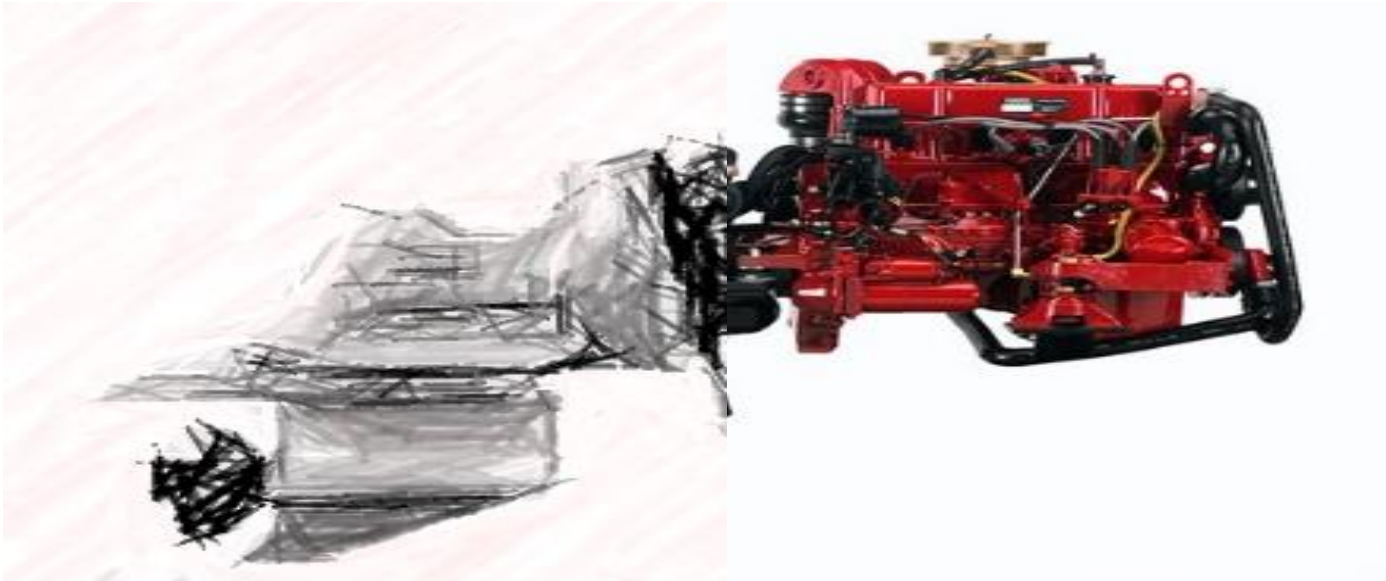
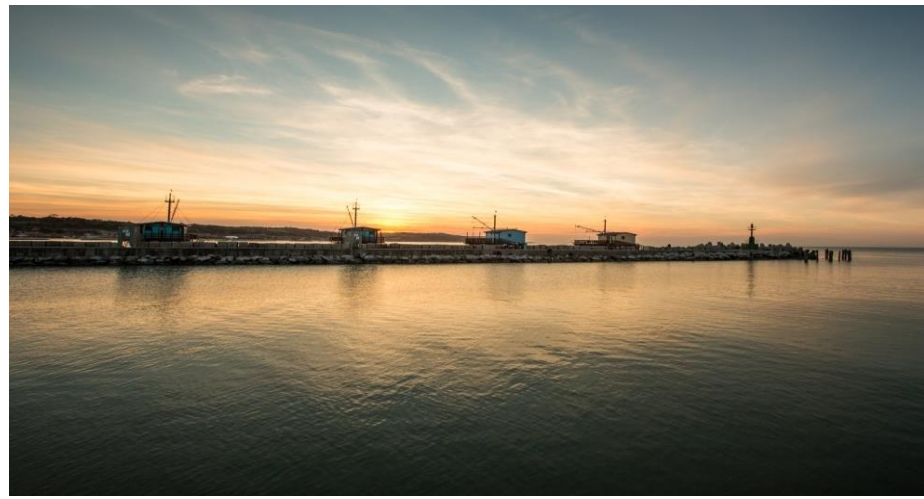


