



Harmonizing Model-Based Standards for Shipbuilding

**NSRP Business Technologies and
Ship Design & Material Technologies Joint Panel Meeting**

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Presentation Topics

- HII-Newport News Shipbuilding (NNS) Overview
- Problem Description and Objective
- Lines of Effort
- Discussion/Conclusion



HII SHIPBUILDING DIVISIONS

Providing Advanced Digital Products

NEWPORT NEWS SHIPBUILDING



Ford-Class
Aircraft Carrier
Programs



Submarine Programs
New Construction



Aircraft Carrier Refuelings
(RCOH) & Inactivation



**Submarine Onsite and
CVN Offsite Fleet
Support Programs**



**Engineering and
Planning Yard
Programs**



Kenneth A. Kesselring
Site Operations

INGALLS SHIPBUILDING



America-class
Large Deck
Amphibious Assault
Ships



San Antonio-class
Amphibious Transport
Dock Ships



Arleigh Burke-class
Aegis Guided Missile
Destroyers



Legend-class
National Security
Cutters

MISSION TECHNOLOGIES



**Cyber & Electronic
Warfare**



**Live, Virtual,
Constructive Solutions**



Fleet Sustainment



**Nuclear &
Environmental Services**



**Intelligence,
Surveillance &
Reconnaissance**



Unmanned Systems

Why Go Digital?

Manufacturing Demands

**“Manufacturing Need for Technology
Efficiency at Scale”** Matt Needy
(NNS VP, ShipTech 2024)

Standards Contribution to Digital

- Repeatable solutions
- 1st time quality/accuracy
- Data exchange and efficiency
- Outsourcing interoperability (6 million man-hours per year)
- Digital thread sustainment (Navy)
- MBSE Requirements management
 - Traceability
 - Certification
 - Early validation
- Drawingless Products
- Clear end-user interpretation/understanding



Define standards that support the way ships are designed, built, and maintained.

Shipbuilding Model-Based Standards must support:

- Assembly configurations for design & build
- Data exchange between partners and customers
- Integration between internal PLM and ERP Systems
- Integration with external Systems (Navy)
- Automation of derivative products for build / test & inspect processes
- Advanced simulation & predictive models (Digital Twins)
- Data that will persist for the lifecycle (30-50 years)



Problem Description and Objective



Current standards that address digital needs are limited and legacy data-based.

