NextGEN

Vision of Enhanced Traceability in NextGen

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Kimberly Gill
NAS Enterprise Architecture & Requirements Services Division Manager (ANG-B1)

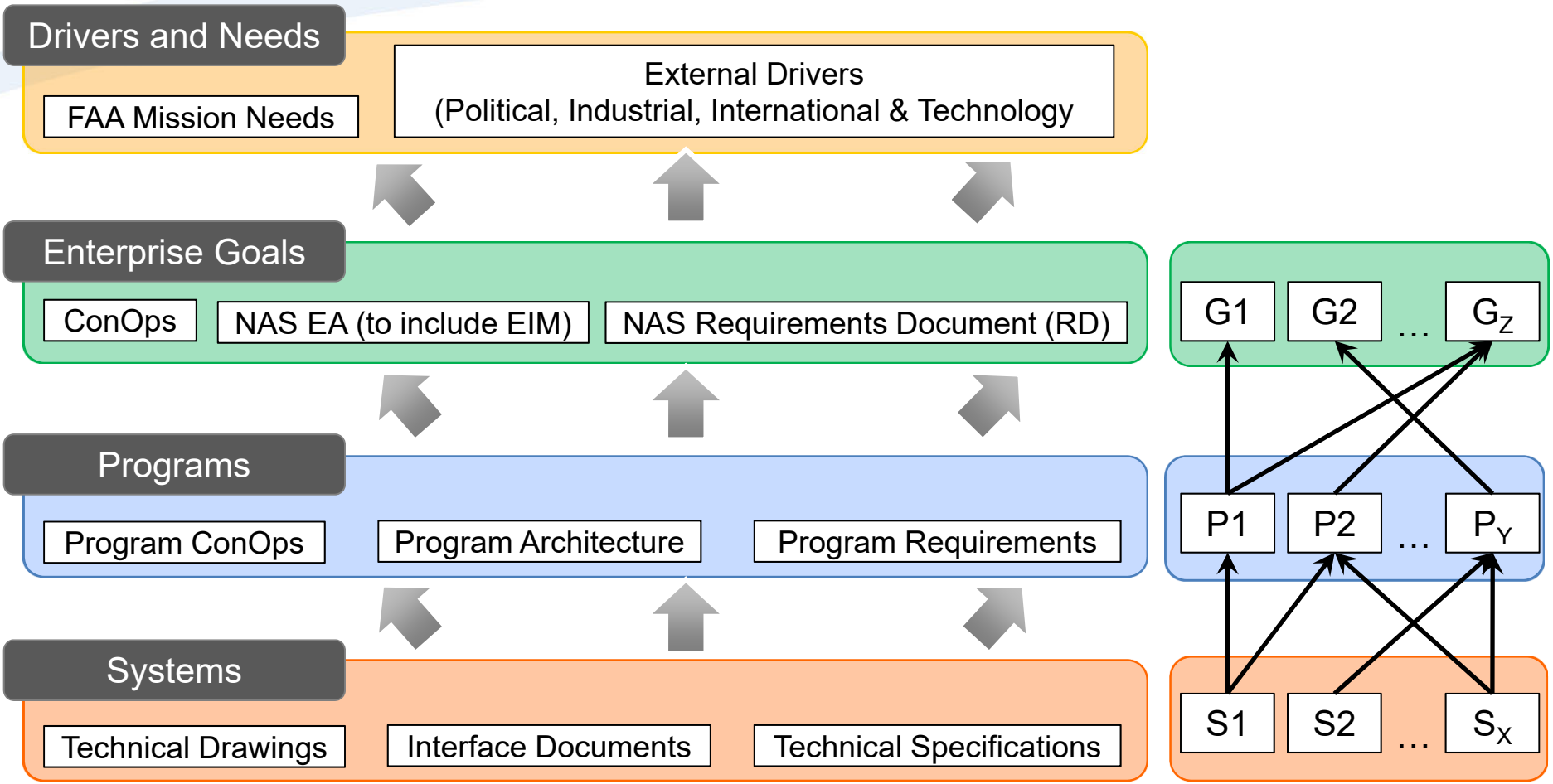
FAA

What Does Traceability Do?

