SSIWSC 2024

Design. Build. Maintain. Connect.

ERP, MES and PLM Understanding their Roles in the Shipyard Enterprise Architecture

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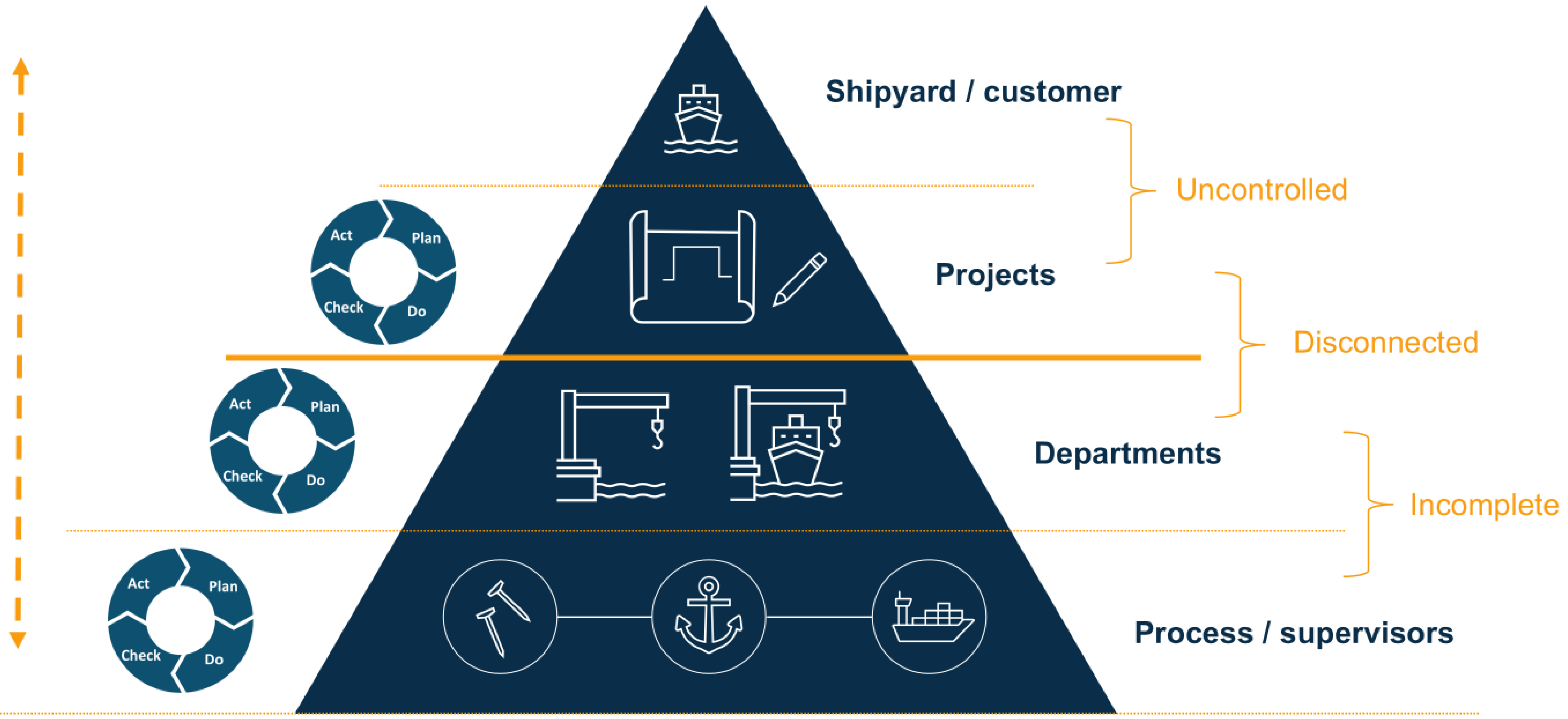
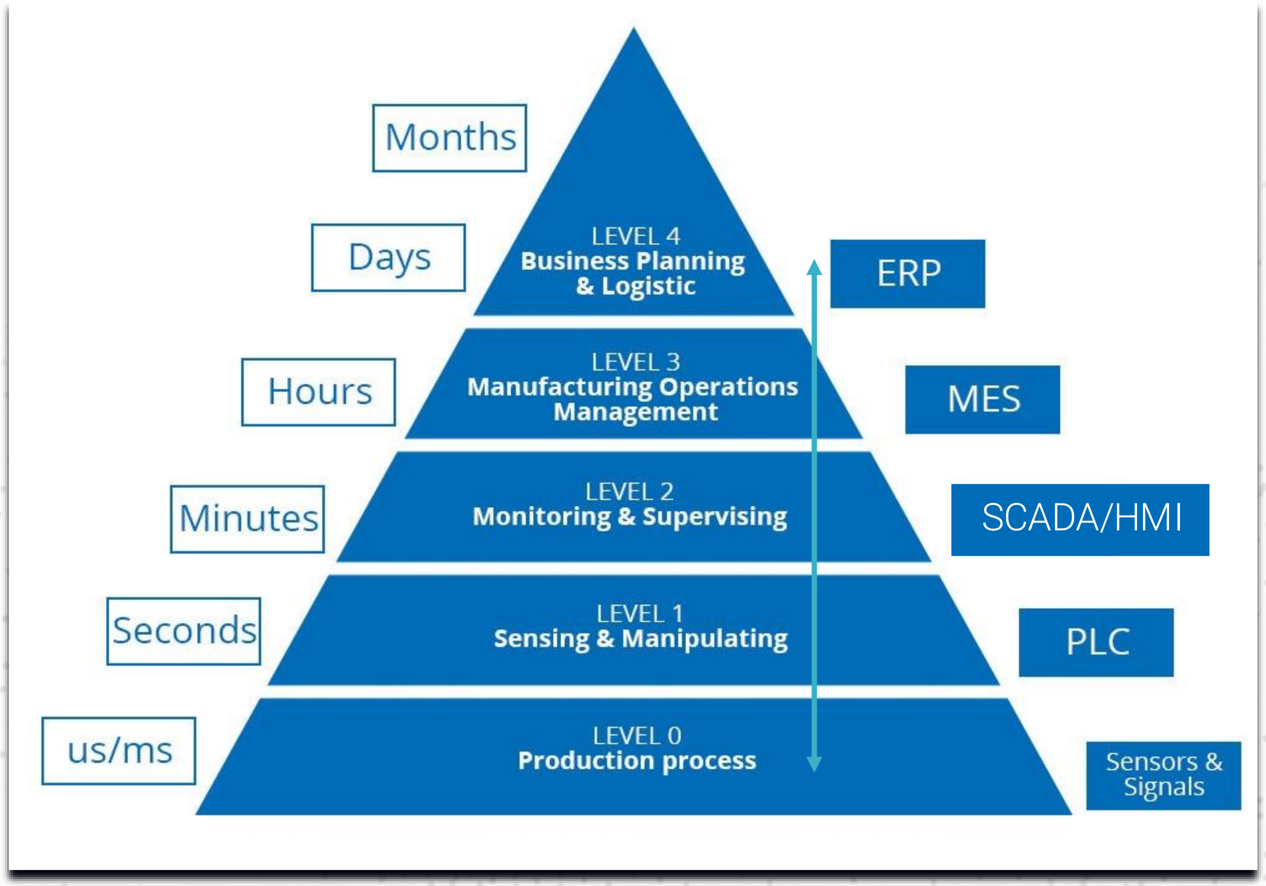
Major shipyard challenges caused by disconnected levels of control



