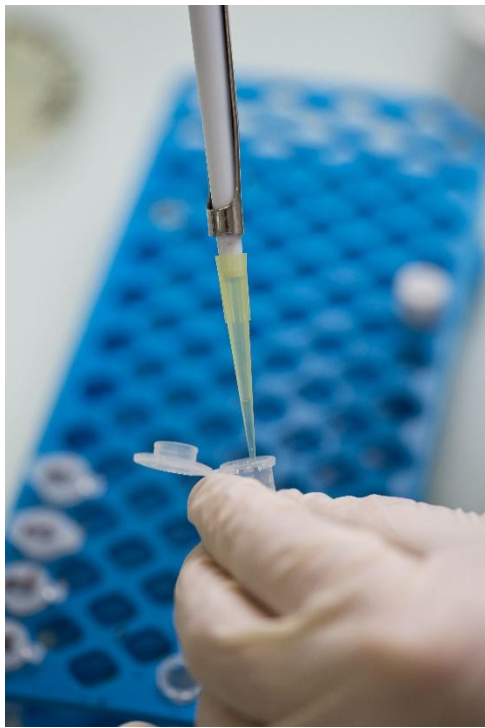


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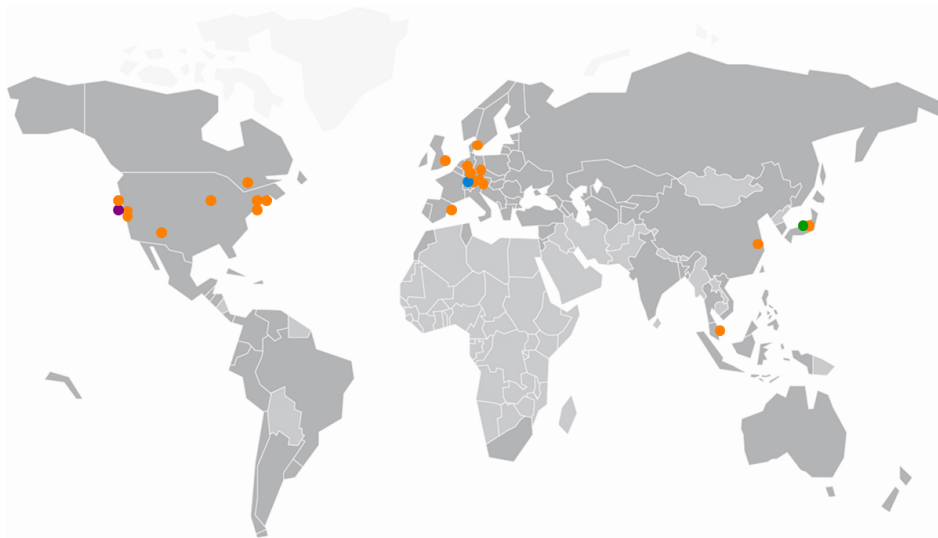
# F. Hoffmann-La Roche

*Uwe Kritzler, Thorsten Ulbricht, Philipp Sutter Oct 18<sup>th</sup> 2017*



# Roche Overview

# Roche - a global pioneer in pharmaceuticals and diagnostics



**94 052** employees\* worldwide

**22** major R&D sites in pharma and diagnostics worldwide

**CHF 9.9** billion invested in innovative R&D

**CHF 50.6** billion sales

- Direct Roche commercial presence
- Commercial distributors

● Roche Group Headquarters in Basel, Switzerland

● R&D sites in Pharma and Diagnostics

● Genentech, R&D and commercial operations US

● Chugai, R&D and commercial operations Japan

\* Employee numbers in FTE (full time equivalent)

# Advancing science to improve people's lives since 1896

*Focused on innovative tests and medicines*

## History of firsts since 1896



Digalen (heart tonic) – Synthesized  
 Vitamin C – Librium, Valium  
 (Benzodiazepines, CNS) – CobasBio  
 Diagnostics product – Rocephin  
 (antibiotics) – AccuCheck (diabetes  
 care) – Invirase (AIDS) – Pegasys (Hep  
 C) – Herceptin, Avastin (Monoclonal  
 antibodies, cancer) – Actemra (Arthritis)  
 – HPV-testing – **more...**

## Industry-leading pipeline



**74** new molecular entities  
 in 2016

**9** Next generation diagnostics  
 instruments launched in 2016

## Portfolio along full cycle of care



**Prevention** **Diagnosis**  
**Treatment** **Monitoring**

Blood Screening – Cardiology – Clinical  
 Chemistry – Diabetes Care –  
 Immunology – Immunotherapy –  
 Neuroscience – Oncology –  
 Ophthalmology – Point of Care  
 Testing – Tissue Diagnostics – Virology

# The world needs better ways to prevent, diagnose and treat disease

*14.5 million*

will die from cancer every year by 2035



*80%*

of global disease burden will be due to NCDs (non-communicable diseases) by 2020

*2/3*

of all diseases are either still not treated adequately or not treated at all

Cervical Cancer –  
*nearly 100%*

avoidable due to advances in HPV screening, diagnosis, treatment & vaccination



*10-15 years* and

*5,000+* set backs to develop one drug

## Our lasting impact on society

*Improving lives – today and tomorrow*



*27 million*

patients treated with top 25 products

*127.5 million*

patients treated with now off-patent products

*17+ billion*

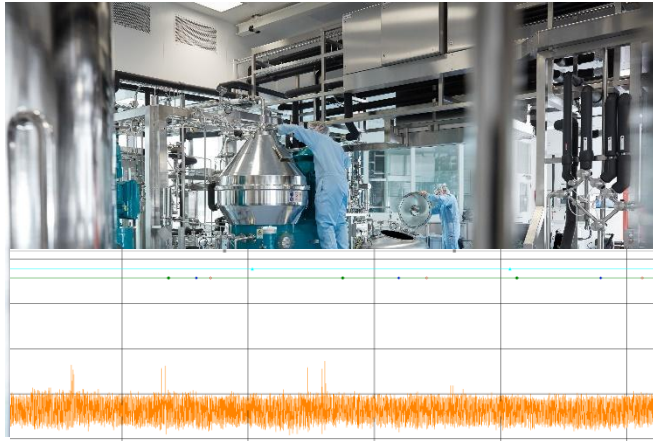
tests conducted with Roche instruments

*30 Roche medicines*

Listed on the WHO Essential Medicines List

*8 years in a row*

ranked as most sustainable healthcare company by Dow Jones Sustainability Indices