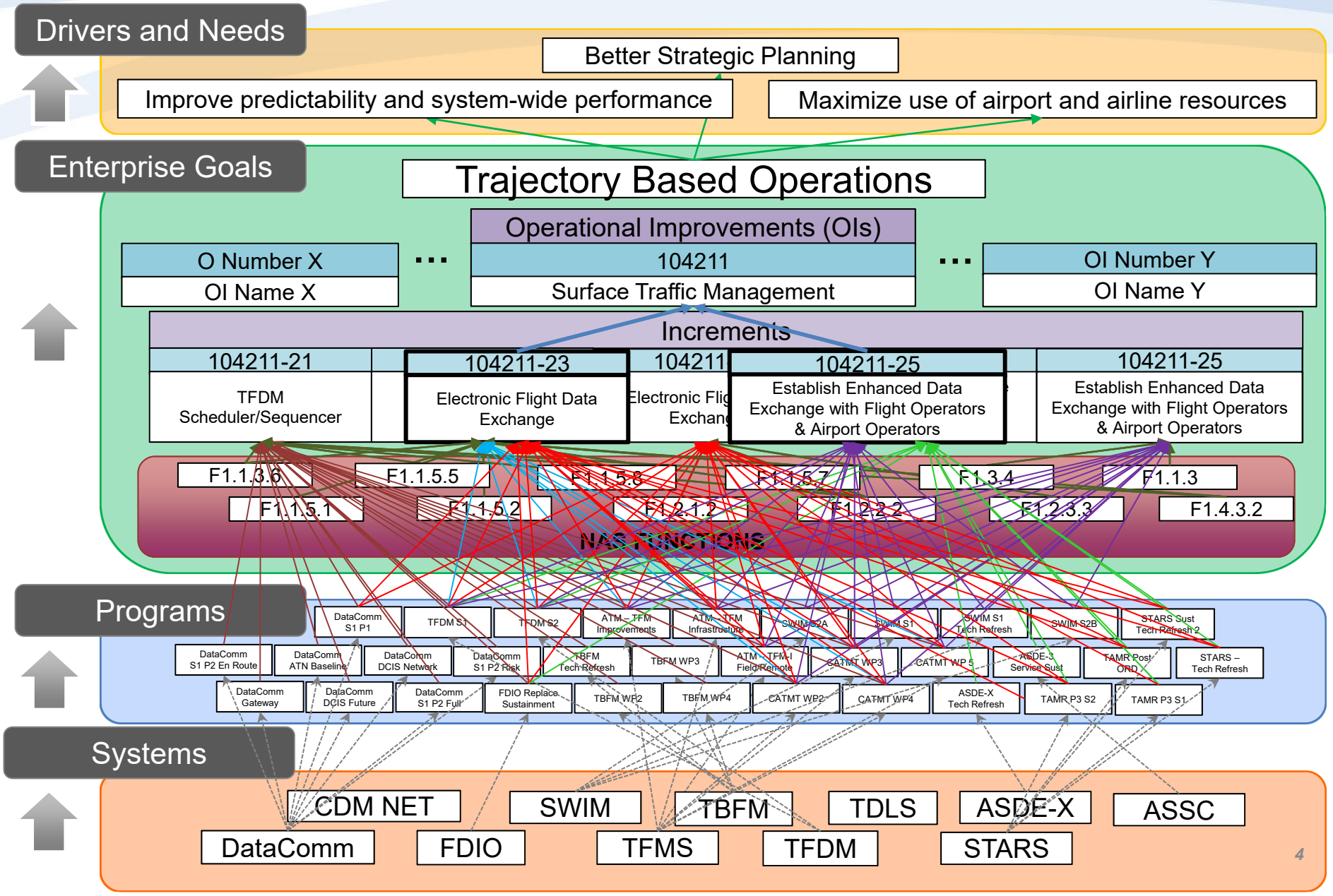
- Traceability provides the source/record for why we made various technical decisions in support of our enterprise goals, e.g., standards, analyses, policy, best practices.
- Traceability is book keeping for these decisions to enable corporate memory external to the heads of a few brilliant engineers.
- It helps to avoid scope creep and remain aligned to the vision. Traceability keeps programs between the navigation beacons.
- Traceability provides a mechanism to ensure we remember all the decisions we made about how a system would support the enterprise so we do not undo any of what was intended in later phases of its lifecycle.

Traceability enables impact analysis!

