



18 MAY 2022

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# Michelin : an accelerated journey from demonstrator to worldwide usage

Presented by Julien RODRIGUES

**AVEVA**



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AVEVA



# MICHELIN GROUP



**125 000**  
people



**€22 B**  
In sales



**170**  
countries

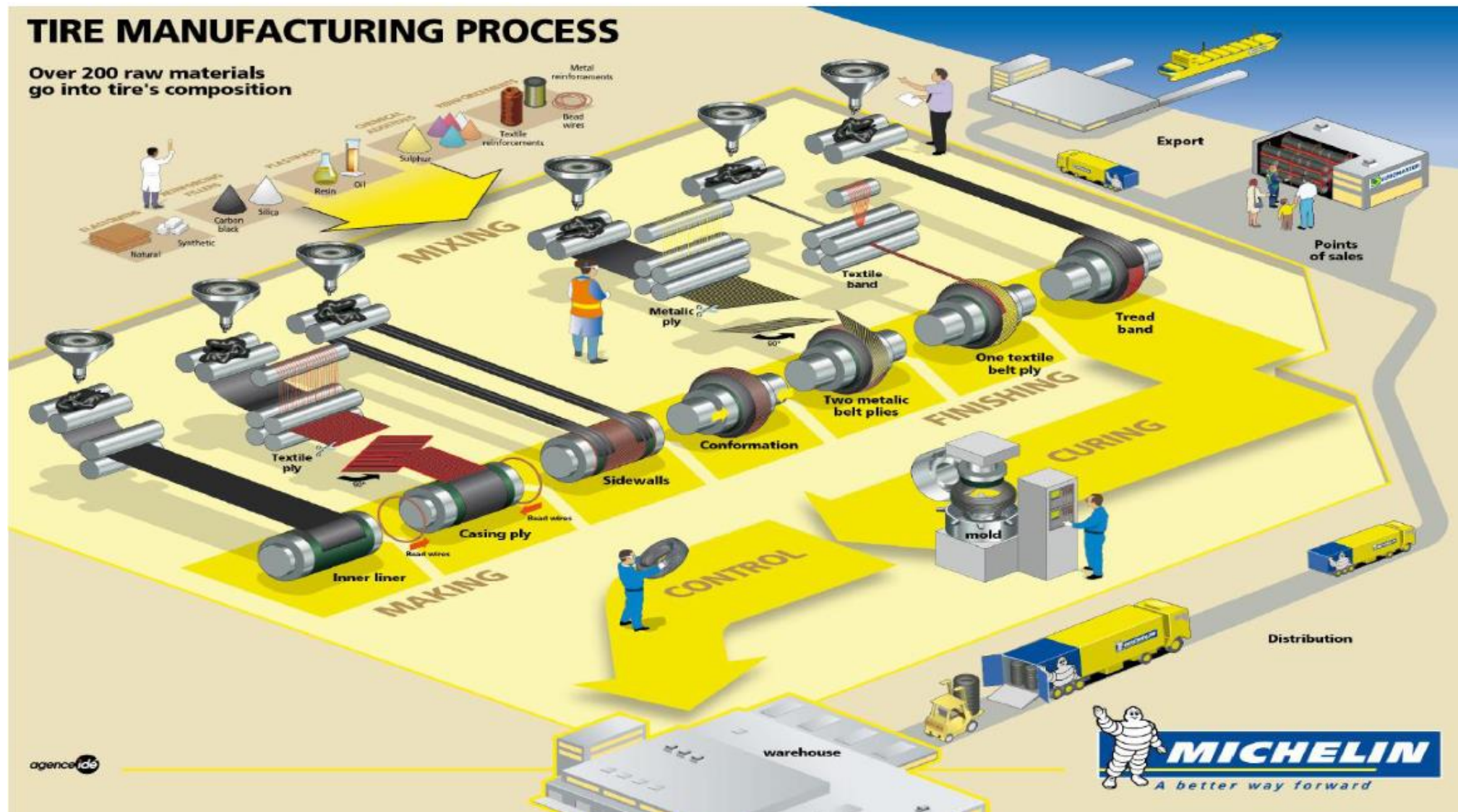


**73**  
sites





# Tire manufacturing process: From Chemistry to Tire



# CREATING SUSTAINABLE GROWTH



# OUR **STRATEGY** STATEMENT

**SUSTAINABLE  
GROWTH...**



**..THROUGH OUR  
UNIQUE  
CAPABILITIES...**

**...DEVELOPING  
DIFFERENTIATED  
PRODUCTS &  
SERVICES**



# Digital manufacturing



AVEVA



# THINK **BIG** – START **SMALL** – ROLL OUT **FAST**

DIGITAL  
TOUR

DEMONSTRATOR

LOT 1

DATA FOUNDATION  
DATA DRIVEN DECISION  
DATA LAKE & ANALYTICS

LOT 2

INTRODUCTION OF AI  
UNDERSTAND AND  
ANTICIPATE FUTURE  
AI PLATFORMS

NEXT STEP  
MORE  
TO  
EXPLORE



EXPLORE

2016

2017

2018

2019

2020

2021

2022

2023

2024