FROM **VIRTUAL TESTING** OF ENGINES TO
VIRTUAL PRODUCT DEVELOPMENT

**VOLVO
PENTA**

Ethan Faghani, Volvo Penta, ethan.faghani@Volvo.com





Volvo Penta

Develops, manufactures and markets world-leading engines and complete power systems for boats and industrial applications.

Premium brand with global presence and sales in more than 130 countries.



Our Vision:
To become the world leader in sustainable power solutions. Economic. Social. Environmental.

VOLVO PENTA

BUSINESS SEGMENTS



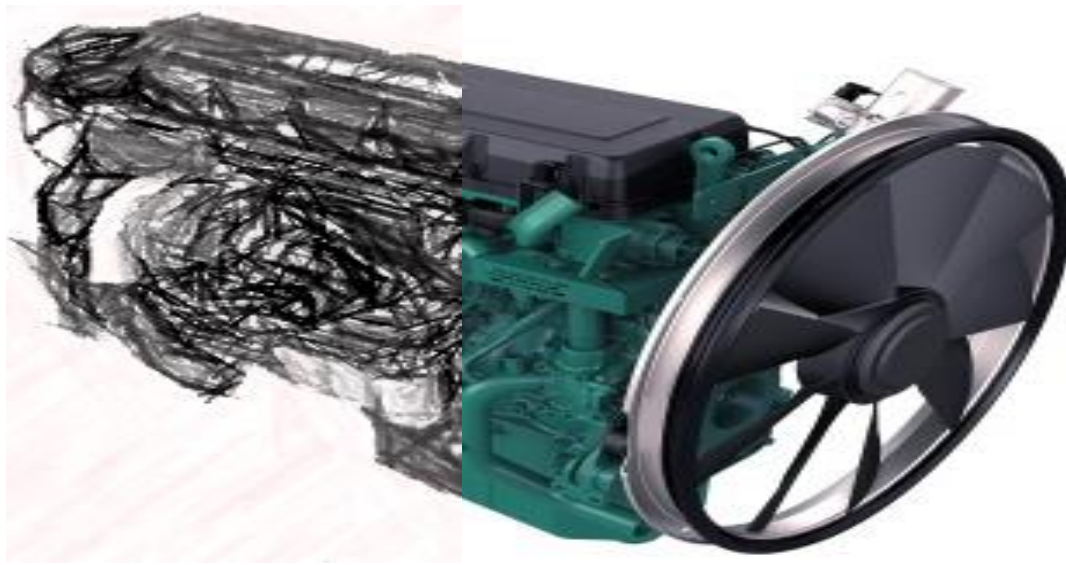
50%

INDUSTRIAL



