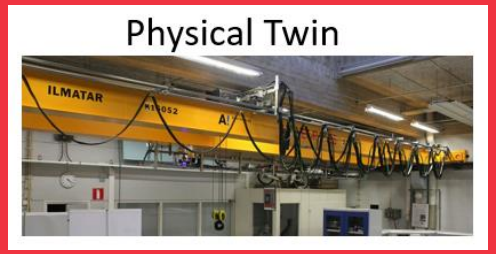
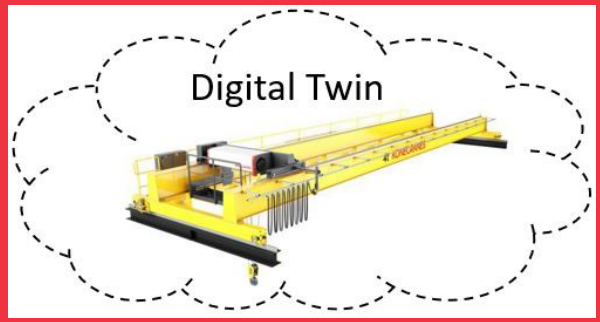
Aalto University



Knowledge

Data



Digitaalinen kaksonen ja DigiTwin-projekti: mitä miksi ja miten?

Juuso Autiosalo
Doctoral Candidate, Project manager
Aalto University School of Engineering

Digital twin definition

Digital twin is a **virtual entity** that is **linked** to a **real world entity**

By doctoral candidates Juuso Autiosalo, Tuomas Tiainen & Jari Vepsäläinen

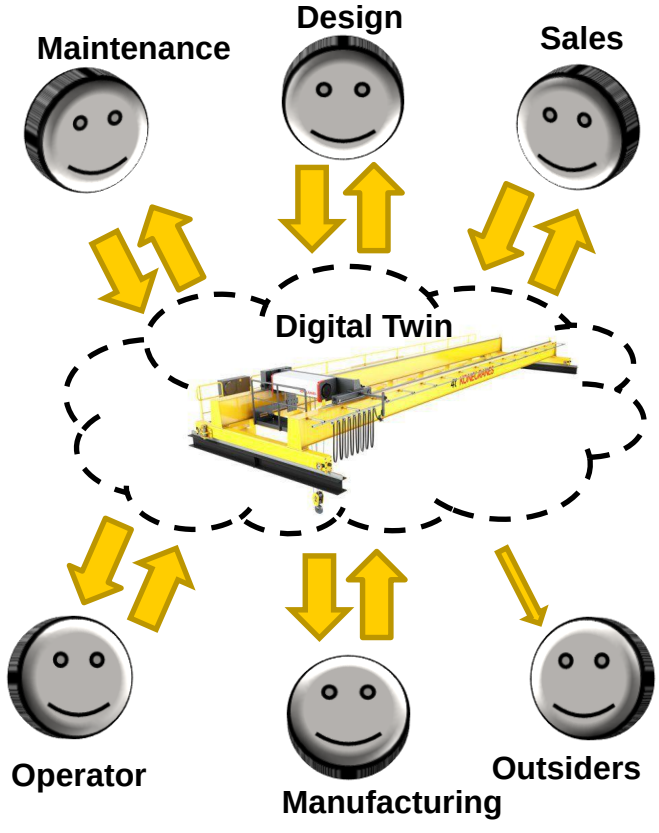
DigiTwin project

Project focuses on the design view of an industrial overhead crane.

Physical Twin

Knowledge

Data



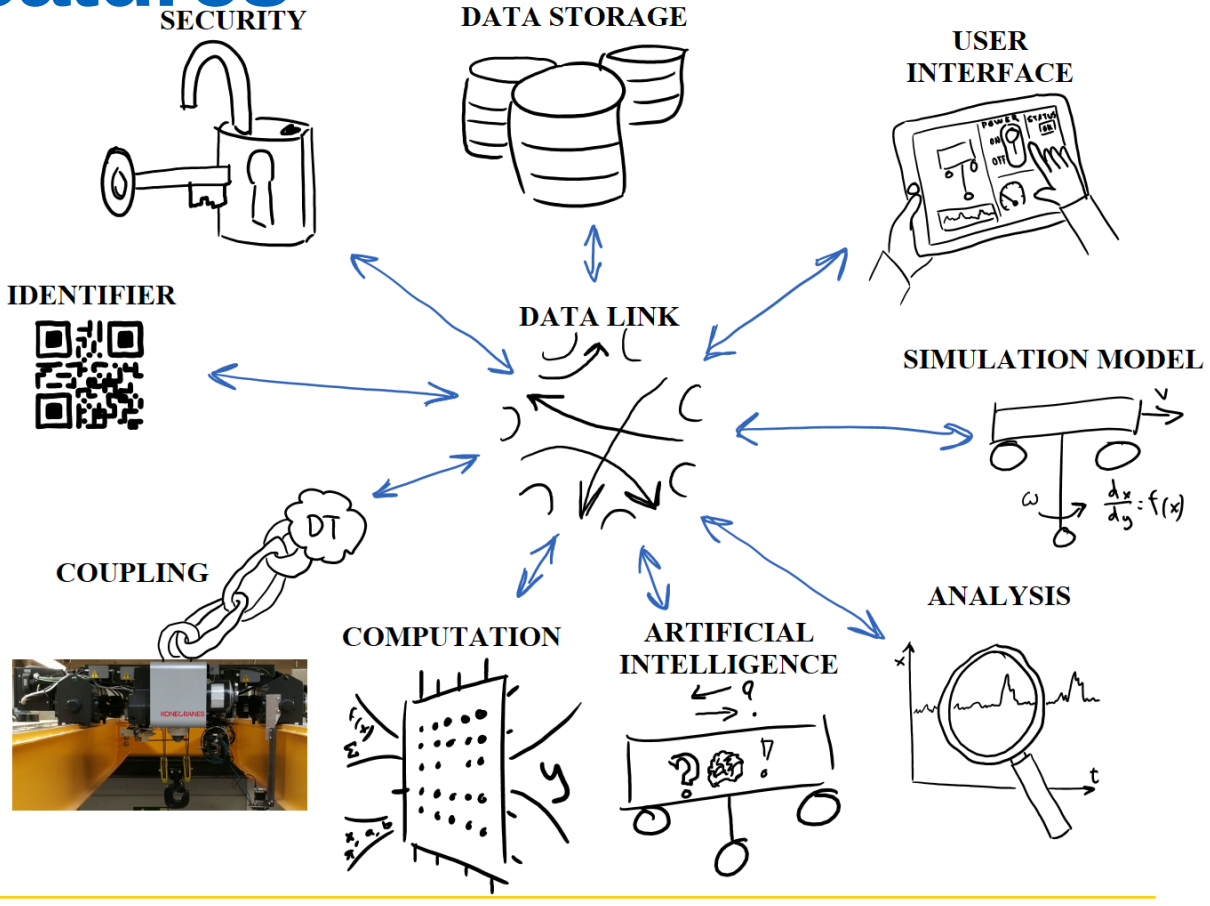
Project builds demonstrators to prove the industrial value of digital twin concept.

