




GE VERNOVA

# **MACHINE LEARNING, MES E SOSTENIBILITÀ NEL MONDO INDUSTRIALE CON PROFICY DI GE VERNOVA**



GE VERNOVA – WHO WE ARE

# ACCELERATING A NEW ERA OF **INNOVATION**

GE Vernova's electrification software business has the energy to change the world, helping to deliver a more affordable, reliable, sustainable, and secure energy future for all.

# Our Speakers today



## FRANCESCO TIEGHI

*CMO*

15 years of experience in the field of industrial automation and OT cyber security managing ServiTecno, distributor for Italy, Greece and Malta of Proficy solutions by GE Vernova



## GIORGIO GUERRINI

*Account Manager*

14 years in Sales and Pre-Sales of digital manufacturing solutions in the discrete and process industries. Account Manager at GE Vernova for the last 2 years.



## DAVIDE CIPOLLA

*Senior Business Consultant*

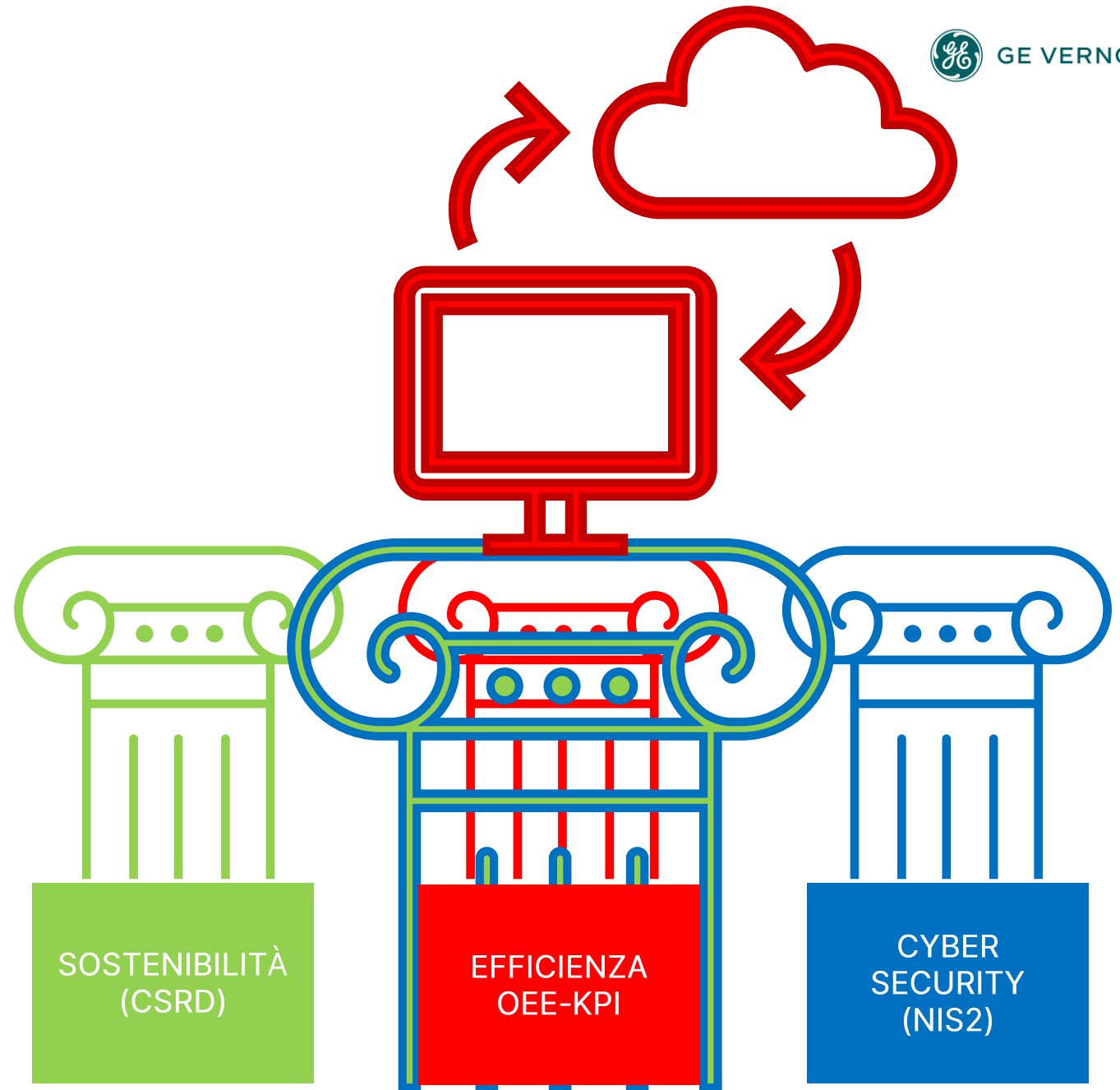
More than 17 years experience with Industrial Software, worked as Developer, MES Consultant, Professional Services Manager and now 5 years as Solution Architect.

