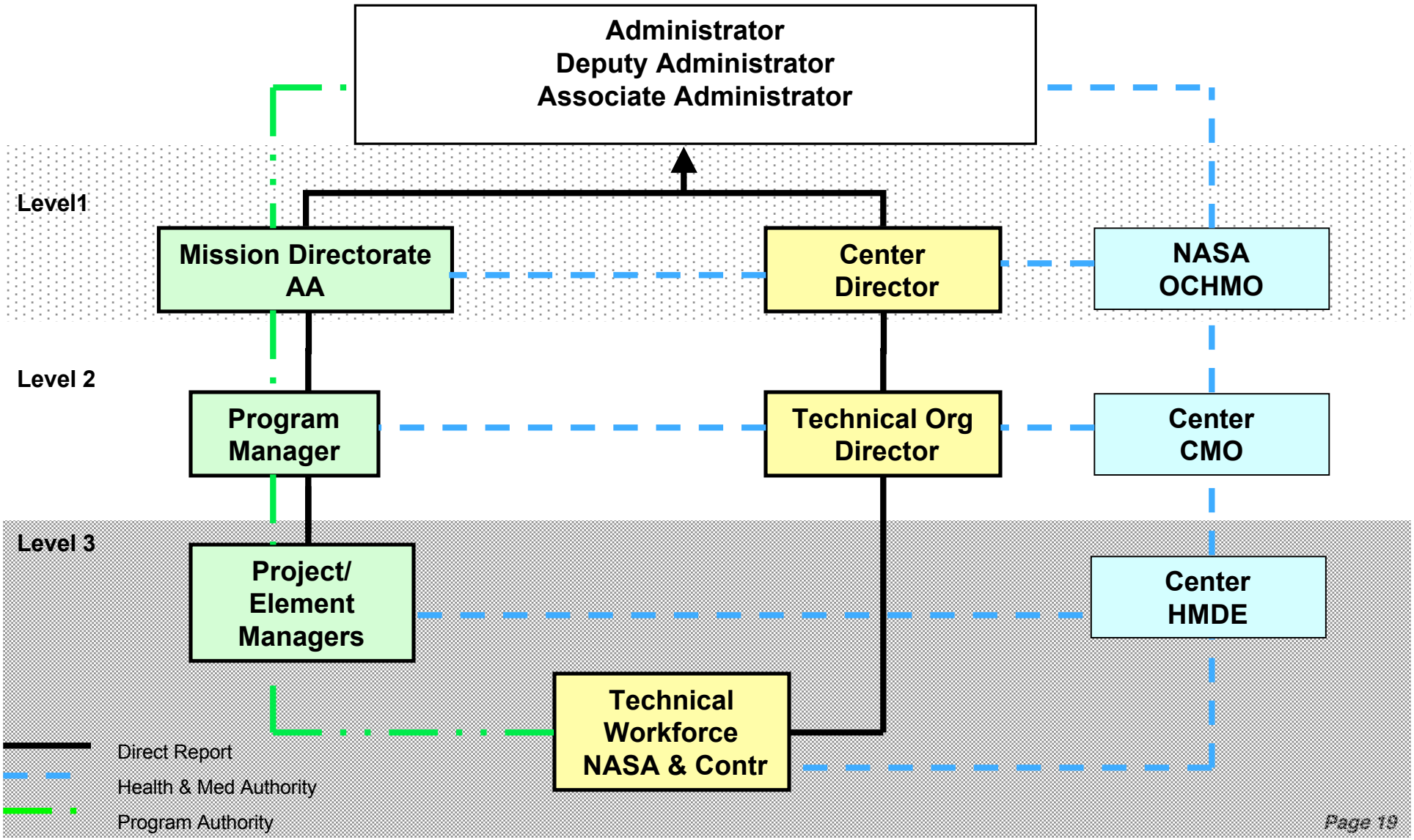
(Most Robotics Programs)



SMA Major Multi-Center Programs
(Tightly Coupled)



Health and Medical Authority
for Programs and Projects



Roles in Program/Project Management

Program / Project Level Technical Authority
Fundamental Responsibilities

- Is the single point of contact for Technical Authority matters at the level of delegated authority
- Serves on the change, control, and internal review boards at the level of delegated authority
- Provides the program or project with a view of matters based on his or her knowledge and experience
- Works with the Center Management and other Technical Authority personnel, as necessary, to ensure direction provided reflects the view of the Center or, where appropriate, the view of the NASA Technical Authority community

Program / Project Level Technical Authority
Fundamental Responsibilities (Cont.)