Floorganise

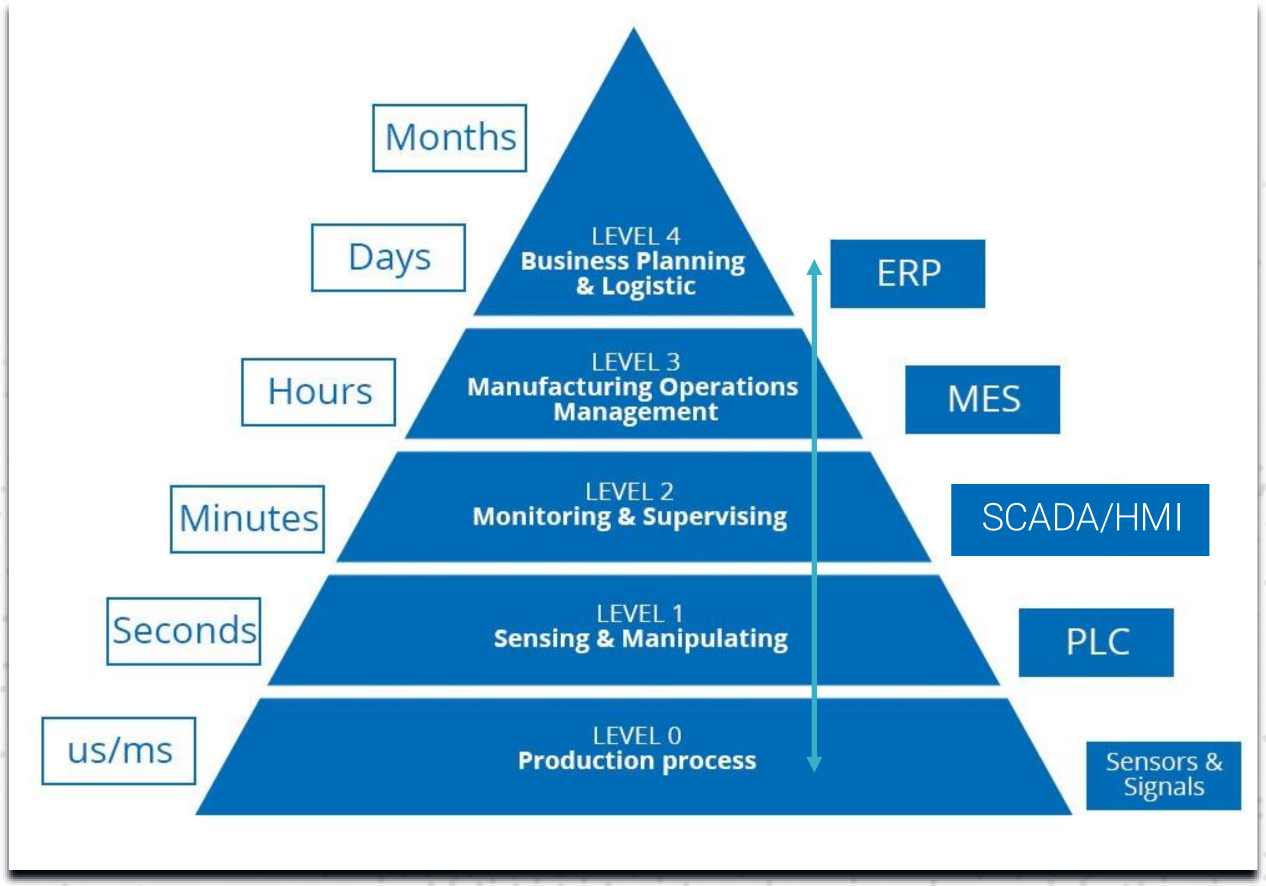
ISA-95 model for discrete manufacturing

- ISA-95, or Enterprise-Control System Integration, is an international standard developed by the International Society of Automation, defines best practices for integrating enterprise and control systems in manufacturing.
- MES (Manufacturing Execution Systems) plays a key role integrating the shop floor with the business and providing actionable data for CPI.
- ISA-95 effective for discrete manufacturing scenarios where you have a fully engineered product before you start production.

