Plant i.T.

Process Control Systems. MES inside.

Works with EcoStruxure™

The IT solution for the beverage industry

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ProLeiT

by Schneider Electric

Integrated IT solution for the beverage industry

You have to set market trends to win customers. Increasing beverage industry requirements in terms of product variety, quality assurance, plant utilization and traceability demand new approaches. The trend is towards automated communication from goods intake through production to dispatch, as well as from the plant production control level to the business system and back.

Due to increasing competition in the beverage industry, all production processes must offer the highest level of flexibility – from the raw material stage through the production process to bottling of the finished product. For example, this means, that several versions of a product can be produced on the basis of the raw material and the mixed recipe. This is possible thanks to an integrated IT system which controls and monitors all subordinate semi or fully automated process areas and is connected to an ERP system via interfaces.

Integrated solutions with Plant iT

Plant iT is a modular IT system with integrated MES functionalities for all process areas in the beverage industry. This industry-specific feature combined with cutting-edge information technology enables data transparency from the operational to the planning level and at all stages of value creation. Manufacturing Execution Systems (MES) provide production managers with new opportunities to overview the entire process chain from raw material delivery to the packaged product. This enhanced transparency optimizes processes, improves product quality, saves energy and raw materials and increases the availability of machines and systems.

Plant iT and integrated beverage production

From raw material delivery and storage, through recipe-controlled beverage mixing or production, the integration of pasteurization units, inline mixers and the bottling line to packaging and dispatching – in cooperation with customers, machine suppliers, the Technical University of Munich (TUM) and the Friedrich-Alexander University Erlangen-Nuremberg, we have defined standard interfaces for process and quality data per machine type of a bottling and packaging plant based on the Weihenstephan Standards (WS Pack). This ensures the realization of customer-specific requirements regarding the distribution and recording of process data and QA-relevant data. Thanks to this trendsetting standard in the beverage industry, it is possible, for example, to realize integrated Overall Equipment Effectiveness (OEE) analyses. Furthermore, coordination of the higher-order process control is enabled by recording all machine data up to transfer to internal logistics and mapping the information flow for individual process steps.

The requirements of industrial beverage production

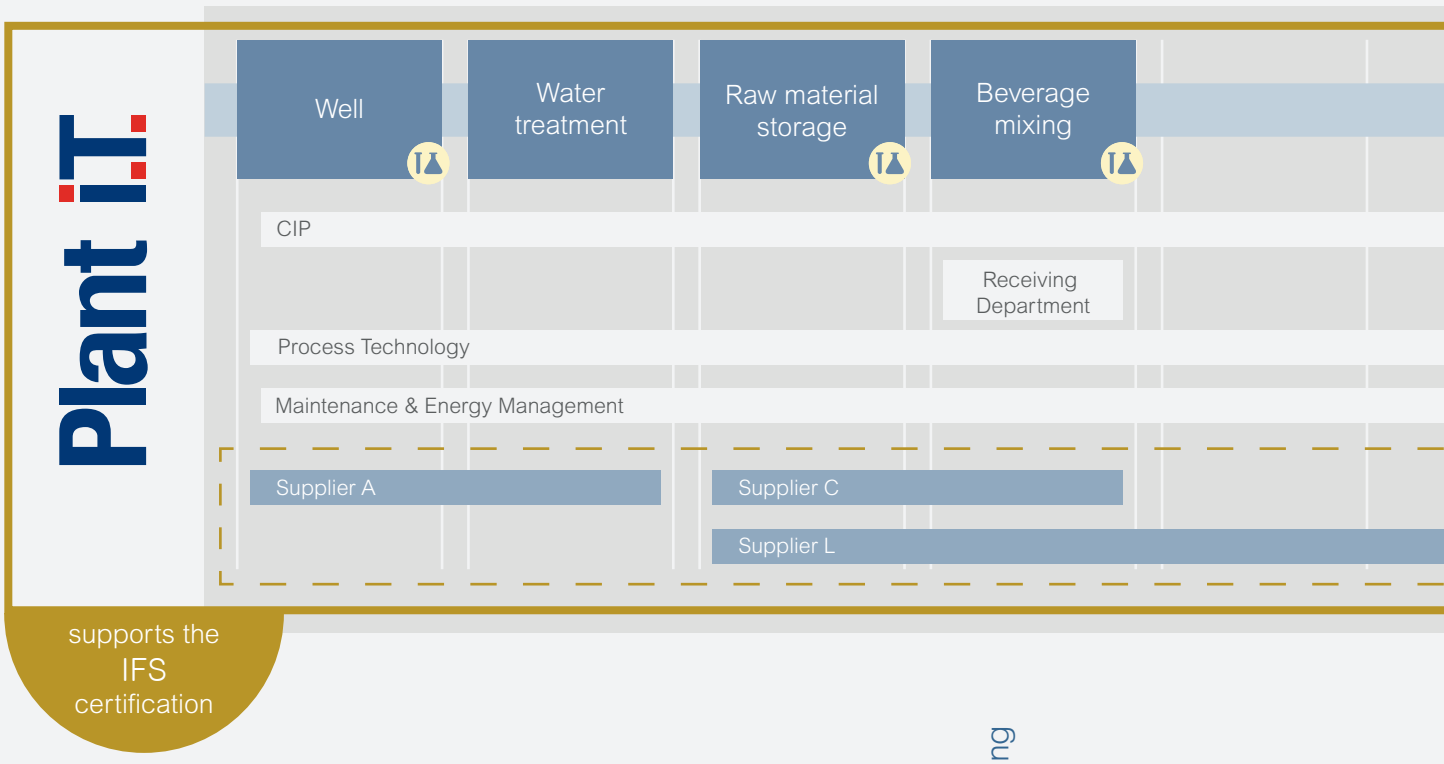
IT controlled integration of all the processes

