



Industry 4.0 in relation to Food Safety

Rikard Franz

Meet the presenter



Meet your host –
the one and only Rikard Franz



With 20 years of hands-on automation work under his belt, Rikard is Tetra Pak's go-to expert on the subject.

Now part of his job is welcoming visitors to the automation room in Lund where he converts newbies into true believers in the power of automation. Sometimes he does this in the physical world. Today, he's gone digital to show you around.

Rikard also enjoys long walks on the beach, running marathons and practicing his light sabre moves.

- Proud manager of a team that develops Tetra Pak plant automation libraries
- Programmer, Project leader, Automation Sales Manager, Automation Manager, Engineering Manager & Product Manager
- Love running and enjoy all kind of food traditions 😊

Today's quote



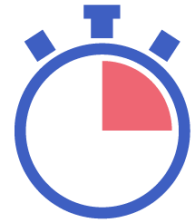
Digitalization is not about planning the future...
it's about the managing the history



I 4.0 benefits for the F&B industry



Increased control over food safety



Improved productivity, by data driven insights



Improved quality assurance using more automation



Managing complex global supply chains through IT and robotics



Using real-time data to respond swiftly to changing consumer needs

Digitalization - Changing conditions



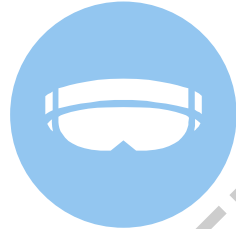
Big data



Artificial intelligence



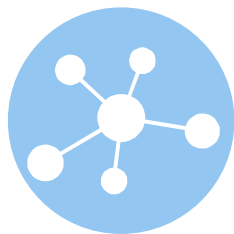
Advanced robotics



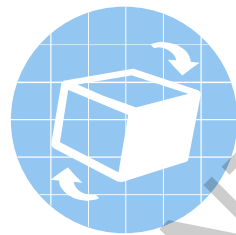
Augmented reality



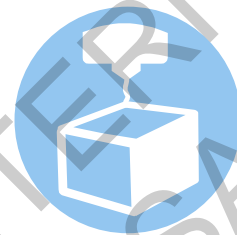
System integration



Industrial IoT



Simulation



Additive manufacturing

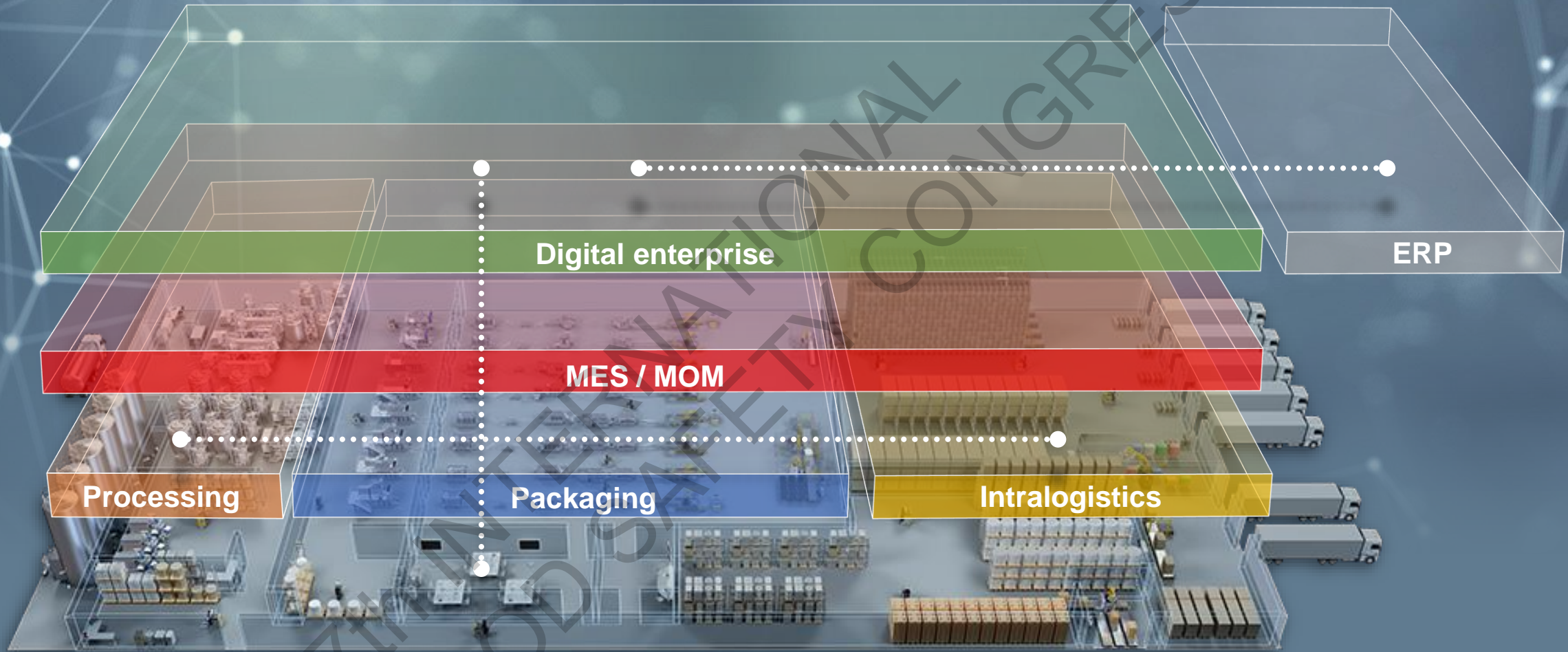


Cyber security



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Horizontal and vertical integration



The connected factory

Factory of the future



Improve food safety & quality through digitalized & integrated QA systems



96% Overall average reduction of random defect rate in 10,000 packages quality sampling

78% average reduction of aimed defect rate per 10,000 packages in quality sampling

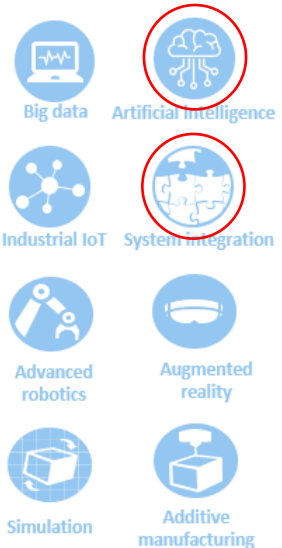
89% first year average reduction of random defect rate in 10,000 packages quality sampling

78%
AVERAGE DEFECT RATE REDUCTION

The number in the bar chart shows defects per 10 000 packages.

AA 2021

Digitalizing quality sampling lowers defect rate



Factory of the future

Compliant manufacturing by improved Acceptance Quality Limits (AQL)



