SMART Water for Europe Initiative (SW4EU), a step closer to real SMART Utilities

Jan Gooijer- Vitens

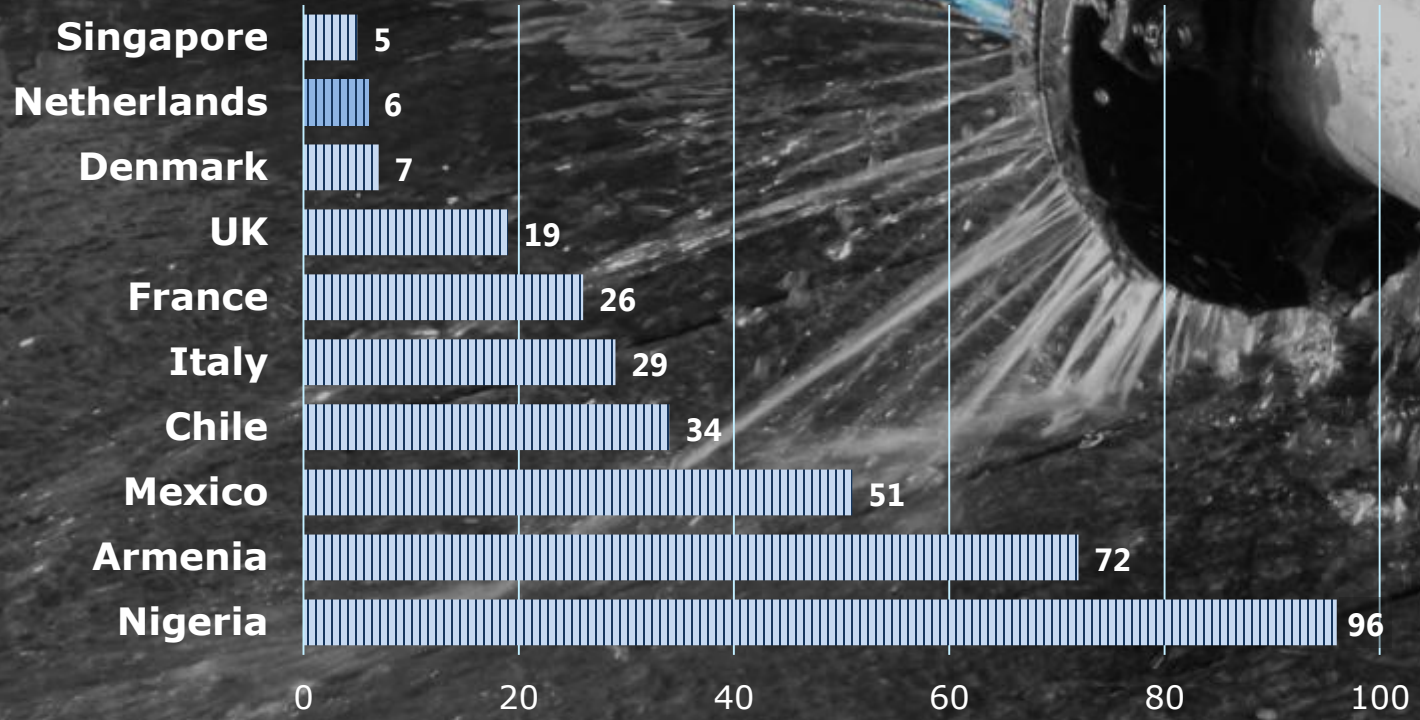
November 3th, 2017 - Amsterdam

Vitens in numbers

5	provinces
110	extraction areas
1,400	employees
49,500	km water mains
5.7 mln.	customers
100 mln.	€ investements
337 mln.	m^3 drinking water per year


