Arrowhead/PVN

Pilot plans in Sweden and Finland

THTH Spring webinar 18th May 2022

Technology & Investment Plant data, Johnny Sundström

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Why is Stora Enso in Arrowhead / PVN

- The target of Stora Enso "Future Mill 2030" study has been to make a "blueprint" of future state and to create a road map how to get there

- The main drivers for implementing the future mill concept are

  - Achieve higher total efficiency in our operations both trough higher production output with a higher cost efficiency

  - Keeping and attracting a talented workforce

  - Prepare for change

- There are many challenges and interoperability is one that affects several sub-streams in the future mill concept.

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Stora Enso Use-Case

overview

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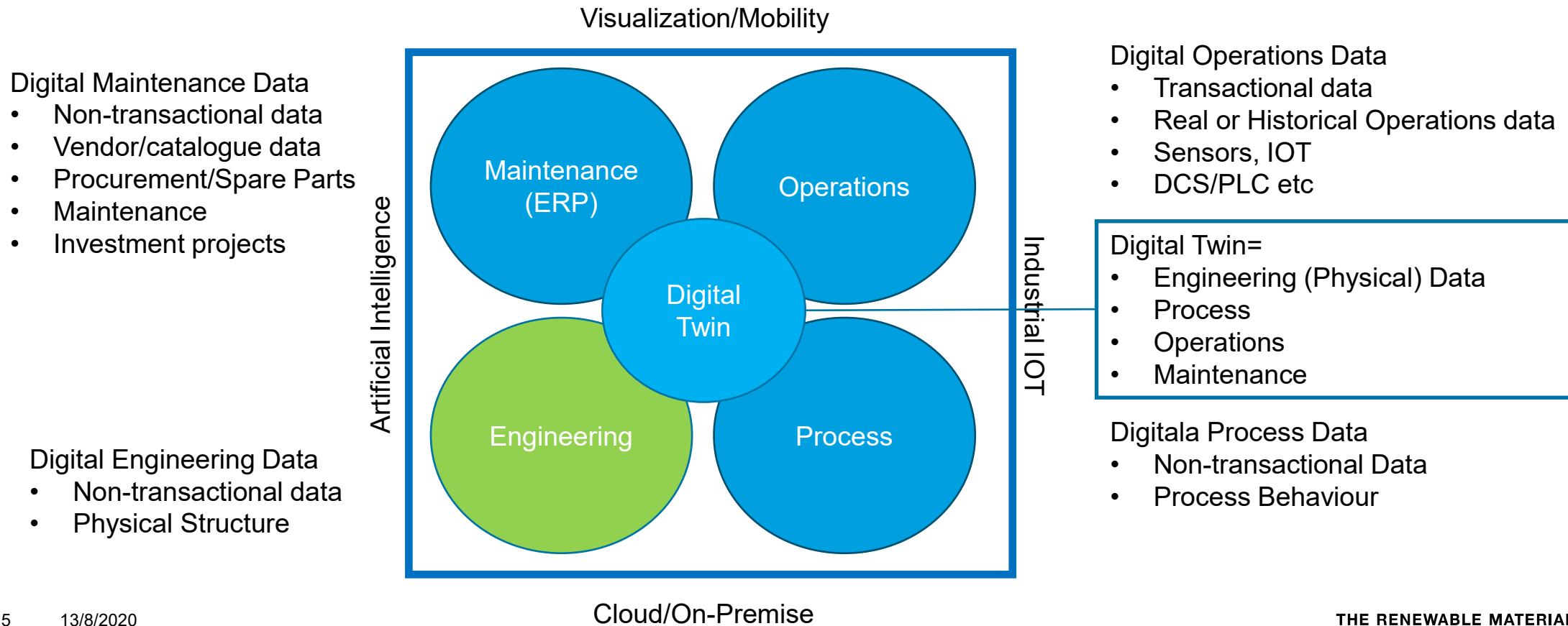
Stora Enso Use-cases

- In the application, we have two use-cases distributed between Finland and Sweden that work together and are based on three streams in Stora Enso "Future Mill" concept.

