Leakage Detection with OSIsoft PI

René Kersten (Senior Functional Administrator PI)
Elco Verbrugge (Process Coordinator Extraction and Purification)

London, 28 May 2015

Vitens
LAAT WATER VOOR JE WERKEN

Agenda

René
- Introduction Vitens
- PI Infrastructure
- Challenge: Leakage Detection
- Principles
- Technical solution: PI Infrastructure add-on
- Functional solution: Configuration PI

Elco
- PI Leakage Detection in practice
- Lessons learned
- Examples
- Next steps
- Positive impacts

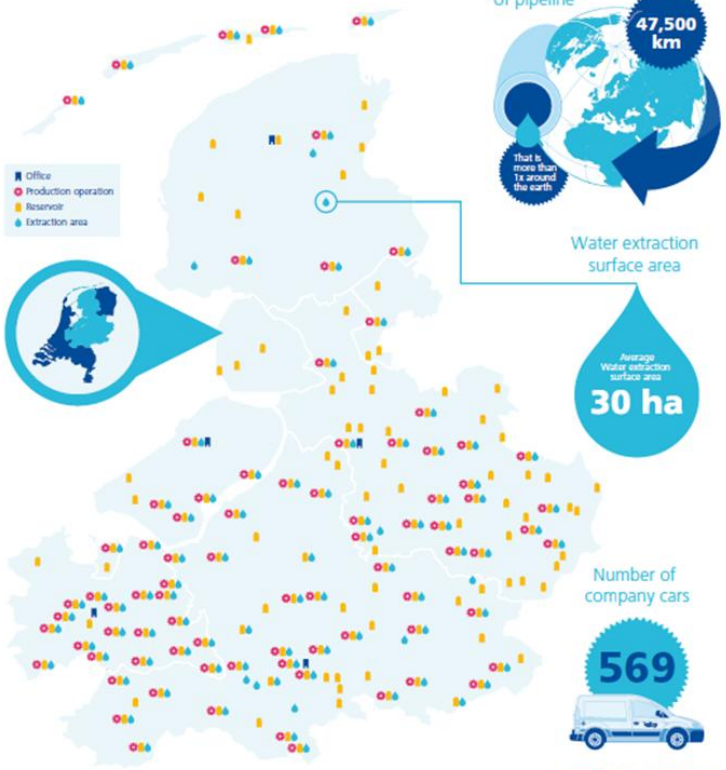
René - Elco
- Questions

Vitens
LAAT WATER VOOR JE WERKEN

Introduction Vitens

Spotlight on Vitens

Vitens' service area



Number of km of pipeline

Water extraction surface area

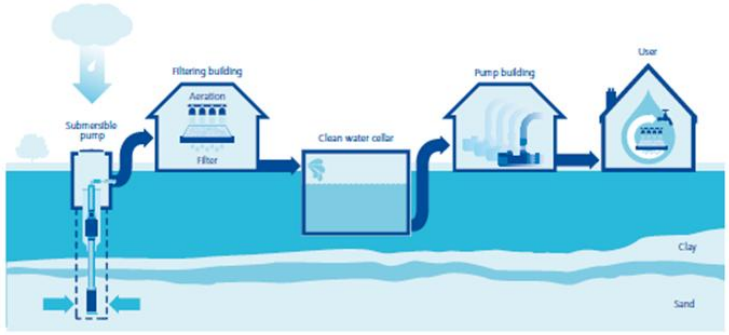
Number of company cars

Number of employees

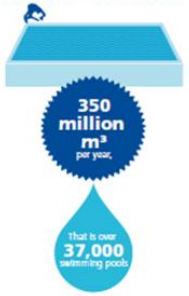
Company results (€ millions)

	2010	2009	2008
Total income	453.6	445.9	450.3
Result	416.8	408.0	414.8
Operating result before depreciation (EBITDA)	161.2	165.0	166.9
Operating result (EBIT)	75.1	81.5	85.7

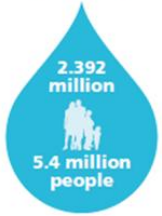
Extraction, purification and distribution process