NETHERLANDS
NON-CHLORINATED WATER

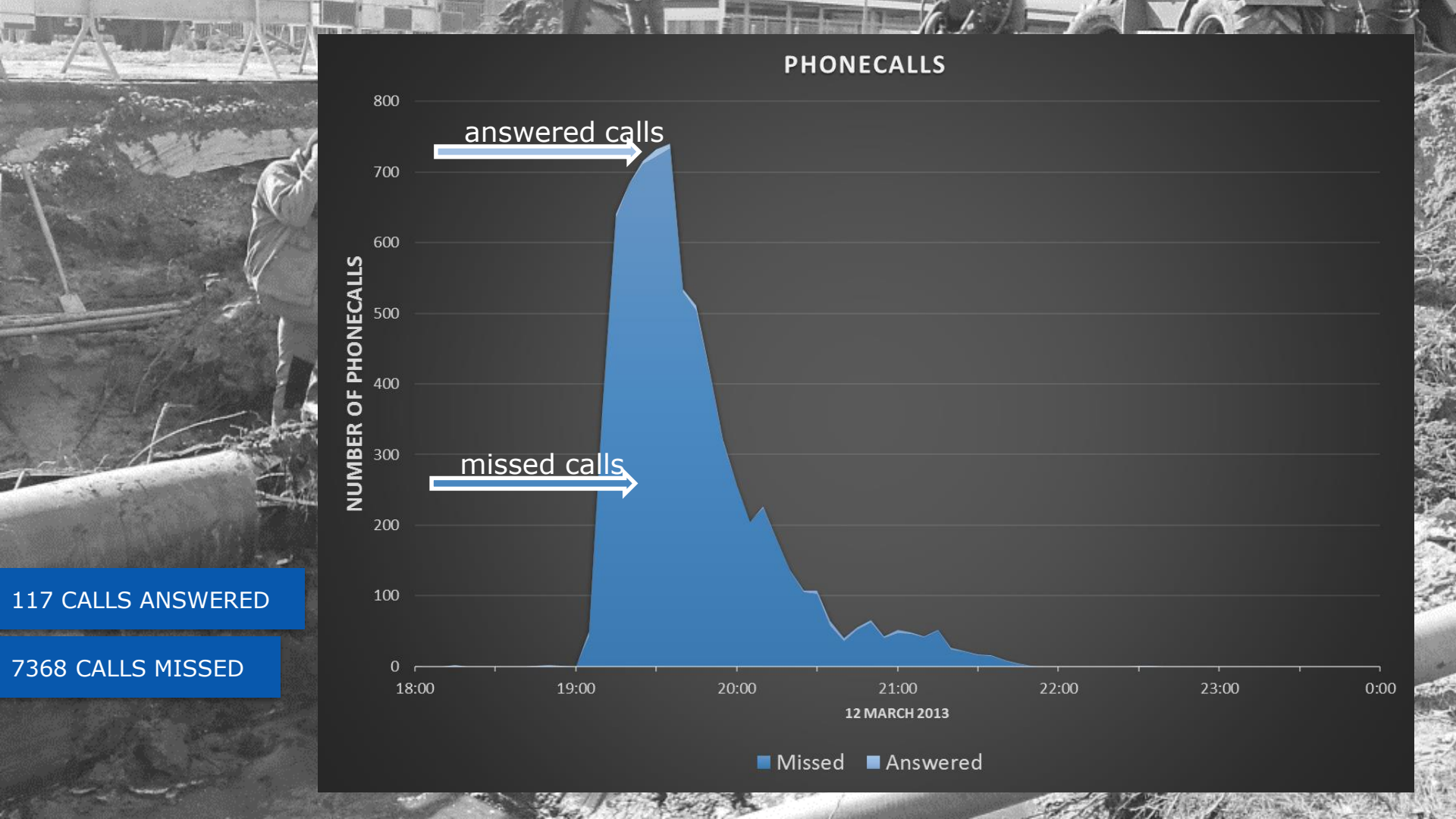
Non Revenue Water



LEEUWARDEN PIPE BURST 12 MARCH 2013

100.000 CUSTOMERS INVOLVED

EVENT DETECTED 19:05 PM
LEAK FOUND 21:15 PM
WATER SUPPLY RESTORED 21:45 PM



117 CALLS ANSWERED

7368 CALLS MISSED

2014
reactive

Manual data management and analogue decentral technology

"Thank you for your phone call.
We'll look into it..."

Current situation 2017 and in development
proactive

Real-time data analysis and real-time sensor technology

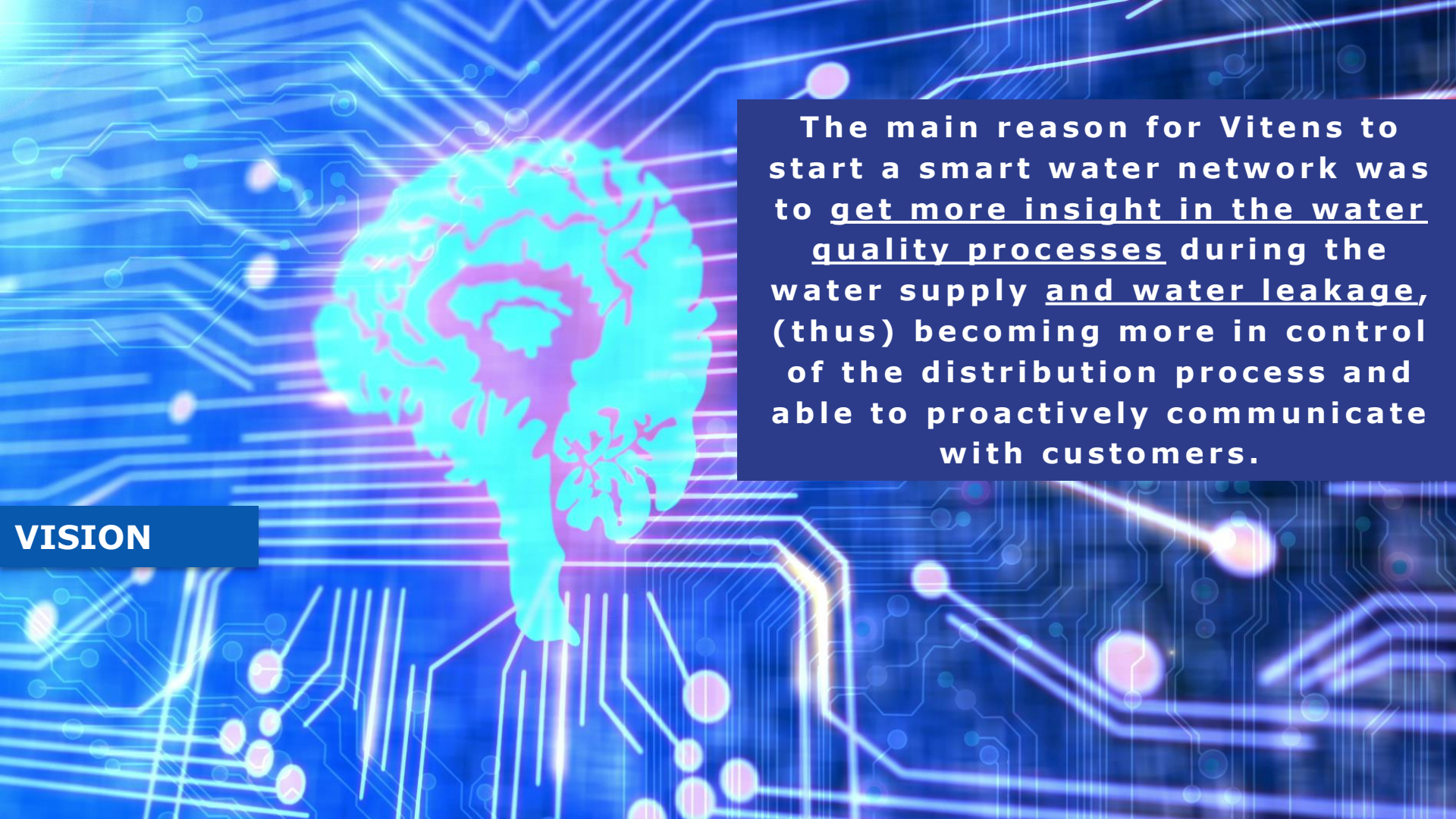
"Thank you for your phone call.
An operator is on his/her way."

