

Characterization Cluster Workshop

Sensors Sub cluster

Challenges for IAQ sensors

NanoSense

NanoSense

- IAQ probes
 - CO2, VOC, T°, RH



Today's probe



On going project



- Particles

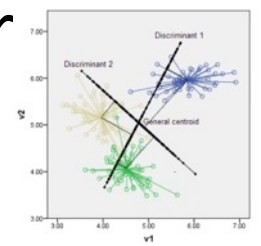
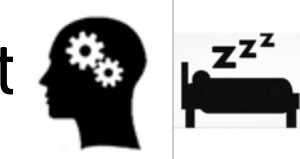
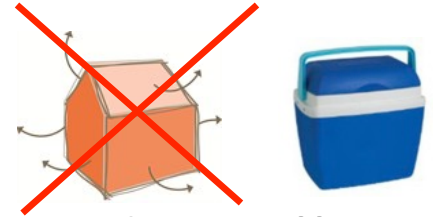


- Radon



IAQ sensors context

- Low energy buildings are air proofed
- Long term exposure to specific VOC and small particles are carcinogenic
- Long term exposure to specific VIC is not healthy
- Short term exposure to high CO2 level affect productivity and sleep
- Lack of moisture control affect building health
- On demand ventilation requires selective air quality sensing



IAQ sensors: non-technical drawbacks

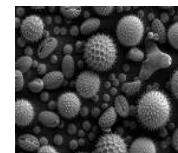
- Sensor systems not affordable



- EU Low energy building objectives not accompanied by associated IAQ regulations for health and productivity



- Urban Incoming air with benzene and PM2.5 is the basis or indoor air dilution.



IAQ sensors: technical drawbacks

- Life duration
- Drift
- Cross sensitivity to NOX and O3
- No dedicated VIC MOX sensor available
- Influence of ambient temperature & humidity
- Energy consumption
- Size
- Price

Challenges #1

- **IAQ sensors flexible selectivity**
 - VOC identification despite severe ambient (fat acids..)
 - VOC identification related to mold spores
 - Accurate VOC quantification
 - VIC detection, identification and quantification
 - Sensitivity compatible with long term exposure regulation limits (<ppb)
 - Stability
 - Life expectancy

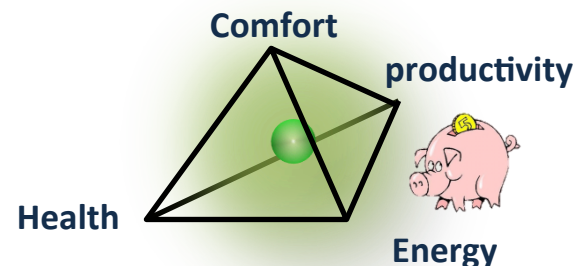
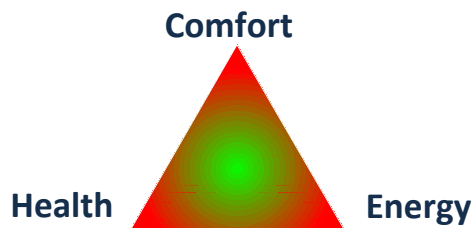
Challenges #2

- **IAQ sensors public acceptance**

- IAQ measurement will be part of everyday data
- NG thermostats
- IAQ is difficult to popularize (no ppm or ppb for public)
- Comprehensive MMI study associated to IAQ needed.



- IAQ setpoints Vs activity, exposure time...



