PI Monitoring using PI

Bernd Sessler, Gerd Fromm, Philipp Sutter, Pascal Nass, Marcin Guth

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Agenda

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- About Roche
- Business Challenge
- Monitoring a PI System with PI
- Application within Roche
- Result Obtained and Business Impact
- Next Steps, future Plans

Presenters

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Bernd Sessler
Project function: Business Product Owner

Gerd Fromm
Project function: IT Product Manager

Philipp Sutter
Project function: PI Senior Expert

Pascal Nass
Project function: Coordination & Concept development

Marcin Guth
Project function: Squad Lead PI Enhancements

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About Roche

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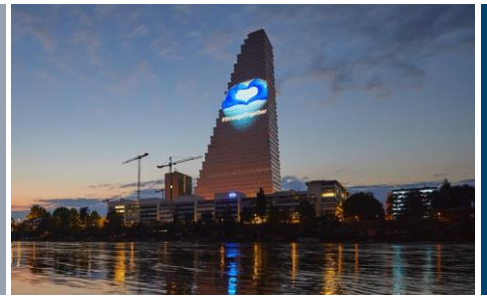
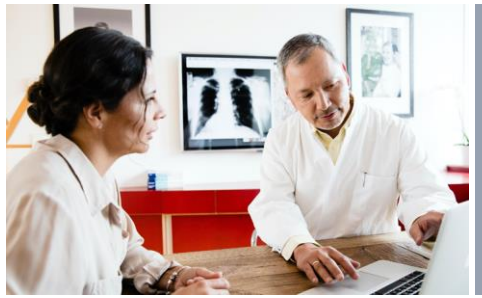
Roche at a glance

Maintaining a long-term orientation

1896
Founded in Basel
Family still holds majority stake



Reliable partner during Corona pandemic



Leader in Diagnostics and Pharma

#1
R&D investor in healthcare

101,465
Employees worldwide

28,900,000
people treated with our medicines in 2020

Lasting
32 medicines on the WHO List of Essential Medicines

… and Sustainable
most sustainable healthcare company in the Dow Jones Sustainability Indices

23.4bn
tests conducted with our Diagnostics products in 2020

Business Challenge

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Business Challenge
Stated by Business Product Owner Bernd Sessler

- 25 PI Systems to be managed to be supported by the new global support team
- Many different local monitoring solutions in place
  - Causing high license costs
  - Each solution needs specific training
  - Impossible to handle by global support team due to lack of harmonisation
- No global monitoring display possible
- Difficult to compare performance of the different systems
- Company goal: reduction of complexity and number of systems
- Cost reduction

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Monitoring a PI System with PI

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PI System Monitoring (PSM)

Traditional Approach

- PI system with all its machines as a data source
- Available Interfaces:
  - Perfmon (RAM/Disk/Processor, PI specific information)
  - Ping (network)
  - TCP response (PI Vision)
  - SNMP (time synchronization)
- Data collected in PI DA

Newer Ideas

- System hierarchy modeled in PI AF
- PI Vision displays
- Notifications sent to operation support team

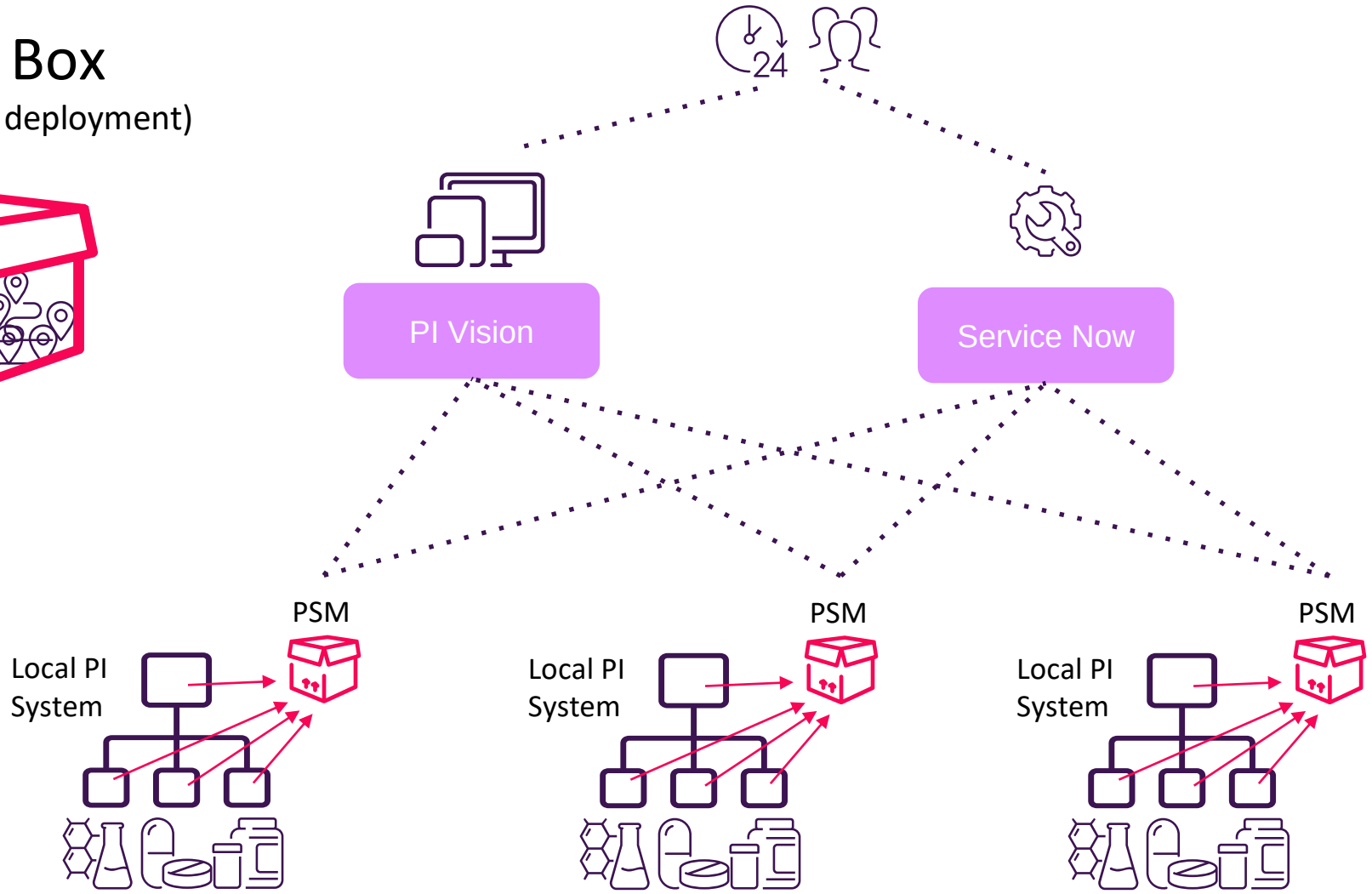
Our Approach

- Automate everything
- Based on standard PI installation in one box
- Templates
- Automatic tag creation
- Automatic hierarchy creation
- Automatic interface node detection