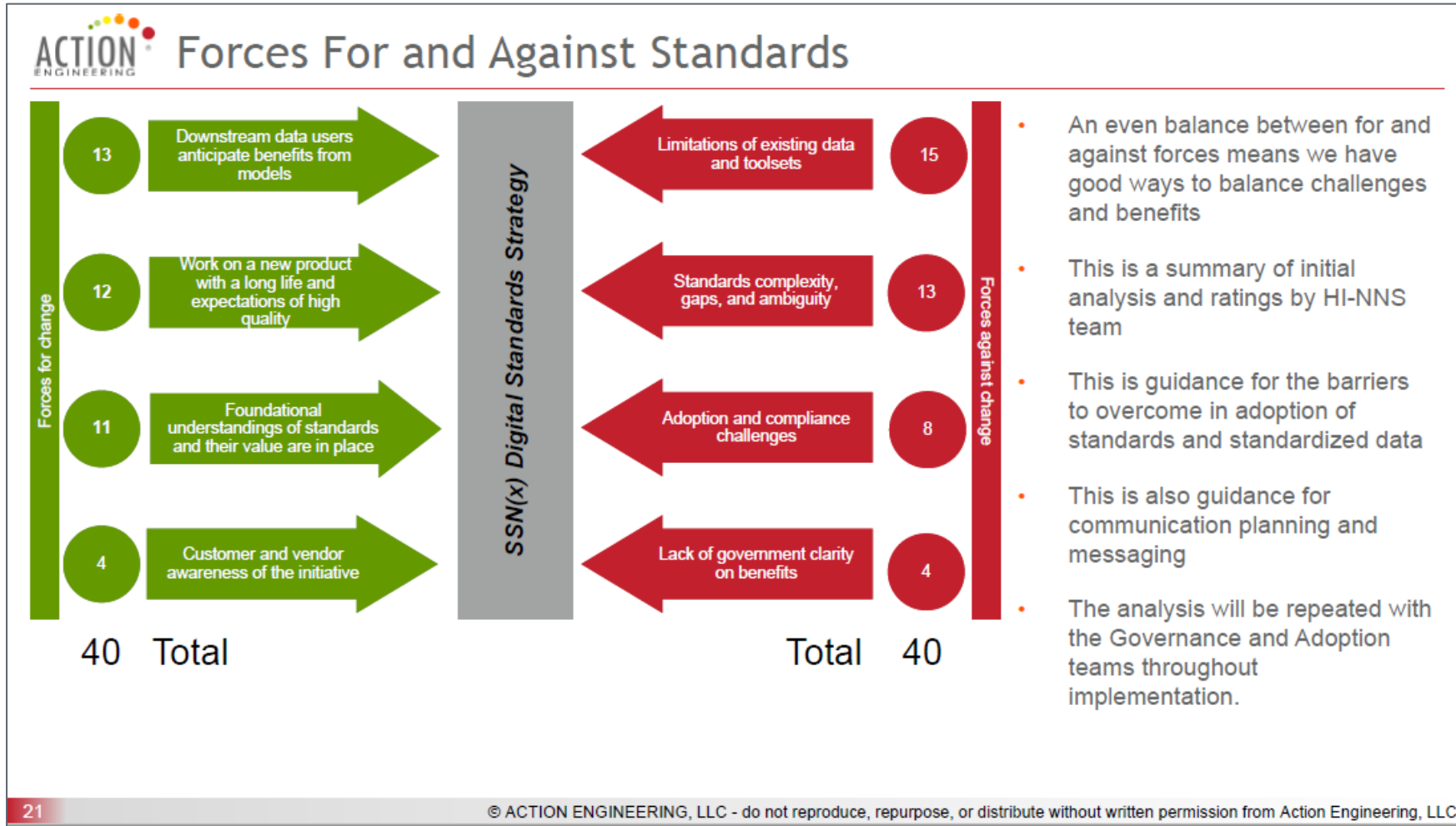
Define and perform work for activities that will ensure efficient data development, management, and exchange for engineering and manufacturing operation activities for a new digitally designed Naval program.