- Both cases are included in Work Package 9 and is related to several WPs in the Arrowhead/PVN project

- **Digital Twins that enable higher performance by interoperability in pulp mills & carton board mills**.
  − Use case based on the issue "How can we operate the pulp mills in Sweden from 1 control room"

- **Interoperability for technical information exchange in process industry**
  − Use case based on the former project pilots by Stora Enso and THTH

New ways of working
Autonomous mills & digitalization
Remote Operations

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The use cases are covered by the following areas, but we choose "what"

Visualization/Mobility

Digital Maintenance Data
- Non-transactional data
- Vendor/catalogue data
- Procurement/Spare Parts
- Maintenance
- Investment projects

Digital Operations Data
- Transactional data
- Real or Historical Operations data
- Sensors, IOT
- DCS/PLC etc

Maintenance (ERP)

Operations

Digital Twin

Engineering

Process

Artificial Intelligence

Industrial IOT

Digital Twin=
- Engineering (Physical) Data
- Process
- Operations
- Maintenance

Digital Engineering Data
- Non-transactional data
- Physical Structure

Digitala Process Data
- Non-transactional Data
- Process Behaviour

Cloud/On-Premise

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Future Mill concept set-up
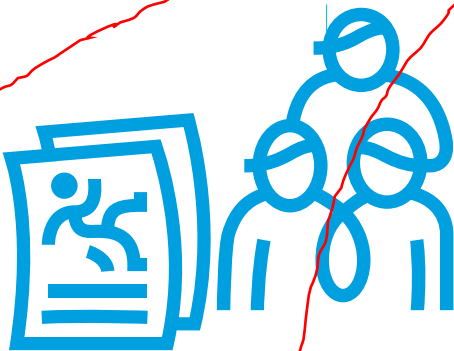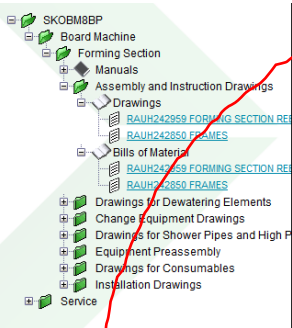## Highly improved communication and collaboration

- How can we operate the pulp mills in Sweden from 1 control room
    - New interoperable technology based on established standards
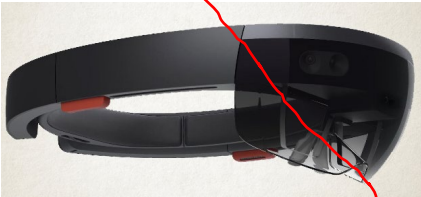   - Can we replace point to point interface with other technology?
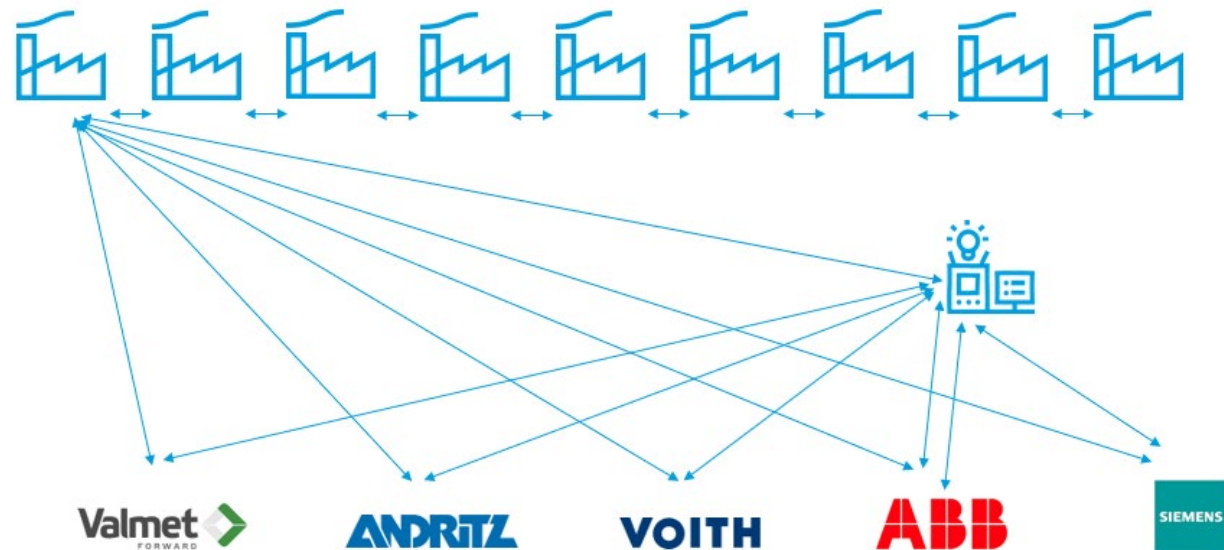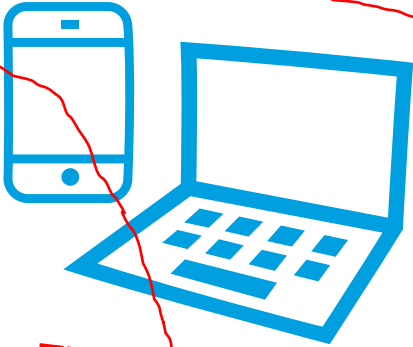
Example of system landscape in future Mill

