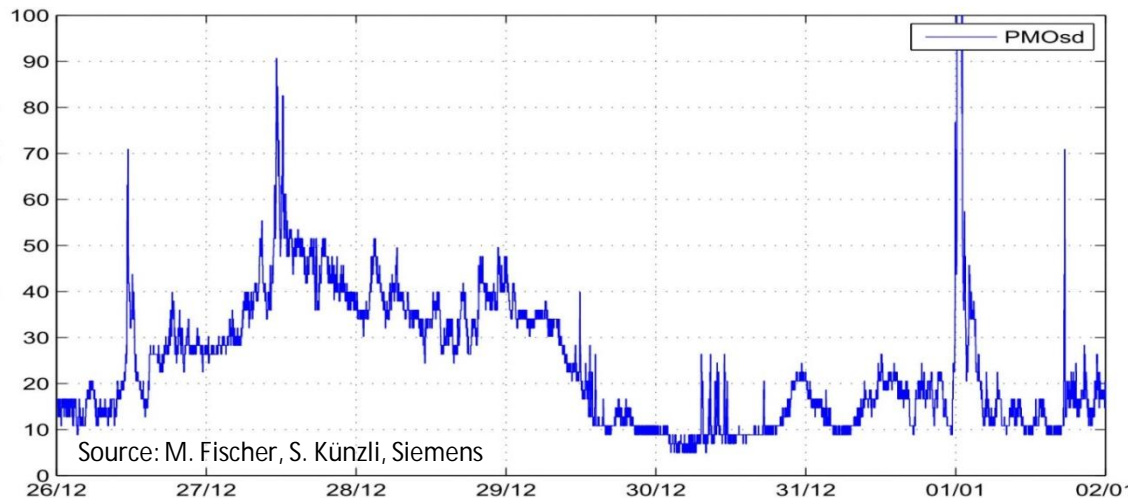
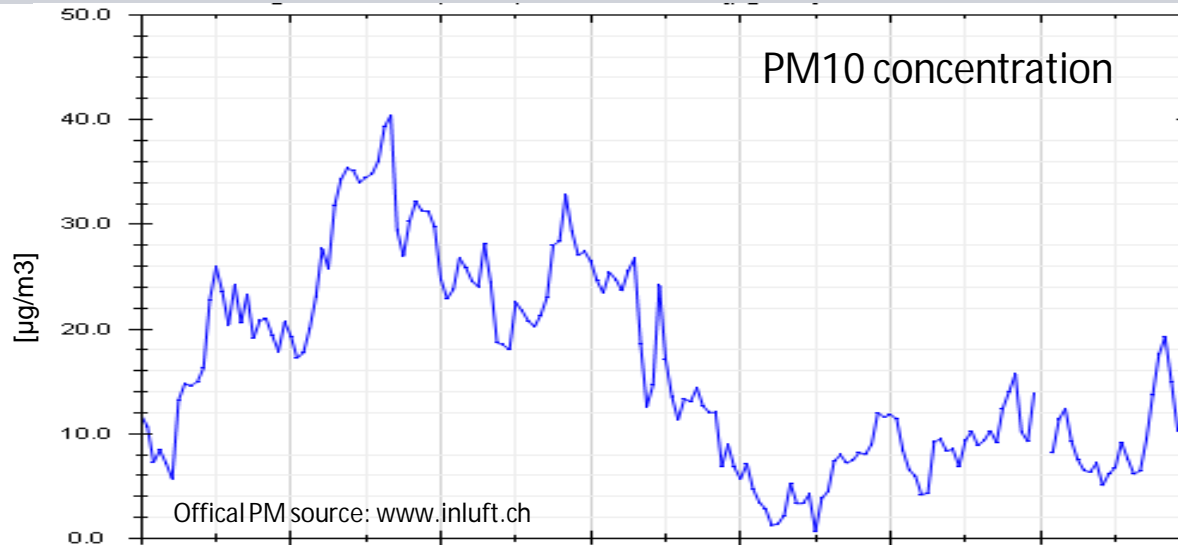


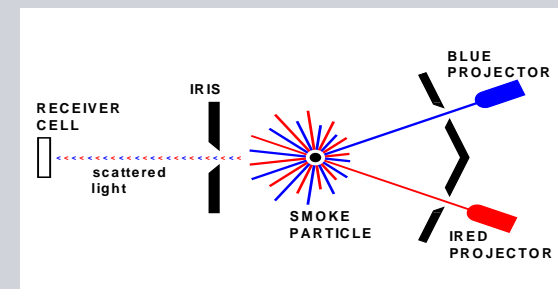
Sensors for Building Automation: Some Aspects from Fire Safety

