

Embedded a key component in the Vanderlande logistic process automation

Erik van Dartel

Technical lead R&D Vision & Embedded systems

8-Nov-2018



Vanderlande customers

AIRPORTS



WAREHOUSING

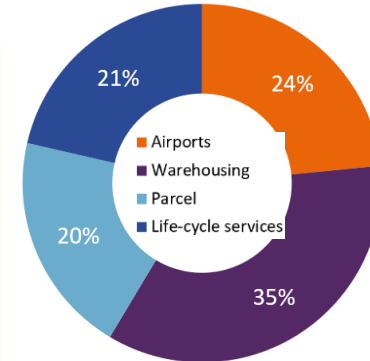


PARCEL



About Vanderlande: Company profile

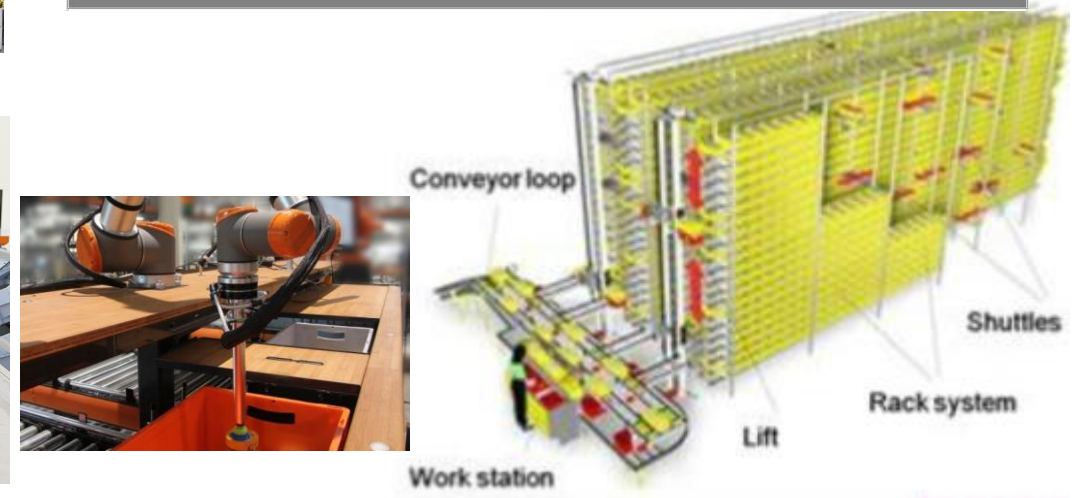
 <p>Global market leader</p>	 <p>Established since 1949</p>	 <p>>5,000 EMPLOYEES</p>	 <p>1.1 Billion REVENUE</p>
<p>innovative systems intelligent software life-cycle services</p>			
 <p>AIRPORTS</p>	<p>10.1 million bags per day</p>	<p>600 ✈️ AIRPORTS INCLUDING 13 OF THE WORLDS TOP 20</p>	<ul style="list-style-type: none"> > Atlanta Airport > London Heathrow Airport > Hong Kong Int. Airport > Amsterdam Airport Schiphol
 <p>WAREHOUSING</p>	<p>Many of the largest</p>	 <p>global e-commerce players</p>	<ul style="list-style-type: none"> > Amazon > TESCO > Zalando > ASDA
 <p>PARCEL</p>	 <p>39 Million parcels sorted every day</p>	<p>5 Largest parcel and postal companies</p>	<ul style="list-style-type: none"> > UPS > Deutsche Post DHL > TNT > FedEx > SF Express



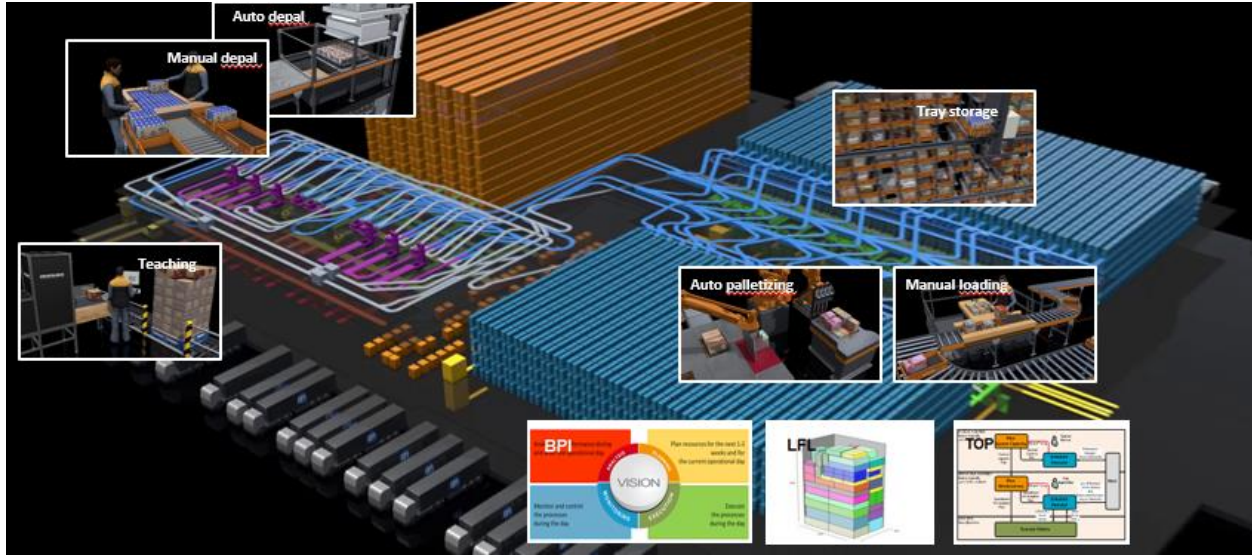
We supply and integrate logistic process automation solutions

VANDERLANDE

- Our mission: to improve the competitiveness of our customers
- We deliver systems that manage the flow of physical objects in airports, warehouses and parcel hubs.
- We automate operation processes as moving, sorting, consolidating and storing of physical objects.