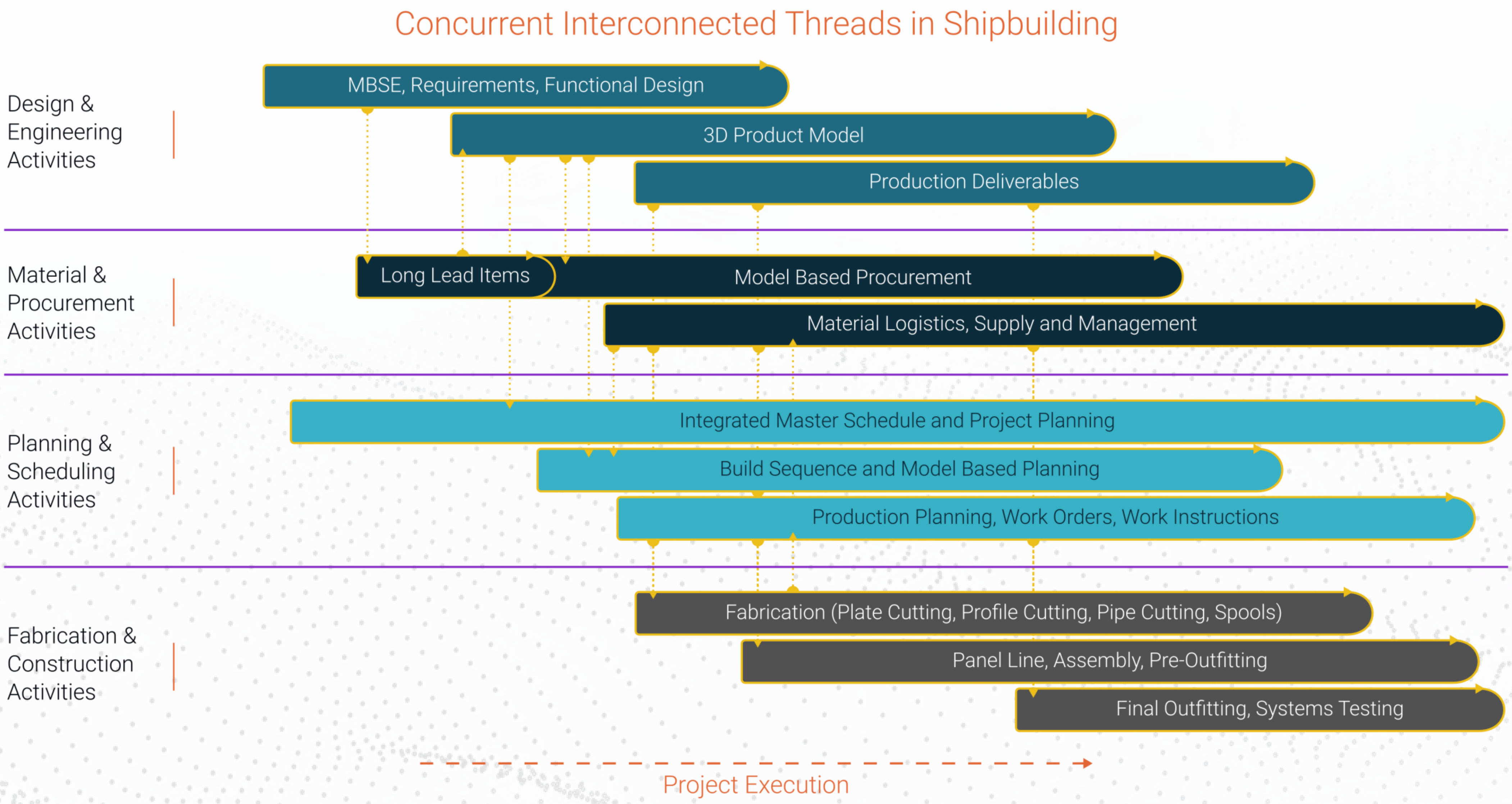


ISA-95 pyramid has limitations

- Was defined before PLM started to be widely adopted by manufacturing industries.
- Does not integrate constant product development and the role of the product model definition as part of the integrated manufacturing thread.
- Not a good fit for Engineer-To-Order processes.



Another approach is needed to connect the shipyard digital thread



US NIST IR 8107 Standards Landscape for Smart Manufacturing Systems

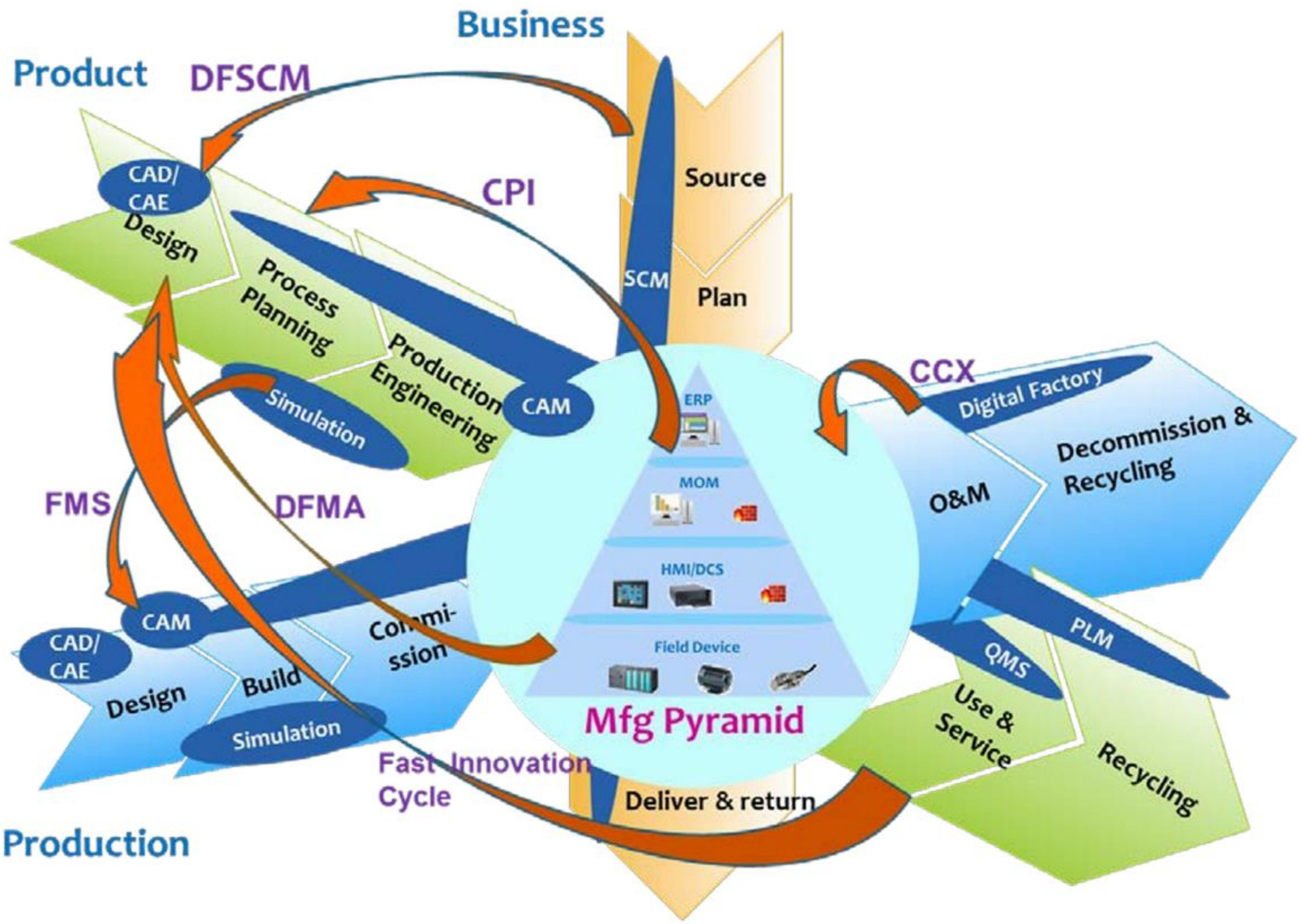
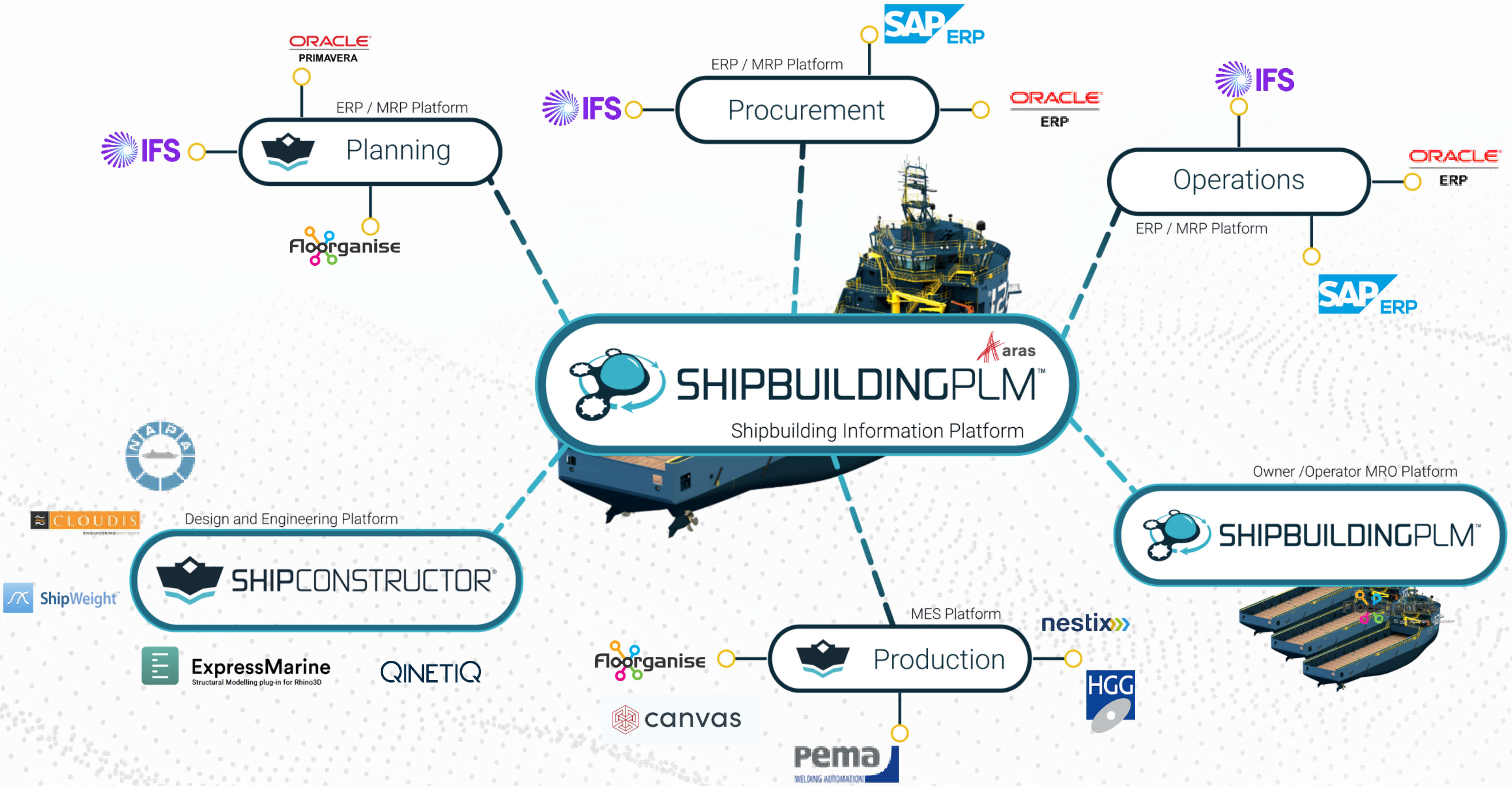


