



**Newport News
Shipbuilding**

A Division of Huntington Ingalls Industries

Newport News Shipbuilding Digital Journey: Drawings to 4GD based Visual Instructions

NIST Conference April 2017

Jim Dorwart

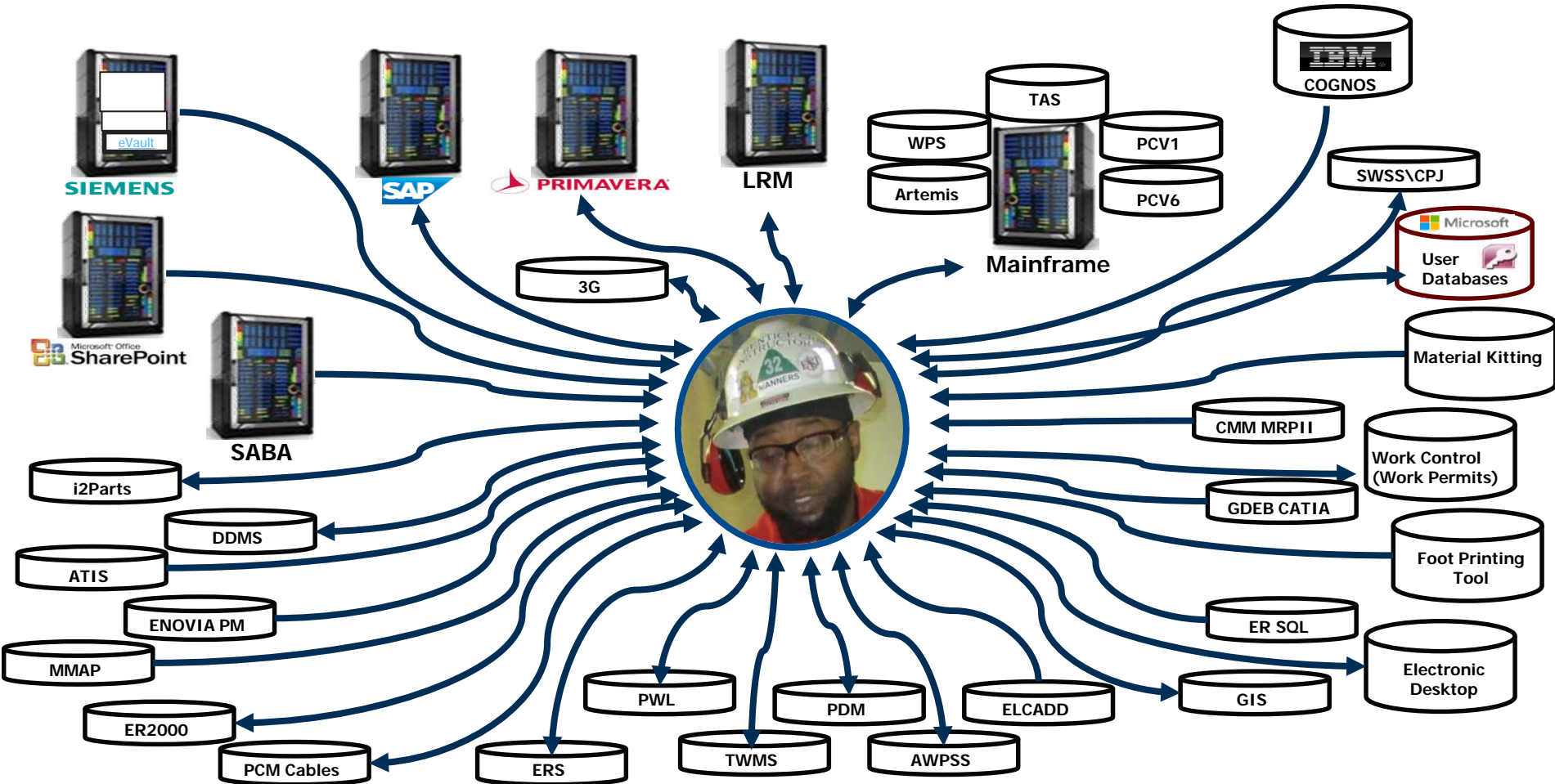
Newport News Shipbuilding



- 131 year old company
- Virginia's largest Industrial Employer (20,000+)
- 2.5 miles of waterfront (550 arces)
- 20+ different Shops (valve sheet metal, foundry, etc.)
- Primarily Navy Work
 - Complex Design
 - Construction
 - Overhaul
 - Maintenance/Modernization
 - Logistics



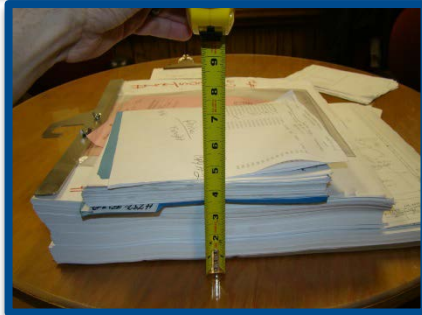
Disparate Information Overload



Where do I find the correct information?



