



HACIA UN TODO INTELIGENTE Y CONECTADO
ALTAIR CAMBIA LAS REGLAS DEL JUEGO DE LA INDUSTRIA 4.0

Paloma Reinoso / Senior Product Specialist SmartWorks IoT

About me

Paloma Reinoso Otero

- Senior Product Specialist en Altair España (mayo 2022 – Actualidad)
- Product Specialist en Altair España (julio 2021 – mayo 2022)
- Becario de IoT en Altair España (septiembre 2020 – julio 2021)
- Máster en Ingeniería Industrial por la Universidad Pontificia Comillas Madrid, España.
- Ingeniero Industrial por la Universidad Pontificia Comillas Madrid, España.



Paloma Reinoso Otero

Senior Product Specialist SmartWorks IoT – Altair

DISCOVERING ALTAIR SMARTWORKS IOT TECHNOLOGY

To transform enterprise decision-making by leveraging the *convergence* of simulation, high-performance computing, and artificial intelligence.



1985

Founded & Headquartered
in Troy, MI U.S.

\$532M

FY21
Revenue

3,000+

Engineers, Scientists,
and Creative Thinkers

15,000+

Customers
Globally

86

Offices in
25 Countries

150+

Altair and Partner
Software Products



15,000+ Customers Worldwide

Automotive 	Aerospace 	Civil Engineering 	Education 	Energy 	Financial Services 
Government & Defense 	Heavy Rail 	Industrial Goods 	Life & Earth Sciences 	Material Suppliers 	Technology 

Altair Accelerates the Entire Enterprise

Industrial Designers

- MBSE
- Simulation Driven Design
- Manufacturing Simulation
- No Mesh CAE
- Design Studies

Mechanical + Electrical Engineers

- Structures
- CFD
- Thermodynamics
- Motion
- Electromagnetics
- PCB Analysis

Software Developers

- Functions as a Service
- Specialized Databases
- Backend as a Service

Operations + Manufacturing

- IoT Connectivity
- Device Management
- Stream Processing
- Data Visualization

Data Analysts, Scientists & Engineers

- Data Prep
- Data Exploration
- Model Development
- Polyglot Model Runtime
- MLOps

Finance, Business + Marketing

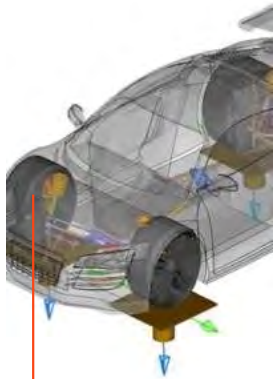
- Report Mining
- Dashboard Creation
- Self-service data transformation

IT + DevOps

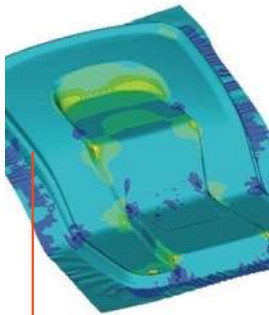
- Edge Computing
- High Performance Computing
- Cloud Bursting
- Monitoring and Analysis



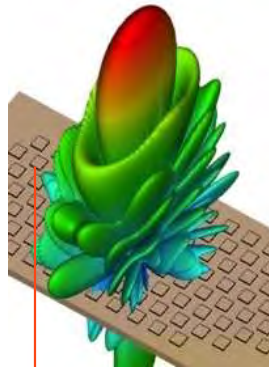
Deep modeling, visualization, and solver portfolio



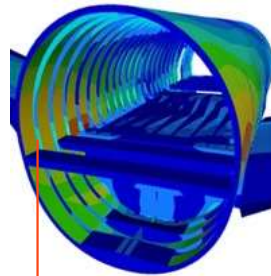
**Systems
Simulation**



**Manufacturing
Simulation**



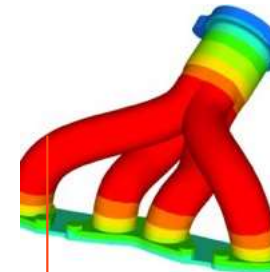
**Electro-
magnetics**



**Structural
Analysis**



**Crash, Safety,
Impact & Blast**



**Thermal
Analysis**



**Fluid
Dynamics**

Broadest Portfolio of Optimization-enabled Solvers

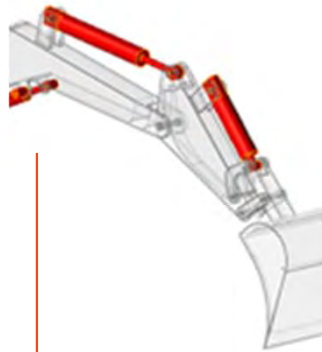
Powerful concept, design, and optimization tools



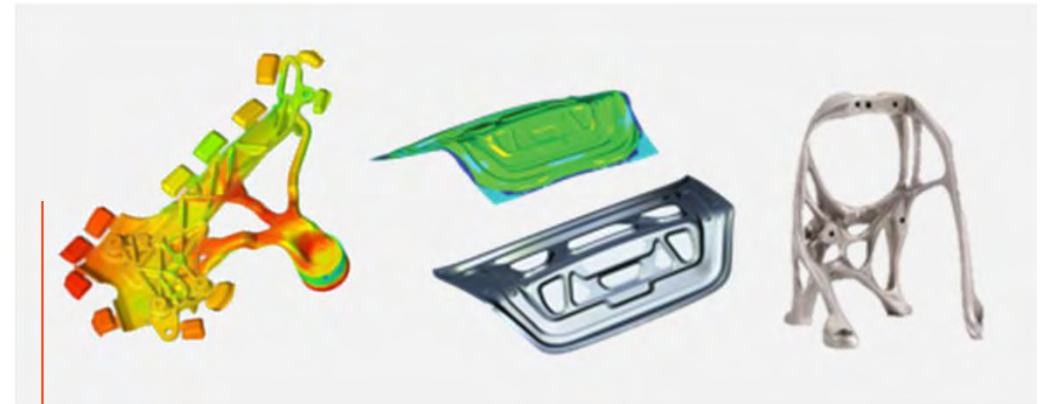
Studio



Structures



Motion

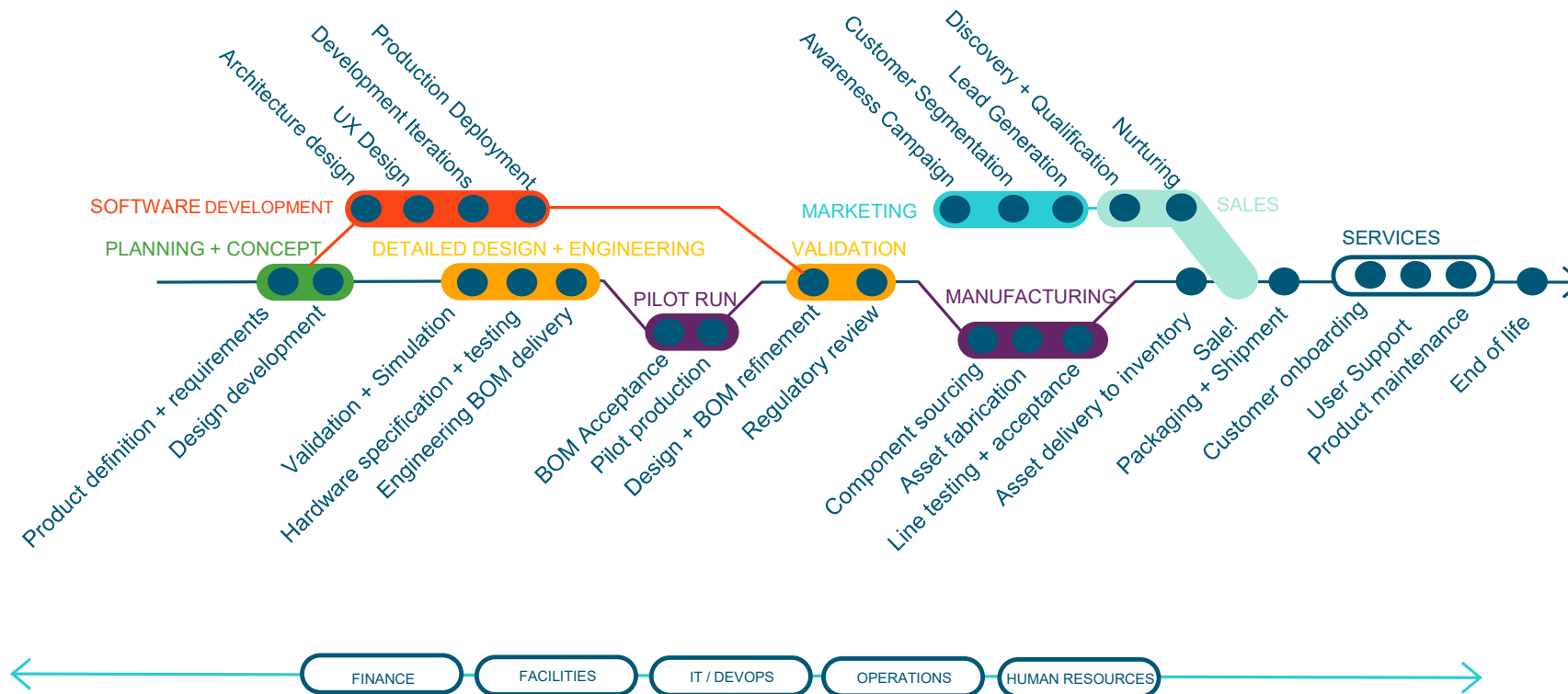


Manufacturing Processes

The industry's most powerful and intuitive solution for design engineers to create high performing and manufacturing products.

Accelerating the Digital Thread Enterprise

Build industry-shaking smart products



Why Industry 4.0?