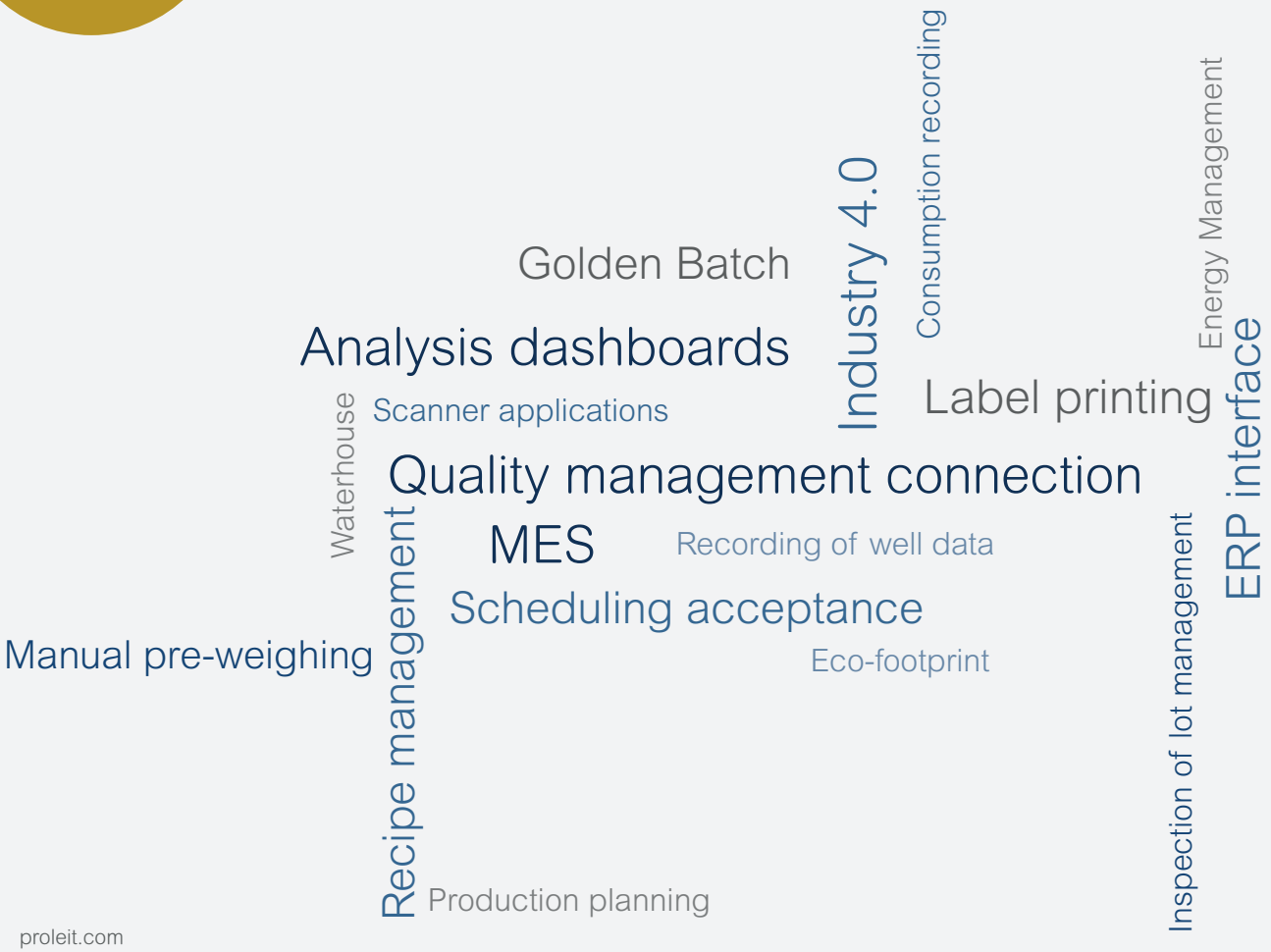
If you take a close look at industrial beverage manufacturers, you will often see production areas consisting of systems and machines from various manufacturers with little or no intercommunication. This heterogeneous system and machine scenario is divided into numerous process areas and very rarely fully automated or connected to a higher-order IT system. Although many system and machine manufacturers offer information solutions in the form of SCADA systems, they are often limited to their own systems and thus to a specific process area, and are not intended for a production line or the entire production facility. This often results in the development of so-called “islands” which have, for instance, their own recipe management whose adjustment in case of original recipe modification can only take place manually and, in the worst case scenario, can only be carried out by a programmer. Furthermore, actual data, for example temperatures, are not permanently recorded at these local automation systems. Pasteurization units and inline mixers are a good example of this. The necessity of higher-order process management becomes apparent when further considering existing dispatching, storage and logistics systems. The flow of information becomes an even more critical factor for production areas which map a workflow with pen and paper as so-called routing or accompanying sheets – in this case, the manual recording of production data is a typical source of errors.

