



**SSIWSC 2024**

Design. Build. Maintain. Connect.

# Managing Change with the SSI Solution: Optimizing Configuration Control

Phil MacIntyre – Product Owner



# Configuration Control Challenges

- Vessels are Large, Complex and Ever Changing
- Each Hull in a Class Can Have Variations
- Capturing the Current Configuration
- Applying Change to Vessels That Require Unique Solutions to Fit in a Configuration



# What is Configuration Control?

## As a Process

- Controlling the Design to Meet Specification and Requirements
- Applying Design Controls to Manage Change
- Providing a Configuration of the Vessel for Review and Construction

## As a Solution

- Locking Design Information at Milestones
- Reviewing and Releasing Information with Revision History
- Using Tasks to Track Model Changes
- Reusing Design Information Between Vessels for Consistency



# Set Up for Success



Set Tasks To be Mandatory



Use General Tasks for Modeling



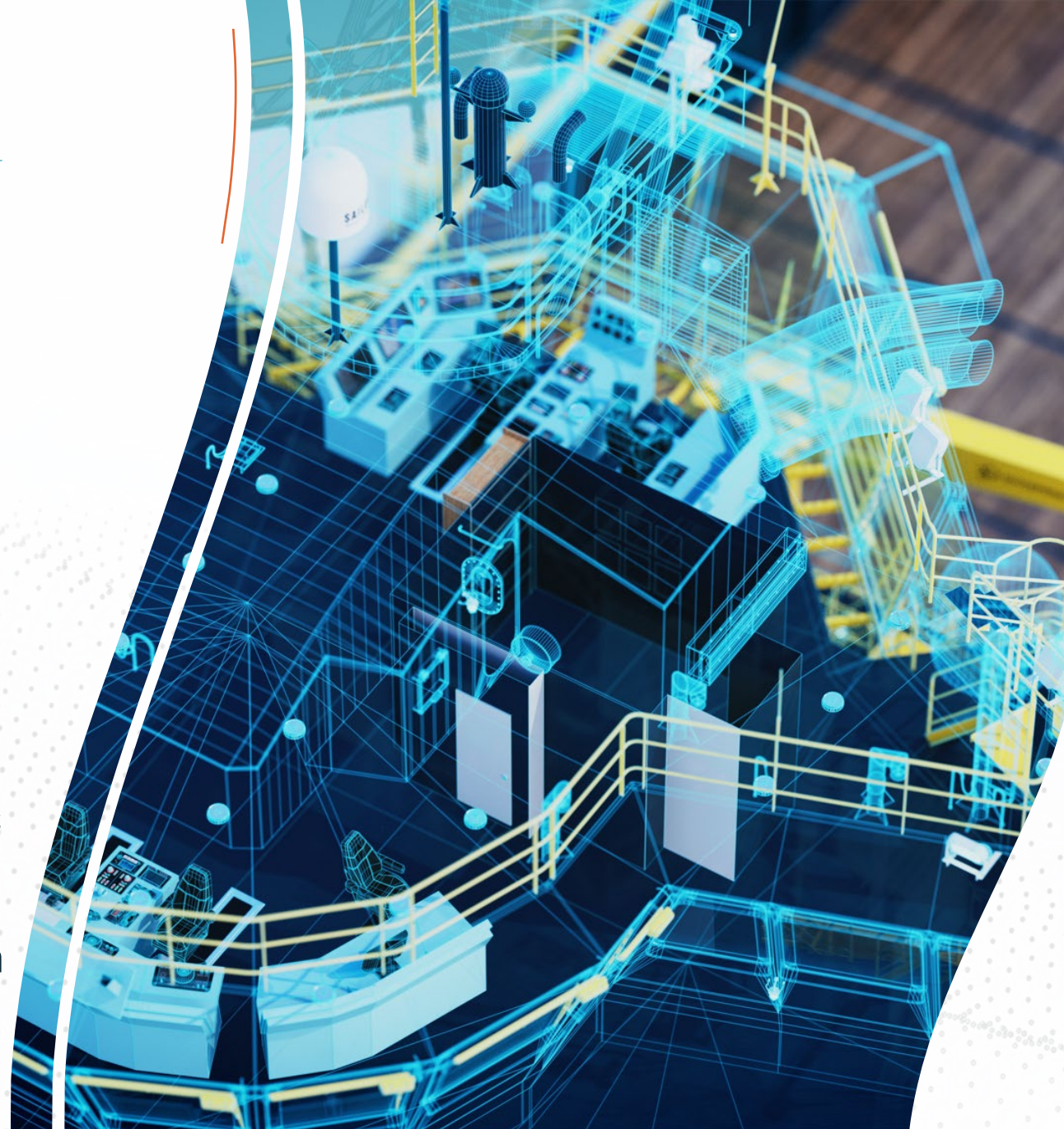
Lock Models at Design Milestones



Create User Groups for Model Updates

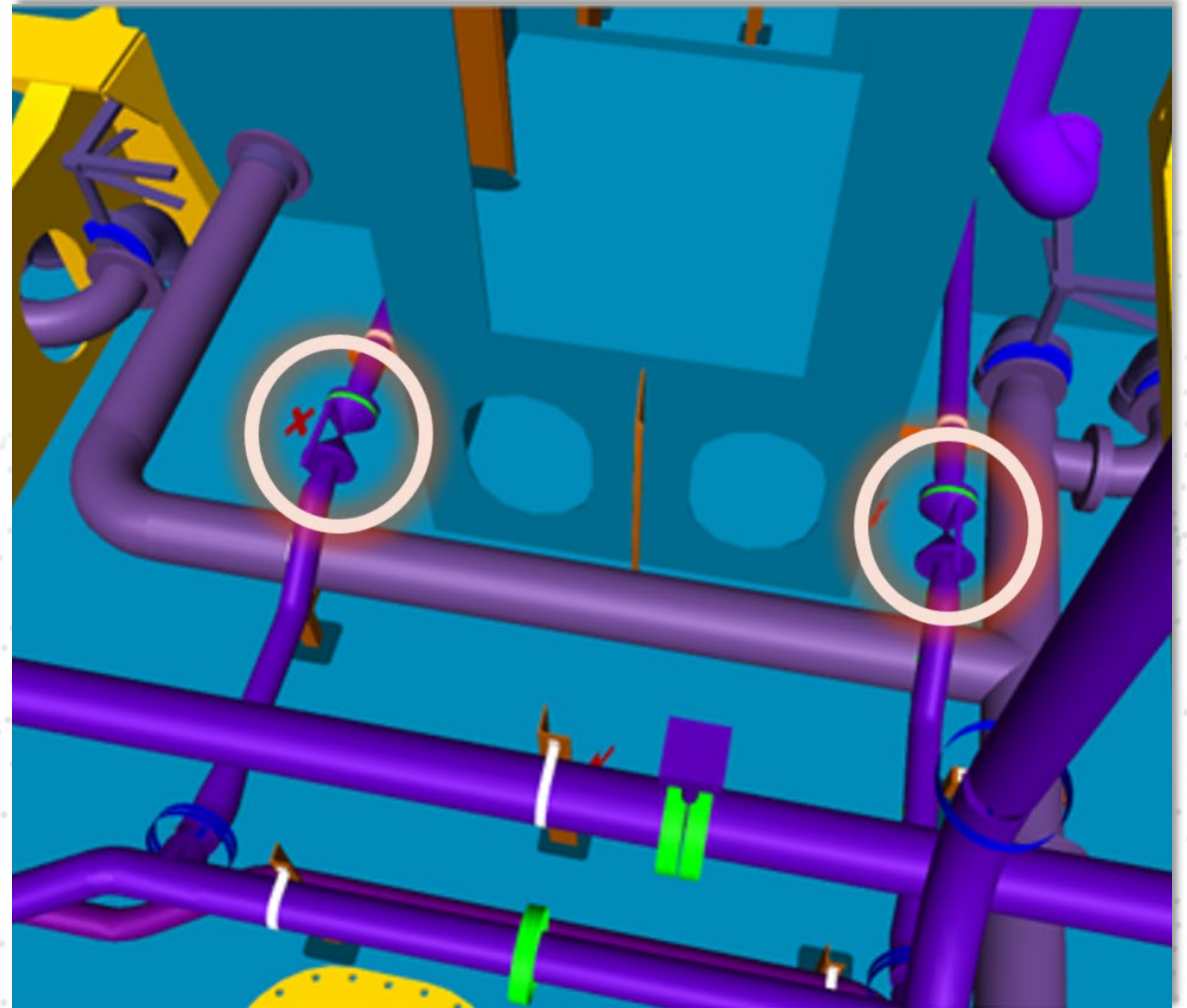


Have Change Policies In Place Inline with Tool Capabilities



# Change Scenario

- Functional Change to Replace Manual Ball Valves to Automated Butterfly Valves
- Model is In Progress and Needs Updating
- Three Hulls in Different States:
  - Hull 1 - Delivered
  - Hull 2 – Under Construction
