DigiTwin project demo: current state & next steps

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Aalto University
Project manager for DigiTwin

Working title of doctoral thesis:
Digital twin for industrial products

What is our digital twin (DT)?

First half

1. Physical Ilmatar Crane
2. Crane PLC
3. Industrial PC/OPC server
4. MindSphere
5. Ilmatar Twin in Teamcenter
6. Analyzed Twin information
7. New Crane

Second half

How does DT help engineering designers?

- Short intro to Teamcenter
- How is usage data presented in Teamcenter?

What next?

What are the components of our DT?

1. Physical Ilmatar crane

Sensors

2. Crane PLC

3. Industrial PC/OPC Server

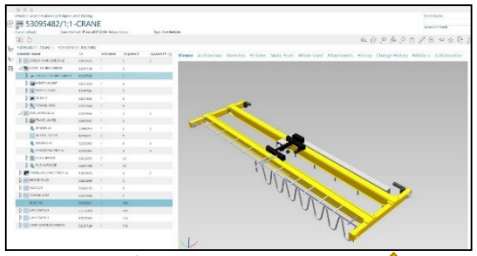
Crane usage data

MindSphere gateway

4. MindSphere

VIRTUAL SENSORS + ANALYTICS ALGORITHMS

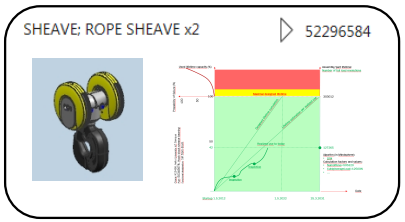
5. Ilmatar Twin in Teamcenter



Design criteria

ERP: Crane as built

6. Analyzed Twin information



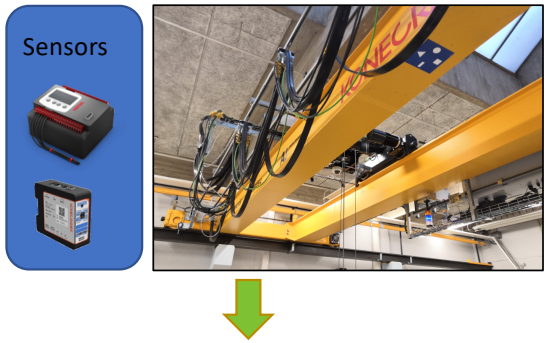
Information to Service/operators

Product development

7. New crane

Where does the data come from?

1. Physical Ilmatar crane



Physical Ilmatar crane

Real world via sensors (and actuators)

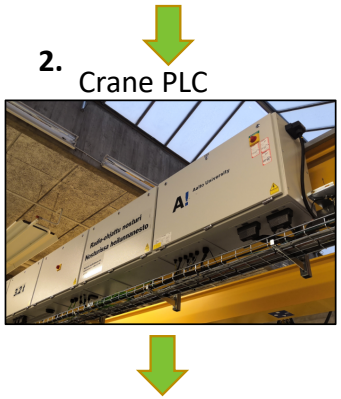
How is the data transferred?

- Wires
- Digital and analog signals

Could there be additional sensors?

- RD Velho NB-IoT

What controls the crane?



Crane PLC (Programmable Logic Controller)

Why do we need this for sensors?

- Sensor data to control the crane accurately.

Standard in industry automation systems

Data transferred via wires, various protocols.

Sould we put this into cloud?

- Control-as-a-service from the cloud

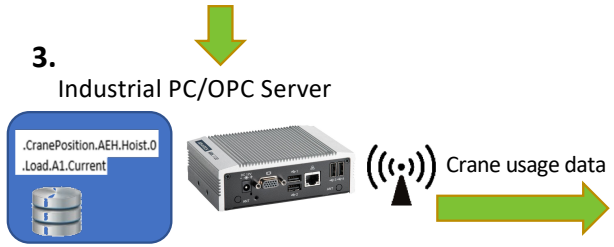
What processes data locally?

Industrial PC

What provides the data to other devices?

- **OPC UA server**

Data transferred via WiFi.



What else could we do with the two-way OPC UA interface?

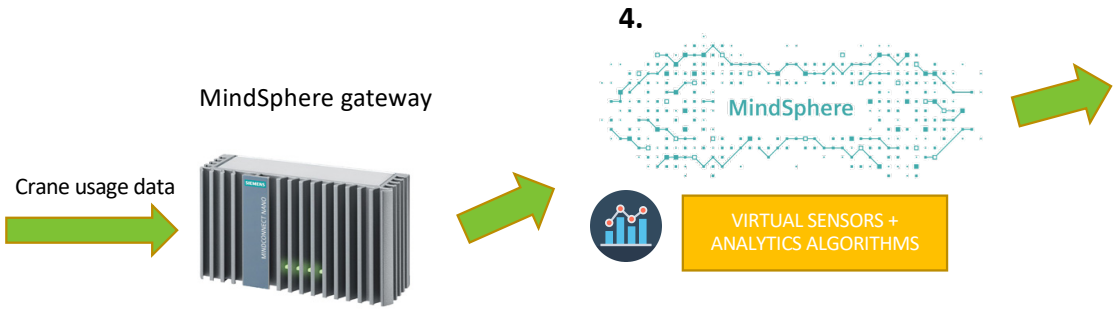
What ensures security in public internet?

MindSphere gateway

What provides the data to other devices?

