AVEVA

Digital transformation of the marine industry

Driving a connected and sustainable marine future
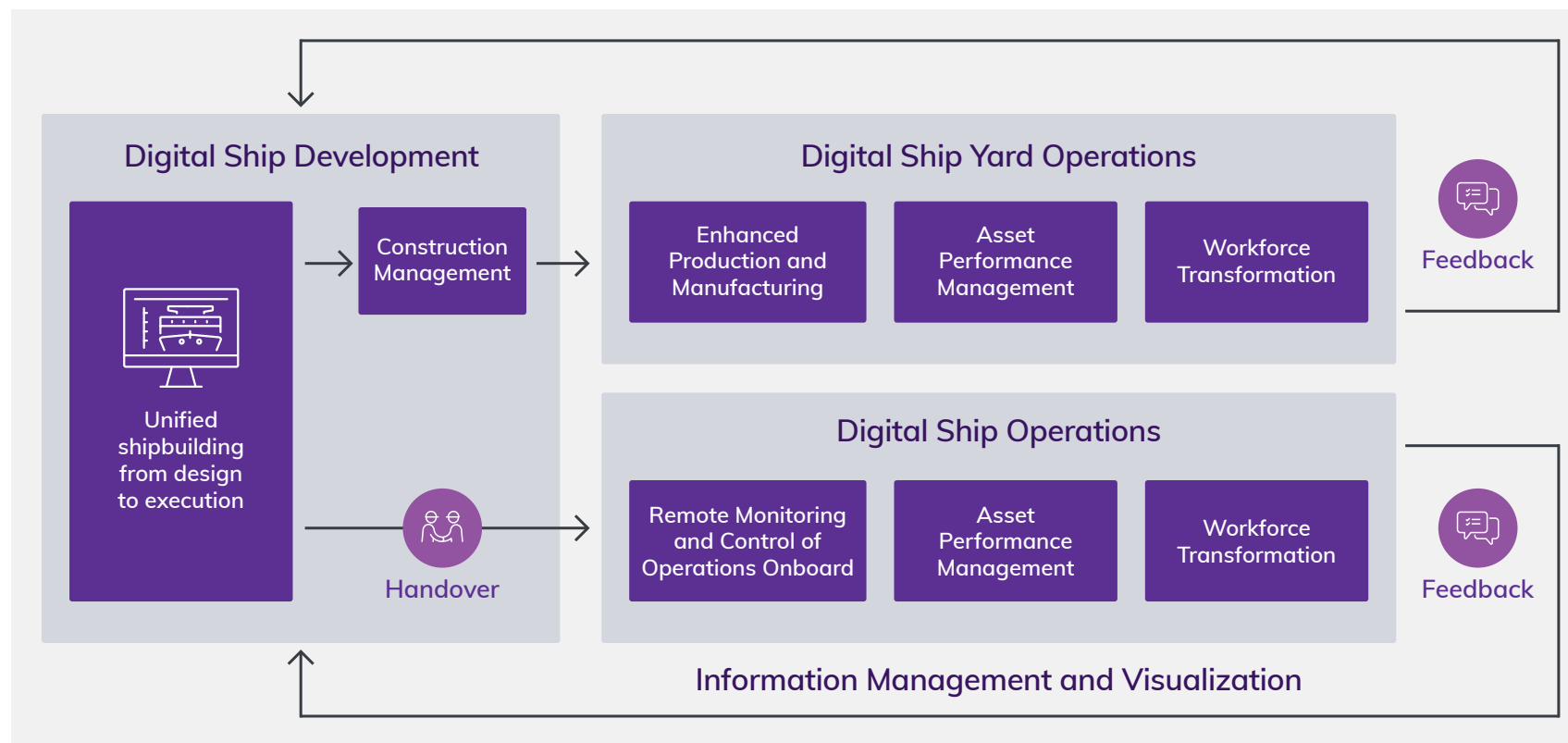
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Information Management and Visualization

- Execute more effective projects, providing industry-tuned features to connect the business-critical processed of engineering, design, materials, planning and construction

- Ability to turn data into insights, for downtime analysis, monitor schedules against project timelines and process optimization

- Provides predictive equipment failure warnings and digitization of maintenance procedures and activities

- Addresses the mobile workforce, enhances collaboration and provides state of the art training possibilities

Introduction

In today's rapidly evolving world, the marine industry retains its critical position as a driver for trade, transporting goods and commodities globally, as well as an essential contributor to our nations' security and defence forces, and a large part of the travel and tourism industry.

