WÄRTSILÄ

LEVERAGING AI TO MAKE EQUIPMENT EXPERTS MORE PROACTIVE

J. Rösgren

FOUNDED IN 1834

GLOBAL LEADER

in sustainable solutions for the marine and energy markets

2018

Turnover
5 174 MEUR

Operating result
543 MEUR

Order intake
6 307 MEUR

Operations in
200 LOCATIONS

Our personnel
APPROX. 19 000

Nationalities
138

OUR GLOBAL PRESENCE

TOWARDS A SMART MARINE ECOSYSTEM

We are leading the industry's transformation towards a Smart Marine Ecosystem, whereby **real-time communication** and the **digitalisation** of all aspects of shipping and port operations, including the entire logistics chain, are utilised to **create long-term value** for our customers and partners.

By applying smart technology and performance optimisation services, **we deliver higher safety, greater efficiencies and minimised climate impact.** This will result in more sustainable, safe, and profitable operations for ship owners and operators around the world.

ENERGY BUSINESS

Wärtsilä Energy Business is leading the transition towards a 100% renewable energy future. As an Energy System Integrator, we understand, design, build and serve optimal power systems for future generations.

Wärtsilä's solutions provide the needed flexibility to integrate renewables and secure power system reliability. Our offering comprises engine-based flexible power plants – including liquid gas systems – hybrid solar power plants, energy management systems and storage and integration solutions.

We support our customers over the lifecycle of their installations with services that enable increased efficiency and guaranteed performance. Wärtsilä has 70 GW of installed power plant capacity in 177 countries around the world.

CUSTOMER BASE

- 182,000 MW
- > 800 installations covered by lifecycle solution agreements
- 2,600 customers manage their 22,500 installations through Online Services

REACH AND EXPERTISE

- 11,000 service professionals
- Certified and extensive OEM experience
- Comprehensive digital approach for optimising operations and enabling growth

Strong emphasis on **digitalisation and smart technologies**

New products and solutions in the areas of **efficiency improvement**, **fuel flexibility**, total **cost of ownership**, and the **reduction of environmental impact**

Long-term co-operation with research institutes and partners

AI, MACHINE LEARNING, DATA SCIENCE LANDSCAPE

AI aided design and R&D

Machine learning engine automation

Robotic process automation

Anomaly detection

Forecasting

Robotics, manufacturing

System optimization

Predictive maintenance

Paradigm Shift

Paradigm shift in predictive maintenance enabled by new technologies

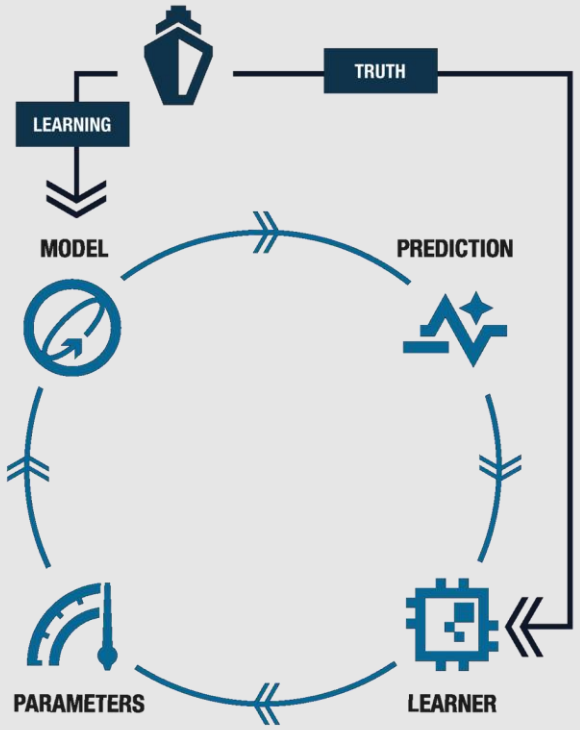
From	To
Engineering rules	Self-learning ML algorithms
Point solutions	Holistic solutions
Experts crunching data	Experts supporting customers
Periodic reports	Real-time collaboration
Reactive troubleshooting	Proactive support and optimisation