Digital twin features

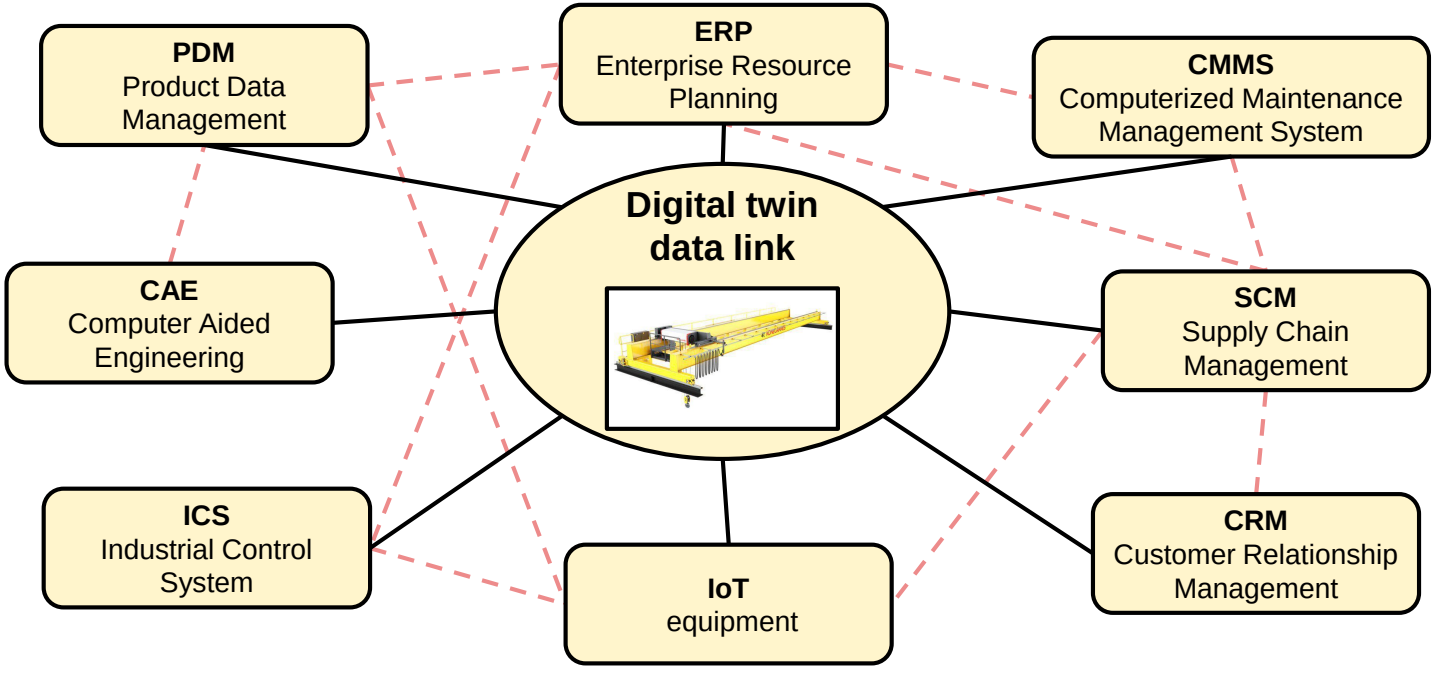
Feature-based definition:

Digital twin is a linked combination of **features,** customized for each **use case.**

“Data link” is being developed.

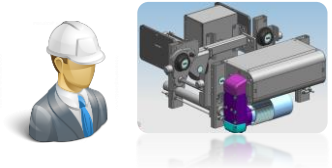


How to use DT in enterprise context?



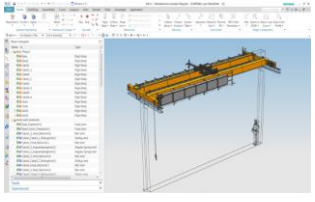
ENGINEERING ASSUMPTIONS CHALLENGED BY IOT DATA

Assumptions from standards, books, …



Crane engineering

\+



Digital Twin

Physical crane

Analytics

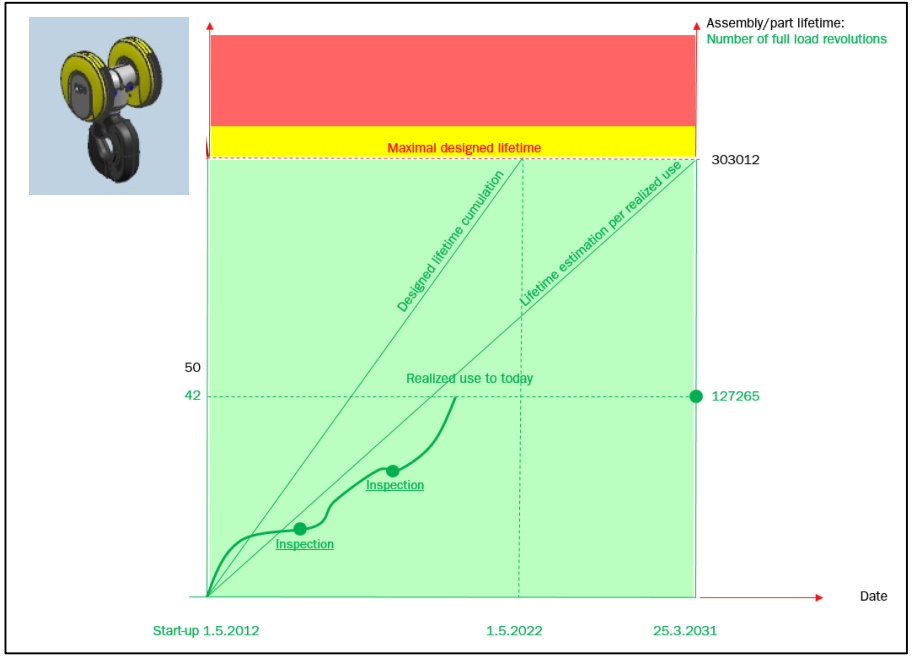
IoT data

ANALYZED COMPONENT INFORMATION

Service view

- Maintenance tasks & inspections based on Twin analyses
- Lifetime estimations for components