THE HUNT



THE PROCESS



THE CONFUSION



**Our Craftsmen Build the Most Complex Ships in the World
THIS NEEDED TO BE MORE EFFICIENT**



What do we have to start from?

Our Business Trinity



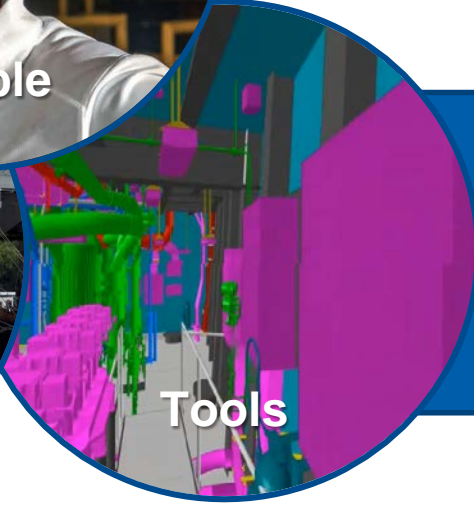
People

Biggest Asset



Process

Opportunity
For
Change



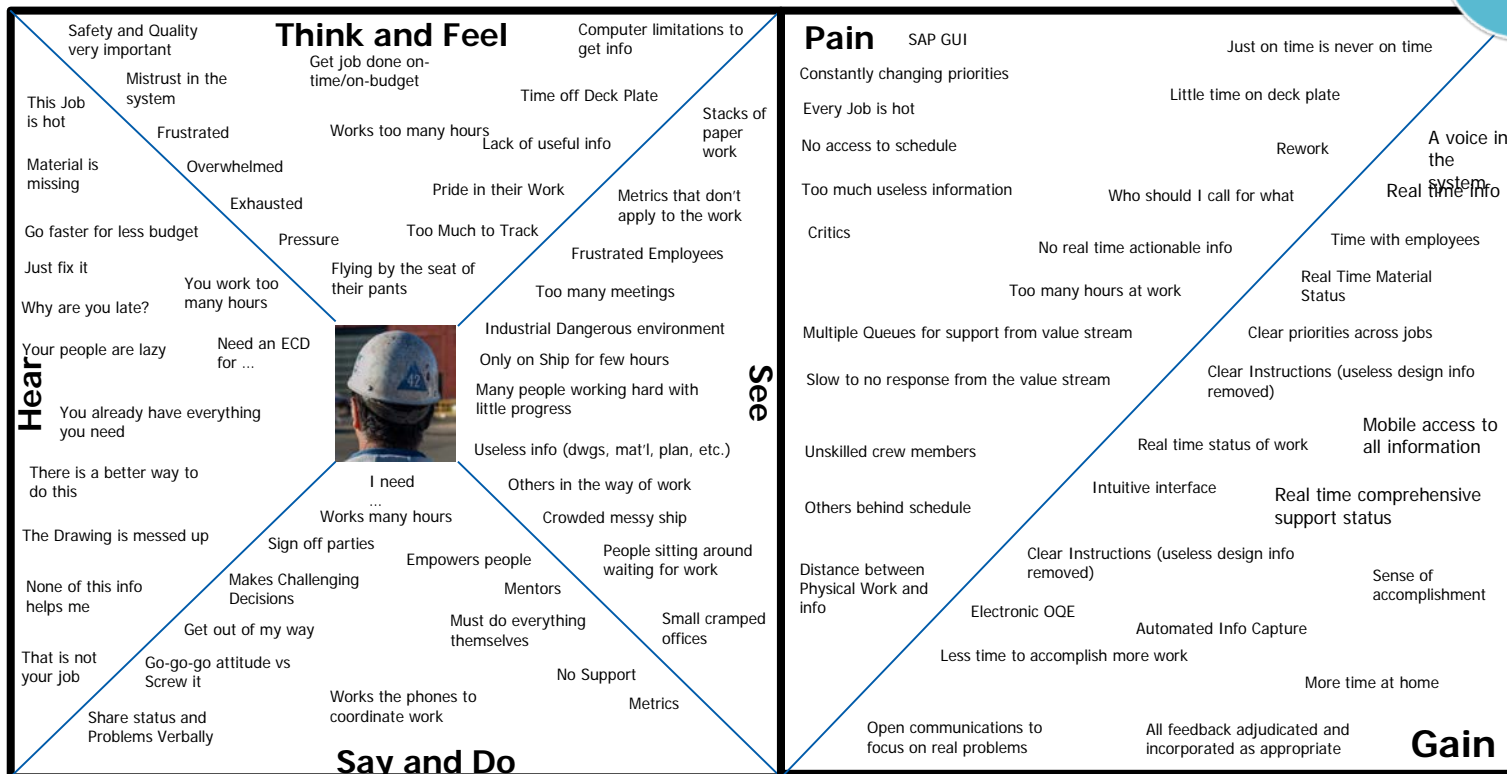
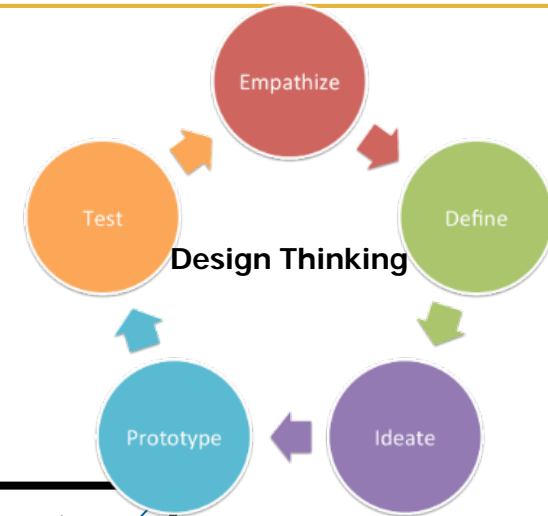
Tools