Challenges #3

- **Miniaturization**

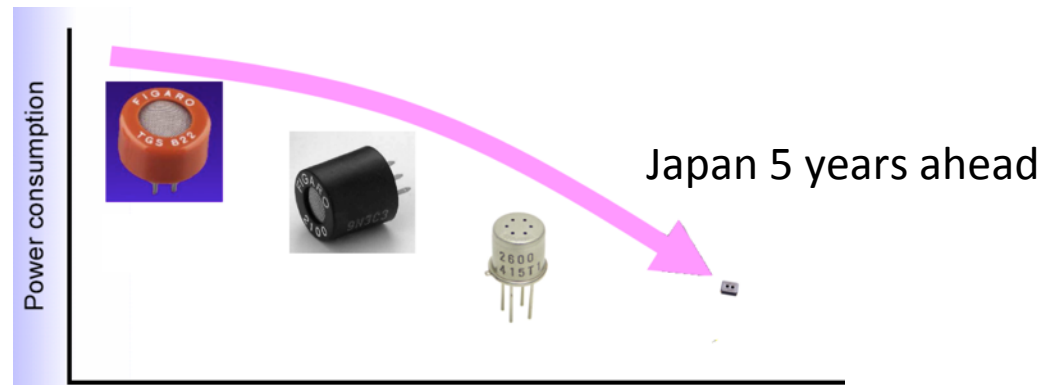
- MEMS = low manufacturing price

- Lower consumption

- Portable and wearable market (IOT) + smartphone

- Building renovation with energy harvesting wireless sensors

- Needed for IAQ sensors embedded in NG thermostats



Challenges #4

- **Air treatment**

- Sensors doesn't solve the bad IAQ

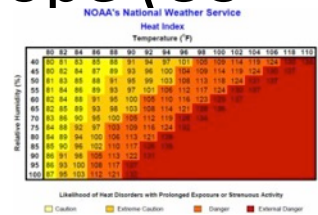
- Advanced low energy air treatment to be developed.



Challenges #5

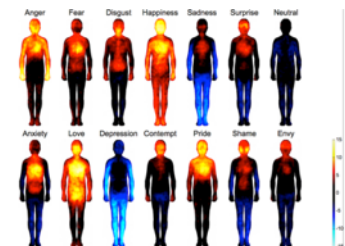
- **Indoor comfort**

- Felt temperature not standardized in Europe (US only)



- Smart control of IAQ, heating, cooling and humidity (perhaps light) as an all could improve comfort when saving energy

- Future occupancy sensors could provide reliable occupancy data AND skin temperature



Wishes on EU regulations

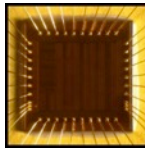
- New IAQ regulations for existing and new buildings:
 - Real time carcinogenic VOC monitoring
 - Real time PM monitoring
 - Public information (challenge #1)
- New regulations for industrial activity :
 - I.e. Real time styrene monitoring (Bumpers, tanks, boats.. manufacturers)

Wishes on EU policies

- Support IAQ sensor miniaturization technologies



- Support IAQ electronic control miniaturization (generic programmable ASIC with or without sensor)



- Support IAQ sensor public acceptance studies (MMI)

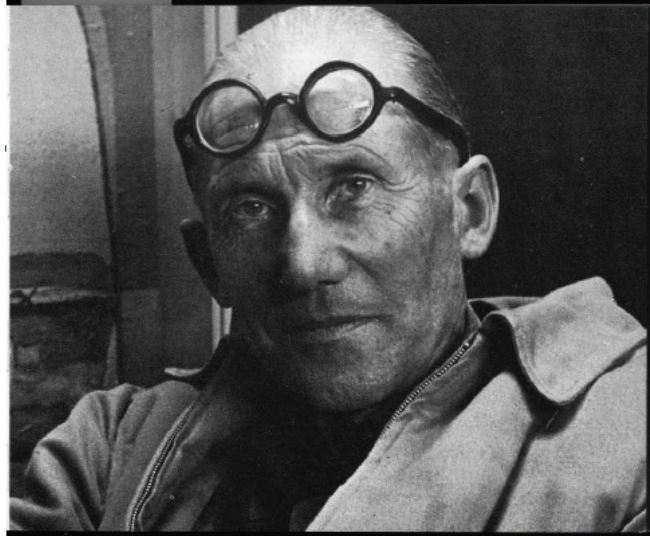


- Support advanced indoor comfort studies



- Support advanced indoor air treatment studies





"A house is a machine for living in"
Le Corbusier

Thank you for your attention

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