→ “Digital Twin based maintenance”

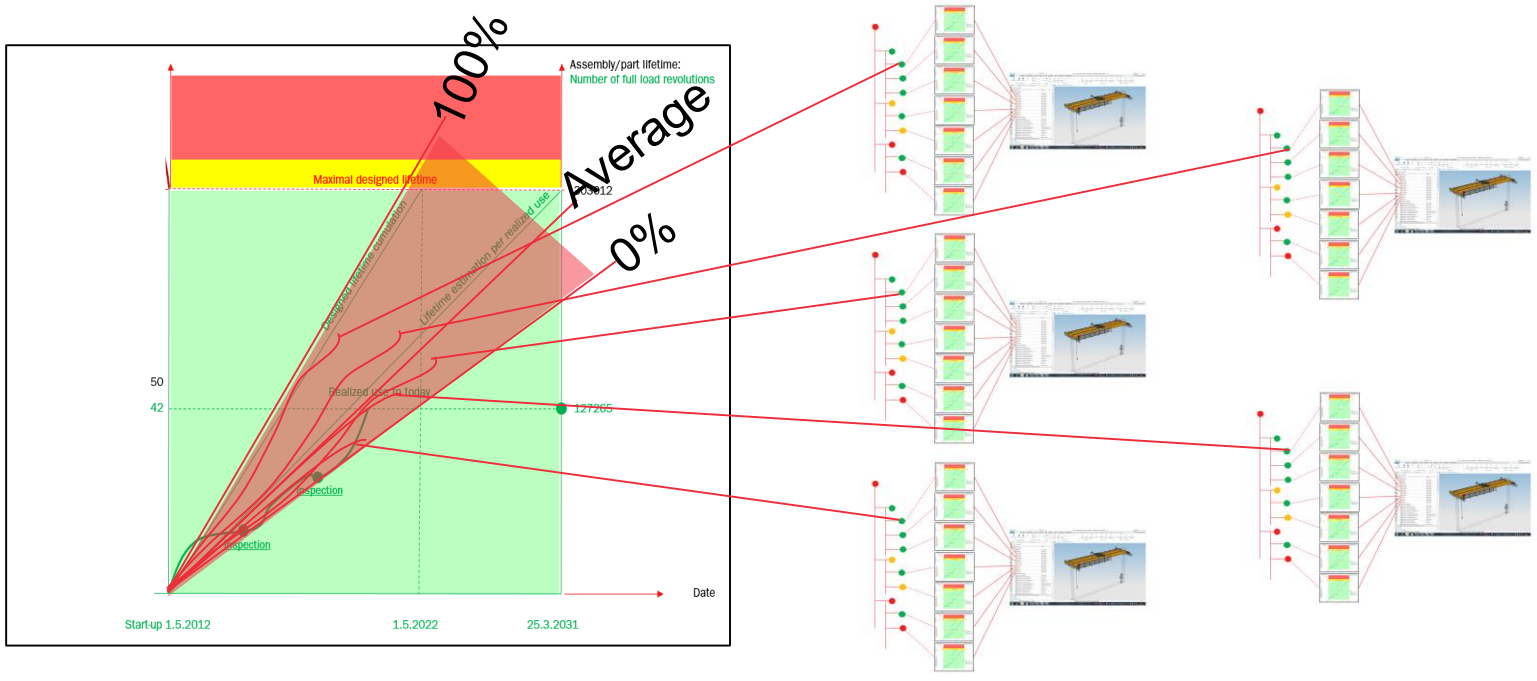


Engineering view

- Comparison of design calculations and realized use
- Information about weak points of products

→ Optimized dimensioning & selection of components

STATISTICAL VIEW TO SIMILAR COMPONENTS



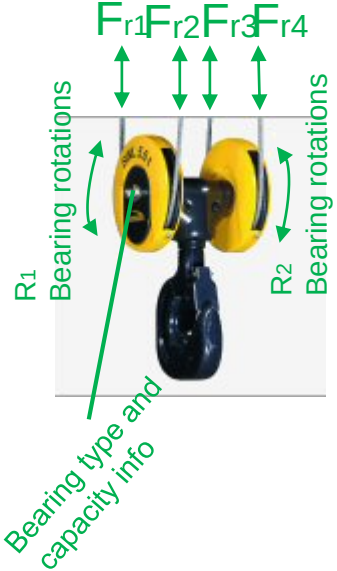
- Find similar parts in cranes on field
- Equalize data from different cranes
- Analyse statistically