Aleksandar Duric

Example: Particle pollution Air quality monitoring using smoke sensors



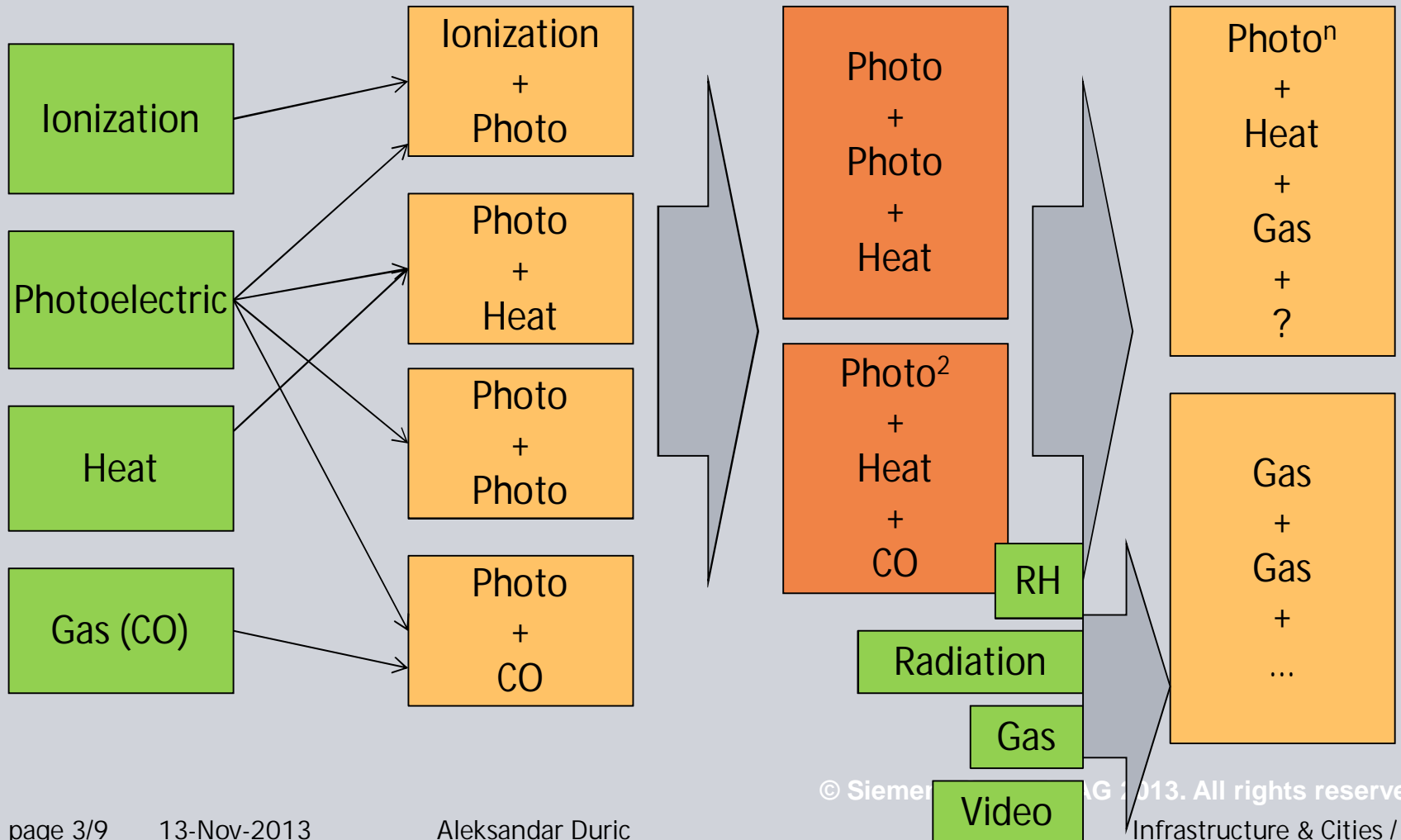
Aspirating Smoke Detector
with IR + blue light sources