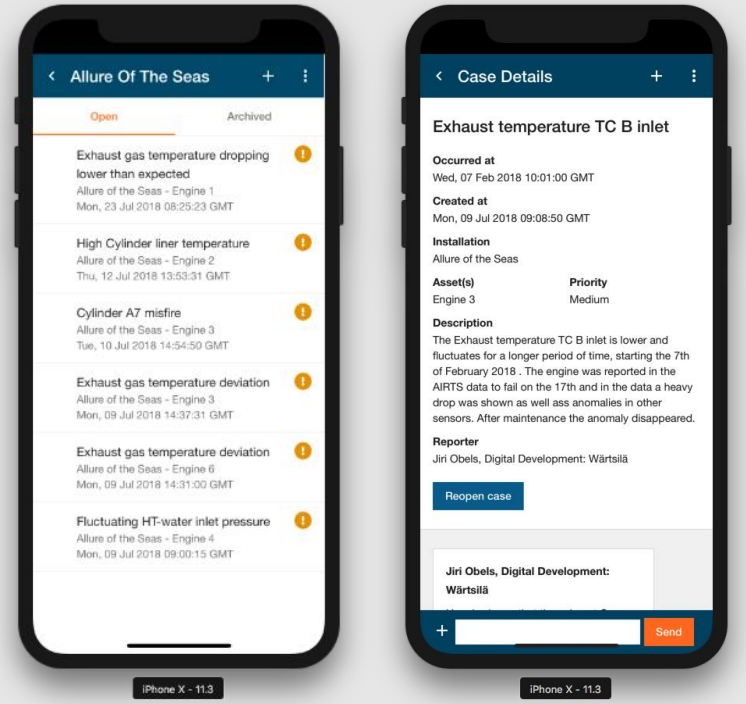
Leveraging Expertise

- Artificial Intelligence techniques are used to **predict operational parameters** at any given time.

- Equipment **experts review the anomalies and provide a diagnosis** and recommendation in a collaboration application.

- Application allows **easy collaboration between experts and operators** enabling better asset management decisions

