



INTERNATIONAL OPERATIONS & MAINTENANCE CONFERENCE
IN THE ARAB COUNTRIES

UNDER THE THEME
"MANAGING MAINTENANCE WITHIN INDUSTRY 4.0"
CONICIDE WITH THE 16TH ARAB MAINTENANCE EXHIBITION

Digitization of construction services with Industry 4.0 technologies

(CONSTRUCTION - WEARABLES - DIGITIZATION)

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4.0



CONTENT

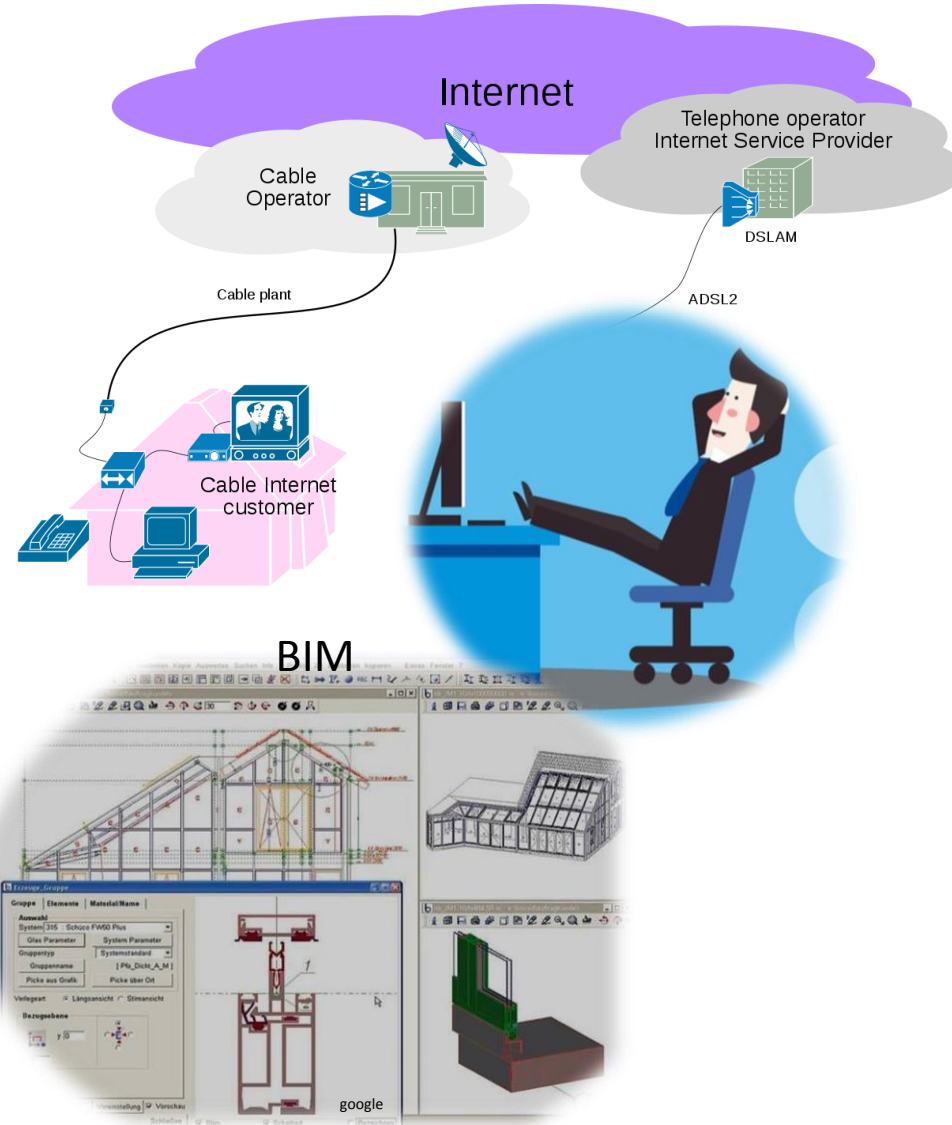


- Motivation
- ConWearDi-Platform
- Intelligent construction materials / case study
- Conclusion

