National Defense Industrial Association

2 February 2011

Mr. Doug Ebersole
Director of Engineering, F-35 Program Office

JOINT STRIKE FIGHTER
F-35
LIGHTNING II
LETHAL SURVIVABLE SUPPORTABLE AFFORDABLE

Agenda

- **Program Overview**
- **Technical Baseline Review**
  - Framework and Program Execution Lessons Learned
- **Program Complexity - JSF Unique Attributes**

Meeting Service and International Needs

- **The Next Generation "Family" of Strike Fighters**
  - 3 Variants
  - F-16/F/A-18C "Like" Aero Performance
  - Stealth Signature And Countermeasures
  - Advanced Integrated Avionics, Data Links And Adverse Weather Precision Targeting
  - Increased Range With Internal Fuel And Weapons
  - Highly Supportable, State Of The Art Prognostics And Health Management
- **3 US Services, 8 Partners, 1 FMS Customer**

Lethal Survivable Supportable Affordable

Fighter Aircraft Generations

5th Gen Integration of Stealth and Fighter Evolution = Quantum Leap

Requirements: Service Needs

- **USAF: 1763 CTOL**
  - Multi-role (primary air-to-ground) fighter to replace the F-16/A-10
  - Complement the F-22
- **DoN: 680 CV/STOVL**
  - USN – Multi-role, stealthy strike fighter to complement the F/A-18E/F
  - USMC - STOVL fighter to replace the AV-8B and F/A-18C/D
- **UK (RN and RAF): 138 CV**
  - Replacement for the Sea Harrier and GR-7
- **International: 592 CTOL/STOVL**
  - Italy, Netherlands, Australia, Norway, Denmark, Canada, Turkey
- **Requirements Document**
  - JORD signed 13 March 00
    - JROC Validated 11 April 00
    - JROC Revalidated 18 October 01
  - Annual JROC program review






JSF Family Of Aircraft

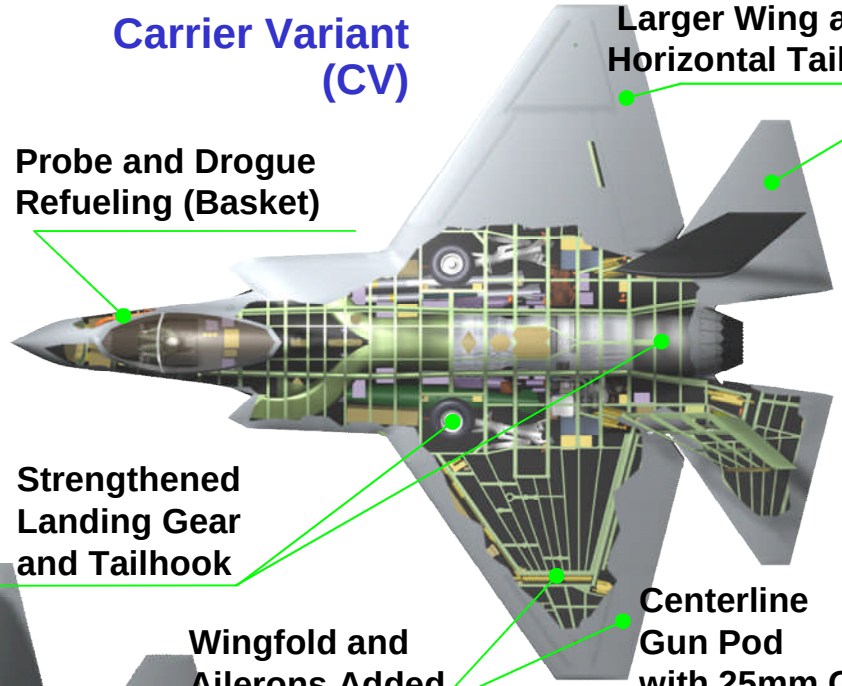
One Program -- Three Variants

Conventional Take-Off and Landing (CTOL)

In-Flight Refueling Door (Boom)

Internal 25mm 4-Barrel Gattling Gun

Carrier Variant (CV)



Larger Wing and Horizontal Tail Area

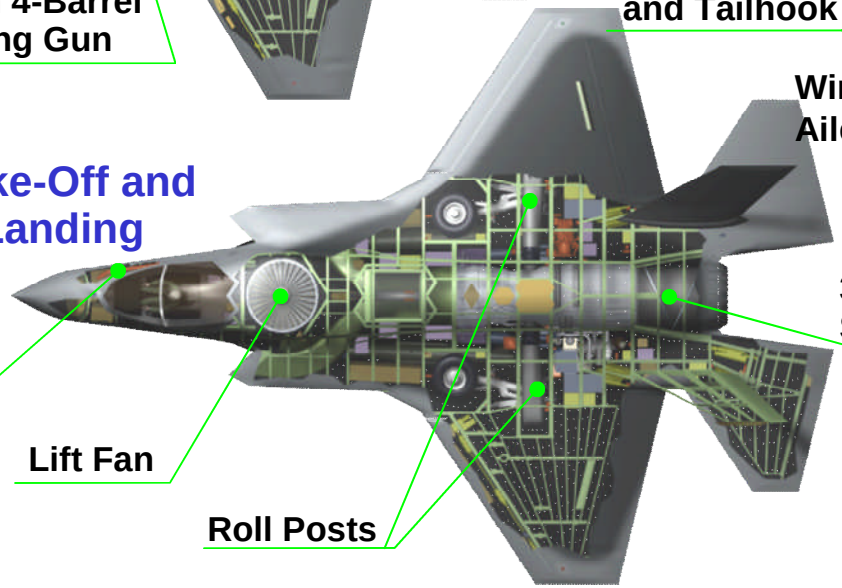
Probe and Drogue Refueling (Basket)

Strengthened Landing Gear and Tailhook

Wingfold and Ailerons Added

Centerline Gun Pod with 25mm Gun

Short Take-Off and Vertical Landing (STOVL)



Probe and Drogue Refueling (Basket)