# MIGLIORA **L'EFFICIENZA E LA SOSTENIBILITÀ** CON LE SOLUZIONI PROFICY DI GE VERNOVA

4 marzo, Eataly Milano Smeraldo



## 5.0 Sostenibilità Efficienza Security

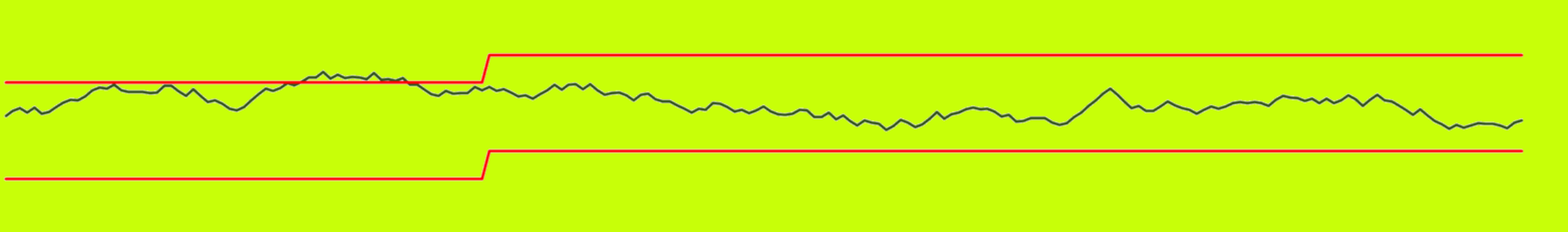


Operationalize sustainability strategies by overlaying resource consumption data with operational context

# Perché incrociare i dati?



kw



# Operationalize sustainability strategies by overlaying resource consumption data with operational context



# GE VERNOVA PROFICY<sup>®</sup> SOFTWARE & SERVICES



# Proficiency®

A full suite of industry software & solutions that supports our customer's key outcomes: **helps increase quality, productivity, reliability & supports their sustainability goals**

**WE SOLVE INDUSTRY CHALLENGES,  
FROM PLANT FLOOR TO CLOUD, ACROSS  
THE ENTERPRISE**



Plant to  
Enterprise  
Scale



Effective  
Operations  
Anywhere Any  
Time



From Data to  
Information to  
Insights



Support your  
Sustainability  
Goals



**LEADER**

Gartner Magic  
Quadrant 2023

Gartner

# How is this affecting manufacturing teams?

Site-level usage lacks the operational context needed to truly optimize consumption.

We don't have the data needed to comply with impending ESG regulations.

We have ambitions to be Carbon Neutral, but no path to daily management of that goal.

We lack the visibility to our utility usage that is needed for continuous improvement.

In my organization, Sustainability and Operational Excellence exist in siloes.

Our utility bills, especially our energy bills, are skyrocketing.

The people who influence how much we emit don't have visibility to that data.



# CSRD (Corporate Sustainability Reporting Directive) requirements

The rules are largely the same for EU and non-EU companies ...