Figure 1. Smart Manufacturing Ecosystem

PLM/ERP/MES are peer platforms in the integrated shipyard



What is the PLM Platform role?

- PLM is the configured enterprise source of truth for the product model definition and the origin of the Model Based Enterprise (MBE), Part-Centric Digital Thread: **What will be manufactured, How it will be manufactured and tested**, and **What materials are needed** to manufacture it.
- **PLM configuration controls the product model definition** through design iteration and change management, communicating the impact of change to downstream stakeholders.

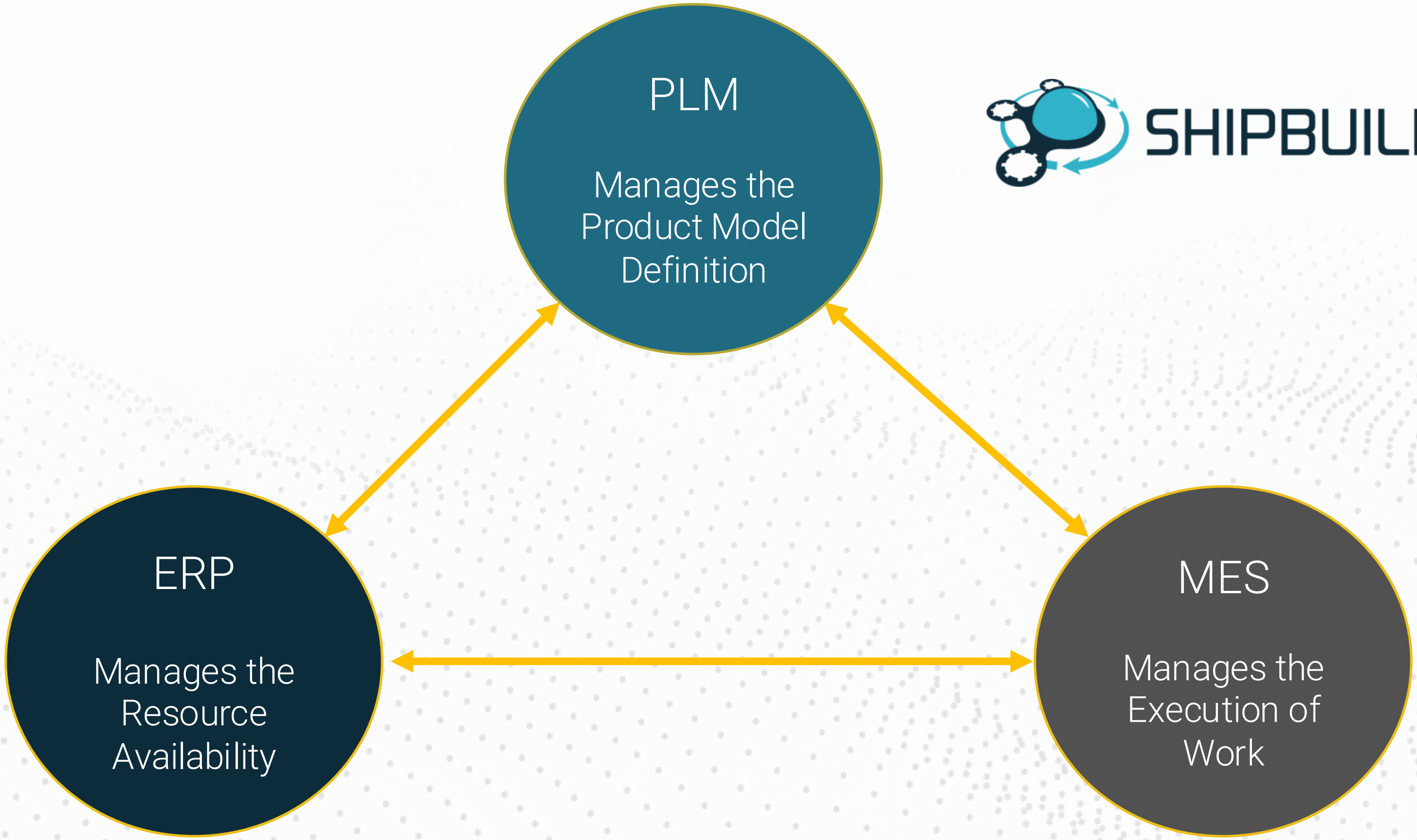
What is the ERP platform role?