Lift Fan

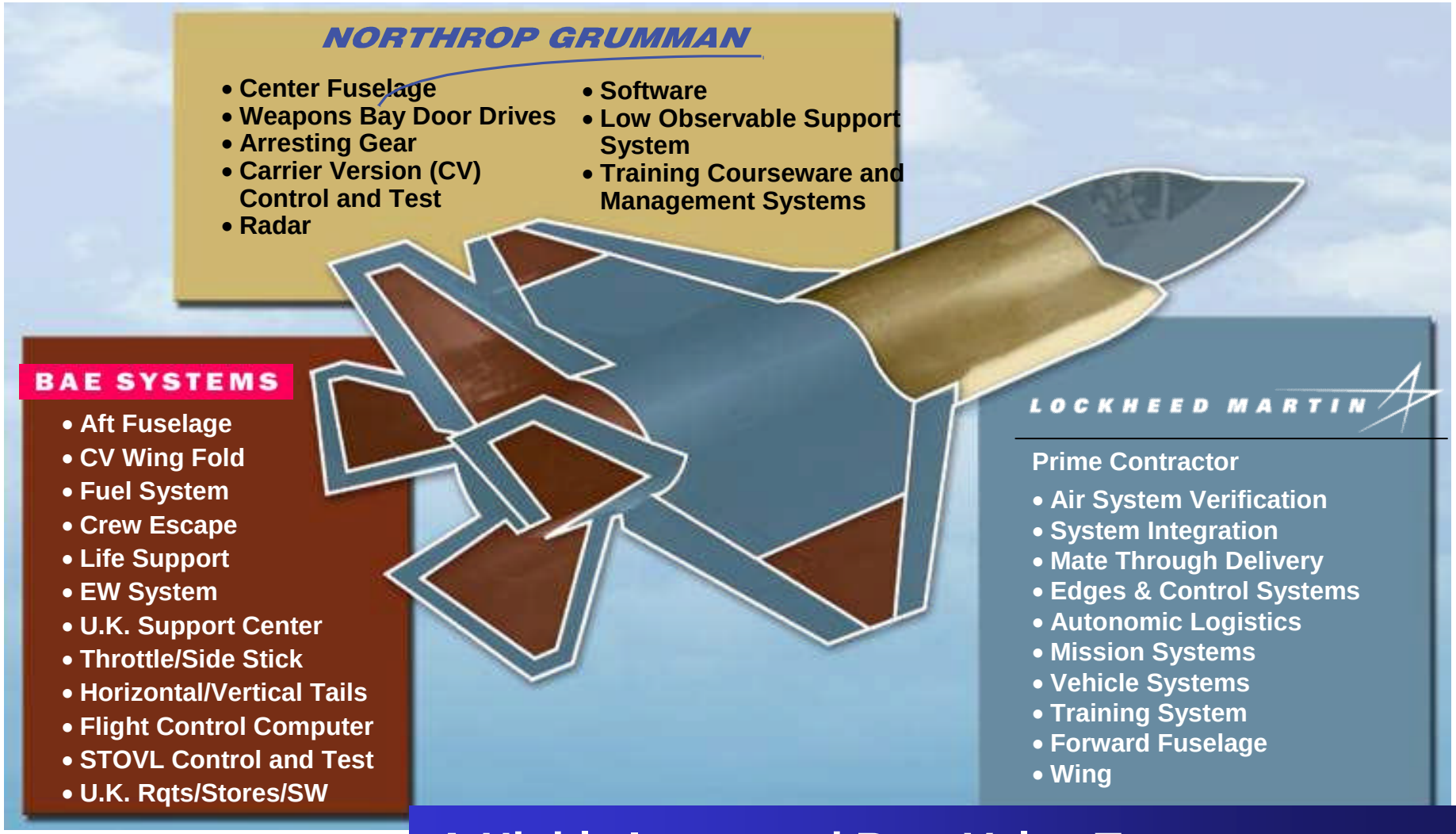
Roll Posts

3-Bearing Swivel Nozzle

All variants

- 450-600 nm Range
- 1.6 Max Mach (Limit)
- Stealthy
- Comparable Weapons
- Similar Avionics
- Similar Flight Envelope
- Same Basic Engines

