TECHNICAL DATA PACKAGE STANDARDIZATION / IMPROVEMENT EFFORTS

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TOPICS

- NAVAIR Long Range Strategy
- Technical Data Tools
- TDP Lifecycle Management Issues and Risks
- Problem Summary
  - Example
- What is NAVAIR doing?
  - TDP EIPT
    - TDP CPI Project
  - Team/Project Relationships
- Current Situation
  - TDP CPI
    - Highlights & POA&M
  - Other Related Projects

Implementing Long Range Strategy

PRIORITIES

PEOPLE

INVEST IN OUR PEOPLE

SPEED

INTEGRATED WARFIGHTING CAPABILITY

DELIVER INTEGRATED & INTEROPERABLE WARFIGHTING CAPABILITIES

AFFORDABILITY

IMPROVE AFFORDABILITY ACROSS THE FULL LIFE CYCLE

STRATEGIES

- Technical & Professional Skills
- Teamwork & Collaboration
- Quality of Work Life
- Innovation, Creativity & Risk Taking

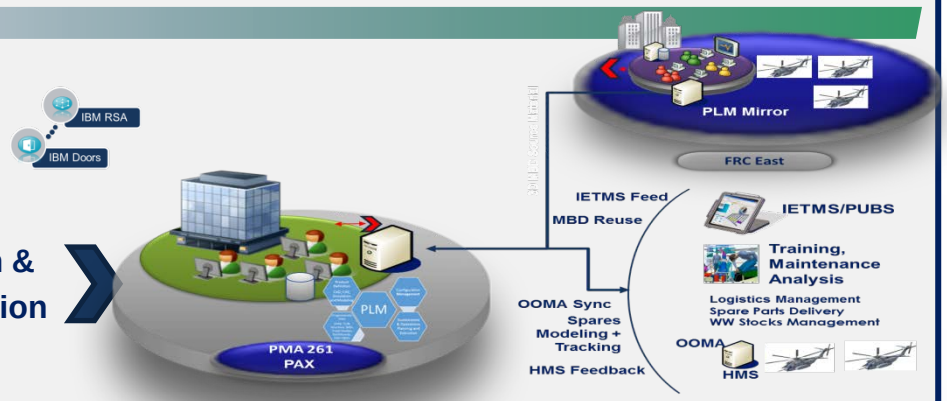
- Capabilities-based Acquisition
- Government as Lead Systems Integrator (LSI)
- Rapid Response, Prototyping

- Operations & Support
- Weapons Systems Development & Procurement
- Organizational Productivity

Execution

Engineering
Platform/ AV integration
Quality
Procurement (Supply-Chain)
Production Engineering
Program Managers
Systems Engineer
Open systems architect
Others, IP and Data Management