A staggering 90%[1] of international trade is seaborne, highlighting the importance of the industry on a global economic level. Whilst recent times have seen a slow-down in the building of ships and the overall quantity produced per year, there has been an upward trend in the size of the vessels themselves, allowing for the amount of trade to remain consistent. However, the increased size of the vessels has resulted in overcapacity of the shipping market for a number of years, with supply outstripping demand. This has a knock-on effect on the demand for orders new ships, which is constrained by three major factors[2]:

• Current structural overcapacity

• New carrier strategies that require more spending on IT and logistics

• Uncertainty about how best to achieve carbon neutrality

The COVID-19 pandemic has made for challenging times across the industry, with undoubtedly the greatest impact being felt in the cruise[2] sector. That being said, shockwaves were also sent across the shipping sector with a crash in oil prices, which may temporarily see an increase in demand for tankers to bunker the cut-price oil but is likely to be short-lived. Issues around crew changes have been widely covered in the maritime press, which coupled with uncertainties around future Covid-19 restrictions, has the potential to further limit international trade going forward.

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Introduction continued

Environmental regulations such as the IMO's 2030/2050 emissions targets will affect all market segments. The initial Greenhouse Gas (GHG) strategy aims to reduce carbon emissions by 40% by 2030 (IMO 2030) from 2008's levels and cut at least 50% of the shipping industry's total greenhouse gas emissions by 2050 (IMO 2050). As discussed above, there is currently uncertainty around the best way forward for alternative fuels, requiring cross-industry collaboration to find the optimal solution.

As the industry adapts to the many changes taking place and added complexities on a global scale, we must look for new, more efficient, more sustainable and better connected ways of working, which is where digital technology comes in. This eBook explains how the marine industry can optimize project execution, shipyard operations and vessel performance by embracing digitalization across the marine lifecycle.

Source:

1. Shipping Key Facts, International Chamber of Shipping (2020) Accessed 27/07/20, www.ics-shipping.org/shipping-facts/key-facts
2. Overcapacity will continue to dog container shipping in 2020
3. www.freightwaves.com/news/overcapacity-will-continue-to-dog-container-shipping-in-2020
4. www.freightwaves.com/news/overcapacity-will-continue-to-dog-container-shipping-in-2020
5. COVID-19 Impacts on Global Cruise Industry, KPMG (2020)

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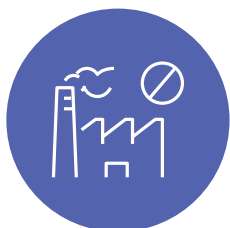transformation

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Industry challenges and trends

The top concerns for industry executives are:

A decade of industry turbulence and the post-covid era

Decarbonization/ environmental regulations

Workforce upskilling and skill shortages

The rise of new technology and big data vs. cybersecurity

Business agility

[1]7 issues facing the shipping industry in the new decade, Willis Towers Watson (2020)

[2]Top Global Maritime Issues Facing the Shipping Industry, Marsh (2019)

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Opportunities enabled by digital transformation

Digital transformation could generate:

50% manhour savings in pipe production

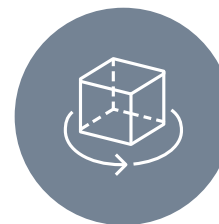**50% reduction in time engineers spend looking for information[1]**

A reduction in Greenhouse Gases (GHG) by optimizing the design of vessels[2]

A more connected workforce

100s of millions saved with predictive analytics

Increased opportunities for training with AR/VR technology

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Sustainability through digital transformation

1. Maritime transport emits around 940 million tonnes of CO2 annually and is responsible for about 2.5% of global greenhouse gas (GHG) emissions[1] (3rd IMO GHG study).

2. Digitalization of GHG can be considered on two levels: (this is the general solution)

    2a. A tool for efficient information gathering, exchange and analysis

    2b. Causing disruption in existing maritime business models, across the entire supply chain

3. Digitalization could enable a reduction in Greenhouse Gases due to increased operational efficiency, fuel management, optimized routing, speed of travel[2] but also through optimization of the drive train/propellers/hull shape etc. (3 to 5 are the detailed solutions)

4. Real-time data and analytics alone can result in a 2-5% reduction in fuel consumption[3]

5. Real-time coordination of production and logistics planning would increase the utilization of bulk ships by 34-43%, which could reduce emissions by 25-30%[5]

[1] AVEVA Website

[2] 3rd IMO GHG study

[3] Digitalization as a Tool to Reduce GHG Emissions in Maritime Transport, TRAFICOM (2019)