JSF Team



A Highly Integrated Best Value Team

JSF SDD Scope

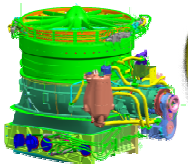
Interoperability

CV

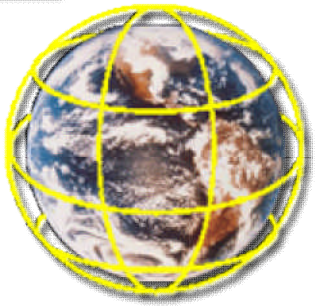
CTOL

STOVL

P&W F135
GE/RR F136



3 Services



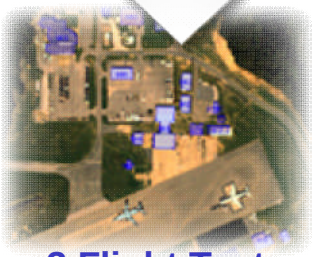
Global Sustainment

8 International Partners

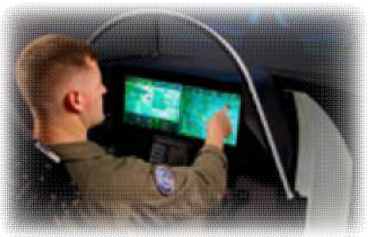
2 Security Cooperation Participants

Domestic / International Suppliers

Autonomic Logistics



3 Flight Test Facilities



Integrated Training

Team JSF

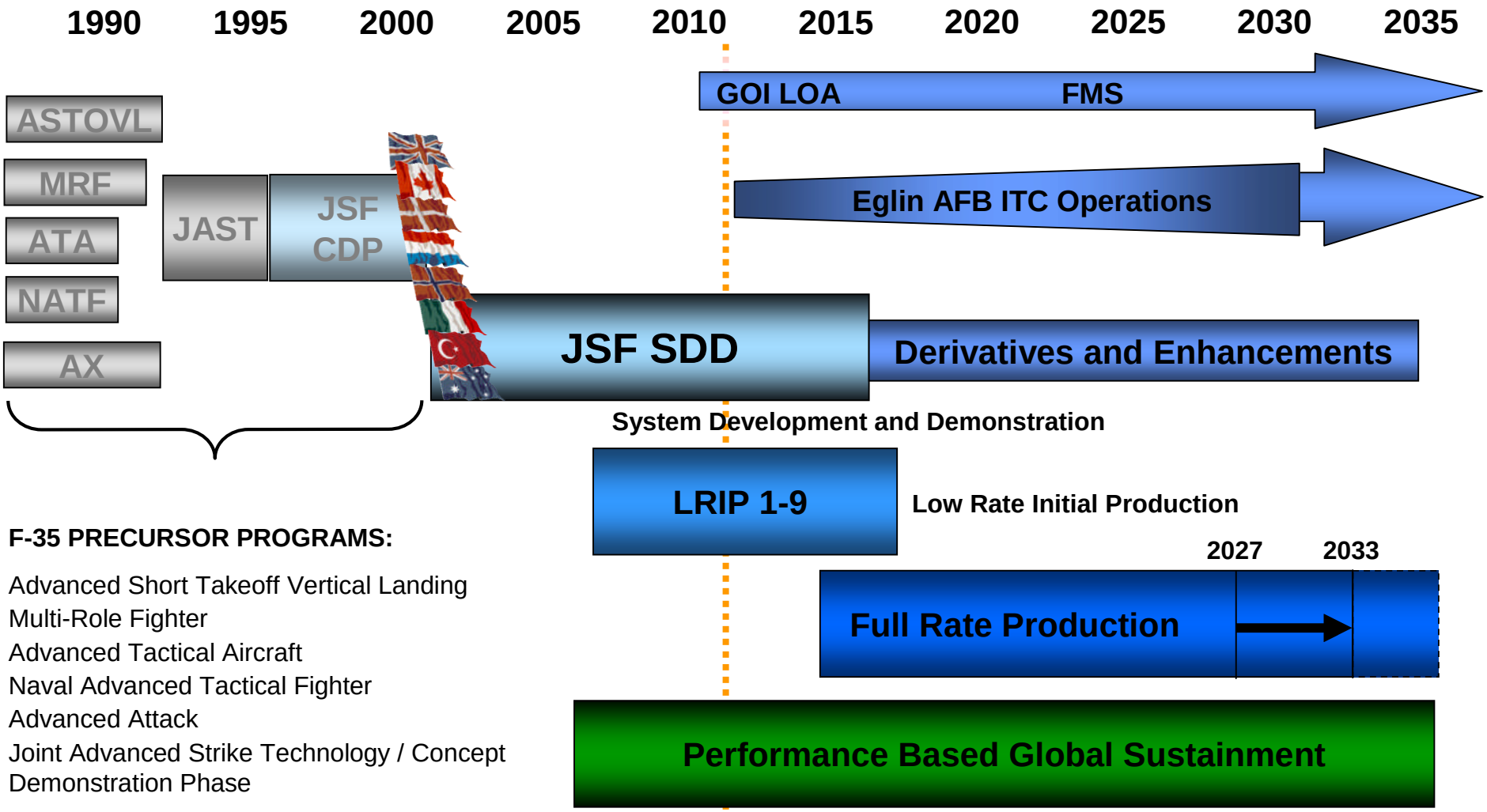
LOCKHEED MARTIN

NORTHROP GRUMMAN

BAE SYSTEMS

GE Rolls-Royce
Fighter Engine Team

JSF Acquisition Timeline



F-35 PRECURSOR PROGRAMS:

Advanced Short Takeoff Vertical Landing
Multi-Role Fighter
Advanced Tactical Aircraft
Naval Advanced Tactical Fighter
Advanced Attack
Joint Advanced Strike Technology / Concept Demonstration Phase

At Nexus of Planned Concurrency

Agenda

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- Program Complexity - JSF Unique Attributes

TBR Charter

Purpose of Review

Provide VADM Venlet Objective Basis of what is needed to complete SDD and provide confidence in the baseline to be finalized and reviewed 1Q 2011 by accomplishing the following objectives:

1. Assess Planning Baseline to ensure cost and schedule planning reflects the technical scope of SDD and is adequate to execute the program.
2. Assess technical planning for gaps, i.e. risks, issues, or other concern areas, to ensure resolution or mitigation is covered in technical basis.
3. Provide final assessment 3-4 weeks prior to November 2010 DAB.

Focus Areas & TBR Team

Air Platform

Airframe, Mechanical Systems, Flight Sciences, Aeromechanics, etc.
Propulsion (sub-team)
R&M, Producibility, Survivability, other "ilities"

Integrated Mission Systems

Test and Evaluation

Test objectives (Verification success criteria/test planning alignment)
Test execution (Schedule/assumptions/staffing/data mgmt & analysis/support)

System Acceptance

Airworthiness (Flight Clearance) criteria
Air System Acceptance criteria
System certifications

Service Integration

Sustainment Strategy (SCM, SE, etc.)
Autonomic Logistics Information System
Training Systems
Joint Technical Data

Schedule: 2 July – 22 Oct 2010

Sponsor: VADM Venlet, PEO(JSF)

Executive Steering Group

Dave Cohen, NAVAIR
John White, ASC/EN
Jim Thompson, OSD
Doug Ebersole, JPO
Tom Blakely, LM Aero

Program Source Data

See governance package reference material

Deliverables

- EAC S-Curve
- TBR Schedule Assessment
- Concern items associated with cost & schedule adjustments

TBR Schedule Estimate Approach

- **Incorporated Latest Contractor Schedule as a Baseline**
  - Revised for known program changes
- **Focus Teams Provided Schedule Opportunities/Threats**
  - Established best case/most likely/worst case bands
- **Rolled-up Data For Final Assessment of Schedule Risk**
- **Used For Time-phasing of Cost Estimate**
- **“SDD Complete” Schedule Driven By Two Factors**
  - Missions Systems development
  - Flight Test execution