# PI System usage @ Roche

# PI System locations

*OSIsoft PI System is used since around 2000 in no standardized way*

- around 1 million Tags
- mixture of components
- each site has an own history
- PI ProcessBook & PI Vision (some)



\* To be phased out or divested



Roche has a majority stake in Chugai Pharmaceuticals, Japan

Not included on graph: well-established contract manufacturing organization (CMOs) network

■ Small Molecules

■ Biologics



# PI System roadmap (focus areas)

*PI System roadmap was developed within 2 regional workshops*

Theme	Benefit	Approach
PI System Architecture	Standardized on architecture	1 – Guideline 2 – Standardize Installations over time
Visualization	Migrate to PI Vision	1 – Training & Guideline development 2 – active best practices sharing
PI AF/EF	Map data & enable data retrieval	1 – Develop Modell standard 2 – Install global PI System installation

# The flexible Roche Lab Building B098 in Basel

---



# Roche in Basel

*pRED Center & B098 (2023)*

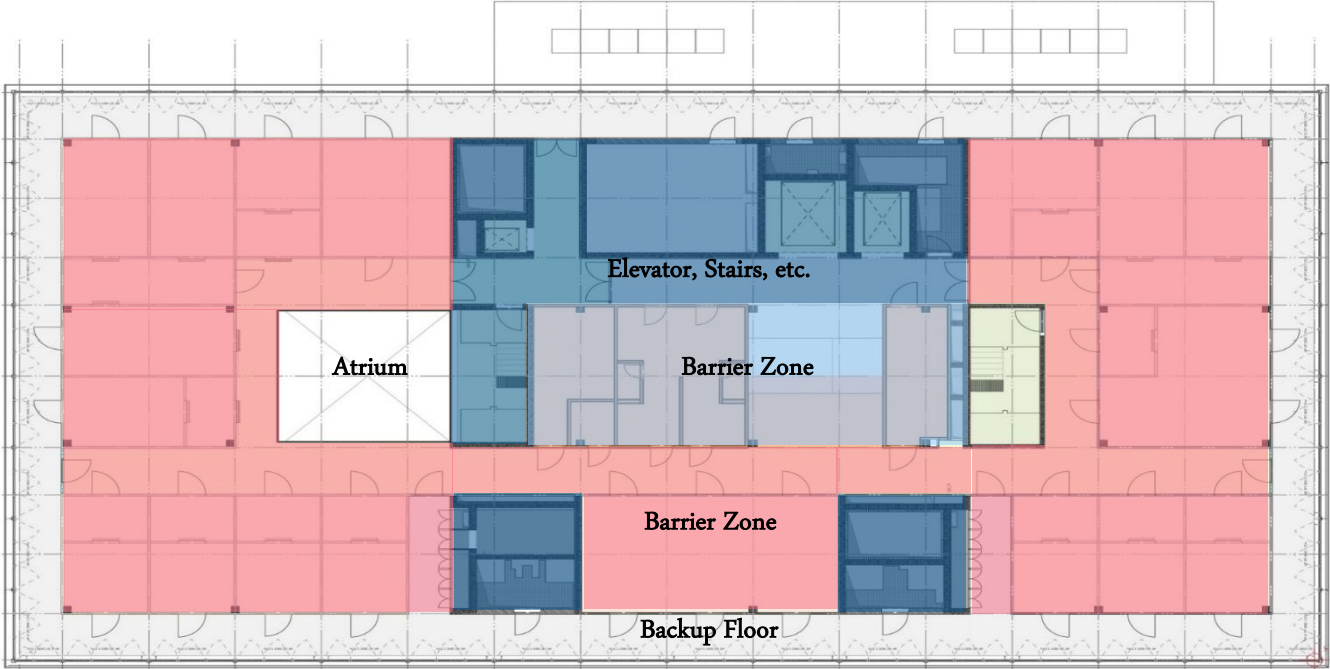


# B098 Project Visualization

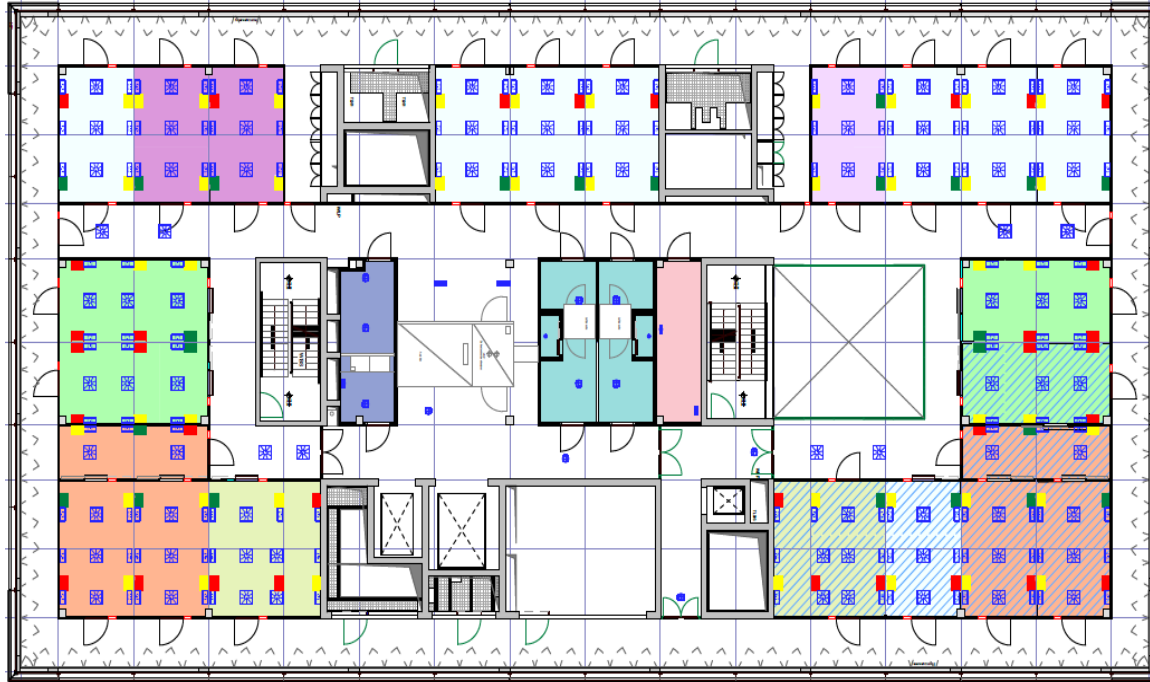




# Generic floor plan



# Flexibility / modularity



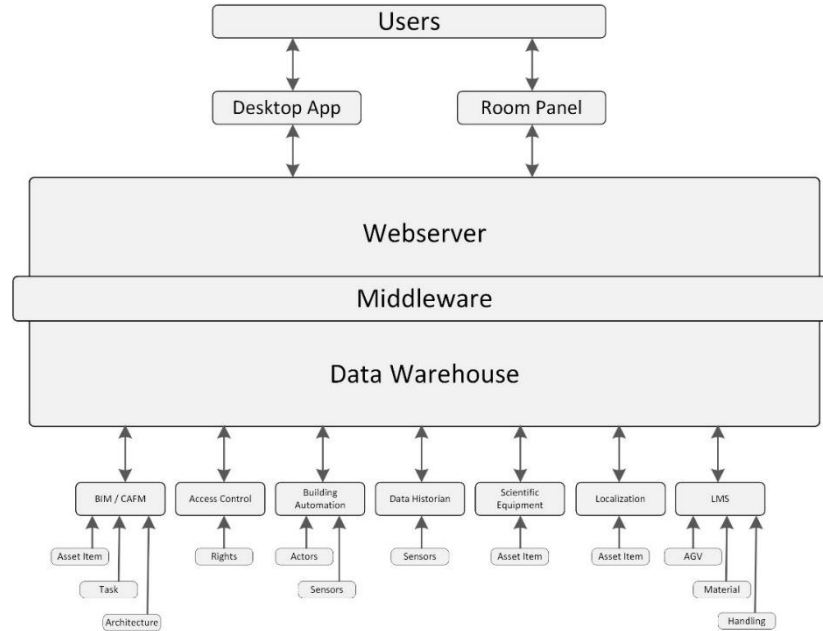
Smallest possible  
subdivision



Largest single  
rooms

# Logical system architecture

## *Architectural overview*



# IT mockup



*Architectural mockup of three lab rooms, Q1 2017 – Q2 2018*



Testing of all requirements before completion of the building

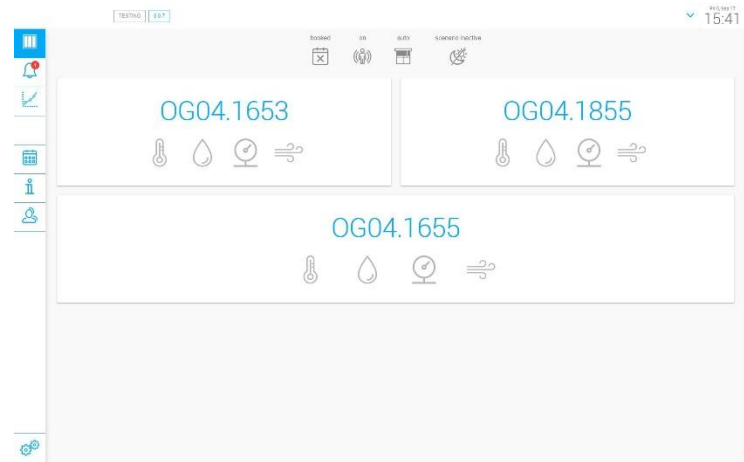