- Is responsible for assuring that changes to and waivers of Technical Authority requirements are submitted to and acted upon by the appropriate level of Technical Authority

- Must serve as an effective part of the overall check and balance system. (This includes conforming to the principle that serves as the foundation of NASA's check and balance system that states "an individual cannot grade his or her own work".)

All Board Members –Responsibility

- Share knowledge and experience
- Clearly express views in a timely manner
- In assessing a board decision a member has three choices:
  - Agree
  - Disagree but be willing to fully support the decision, or
  - Disagree and raise a Dissenting Opinion.

The choice of a Dissenting Opinion requires a conscious and personal decision that:

(1) The decision or course of action should be changed for the good of NASA,

(2) The issue is of such sufficient importance that it warrants review by higher level management, and

(3) A specific request be made that a Dissenting Opinion be recorded and the issue resolved by the Dissenting Opinion process

Technical Authority - Role on Boards

- **Share knowledge and experience with the program/project**

  This role is different and distinct from exercising Technical Authority. The program/project can and should treat this input accordingly.

- **Exercising Technical Authority when necessary**

  Being the single point of contact for the program/project for Technical Authority matters at the level of designated authority

  Raising a Dissenting Opinion on a decision or action by the Board when appropriate

Proceeding at Risk

Can a program or project action proceed in the face of a Technical Authority dissenting opinion?

- **Yes**
- **Resolution should occur prior to implementation whenever possible.**
- **The Program/Project Manager may proceed at risk in parallel with pursuit of resolution if they deem it is in the best interest of the program/project.**
- **In such circumstances, the next higher level of Programmatic and Technical Authority would be informed of the decision to proceed at risk.**

  Rationale - These higher level authorities will be involved in the adjudication of the dissent and should have the opportunity to know before the fact that the action or decision is being implemented on a risk basis.

Single Point of Contact
What does it mean?

Being the single point of contact means being the focal point for formal actions between the Programmatic Authority and the Technical Authority at the level of delegated authority.

Single Point of Contact Example

A project would submit a request for a waiver to a requirement under the cognizance of Center or Agency level engineering through the Project Chief Engineer (the Engineering Technical Authority at the project level).

The Project Chief Engineer is responsible to ensure that the request was reviewed by the appropriate level of Engineering Technical Authority (at the Center or at the appropriate Headquarters office or designee.

After an Engineering Technical Authority community position is established, the Project Chief Engineer would sign-off on the disposition and provide it to the Project.

Technical Authority Community View

What does it mean?

- A program or project Technical Authority is responsible to ensure that the associated Programmatic Authority is provided with a well founded and properly coordinated community response when Technical Authority direction is given.

- When multiple Technical Authorities are involved, the lead Technical Authority coordinates the development of a Technical Authority community view.

- A community view is arrived at by the applicable Center's Technical Authority organization as a minimum.

- When appropriate, consultation should be sought to obtain an NASA Technical Authority view. In some instances establishing a community view may require consultation with other Centers, NESC, NSC, NASA Headquarters, outside experts etc.

Technical Authority Community View
What is the underlying rationale?

- Technical Authority direction related to Technical Authority established requirements is binding on the Programmatic Authority.

- The Programmatic Authority has three choices:
  - Accept the Technical Authority disposition,
  - Request a review by a higher level of Technical Authority and Programmatic Authority through the Dissenting Opinion process of NPR 7120.5D, or
  - Cancel the request for requirement relief.

- For such binding direction the Technical Authorities are obligated to resolve any internal differences before providing direction to the Programmatic Authority.

What is the role of the Lead Technical Authority ?

Prior to providing the Technical Authority disposition to the Programmatic Authority the lead Technical Authority must:

- Ensure that the issue is acted on by the appropriate level of their Technical Authority
- Coordinate with the other involved Technical Authorities to ensure that they have their respective community positions
- Confirm that any differences within a Technical Authority or among Technical Authorities are resolved (by the Dissenting Opinion process if necessary)
- Confirm that the required mandatory concurrences have been obtained and all required Technical Authority notifications have been made

How is the "Lead" Technical Authority identified?