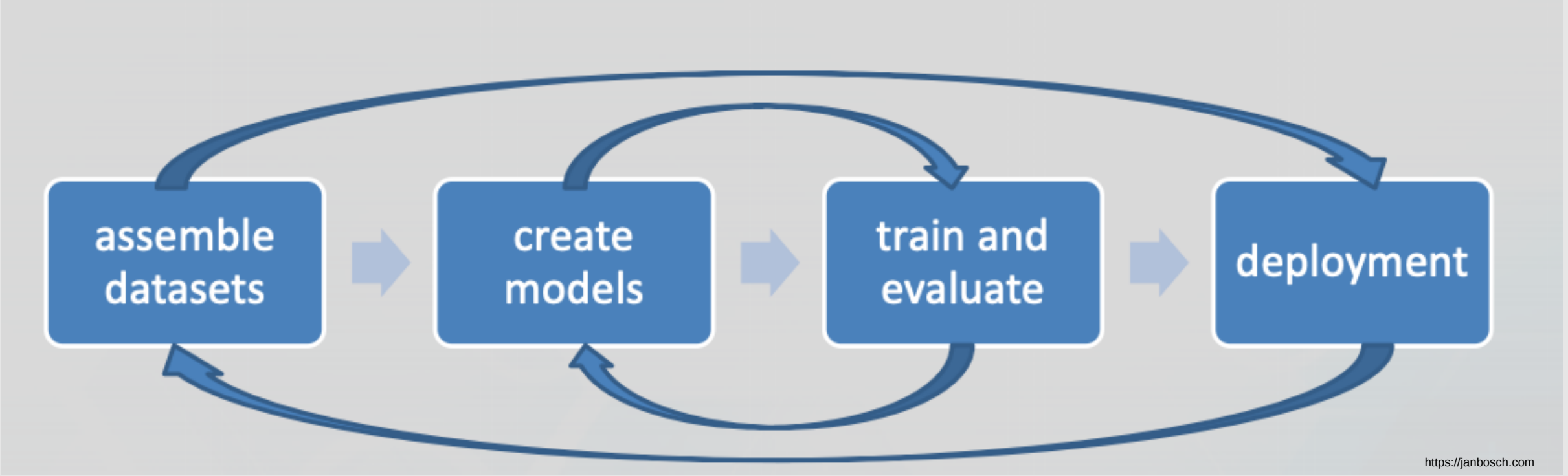




Wärtsilä Expert | **Customer Onshore Experts** | **Customer Chief Engineers**

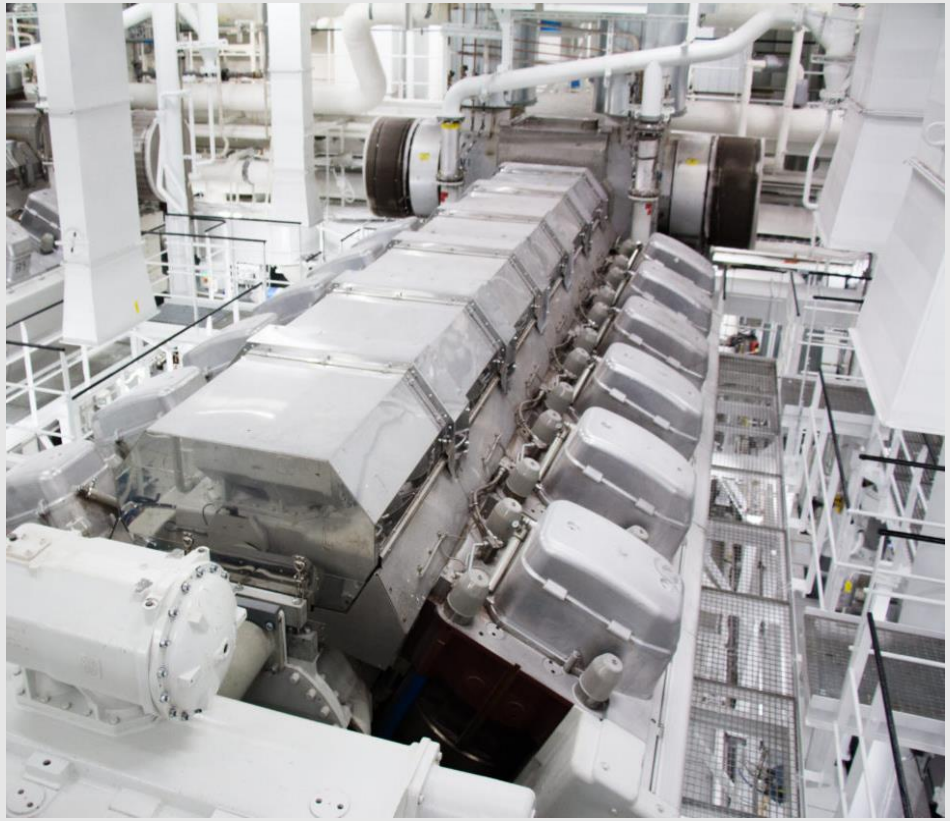
Simple working principle

From working principle to deployment



Results Proof-Of-Principle