"Dear customer, you may experience low pressures. We're working on it..."

Our dream
preventive

Predictive operation with real-time data analysis and real-time sensor technology

"..."
(No message. Problem is solved before a customer notices anything)



VISION

The main reason for Vitens to start a smart water network was to get more insight in the water quality processes during the water supply and water leakage, (thus) becoming more in control of the distribution process and able to proactively communicate with customers.

Vitens

Smart Meter

Flow and Pressure Meters

Water Quality Sensors

Supply region Vitens

Data collection and processing

Data visualization and analysis

Operations

Training & Education

Projects

Energy Consumption Reduction

Wat ty
Mo g

Realti tection
and Lo isation

Customer Interaction

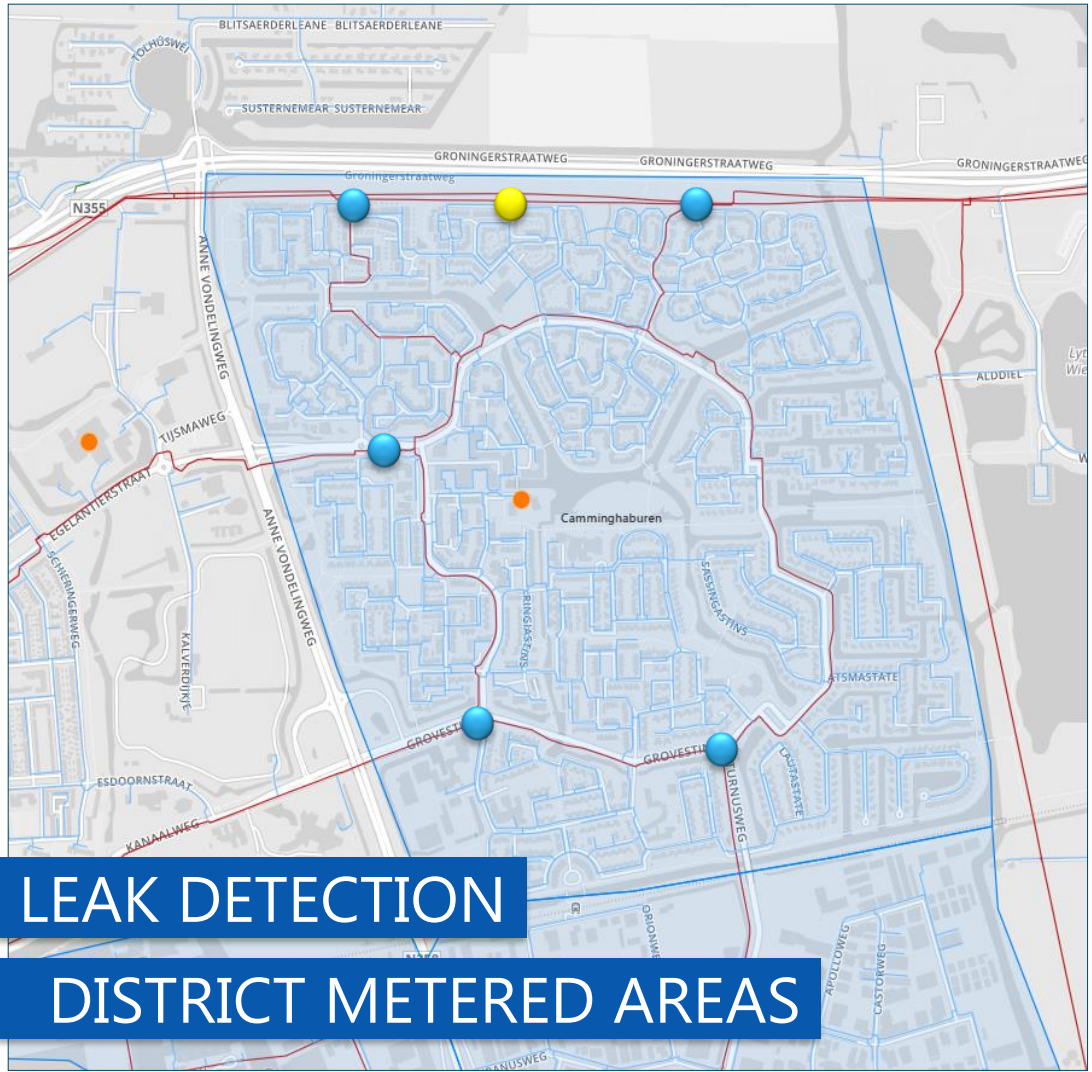
VITENS SMART GRID

300 SENSORS

9,000 KM INFRASTRUCTURE

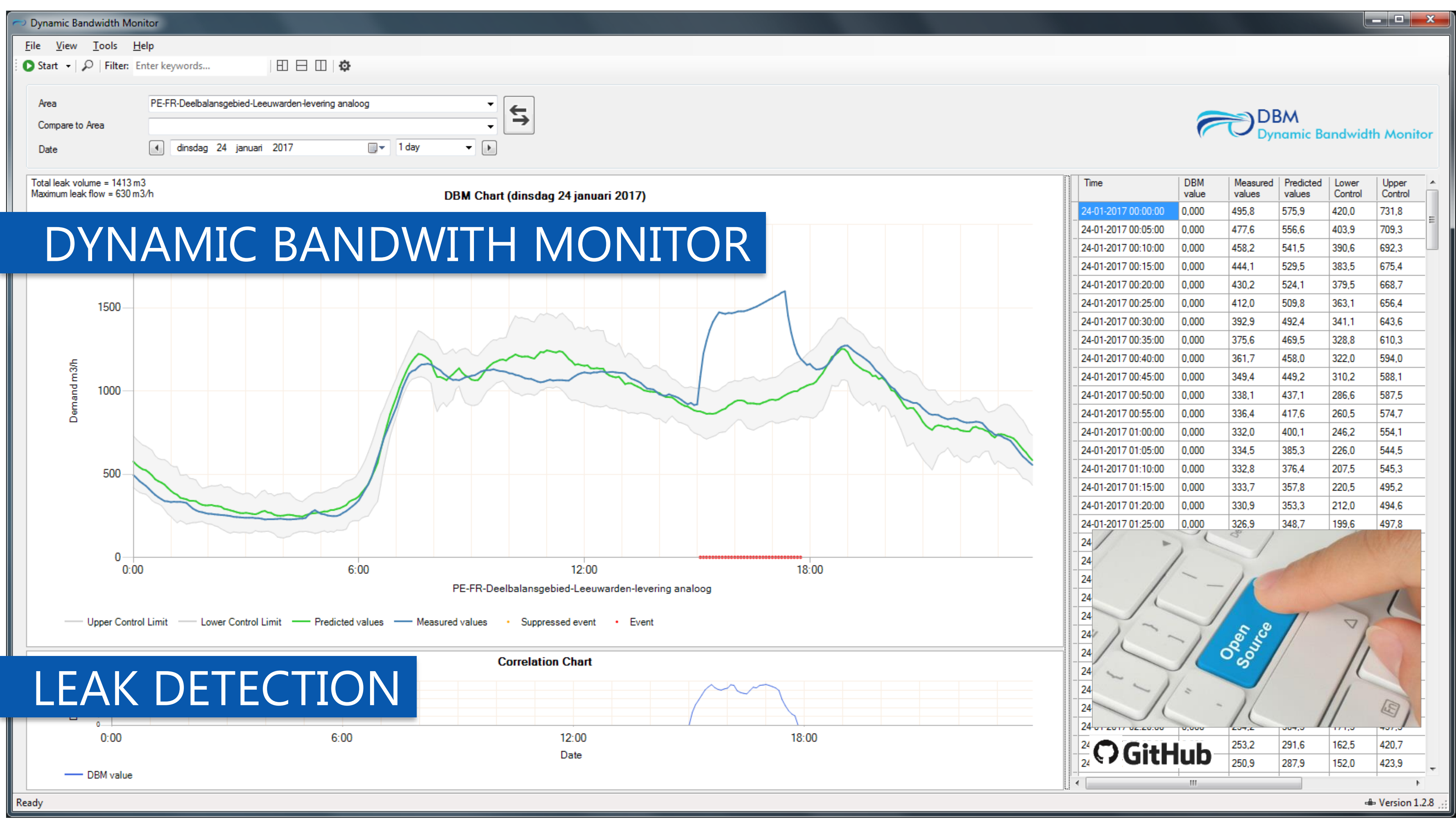
DEDICATED IT-INFRASTRUCTURE

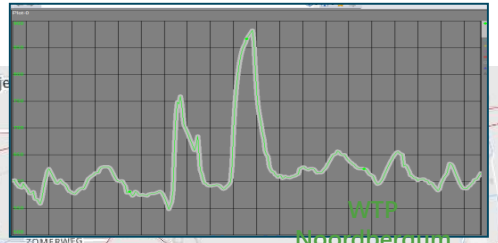
STATE-OF-THE-ART CONTROL ROOM



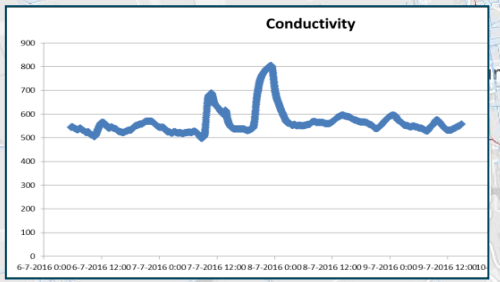
LEAK DETECTION

DISTRICT METERED AREAS

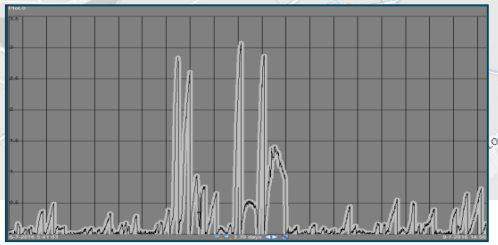

DYNAMIC BANDWITH MONITOR
LEAK DETECTION
Dynamic Bandwidth Monitor
File View Tools Help
Start Filter: Enter keywords...
Area PE-FR-Deelbalansgebied-Leeuwarden-levering analoog
Compare to Area