- **OPC UA server**

Crane usage data transferred via WiFi.



What provides engineering knowledge?

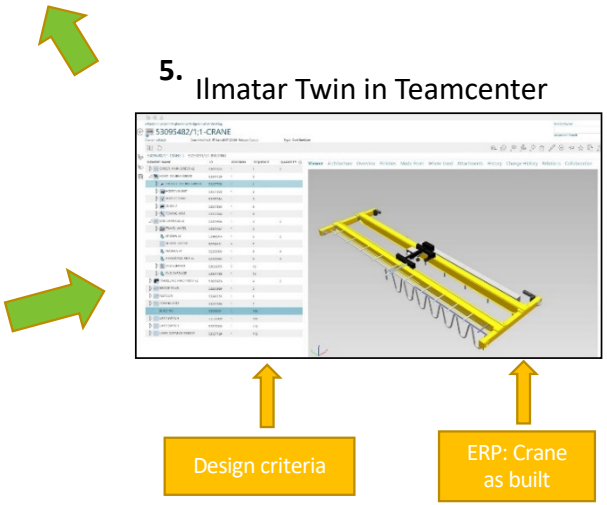
Ilmatar Twin in Teamcenter

Adds the engineering context to the data.

- Combines design criteria and as-built model of the crane to the previous data

Could all engineering data be available in one place?

What could be achieved if the engineering data was machine readable?



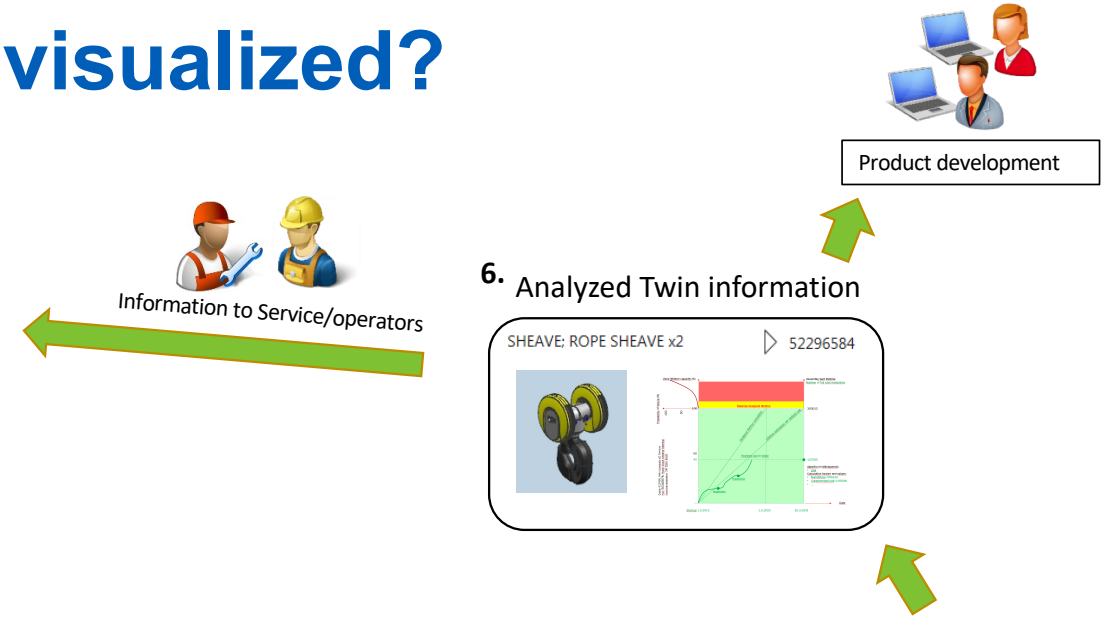
How is the data visualized?

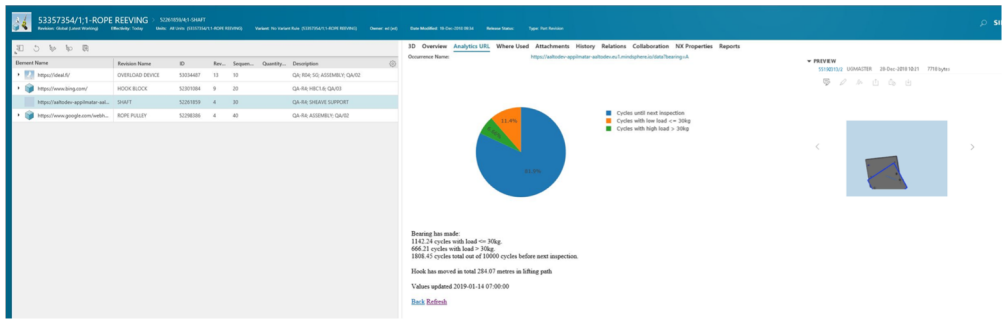
Analyzed Twin information

MindSphere app embedded to Teamcenter

Simultaneous view to

- product structure,
- usage data and
- 3D model.





How do engineers use the usage data?

Product development

7. New crane

Designing New crane

Use the use experience of existing cranes to define best fit crane for purpose.

Ease the workload of engineers by bringing the data more available.

What would be the most useful ways to leverage all the data of the digital twin?