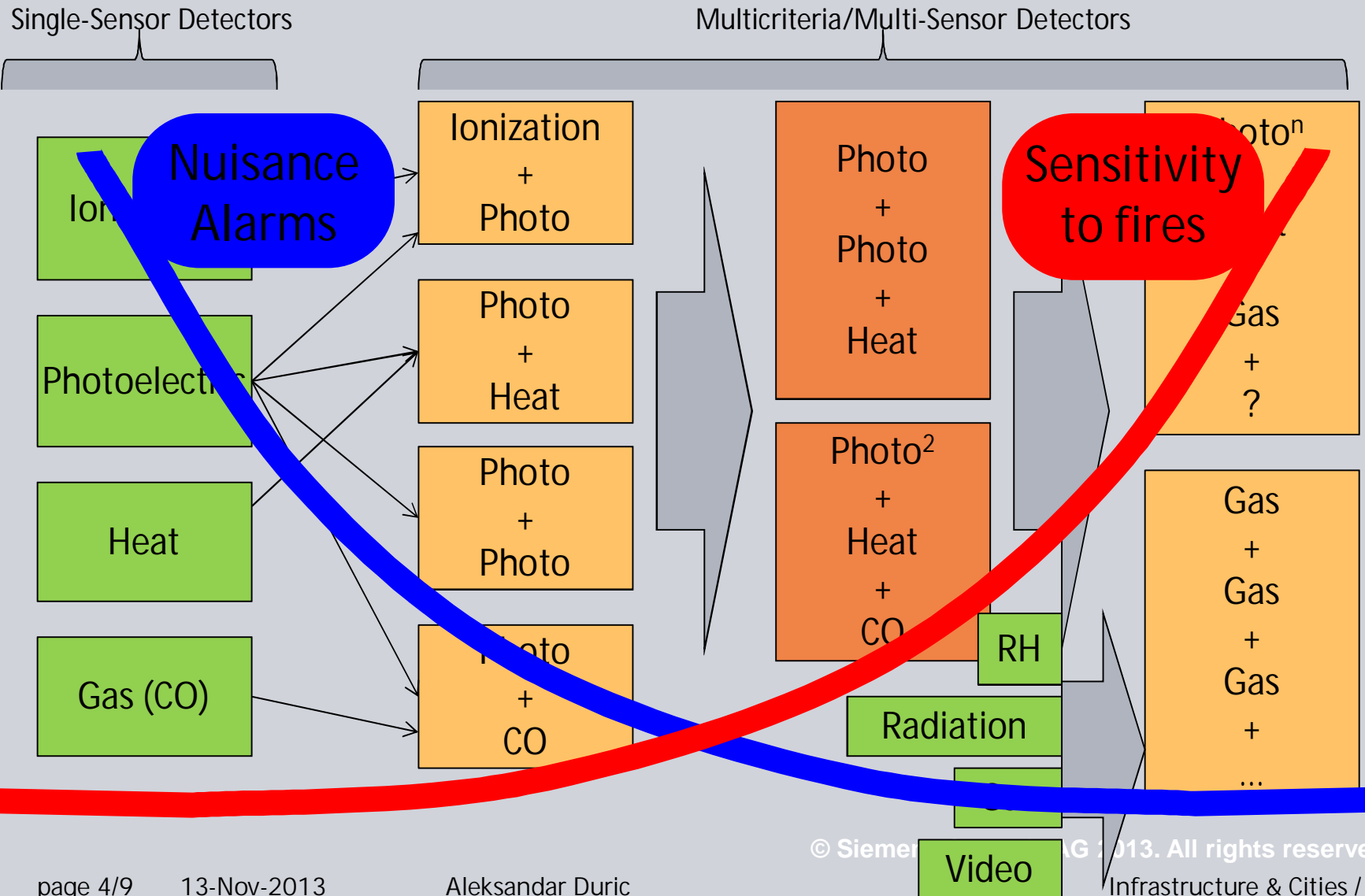
Sensors in spot type fire detectors

Single-Sensor Detectors

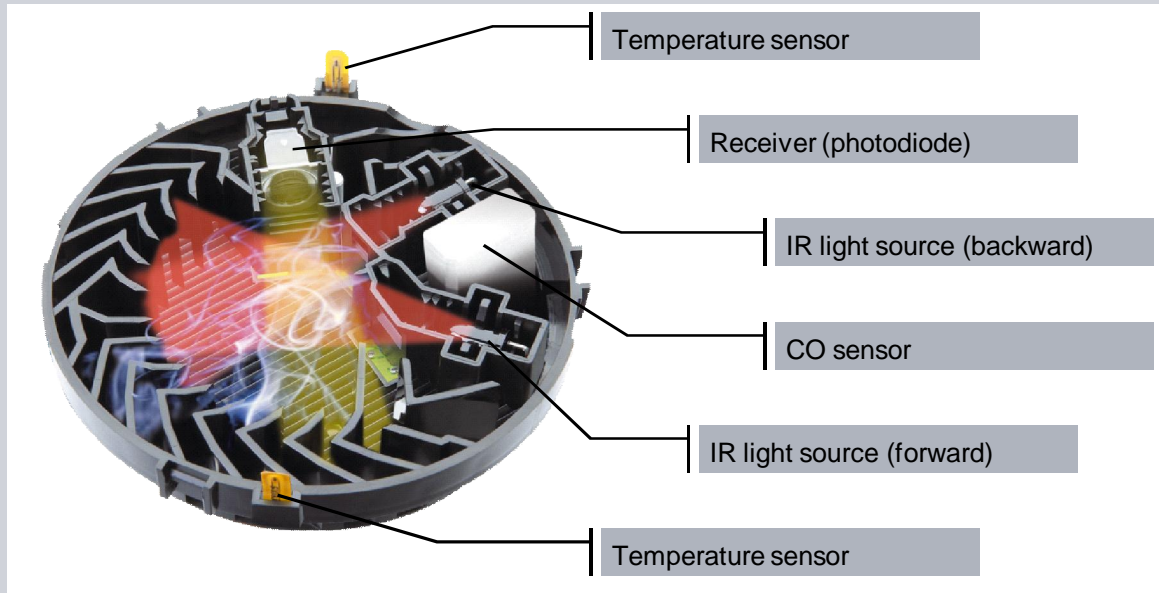
Multicriteria/Multi-Sensor Detectors



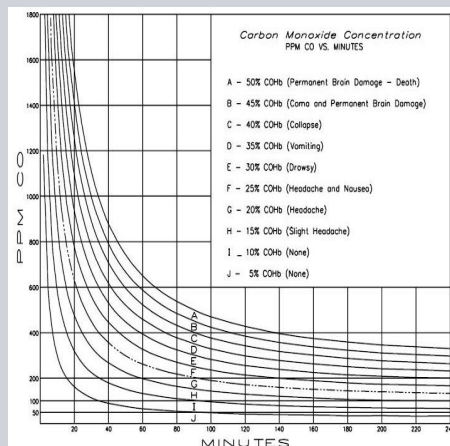