50%

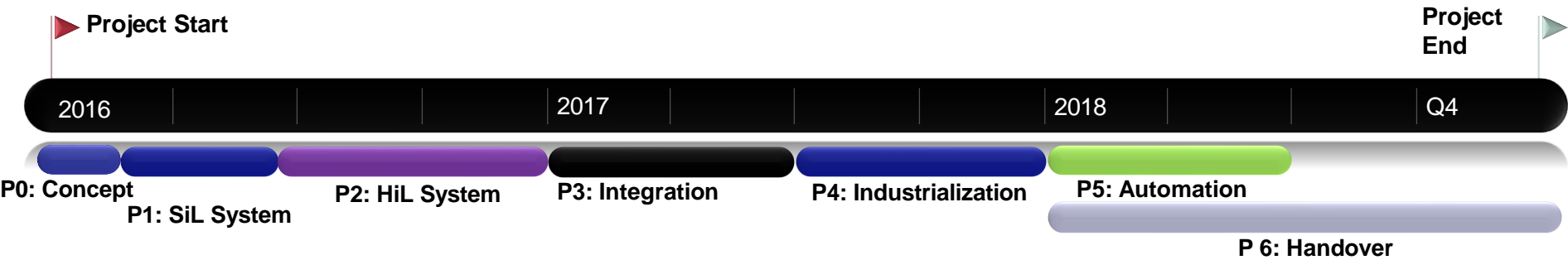
MARINE



VIRTUAL ENGINE TESTING

1

Virtual Testing Project



Business Case



Increase Efficiencies

20% of testing and verification



Increase Quality

Diagnostics and software check



Fulfill Emission Regulations

Powertrain rough optimization

Successful Virtual Testing



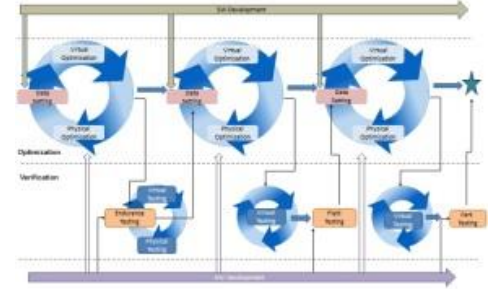
System

Low maintenance and customer friendly



Model

Quality controlled, short lead time

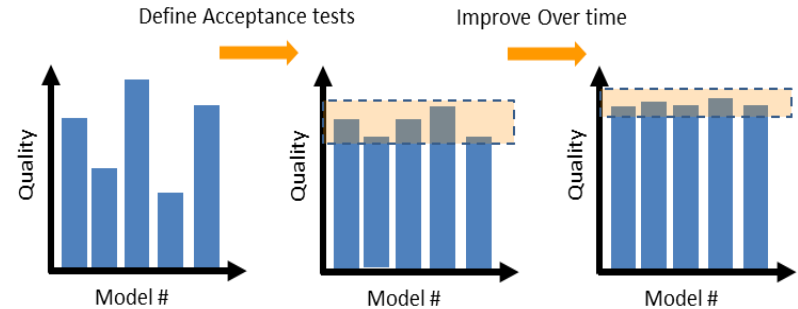
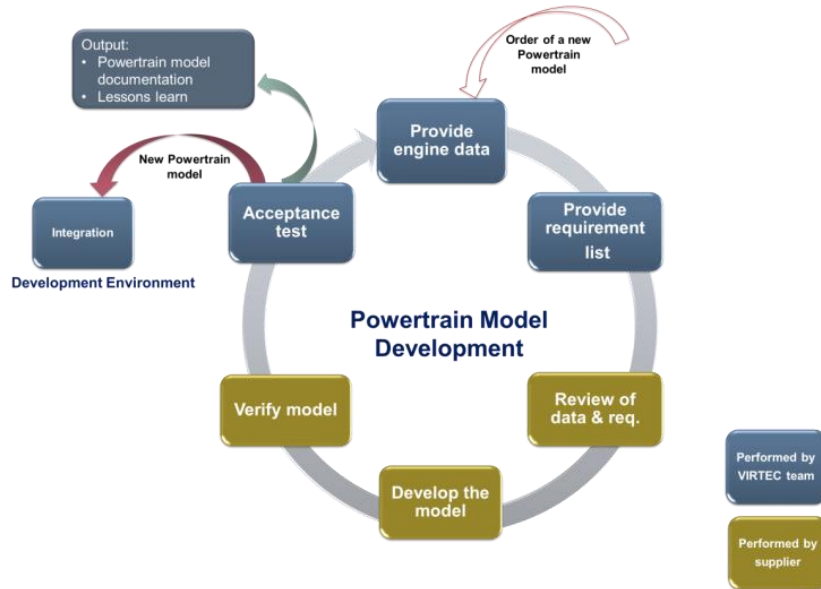