- **ERP controls the availability of resources** to manufacture and deliver the physical product defined by the product model definition, in alignment with the project schedule and budget: **the financial, material, tooling and human resources.**
- ERP **should** provide business oversight of the overall program/project status/health across all resource domains, but often lacks accurate information from the business domains to achieve this goal.

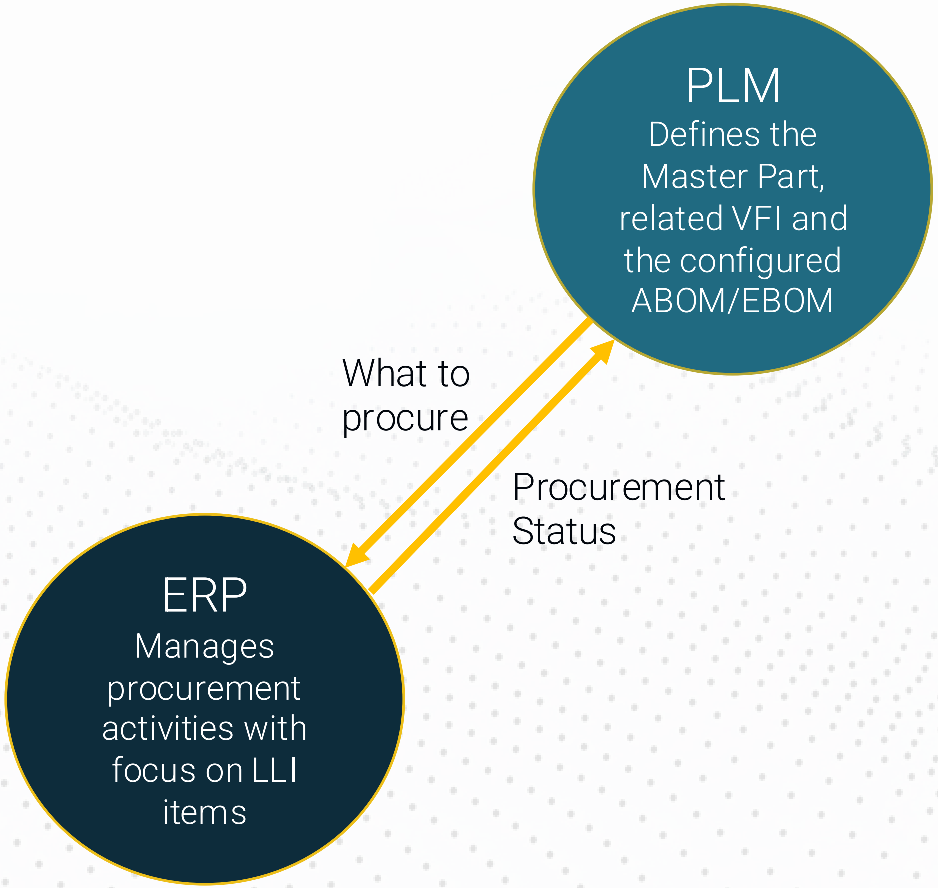
What is the MES platform role?

- **MES defines the detailed work activities and oversight of the execution of manufacturing work** (human and automated) to create a physical product, based on the configured product model definition.
- **MES tracks work completion and what resources (materials, time/hours) have been consumed to complete the work.**

