Boosting process analytics at RHI Magnesita PI and Visual Computing

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RHI Magnesita at a glace

14,000
Employees spread over 40 countries

€2.7bn
2017 pro-forma revenue

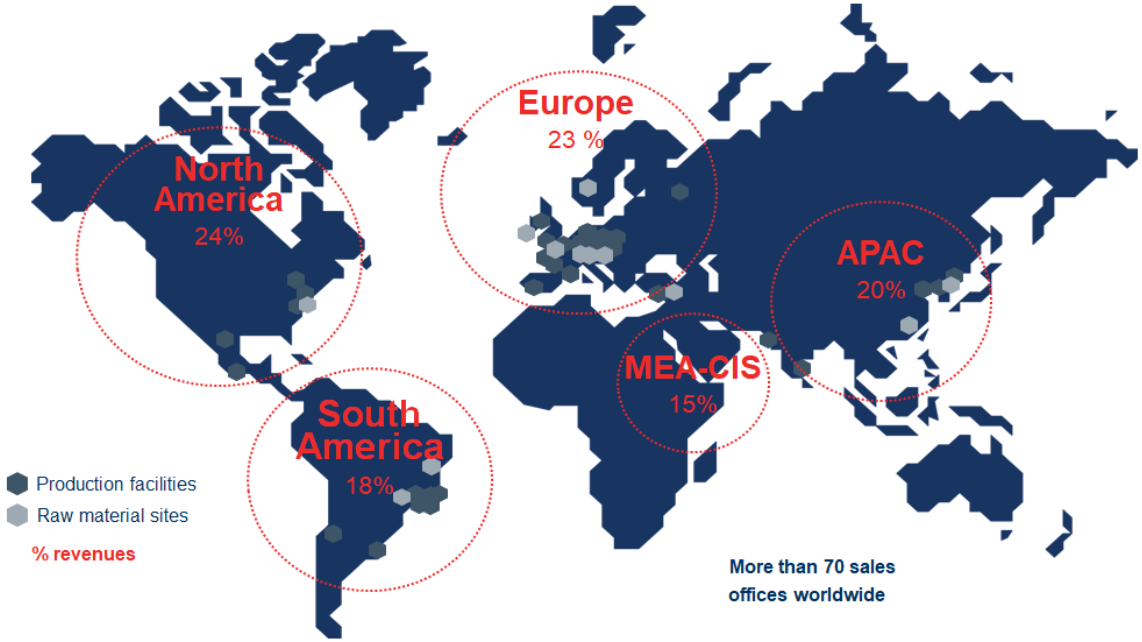
10,000
Customers served globally

35
Main production sites across 16 countries

180
Countries shipped Worldwide

10
Main raw material sites in 4 continents

€37m
Annual investment in Research



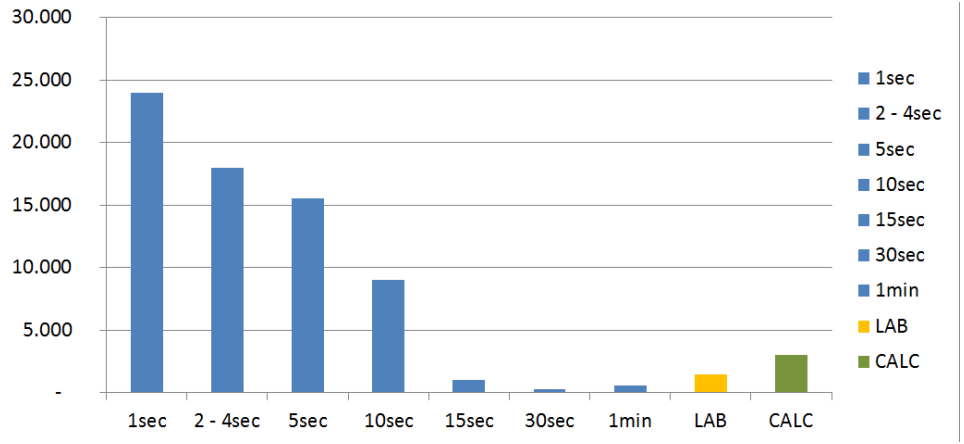
For what we use PI data ?

Track, analyze and understand current and historical process information and support the production process

- Availability of process data in real-time and historically
- Access to process data via the network and mobile
- Tool for production excellence (reporting, optimization projects, maintenance, quality, …)
- Additional “data source” for:
    - Predictive Maintenance with SAP PM
    - Operation-Reports in Microsoft BI
    - OEE Reporting

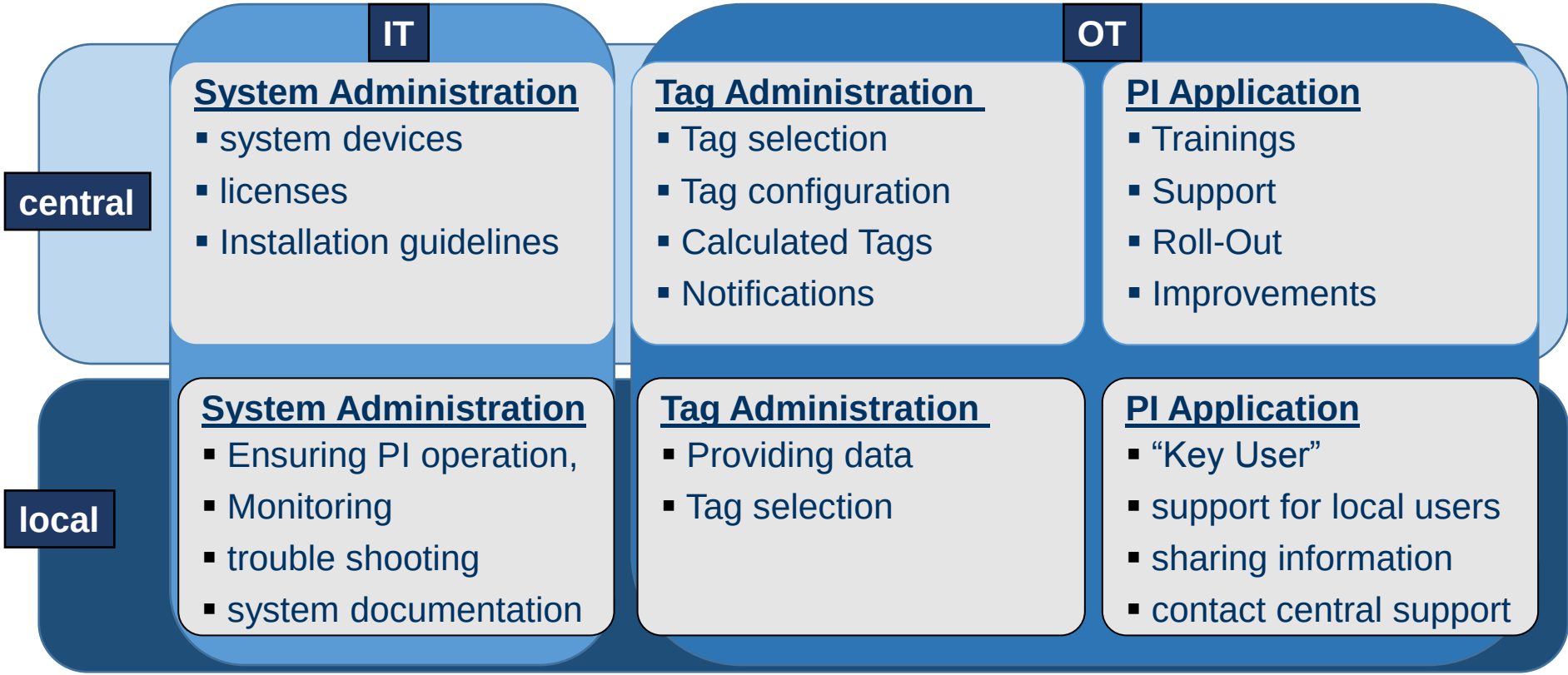
PI @ RHI Magnesita – Key figures

- 26 connected plants,
- > 450 connected main machines,
- ~ 70.000 PI-tags,
- One PI-Server in Vienna and one Dalian (CN)
- Synchronization the data from China to Vienna („PI – PI interface“)