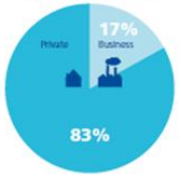
Total consumption 2010



Number of connections



Distribution of consumption in m³

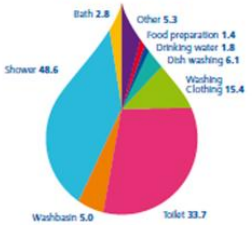


Average cost of drinking water

€ 1.29 per 1,000 litres

Costs per connection

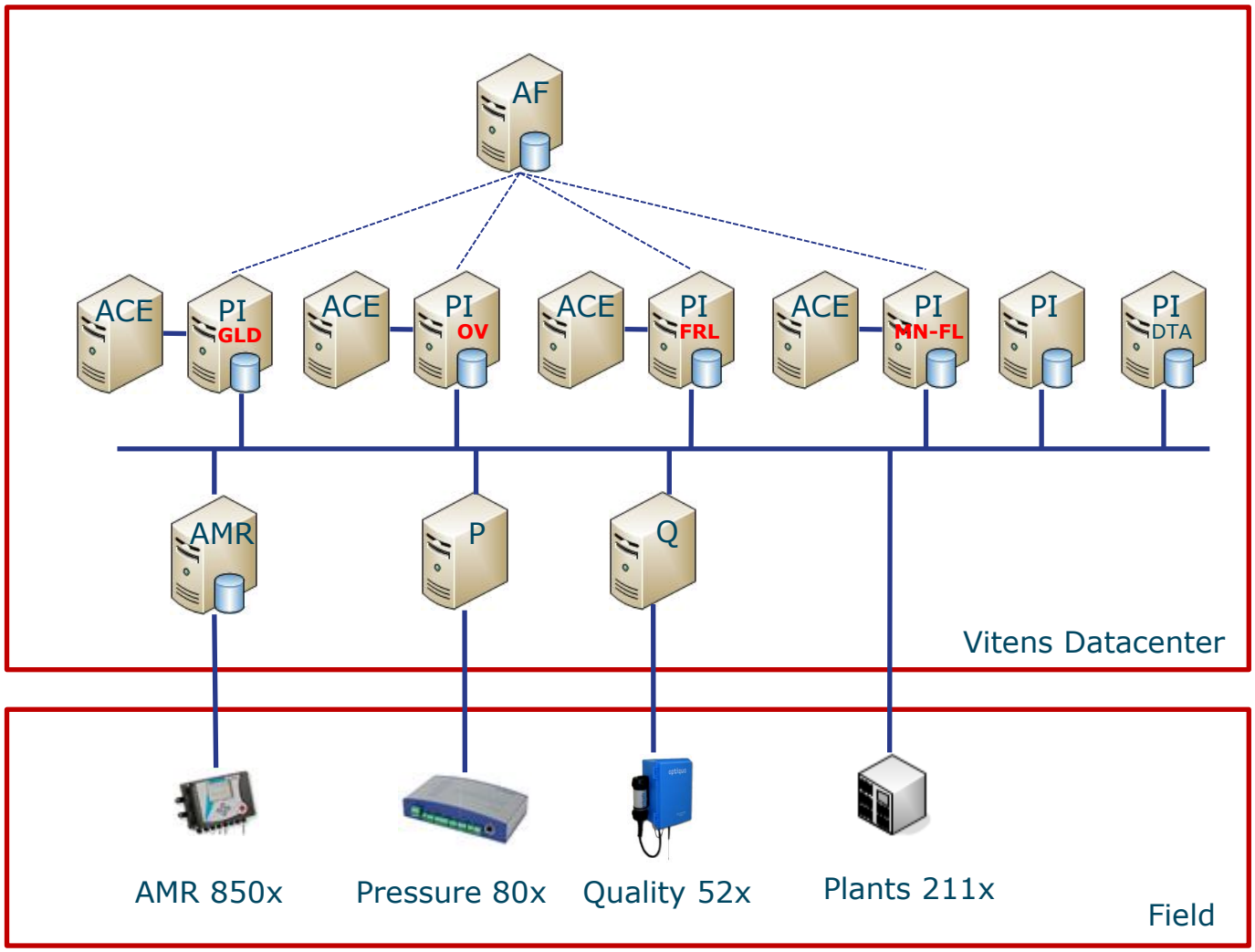
Water consumption per household per day in litres



Vitens

LAAT WATER VOOR JE WERKEN

PI Infrastructure



Vitens
LAAT WATER VOOR JE WERKEN

Challenge Leakage Detection

Presentation abstract:

As a supplier of drinking water, we unfortunately have to deal with leaks in our daily operations. In most cases, we are alerted by our customers. Usually because the pressure is too low, or they are not receiving any water at all. This means that we are always one step behind.

We wanted to be able to be **one step ahead** instead. Our challenge was to create business rules in OSIsoft PI that would alert us whenever an exception occurs in our distribution network. Our Central Water Distribution department can then **immediately take action**, even before we receive the first call from our customers. We have developed these business rules in a combined effort between business and IT. In our presentation, we will talk about how this functionality was developed, which parts of the PI system we use, the current operational results (hit rate) and lessons learned.

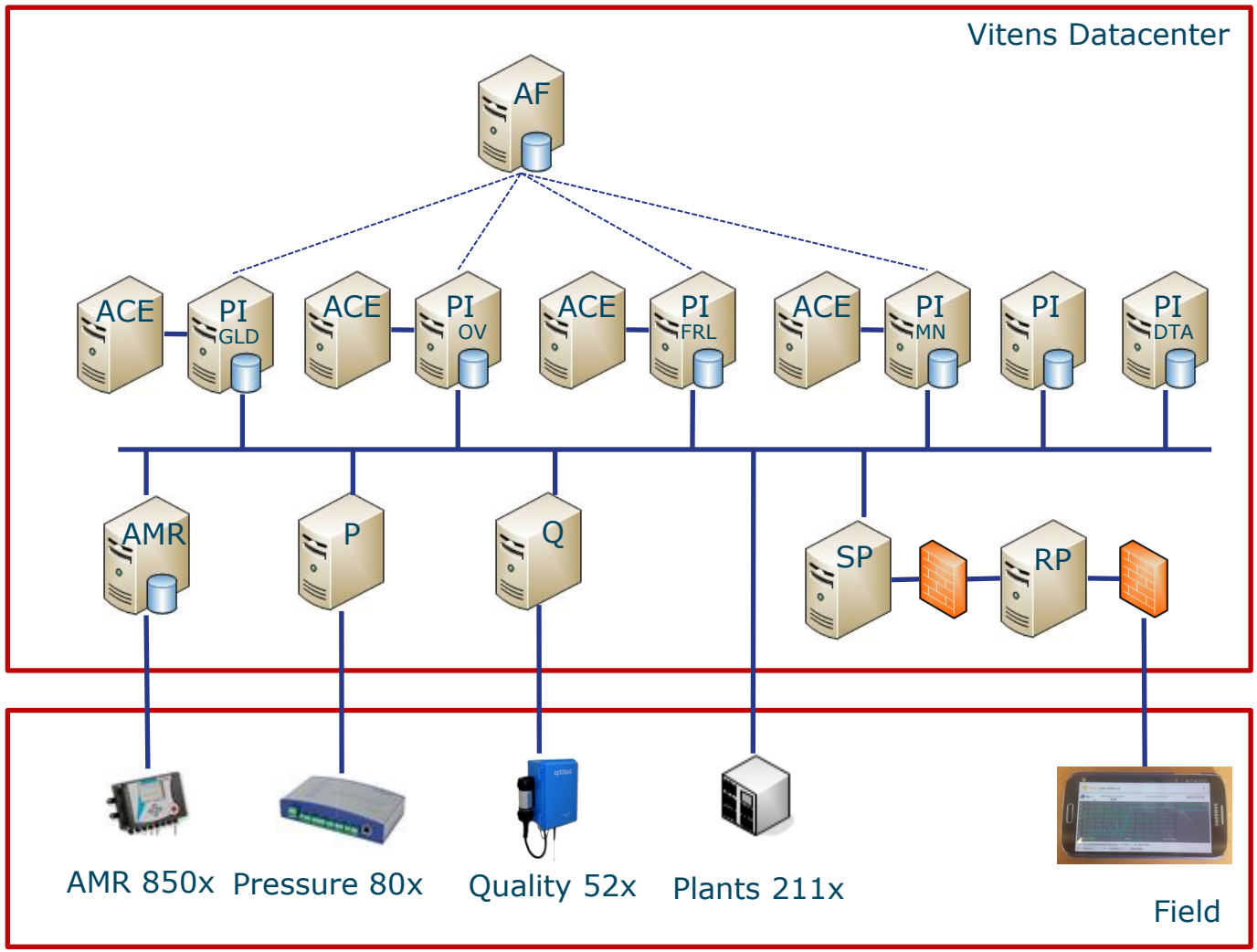
Vitens
LAAT WATER VOOR JE WERKEN

Principles:

- Just start ☺
- Using OSIsoft installed base (PI – AF – Webparts)
- Suggest a business rule based on existing measurements (flow and pressure) in the field
- There must be send and receive a notification => Anyplace, anytime, anywhere, with additional information
- Immediate analysis of information, use visualisation tools to trend data
- Secure
- Easy to maintain (template based)
- Scalable, easily expandable (template based)

Vitens
LAAT WATER VOOR JE WERKEN

Technical solution:
PI Infrastructure add-on



Vitens
LAAT WATER VOOR JE WERKEN

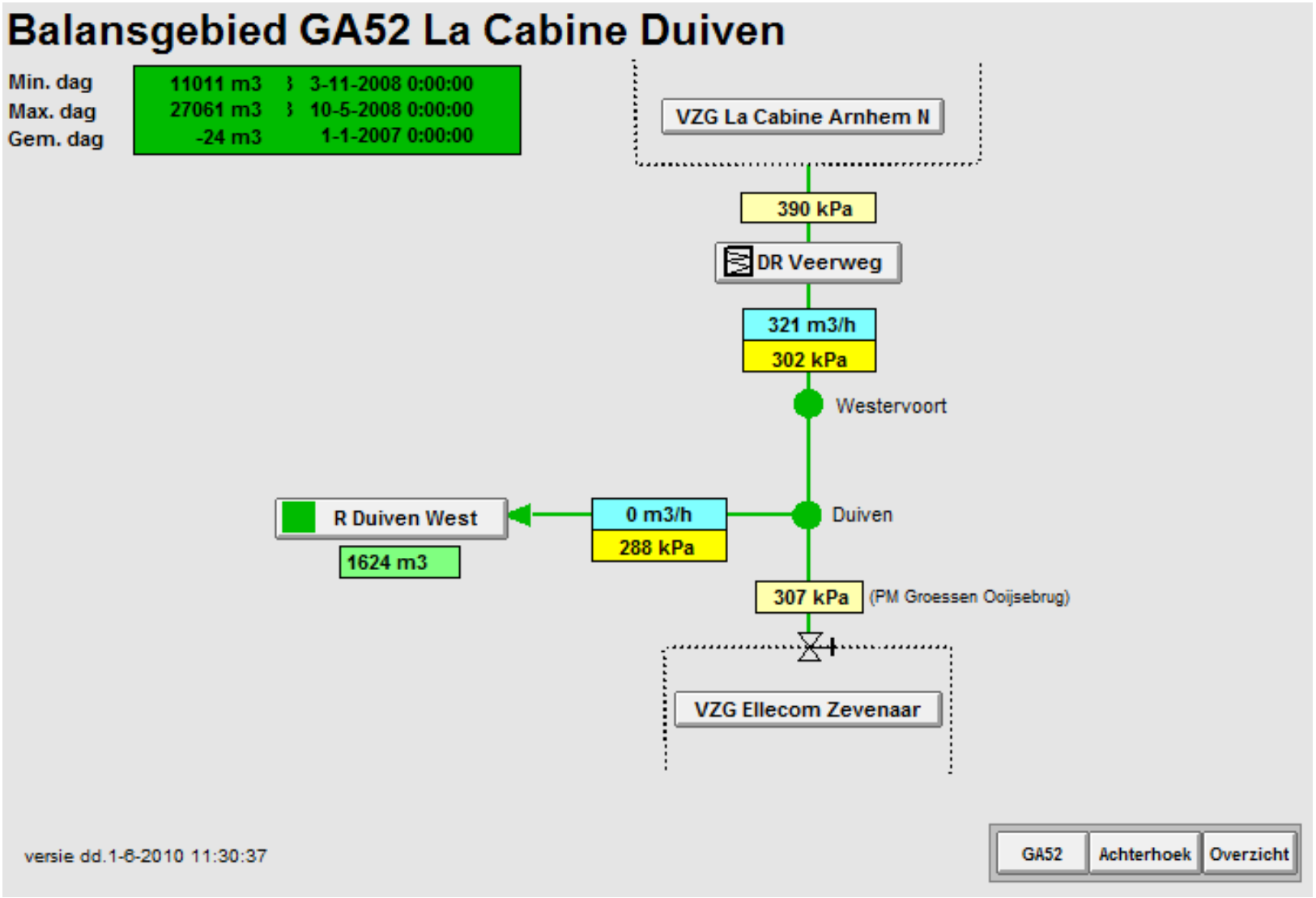
Functional solution: Configuration PI

- Symptoms of a leak: flow increases, pressure decreases
- Business rule *(Elco)*
- AF, templates (element and notification)
- Notification
- PI instant Webpart (SharePoint), including customizing the Webpart (trigger time, -30min / +30min)
  (using custom JavaScript in Ad-hoc trend)
- Receive notifications on smartphone. View ad-hoc trend directly from notification

PI Leakage Detection in practice (Elco)

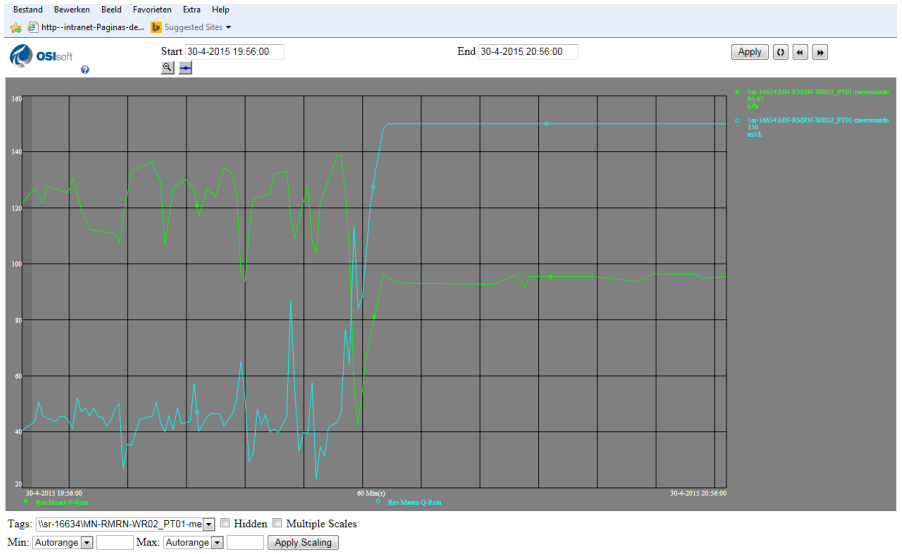
- Business rule
- Initial configuration of parameters based on best guess/knowledge by operator (configuration Maarn)
- Fine-tuning of parameters after real exceptions
- Hit rate => 95%