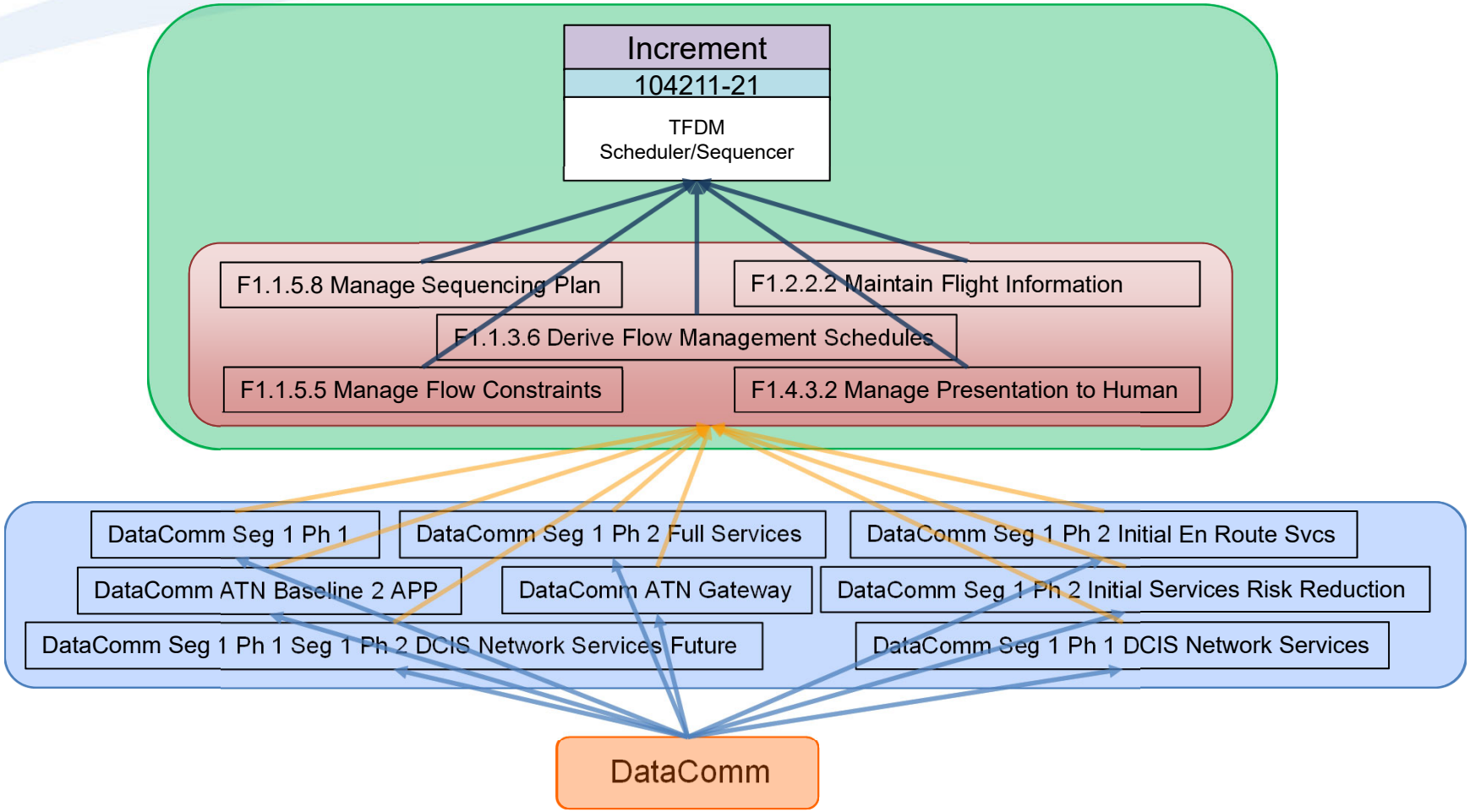
Key Aspects of Traceability



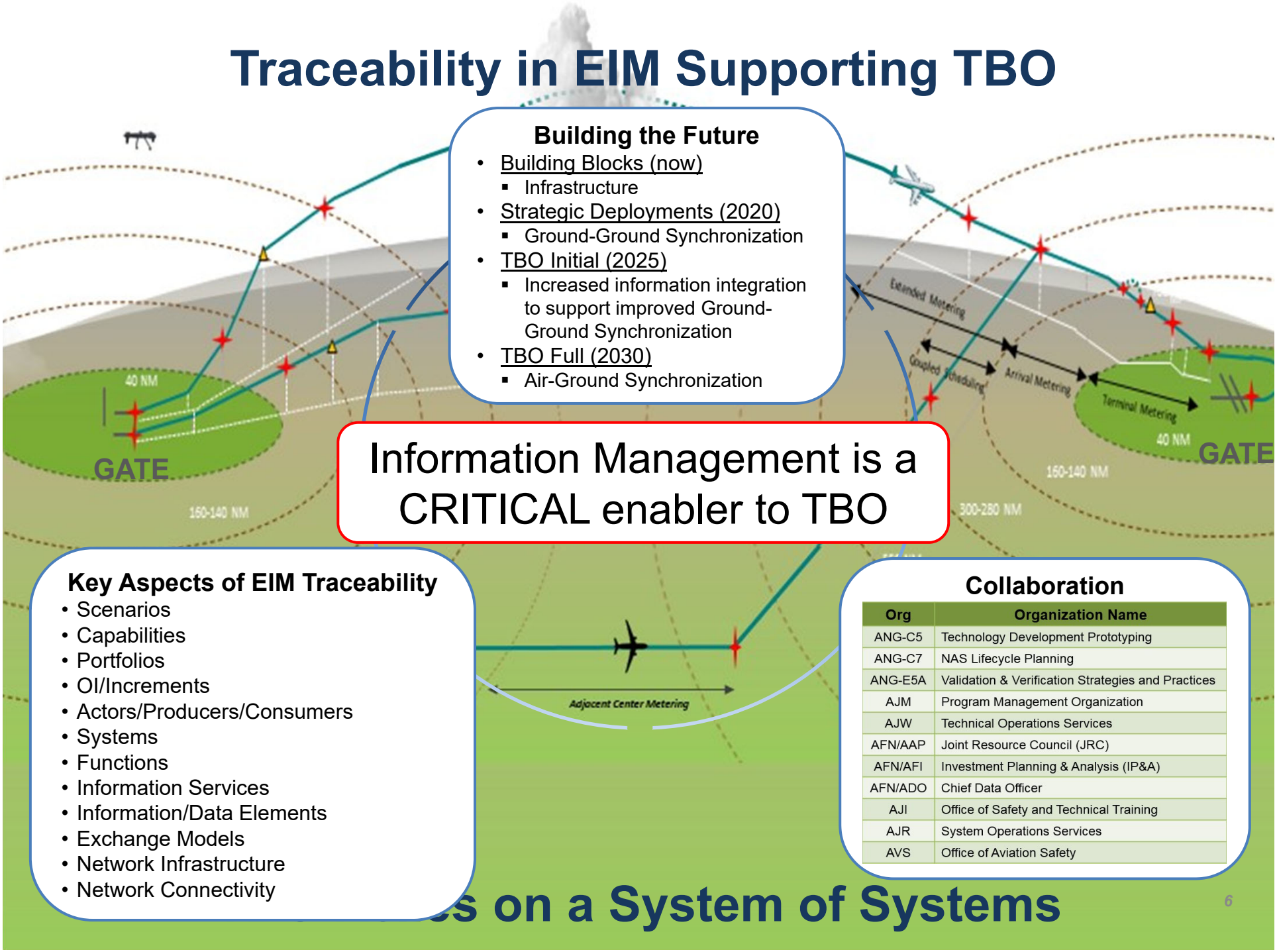
Applying Key Aspects of Traceability to TBO



Traceability – Program Breakdown



Traceability in EIM Supporting TBO



Building the Future

- Building Blocks (now)
  - Infrastructure
- Strategic Deployments (2020)
  - Ground-Ground Synchronization
- TBO Initial (2025)
  - Increased information integration to support improved Ground-Ground Synchronization
- TBO Full (2030)
  - Air-Ground Synchronization

Information Management is a CRITICAL enabler to TBO

Key Aspects of EIM Traceability

- Scenarios
- Capabilities
- Portfolios
- OI/Increments
- Actors/Producers/Consumers
- Systems
- Functions
- Information Services
- Information/Data Elements
- Exchange Models
- Network Infrastructure
- Network Connectivity