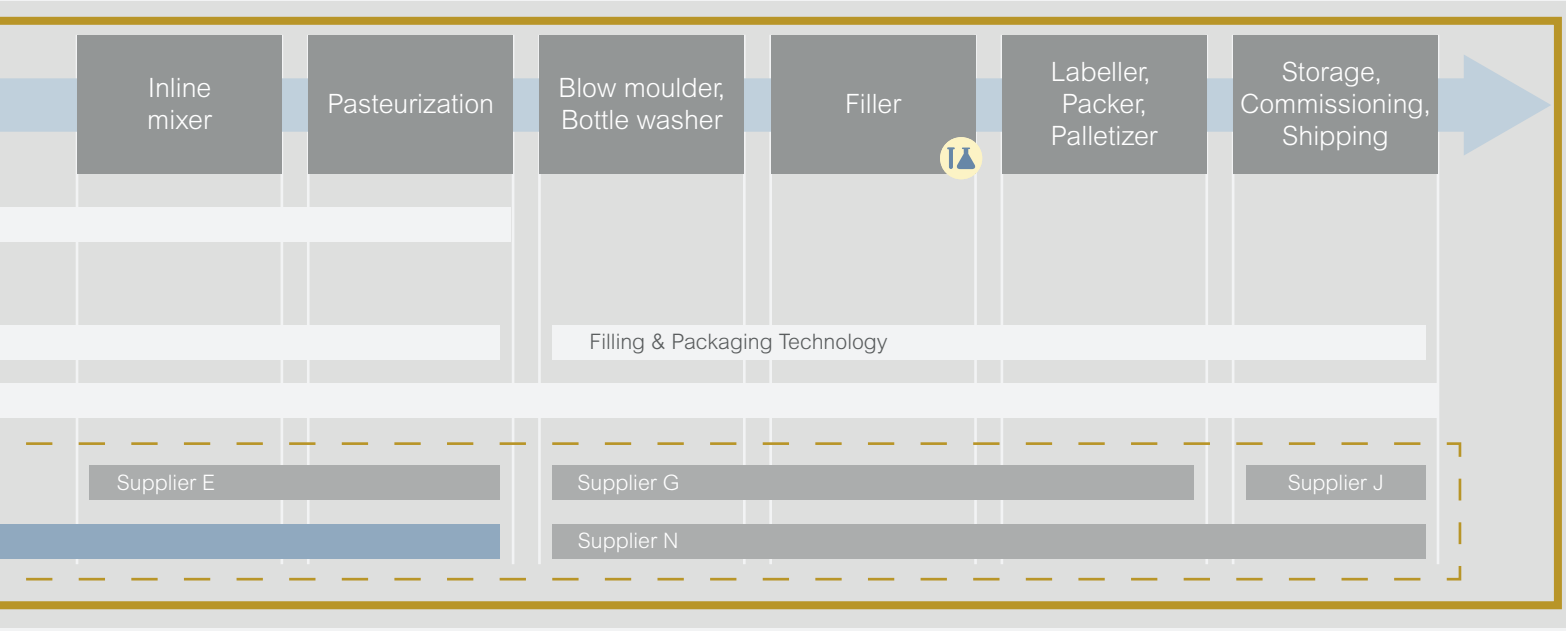
Plant iT offers the perfect solution

Irrespective of existing systems and requirements, Plant iT can process information from all process and packaging areas and assumes integrated process management thanks to defined interfaces. A feasible solution for “islands” could be to interlink the controls in order to, for example, specify order parameters as well as record, analyze and send actual values to an ERP system in a condensed form. Furthermore, Plant iT can ensure compliance to quality parameters, the calculation of material consumption according to the order list and complete traceability of the entire production process in line with statutory regulations. Plant iT additionally supports IFS certification.

Process chain in an industrial beverage plant







Automatic recipe optimization

Web reporting

Packaging plant connection

Bills of material

OEE performance data

Plant iT

Integrated tracking and tracing

Cleaning schedules

Material batch parameters

Batch management

Serialization

Remaining quantity processing

Dynamic residual batches

Audit Trail

Detecting optimization potentials

Cleaning matrix

Line management

Paperless production

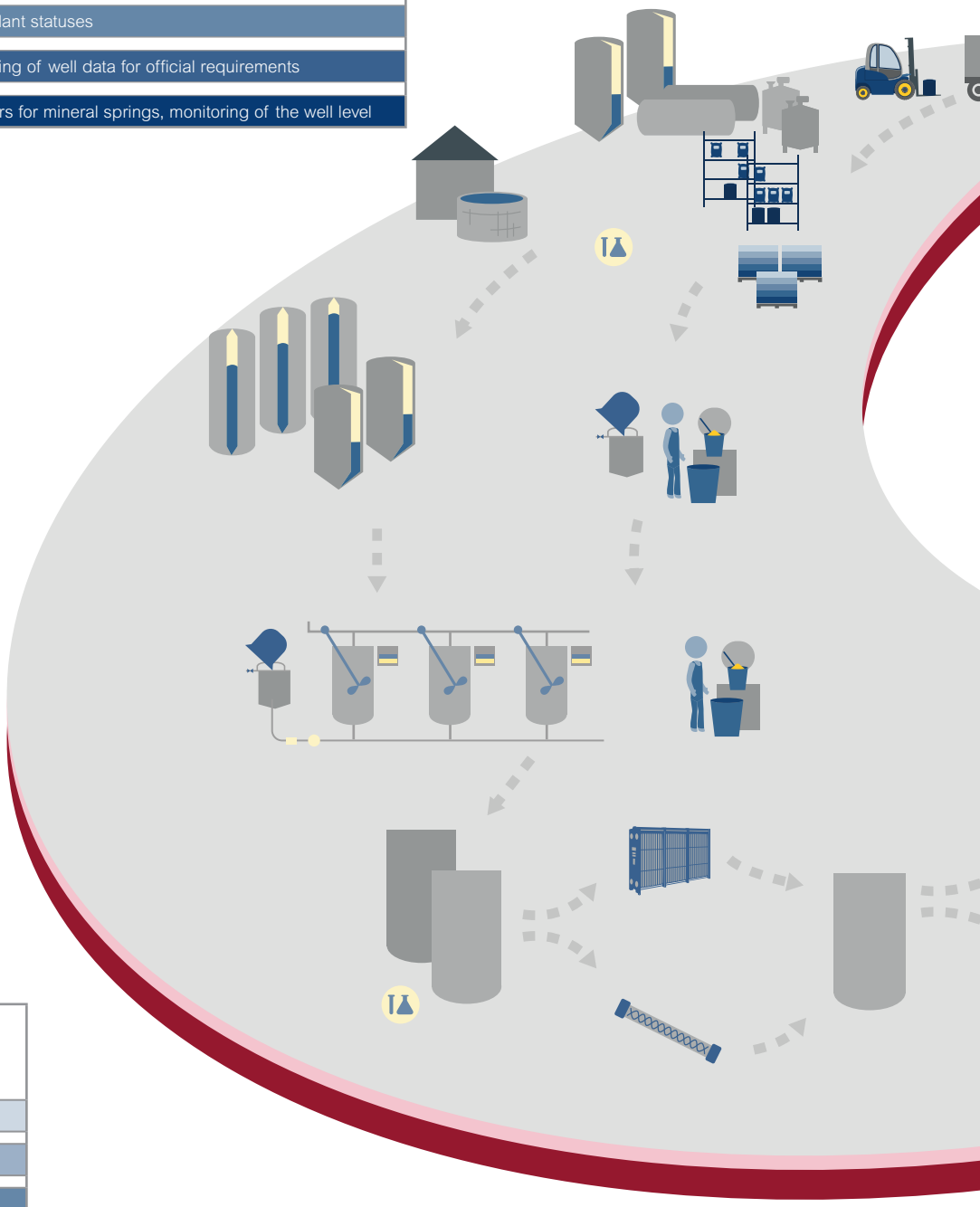
Integrated solution concept

Well / Water house

- Water treatment
- Recipe and BOM management, production parameters
- Line allocation, plant statuses
- Long-term archiving of well data for official requirements
- Quality parameters for mineral springs, monitoring of the well level