Our Brownfield
Infrastructure

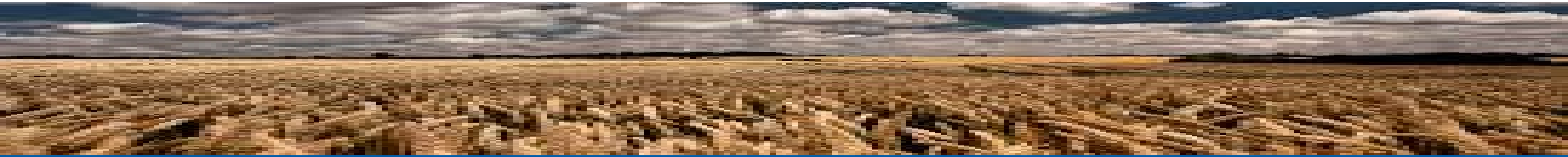


People: End User Centered Product

- Start with the end user
- Develop Low res Prototypes
- Followed Through
- Make our Brown Field Work for Us



Tools: Brown Field or Scorched Earth



2000
Dassault PLM
Catia V4 AC – Shell Glob Models



2015
Teamcenter 9.0.x
NX 8.5 with 4GD

- i. Lots of custom drawing only code
- ii. All CAD Data was developed as Design Only usage
- iii. All Design authored in 4GD not BVR
- iv. NO MPP, NO EWI

PLM, CAD



1998
4.0 execution



2015
UniCode Compliant

- i. Work Packages
- ii. Operations
- iii. Material
- iv. SAP VE (Right Hemisphere) embedded in our BOM process