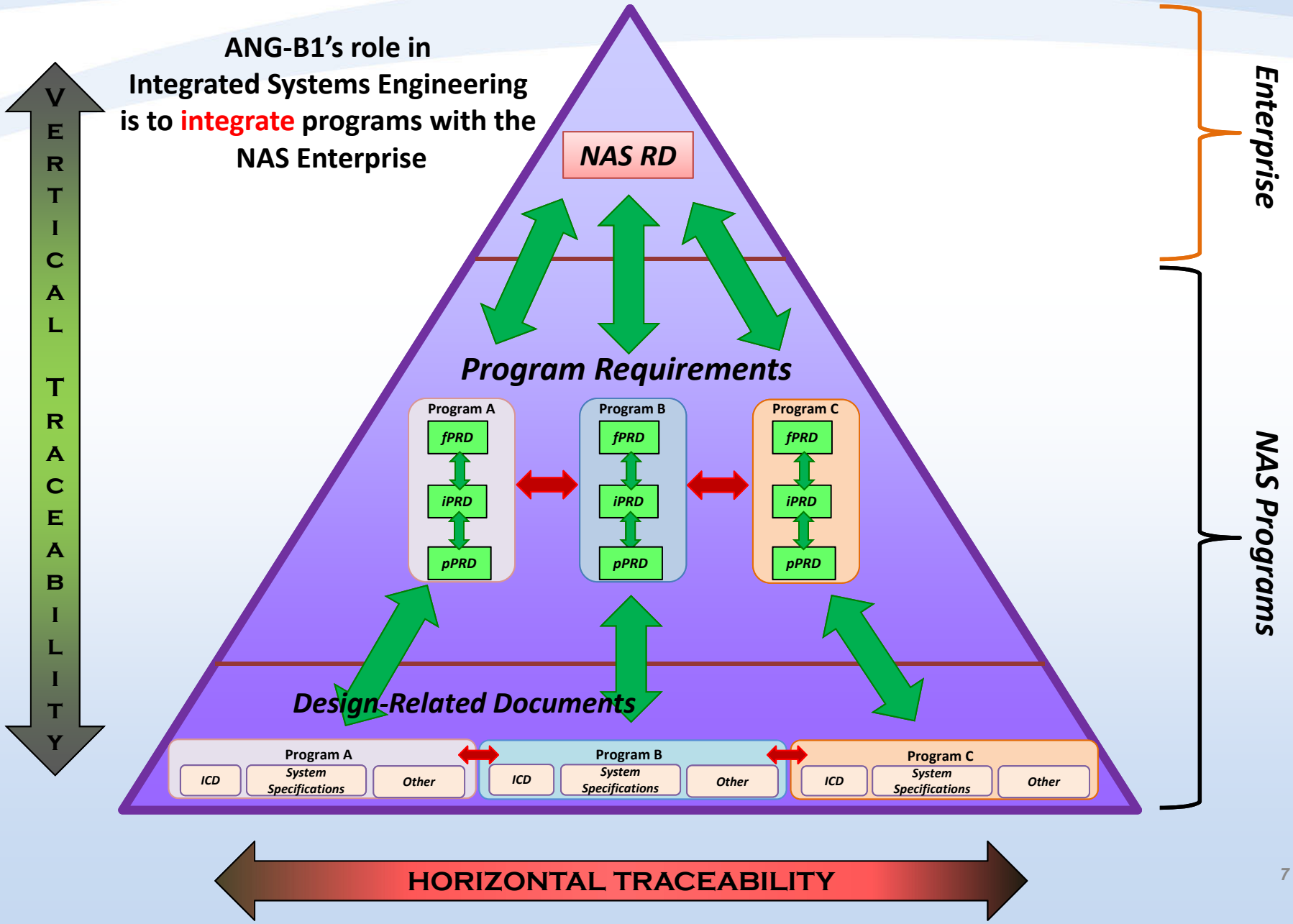
Collaboration

Org	Organization Name
ANG-C5	Technology Development Prototyping
ANG-C7	NAS Lifecycle Planning
ANG-E5A	Validation & Verification Strategies and Practices
AJM	Program Management Organization
AJW	Technical Operations Services
AFN/AAP	Joint Resource Council (JRC)
AFN/AFI	Investment Planning & Analysis (IP&A)
AFN/ADO	Chief Data Officer
AJI	Office of Safety and Technical Training
AJR	System Operations Services
AVS	Office of Aviation Safety