TBR Hybrid Cost Estimate Approach

Discreet – "Bottoms Up" Assessment

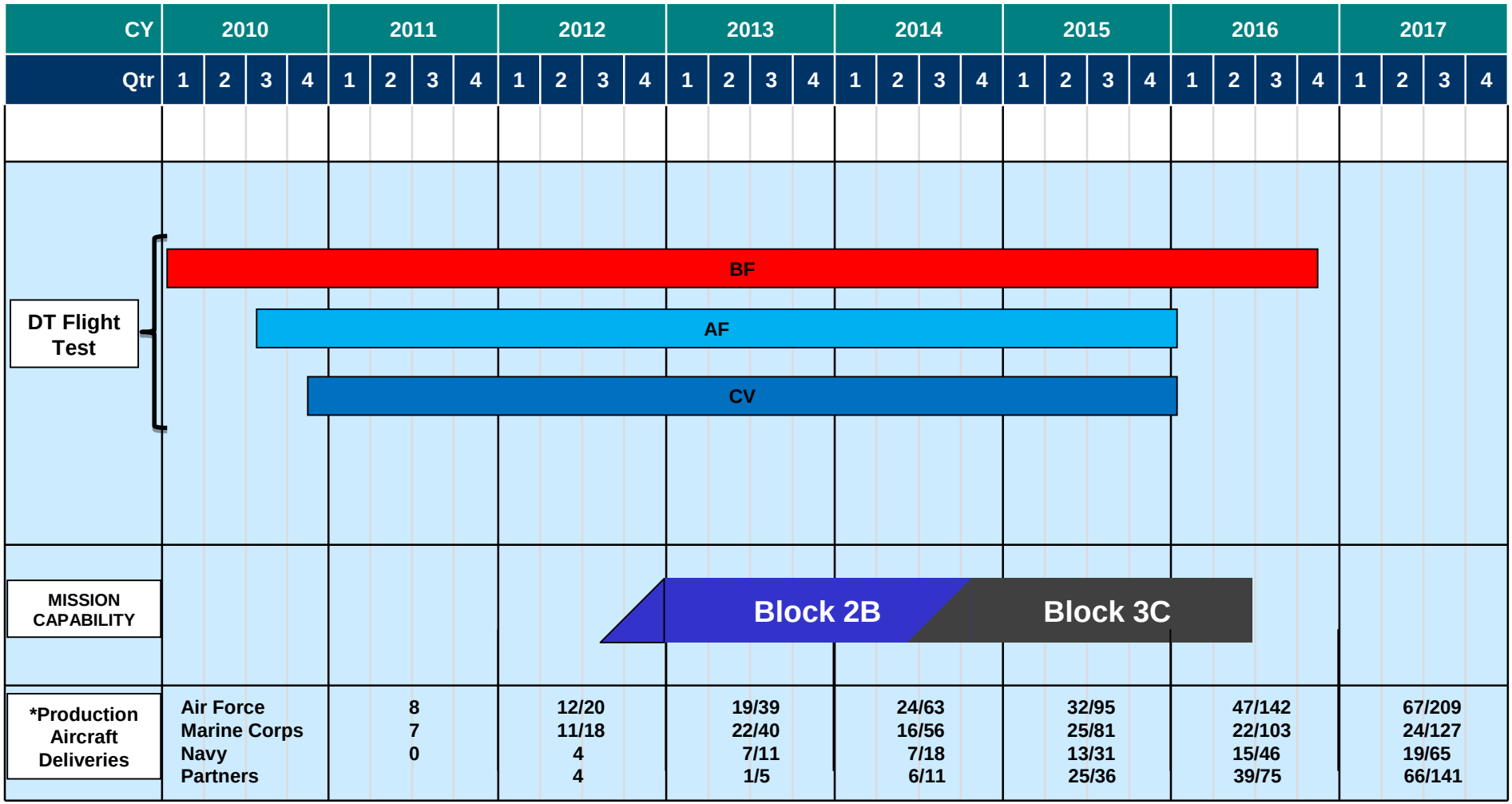
- **Identify "Targeted Control Accounts (TCAs)"**
  - Concern Items – technical risks, issues, design maturity, work to go
  - Cost deltas between baseline and EAC10
  - For all TCAs
    - Conduct interviews with CAMs around Basis of Estimate
    - Demand data artifacts to credit accomplishment
    - Establish 3 point estimates based on discussions

Performance Based Earned Value Assessment

- **Project EAC Based on EVM Performance to Date (all CAs)**
- **Other Means of Extrapolation (e.g. Leverage JET II / CAPE N-M)**

Roll Up Results to Determine EAC—Utilize S-curve Techniques

Adjusted SDD Schedule



* Annual/Cumulative - Pre POM 12 Adjustments changes may occur

Re-plan Enablers

- **Revitalize Systems Engineering Management**
  - Reconstitute the systems engineering team
  - Recognize Government role in systems engineering management
  - Ensure process instantiation and rigor in execution
- **Schedule and Conduct Rigorous Systems Engineering Reviews**
  - Use independent panels with agreed-to entry/exit criteria
- **JPO Personnel Must Have Access to Design Artifacts and Tools**
  - Developmental and configuration management databases
    - DOORS, PVCS, SIMS, Rhapsody, SPARS, test procedures & results
- **Establish Accurate and Meaningful Metrics**

Implement Systems Engineering Discipline

Re-plan Enablers

- **Establish Rigorous Block Development Approach**
  - Emphasize robust systems integration phase
- **Re-balance Mission Systems Development and Integration Effort**
  - Harmonize Supplier/Prime software delivery with integration
  - Close gap during integration
    - Define integration strategy with specific procedures
    - Staff integration activity with SMEs versed in both design and development
    - Tie system integration to JCS & MSSS requirements
- **Ensure Integrated Approach to Re-planning the Program**

Establish Disciplined Block Mgmt & Planning

Re-plan Challenges

- **Numerous SDD Interim Milestones/Fleet Releases**
- **Unprecedented Test Breadth and Scope**
  - Number of test aircraft
  - Amount of data may overwhelm system and resources
- **Overcoming Past Practices and Shortfalls**
  - PM / EVM / Contracts
  - Tech planning, risk mgmt, config mgmt, requirements mgmt, etc.
- **HMD Solution Uncertainty**
  - Lower technology off-ramp in parallel to baseline development

