DNV·GL

MARITIME

Smarter Shipping

Anders Mikkelsen

19 June 2018

Vancouver ShipInvest & Management Ltd

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A global quality assurance and risk management company

OUR PURPOSE

TO SAFEGUARD LIFE, PROPERTY AND THE ENVIRONMENT

We apply deep insights and diverse industry domain competence

- We **classify, certify, verify and test** against regulatory requirements, standards and recommended practices
- We develop new **rules, standards and recommended practices**
- We **qualify new technologies** and operational concepts
- We give **expert advice** on safety, technology, data management, efficiency, performance, risk management

Taking a broader view – enabling safer, smarter and greener performance

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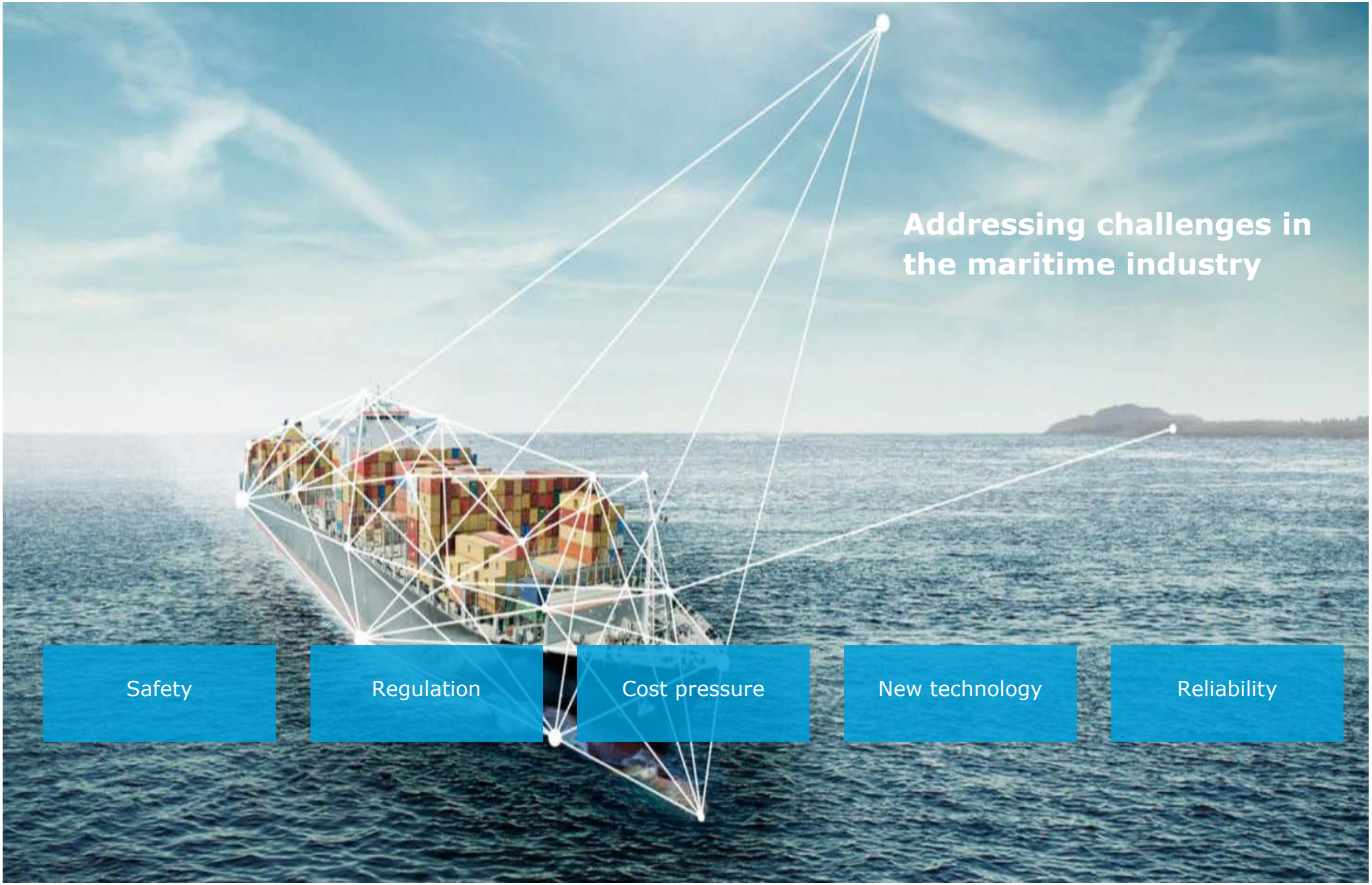
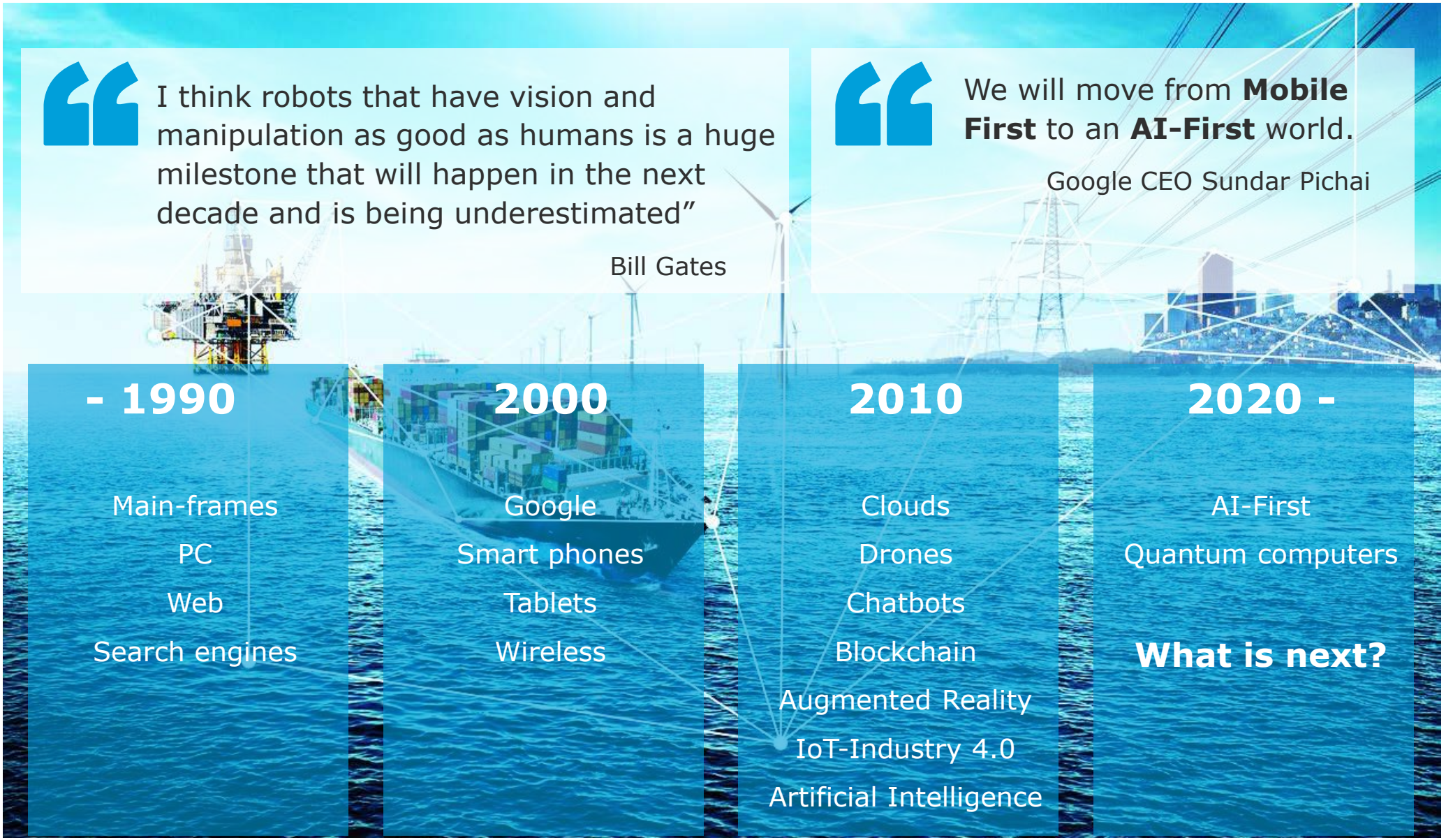

