COMFRC

Commander, Fleet Readiness Centers

FRCSW ATI IPT Overview

June 2020

Presented by: Gabe Draguicevich

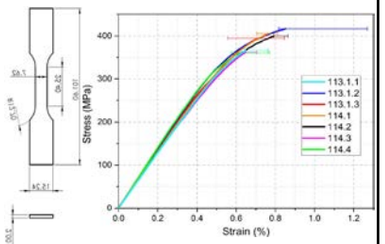
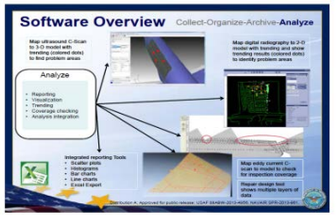
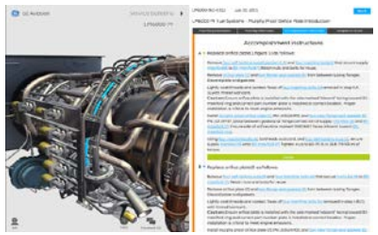
Advanced Technology & Innovation

NAVAIR Fleet Readiness Center Southwest

AGENDA

- **FRCSW Led SBIR Projects**
- **MBE Digital Initiatives**
- **Questions**

FRCSW Led SBIR/SDIS Technology Projects

	Project	Details
	KM Equip for Dimensionally Restoring Bores of ACFT Components (Inovati) Lead: FRCSW; SBIR, AERMIP, SI Impact: Readiness and Cost Savings	• Fund Inovati to develop repairs and transition the necessary hardware and software to accomplish bore repair with existing FRCSW Cold Spray systems. • The SBIR covers costs associated with "roll testing" the F/A-18 wheels at USAF WPAFB Test Facility
	Dimensional Restoration of Damaged Aircraft Components (ES3 Inc) Lead: FRCSW; SBIR Phase II.5 SI Impact: Throughput and Readiness	• Evaluate and validate cold spray coatings with three cold spray systems - robotically and hand held applications - for COMFRC's industrial operations • Develop the test protocol for validating all cold spray applications and testing for NAVAIR Certification and general authorization for aerospace components.
	NCheck (Etegent Technologies) Lead: FRCSW; SDIS SBIR Phase II.5 project Impact: Throughput and Readiness	• Artisan inspection documentation using digital tablets Digital mapping of damage photos, NDI and inspection data for ingestion into Nlign via AVPLM • Improve turn around time and lower engineering costs on repair dispositions • Ability to query/reuse previous repair dispositions.
	AR/VR Tools for In-House Instructions (Sharp Vision Inc) Lead: FRCSW; SBIR Phase II.5 Impact: Throughput & Maintenance	• Develop a process for creating visualization models and AR/VR software tools for training and work instructions to improve the effectiveness, productivity and quality in training, manufacturing, maintenance and repair in the model based environment.

Federal Lab Activities: FRCSW CRADAs

- **FRCSW - ITAMCO CRADA Exploring Blockchain for Supply Support**
  - Led to SBIR Phase II and collaboration with NAVAIR Digital Group, BR&T on SuperHornet Critical Part use case

- **LP-CRADA with Atmospheric Plasma Solutions (APS) (Completed)**
  - Risk Reduction research on promising SBIR developed technology for sealant, paint and RAM removal on aircraft aluminum skins for potential Phase II.5 contract.

- **FRCSW – SurFx CRADA (Signature phase - Awaiting new ORTA assignment)**
  - Evaluate new Atmospheric Plasma formulations and process for composite injection repairs

- **FRCSW – AKT Optimize CRADA**
  - Evaluate new JPA development software for organic production

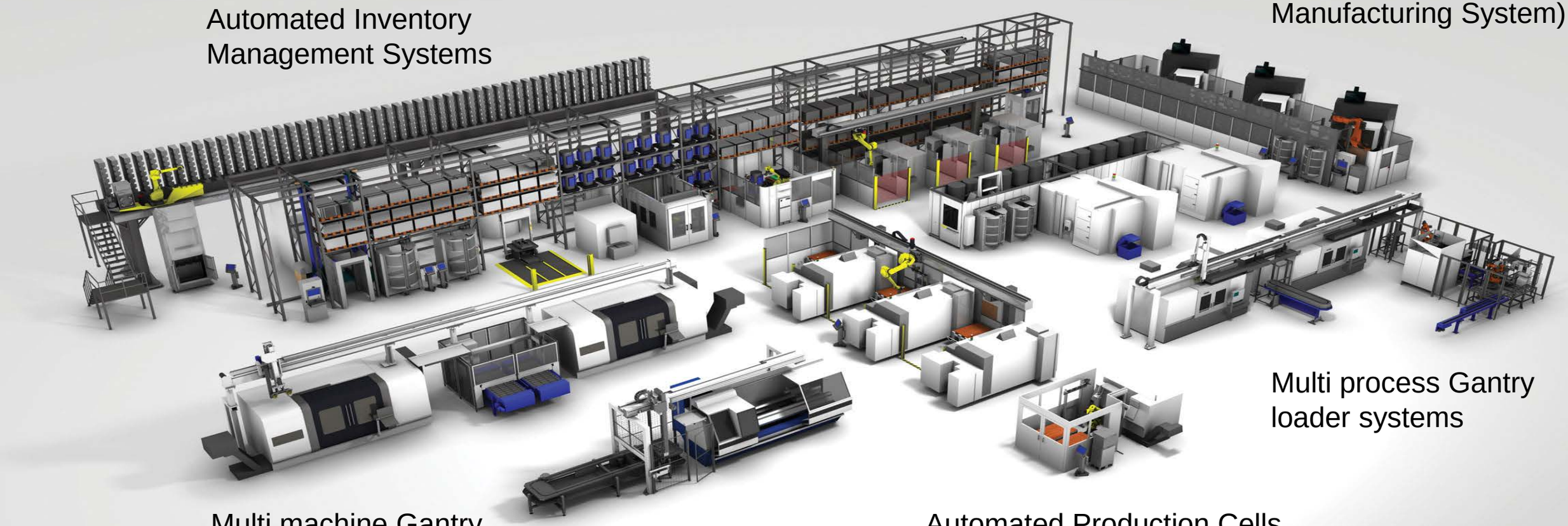
- **Proposed FRCSW LP-CRADA with MELD Manufacturing (On Hold)**
  - Investigate of Additive Friction Stir weld repair of fastener holes, corrosion and wear in anticipation of ONR S3R project funds FY 21 and FRCSW CIP placeholder purchase

Proposed Industrial Led Projects For FY 20-21

Project Name	Brief Description	Benefiting Shop
Catapult Innovation Admin Support	Admin and coordination of CATAPULT Innovation activities to administer 3 events/yr	FRCSW
RFID Tracking of NPSL assets	Asset tracking is needed to streamline the inventory process of PEMA tagged assets. Some items are periodically misplaced and an RFID system could help locate the asset faster, i.e., misplaced calibration folders, PEMA asset that move between rooms or buildings. RFID could be used to improve the process control of assets going through the calibration process which includes customer equipment that requires calibration; could be tracked more efficiently during all processes. Tagging will be with the history folder of customers' product since NPSL does not have ownership over the item.	NPSL & COMFRC RFID Team
SDIS	IFDIS-HUD	Components
ONR ADAPT	4- Robotic Material Handling	COMFRC/NAVSEA/LOGCOM
ONR ADAPT	7- Autonomous Facility Health Monitoring and Prioritization	COMFRC/NAVSEA/LOGCOM
Integrated Manufacturing (Machining and Grinding) Cell	CIP Project to support the concept of Industrial Optimization Plan (IOP)	Mfg / Components Machining
Zinc Nickel Plating Line	SBIR Started at Hill AFB. When transition to a 2.5, JAX took lead. (These projects are shared by the FRC's) Certification from NAVAIR for landing gear substitution of CAD coating.	Plating
Cold Spray Booth	Expansion of existing system. Materials lab and production systems will be duplicate.	Components / Material Lab
OSD JRobot	Factory Automation / Parts Inventory / Artisan	Test/Pilot Program
USMC SCO/NIAR - JARVIS Scan & Robotic drilling	Hole scanning and drill alignment.	Technology Development
PMB/Paint Shop KYDEX cover trial (benesug)	Masking for PMB	Test / Pilot Program

Enhancing the Digital Depot

FACTORY AUTOMATION SYSTEMS



Automated Inventory Management Systems

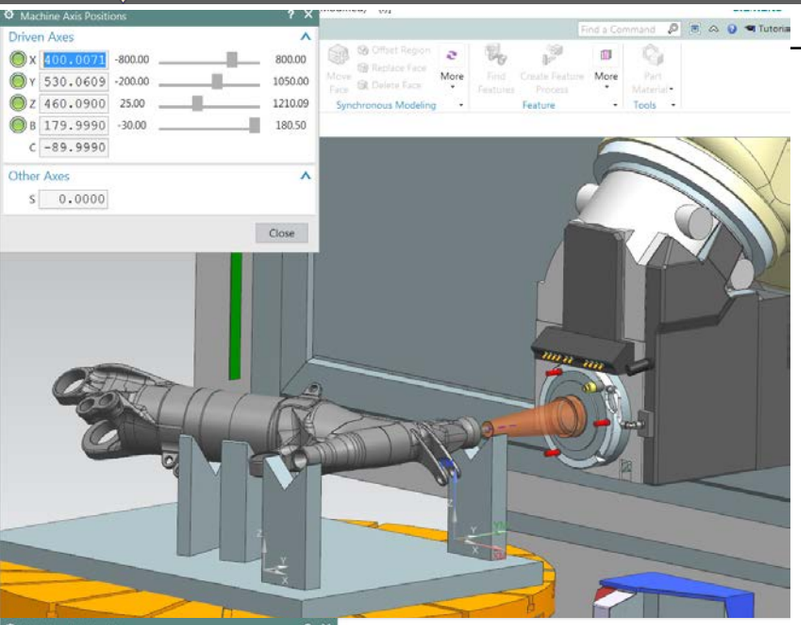
Robotic – FMS (Flexible Manufacturing System)