PSM Architecture

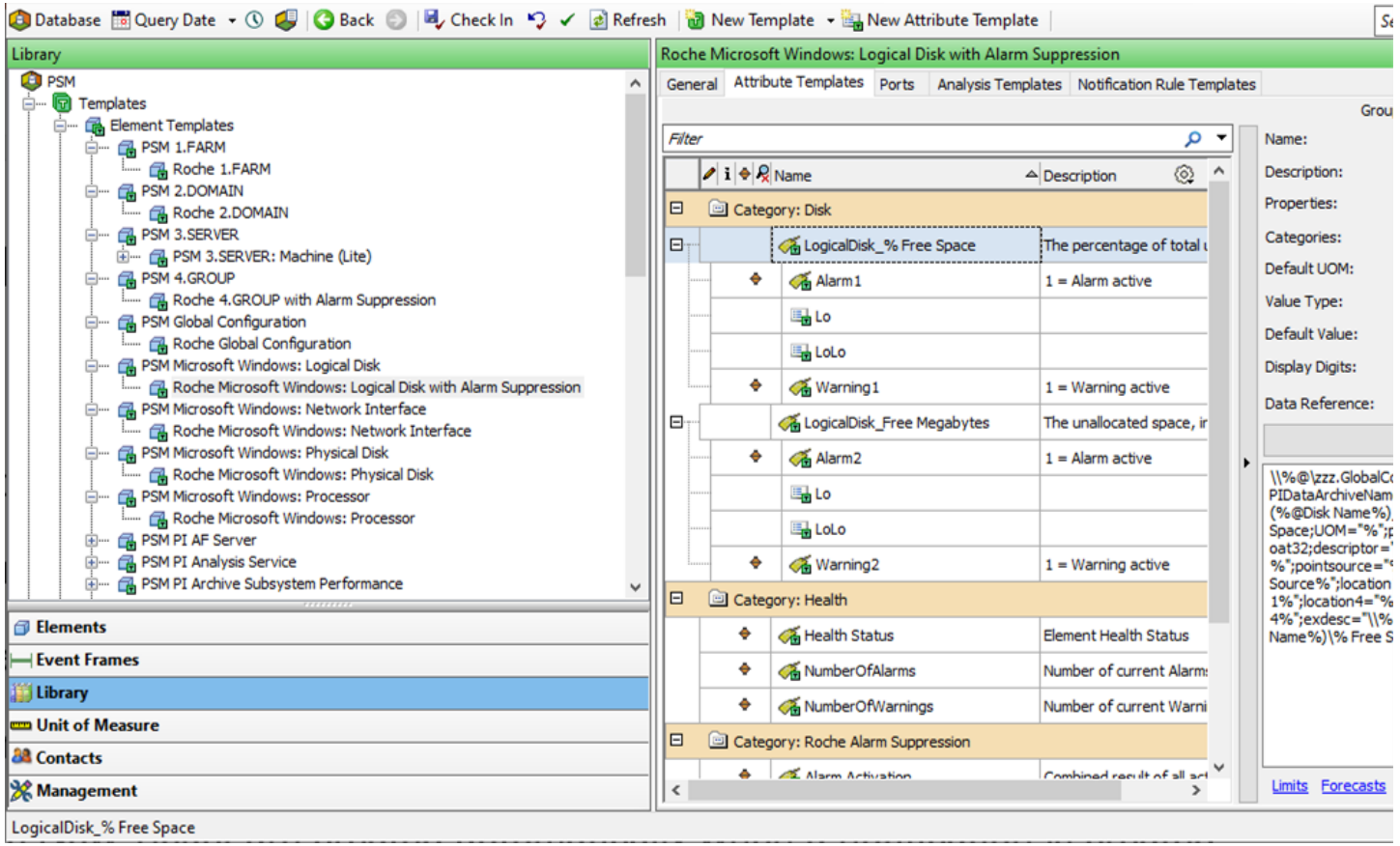
The PSM Box

(small PI Server deployment)



PSM: Templates and Structure

- Baseline: PSM templates from OSIsoft
- Template changes:
  - Alarm Suppression incl. End time
  - Roll-up of alarms and warnings
  - Configurable Alarm delays
  - Automatic Ticket creation in ServiceNow
- Additional templates
  - Watchdog monitoring
  - Time Sync
- All templates contain
  - automatic tag creation
  - automatic element naming



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PSM: Create instances via scripts

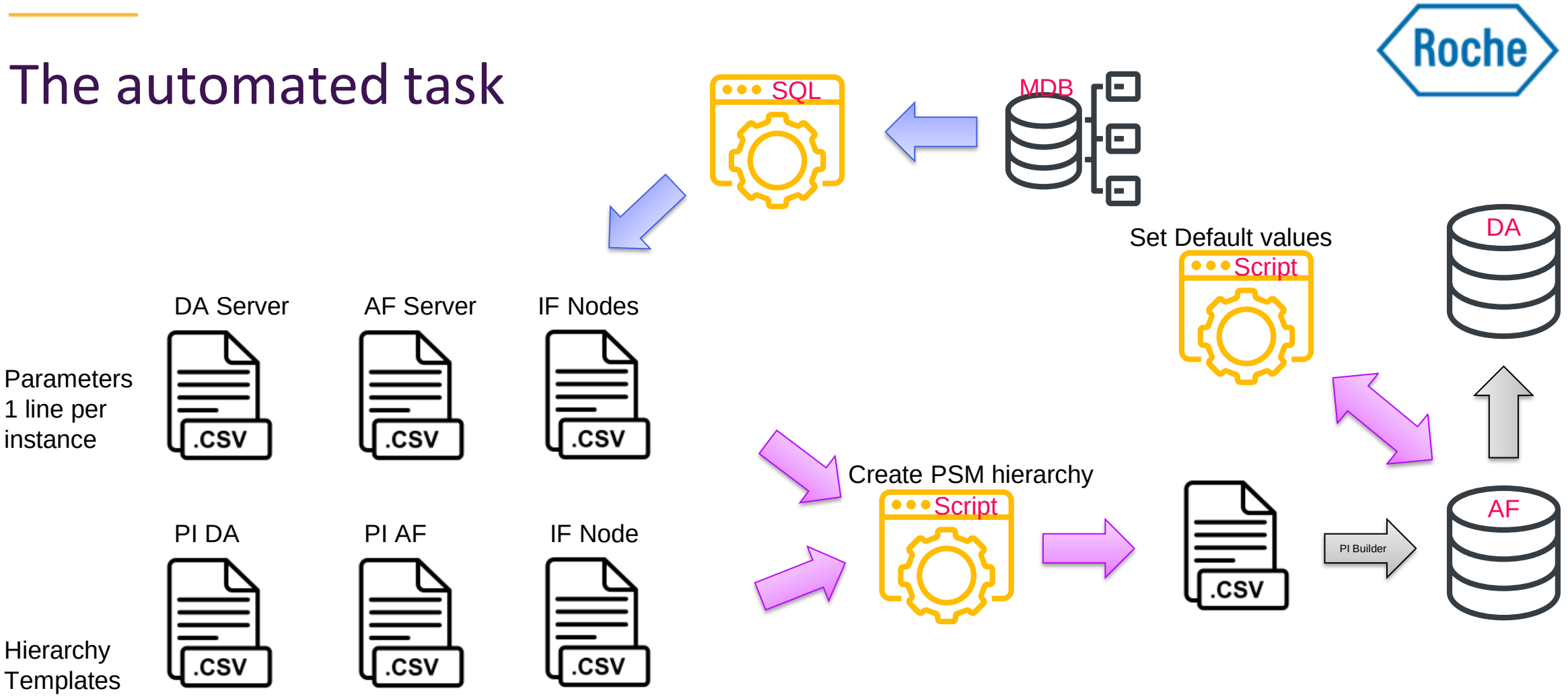
Problem:

- Each machine to be modelled contains several levels
  - Processor
  - Disks
  - RAM
  - Interfaces
  - Etc.
- We have a real lot of Interfaces and Interface Nodes
  - Hundreds of interfaces
  - Dozens of interface nodes
- Default values on PI tags
  - Not written during automatic tag creation via template instantiation

Solution:

- Create instances via scripts based on element hierarchy templates (CSV files)
  - Windows machine
  - PI DA Server
  - PI AF Server
  - PI Vision Server
  - Etc.
- Reads interface nodes from MDB automatically
  - Create IF nodes and corresponding interfaces
- Script to set default values even on PI tags
  - Read template default value and write to tags

The automated task



Application within Roche

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Site Implementation

- Using the Roche scripts, a standard PI installation is completed with Groups, Identities and mapping in 2 hours
  - Harmonization & Standardization
  - Major time gain
  - No human errors

- Installation of PSM was treated as a small PI Server deployment.
  - PI Asset Framework
  - PI Data archive
  - PI Ping Interface
  - PI Perfmon Interface
  - PI SNMP Trap Interface
  - PI TCP response Interface

