



Feel Empowered

Tackling Shipbuilding's Unique Challenges by Integrating Multi-PDMs Within a PLM Landscape

Case example of the Polarstern II

Henk Kramer

Vice President – Central Europe

A shipbuilding-focused engineering to production lifecycle platform, paired with an enterprise PLM

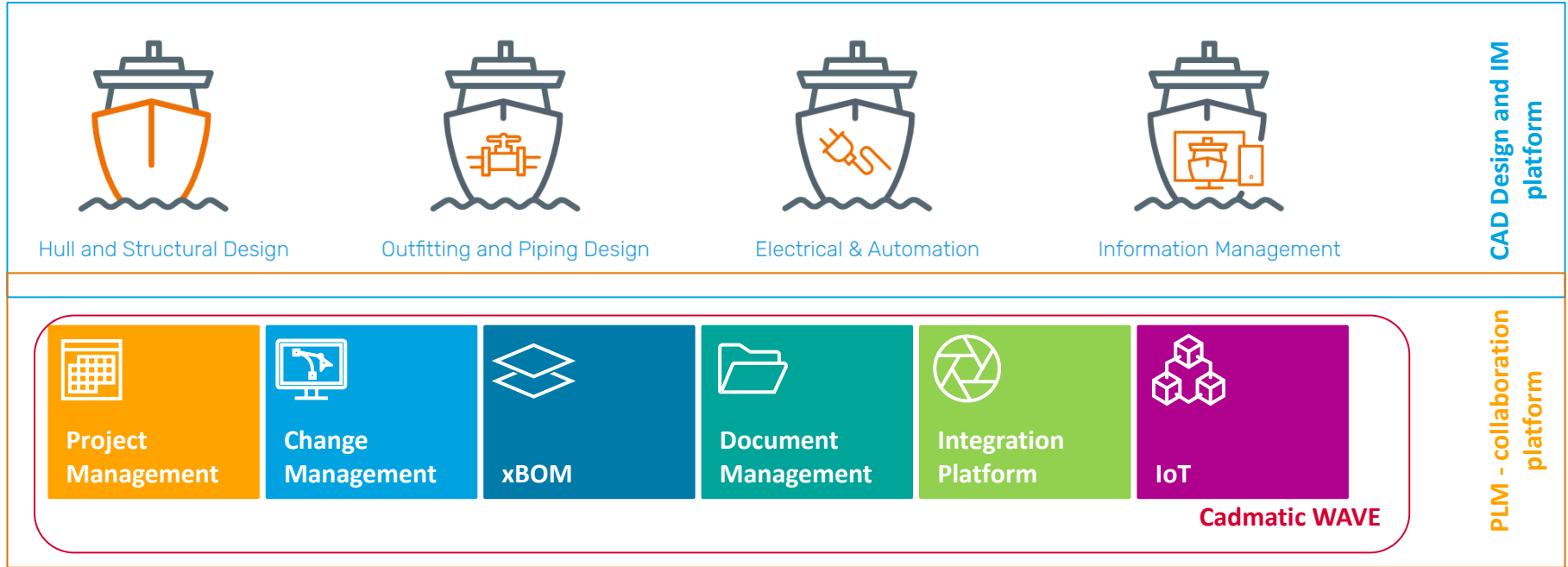
Who are we?

And what do we do?



CADMATIC portfolio

Composable solution for shipbuilding design and collaboration



The purpose of CADMATIC Shipbuilding Lifecycle Management System – WAVE
Ship design-centered highly composable solution for shipyards and networks with open integration
platform possibilities to ILS and IoT

What did we do?

And why did we have to do it?



First the Why: A unique domain with its own problems

Shipbuilding is unlike other industries – Industry-agnostic PLM tends to fall short

- **One-offs and ‘first-of-classes’:** Every ship is typically unique or a ‘first-of-class’. Series are exceptional and - if there - small. This means lessons learned are partially applicable at best and reuse of data very little
- **Focus on delivery time:** End-product needs to be delivered asap, quality is second priority. Waiting for design to finish means expensive delays. Fixing on the spot is usually cheaper and preferred
- **Overlapping phases:** Design, engineering, planning and production, they all happen concurrently. The project is under way before design is even partially mature
- **Sister ships aren’t variants:** They might be distant cousins at best, containing vastly different items, thus even in series the re-use of material and knowledge is problematic
- **Sheer scale and complexity:** Ships are floating cities hundreds of meters long, tens of meters wide and high. The amount of systems, parts and geometry are unlike other industries. Simple engineering mistakes could mean production becomes impossible
- **As-designed and as-built differ significantly:** Small objects such as smallbore piping, small ironwork or loose objects are usually not engineering, but simply field-routed and placed. On-the-spot fixes are never communicated back. Maintaining synchronicity between the two is deemed costly with little return. A True Digital Twin proves to be difficult
- **Projects are rarely seen back after hand-over:** Shipping and Shipbuilding are two distinct and disconnected industries. After hand-over the project is usually never seen back (exceptions there). A shipyard ‘goes on to the next’ and shipping companies start with an ‘as-discovered’ in their own software