Date dinsdag 24 januari 2017 1 day
DBM Dynamic Bandwidth Monitor
Total leak volume = 1413 m3
Maximum leak flow = 630 m3/h
DBM Chart (dinsdag 24 januari 2017)
Demand m3/h
1500
1000
500
0
0:00
6:00
12:00
18:00
PE-FR-Deelbalansgebied-Leeuwarden-levering analoog
Upper Control Limit
Lower Control Limit
Predicted values
Measured values
Suppressed event
Event
Correlation Chart
Date
DBM value
Time | DBM value | Measured values | Predicted values | Lower Control | Upper Control
24-01-2017 00:00:00 0,000 495,8 575,9 420,0 731,8
24-01-2017 00:05:00 0,000 477,6 556,6 403,9 709,3
24-01-2017 00:10:00 0,000 458,2 541,5 390,6 692,3
24-01-2017 00:15:00 0,000 444,1 529,5 383,5 675,4
24-01-2017 00:20:00 0,000 430,2 524,1 379,5 668,7
24-01-2017 00:25:00 0,000 412,0 509,8 363,1 656,4
24-01-2017 00:30:00 0,000 392,9 492,4 341,1 643,6
24-01-2017 00:35:00 0,000 375,6 469,5 328,8 610,3
24-01-2017 00:40:00 0,000 361,7 458,0 322,0 594,0
24-01-2017 00:45:00 0,000 349,4 449,2 310,2 588,1
24-01-2017 00:50:00 0,000 338,1 437,1 286,6 587,5
24-01-2017 00:55:00 0,000 336,4 417,6 260,5 574,7
24-01-2017 01:00:00 0,000 332,0 400,1 246,2 554,1
24-01-2017 01:05:00 0,000 334,5 385,3 226,0 544,5
24-01-2017 01:10:00 0,000 332,8 376,4 207,5 545,3
24-01-2017 01:15:00 0,000 333,7 357,8 220,5 495,2
24-01-2017 01:20:00 0,000 330,9 353,3 212,0 494,6
24-01-2017 01:25:00 0,000 326,9 348,7 199,6 497,8
Open Source
GitHub
Ready
Version 1.2.8