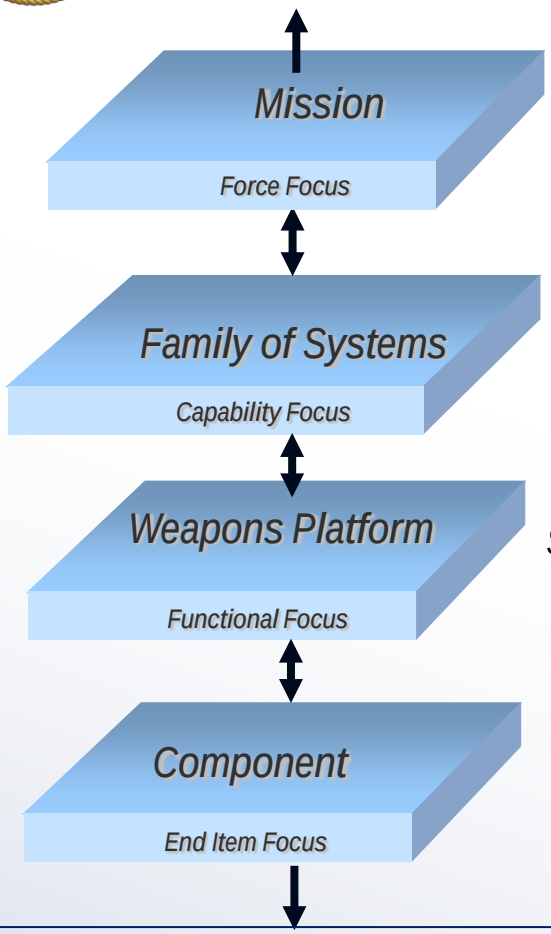
Immersion & Collaboration



Model Based Engineering and PM

ACHIEVING INTEGRATED WARFIGHTING CAPABILITY

Technical Data Tools Hierarchy

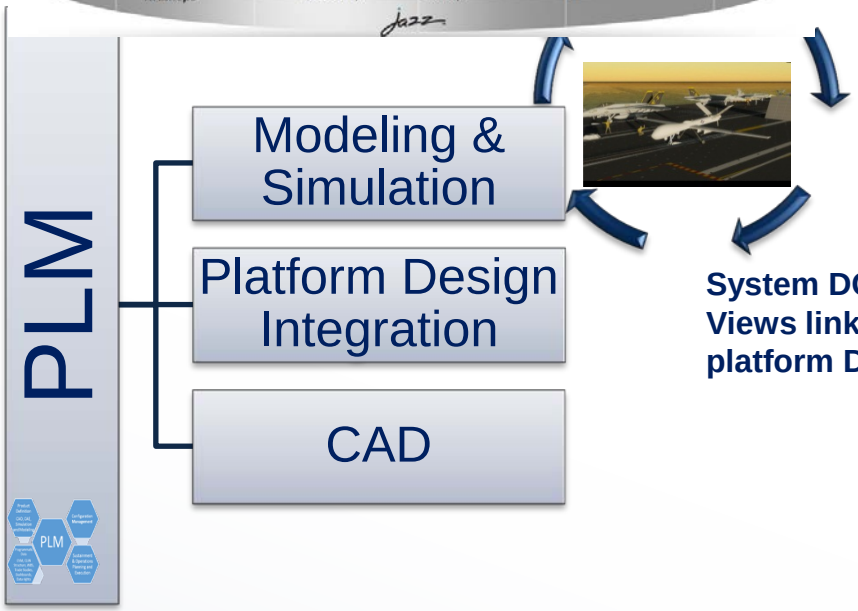


Translates Operational Concepts → Mission Capabilities

Translates Mission Capabilities → System Requirements

Translates System Requirements → Component Functions

Translates Component Functions → End Items



System DODAF Views linked to platform Design

IBM Jazz Platform Available for Architecture (DODAF) and Requirements support.

Product Lifecycle Management Suite Needed to integrate activities performed at platform level and to support SOS & FOS Modeling

TDP Lifecycle Management Issues and Risks

Lack of network connectivity across Enterprise to transfer data electronically

Acquisition

2D based acquisition system, Failing

3D Models now common, Acquisition Requirements not standardized

Quality

No Standard 3D Model Acceptance Criteria

Flawed/30 Day CDRL Acceptance plan

HW/SW/training issues in many cases

Storage & Access

No central repository/workflow tool/configuration management for 3D Models

Hard drives/CD/local network storage

Access limited, knowledge of existence limited

Translation

Lack of software,, hardware, training, and connectivity

No standardized validation/ verification criteria

3D Model availability and lack of control may compromise design agency

Airworthiness Risk, FAI unreliable

Use

Models often don't match OEM "As Built"/"As Delivered"

Reverse Engineering requirements

Items Can't be correctly manufactured/re-procured from delivered data

Re-procurement risk, Manufacturing Risk

Outcomes

- **Loss of TDP ROI**
- **Sole Source Lock**
- **Slow Response to Warfighter**
- **LSI Capability-Constrained**
- **Reduced Availability**
- **Significant Cost Growth**
- **Possible Loss of A/C and Crew**