s on a System of Systems

Vertical & Horizontal Requirements Traceability

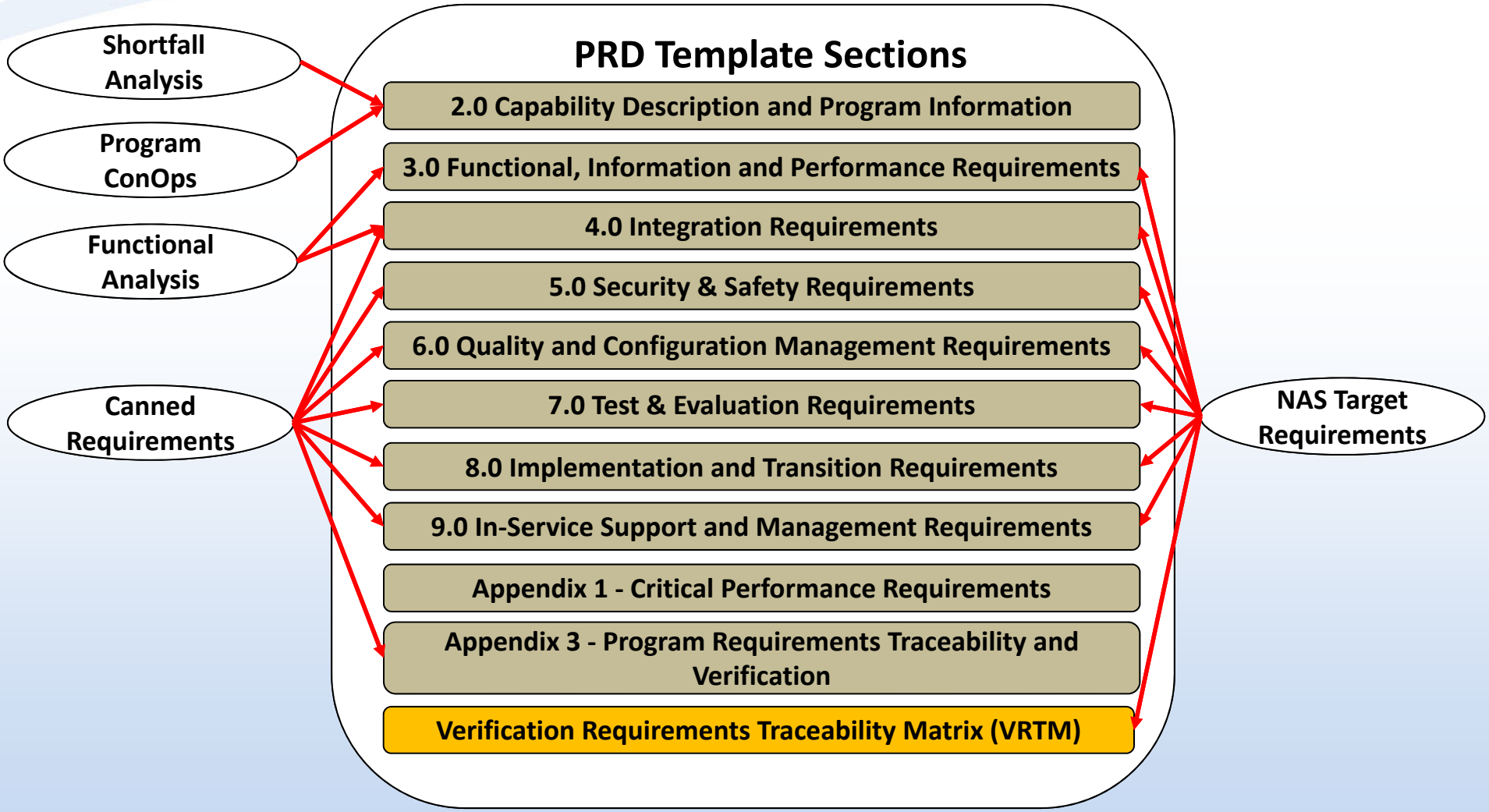
ANG-B1's role in Integrated Systems Engineering is to integrate programs with the NAS Enterprise



Intra-Agency Collaboration & Traceability Efforts

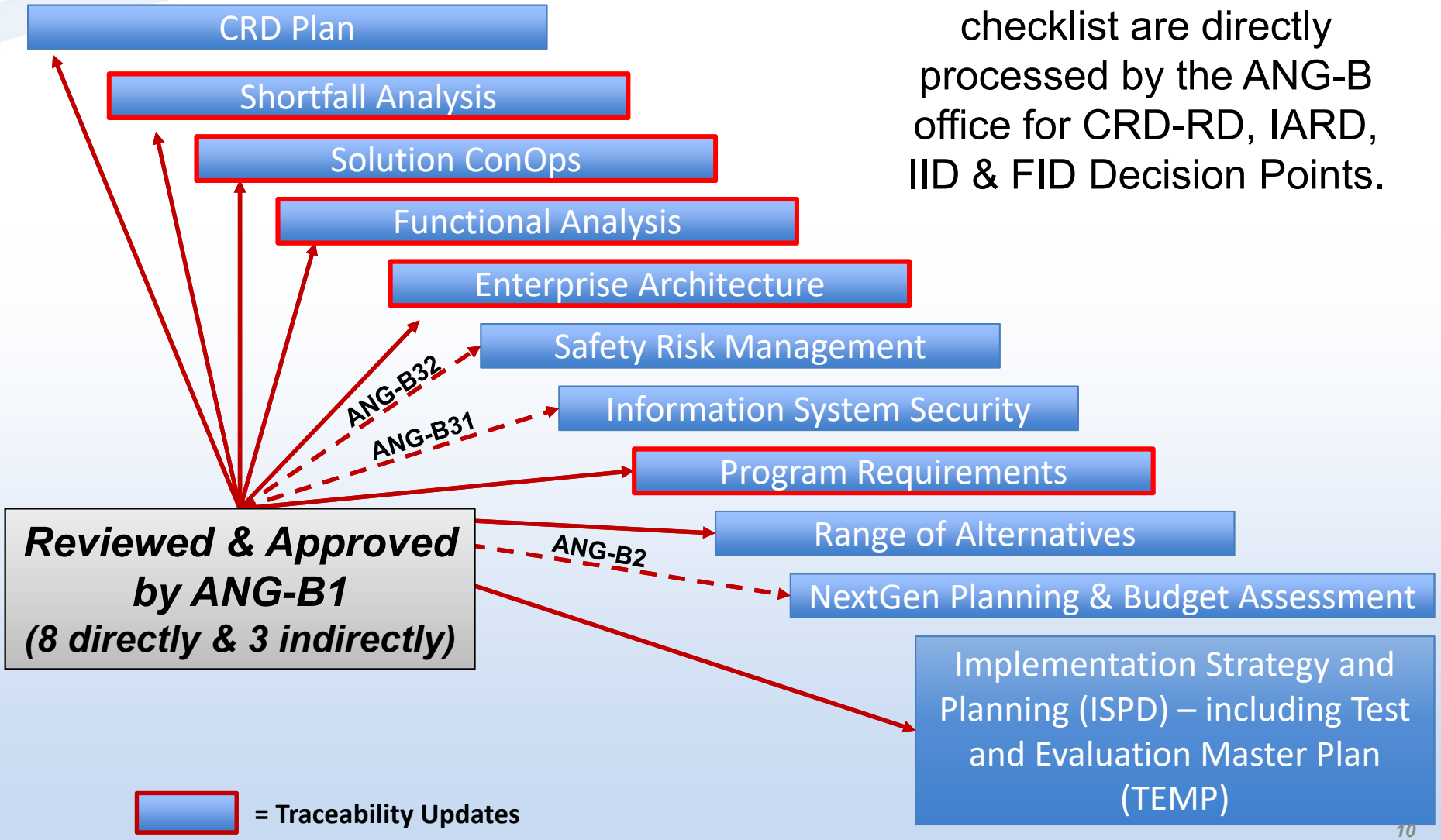
Org	Organization Name	Engagement
ANG-C	Advanced Concepts & Technology	• NAS Target Requirements Document (TRD) • NAS Segment Implementation Plan (NSIP) Increments • ConOps Template
ANG-E5A	Validation & Verification Strategies and Practices	• Integrated Systems Engineering (ISE) and V&V Strategies & Practices Collaboration Team • Requirements testability enforcement • Post-FID requirement status feedback loop
AJM	Program Management Organization	• PMO Requirements Management (RqM) Workshops • DOORS collaboration, post-FID requirements traceability
AJW	Technical Operations Services	• Influence Configuration Management (CM) policy for traceability
AFN/AAP	Joint Resource Council (JRC)	• JRC Readiness Workshop
AFN/AFI	Investment Planning & Analysis (IP&A)	• Shortfall Analysis Report (SAR) & traceability between AMS documentation & artifacts
AFN/ADO	Chief Data Officer	• EIM Steering Committee