# B098 Room Panel

## *Test installation in the IT mockup*

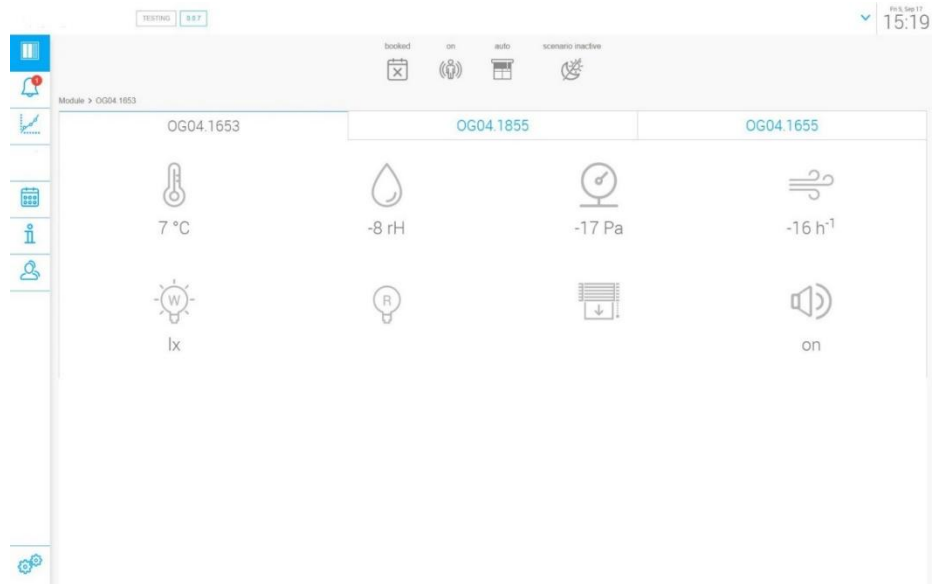


- Fully functional and access controlled room panel (light, stores, air flow, ...) at the entrance of lab rooms
- During project: complete functional tests of building control via room panels will be possible

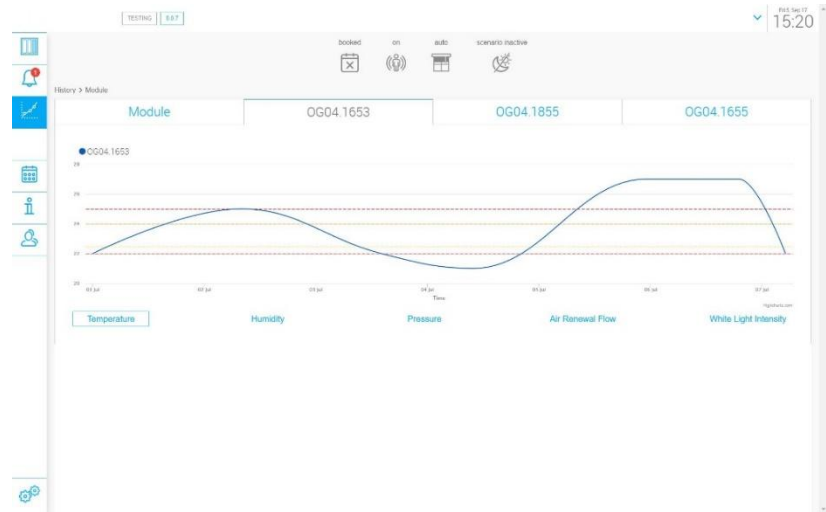


# B098 Room Panel

## *Detailed View*

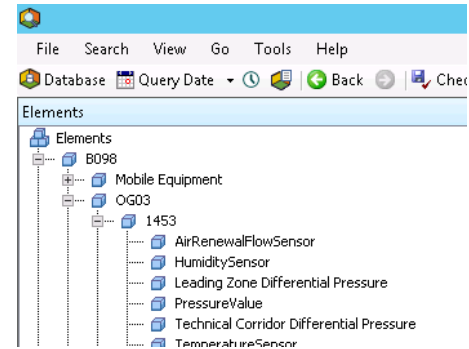


# B098 Room Panel Detailed View



# PI AF / Event Frames

## PI Web API



# The Building Model in PI AF

The Building, Requirements:

- Floors with zones, but no rooms
- Modules/Rooms created as needed
- Monitoring data for each room
  - Temperature
  - Humidity
  - Differential Pressure
  - Etc.

The PI AF Element Structure:

- Building
  - Floor



- Sensors..
  - » MVs
  - » Alarms...