Supply & demand

- Shifting demand to emerging countries
- Increased importance of additional services
- Variability in core production costs

Business models

- Evolution from traditional to connected products
- Shift from selling assets to selling the use of assets

Technology

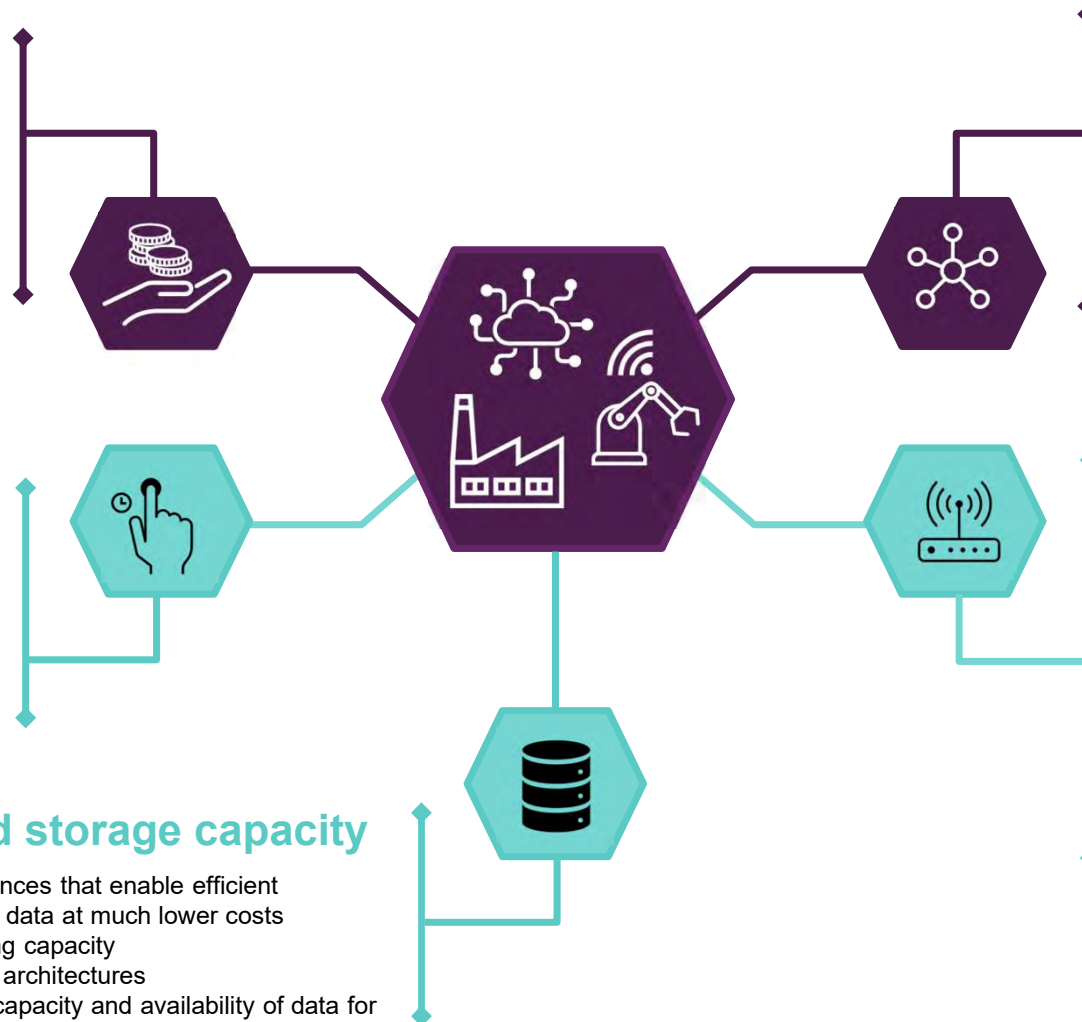
- Lower technology costs
- Increased processing and storage capacity
- Maturity and applicability to business cases

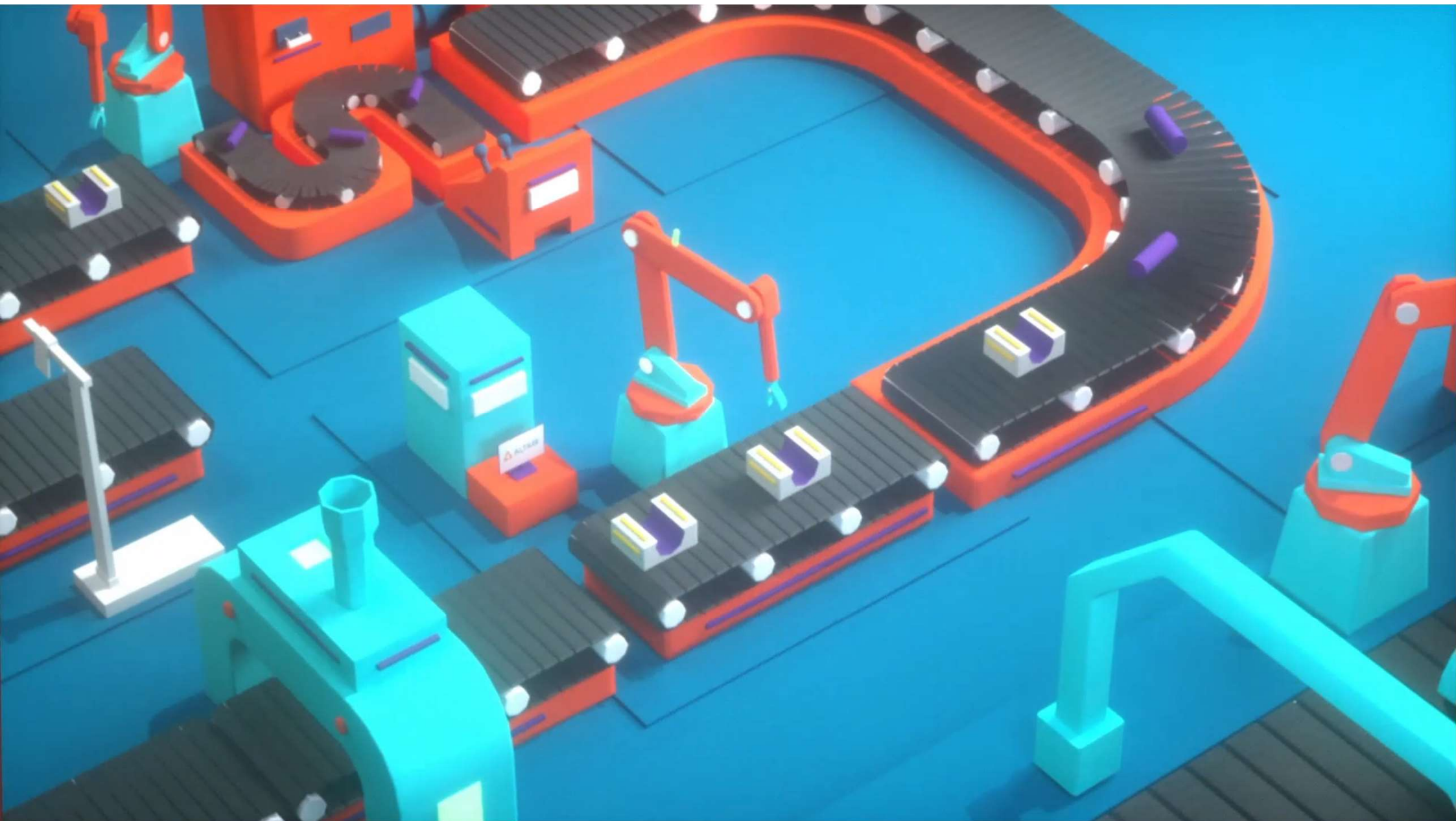
Connectivity & data generation

- Massive sensorization: any element (thing), process and relationship is (potentially) connected.
- Exponential increase of data generation, in every process or interaction (physical or technological).
- Need to transform data into valuable information for decision making.

Processing and storage capacity

- Technological advances that enable efficient management of big data at much lower costs
- Increased computing capacity
- Big Data and cloud architectures
- Increased storage capacity and availability of data for exploration.





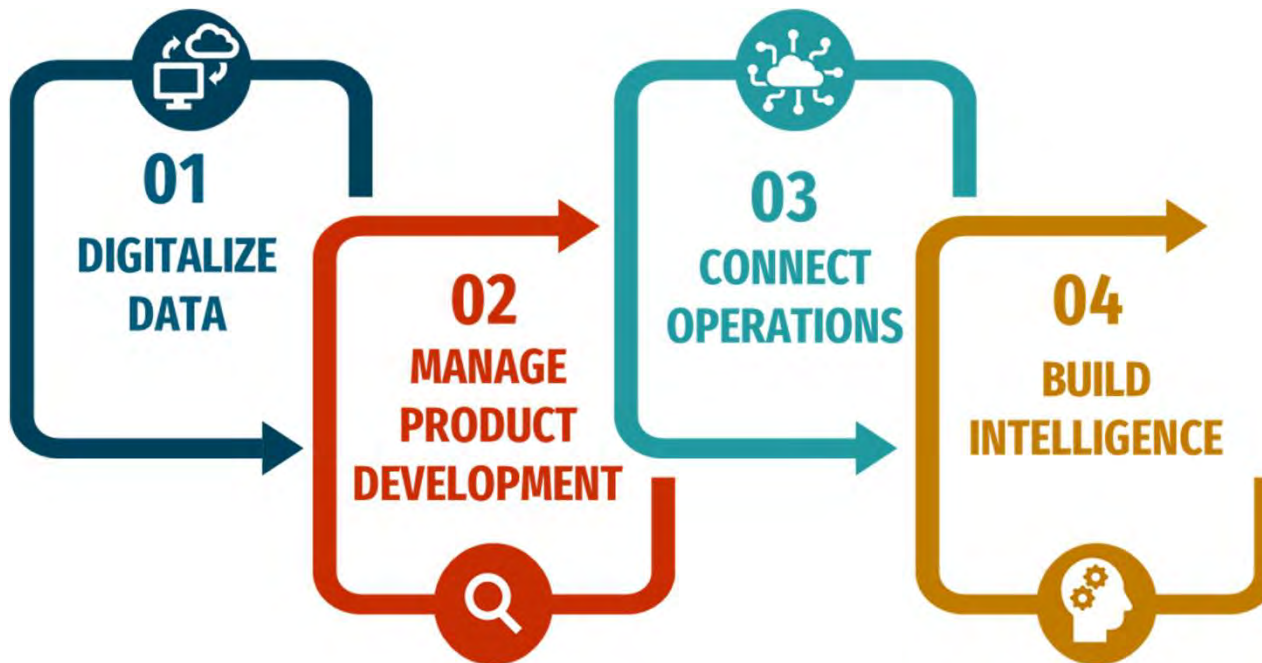
An aerial view of a city at night, with a network of glowing lines and nodes overlaid on the buildings and streets, suggesting a smart city or data network. The lines connect various points across the city, creating a complex web. The city lights are visible in the background, and the sky is dark with some light rays.