  - Hull 3 – In Design



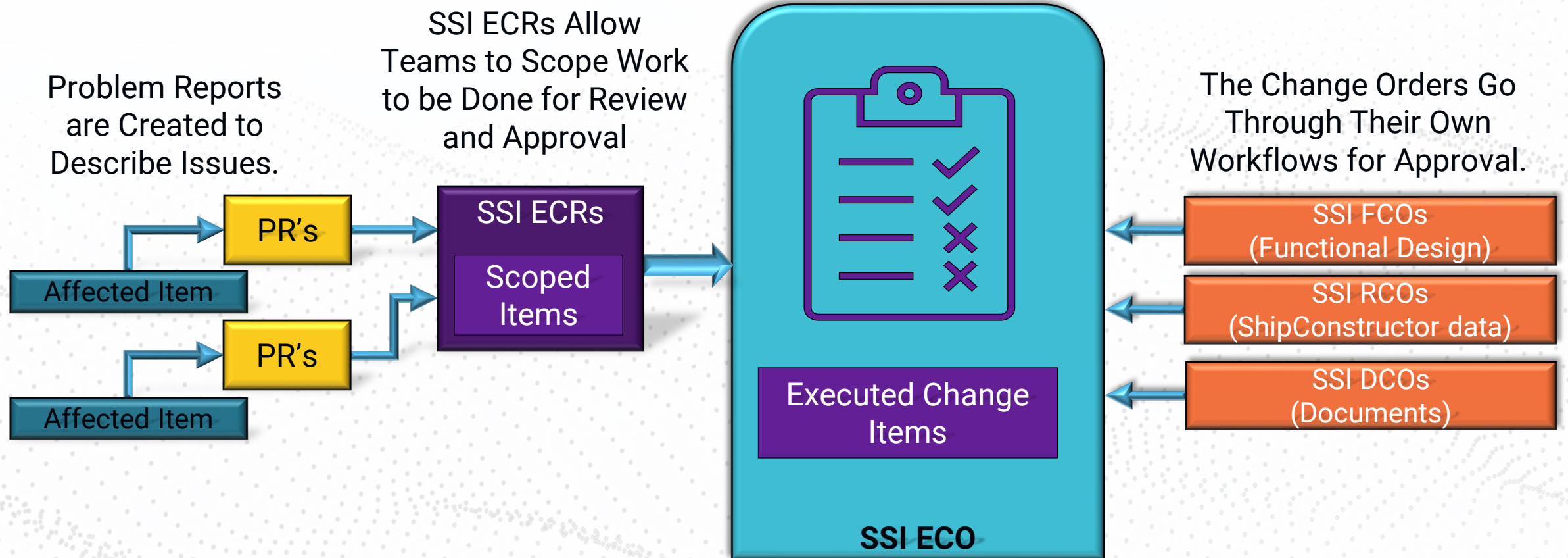
A vertical image on the left side of the slide showing the interior of a ship's hull under construction. It features a complex network of grey metal beams, walkways, and stairs. A yellow mechanical component is visible at the bottom. The image is partially obscured by a white curved line that separates it from the main text area.

# Engineering Change Management

ShipbuildingPLM Engineering Change Management Overview

# SSI ECM Overview

An SSI ECO is Made to Visualize and Organize the Change Work Distributed Between SSI FCOs, SSI RCOs, and SSI DCOs. It Ensures the Engineering Change Solution from the ECRs is Executed as Scoped.