Improving Traceability Through PRD Template Updates

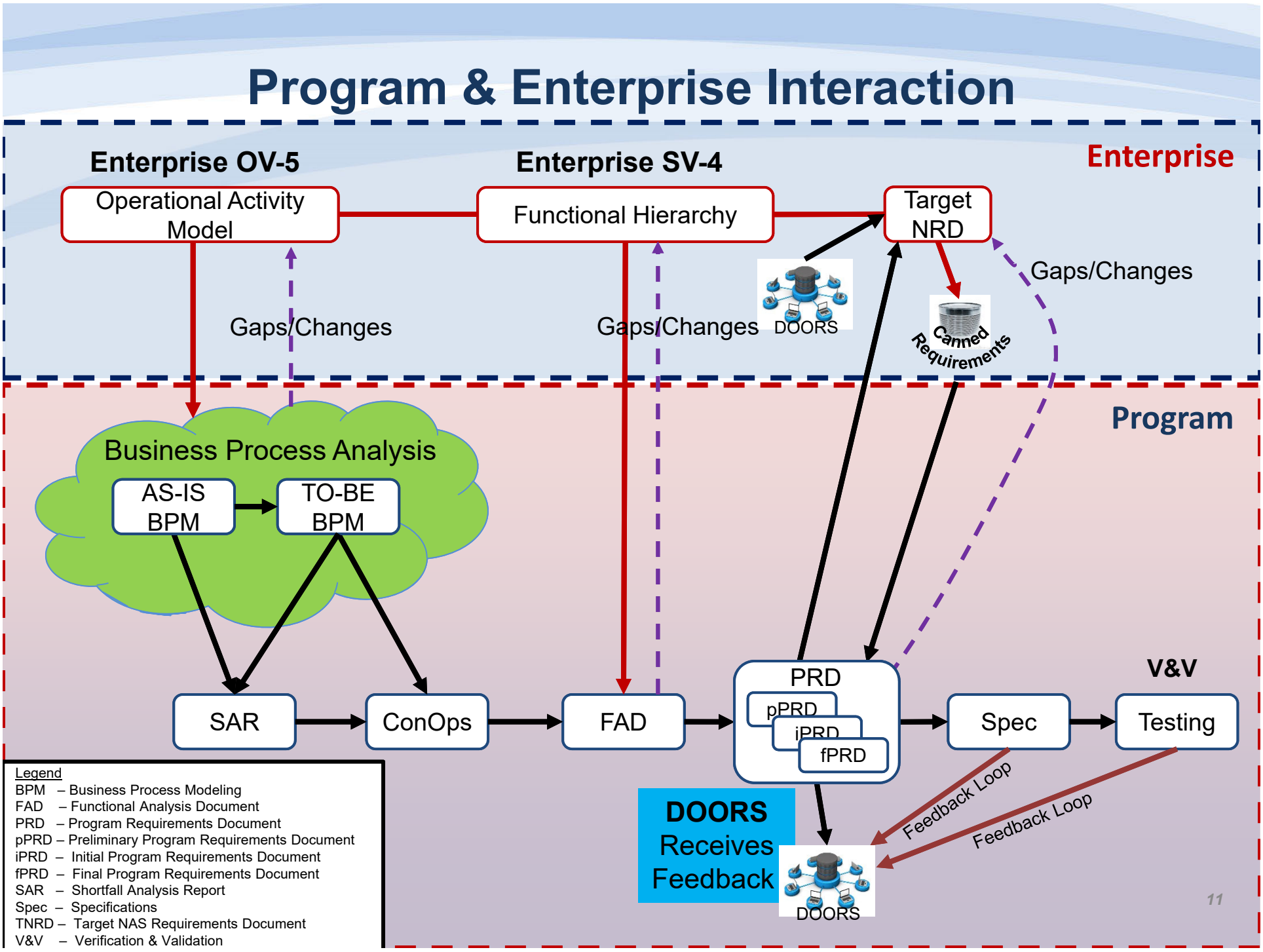


ANG-Related JRC Checklist Items

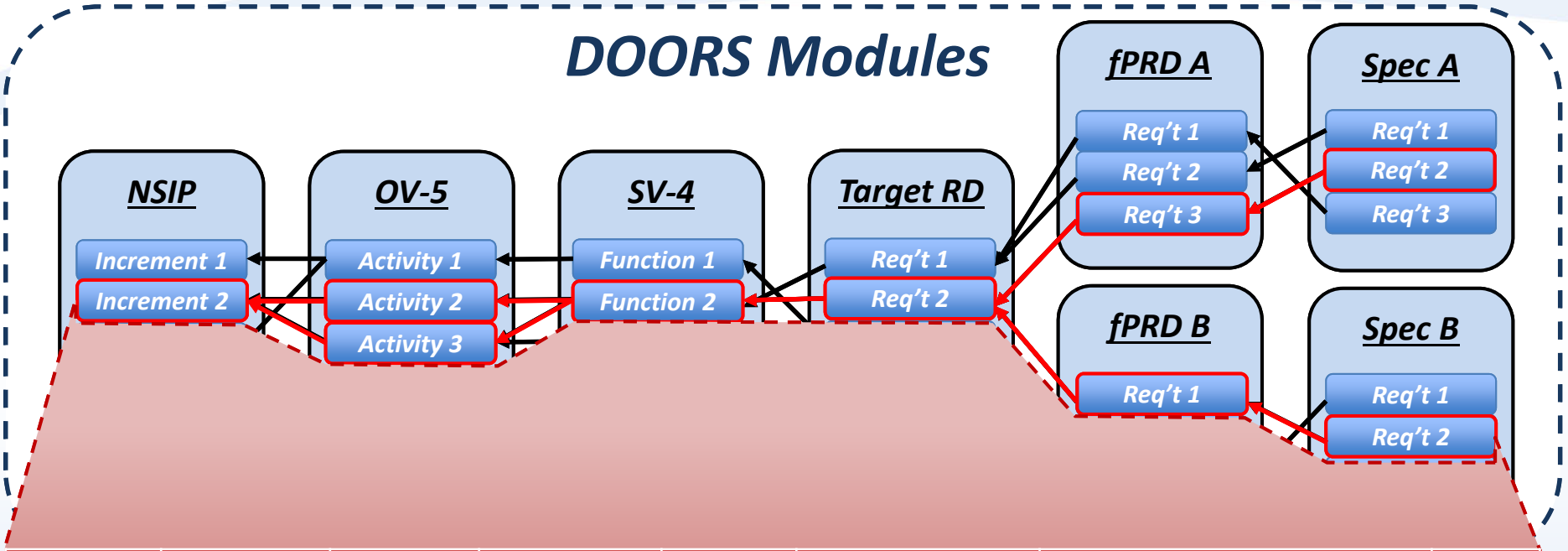
11 items on the JRC checklist are directly processed by the ANG-B office for CRD-RD, IARD, IID & FID Decision Points.



Program & Enterprise Interaction



DOORS Traceability Vision
Impact Analysis Example



Increment	OV-5 Activity	SV-4 Function	TNRD Requirement	Program	fPRD Requirement	Spec Requirements	Test Result
Improve SUA-Based Flow Predictions (108212-12)	• Assess Capacity	Manage SAA	The NAS shall manage SAA.	AIMM S2	AIMM must provide SAA data to authorized users.	The system must meet all requirements provided in the latest version of the SAA IRD.	*Fail
Improve SUA-Based Flow Predictions (108212-12)	• Assess Capacity • Establish Traffic Flow Constraints	Manage SAA	The NAS shall manage SAA.	SWIM	The NCR Service shall access SUA data.	SWIM shall provide a service that detects geographic and temporal conflicts between user-defined airspace and all other airspace.	Pass

*** Not actual, example only**

Summary

1. Program requirements validation by tracing a program's functions to higher level NAS functions and other sources documents.
2. Traceability aims to eliminate duplication of functionality.
3. Traceability provides a platform to perform gap analysis.
4. Traceability supports future NAS investment analyses.
5. Traceability assists in identifying relationships and interdependencies between programs.
6. Traceability enables accurate depiction of program contributions to high-level capabilities.
7. Deferred requirements are managed
8. Traceability provides for impact analysis when changes are made to the baseline.

Questions?

Backup

