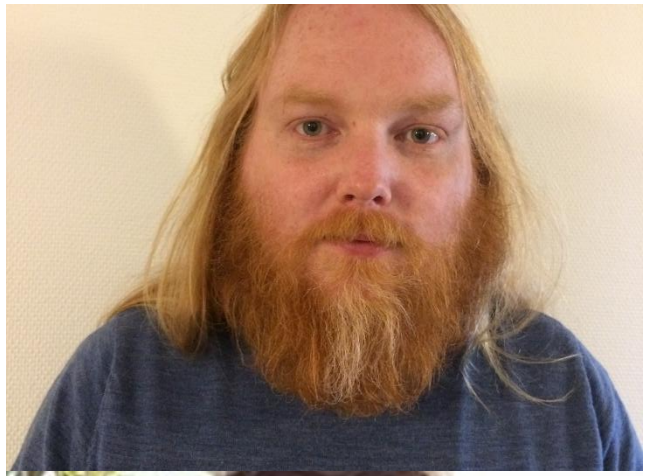
Global OEE project at Sandvik Coromant

Erik Hedvall
Conny Söderlund

Global OEE project at Sandvik Coromant



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- Sandvik Coromant
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- Senior Project Leader
- Sandvik Coromant


WE ARE A CUTTING
EDGE TECHNOLOGY
ENGINEERING GROUP

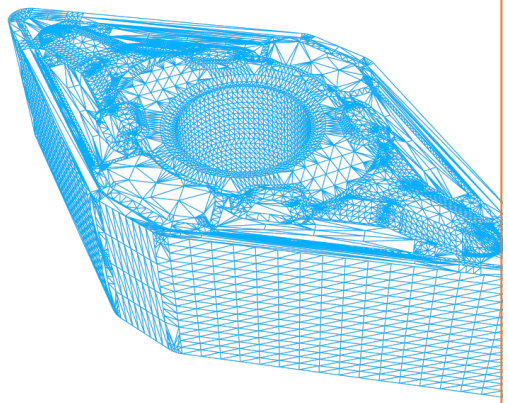
TO AIR-DRIVEN ENERGY

FROM NANOTECHNOLOGY

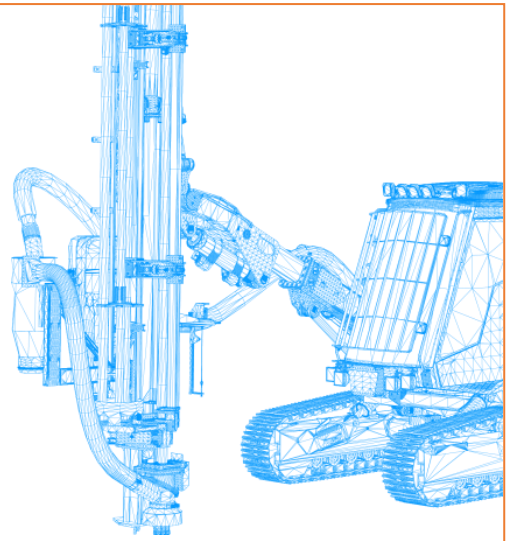
SANDVIK

World-LEADING POSITIONS

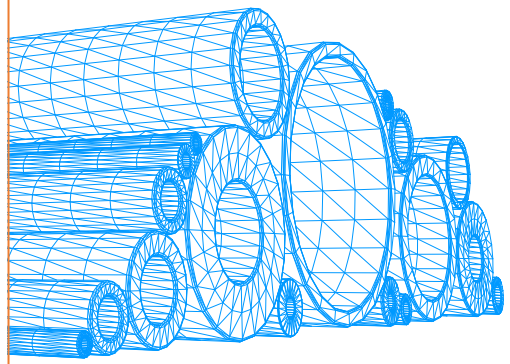
IN THE FOLLOWING AREAS



METAL CUTTING



MINING AND ROCK TECHNOLOGY



ADVANCED MATERIAL KNOWLEDGE

43,000
EMPLOYEES

82
BILLION SEK
INVOICED SALES

60
R&D CENTERS GLOBALLY

SALES IN OVER
150
COUNTRIES
AROUND THE GLOBE

3.5
BILLION SEK
ANNUAL R&D INVESTMENT

7,900
ACTIVE PATENTS AND OTHER IP* RIGHTS

SANDVIKEN_

PASSION FOR EXCELLENCE

8,000 employees and is represented in 130 countries

SANDVIK Coromant

FAGERSTA_

MAKING IT EASIER

has 5,600 employees with local offices in 60 countries

SECO

TÜBINGEN_

ENGINEERING KOMPETENZ

3,800 employees and around 50 subsidiaries and distribution partners worldwide

WALTER

MILAN_

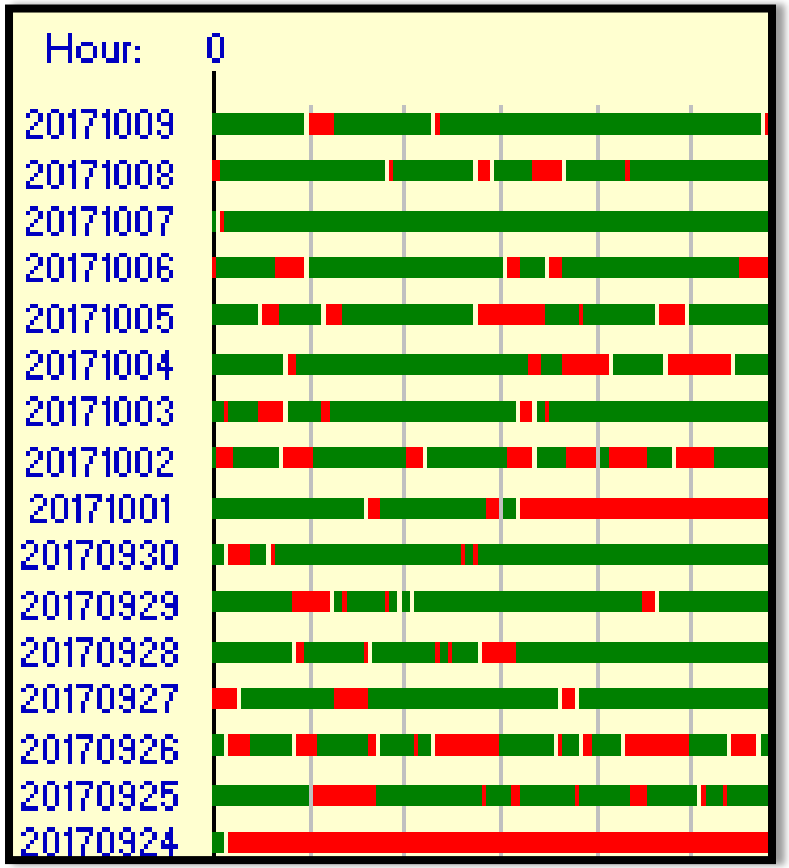
SIMPLY RELIABLE

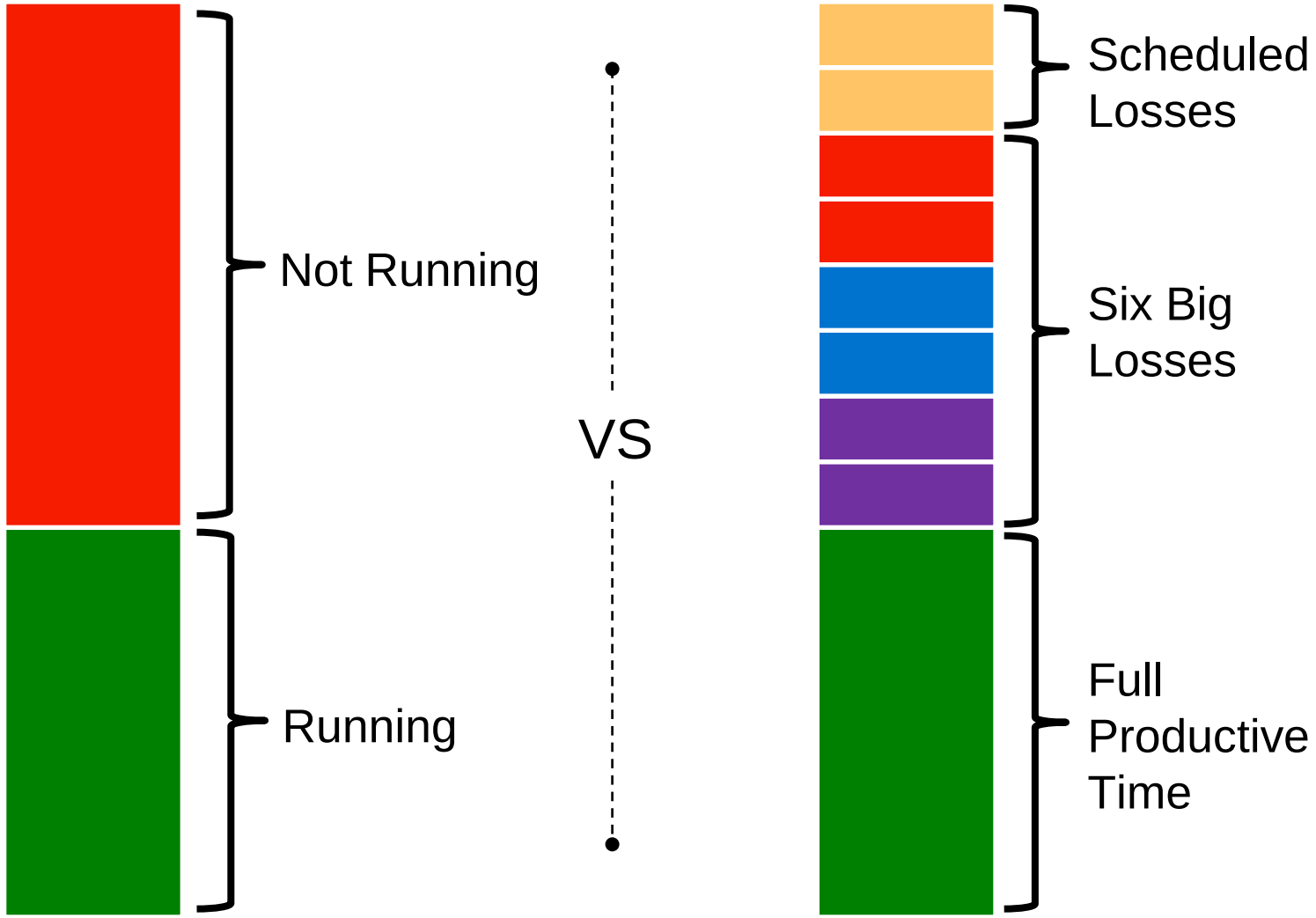
1,700 employees and are represented in 100 countries