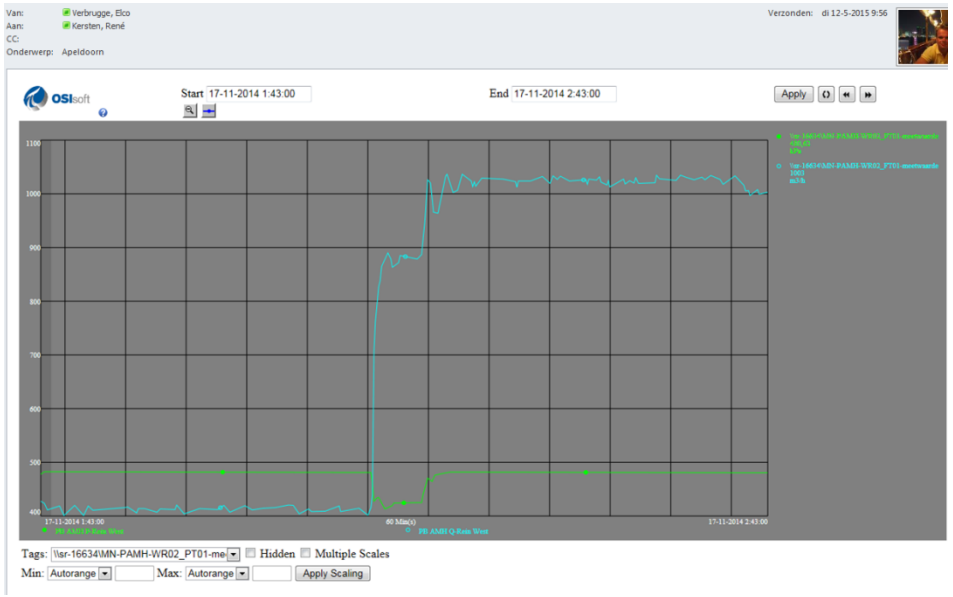
Lessons learned (Elco)

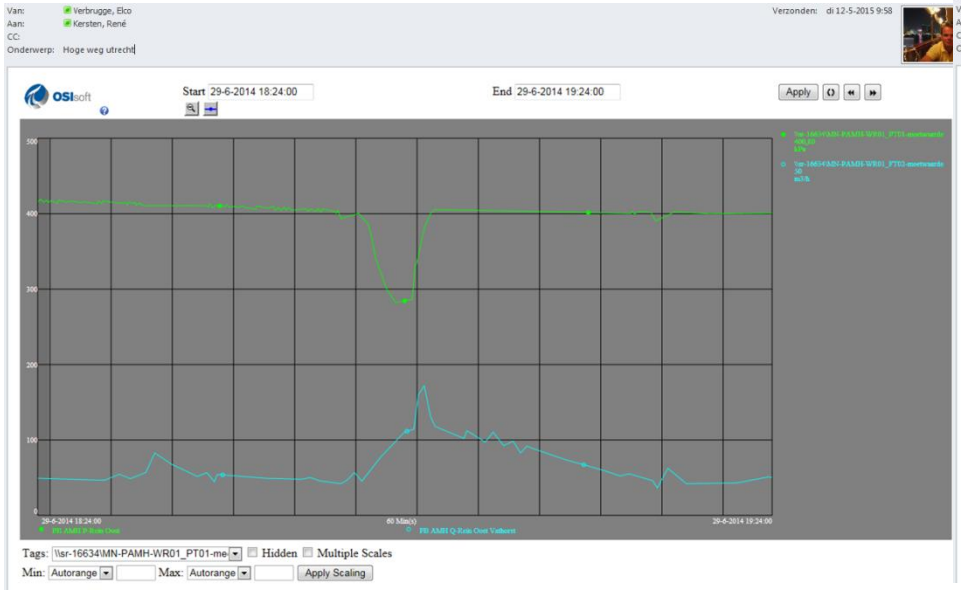


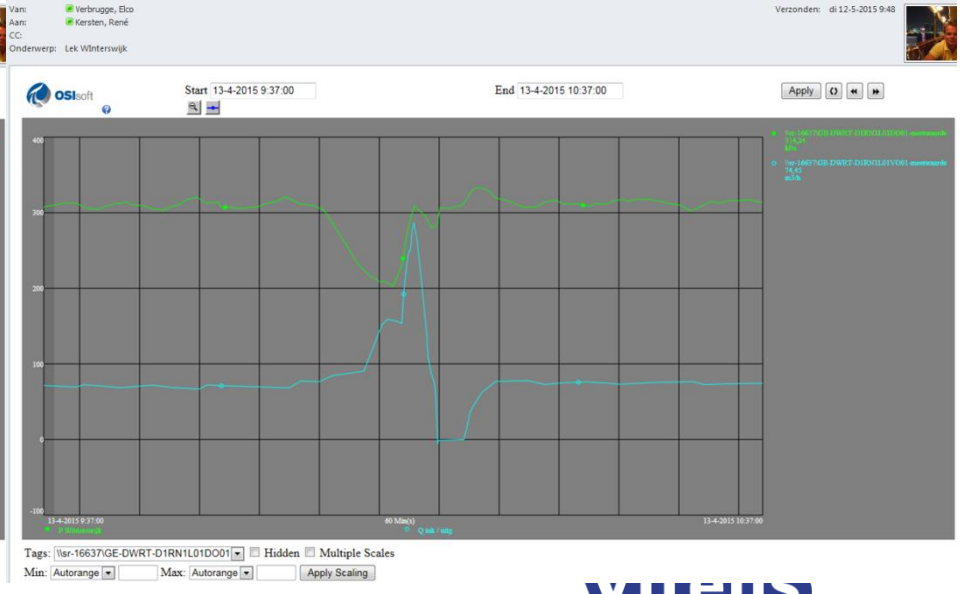
Vitens
LAAT WATER VOOR JE WERKEN

Examples (Elco)









Next step(s) (Elco)