PLM/ERP/MES roles in an integrated shipyard architecture

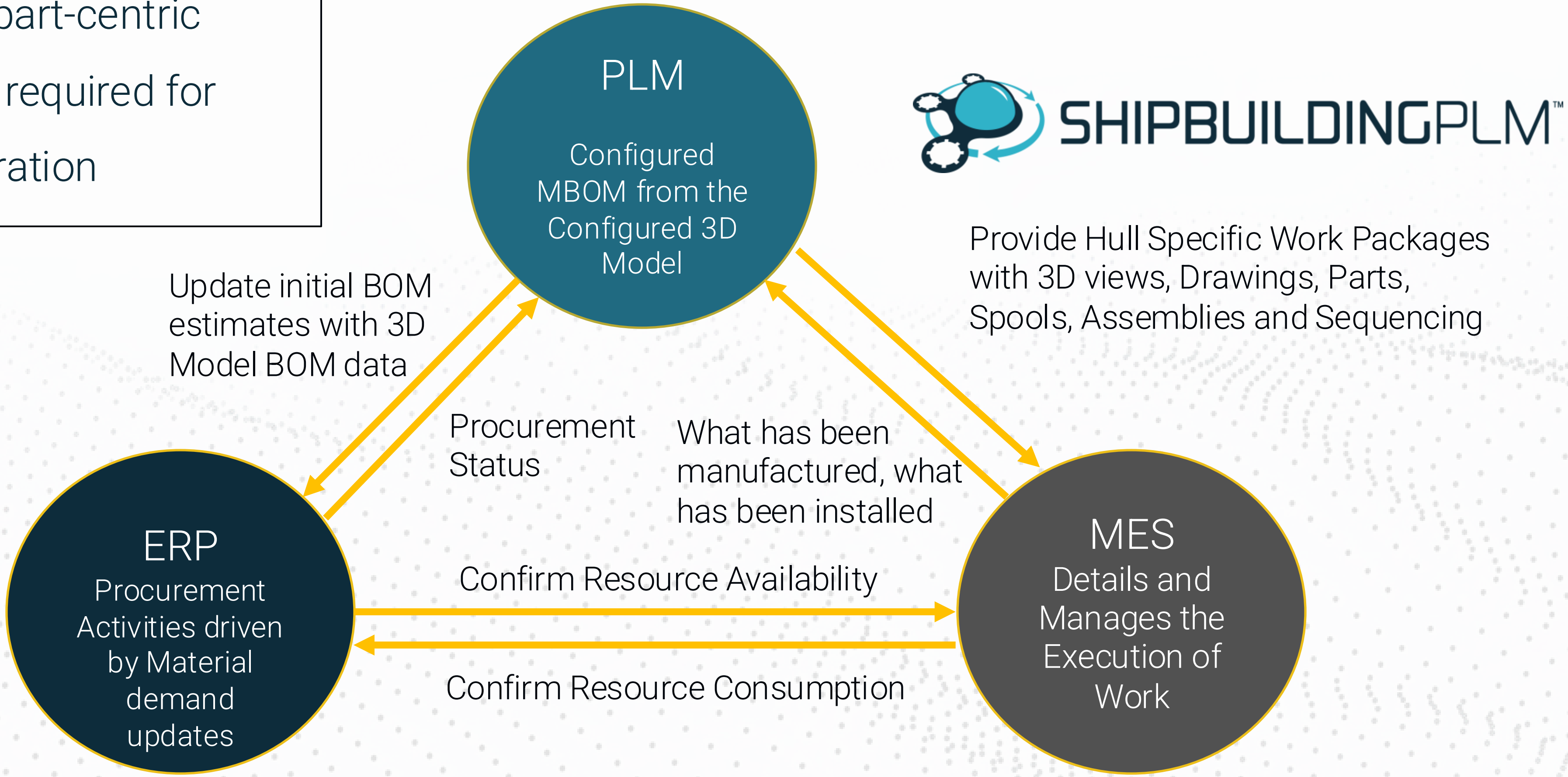


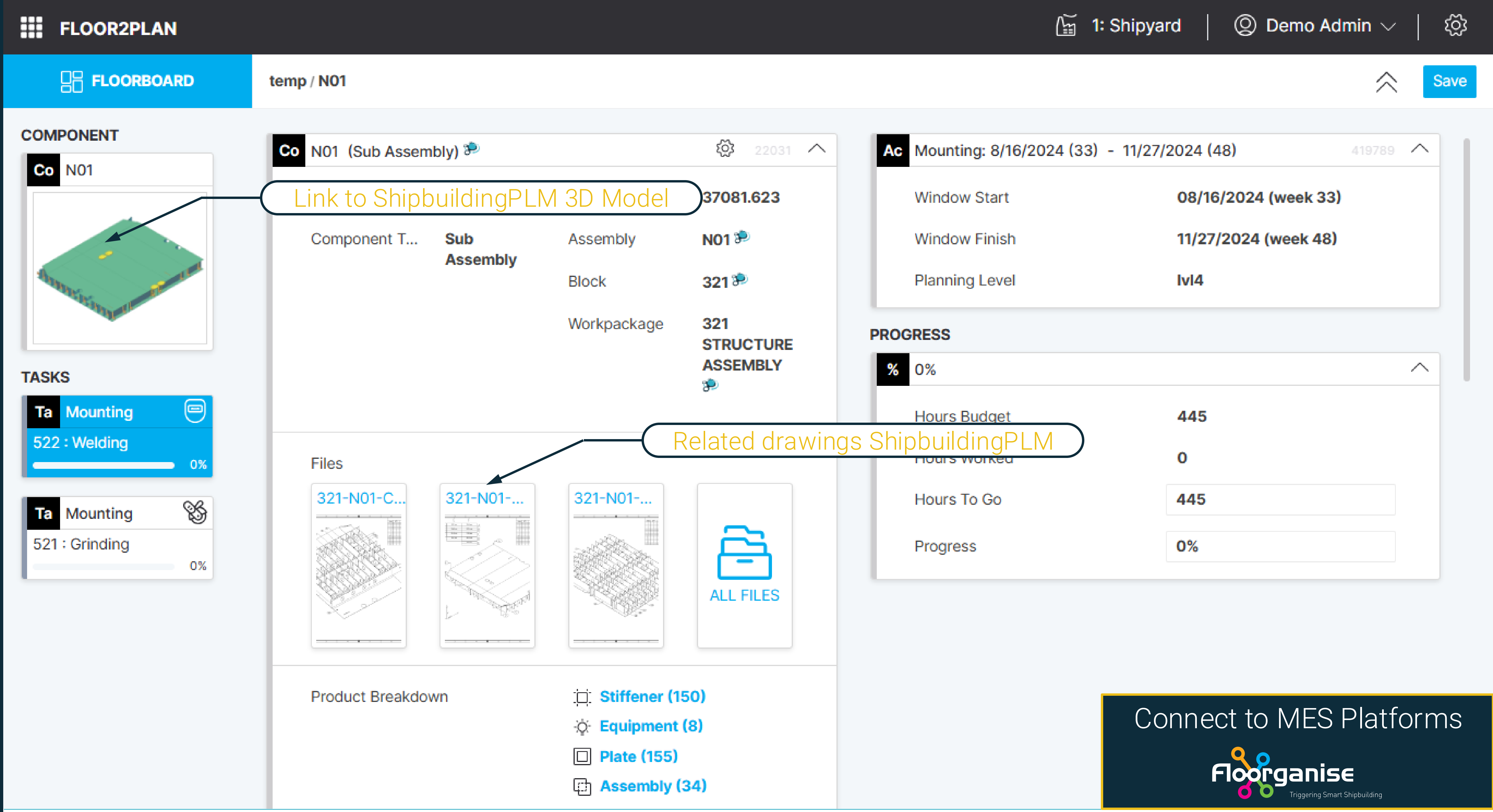
Role playing: ABOM/EBOM workflow



Role playing: Model Based MBOM workflows

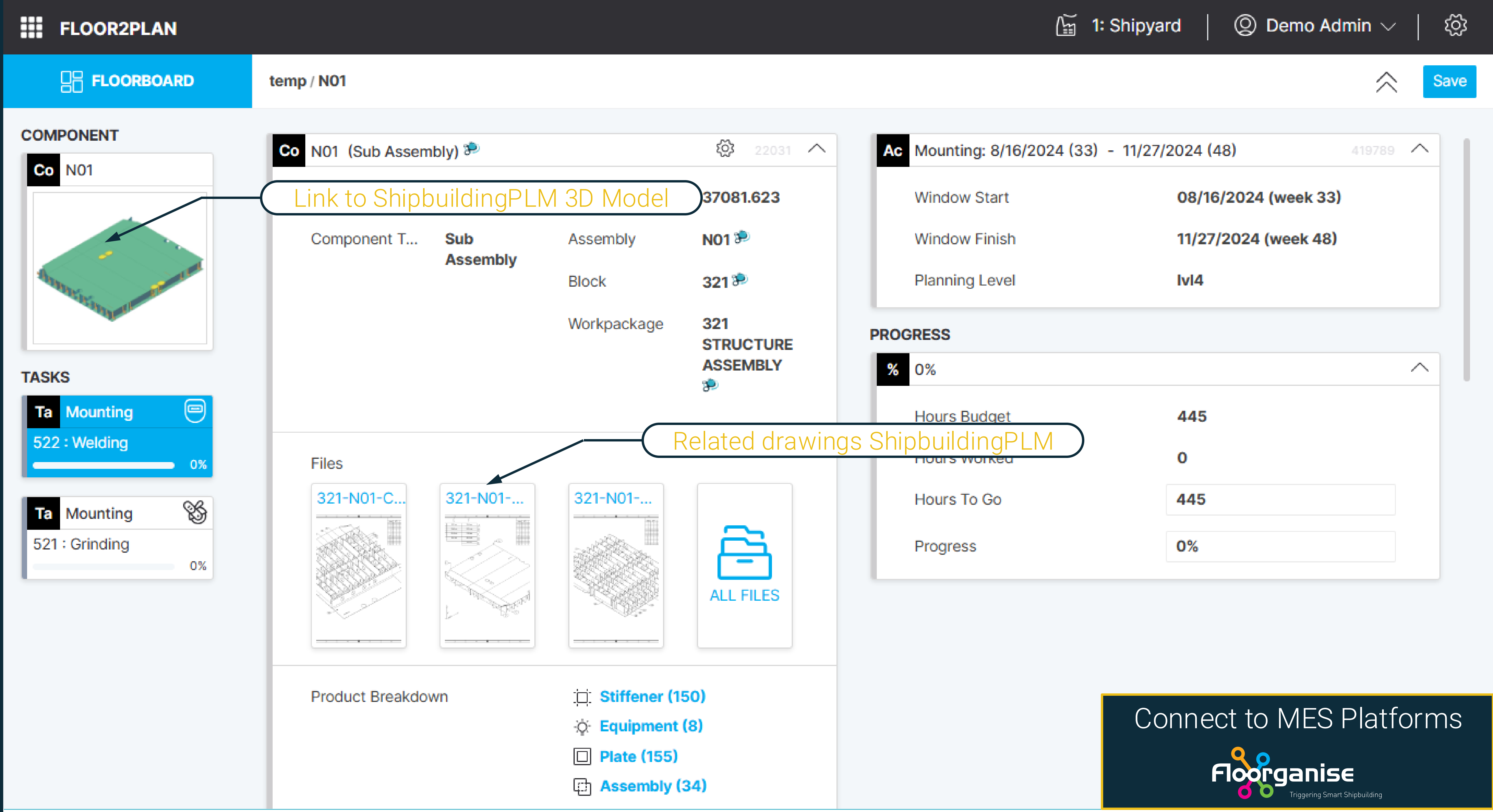