DORMER PRAMET

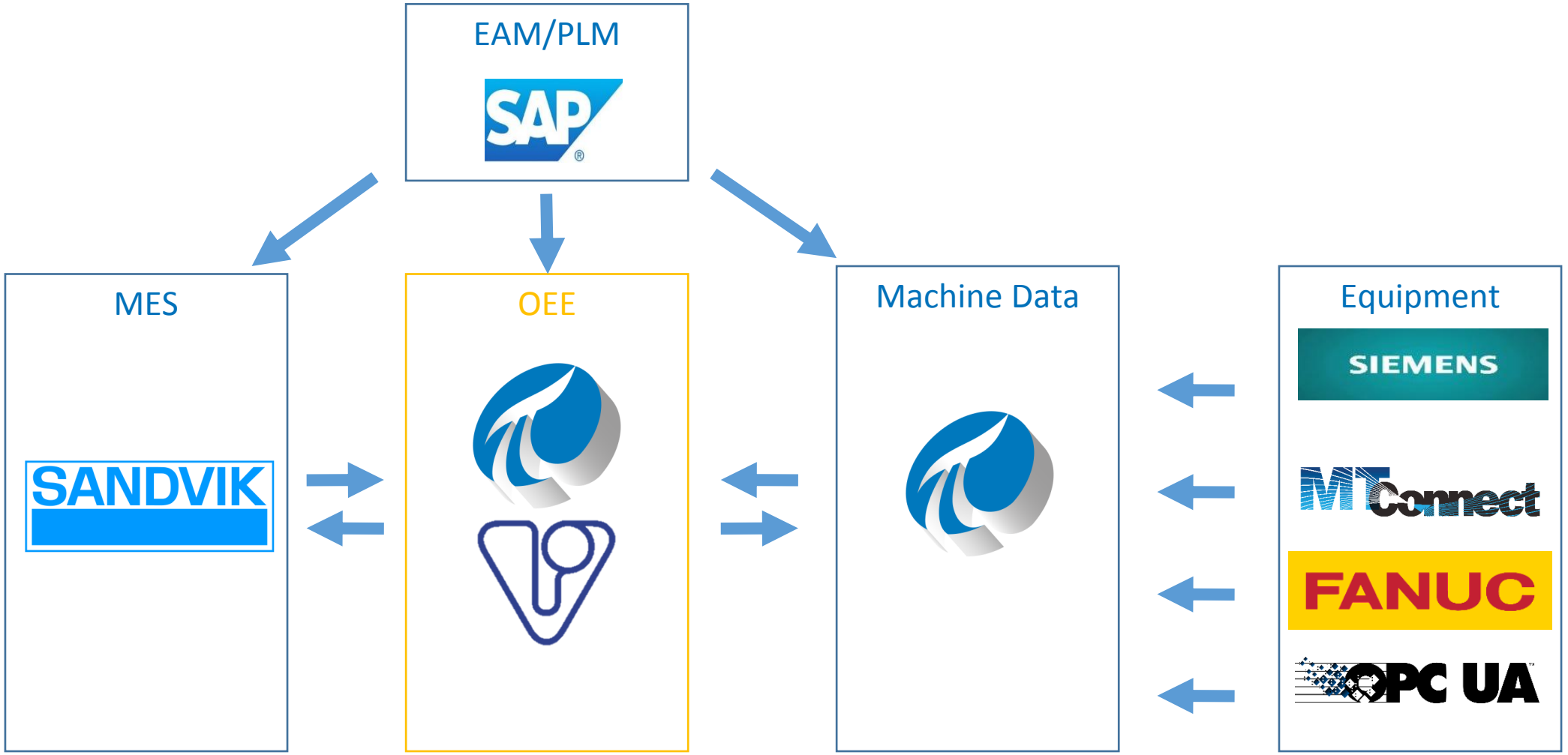
PRODUCTS

Our Objective – Standardize OEE



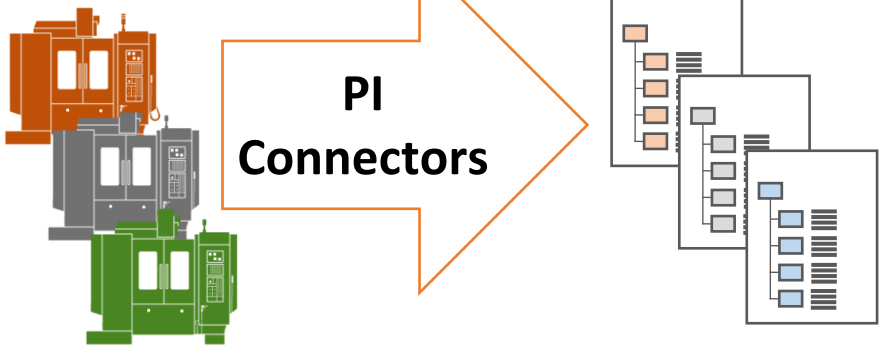


Solution – Our System Architecture

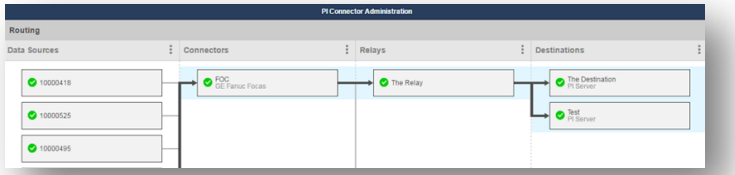


The Role of the PI System

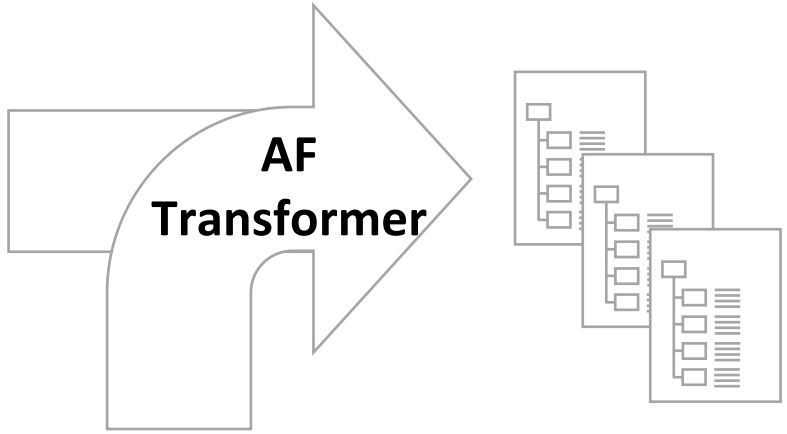
Connect



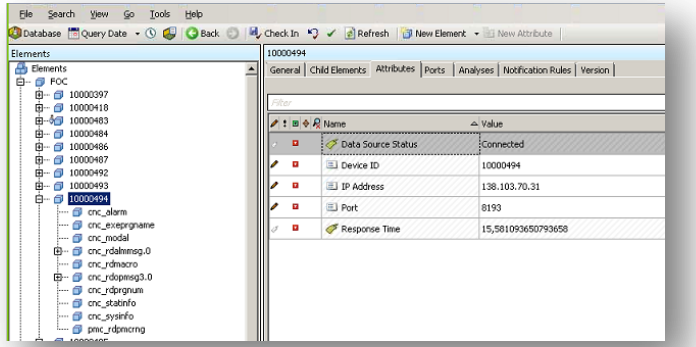
Data Collection Manager



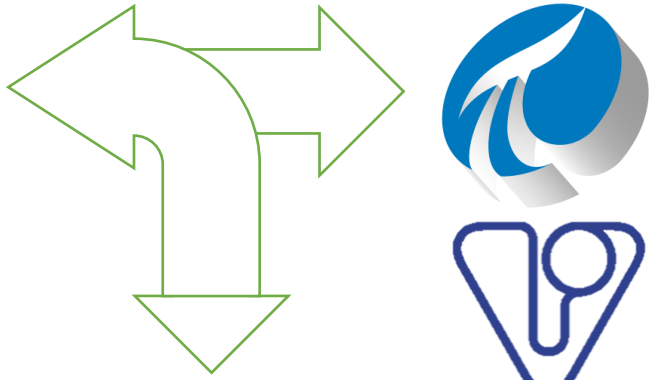
Standardize