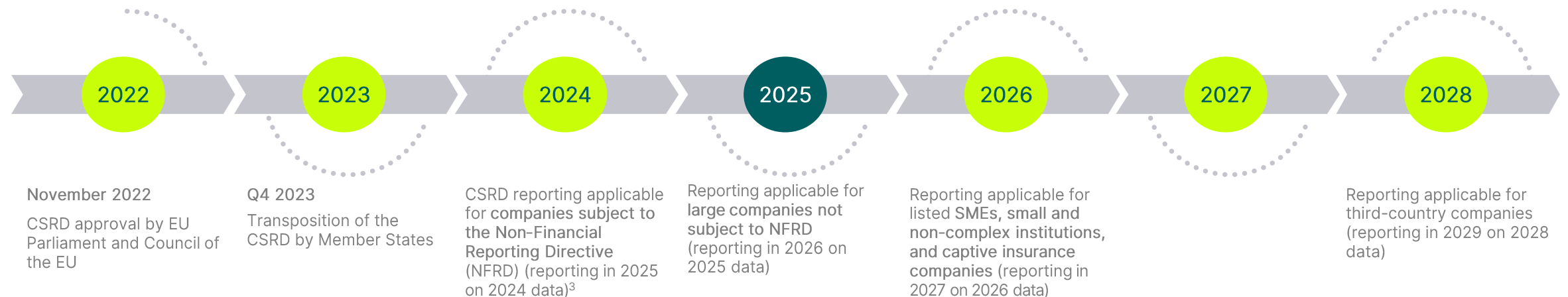
EU companies need to comply if they meet any of these 3 criteria:

- 50+ million Euros in net turnover
- 25+ million Euros in assets
- 250+ employees



Non-EU companies must comply if they have a net turnover >150M Euros in the EU, and meet one or more of these criteria:

- A large EU subsidiary (meeting the EU company criteria above)
- A branch in the EU with a net turnover exceeding 40M Euros
- Securities listed on the EU regulated markets



# Plant Floor to Cloud through the Enterprise



## Production Automation

HMI/SCADA\* SOFTWARE



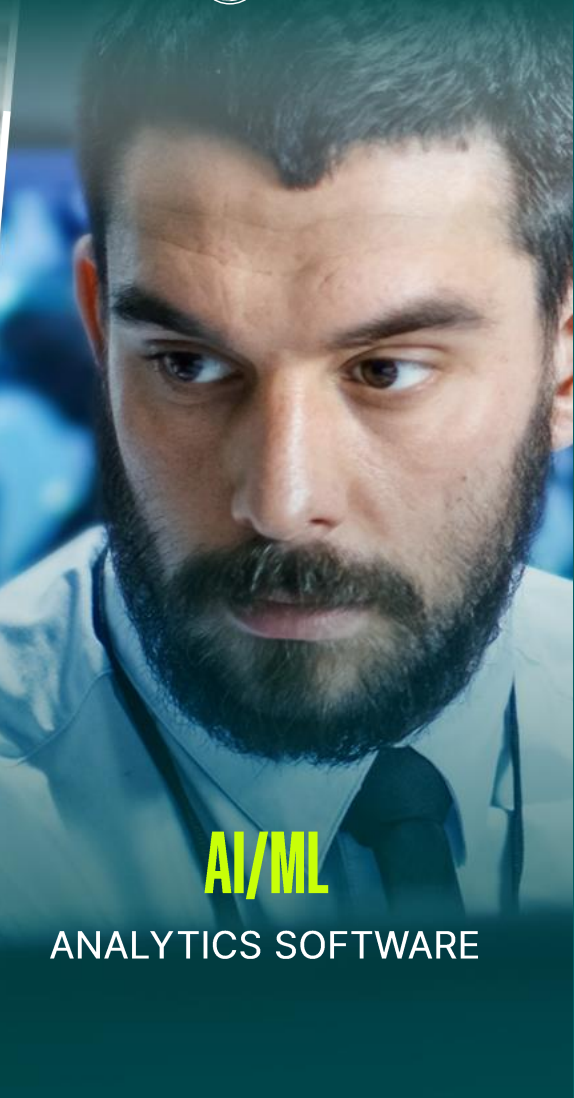
## Manufacturing Execution

MES\*\* SOFTWARE  
Incl. SCHEDULER



## Industrial Data Management

HISTORIAN SOFTWARE



## AI/ML

ANALYTICS SOFTWARE

\* HMI/SCADA: Human Machine Interface/Supervisory Control & Data Acquisition  
\*\* MES: Manufacturing Execution System

# We enable our customers' Digital Transformation journey & Support their Sustainability goals

## 1 CONNECT & COLLECT



### BREAK INFORMATION SILOS

Consolidate data from heterogeneous sources – no data gap

- Shop floor (automation) systems
- LIMS systems
- ERP data (Financial, production, etc.)
- Manual Data Input
- Barcode, QR Codes
- Files