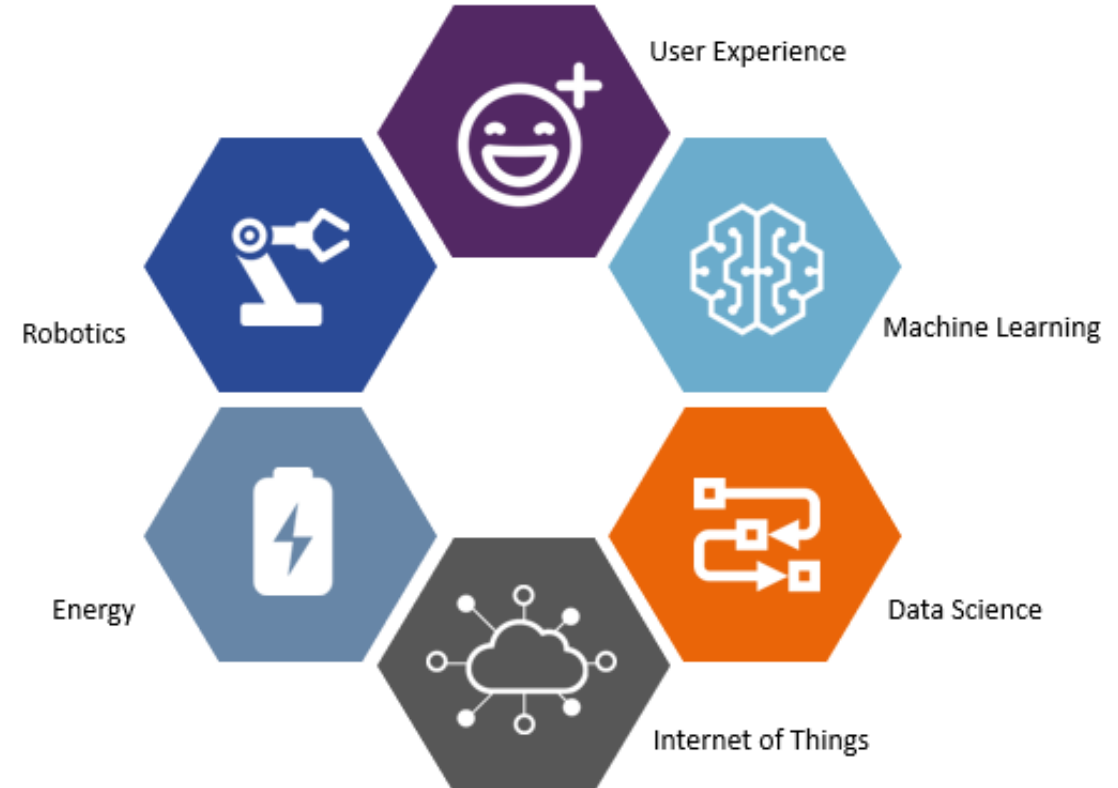
R&D (275 employees worldwide)



Innovation



Technology themes

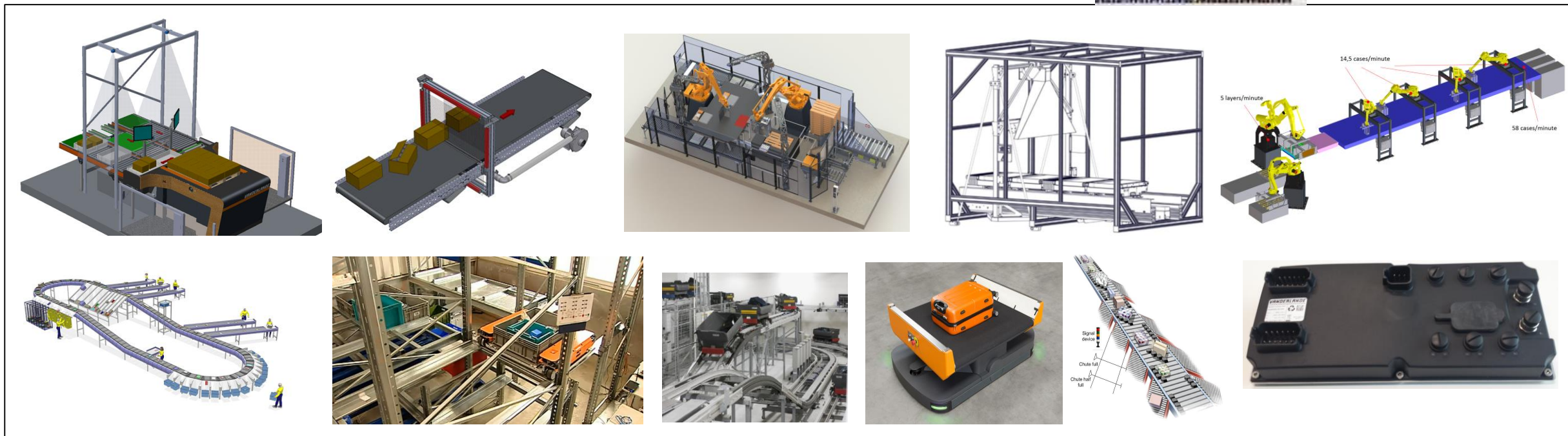


R&D: Vision & Embedded systems

VANDERLANDE

Technical Lead:

Erik van Dartel



Team:

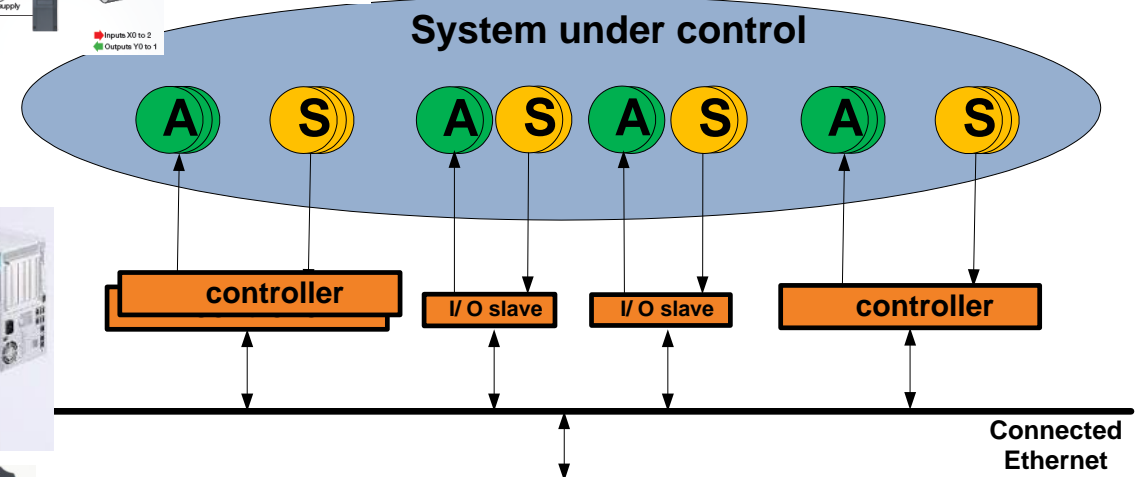
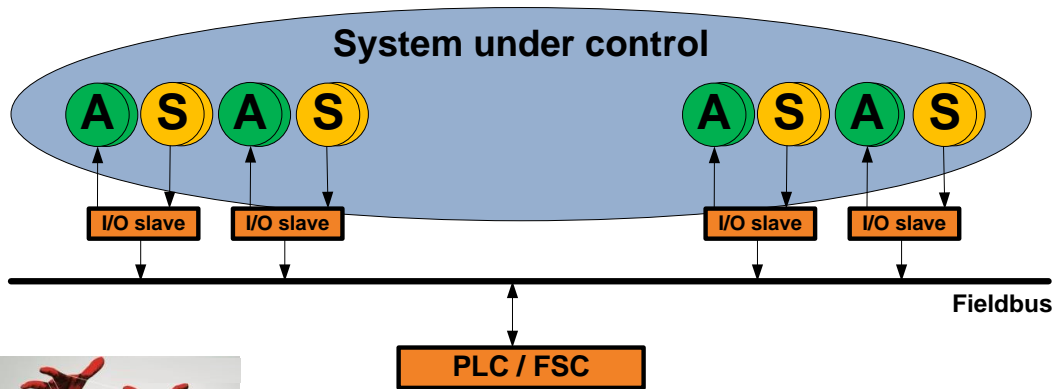
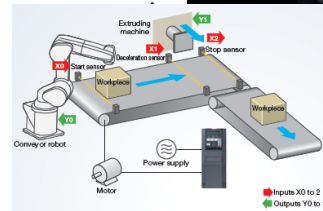
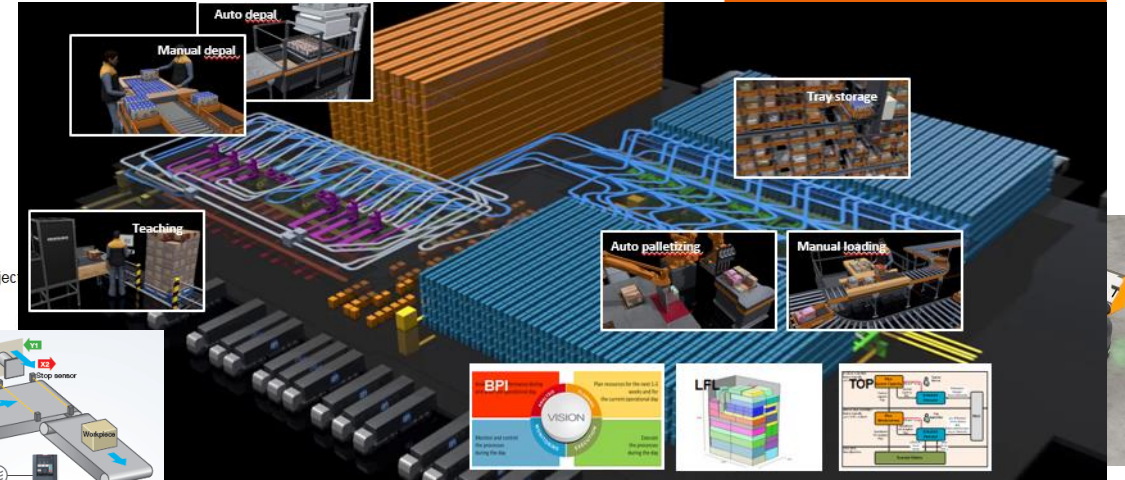
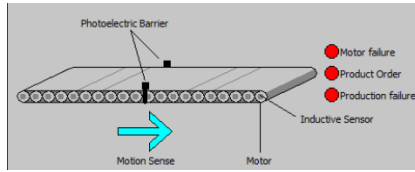
Fixed:	16	(6 PC, 8 EC)
Contractor:	6	(5 PC, 1 EC)
Students:	3	

Core Competences: Mechatronics, MBD, Matlab, algorithms, camera's, electronics, drives, software, code generation

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- > Trend: shift to decentralized control
- > Focus on data exchange and standardization
- > Importance UX
- > Data science
- > Plug & play deployment
- > Model Based Design

Trend: Shift to decentral smart control (functional modules)



Data exchange becomes key

- Horizontal (number of different controllers that together perform a decentral task)
- Vertical (f.i. information to the cloud to enable predictive maintenance)

- Preference: devices use the same protocols to exchange data
- We can not prescribe the market
- We invested in the used Ethernet protocols (Profinet, Ethernet/Ip)

Where has it brought us so far?