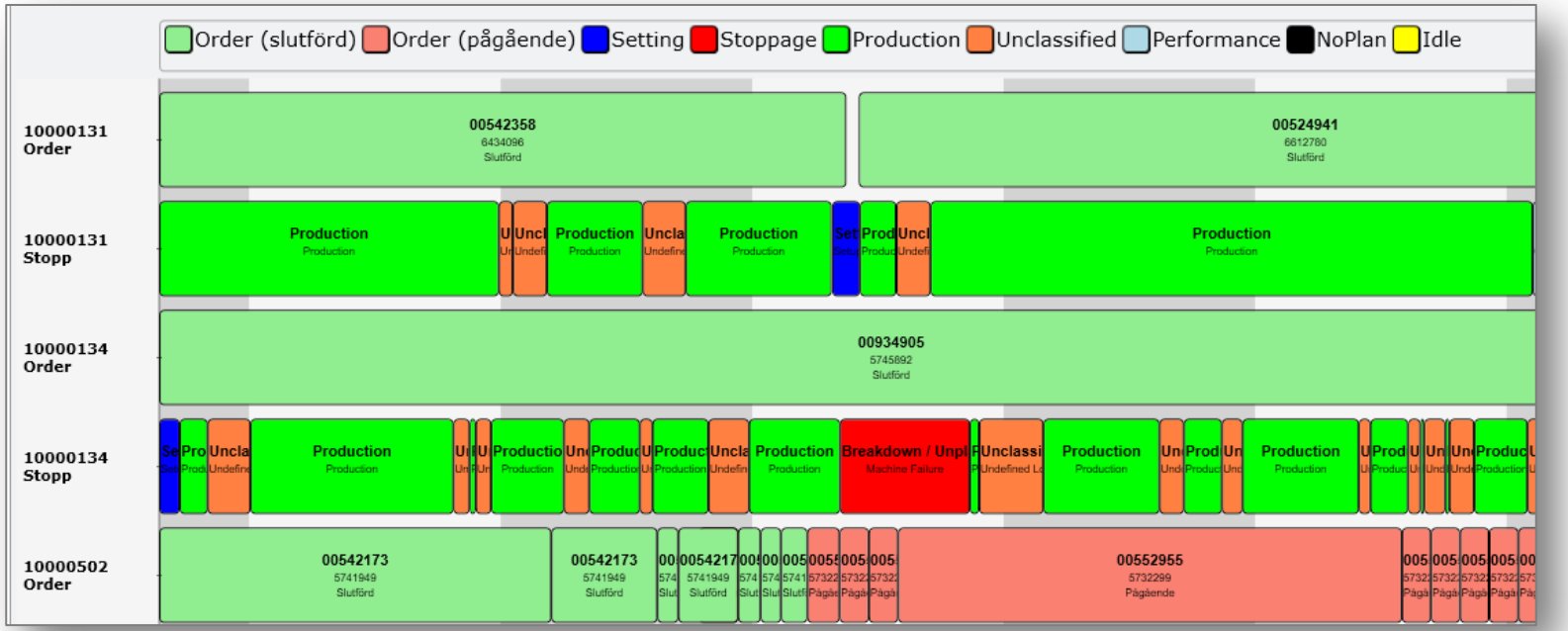
Standardized Templates

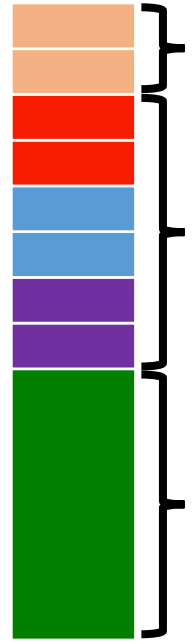


Deliver & Store



Standardized OEE Dashboard





Scheduled Losses

Six Big Losses

Full Productive Time

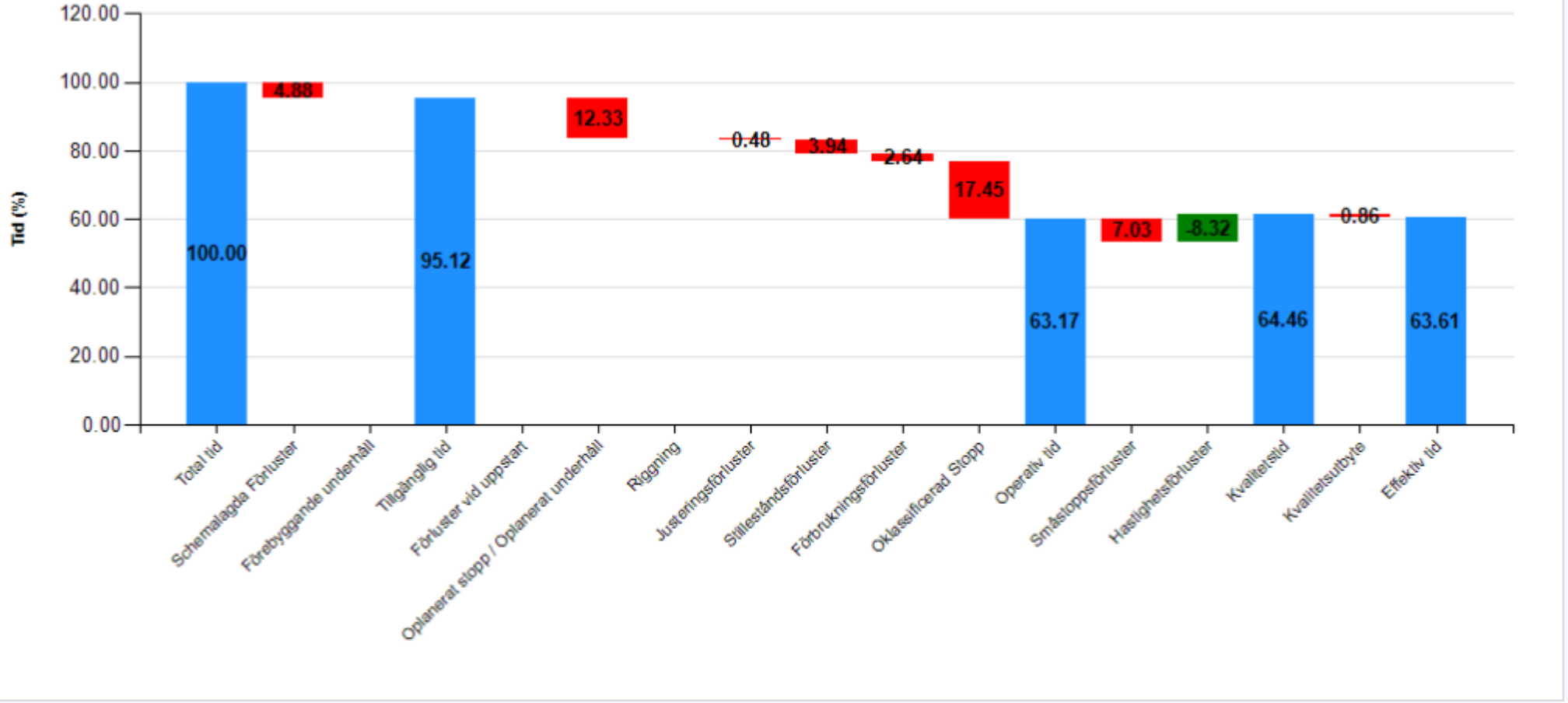
Improve Asset Utilization

Global and Local Improvements

Real Time Feedback

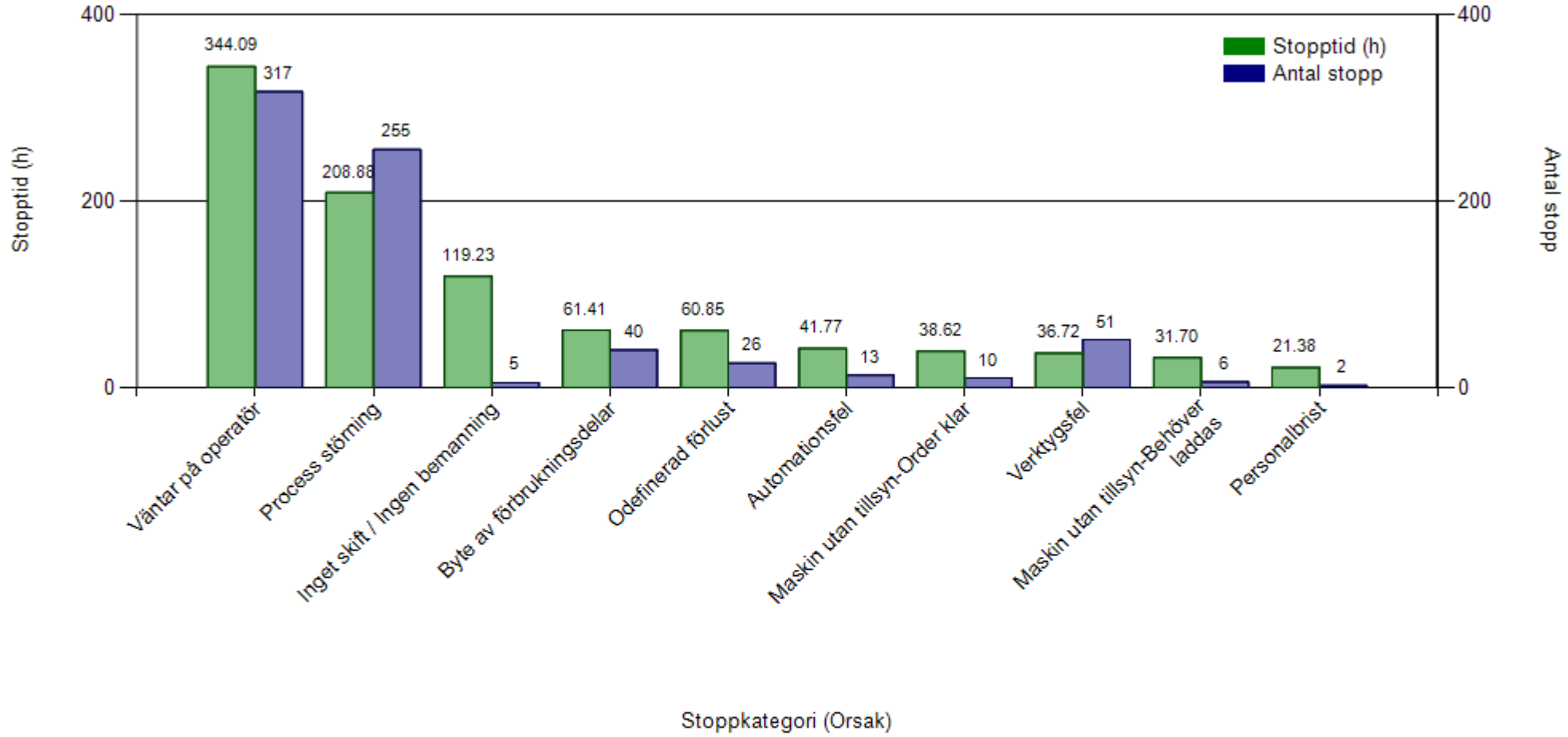
Examples of OEE standard report

Plant performance : TEEP OEE Waterfall



Tillgänglighet	Anläggningseffektivitet	Kvalitetsutbyte	OEE	TEEP
63.2 %	102.0 %	98.6 %	63.6 %	60.4 %

Plant performance : Stop Loss Top List Reason

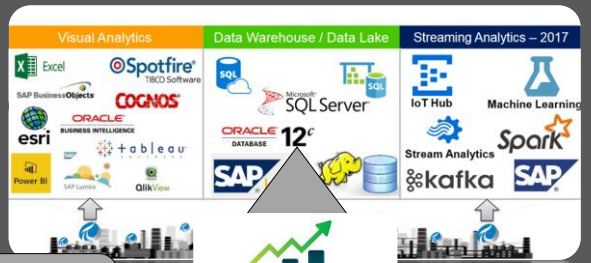


Tillgänglighet	Anläggningseffektivitet	Kvalitetsutbyte	OEE	TEEP
63.2 %	102.0 %	98.6 %	63.6 %	60.4 %

OEE Project as of today

Two PU’s are running system with approx 100 machines connected. Remaining 700 machines will now be connected according to plan.