Preliminary solutions

- Production order, mixing and dosing control, manual and automatic additions
- Recipe and BOM management, production parameters
- Line allocation, plant statuses, CIP automation
- Consumption and batch data
- Tracking via dosing units, recording of all the components for manual dosing



ERP

- Order dispatching

MES

- Execution management
- Specification management
- Resource management
- Data recording & analysis
- Tracking & tracing

PCS

- Process control

Mixing / Preparation tank

- Production order for juice or syrup, mixing and dosing control, manual and automatic additions
- Best before date, quality inspection
- Line and machine allocation, CIP automation
- Product quantity, temperatures
- Tracking via raw material batches

Plant i.T.

Raw materials warehouse

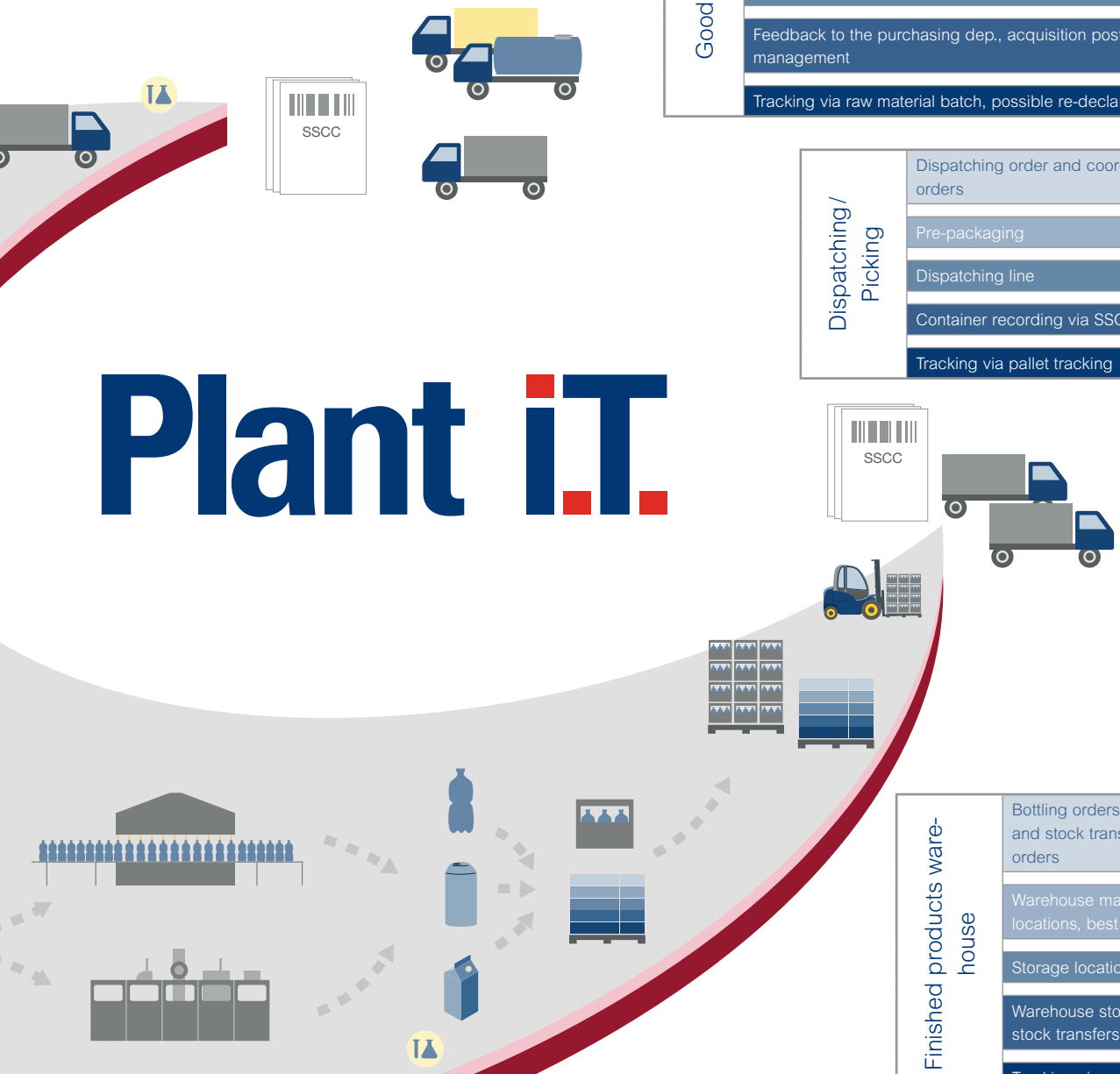
- Stock intake and stock transfer orders, provision orders
- Raw materials management, best before date, quality inspection
- Silo management, storage location management
- Material bookings, warehouse capacity, warehouse utilization
- Tracking via raw material batches

Goods intake

- Intake orders, sampling, tank allocation
- Raw materials management, inspection instructions, material compatibility
- Vehicle monitoring, tank monitoring
- Feedback to the purchasing dep., acquisition posting in materials management
- Tracking via raw material batch, possible re-declaration

Dispatching/ Picking

- Dispatching order and coordination, loading orders
- Pre-packaging
- Dispatching line
- Container recording via SSCC
- Tracking via pallet tracking



Finished products warehouse

- Bottling orders and stock placements and stock transfer order control, labelling orders
- Warehouse management, warehouse locations, best before date
- Storage location management
- Warehouse stock, stock placements and stock transfers
- Tracking via container detection

Bottling/ Packaging

- Bottling orders and control, labelling orders
- Bottling parameters (packaging weight/quantity), palletizing parameters, labelling specifications
- Storage location management (packaging materials), pallet management product
- Number of pieces, OEE-relevant data, faults, etc.
- Tracking via container detection