MOTIVATION



Modern planning office using IOT

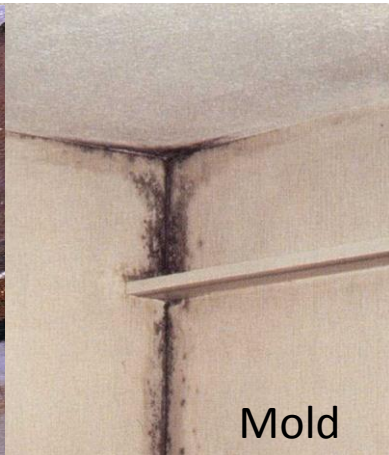
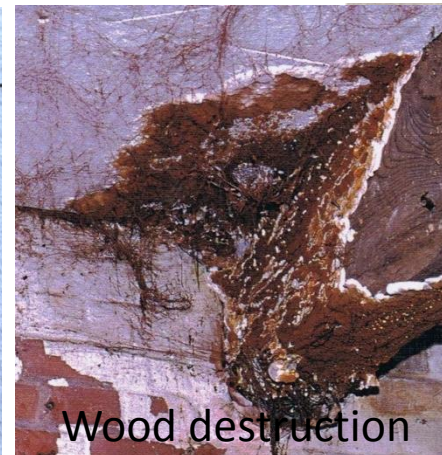


Traditional construction site



MOTIVATION

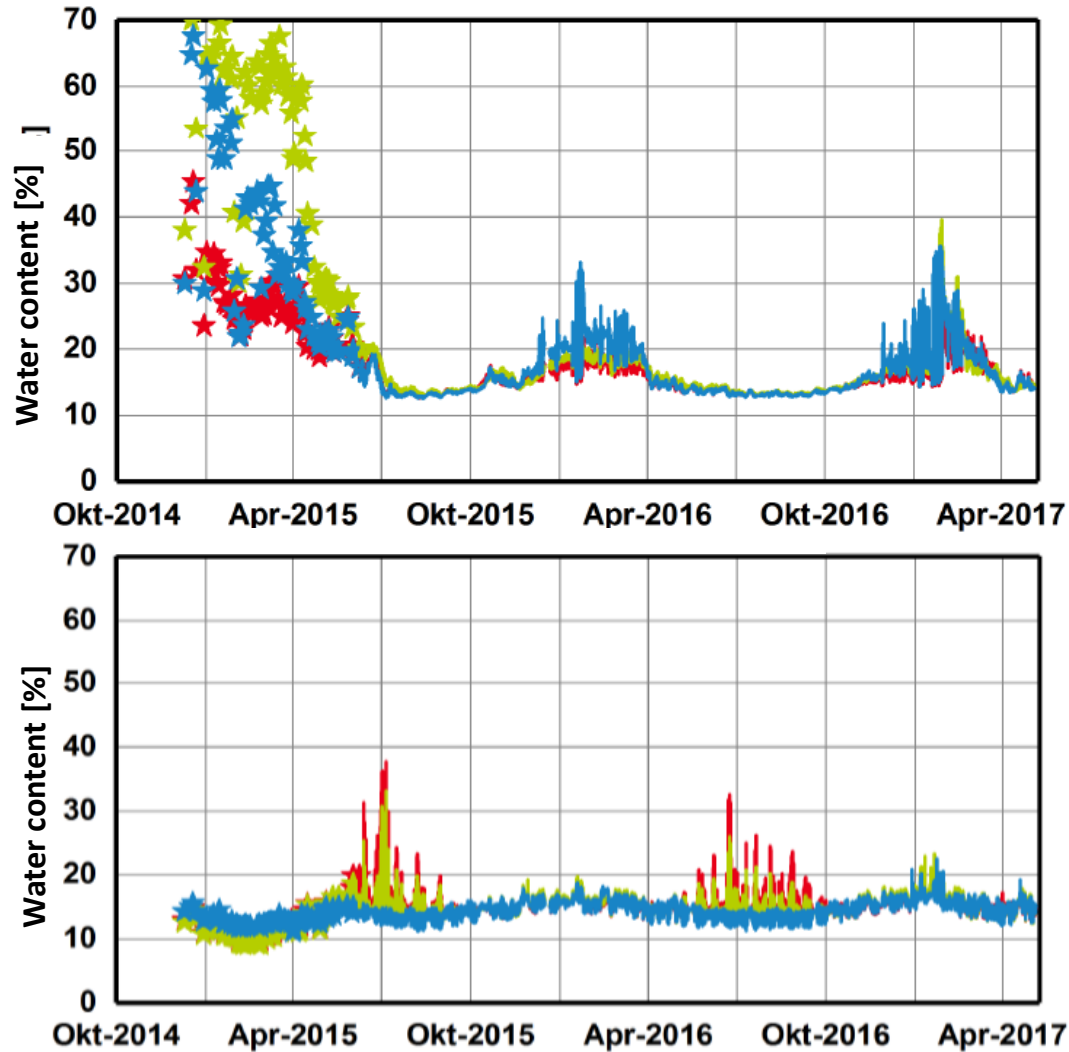
Structural damage during and after the construction phase