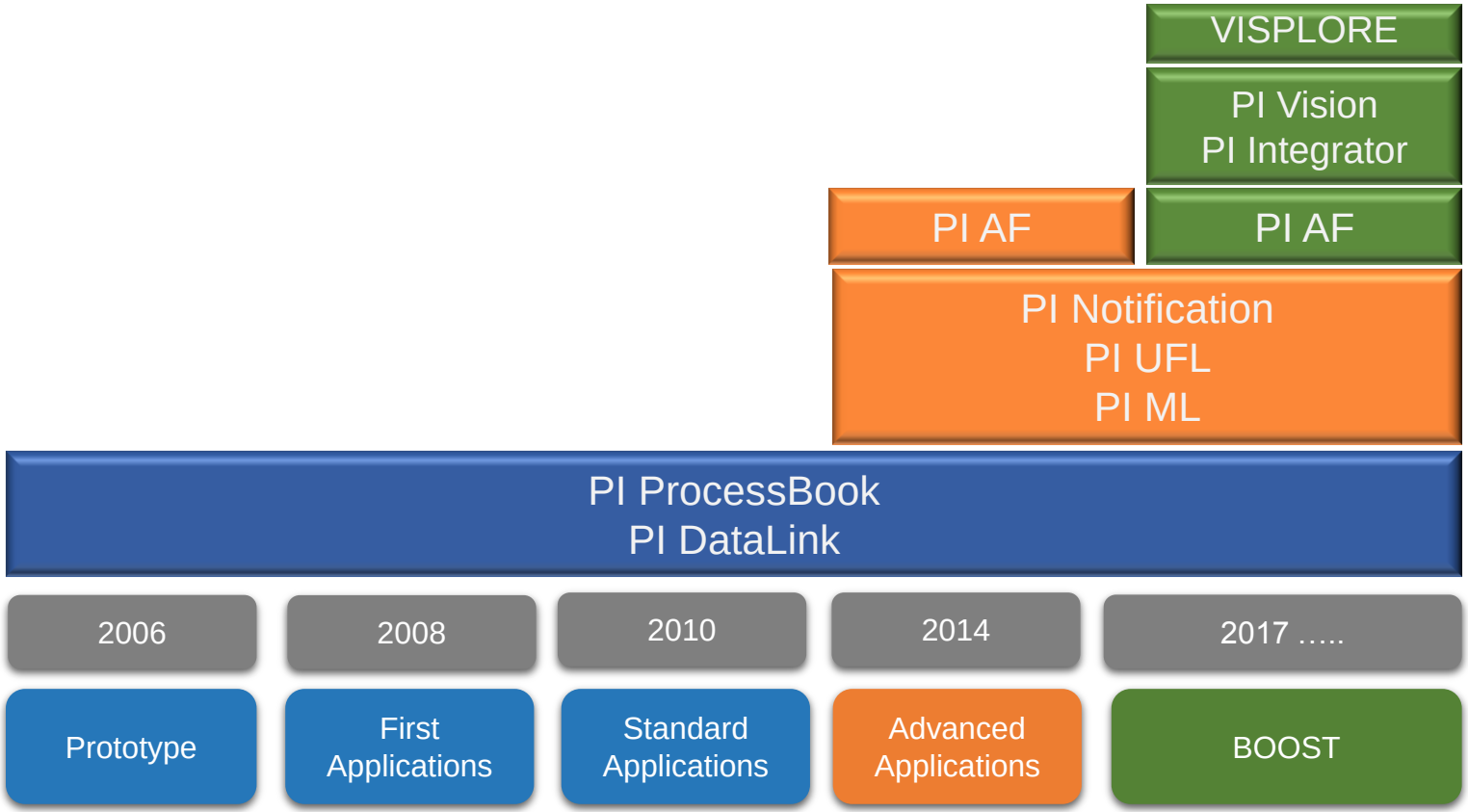


Key to our success: support structure

- Global & standardized

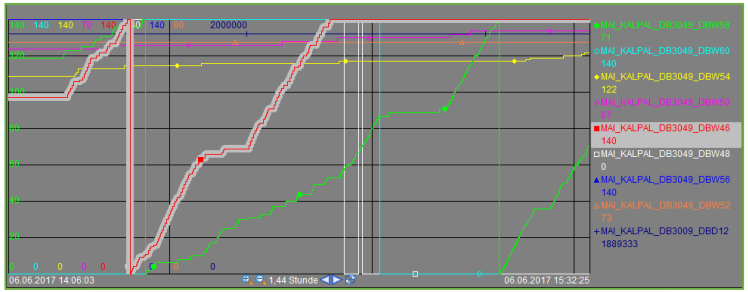


PI @ RHI Magnesita – let´s boost

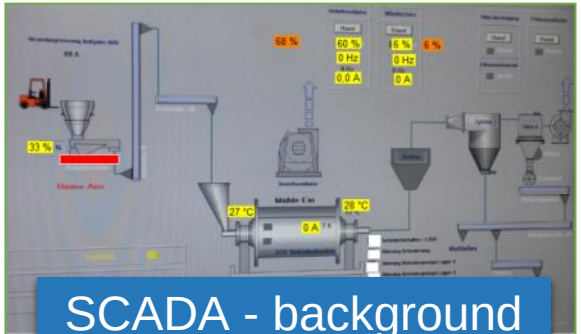


PI Tools - ProcessBook

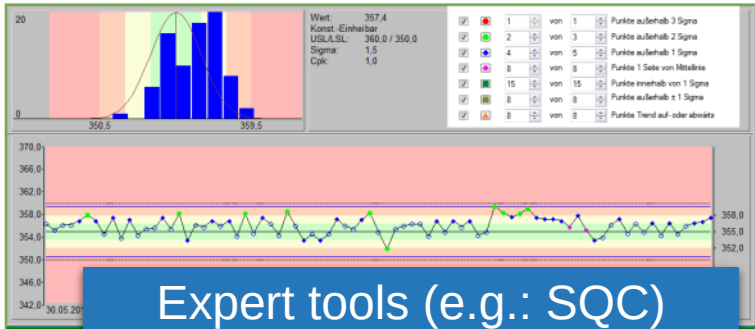
- “The truth is visible in Process Book” – always have a look on real trend of data
- Basis for all other analysis (quick check, tag selection, corrections and outliers)