Standard PI System

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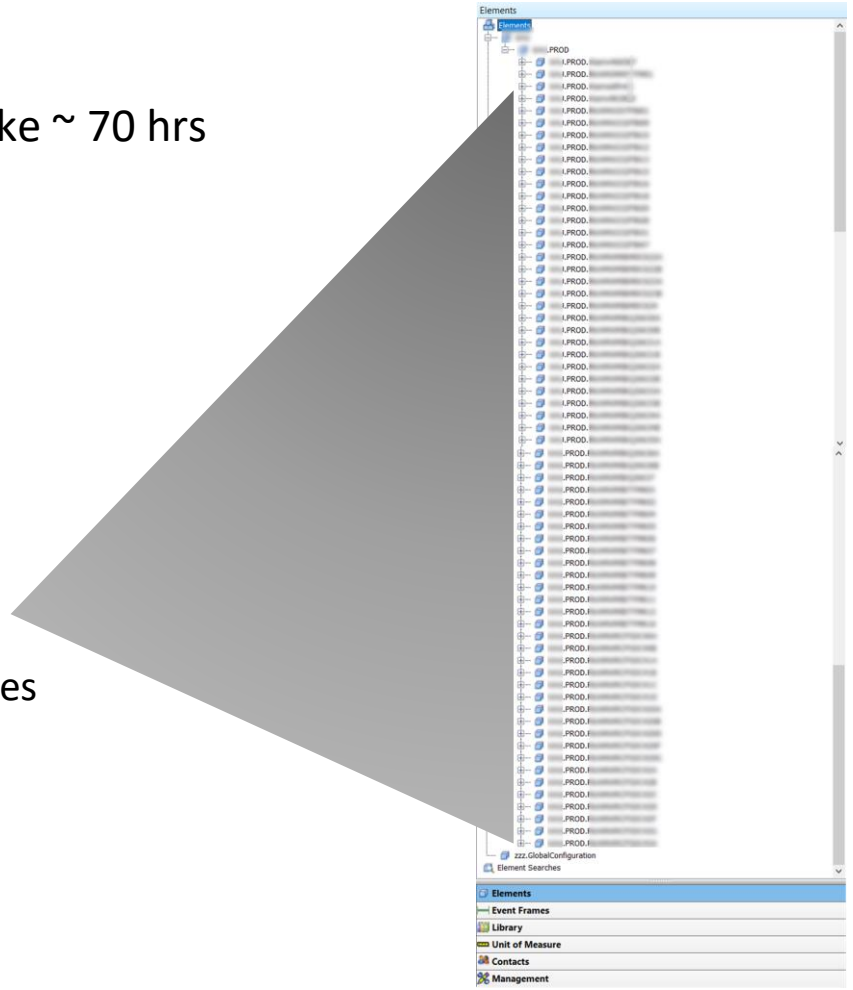
Site Creation

- The manual creation of a site with 92 Interfaces on 63 nodes would take ~ 70 hrs
  - Create the first computer with windows structure would take ~ 1 hr
  - using the PI Builder is ~ 30 mins per computer (63 *30) ~ 31 hrs
  - Creation of PI system is ~ 30 mins per computer (63 *30) ~ 31 hrs
  - Creation of PI DA, AF and Web is ~ 1 hr per server (3 * 1) ~ 3 hrs