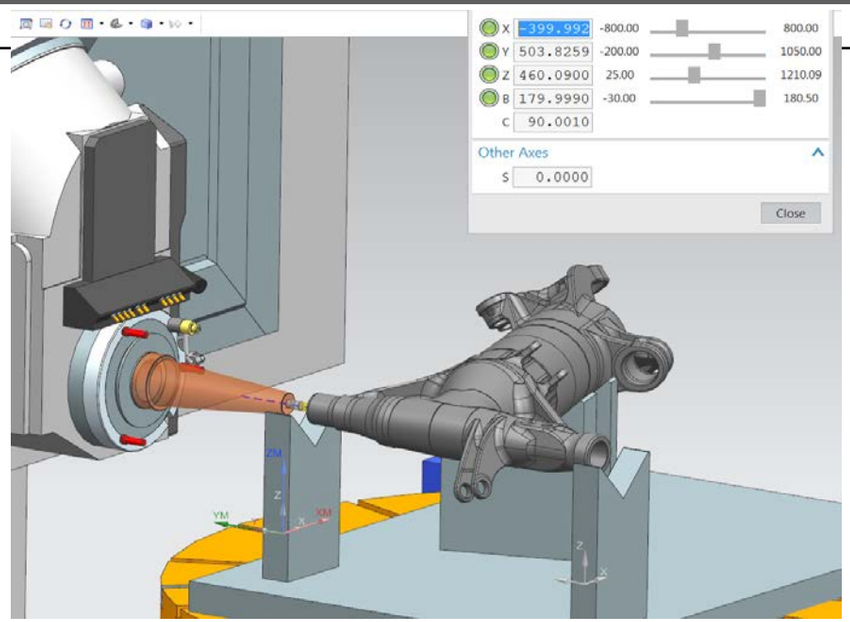
Multi process Gantry loader systems

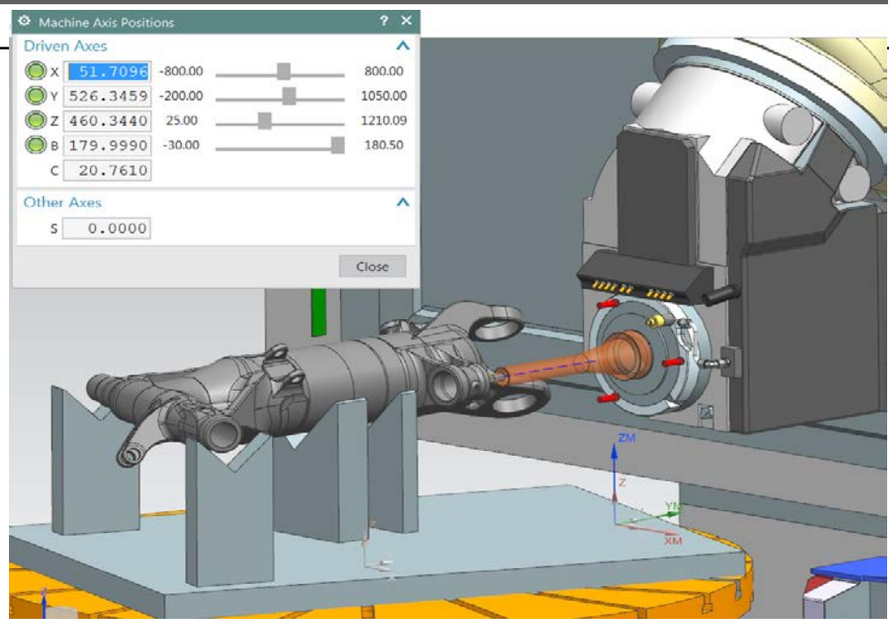
Multi machine Gantry loader systems

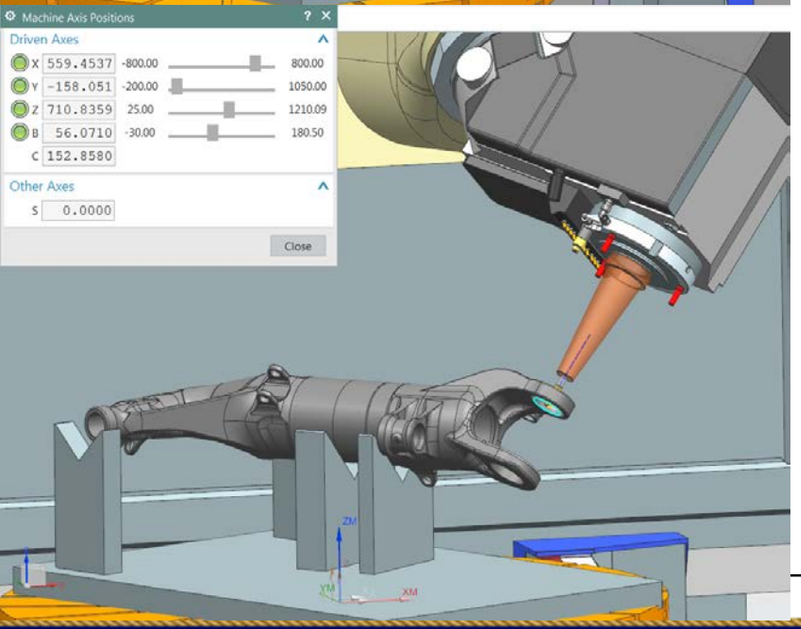
Automated Production Cells

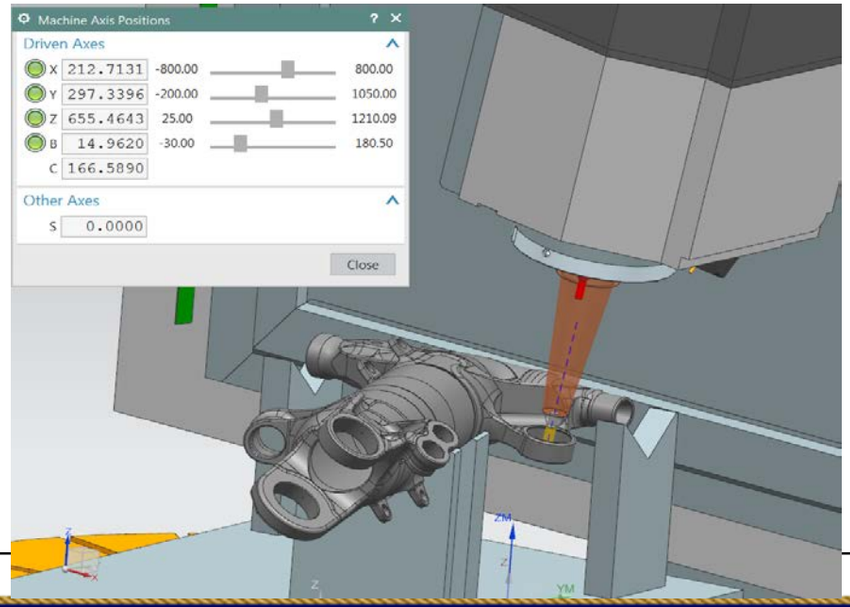
74A410511-2027 Landing Gear

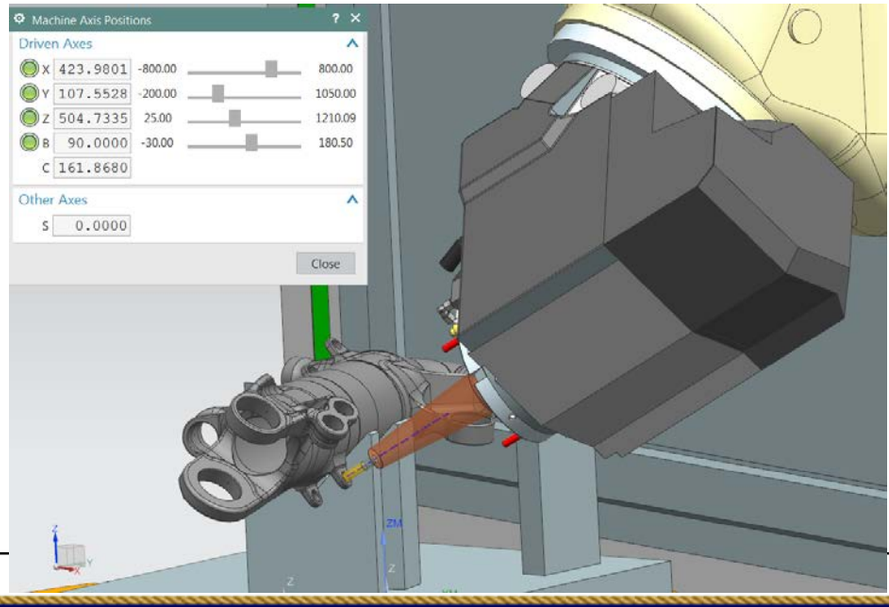












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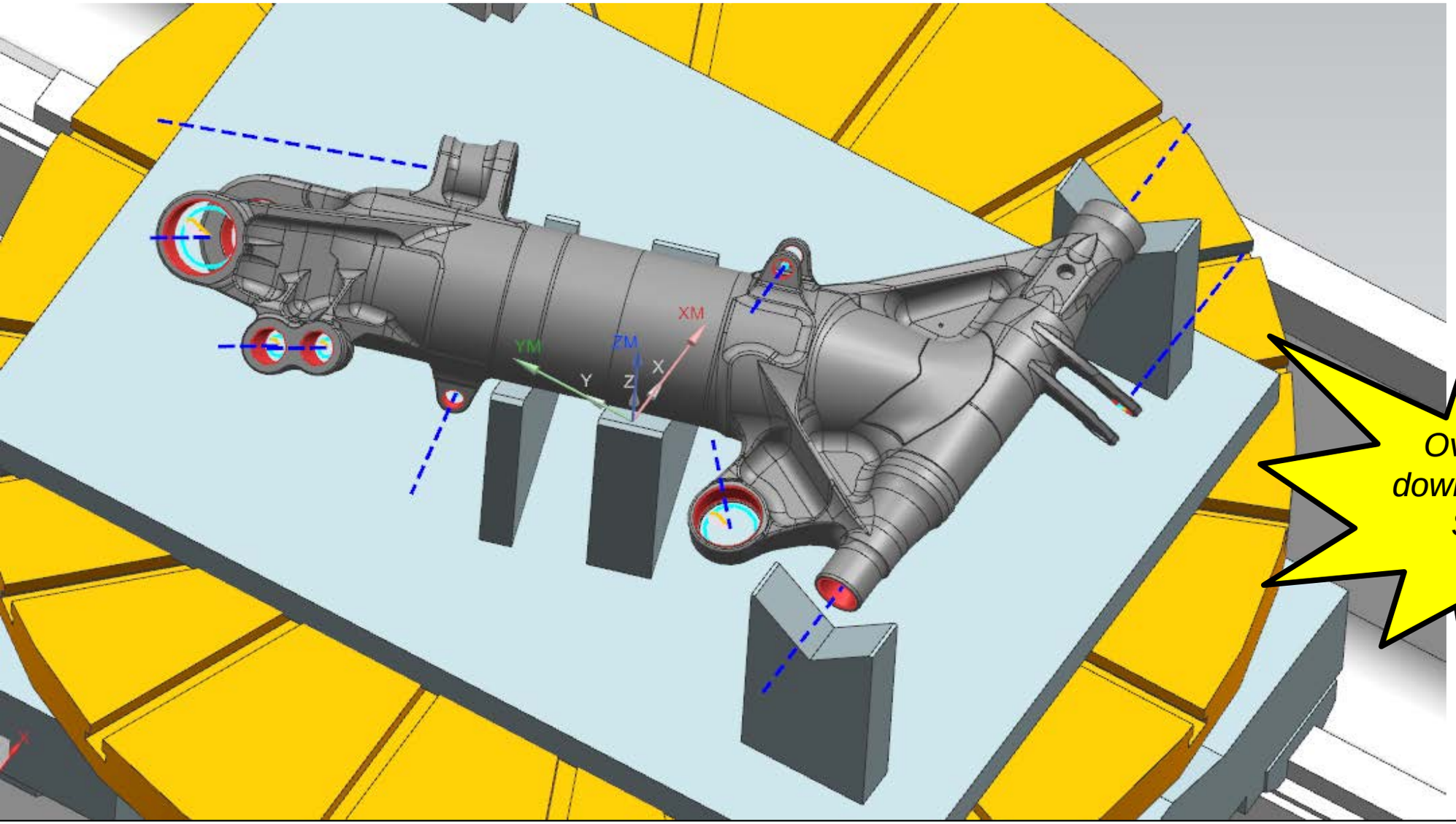
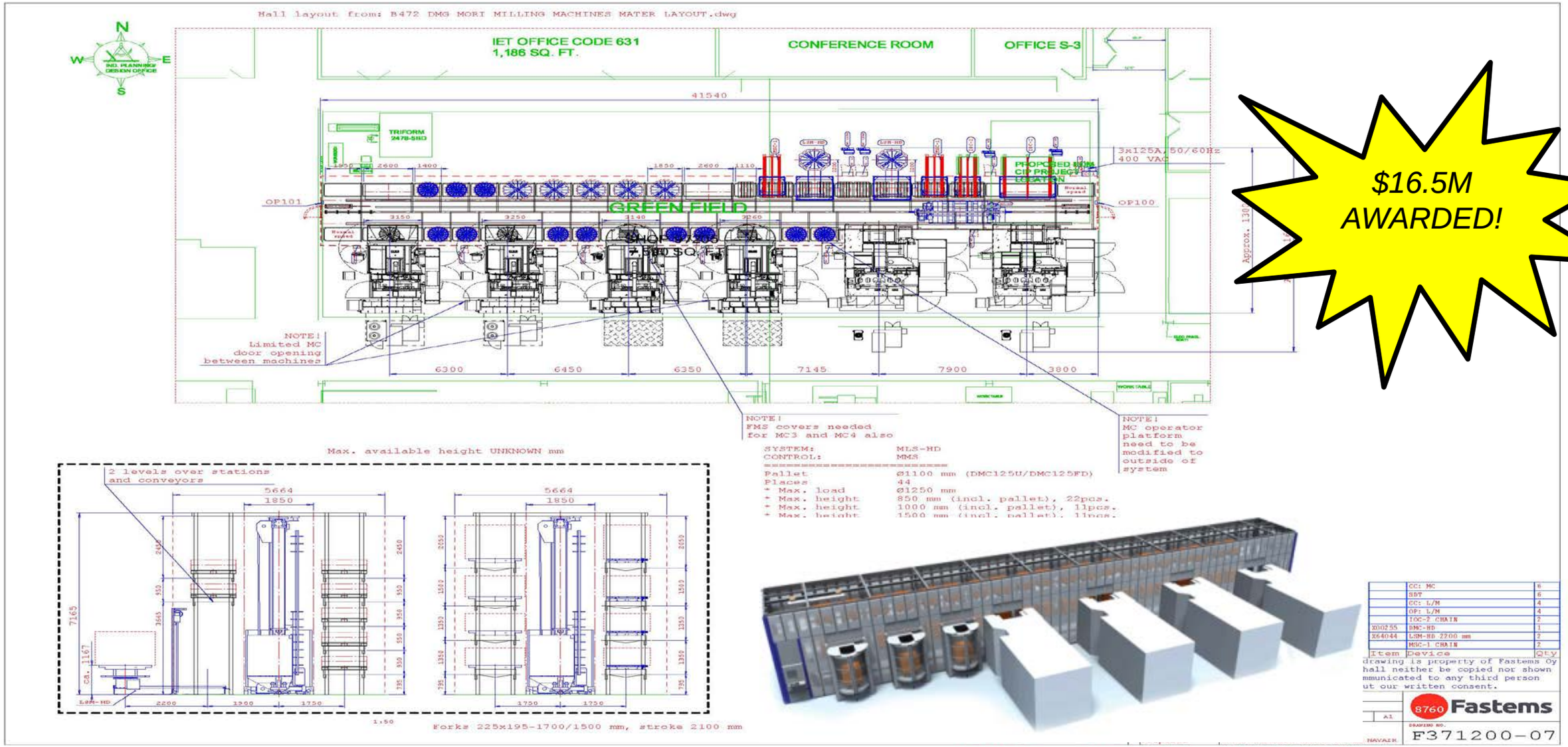


1. Machining of existing Bushed Bores to their original Positional / Dimensional (All features in single set-up)

Over 80 Hours down to 6 Hours of Set up and Machining

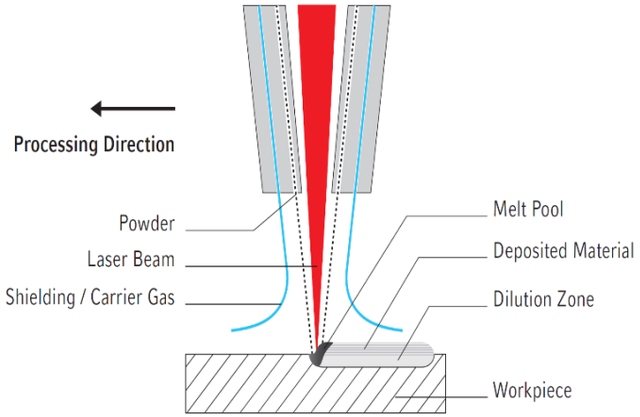
Integrated Manufacturing Cell / Factory Automation



$16.5M AWARDED!

3D Printing / Additive Mfg / Hybrid Machining

LASERTEC 65 3D **Additive Manufacturing**



- 10x faster vs. powder bed - technology
- Complete machining without process-chamber
- Wall thickness from 0,1 mm to 5 mm possible