Timeline of process data



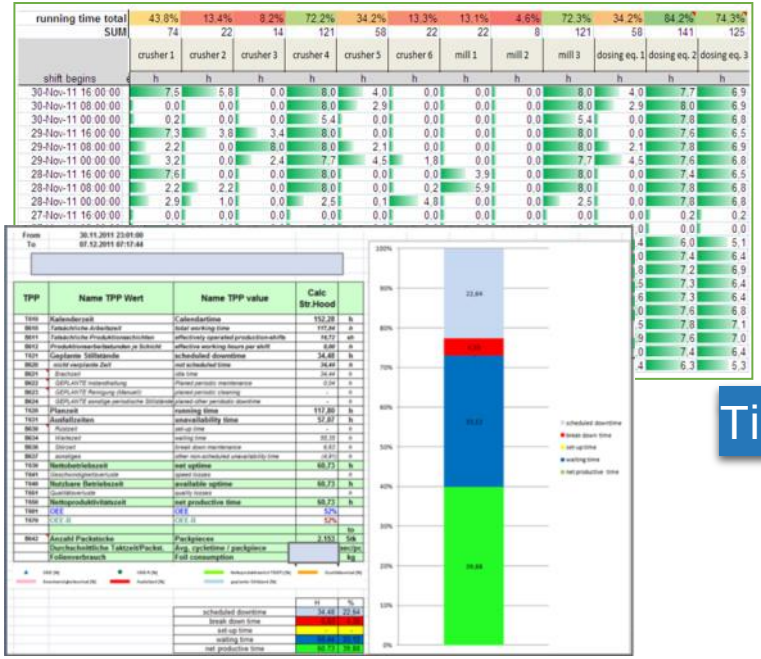
SCADA - background

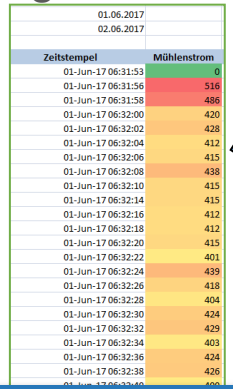


Expert tools (e.g.: SQC)

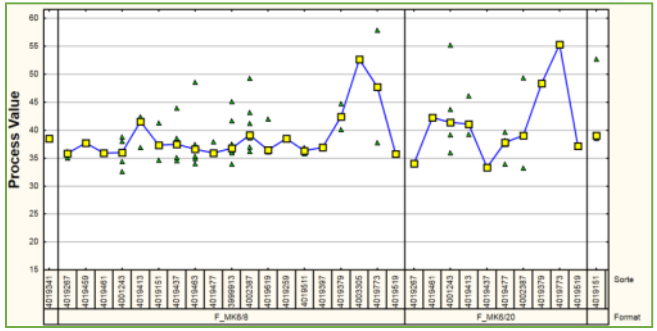
PI Tools - DataLink

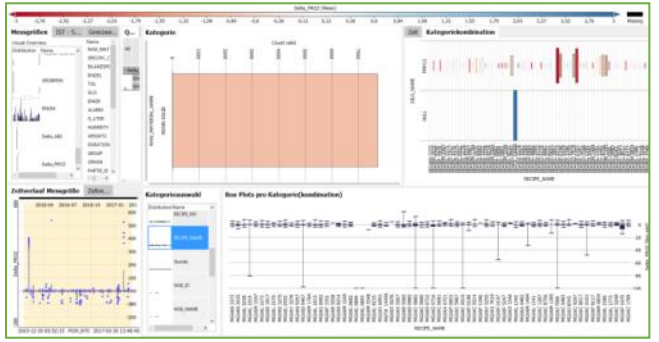
- Fast and powerful application of process data
- Interface to other standard analyzing tools





Timeline of process data



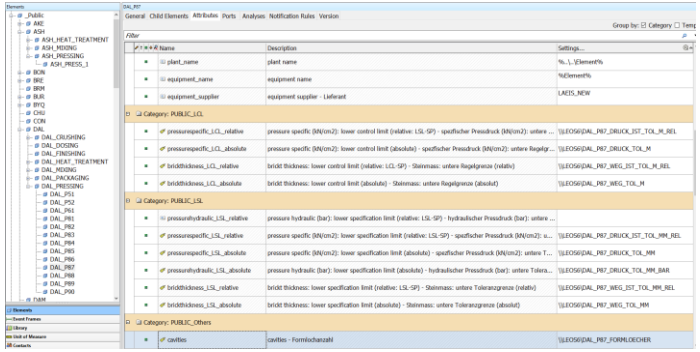


Excel-Reports

Expert Tools (Statistics, Visual Computing)

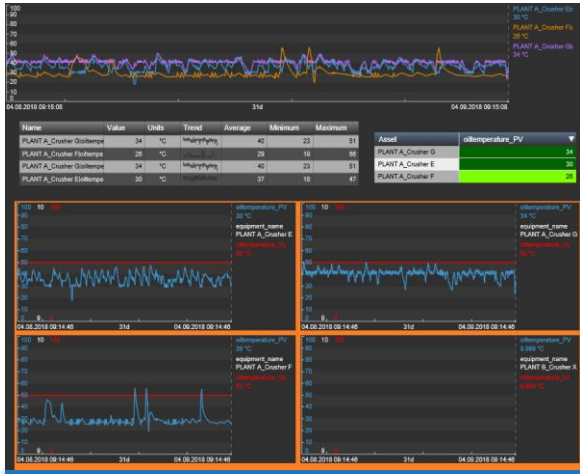
PI Tools – AF-Structure & PI Vision

- Much easier tag-search
- Standardization (names, KPIs, structure,…)



