



**Real application of AI**  
for a  
**world-class manufacturing company**

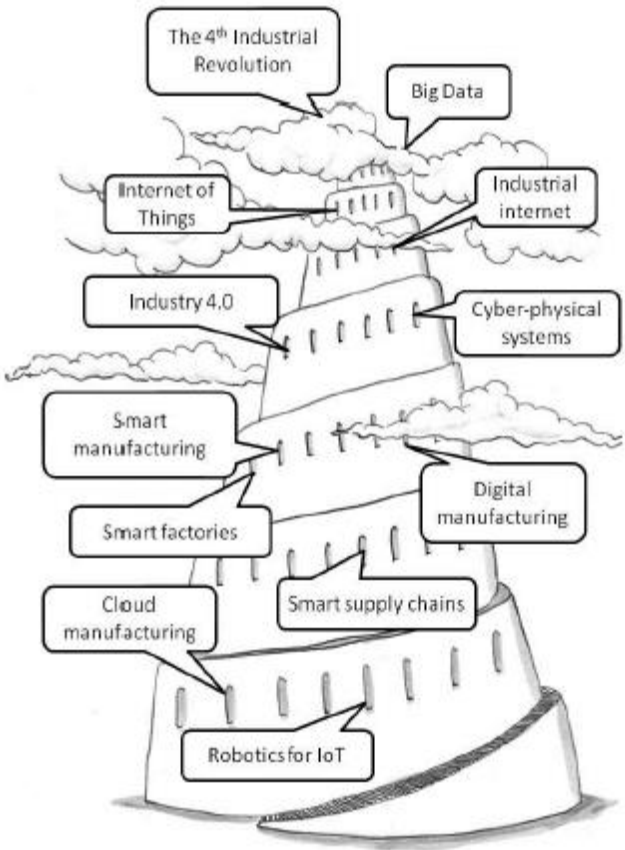
# Many manufacturing companies are struggling on their Digital Transformation Journey.....

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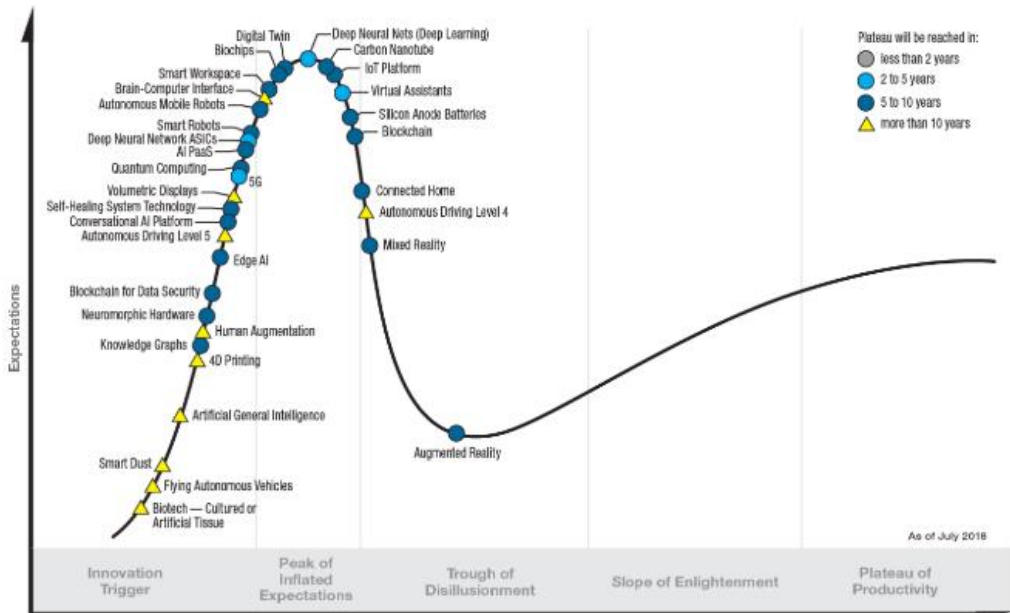
EFFICIENCY THROUGH INNOVATION