MOTIVATION



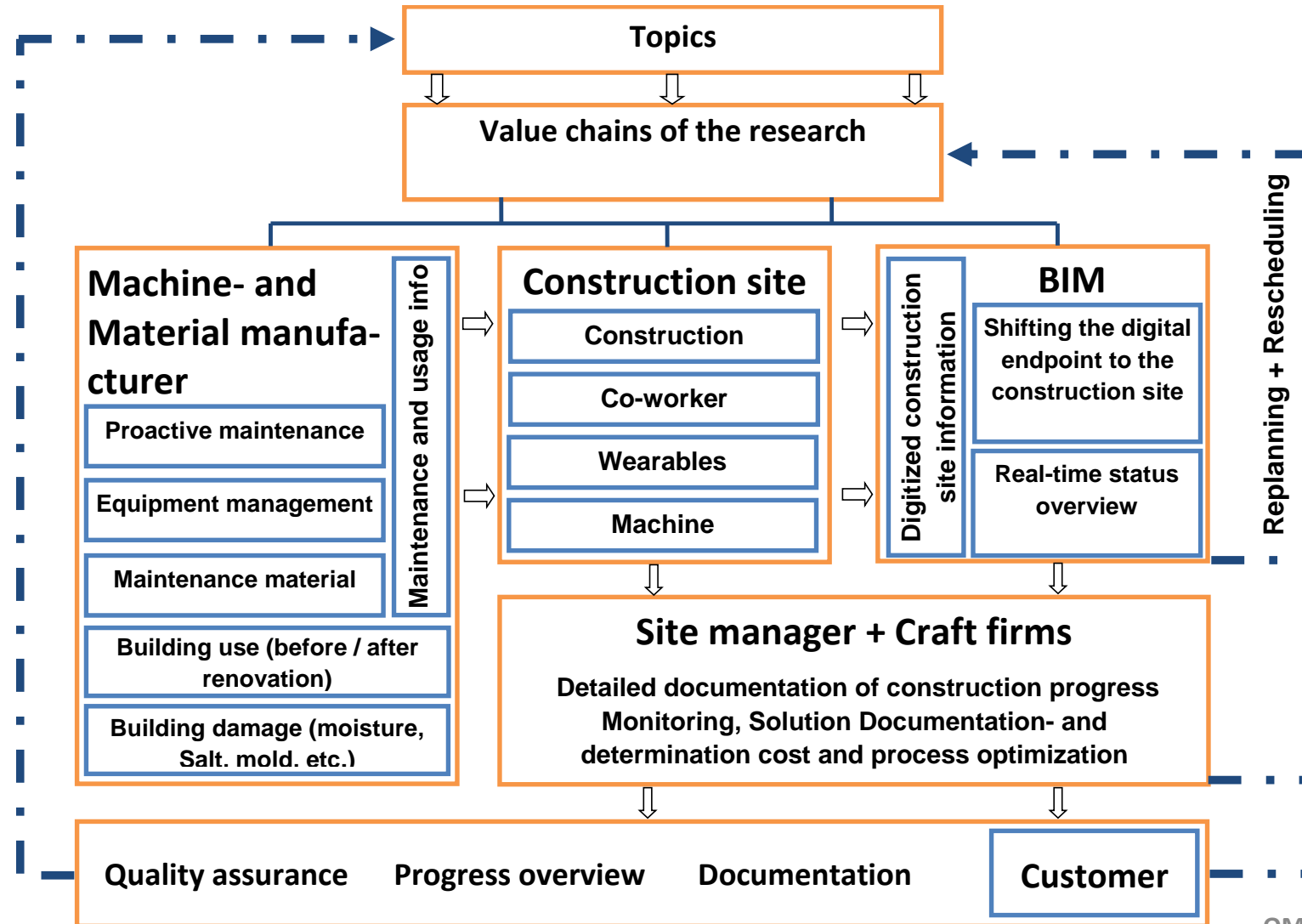
Structural damage during and after the construction phase



Is an intelligent building material a currently significant topic?

