CAMELOT
Management Consultants

Sustainable Manufacturing

Smart Energy

April 2023

Five key elements to establish Smart Factory in your organization

Operating Model
Align value creation in factory with customer

Enabling use Cases
Camelot & SAP Digital Apps

Foundation
Scalable technology stack that deliver standards and capabilities

Change Management & Communication
Upskill & embrace new way of working

Cross-functional Teams
Drive initiative & ensure end-to-end supply chain view

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Smart Factory Benefits

REVENUE

Increase in customer satisfaction
Improved order fulfillment and on-time shipments.

Incremental revenue opportunities
Real-time visibility to on-hand inventory.

Reduction of manufacturing cycle times
Real-time visibility to orders and exceptions

OPERATIONS

Less defects, re-work and short runs
Six Sigma compliance.

Reduced exception handling costs
Faster automated resolution of exceptions

Sustainable Manufacturing
Clean manufacturing to conserve energy and natural resources

WORKING CAPITAL

Reduction of raw material inventory
Accurate inventory visibility and exception-based management

Optimized finished goods inventory
Realtime inventory visibility.

Less production cost variances
Real-time analytics to measure actual vs. budgeted production costs

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Digital Manufacturing Value Proposition

IMPLEMENTATION SERVICES

- SAP Digital Manufacturing suite implementation services for SAP DM, SAP MII/ME, SAP Pco
- Process and application consulting
- Solution Implementation

INNOVATION SERVICES

- Smart Factory use case portfolio which includes deciated industry specific use cased which can be realized for our joint customers
- Sustainable Manufacturing application extending SAP DMC and built on SAP BTP

SCRC SERVICES

- Application Management Services
- Improvement of processes
- Knowledge transfer
- Train the trainer Workshop
- End-user training

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Camelot Smart Factory Service Portfolio

Plant Maintenance

Predictive Quality

Electronic Shift Book

Robot Palletization

Alerts

Autonomous Maintenance

Overall Equipment Effectiveness

Cloud

- SAP Digital Manufacturing Cloud for Insights (DMCi)
- SAP Digital Manufacturing Cloud for Execution (DMCe)

On-Premise

- SAP Manufacturing Integration and Intelligence (MII)
- SAP Manufacturing Execution (ME)
- SAP Plant Connectivity (PCo)

Smart Energy

Production Execution

Track & Trace

Manufacturing Performance

Product Quality

Process Optimization

Product Networks

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Smart Energy

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Process Optimization

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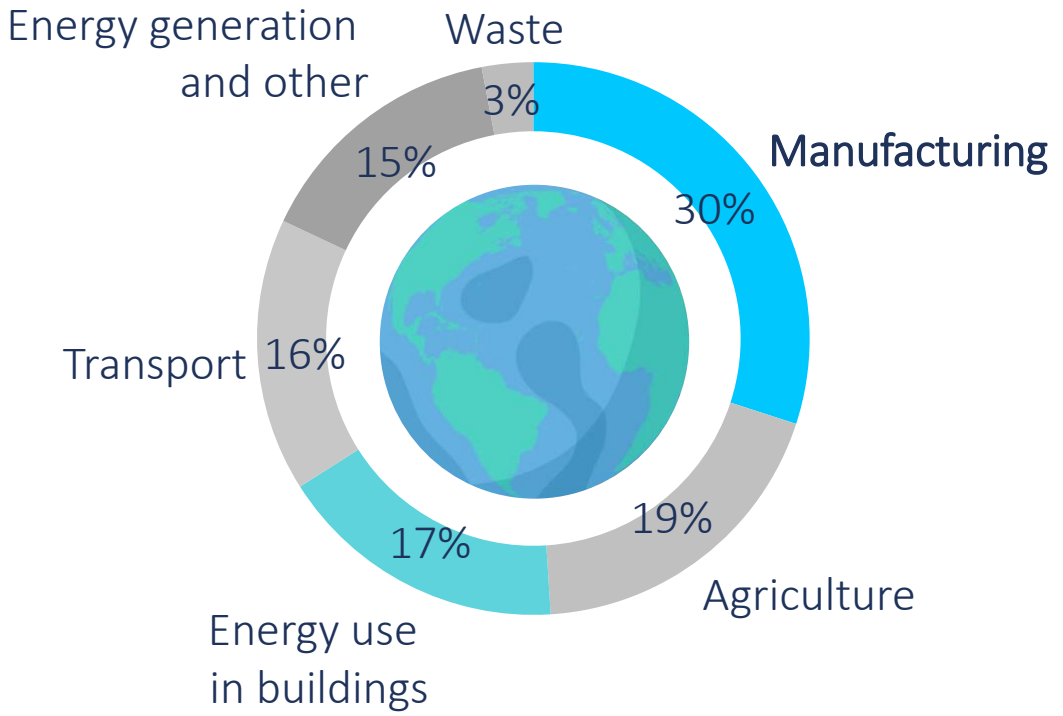
Manufacturing is at the center of attention of global efforts for more sustainability

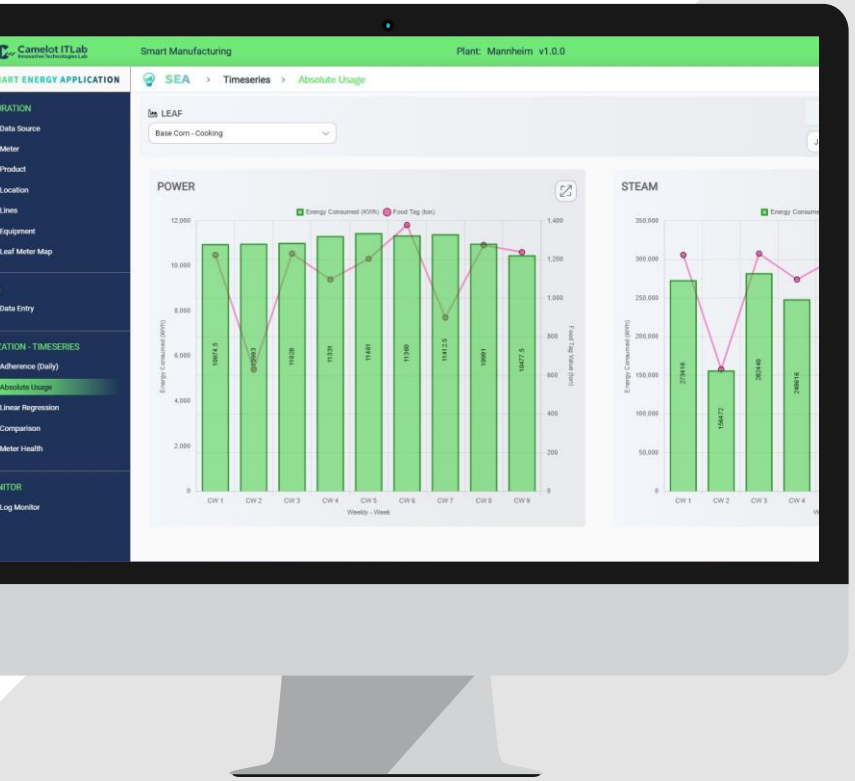
Manufacturing accounts for 30% of global CO2 emissions; it is the greatest lever to achieve sustainability

Total emissions: 50 bn to (2019)



Sources: European Environment Agency (EUA), Oxford University

LET'S TAKE ACTION TOGETHER



Manufacturing Industries have been known to implement sustainability in their production processes in multiple forms like conducting an Environmental Impact Assessment, resorting to Lean Manufacturing, investing in Sustainable Technology or even implementing an in-depth Monitoring Technology to make sure wastage is minimized and sustainability goals are achieved.

SMART ENERGY APPLICATION

MONITORING AND REPORTING

Analysis of usage of natural resources with a dual aim of maximizing production and minimizing wastage of natural resources.

INNOVATION FOR A SUSTAINABLE FUTURE

with ‘Streamlining the Manufacturing Process’ to ensure an ‘Optimum Utilization of Natural Resources’

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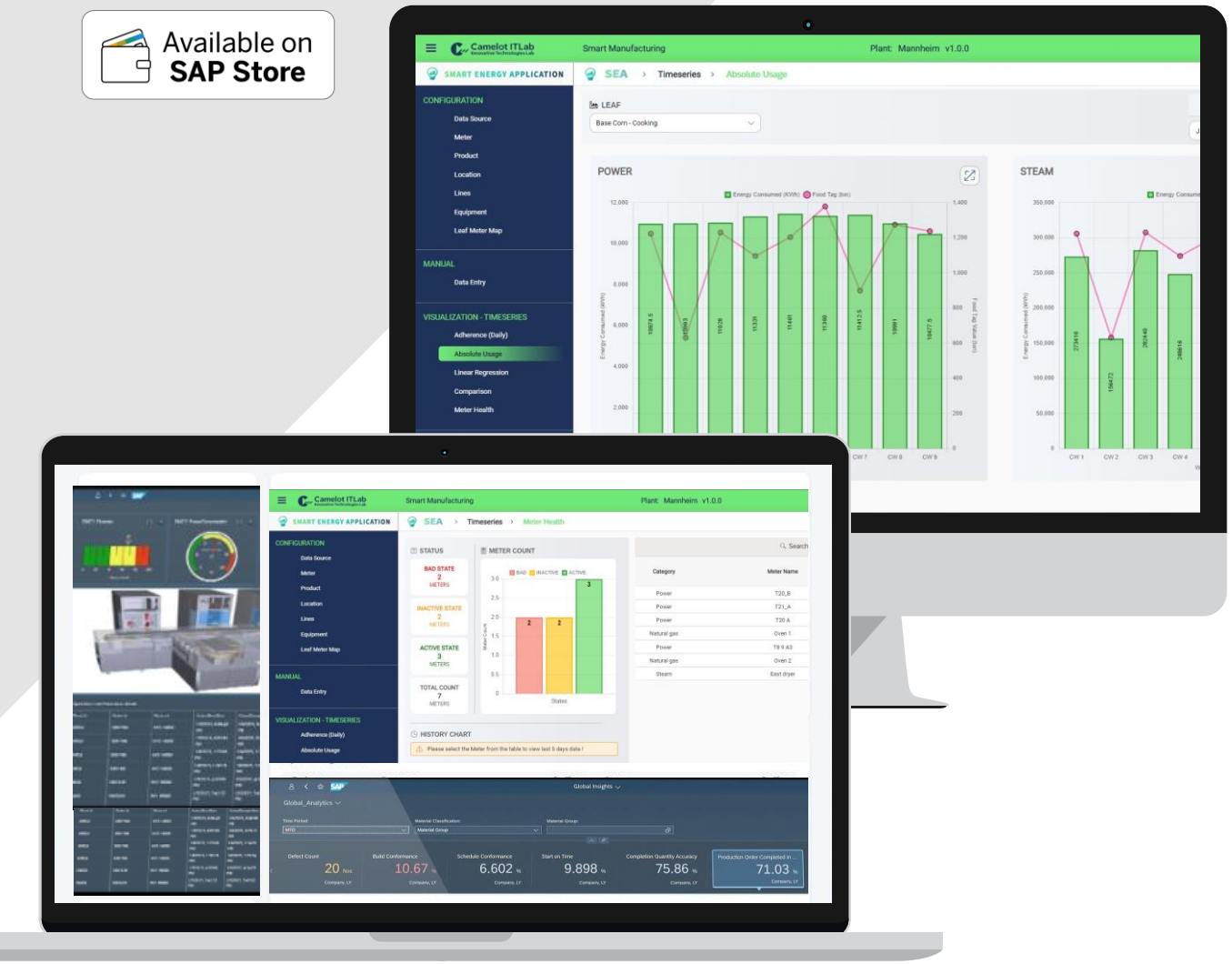
Camelot Sustainable Manufacturing - Smart Energy powered by SAP Business Technology Platform

SMART ENERGY APPLICATION

Available on SAP Store



SMART ENERGY APPLICATION

- Digital solution for tracking resource consumption and usage leveraging AI algorithms to define and analyze trending data and define smart targets
- Extending SAP DMC and built on SAP BTP
- Usage of SAP Workzone for seamless user experience

Sustainability project reference

Kellogg's

Analysis of energy consumption and definition of smart targets leveraging AI algorithms, thus reducing amount of energy and realizing Kellogg's sustainability vision

Customer benefits

SEAMLESS INTEGRATION

Integration and extension of SAP DMC via SAP BTP and SAP Build Workzone to enable improved user experience

IMPROVED VISIBILITY

Tracking of actual resource consumption Bring visibility to operations about how much energy we are using

SMART TARGETS

AI-enabled analysis and continuous improvement of energy, waste, and emissions in shopfloor

REDUCED ENERGY

Guided root cause analysis and and reduction of energy consumption

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We are a global management and technology consulting firm focusing on value chain management. Our mission: turning our clients' value chains into a competitive advantage and creating lasting impact where our clients need it most. By combining our industry focus, value chain process expertise, and technology know-how, we guide our clients from strategy to sustainable technology adoption.

www.camelot-mc.com

Why Camelot

→ CAMELOT guides businesses around the globe in transforming their IT ecosystems, with a strong focus on Supply Chain Management, Logistics, Data & Analytics, Customer Experience, and ERP.