Poor TDP Acquisition Process + Limited data management tools/training/Funding =

PRODUCT DATA CHALLENGES

In addition to the challenges NAVAIR faces regarding the acquisition of product data, other obstacles include:

- Culture of not buying TDP data needs to be replaced with a culture of contracting for or pricing TDP data
- TDP data is not priced during competition and becomes expensive without competition
- Continuity of data and data rights is not maintained throughout life cycle (as contractors & PMs & contracts & content management responsibility change & evolve)
- Policies and guidance are not directive enough
- Policies and guidance are not adequately enforced
- Advocates for sustainment and product data are not available or involved when acquisition decisions are made
- Programs would rather buy weapon system hardware than data
- Programs that enter at Milestone B or C do not adequately address TDP data
- Long term enterprise perspectives are not considered when programs make acquisition and sustainment decisions
- Accurate costs and benefits of product data are difficult to quantify

Software tool sets

	Engineering CAD Packages								PLM/Repository									CNC Software			
Site	CATIA	UGNX	Pro Eng	Solid Works	Auto CAD	Promise E	Solid Edge	CADRA	CM Pro	ESRS	Team Center	Windchill/ PDM Link	LEDS	TIERS	CITIS	JEDMICS	Enovia	GIBBS CAM	SURF CAM	Pro Eng	UGNX
FRCE	x	x	x		x		x			x						x		x			
FRCSW	x	x	x	x	x	x		x	x		x					x				x	
FRCSE		x	x	x	x		x		x		x					x			x		x
NAWCAD/LKE	x	x	x	x	x				x			x				x		x		x	
NAWCWD/CL	x		x	x	x							x	x								
NAWCTSD/ORL					x									x							
NATEC																x					
Boeing	x	x							x		x				x						
Lockheed	x		x	x		x		x	x		x	x									
NGC	x	x	x								x	x					x				
Bell	x	x	x								x	x					x				
Sikorsky	x	x	x								x	x					x				

There are multiple Gov't and OEM repositories for 2D and 3D data (one for one at OEMs for every program)

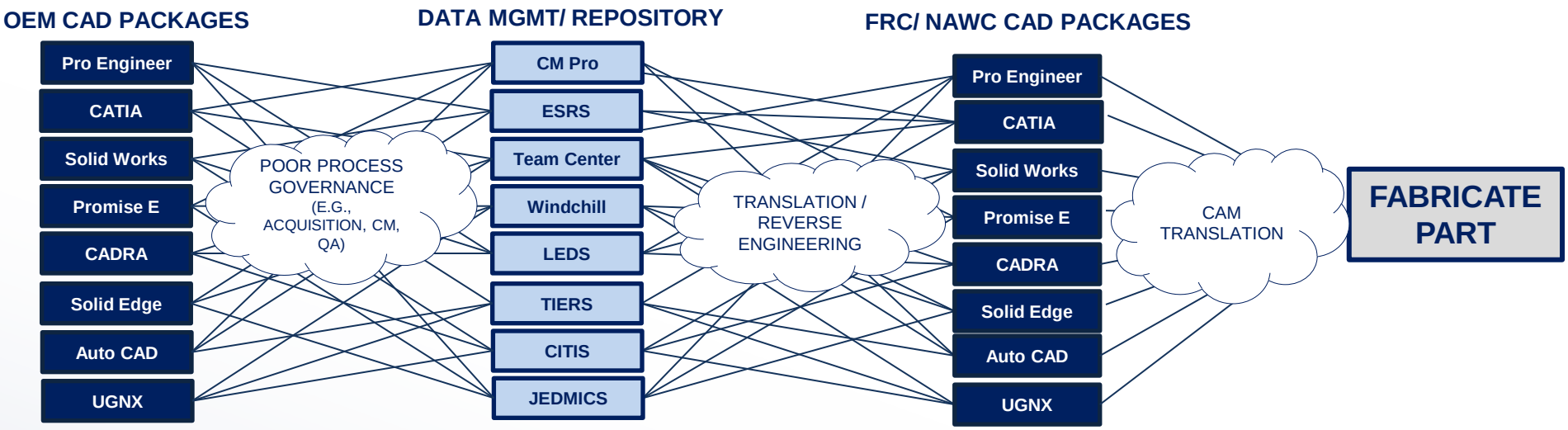
- 3D models (viewable and native CAD files) are stored predominately on local servers (sneaker-net) with little or no configuration management/status accounting data or connectivity. JEDMICS, CMPro, ESRS, Windchill, Teamcenter (include CITIS) are capable of storing models. Not all systems are currently able to manage metadata requirements
- 2D drawings are managed in JEDMICS (viewable only), OEM databases, CMPro, Windchill, Teamcenter, CITIS, LEDS, AIM, etc.