# The Building Model in PI AF

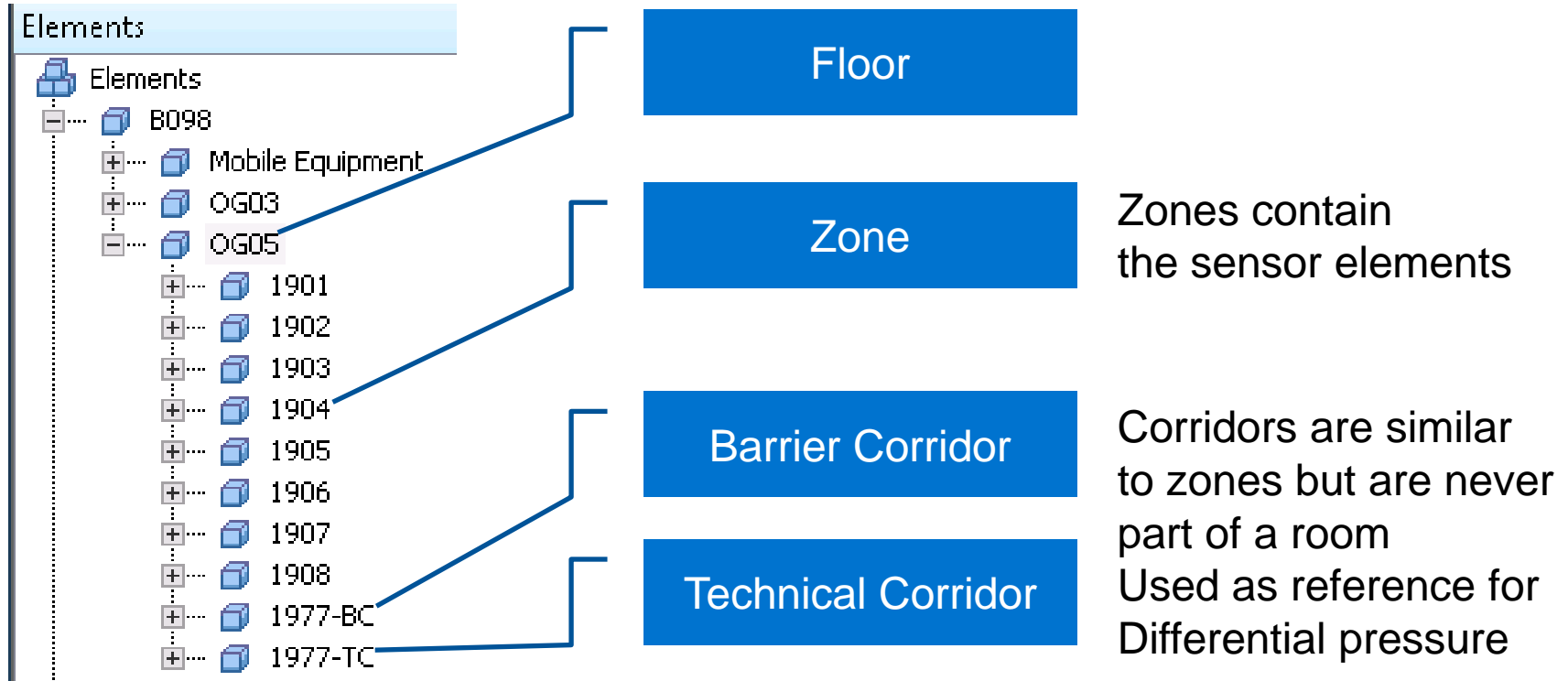
## The Building

- Zones contain all the sensors
- Zones can be temporarily combined to Rooms, and rooms into Modules
- Only one (leading) zone per room is relevant for data historization

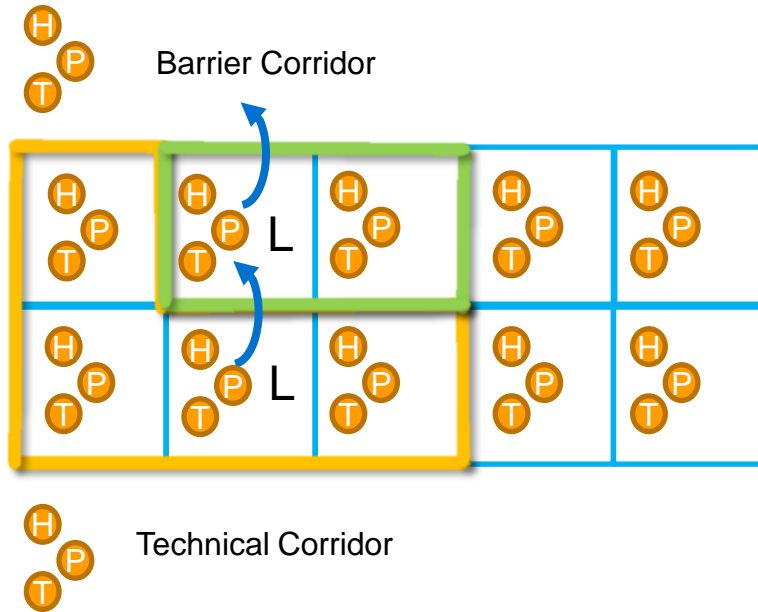
## The PI AF Model

- Zones as Elements in PI AF
- Rooms as Event Frames
  - References to zone elements
  - Leading zone = primary reference
- Module = Top Level Event Frame, Room = Child EF

# PI AF Structure and Zone element



# Differential Pressure Calculation



- Sensors in all zones
- Module
  - Anteroom
  - Main Room
- Each room has a leading zone
- Differential pressure:
  - Main → Anteroom
  - Ante → Barrier Corridor



# Differential Pressure calculation

Leading Zone  
Main Room

No analyses in event frames...

Leading Zone  
Anteroom

Category	Property	Value
Alarm	Alarm	WarnLow
Configuration	SensorCode	PD
Configuration	SensorTa...	B098.OG05.Z1901.PD.
Configuration	ZoneMinus	1904
Configuration	ZonePlus	1901
Measured Value	Value	1 Pa
Measured Value	ValueMinus	7 Pa
Measured Value	ValuePlus	7 Pa

Category	Property	Value
Alarm	Alarm	WarnLow
Configuration	SensorCode	PD
Configuration	SensorTa...	B098.OG05.Z1904.PD.
Configuration	ZoneMinus	1977-BC
Configuration	ZonePlus	1904
Measured Value	Value	1 Pa
Measured Value	ValueMinus	6 Pa
Measured Value	ValuePlus	7 Pa