- Using the scripts, a site with 92 Interfaces on 63 nodes took ~ 30 mins
  - Time needed was less than a minute (18.9 seconds) to create the templates
  - Uploading within PI AF took about 21 mins
  - Major time gain (14000% / site)
  - No human errors



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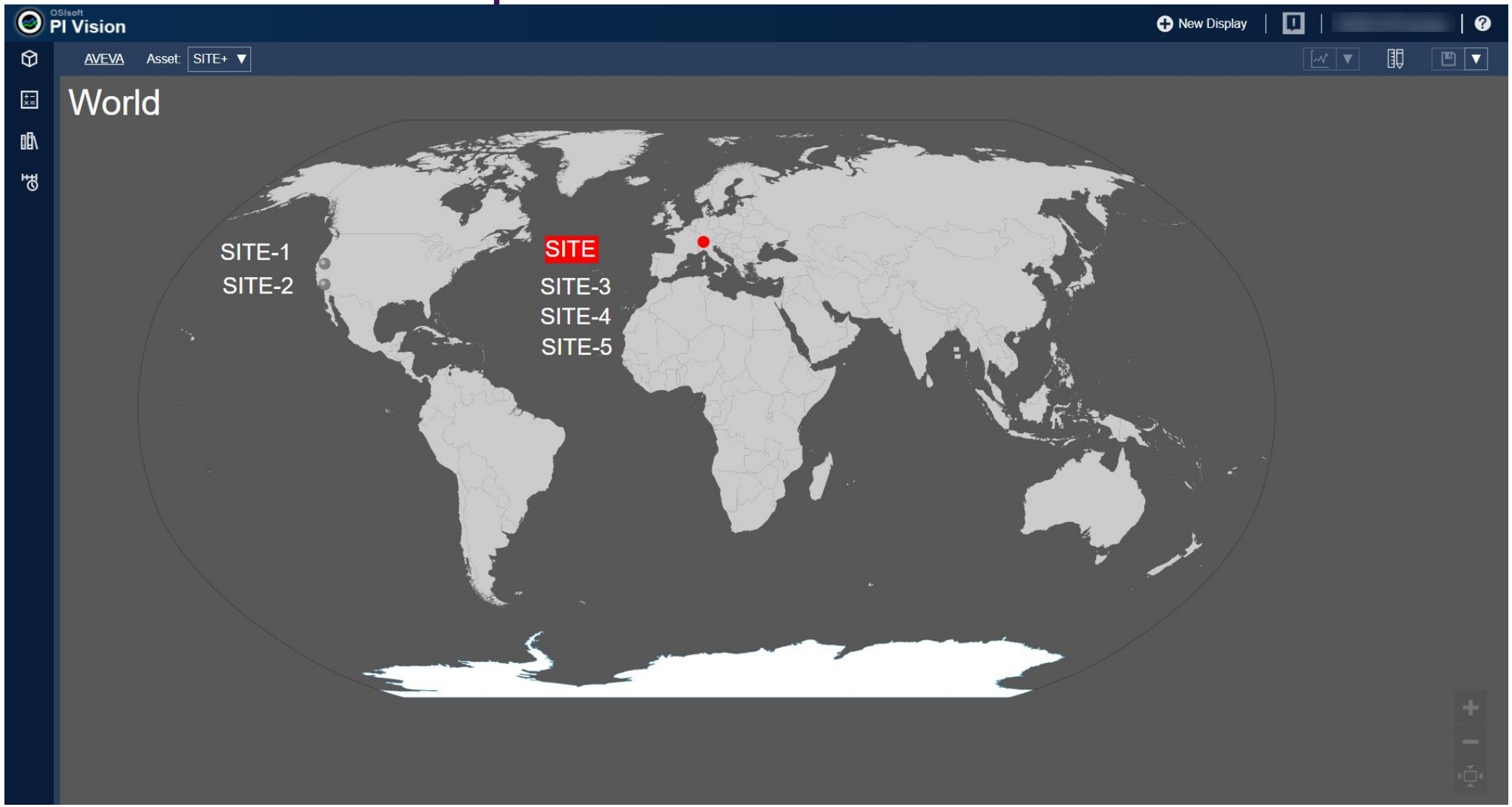
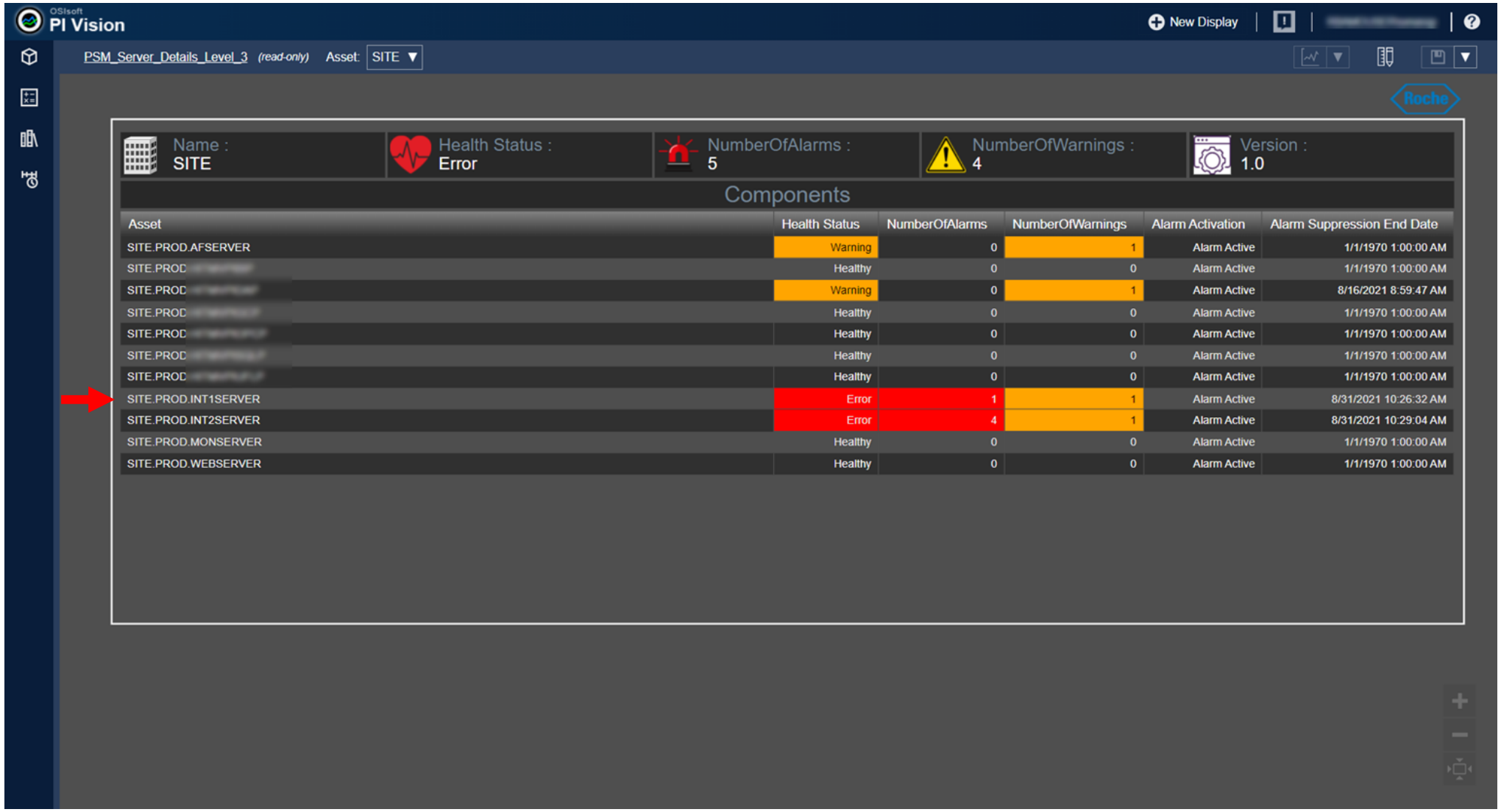
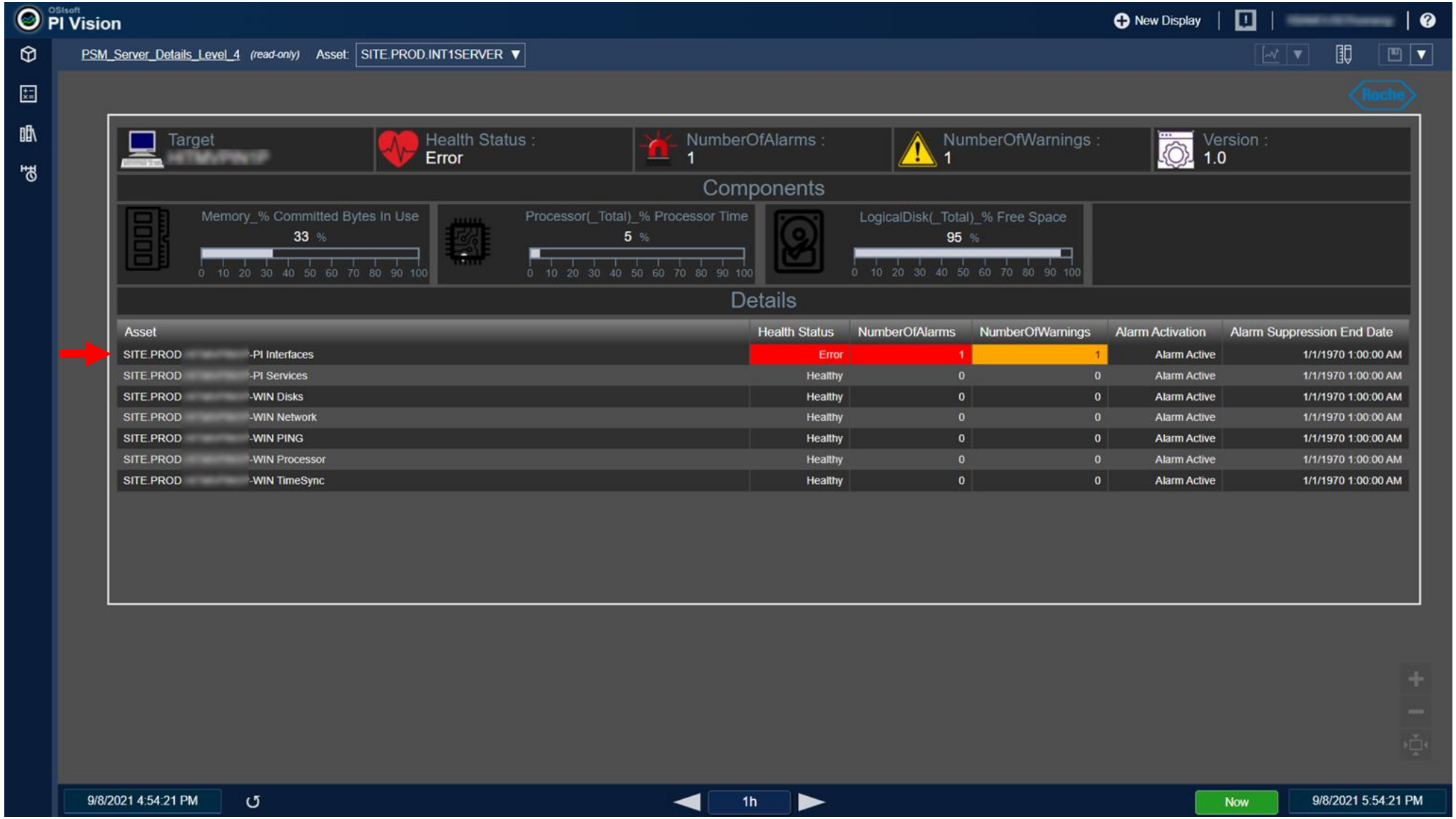
PI Vision : Sites supervision