Shipbuilding through the years evolved and solved challenges ‘their own way’

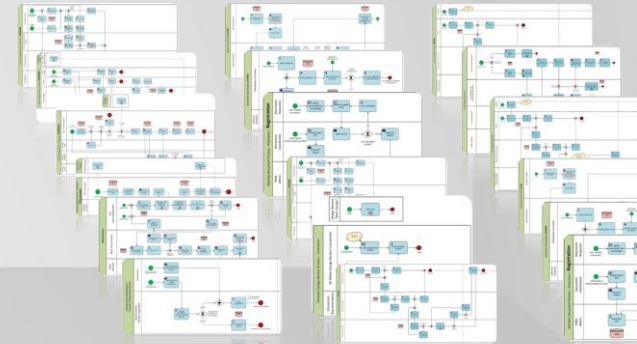
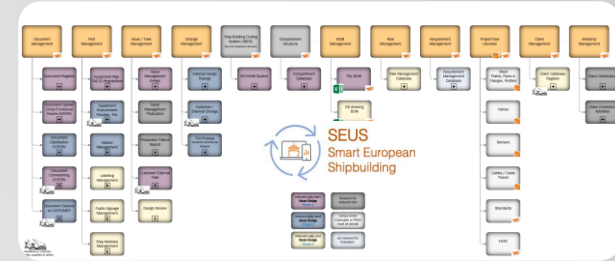
- **Ships are designed and produced with multiple views of the project:** Projects are engineered per system, arranged by compartments, produced in blocks, procured in batches, and delivered as an as-built that contains thousands of deviations. All these views of the same object are true at the same time, depending on the person you ask



Then the What: Create a production-focused platform

‘Digital Thread’ up to and including production, while agnostic to enterprise PLM platforms

- **Go back to the drawing board:** We started to look at industry-specific processes and workflows and ‘typical PLM’ and where they don’t meet. Re-design the required data model from scratch (*Horizon 2020 project – SEUS*)
- **Adapt software to industry:** Understanding the industry’s issues, create software that changes to the industry instead of ask the industry to change to software
- **Maintain tradition, design for future:** Shipbuilding is traditional industry, document-driven. The wish is to become drawing-less, reality is far. Be realistic, allow for both
- **Focus on production:** Managing the processes in and around the shipyard and managing the engineering for production are two different philosophies. The unsolved challenge is design-to-build
- **Create an integrated Digital Thread:** From Engineering, to Assembly Planning, to Work Planning, integrated into PDM, delivering the 5 W’s of a workpackage to the shipyard, based on actuals
- **Be agnostic and open:** Enterprise PLM is mature. The industry is decades old and shipbuilding tends to trail the PLM industry. Over the years many shipyards that have invested into PLM. Replacing this is risky and costly and may not even be the smartest thing