AF-structure

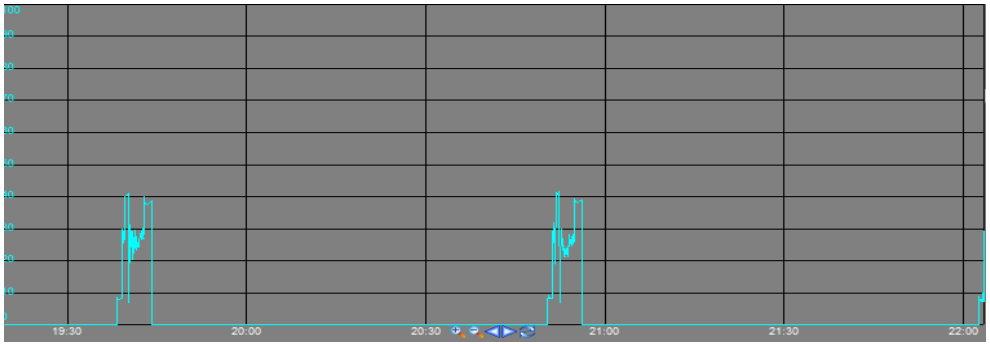
Notifications

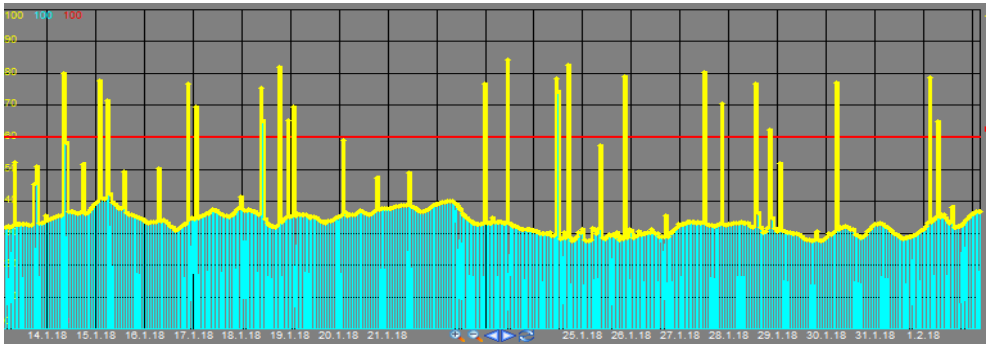


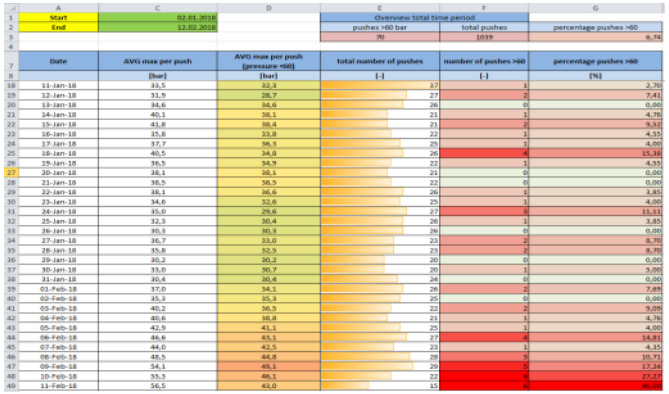
PI Vision

Example of standard application

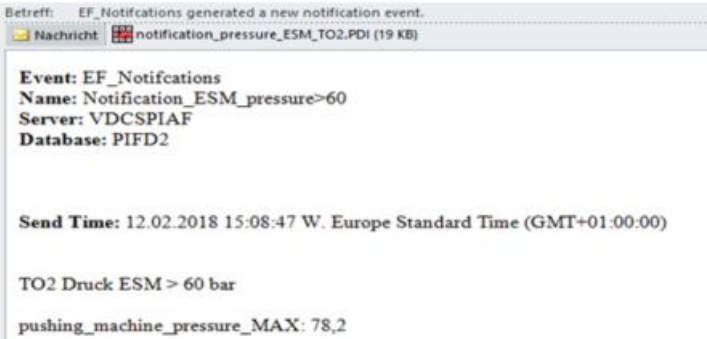
- One original PLC-tag → calculated tags → Notification → Excel Report







	A	C	D	E	F	G
1	Start	02.01.2018		Overview total time period		
2	End	12.02.2018		pushes >60 bar	total pushes	percentage pushes >60
3				70	1019	6,74
4						
7	Date	AVG max per push	AVG max per push (pressure >60)	total number of pushes	number of pushes >60	percentage pushes >60
8		[bar]	[bar]	[-]	[-]	[%]
18	11-Jan-18	33,5	32,3	37	1	2,70
19	12-Jan-18	31,9	28,7	27	2	7,41
20	13-Jan-18	34,6	34,6	26	0	0,00
21	14-Jan-18	40,1	38,1	21	1	4,76
22	15-Jan-18	41,8	38,4	21	2	9,52
23	16-Jan-18	35,8	33,8	22	1	4,55
24	17-Jan-18	37,7	36,3	25	1	4,00
25	18-Jan-18	40,5	34,8	26	4	15,38
26	19-Jan-18	36,5	34,9	22	1	4,55
27	20-Jan-18	38,1	38,1	21	0	0,00
28	21-Jan-18	38,5	38,5	22	0	0,00
29	22-Jan-18	38,1	36,6	26	1	3,85
30	23-Jan-18	34,6	32,6	25	1	4,00
31	24-Jan-18	35,0	29,6	27	3	11,11
32	25-Jan-18	32,3	30,4	26	1	3,85
33	26-Jan-18	35,3	30,3	26	0	0,00
34	27-Jan-18	36,7	33,0	23	2	8,70
35	28-Jan-18	35,8	32,5	23	2	8,70
36	29-Jan-18	30,2	30,2	20	0	0,00
37	30-Jan-18	33,0	30,7	20	1	5,00
38	31-Jan-18	30,4	30,4	24	0	0,00
39	01-Feb-18	37,0	34,1	28	2	7,69
40	02-Feb-18	35,3	35,3	25	0	0,00
41	03-Feb-18	40,2	36,5	22	2	9,09
42	04-Feb-18	40,6	38,4	21	1	4,76
43	05-Feb-18	42,9	41,1	25	1	4,00
44	06-Feb-18	46,6	43,1	27	4	14,81
45	07-Feb-18	44,0	42,5	23	1	4,35
46	08-Feb-18	48,5	44,8	28	3	10,71
47	09-Feb-18	54,1	49,1	29	5	17,24
48	10-Feb-18	55,3	46,1	22	5	22,73
49	11-Feb-18	56,5	43,0	15	3	20,00



Betreff: EF_Notifcations generated a new notification event.

Nachricht | notification_pressure_ESM_TO2.PDI (19 KB)

Event: EF_Notifcations
Name: Notification_ESM_pressure>60
Server: VDCSPIAF
Database: PIFD2

Send Time: 12.02.2018 15:08:47 W. Europe Standard Time (GMT+01:00:00)

TO2 Druck ESM > 60 bar

pushing_machine_pressure_MAX: 78,2

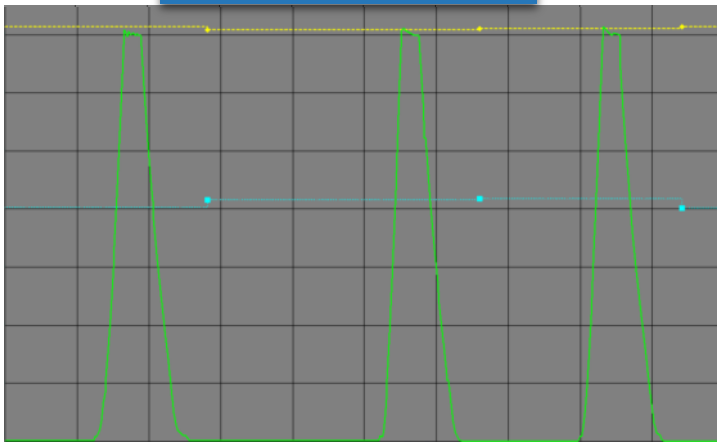
Example of standard application

- Longtime - perspective

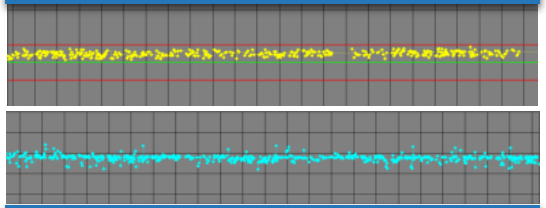
- Measures taken by the plant
- Clear improvement

Example of standard application

Live trend in Process Book



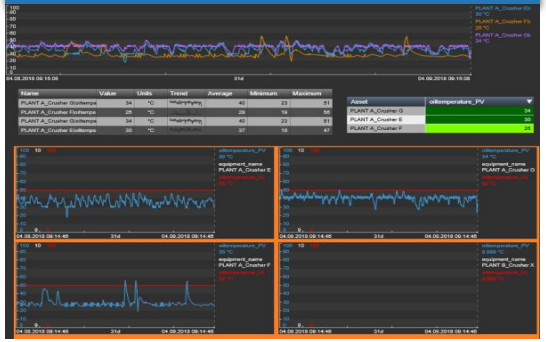
Calculated tags show the actual situation



Statistics (Excel functionality)

	2017-Q2	2017-Q3	2017-Q4	2018-Q1	2018-Q2
ok	96,2	97,5	98,8	99,6	99,8
P low	0,0	0,0	0,1	0,0	0,0
P high	3,6	2,2	1,1	0,3	0,2
T low	0,2	0,3	0,0	0,1	0,1

Improved Visualisation in PI Vision

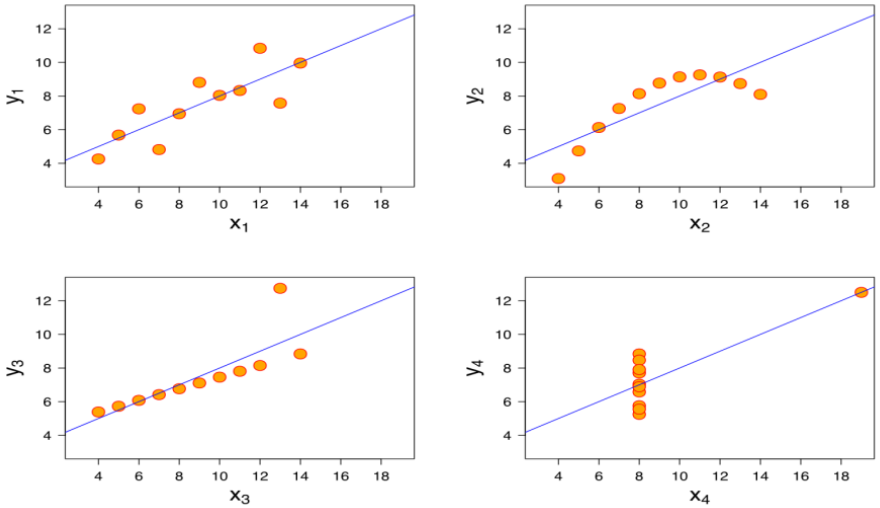


What´s about:

- Advanced statistics (per categories)
- Outliers
- Benchmarking
- Longtime
- …

Visual Computing – enlighten the data

- What have these data series in common?