## 2 STORE & NORMALIZE



### BUILDING A STRONG DATA MODEL

Put data in context & provide a structure/model:

- Use the S88/S95 models (Equipment hierarchy, Object Models)
- Batch/Lot/Serial
- Materials, Grade
- Storage Tanks, Bins

## 3 MONITOR (VISUALIZE & CONTROL)



### INCREASE SITUATIONAL AWARENESS

A “single pane of glass” with KPIs & all relevant information, anywhere, any time - enable actions.

- Deliver information to the right stakeholder for fast action
- Create visual summaries (ad-hoc) of data to alert decision makers
- Full Tracking & Tracing (Genealogy)

## 4 ANALYSE / OPTIMIZE



### MAKE INFORMED DECISIONS

Analyze data across sources & across sites and report on it

- Real-time quality monitoring
- Condition-based quality alerts
- Process analytics using AI/ML
- Analyze data across sources, for ex. across production sites (centerlining)
- Ad-hoc reporting

## 5 PREDICT



### BE PROACTIVE NOT REACTIVE

Process analytics using AI/ML

- Close the loop on analytics for continuous improvement

# Proficiency Historian, Proficiency Data Hub



High performance, enterprise-wide industrial data management allowing industrial companies to realize continuous improvement with contextual data analysis across their operations.

## Proficiency Historian



### Connect & Collect Data

- Time-series process data and alarms & events data from equipment and processes
- Historian has native collectors and Store & Forward capability

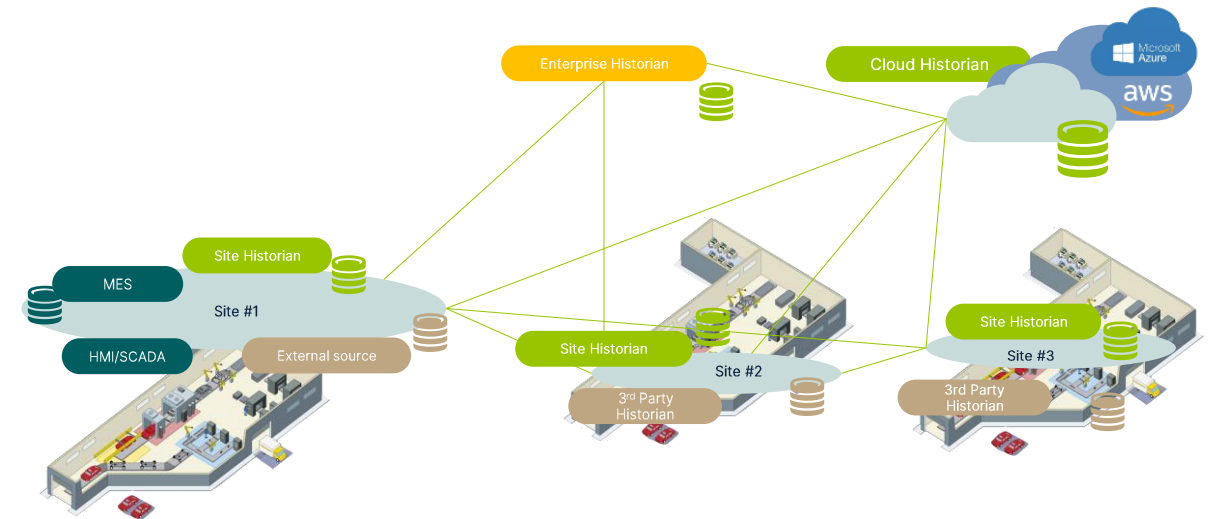
### Store & Normalize / Contextualize

Scalable from very small to large:

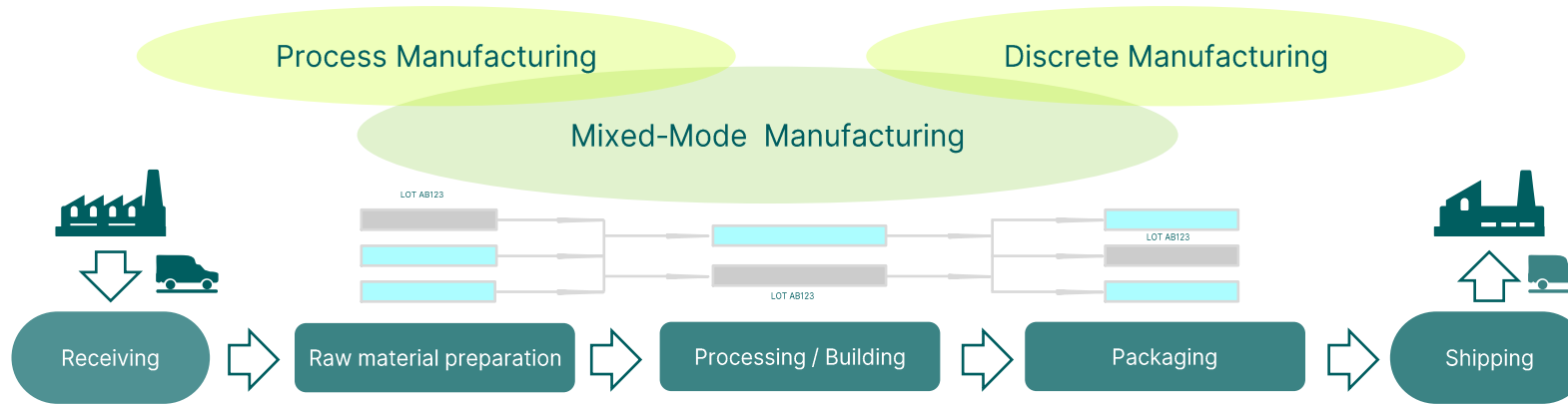
- Millions of tags
- High availability
- Data compression
- Secure-by-design

### Distribute / Consume

- HMI/SCADA
- HTML5 clients
- Cloud
- Big data on-ramp

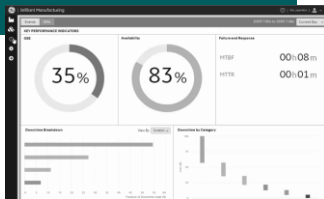


# Proficiency Plant Applications / MES



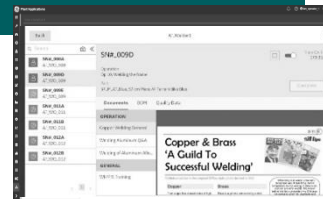
## EFFICIENCY MANAGEMENT

- Track downtime & waste
- OEE and root causes
- Standard and ad-hoc reports & dashboards



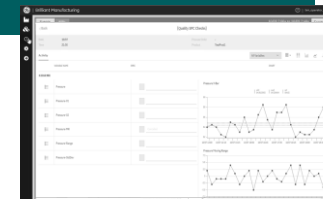
## PRODUCTION MANAGEMENT

- Track & trace genealogy of products
- Production schedule execution & tracking
- Drive operator behavior
- Monitor consumption & send to ERP



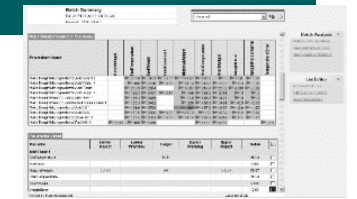
## QUALITY MANAGEMENT

- Drives Right First Time
- Real time process quality analysis & control
- Alarm to conformance limits
- Rich non-conformance management



## BATCH ANALYSIS

- Batch analysis according to ISA-88
- Electronic batch records
- Supports any underlying batch system
- Analysis of scheduled & completed batches



**MAXIMIZE OPERATIONS MANAGEMENT, IMPROVE PRODUCTION PERFORMANCE, DRIVE PRODUCT QUALITY, AND MORE.**

# ROB-EX Scheduler – Summary



Modular and scalable production scheduling system, which delivers a total visibility & removes/minimizes the impact the production changes

- Integrates with all ERP systems
- Works for discrete, process, and project manufacturing
- Easy to use, visual and intuitive