# Q. What is Digital Transformation?



Gartner



Gartner Hype Cycle for Emerging Technologies

Smart Manufacturing Tower of Babel

➡ **Confusion!**

# A. In simple terms Digital Transformation is:



- Getting people away from paper and spreadsheets
- Fully inter-connected, machines, factories and supply chains
- Real-time actionable data to optimise operational performance
- Continuous improvement through the use of data analytics
- Stronger links between design and manufacturing
- More sustainable use of resources

## Why is it important:

Drive Manufacturing **Competitiveness** with better:

- Efficiency
- Quality
- Flexibility and Agility
- Reduction in Defects
- Faster New Product Development

*“Lack of Real-Time **Data-Based** Decision Making Costing Companies 10-30% per annum”*

# Real application of AI and Digital Transformation, for a world-class manufacturing company

## Contents:

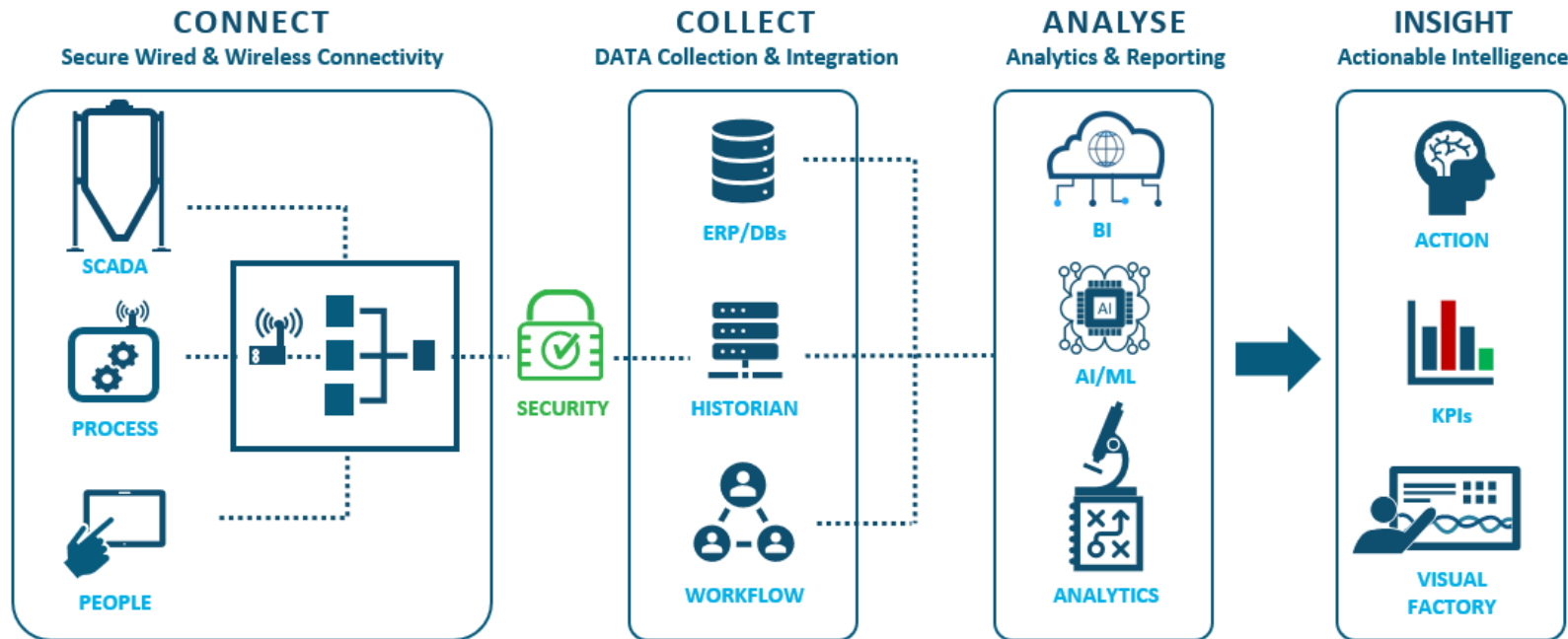
- Pre-requisites for solution
- The Danone Operational Excellence and Digital Transformation journey
- Connectivity and Data Integrity
- Security and Scalability
- Advanced Data Analytics
- Next steps