“By 2023, the smart manufacturing market will grow to approximately 480 billion U.S. dollars”

How can we...

- make products cheaper, but maintain **quality** ?
- **lower spend** on waste/returns/warranties ?
- **identify problems** before they appear ?
- use the data collected to make **better choices and decisions faster** ?

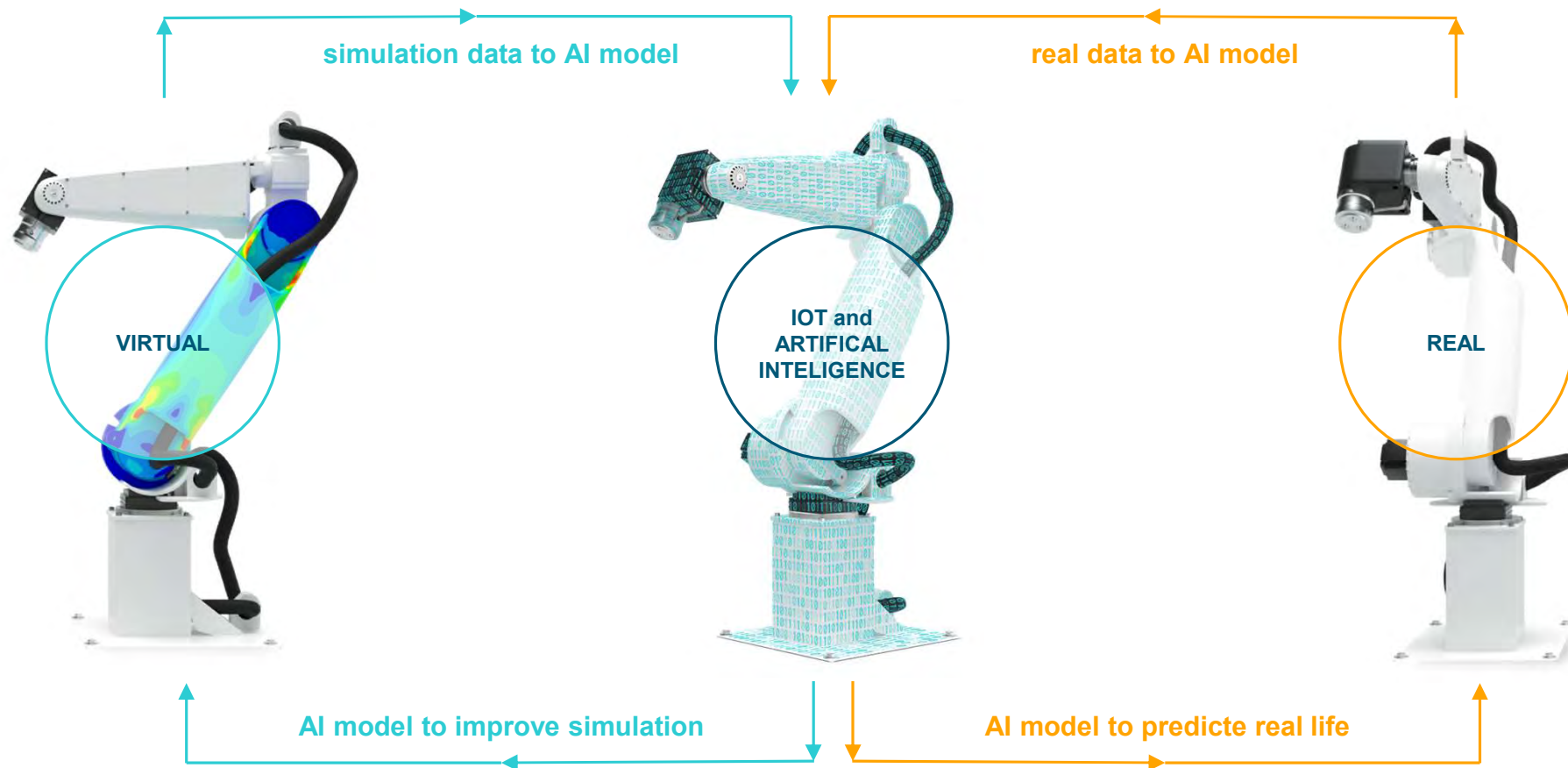
The value of Digitalization



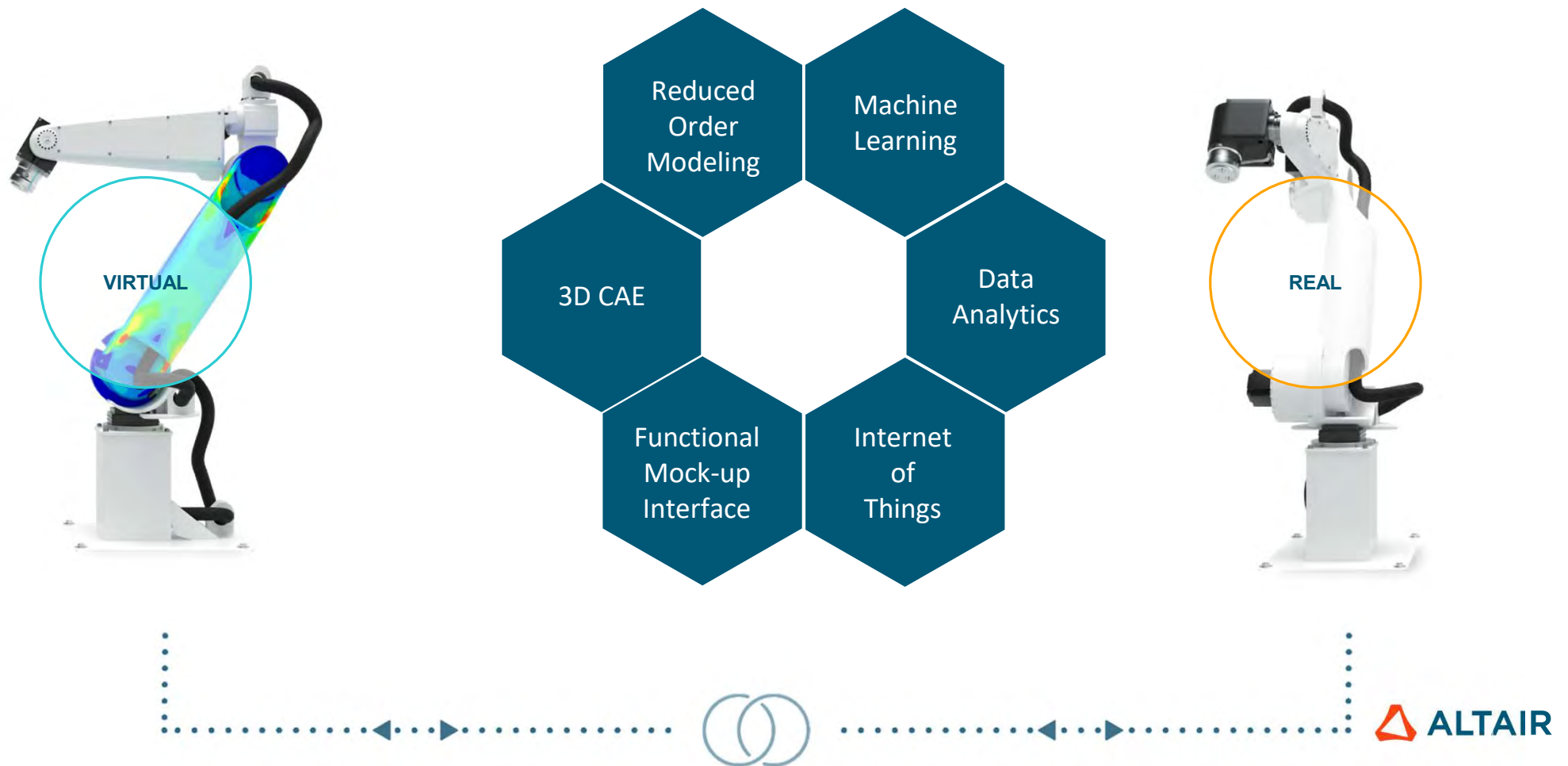
Benefits

- Collaboration
- Historical data to leverage
- Enhanced decision making
- Better designs created faster at improved cost
- Higher ROI over product lifecycle