Response intellisonde (Conductivity ↑)



Response s::can (Conductivity ↑)



Response Eventlab

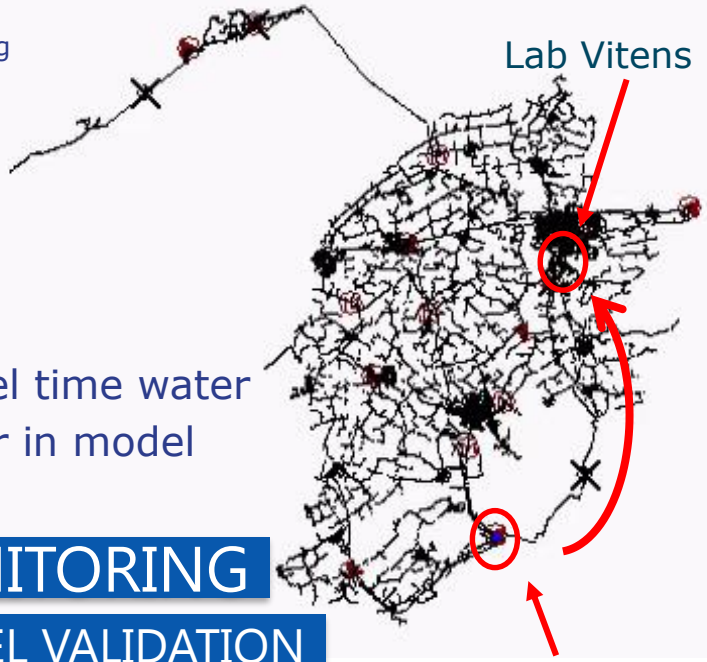
Reservoir Greunsweg

WATER QUALITY MONITORING

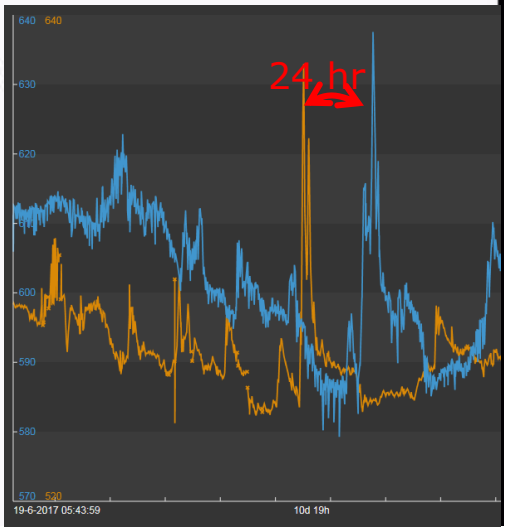
1/07/2015 00:00:00

Color indicates fraction of water originating from Production Location Spannenburg.

- Blue: 80 - 100%
- Red: 60 - 80%
- Orange: 40 - 60%
- Yellow: 20 - 40%
- Green: 00 - 20%



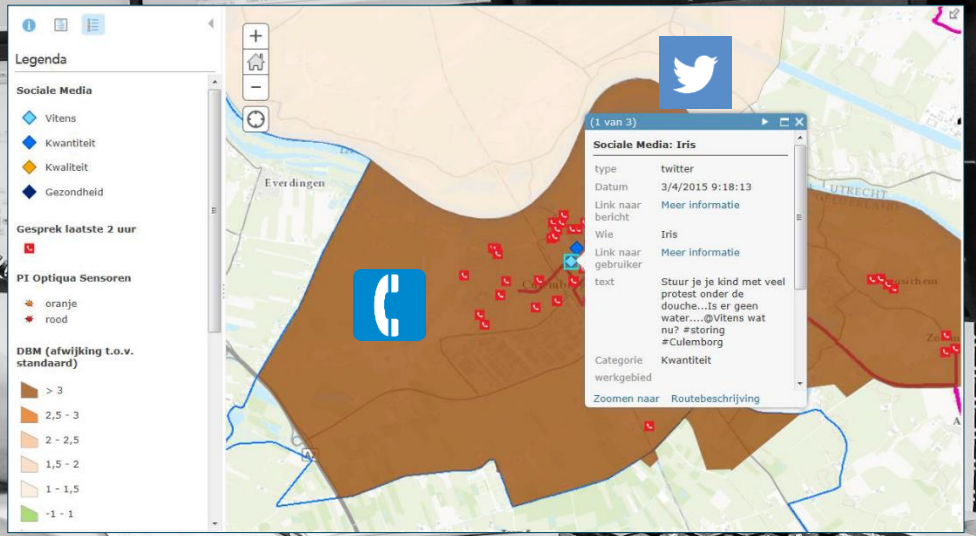
EGV sensors at Spannenburg and lab Vitens



WATER QUALITY MONITORING

USE WQ SENSORS FOR MODEL VALIDATION

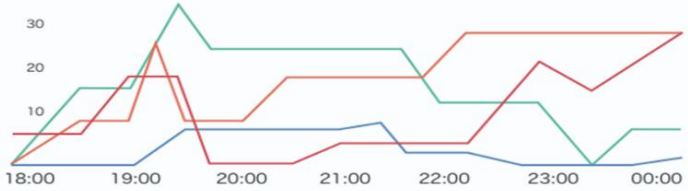
CENTRAL OPERATIONS
CUSTOMER INTERACTION



Watervoorziening

Alle zoekopdrachten | Geen filters

TIJDLIJN



KAART

LEGENDA

- Lekkage
- Waterdruk
- Vervuild water
- Gezondheid

BEELD

BERICHTEN

George van Veen 07:24
Is er een storing bekend bij de bilt? Wij krijgen namelijk geel water uit de kraan net als de buren.