Operational Excellence Platform,  
*designed for*  
Digital Transformation



# Prerequisites for solution:

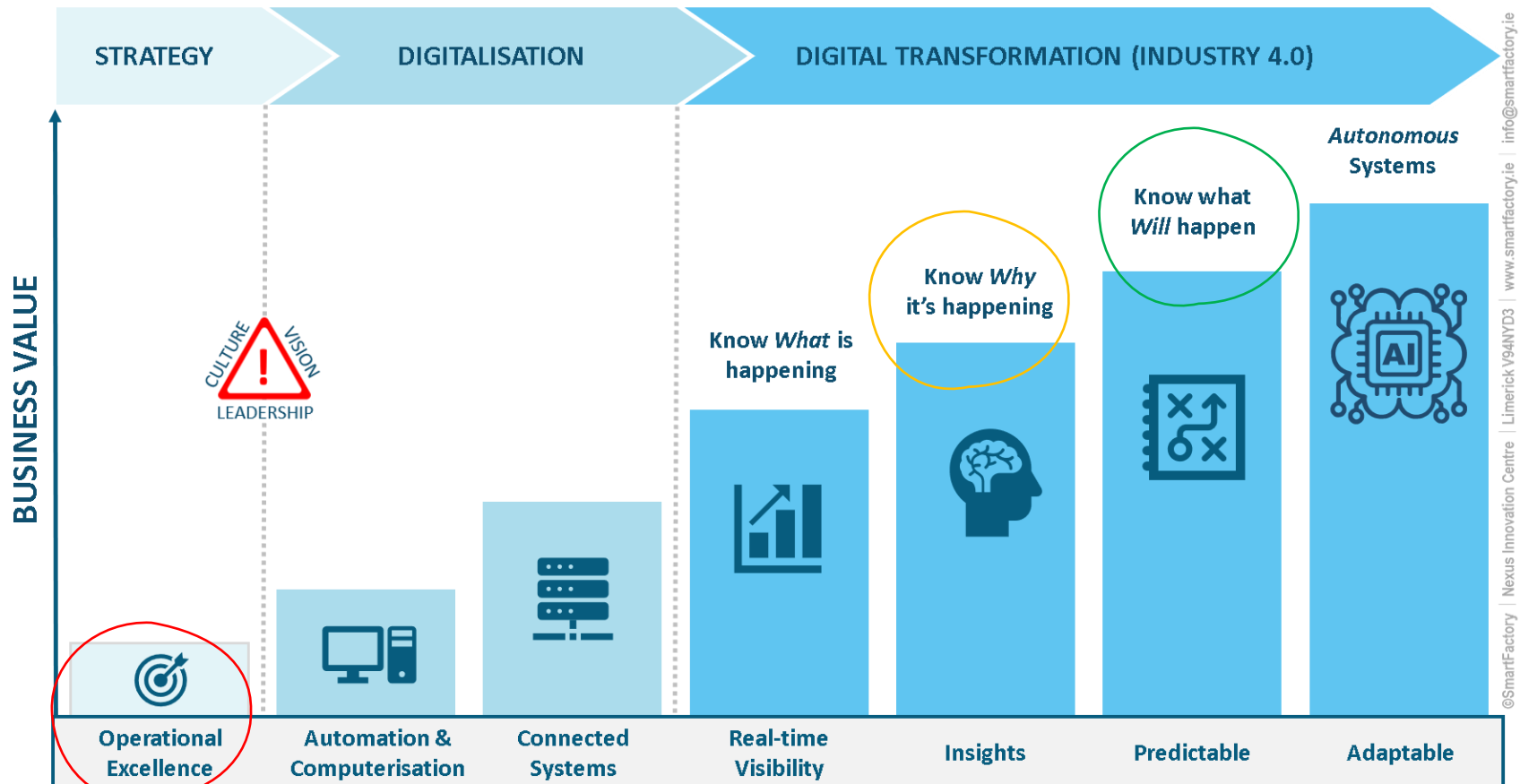


- Support Operational Excellence culture on-site
- Connect with Legacy systems
- Scalable to meet future requirements