Local PLM systems like Teamcenter, CMPro, Windchill are being used but only in select departments within activities (there may be multiple systems managed in parallel) - there is no national linkage and no authoritative data

IAW SECNAVINST 5000.36, OPNAV N4 designated JEDMICS as the Navy **core authoritative source** FAM approved IT system for engineering drawing technical data, but is utilized solely as a repository (no configuration control)

PROBLEM SUMMARY

"AS-IS" STATE



DISPARATE TOOL SETS & PROCESSES BEING USED ACROSS OEMs & GOVT SITES

ACQUISITION REQUIREMENTS NOT SYNERGIZED WITH LIFECYCLE SUSTAINMENT

DATA QUALITY PROBLEMS RECOGNIZED ONLY AT TIME OF USE

Goals

Quality: Establish 100% TDP configuration control. Improve TDP quality, usability & availability.

Cost: Reduce cost of reverse-engineering / translating / healing data and recreating parts due to incorrect TDPs.

CT: Reduce cycle time required to locate TDP and reverse-engineer TDPs.

Example of Business Impact

Annual costs associated with the TDP Challenges, Single Platform Single Business Site:

1. $1,526K Scraping Parts Manufactured due to incorrect technical data
2. $5,393K Reverse Engineering
3. $727K Translation/Healing
4. $1,965K Conversion from 2D to 3D and 3D to 2D

Example Program Macro TDP Issues

Data that is suppose to be available is not always easy to obtain and if it is not available or doesn't match the aircraft part, it must be reverse-engineered

Cycle time for medium complexity reverse engineering effort @ 2-6 months due to quantity of actions and availability of tools and engineers (Single Site impact)

Program A: 30% of OEM data is not in the correct configuration,

Program B: 97% of delivered data is unusable for manufacturing as delivered from the OEM (Variety of factors including internal factors to NAVAIR)

NAVAIR Business Fiscal Year 2012

TACTICAL AIRCRAFT

AIR ASW, ASSAULT & SPECIAL MISSION

TEST & EVALUATION RANGES

Overview

~$37.4 billion/year

~35,000 People (Civ/Mil/Ktr)