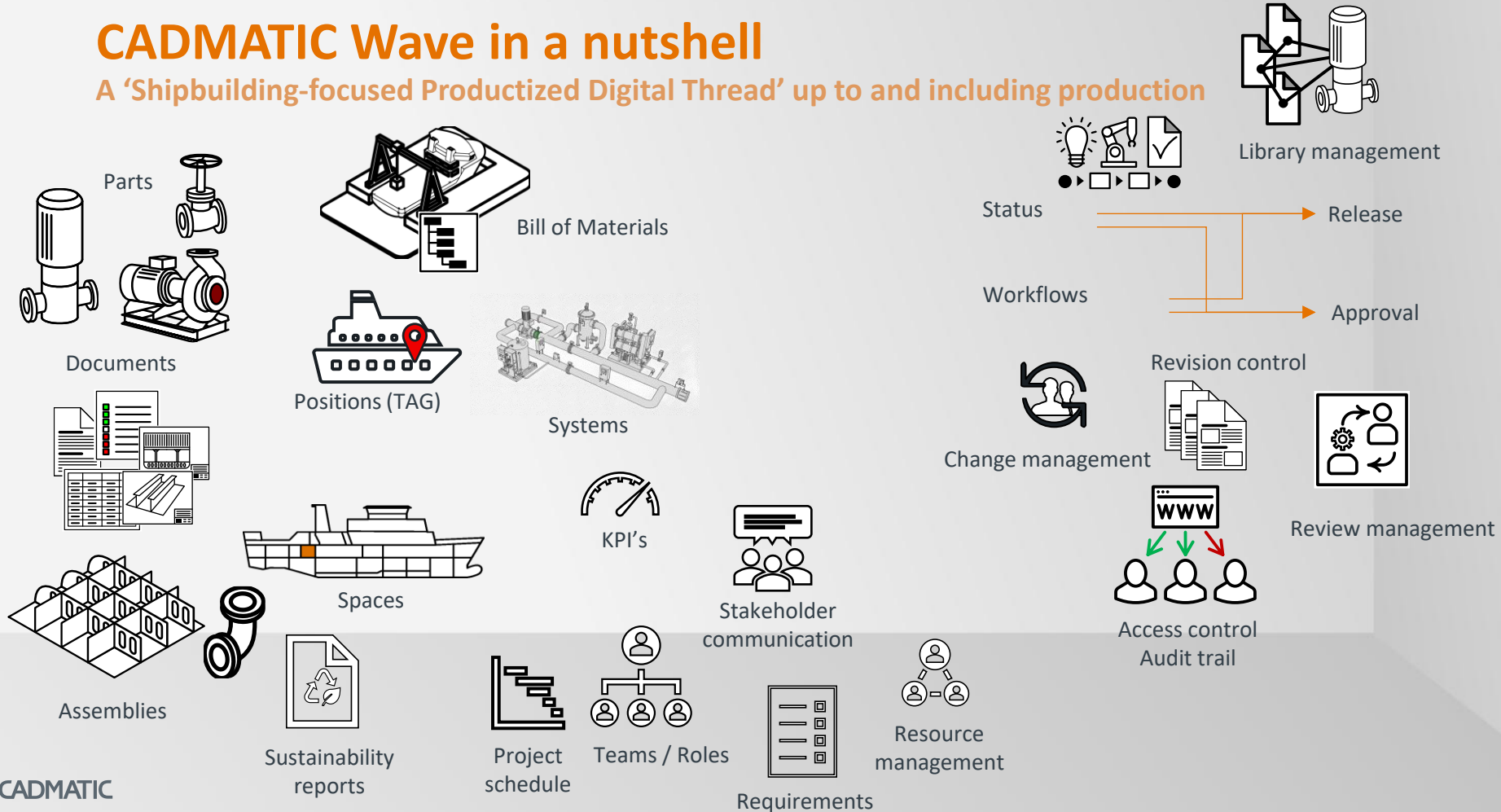


Shipbuilding through the years evolved and solved challenges ‘their own way’

- **Maintain agility and flexibility:** The expectation that time-spent upfront leads to time saved later on does not always work out. Shipbuilding has proven to be exceptional in solving its own problem. Let’s design software that complements

CADMATIC Wave in a nutshell

A 'Shipbuilding-focused Productized Digital Thread' up to and including production



A case example

The successful implementation on the TKMS – Elomatic ‘PolarStern II’ project under construction at the Wismar yard in Germany



POLARSTERN II

ELOMATIC
Visions of Tomorrow, Engineered Today



ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR-
UND MEERESFORSCHUNG

She'll be a ship like no other

Icebreaker, multidisciplinary research platform – and pioneer: Polarstern II will be a modern polar research and resupply vessel to succeed the Polarstern. She will be the lifeline to the Arctic and Antarctic, not to mention a shining example of sustainability and innovation in shipping. She will ensure that top-notch research continues in the future, offering the global community new insights into how our oceans and polar regions can be protected.

160
meters
length

27.3
meters
width

11.10
meters
maximum
draft

34,000
kWm
power

26,700
GT
gross tonnage

PC 2
Polar Class
Ice class

110 / (140)
Persons on board
normal operations / (max)

1,8m
Level
ice+20%
snow @ 3kn

90 days
autonomy at
sea

Battery
system

A Case Example:

IT for an integrated Shipbuilding PDM into and environment with existing Enterprise PLM