End of first half

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Sensors

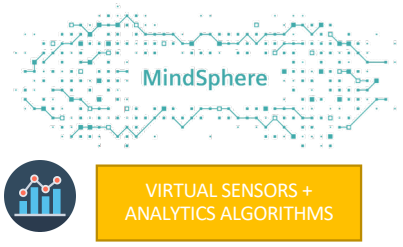
2. Crane PLC

3. Industrial PC/OPC Server

Crane usage data

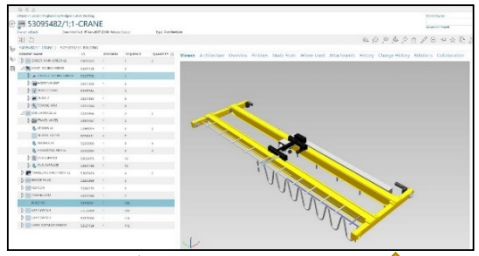
MindSphere gateway

4.



VIRTUAL SENSORS + ANALYTICS ALGORITHMS

5. Ilmatar Twin in Teamcenter



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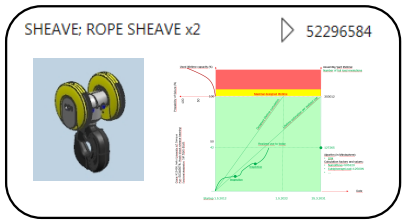

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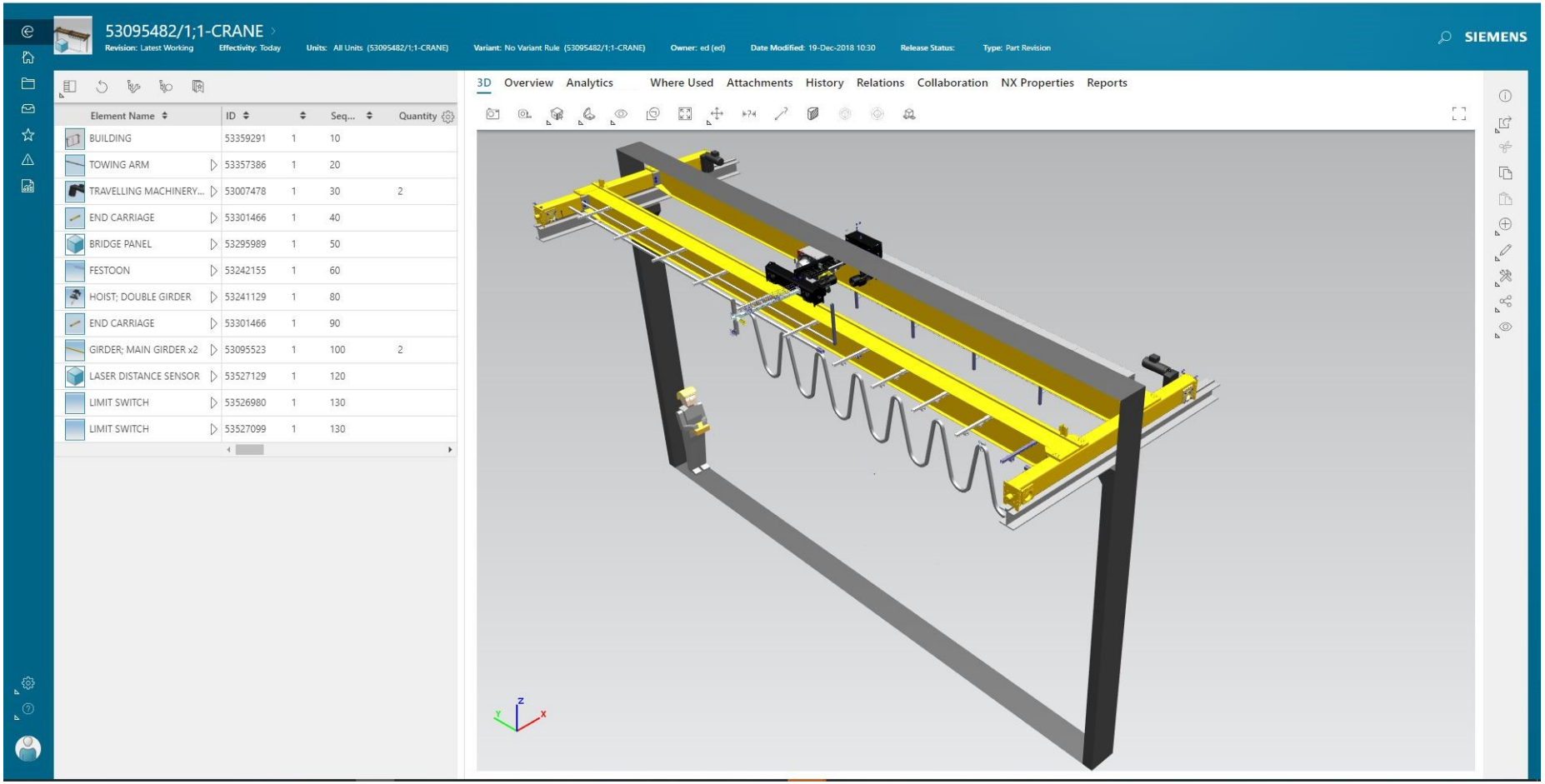