~8 Primary Sites

~90 ACAT Programs

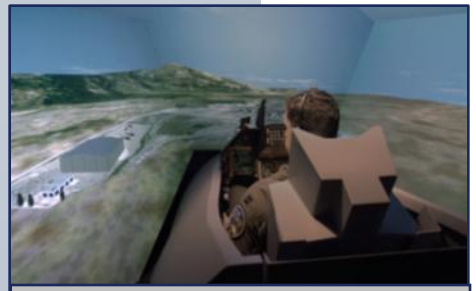
~200 New Aircraft Deliveries

~550 Aircraft Repairs

~3,900 Aircraft Supported

~100 Type/Model/Series

UNMANNED AIRCRAFT & STRIKE WEAPONS



COMMON SYSTEMS/MISSION SYSTEMS/TRAINING/ALRE

FLEET READINESS CENTER INDUSTRIAL FACILITIES

Example – F/A-18 Y431 LEX Spar

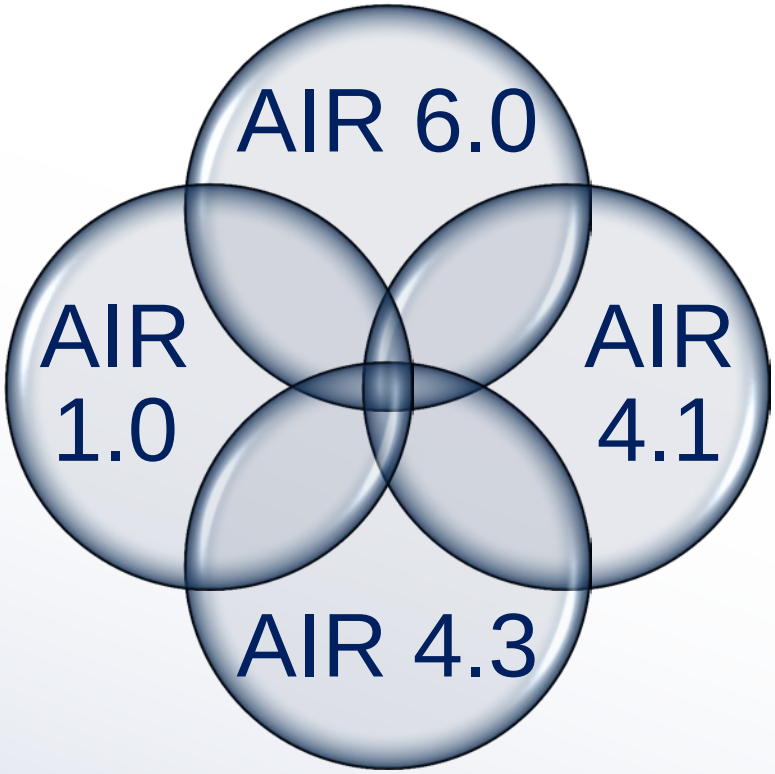
- F/A-18 in repair at JAX discovered with Y431 LEX Spar (P/N 74A322322-2012) damaged beyond repair
- No spares available from supply
- FRCSE initiated in-house manufacture of spar
  - Validated 3D model not available
  - Reverse-engineering initiated
  - “Sample” LEX spar removed from another aircraft to create / validate manufacturing model
- Effort was time consuming and laborious (required removal of nacelle, etc.). Required reinstallation on donor aircraft.

Significant costs and delays incurred due to non availability of validated model.

What Is NAVAIR Doing?

- Cross-Competency TDP Enterprise IPT formed
  - CPI approach adopted to analyze problems using DMAIC process
    - CPI Executive Project Sponsor: Dan Nega
    - CPI Stakeholder Sponsors:
      - AIR 4.1 Stu Young
      - COMFRC Dennis West
      - AIR 0.0-CIO Jack Summers
      - AIR 1.0A Anthony Manich
  - Maintains communication with / awareness of other projects outside scope of EIPT

Current NAVAIR Stakeholders



6.0 Logistics
- 3D repository Gap
- Translation and verification process challenges

4.1 Systems Engineering
- Lead Systems Integrator-LSI
- Open Systems Architecture
- Flight Clearance and Flight Safety
- Overall Technical Management