Addressing challenges in the maritime industry
Safety
Regulation
Cost pressure
New technology
Reliability

Improving safety and performance

Technology trends and drivers



> I think robots that have vision and manipulation as good as humans is a huge milestone that will happen in the next decade and is being underestimated”
>
> Bill Gates

> We will move from **Mobile First** to an **AI-First** world.
>
> Google CEO Sundar Pichai

- 1990

Main-frames

PC

Web

Search engines

2000

Google

Smart phones

Tablets

Wireless

2010

Clouds

Drones

Chatbots

Blockchain

Augmented Reality

IoT-Industry 4.0

Artificial Intelligence

2020 -

AI-First

Quantum computers

What is next?

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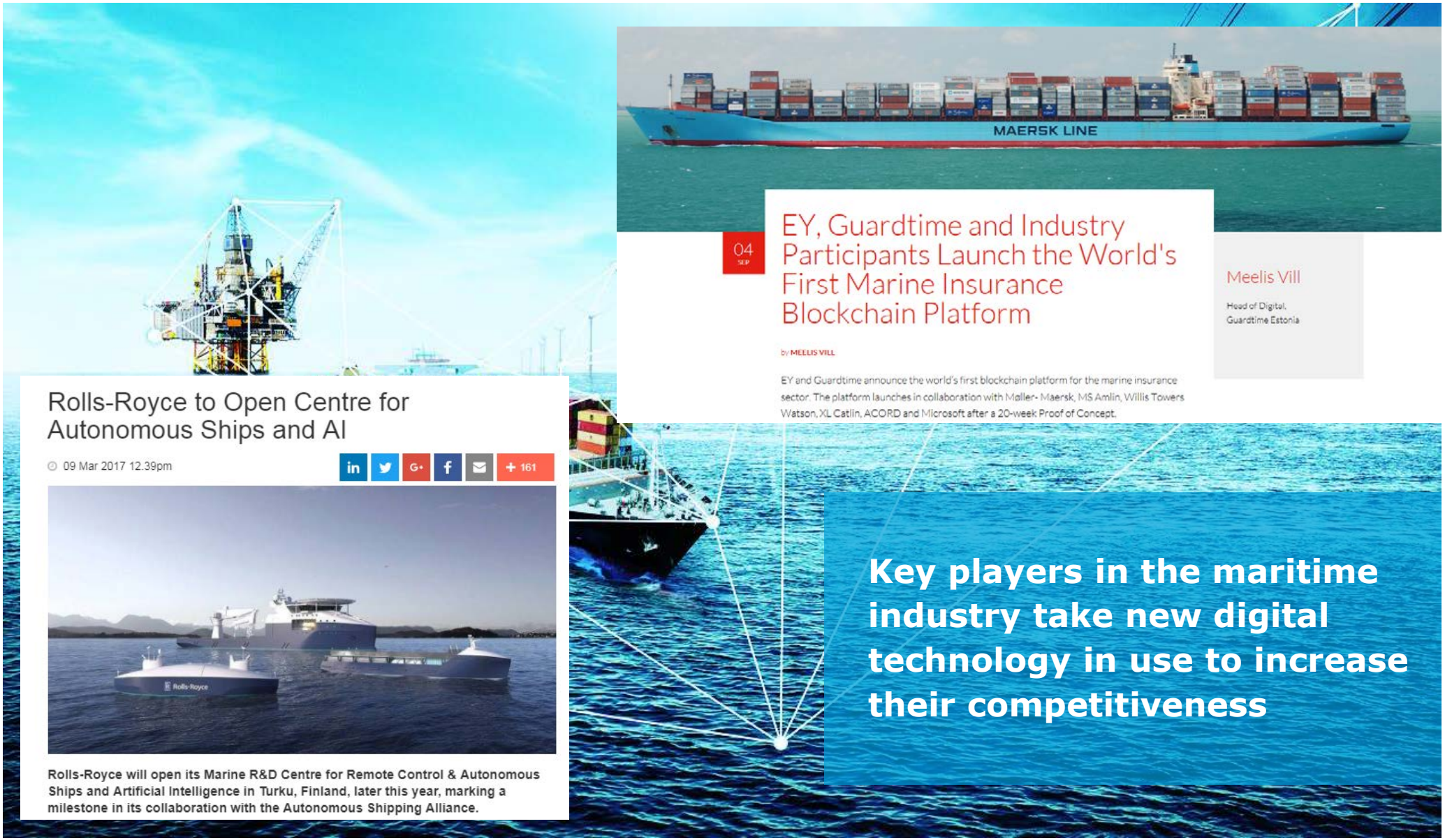
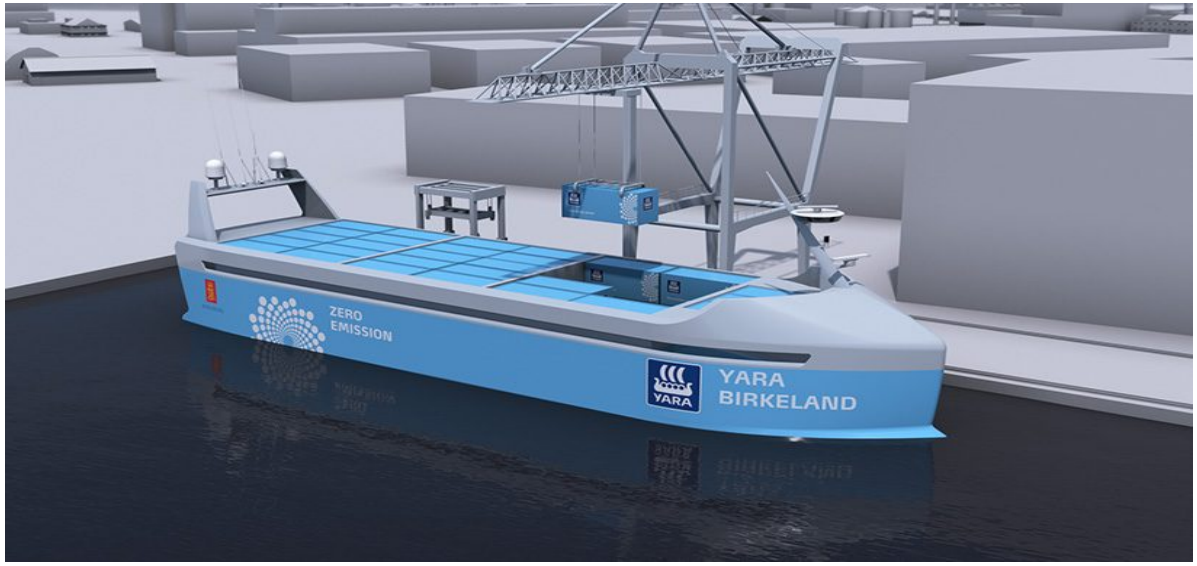
How will the maritime industry be changed?