Dataflow



METADATA

ERP,MES

Quality Control, ProductData..

Propagate

OEE

Visualization / Consumption

Analyze

Information with context for decision support And consumption by others

Contextualize

Raw signal data is converted into understandable information

Aggregate

Collect

Large quantities of Rawdata

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Transformation

From signal to insight

Raw data

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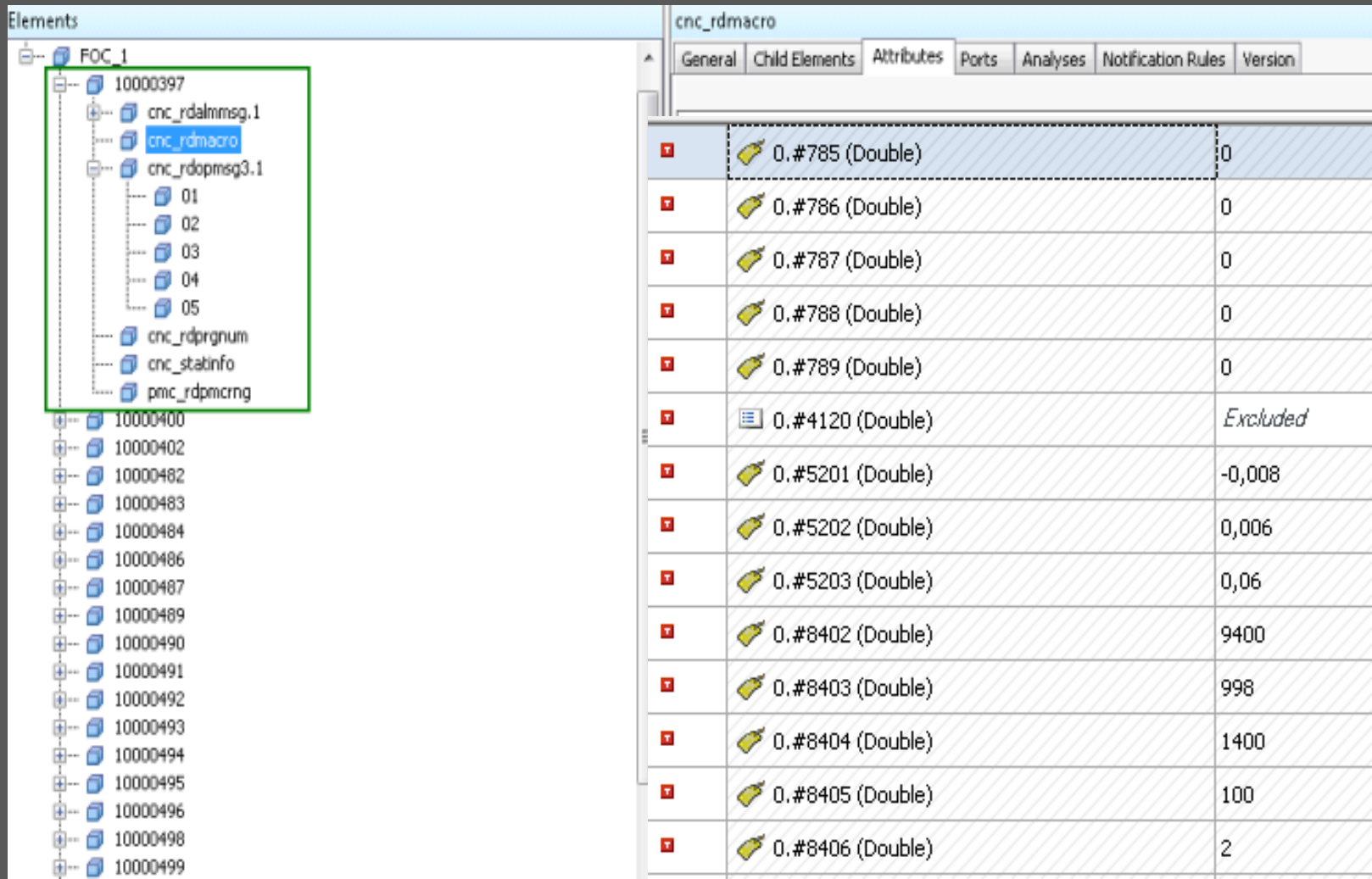
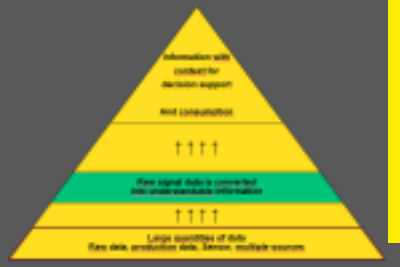
Collect rawdata, used both for OEE and PDA

Only a subset is relevant for OEE, but we collect much more for CI, RCA, Analytics etc



Calculate / Transform / Contextualize



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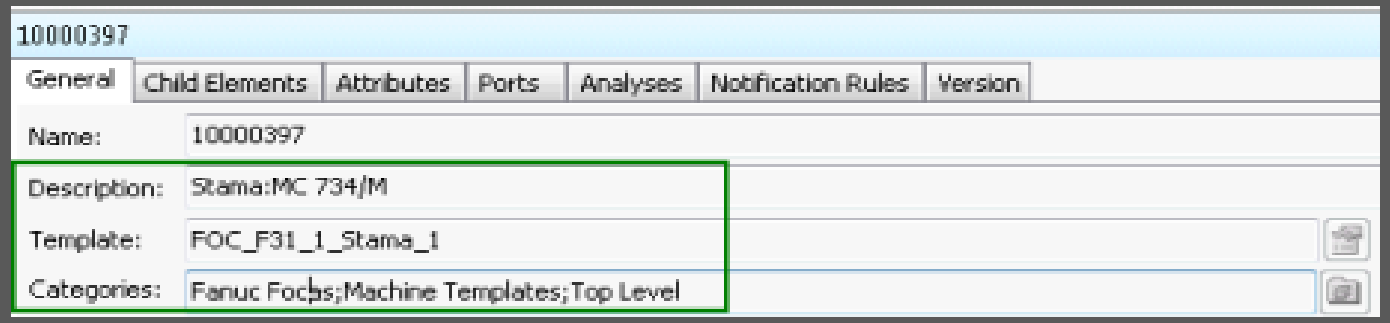