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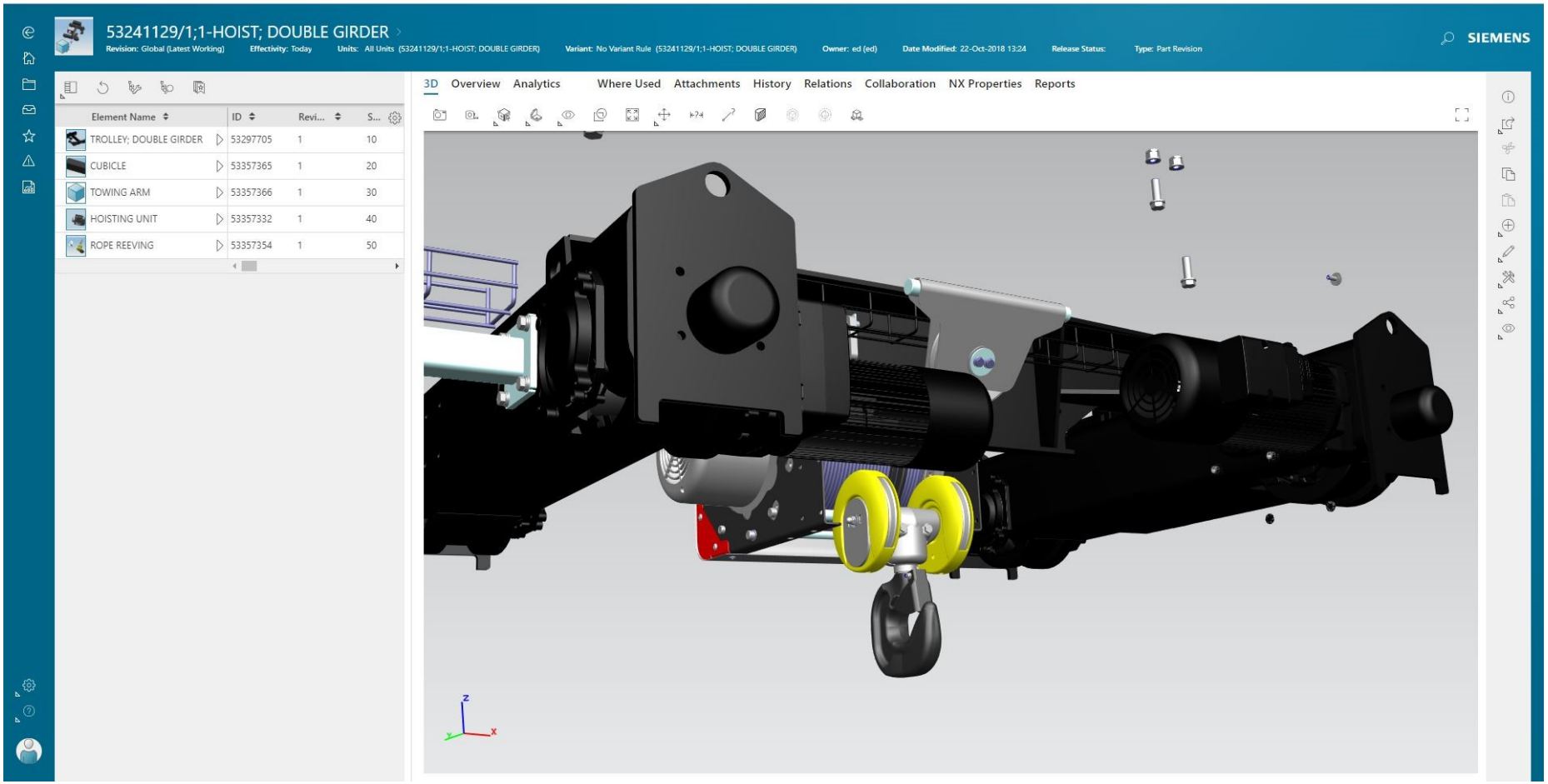