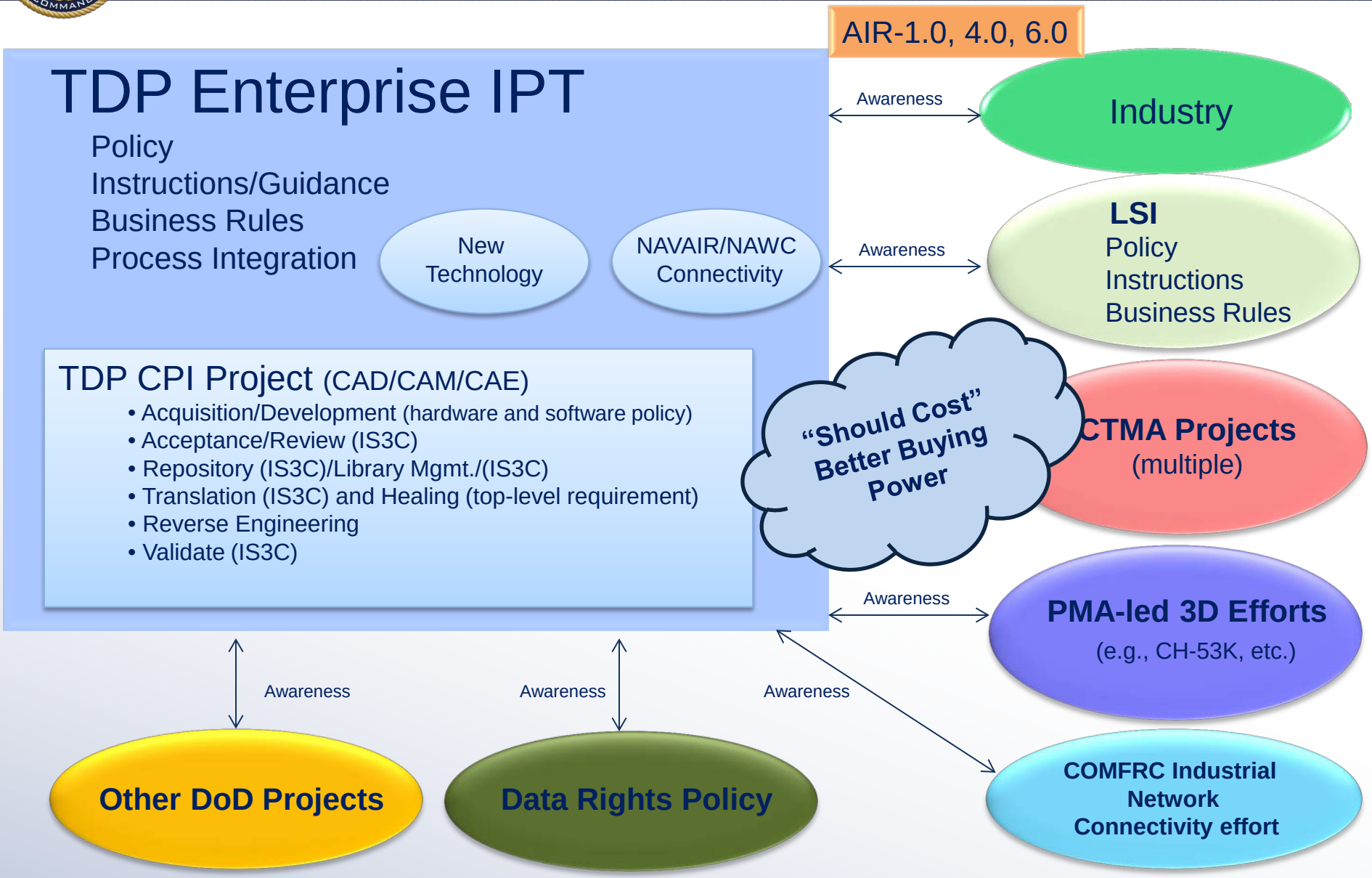
4.3 Air Vehicle Engineering
- Perform Design Analysis
- Rapid Design Modifications & Trades
- 3D support for Fleet Bulletins

1.0 Program Management
- Supply Chain Management
- Enable contracting options
- Unified Business Management Environment

Common Goals:

Leverage TDP
Respond faster to capability needs
Increase opportunity for competition

TEAM/PROJECT RELATIONSHIPS



CURRENT SITUATION
CPI: Analyze Phase – Root Cause Summary

Row Labels	Acq	Accept	Validate	Lib Mgmt	Heal	Rev Eng	Transl	Grand Total
Policy, process, standards	30	69	40	67	43	37	28	314
Personnel, Resources (Lack of TDP SMEs)	39	38		24	14	6	15	136
Training	34	38					15	87
Inadequate Contract Requirements	20	28					25	73
Inaccurate life cycle cost estimation		52					20	72
TDP Access/Control/Distribution Processes				56				56
Long term Supportability Planning			5		40	6		51
Software issues					9	39		48
Multiple CAD/CAM/CAE software packages	10	9		18				37
Lack of Understanding							31	31
Lifecycle storage strategy					29			29
Infrastructure not connected				26				26
Quality				23				23
Tech Authority				11				11
Parking Lot	1					1		2
Grand Total	134	234	45	225	135	89	134	996

Related to Configuration Mgmt Tools / Processes: Score 196

Ranked 250 root causes by process in terms of high, medium, low impact to our problem statement and categorized as indicated in the table above.