Digitalisation – connectivity – remote – autonomy: from vision to reality - Towards unmanned ships?



Link

For DNV GL, digitalization is the main vehicle to modernize class

Focus areas for class:

Standardized class services
Streamlining and automation by use of e.g. lean processes, machine learning and robotics

Customer self-services and enhanced digital collaboration moving customer facing processes to our customer portal My DNV GL, enabling new digital services

New ways of assuring compliance
Application of new technologies to remotely assuring compliance, e.g. remote witnessing, use of simulators, drones, etc.

Data driven class
Smarter use of data to work more efficiently and enable data driven compliance (e.g. simulations and sensor based class)

How we are Modernizing and Leveraging with the Digital age

My Services

E-certificates

Machine learning

Sensor based class

DATE

Remote inspections

Veracity data platform

Simulations

Drone surveys

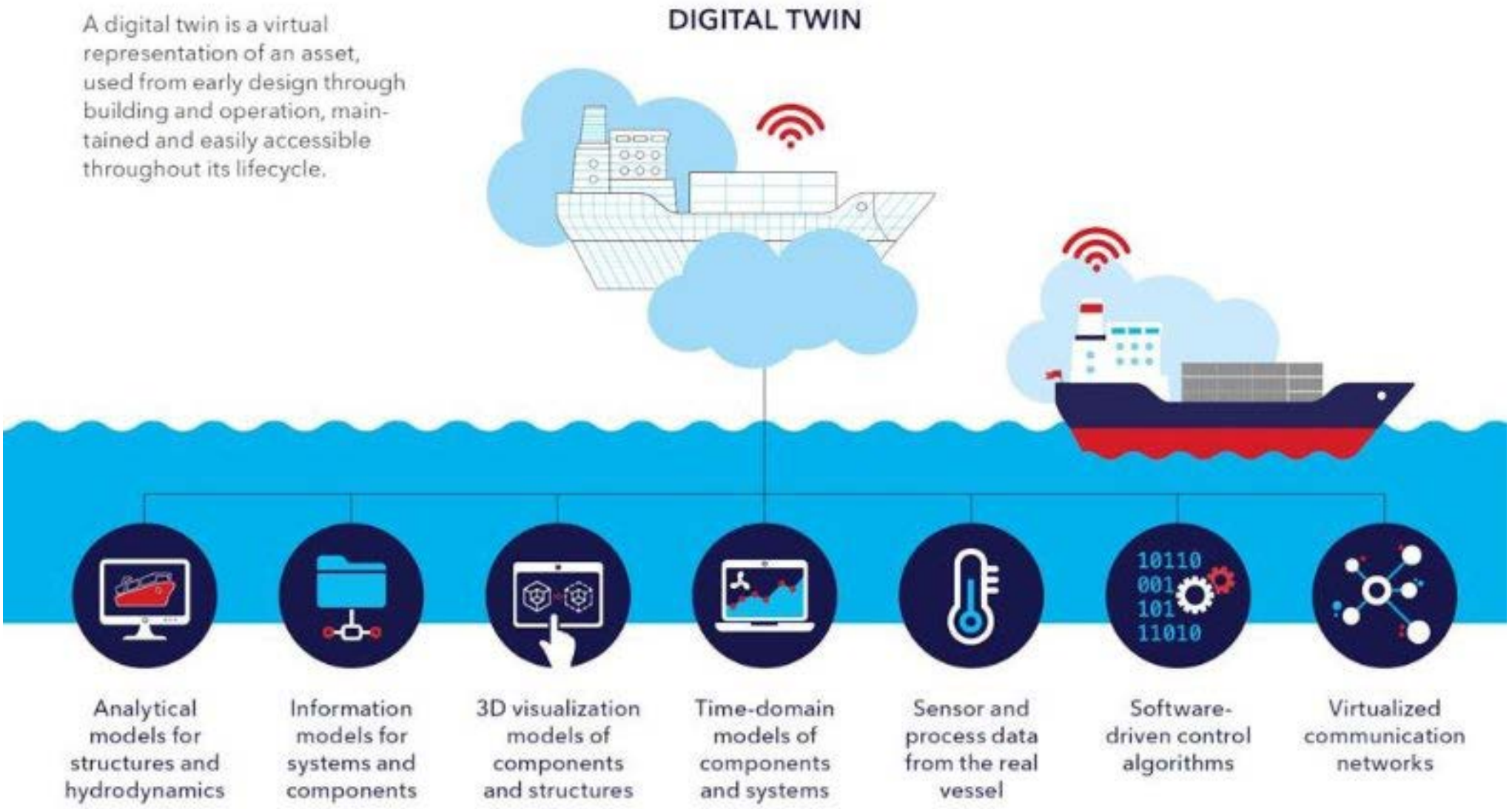
Smart survey booking

Safety Insight Class+

Automated Approval

Digital Twin- The virtual vessel

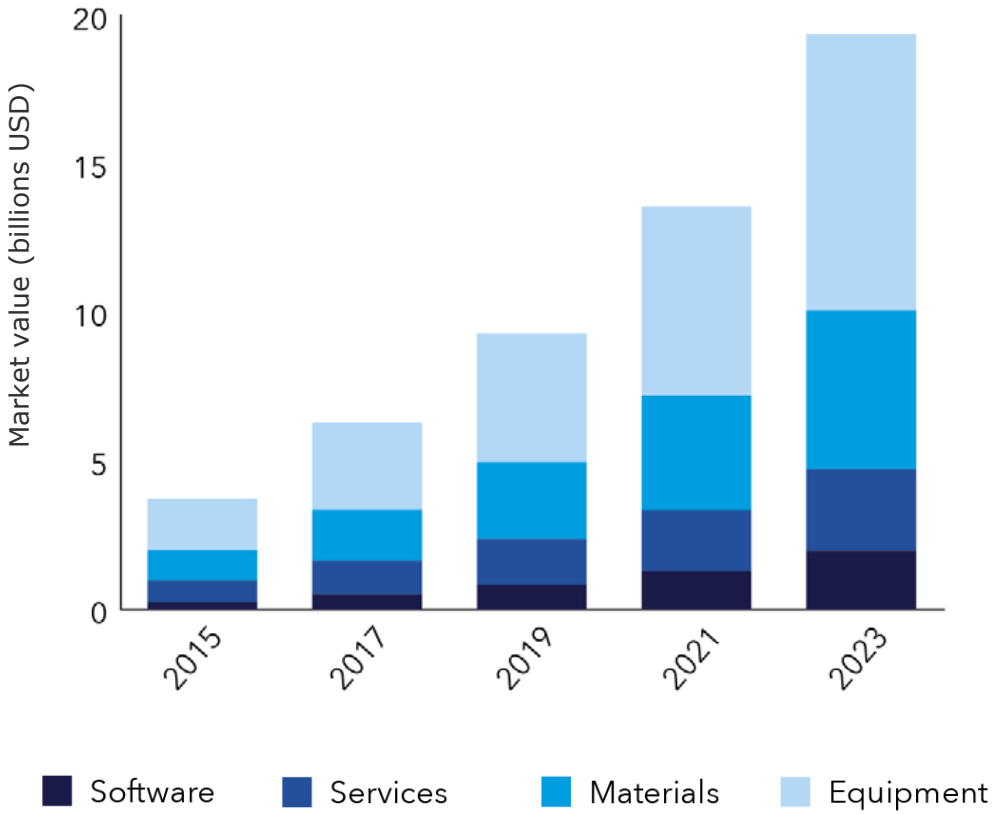
A digital twin is a virtual representation of an asset, used from early design through building and operation, maintained and easily accessible throughout its lifecycle.



Veracity

Additive manufacturing

Worldwide 3D Printing Industry Forecast

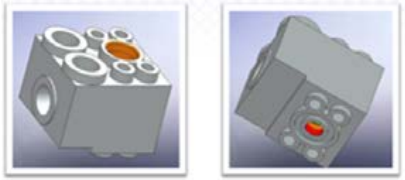


- Transforming design and manufacturing processes
  - Rapid prototyping