- Feasibility of 3D-contours without support structure e.g. machining of a flanges, cones
- The flexible change between laser and milling operation allows the direct milling machining of sections which are not reachable anymore at the finished part

PEO (CS) LOG-IT Vision, Mission and Goals

VISION

Enable next generation Digital Sustainment capabilities that enhance our competitive advantage and dramatically improve Naval Aviation readiness

MISSION

Lead the acquisition and coordination of all Digital Sustainment Solutions for NAVAIR and the Naval Aviation Enterprise (NAE)

GOALS

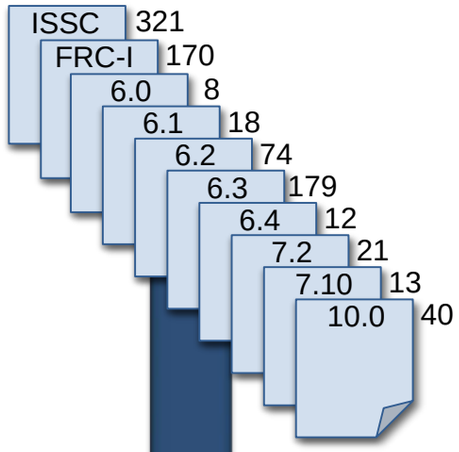
(1) Prevent investment in duplicative digital sustainment solutions that are not aligned with the PEO(CS) and Navy Digital Roadmap

(2) Retire legacy systems, transitioning capability and data into the modernized digital ecosystem

(3) Enabling authoritative enterprise capabilities and single sources of truth for Product Lifecycle Management (PLM), Maintenance Repair Overhaul (MRO), and Integrated Data Environment (IDE)