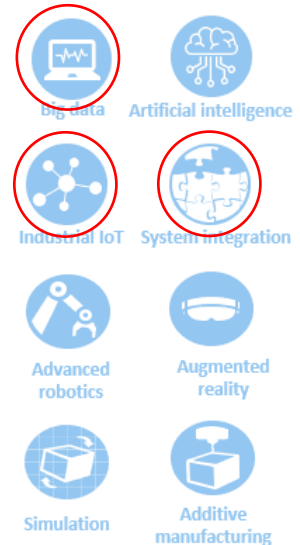
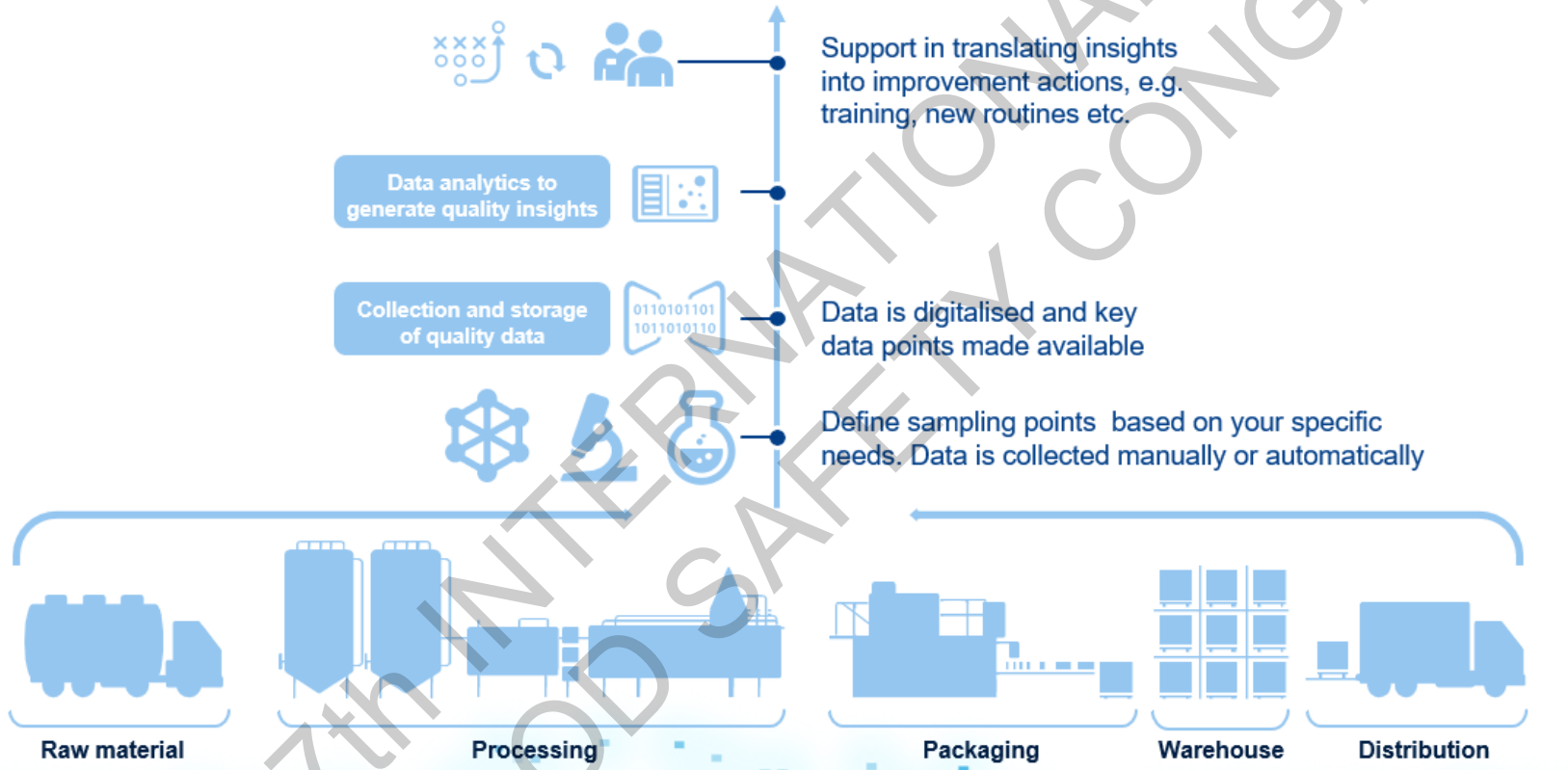
Outcome:
Optimised quality procedure



- Big data
- Artificial Intelligence
- Industrial IoT
- System integration
- Advanced robotics
- Augmented reality
- Simulation
- Additive manufacturing