Manufacturer/Supplier
Consultants

Visualisation

Hub

This slide shows roughly our two use-cases and how they need to interact

Manual handling of Information, Documents and drawings

Engineering-system

ERP

System x

Funcional Locations
Equipment
Components etc.

Delivery format
XML

Automatic handling of Information

Data and files

Data

Graphics

E.g
Operations systems
Process Behaviour systems
Riskhandling systems
Etc.

Referens Data Library

2D P&ID etc

3D Models

How to deliver ISO 15926
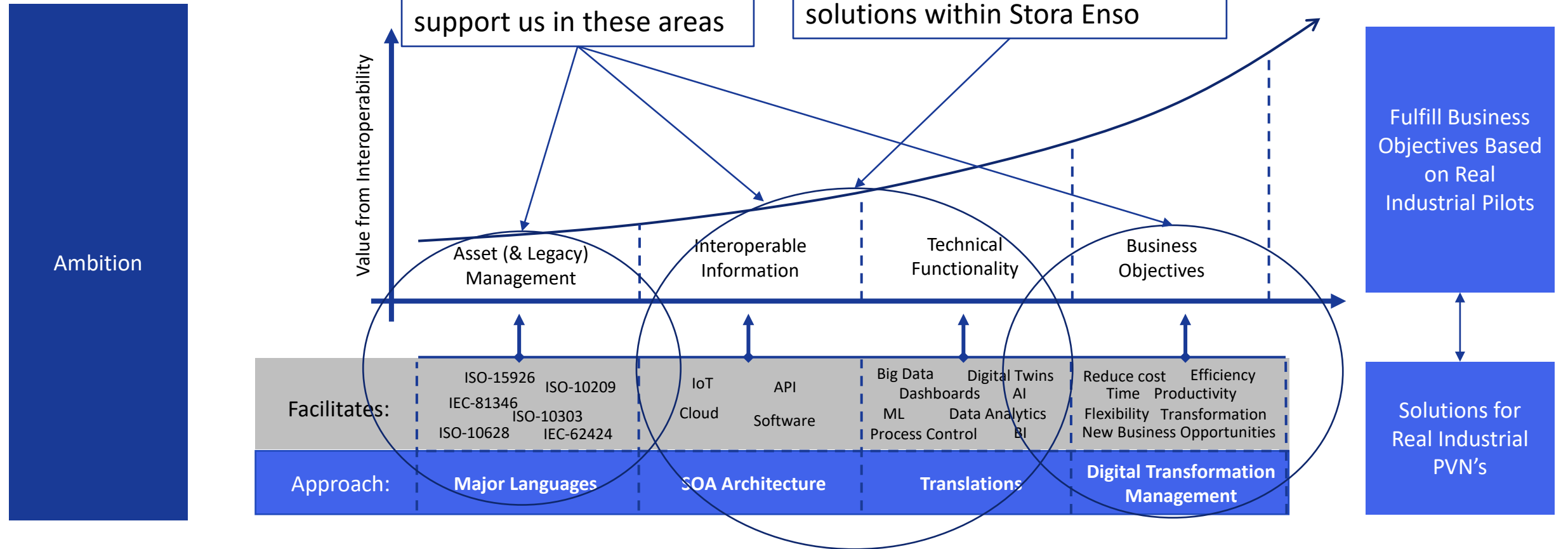
Graphics and data