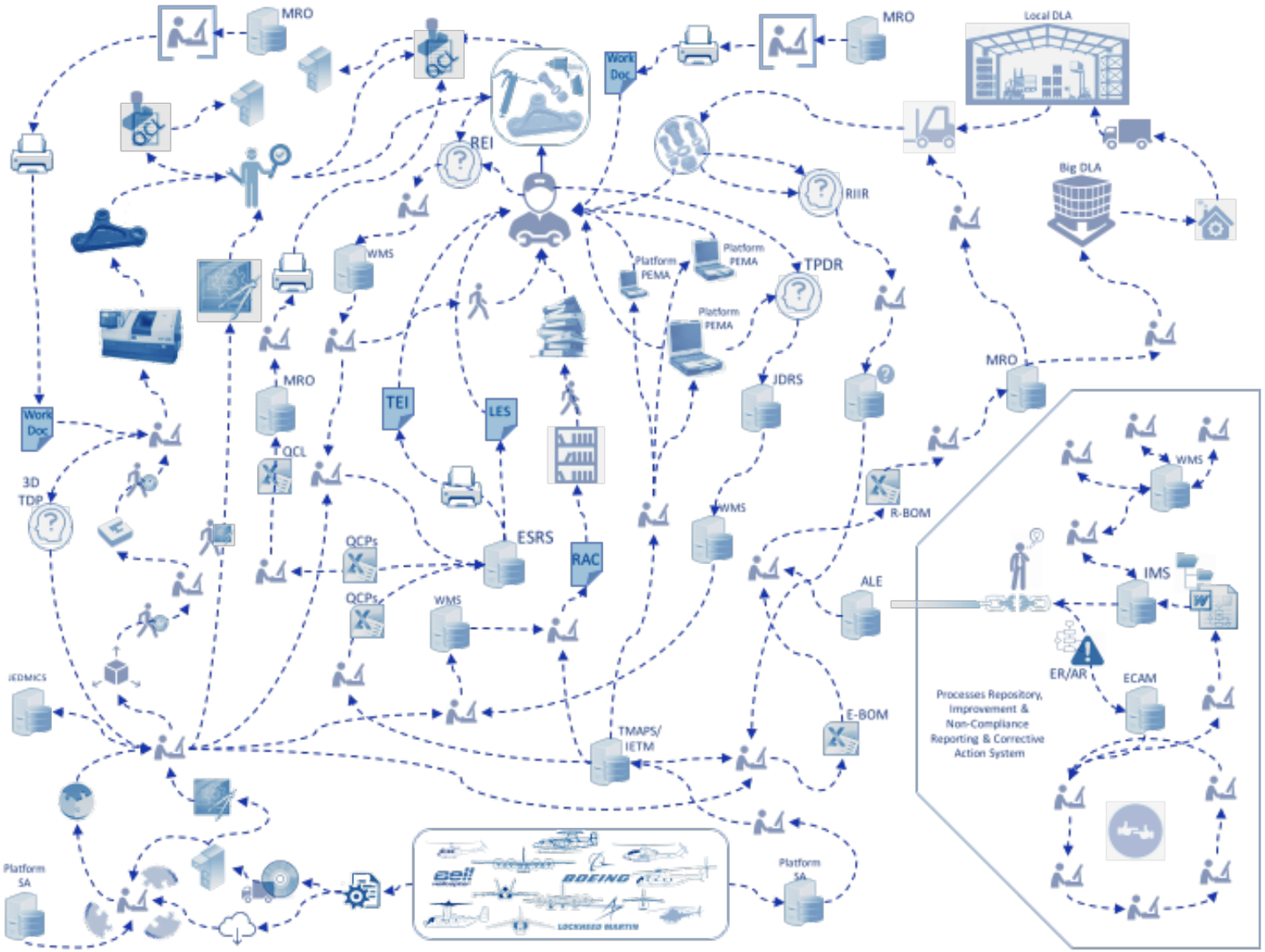
The Fundamental Problem

1000s of
Instructions &
Processes

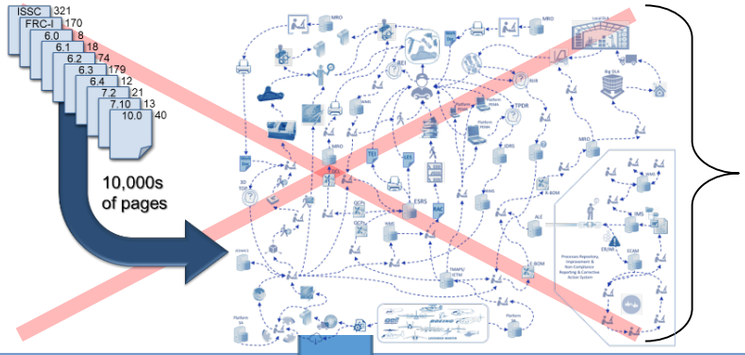


10,000s
of pages

Disparate IT Systems, E-mail, Spreadsheets, Paper

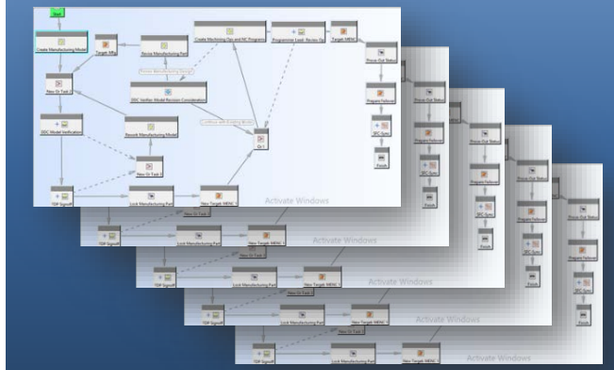


Aviation PLM (AVPLM): Concept



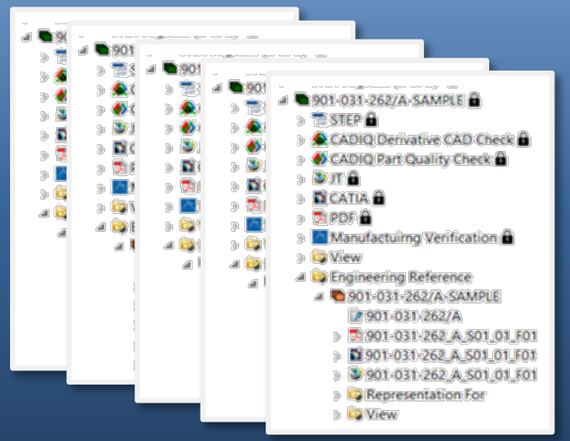
- Loss of Consistency,
- Inability for effective Continuous Process Improvement (CPI)
- Lost time finding data
- Lost time validating Data
- Subordinate corrective Action processes not linked / tracked

Digital Workflows



Accelerated Sustainment

Data Items / Data Models



TEAMCENTER

- **No Data Hunting**
- **No Data Validation**
- **No Rework**
- **Fully & Digitally Auditable**
- **Closed Loop Corrective Actions**

AVPLM = Common Architecture supporting ALE + IDRN

LOG-IT ADM Structure

Resources and Requirements Review Board (R3B)

Chair: CNO/CMC/RDA

Members: OCMO, CIO, ASNs, VCNO, ACMC, Fleet Commanders

VADM Michael Moran Milestone Decision Authority (MDA) for NAVAIR LOG-IT

Senior Steering Group

Chair: Principal Military Deputy (PMD), ASNRDA

Members: VCNO, DASN IWAR, OPNAV N4/N9, USFF, DASN FMS, CIO, Capability CFT Chairs, ACMC, OCMO

Capabilities Prioritization Board (CPB)

Chair: OPNAV N4 and HQMC I&L or DASN S

Integration CFT

Chair: DASN IWAR

Architecture Review Board (ARB)

Chair: CIO/CMO

Members: DASN IWAR, OPNAV N2/N6/N4/N9, USFF, DASN FMB, DASN FMS, CIO, Capability CFT Chairs, HQMC DC C4, HQMC DC I&L, OCMO, PMW-220, DASN Sustainment