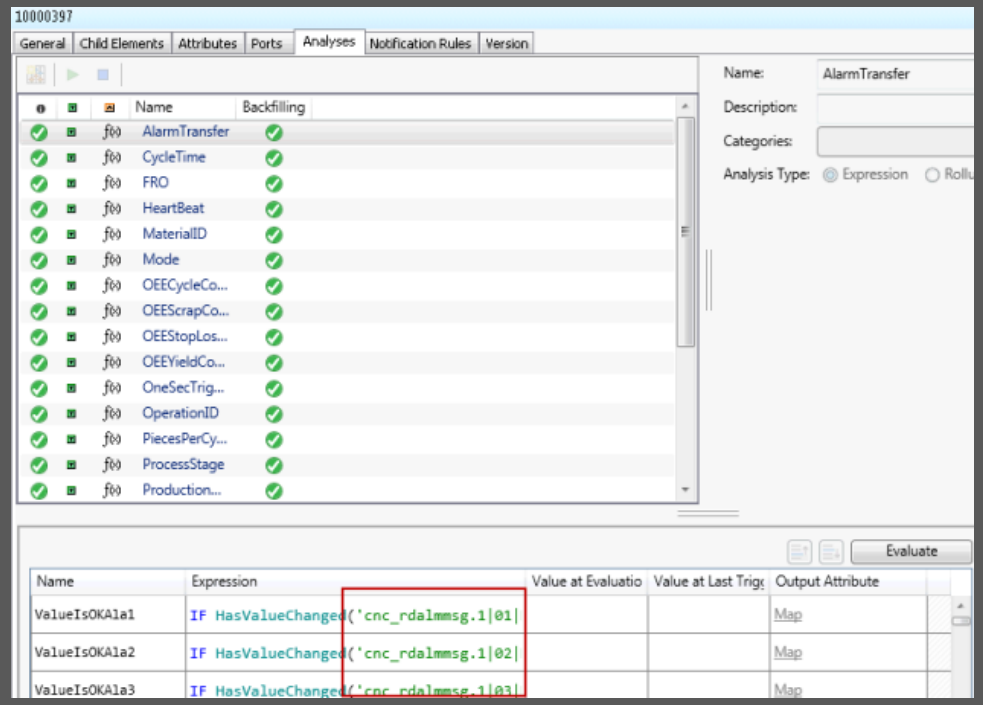

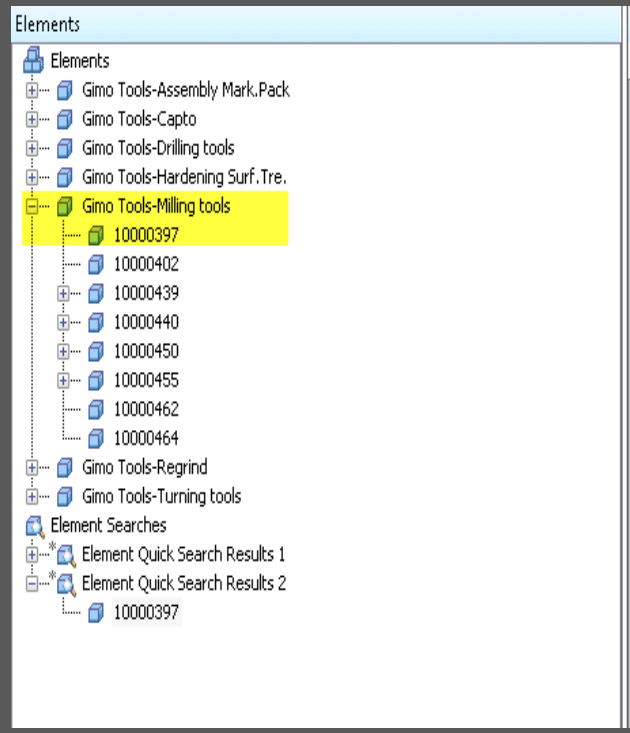

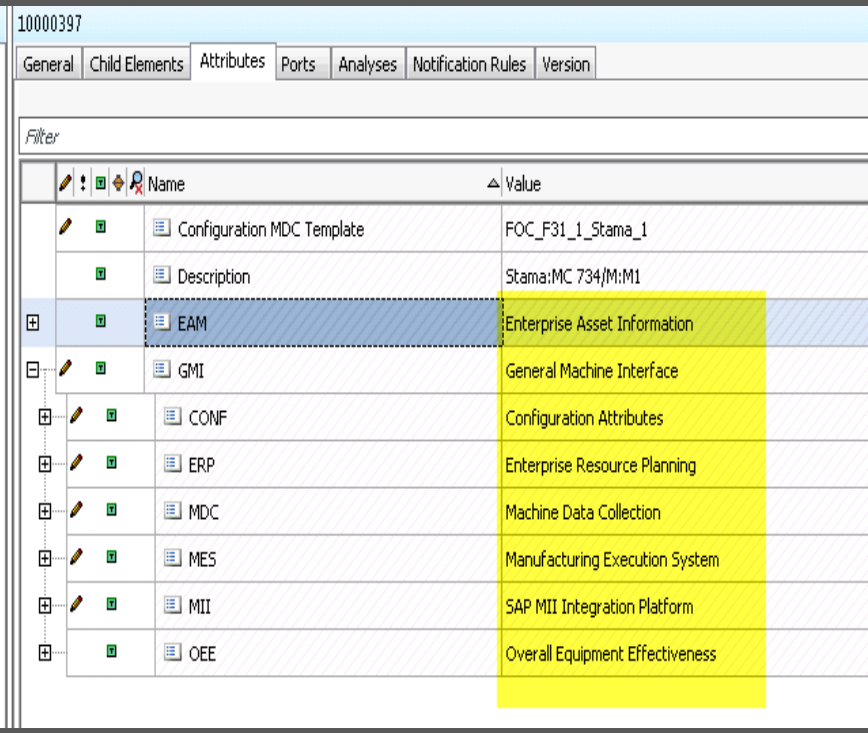

Voila! Human readable

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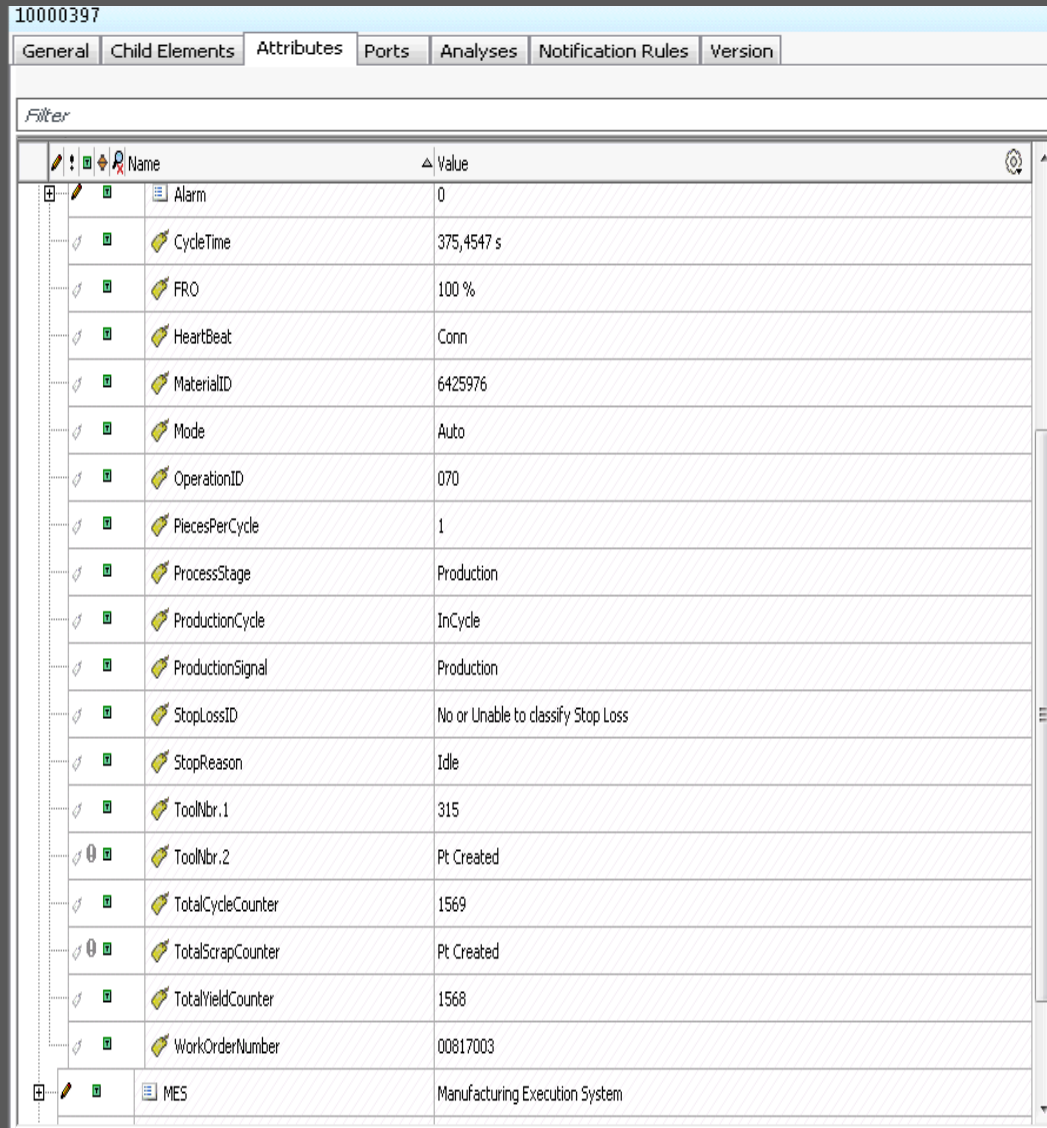