Sjoerd Rijn 07:22
Niet alleen lage waterdruk in de Bilt maar ook heel vies water brrr

Maaike Harms 07:19
Wat een drama, geen druk op de waterleiding #Zeist #prinsesmargrietlaan. Zal dit hiermee te maken hebben?

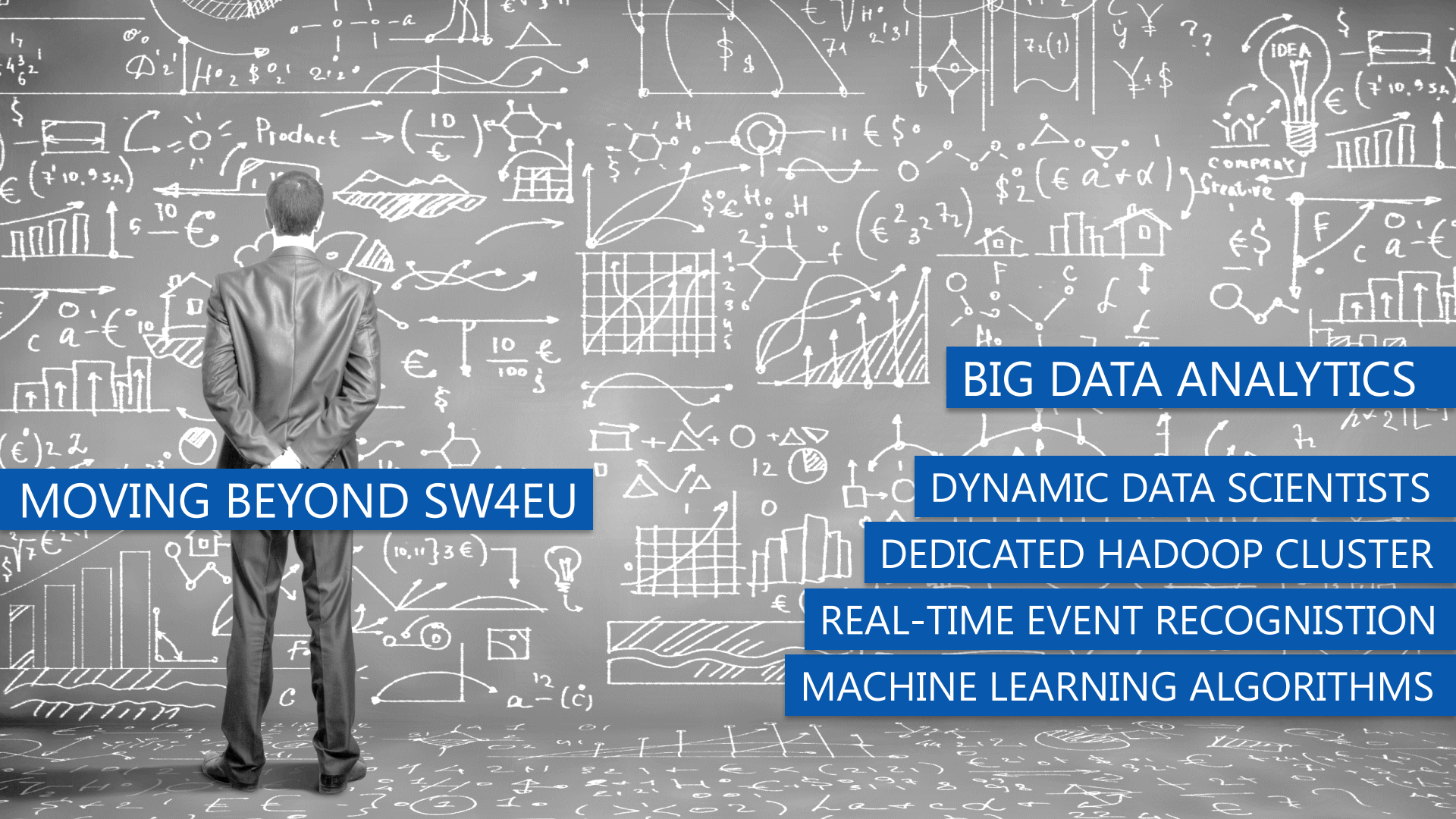
Malik Dijkstra 07:16
Geen water uit de kraan in #debilt?