MRO

Functional Chair: USFF N43

Acquisition Chair: PMW-150 PMS-444

PLM

Functional Chair: USFF N43

Acquisition Chair: NAVAIR PEO(CS) NAVSEA O6

SCM

Functional Chairs: USFF N41 NAVSUP N4

Acquisition Chair: PMW-150 PMW-220

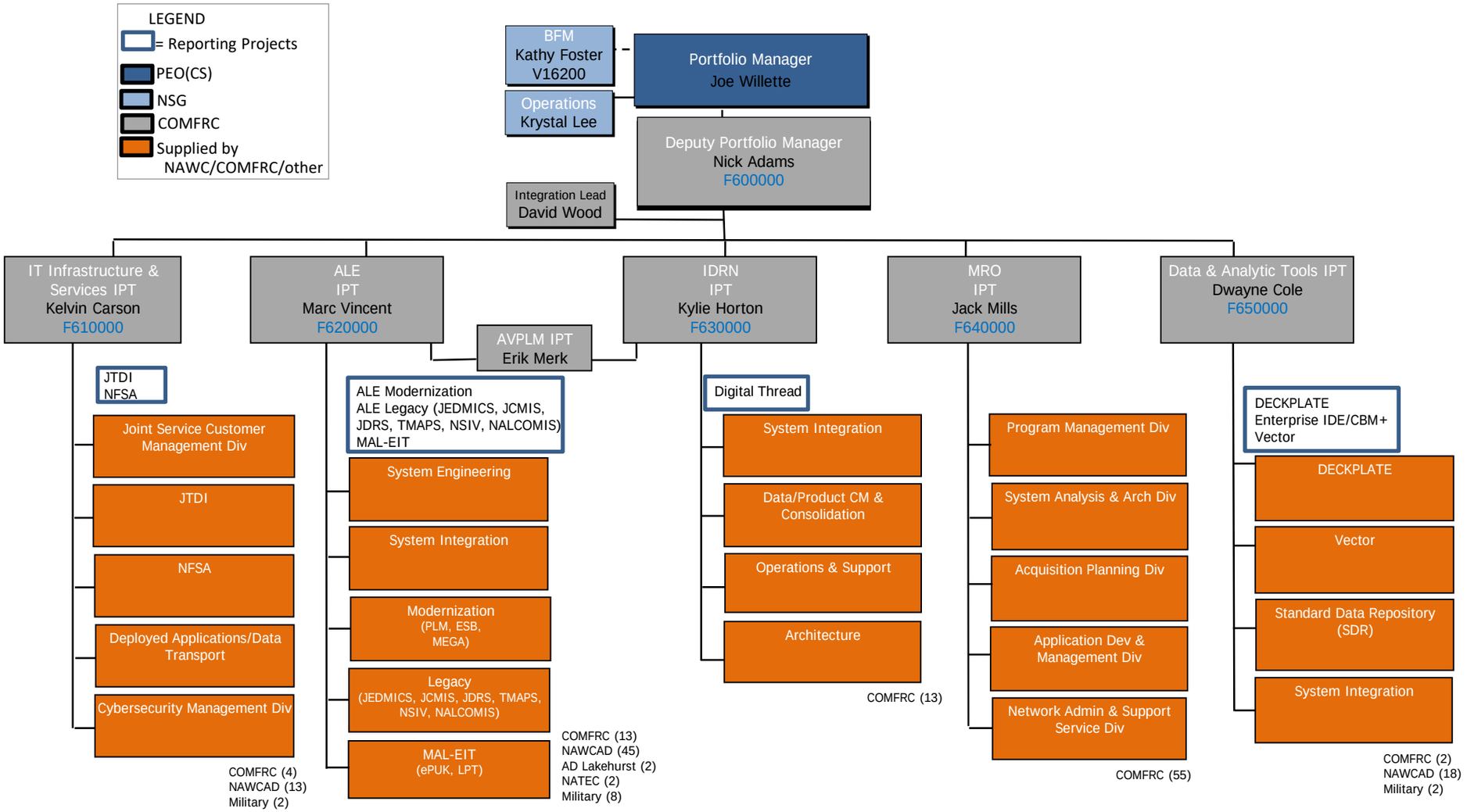
IDE

Functional Chairs: OPNAV N41

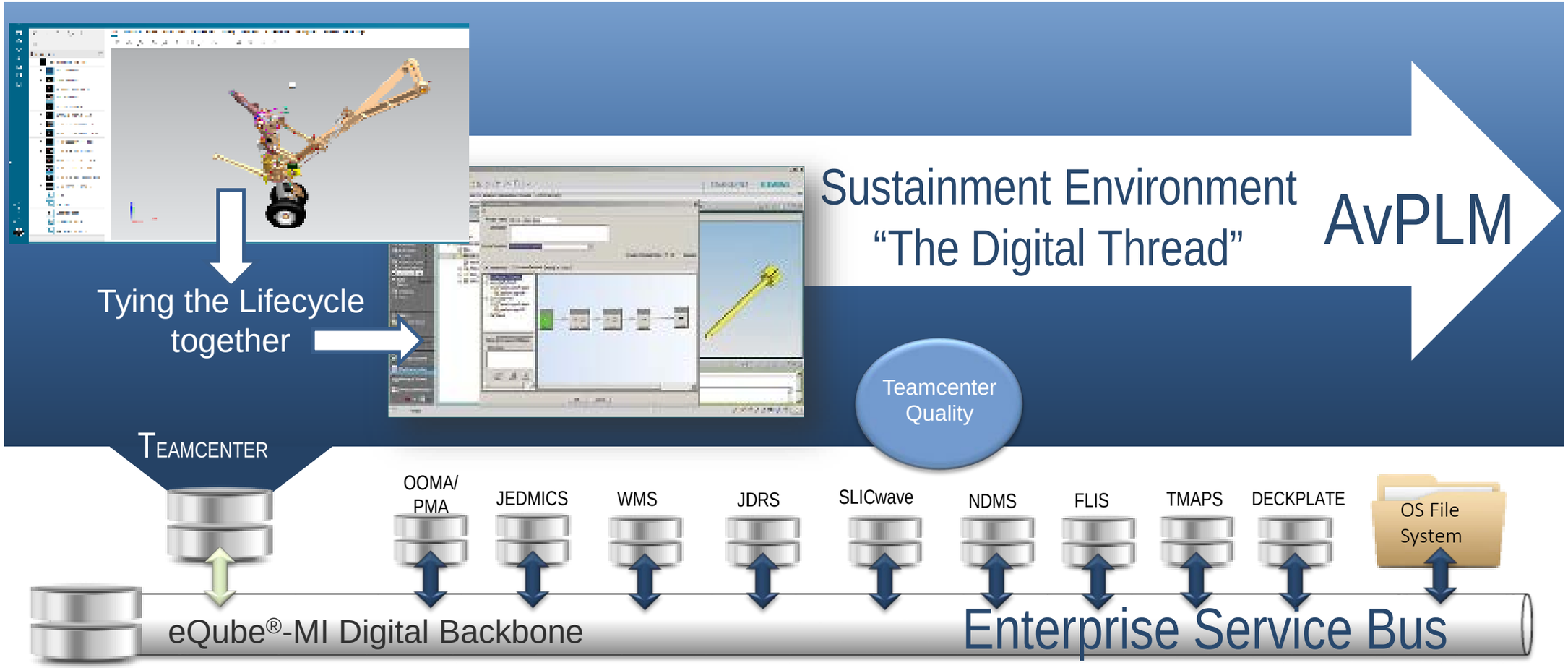
Acquisition Chair: PMW-150

NAVAIR serves as PLM Co-Chair. Membership in MRO, SCM, and IDE CFTs

PEO(CS) LOG-IT Org Chart



Aviation PLM (AvPLM)



Primary AvPLM Objectives:

- Retirement and consolidation of legacy LOG-IT systems
- Facilitate and automate lifecycle management processes from conception through production and sustainment
- Configuration, Change and BOM management for parts and aircraft (by BuNo)
- Support Maintenance, Repair, Overhaul (MRO) systems as well as PMAs and FSTs
- Configuration Management of integrated baseline data and Products Support Elements (e.g TECHPubs, Drawings)
- Use configurable COTS to reduce technical and cost risk

ALE Modernization

Aviation Platforms Supported

- H-1
- H-60
- MQ-25
- P-8
- MQ-4
- V-22
- F/A-18
- MQ-8
- E-2D
- VH-92
- H-53
- AIRWorks
- PMA-281

Future Emerging Requirements

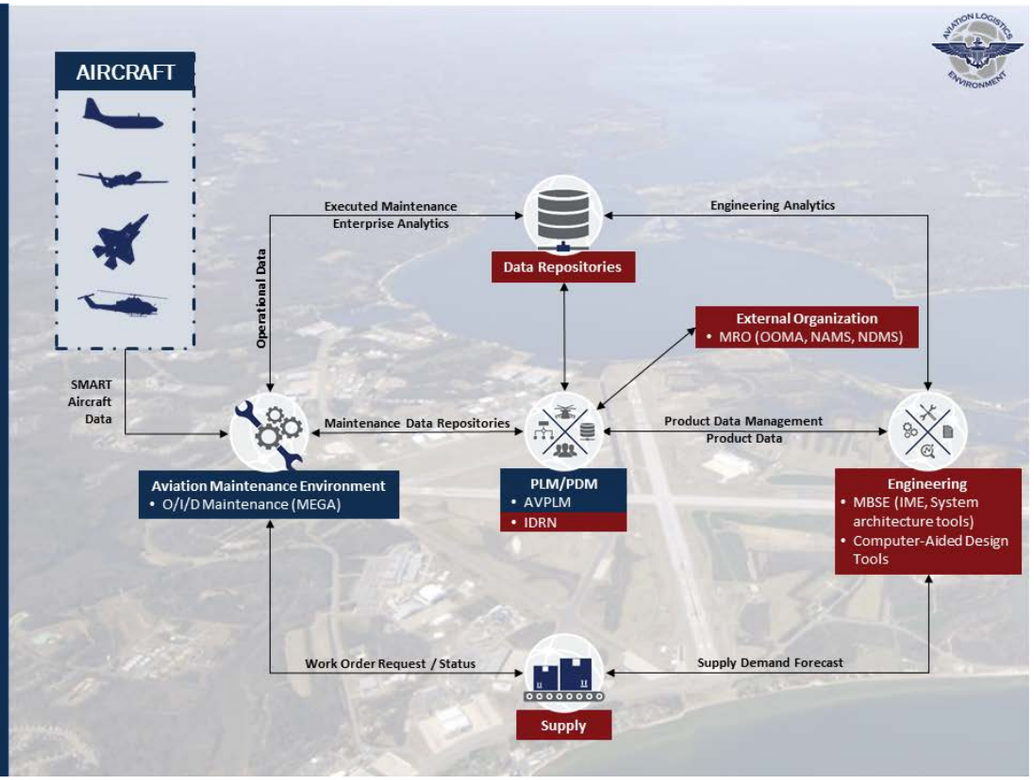
AVIATION LOGISTICS ENVIRONMENT OV-1

ALE is the Naval Aviation Enterprise Logistics IT Solution

- Common NAE infrastructure capability Maintenance Engineering Ground Station Aviation (MEGA) and Enterprise-level Product Lifecycle Management (PLM)
- All levels of Maintenance
- End-to-end process view (standard user interface) that enables on-demand information to stakeholders
- Retirement of aging, near end-of-life systems and applications
- Consistent and accurate weapons system technical and engineering documentation
- Standardized metrics, algorithms, and business analysis tools
- Alignment to Information Assurance (IA) and Cybersecurity standards

Data Flow Connection (Includes Enterprise Service Bus (ESB) API orchestration)

External to ALE



Locations

- All CVN/LHD/LHA
- CNAF
- FRCs
- NAWCs
- Air Force Locations
- Coast Guard
- White House Comm. Agency
- Pax River Data Center

ALE Mod provides COTS Aviation Product Lifecycle Management (AvPLM) and Enterprise Service Bus (ESB) for universal access to authoritative data and workflow automation, and GOTS Maintenance Engineering Ground Station for Aviation (MEGA) for planeside integration. ALE Legacy applications (JCMIS, JDRS, JEDMICS, NSIV, TMAPS, EPUK, LPT) will transition to the ALE Mod infrastructure providing capabilities for management of Engineering product data, end item configuration, deficiency reporting, standard ITEM viewing, Technical manuals.

Organizational users of ALE include:

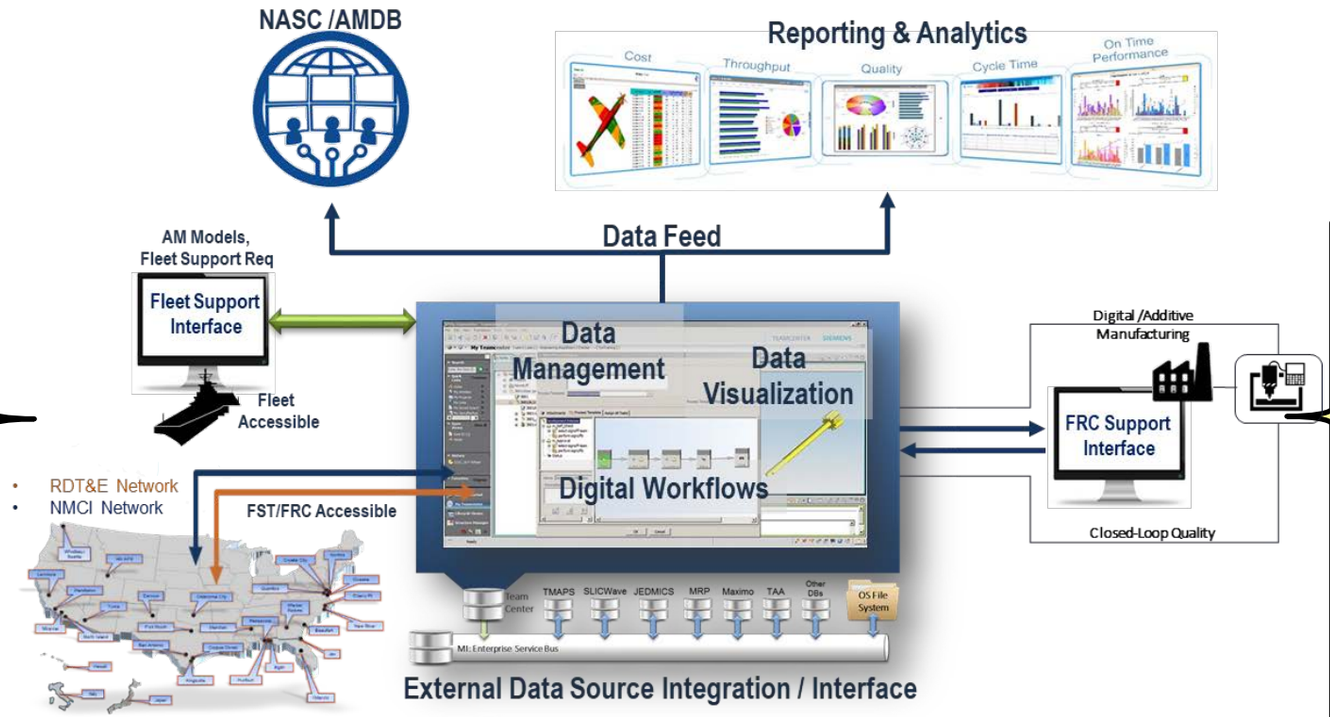
1) Squadrons
2) Wing/MAG
3) All O/I/D Level Maintenance Activities, CONUS/OCONUS USN, USMC
4) Aviation supply departments
5) In-service support centers
6) Fleet support teams
7) Fleet Readiness Centers
8) NAVAIR Program Offices
9) NAVAIR Technical and Engineering Center
10) NAWC
11) CNAF
12) CNATTU
13) NAVSEA
14) All CVNs & Air Capable Ships
15) NAVSUP
16) DLA
17) Joint – USAF, USCG
18) Foreign National – FMS & CPP
19) OEMs
20) 3rd party repair sites

IDRN Overview

Aviation Platforms Supported

- H-1
- H-60
- V-22
- F/A-18
- MQ-8
- E-2D
- VH-92
- MQ-25

Future Emerging Requirements



Locations

All FRCs

All NAWCs

Fleet Forces

IDRN leverages COTS Aviation Product Lifecycle Management (AvPLM) and Enterprise Service Bus (ESB) solutions to provide universal access to authoritative data and workflow automation across FST and Depot-levels, enabling configuration management of data, implementation of closed loop quality and consolidation of engineering products including digital enablement of additive manufacturing.