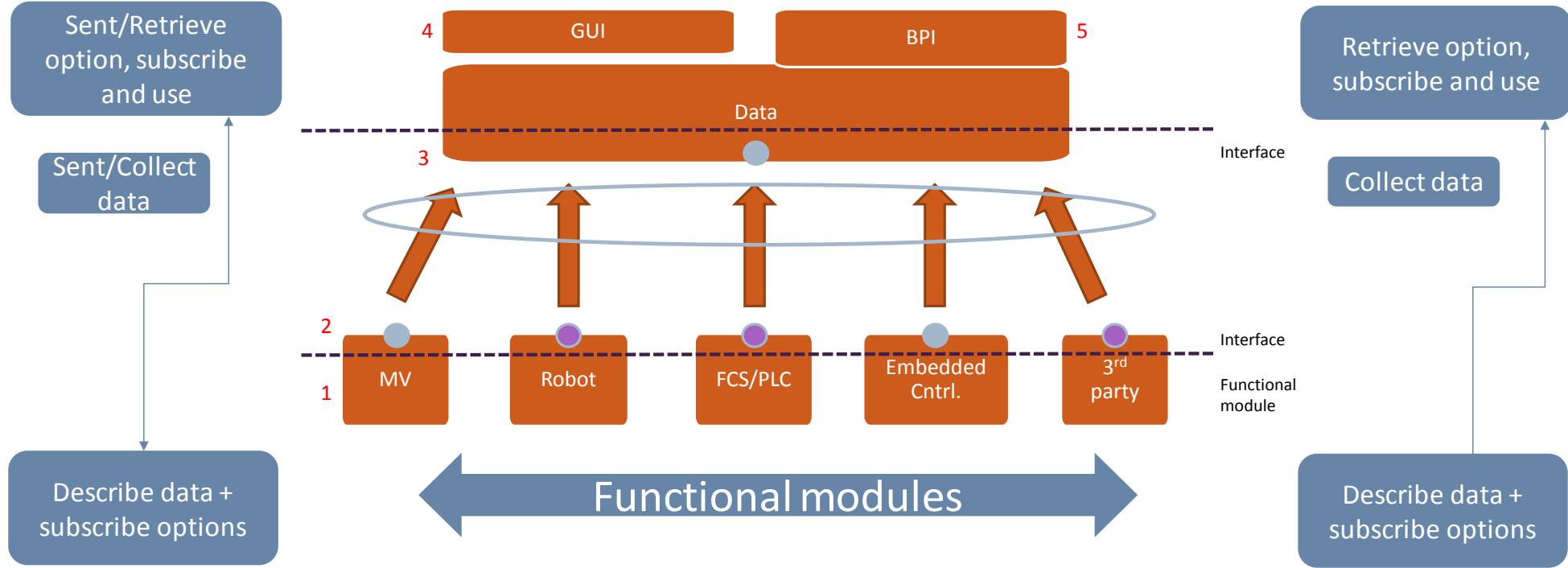
Data exchange horiz/vert based on standard protocol

UX stakeholders:
 Assembly
 Installation
 Commissioning
 Service
 R&D

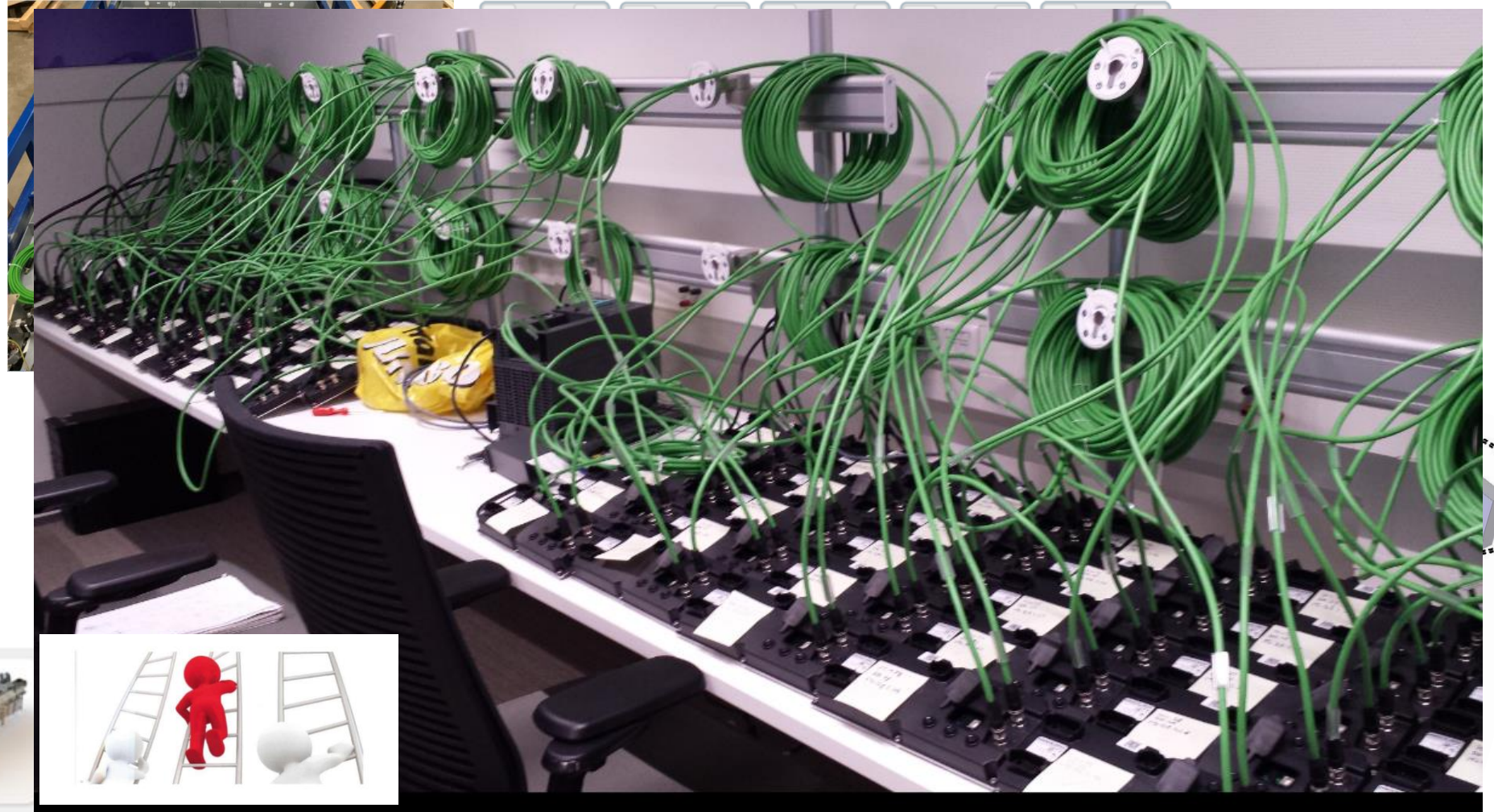
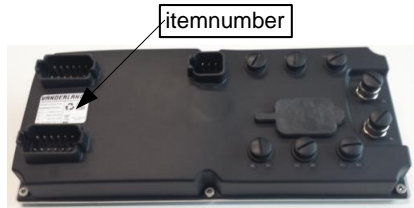
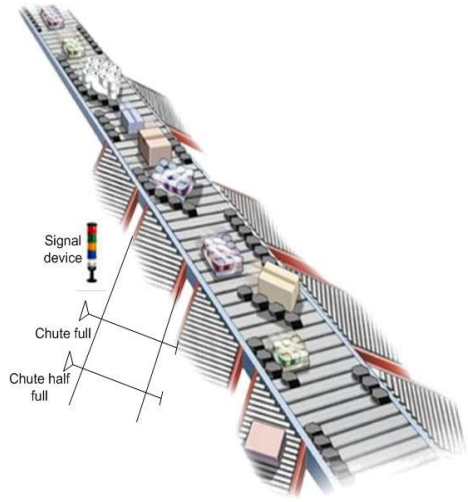