## Top 3 Customer Benefits

- Reduces labor cost
- Increases revenue
- Optimizes capacity



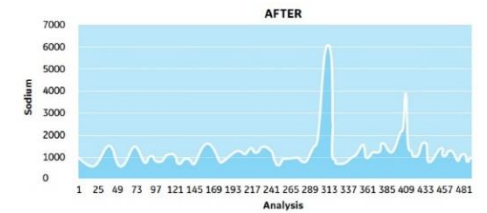
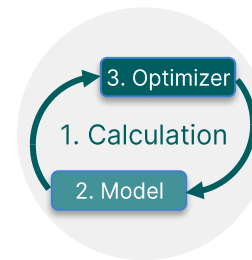
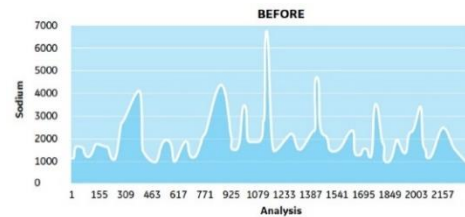
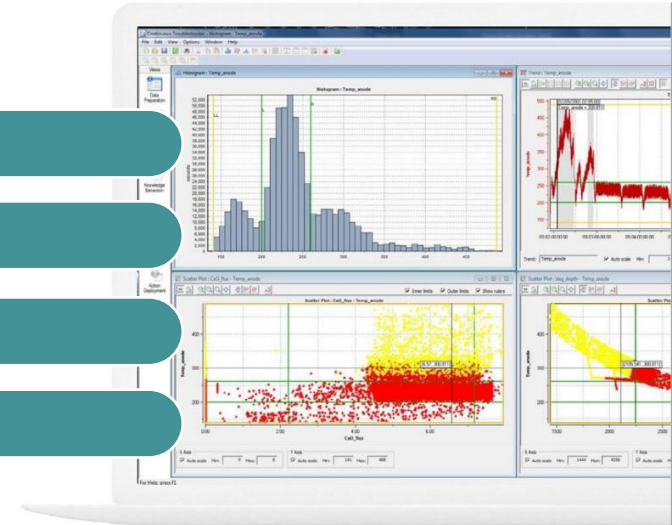
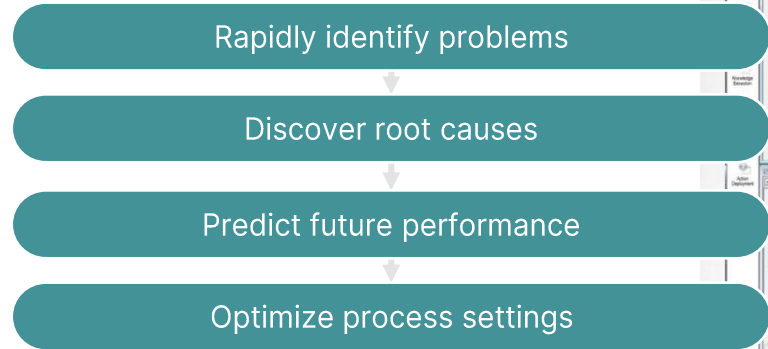