  - Shorter manufacturing time
  - Customization of features
  - Reduced material use
- Local production of spare parts on demand in ports
  - Reduced need for spare parts inventory

3D printing & additive manufacturing

Hydraulic valve block

QUICK SCAN 3D PRINTING

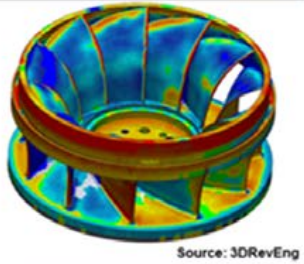


- From 4 parts to 1 single piece
- Weight reduction of 76%
- Energy savings allow for a price premium of €10/kg
- Increased performance:
  - Chance of leakage is reduced
  - Smooth channel transitions improve the fluid flow

Berenschot

Repair of turbine runner

QUICK SCAN 3D PRINTING

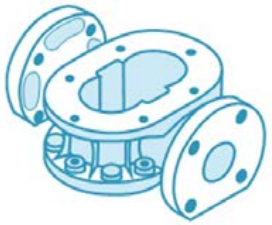


- No drawings available
- 3D scanning allowed for complete re-engineering against reduced costs (-50%)
- Downtime and re-engineering costs kept to a minimum
- Damage to original runner easily removed from 3D model

Berenschot

Design for additive manufacturing

Design evolution from Casting to Additive Manufacturing



Design for Additive Manufacturing focusses the development and implementation of design philosophies into the product development and engineering processes. Each 3D-printing technology has its own set of demands and possibilities, and it is our task to transform parts from their conventional manufacturing history into the AM design accordingly. Typically, geometric features like cavities, drilled holes, thick walls and overhanging edges get remodeled and enhanced, while weight reduction, added functions and integrated design become a reality.