# PEOPLE AT THE HEART OF A GLOBAL TRANSFORMATION

## SOLUTION

*COLLABORATION/MOBILITY*

*DATA COLLECTION*

*DATA ANALYZE*

## COMPETENCIES

*6 DIGITAL LEADING TEAMS IN 6 FACTORIES*

*BUSINESS TRANSFORMATION*

*1 DIGITAL ROADMAP PER FACTORY*

## USAGE DEPLOYMENT

*USE CASE CATALOG*

*NETWORK ANIMATION*

*GOOD PRACTICES CAPTATION*

2019

2020

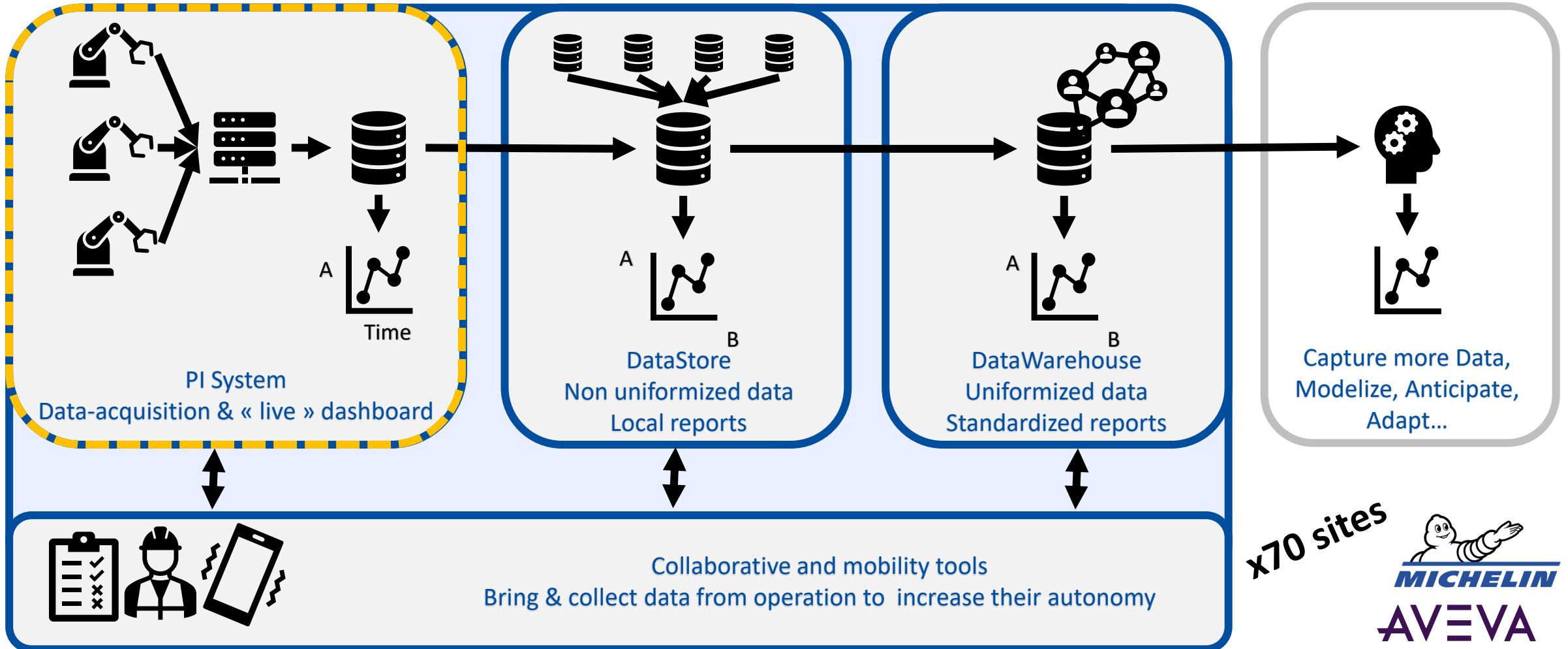
2021

2022

# FOCUS ON THE LOT1 SOLUTION

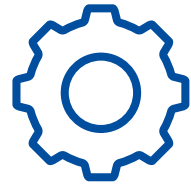
## LOT 1

## LOT 2 +





How to deploy  
in 3 years time?



## Challenge

- Up to 7 new installations/upgrades per month
- On Premise Secure Solution
- Standard installation on heterogeneous architectures
- Migration of historical PI system

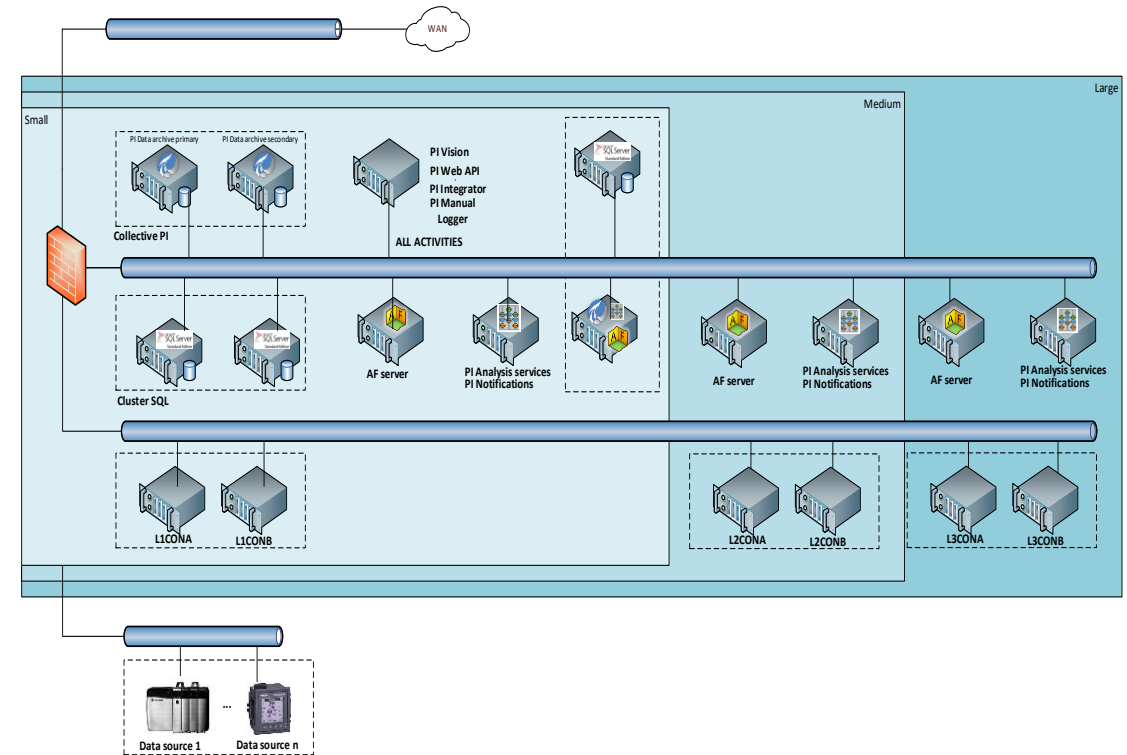


# How we succeed



## Solution

- Design adapted to plant configuration
- Secure design (gMSA, Kerberos)
- Standard installation
- Description of installation process done internally (installation guide)
- Setup automatic deployment
- Automate the validation testing procedure.