On two cruise vessels with in total 10 W46 engines



W46 on a cruise vessel

30

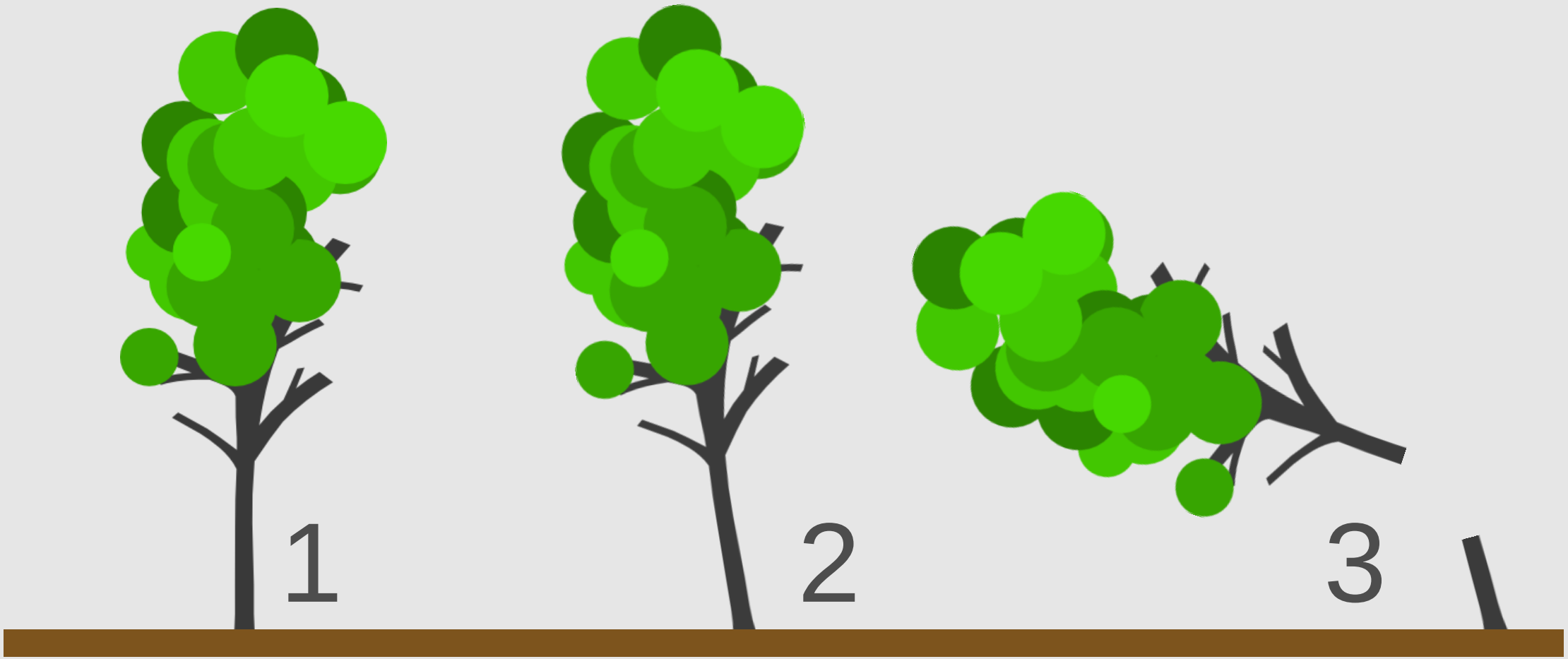
Cases with live data in 8 weeks

5	**10**	**15**
Cases	**Cases**	**Cases**
Potential failures detected	**Excess fuel consumption detected**	**Other**