Working Process

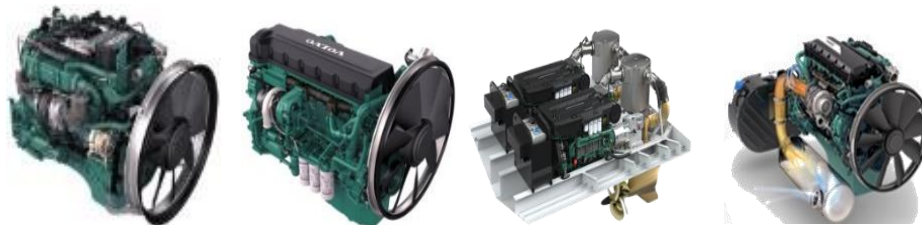
Logical, well designed and buy-in from the company

Model Quality Control

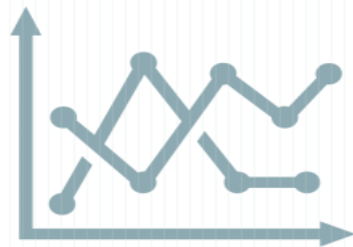
“ All the models are **wrong**, some are **useful!**” *George Box*



Virtual Testing Portfolio



Diagnostics



Back2back testing

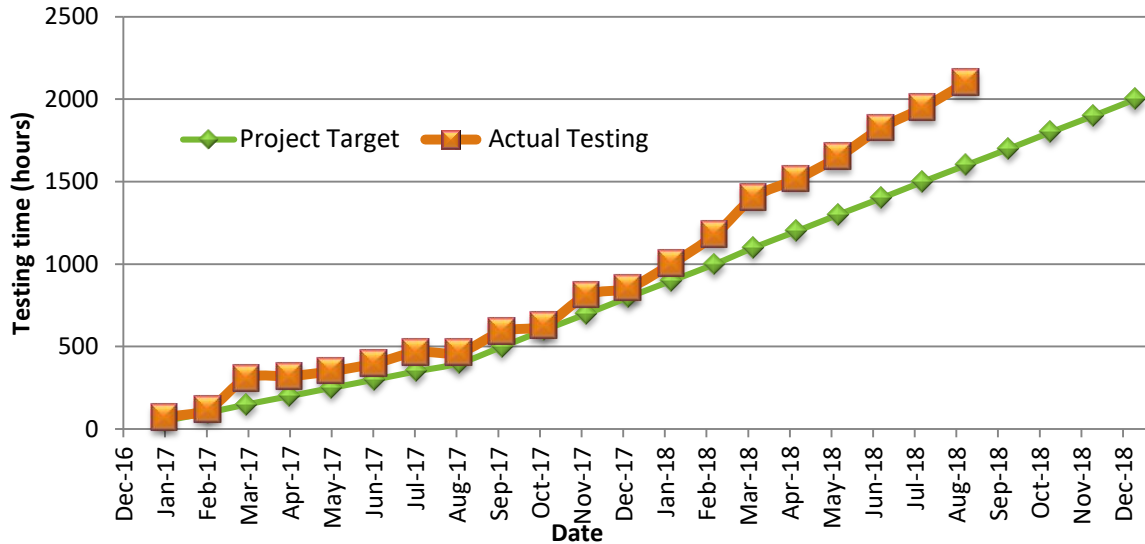