- Highest standards for cybersecurity and data integrity
- Provide in-depth Data Analytics with AI/ML capabilities

# Digital Transformation Maturity Model

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Adopted from the Industrie 4.0 Development Path by RWTH Aachen University

It starts with **Leadership** and **Culture**:

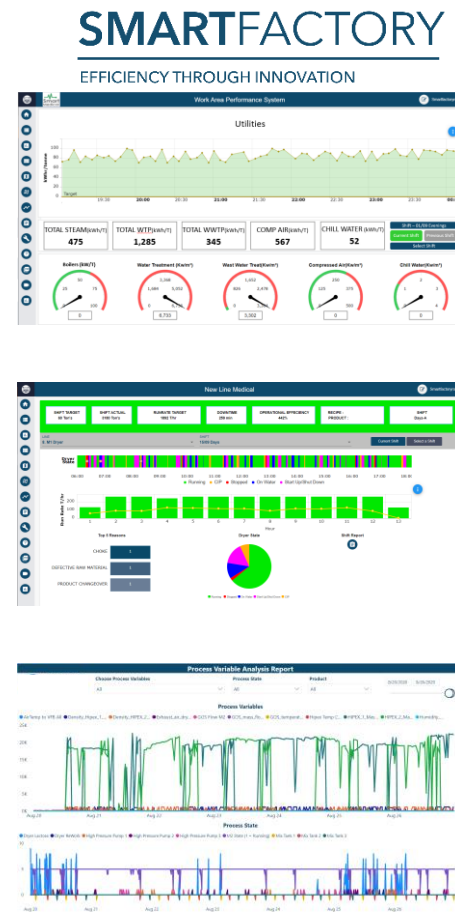
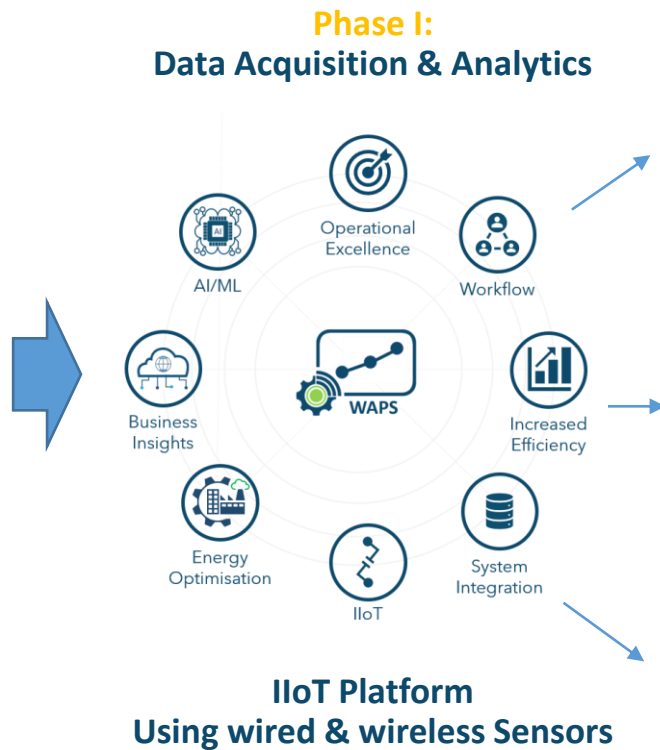
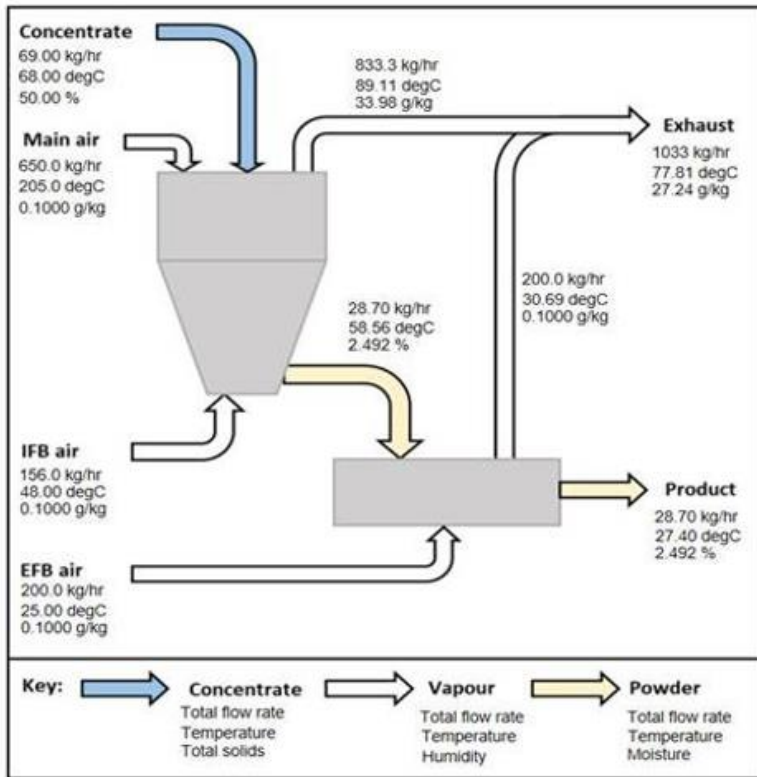
- What problems you are trying to solve
- Vision of the **business value** you will create
- Is your organisation ready for the changes