Cultural Change Required

Agenda

- Program Overview
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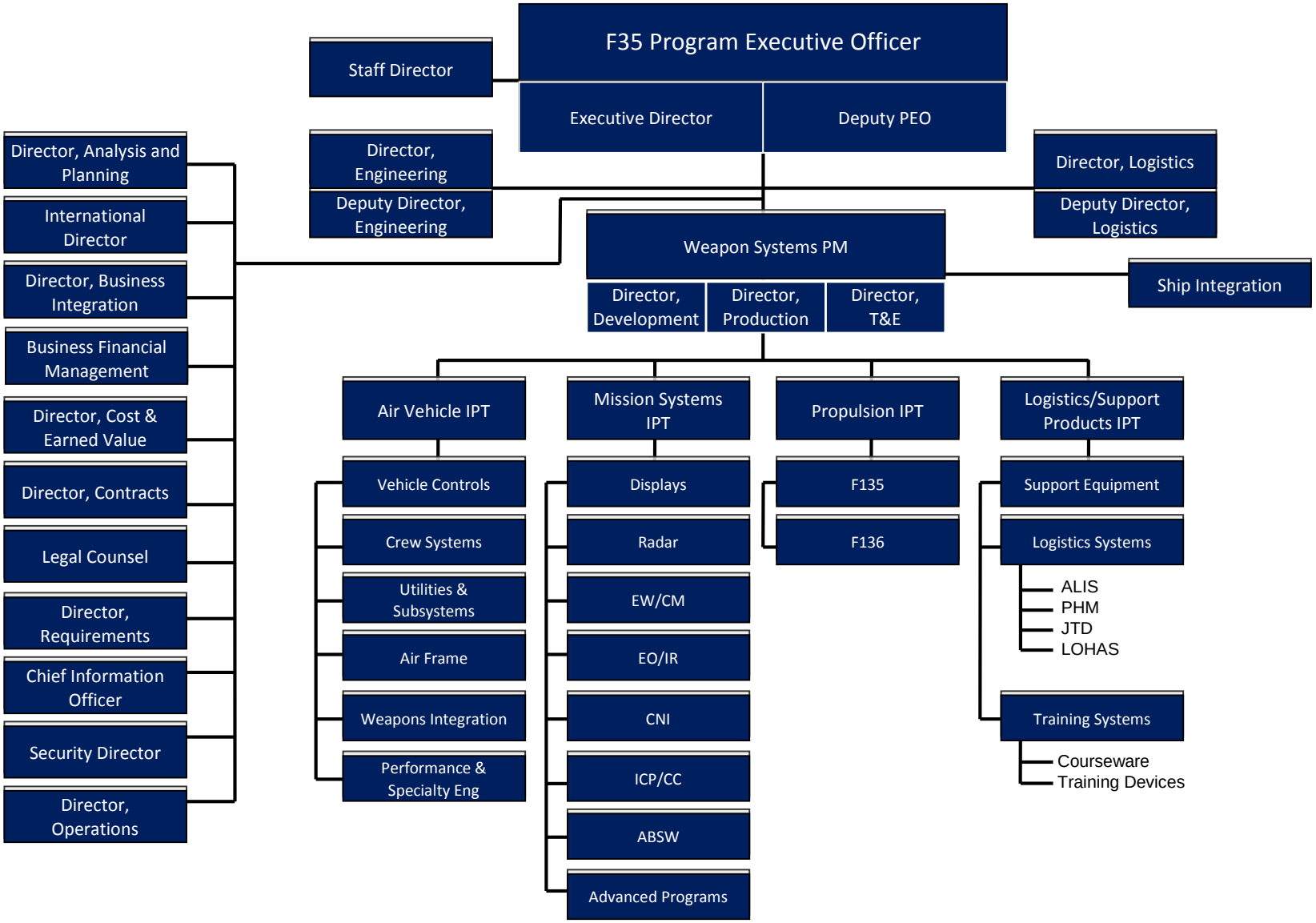
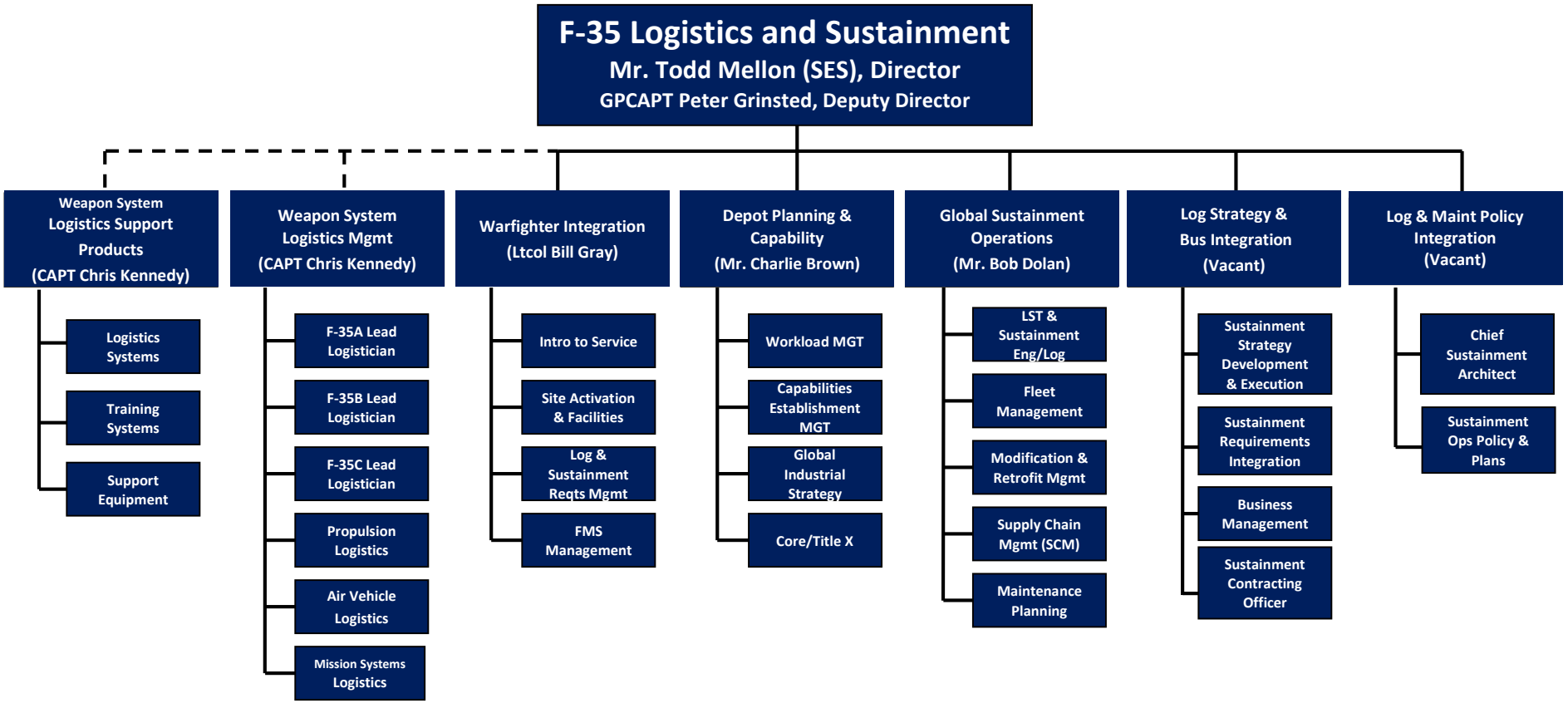
- **Program Complexity - JSF Unique Attributes**
  - Organization
  - Stakeholders
  - Governance Structure
  - Global Production Diversity
  - Duplicative Customer Requirements