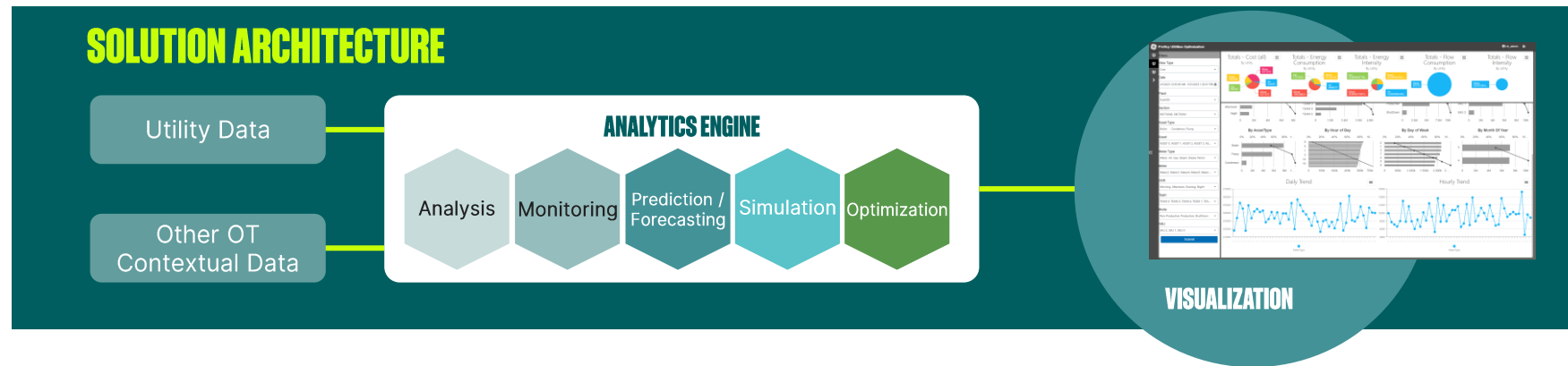
## 5 INTEGRATED AI/ML ENABLED CAPABILITIES FOR ENGINEERS IN ONE PRODUCT,

from offline analysis to real-time closed loop optimization & control, integrated with the Proficiency Portfolio

<b>1 ANALYSIS</b>	Automatic Root Cause identification accelerates problem resolution & continuous improvement
<b>2 MONITORING</b>	Early Warnings reduce downtime & waste (sensors, control loops, equipment, process lines)
<b>3 PREDICTION &amp; FORECASTING</b>	Proactive Actions improve quality, stability, reliability & control (Downtime, Throughput, Quality, Energy, and other Resources)
<b>4 SIMULATION</b>	Process Digital Twin based What-if Simulations accelerate accurate decisions at a lower cost
<b>5 OPTIMIZATION</b>	Optimal Process Setpoints improve throughput at acceptable quality by up to 10%



# Fast time-to-value, advanced analytics, & persona-based visualization with Proficiency for Sustainability Insights



USE CASES / EXAMPLES & OUTCOMES					
CORRELATE CONSUMPTION IN ANY MANUFACTURING CONTEXT IN REAL TIME			REDUCE CONSUMPTION & EMISSIONS AT THE PROCESS AND PRODUCTION LEVELS		OPTIMIZE USAGE AND COSTS ACROSS PRODUCTION RUNS & SITES
<b>Production</b> <ul style="list-style-type: none"> <li>Product SKU</li> <li>Process area, Production line</li> <li>Operational events</li> <li>Shift, Time of Day, Weather conditions</li> </ul>	<b>Organizational</b> <ul style="list-style-type: none"> <li>Enterprise, Business, Region</li> <li>Site, Factory, Production team/crew</li> </ul>	<b>Environmental</b> <ul style="list-style-type: none"> <li>Correlate consumption to Scope 1 &amp; Scope 2 emissions, water use, energy intensity, etc.</li> </ul>	<b>Process Level</b> <ul style="list-style-type: none"> <li>Find inefficient equipment</li> <li>Find usage during non-production periods</li> <li>Find unrecognized patterns, waste and improvement opportunities</li> </ul>	<b>Production Level</b> <ul style="list-style-type: none"> <li>Map resource intensity of product portfolio</li> <li>Find best practices; Standardize operations</li> <li>Contextualize data to help manage sustainability KPIs from the plant floor</li> </ul>	<b>Production Runs</b> <ul style="list-style-type: none"> <li>Optimize schedule for resource efficiency</li> <li>Lower variability across multiple production runs</li> <li>Curtail, shift production in high-cost periods</li> </ul>
					<b>Sites &amp; Supply Networks</b> <ul style="list-style-type: none"> <li>Holistically optimize the production process accounting for cost &amp; environmental impact</li> <li>Optimize production plans using resource and emissions intensity as an input</li> <li>Improve supply chain flexibility &amp; resilience</li> </ul>

# PUTTING THEORY INTO **PRACTICE**

Daide Cipolla  
Senior Business Consultant

# Proficiency Smart Factory – Tracking through operations



**Inventory 1020**  
 Time stamp: June 8th 2023 07:14:40  
 Part ID: RMI098978we43

Batch: BA12300EA  
 Purchase order: POMB876eW8

Quality  
 Test A: OK  
 Test B: OK

Energy consumption: 2.242 kWh  
 Scope 1 emission: 0.032 kg CO<sub>2</sub>  
 Scope 2 emission: 0.832 kg CO<sub>2</sub>