USE CASE

Sensored raw data

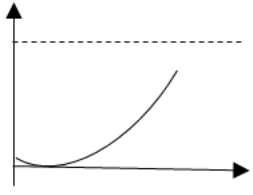
Processed info from raw data

Rope forces

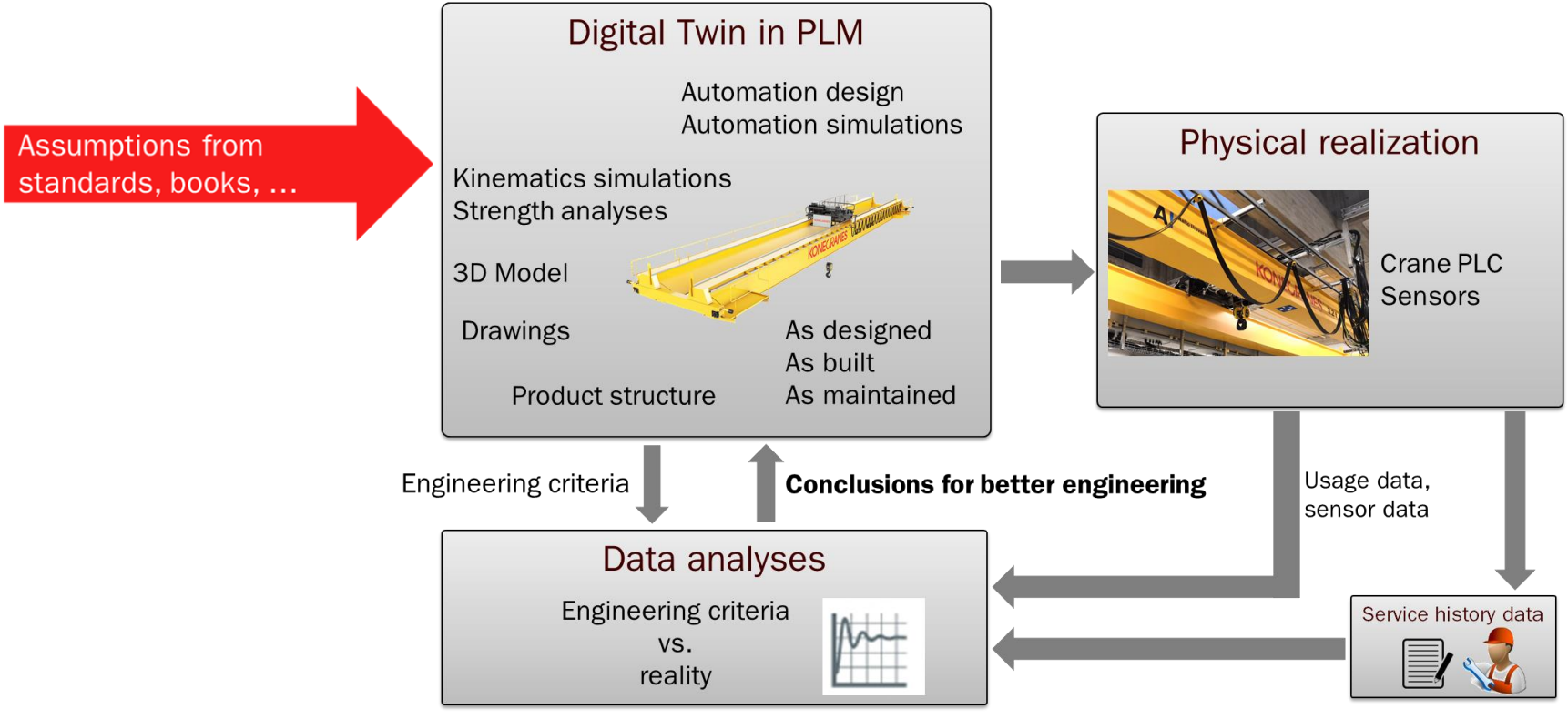


Algorithms analyzing and reporting bearing status & estimation

$a = b * c < E$



IoT driven engineering



Crane bearing use case

Sensored raw data