Results proof-of-principle

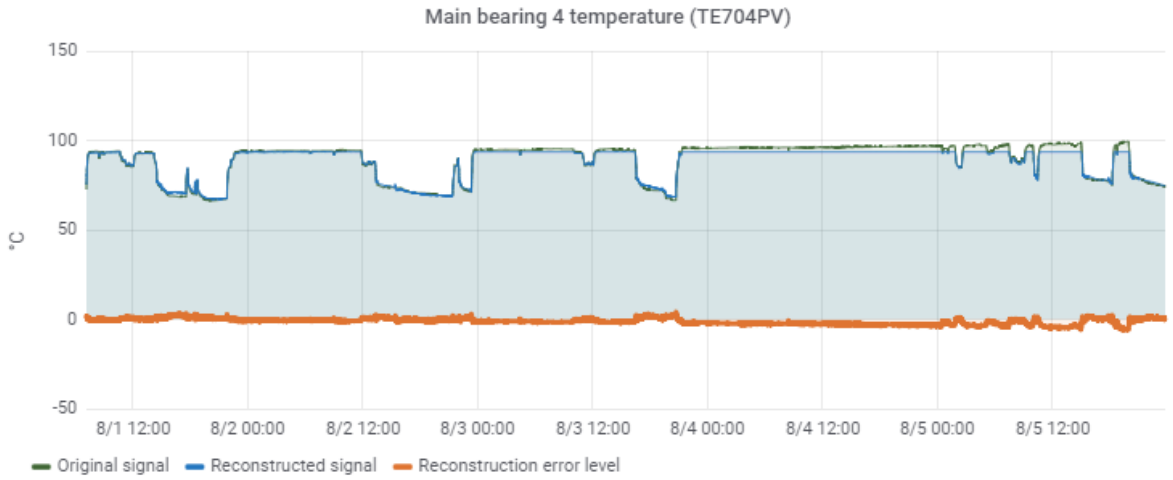
Falling tree paradox

Degradation of asset until break-down

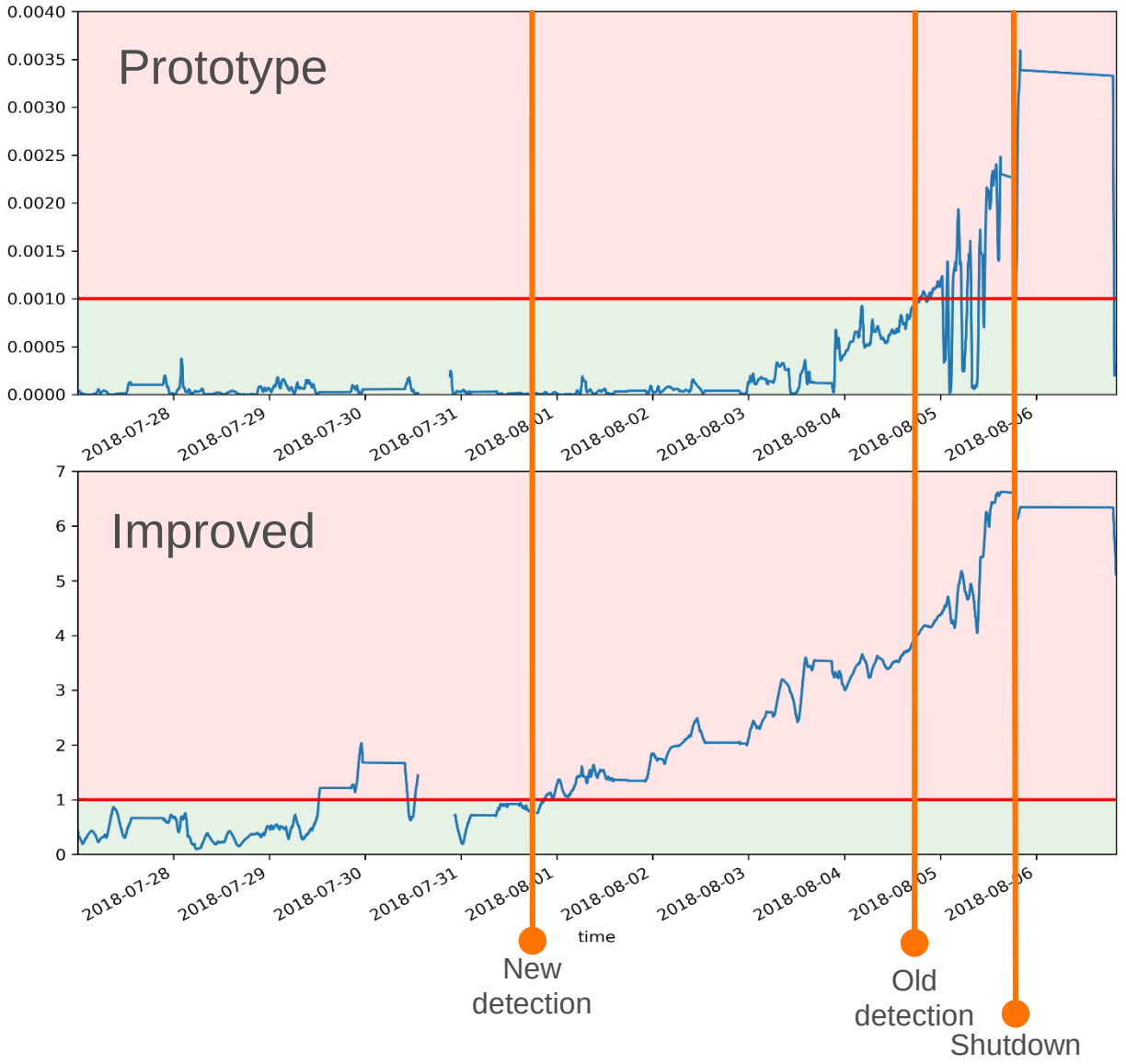


Example 1

- Cause: Fuel in lubrication oil
- Effect: Unplanned-downtime
- Early warning: From 0 day to 5 days