[4] Optimize Performance via Data Analytics, Maritime Logistics Professional, Keefe (2014)

[5] Driving Emission Out of Shipping, Gustafsson et al., PBI Research Institute (2019)

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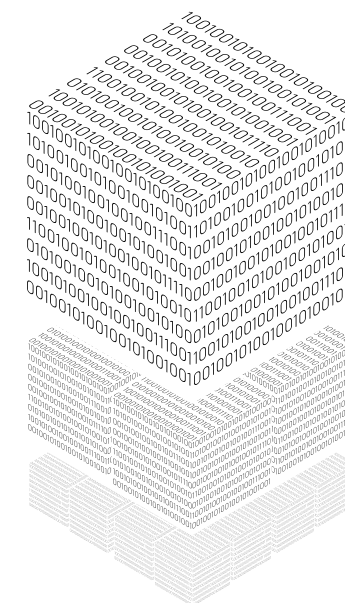# Digital transformation begins with the digital twin

What is a Digital Twin?

A digital twin can be defined as an 'evolving digital profile of the historical and current behavior of a physical object or process that helps optimize business performance'[1]. It can be formed by multiple discrete digital twins across a business. In reality, it begins with one holistic homogenous digital twin but is formed by multiple discrete digital twins across a business, wherever they provide value.

- It is a digital replica of a physical object, process or entity

- It provides us with living data – both static and real-time – and helps us to understand the behaviour of the system or 'state-of-work' and what could happen in the medium and long term, as well as what is happening right now

The digital twin has true strategic value as it provides a basis for multiple layers of information, analytics, monitoring and control, and asset management.

Click here to learn more about Digital Twins

1. Industry 4.0 and the Digital Twin, Deloitte (2015)

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Digital enablers

Digital enablers

Sensing　Data　Cloud　Analytics　AI　Mobility　Security

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Opportunities enabled
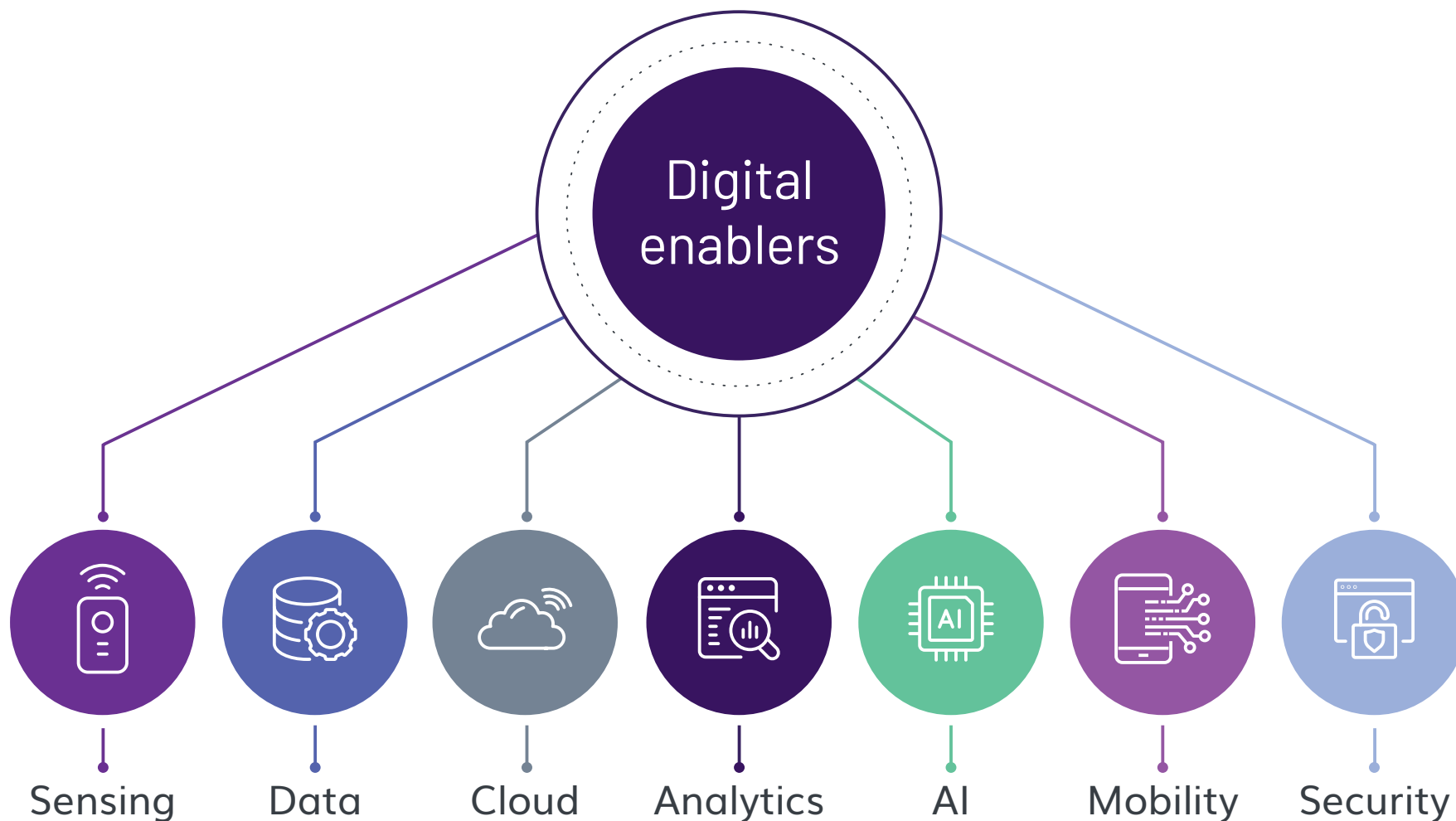by digital transformation