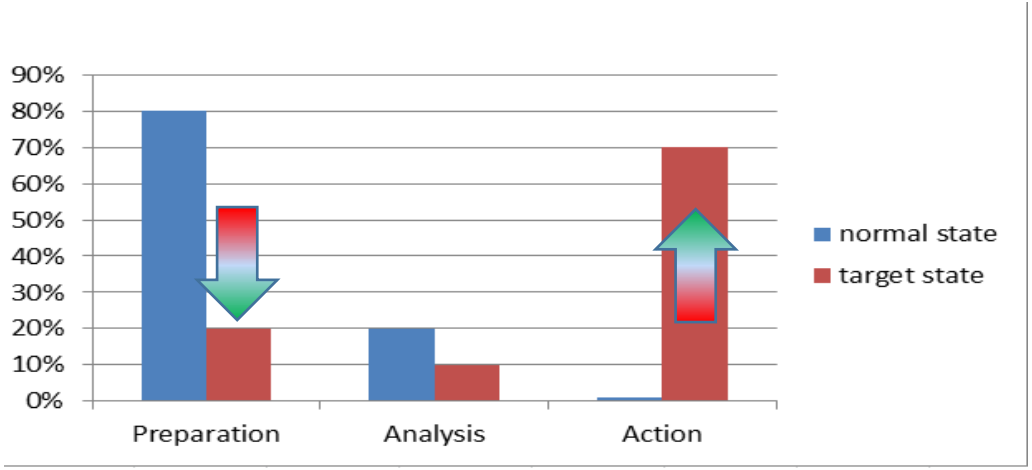
https://de.wikipedia.org/wiki/Anscombe-Quartett

linear regression	4997x + 3,0025	
linear correlation	0,67	
	X	**Y**
AVG	9,0	7,5
STDEV	3,32	2,03