Benefits Predictive Maintenance

- Increase equipment uptime
- Decrease unscheduled maintenance
- Reduced spare parts inventory
- Maintenance costs down
- Overhaul and repair time down
- Increase system knowledge (big data)



Vertical: Focus on UX for product life cycle



SPO 1.0



SCO

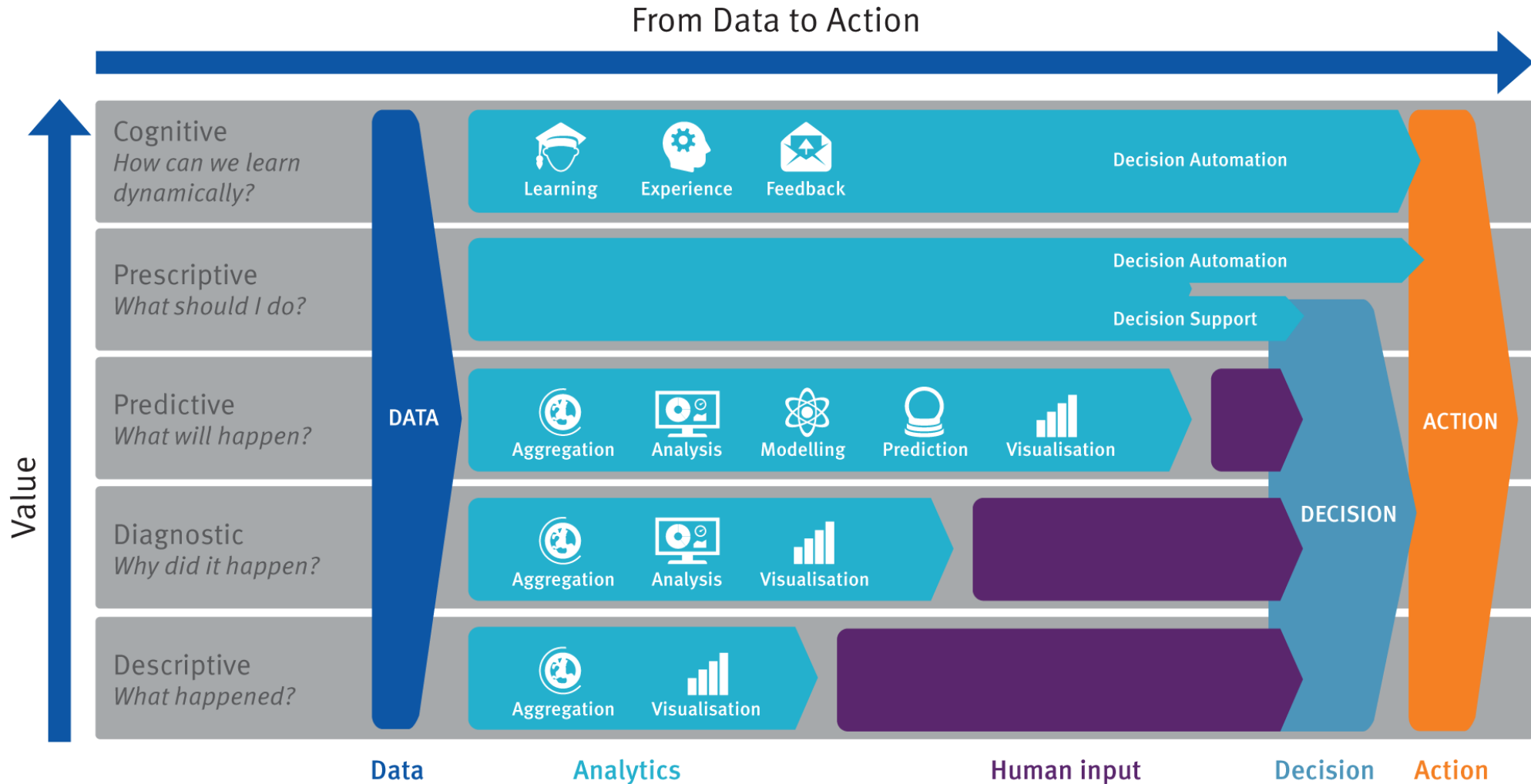


SCU

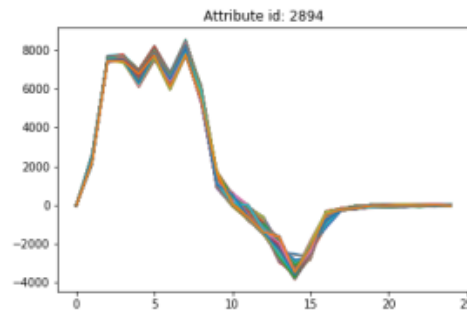
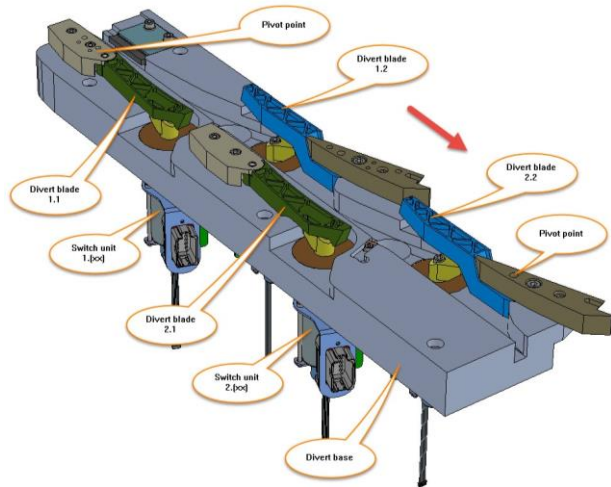
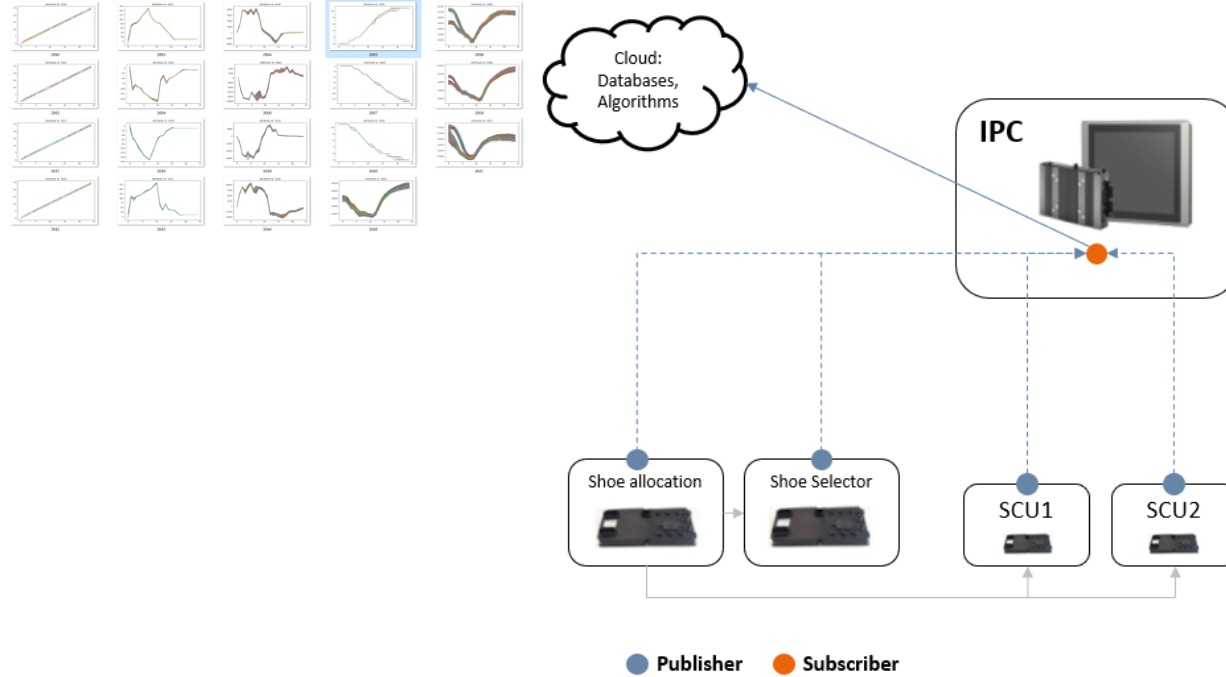


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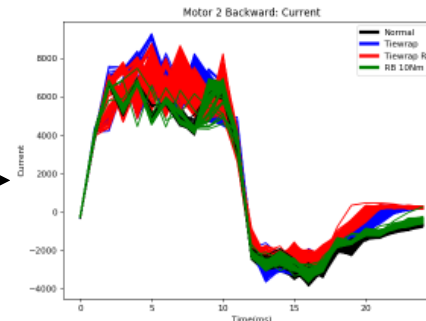
Data Science - From fundamentals to added value