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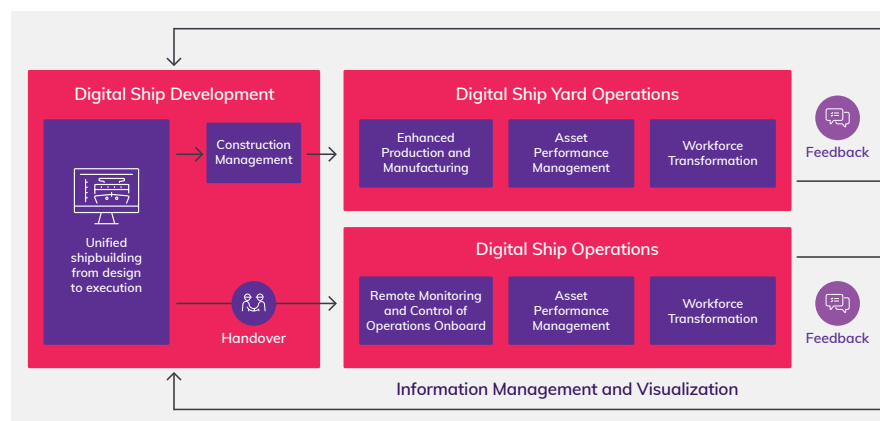for marine

The AVEVA
value proposition

Connected workforce

Connected worker solutions can be integrated across AVEVA's portfolio to increase collaboration, rapidly upskill the workforce and attract a new generation of talent looking for modern and interactive ways of learning.

Mobile Applications

Enable users to view data and KPIs on mobile devices/tablets for real-time decision making. Deliver consistent execution of best practices for data collection during safety, maintenance and environmental inspections.

Digital Collaboration

Digitize your SOPs/workflows, including mobility an procedural enforcement; collaborate on multi-user planning or schedule scenarios. Connecting desktop workers (design, production etc.)
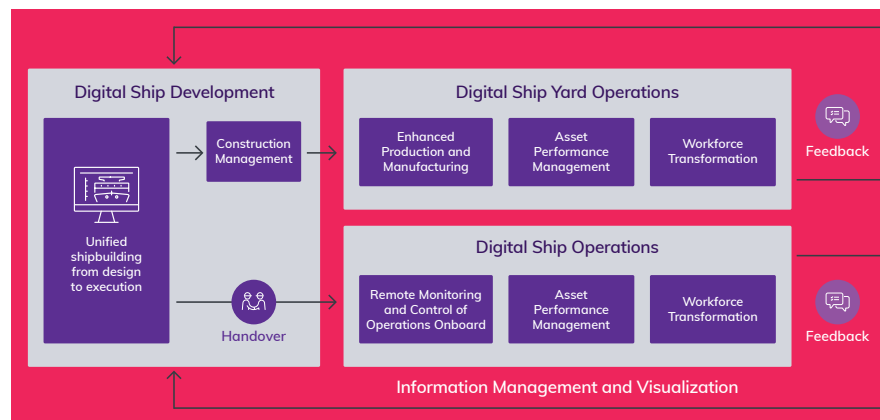
Augmented Reality

Use innovative augmented reality software on mobile devices to augment physical equipment and process areas with real-time data and relevant information. When integrated into training programs but also real-world maintenance rounds, this is an extremely powerful tool.