- Determine exact location using pressure sensors
- ……

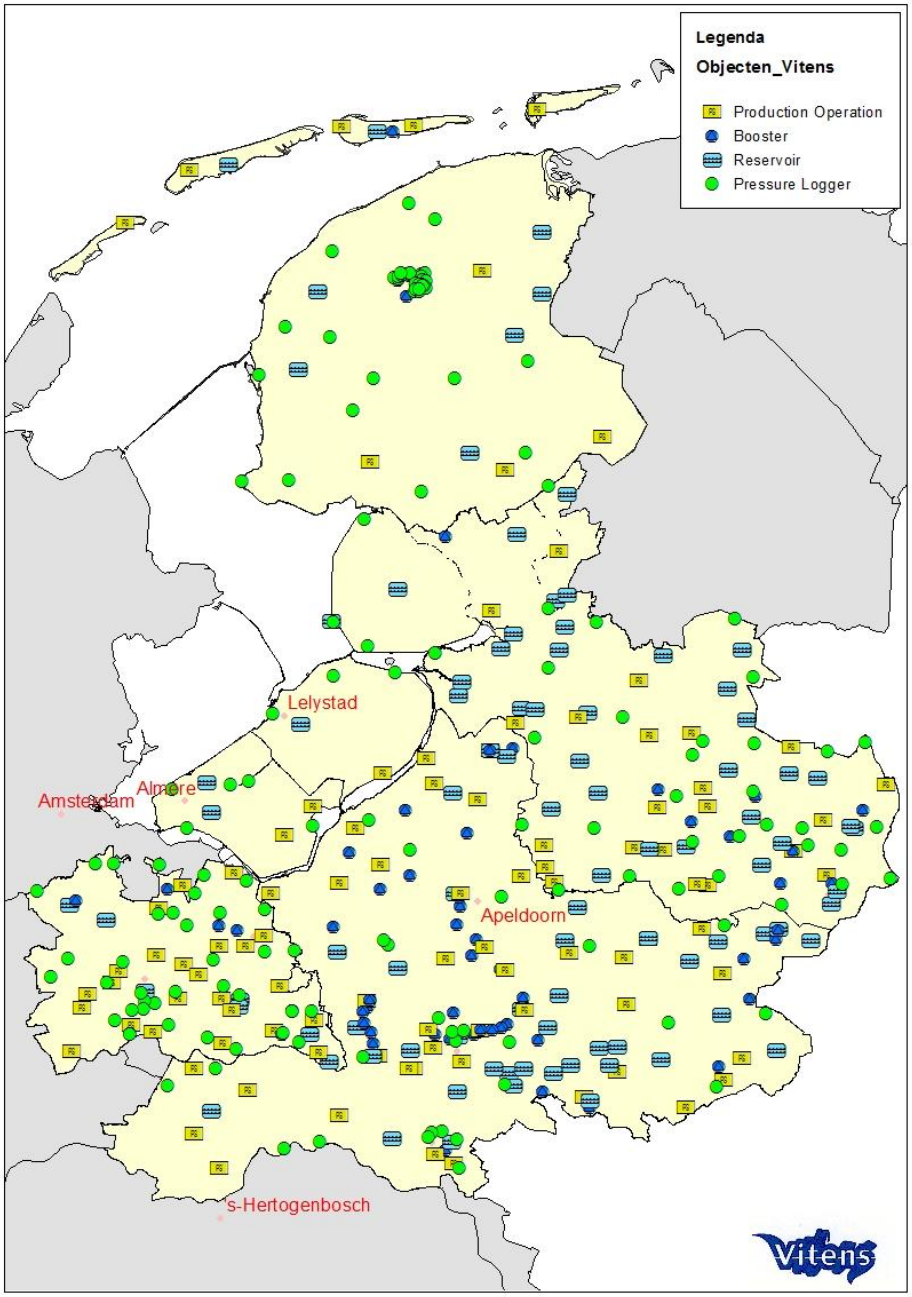
Positive impacts

- Less leakage water
- Less energy consumption
- Less damage
- Less dewatering
- Decreasing the Mean Time To Repair (MTTR)
- The customer has faster access to drinking water