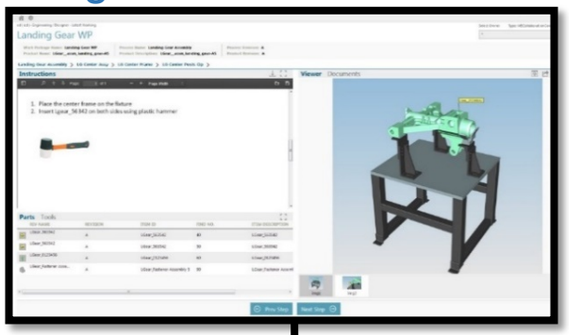
Users supported by IDRN include:

- **Fleet (AM)**
- **In-Service Support Centers**
- **Fleet Support Teams**
- **Fleet Readiness Centers**
- **NATEC**

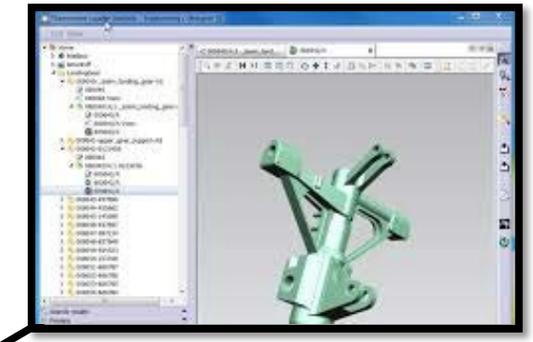
Aviation PLM (AVPLM)

Search

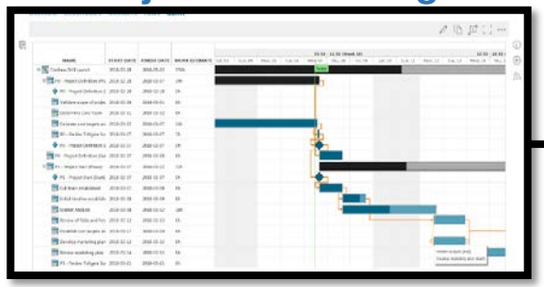
Digital Work Instructions

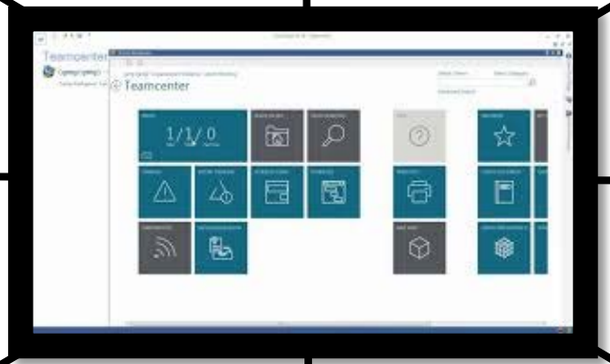


Bill of Materials (BOM) Management

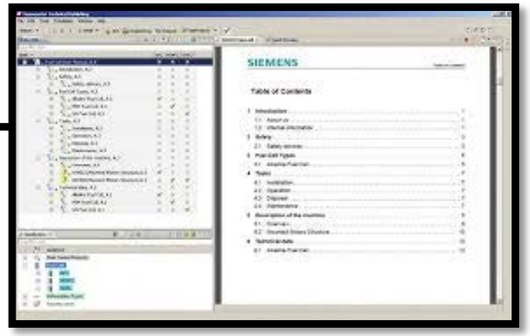


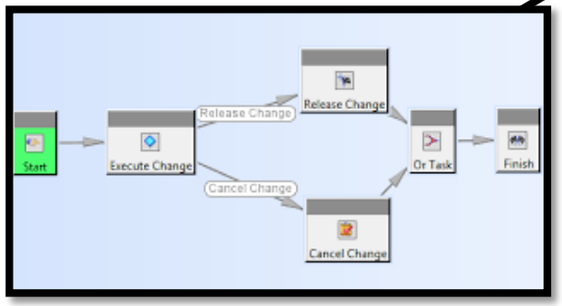
Project Scheduling



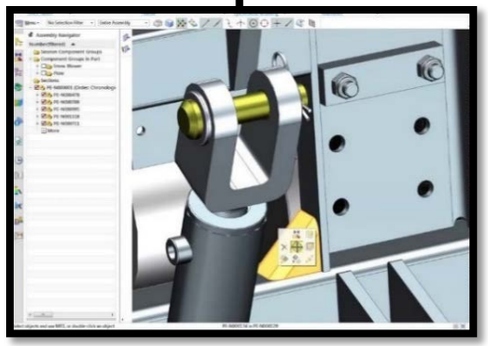


Content Management





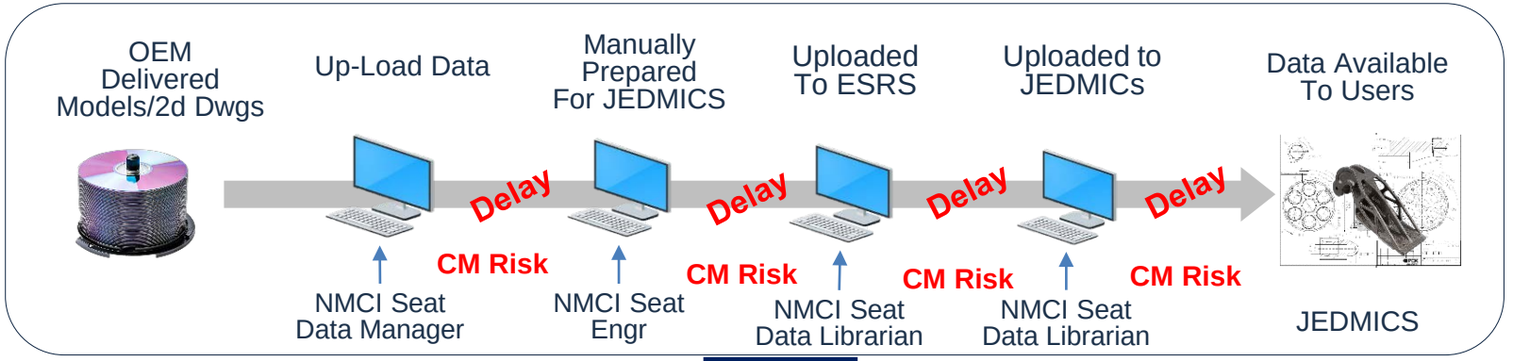
Digital Workflows



CAD Integration & Visualization

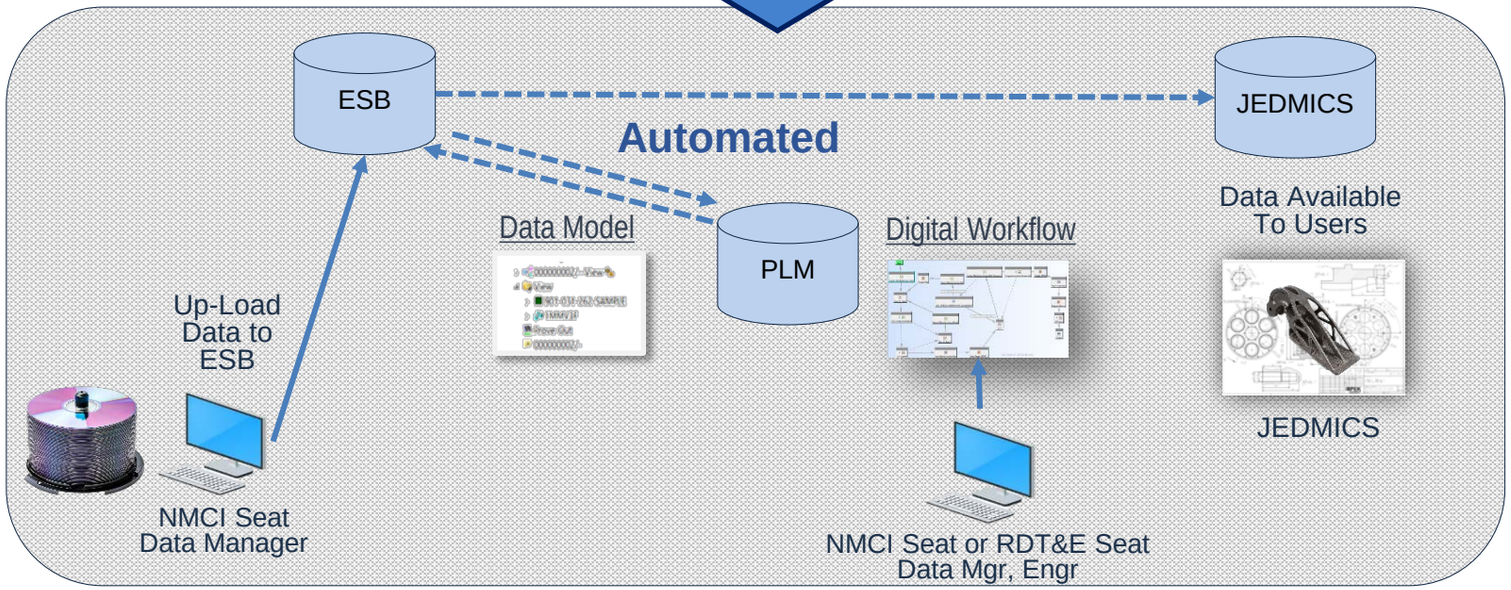
Data Item Relationships

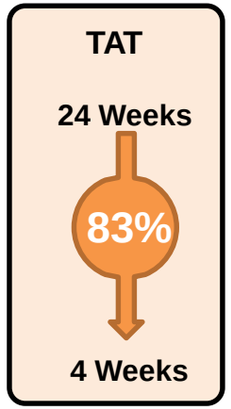
TDP Acceptance and Upload (V-22)