Operator/Maintenance Round Training

Provide an authentic learning experience to engineers, by guiding them through real-world situations, which mimic the actual shipyard, key asset, or vessel they are working on. Train them safely in a fully controlled environment, whilst accelerating the overall process because they do not need the real-life asset to be available.

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Information Management and Visualization

Real-Time Operational Performance Management

World-leading data gathering technology allows for large volumes of information to seamlessly converge and contextualize engineering, operations, performance and financial data for enterprise-wide visibility. Overcome siloed information challenges to drive real-time critical decisions that directly impact your bottom line. Improved integration and collaboration across functional departments, enabling the sharing of information and coordination of daily activities and processes.

Information Management and Visualization

Using the 3D digital twin created during the Design & Engineering phase as a basis, you can bring together information from multiple sources and in multiple formats, to enable users to securely access, visualize, validate and collaborate on the digital asset data. Powerful search capabilities enable rapid location of validated project information, and quicker decisions on Engineering Change Notices (ECNs). When coupled with a 3D Visualization tool, a seamlessly connected view of project and asset information is empowered, delivering a highly efficient and effective decision support capability for capital projects and operations environments.

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Cloud

Increased accessibility

As designers and engineers are being asked to work from remote locations, make their tools accessible anywhere and anytime, on any device, with an Internet connection.

Highly scalable

For changing user-base on demand, and high-performance processing needs, particularly when 'flexing' up and down for different shipbuilding projects.

Improved collaboration

Share information securely within your organization but also with trusted 3rd parties, who are becoming increasingly important throughout the marine lifecyle, specifically within the design and development process.

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Digital ship development

Ship design and engineering
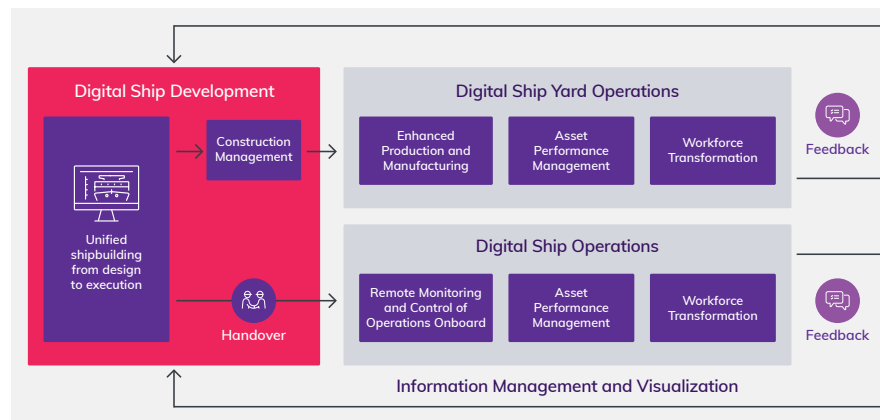
Design and Engineering

Built specifically for shipbuilding, AVEVA's powerful 3D Design and Engineering tools enabling clash-free multi-discipline design to maximise efficiency and build a true digital twin from the keel up. Rapidly generate accurate drawings and reports to reduce timescales and commercial risk, whilst the ability to reuse designs saves time on future projects. One single source of truth, providing mature and validated data, allows you to easily rework the existing models without costly or time-consuming changes.
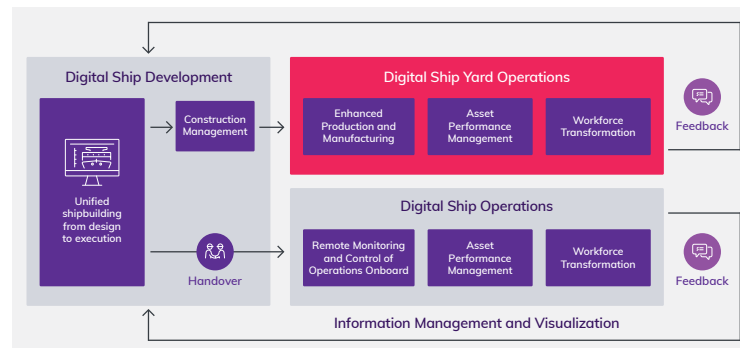
Enterprise Resource Management

Take complete control over your entire project with an ERM system that is fully integrated with your design and engineering processes and tools. Supporting the design, procure, construct and delivery process, you can create efficiencies from the automation of initial project planning and material definition, through Bill of Materials management, procurement and logistics, to fabrication and construction planning and control.