Discussion Topics

JSF Organization Structure



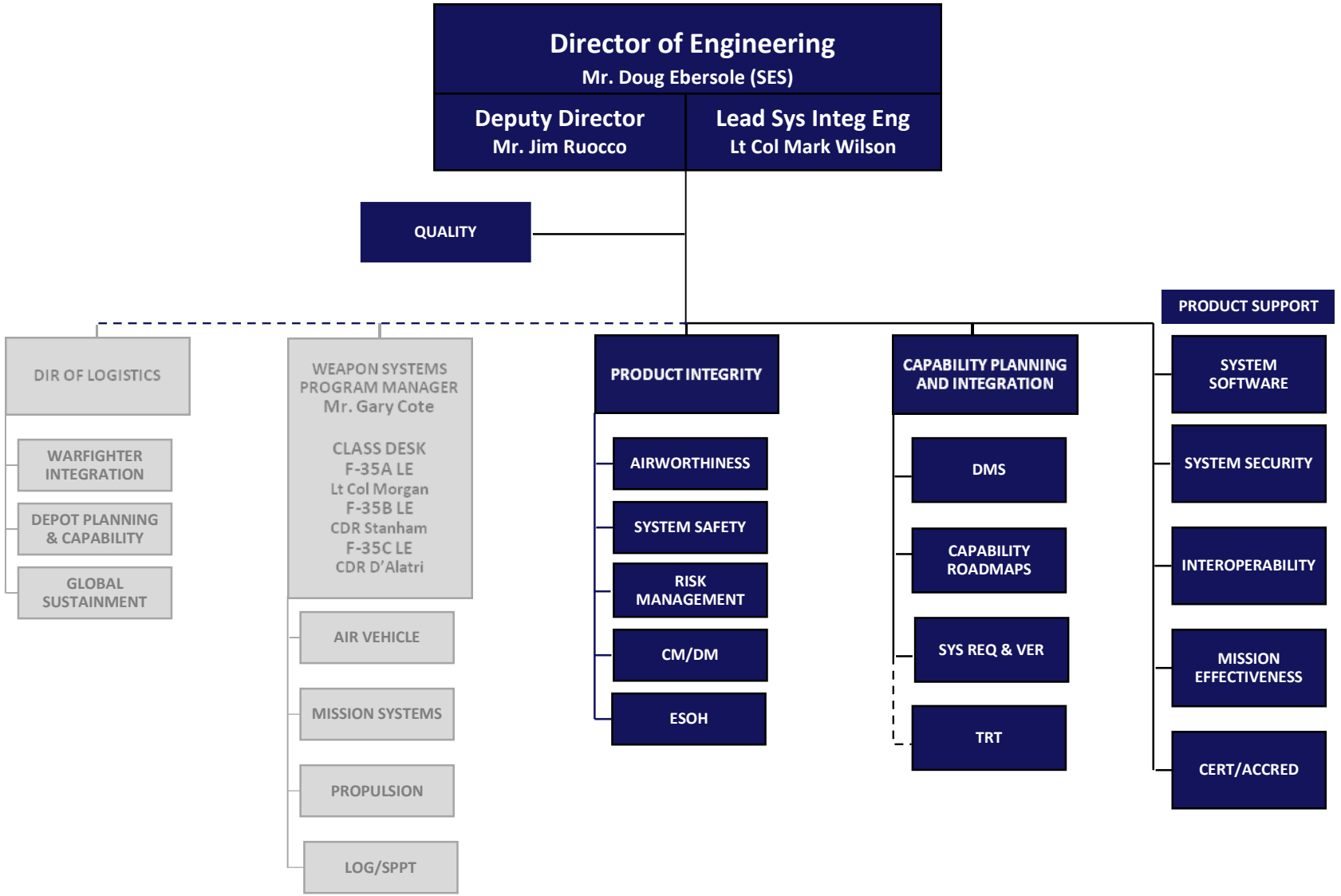
F-35 Logistics and Sustainment



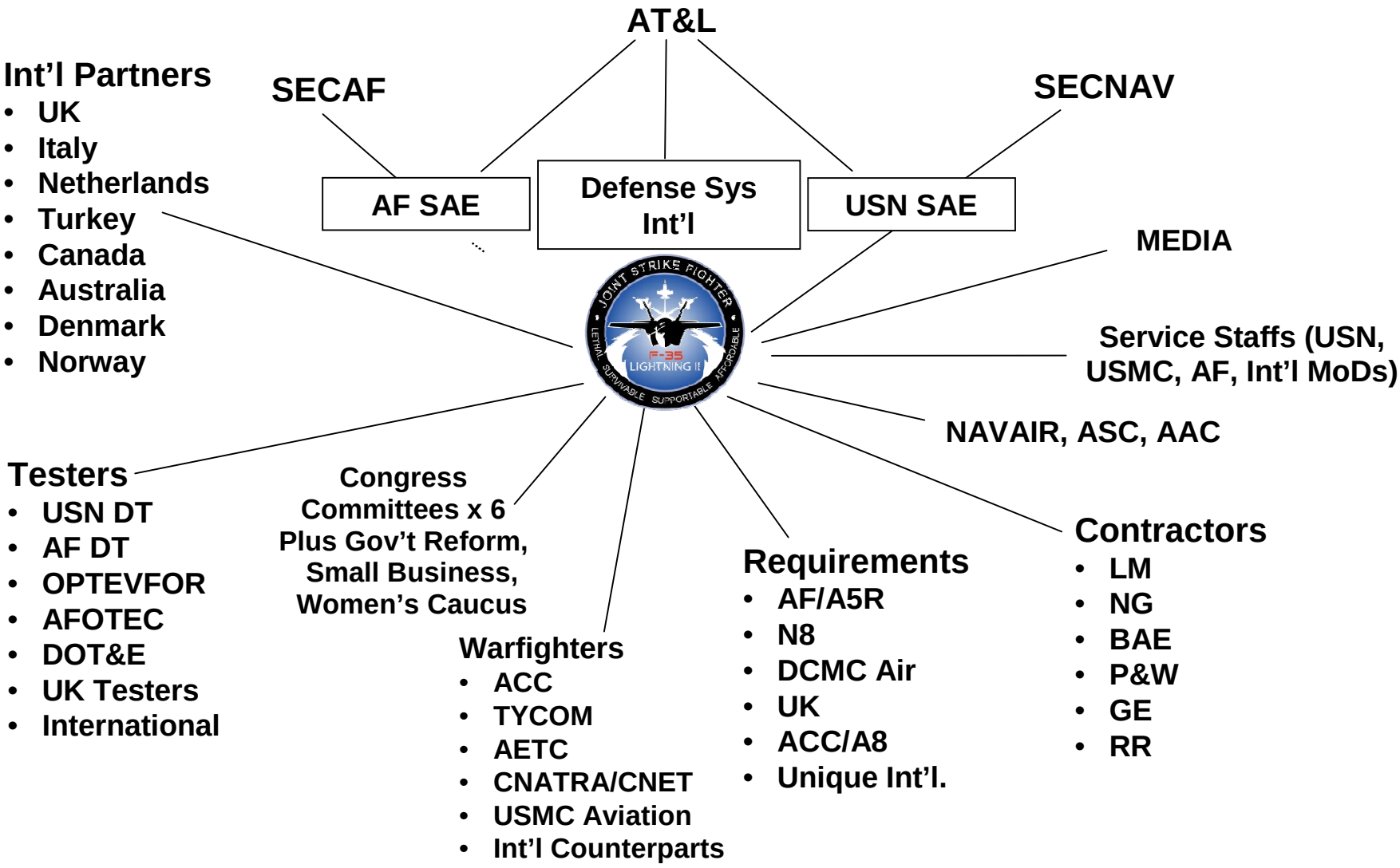
Weapon System Logistics Mgmt and *Logistics Support Products IPT* are integral elements of Weapon System PM construct