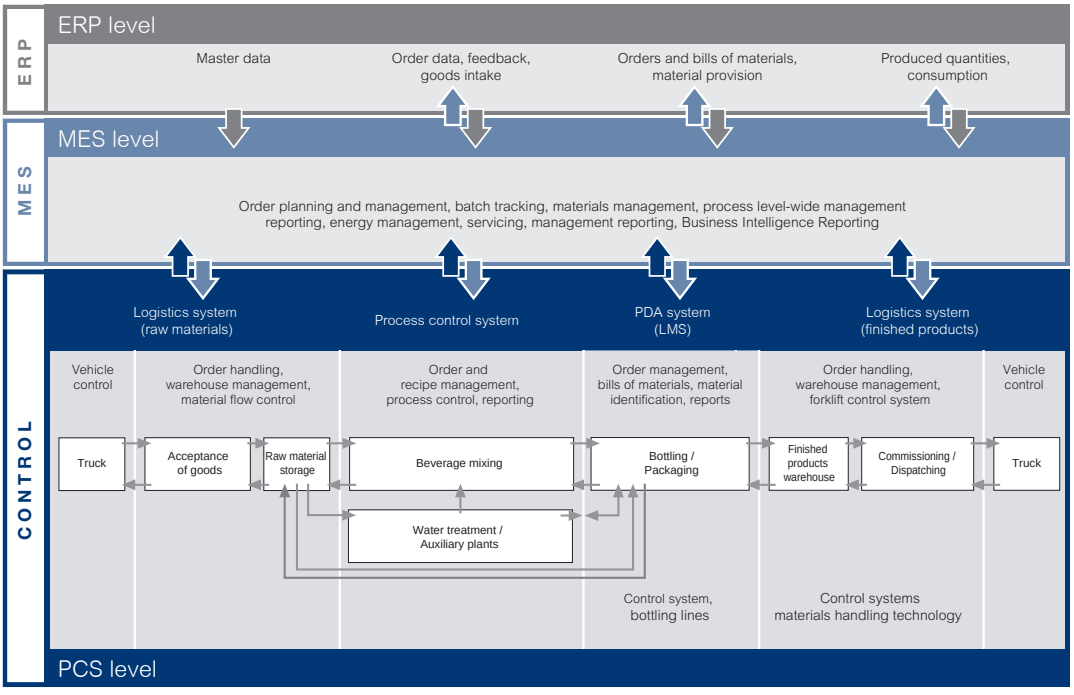
Pasteurization unit, inline mixers

- Production order for bottling/inline mixers
- Machine and quality parameters (temperatures, Brix value)
- Line and machine allocation
- Temperatures, pressures, quantities, Brix, etc.
- Tracking via mixing/preparation tank

Plant iT and MES

A vertical integration

MES and PCS levels are often seen as two separate systems in one production plant. Plant iT prevents this common separation. Unnecessary interfaces and duplicate administrations are avoided thanks to the provision of MES functions in the Plant iT system. Furthermore, this provides the perfect foundations for integrated information processing and increased efficiency for system operation, maintenance and repairs as well as future extensions. ProLeiT has therefore developed the flexible system platform Plant iT, consisting of basic systems and modules for application in various areas of a production plant. The Plant iT material module is an excellent example of the modular design of the Plant iT system. Since the availability of materials is of key importance for beverage plants, process-related materials management provides all the data on a permanent basis. This ensures rapid decisions on intervention in the process cycle during production. An essential criterion for the quality of these decisions is the up-to-dateness of the information on the stock, local availability and quality status of the materials being processed. Plant iT therefore guarantees the required integration to, e. g., ensure traceability and carry out recipe optimization depending on the raw material parameters. Furthermore, Plant iT can map the entire received raw materials with the respective workflow.



MES in the beverage industry

The modularity of the process control system Plant iT supports gradual implementation in the facility. Existing plant technology and processes can thus be integrated. ProLeiT has extensive project experience and numerous testimonials in the field of consulting and MES solution implementation in the beverage industry.

Manufacturing Execution Systems (MES) become the data hub between important areas of production. They answer, amongst other things, the following questions:

What is produced where and by whom? (execution management)

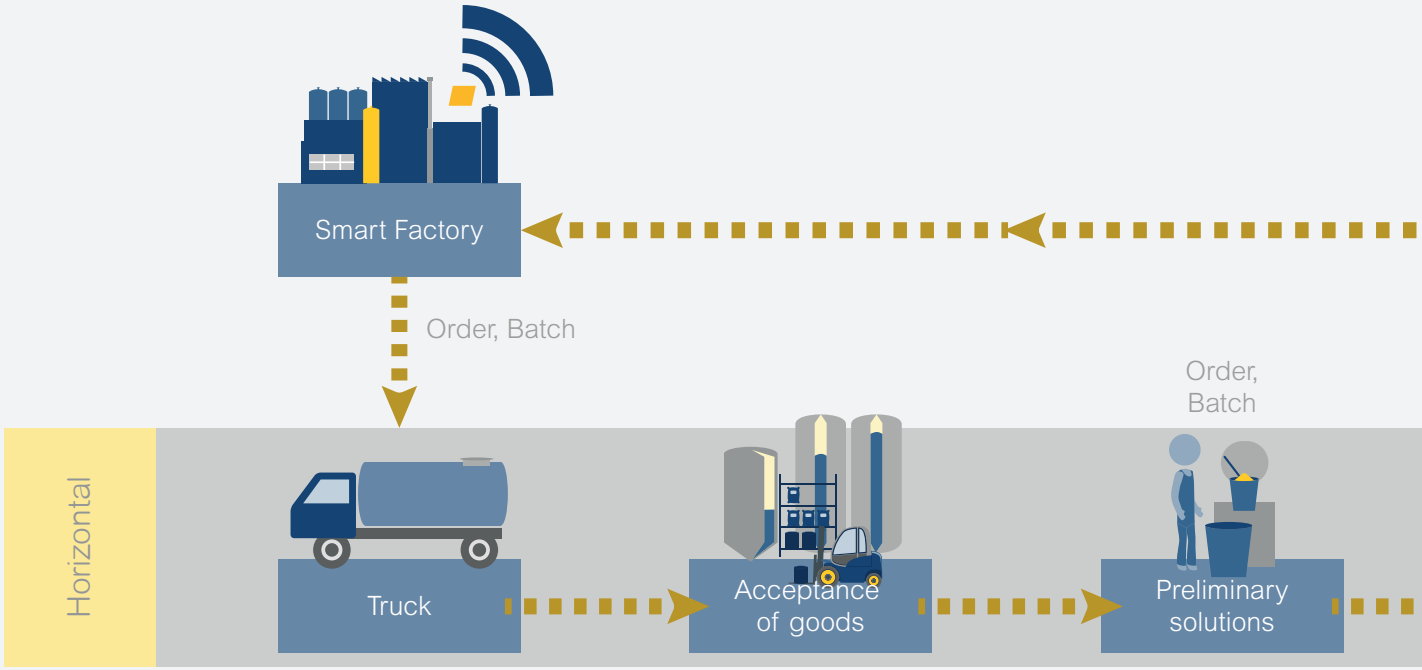
How should production occur? (specification management)