Factory of the future

Improve food safety & quality through integrated & paper-less QA systems

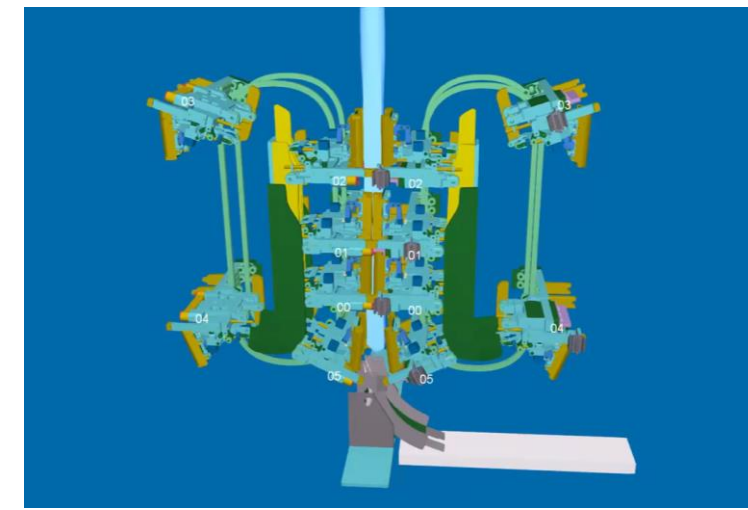
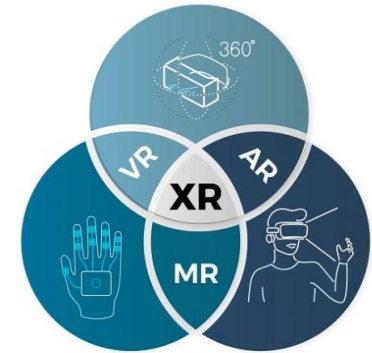


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Improve food safety & quality through digitalized & integrated QA systems

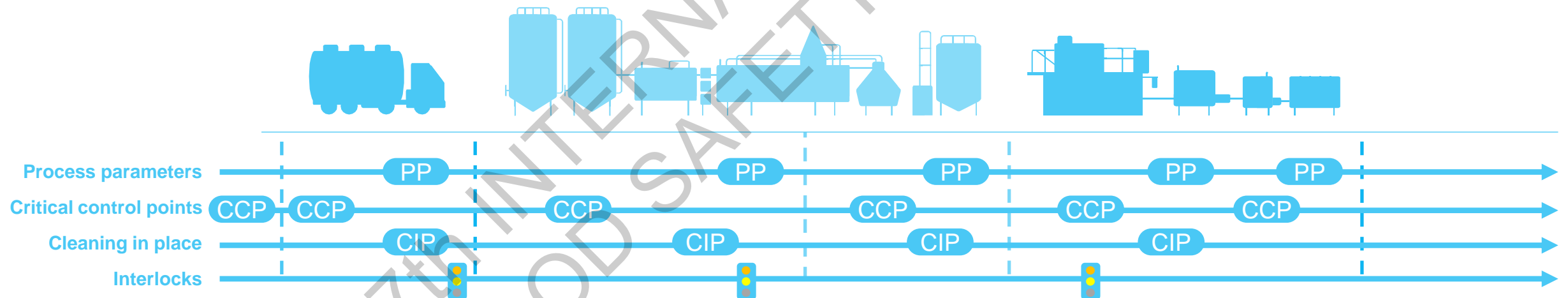
- A good software structure opens for
 - Simulation
 - FAT where most everything can be tested
 - Common language
 - Models + 'real data' to optimize process control & maintenance
 - Faster commissioning
- and in the future a link to Extended reality (XR)



Factory of the future

Control of critical control points

- **Real-time monitoring and control of Critical Control Points**, ensures that production is consistent and legally compliant
- **Support production of safe food** by matching material to product to be filled
- **Simplified food safety management** by integrating quality sampling into automation system

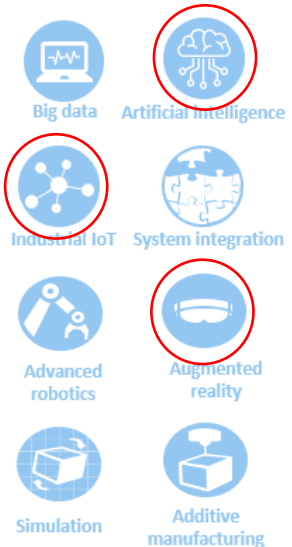


Factory of the future

Secure food safety & quality by preventing human error



- ▶ Alarm & Events
 - Operator assistance with logging, guidance and visualization linked to AI and IoT devices
- ▶ Tamper Free Production solution
 - Integration of material interlocking secures Food Safety and quality when mixing
 - Recipe handling that increase product quality as operators are forced to follow a given workflow
 - Improves the operational performance and reduces the operational cost
 - Reduce training cost shortens learning curve