→ CAMELOT provides a digital assessment approach to identify the right technological innovations with the highest added value

→ CAMELOT continuously scans the market for newly developed technological innovations and has experience in implementing a variety of digital technologies

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Contact

CAMELOT Management Consultants

CAMELOT Management Consultants

www.camelot-mc.com · office@camelot-mc.com

EUROPE

Global Headquarters

Theodor-Heuss-Anlage 12 | 68165 Mannheim | Germany

Phone +49 621 86298-0

AMERICAS

100 W. Sixth Street | Suite 103 | Media · PA 19063 | USA

Phone +1 267 589 9242

MIDDLE EAST

Jumeirah Lakes Towers

Cluster O · Reef Tower · 30th Floor | P.O. Box 5003333 · Dubai

United Arab Emirates | Phone +971 4 350 7441

ASIA/PACIFIC

97 Varsha · Plot no. 96/2+97

CTS no. 1132-1133 · Anand Park | Aundh · Pune · MH

India 411007 | Phone +91 9987 987 385

Business Background (Mike D)

- Retrieve data as opportunity for predictive analytics and artificial intelligence
- Visibility: Bringing visibility to operators and operations team how much energy is used, if correct amount of energy is used
- Smart Targets: How much energy should we have used for amount we have produced

- Feature: Visualization as regression to showcase how much energy should have been used

- Accelerating continuous improvement by aggregating real-time production data and then analyzing and visualizing KPIs through dashboards. This improved understanding of performance can enable better, faster decisions that improve performance. This also helps adapt to new sustainability KPIs such as consumption of energy and other resources

Mission of the Project

- It is a **digital solution** which enables us to **track real time adherence of energy/water/resource usage**, where usage is contrasted against baseline values and **correctly identifying the deviations from the targets** and trending data to improve **effective usage of natural resources**.
- It will allow both **manual meter entries** and **automatic meter entries**.
- IT provides **data insights** into energy consumption based on Areas, Meter Categories, amount of food produced which can be in tons / batch counts.
- Using **Linear Regression algorithms**, slope and intercept values are calculated. Data quality ranking is evaluated based on **R^2 value** (Coefficient of determination which is used in Statistics).
- Using these reference values, Engineering team will be able to **set target limits**.
- **Early-stage identification** of any deviation from baseline on daily basis and for engineering team which helps to identify and implement any improvement needed.
- Assists in - **strategic decision making** on the following :
  - energy sources
  - sustainable electricity suppliers
  - biogas
  - Achieving in carbon neutrality.

A Step ahead into Sustainability – Dealing with Monitoring Challenges and Benefiting Customers

- **Challenges which led to the birth of project**
  - Data Quality & Accuracy
  - Data Integration
  - Infrastructure Issues
  - Global Template

- **How does the project benefit the Customers?**
  - Real time monitoring
  - Automated data collection
  - Daily Adherence
  - Meter Health
  - Global Template for different business units

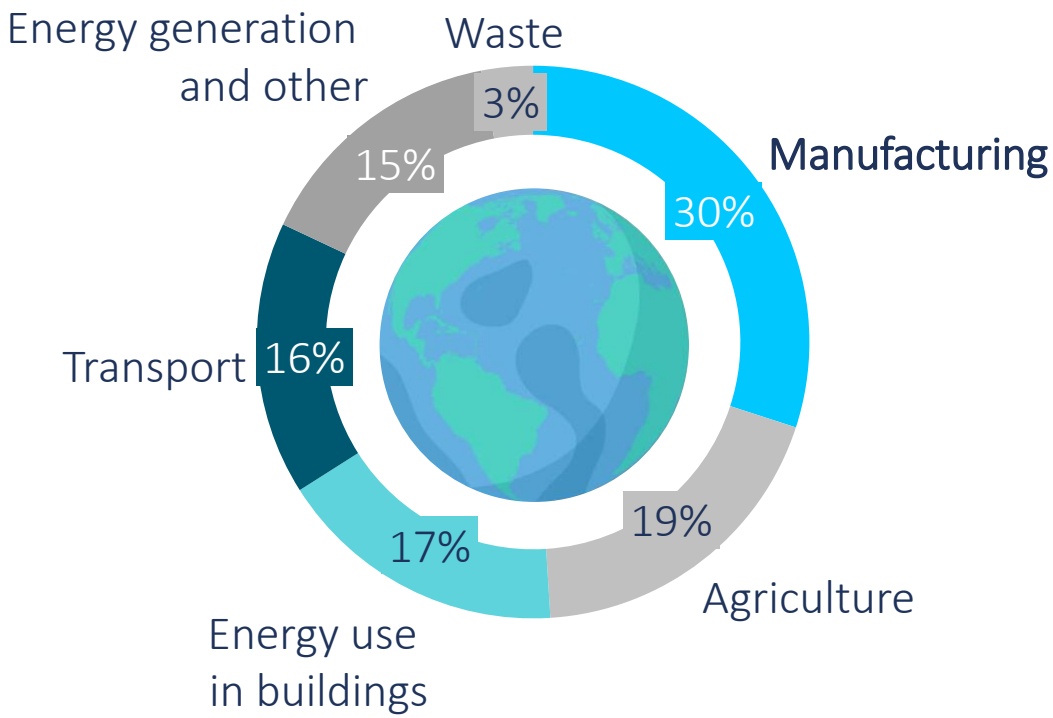
"This tool is really important to us where it provides data points to Tier meetings that occur daily at our plant where the Operations team needs to drive actions incase of abnormalities in energy / water consumption"

– Director, Global Engineering, CPG Industry

Manufacturing is at the center of attention of global efforts for more sustainability - Impressive results with great leverage can be achieved

Manufacturing accounts for 30% of global CO2 emissions; it is the greatest lever to achieve sustainability

Total emissions: 50 bn to (2019)

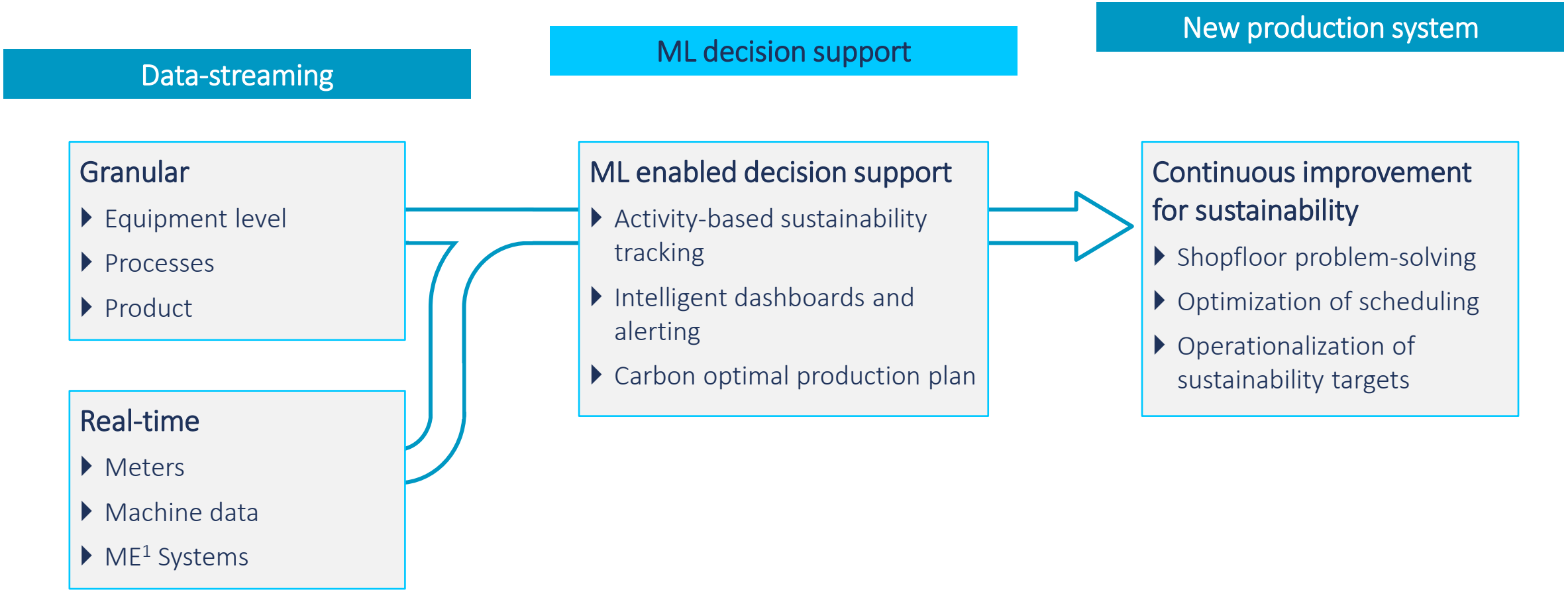


Sources: European Environment Agency (EUA), Oxford University

A new paradigm for sustainable manufacturing: ML enabled decision-making on energy and resource consumption

- **Manufacturing is in the center of the drive to more sustainable ways of production**, because it is a major driver of emissions and natural resource consumption
- **A new paradigm** is needed to make sustainability in manufacturing happen
  - **Data streaming**: data on resource and energy consumption must be generated and leveraged in high granularity and real-time
  - **ML supported decision-making**: the focus must turn away from reporting on sustainability, to managing sustainability performance
  - **New Production System**: not only IT setups must change, but management processes and routines must be refocused on sustainability
- **New methods** are required to implement a sustainable production system
  - A **new type of activity-based accounting**, enabling BoM data and process KPI to be extended by sustainability dimensions
  - **New work routines** embed decisions on sustainability performance into shopfloor planning and problem solving
  - A **new IT architecture** connects equipment-meters with ML services and enterprise planning systems
- Sustainable manufacturing is a **great journey that can begin with a small step**
  - Providing Proof of Value (PoV) is a good first step. Connecting data from a single production area to our ML service to feed a dashboard can usually be achieved in one sprint of 2-4 weeks
  - The PoV is then extended to the entire factory in an agile approach, and will serve as blueprint for the global roll-out

Three key principles are critical prerequisites for the new paradigm in Smart Energy



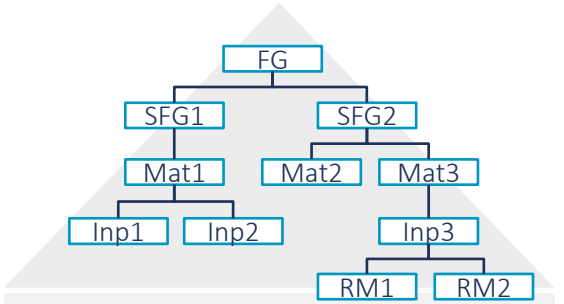
[1]Manufacturing Execution

A new production system that embeds sustainability in management processes and routines is needed

A new production system

- Today's production planning controlling systems leave **managers in the dark** about the environmental impact of their manufacturing processes
- The "Smart Energy" system **extends manufacturing intelligence dashboards with sustainability dimensions** like energy, water and waste
- A **new way of activity-based accounting** is implemented, to extend BoMs[1] and process KPI by energy and resource use
- This supports **decision making on sustainability performance in work routines and problem-solving sessions** on the shopfloor

Activity based sustainability accounting



Example BoM explosion

Quantities

Resource time (labor, assets)

Costs

Typical BoM data

Energy use

Resource consumption

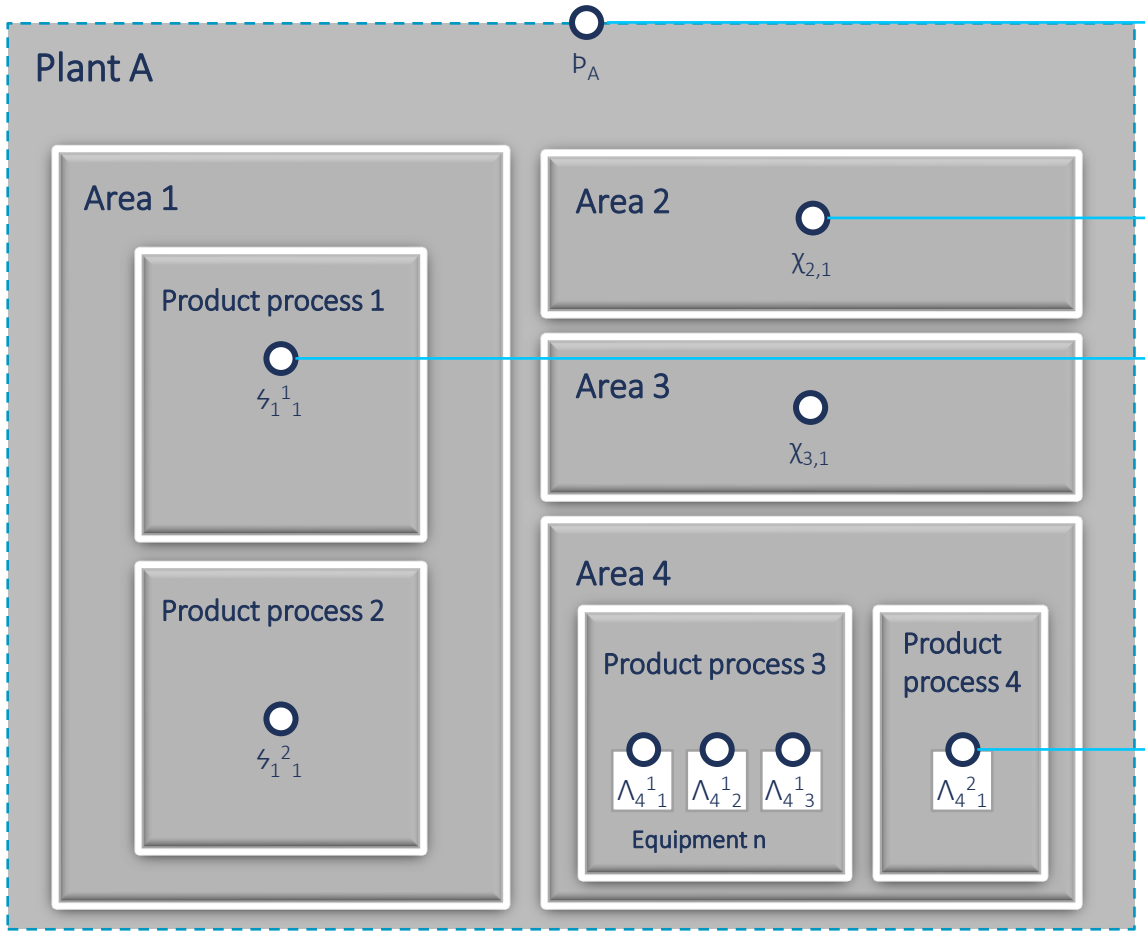
Waste production

Smart Energy BoM extension

[1]Bill of Materials

Data is streamed in real-time from equipment and prepared by ML services for aggregation and analysis