Detailed lists of root causes are available as requested.

CPI POA&M

Tollgate	Date	
Define:	**01/31/13**	**Complete**

Charter signed/approved by all stakeholders; Voice of Customer surveys.

Measure:	**07/31/13**	**Complete**

Data Collection ongoing; gathering metrics from Programs, FRCs, NAWCs.

Analyze:	**11/30/13**	

Use collected data for root cause and gap analysis.

Improve:	**02/28/14**	**On Track**

Develop To Be Framework and BCA. Develop near term process fixes and acquisition language.

Control:	**04/30/14**	

Implement and monitor process fixes. Determine follow-on CPI teams.

CPI PROJECT NEXT STEPS

- **Improve:**
  - Document “to be” business processes
  - Requirements definition
  - Analysis of Alternatives
  - Recommend Solutions
- **Control:**
  - Develop implementation plan
    - Update policy
    - Update tools
    - Develop training plan
    - Establish Control Plan
- **Establish team to implement**

CTMA: FRCSW Teamcenter PLM Project

- FRCSW Leads: Mike Warren (6.8) / Rick Mendoza (4.3)
- Purpose: Develop configuration management and part associations for 3D data. Develop capability for access by all data consumers throughout creation, management, and utilization.
- Status:
  - Phase 1: NMCI-RDT&E Networks Connected
    - Teamcenter Inter-Network Operability Obtained
    - Tech. Lib. functions and 3MS workflows integrated in Teamcenter
  - Phase 2: Data Access to FRCSW from CHPT and JAX demonstrated via Web Client
  - Phase 1 & 2: Completion extended to 24 June 2014
    - Achieve FRCSW RDT&E data access from CHPT and JAX via Rich Client on NMCI S&T seats

CTMA: 3D PDF/ Model Validation

- NAWCAD LKE Project Leads: Erik Merk (6.8.4) / John Schmelzle (4.8.6)

- Purpose:
  - Create 3D Technical Data Packages (TDPs) Model Based capability to be used for acquisition, logistics, and manufacture
    - Translate LKE's Source ProE/Creo CAD files into both 3D PDF and STEP files
    - Facilitate review of data using Adobe Viewer
    - Demonstrate use of STEP Vendor Neutral files (.STP) corresponding to the native CAD files for use in manufacturing/vendor solicitation
  - Two Step Process:
    - Design 3D PDF Template
    - Develop /demonstrate (internal) Manufacturing RFQs and (external) RFP/solicitations using STP and CAD files embedded within 3D PDF files

- Status:
  - $100,000 grant awarded, project to be completed 9/30

Industrial Network Connectivity Infrastructure

- Project Sponsor - COMFRC 6.0 Deputy (Dennis West)
- Project Lead - COMFRC National 4.0 (Chris Holder)

- Purpose: FRC sites are unable to easily move or share digital data for Computer Aided Manufacturing (CAM) functions due to the lack of an approved/accredited network for industrial computers and equipment.
  - NAVAIR Engineering (ISSC) and Production Competencies use different networks to support their customers: RDT&E and NMCI for Computer Aided Design (CAD) and Computer Aided Engineering (CAE); Legacy and Standalone Applications for production and manufacturing functions.

- Status - The project lead is currently gathering information on current FRCE, FRC SE and FRC SW network capability improvement efforts and soliciting site recommendations for a COMFRC-wide course of action.

QUESTIONS?