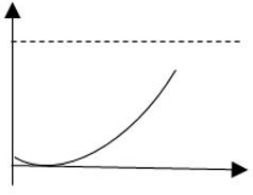
Processed info from raw data

Rope forces

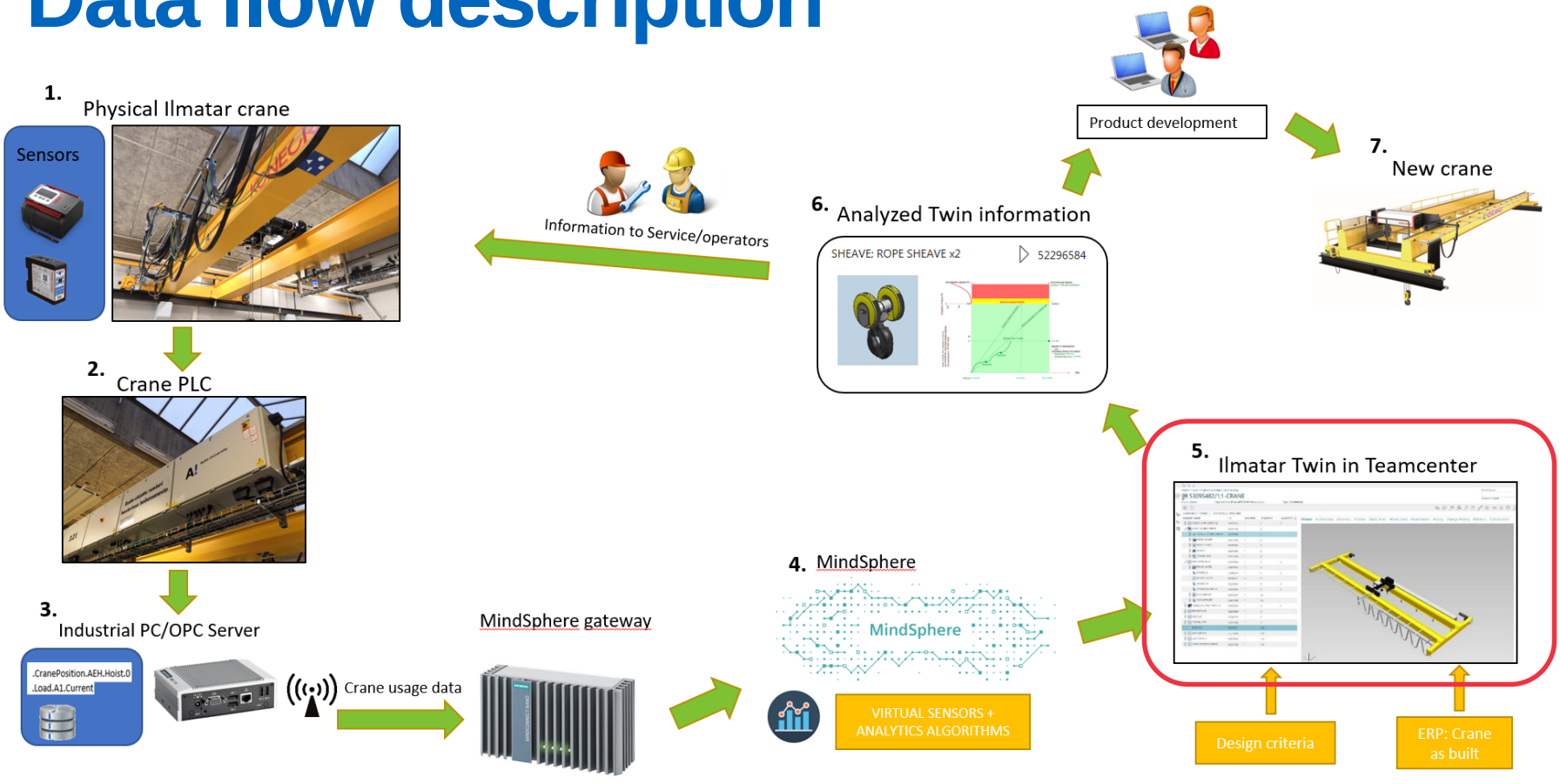
$F_{r1} F_{r2} F_{r3} F_{r4}$

Algorithms analyzing and reporting bearing status & estimation

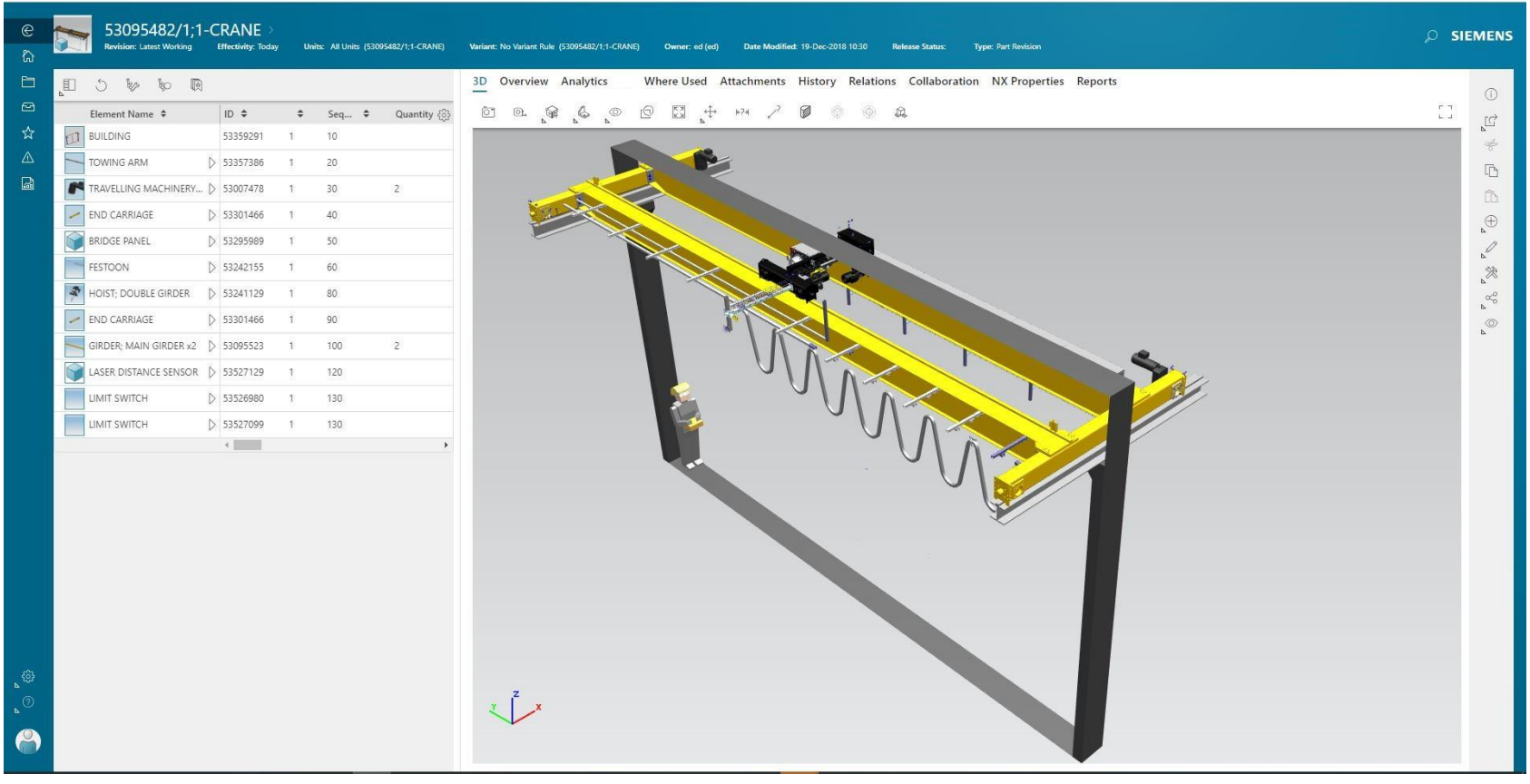
$a = b * c < E$



Data flow description



How does DT help engineers?