# How we succeed

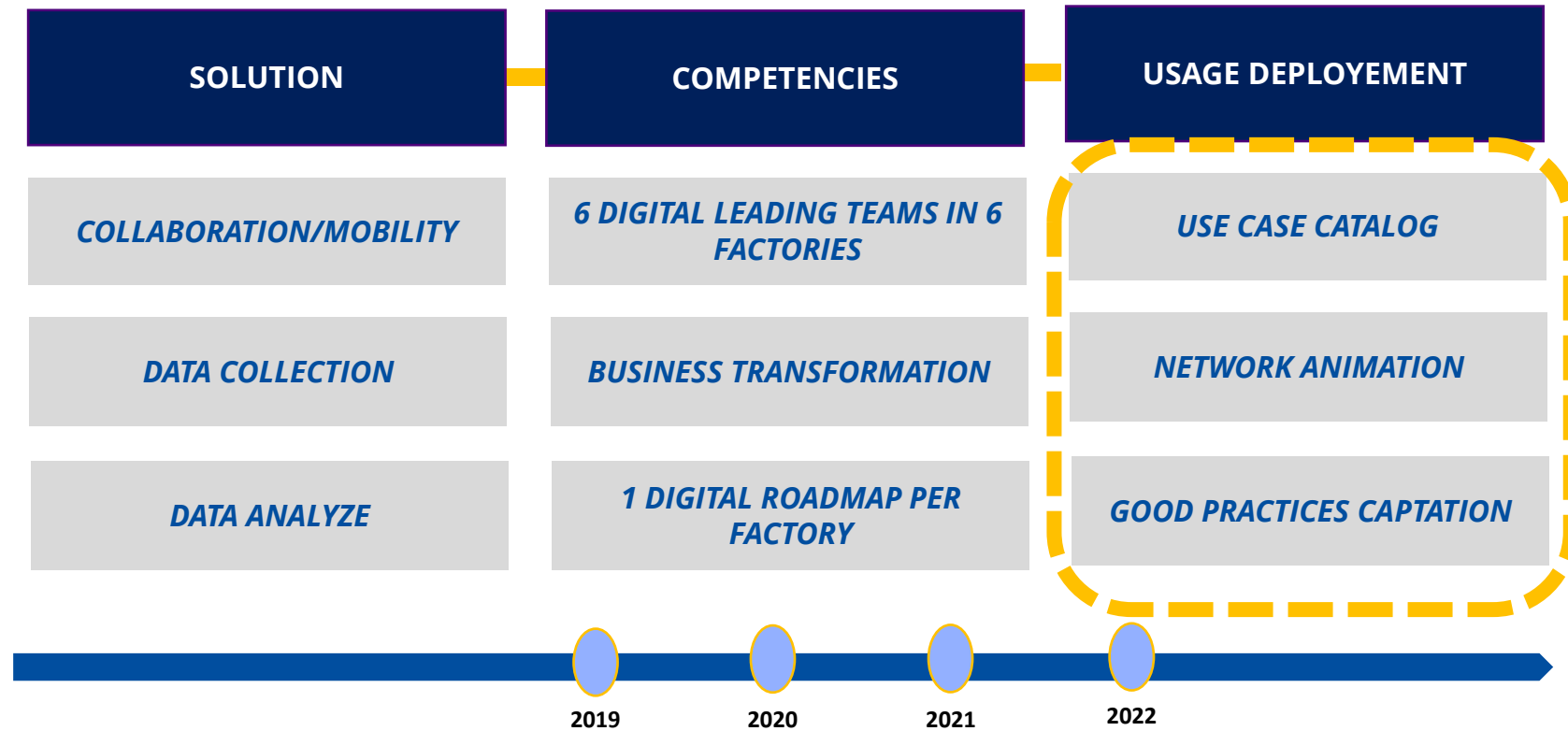
## •— Installation •— Benefits

- Installation reduced from 15 days to 2 days
- 80% automated (manual operations and errors eliminated)
- From 50% to +90% of results conformity
- On time scheduling despite COVID and semiconductor shortage
- Robust Deployment framework and procedure





# How we accelerate usages



# USERS AT THE HEART OF THE ORGANIZATION



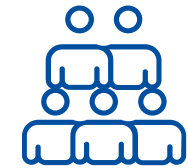
1 x PI team  
Digital Platform



6 x Digital  
leading teams in  
6 factories



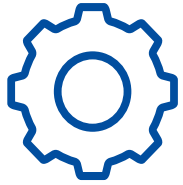
70 x Site Digital  
Team



+8 000  
Users



# Establish the foundations for data governance



## Challenge

Define a Data Model that can:

- Adapt to Michelin Process range (Continuous, semi-continuous, discrete, storage...)
- Be easily deployed by Local data manager.
- Permit data aggregation and comparison.



## Our Solution

Build a method with strong rules:

- Primary model is Asset centric (**Based on physical assets**).
- Tag Naming and model are based on well distributed standards and **PI Asset Framework Templates**

Develop a tool to support this method. Deploy and train all users on this tool.



# Data Structuration

## Workflow

Each site make an accurate definition of their assets using standard organization rules (Data Preparation) into an Equipment Definition File



Prefix			Body					
Zone	Country	SITE	L0_Area	L1_Process_Cell	L2_Unit	L3_Module	L4_Component	Description
EUR	FR	UGO	RT					Atelier RT
EUR	FR	UGO	RT	DMB_01				DMB #01
EUR	FR	UGO	RT	DMB_01	DMB_01_U			DMB #01
EUR	FR	UGO	RT	DMB_01	DMB_01_U	00_DER_FM		DMB_01_Déroul
EUR	FR	UGO	RT	DMB_01	DMB_01_U	01_DECAL		DMB_01_Ens Dé
EUR	FR	UGO	RT	DMB_01	DMB_01_U	02_BRO		DMB_01_BROSS
EUR	FR	UGO	RT	DMB_01	DMB_01_U	03_BEC		DMB_01_Bac e