STRATEGY **BEFORE** TECHNOLOGY



# Spray Dryer Process



One of the largest Spray Dryers globally (manufacture of baby nutrition)

Energy Consumption >€15MM/yr

Approx. 1,200 process variables

Approx. 6MM data points

**Phase II** Objective: Investigate if AI/ML can be used to Reduce Energy Consumption



# Sample Energy Dashboard

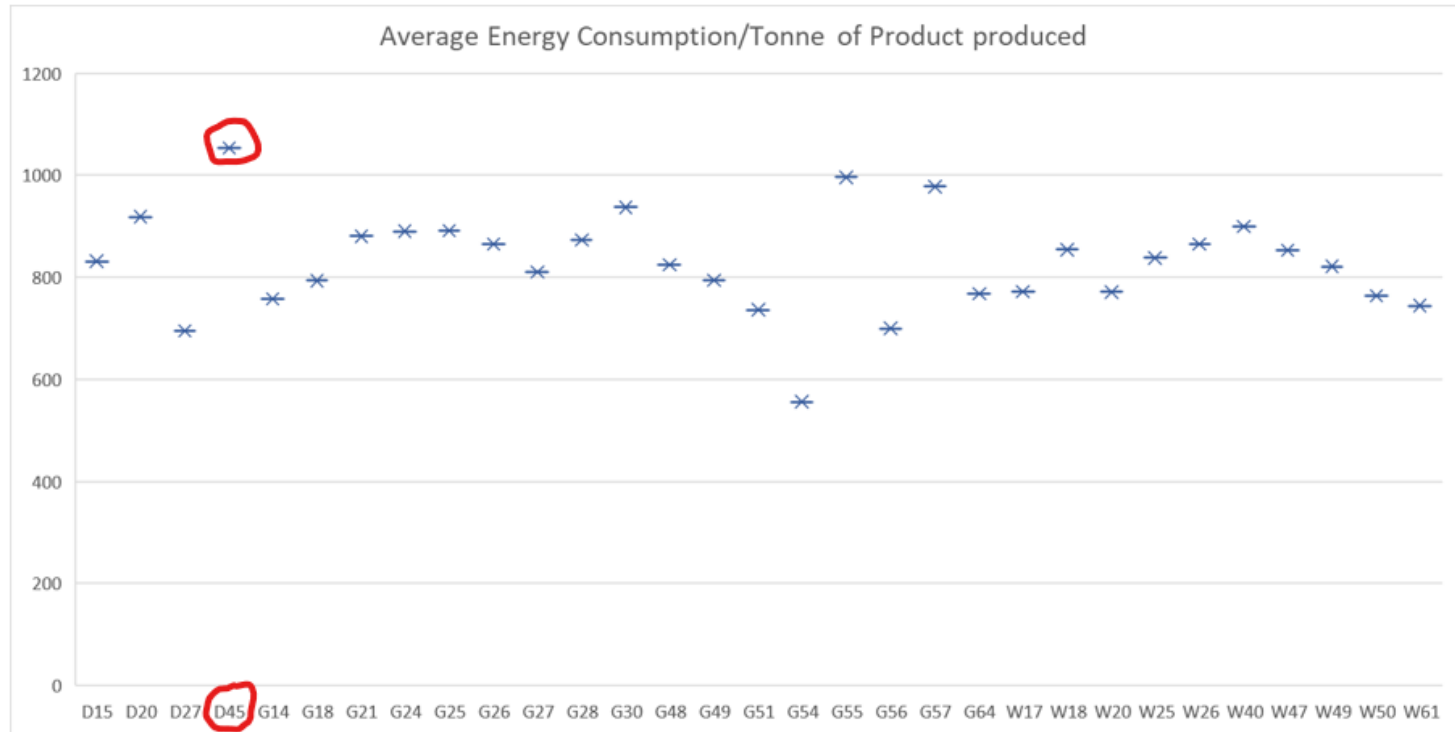
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- Live and totalised Energy Consumption
- Drill-down for each Dryer, by each Utility (electricity, gas, steam, etc.)
- Overlay Dryer throughput
- Analyse usage per hour

# Analysis of Raw Data using AI, to provide hidden insights



(Description of data model and analytics used can be discussed in more detail with Lauren Burnham-King from CeADAR)