ERP, MRP, MES

Reports, Metrics, Business Management,



Mobile Infrastructure



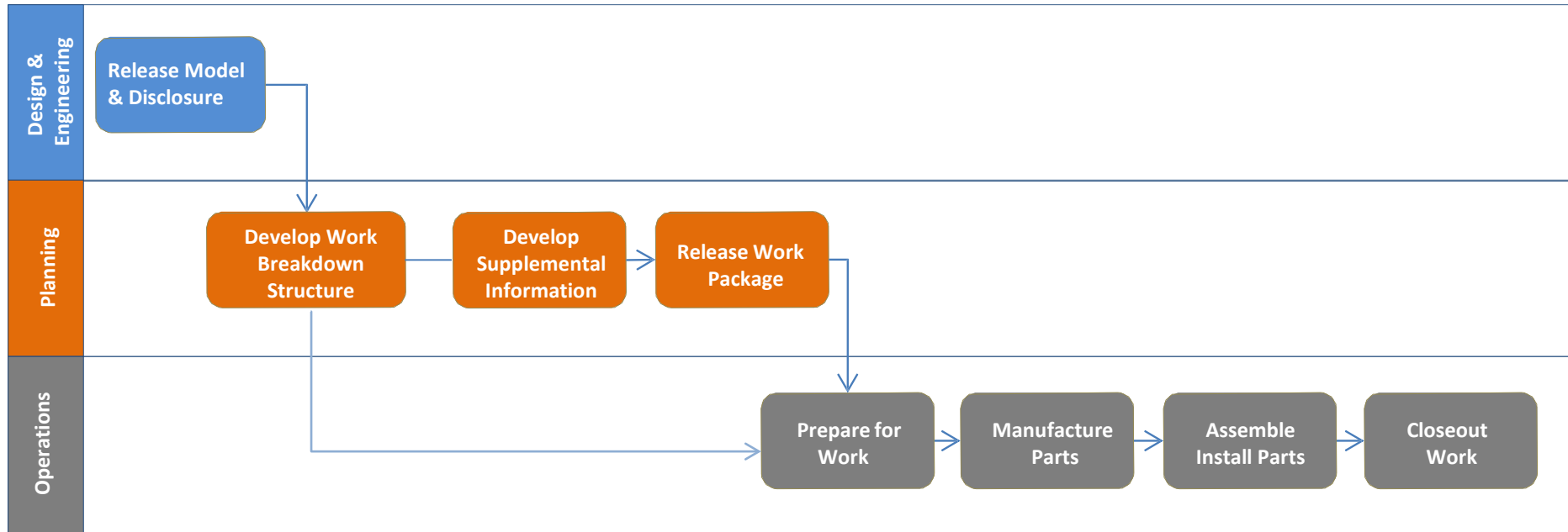


Rules: Driving Philosophies for Data Provisioning and Processes

- **People Focused Only**
- **Reuse** (Hull, Across Hull, Across Platforms)
- **Author Master Data Once**
- **Allow People to Fail Fast**
- **Digital String** (Config and Change Man)
- **Allow People to Test to break the systems** (find the Limits)
- **Common** (Processes, Tools, etc.)



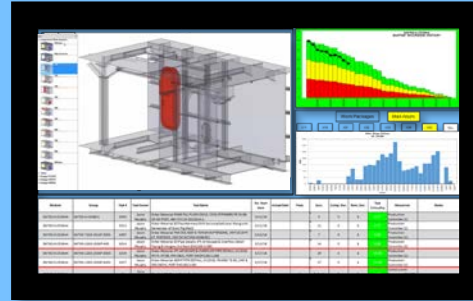
Processes: High Level Construction Boundaries



3 Core Product Group

VBM : Visual Build Management

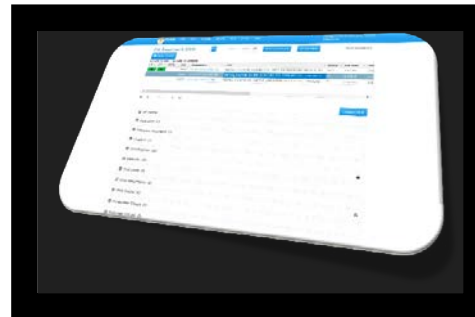
- Management focused
- Work sequencing, coordinating work
- Marries visualization with critical-chain project management



**Planning/
Construction
Supervisor**

SWiMS : Shipyard Work Integrated Management System

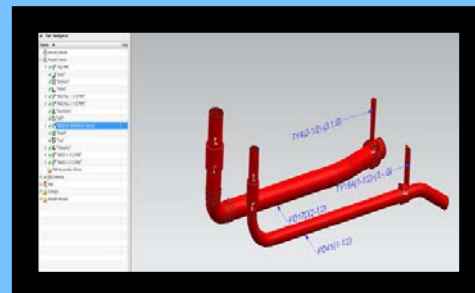
- Foremen-focused
- Single point-of-access to all necessary information



**Production
Foreman**

VWI : Visual Work Instructions

- Presentation Based
- Craftsmen-focused
- Digital, 3D interactive replacement for drawings
- Detailed, step-by-step instructions for production