# ShipbuildingPLM ECM Overview

- Multi-Hull ECRs Group the Divergent ECRs into a Single Managed Item
- ECR by Hull Allows Divergent Scoping for Individual Hull Configurations
- ECOs Written by Hull Allows Work to Be Executed When Required

The screenshots illustrate the Aras Innovator interface for managing Engineering Change Requests (ECRs) and Engineering Change Orders (ECOs) in a shipbuilding context. The top window shows a Multi-Hull ECR (MHE-S000001) titled "Bulk Discharge Valve Change For Hulls 1-3". The middle window shows an ECR (ECR-S000001) titled "PSV-Hull2-Manual\_Valve\_Change", with a purple box highlighting the "SSIECRs" list on the left. The bottom window shows an ECO (ECO-S000001) titled "PSV-Hull2-Manual\_Valve\_Change", with a blue box highlighting the "ECO-S000001" entry in the "PRs Impact Matrix" section.

Number	Title	State	Activity	Requested By	Key Implementation Timing Factors
ECR-S000001	PSV-Hull2-Manual_Valve_Change	Approved	ECR Approved	SSIE Engineering Lead	Arrangement Drawings not started yet for Unit and SWBS. Please go through approvals prior to arrangement drawing start date to prevent additional rework.

Number	Title	Priority	State	Activity	Required Departments
ECO-S000001	PSV-Hull2-Manual_Valve_Change	4	Released	Release Change	Structural Design Pipe Design HVAC Design Electrical Design Functional Design Planning Production Compliance

Number	Title	State	Activity	Hull [..]	Reason for C...	Source	Priority	Cost Estimate	Requested B...	Required Dep...	Requires Reg...	Requires Ow...	Approved Dat...	Implement B...	Team [..]
ECR-S000001	PSV-Hull2-Manual_Valv...	Approved	ECR Approved	HULL2	Customer Pre...	Customer	3	17500	SSIEs Engine...	Pipe Design, E...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	12/21/2023 9...	12/30/2023	SSIE Referen...