Systems & Allocated NAS Functions

*Increment	*Systems	*Programs	**Functions
TFDM Scheduler/ Sequencer (104211-21)	Primary **DataComm** **TFMS** Secondary TBFM (S) FDIO (S) TFDM (S) TDLS (S)	• DataComm S1 P1 (G01C.01-05) • DataComm S1 P2 Initial En Route Svcs (G01C.01-06) • DataComm ATN Baseline 2 APP (G01C.01-09) • DataComm ATN Gateway (G01C.01-08) • DataComm S1 P1 S1 P2 DCIS Network Services Future (G01C.01-11) • DataComm S1 P2 Full Services (G01C.01-10) • DataComm S1 P2 Initial Services Risk Reduction (G01C.01-12) • DataComm S1 P1 DCIS Network Services (G01C.01-07) • FDIO Replacement Sustainment (A01.11-01) • TFDM S1 (G06A.03-01) • TFDM S2 (G06A.03-02) • TBFM Tech Refresh (G02A.01-07) • TBFM WP2 (G02A.01-03) • TBFM WP3 (G02A.01-06) • TBFM WP4 (G02A.01-08) • ATM – TFM Improvements (A05.01-14) • ATM – TFM Infrastructure – Tech Refresh (A05.01-12) • ATM – TFM-I – Field/Remote Site Technology Refresh (A05.01-13) • CATMT WP2 (G05A.05-01) • CATMT WP3 (G05A.05-02) • CATMT WP4 (G05A.05-03) • CATMT WP5 (G05A.05-04)	F1.1.3.6 Derive Flow Management Schedules F1.1.5.5 Manage Flow Constraints F1.1.5.8 Manage Sequencing Plans F1.2.2.2 Maintain Flight Information F1.4.3.2 Manage Presentation to Human
Departure Reservoir Management (104211-22)	Primary **TFMS** Secondary TFDM	• TFDM S1 (G06A.03-01) • TFDM S2 (G06A.03-02) • ATM – TFM Improvements (A05.01-14) • ATM – TFM Infrastructure – Tech Refresh (A05.01-13) • CATMT WP2 (G05A.05-01) • CATMT WP3 (G05A.05-02) • CATMT WP4 (G05A.05-03) • CATMT WP5 (G05A.05-04)	F1.1.3.6 Derive Flow Management Schedules F1.1.5.1 Assess Flow Situation F1.1.5.2 Determine Delays F1.1.5.5 Manage Flow Constraints F1.1.5.7 Manage Sequencing Plans F1.2.2.2 Maintain Flight Information F1.4.3.2 Manage Presentation to Human