Who should produce what and where? (resource management)

How did production occur? (data recording, analysis)

When, where and by whom was something produced? (tracking & tracing)

Industry 4.0 in the beverage industry



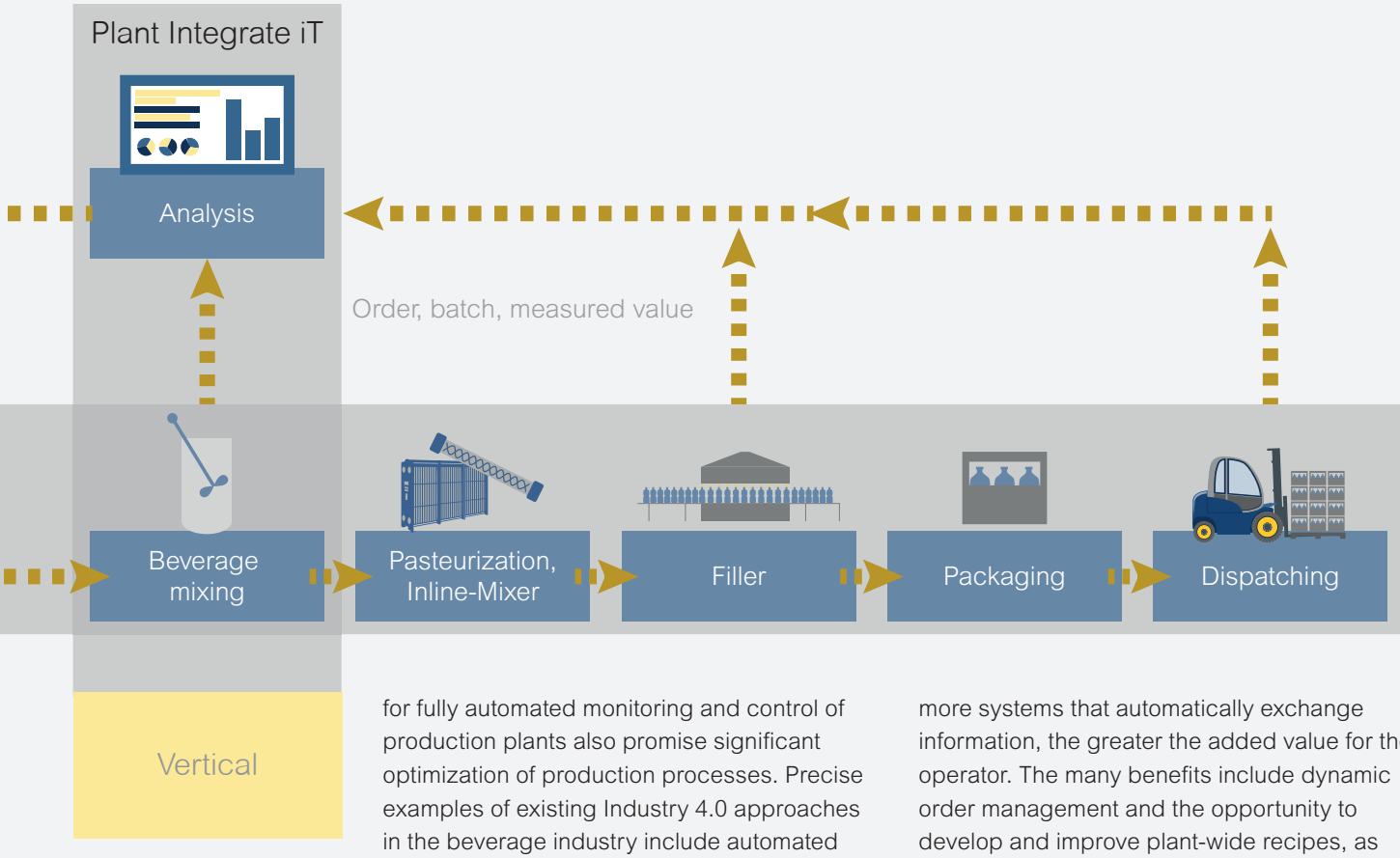
Rapid development, including an ever faster and more networked world of production, offers not only new opportunities but also creates new challenges. In this context, the keywords Industry 4.0 or Industrial Internet of Things (IIoT) are often used. Industry 4.0 is usually only associated with conventional machine and plant engineering applications; in other words, production-related activities. That said, the smart factory provides many benefits for the process industry, including digital integration of all industrial facilities and processes. Furthermore, implementation is quite straightforward when using a Manufacturing Execution System (MES) as the central analysis and reporting unit.

The smart factory

Transforming a traditional factory into an Industry 4.0 smart factory results in significant changes to the way it operates. Business processes respond dynamically to changes in the market, while production techniques adapt automatically to ensure an appropriate balance between cost, quality and environmental impact. Production technology will adapt to specific customer needs, identify and eliminate bottlenecks and control plant throughput automatically. This goal – true to the vision of Industry 4.0 – is achieved by vertically coupling technical and commercial business processes and horizontally linking processes and systems along the value-added chain. Processes can therefore be controlled and improved across the entire plant. Production becomes completely transparent from start to finish, providing the ideal platform for sound commercial and technical decisions. The smart factory additionally enables companies to identify and satisfy individual customer needs, as even the smallest batch sizes can be produced economically.