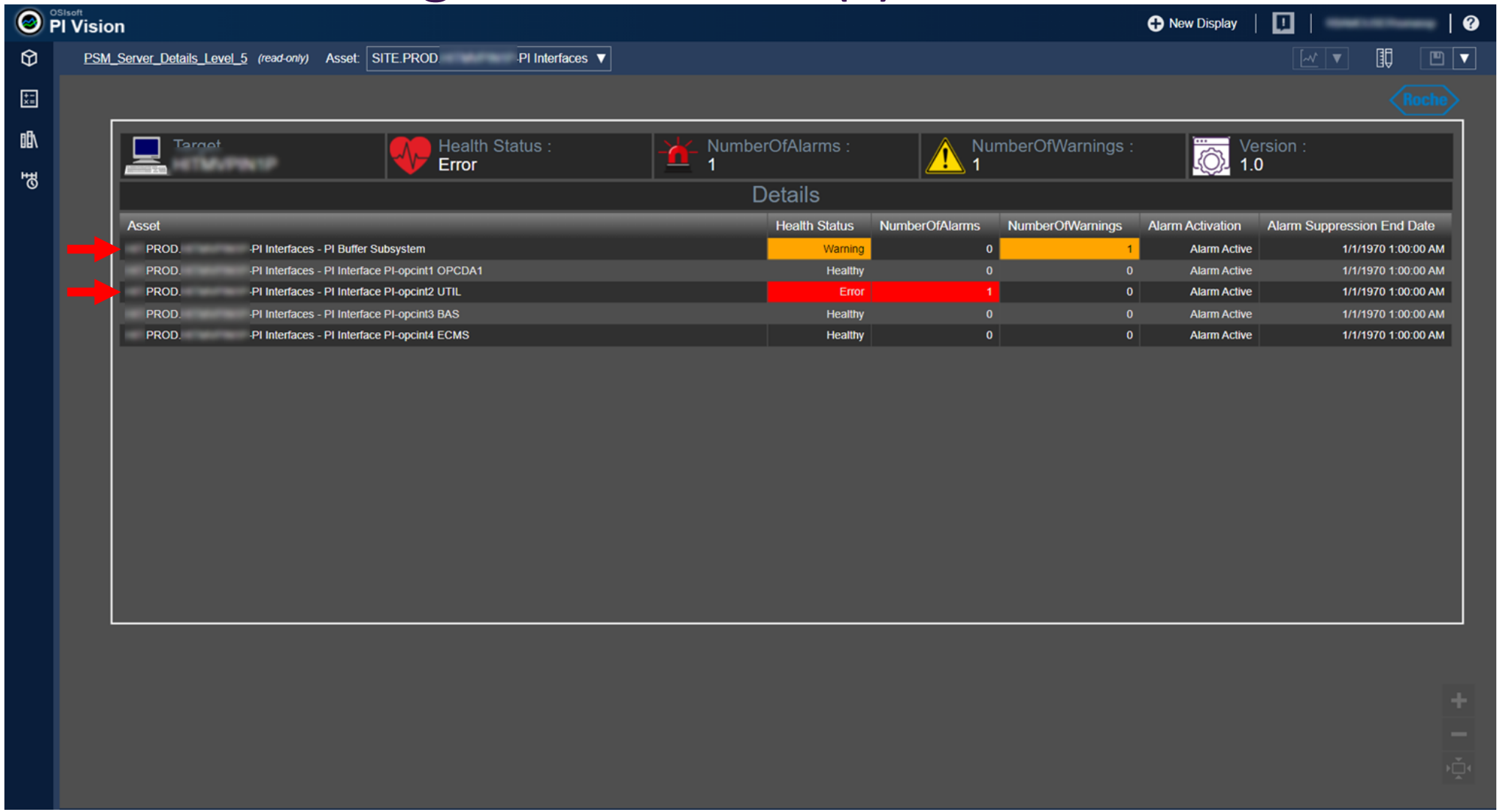
PI Vision : Site level information



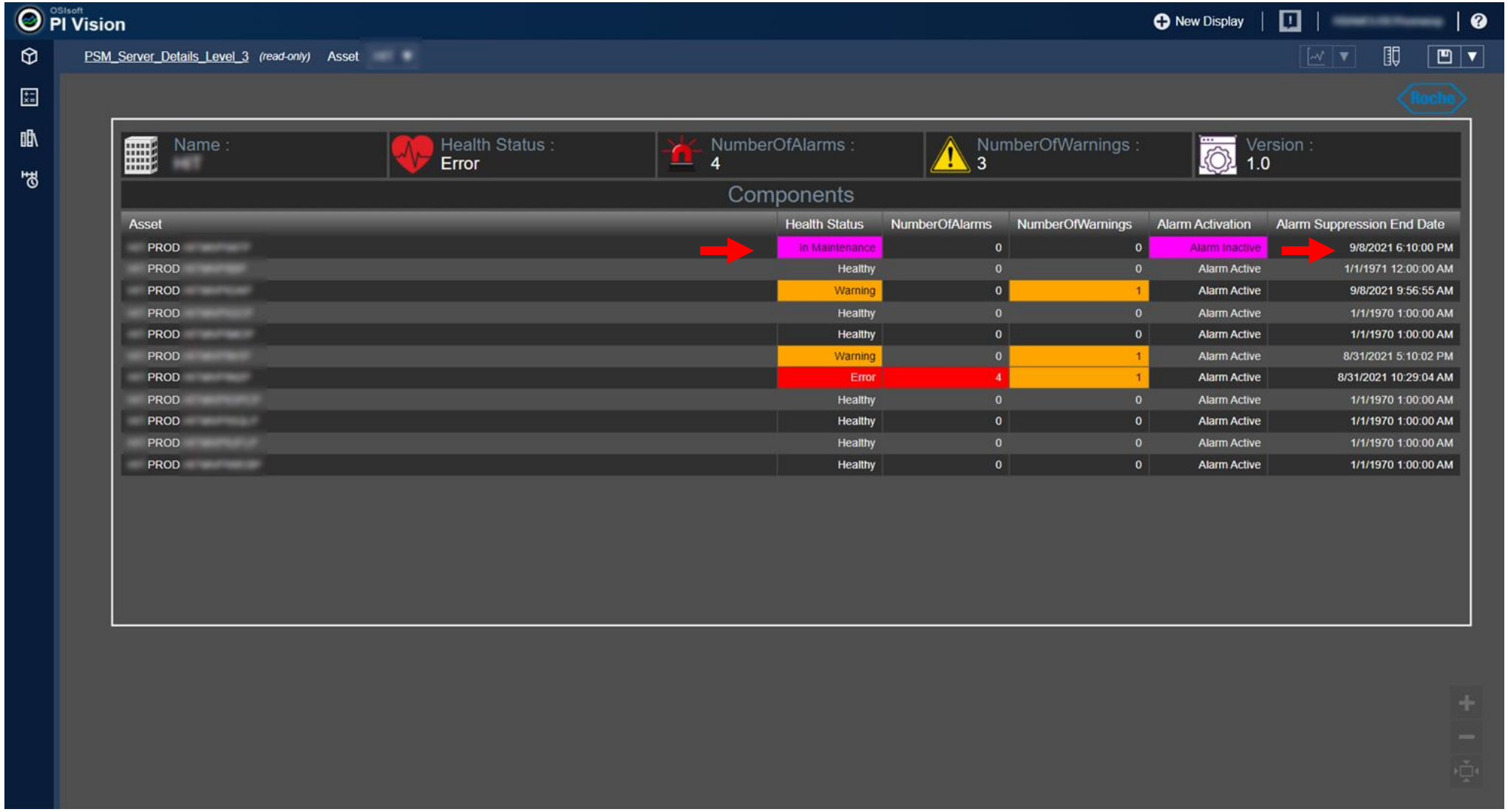
PI Vision : Server selection



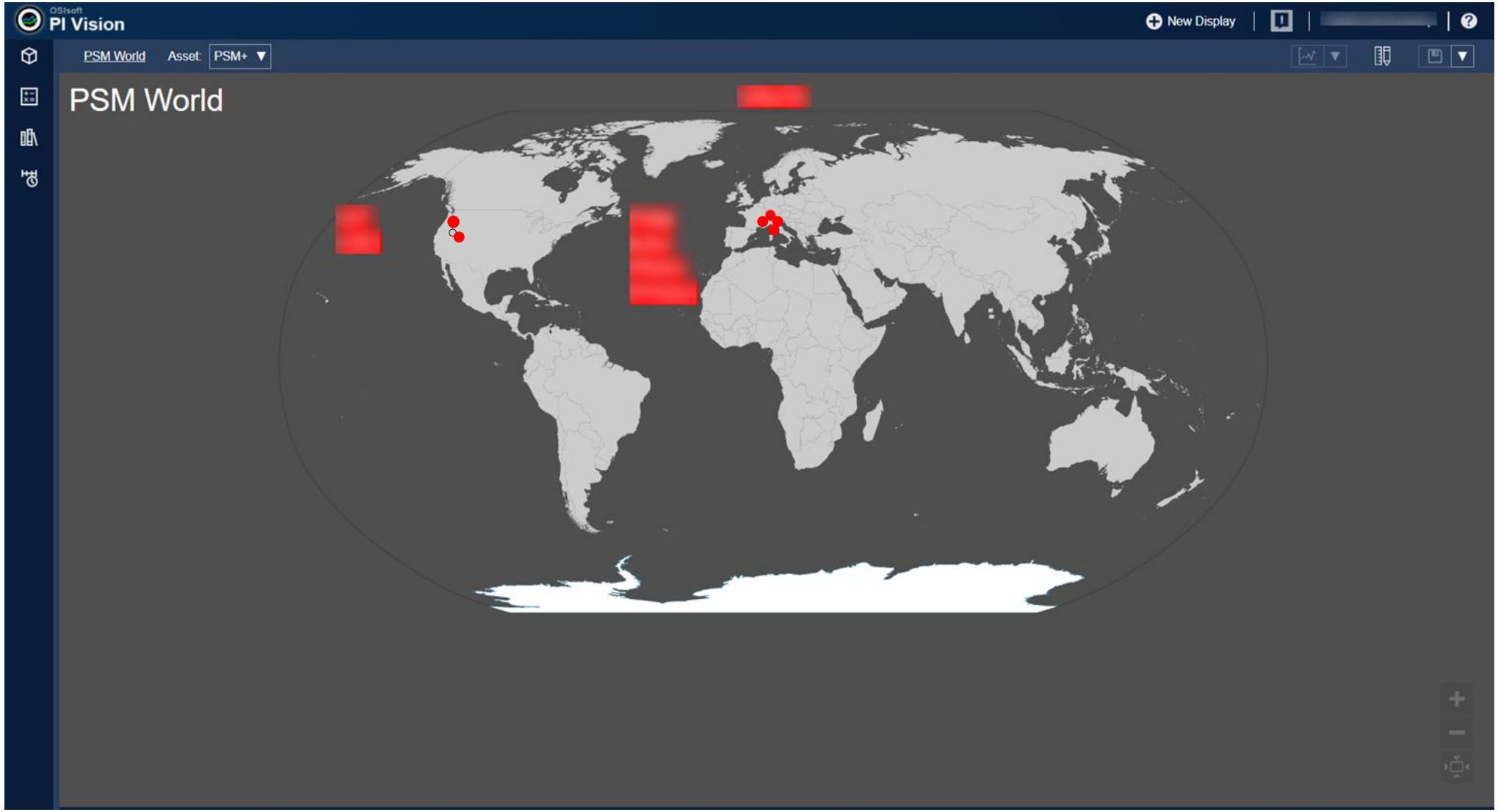
PI Vision : Diving into the issue(s)



PI Vision : Maintenance mode



PI Vision : Roche installed base



Result Obtained and Business Impact

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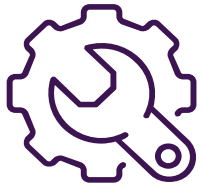
Summary



Challenge

Reduction of complexity and number of monitoring systems for 25 sites.