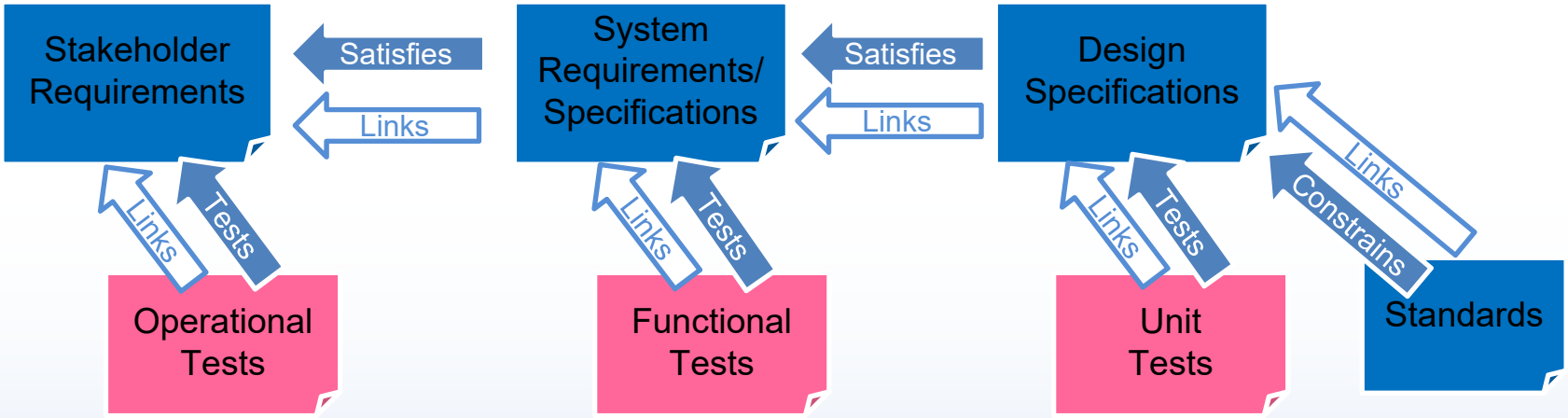
*** Source: NAS Segment Implementation Plan (NSIP) 2017**
**** Source: SME input and DOORS linkages between Target RD & SV-4**

Systems & Allocated NAS Functions

*Increment	*Systems	*Programs	**Functions
Electronic Flight Data Exchange (104211-23)	Primary **TFMS** Secondary FDIO STARS TFDM TDLS	• FDIO Replacement Sustainment (A01.11-01) • STARS Sustainment Tech Refresh 2 (A04.01-03) • STARS – Tech Refresh (TAMR P1) (A04.01-01) • TAMR P3 S1 (A04.07-01) • TAMR P3 S2 (A04.07-02) • TAMR Post ORD Enhancements (A04.07-04) • TFDM S1 (G06A.03-01) • TFDM S2 (G06A.03-02) • DataComm S1 P1 (G01C.01-05) • ATM – TFM Improvements (A05.01-14) • ATM – TFM Infrastructure – Tech Refresh (A05.01-12) • ATM – TFM-I – Field/Remote Site Technology Refresh (A05.01-13) • CATMT WP2 (G05A.05-01) • CATMT WP3 (G05A.05-02) • CATMT WP4 (G05A.05-03) • CATMT WP5 (G05A.05-04)	F1.2.2.2 Maintain Flight Information F1.2.1.2 Maintain Aeronautical Information
Integrate Surveillance Data with Flight Data (Surface) (104211-24)	Secondary ASDE-X (S) ASSC (S) FDIO (S) STARS (S) TFDM (S)	• ASDE-3 Service Sustainment (S01.05-01) • ASDE_X Tech Refresh & Disposition (S09.01-01) • FDIO Replacement Sustainment (A01.11-01) • STARS – Sustainment Tech Refresh 2 Plan/Eng (A04.01-03) • STARS – Tech Refresh (TAMR P1) • TAMR P3 S1 (A04.07-01) • TAMR P3 S2 (A04.07-02) • TAMR Post ORD Enhancement (A04.07-04) • TFDM S1 (G06A.03-01) • TFDM S2 (G06A.03-02)	F1.2.3.3 Track Vehicles
Establish Enhanced Data Exchange with Flight Operators (FOC) and Airport Operators (104211-25)	Primary **SWIM** **TFMS** **CDM Net** Secondary TFDM	• SWIM S2A (G05C.01-04) • SWIM S1 (G05C.01-01) • SWIM S1 Tech Refresh (G05C.01-05) • SWIM S2B (G05C.01-08) • TFDM S1 (G06A.03-01) • TFDM S2 (G06A.03-02) • ATM – TFM Improvements (A05.01-14) • ATM – TFM Infrastructure – Tech Refresh (A05.01-12) • ATM – TFM-I – Field/Remote Site Technology Refresh (A05.01-13) • CATMT WP2 (G05A.05-01) • CATMT WP3 (G05A.05-02) • CATMT WP4 (G05A.05-03) • CATMT WP5 (G05A.05-04)	F1.1.3 Manage Trajectories F1.3.4 Manage Systems & Services

*** Source: NAS Segment Implementation Plan (NSIP) 2017**
**** Source: SME input and DOORS linkages between Target RD & SV-4**

DOORS,
Requirements Lifecycle & Traceability



- **Controls changes to requirements**
- **Assesses impact of proposed changes**
- **Communicates approved changes**
- **Establishes traceability from tests to requirements**

- **Users map and trace the origins of requirements and specifications through user-defined links**
- **Links show the one-to-one or one-to-many relationships between requirements in separate DOORS modules and documents**

BACK TO SLIDE

Enterprise Architecture Product Interaction