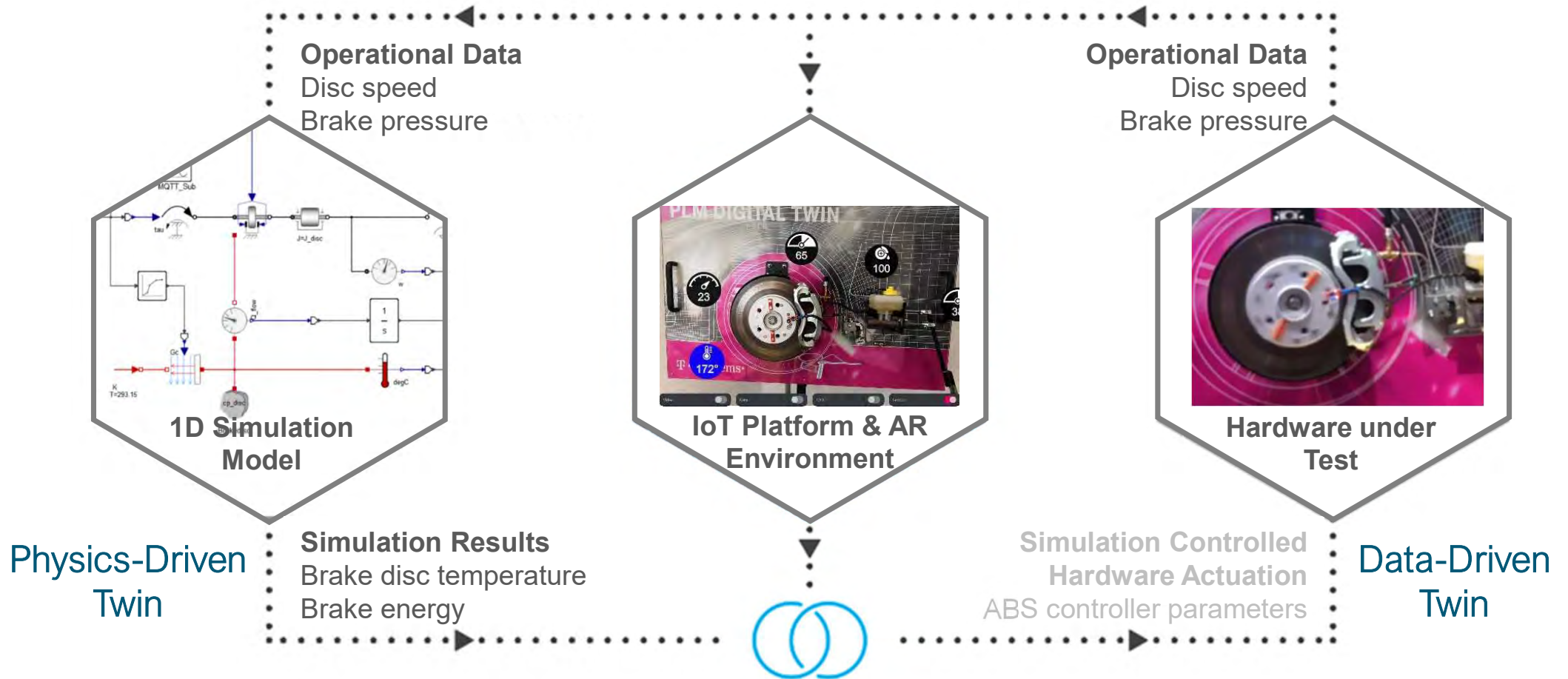
Altair Digital Twin Platform: Building Blocks



Altair Digital Twin Platform: Building Blocks



Augmenting reality with virtual sensors



Smart manufacturing



Maintenance

Quality

Efficiency

HOW TO SUCCESSFULLY DIGITALIZE OPERATIONS

Implementing a smart manufacturing process



Connect

Connecting machines, peripherals, and other data sources to a common network is the basis to use data to automate value creation



Collection

After achieving connectivity comes the collection and storage of production data, which is the foundation for the next steps in the process



Visualize

While a smart factory relies on data, generating value from it is essential to make insightful, fully-informed decisions



Analyze

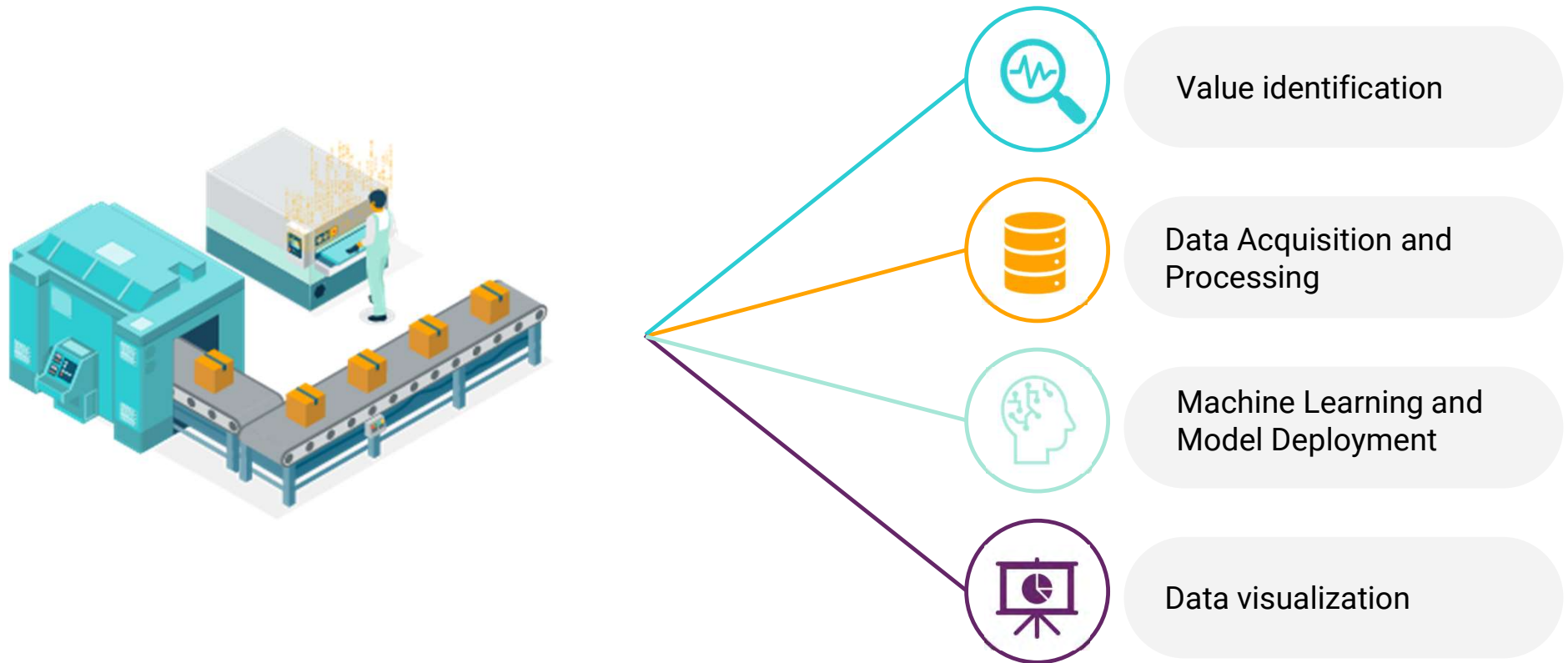
Using specialist software gives the user the possibility to emulate how an expert would use data to generate insights



Automate

Enable the system to perform autonomous decisions and actions to support the entire organization's decision making

Manufacturing Data Analytics Workflow



Altair SmartWorks



SMARTWORKS ANALYTICS

LOW-CODE DATA ANALYTICS AND DATA SCIENCE

MANUFACTURING

MARKETING

SALES

FINANCE



SMARTWORKS IOT

LOW-CODE IIOT AND APPLICATION DEVELOPMENT PLATFORM

MANUFACTURING

SOFTWARE DEVELOPMENT

SYSTEM VALIDATION

Modern. Scalable. Secure.