As of 12 Oct 10

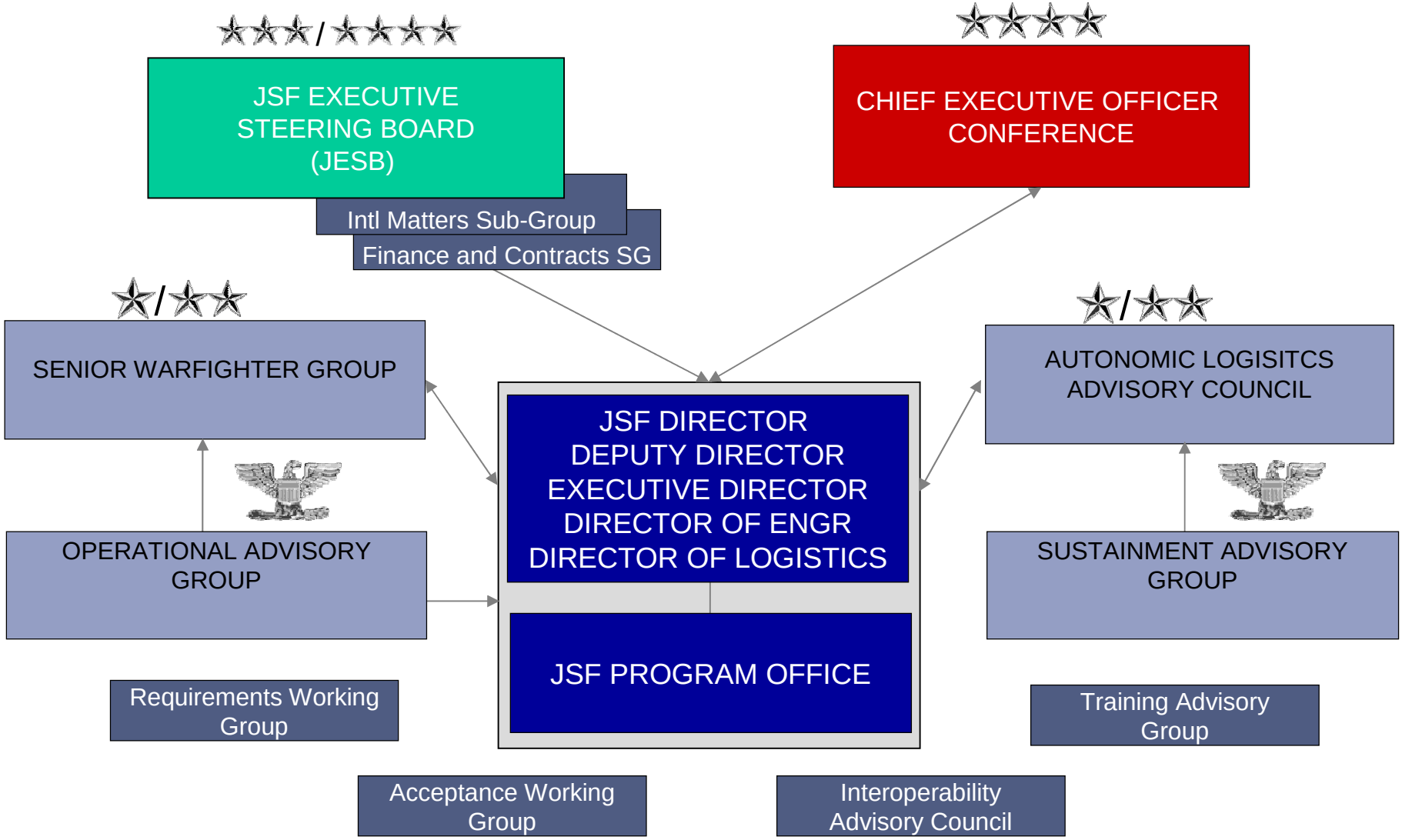
F-35 JSF Director of Engineering



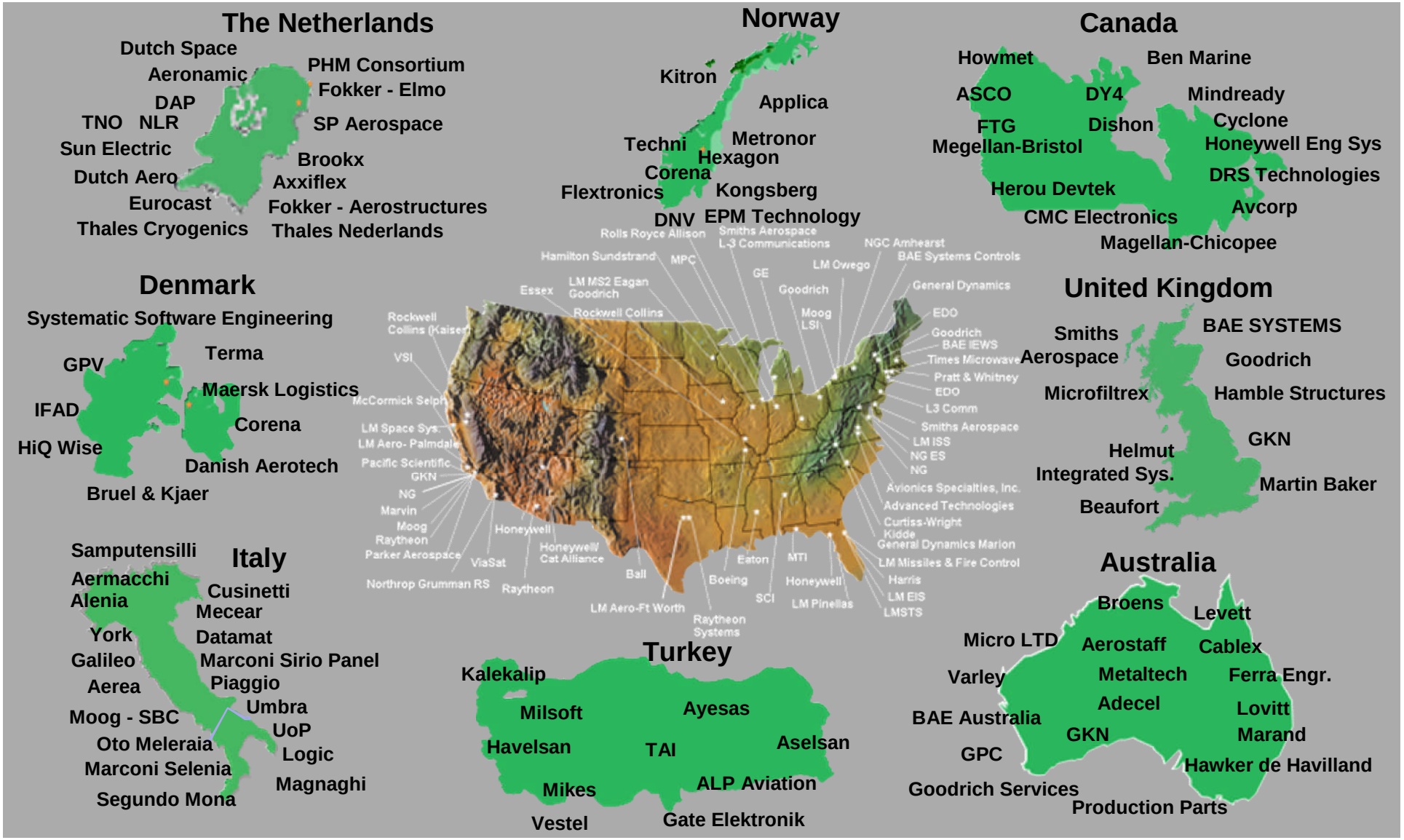
JSF Stakeholder Environment



Governance Overview



Global Production System



JSF International Strategy / Cooperative Framework

Enablers

MOU & LOA

Gov't to Gov't

Industry to Industry

Agreements & Licenses

Multinational Cooperative Development Program

Enhances Future Interoperability and Coalition Warfare

Airworthiness Artifacts Required For Flight Release

	USAF		DoN	
ARTIFACT	**Military Experimental Flight Release**	**AW Cert**	**Interim Flt Clearance**	**AW Cert**
Tailored Airworthiness Certification Criteria Approved	**X**	**X**		
NAVAIR 18 March 2010 Letter (enclosure with 22 integration reports and 448 specific items)			**Partial**	**X**
Required ground and flight test points completed successfully	**X**	**X**	**X**	**X**
Qualification to appropriate levels completed on all fielded hardware and software	**X**	**X**	**X**	**X**
Culminating FFRRT-type event successfully completed	**X**		**X**	
Aircraft Operating Limitations incorporated into Flight Manual Product Set	**Flight Test**	**X**	**X**	**X**
Flight Manual Product Set validated by the AF/Navy in all devices using it		**X**		**X**
Aircrew and maintenance training system accepted as suitable by the AF/Navy		**X**		**X**