Creating Value from Interoperability

Use Case Finland

Interoperability for technical information exchange in process industry

Johnny Sundström, Technology&Investment Fors Mill

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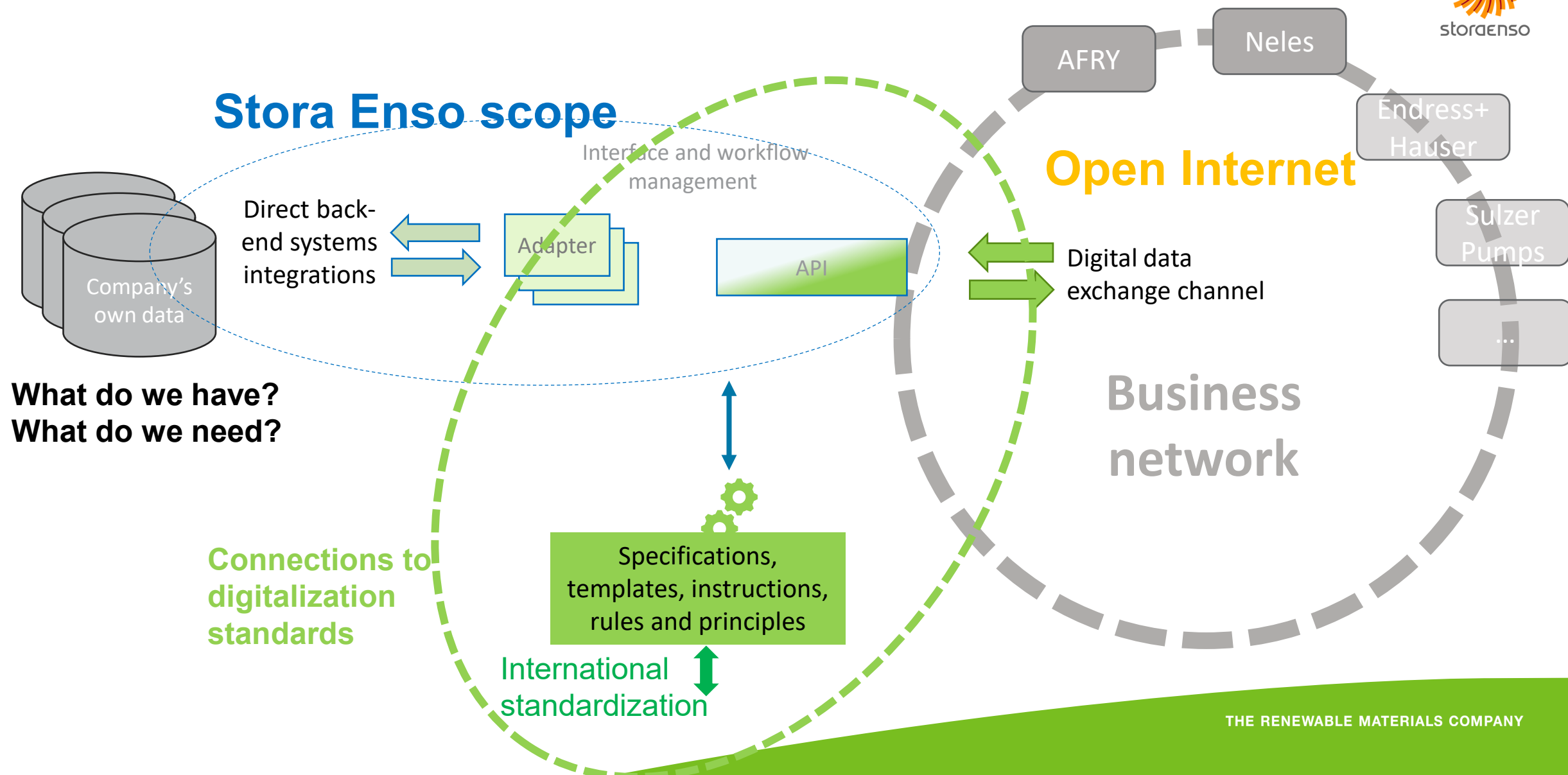# Use case: Interoperability for technical information exchange in process industry

- Overview: Technical information exchange in process industry using digital platforms and interoperable data

- Techical objective:
  - Develop and demonstrate an interoperable digital process for investment project and service operations information exchange, including engineering and process equipment technical data from valves, pumps, and other process equipment.
  - Develop and demonstrate digital integrations combining engineering data and technical asset information with operational and condition monitoring data for improved reliability and dependability

- Expected impact:
  - Increased efficiency of engineering and data management throughout the lifecycle
  - Reduced manual effort in collecting, sending and validating data
  - Increased quality of data