Then each Assets is associated to local and standard Templates



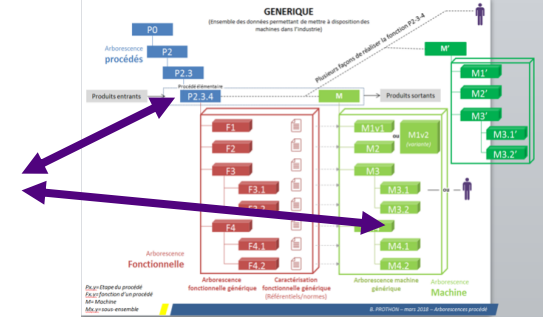
Template: TPL_ASSM_L3_CX_Cut_Module	
	CX_Cut_bad_count
	CX_Cut_count
	CX_Cut_Cycle_Step
	CX_Cut_POR
	CX_Cut_Time
	Lowerlimit_Cut_Time
	Max_Threshold_Cut_Cycle_Time
	Min_Threshold_Cut_Cycle_Time
	Standard_Cut_Time
	Upperlimit_Cut_Time



Template: TPL_PREP_L3_Conv	
Template: __TPLGA_Test_Generic	
	Attribute_In
	Attribute_In_Same_Name_Cfg1
	Attribute_In_Same_Name_Cfg2

Link the equipment model to Organizational and Functional Referential

Prefix		Body						
Zone	Country	SITE	L0_Area	L1_Process_Cell	L2_Unit	L3_Module	L4_Component	Description
EUR	FR	UGO	RT					Atelier RT
EUR	FR	UGO	RT	DMB_01				DMB #01
EUR	FR	UGO	RT	DMB_01	DMB_01_U			DMB #01
EUR	FR	UGO	RT	DMB_01	DMB_01_U	00_DER_FM		DMB_01_Déroul
EUR	FR	UGO	RT	DMB_01	DMB_01_U	01_DECAL		DMB_01_Ens Dé
EUR	FR	UGO	RT	DMB_01	DMB_01_U	02_BRO		DMB_01_BROS
EUR	FR	UGO	RT	DMB_01	DMB_01_U	03_BEC		DMB_01_Bac



Link each asset of the model to multiple site data sources

Prefix		Body						Description
Zone	Country	SITE	L0_Area	L1_Process_Cell	L2_Unit	L3_Module	L4_Component	
EUR	FR	UGO	RT					Atelier RT
EUR	FR	UGO	RT	DMB_01				DMB #01
EUR	FR	UGO	RT	DMB_01	DMB_01_U			DMB #01
EUR	FR	UGO	RT	DMB_01	DMB_01_U	00_DER_FM		DMB_01_Déroule
EUR	FR	UGO	RT	DMB_01	DMB_01_U	01_DECAL		DMB_01_Ens Déc
EUR	FR	UGO	RT	DMB_01	DMB_01_U	02_BRO		DMB_01_BROSSA
EUR	FR	UGO	RT	DMB_01	DMB_01_U	03_BEC		DMB_01_Bac eau

- PI Interface
- PI Connector
- PI Adapters
- OPC DA
- Modbus
- RDBMS
- UFL
- OPC UA

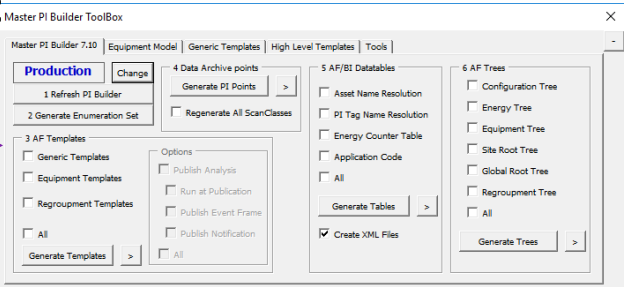


# Data Structuration

The final equipment Model can now be published

Prefix	Zone	Country	Site	L0_Area	L1_Process_Cell	L2_Unit	L3_Module	L4_Component	Description
EUR	FR	UGO	RT		DMB_01				Atelier RT
EUR	FR	UGO	RT		DMB_01	DMB_01_U			DMB #01
EUR	FR	UGO	RT		DMB_01	DMB_01_U	00_DER_FM		DMB_01_Dérout
EUR	FR	UGO	RT		DMB_01	DMB_01_U	01_DECAL		DMB_01_Ens Dec
EUR	FR	UGO	RT		DMB_01	DMB_01_U	02_BRO		DMB_01_BROSSAG
EUR	FR	UGO	RT		DMB_01	DMB_01_U	03_BEC		DMB_01_Bac esu

Using our proprietary tool and PI-Builder we can then:



Publish All DA points using our Tag naming specification

Server	Name	Stored Values	Point S
P	S1DSIDIPIDAA	NCA.MX.MX2.ZB.GR02.ZB02.MI01.Chamber.00.IA.Probe1.DropDoorTemperature	Real-time data S24_U
P	S1DSIDIPIDAA	NCA.MX.MX2.ZB.GR02.ZB02.MI01.Chamber.00.IA.Probe1.LateralTemperature	Real-time data S24_U
P	S1DSIDIPIDAA	NCA.MX.MX2.ZB.GR02.ZB02.MI01.Chamber.00.IA.Probe2.DropDoorTemperature	Real-time data S24_U
P	S1DSIDIPIDAA	NCA.MX.MX2.ZB.GR02.ZB02.MI01.Chamber.00.IA.Probe2.LateralTemperature	Real-time data S24_U
P	S1DSIDIPIDAA	NCA.MX.MX2.ZB.GR02.ZB02.WM01.Mix.Cycle.00.AbnormalMix.TemperatureRequested	Real-time data S24_U
P	S1DSIDIPIDAA	NCA.MX.MX2.ZB.GR02.ZB02.WM01.Mix.Cycle.00.NormalMix.TemperatureRequested	Real-time data S24_U
P	S1DSIDIPIDAA	NCA.MX.MX2.ZB.GR02.ZB02.WW01.Mix.Temperature.00.IA.Temperature_WW	Real-time data S24_U
P	S1DSIDIPIDAA	NCA.MX.MX2.ZB.GR02.ZB02.WW01.Mix.Temperature.00.Maximum	Real-time data S24_U
P	S1DSIDIPIDAA	NCA.MX.MX2.ZB.GR02.ZB02.WW01.Mix.Temperature.00.Temperature_Average	Real-time data S24_U

Publish the Templates and Trees into PI Asset Framework

Elements	WINDUP_01
S2_Q2_RAB	
S2_Q2_RAB_DRUM	
CLC_S3	
COEX_05	
COEX_XPI_05	
COEX_ACC_05	
COEX_ALIM_05	
COEX_COND_05	
WINDUP_01	
WINDUP_02	
Cylinder	
ENCODER	
XPI_WindUp_02	
COEX_CX_05	