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Digital shipyard and ship execution

Ship production and shipyard operations management

Manufacturing/Production

Digitally transform manufacturing operations through a Digital Work Order Execution System, connecting any ERP system to the shop floor, bridging the gap between high-level planning and reality. Digitally capture all manufacturing collaboration and processes, bringing relevant information to the workshop for perfect execution, and complete the feedback loop to planning and scheduling by connecting to your machines. Work flexibly to adapt to new product types and benefit from seeing the big picture at the same time as empowering the workforce with all the information they need.

Data Collection and Asset Performance Management

Deliver improved asset health, optimize maintenance schedules and reduce critical asset downtime, through data collection, aggregation and analytics. Monitor key assets in the yard such as cranes, to ensure your path to project success is simple. Predictive Analytics software can accurately predict potential problems and prescribe solutions through analysis and simulation. Apply advanced predictive algorithms to identify subtle changes in system behaviour which are often the early warning signs of equipment health and performance problems.
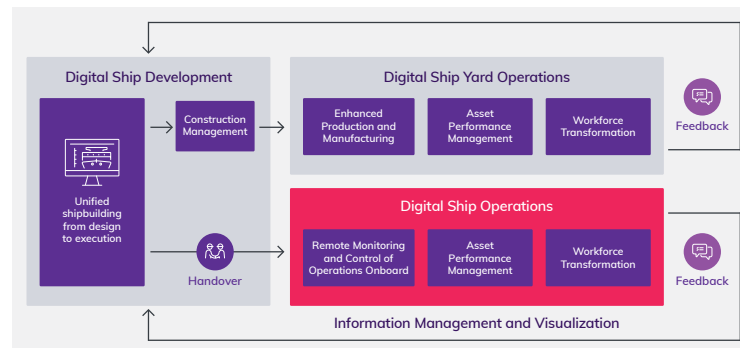
Connected Workforce

Connecting your workers to the information they need, the tools required and the right people throughout the process, has never been easier. Experts, those on the shop floor and office team members, both internal and external, can now work together seamlessly to collaborate, making shipbuilding projects more efficient and successful. Support remote working and critical decision making by connecting the design office, OEMs and subcontractors, across multiple devices and apps.

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Digital ship operations

The ship at sea

Vessel Optimization

Bring together both existing and untapped data sources via sensing, to drive greater operational efficiency and reduction in downtime by monitoring individual vessels and even entire fleets. Make real progress towards sustainability targets by optimizing the route, fuel/energy management and speed of travel, whilst keeping the operational profile of the vessel in mind. Maximize your competitive edge through the use of dashboards, detailing vital performance insights to increase rapid decision making and business agility, which is now more important than ever.

Data Collection and Asset Performance Management

The Digital Twin of the vessel provides an exact replica to overlay with real-time operational data. In the same way that key assets and equipment in the shipyard can be monitored, this can also be applied to the ship itself. Whilst most major OEMs provide alerts and warning for their individual systems, Asset Performance Management takes a longer term view, assimilating all of the information and aiming to avoid last-minute maintenance or breakdowns.

Predictive Analytics

Easily integrated into a shipyard scenario, Predictive Analytics software can also be used to accurately predict potential problems onboard the vessel itself. By prescribing solutions through analysis and simulation, planned maintenance can be scheduled, and long-term performance of the ship can be optimized across a multitude of drivers including cost-effectiveness, reduced emissions and speed.

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AVEVA uniquely connects the information in the project planning, project execution and operational phases of an vessel's lifecycle to accelerate your digital transformation towards a more agile and sustainable industry by:

- Giving you confidence to efficiently make late changes and adapt to market conditions

- Ensuring workers have the information they need to do their jobs

- Bridging the project and operational phases with consistent, complete information

- Optimizing processes to deliver efficiently, even as conditions change

For more information, please visit:
aveva.com/en/industries/marine/

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We'll take you there™

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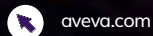
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About AVEVA

AVEVA is a global leader in engineering and industrial software driving digital transformation across the entire asset and operational life cycle of capital-intensive industries. The company's engineering, planning and operations, asset performance, and monitoring and control solutions deliver proven results to over 16,000 customers across the globe. Its customers are supported by the largest industrial software ecosystem, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, UK, with over 4,400 employees at 80 locations in over 40 countries.