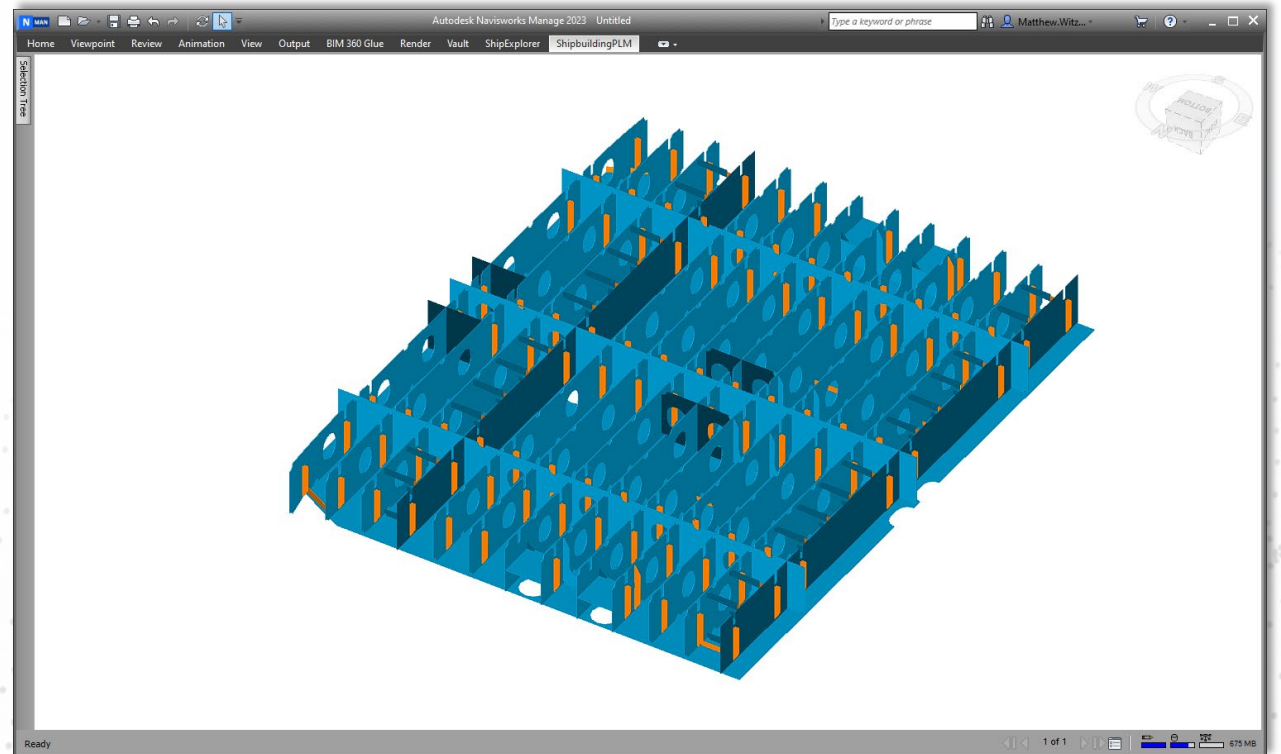


# Configuration Design Review

Visualization in ShipExplorer and WorkShare Graphic Compare

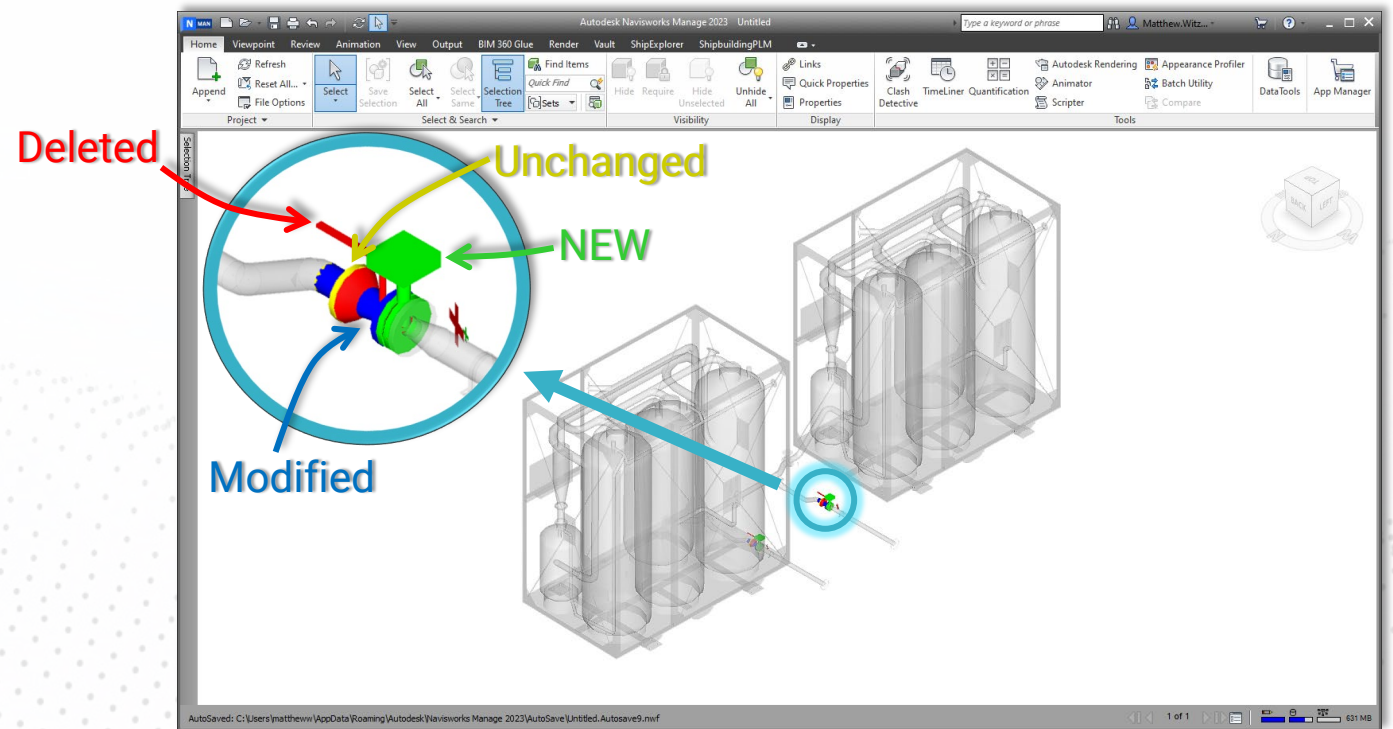
# ShipbuildingPLM Configured Models

- Navisworks Models From ShipbuildingPLM are Available in ShipExplorer
- Models Based on Assembly Level Are Available
- Choose From the Revision History to Load
- Multiple Models Can be Appended to Build a Contextually Rich Model