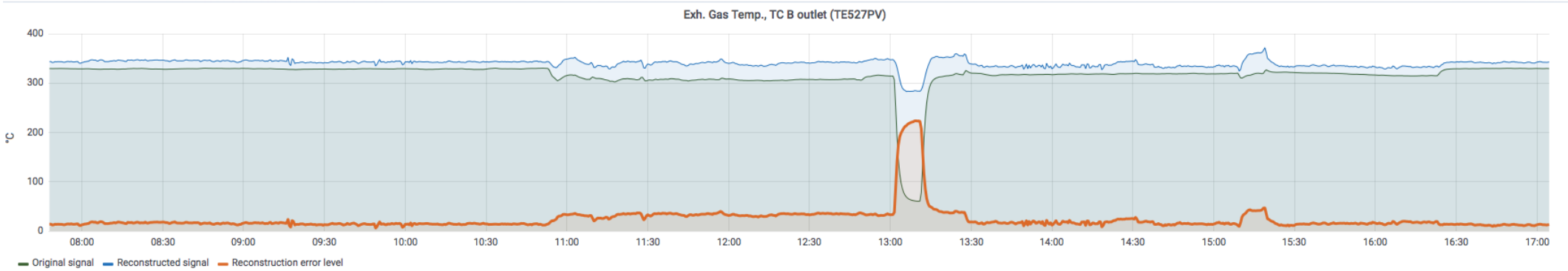


Trend of actual and predicted signal



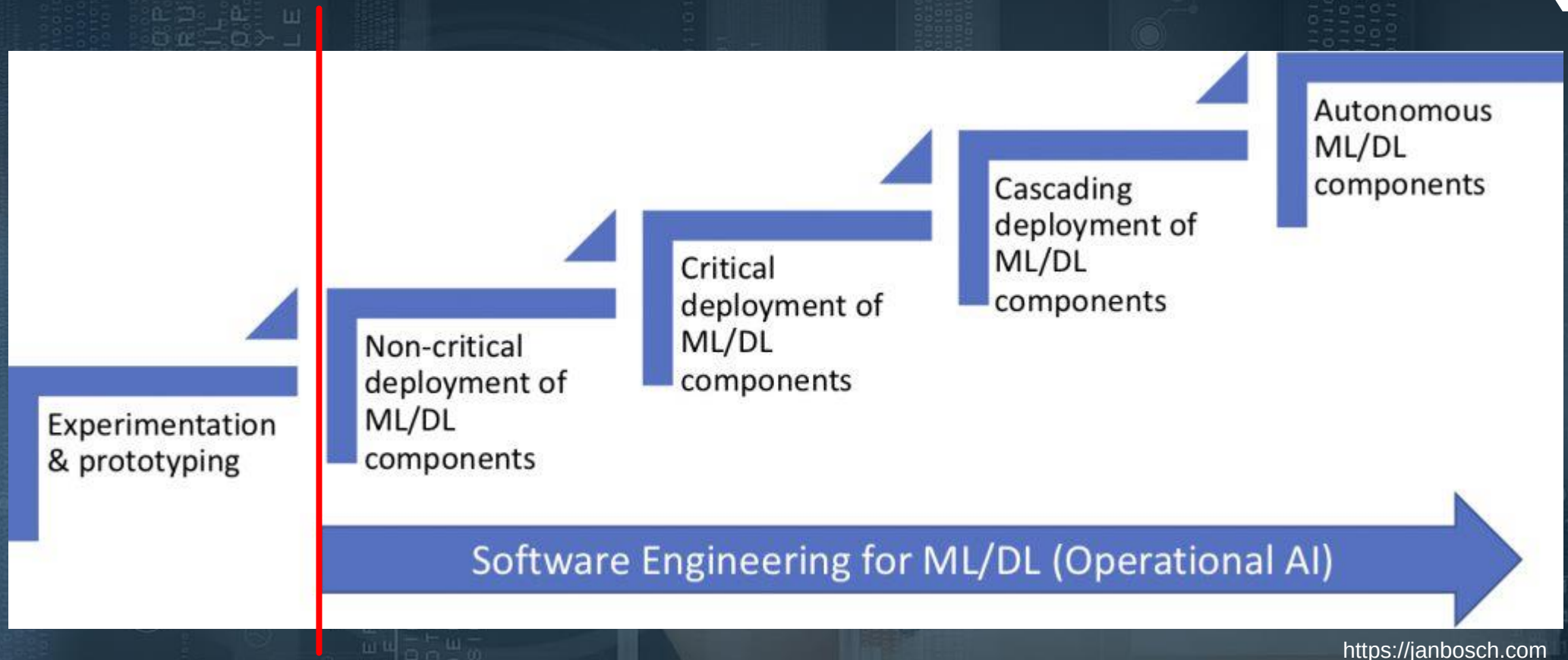
Example 2

- Detected **abnormal turbocharger washing**, diagnosed malfunctioning valve
- Actions taken by vessel crew:
  - Inspected washing valve and valve was fixed
- Potential consequences if not found:
  - Turbocharger will get stuck due to carbon deposits and need to be **opened up and cleaned** which is **more effort and downtime** of the engine compared to washing the turbo chargers