- Model-based, part-centric architecture is required for effective integration





Connect to MES Platforms

Floorganise
Triggering Smart Shipbuilding



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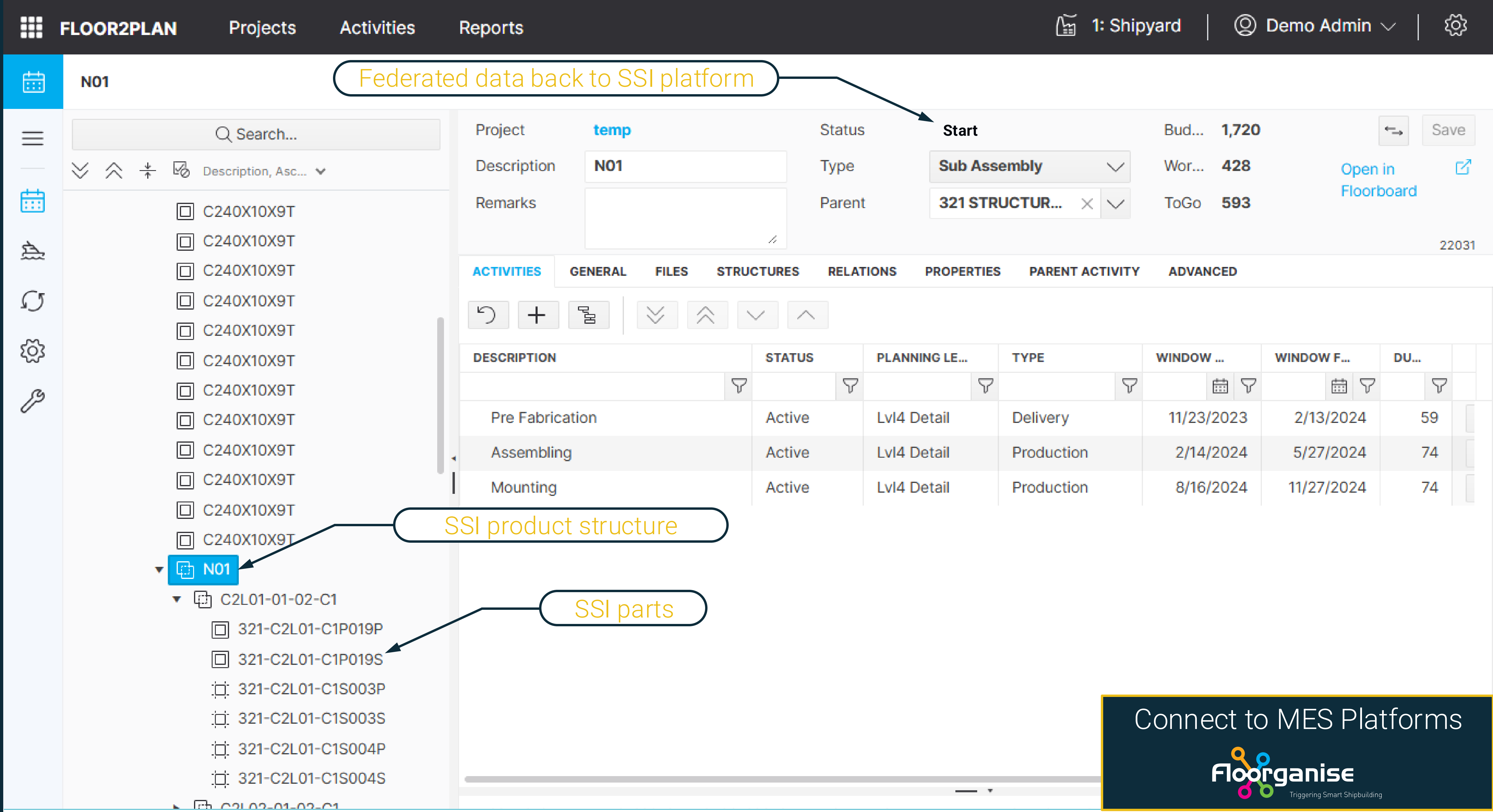