Intuitive interfaces

REST, MQTT, SDK's

Cloud-native Architecture

*Kubernetes, Docker, Containers,
Microservices, Terraform, Helm*

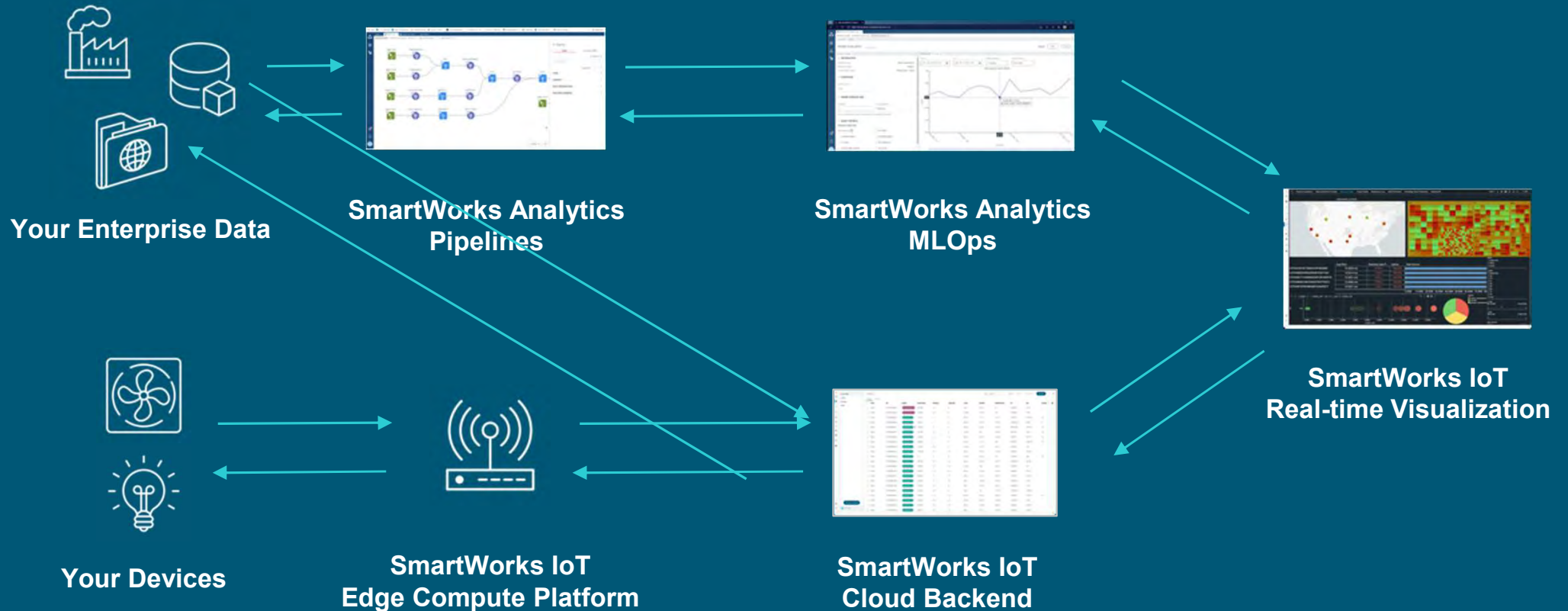
Modern Languages

Go, Python, Typescript

Modern, Open Toolset

*Kafka, TiDB, KrakenD,
ORY, VernMQ, React,
Web Components*

Tools for the Full Lifecycle of enabling Operational ML

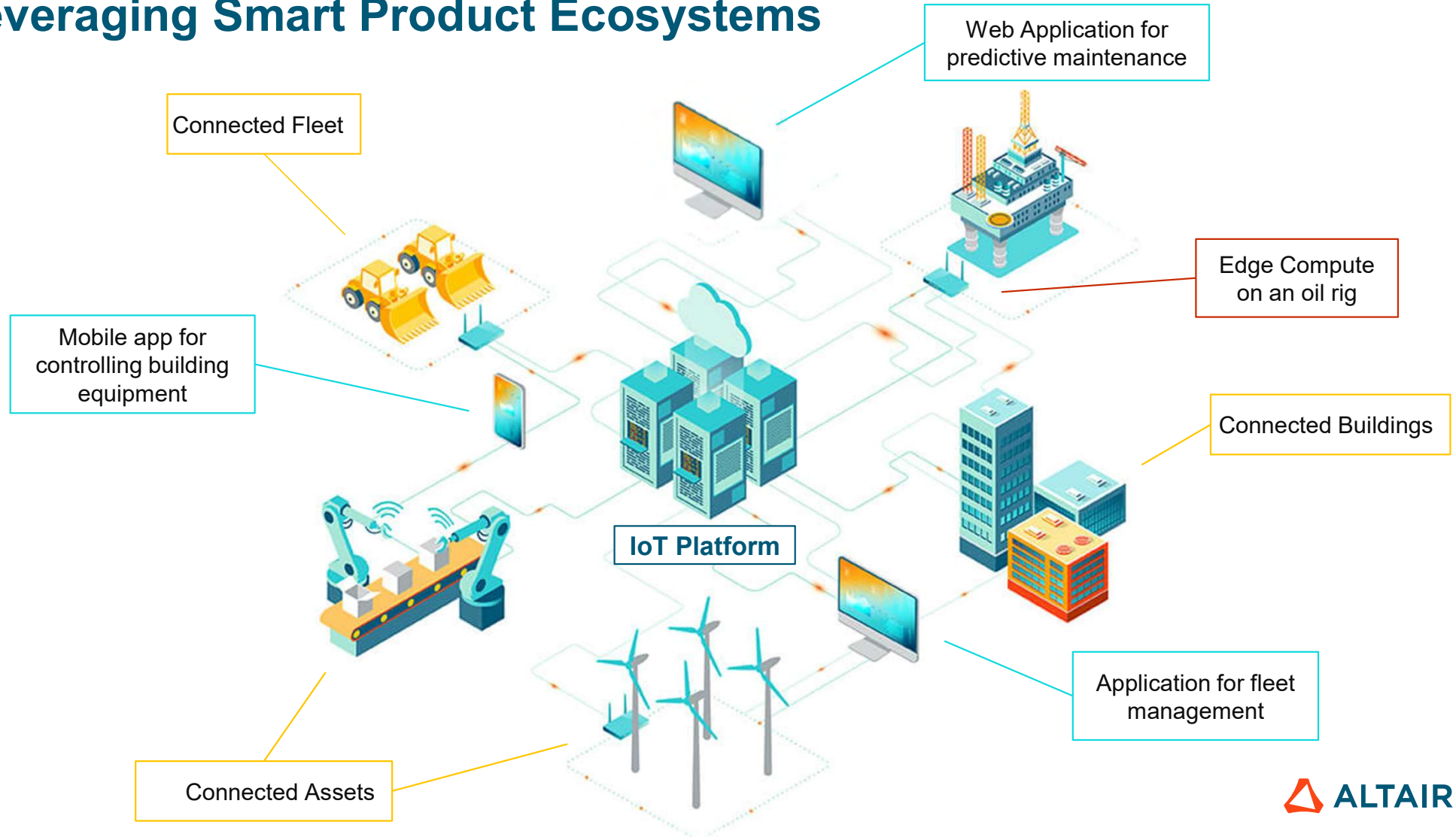


SmartWorks IoT

Low-code IoT application
development platform



Leveraging Smart Product Ecosystems



Understanding IoT Ecosystem

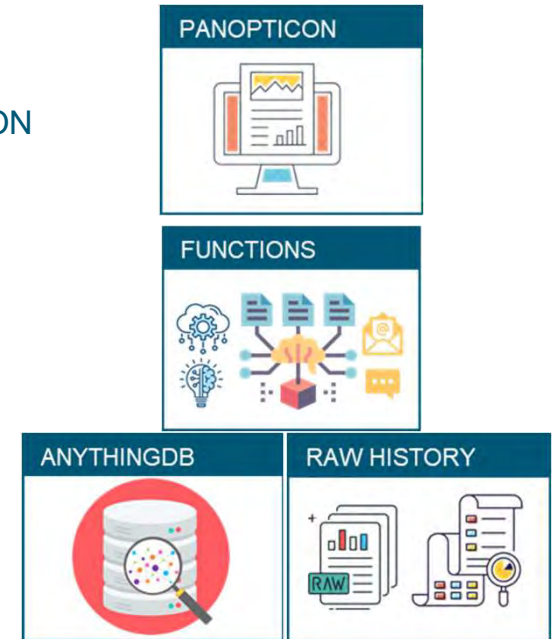


REAL TIME VISUALIZATION
AND ANALYSIS

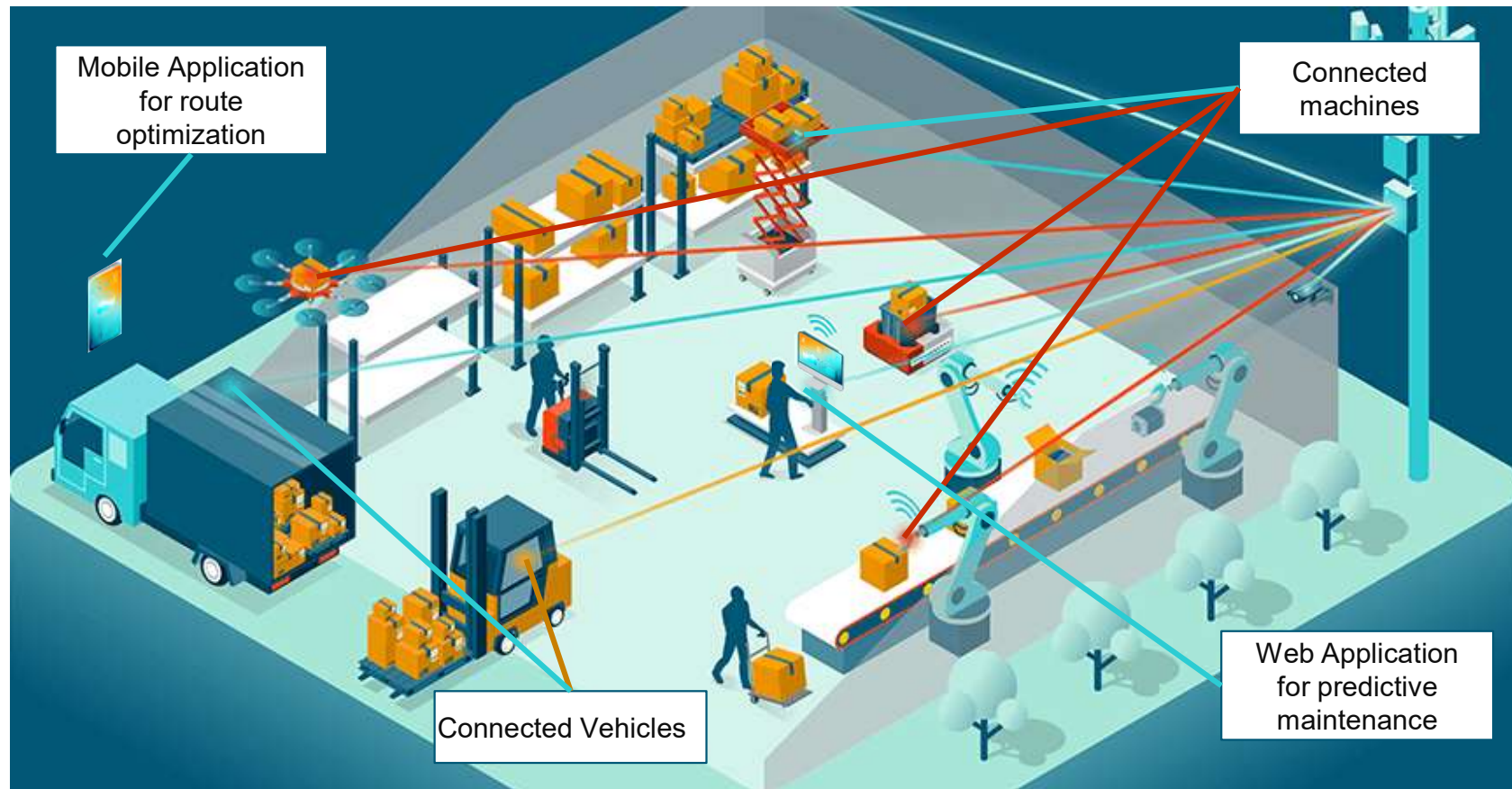
BUILD AI, AUTOMATION,
USE ML MODELS

DATABASE

CONNECTED
THINGS



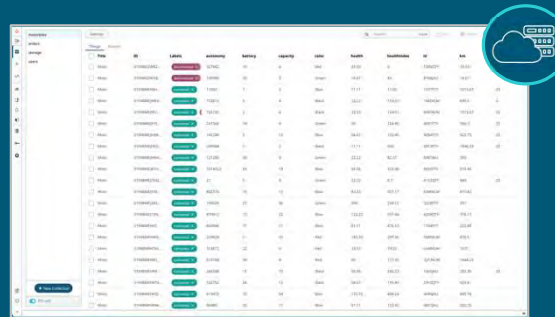
Leveraging smart connected ecosystems



Develop an IoT App



Devices



SmartWorks IoT



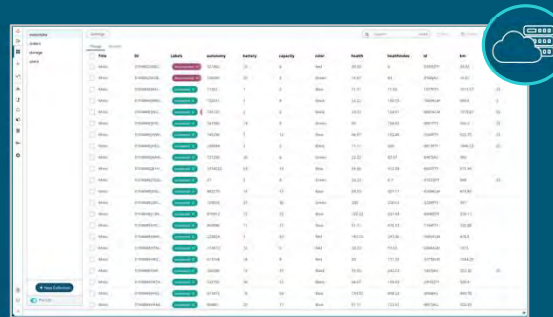
User App

- Communication between devices and the application
- Store data from the device
- Transform and filter the data
- Set alerts/notifications
- Integrate with ML models
- Develop custom algorithms