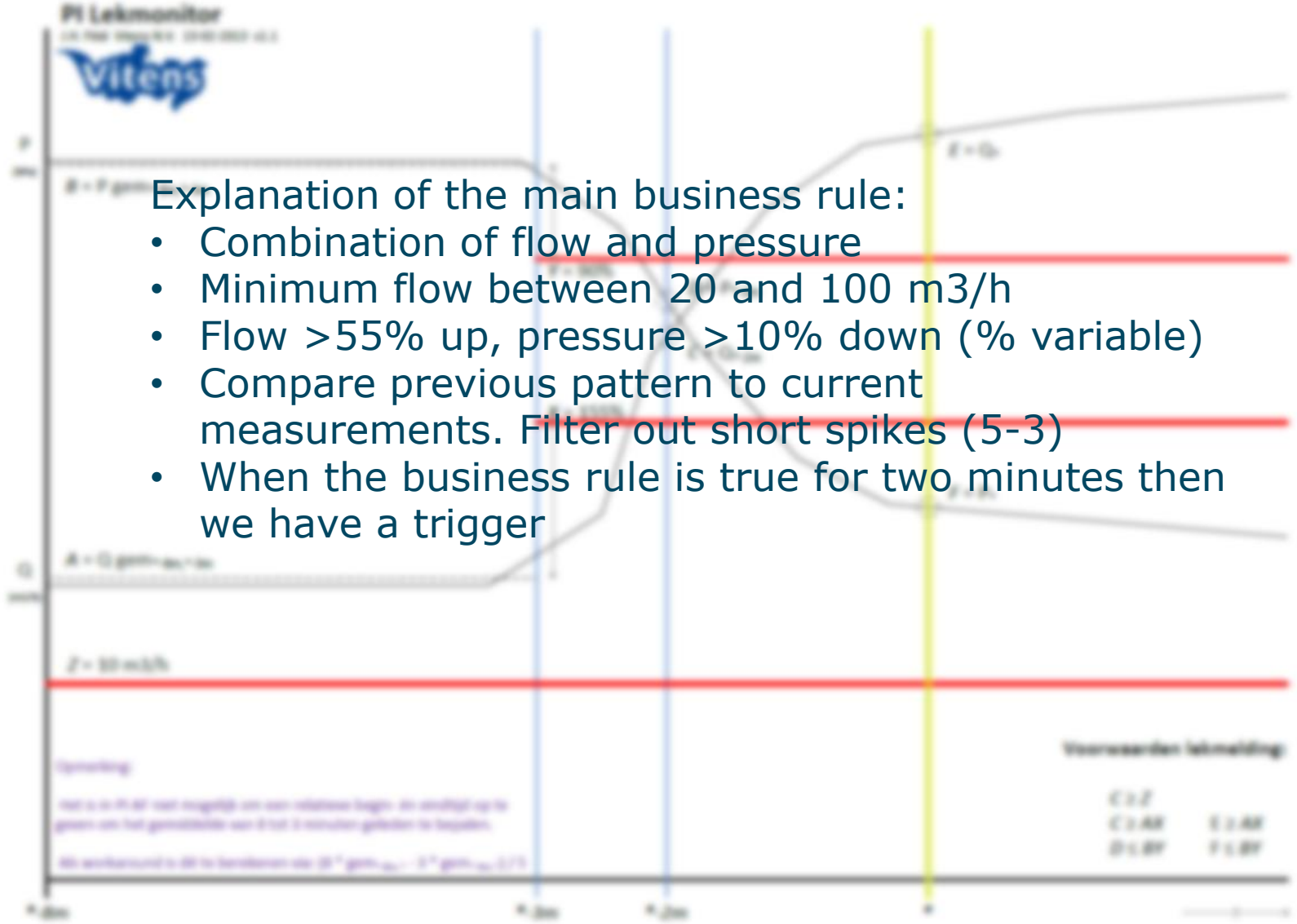
Vitens
LAAT WATER VOOR JE WERKEN

Questions

Vitens
LAAT WATER VOOR JE WERKEN



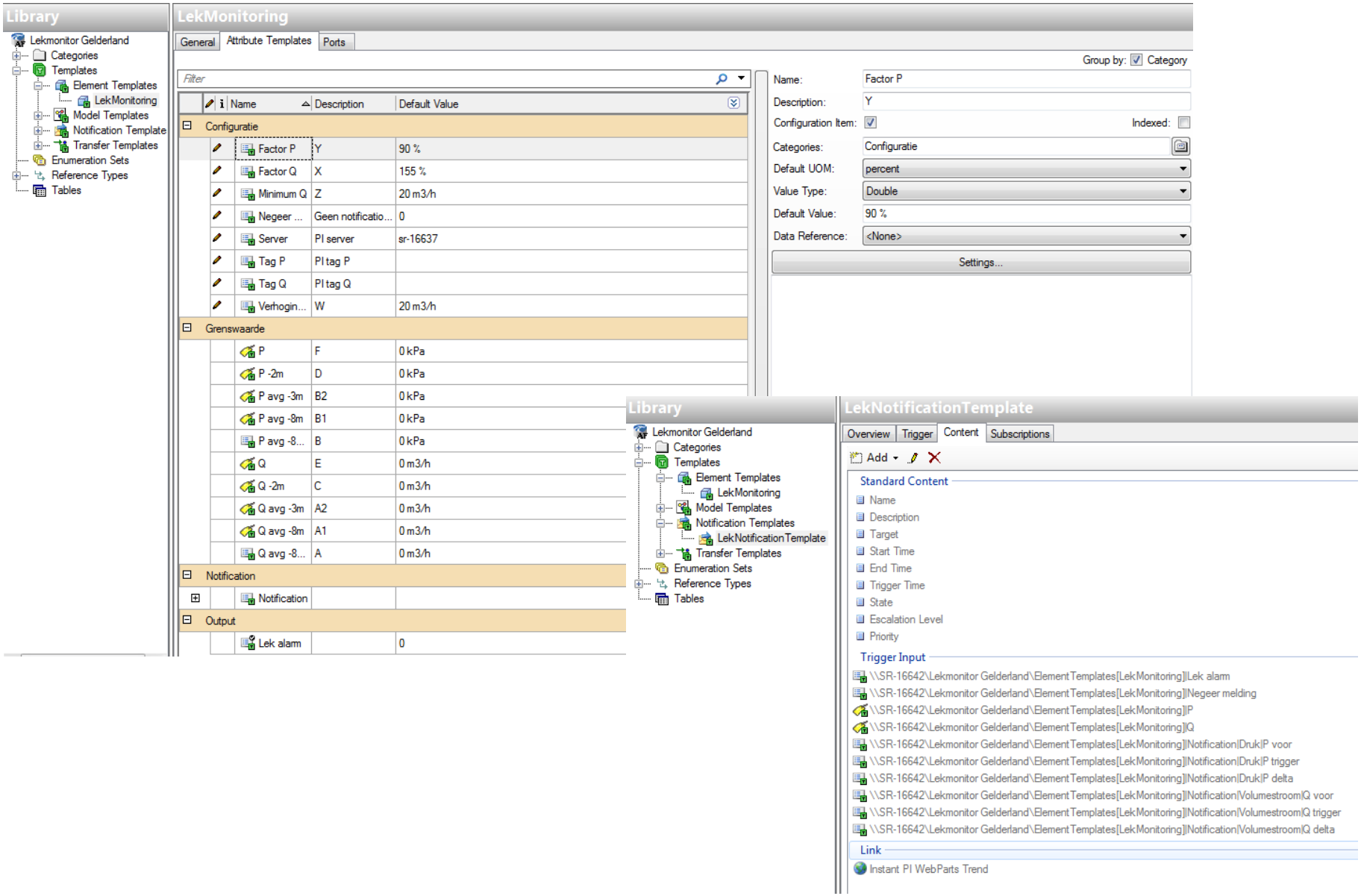
Vitens
LAAT WATER VOOR JE WERKEN



Explanation of the main business rule:

- Combination of flow and pressure
- Minimum flow between 20 and 100 m3/h
- Flow >55% up, pressure >10% down (% variable)
- Compare previous pattern to current measurements. Filter out short spikes (5-3)
- When the business rule is true for two minutes then we have a trigger

Vitens
LAAT WATER VOOR JE WERKEN



Vitens
LAAT WATER VOOR JE WERKEN

Van: PI_notifications@vitens.nl
Aan: Kersten, René
CC:
Verzonden: do 30-4-2015 20:26
Onderwerp: SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn\Notifications[LekNotification134] generated a new notification event.