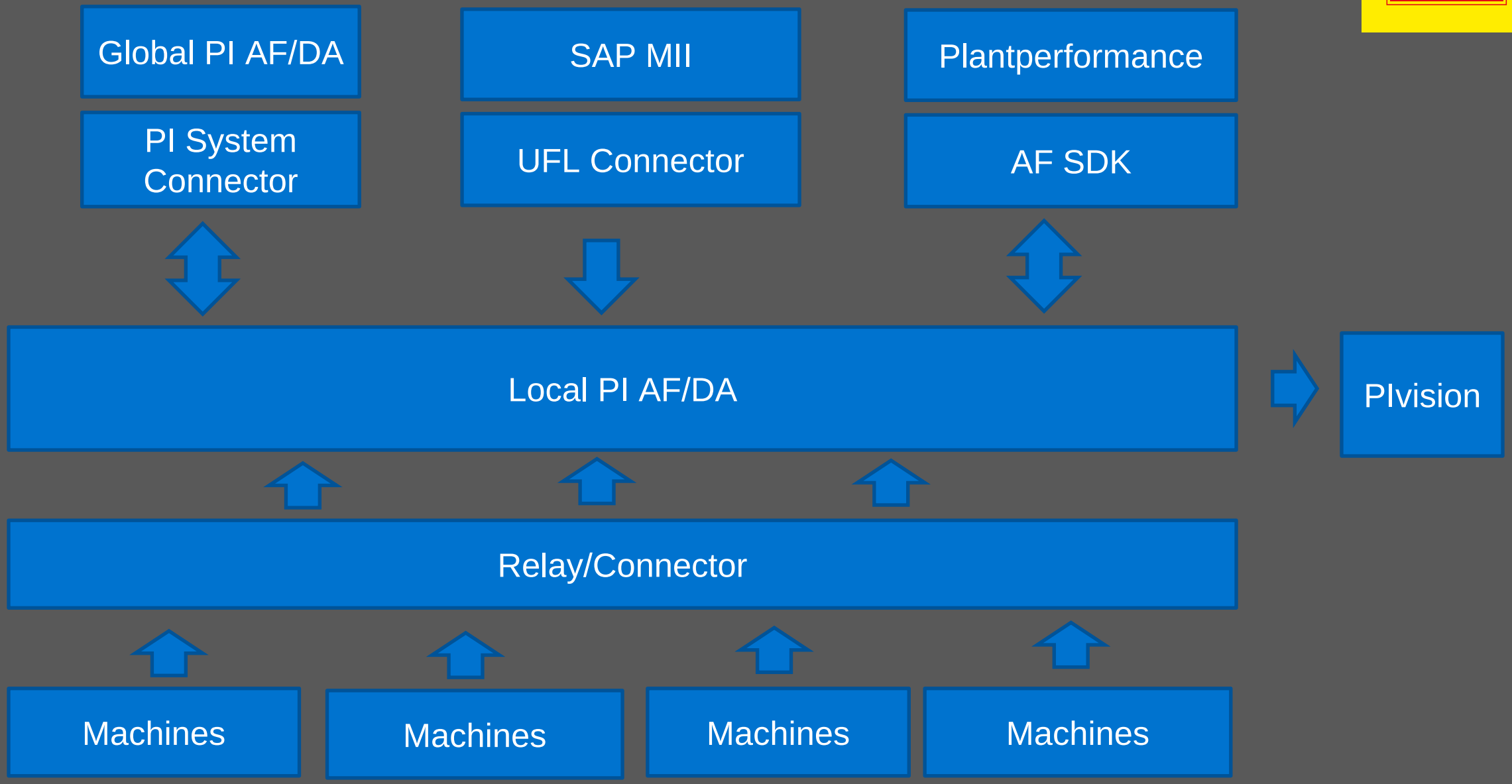
Logic implemented

With a big effort to make this reliable and trustworthy

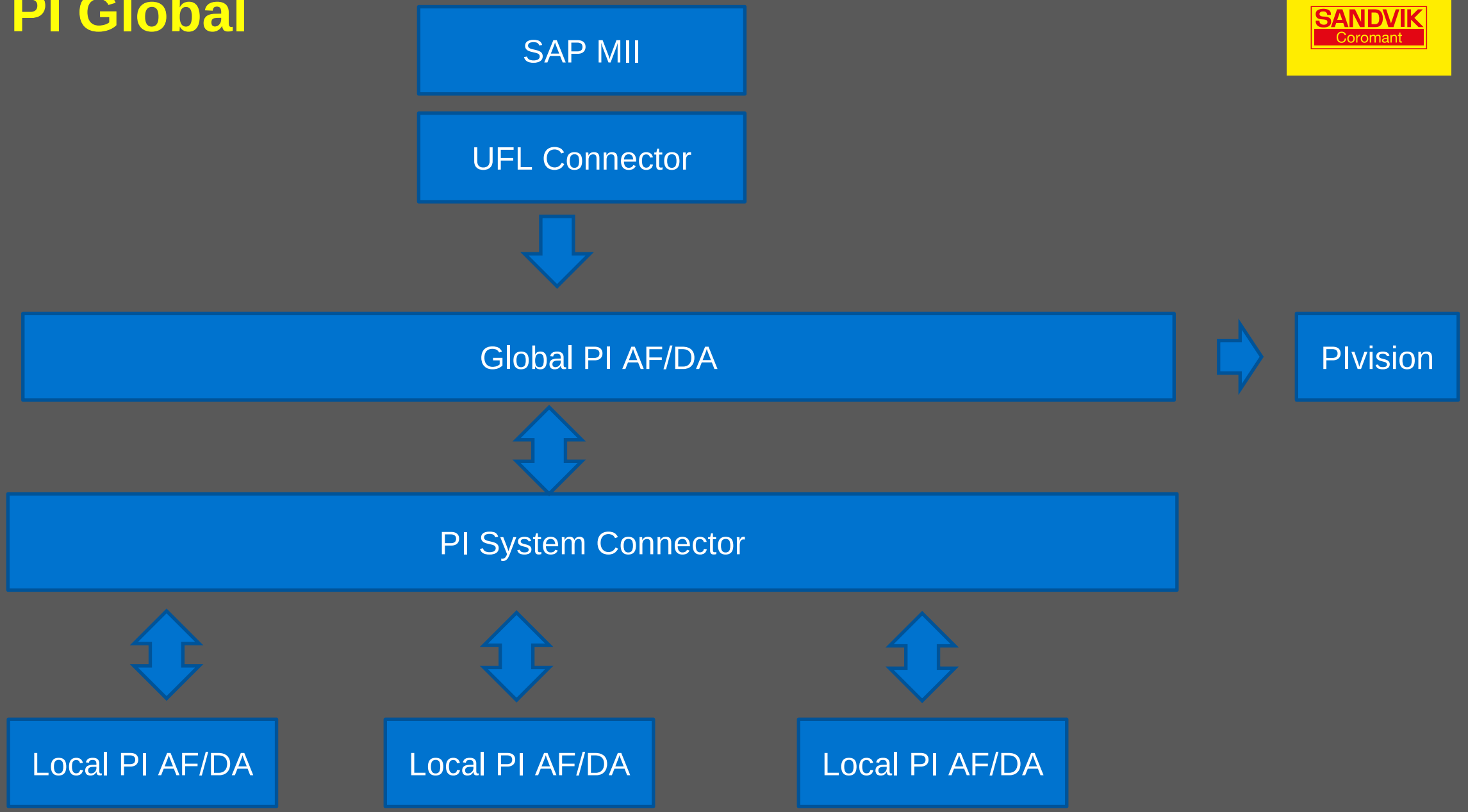
Everything from raw signal, process analytics, contextualize is done within same platform