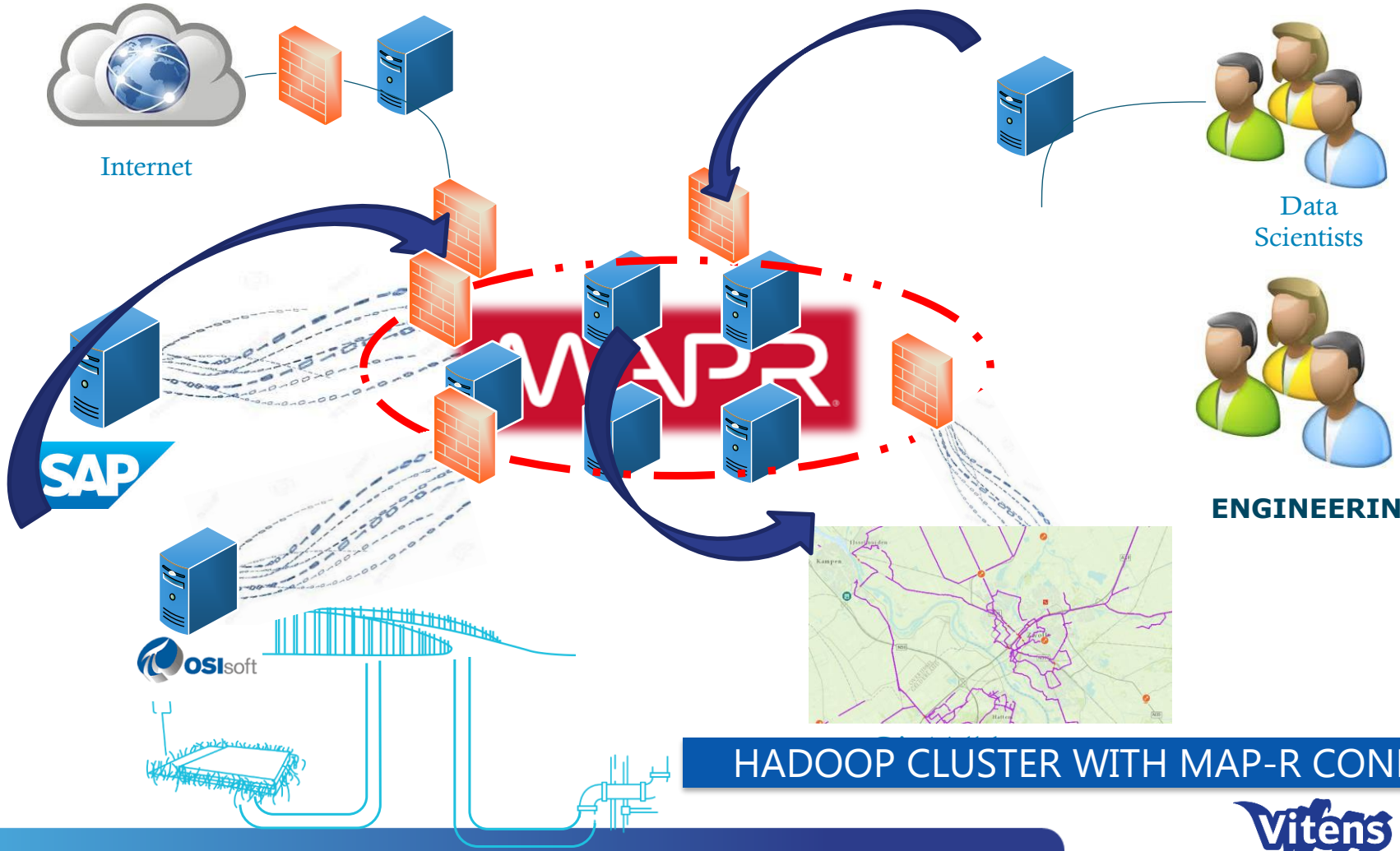
WOORDFREQUENTIE

Water	26
Lekkage	24
Geen	18
Leidingbreuk	15
Breuk	8
Druk	4
Laag	2
Lage	2
Omgeving	2
Leiding	2