Non-standard conditions



Training & Learning

Performance



Virtual Test Cell at Volvo Penta

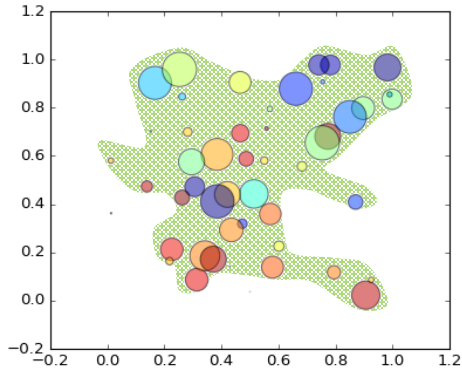


VIRTUAL PRODUCT DEVELOPMENT

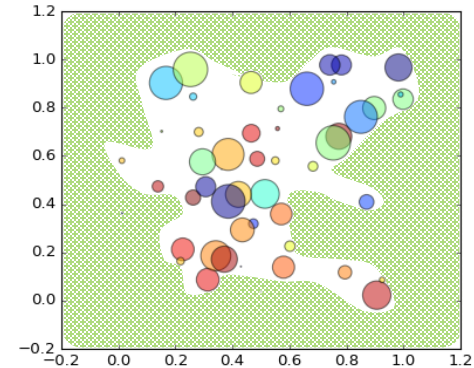
2

Business Focus

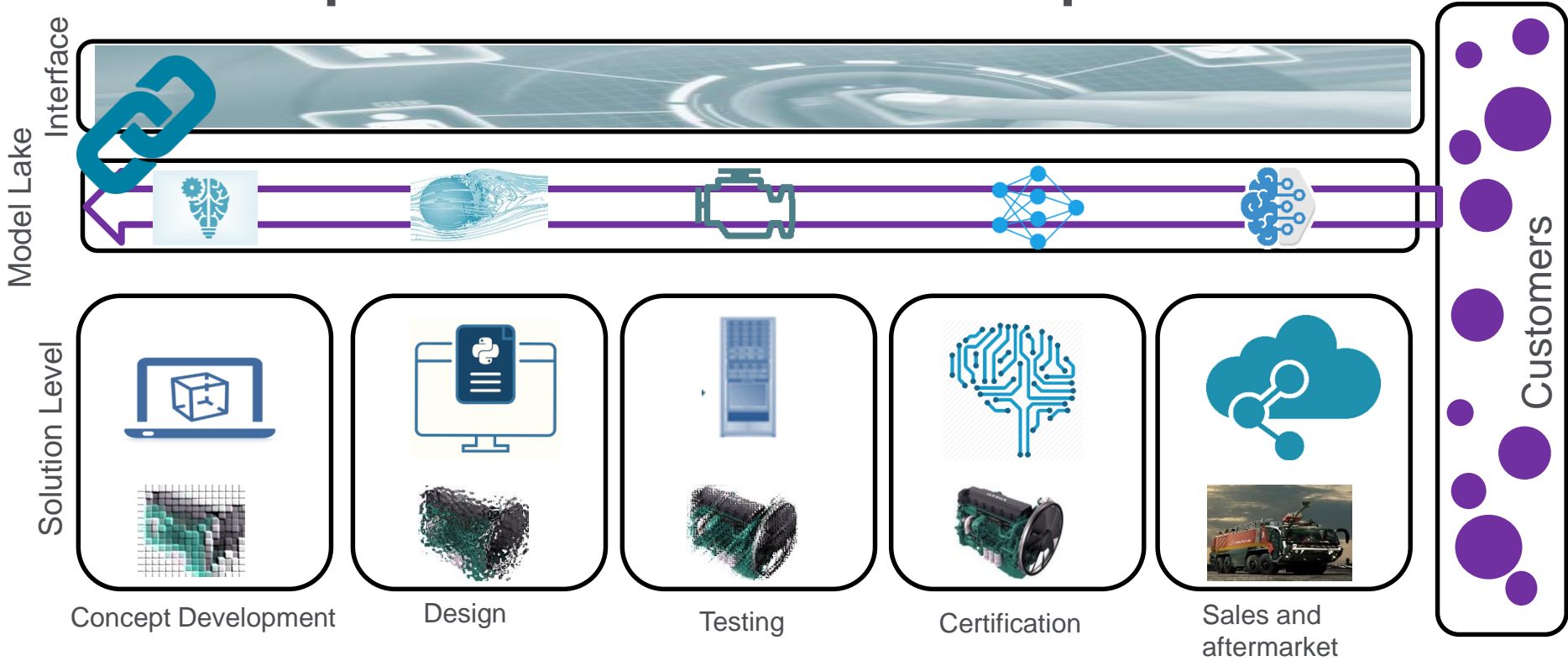
- Overlapping physical development domain
- Improved efficiency is the main goal