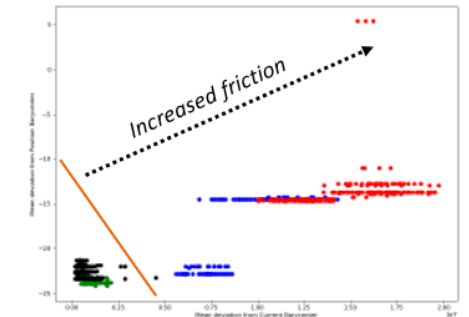
Predictive maintenance



Normal behavior



more friction caused by pollution

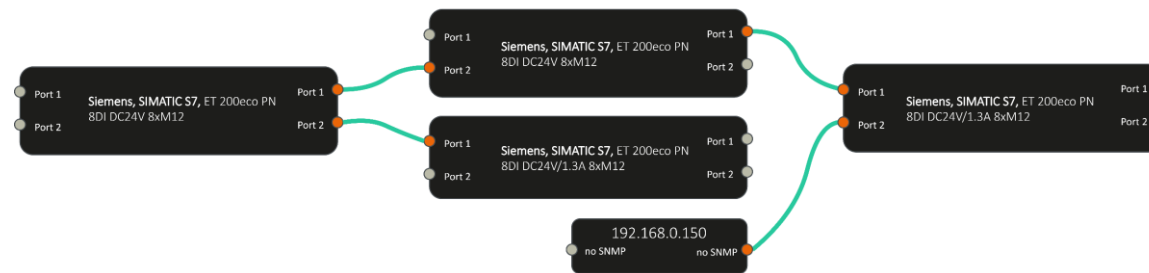
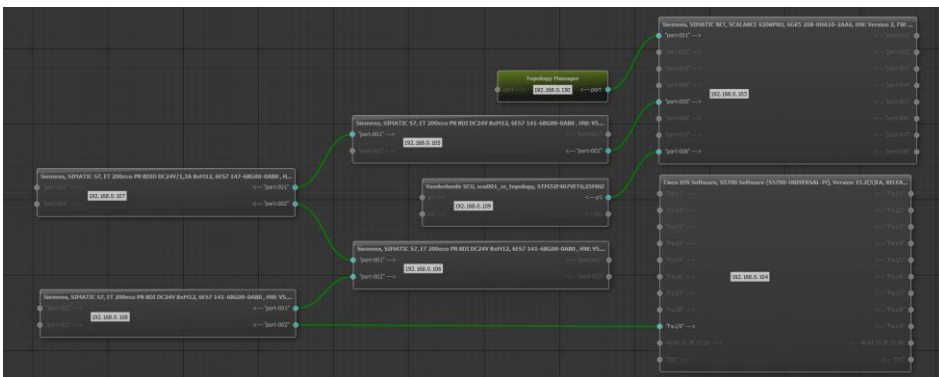
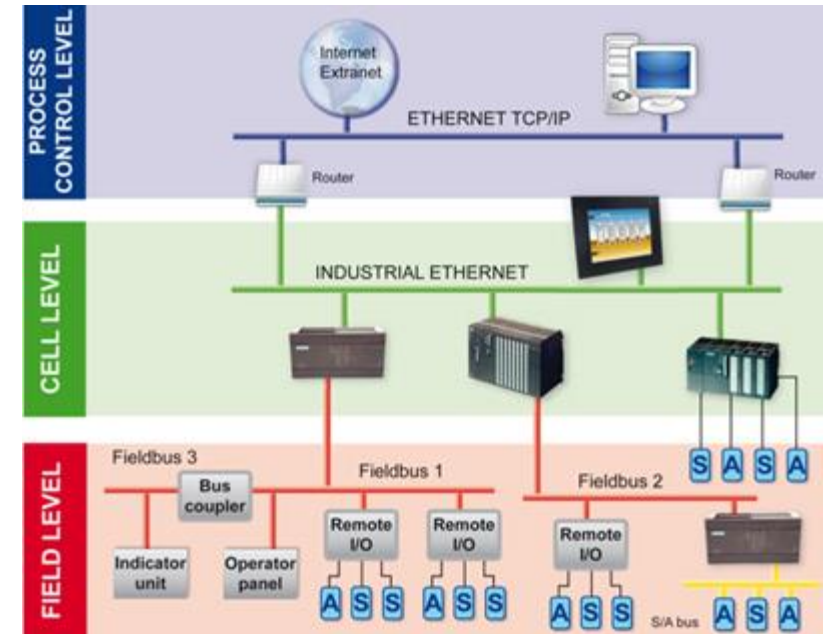


separate normal from abnormal behavior (orange line)

Next step plug and play deployment

1. By standardizing we can support our own and 3th party products.

1. Scan the network (detection of all controllers)
2. Selection and firmware download
3. Topology detection
4. Future: plug and play deployment

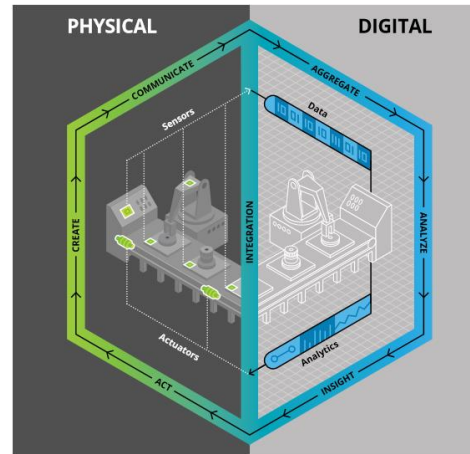


Design and code generation from Matlab

Future:

To develop, test and produce new products in an entirely virtual space before they are actually produced.

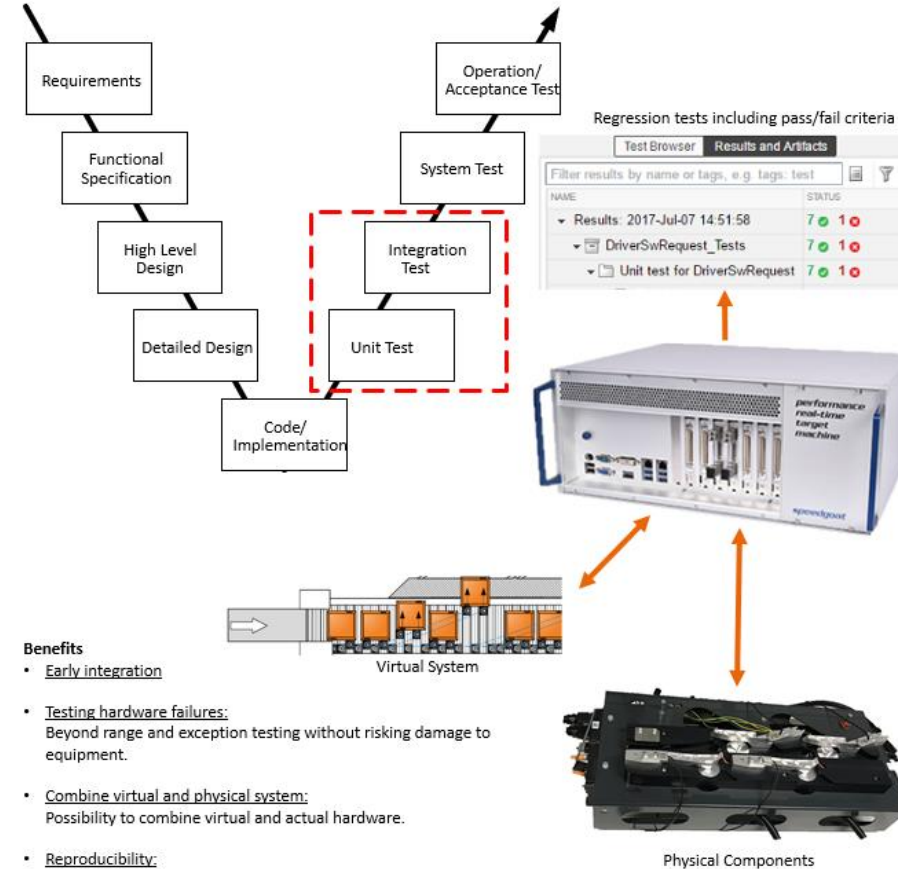
To improve products with data out the field.



