

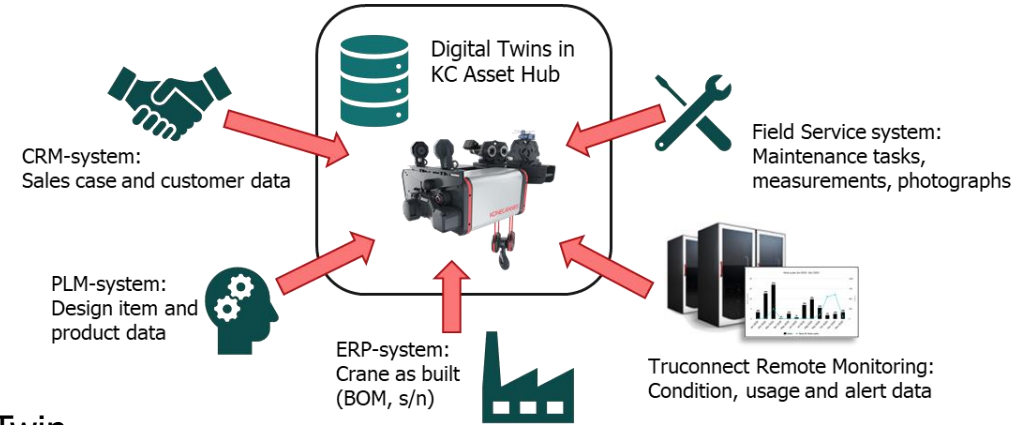
Future of Crane Digital Twins and Their Connectivity

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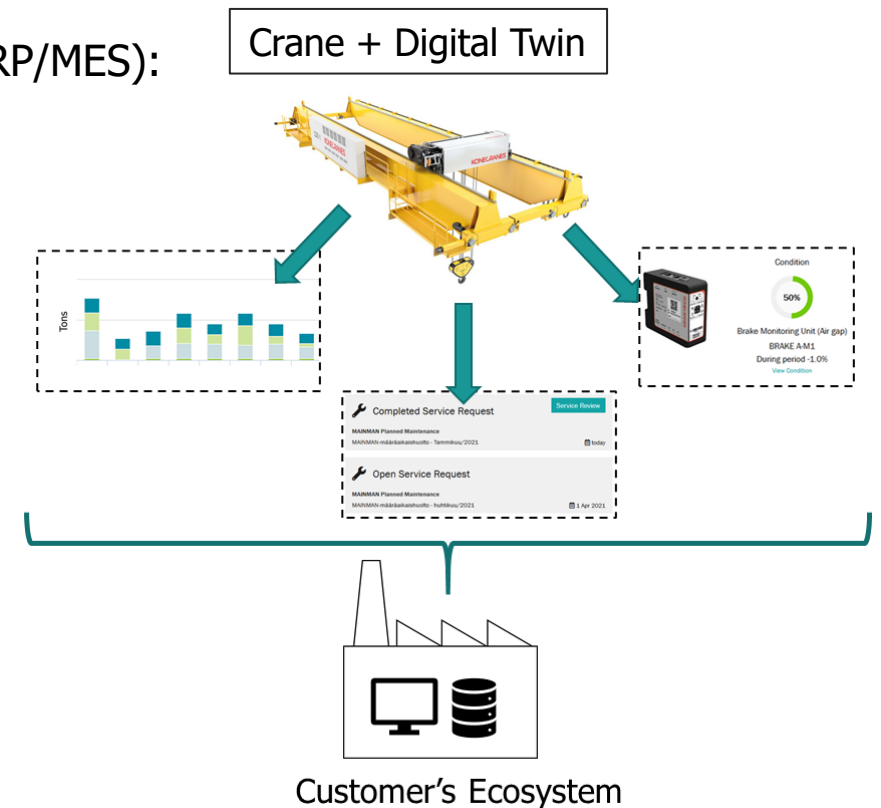
Crane Digital Twins today

- Representation of all available lifecycle data
 - Digital Shadow created for every sold crane → develops towards Digital Twin
 - Acts as a connection point between lifecycle data sources
- Enablers:
 - Complete pipeline: Design/PLM-system -> Manufacturing/ERP-system -> Lifecycle Care/Field Service-system
 - TRUCONNECT Remote Monitoring
 - Extensive maintenance reporting for data collection
- Challenges:
 - Creating culture to work together towards Data and Digital Twin driven company
 - Nonconformities between source systems to create coherent Digital Twin
 - As designed vs. as built vs. as maintained
 - Varying business needs for Digital Twins → Prioritizing different development paths for DT's



Customer needs for Digital Twins and their connectivity

- Crane is always part of a larger customer process
 - Critical role in connected and data driven material flow
- Varying needs for Digital Twin data connected to customer's Ecosystem (ERP/MES):
 - Production data
 - Real-time operation status of crane through OPCUA
 - Material flow through crane: lifted tons, number of work cycles
 - Maintenance program information
 - Reported and scheduled tasks of each crane
 - Maintenance budgeting
 - Crane operation/condition alerts
 - Production errors
 - Critical component condition
- Brings API development needs to machine/DT provider



Future development

- Development needs/paths:
 - Ensuring that Digital Twins are up-to-date and “live” beside the physical product through lifecycle
 - Huge amount of data when each sold product gets a Twin and gathers data through ~20 year lifecycle
 - Dividing Digital Twin data flow and functionalities between local and cloud
 - Depends on the performance needs and data security features of Twins
 - Adapting to development of IoT/cloud platforms and Digital Twin standards
 - Which platforms and standards will spread in customer industries





**NOT JUST LIFTING
THINGS, BUT ENTIRE
BUSINESSES**