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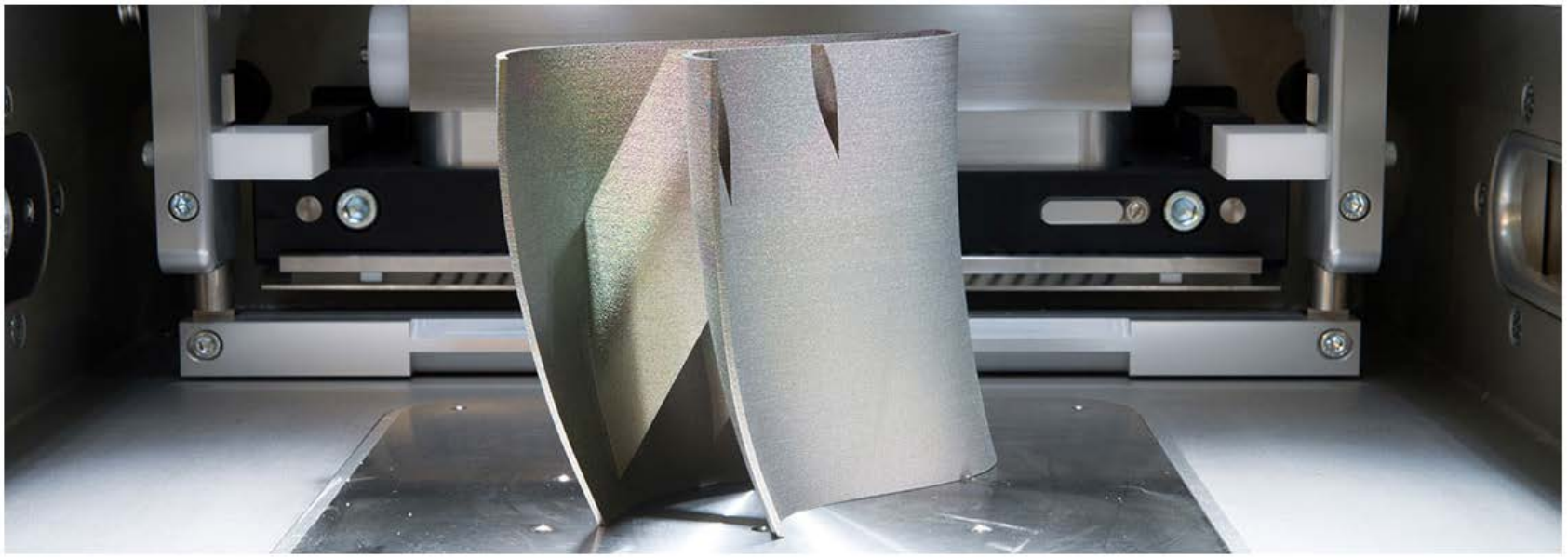
3D printing & additive manufacturing

DNV GL boosts investment in 3D printing with establishment of Global Additive Manufacturing Centre of Excellence in Singapore

The new DNV GL centre will serve as an incubator and testbed for research and development of additive manufacturing technology for the oil & gas, offshore and marine (O&M) sector.

SHARE: PRINT:



Singapore, 09 February 2018: The new centre, which is supported by the Singapore Economic Development Board (EDB), will focus on developing competence including qualification, certification and training for additive manufacturing (AM), also known as 3D printing.

Machine learning & Re-use of previously approved drawings

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Thank you!

"This really is an innovative approach, but I'm afraid we can't consider it. It's never been done before."

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SAFER, SMARTER, GREENER