Craftsman

Visual Build Management & Build Strategy

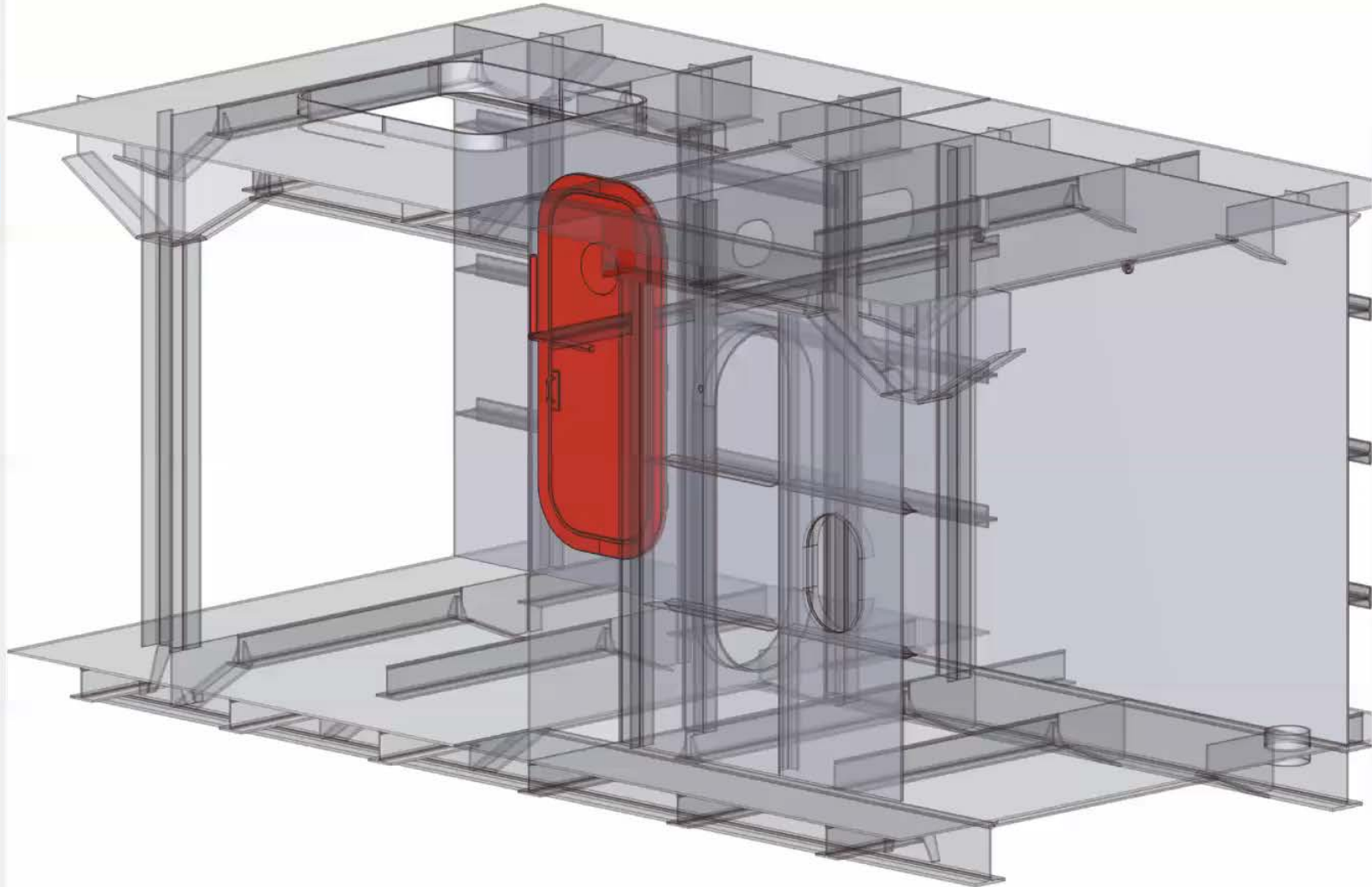
Steps

Compartment Work Sequence

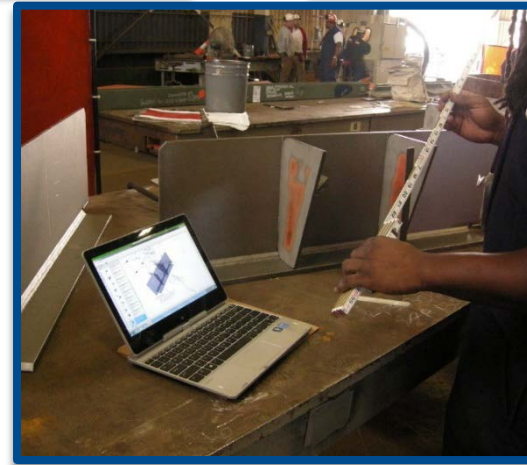
- All Items
- Main Structure
- 100
- 150
- 200
- 300
- 400
- 500
- 600
- 700
- 800
- All Items