Development path of spot type fire detectors



A Multi-Sensor Fire Detector



Multicriteria Fire Detection



CO life safety

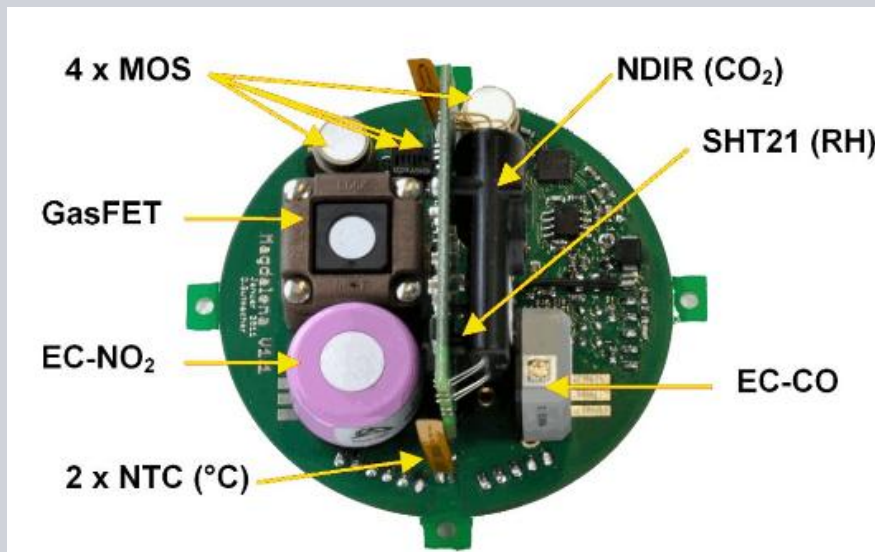
Signals available for other systems:

- Obscuration [%/ft]
- Temperature [°F]
- CO concentration [ppm]