Work Performed in Collaboration with Action Engineering

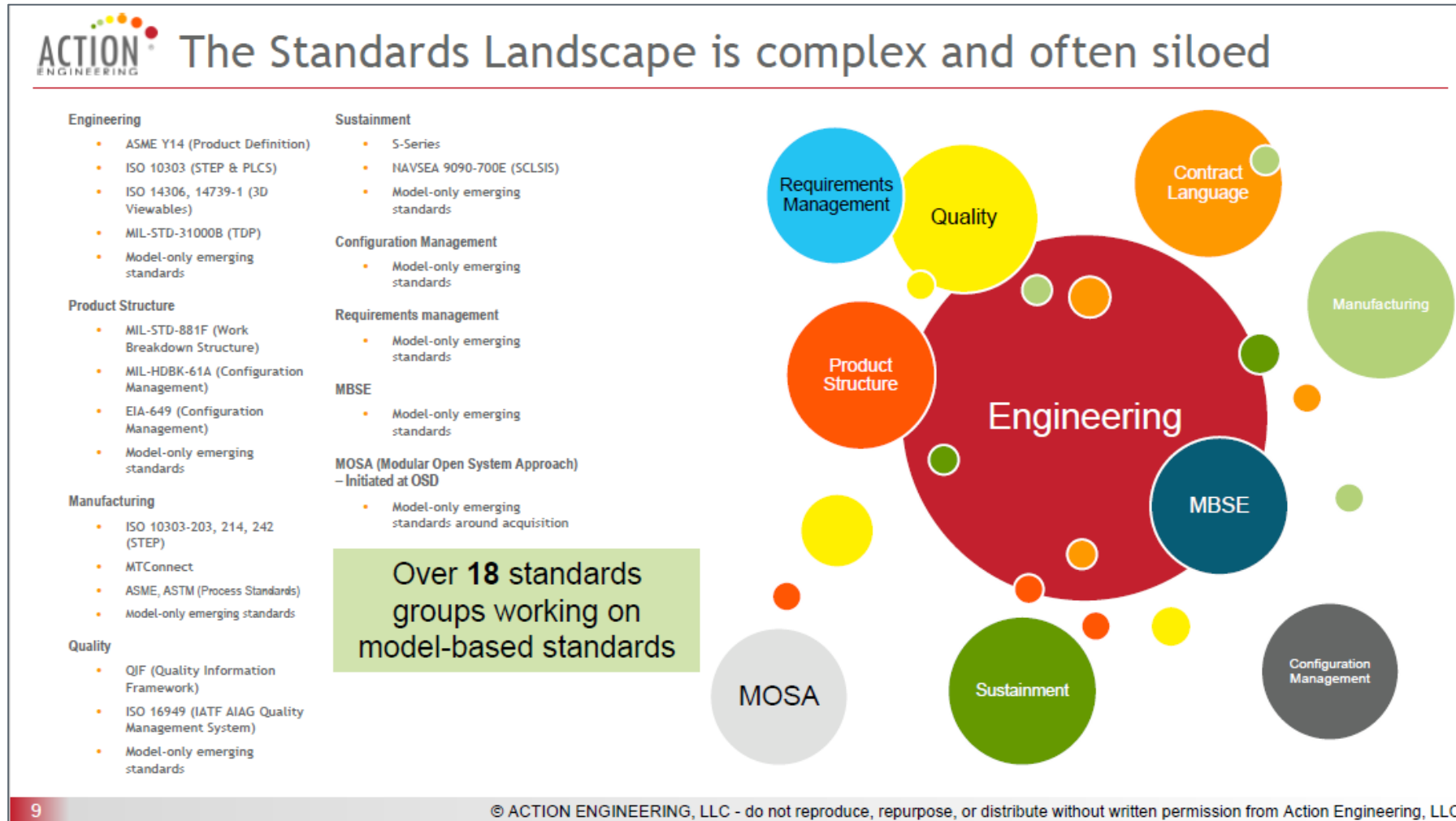
Model-Based Standards

Challenges



Model-Based Standards

Complexity

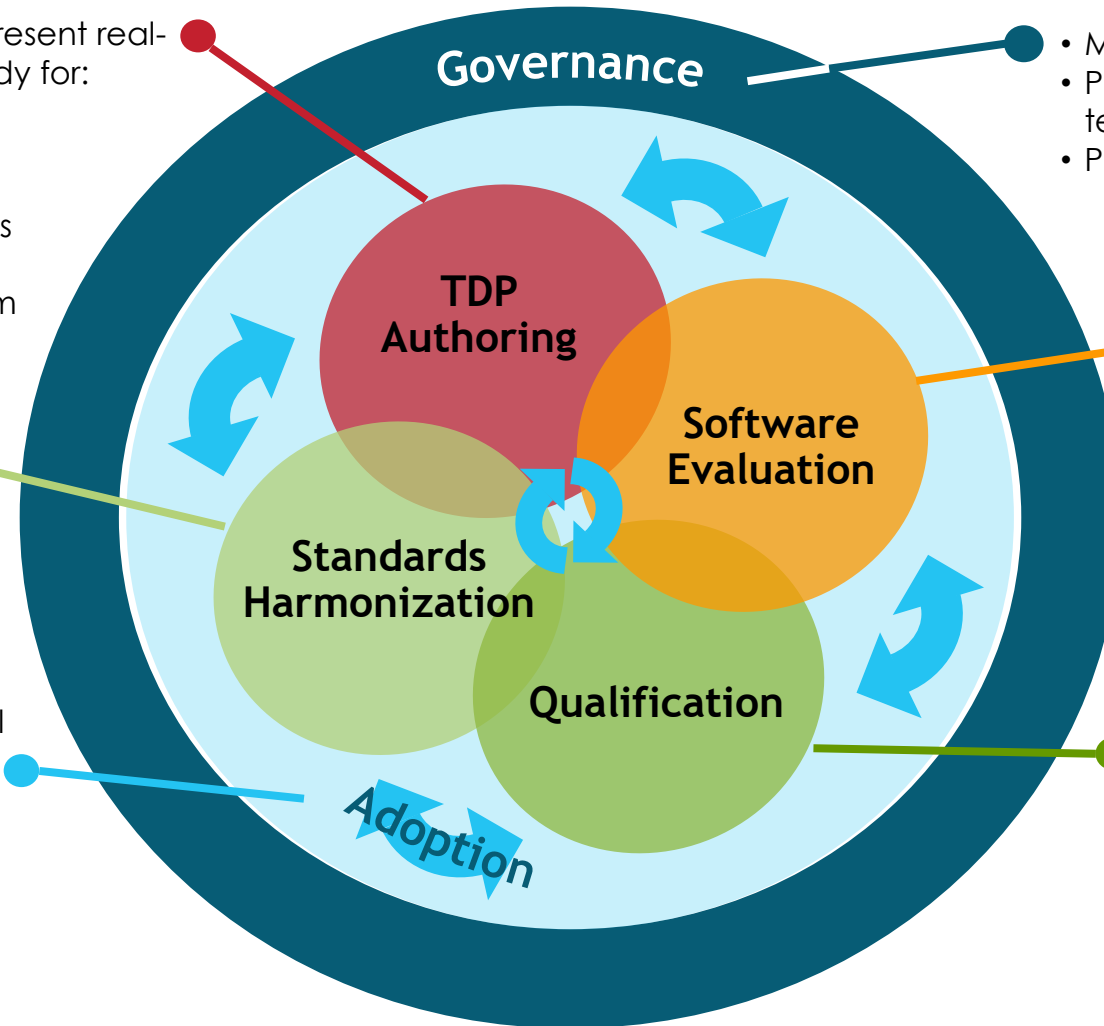


Lines of Effort

- Author 3D Technical Data that represent real-world designs and are digitally ready for:
 - Manufacturing
 - Quality
 - Sustainment
- Produce native and neutral formats to be tested against the Standards and Tools by the Qualification Team

- Review existing standards
- Identify gaps
- Write new standards
- Continuously manage standards, iterate and update over time

- People-focused use of 3D Technical Data including:
 - OCM guidance & expertise
 - Workforce transformation
 - Workforce communications
 - Workforce training
- Facilitation guidance to teams