New potentials for the beverage industry

These technical developments create new automation potentials for the beverage industry. Not only will the increased networking of the internal value creation process from procurement, through production to sales and logistics lead to significant increases in productivity and efficiency; the new possibilities



for fully automated monitoring and control of production plants also promise significant optimization of production processes. Precise examples of existing Industry 4.0 approaches in the beverage industry include automated quality assurance, which is accomplished in many companies with the help of sophisticated sensor technology, the paperless production as well as the possibility of tracing products throughout the complete value-added process in order to identify and eliminate sources of error.

Integration of heterogeneous systems via MES

This vision can be brought to life with a Manufacturing Execution System (MES) tailored to customer requirements. The MES solution from ProLeiT is called Plant Integrate iT and can be used independently of the process control system Plant iT. The MES integrates the heterogeneous information of the individual production plants and combines the production level with the commercial business processes. Needless to say, companies profit directly from a plant-wide and common database. The more systems that automatically exchange information, the greater the added value for the operator. The many benefits include dynamic order management and the opportunity to develop and improve plant-wide recipes, as well as being able to trace production data.

Using KPIs wisely

Key figures are necessary to monitor success and investments. These KPIs should be identified and displayed in real time to ensure problems are not only identified promptly, but also in order to initiate appropriate countermeasures. Plant Integrate iT offers freely configurable dashboards to achieve this. Recorded and archived data can be filtered according to various criteria, including time period, order, customer, product, batch, location and energy consumption, as well as interlinked and presented in real time. In many cases, this reveals connections that would otherwise remain hidden. This enables those responsible to react more quickly and effectively to deviations and to counteract them accordingly.

Overall Equipment Effectiveness

OEE – is the abbreviation for “Overall Equipment Effectiveness”, a method developed for the determination of key figures for monitoring and improving the efficiency of production plants. In many industries, the evaluation of process quality using the OEE method has already proven successful. There are also many advantages for beverage industries, but the most important thing is: transparency. Potentials for optimization can be systematically uncovered with the aid of OEE key figures. They indicate where productivity losses occur and analyze the availability, system performance and quality of the individual production lines. They therefore form the basis for all optimization measures.

Plant iT, ProLeiT‘s process control system, delivers OEE key figures and reports at the push of a button – per line and across production facilities. Since all production data is interlinked, it is also possible to provide OEE analyses and detailed representations of the plant efficiency of individual lines and machines. Depending on the respective customer requirements, the capacity utilization of the various lines can be compared as well as compliance with key performance figures. Dashboards, tables or lists are, for instance, available for the graphical presentation of data.

Beverage-specific standard requirements have been integrated into Plant iT and can be presented in real-time as online reports. The following information is, amongst others, evaluated:

- Performance statistics
  - e. g. utilization times of all the machines
- Energy statistics
  - e. g. consumption per machine, line or produced container
- Fault analyses
  - e. g. causes of downtime and downtime per machine, line or product
- Consumption analyses
  - e. g. raw material / packaging materials per batch / order; waste / losses
- Golden batch analyses
  - e. g. process value comparison

Plant iT screenshot of an OEE display

Tracking & tracing

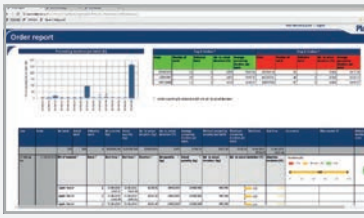
From the producer to the end consumer and back again

In the course of compliance with international food standards (e. g. IFS), the issue of „traceability of raw materials up to the finished end product within a production process“ is becoming increasingly important. ProLeiT ensures this at all times through the consistent and complete recording of raw materials and finished products within the scope of tracking & tracing.

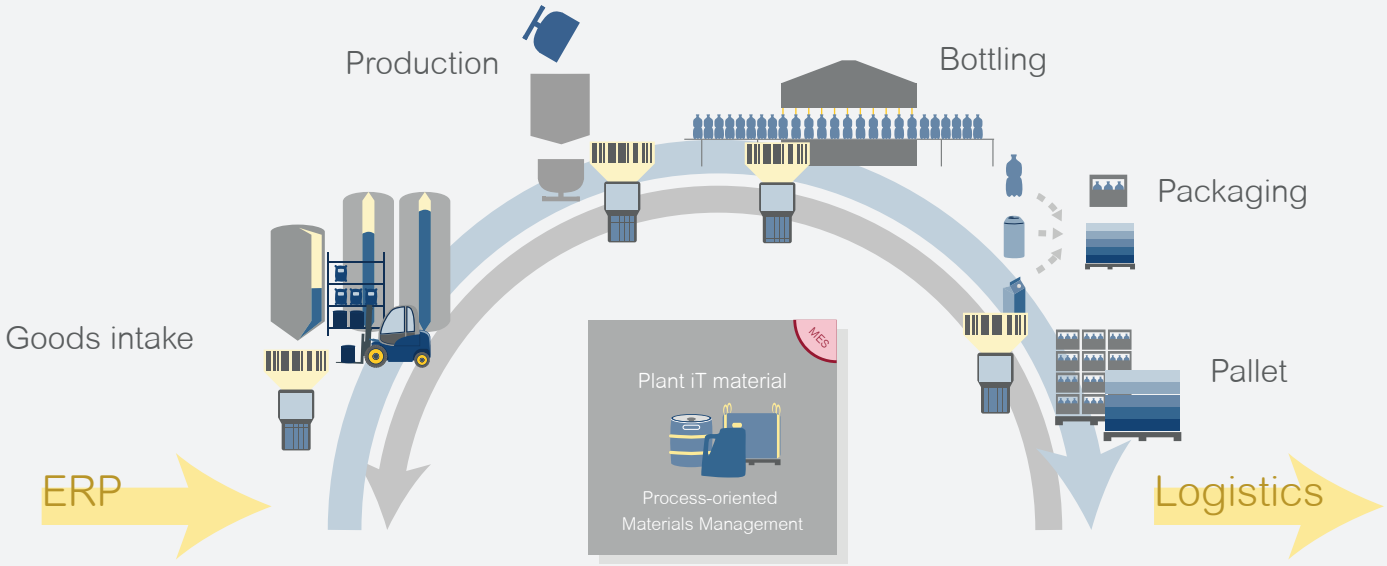
The reasons for this are not only the increasing demands of retailers and the desire for greater transparency on the part of end consumers but also the economic damage caused time and again by costly product recalls. Clear identification and the complete traceability of goods throughout the entire production cycle offer a number of advantages. Since the chronological tracking of relevant process steps allows producers, logisticians and manufacturers to be assigned exactly to the respective product or production step. Errors can therefore be avoided preventively or possible sources of errors can be found more easily retrospectively. Process-related materials management, such as the optionally available Plant iT material module, offers a transaction-accurate online view of all material transactions. They are recorded on the basis of a process-compliant warehouse structure and besides precise inventory management also enable investigation and evaluations, in particular batch traceability.