Myself

Anteroom  
Leading Zone

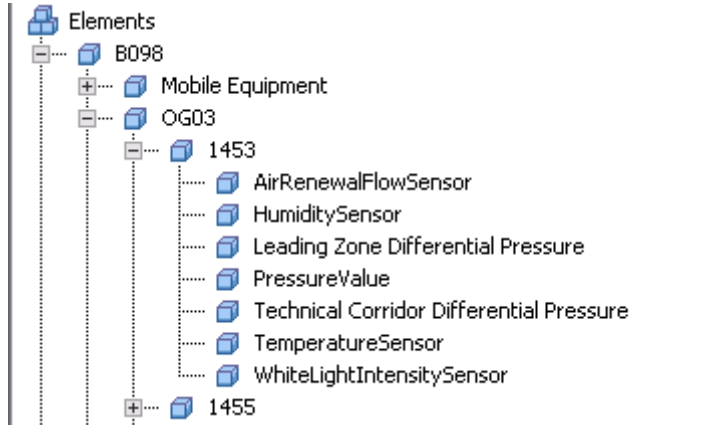
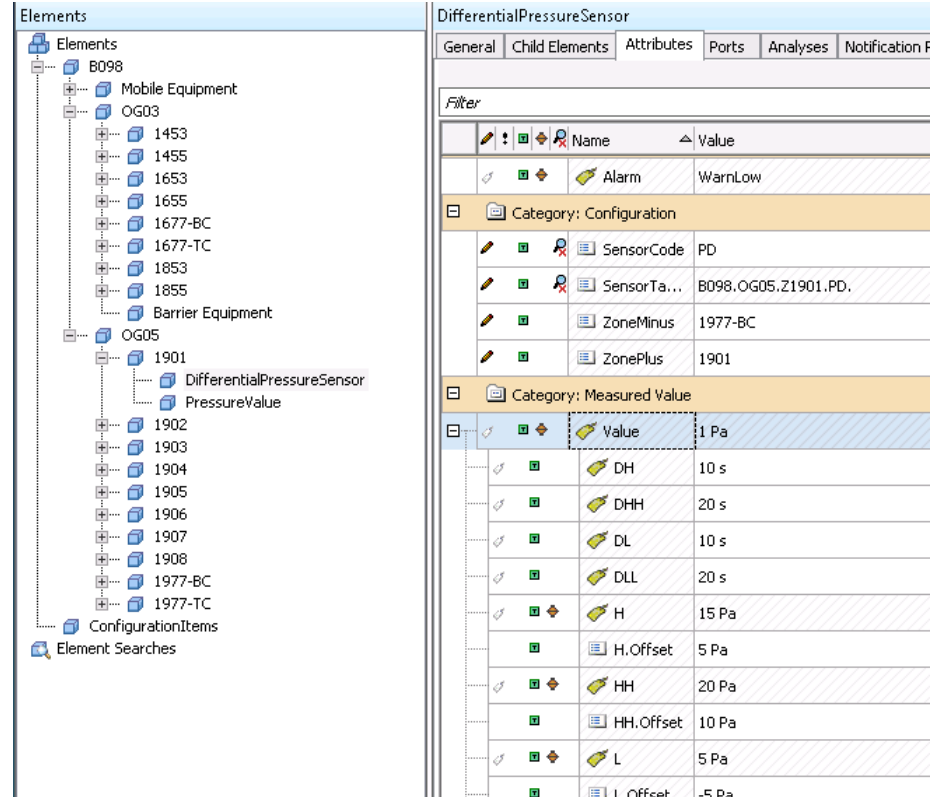
Myself

Barrier Corridor  
Zone

# Sensors and Alarming

All sensors can create alarms

- Delay times
- Setpoint + offsets to alarm limits

Elements

- B098
  - Mobile Equipment
    - OG03
      - 1453
      - 1455
      - 1653
      - 1655
      - 1677-BC
      - 1677-TC
      - 1853
      - 1855
      - Barrier Equipment
      - OG05
        - DifferentialPressureSensor
          - PressureValue
        - 1901
        - 1902
        - 1903
        - 1904
        - 1905
        - 1906
        - 1907
        - 1908
        - 1977-BC
        - 1977-TC
        - ConfigurationItems
        - Element Searches

DifferentialPressureSensor

General Child Elements Attributes Ports Analyses Notification F

Filter

Name	Value
Alarm	WarnLow
Category: Configuration	
SensorCode	PD
SensorTa...	B098.OG05.Z1901.PD.
ZoneMinus	1977-BC
ZonePlus	1901
Category: Measured Value	
Value	1 Pa
DH	10 s
DHH	20 s
DL	10 s
DLL	20 s
H	15 Pa
H.Offset	5 Pa
HH	20 Pa
HH.Offset	10 Pa
L	5 Pa
L.Offset	-5 Pa

# Event Frames for Alarms

DifferentialPressureSensor

General Child Elements Attributes Ports Analyses

Name	Backfilling
Alarm	
AlarmHigh EventFrame	
AlarmHWEror EventFrame	
AlarmLow EventFrame	
CalculateDiffPressure	

Event Frames

Event Frame Searches

Event Frame Search 1

- Alarm 1901.DifferentialPressureSensor
- Alarm 1901.DifferentialPressureSensor
- Alarm 1901.DifferentialPressureSensor
- Alarm 1901.DifferentialPressureSensor
- Alarm 1901.DifferentialPressureSensor
- Alarm 1901.DifferentialPressureSensor
- Alarm 1901.DifferentialPressureSensor

Event Frame Search 2

Transfer Searches

Transfer Search 1

Alarm 1901.DifferentialPressureSensor

General Child Event Frames Referenced Elements Attributes

Name: Alarm 1901.DifferentialPressureSensor

Description:

Template: Alarm

Start time: 28.09.2017 17:06:46

Categories:

[Extended Properties \(0\)](#) [Annotations \(0\)](#) [Security](#)

Find: [Parents](#) [Children](#)

Actions: [Recapture Values](#) [Lock](#)

[Acknowledge](#)

**Trigger**

**EF Creation**

Name	Expression	
MinValueOverDHH	If 'Value DHH' > 0 Then TagMin('Val	
MinValueOverDH	If 'Value DH' > 0 Then TagMin('Value', '*'-'Valu	Map
MaxValueOverDL	If 'Value DL' > 0 Then TagMax('Value', '*'-'Valu	Map
MaxValueOverDLL	If 'Value DLL' > 0 Then TagMax('Value', '*'-'Val	Map
NewAlarmStatus	If Not '.. AlarmActive' Then "Normal" Else If Ba	Map
Output	If NewAlarmStatus = 'Alarm' Then NoOutput() Else	Alarm