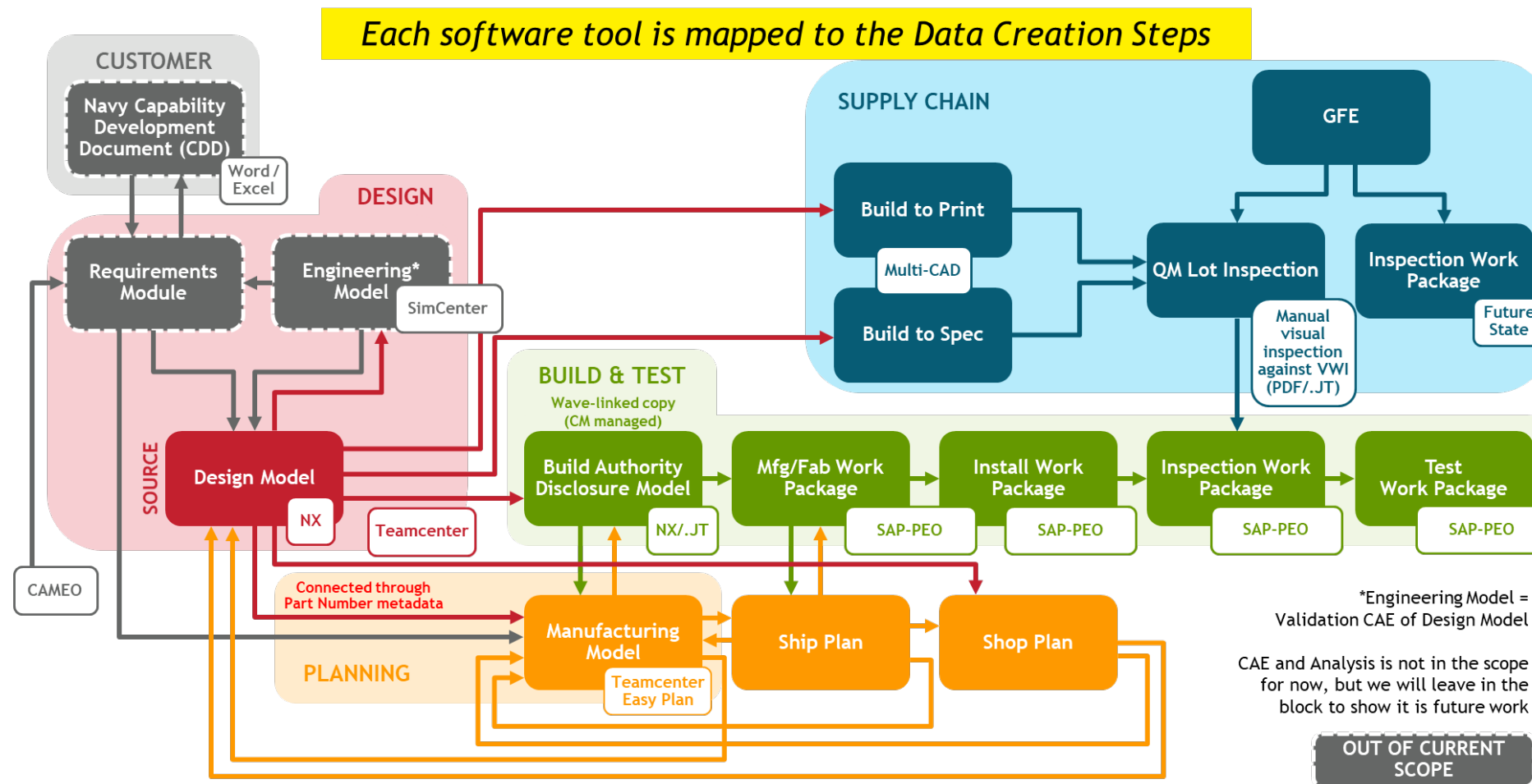


- Maintains Mission and Vision
- Provides operating guardrails for teams to work within
- Provides guidance when teams stall

- Evaluate software tools for: Interoperability, Data Exchange, Security
- Review software tools: Available, Emerging, Posit future state technology needs

- Evaluate 3D Technical Data Examples for digital-readiness using:
 - Software Tools
 - Standards
 - Examples
- Report results

HII-NNS Planned/Notional Digital Environment



Use Cases

Design

1. Design Review
 - a. Part
 - b. Assembly
 - c. System*
2. Engineering Changes
 - a. Part
 - b. Assembly
 - c. System*

Planning

1. Ship Plan
 - a. Part
 - b. Assembly
 - c. System*
 - d. Modules**
2. Shop Plan
 - a. Part
 - b. Assembly
 - c. System*
3. Manufacturing Model
 - a. Part
 - b. Assembly
 - c. System*

Build & Test

1. Fab Work Package – Part and Components
2. Install Work Package – Assembly
3. Inspection Work Package
 - a. Part
 - b. Assembly
 - c. System*
4. Test Work Package

Supply Chain

1. Build to Print
2. Build to Spec
3. Inspection Work Package
4. Receipt Inspection

*System: Refers to a specific functional area (e.g., structural, electrical, piping)

**Modules: Refers to a strategic boundary within the ship that includes many systems

This list is not exhaustive. New use cases will arise as the project develops.



Work Performed in Collaboration with Action Engineering

Standards

Design

- ASME Y14
- LOTAR
- QIF (Quality Information Framework)
- ISO 10303 (STEP & PLCS)
- SAE EIA-649-1 (Configuration Management)
- MIL-HDBK61A (Configuration Management)

Planning

Build & Test

Supply Chain

- NAVSEA 9090-700E (SCLIS)
- S-Series

- MTConnect
 - ASME, ASTM (Process Standards)
- ISO 16949 (IATF AIAG Quality Management System)
 - ASME Y14, B46, B89
 - SAE AS9000, AS9102
- QIF (Quality Information Framework)

- ISO 14306, 14739-1 (3D Viewables)
- SAE EIA-649-1 (Configuration Management)
- MIL-HDBK-61A (Configuration Management)
 - ISO 10303 (STEP)

- MIL-STD 881F (Work Breakdown Structure)
 - MIL-STD 31000B
 - DoDI 5000.97
 - MIL-HDBK-539
 - Dev/Sec/Ops?