Many local monitoring solutions are difficult to handle by the global PI support team.

Operational, project and licence costs reduction.

New PI instances/ interfaces installation cost and time reduction.

Solution

Many legacy monitoring applications replaced by one solution with a global PI vision dashboard.

One monitoring solution with same technical and training requirements.

Script based installations of PI infrastructure generates AF output files automatically.

Benefits

Harmonisation and standardisation of PI Core landscape within Roche.

Easier to validate/ maintain/ operate (trainings, document lifecycle, operational and maintenance costs reduction).

No further licence cost for monitoring (100% cost reduction). Licences covered by the Enterprise Agreement.

Next Steps, future Plans

Near future (this year)

- Interface Watchdog monitoring
- Add more categories to AF templates, so that PI Vision displays get populated automatically
- Improved and more standardized notifications

Possible future plans

- Add other, not directly PI-related devices to monitoring (e.g. Printers)
- Network load monitoring

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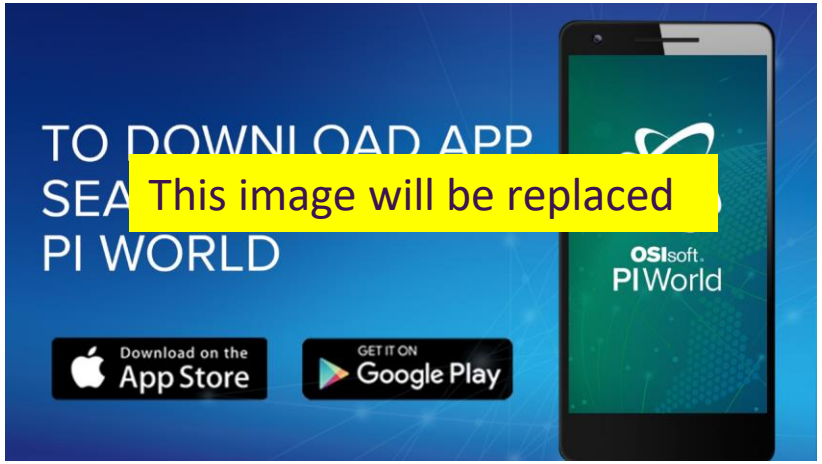
- State your name and company

Please remember to…

Complete the survey!

- Navigate to this session in the mobile agenda for the survey



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Result Obtained and Business Impact

- 25 PI Systems to be managed to be supported by the new global support team
- Many different local monitoring solutions in place
  Many legacy monitoring solutions replaced by one solution
  - Causing high license costs
    Licenses are covered by the Enterprise Agreement (no extra costs)
  - Each solution needs specific training
    PI knowledge always available on the sites, no extra training needed
  - Impossible to handle by global support team
    Easy to handle by one global support team
- No global monitoring display possible
  Global PI Vision display, easy to implement
- Difficult to compare performance of the different systems
  Same approach on all system, KPIs comparable
- Company goal: reduction of complexity and number of systems
  Only one solution in place
- Cost reduction
  No further licence cost for monitoring (100% cost reduction)

Business Impact: One global monitoring solution, no additional costs, easy to maintain, global and local monitoring displays available

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Benefits and Savings

- New PI instance installation using dedicated scripts
    - Installation time reduction from 1-2 weeks to 30 minutes (project, human involvement and operational costs reduction)
- Global PI landscape simplification/ harmonisation
    - Multiplicity of the monitoring tools reduced (different vendors, Excel based tools)
    - Easier to validate/ maintain/ operate (trainings, document lifecycle, operational and maintenance costs reduction)
- No further licence costs for monitoring of PI infrastructure incl. PI interface nodes (100% cost reduction)

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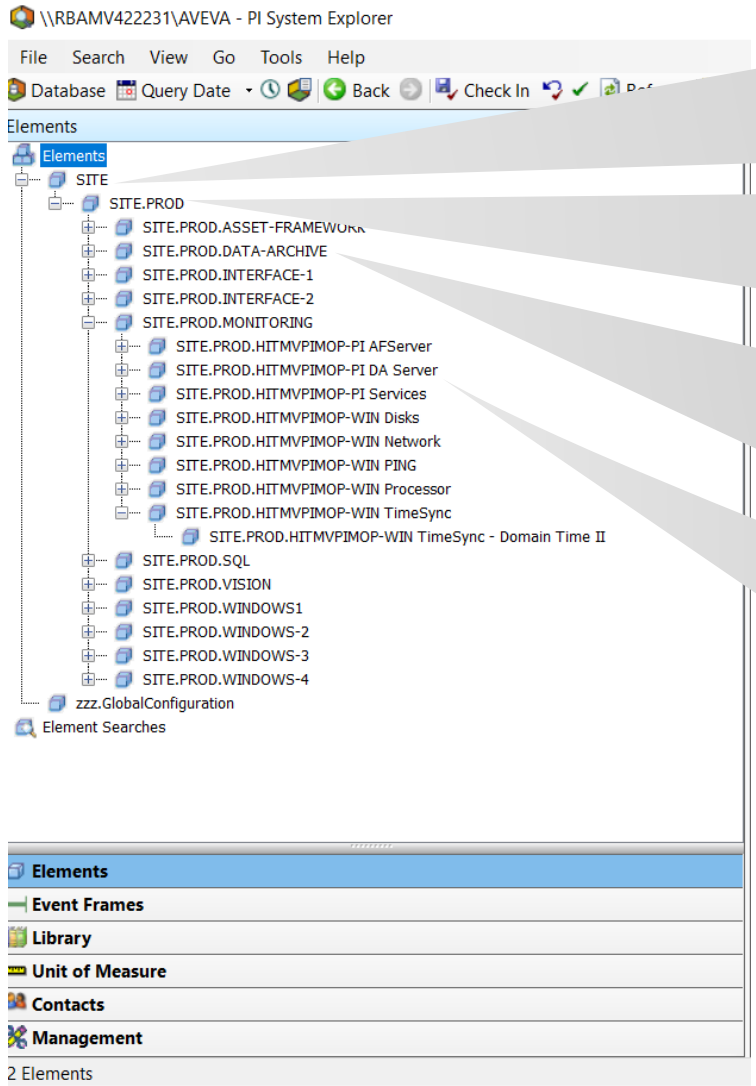
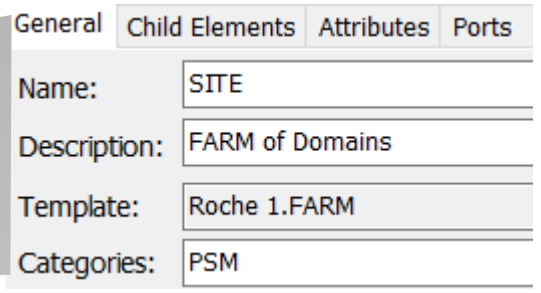
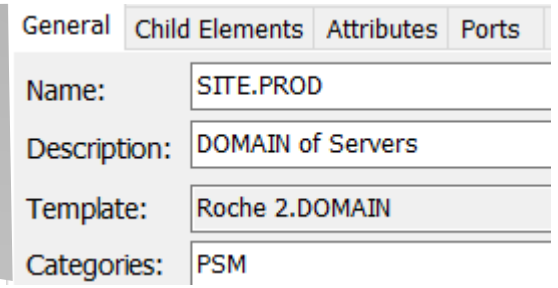
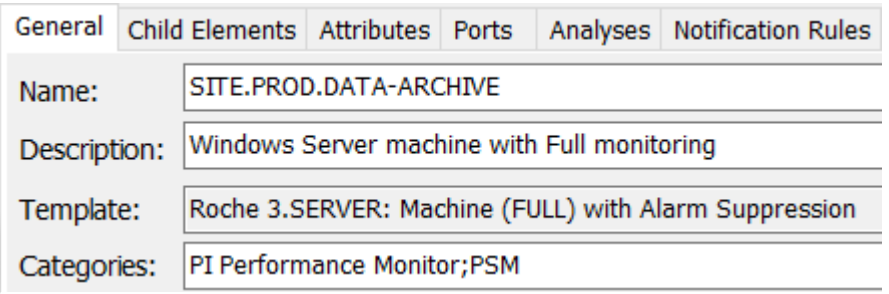
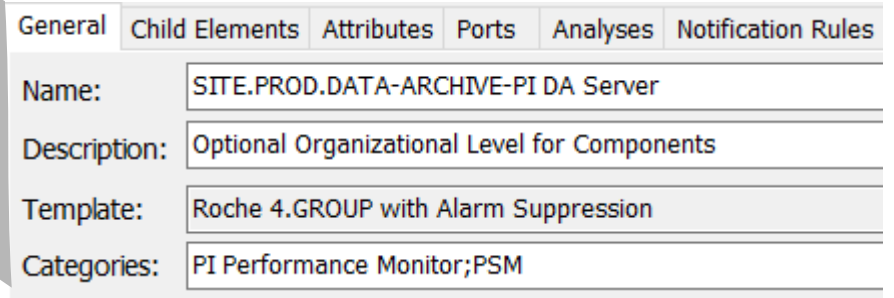
4 groups templates level