- Use of common technologies
  - Translation between different formats and information models used in process industry value networks
  - Major digital languages: RDL2, ISO 15926, IEC 61987, DEXPI, …
  - Micro-services: security and integrity, data access management and sharing, interoperable service infrastructure, …

Stora Enso Finland use-case pilots

- **Investment project** use-case in digital value chains
  - Pilot partners Neles Oy, Afry Finland Oy, Endress+Hauser Oy etc
  - DEXPI data exchange partner Semantum

- **Supplier service** use-case in digital value chains
  - Pilot partner Neles Oy

- **Dependability/Reliability data** in digital value chains
  - Pilot partner Afry Oy (leading the pilot)

- **Sustainability data** in digital value chains
  - Pilot partner Semantum Oy

Stora Enso (FI) use case illustration
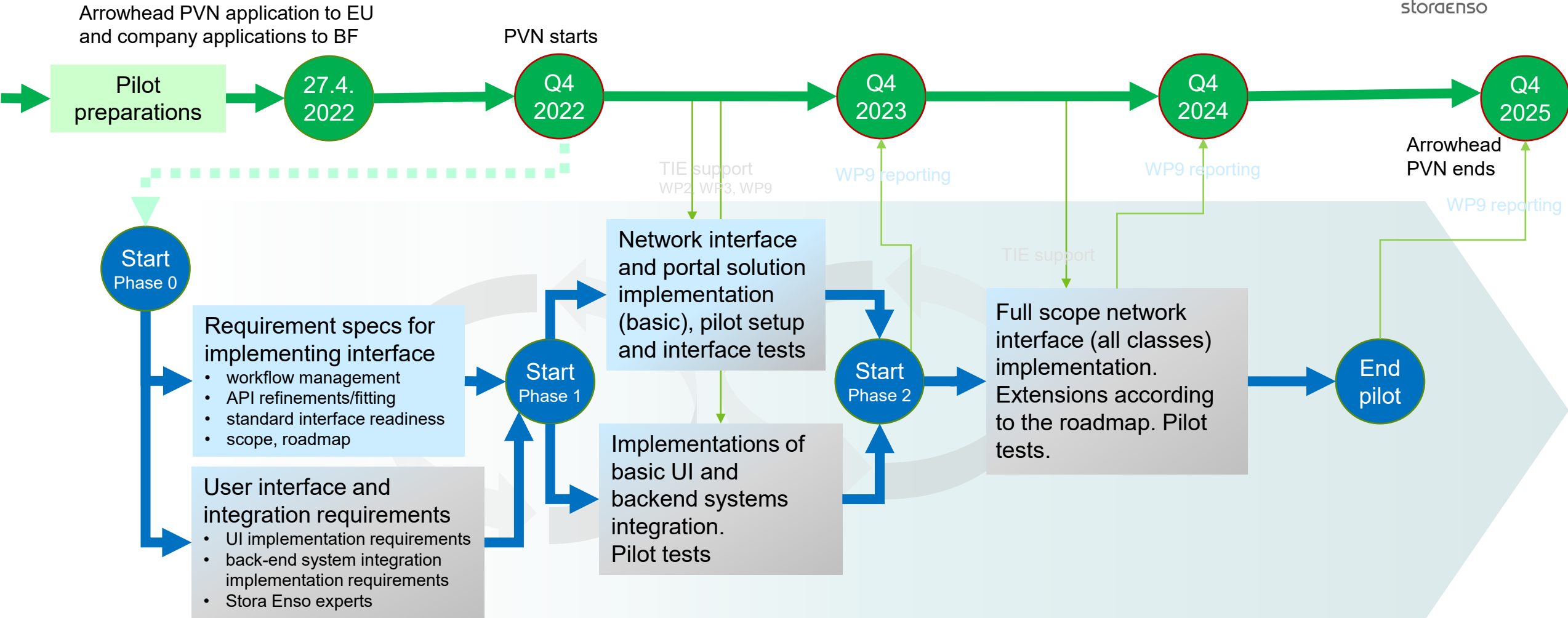
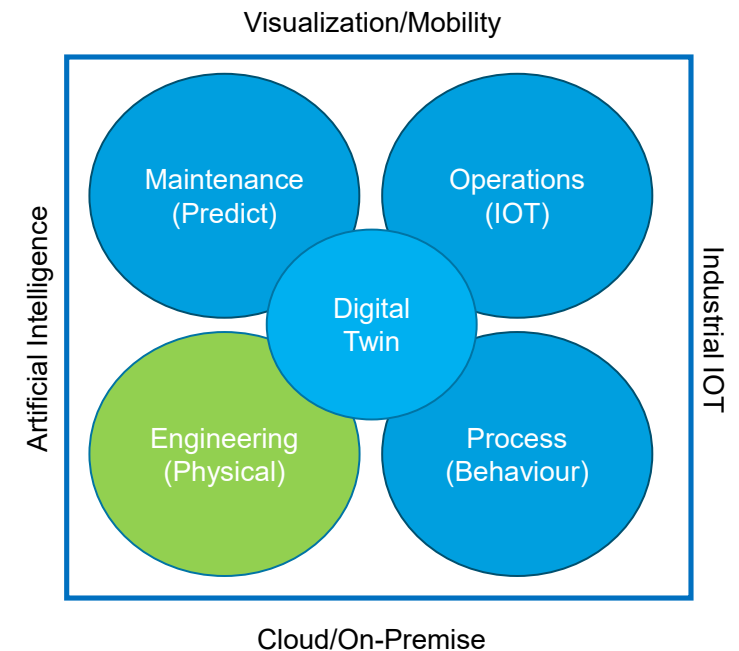# Use Case Sweden