Sub-division of factory in measurement areas



Aggregation of measurements in KPI tree

Meters on plant level
- Connections to grid
- On-site energy transformation

Meters on area level
- End-to-end (E2E) manufacturing processes (e.g., conversion of input into finished goods)

Meters on product process level
- Sub-processes, part of E2E process (e.g., various WIP processes)

Meters on equipment level
- Process equipment (e.g., grinders, ovens, assembly)

Analysis and decision-making is supported by ML-enabled dashboards, giving shopfloor and operations people real-time insights into sustainability performance

Real time analysis

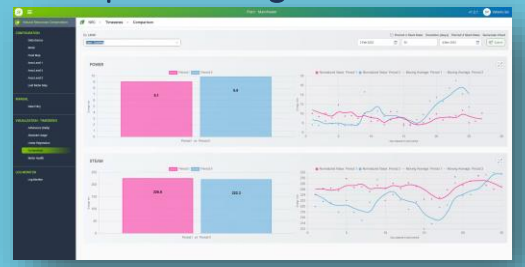
Tactical review

Strategic action

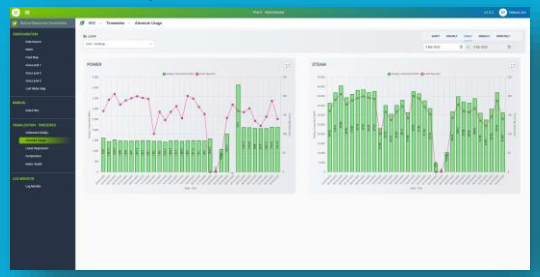
Engineering team

Energy to product output

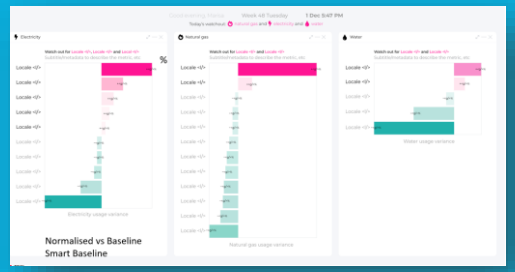
Glidepath vs. target



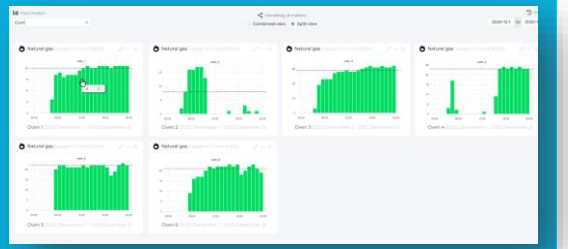
Consumption variance review



Deviation vs. recipe/ budget

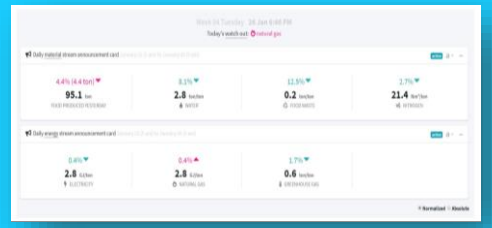


Usage pattern optimization



Operators

Shift dashboard/ alerts



Peak consumption series

Resource use metrics are added to BoMs and activity-based accounting. The generic set of resource input KPI can be extended on a per-need basis

Resource input KPI

Energy efficiency

Conventional
- Electricity
- Natural gas
- Gasoline
- Diesel
- Others

Renewable
- Renewable electricity
- Renewable fuels

Intermediates
- Steam
- Compressed air

Water consumption

Water use
- Water supply
- Water reuse

Wastewater
- Treatment
- Discharge

Waste generation

Waste disposal
- Deposition
- Incineration

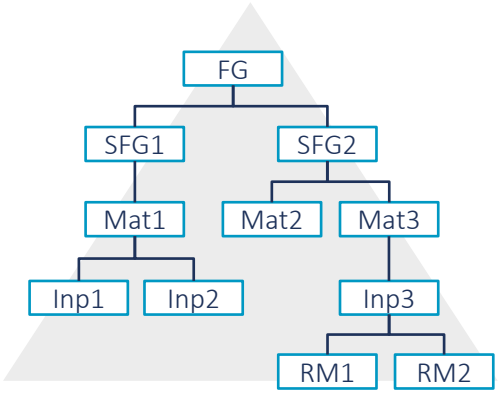
Waste treatment
- Bio recycling
- Anaerobic digestion
- Composting
- Animal feed

Resource consumption and emissions KPI

- Primary and secondary direct consumption, emissions
- Primary and secondary indirect consumption, emissions
- Conversion of primary energy to secondary energy

Instead of “greenwashing” based on efficiency averages, resource and energy use is embedded in BoM and activity-based accounting to create sustainability reports on product level

Extended BoM



Quantities

Attributes

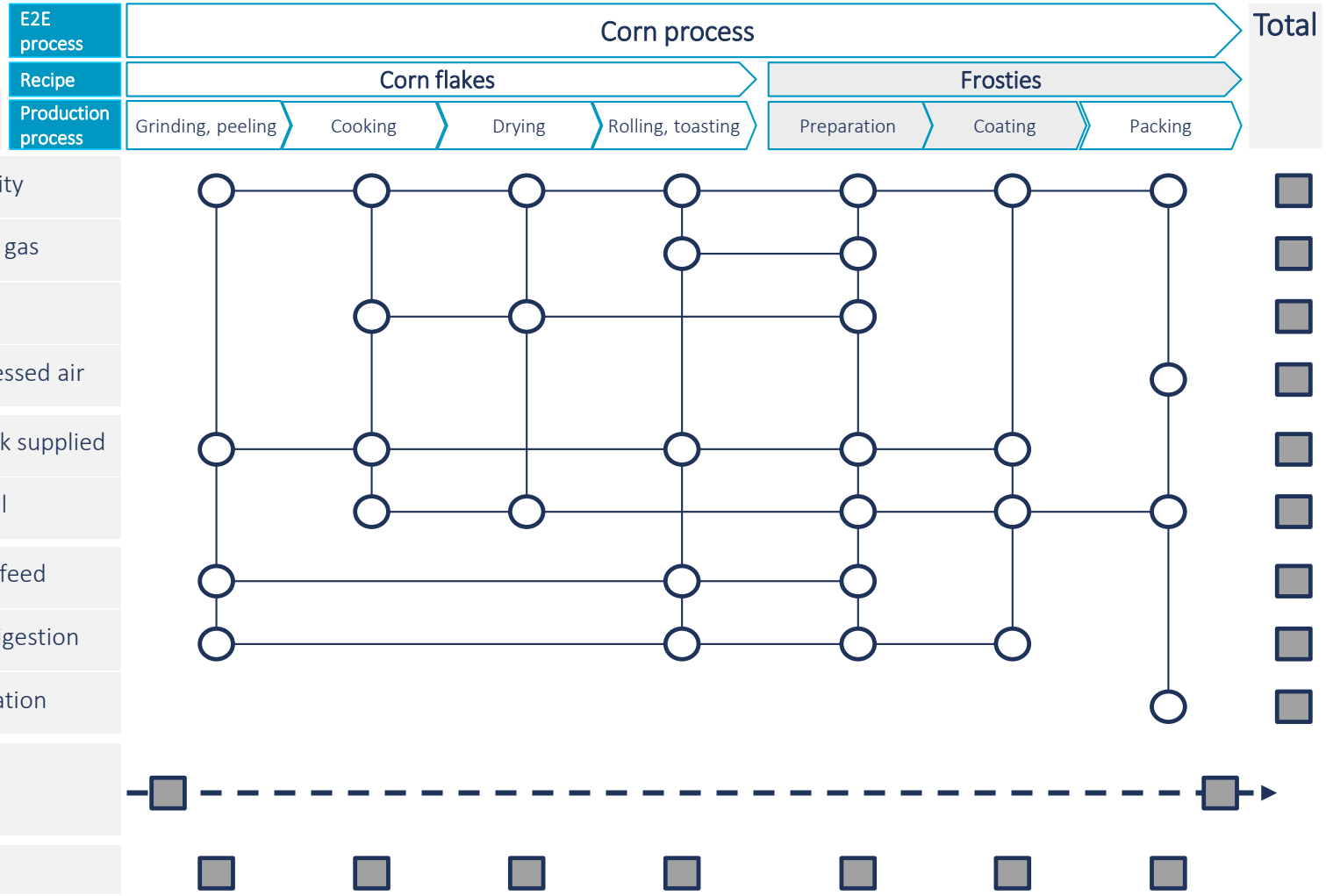
Costs

Energy use

Resource consumption

Waste production

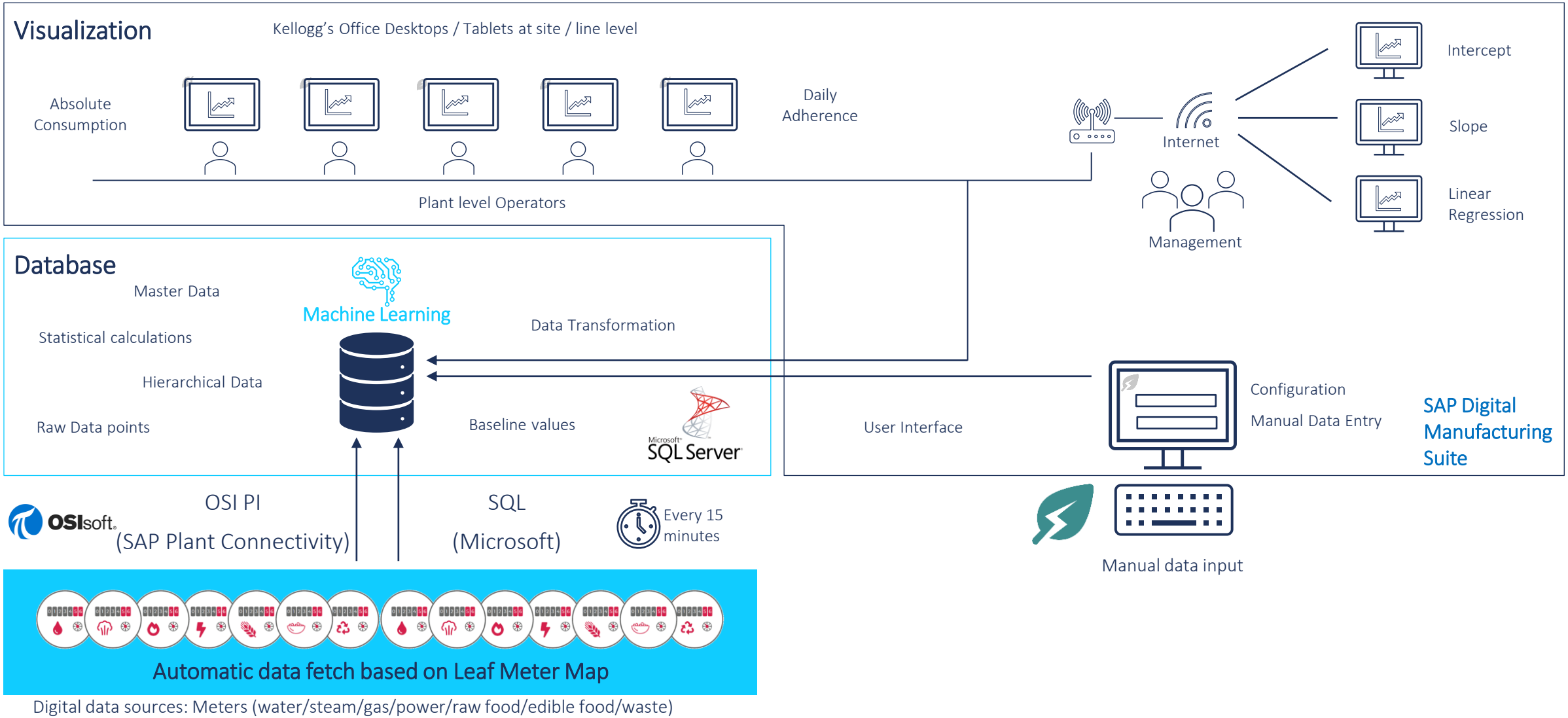
Resource use measurement grid along manufacturing process