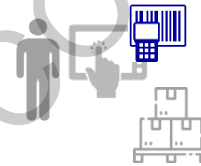
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Secure food safety & quality by preventing human error

Production orders are transferred from MES with BOM (Bill of Material) to production areas



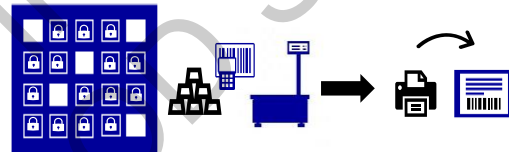
Operators automatically receive production batch order execution instructions



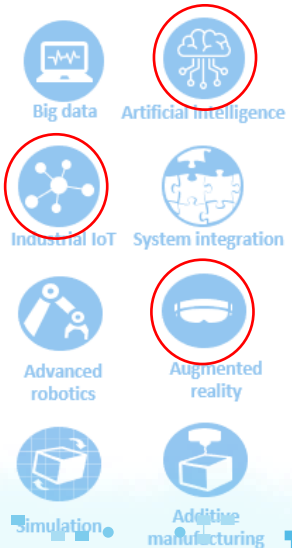
Operators are guided for exact ingredient /material preparation required for order



Prepared lots are registered and validated before further operations for batch execution



RFID technology can be used to validate material for each SKU



Factory of the future

Increase productivity through faster resolution of issues

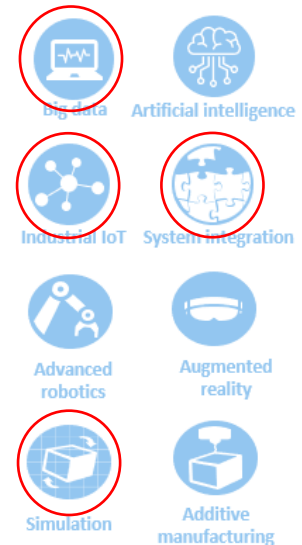


Full traceability & recall process in real time!

The screenshot displays the TraceMaster software interface, divided into two main sections: 'End-to-End Value Chain Traceability' and 'Recall Management'.

End-to-End Value Chain Traceability: This section features a 'Traceability Options' menu with 'Timeline View' and 'Radial View'. The main area shows a radial flow diagram of a supply chain with nodes for 'WH Ica', 'WH Coop', and 'WH Lidl'. A map on the right shows the geographical distribution of these warehouses, including locations like Ica Maxi - Eslöv, Ica Maxi - Stafanstorp, and Oatly Main Warehouse. A 'Distribution Info' table lists production and distribution events with dates and times.

Recall Management: This section provides a comprehensive overview of a recall. It includes a 'Recall Management' dashboard with key metrics: 4 recall cases (1 new), 780 returned items (11,412 yesterday), 12 collection requests (2 new), 98% pallets tracked, 2 recall claims (new), and 92% collection termination. Below this, a 'Recall name' section details the 'Milk Bacteria recall' with its ID (RAAB12), start/end dates, and status (OPEN). It also shows the 'AFFECTED DISTRIBUTORS' (3 complete, 2 incomplete) and 'AFFECTED RETAILERS' (21 complete, 19 incomplete). A 'COLLECTED ITEMS' bar chart shows progress over days. A 'Status Overview' section includes a 'Recall Scope' and 'Collection Report' with a trend line showing 87% completion. A 'Collection Report' table lists tasks assigned to individuals like Mark Black and Marie Thompson.