# Model Visual Comparison

- ShipExplorer Can be Used to See Differences in Hulls Prior to Design Transfer
- Reviewing Multiple Hulls Against Each Other Allows for Scope Validation and to Plan for Localized Adjustments
- Several Tools to Accomplish This
  - Graphical Preview (WST)
  - Compare Revisions (SE)
  - Graphic Compare (WST - New)
- Additions, Deletions, and Changes are Color Coded and Highlighted





# Design Transfer

WorkShare Transfer, Locking, and Tasks for Design Reuse

# Locking Access Across Project

- Models Locked at Milestones Stop Configuration Changes
- Locked Items Will Prevent Transfer of Design
- Lock Access Must Be Granted in Destination Project for Locked Items

Drawing	Locked	Include Parts	Locked Date	Locked By	Access	Unit	Item Type	Drawing Path
331 BH	<input checked="" type="checkbox"/>	<input type="checkbox"/>			Pipe USER	331	Pipe System Model Drawing	Units\331\Piping\331 BH.dwg
331 BW	<input checked="" type="checkbox"/>	<input type="checkbox"/>				331	Pipe System Model Drawing	Units\331\Piping\331 BW.dwg

Total Items Loaded: 2

# Tasks Across Project

- Tasks for ECO/ECR Created In A Single Hull.
- Tasks Can be Exported Between Hulls to Reuse Organizational Structure
- Add or Remove Tasks Based on Individual Scope
- Required Tasks Will Ensure Only Assigned People Can Transfer Designs

The screenshot displays the 'Task Management' window in ShipConstructor. A purple box highlights the task list for 'PSV-WSC2024-HULL3', which includes tasks ECO-001, ECO-002, ECR-002, and ECR-003. A purple arrow points from this box to a 'ShipConstructor' dialog box titled 'Import Complete', which reports: 'Tasks Imported: 4', 'Tasks Updated: 0', 'Tasks Skipped: 0', and 'Tasks Ignored: 0'. Below the dialog, a table shows the imported tasks with columns for Item Names, Unit, Type of Changes, Item Type, Category, User Names, Task Name, Drawing Path, and Last Modified Date Time. The table contains the same four tasks as the source hull. In the bottom left, a portion of an Excel spreadsheet is visible, showing the same task data.

Task Name	Status	Description	Active Users	Assigned To	Task Completed	Task Started
ECO-002	Pending	Automated Valves for Bulk Discharge System	ESTeamSPLMsvr,mattheww	ESTeamSPLMsvr,mattheww		
ECO-002:ECR-001	Pending	Replace Manual Valves with Automated Valves	ESTeamSPLMsvr,mattheww	ESTeamSPLMsvr,mattheww		
ECO-002:ECR-002	Pending	Additional Cableway to New Valves	ESTeamSPLMsvr,mattheww	ESTeamSPLMsvr,mattheww		
ECO-002:ECR-003	Pending	Ballast System Updates	ESTeamSPLMsvr,mattheww	ESTeamSPLMsvr,mattheww		

# Workshare Transfer

- Gather Changes By Task
  - Verify All Items in Task to be Transferred
  - Other Loading Methods Available
- Save the Load Criteria to XML for Reuse
  - This Speeds Up Transfers Between Hulls
- Review and Transfer Design