PI Local


Global PI AF/DA
SAP MII
Plantperformance
PI System Connector
UFL Connector
AF SDK
Local PI AF/DA
PIvision
Relay/Connector
Machines
Machines
Machines
Machines

PI Global


SAP MII
UFL Connector
Global PI AF/DA
PIvision
PI System Connector
Local PI AF/DA
Local PI AF/DA
Local PI AF/DA

PI Vision

- AF transformer changes the AF structure to make it human friendly.
- Creates event frames based on machine stops and connect order.
- Production have started to created their own graphs / analyses with PI vision and data link. Not only OEE
- AD groups are used for security

PI Vision : Fette presses, live update

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OSIsoft PI Vision

New Display

Fette overview *(read-only)*

Ad Hoc D

Fette:MP 120 G1:NR 540 Line 4 Conn Cleaning No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 541 Line 4 Conn Idle Setup	Fette:MP 120 G1:NR 542 Line 4 Conn Unloading No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 543 Line 4 Conn Production No or Unable to classify Stop Loss
Fette:MP 120 G1:NR 544 Line 4 Conn Unloading No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 545 Line 4 Conn Production No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 546 Line 4 Conn Idle Setup	Fette:MP 120 G1:NR 547 Line 4 Conn Production No or Unable to classify Stop Loss
Fette:MP 120 G1:NR 551 Line 5 Conn Idle No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 553 Line 5 Conn Idle Setup	Fette:MP 120 G1:NR 556 Line 5 Conn Idle No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 560 Line 6 Conn Idle Setup
Fette:MP 120 G1:NR 561 Line 6 Conn Idle No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 562 Line 6 Conn Idle Setup	Fette:MP 120 G1:NR 563 Line 6 Conn Production No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 564 Line 6 Conn Idle Setup
Fette:MP 120 G1:NR 565 Line 6 Conn Cleaning No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 566 Line 6 NoConn Idle Setup	Fette:MP 120 G1:NR 567 Line 6 Conn Idle Setup	Fette:MP 120 G1:NR 590 Line 9 Conn Production No or Unable to classify Stop Loss
Fette:MP 120 G1:NR 591 Line 9 Conn Inspection No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 594 Line 9 Conn Inspection No or Unable to classify Stop Loss	Fette:MP 120 G1:NR 595 Line 9 Conn Inspection No or Unable to classify Stop Loss	Fette:MP 120 G2:NR 550 Line 5 NoConn Idle Setup
Fette:MP 120 G2:NR 552 Line 5	Fette:MP 120 G2:NR 554 Line 5	Fette:MP 120 G2:NR 555 Line 5	Fette:MP 120 G2:NR 557 Line 5

PI Vision : Machine details

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OSIsoft PI Vision

Fette detail *(read-only)* Asset: Fette:MP 120 G1:NR 542 ▼

Machine: Fette:MP 120 G1:NR 542

Go back

Order information

BrandCode
COR

ProductCode
880-01 02 03H-C-GR

WorkOrderNumber
00805651

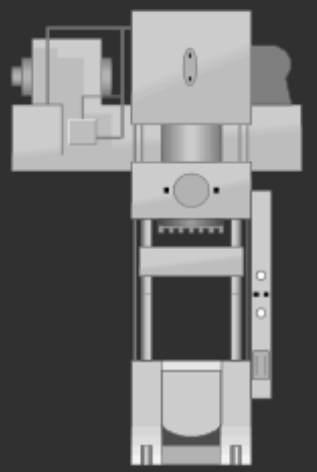
CAPP.Family

MaterialID
5765556

DesignCycleTime
381,02 s

Cycle time

Value ▲	Units	Trend ▲	Minimum	Maximum	Range
2,2608	s		0,076645	4,8315	4,7548



Machine Status

ProductionSignal
Idle

ProcessStage
Unloading

StopLossID
No or Unable to classify Stop Loss

CycleTime
2,2608 s

HeartBeat
Conn

Machine Information

Manufacturer Of Asset
Fette

Equipment Number
10000082

Inventory Number
11199100-00

Construction Year
2004

Machine Group
Line 4

Integration to ERP / MES

- Machines information from SAP EAM
  - SAP MII sends information to PI UFL connector REST
- Product/Order Information from SAP PLM / MES
  - Plantperformance write/read information to PI by AF SDK

AF Transformer / PI System Connector

- PI system connector is used for 2 tasks
  - Send aggregated local machine information to a global PI installation.
  - Send verified templates from the global PI installation to local PI installation.

- AF Transformer
  - To transform AF structures so it fit end user, example human or system

Development of new PI components

Osisoft develop 3 new connectors for Sandvik

- PI Connector for OPC Fanuc Focas
- PI Connector for OPC MTconnect
- PI Connector for OPC Siemens RPC Sinumerik

Coromant project team also supported OSIsoft with beta testing of the following products

- PI Connector for OPC UA
- AF Transformer
- PI Connector Relay
- PI Data Collection Manager
- PI System Connector
- PI UFL Connector

All of these products are critical components for the OEE project

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MTConnect

SIEMENS

FANUC

Challenges

- Firewall/Network
- Development of new products/functions
- Security
- OEE project timeline and resources
- Scope creep in project (PI)

Next step PI

- Integration with Power BI (ongoing POC)
- Expand functionality to more than only OEE
- Tighter integration with SAP MII
- Start to use more types of connectors/Interface
- Connection to more production related systems

Global OEE system at Sandvik Coromant

Supporting tool for production units showing how expensive CNC machines are used and what losses we have in each area.

CHALLENGE

Collect and consolidate data from multiple systems, machines and sites and display result that gives operators and change leaders a visual view over how each machine is used in real time or in the past.

SOLUTION

Combining flexible interchangeable components that we can grow and move as the organization changes. Tracebility on machines and data is also vital.

RESULTS

Clear data that change leaders can act on.

- We expect to gain a minimum of 1% per machine and year in improved OEE on all machines.
- Possibilities with PI that was not know as the project started.

QUESTIONS?

SANDVIK
Coromant

Merci

谢谢

Спасибо

Danke

Gracias

감사합니다

SANDVIK
Coromant

ありがとう

Grazie

Obrigado

Thank You