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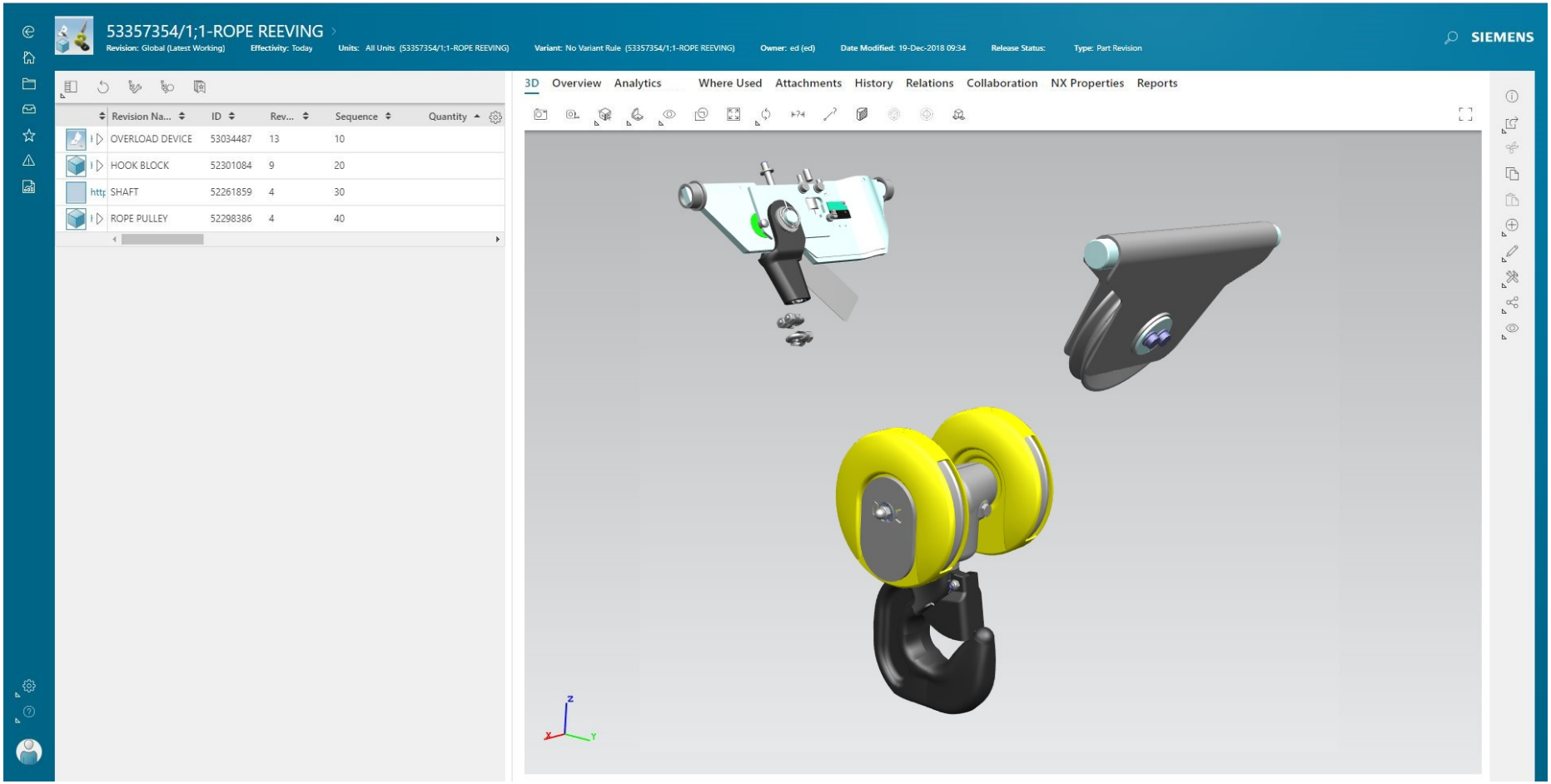

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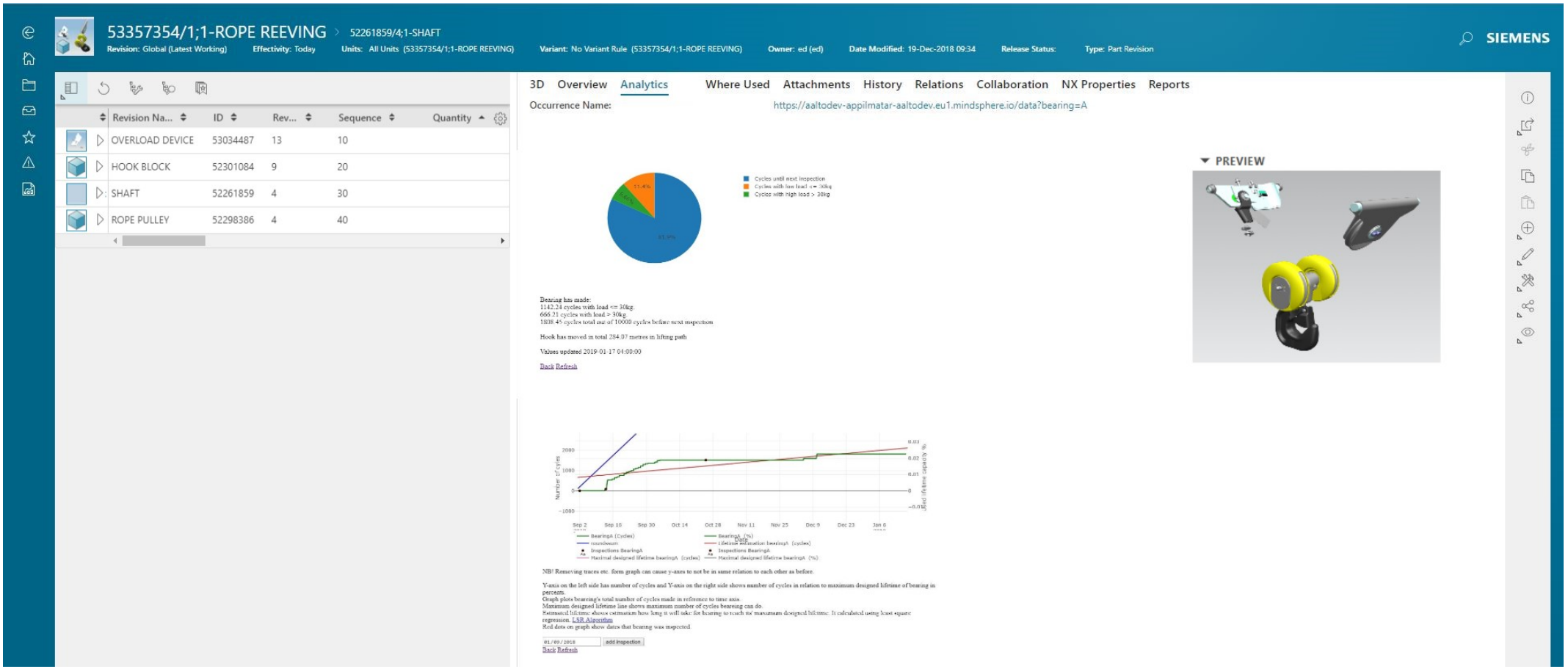