Connect to MES Platforms

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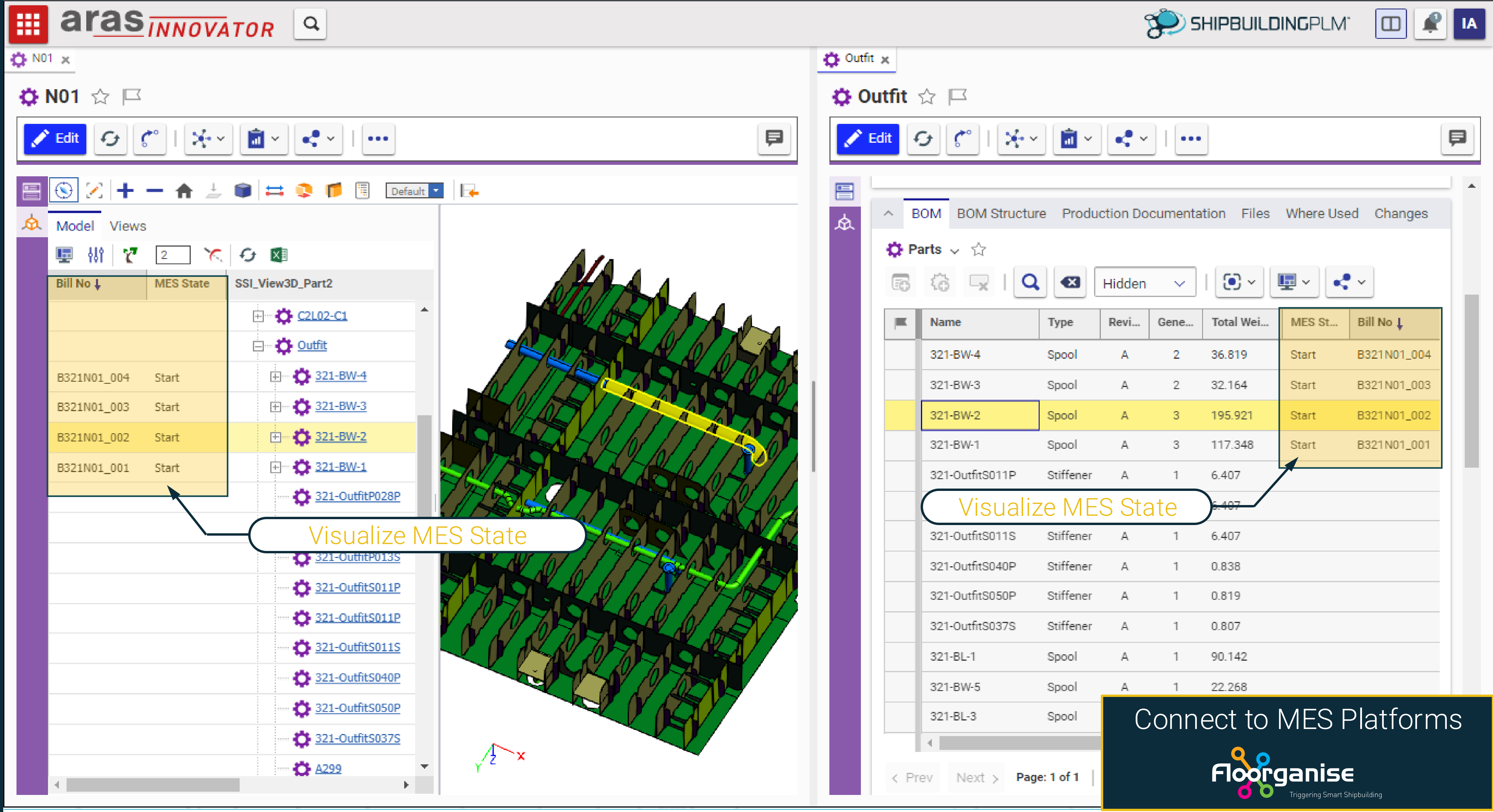
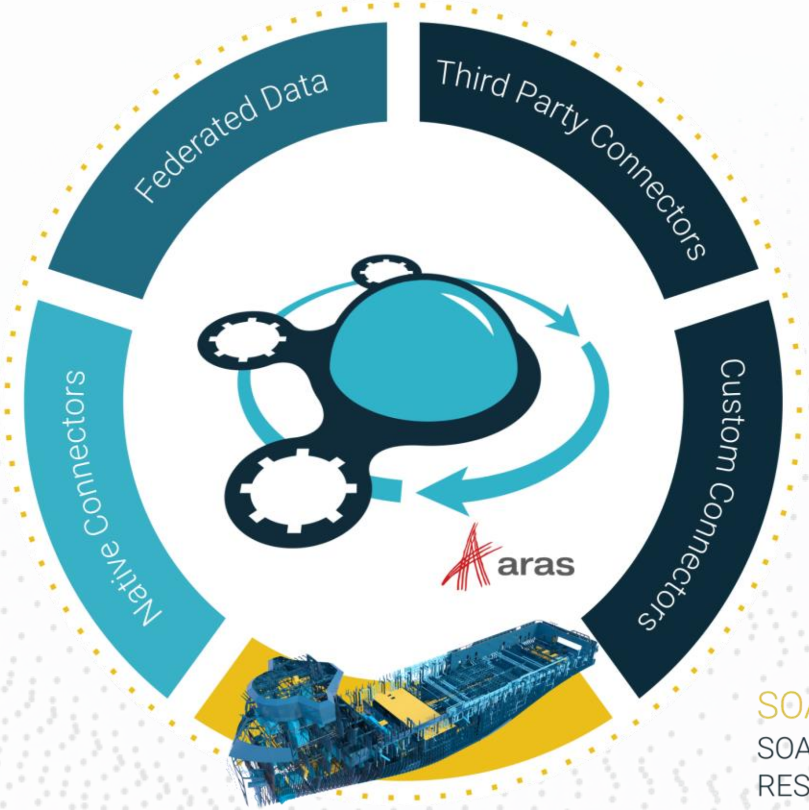

Visualize MES State
Visualize MES State
Connect to MES Platforms
Triggering Smart Shipbuilding

Interface Guidelines

- PLM/ERP/MES interfaces need to support multiple use cases across the shipbuilding lifecycle.
- Focus on business processes first, technology to support integration should be driven by use cases.
- Make sure Change Management scenarios are accounted for.
- Connectors should be considered a baseline technology foundation, requiring additional configuration for specific use cases.



SOA Architecture
SOAP Services
RESTful Services

Key Takeaways

MES has a key role to play integrating the deck plate with the shipyard business

PLM, ERP and MES need to be integrated as peer platforms

A model-based, part-centric architecture is required for effective integration

The SSI Platform provides the required capability for interface development

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Questions?

Thank you!