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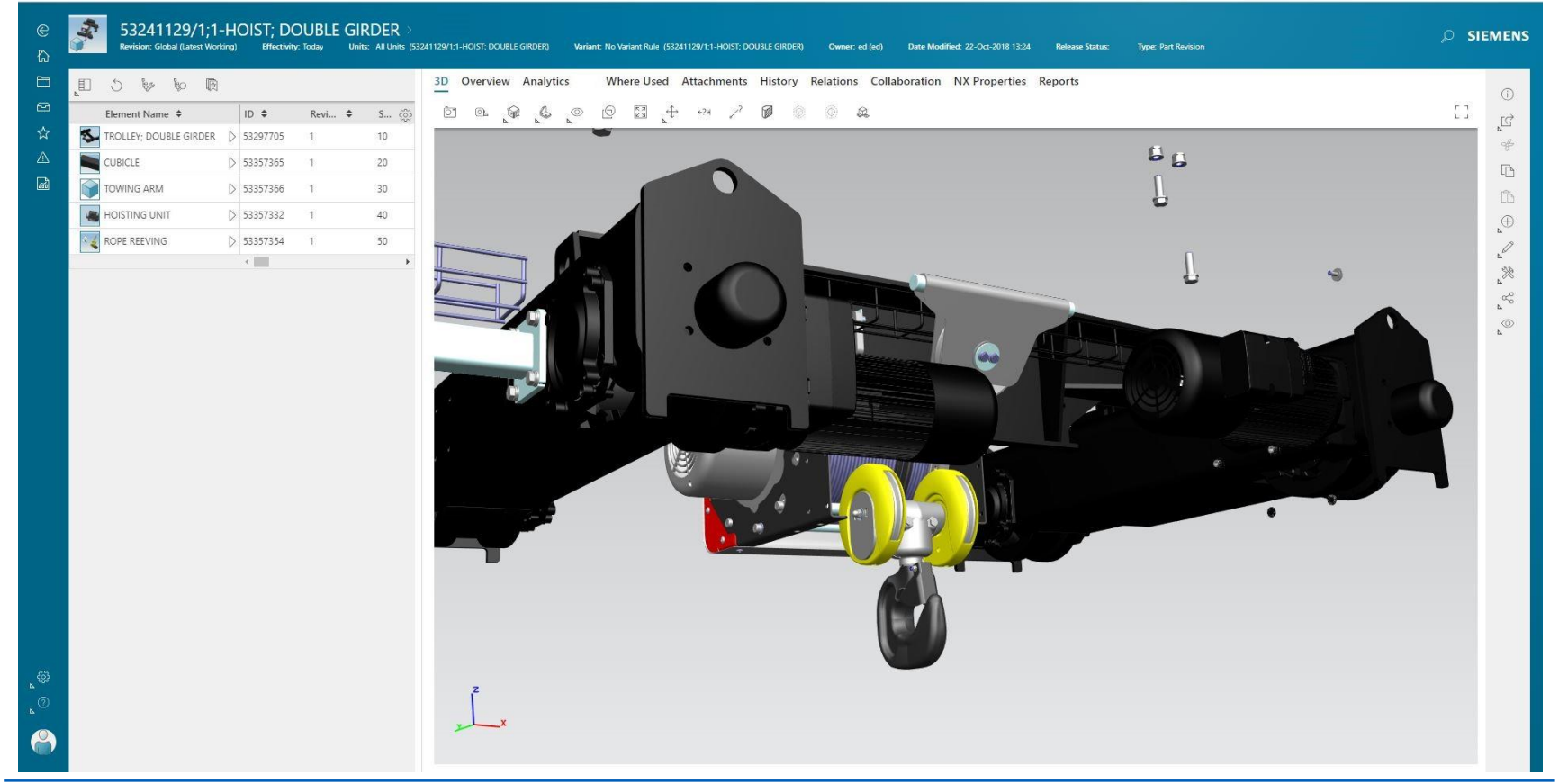
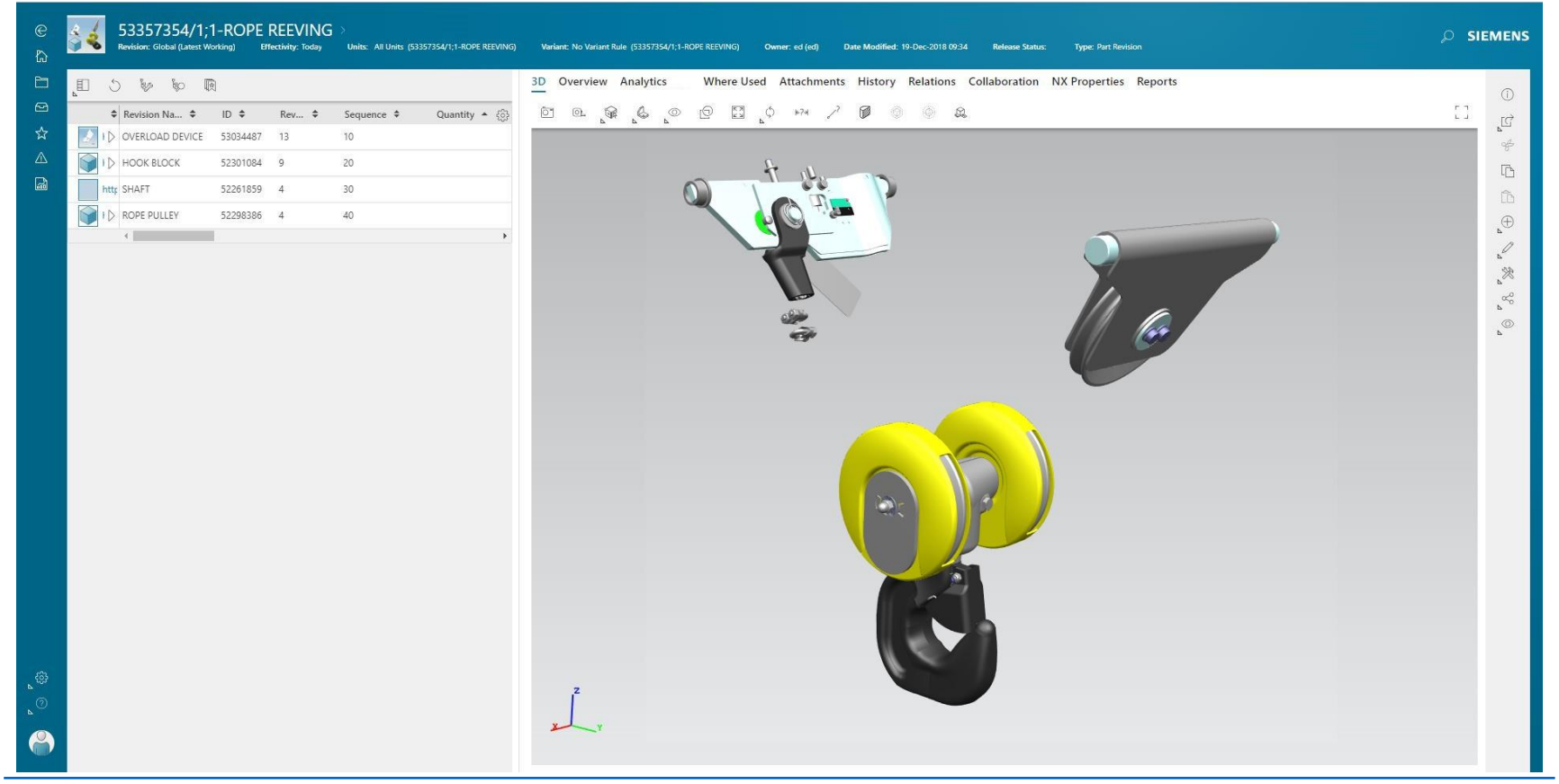
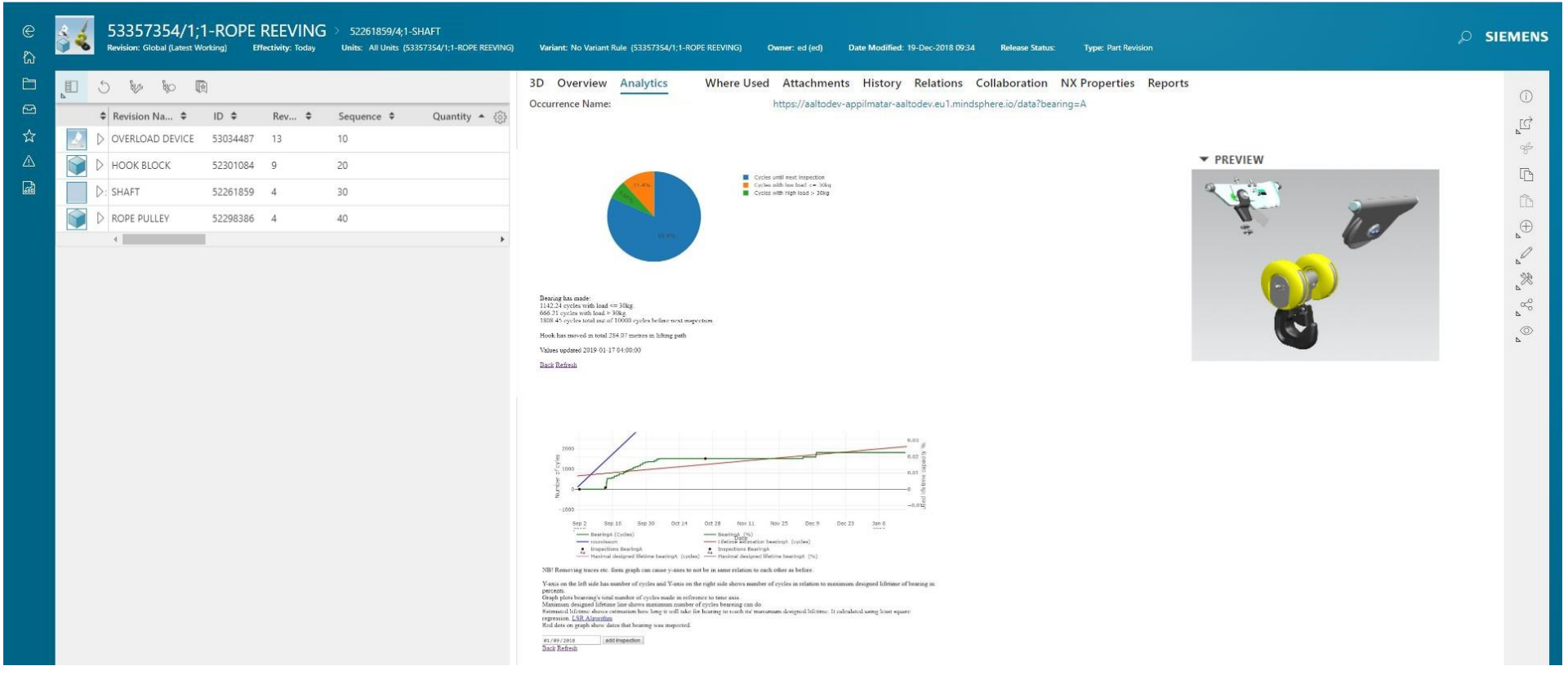