Human intuition and creativity are essential

Visual Computing – speed up the analysis

- Ask the expert and you will here… it takes time

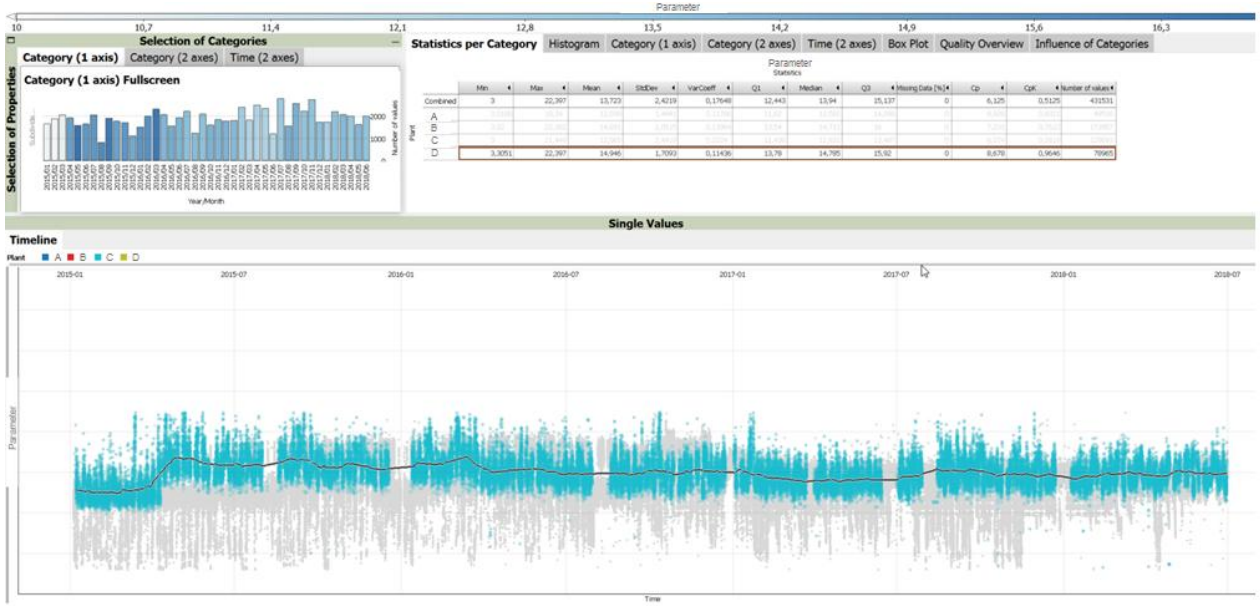


Intelligent interfaces and programs easy to use

- Time for analysis
- Quantity of data
- Quality of data
- Number of KPI

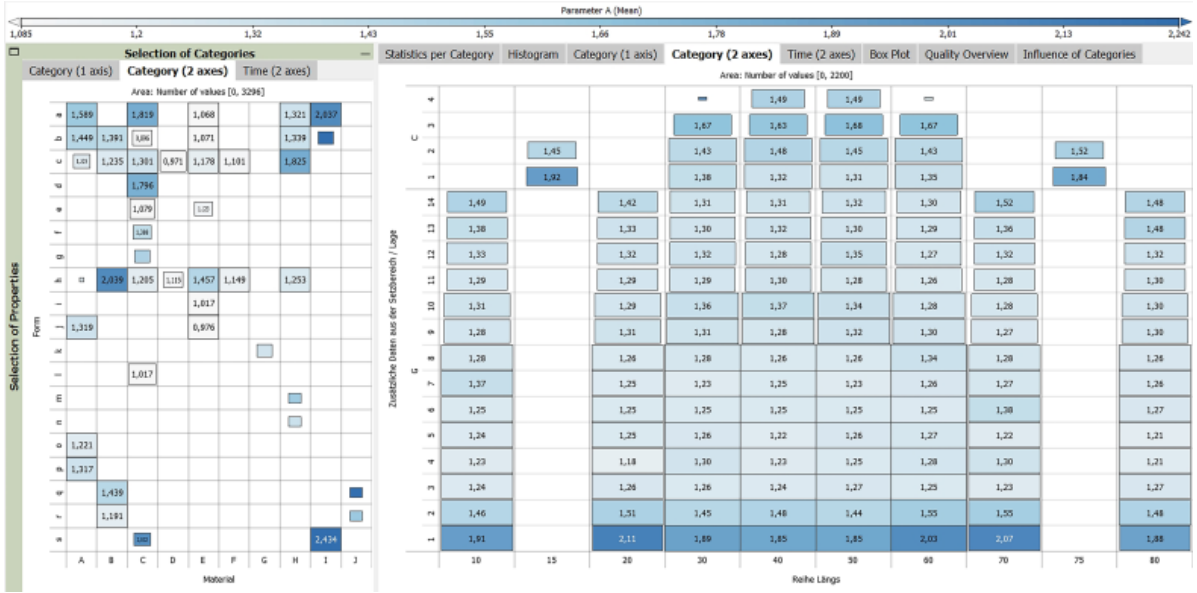
Example of Visual Computing

- Longtime - statistics and benchmarking



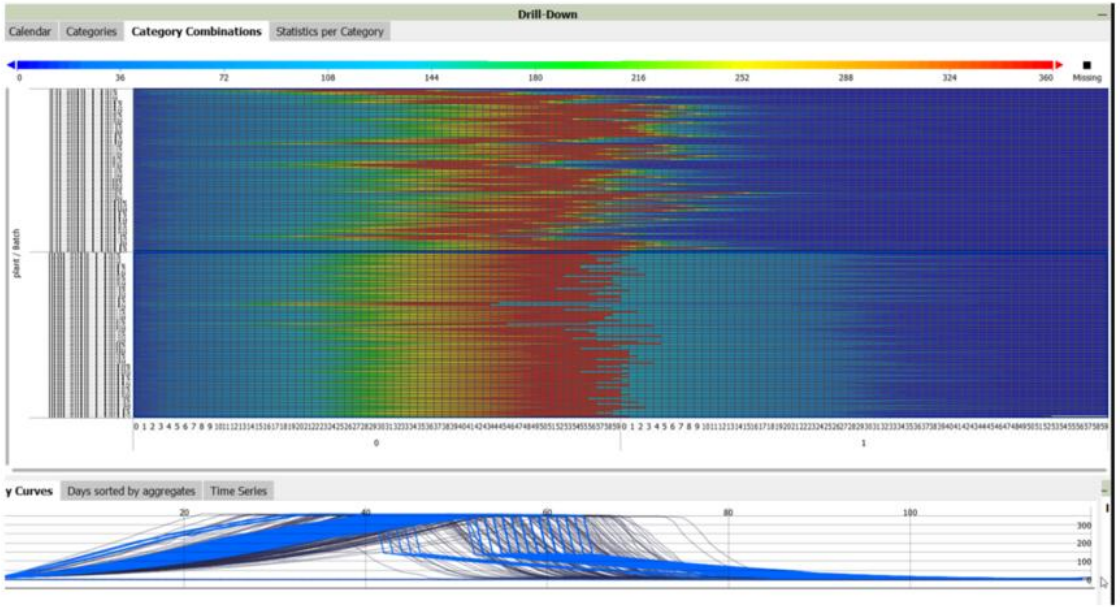
Example of Visual Computing

- Comparison of categories



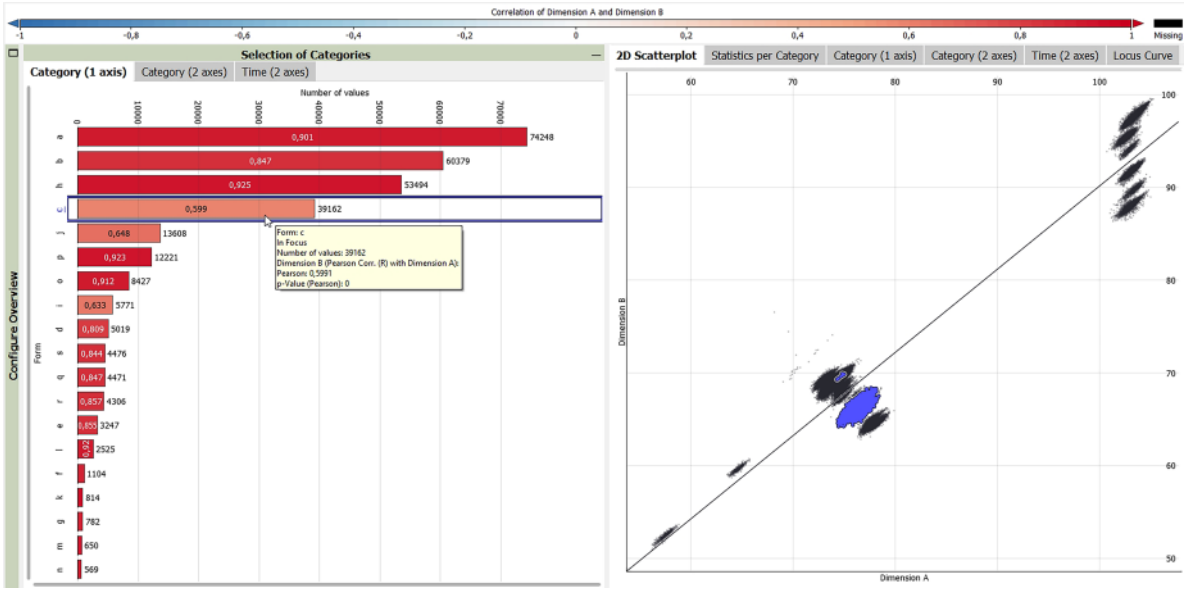
Example of Visual Computing

- Longtime - Batch comparison



Example of Visual Computing

- Complex correlation analysis



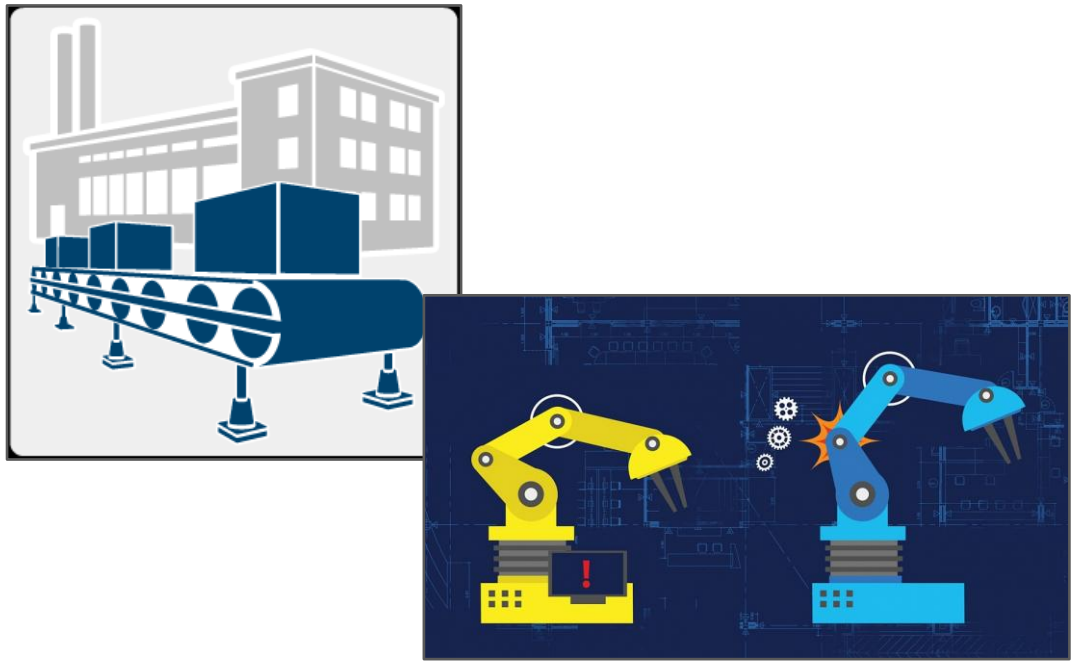
Competence in Visual Analytics

- Austria's leading center for Visual Computing
- Focus: joint R+D projects with the industry
- ~ 70 employees

Our goal: Empowering YOU for Enhancement

… by comprehensive knowledge of your process data

- Process optimization
- Fault detection
- Predictive models



Visplore: Software for process data analytics

Analytical visual tool suite

… for process experts, R&D engineers, data scientists

Deeper than BI, simpler than statistics software

- **Easy**: pre-configured, task-tailored, linked views
- **Efficient**: from overview to details in milliseconds
- **Dynamic**: Delay-free feedback for millions of values
- **Flexible**: Comprehensive export and scripting options

Use Case Example: Batch Production

- Compare process parameter of batches from four plants
- Trace trends of user-defined KPIs per batch

Data Dashboard Workflows Help

Import data...