Event Frames compatible to RIPIN alarm handling tool (→UC Berlin)

# Middleware Connection via PI Web API

- Middleware only uses PI Web API to connect to PI Data Archive/PI AF Server
- Door tablet web pages have PI Web API calls directly embedded
- Configuration via PI Web API
- 3D model embedded PI System data via PI Web API
- WebID caching in middleware:
  - Make sure that cached WebIDs are still valid
  - Cache, don't just copy and keep
  - Refresh the cache when necessary

# Room Creation via PI Web API

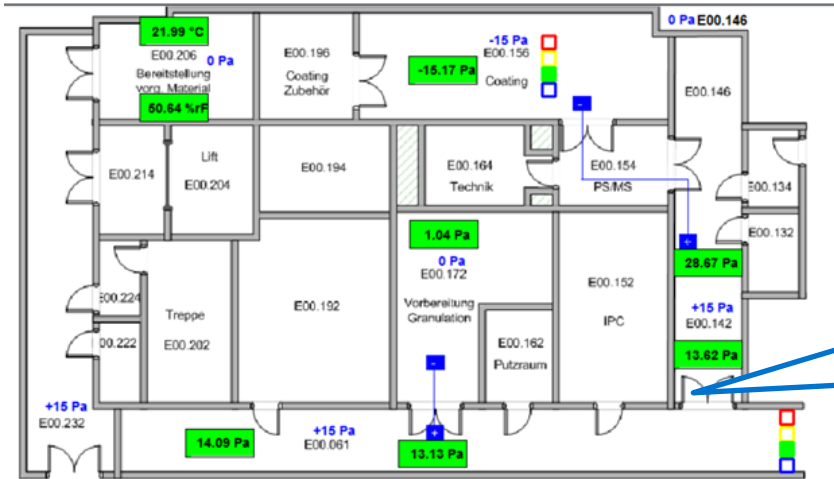
- Create Event Frame for Module
- Create child Event Frames for each room
  - Primary referenced element = leading zone
  - Add references to all other zones
- Configure leading zones connections for differential pressure
- Enable/Disable alarming for leading/non-leading zones
- ...





# B098 Data Visualization Platform

## *Past Visualizations*

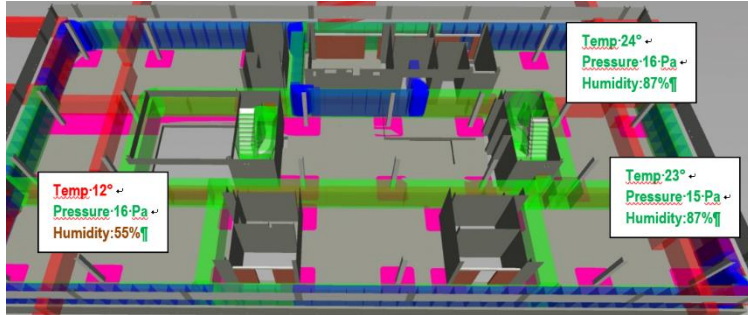


### *As is Visualization*

Sensor Data overlaying a static backdrop. No easy change of setup. Changes need to be applied by experts on expert systems.

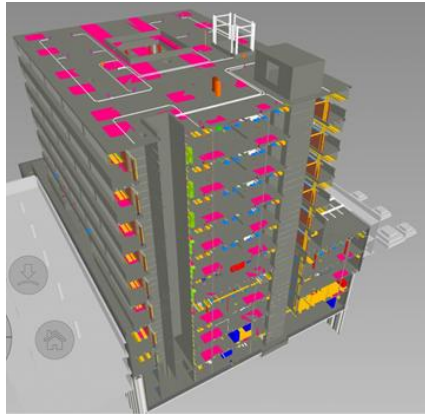
# B098 Data Visualization Platform

## *Future Visualizations with BIM Technology*

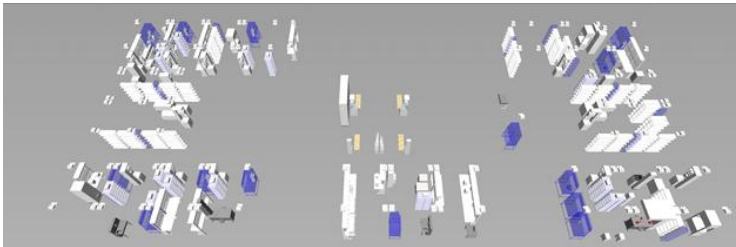


*To be Visualization*  
Dynamic linking between a source model and different Data Layers. Here linked to the environment Data.

*To be Visualization*  
3D geometry linked to the Equipment tracking Data in real-time



*New possibilities*  
Dynamic cross sections of complete structures can be made. This delivers complete new insight to energy consumption, building usage etc.