## 01 OPERATIONALIZE ENVIRONMENTAL SUSTAINABILITY GOALS

## 02 BREAK SILOES BETWEEN OPS AND SUSTAINABILITY

**Station 1135**  
 Start time: Aug 8th 2023 09:23:18  
 Serial#: 129832124

**Task A**  
 Timestamp: Aug 8th 2023 09:23:44  
 Part ID: RMI098978we43

**Torque**  
 Torque: 95 NM

Lower Reject Limit	Lower Warning Limit	Target	Upper Warning Limit	Upper Reject Limit
91 NM	92 NM	94 NM	97 NM	98 NM

Energy consumption: 2.242 kWh  
 Scope 1 emission: 0.032 kg CO<sub>2</sub>  
 Scope 2 emission: 0.832 kg CO<sub>2</sub>  
 End time: Aug 8th 2023 09:25:32

**Station 1145**  
 Start time: Aug 8th 2023 09:27:44  
 Serial#: 129832124  
 Operator: Mr. ABC

**Test A**  
 Timestamp: Aug 8th 2023 09:27:58  
 Pass: Ok

**Test B**  
 Timestamp: Aug 8th 2023 09:28:41  
 Pass: Fail

Energy consumption: 0.025 kWh  
 Scope 1 emission: 0.000 kg CO<sub>2</sub>  
 Scope 2 emission: 0.093 kg CO<sub>2</sub>  
 End time: Aug 8th 2023 09:29:43

**Non Conformance**  
 Start time: Aug 8th 2023 09:29:26  
 Reason: Engine, Heat, Acceleration  
 Action: Adjusted jab-space  
 Energy consumption: 0.003 kWh  
 Scope 1 emission: 0.000 kg CO<sub>2</sub>  
 Scope 2 emission: 0.001 kg CO<sub>2</sub>  
 End time: Aug 8th 2023 09:37:28

**Station 1145**  
 Start time: Aug 8th 2023 09:41:31  
 Serial#: 129832124  
 Operator: Mr. ABC

**Test A**  
 Timestamp: Aug 8th 2023 09:41:58  
 Pass: Ok

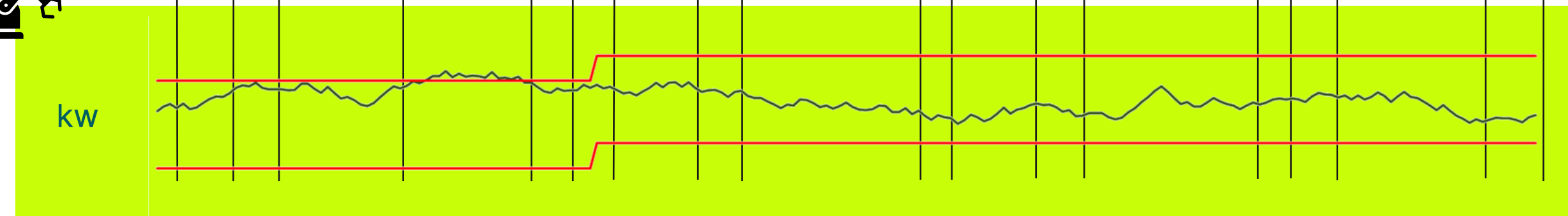
**Test B**  
 Timestamp: Aug 8th 2023 09:43:05  
 Pass: Ok

Energy consumption: 0.039 kWh  
 Scope 1 emission: 0.000 kg CO<sub>2</sub>  
 Scope 2 emission: 0.014 kg CO<sub>2</sub>  
 End time: Aug 8th 2023 09:45:09

# Proficiency Sustainability Insights – Context provides insights

## 03 PROVIDE PROCESS CONTEXT NEEDED TO TRULY OPTIMIZE

Shift	386,9 kwh				307,1 kwh					
Grade/product type	191,4 kwh				502,6 kwh					
Maintenance					67,5 kwh					
Change over	24,7 kwh									
Non-conformance					72,8 kwh					
Downtime	71,6 kwh									
Idle time	24,9 kwh			24,4 kwh	25,1 kwh		19,4 kwh	30,0 kwh	19,1 kwh	
Production events	23,2 kwh	47,0 kwh			38,7 kwh	107,3 kwh	43,2 kwh		21,8 kwh	33,3 kwh



# DEMO

# Q&A

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4 marzo, Eataly Milano Smeraldo







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