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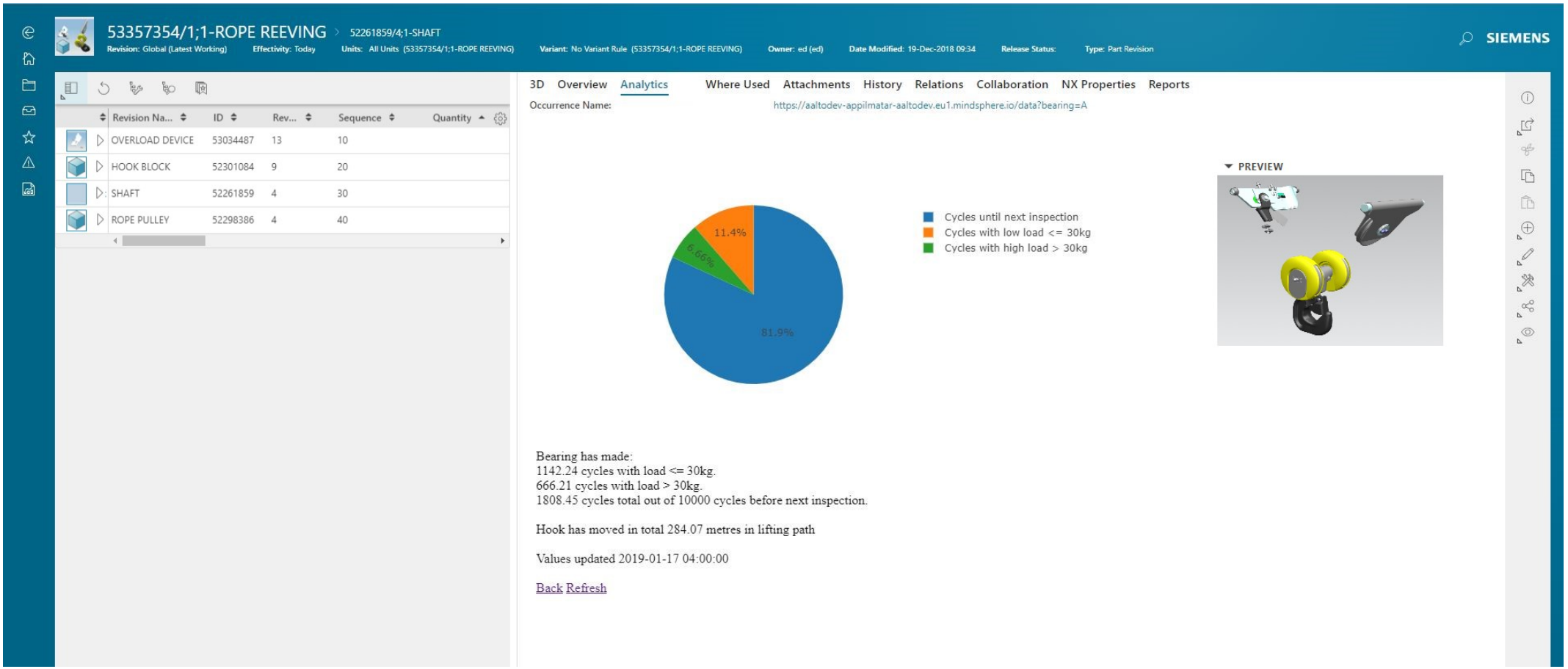