Agency-level requirements

A database (under development) will define the lead Authority for Agency-level Technical Authority requirements and the role of the other Technical Authorities in the dispositioning process.

If the requirement lead is not available from the database, the Technical Authority responsible for the document in which the requirement appears is the default Lead Authority.

Center-level requirements

Handled per Center processes

How is the "appropriate level" of Technical Authority for waiver disposition determined?

"Appropriate" is determined by the higher of the following:

- The level at which a Chief Technical Authority has reserved dispositioning authority

- The level at which the parent requirement was established unless formally delegated elsewhere

For delegations of

Agency-level requirements - See database previously noted.

Center-level requirements - Handled per Center processes

Role in Requirements Management

Requirements - Basics

NPR 7120.5D distinguishes between:

Management Process Requirements

- Focus on how NASA does business
- Are independent of any particular program or project
- Are the responsibility of originating office unless delegated elsewhere

Programmatic Requirements

- Focus on the products to be developed and delivered
- Are related to the goals and objectives of a particular NASA program/project
- Include Derived Requirements which are the responsibility of the Programmatic Authority

Requirements - Basics
Derived Requirements

- Arise from constraints, consideration of issues implied but not explicitly stated in the high-level direction provided by NASA Headquarters and Center institutional requirements, factors introduced by the selected architecture, and the design

- Are definitized through requirements analysis as part of the overall systems engineering process and become part of the program/project requirements baseline

- Are established by and are the responsibility of the Programmatic Authority

Requirements - Basics
Derived Requirement Example

A project determines that it needs to specify a pressure vessel.

In the design implementation the project decides to use a composite overwrap pressure vessel that meets Agency-level requirement for a safety factor of N.

Because of a perceived technology risk, the project decides to impose a safety factor of N+m.

Both the requirement to use a composite overwrap vessel and the extra increment on the safety factor are derived requirements. Both are the responsibility of the Programmatic Authority at the level that established them.

Requirements - Basics
Derived Requirement – Example (Cont.)

The project Board could change the design from a COPV to a metallic pressure vessel with notification to the next higher level.

Similarly, if the project decides to eliminate the extra added safety factor (+m) the requirement can be changed at the project level.

However, if the project proposes that the tank need only meet a safety factor of N-x (less than the Agency requirement), the change would require the appropriate Technical Authority approval.

Principle - The organizations and the organizational levels that agreed to the establishment of a requirement must agree to the change or waiver of that requirement, unless this has been formally delegated elsewhere.

In this case the safety factor of N was established by a Technical Authority.

Technical Authority Requirements

- Are invoked by OCE, OSMA, OCHMO documents (e.g. NPRs, Standards specified as NASA core or mandatory standards)
- Are contained in Center Institutional documents
- Are the responsibility of the Office or organization that established the requirement unless delegated elsewhere.
- **Note** - This means that the program or project level Technical Authority does not establish any Technical Authority requirements.

Program/Project Level Technical Authority
Role in Requirements Management

Programmatic Authority Established Requirements
(Includes derived requirements)

The Technical Authorities participate on the boards that establish, waive, and change Programmatic Authority requirements at the program or project level. They provide their views for consideration and exercise the Dissenting Opinion process when appropriate.

Technical Authority Established Requirements

The Technical Authorities serve as the single point of contact for submission and disposition of exceptions, changes, and waivers for requirements under the cognizance of their Authority.

They are responsible for assuring that changes to and waivers of requirements are submitted to and acted upon by the appropriate level of Technical Authority and provide a Technical Authority community disposition to the program or project.

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Does the Technical Authority process affect SMA's "suspend work" powers?

- **NPD 1000.3C states "that in an extreme case that presents an unacceptable risk to personnel, property, or mission success, the Chief, Safety and Mission Assurance [or his delegated representative] is authorized to suspend any operation or project activity and provide guidance for corrective action."**

- **Nothing in the Technical Authority process is intended or should be construed to abridge or diminish this delegation.**

Conclusion

The Technical Authority was established as an important part of the check and balance system put in place by the NASA Governance model to support safety and mission success.