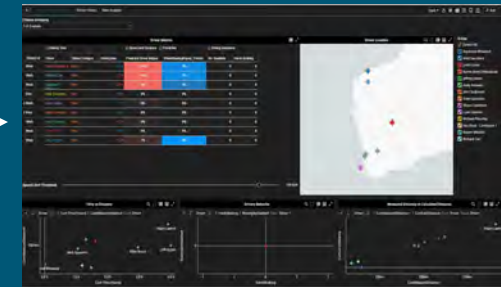
Dashboard Creator for RT Asset Monitoring



Devices



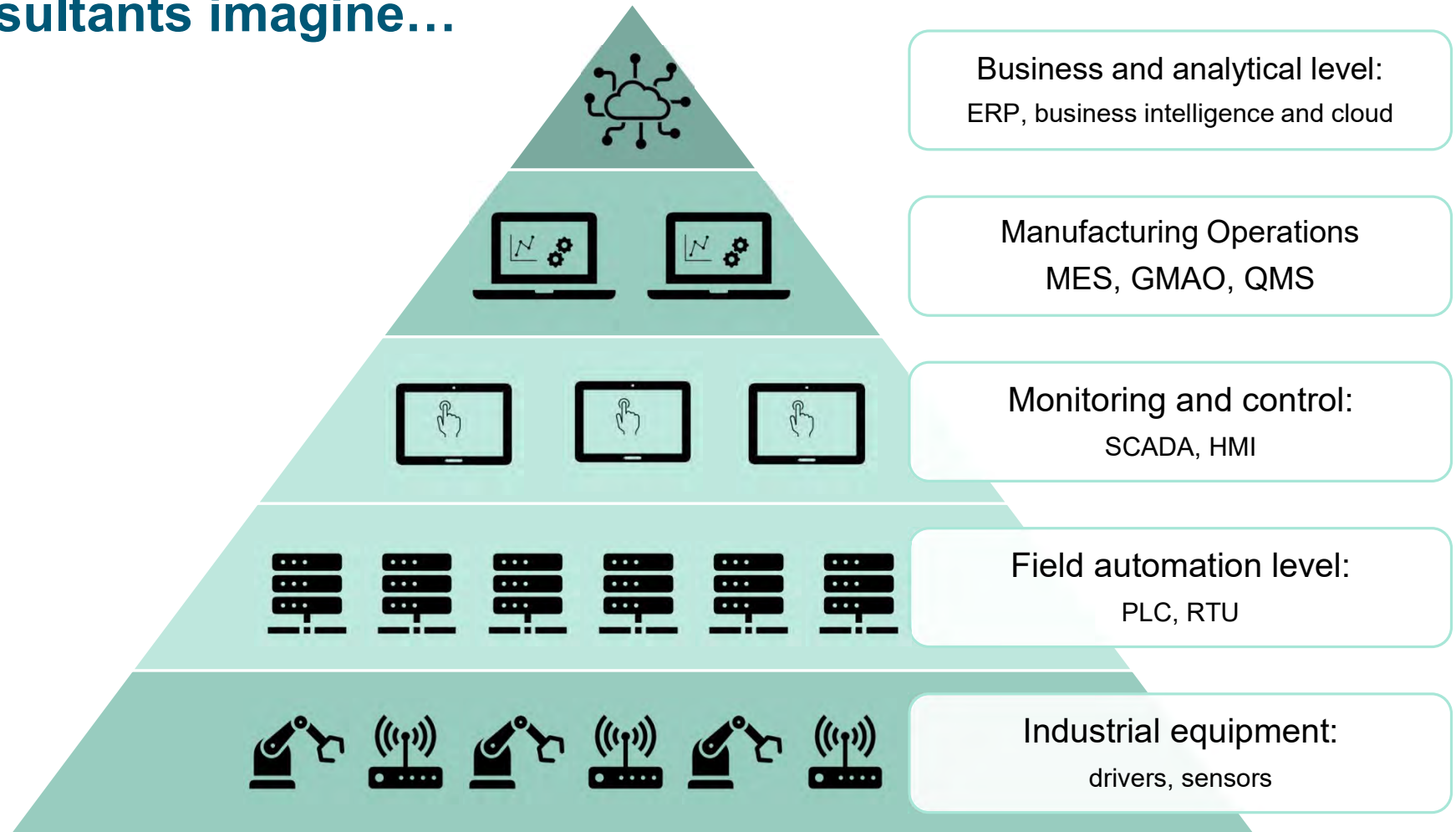
SmartWorks IoT



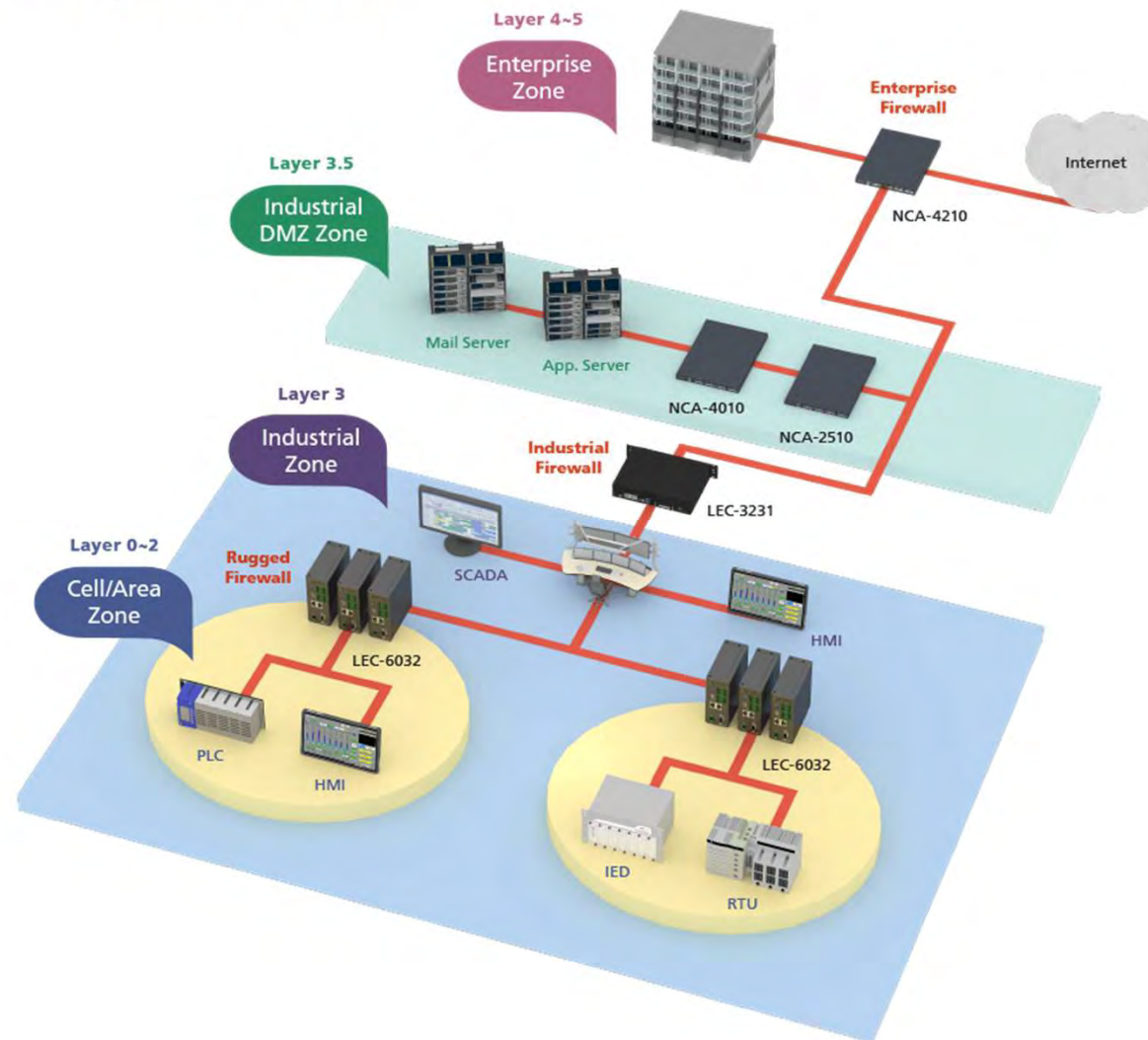
SmartWorks IoT
Real-time Visualization

- Real-time Charts, and Graphs
- Dozens of Data Connectors
- Device Control

What consultants imagine...

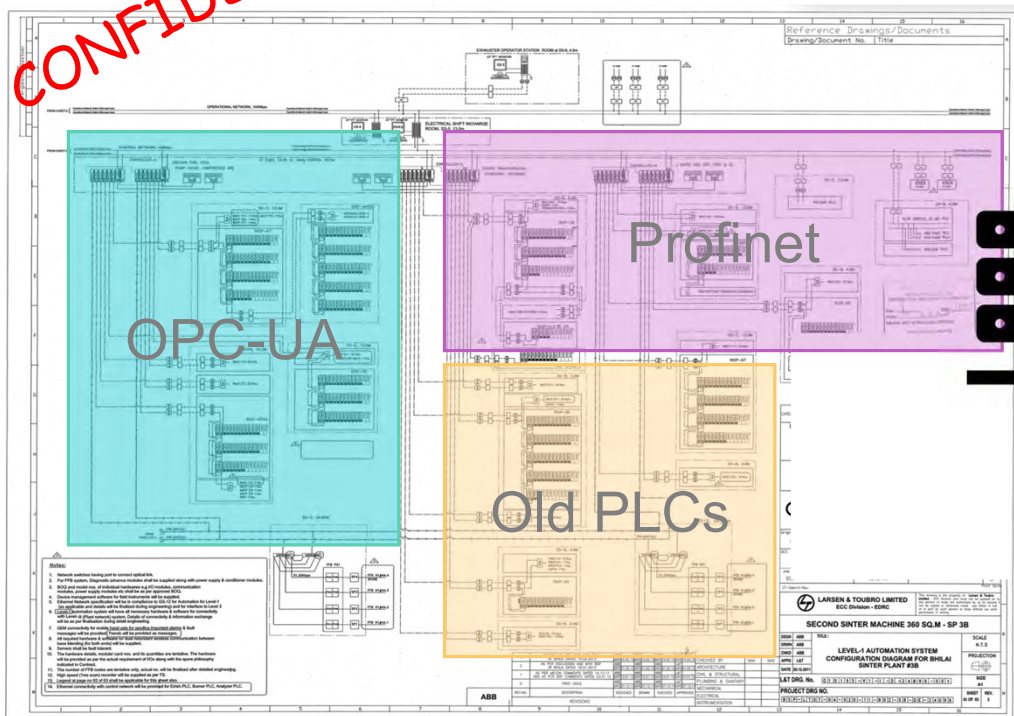


What your CTO thinks you have...