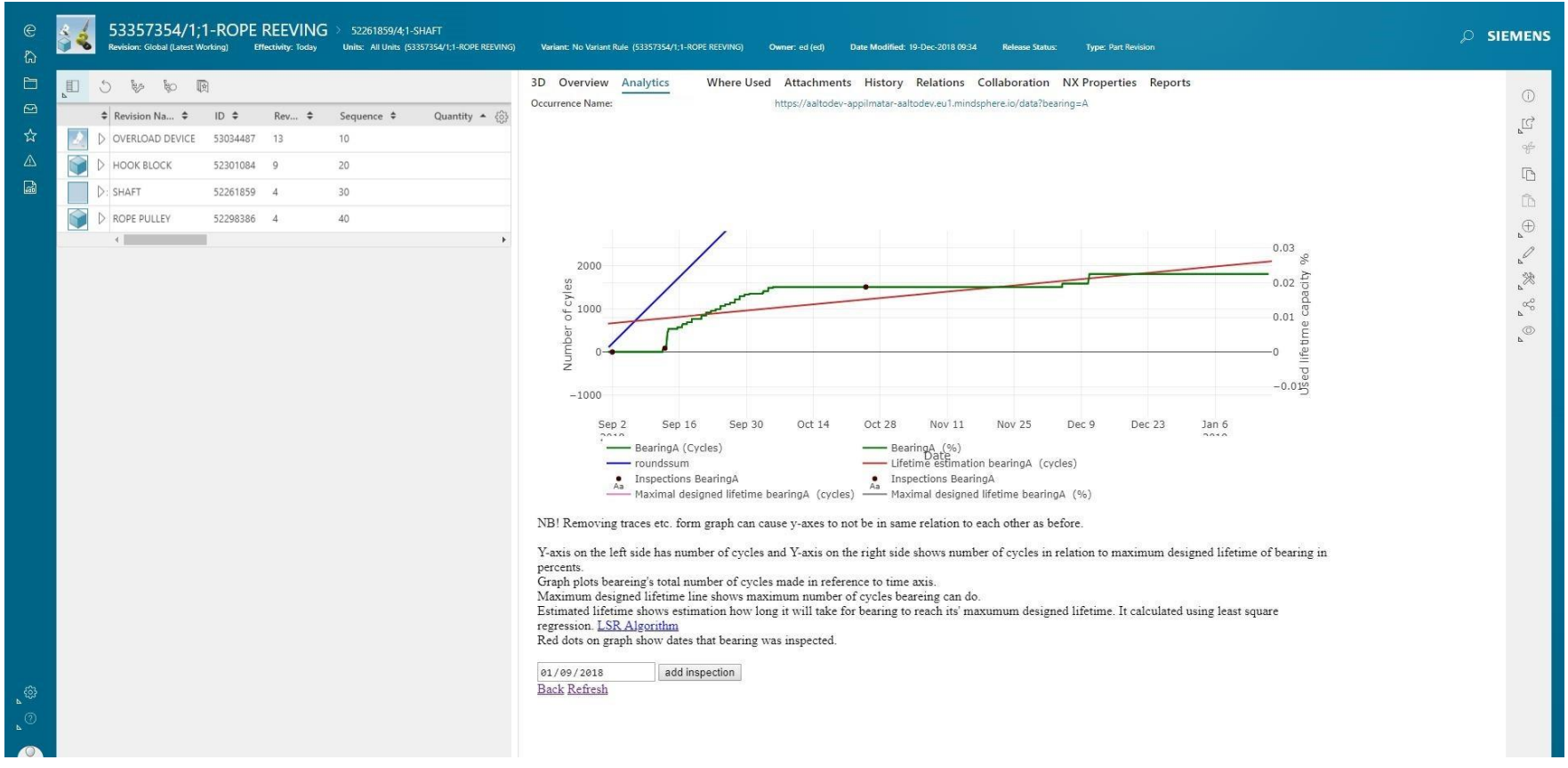
How does DT help engineers?