Name: LekNotification134
Server: SR-16642
Database: Lekmonitor Midden Nederland
Start Time: 30-4-2015 20:26:00 W. Europe Daylight Time (GMT+02:00:00)
Trigger Time: 30-4-2015 20:26:00 W. Europe Daylight Time (GMT+02:00:00)
Target: SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn
State: OutsideControl
Priority: Normal

Trigger Input:
\\SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn|Lek alarm: 1
\\SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn|Negeer melding: 0
\\SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn|P: 75,8974380493164
\\SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn|Q: 121,575096130371
\\SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn|Notification|Druk|P voor: 123
\\SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn|Notification|Druk|P trigger: 90
\\SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn|Notification|Druk|P delta: -33
\\SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn|Notification|Volumestroom|Q voor: 44
\\SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn|Notification|Volumestroom|Q trigger: 79
\\SR-16642\Lekmonitor Midden Nederland\Productibedijf Woudenberg\Reservoir Maarn richting Maarn|Notification|Volumestroom|Q delta: 35

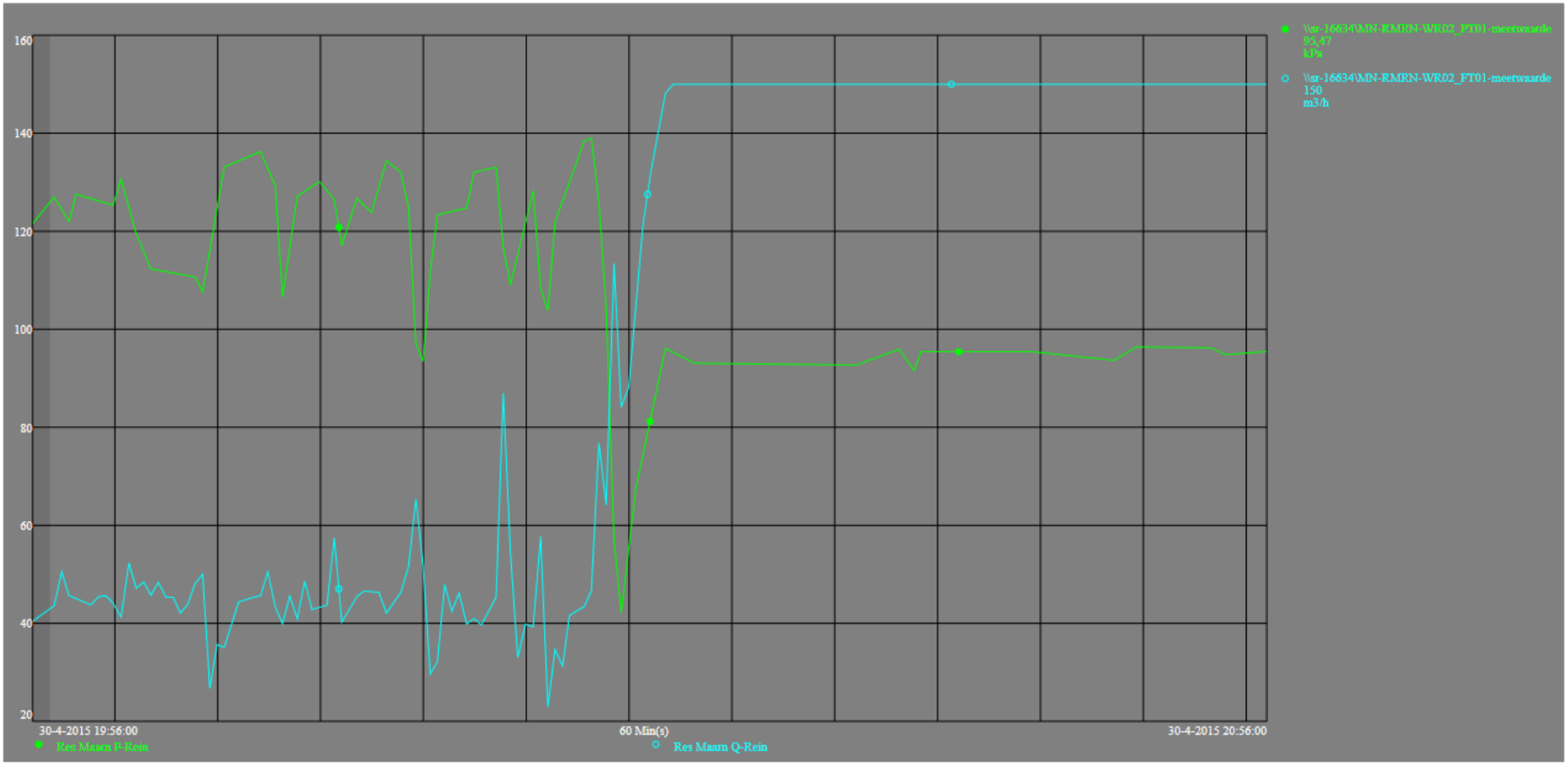
Link:
Instant PI WebParts Trend

Bestand Bewerken Beeld Favorieten Extra Help

http--intranet-Paginas-de... Suggested Sites

OSIsoft

Start 30-4-2015 19:56:00 End 30-4-2015 20:56:00 Apply

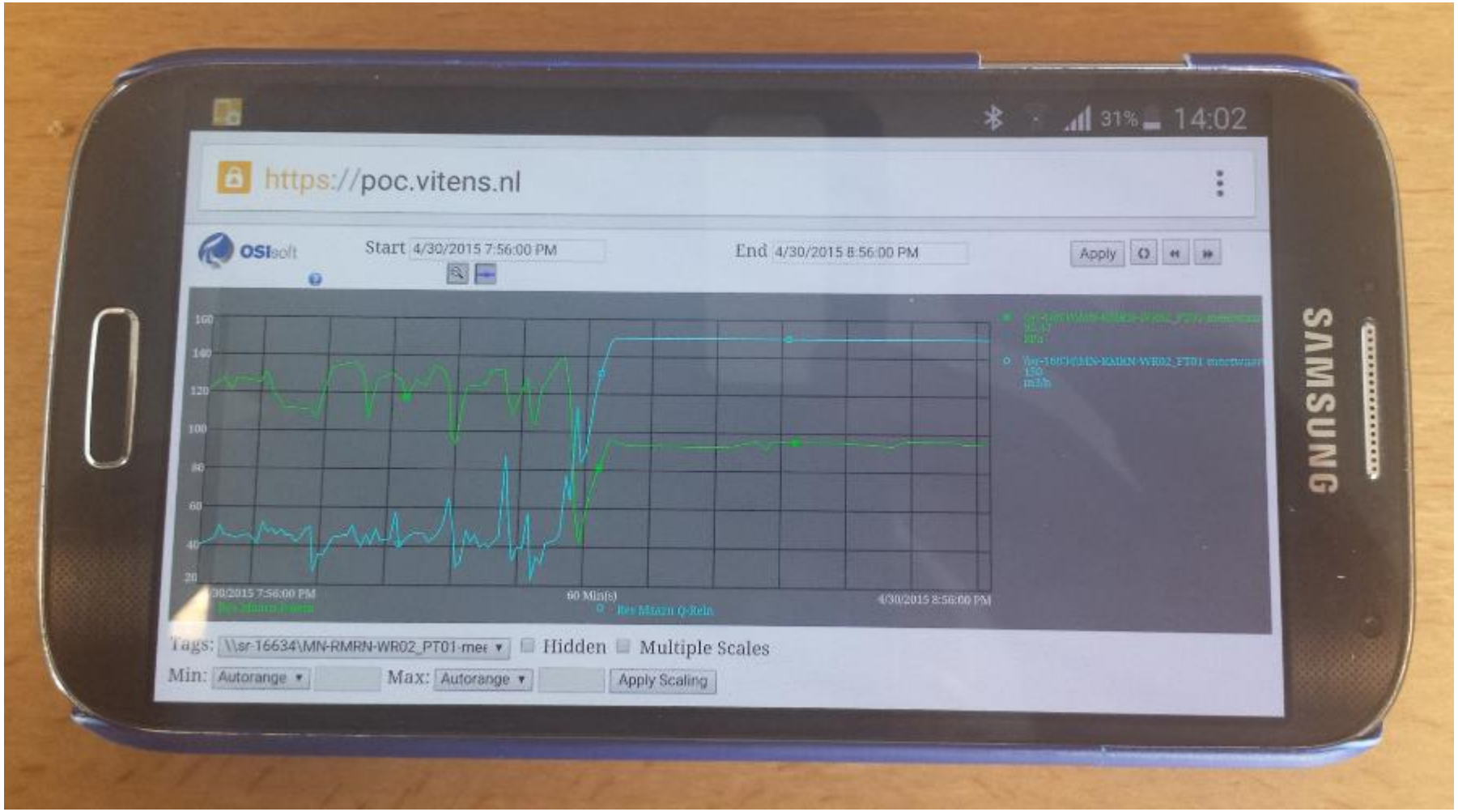


Tags: \\sr-16634\MN-RMRN-WR02_PT01-me Hidden Multiple Scales

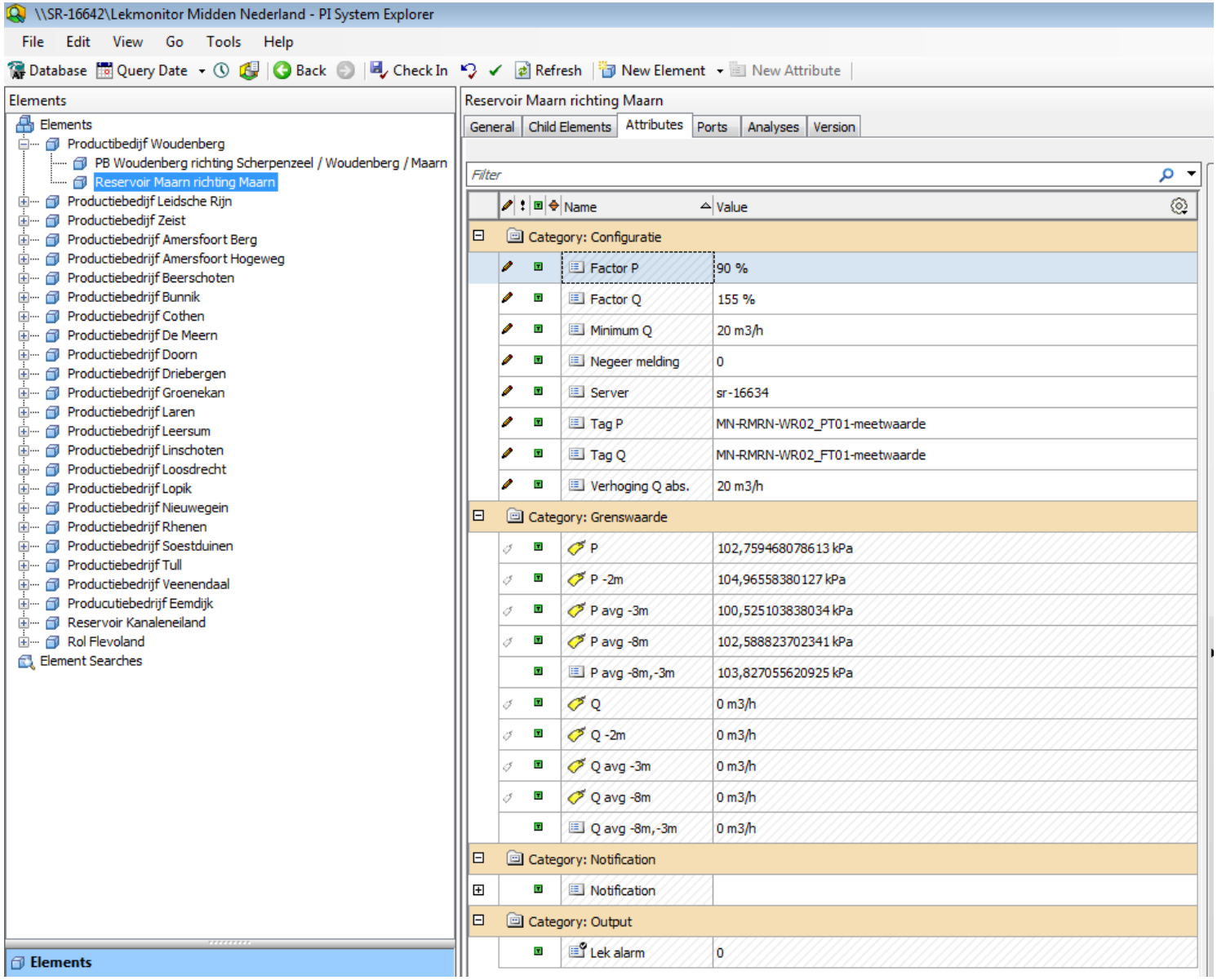
Min: Autorange Max: Autorange Apply Scaling

Vitens

LAAT WATER VOOR JE WERKEN



Vitens
LAAT WATER VOOR JE WERKEN



Vitens
LAAT WATER VOOR JE WERKEN