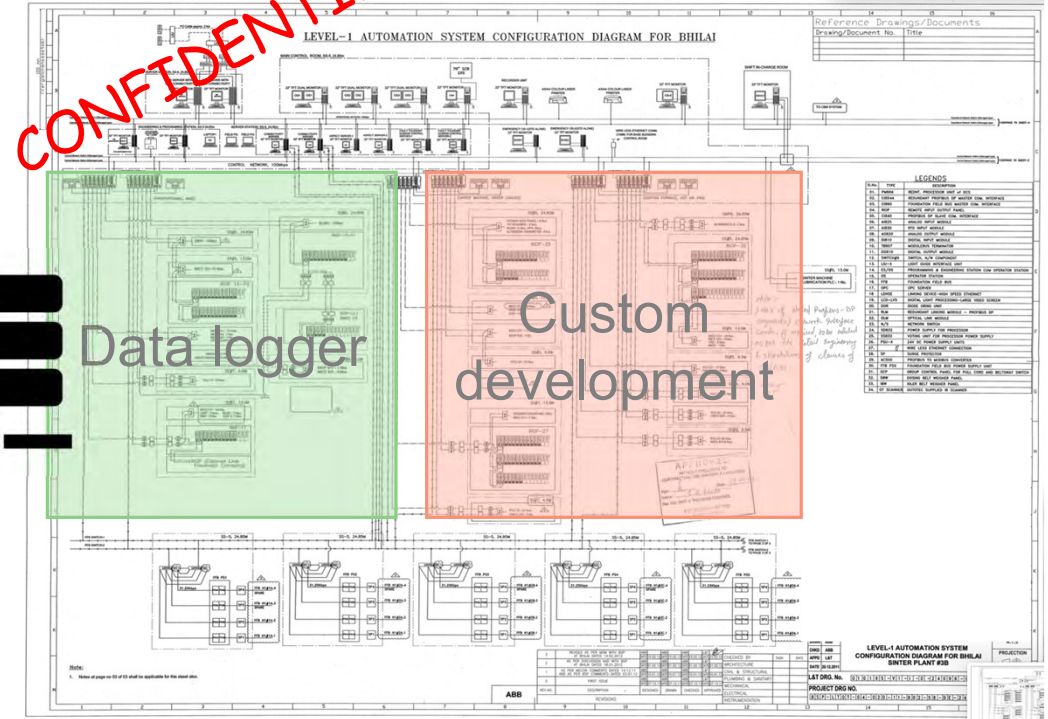


What the reality is...

CONFIDENTIAL



CONFIDENTIAL



Orchestration platform for Edge AI and Automation



Devices

**SmartWorks IoT
Edge Compute Platform**

- Protocol Normalization
- Data transformation
- Hardware monitoring
- Remote access
- Cloud Connectivity
- OS updates

**SmartWorks IoT
Cloud Backend**

**SmartWorks IoT
Real-time Visualization**

no-gloves



REAL USE CASES



Implementing a traceability system

Challenge

Carbon fiber is used in many composite manufacturing processes that range from the aerospace to bike helmets. Its storage and usage under very cold conditions is key. Out of cooler time control and optimal usage are key quality parameters

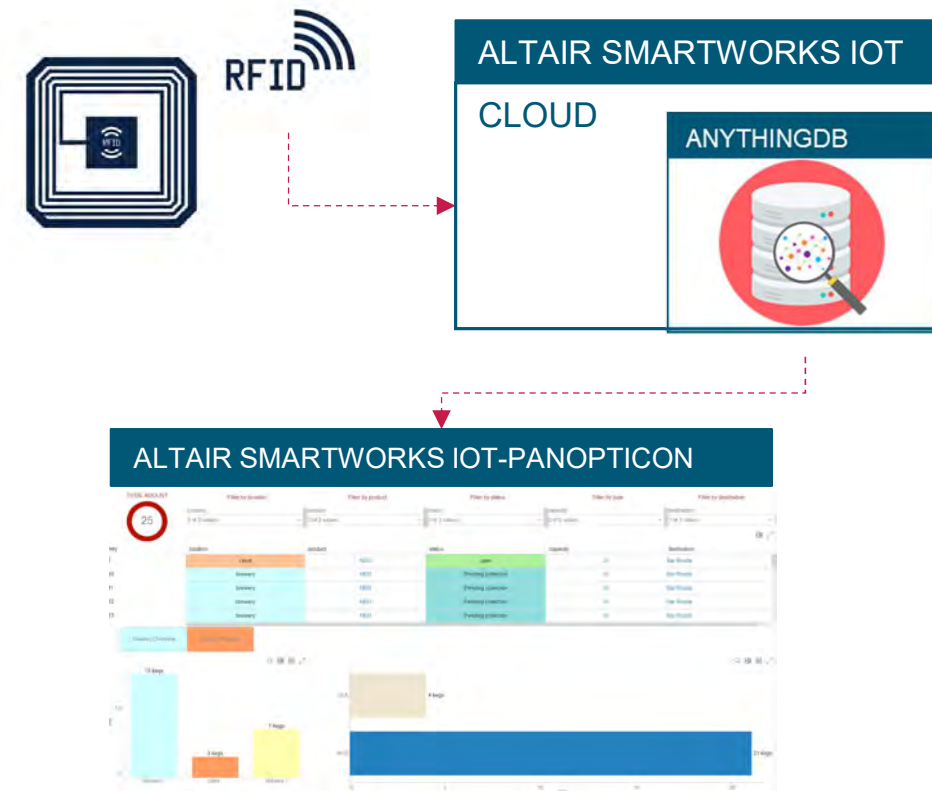
Solution

Global Solutions Group took a commercial hardware to build a traceability solution with minimum process intrusion and integration with existing ERP. A combination of field work to deploy and calibrate RFID antenna and cloud services to minimize costs

Outcomes

- Reduced losses from raw material misplacing
- Enhanced management process
- No investment in engineering or development while integrated with internal processes
- Proven hardware, ease to replace and extend

Solution architecture



Quality improvement – Industry 4.0 in Pharmaceutical Challenge

Only Fine powder is used in the production of the tablets. The coarse powder is either thrown away or collected for a second round of crushing and separation. Acceptable level of fine/coarse particle size is 90%. Batches with less than 90% fine/coarse output need to be flagged in advance for extending the crushing cycle

Solution

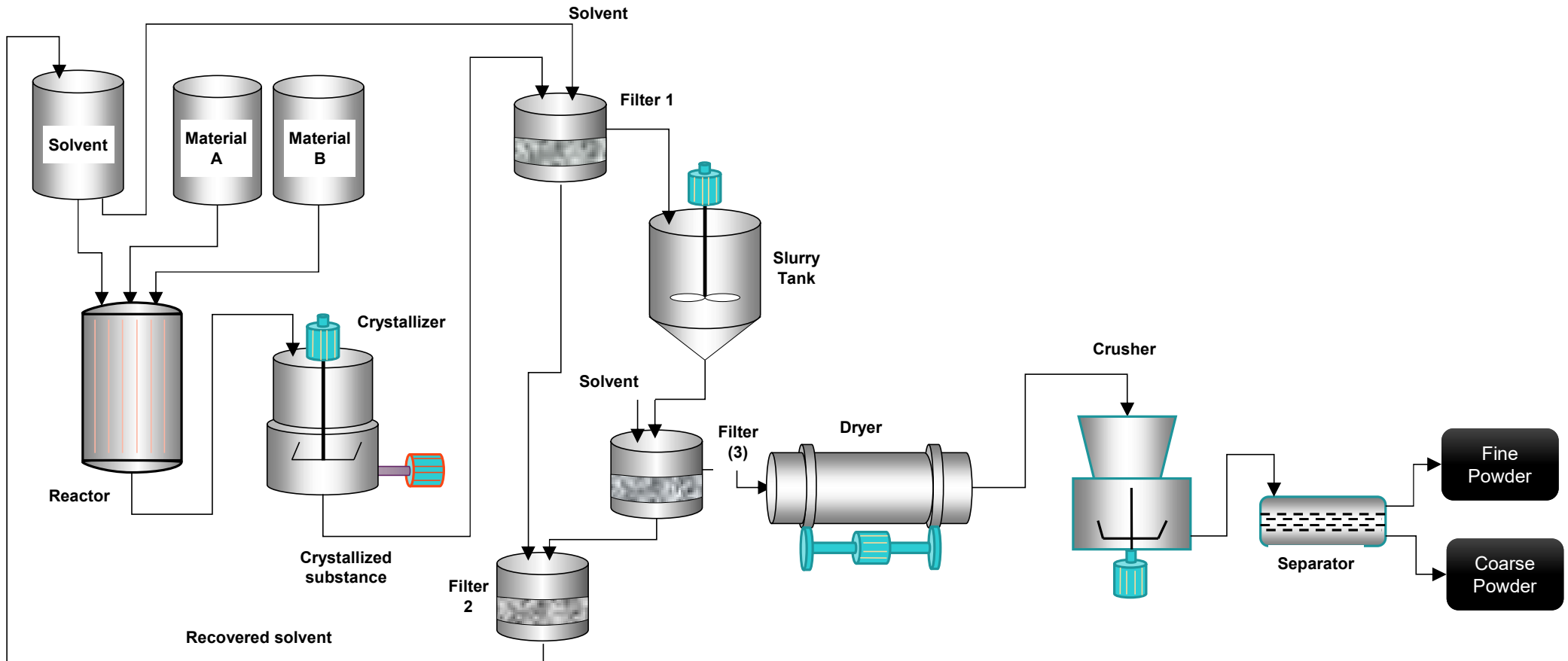
Develop a ML model to predict the likelihood that the current batch will need extended crushing time to yield a ratio of 90% or more fine/coarse particles. Create an alert for a longer crushing cycle if high probability of having <90% fine particles.