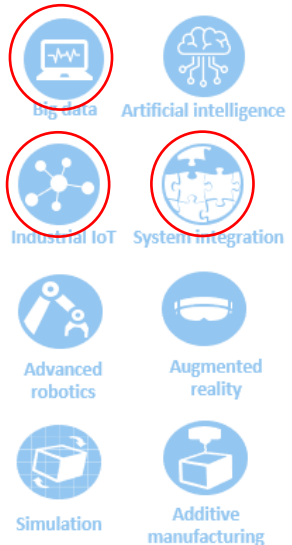
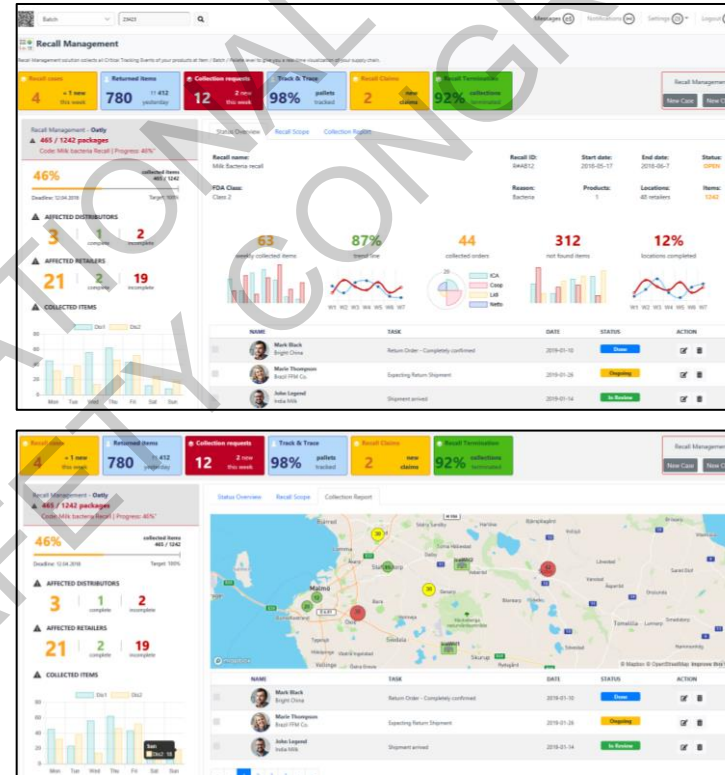


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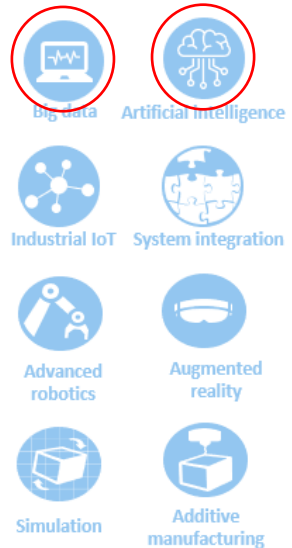
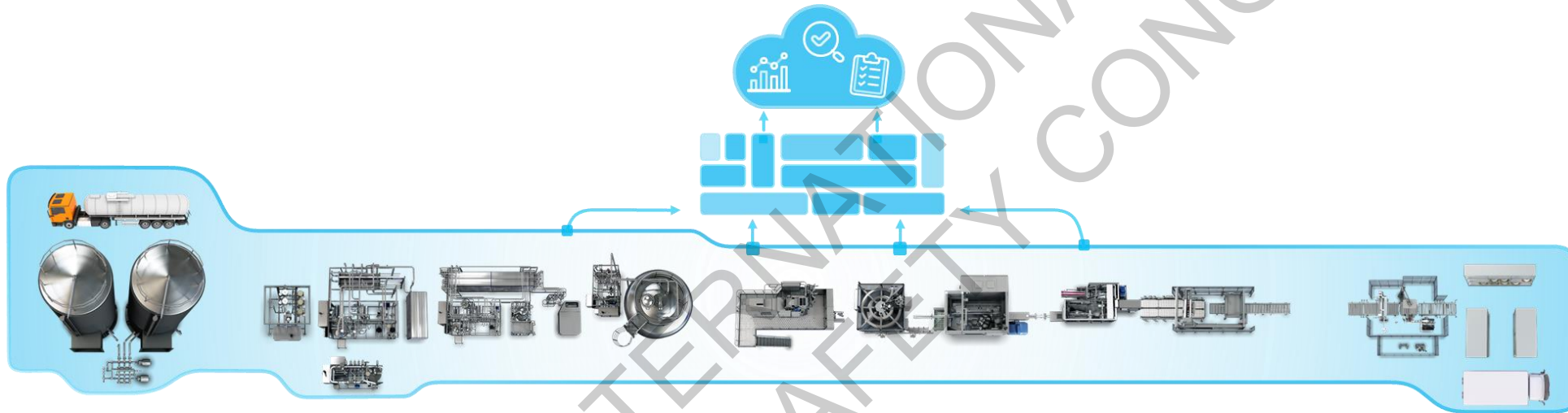
Mitigate the financial and reputational impact of recalls or liability claims