# OEE Dashboard – Real-time monitoring of Downtime, Hourly Target vs Actual and Stops

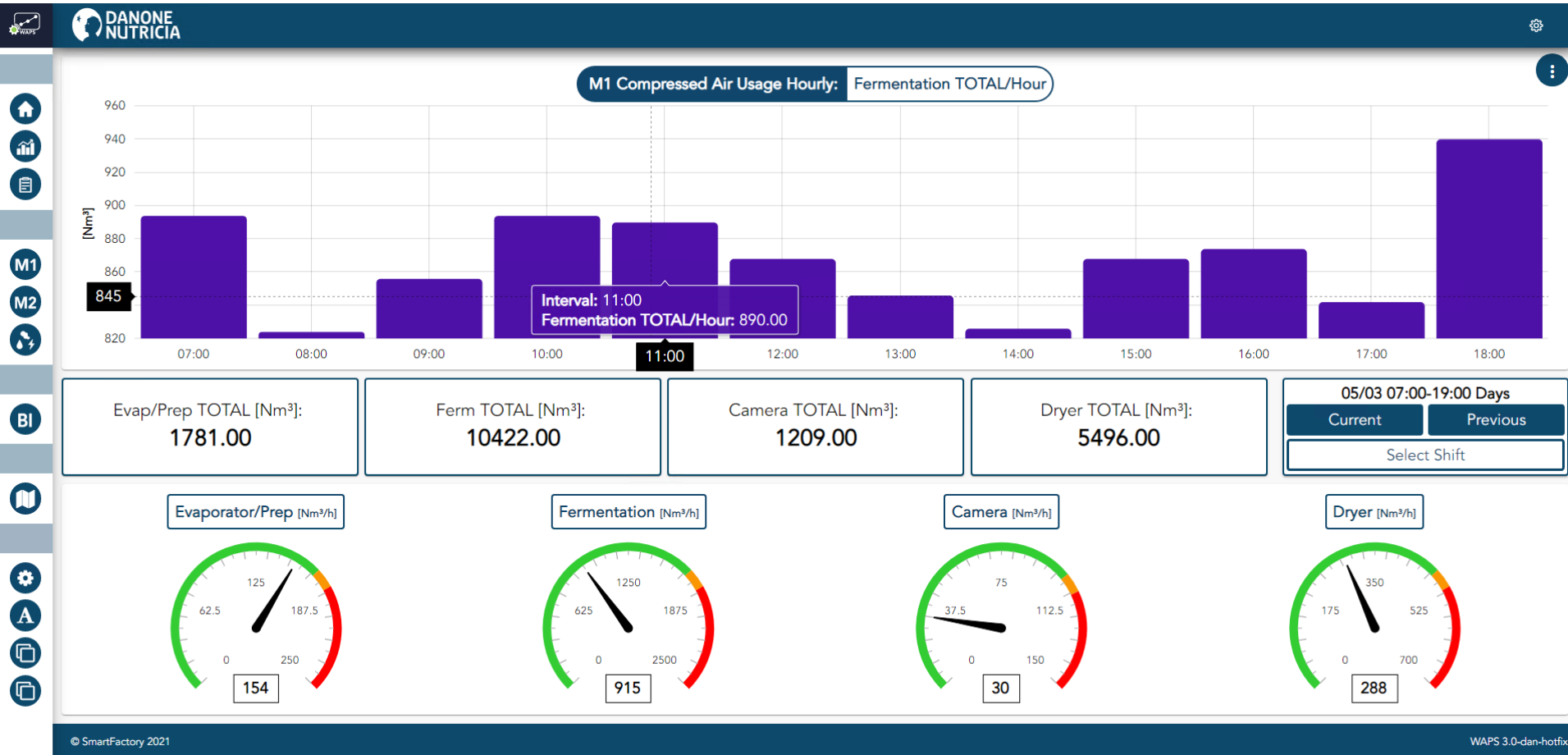


- Bar Chart shows hourly output. Run Rate target based on Product. Shift Target based on production schedule.
- “Reasons” for downtime/missing target are manually entered on *Downtime Viewer*, via drop-down lists (categories)
- Icons indicate when a Reason/Comment has been added
- Red/Green based on 1:3:10 Rule for Operational Excellence visual management (i.e. what’s not in control and what is being done to correct it)

# Sample Dashboard – Hourly Usage of Compressed Air

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- Live and totalised Utility Consumption
- Drill-down for each area and utility (water, compressed air, nitrogen, etc.)
- Overlay Dryer throughput
- Analyse usage per hour

# Workflow – Paperless Shift Report

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SHIFT TARGET:  
**48.00** [t]

SHIFT ACTUAL:  
**50.69** [t]

RUN RATE:  
**4.00** [t/h]

DOWNTIME:  
**3.47** [min]

OE:  
**99.52** [%]