FROM

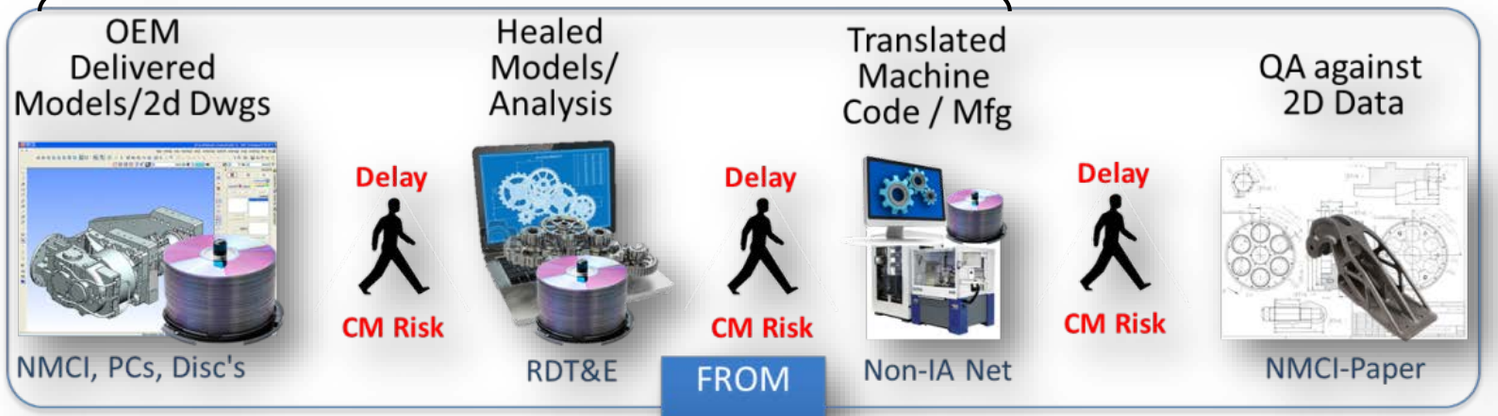
TO





Digital Manufacturing

Avg. Time to prepare data for Part Manufacture



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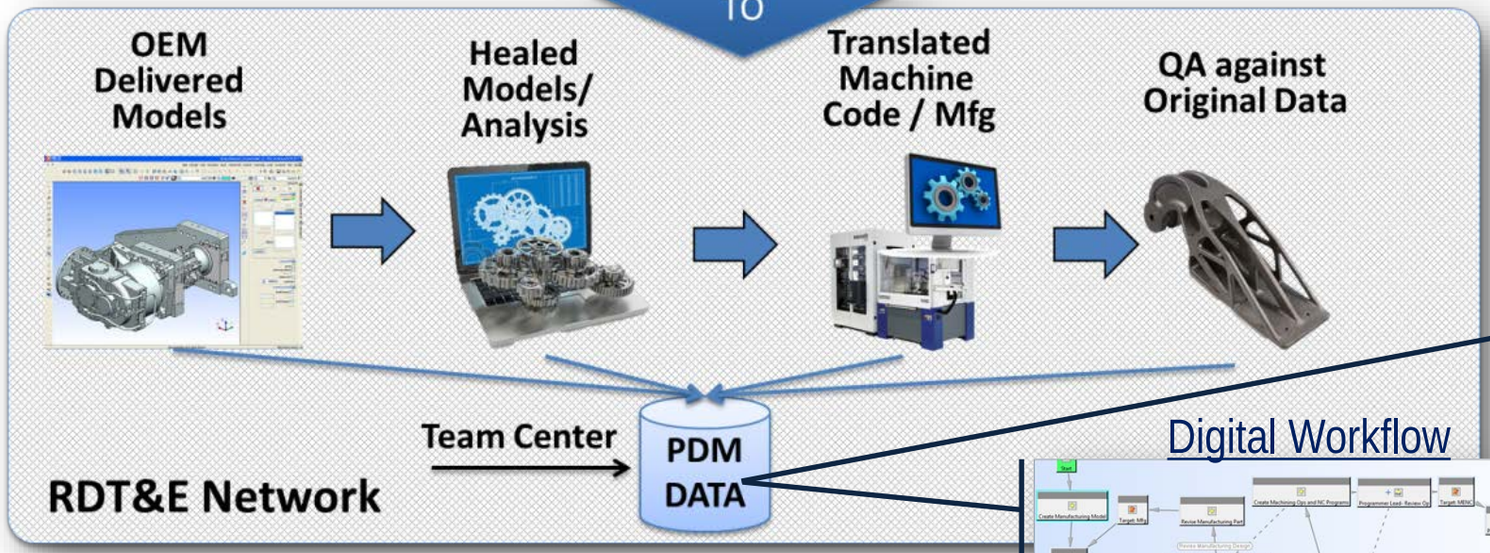
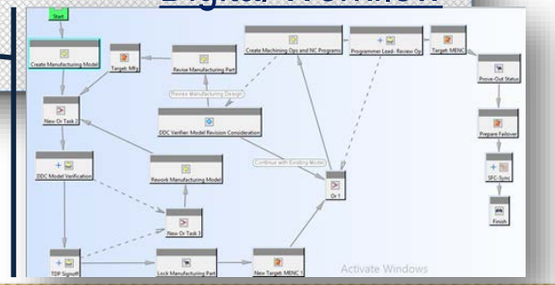
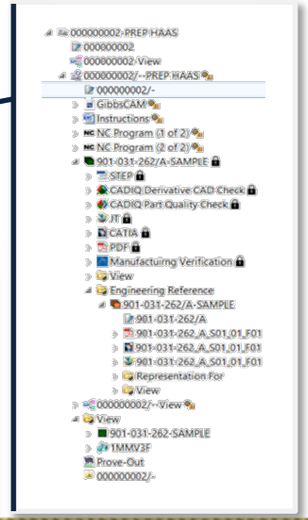


Initial Request	Subsequent Requests
80 MHrs	80 MHrs
25%	98%
50 MHrs	1 MHr

Digital Workflow



Data Model



Electronic Work Package – Overview

Electronic Work Package = EWP

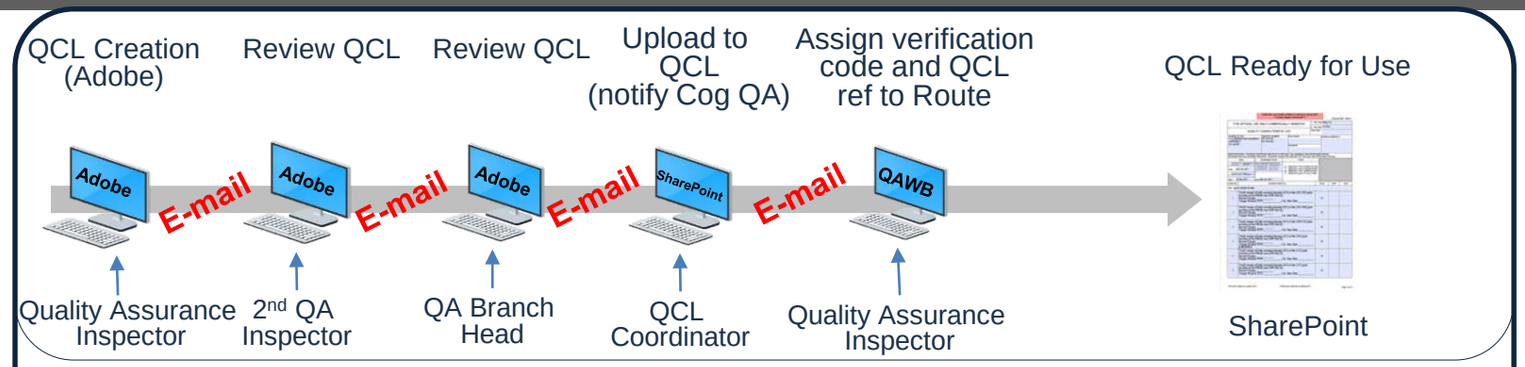
- Digitization of paper work orders (WO) → electronic work order (EWO)
- Digitization and standardization of Quality inspection plan (IP)
- NAVAIR Depot Management System (NDMS) creates the EWO
- Aviation Product Lifecycle Management (AvPLM) Opcenter Quality creates the IP
- Data is enabled via an Enterprise Service Bus (ESB)
- EWP is LIVE in Production as of Dec 2019

Benefits of EWP

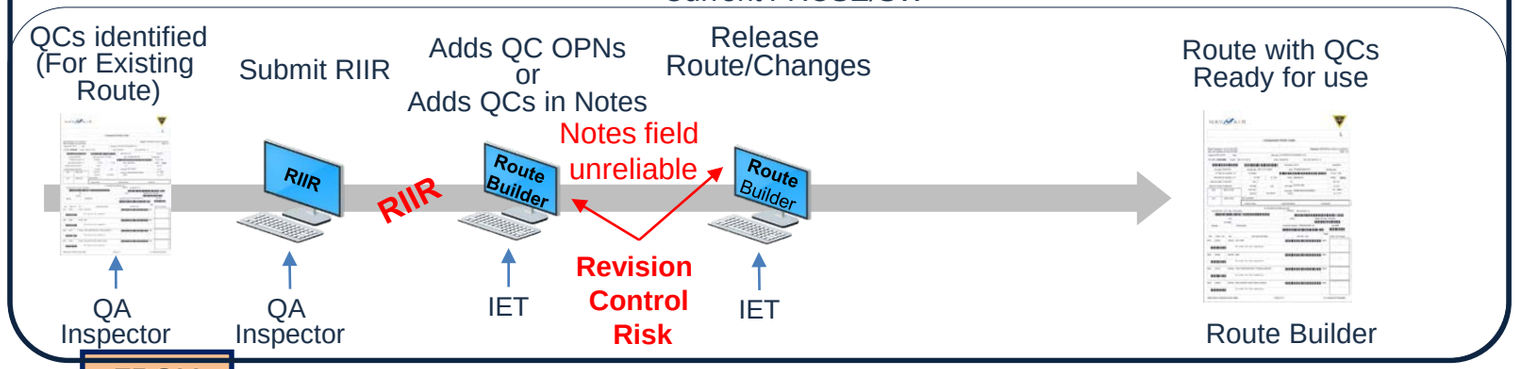
- Removes paper work orders
- Enhances audit readiness (end item visibility)
- Removes rubber stamp (certification, verification)
- Enables FRACAS with digital data to support RCB process
- Reduces route development time
- Reduces artisan certification and quality verification turnaround time
- Improves data analytics capability
  - Enables more accurate first pass yield analysis
  - Provides the foundation for detailed work instructions