- Reduce number of Claims and overall cost of the Claims Management process
- Automated and improved sampling, optimized release of good packages
- Efficient root-cause analysis and implementation of corrective measures
- Real-time identification of location and affected items on final product level
- Increased consumer safety and increased trust



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Digitalization opens for common data structures

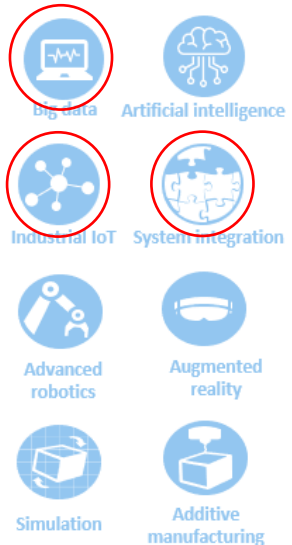


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Faster and more informed decisions by understanding performance data



- ▶ Improved analysis of quality data enables you to create fact-based decisions
- ▶ Based on web technologies and cloud-based solutions (e.g. Azure), increased data visibility enables faster actions and adjustments on specifications.
- ▶ Big data makes it easier to make root cause analysis faster and more accurate



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Better data insights to improve operational performance



Securing food safety and quality throughout your entire production

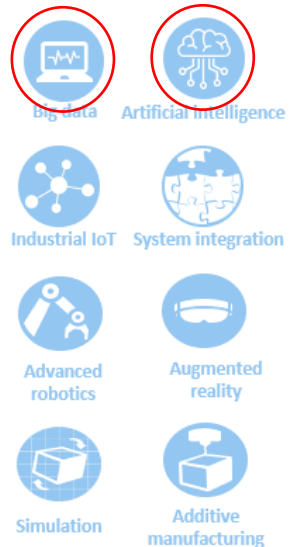
- Industrial IoT sensors and equipment allows for monitoring of quality data in real-time to maintain productivity
- Artificial intelligence alerts Production staff at much earlier stage, securing uncompromised food safety



OEE Optimisation

- Industry 4.0 technologies provides an OEE platform that gives full visibility and better understanding of key loss areas
- Big data analytics and cloud computing solutions allows for continuous improvement;
 - Lines, Production plants and intra-company

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Take control of your data, small or big ?

1 Take control of your data

Start with a clearly **defined quality standard** that will ensure production quality and also reflect relevant legislation or regulations.

Design a monitoring system that defines the critical control points adding new sensors or integrate machine control systems to make sure the **appropriate data is collected**.

Huge volumes of data will be generated, so **cloud computing and edge technologies** are used to share data across sites and beyond a company's borders

2 Quality management system integration

Data is fed into the manufacturer's quality management system where it is **analysed and compared** against the required standard.

Predictive algorithms are developed that compare the data gathered by the monitoring systems and then compare it with the quality standard.

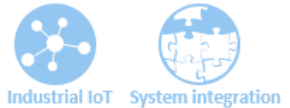
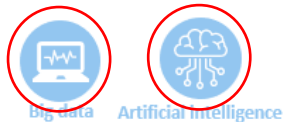
This will identify where and when **deviations are occurring** to provide an **early warning of potential process deviations**. Process parameters can then be reviewed and, if necessary, changed before quality deteriorates.