[1]End-to-end

Camelot ITLab
Innovative Technologies Lab

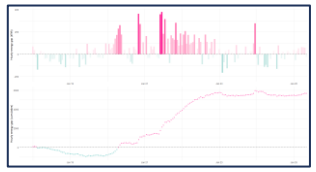
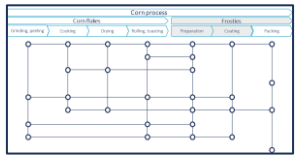
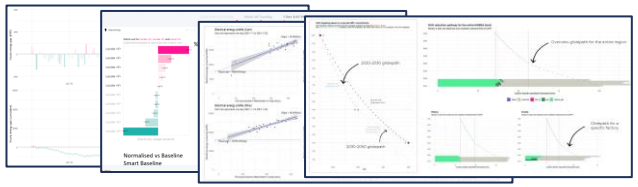
Technical Architecture



Digital data sources: Meters (water/steam/gas/power/raw food/edible food/waste)

How CAMELOT can support you:

Proof of Value within 2-4 weeks, full pilot plant in 4-6 months

	1 Proof of Value (PoV)	2 Need analysis and system design	3 Agile development	4 Roll-out implementation
Number of sprints (2 weeks each)	*one or two*	*one or two*	*Depending on scope, ~4 months*	*Depending on scope*
Key activities	▸ Build a live dashboard on 1-2 selected KPI as PoC ▸ By connecting existing meters-infrastructure to CAMELOT system	▸ Screen existing data for opportunities ▸ Understand business needs (workshops) ▸ Draft layout of meters along areas and processes, analyze gap	▸ In 1-2 selected plants… ▸ Design future state for measurements and dashboards ▸ Detail and implement system design ▸ Iterate for learnings ▸ Create template for global roll-out	▸ Implementation of proven concept to other factories ▸ Training of staff in use and interpretation of data
Results	 1 PoC Dashboard, running on CAMELOT system	 Shared understanding of starting point and target state	 All dashboards and KPI, running on customer system in 1 plant	 Global rollout of Smart Energy system

CAMELOT has supported Kellogg's at conceptualizing and implementing a system to measure energy, water and waste use on the shopfloor in real-time

Kellogg's is a global leader in the food processing and consumer brands industry, with 54 manufacturing plants in 18 countries. Kellogg's operates in 13 subsidiaries and 1 joint venture. Its cereals, snacks and convenience foods are sold in over 180 countries.

Industry:	Food processing
Headquarters:	Michigan, USA
Revenue '20:	13,8 bn USD
Market cap:	22,7 bn USD, S&P500 component
Employees:	34.000
Brands:	

Kellogg's natural resource conservation initiative (NRC)

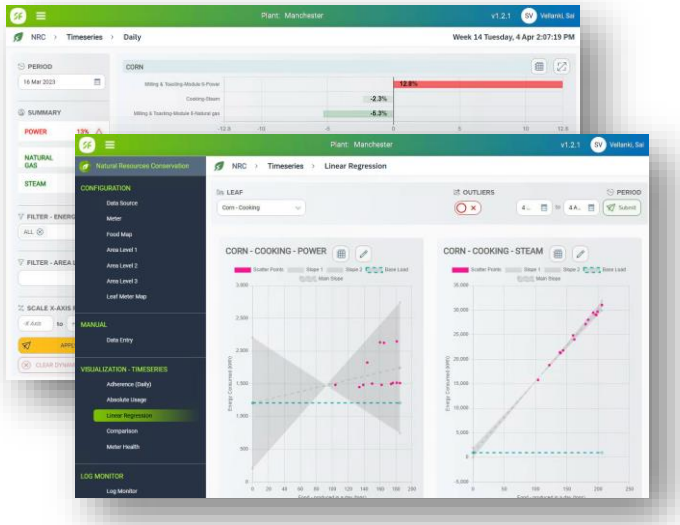
- Limiting climate impact of food processing in all plants, by reducing scope 1&2 greenhouse gas emissions by 65% until 2050
- Reduce water consumption by 30% until 2030 in high-risk sites
- Limit waste output by 50% until 2030 in all sites, therefore reducing raw material consumption

CAMELOT' Smart Energy concept

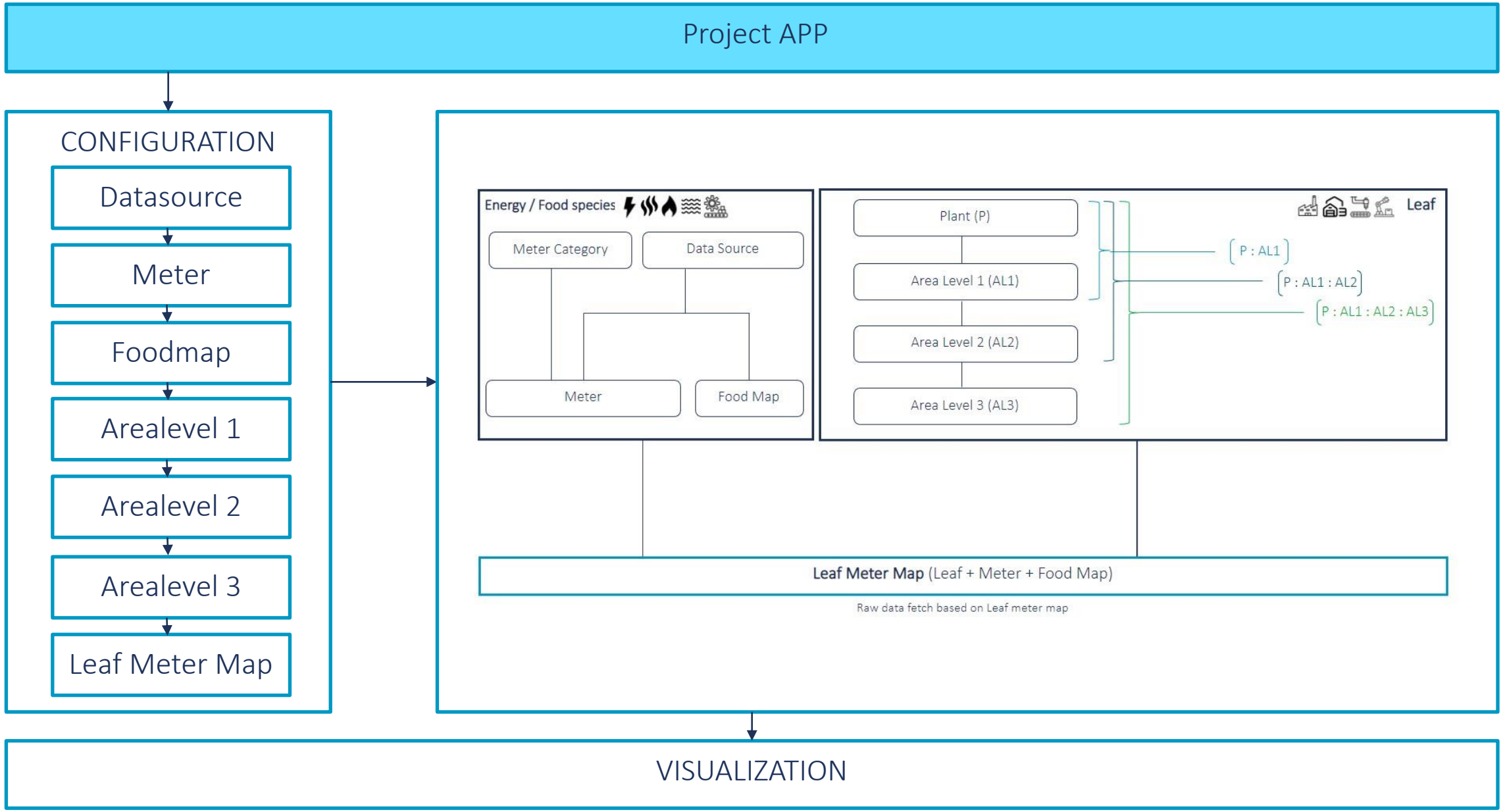
- Measuring energy, water and waste consumption in real-time, from shopfloor to factory level. Tapping into various data sources and streams, and allowing manual inputs to fill remaining gaps
- Embedding dashboards and NRC cockpit into existing smart factory and ERP systems
- Applying machine algorithm services to enrich raw data for max. relevance

Key results

- Working Smart Energy prototypes in 2 UK plants with corn and rice lines
- Business-value-focused dashboards to manage energy, water and waste consumption
- Strong buy-in and acceptance by staff both on shopfloor and management level



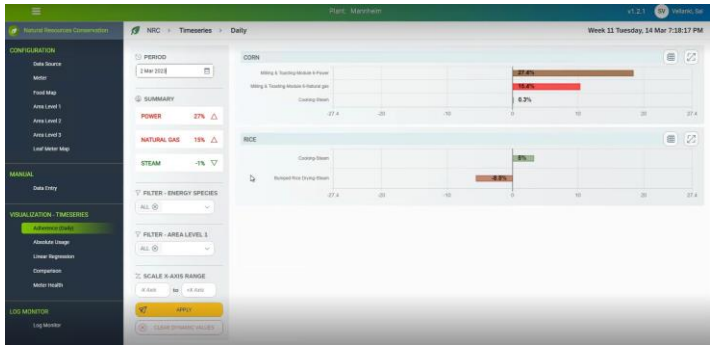
Example NRC dashboard in smart factory cockpit

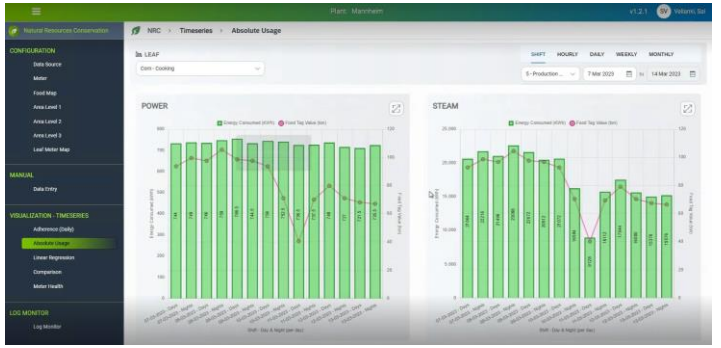

Project APP
CONFIGURATION
Datasource
Meter
Foodmap
Arealevel 1
Arealevel 2
Arealevel 3
Leaf Meter Map
Energy / Food species
Meter Category
Data Source
Meter
Food Map
Plant (P)
Area Level 1 (AL1)
Area Level 2 (AL2)
Area Level 3 (AL3)
Leaf
P : AL1
P : AL1 : AL2
P : AL1 : AL2 : AL3
Leaf Meter Map (Leaf + Meter + Food Map)
Raw data fetch based on Leaf meter map
VISUALIZATION

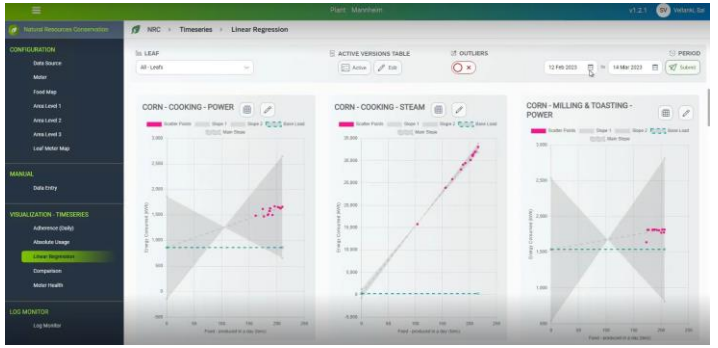
CONFIGURATION

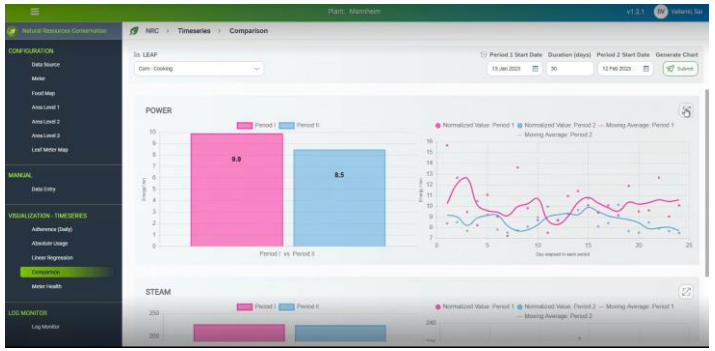
VISUALIZATION

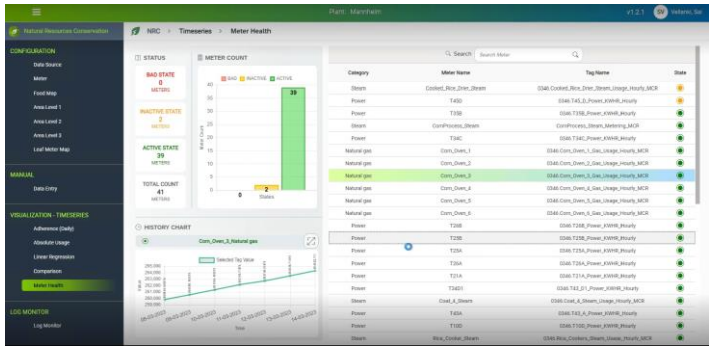
- Adherence Daily
- Absolute Usage
- Linear Regression
- Comparision
- Meter Health