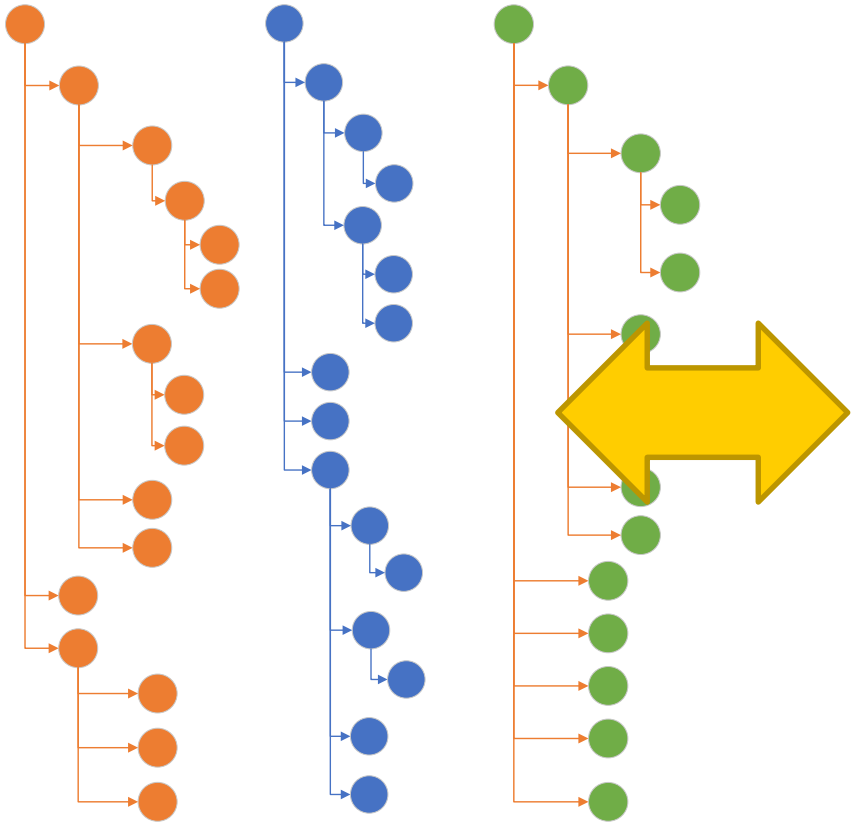
How does DT help engineers?



How does DT help engineers?



DIGITAL TWIN: COMBINING LIFE CYCLE STAGES



Slide credits: Ville Pantsar, IDEAL PLM

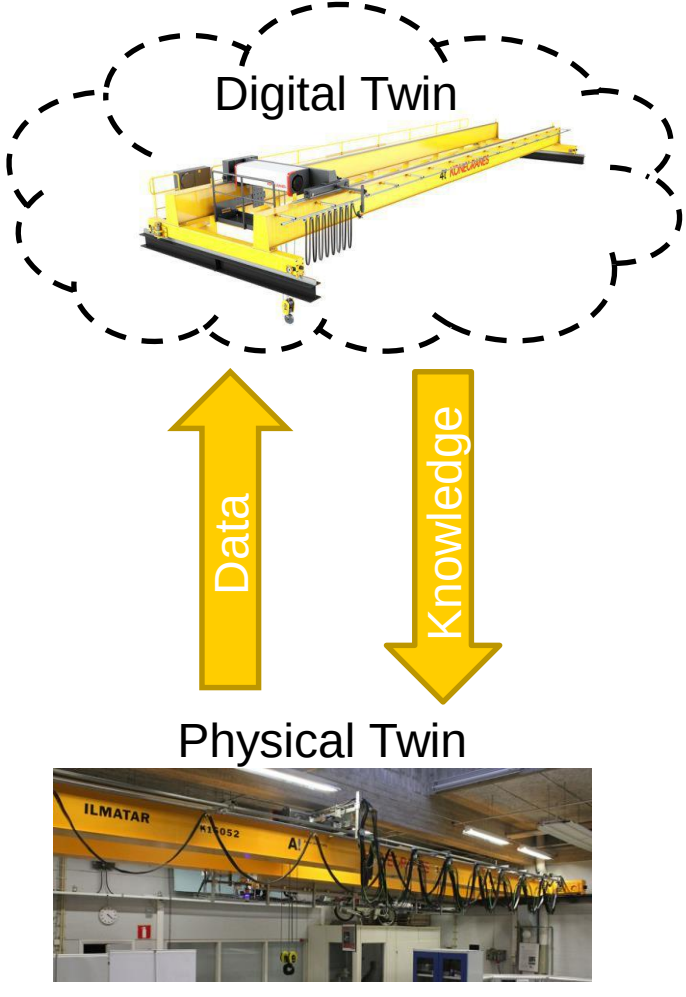
Summary

Digital twin *features* depend on use case.

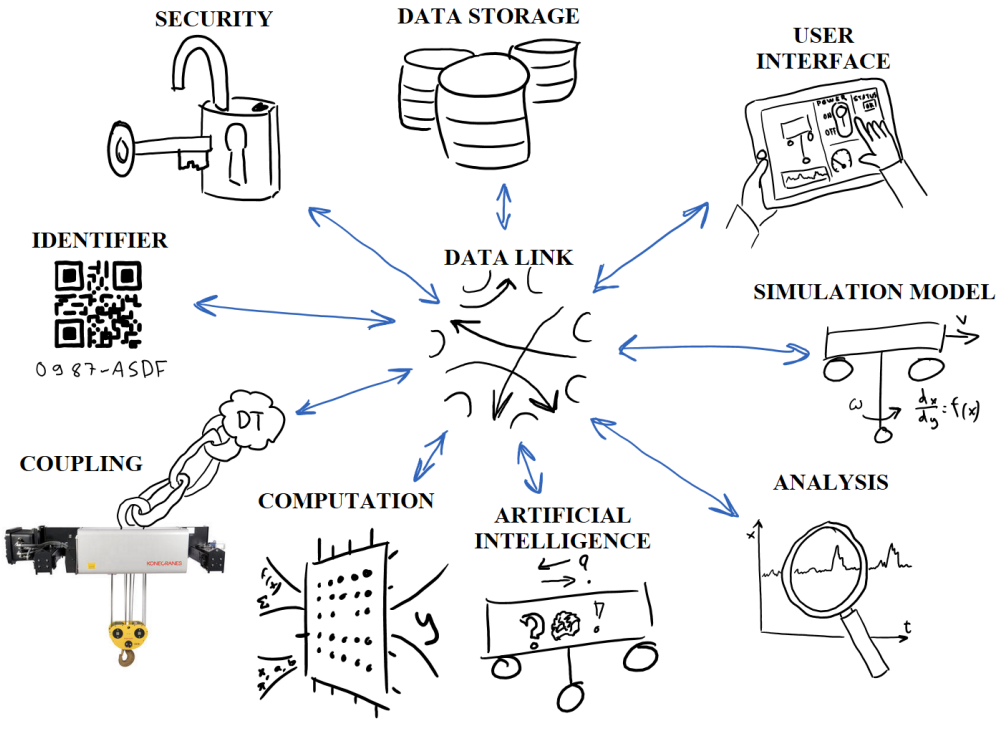
Crane engineering use case:

- **select component**
- **data flow**
- **analysis**
- **helping engineers**

➢ **Shift to IoT driven engineering**



Questions?



More info:

digitwin.fi

Share your perspective on digital twin at Slack?

digitwin.fi/join-slack

Propose a meeting?

Jari Juhanko