Cohorts

Supply chain vendors have personas in each cohort that match the HII-NNS personas

Authors

Authors 3D Data
Creates standardized
Data and Refers to
Standards

- Repair Officer/Lead, USN
- Design Engineers
- Quality Engineers
- Manufacturing Engineers
- Tooling and Fixturing
- CAD Administrator



Analysts

Reads and Manipulates
3D Data
Uses Standardized Data
and Refer to Standards

- Specialist, USN
- Quality Assurance, USN
- CNC Programmers
- CMM Programmers
- Machinists
- Procurement Specialist



Consumers

Reads 2D Drawings
Today, Needs to Read
and use 3D data
Uses Standardized Data

- Supply, USN
- Operator, USN
- Inspectors
- Assembly Teams
- Technical Writer
- Area Planner



Command

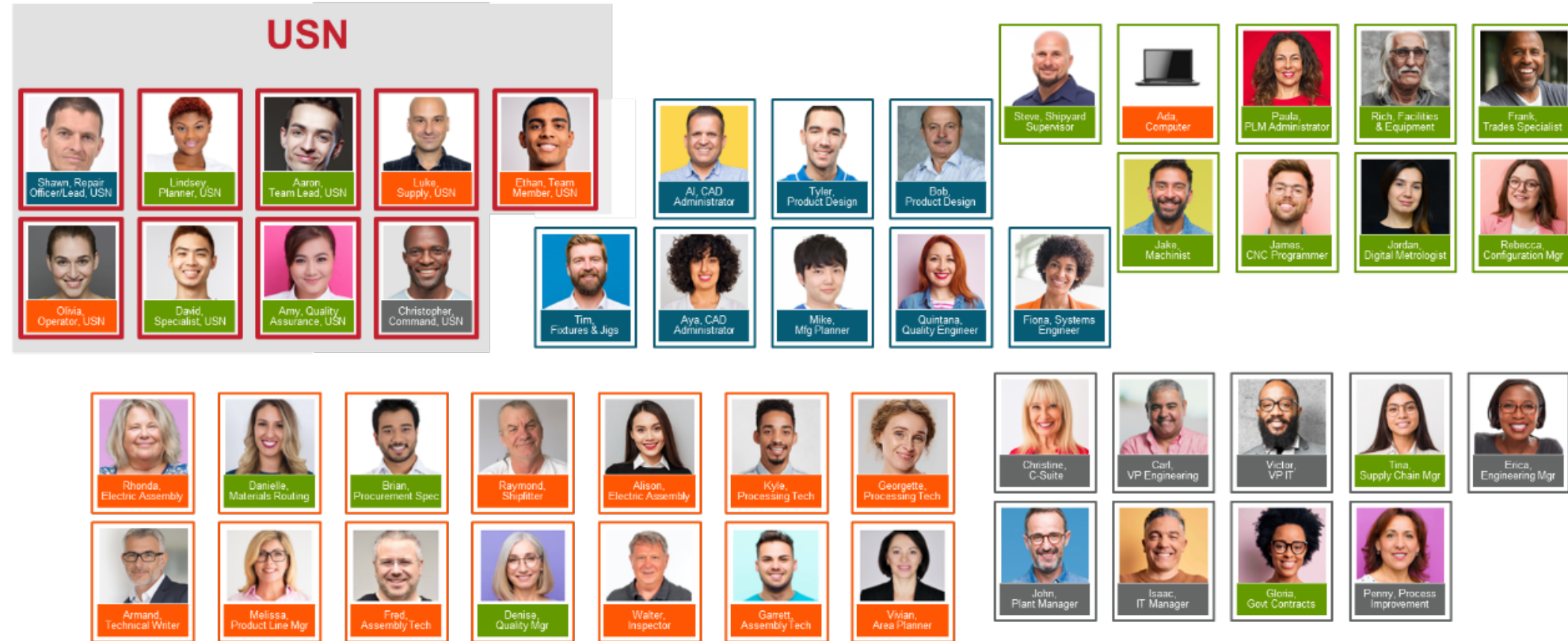
Needs to Know the Value
of 3D Data

Refers to Standards

- Command, USN
- Executives
- Management
- Sales
- Document Control
- Supply Chain Manager