- Extending physical development domain
- Improved performance and quality is the main goal

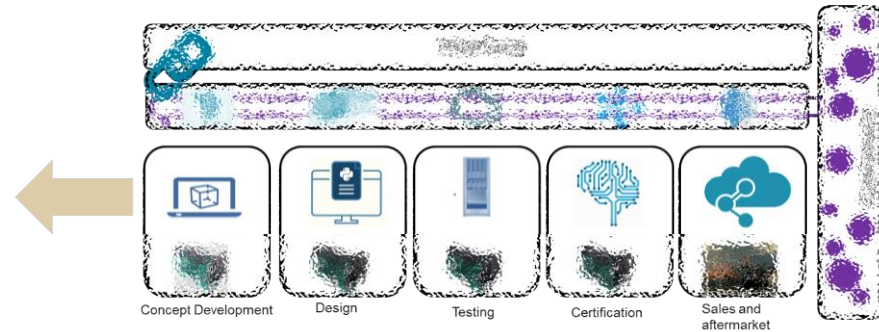


A Concept for Virtual Product Development



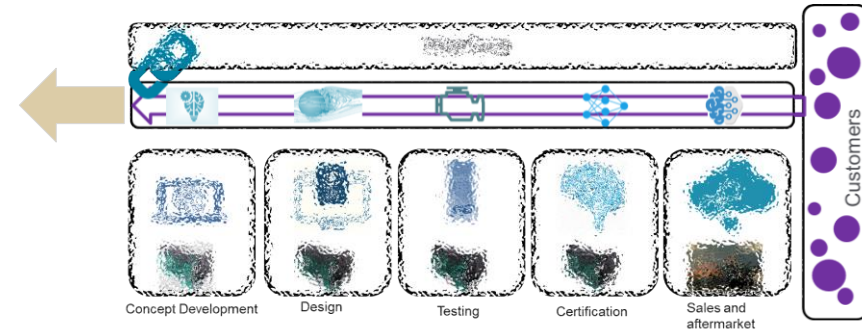
Solution Level

- Different solutions for different organizations:
 - MiL, SiL or HiL
 - Realtime capabilities
 - System or Component level
- Different Modeling fidelity for different purposes



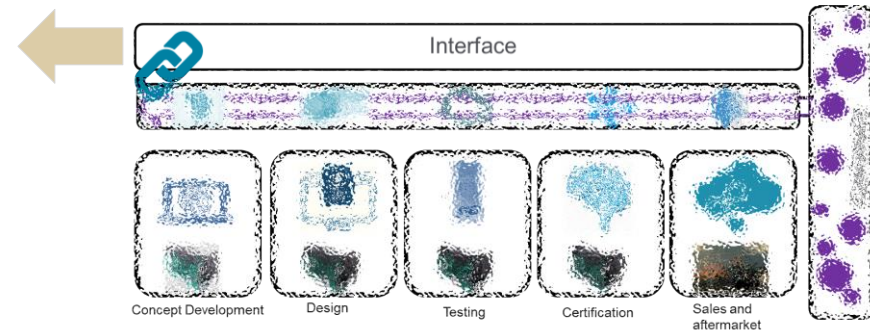
Model Lake

- The models connected together
 - mostly system level
 - mostly data based
- Model evolution from a stage to the next
- Defining extra quality gates
- Providing full picture when connecting to end user data



Interface

- A user friendly software or a manual selection at the beginning
- Limitations and use case knowledge included in the selection methods



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