LOG MONITOR

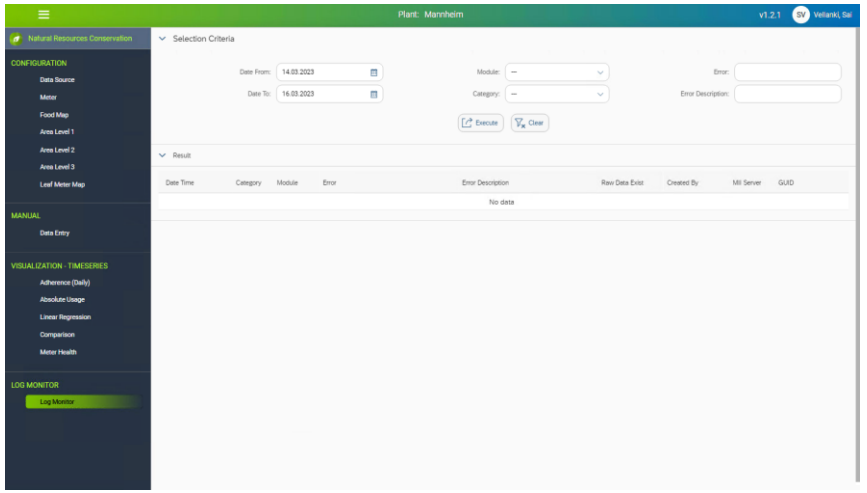
Trajectories – Implementation of Solution

CONFIGURATION

VISUALIZATION

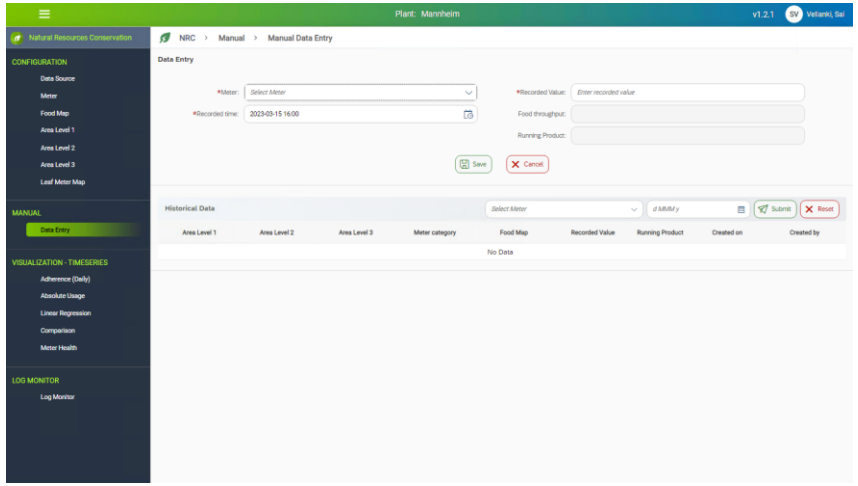
LOG MONITOR

Log Mointor



MANUAL

Data Entry



Features Specifiction

- Configuration:
- Visualization:
- Manual Data Entry:
- Log Monitor:

Challenges which might arise in the Future

- Data quality
- Integration with existing Infrastructure systems.
- Training and adoption
- Changes in type of Product being manufactured

Camelot Campaign Planner & Designer

Challenge	Our Value Proposition
Increasing complexity in product portfolio and planning constraints complicate creation of feasible production plan	**Touchless planning:** Parameter-controlled, automated scheduling logic to create reliable & feasible production plan
High degree of variability in demand & supply increase supply chain nervousness and result in poor service level and product availabilities	**Profit increase:** Cost & revenue optimization by increasing output and improving OEE
Missing IT solutions for innovative, automated and demand driven production planning concepts	**Variability reduction:** Demand-driven principles stabilize supply and demands upstream the supply chain

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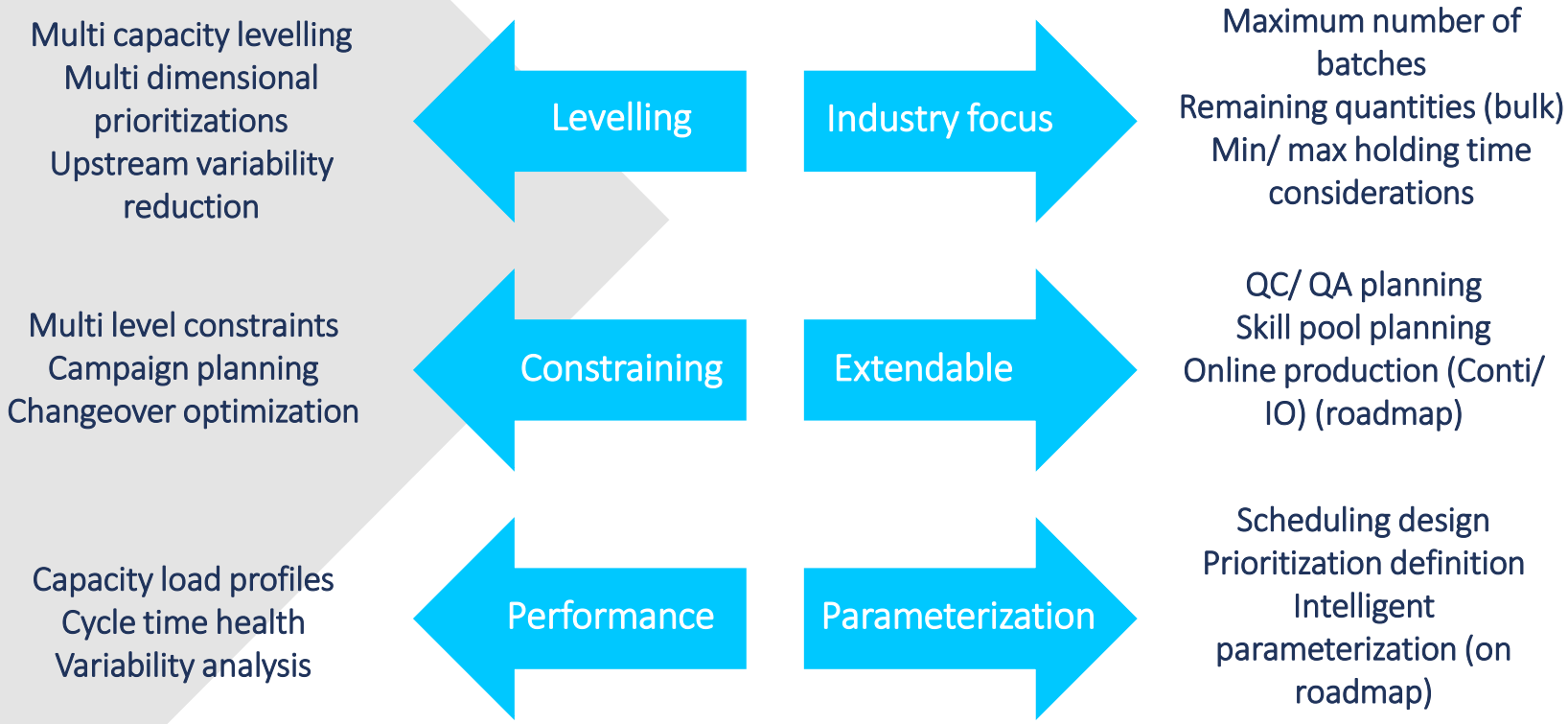
Camelot Campaign Planner & Designer Capabilities



Enhancement in Product Life Cycle Management: Creation of missing planning objects for Reference Products

CURRENT SITUATION

- **Bullwhip Effect**
- **Challenges;**
  - Low OEE
  - Variability
  - High WC
  - Misalignment
  - Operational Hectic
  - Low OTIF
  - Stock-Outs
  - Short-term Adjustments
  - Manual Effort
  - Capacity Shortages
- **Planning Characteristics;**
  - Repetitive Planning Logic
  - High Setup Times
  - Grouping of Products
  - Forecast-based Planning

Fully-integrated into SAP SCM

Certified in SAP S/4 Advanced Planning

Approved by Demand Driven Institute

CAMELOT CAMPAIGN PLANNER & DESIGNER

Demand Driven Rhythm Wheel Planning

Setup Matrix Builder

Setup-Oriented Forward Scheduling

Advanced Planning Analytics

FUTURE SITUATION

- **Less Bullwhip – More Stability**
- **Benefits;**
  - Inventory reduced by 35%
  - Service level increased by 4,4%
  - Active use of safety stocks
  - High plan adherence
  - Variability reduced by 30%
  - SC cost down by 20%
- **High Level of Automation**
- **Advanced Planning Logs**
- **Proven Benefits in Industries**

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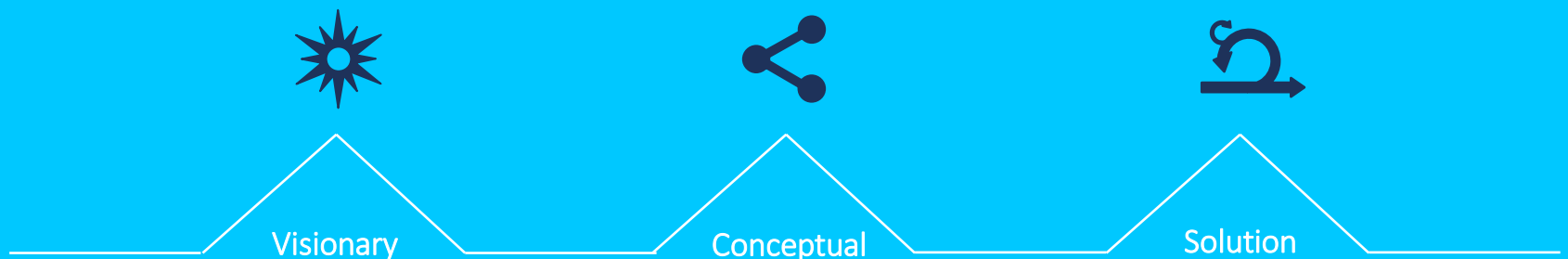
What CPD offers to master your challenges

As our mission we strive to excite people with a scheduling solution by utilizing our visionary and conceptual capabilities to provide a tailored end-to-end solution



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With our visionary solution based on three main components we address customer's challenges towards an integrated and concurrent supply chain planning and scheduling

1 Increased planning support and transparency

- Consideration of **different planning horizons**, like frozen and tactical horizon
- Integrated **cross-plant** and **cross-supply chain** level production planning
- Increased **transparency** through system- based evaluation & analysis
- Increased planning **standardization** and **automation**

2 Enhanced system integration and consistency

- **Scheduling** solution integrated in RapidResponse
- **Ensure real time transparency** within the entire company

3 Innovative planning concepts for production smoothing

- **Production smoothing** through advanced planning algorithms (e.g. SOFOS and Rhythm Wheel planning concept)
- Set-up time management (Advanced Setup Matrix Builder)

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The Campaign Planning approach stabilizes the production network and frees up capacity to increase supply agility

Project Example

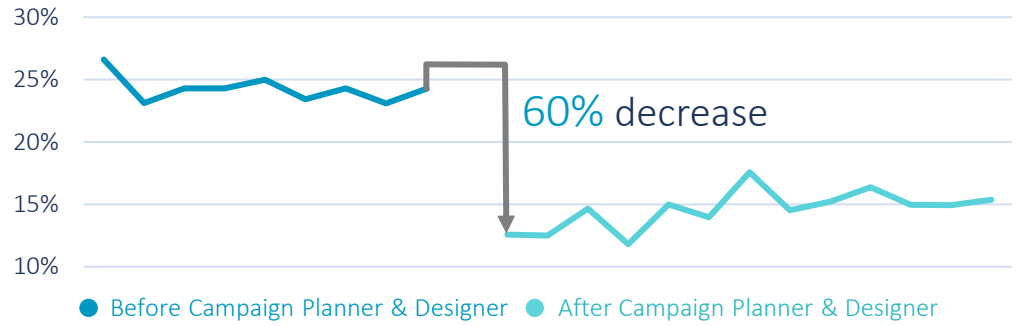
REDUCTION OF AVERAGE SETUP RATIO
-40%

FREED CAPACITY OF ONE MAJOR PLANT
+16.000h pa

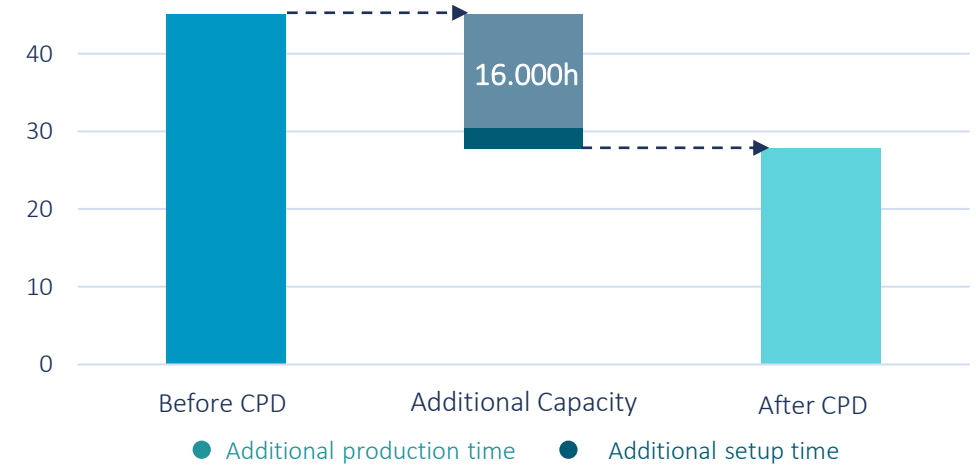
OPERATIONAL OUTPUT INCREASE[3)]
+36m pieces pa