Status

- Package #123876
- Package #458747
- Package #098095



Visual Work Instructions

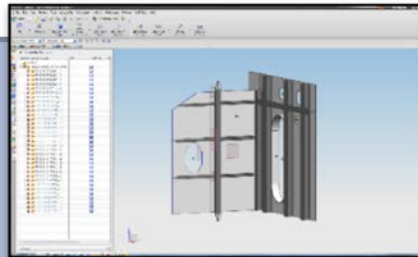


Visual Work Instructions

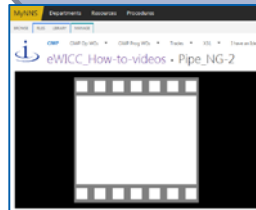
Augmented Reality



Siemens NX Product Model



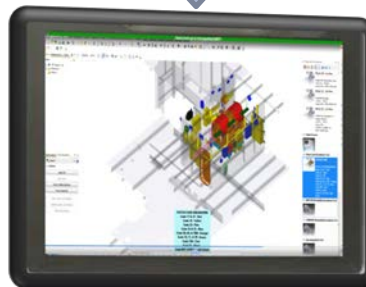
Digitized Drawings



“How to”
Videos



Laser Scanning /
Reality Capture

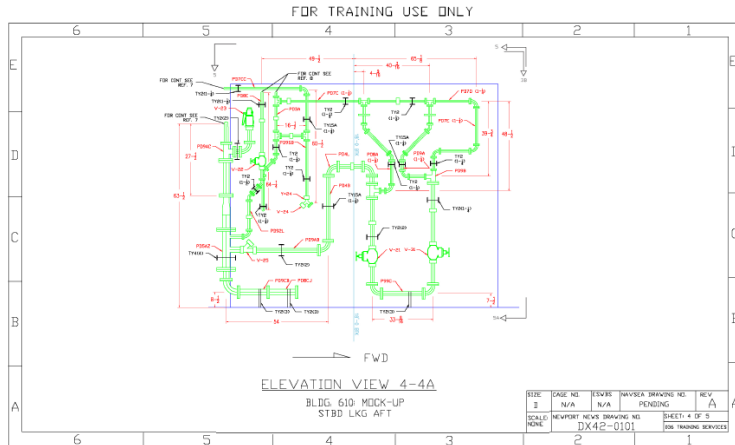


Visual Work Instructions



Visual Work Instructions in a Nut Shell...

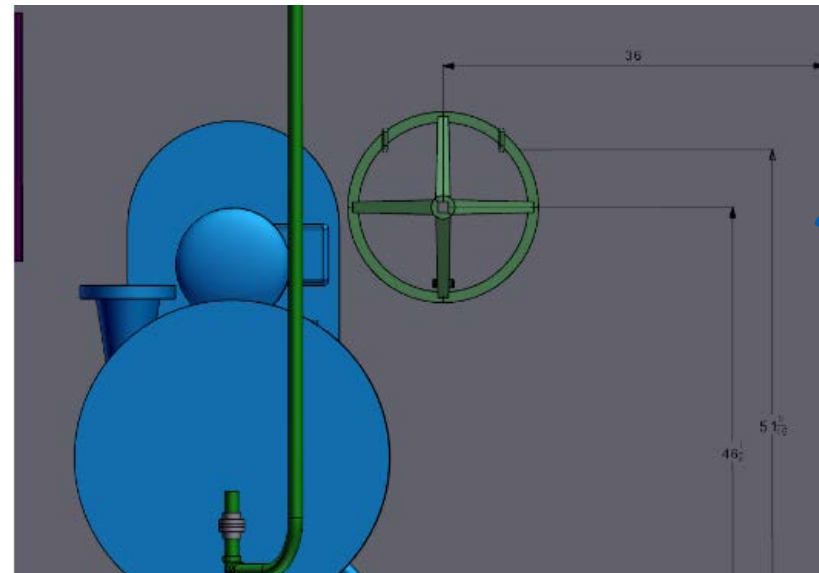
Typical Install Drawing



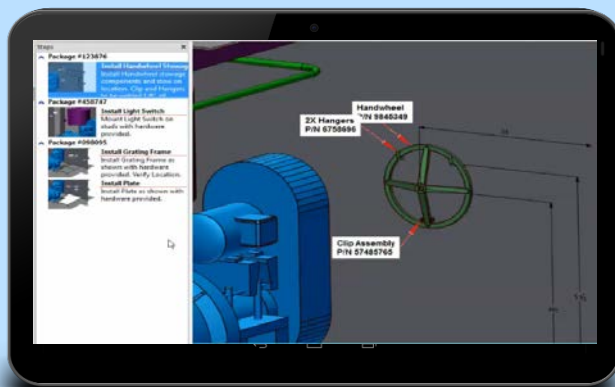
Product Manufacturing Information

- Part Id Numbers
- Drawing views
- Field joints
- Weld information
- Details
- Compartment numbers
- Structural THKNS/MTL
- Hull Applicability
- Test Boundaries
- Dimensions
- Flow arrows
- Frames and Reference lines
- Label Plates, Damage Control plates
- Method
- Tolerances
- Surface Finishes
- Consumable company stock material