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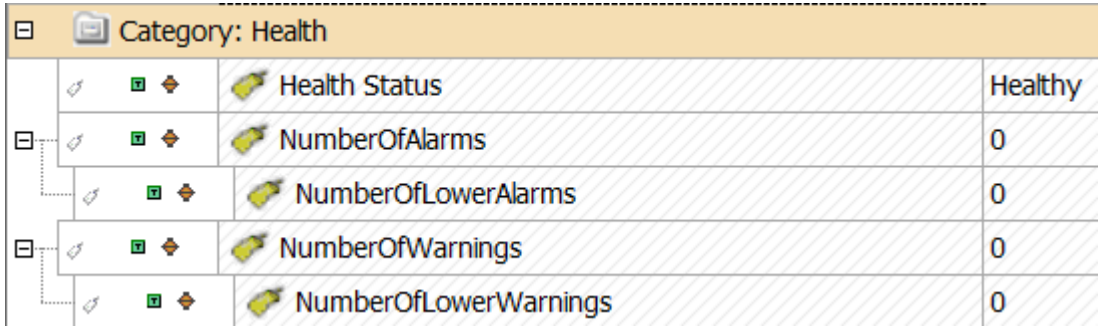
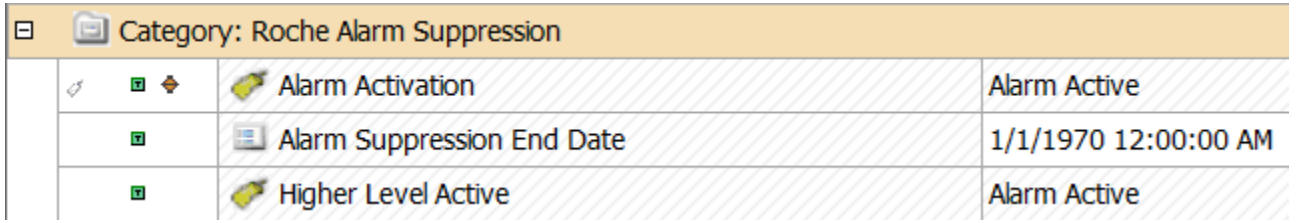
Categories: Health and alarm suppression

- Health
  - 2 information categories (Alarms and Warnings)
  - sub alarms or warnings are reported to upper level



- Alarm suppression
  - Allows upgrades / engineering work
  - Automatic restart when date is due
  - supervision of lower level of suppression



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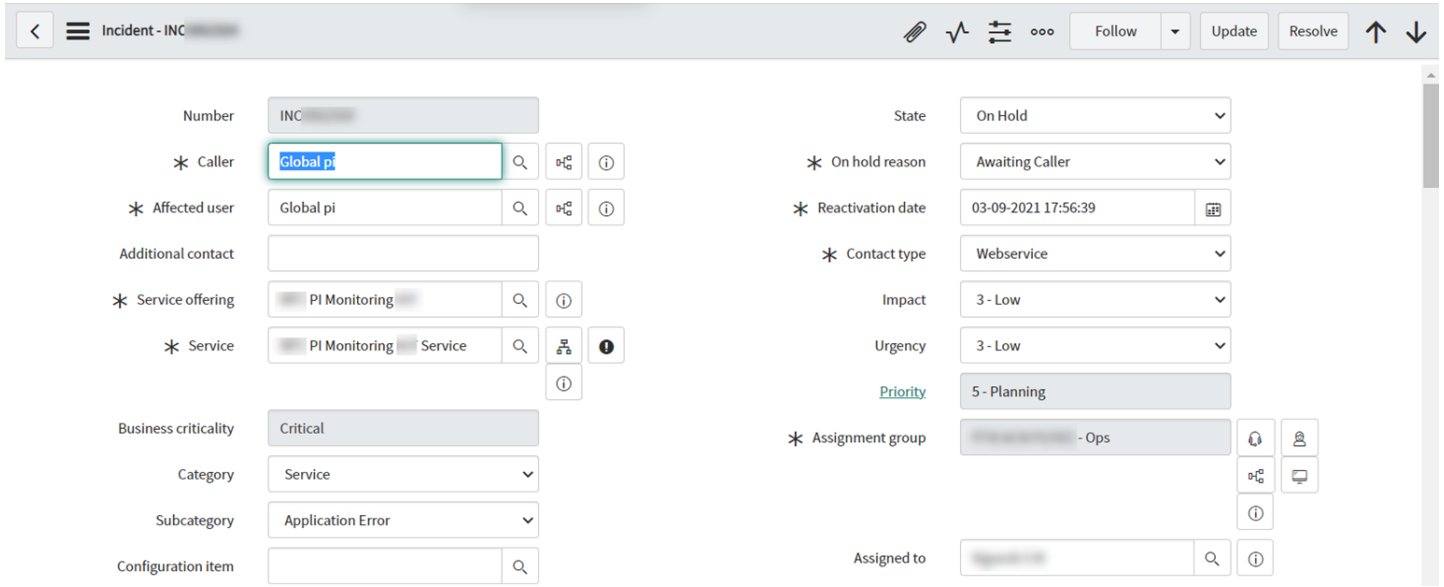
Notifications

- Notifications are automatically sent to
  - Operation team (mail and mobile)
  - Automatic ticketing system (SNOW)



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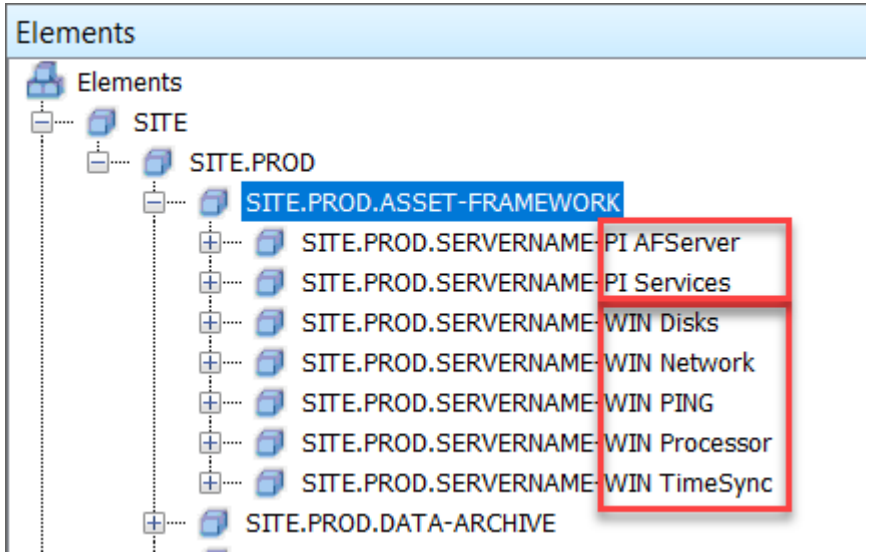
Machine Monitoring: PI and Windows groups

- Segregation of 2 main types: PI elements and windows elements
  - Better differentiation between PI and windows functions, easier to find underlying errors
  - Subcategories are dedicated templates
    (e.g. all PI-related services are grouped in the level under “PI Services”)