FREED UP CAPACITY LEVELS[4)]
+240m USD sales

MONTHLY SETUP RATIO REDUCED [%][1), 2)]



ADDITIONAL PRODUCTION TIME GENERATED [1000 h] [1)]



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Our Camelot Campaign Planner & Designer has been a key element of our latest implementation projects and across different industries

Demand-Driven LEAN SUPPLY CHAIN PLANNING

CAMELOT CAMPAIGN PLANNER & DESIGNER

End-to-end network propagation & visibility of demand and supply

APO PP/DS and Lean Suite enabled production planning

AstraZeneca, B/S/H/, LEO, Henkel, Nestlé, Lilly, Pharmstandard, Colgate, FlintGroup, Imperial Brands, P&G, STMicroelectronics life.augmented, Novartis

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Key Benefits of the solution

Business Process Benefits

- **Minimized Supply Chain Bullwhip effect**
  due to regular production patterns - Increases Supply reliability
- **Reduced Inventory holding costs**
  due to optimized Safety Stock levels
- **Improved Capacity Utilization**
  due to optimally sequenced production patterns
- **Reduced Scheduling Effort**
  based on finite scheduling heuristics
- **Pull Replenishment**
  throughout the supply chain
- **One tool for all Planning functions**
  increases efficiency

IT Benefits

- **Standard SAP environment**
  for LEAN Planning
- **Customizable**
  to business needs
- **High user acceptance**
  due to SAP Fiori UI
- **Seamless integration in SAP**
  ensures limited support effort
- **No external interfaces needed**
  for data extraction
- **Business acceptance**
  due to standard SAP planning processes

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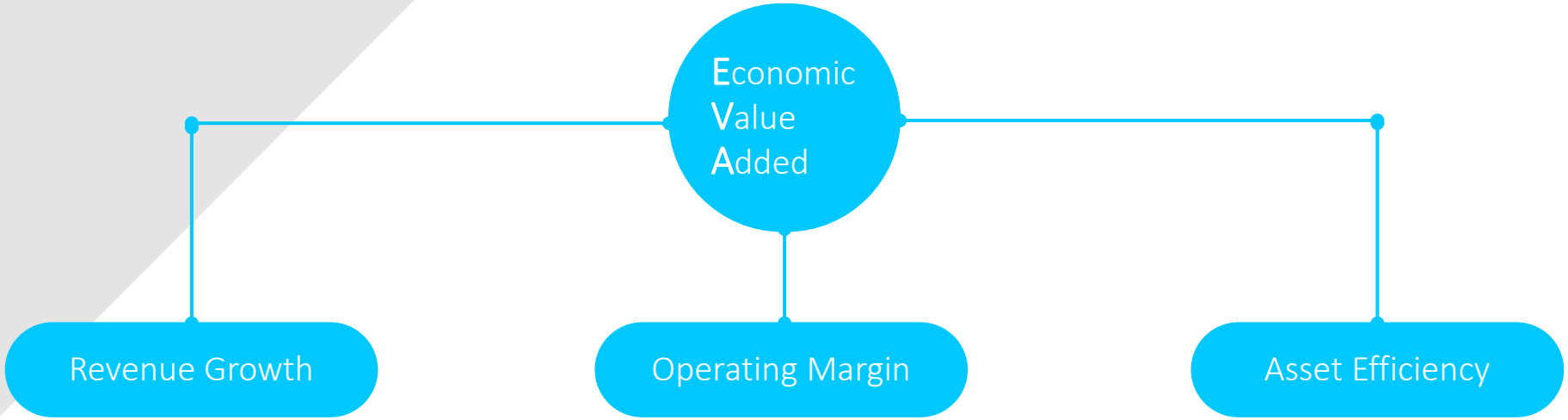
The Camelot Campaign Planner & Designer brings multiple levers to economic value added creation)



Margin-based supply chain segmentation
→ Reduction of supply chain costs by 20%

Improved Customer Order Fulfillment Experience
→ Service levels from reference customers increased by 4,4%

Improved Operational Equipment Efficiency
→ Conversion cost reduced by 10%

Managed operational variability
→ Throughput time reduced by 40%

Margin based prioritization
→ Reduction of on-hand inventory by 35%

Reduction of overhead costs
→ Planning time reduced by 67%

Increased output from existing manufacturing assets
→ Average setup ratio reduced by 40%

End-to-End supply chain visibility
→ Reduction of average demand variability by 60%

Reduce in house production times
→ Lead time reduced by 67%

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Based on selected customer references

The improvements of a demand driven adaptive supply chain yield to a significant financial impact in the dimensions capacity, inventories and workforce efficiency

Operational improvement

- **Increased visibility** and valid information basis for decision making
- **Increased agility** and **responsiveness** by **reducing** customer **lead times**
- Connection of factories and market demand via **integrated planning & execution process**
- **Reduced variability in the supply chain** (e.g. via stabilized demand information)
- **Improved use of capabilities** (capacity, inventory) by focus on actual customer demand
- **Reduced manual efforts** (e.g. via better process and system integration, clear roles & resp.)

Expected dimensions of financial impact

- Improved machine availability/ less change over costs
- Reduced write-offs
- Reduced inventories
- Workforce efficiency improvements
- Reduced variability

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The implementation of the Camelot Campaign Planner & Designer provides significant improvements of crucial key performance indicators with significant impact on the value stream's financial result

INCREASE OF AVAILABLE PRODUCTION TIME

15 to 40%

The demand driven rhythm wheel approach stabilizes the production network and frees up capacity to increase supply agility

REDUCTION OF FINISHED GOODS INVENTORY

-15 to -35%

The bullwhip effect and on hand stocks are reduced with demand driven planning approaches

INCREASE SERVICE LEVEL

2.5 to 25%

The increased reliability in production and active stock management improve order fulfillment

REDUCTION OF WORKING CAPITAL

-10 to -30%

A levelled production reduces supply chain volatility and ensures less working capital due to lower lead times

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Templates

IBP Release 2102

Salient new features with the 2102 quarterly IBP upgrade which can help Zinus in improving their Demand planning process

Most valuable new features for Zinus

Improved advanced forecasting algorithms with promotion planning

Trend pattern detection in Gradiant boosting algorithm

Enhancements in Product life cycle mgmt. to create missing planning combinations

Forecasting now possible with aggregated seasonality

Enhancements in forecast realignment

Leveraging calendar capabilities in demand sensing

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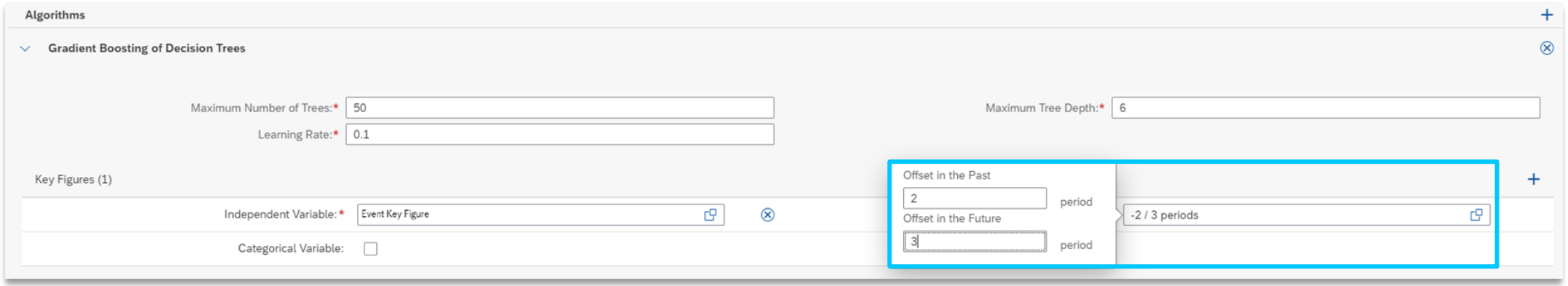
Enhancement in Forecasting: Model pre- and post-period impact as an enhanced feature for regression models

- Improved forecast algorithm to learn from the past and apply this in the future in case of events or promotions that also impact sales the period before and after
- The algorithm learns if there was any impact and how big it was for the periods before and after for each forecasting combination
- **Offsets** can be specified in the forecast model for each independent variable
- Available for MLR, Gradient Boosting, (S)ARIMAX



- Max. -3/3 periods due to performance reasons
- -2/3 : Two periods before and three periods after

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Enhancement in Forecasting: Gradient Boosting to manage trends

Before the release Gradient Boosting had problems to handle trends.

Enhancement of Gradient Boosting to manage trends:

- When Gradient Boosting starts, the input key figure is checked against trends
- If trends are found, Gradient Boosting operates in the enhanced mode to manage trends
- In case there are no trends in the input data, Gradient Boosting operates in standard mode

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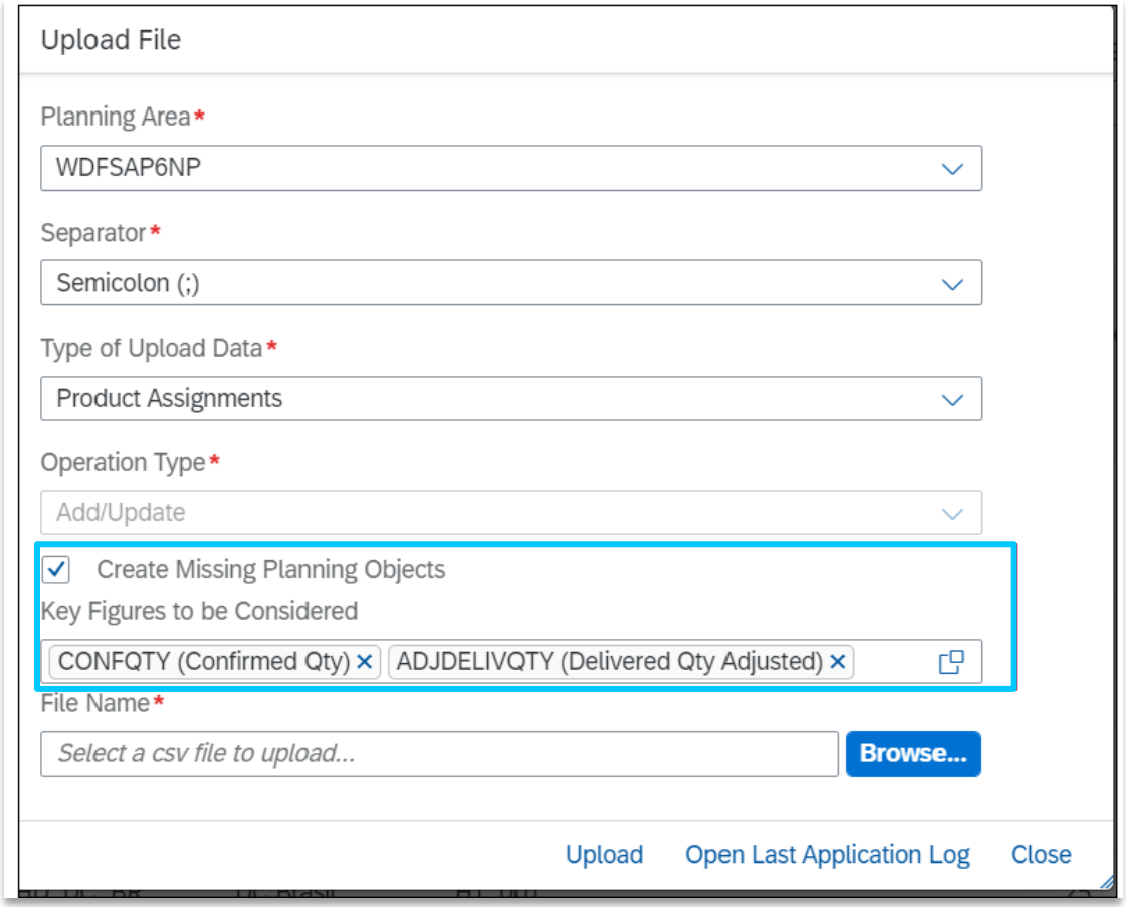
Enhancement in Product Life Cycle Management: Creation of missing planning objects for Reference Products

- Instead of manually maintained settings the user can also upload data from a file
- A missing planning object of a new product can now be created automatically as part of the file upload by copying the planning objects of a reference product using the upload feature for product assignments
- The system needs to know on which planning level the planning objects need to be created (technical requirement).
- The planning level can be defined upfront, so the planner does not necessarily need to do it