Choose Dashboard

- Properties as Columns
  - Property Analysis
  - Correlation Analysis
  - Quality Analysis
  - Batch Analysis
  - Regression
  - Regression Comparison
- Properties as Categories
- Time Series Analysis
  - Pivotization
  - Structure Analysis
  - Dependencies
  - Forecast Quality
  - Forecast Comparison

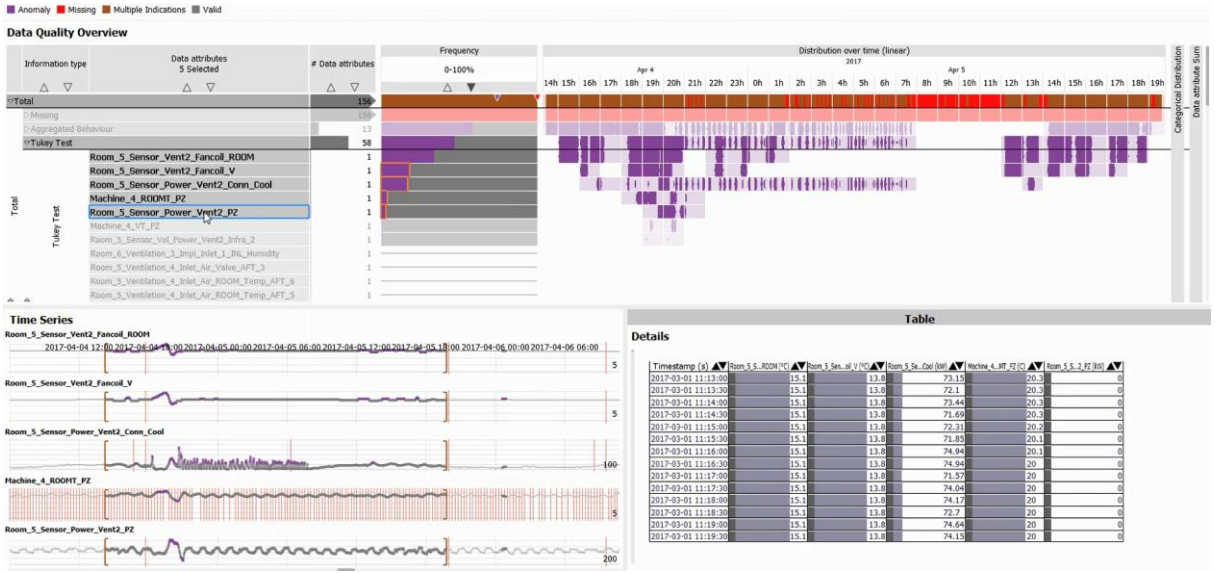
Quality Analysis: This dashboard provides an overview of the distribution of data quality problems. Different diagrams enable to effectively capture the distribution of problems regarding temporal or categorical aspects and to check them efficiently in detail.

Focus: **All**

Values: 526; in focus: 526 (100.00 %); Highlighted: 0

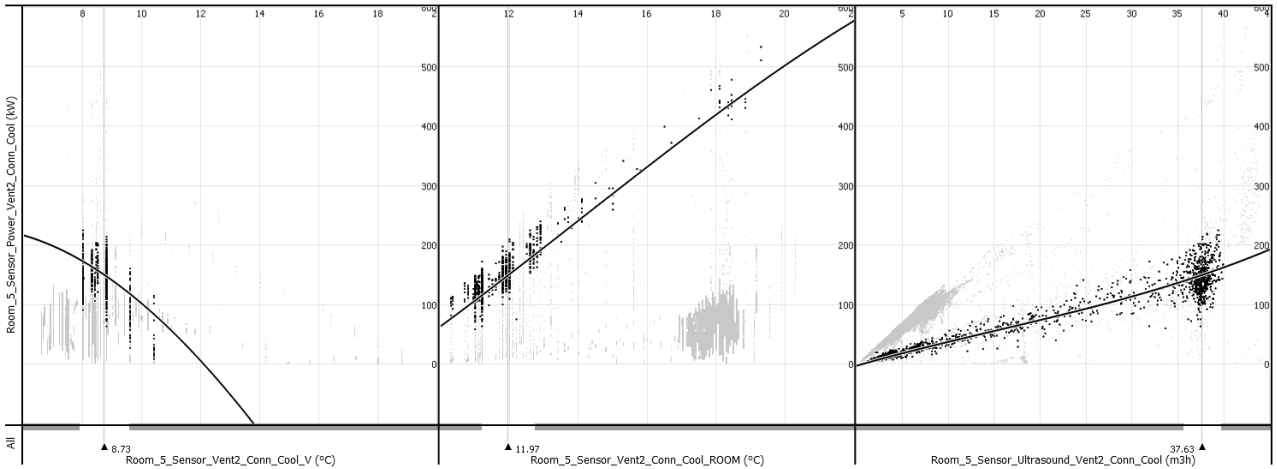
Use Cases: Data Quality

- Find gaps and data quality problems
- Cleanse time series



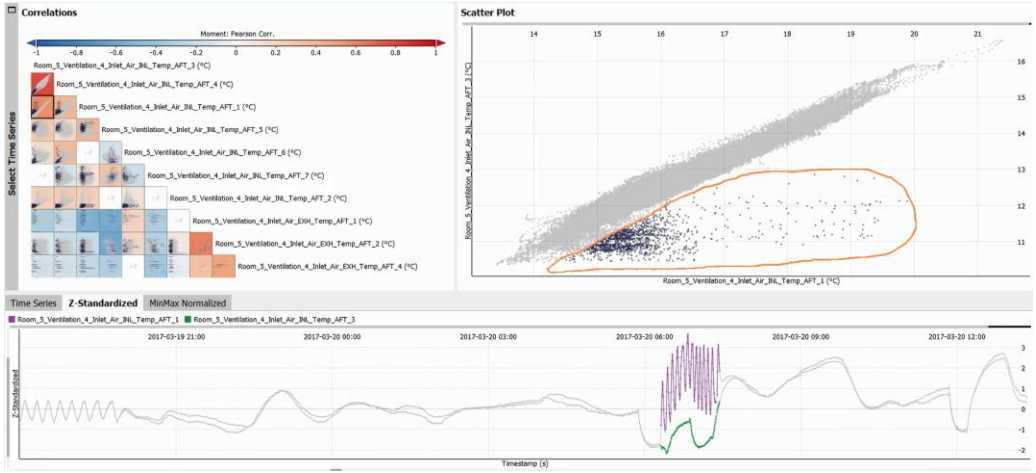
Use Cases: Model Quality

- Discover correlations between sensors
- Identify dependencies and model sensitivities
- Optimize automated checks for fault detection