Starting at a freely selectable entry point, investigations can be carried out in both directions. An overview divided into predecessors (upstream) and successors (downstream) with presentation of the information, similar to the warehouse and transaction overview, facilitates navigation.

Batch tracking



Batch report



For all challenges in the beverage industry

- Order management
  - Goods receipt
  - Syrup and juice mixing
  - Pasteurization
  - Bottling
  - Packaging
  - Dispatching
- Recipe management
  - Acceptance of bills of materials as well as consumption and production feedback
  - Recipe changes (target quantity, water/concentrate quantity) of a current order
  - Manual component management and definition of addition times in the recipe
  - Recipe optimization and remaining quantity processing
- Process-oriented materials management
  - Mapping the material flow across all process steps
  - Inventory management for all materials
  - Material provisions
  - Recording and processing of rework
  - Batch and product tracking
- Integrated energy management
  - Energy data acquisition per batch and visualization
  - Energy statistics with detailed consumption reports
  - Feedback of the energy consumption to the higher-order process cost controlling
  - Load management with configurable parameters
- Quality and production optimization
  - Connection to laboratory systems
  - Workflow of QA-relevant inspection processes
  - Operating data acquisition
  - OEE key figures for the beverage industry
- Maintenance
  - Maintenance orders
  - Spare parts procurements, warehouse-dependent or order-oriented
  - Planning maintenance projects and tracking processes
  - Warehouse management of spare parts with minimum stock monitoring

Scalable

Demand driven

Industry-specific solution

Open, modular solution

High level of flexibility

Can be extended at any time

Tested technology

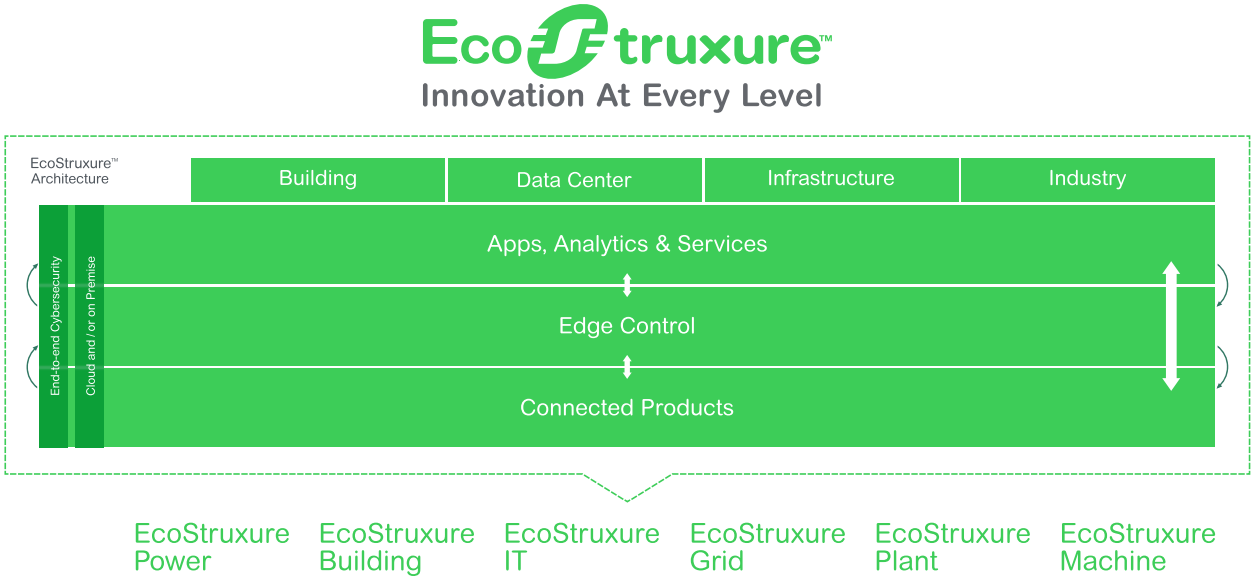
High level of standardization

EcoStruxure™

Innovation At Every Level

Since the merger of ProLeiT and Schneider Electric in August 2020, Plant iT has been complementing the Schneider Electric EcoStruxure system architecture. Bringing together the expertise of Schneider Electric SE and ProLeiT offers tremendous value to the customers of both companies to increase their productivity and efficiency. The ProLeiT solutions specifically address the consumer packaged goods (CPG) and food & beverage (F&B) sectors and thus enable broad market penetration. Through its own EcoStruxure system architecture, in which the AVEVA software plays an integral role and which is further strengthened by the ProLeiT portfolio, Schneider Electric, a company active in over 100 countries worldwide, has long been successfully driving forward digital transformation in industrial automation.

EcoStruxure is Schneider Electric's open, interoperable, IoT-enabled system architecture and platform. EcoStruxure delivers enhanced value around safety, reliability, efficiency, sustainability, and connectivity for our customers. EcoStruxure leverages advancements in IoT, mobility, sensing, cloud, analytics, and cybersecurity to deliver Innovation at Every Level. This includes Connected Products, Edge Control, and Apps, Analytics & Services which are supported by Customer Lifecycle Software. EcoStruxure has been deployed in almost 500,000 sites with the support of 20,000+ developers, 650,000 service providers and partners, 3,000 utilities and connects over 2 million assets under management.



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