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Enhancement in Time Series Analysis: Forecasting with aggregated seasonality (1/2)

	Before	After
1	Seasonal patterns could only be saved on the calculation level: The base planning level of the target key figure for seasonality pattern had to match the calculation level of the Forecast Automation profile	Seasonal patterns can be identified on aggregated level and disaggregated to lower level
2	System checked seasonality pattern and decided automatically if it is an additive of multiplicative seasonality	Multiplicative seasonality can be chosen so the system checks only for multiplicative seasonality

The goal is to identify the seasonality pattern on higher level and use it on lower level

→ Only meaningful for multiplicative seasonality

- Key figure to store seasonality pattern is defined on Product ID & Location level
- Seasonality pattern is disaggregated via “Copy Value” from Product Group/Location to Product ID/Location level

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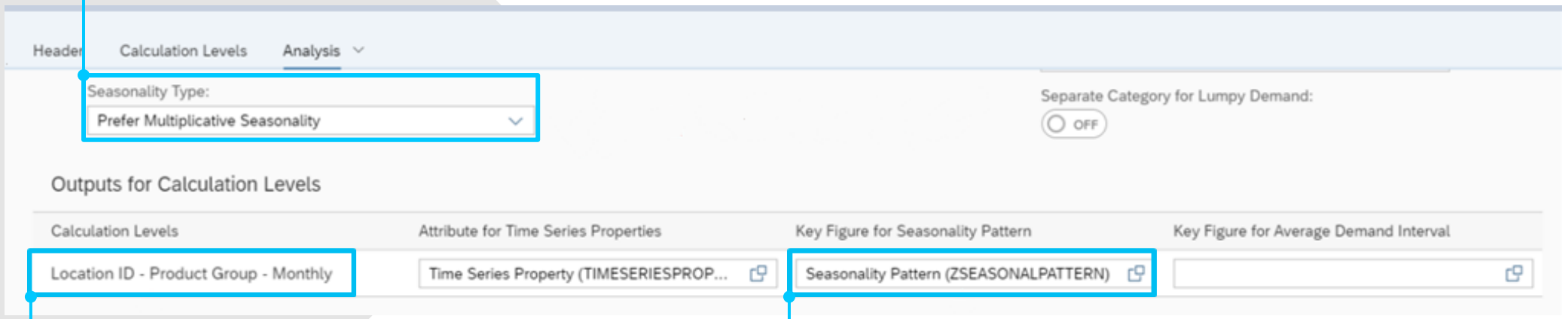
Enhancement in Time Series Analysis: Forecasting with aggregated seasonality (2/2)

1 Choose Multiplicative Seasonality



2 Seasonality is identified on higher level

3 The result is disaggregated via “Copy Value” to the base planning level of this key figure

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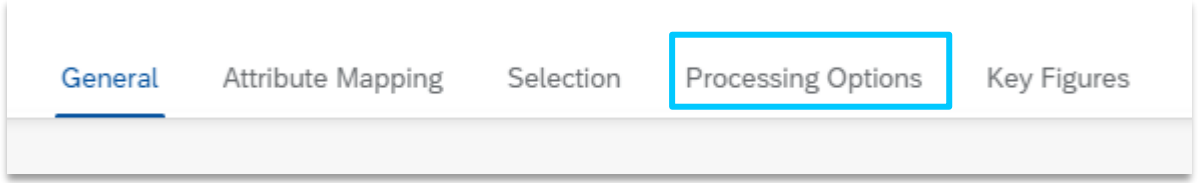
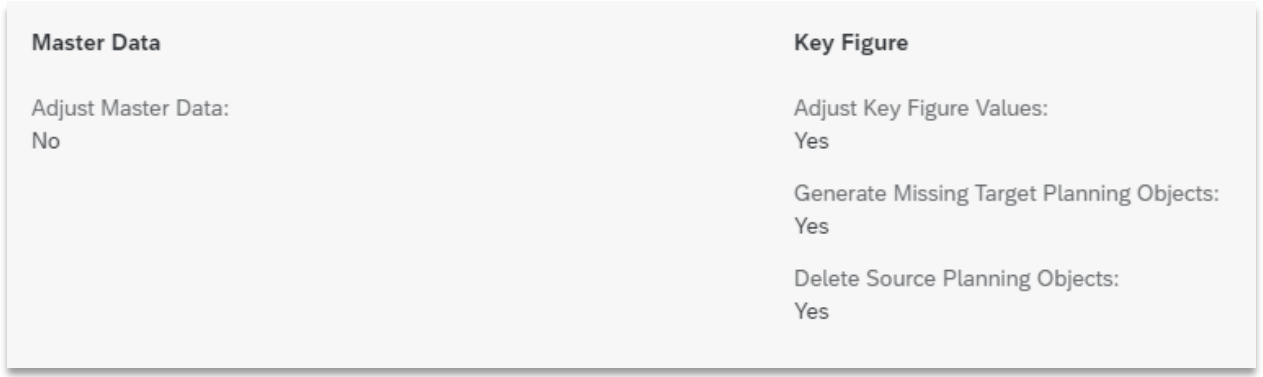
Enhancement in Demand Planning: Usability
Enhancements in Manage Realignment Rules App

- The **Processing Options** are now displayed after the **Selection** section



- The fields under Processing Options have been which settings refer to master data and which refer to key figures



- For uploading realignment projects, “Comma” is now supported as an additional separator

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Enhancement in Demand Sensing: Technical Key Figure Simplification

Several technical key figures have been removed from SAP6 and SAPIBP1 sample planning areas to:

1. Simplify configuration requirements by removing key figures that will no longer be used
2. Replace the numerous profile weights and daily profile key figures that are currently in use with one set of daily profile key figures that show the final weighted profile after daily disaggregation is performed

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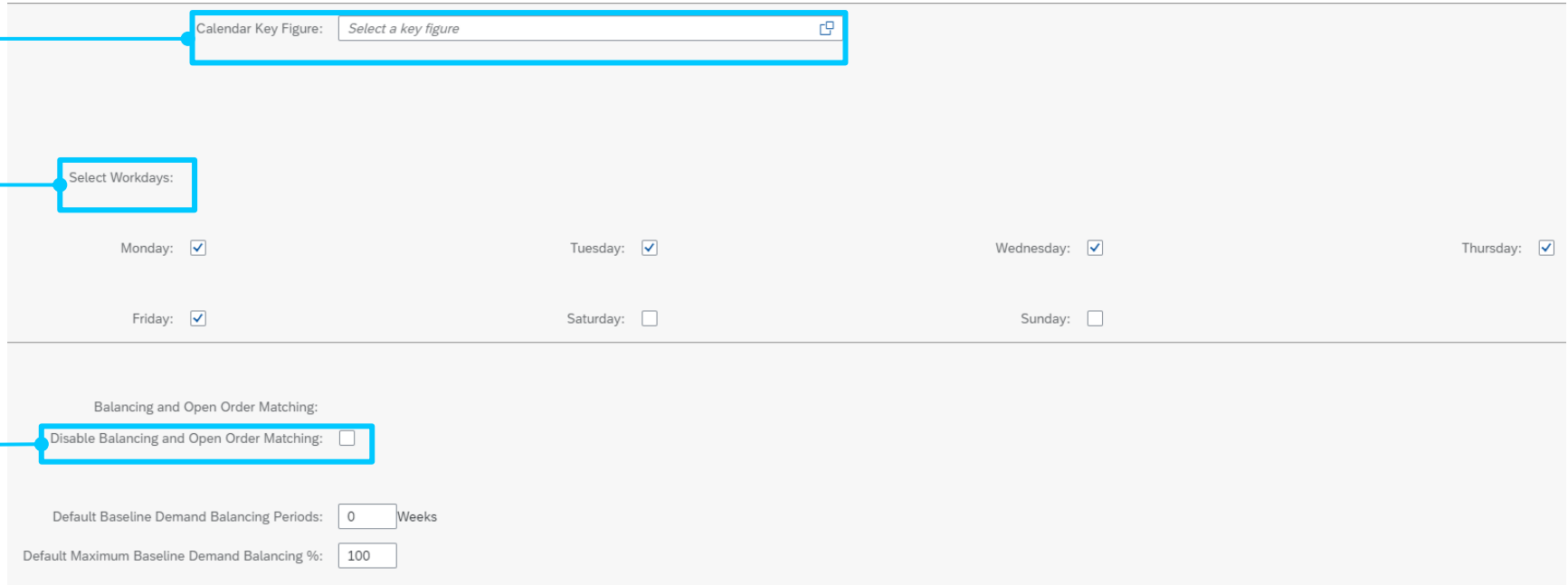
Enhancement in Demand Sensing: Leveraging Calendars in Demand Sensing

- Daily working calendars can be utilized by selecting a binary key figure to differentiate between holidays and working days
- The user only needs to define holidays, other days are marked as working days
- The key figure should be populated or calculated on the level which Demand Sensing is being run
  - **Balancing and Open Order Matching** should not be disabled
  - **Calender Key Figure** and **Select Workdays** inputs are used together

Select KF with working day/ holiday information

Defines a „normal“ week

Do not mark



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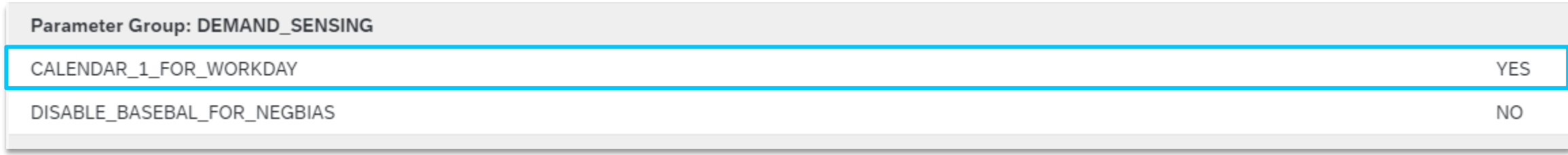
Enhancement in Demand Sensing:
Leveraging Calendars in Demand Sensing

- Users can use the Global Business Setting and Global Configuration: **CALENDAR_1_FOR_WORKDAY**
- Default setting: 1 – Workday; 0 – holiday
- **CALENDAR_1_FOR_WORKDAY** (listed under Parameter Group: DEMAND_SENSING in the Global Configuration App)
  - Value **YES**: 1 – Workday; 0 – holiday (default setting)
  - Value **NO**: 0 – Workday; 1 – holiday



Parameter Group: DEMAND_SENSING	
CALENDAR_1_FOR_WORKDAY	YES
DISABLE_BASEBAL_FOR_NEGBIAS	NO

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Enhancement in Demand Sensing: New Optional Intermediate Key Figure

Key Figure	03/22	03/23	03/24	03/25	03/26	03/27	03/28
Requested Qty	167	183	196	204	211		
Sensed Demand Qty	199	217	257	223	230	0	0
Workday	1	1	1	1	1	0	0

Weekend

- „normal week“ with Saturday and Sunday as non-working days

Key Figure	03/29	03/30	03/31	04/01	04/02	04/03	04/04
Requested Qty	183	202	236	244			
Sensed Demand Qty	199	217	257	498	0	0	0
Workday	1	1	1	1	0	0	0

Public holiday & weekend

- Saturday and Sunday are non-working days
- 04/02 is a holiday (Good Friday)
- Demand is shift to the preceding working day (Thursday, 04/01)

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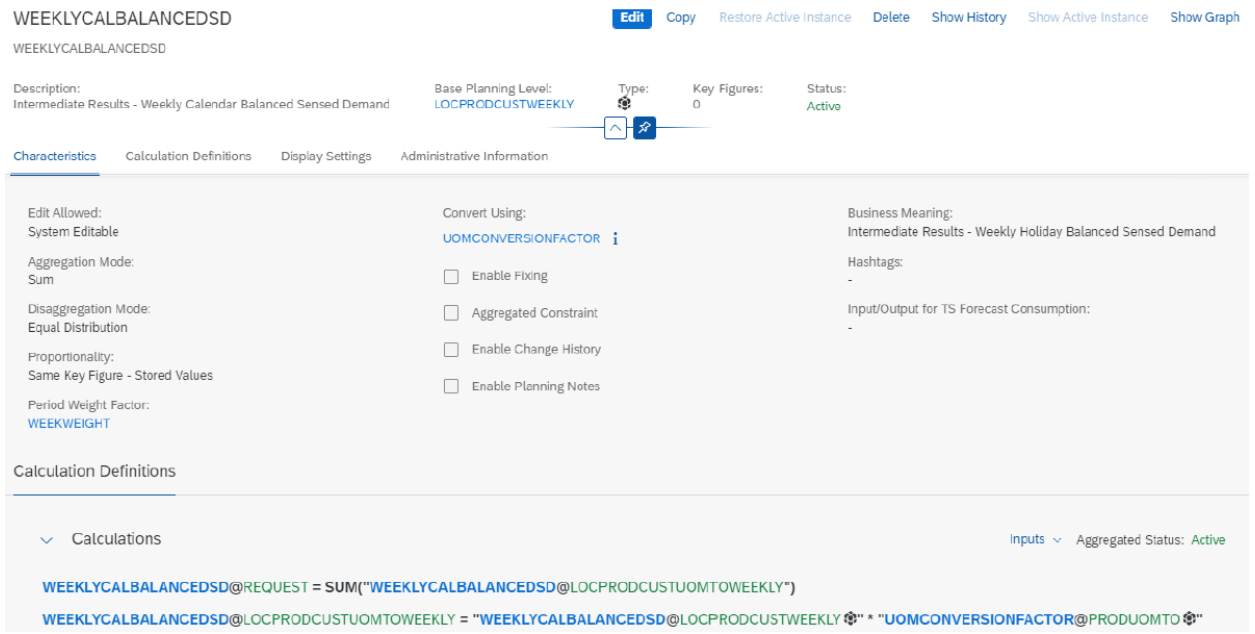
Enhancement in Demand Sensing: New Optional Intermediate Key Figure