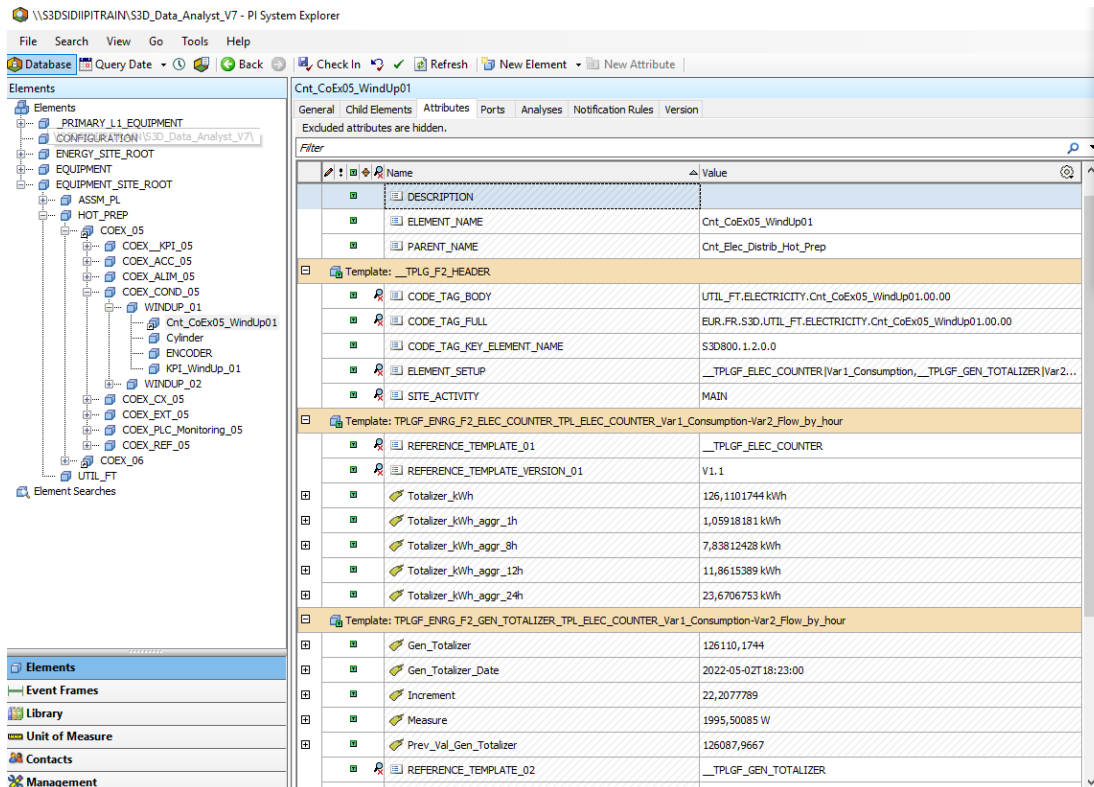
General	Child Elements	Attributes	Ports	Analyses	Notification Rules	Version
Excluded attributes are hidden.						
Filter						
Name						
REFERENCE_TEMPLATE_VERSION_01						
Template: TPL_PREP_I3_WindUp_Var_WIS_Local						
Alert_Alarm_Identifier						
Alert_Description						
Bobbin_Number						