Product Model

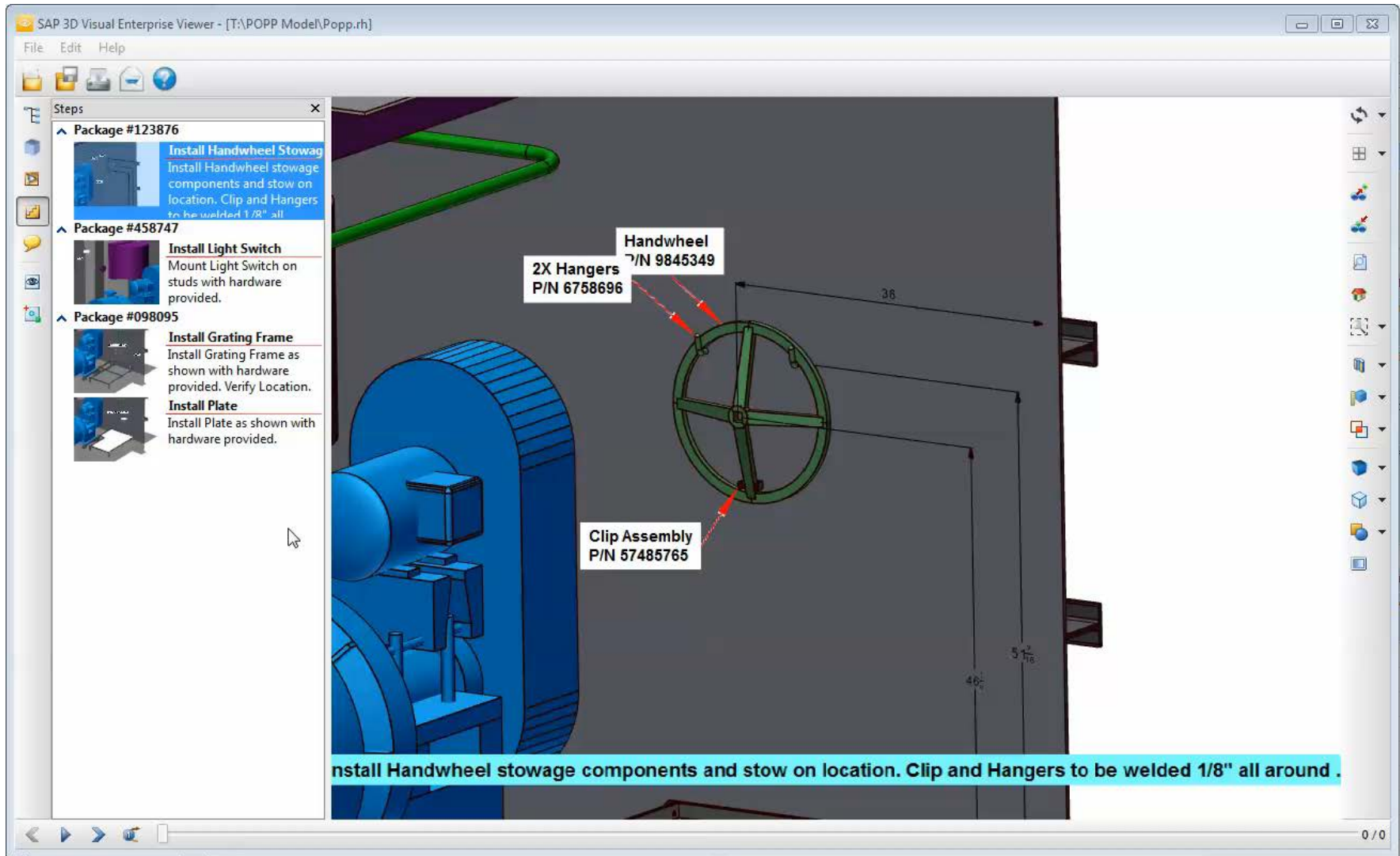


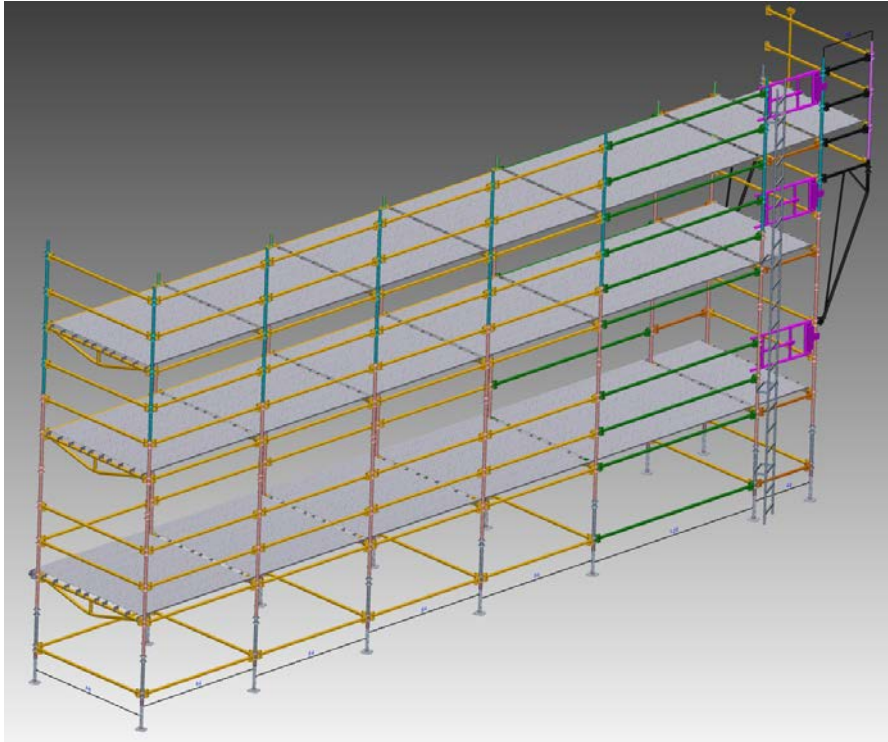
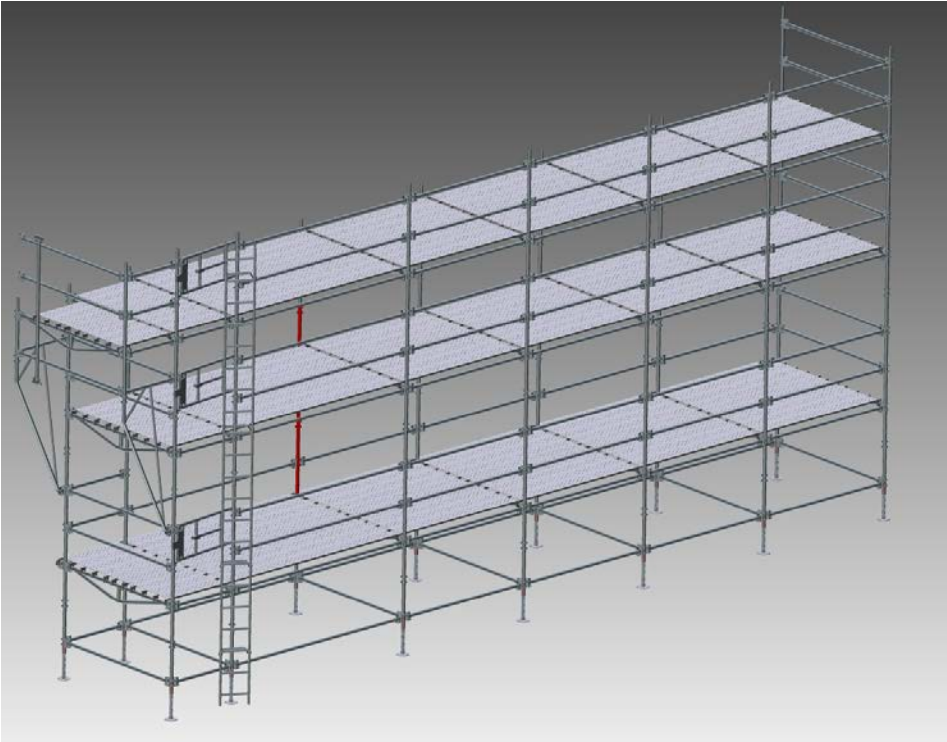
Visual Work Instruction



Visual representation of the technical instructions and product manufacturing information







Staging/Scaffolding



Visual Work Instruction Experiences



1000+
VWI's