3 Maintain a stable, high performance process

By collecting, connecting and comparing quality data, the preceding steps will ensure that a **production process is stable** and producing output at (or above) the required standard

The availability of data from across the plant will **automate record keeping and simplify the quality audit process**.

A solution like this will also support efforts **to improve traceability** from the upstream supply chain, down through the production process and on into the distribution network.

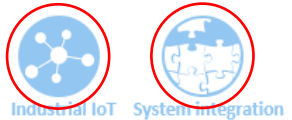
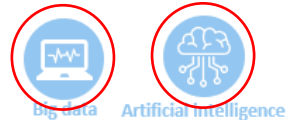


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Food safety & quality issues through new and existing solutions



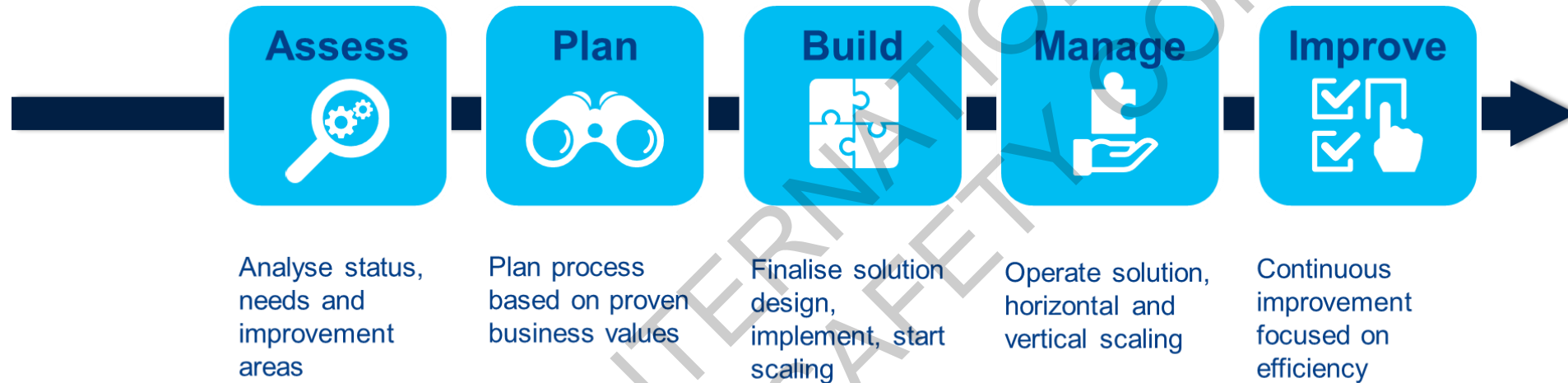
- ▶ Hardware
 - Long life-cycle on IO-installation
 - Shorter life-cycle on PLC & network supplier
 - Solution - Keep IO and rebrand PLC & networks
- ▶ Software
 - Obsolescence with faster pace (driven by IT requirements)
 - Upgrades linked to need for new functionalities
 - Upgrades linked to Cyber Security (e.g. DCOM)
 - Tight & linked functionality between Windows, PLC, HMI, Database & MES



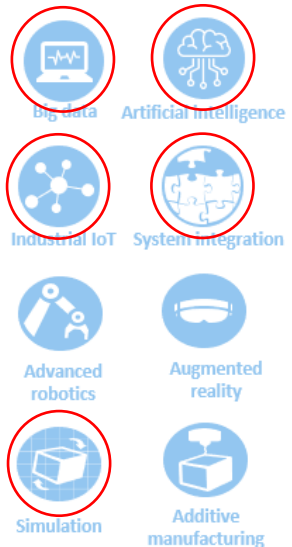
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Without cyber security there is no Digitalization



RF/Tetra Pak/20190819



Factory of the future



Final conclusions...

- Everything is getting connected
- Digitalization is here to stay

Join the joyride and take advantage of it

I 4.0 provides lots of new values, but Plan your journey carefully

Go for solutions that makes your site integrated (IoT) and use open platforms

Take Cyber security risks really serious



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