Publish Assets and Points Referential into our Factory Data ware



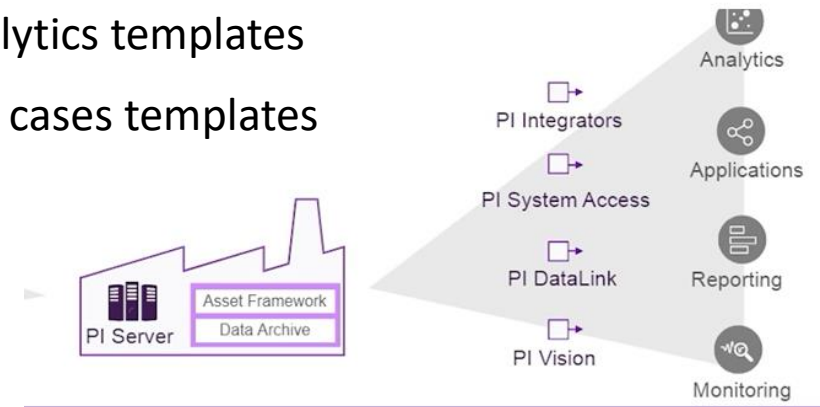
# Data Structuration




Result is a fully Functional Database describing the assets and their live data



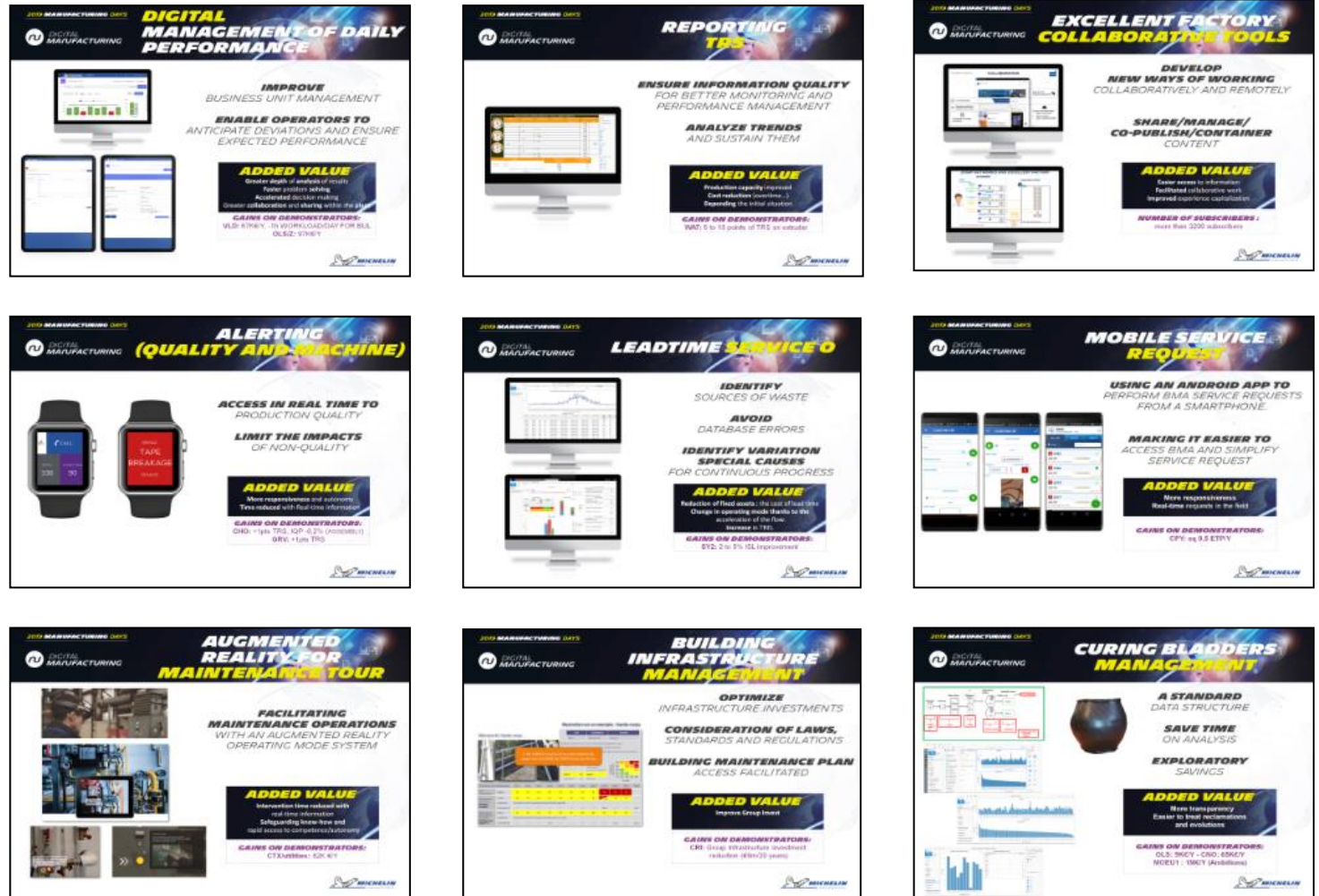
These assets can now be used as a base for:

- Reporting (DataLink, PI Integrator)
- Visualization (PI Vision)
- Analytics templates
- Use cases templates

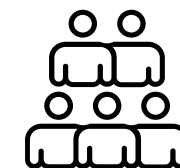


 **+6000** Displays     **+400 000**/day     **+2 000 000** Tags

# A Use Cases Catalog for a fast scale-up



... More than 65 Use Cases



+8 000  
Users

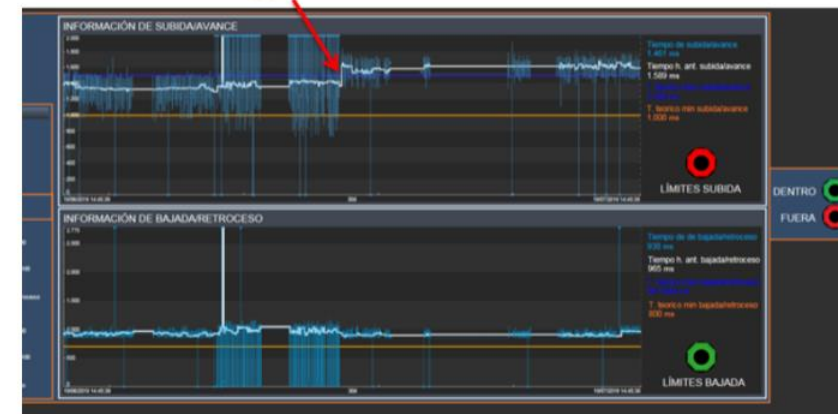




# Use case: Automated maintenance request



Alert



## Objective

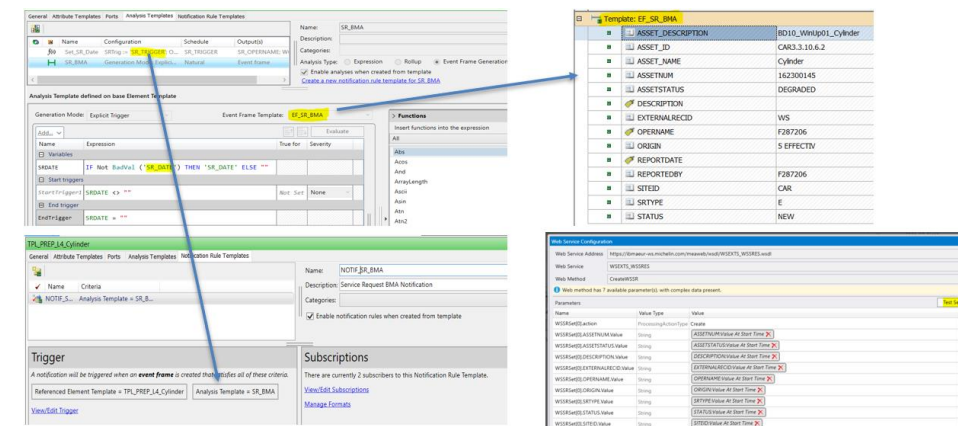
- When a machine fails, operator request an intervention connecting on a maintenance management solution. (No value Added)

## What does the Use case

- Automate Service Request to IBM Maximo maintenance Application (BMA) from triggers and analyzes