Outcomes

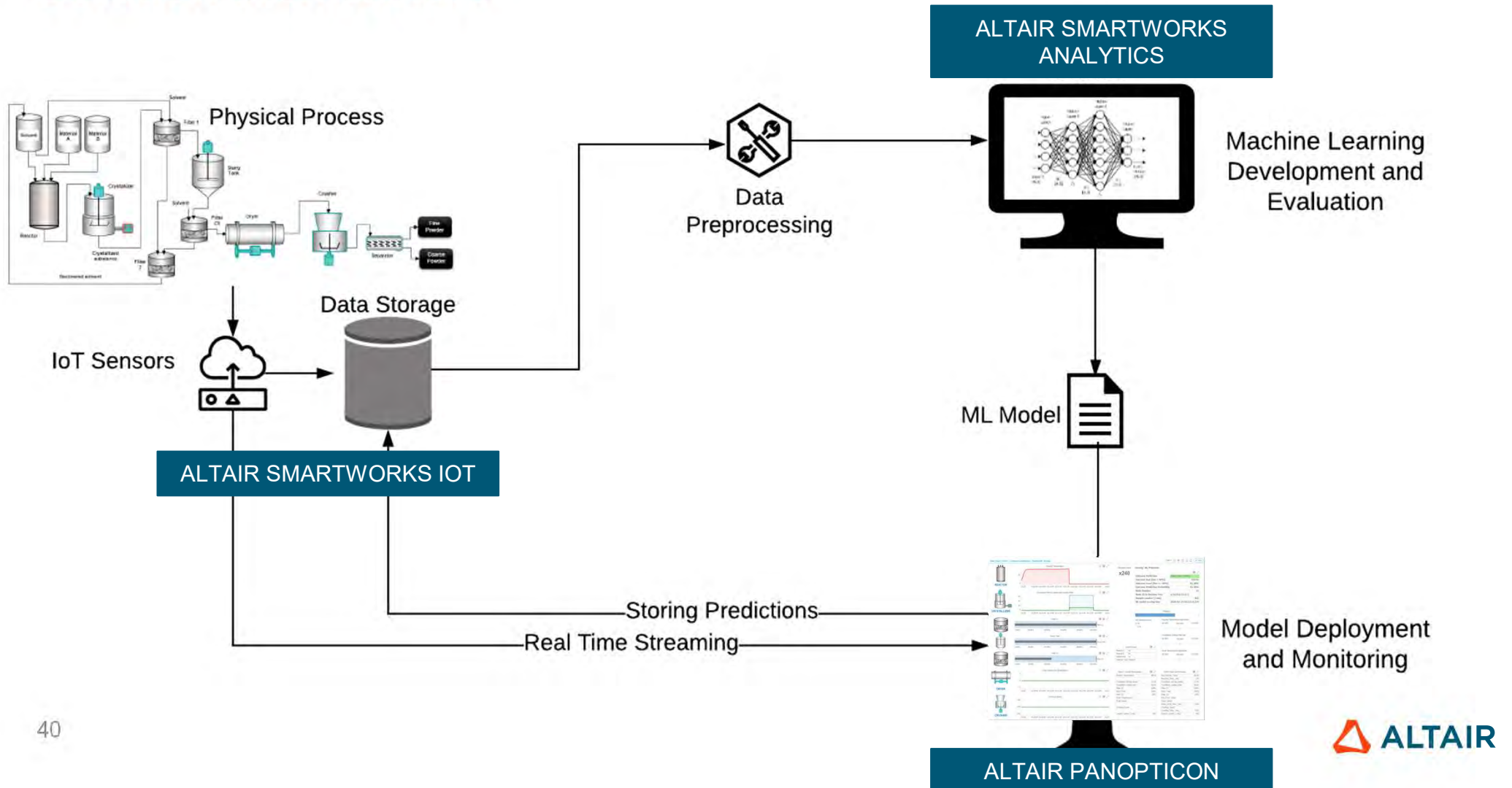
- Process Monitoring and timeseries analysis
- Continuous ML Scoring
- What-if and back Test
- Process Details display

Case Study

- Organic Synthesis Process



Solution architecture





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Predictive maintenance

Challenge

Makino, one of the largest machine tool manufacturers in the world, wanted to implement an efficient predictive maintenance solution and increase revenue by improving asset utilization and reducing downtime

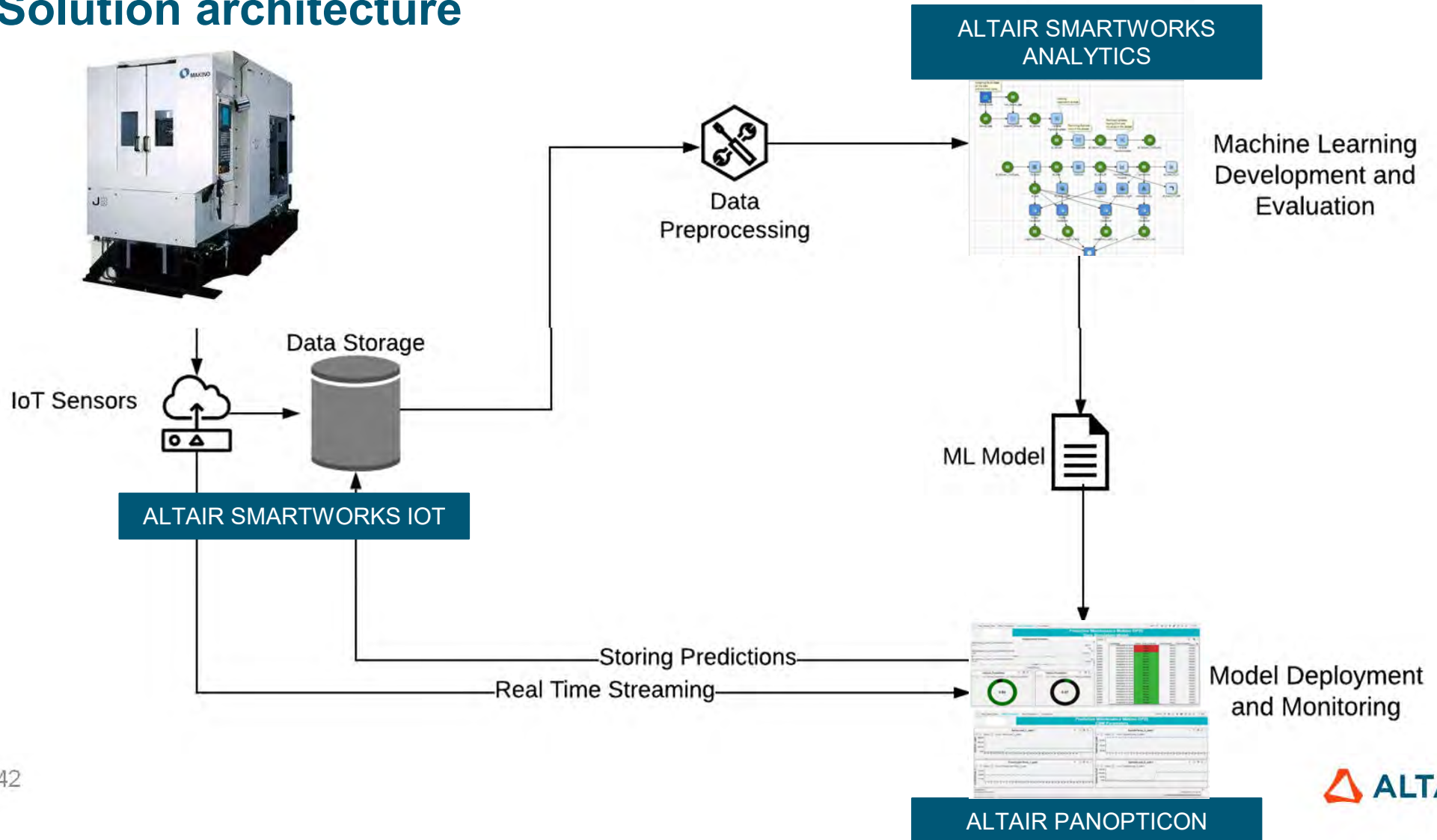
Solution

Develop a ML model to predict insights for probability failure index for different machine failure predictions. Send alerts based on machine parameters and implement real time machine operation monitoring

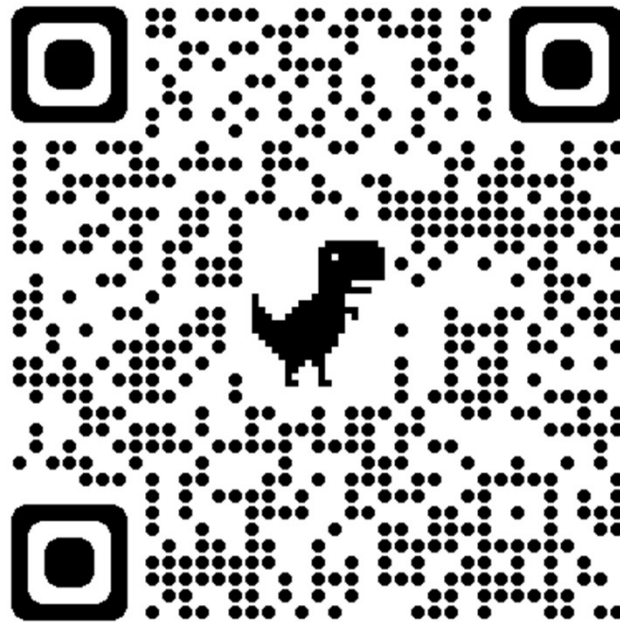
Outcomes

- Shift in Maintenance practices from time based to usage and condition-based maintenance through data driven decision process.
- Reduce Fixed Asset Service and Maintenance Costs.
- Reduce Asset Service and Maintenance Parts Inventory.

Solution architecture



Q & A



Sign up for free today!



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THANK YOU

altair.com



#ONLYFORWARD