Key Figure	11/01	11/02	11/03	11/04	11/05	11/06	11/07
Requested Qty		47	58	66	71		
Sensed Demand Qty	0	56	64	74	77	0	0
Workday	0	1	1	1	1	0	0

- Saturday and Sunday are non-working days
- The first day of the week is a public holiday
- The preceding workday is Friday in the previous week, so demand is moved to the previous week

- In this case an optional technical Key Figure that stores information on how much the weekly sensed demand is can be defined
- The Key Figure shows how much the sensed demand was increased in the previous week and how much it was decreased in the current week (due to shift of demand on a holiday)



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01 Digital Transformation Principles

02 Technology Choices

03 Technical Capability & Passion

04 Operational Engagement & Adoption

05 Our Solutions

smart factory
by Kellogg's

Overarching Principles

Heavy Focus on End User

Framework for Future Development

Align & Standardise to a Global System

Cross Functional Collaboration Engineering / IT / KWS

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Framework for Future

Framework for Future Development

1. Ways of Working

Intent: Digitally Enable KWS Centres using Software Applications

2. Plant Connectivity

Intent: Install Plant Connectivity infrastructure & applications to Visualise, Historize & Analyse Performance

3. Predictive Analytics

Intent: Use the power of Artificial intelligence to Predict plant performance

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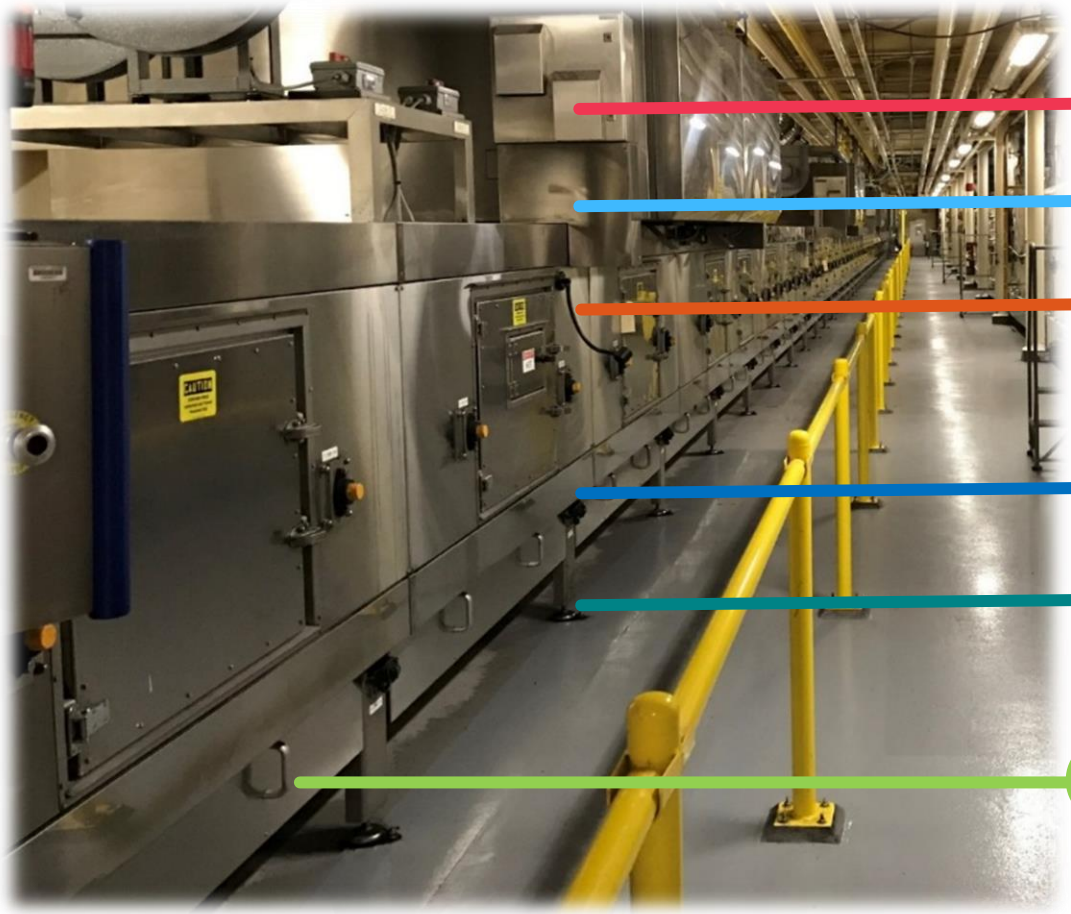
Framework for Future



- QA Checklists
- AM Checklists
- Defects Handling

WoW

- Data Collection & Monitoring
- Analytics – (Source of Loss)

Plant Connectivity

- AI / Machine Leaning

Predictive

Our Smart Factory Technology Stack

smart factory

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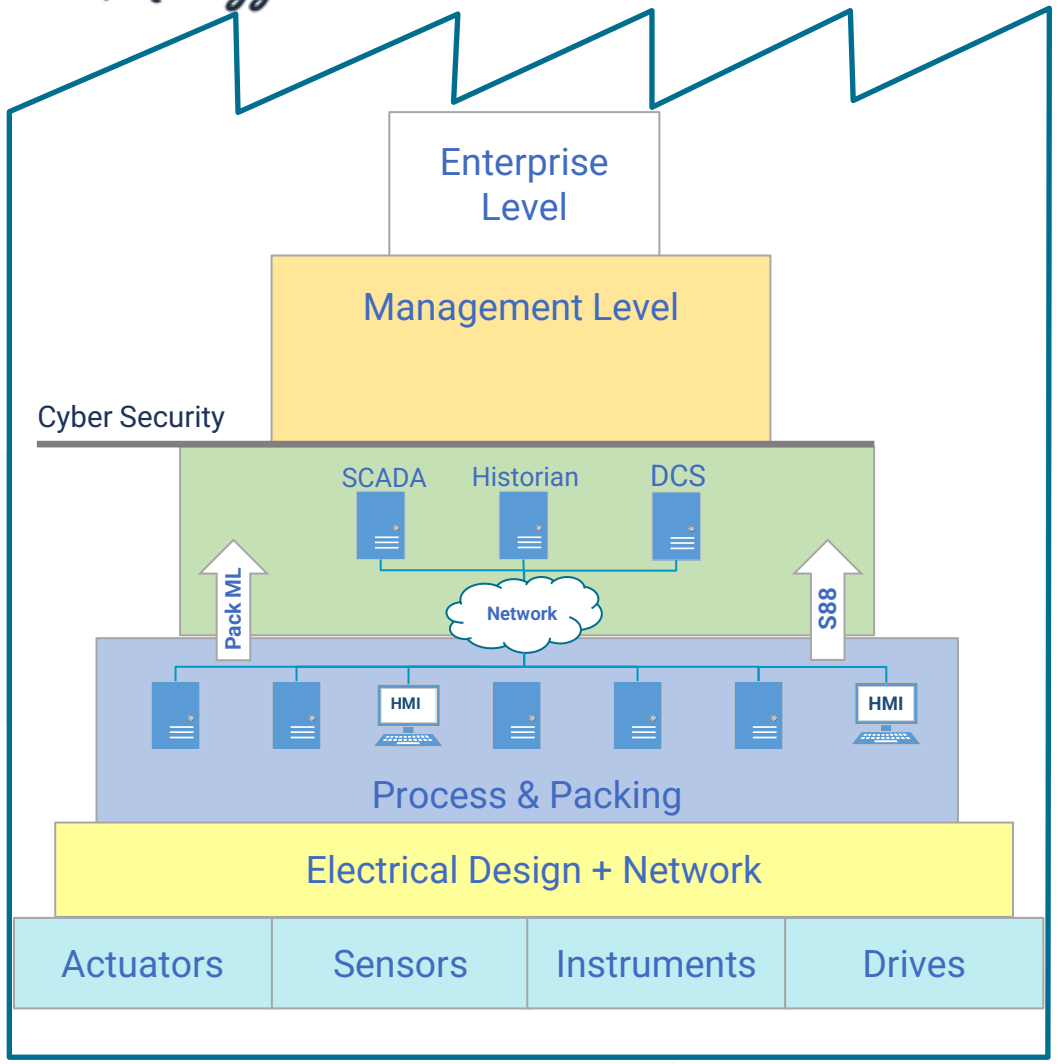

Technology Stack

Platform	Applications	
SAP	- Supply Chain	
SAP	DDS QA PLA NRC AM	Standard Applications
AVEVA	- Pi System	Plant Curiosity
Rockwell Automation	- >95% Connectivity	
	- Improved Sensor Technology	

Our Applications

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Key Points

01 Aligned Strategy / Technology Choices

02 Technical Capability & Passion

03 Digital Readiness & Culture are Key to Adoption

04 Case Studies to show the Benefits

DIGITAL IS PIVOTAL

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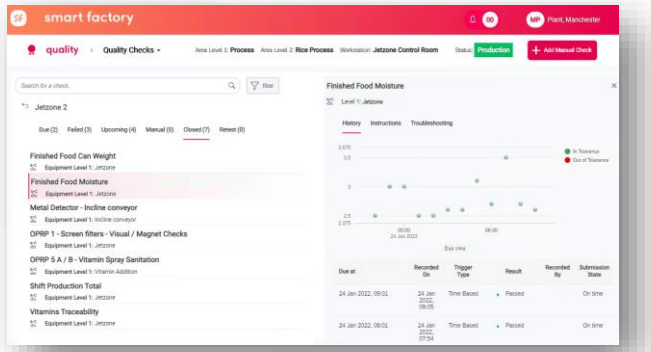
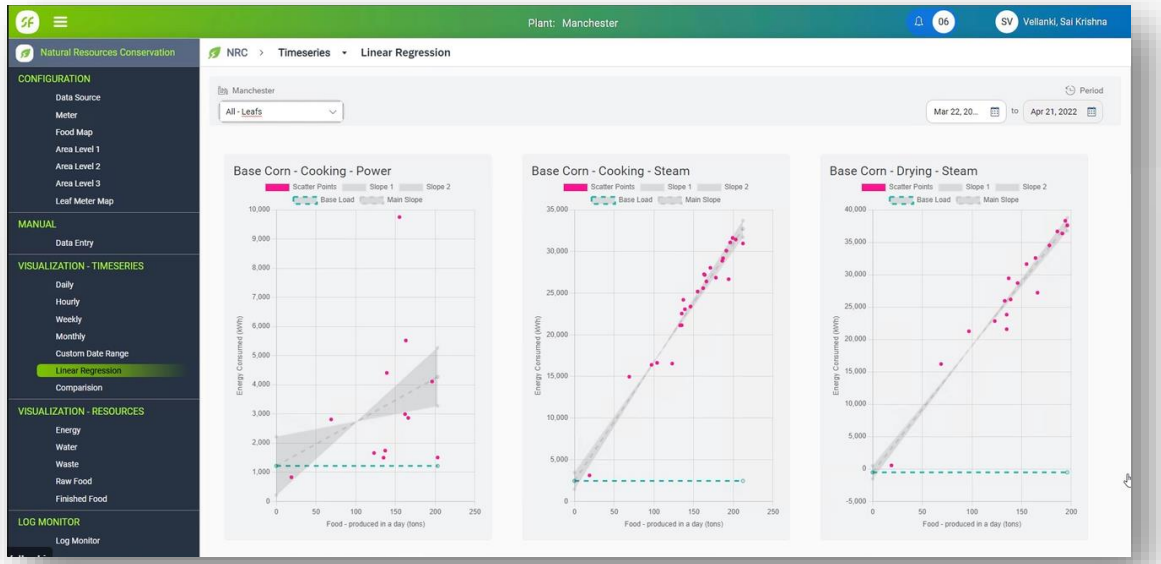
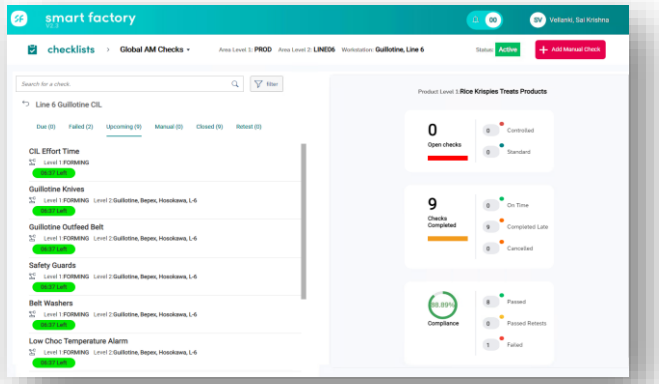
Our Applications

Developed by Camelot

Camelot ITLab
Innovative Technologies Lab







QA

NRC

AM