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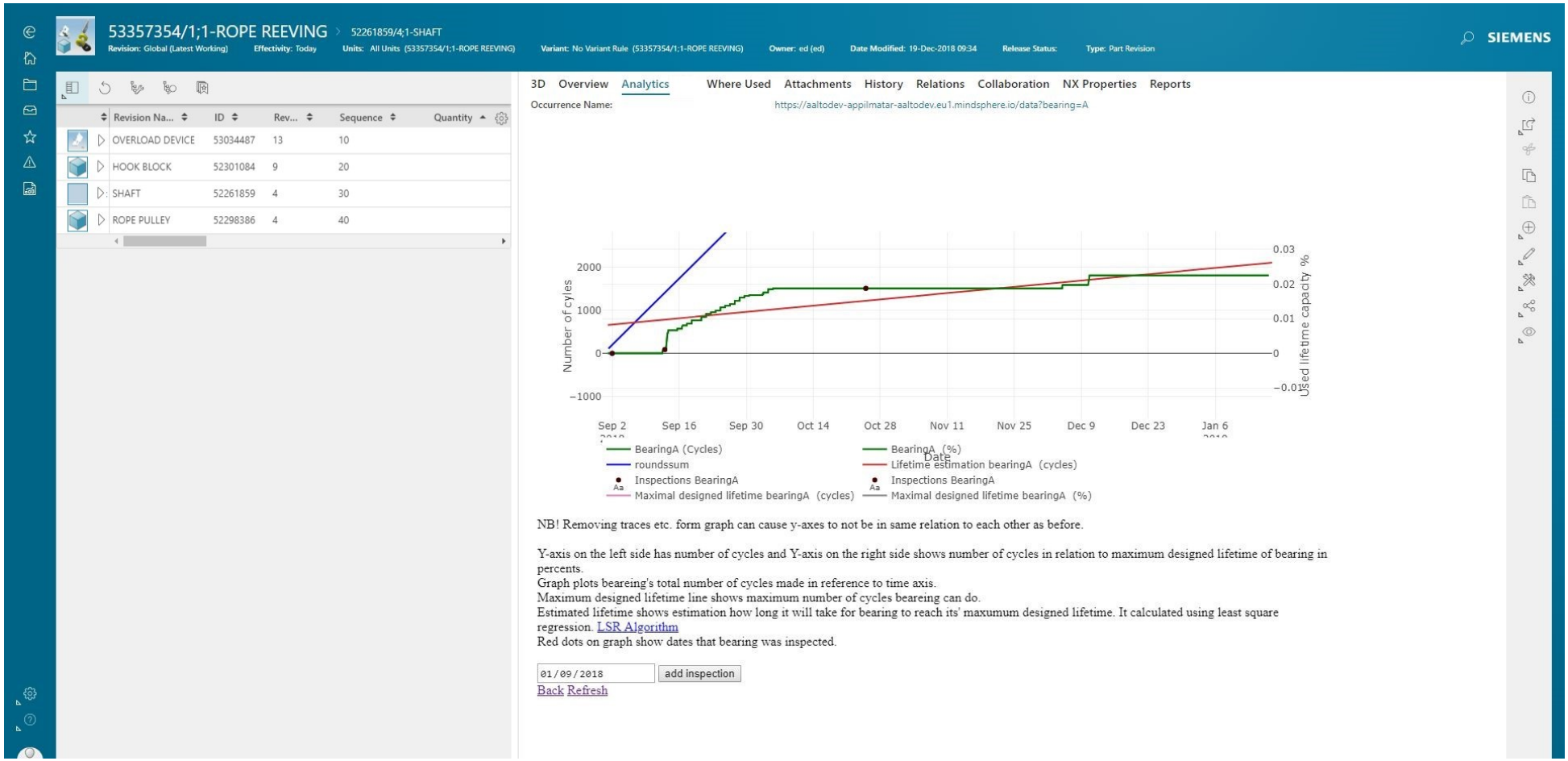
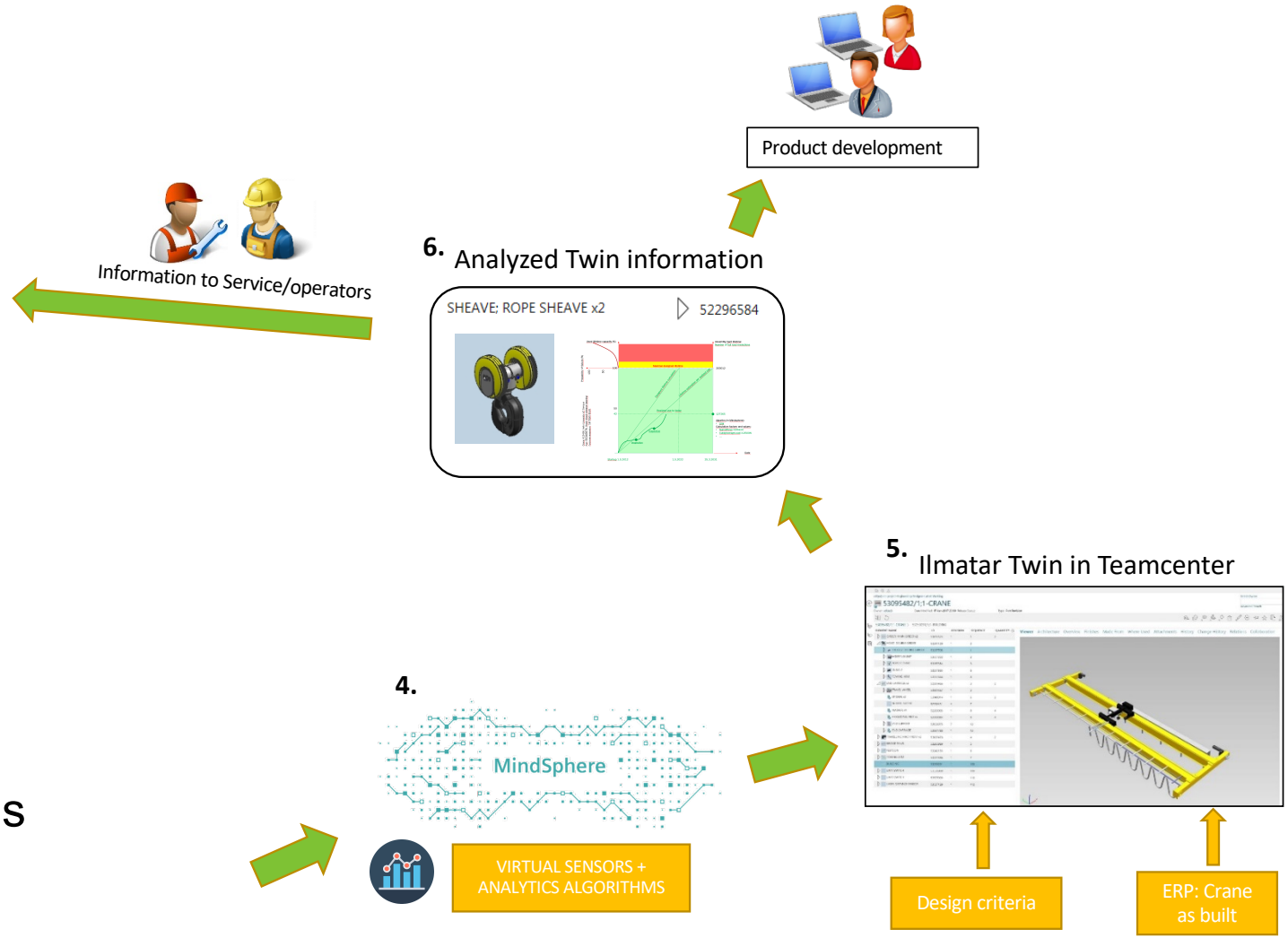