TWITTER MONITOR

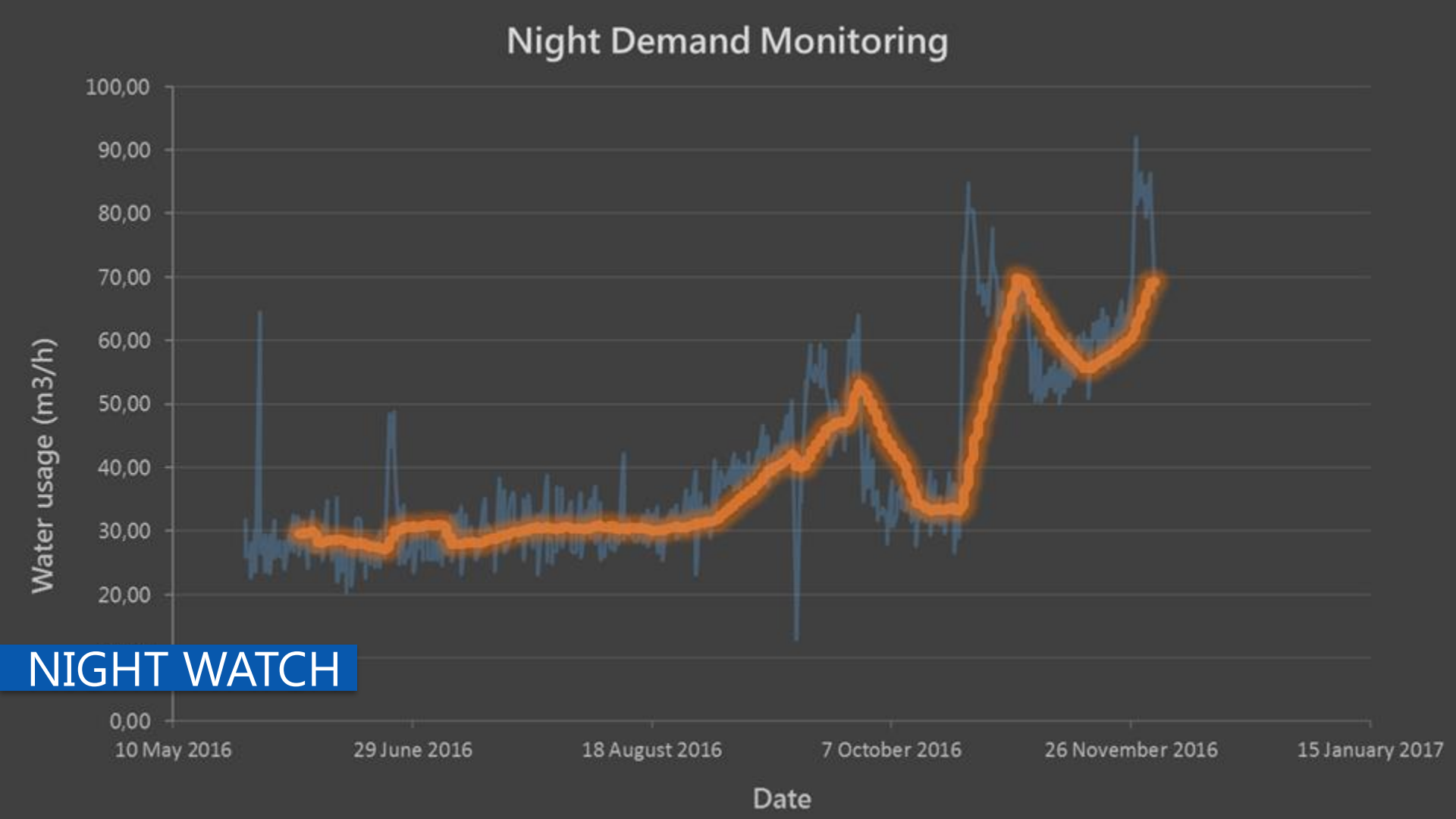
CUSTOMER INTERACTION

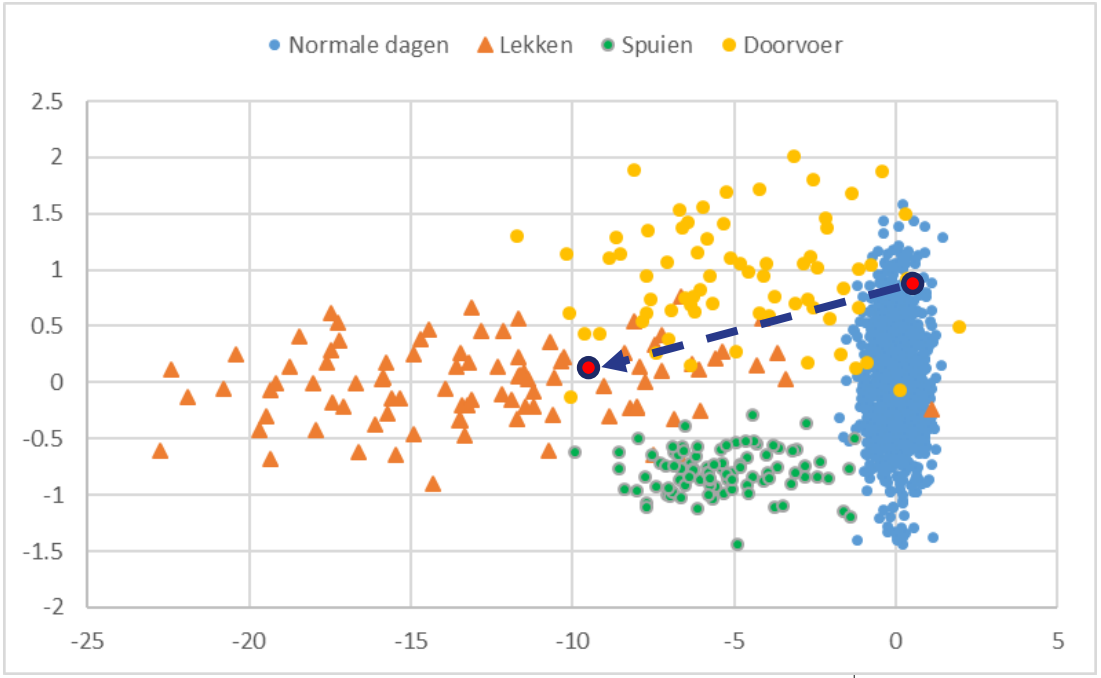

MOVING BEYOND SW4EU
BIG DATA ANALYTICS
DYNAMIC DATA SCIENTISTS
DEDICATED HADOOP CLUSTER
REAL-TIME EVENT RECOGNISTION
MACHINE LEARNING ALGORITHMS

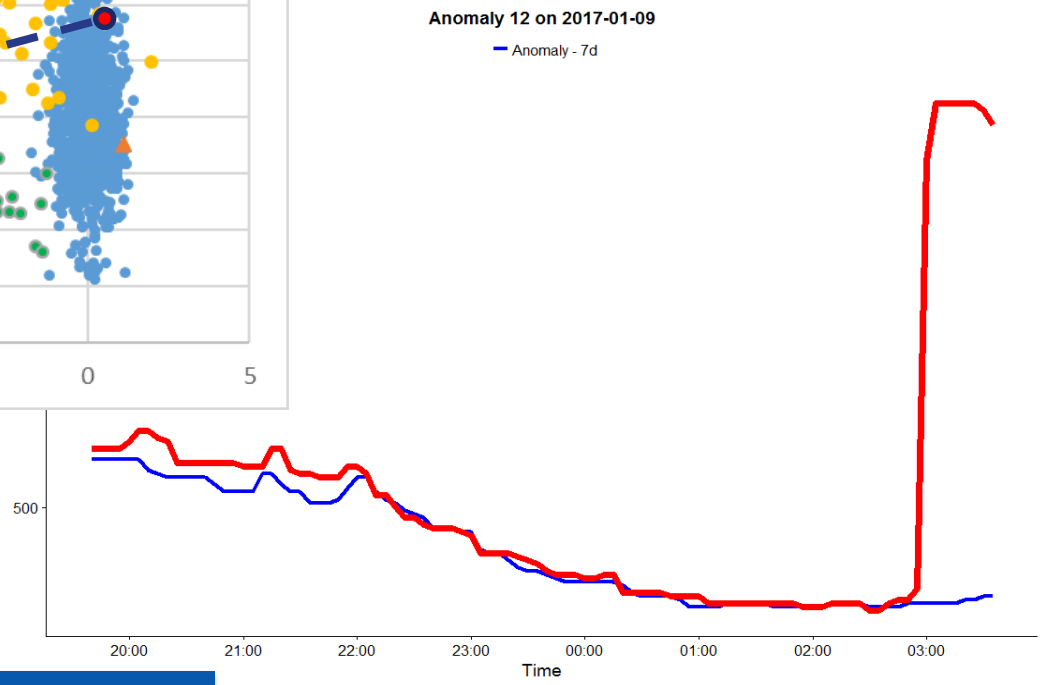


HADOOP CLUSTER WITH MAP-R CONFIG

Vitens


Night Demand Monitoring
100,00
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
0,00
Water usage (m3/h)
10 May 2016
29 June 2016
18 August 2016
7 October 2016
26 November 2016
15 January 2017
Date
NIGHT WATCH





PERSPECTIVE

AUTOMATIC ANOMALY DETECTION

Vitens

PERSPECTIVE

HIGH LEVEL OF WQ CONTROL FOR DAIRY FACTORY

Vitens

CONCLUSION

SW4EU: STRONG VISION, STEEP LEARNING CURVE

NEW OPPORTUNITIES ON THE HORIZON


Vitens
LAAT WATER VOOR JE WERKEN