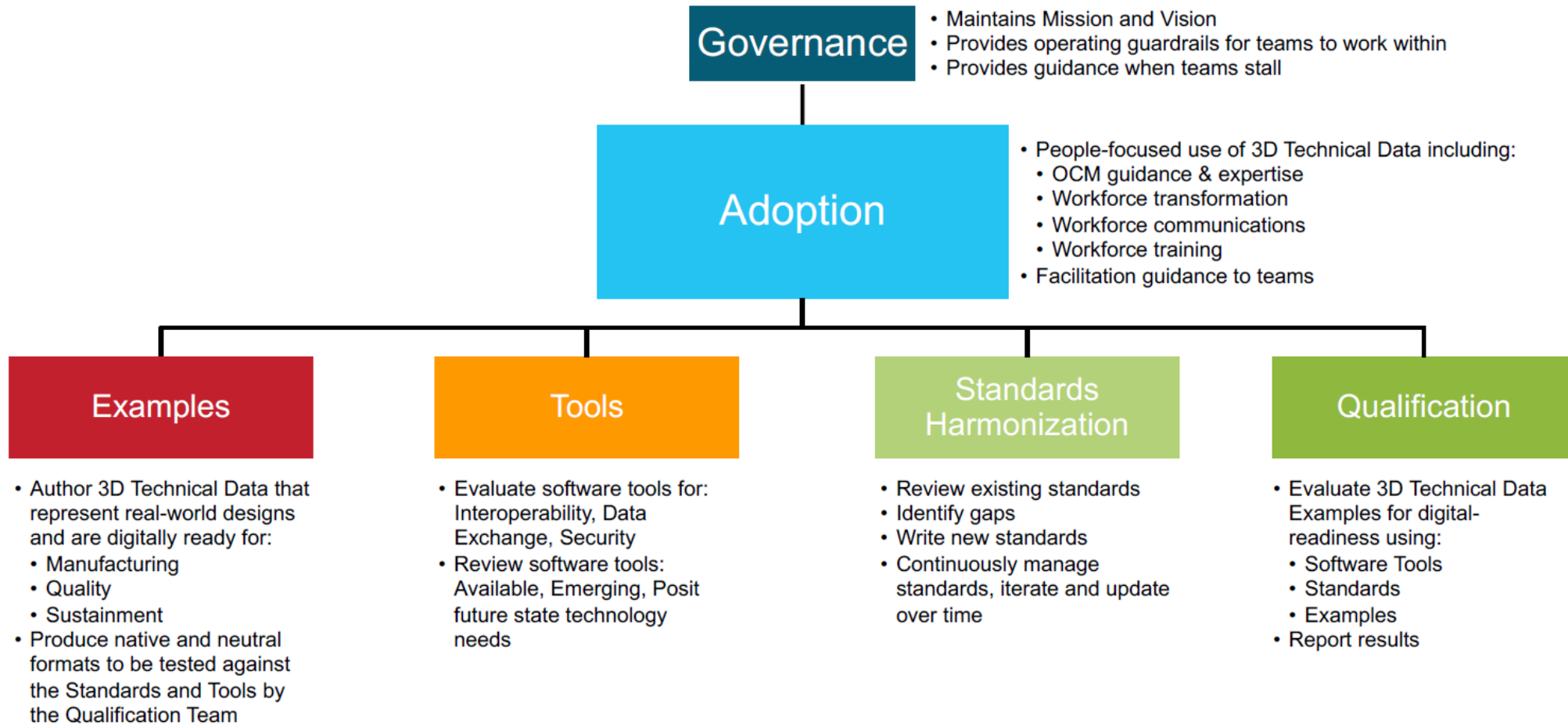


Personas



Develop & Implement a Standards Strategy

Team being Established Currently



Thank You for your Attention...

Discussion