WP9, Digital Twins that enable higher performance by interoperability in pulp mills & carton board mills

Johnny Sundström, Technology&Investment Fors Mill

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Digital Twins that enable higher performance by interoperability in pulp mills & carton board mills

- The use case will address **improved interoperability in digital twins** to enhance production process performance and increased OEE. This entails enabling data from four areas: Maintenance, Operations, Engineering and Production processes, to be used by digital twins.

- By using AI, industrial IoT, cloud services/legacy systems and visualization techniques plus several communication technologies and protocols.

- Interoperability will ensure relations of real time data/information between different systems. This will enable more informed decision support.

- Simulations can be fed with data from more information systems and can include several sub processes.

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Visualization/Mobility

Artificial Intelligence

Industrial IOT

Maintenance (Predict)

Operations (IOT)

Digital Twin

Engineering (Physical)

Process (Behaviour)

Cloud/On-Premise

Technical objective

- Interoperable digital twins
  - − Improved mill and assets information/descriptions (complying to standards)

- Improved collaboration though interoperability between operational/management level and external suppliers
  - − Improved searchability of information

- Data exchange and interoperability through open data architecture
  - − Separating data from application silos
  - − Enabling data to be used by many applications

- Digital transformation management process
  - − Develop blueprint and process steps for successful transformation

Usage of common technology (Translation, Common language, Micro-Services)

- Translations
  - Information exchange between formats
  - Confidence and quality levels of data – **what decisions can be made based on what data?**

- Microservices
  - Information exchange between asset and data layer to application layer

- Common languages
  - Development of Reference data Models
  - Usage and development of standards

Expected Impact

- Increased use of digital twins when trimming to find the right starting parameters for assets and production processes will shorten the start-up time from 2-3 days to 6-12 hours. This means that the time is shortened from a non-prime product that only generates cost to a prime product that generates revenue.

- Improved uptime of 2-4 days per year, which equals about 1-1,5% increased OEE

- Improved interoperability and quality of data –
    - Improved decision-making ability and profitability
    - lower costs for compiling data sets for decision making.
    - Reduced cost by at least 10% in project work and 30% reduced information asset management
    - Less effort required for data management – up to 30% improvement

- Improved collaboration with external partners in the PVN both between production assets and systems as well as humans – improvement in terms of effort and time

- Usage of blueprints and process steps for successful digital transformation management will enable the streamline and the transformation of the pulp mills & carton board mills

- Easier to train, recruit and retain people by improving employer attractiveness

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Stora Enso Use-Case

TRL, Opportunitie's

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Technology Readiness Level

Our use cases aim to go from level 4 to 8

Project Opportunitie's

- Access to Europe's expertise throughout

- Opportunity to create contacts for recruitment

- Create contacts with new technology consultants

- Reduced risk through competence development of own resources

- Reduce lock-in effects with suppliers and consultants

- Long-term operations for production on already established sites

- Strengthen the depiction of an attractive employer

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