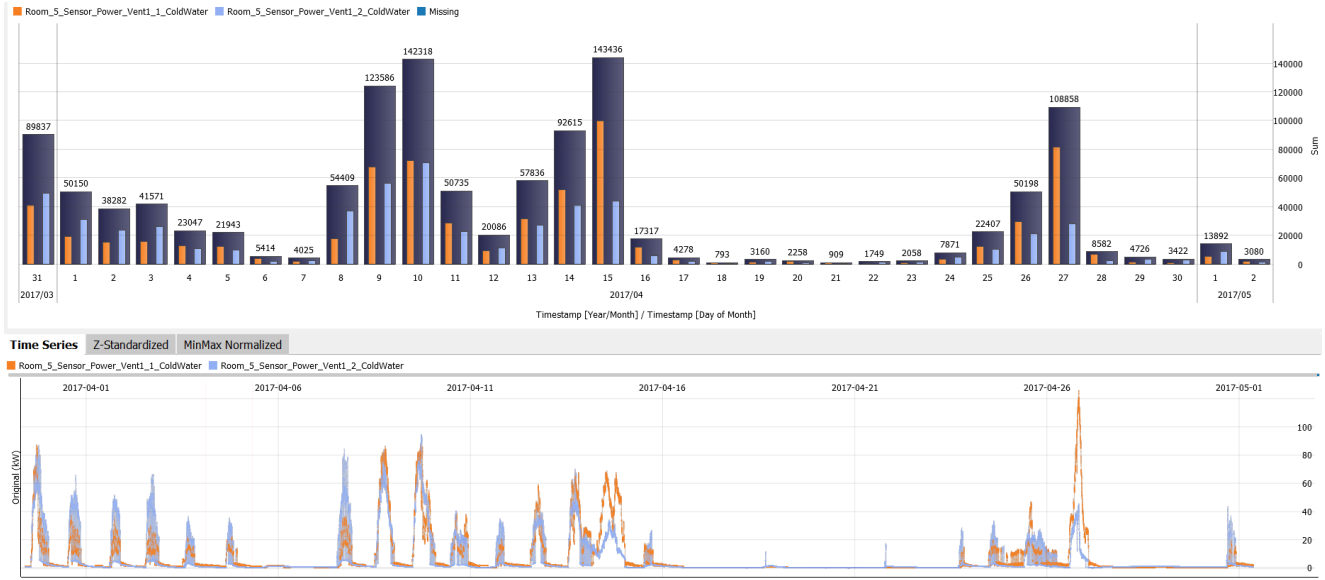
Use Cases: Process Quality

- Discover anomalies and understand their root cause
- Compare recurrent patterns (batches, machinery health)
- Recognize the distribution of faults and alerts



Use Cases: Reporting

- Define summaries and pivot tables
- Copy&paste to Excel or other tools



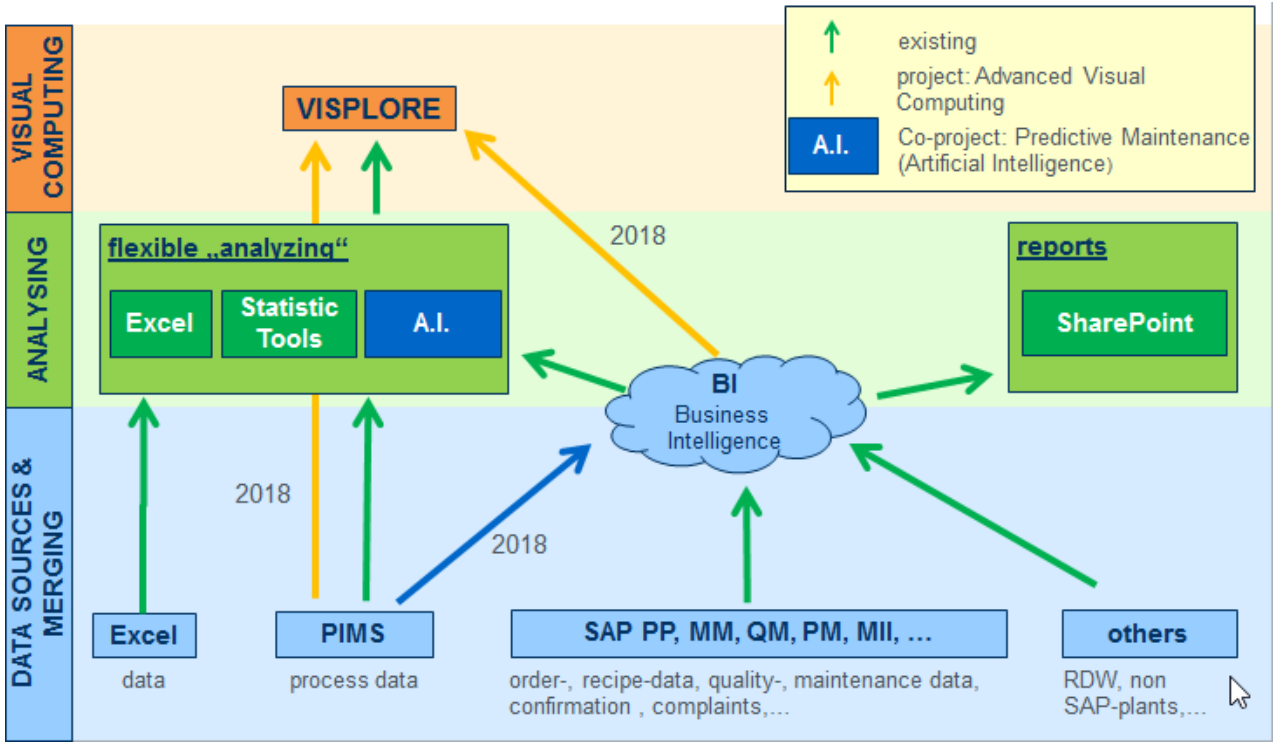
Benefits

- **Save time** of experts for data exploration and preparation
- **Identify unexpected opportunities** for improvement
- **Improve models** and fault detection
- **Simplify communication** and training

Visplore: Status

- **Pre-product phase**
  - RHI Magnesita early adopter and application partner
  - Planned go to market Q2/2019
- **PI System integration development in progress**
  - Efficient searching and loading of data from PI System
- **OSIsoft partnership approval process in progress**

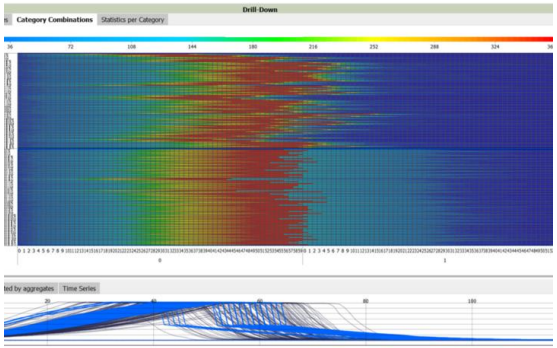
Data Flow PIMS / BI / VISPLORE



2018 also
PI → Excel and BI
with PI Intregator

RHI Magnesita

Boosting process analytics with PI and Visual Computing



CHALLENGE

Full potential of process data is not exploited because too time-consuming and too complicated

- Where to look at?
  - >450 main equipment in PI
  - Structured analysis
- Process expert or data scientist
  - Central analysis & reports
  - Missing tool between BI and Statistic Program

SOLUTION

Tools for process experts and data scientists - combine human intuition with data & algorithms

- central initiative
- New OSISoft - tools like PI Integrator and PI Vision
- Innovative ways for analyzing and reports: BI and VISPLORE

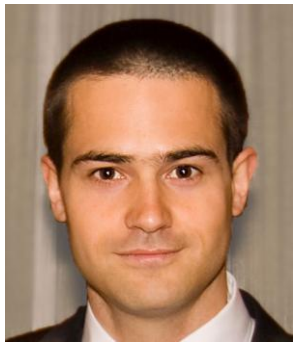
RESULTS

Save expert time, increase data usage, find potentials for optimization

- Advanced analytics for everyone
- Higher process stability
- Optimization of processes (e.g.: energy reduction in a plant of 400.000€/a)

Contacts

- Thomas REITERER
- Head of R&D Processtechnology
- RHI MAGNESITA
- Thomas.reiterer@rhimagnesita.com



- Harald PIRINGER
- Head of Visual Analysis Group
- VRVis GmbH
- piringer@vrvis.at

Questions?

Please wait for the **microphone**

State your **name & company**

Please rate this session in the mobile app!