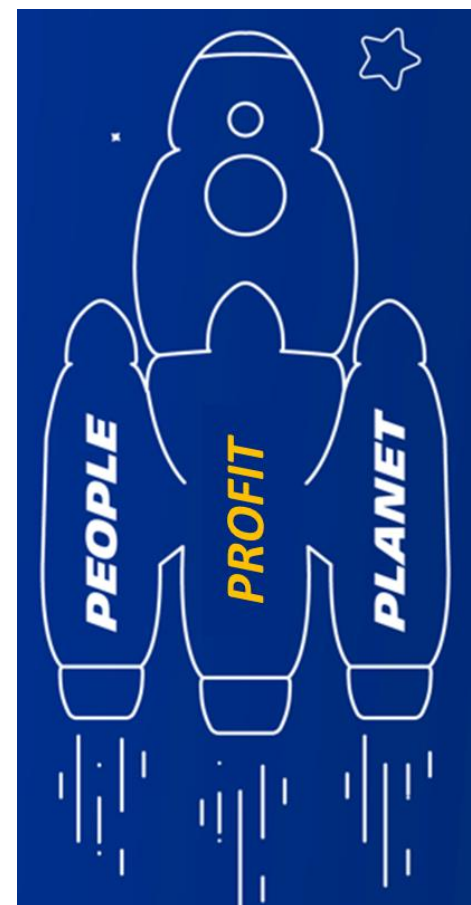
## Benefits

- 30% of Service Requests automated





# Use case: Machine cycle time



## Objective

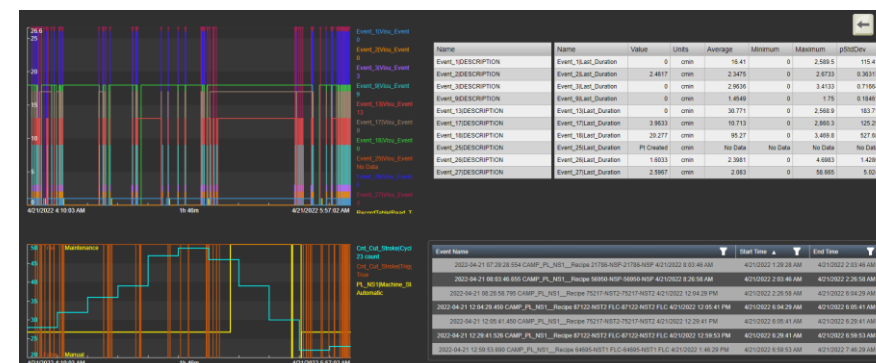
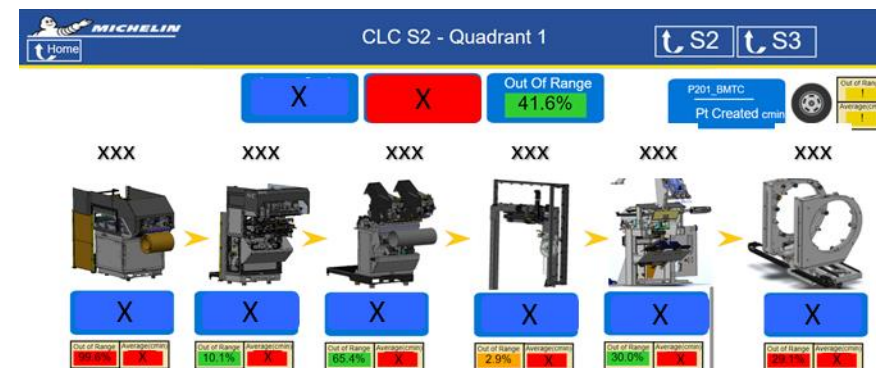
- Monitor machines cycle time to detect loss of production capacity faster.

## What does the Use case

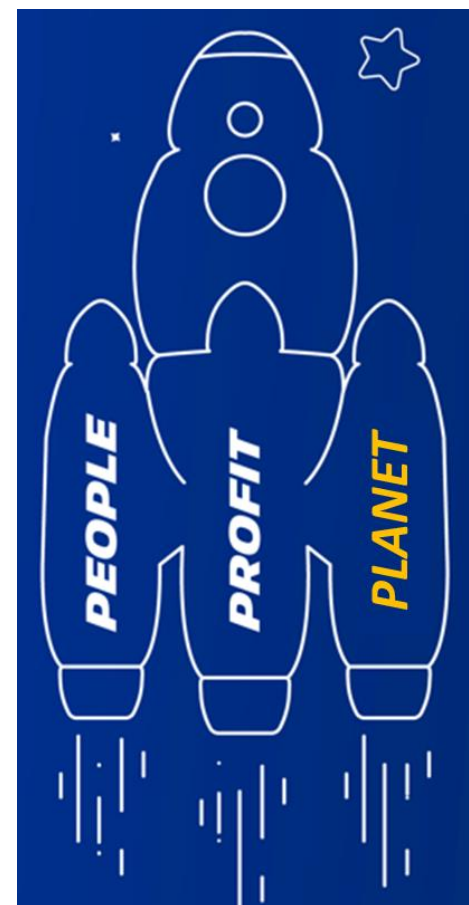
- Measure cycle time in floor PLC or calculate it using PI analysis or external computing solution (Python...)
- Show cycle time evolution to operators
- Add context data to build BI reports

## Benefits

- Identify bottlenecks - Production capacity increase



# Use case: Energy efficiency



## Objective

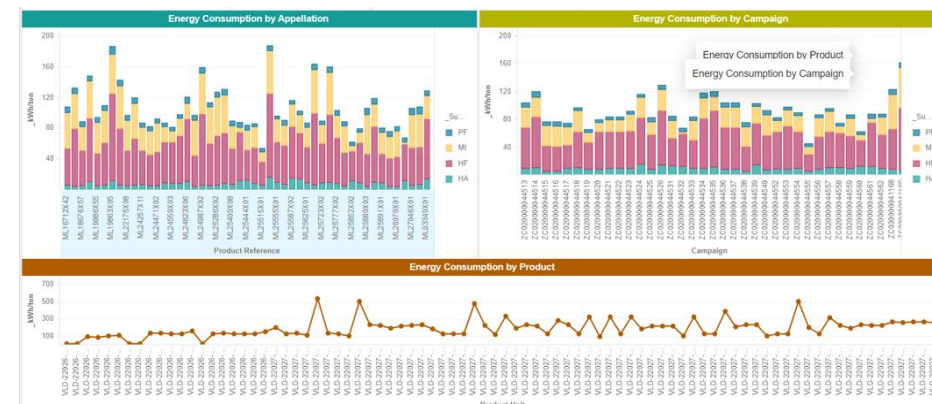
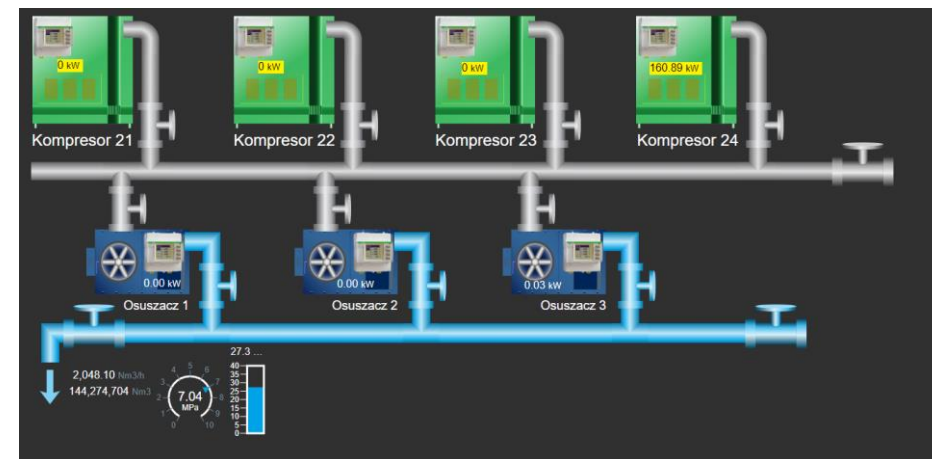
- Identify lever to reduce our energy consumption and leaks.