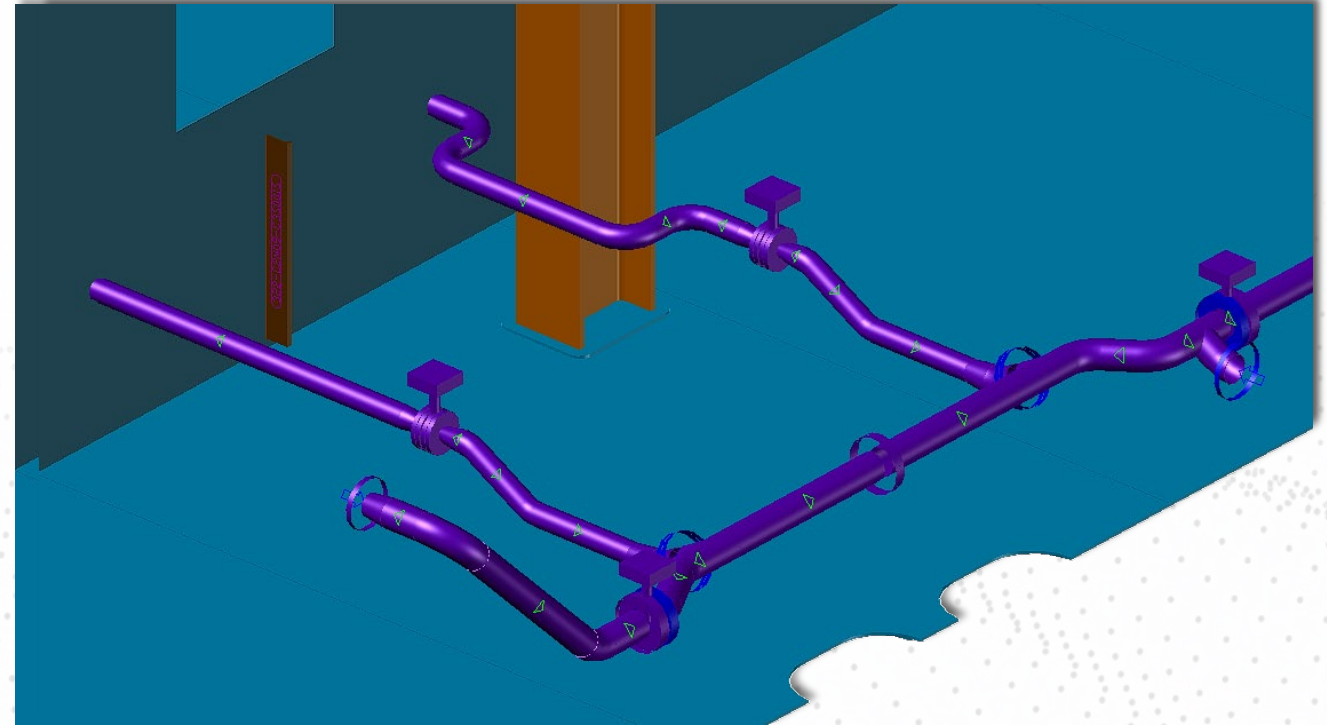
The 'Select a task' dialog displays the following table:

Task Name	Status	Description	Active Users
ECO-001	Complete	Replace ball valves with actual	
ECO-002	Complete	Automated Valves for Bulk D	
ECR-001	Complete	Replace Manual Valves with /	
ECR-002	Complete	Additional Cableway to New	
ECR-003	Complete	Ballast System Updates	
NSRP RA23-10 Phase 1	Complete		