What next?

Fleet data
Machine learning
Component lifetime
Maintenance
Augmented reality
IoT sensors

Your ideas?

Further future directions
in the afternoon.



Questions?

Juuso Autiosalo

How to join the DigiTwin network?

What does it mean in practice?

To be honest we don’t know exactly.

(We are starting a Master’s thesis)

Every partner will most likely have their own story

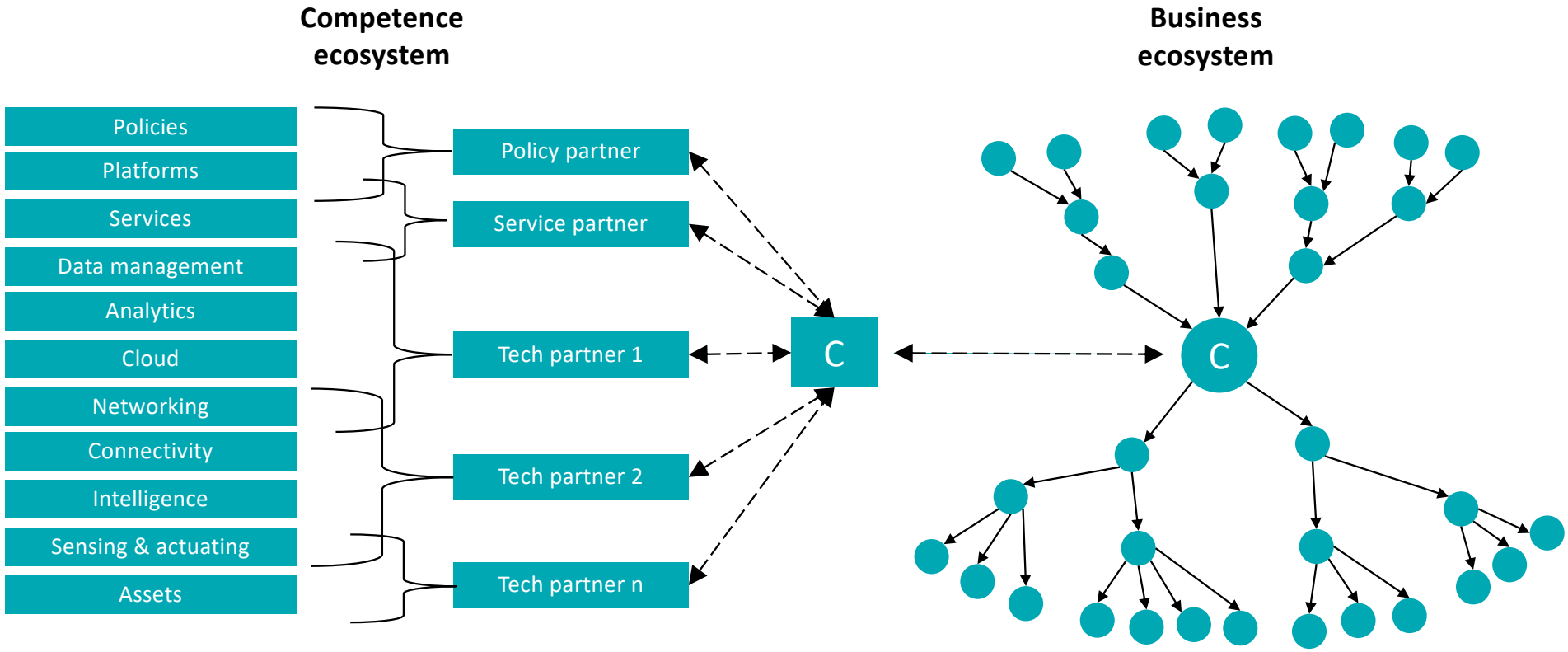
Student project collaboration?

IoT sensor?

What are your needs for networking?

Why are we calling you to join?

Ecosystem convergence



How can you join?

Proposed steps of collaboration:

1. Loose
    - Information channels: events and various digital methods
2. Moderate
    - Some concrete prototype (digital or physical)
3. Tight
    - Customized per partner, business?

Aalto acts as a facilitator for the network.

What now?

Loose cooperation => Moderate cooperation?

Finding the business case together

Be proactive!

Also more events coming, keep posted.
Suggestions for events => Slack workspace

Digital twin of Aalto campus

Concrete actions right now?

Share your perspective on digital twin?

digitwin.fi/join-slack

Use hashtags?

#digitwin

#digitwindemoday

Propose a meeting?

Jari Juhanko

Questions?