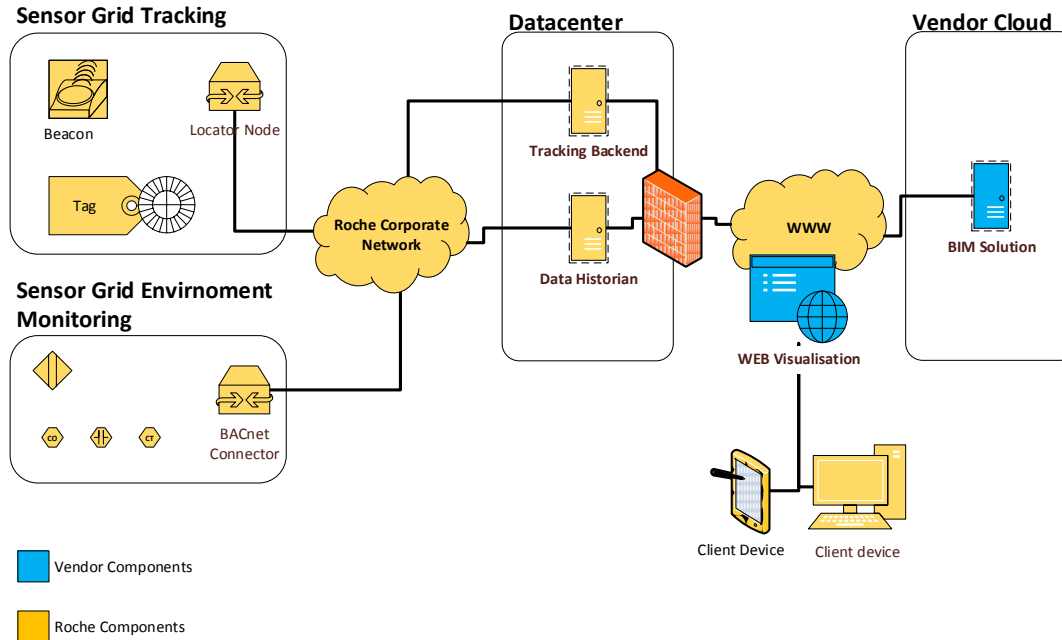




# B098 Data Visualization Platform

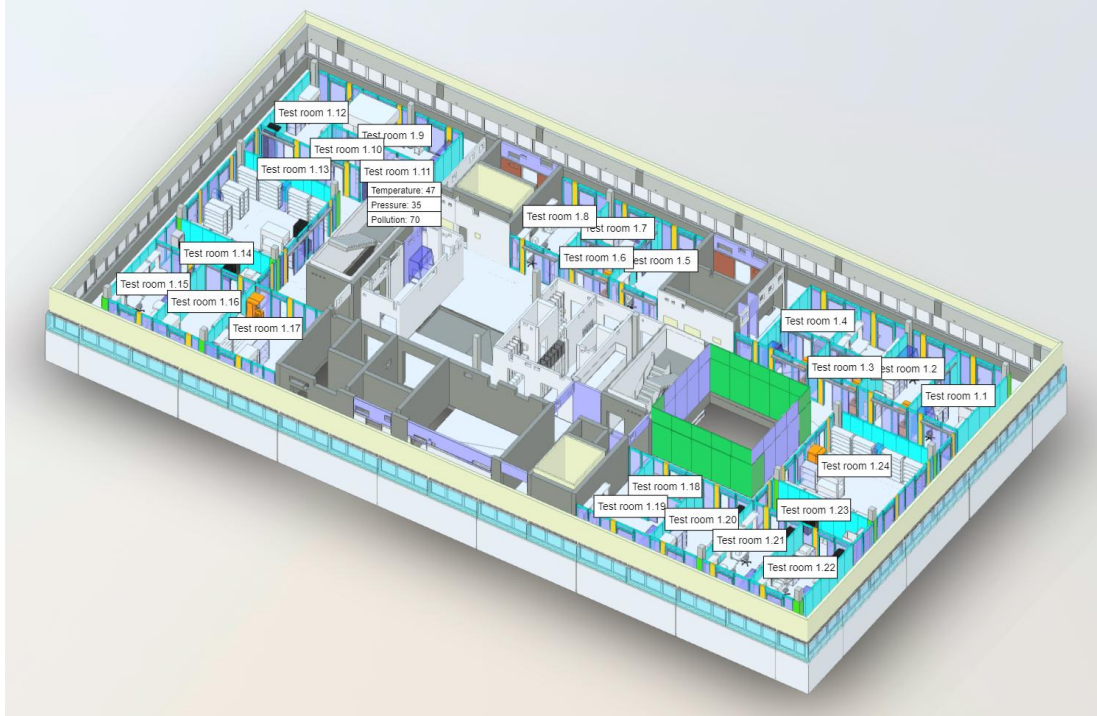
## *Behind the scenes*

### System Overview B098 BIM Visualisation



# B098 Data Visualization Platform

## *Live Demo*

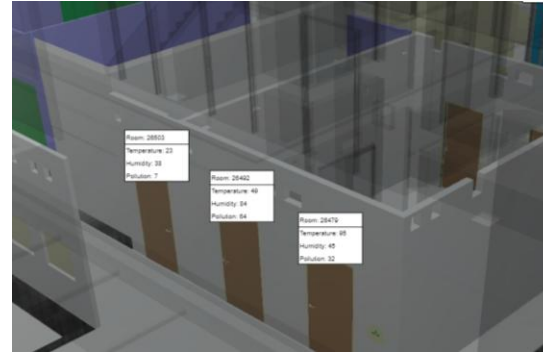


# Summary

Building 98 is the most modern laboratory building from Roche.

Monitoring and data acquisition is handled by the PI System using event frames to model rooms.

PI Web API is used by all applications that use the PI System (room panels, 3D building model)



## BUSINESS CHALLENGES

- Flexible new Lab Building with no fixed room layout
- PI Data Archive as the main monitoring database shall store full history

## SOLUTION

- Rooms as Event Frames
- PI Web API and custom UI
- PI System data embedded in 3D building model

## RESULTS AND BENEFITS

- Unique User Interfaces for real-time PI System data
- New ways to use PI AF modeling capabilities

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Owner  
Octavesoft



## Questions

Please wait for the **microphone** before asking your questions

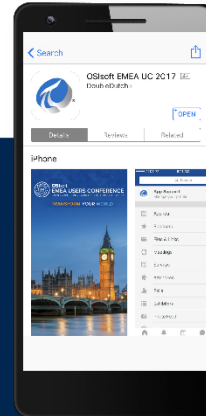


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