## What does the Use case

- Connected energy counters to display dashboard
- Add context data to build BI reports
- Definition of a golden batch by recipe (deviations detection)

## Benefits

- Up to 10% energy reduction



# Results



+6000

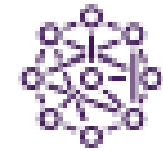
Displays

Event Frames



+400 000

EF per day

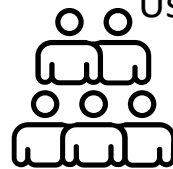


+2 000 000

Tags

+8 000

Users



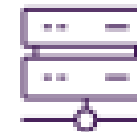
70

Plants



+800

Virtual Machines



+800

Interfaces



# What we improved?

Assets availability

Maintenance reactivity

Product Quality

Energy usage

Up to 10% reduction



Less Non Value Added actions

30% of service requests automated

Water consumption

10% reduction

Quicker analysis

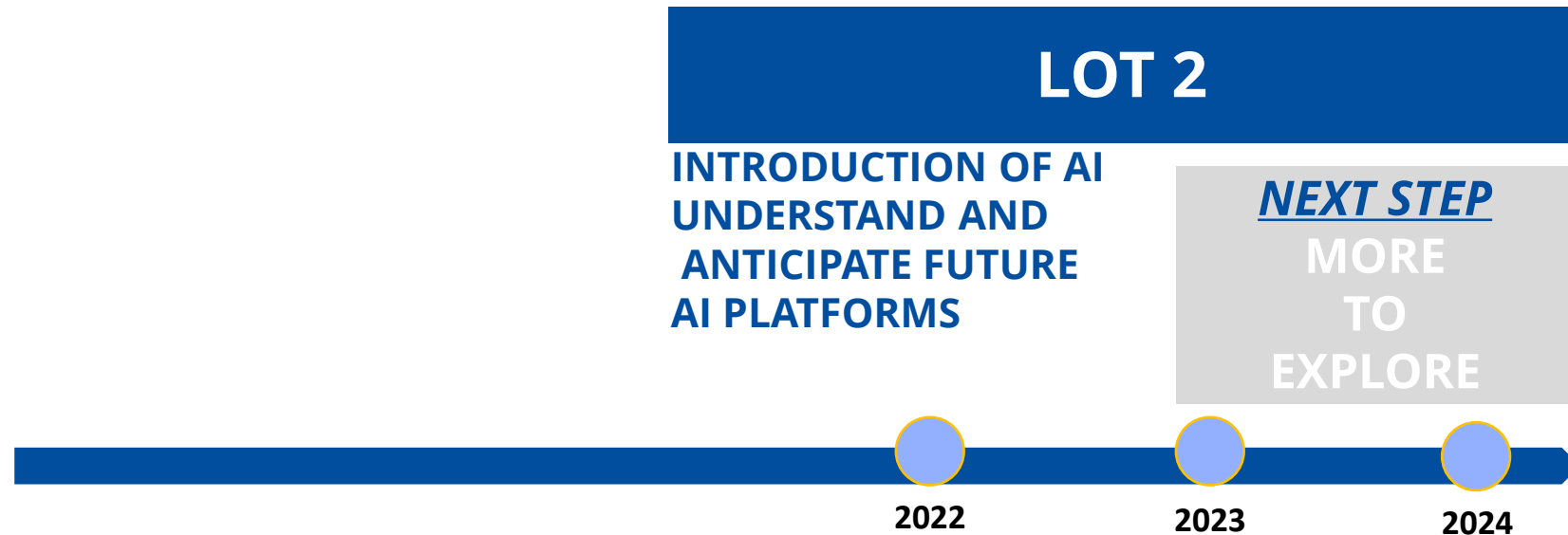
Operator's autonomy

Reduce production variability



## Next steps

- From 70 sites to 1 « data-ocean »
- LOT1 robustness and high availability





# The team is there for your questions



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THANK YOU

謝謝

DZIĘKUJĘ CI

NGIYABONGA

TEŞEKKÜR EDERİM

DANKIE

TERIMA KASIH

GRACIES

WHAKAWHETAI KOE

DANKON

TANK

TAPADH LEAT

SALAMAT

KÖSZÖNÖM

СПАСИБО

GRAZIE

MATUR NUWUN

ХВАЛА ВАМ

MULTUMESC

PAKMET CIZGE

고맙습니다

GRAZIE

شكرا

FAAFETAI

GO RAIBH MAITH AGAT

ESKERRIK ASKO

БЛАГОДАРЯ

GRACIAS

MAHADSANID

TI БЛАГОДАРАМ

TEŞEKKÜR EDERİM

TAK DANKE

OBRIGADO

RAHMAT

MERCI

GRAZZI

PAKKA PÉR

HATUR NUHUN

PAXMAT CAĞA

MAHALO IĀ 'OE

TAKK SKAL DU HA

MERCİ

DI OU MÈSI

ĐAKUJEM

CẢM ƠN BẠN

UA TSAUG RAU KOJ

WAZVIITA

TI БЛАГОДАРАМ

СИПОС

FALEMINDERIT

ありがとうございました

SIPAS JI WERE

TERIMA KASIH