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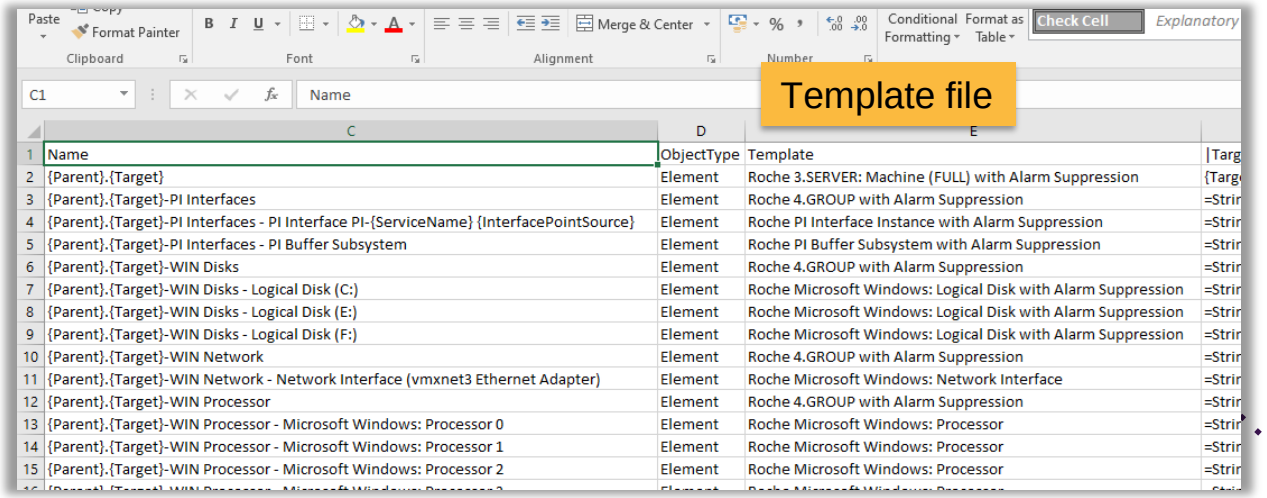
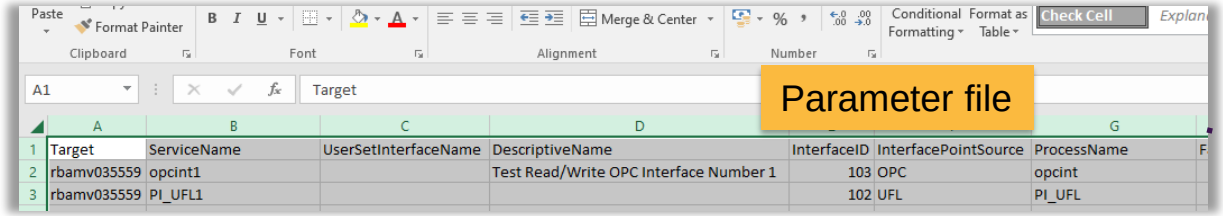
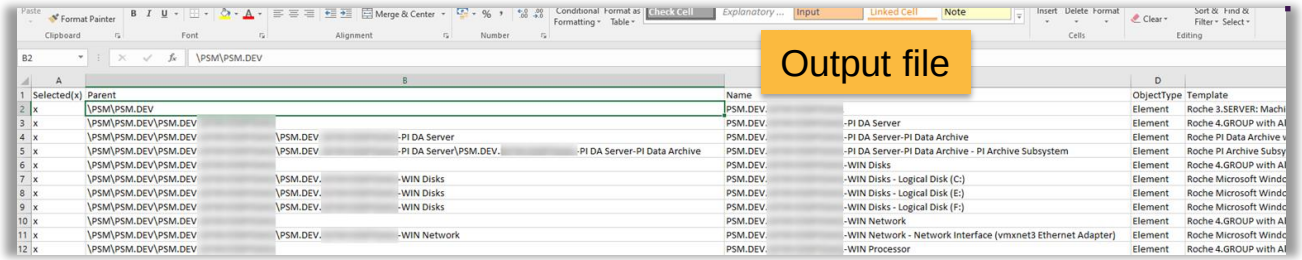
Automatic hierarchy and tag creation



Name	ObjectType	Template
{Parent}.{Target}	Element	Roche 3.SERVER: Machine (FULL) with Alarm Suppression
{Parent}.{Target}-PI Interfaces	Element	Roche 4.GROUP with Alarm Suppression
{Parent}.{Target}-PI Interfaces - PI Interface PI-{ServiceName} {InterfacePointSource}	Element	Roche PI Interface Instance with Alarm Suppression
{Parent}.{Target}-PI Interfaces - PI Buffer Subsystem	Element	Roche PI Buffer Subsystem with Alarm Suppression
{Parent}.{Target}-WIN Disks	Element	Roche 4.GROUP with Alarm Suppression
{Parent}.{Target}-WIN Disks - Logical Disk (C:)	Element	Roche Microsoft Windows: Logical Disk with Alarm Suppression
{Parent}.{Target}-WIN Disks - Logical Disk (E:)	Element	Roche Microsoft Windows: Logical Disk with Alarm Suppression
{Parent}.{Target}-WIN Disks - Logical Disk (F:)	Element	Roche Microsoft Windows: Logical Disk with Alarm Suppression
{Parent}.{Target}-WIN Network	Element	Roche 4.GROUP with Alarm Suppression
{Parent}.{Target}-WIN Network - Network Interface (vmxnet3 Ethernet Adapter)	Element	Roche Microsoft Windows: Network Interface
{Parent}.{Target}-WIN Processor	Element	Roche 4.GROUP with Alarm Suppression
{Parent}.{Target}-WIN Processor - Microsoft Windows: Processor 0	Element	Roche Microsoft Windows: Processor
{Parent}.{Target}-WIN Processor - Microsoft Windows: Processor 1	Element	Roche Microsoft Windows: Processor
{Parent}.{Target}-WIN Processor - Microsoft Windows: Processor 2	Element	Roche Microsoft Windows: Processor



Target	ServiceName	UserSetInterfaceName	DescriptiveName	InterfaceID	InterfacePointSource	ProcessName
rbamv035559	opcint1		Test Read/Write OPC Interface Number 1	103	OPC	opcint
rbamv035559	PI_UFL1			102	UFL	PI_UFL



Selected(x)	Parent	Name	ObjectType	Template
x	\PSM\PSM.DEV	PSM.DEV.	Element	Roche 3.SERVER: Machi
x	\PSM\PSM.DEV\PSM.DEV	PSM.DEV. -PI DA Server	Element	Roche 4.GROUP with Al
x	\PSM\PSM.DEV\PSM.DEV \PSM.DEV -PI DA Server	PSM.DEV. -PI DA Server-PI Data Archive	Element	Roche PI Data Archive v
x	\PSM\PSM.DEV\PSM.DEV \PSM.DEV -PI DA Server\PSM.DEV. -PI DA Server-PI Data Archive	PSM.DEV. -PI DA Server-PI Data Archive - PI Archive Subsystem	Element	Roche PI Archive Subsy
x	\PSM\PSM.DEV\PSM.DEV	PSM.DEV. -WIN Disks	Element	Roche 4.GROUP with Al
x	\PSM\PSM.DEV\PSM.DEV \PSM.DEV. -WIN Disks	PSM.DEV. -WIN Disks - Logical Disk (C:)	Element	Roche Microsoft Windc
x	\PSM\PSM.DEV\PSM.DEV \PSM.DEV. -WIN Disks	PSM.DEV. -WIN Disks - Logical Disk (E:)	Element	Roche Microsoft Windc
x	\PSM\PSM.DEV\PSM.DEV \PSM.DEV. -WIN Disks	PSM.DEV. -WIN Disks - Logical Disk (F:)	Element	Roche Microsoft Windc
x	\PSM\PSM.DEV\PSM.DEV	PSM.DEV. -WIN Network	Element	Roche 4.GROUP with Al
x	\PSM\PSM.DEV\PSM.DEV \PSM.DEV. -WIN Network	PSM.DEV. -WIN Network - Network Interface (vmxnet3 Ethernet Adapter)	Element	Roche Microsoft Windc
x	\PSM\PSM.DEV\PSM.DEV	PSM.DEV. -WIN Processor	Element	Roche 4.GROUP with Al

Input:

- Multiple levels of elements created automatically
- Tags created automatically
- Scripted based on two inputs
  - A template file for the sub-hierarchy to be created (e.g. An interface node including interface service, watchdog etc.)
  - A parameter file that contains all instance-specific values

Output:

- A CSV file compatible with PI Builder

Hierarchy creation:

- Use the output file with PI Builder