Test with plant models

Speedgoat: real-time simulation

Fast validation and verification of new hard- and software without the need of the real system.



Benefits

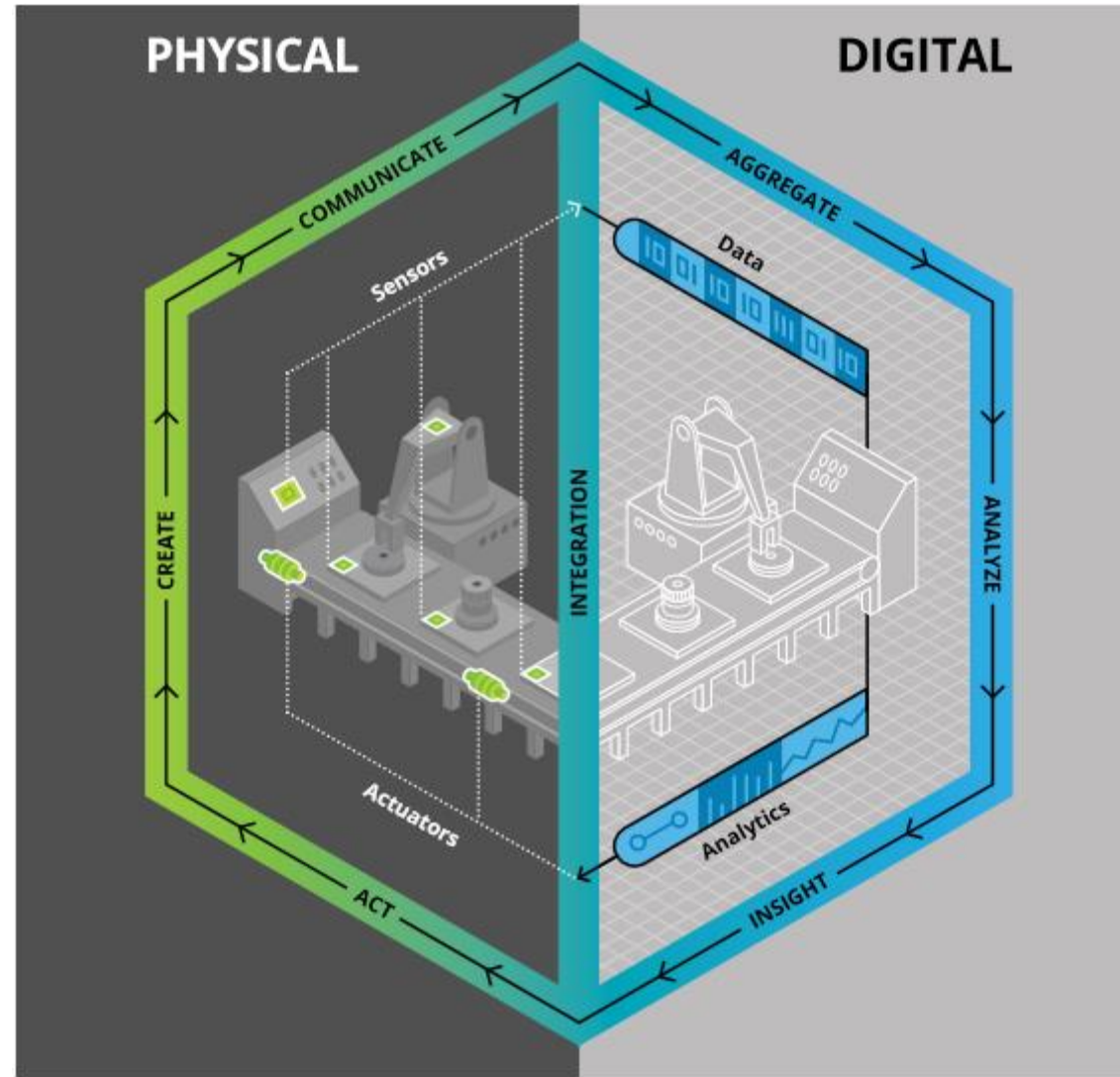
- Early integration
- Testing hardware failures:
Beyond range and exception testing without risking damage to equipment.
- Combine virtual and physical system:
Possibility to combine virtual and actual hardware.
- Reproducibility:
Every run using the same input results in the same output.
- Adaptability:
Virtual model and I/O interface can be up/down scaled easily.

- 1. Shift to decentral smart control**
- 2. Smart connected: data exchange becomes key**
 1. Functional modules
 2. UX during different product life cycle
 3. Data science: from Descriptive to Predictive to Cognitive
- 3. MBD for test and development**

Questions



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The Digital Twin

- A complex system produces massive amounts of data. Connect a group of systems together through the internet, and the data increases exponentially. All of the data coming off of these devices is descriptive. That is, the data tells you what happened and when it happened. Data analytics extends the data to be predictive and tell you when something will happen — a failure, for instance. But data analytics doesn't tell you how to improve the product to avoid the failure. However, a digital twin — a 3-D digital model of a physical system — can do this!