Sustainment Operating Instructions accepted by the AF/Navy	**Partial**	**X**	**Partial**	**X**
Maintenance processes accepted as suitable by the AF/Navy		**X**		**X**
Configuration management processes accepted as suitable by the AF/Navy	**X**	**X**	**X**	**X**
LRIP Configuration Documented; waivers/deviations/variances impacts understood and agreed	**Understood**	**X**	**X**	**X**
Functional and Physical configuration audits successfully conducted	**Partial**	**X**	**Partial**	**Partial**
NTAB CAT 1 deficiencies corrected and demonstrated in flight test		**X**	**X**	**X**
SPAR severity level 1, 2 and 3 high discrepancies corrected and demonstrated in flight test	**X**	**X**	**X**	**X**
Monitored flight requirements reduced to zero (includes SRM)		**X**	**X**	**X**
Risk acceptance by appropriate AF/Navy authorities on all outstanding risks	**X**	**X**	**X**	**X**
Maturity exit criteria satisfied		**X**	**Partial**	**X**
Agreed to DD250 Acceptance Plan including successful Acceptance Test Flight by DCMA		**X**	**Partial**	**X**
DT/OT report on aircraft readiness to conduct the training mission		**X**		**X**
Safe and consistent mode 4 STOVL ops demonstrated in flight test with LRIP representative aircraft			**Partial**	**X**
Preliminary NATOPS “Equivalency” Determination and “Flight Manual Product Set” completed (FMPS = All Aircrew Content Delivered via NATOPS/NATIP/Checklists)			**Partial**	**X**

Questions?