ON/OFF control signal for T and CO

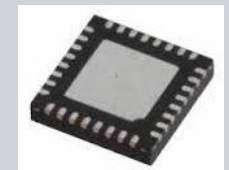
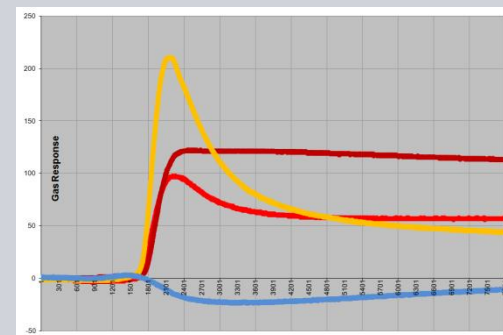
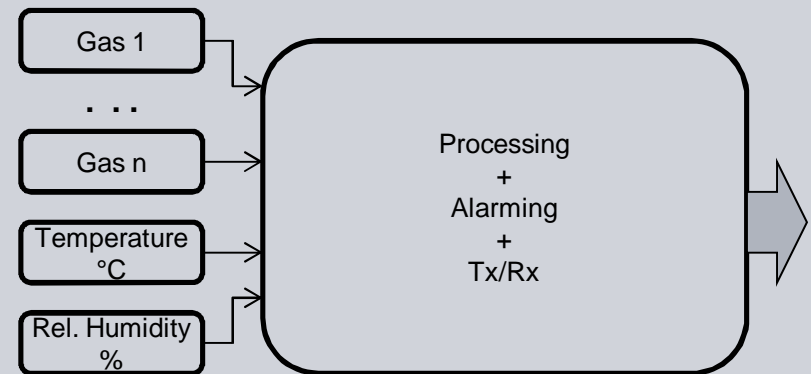
Sensor integration: Fire-gas detection

Research platform for fire gas detection



D. Gutmacher et al., Siemens AG, Gas sensor technologies for fire detection, Sens. Actuators B: Chem. (2011), doi:10.1016/j.snb.2011.11.053

Integrated gas sensors



Single chip

Fire safety sensors

Data Sharing with other Building Systems

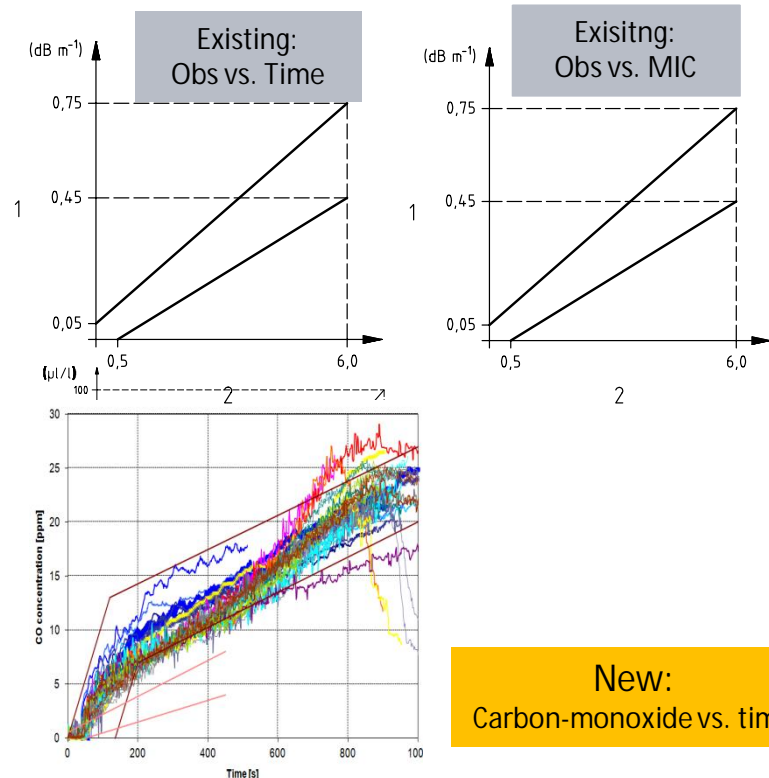
- Data (signal) availability and reuse:
fire sensors → other systems
HVAC, security, and other sensors → fire sensing
- Connectivity
- Reliability and information validity
(Alarm suppression?, Control signals ?)
- Sensor positioning
- Special applications (data centers, industrial plants,...)
- Standardization



A lot of work (to be) done in standardization

- Sensor characterization in multi-sensor detectors
- Research in detection of different fire phenomena
- Real-world fires vs. fire tests
- Changing materials
- Standard UL268:
 - Multicriteria smoke detectors
 - New PU foam fire tests
- New EN-Standards: EN54-29 (OT), -31(OTC)-> formal vote

- EN fire tests:
Limits for ALL sensed phenomena
Test End Criteria for Obs, T and CO



Conclusions

- Integration of sensors already takes place, both on:
 - Physical level (HW)
 - Information (signal) level
- Fundamental topics require systematic approach:
 - Research in detection of different fire phenomena
 - Information availability and reuse
 - Connectivity
 - Sensor- and Information Reliability
- Companies offering broad building automation portfolios predestined to be key drivers in the sensor integration in automated buildings, both in:
 - technology and
 - standardization