EWP is the foundation for the Digital Depot

EWP Pilot QC Creation



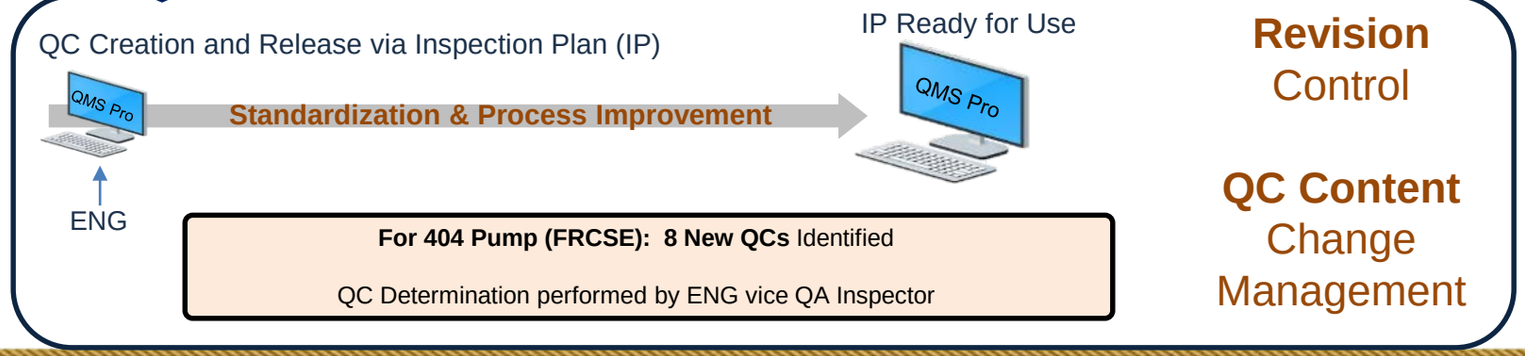
Current FRCSE/SW



FROM

TO

EWP All FRCs



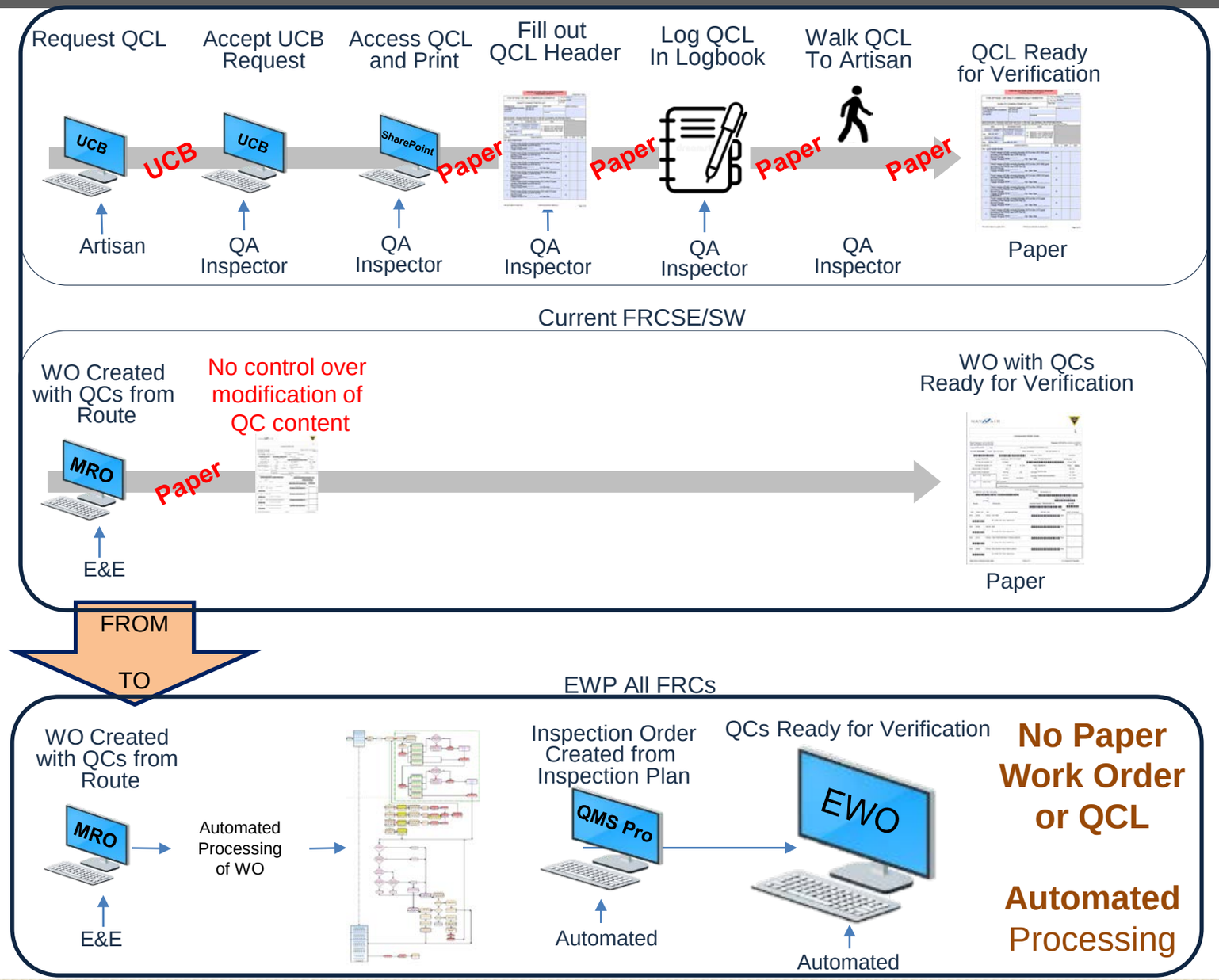
IP **Creation** Time per OPN

~40 **mins**

57%

~60 **mins**

EWP Pilot QC Issuance



QC Issuance Time per OPN

~20 **mins**

100%

0 **mins**

Maintenance Engineering Groundstation for Aviation (MEGA)

DASHBOARD

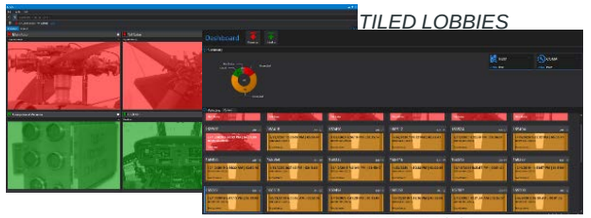
PILOT and AIRCREW

MEGA

MAINTENANCE CONTROLER

Parsed Sensor Data

Candidate Work Order and Life Usage Data



TILED LOBBIES

WARININGS, CAUTIONS ADVISORIES

syncText	sync	position	dataLEN	packetLEN	packet
IDEN	0x4944454E	1	258	256	0x01000040900000000001000102036303030303053
TUD	0x544c4944	269	204	192	0x32303138303230365430322C328325
CREW	0x43524557	473	28	16	0x00000000000000000000000000000000
IDEN	0x4944454E	501	268	156	0X0800040900000000001002053030353030120
VERS	0x56455253	769	1424	1412	0X0000000162000032303138303238543032343639
PTRN	0x5054524	2193	148176	148164	0x0000009080000000010000000100000000000004941532
RGDF	0x52474446	150369	40	28	0x0000000031310000100000000131000020000000

RAW DATA FILES

OOMA/NAMS (MRO)

As-Supported
As-Delivered
As-Operated
As-Maintained

WORK CENTER

ESB

RBOM of Allowable Configuration (As-Supported)

MAINTAINER

OOMA PMA Server (Baseline) Upgraded to AVPLM

ITEM VIEWER (S1000D)

MEMORY UNIT

LAUNCH TECHNICAL MANUAL

MAINTENANCE DATA

EDGE ANALYTICS
FRESH FLIGHT LINE DATA
TRENDING DATA FLOW
SDR UPDATED ALGORITHM

MEGA (w/NSIV)

MAINTAINER

CREW CHIEF

Work Order, Fault Data, and Tech Pub Data integrated

COMPONENT and DATA to MEGA @ I-LEVEL MAINTENANCE ACTIVITY (OIMA)

Workflow

Automated Workflow

ROTOR TRACK/BALANCE

PLANESIDE AND EDGE ANALYTICS

NSIV IS THE LOG-IT AUTHORITATIVE ITEM VIEWER ACCESSED THROUGH MEGA

BUILT FOR SAILORS, MARINES AND CIVILIANS

PLATFORM AGNOSTICS AND PROVIDES AME STANDARDIZATION

UNIVERSAL, EXTENSIBLE AND CONFIGURABLE
(OOMA, NAMS, JDMS, and NSIV approved and interoperable)

ALE Modernization - Customer Interest

- PMA-276, H-1: Implementing MEGA, Implementing AvPLM, PMA Invested (MEGA)
- PMA-299, H-60: Implementing EDGS, Evaluating MEGA, Implementing AvPLM, PMA Invested (MEGA and AvPLM)
- PMA-268, MQ-25: Evaluating MEGA, Implementing AvPLM, PMA Invested (AvPLM)
- PMA-290F, P-8A: Configuring MEGA, Evaluating AvPLM
- PMA-231, E-2D: Evaluating MEGA, Implementing AvPLM
- PMA-262, MQ-4: Configuring MEGA, Evaluating AvPLM
- PMA-266, MQ-8: Evaluating MEGA, Implementing AvPLM
- PMA-274, VH-92: Evaluating MEGA, Evaluating AvPLM
- PMA-275, V-22: Evaluating MEGA, Implementing AvPLM, PMA Invested (AvPLM)
- PMA-265, F/A-18: Evaluating MEGA, Evaluating AvPLM
- AIRWorks: Implementing AvPLM
- PMA-281: Implementing AvPLM
- PMA-261, H-53: Evaluating MEGA
- T-700: Evaluating MEGA
- NAVAIR CBM+: Evaluating MEGA

Questions