Trend of actual and predicted signal

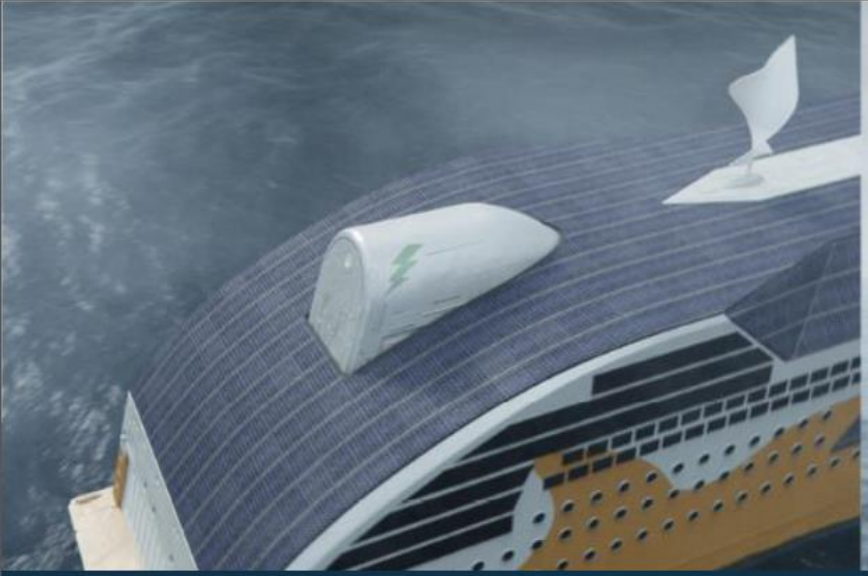
HOW AI EVOLVES IN INDUSTRY



https://janbosch.com

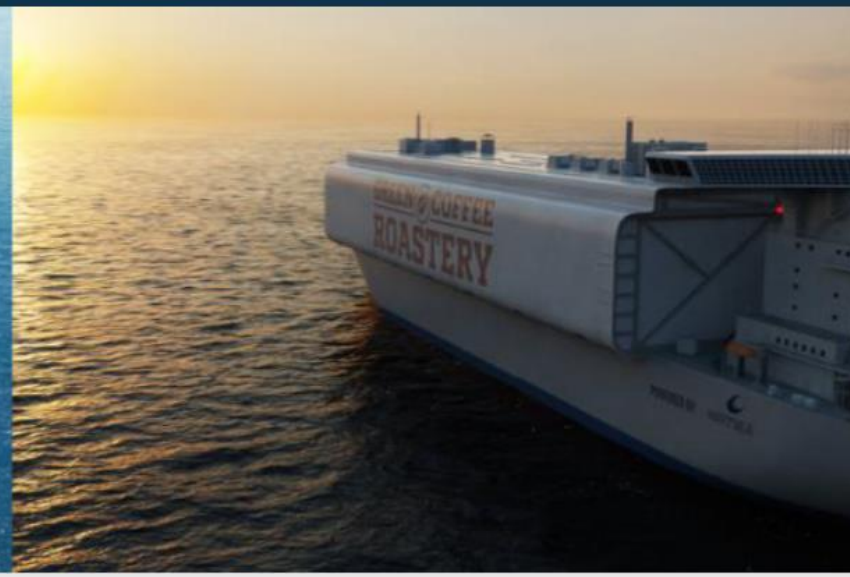
CONCLUSIONS

- The anomaly detection prediction case is an “easy” start and showing promising results
- Productifying AI solutions and depoloying in industrial context is a big undertaking
- Only scratching the surface – but will be essential for future competitiveness



JOIN US SHAPING THE FUTURE





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