# Post Transfer Updates

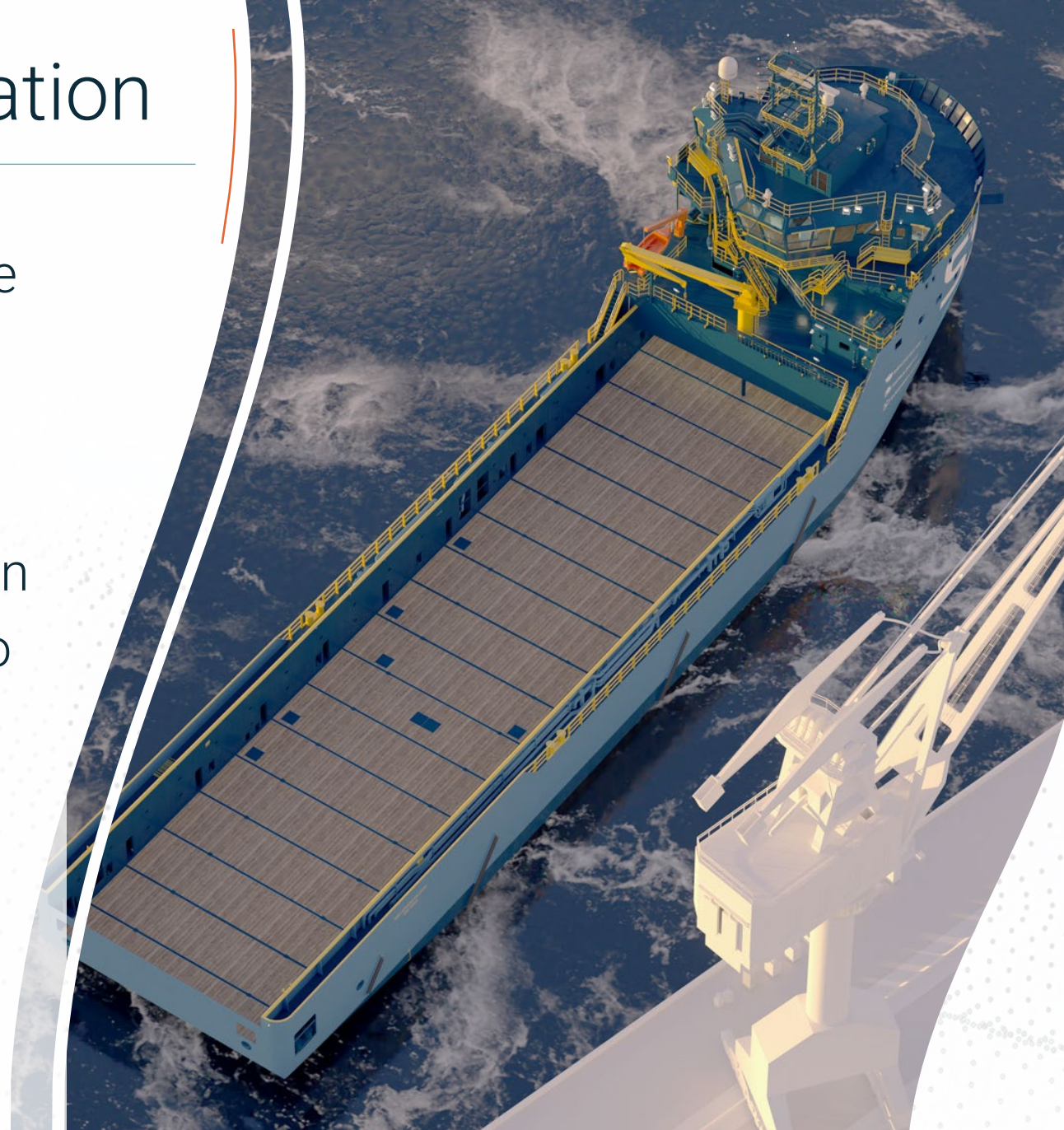
- Adjustments Between Hulls May be Necessary
- Use WST to Push the Common Design Between Hulls
- Local Changes to the Design May be Required Based on Hull Specific Context
- Each Hull Can Contain a Unique Configuration Based on the Original Change Request





# Finalizing Model Administration

- Closing Tasks Stops Gathering Change
- Removing Access to Locked Items Stops Change
- Closing These Two Items Configuration Locks the Model and Allows Change to be Gathered and Reviewed



# ShipbuildingPLM Configuration

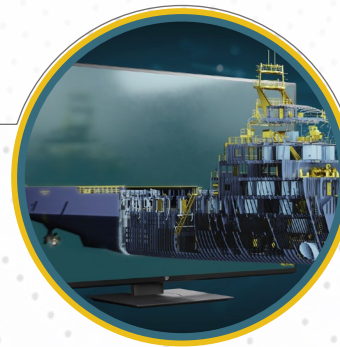
## Hull Management

Each ShipConstructor Project is a Unique Digital Ship Hull Within ShipbuildingPLM



## Digital Thread

Individual Hulls Create a Project Digital Thread and Can be Reviewed Against Other Hulls



## Change Release

Change Per Hull Is Released as it Progress Through the Workflow





# Configuration Control Recap

## Configuration Control Workflow and Tools

# Configuration Process Workflow Review



# Key Process Take aways

- Each Project is an Individual Configuration and SSI Provides Comparison Tools
  - ShipExplorer Tools Graphically Compare Differences
  - Workshare Transfer Provides a Path for Design Reuse
  - ShipbuildingPLM Manages All Configurations



# Thank You for your Time

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