created

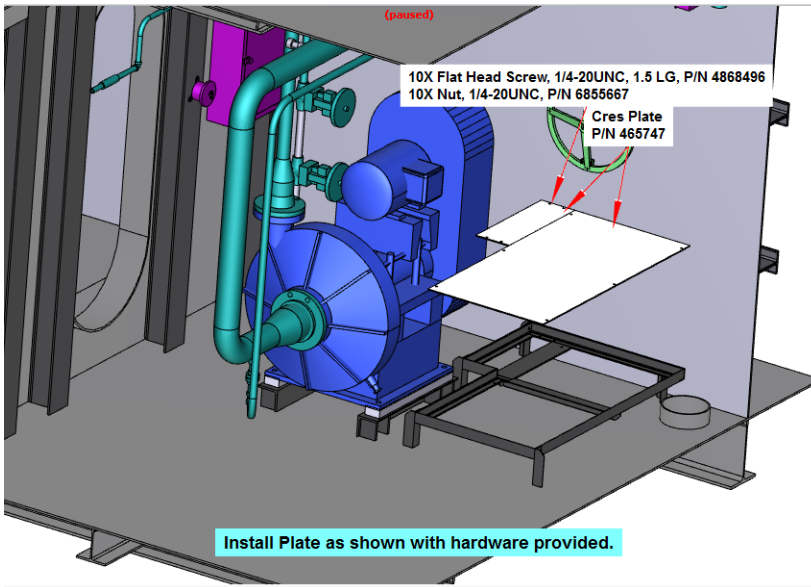
200+
Mobile
Devices

0
Requests
to Return to
Drawings



Biggest Company Transitions

- “1930s” All Welded Construction
- “1950s” Nuclear Propulsion for Subs and Carriers
- “1980s” Modular Construction
- “2010s” Digital Shipbuilding





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