PO: **101029832**  
Product: **L08**


Team:  
**B**

Select Line  
M1 Dryer

Select Shift  
07/03 07:00-19:00 Days

Current Shift

Select Shift 

Shift Report 

Safety

Quality

Cost

Delivery

Motivation

Environment

Shift Log

Summary

	Target	Result	Comment	Status
Safety Incidents : <input checked="" type="checkbox"/> No				
Near Miss	<input type="text" value="0"/>	<input type="text" value="No Near Miss Safety Issues"/>	<input type="text"/>	<input type="text"/>
First Aid	<input type="text" value="0"/>	<input type="text" value="No entry"/>	<input type="text"/>	<input type="text"/>
nLTI	<input type="text" value="0"/>	<input type="text" value="No Near nLTI Safety Issues"/>	<input type="text"/>	<input type="text"/>
LTI	<input type="text" value="0"/>	<input type="text" value="No LTI Safety Issues"/>	<input type="text"/>	<input type="text"/>
Alarms on safety system	<input type="text" value="0"/>	<input type="text"/>	<input type="text"/>	OPEN <input type="text"/>
IR camera working	<input type="text" value="5"/>	<input type="text"/>	<input type="text"/>	OPEN <input type="text"/>
Production Permits	<input type="text"/>	<input type="text"/>	<input type="text"/>	OPEN <input type="text"/>

Submit

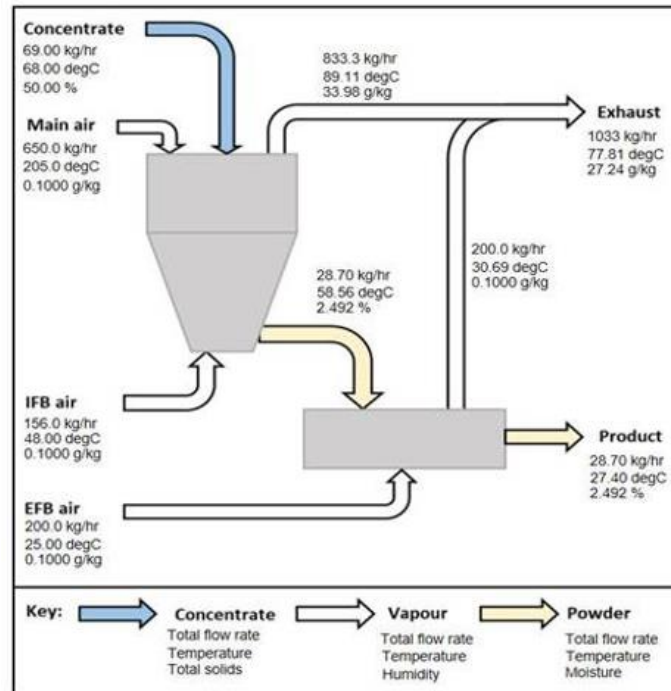
Cancel

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WAPS 3.0-dan-hotfix

- Convert Excel based Shift Report to digital workflow
- All SQCDME KPI's stored in database, for further analysis
- Create rules and alerts, based on actual results
- Automatically capture shift log (tank levels, recipe details, etc.) from PLC's
- Localisation - support for any language

# Next Steps:



- Further develop AI model to determine the energy usage, for all products
- Investigate if AI and IIoT sensors could be combined to predict a choke (blockage in dryer)
- Investigate if ML could be used to detect process issues (e.g. burst compressed air diaphragm)
- Investigate if AI could be combined with vibration sensors, to predict equipment failures (e.g. motor failure)
  - If successful, develop AI module with CeADAR for SmartFactory WAPS Application

# Company Overview

## We understand manufacturing:

SmartFactory is led by a strong experienced team of engineers, with more than 25 years of experience in the manufacture of FMCG's, Medical Devices and Electronics.

## Modular & Scalable:

The modular solution includes:

- |                         |                      |
|-------------------------|----------------------|
| ✓ OEE/Downtime Analysis | ✓ Data Visualisation |
| ✓ Data Analytics/AI     | ✓ Digital Workflows  |
| ✓ Condition Monitoring  | ✓ Real-Time Locating |
| ✓ Pick-to-Light         | ✓ Energy Monitoring  |

The SmartFactory team can provide an end-to-end solution including IIoT readiness assessment, business value and RoI appraisal, design, engineering consultancy and industry-proven hardware.

## Working with world-class clients around the world including:



**“The SmartFactory data collection initiative is the best I have seen, in all my time in finance”**

Senior Finance Executive visiting the Irish manufacturing site



Operational Excellence Platform,  
*designed for*  
Digital Transformation

## Headquarters

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## World-class partners:



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