CONWEARDI – FUNCTIONAL SCHEME

Functional scheme of the ConWearDi (CONSTRUCTION-WEARABLES-DIGITIZATION) project



INTELLIGENT MATERIALS CASE STUDY IN BERLIN



MEASUREMENT CONCEPT

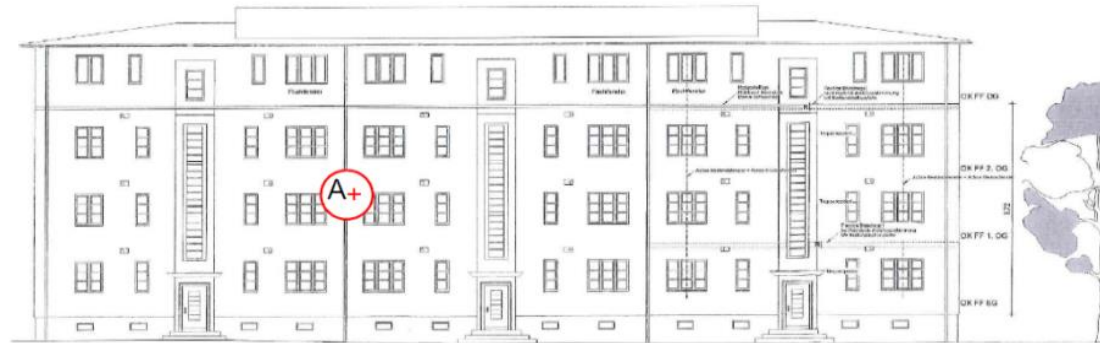


Locations

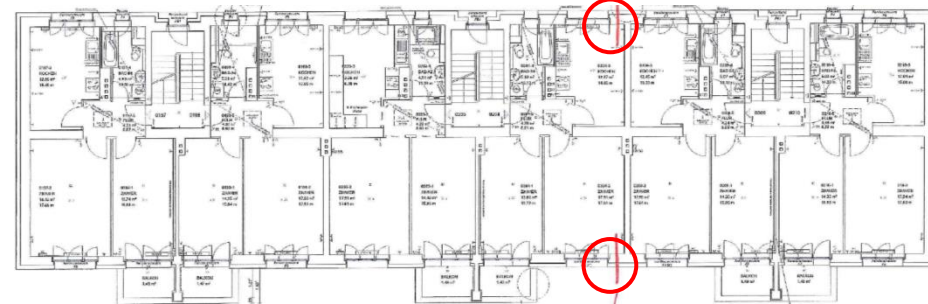
Inside (room)
Outer wall
Outside

Parameter

Humidity
Temperature
Etc.



A. Northeast

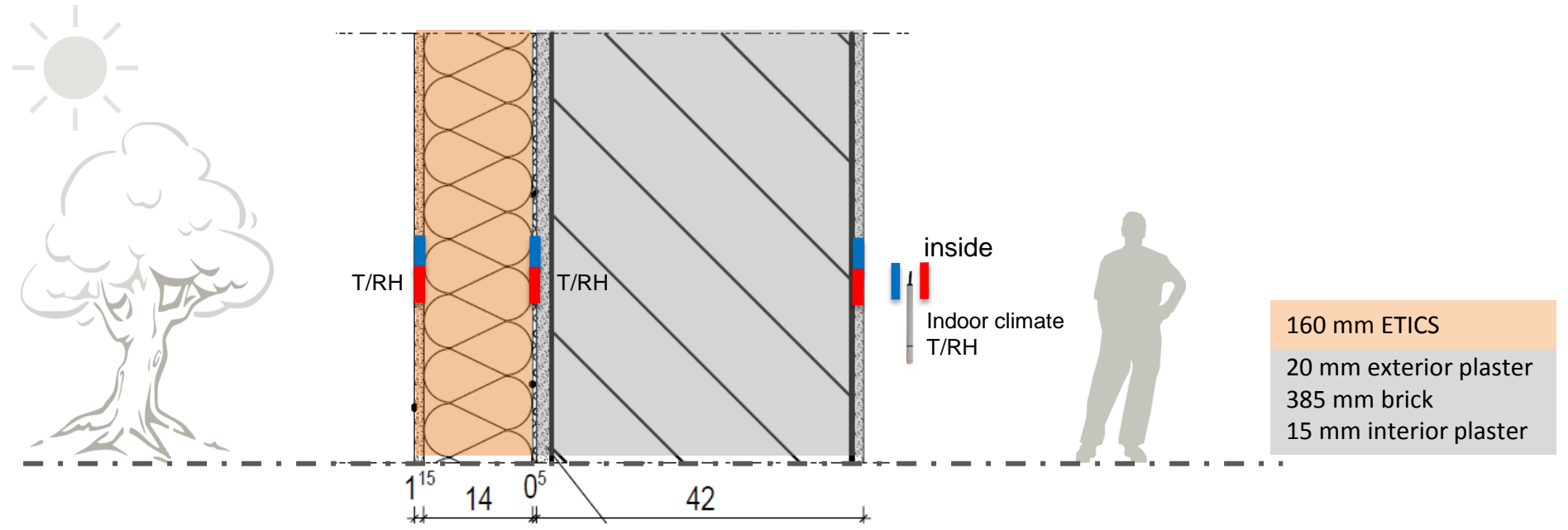


B. Northwest

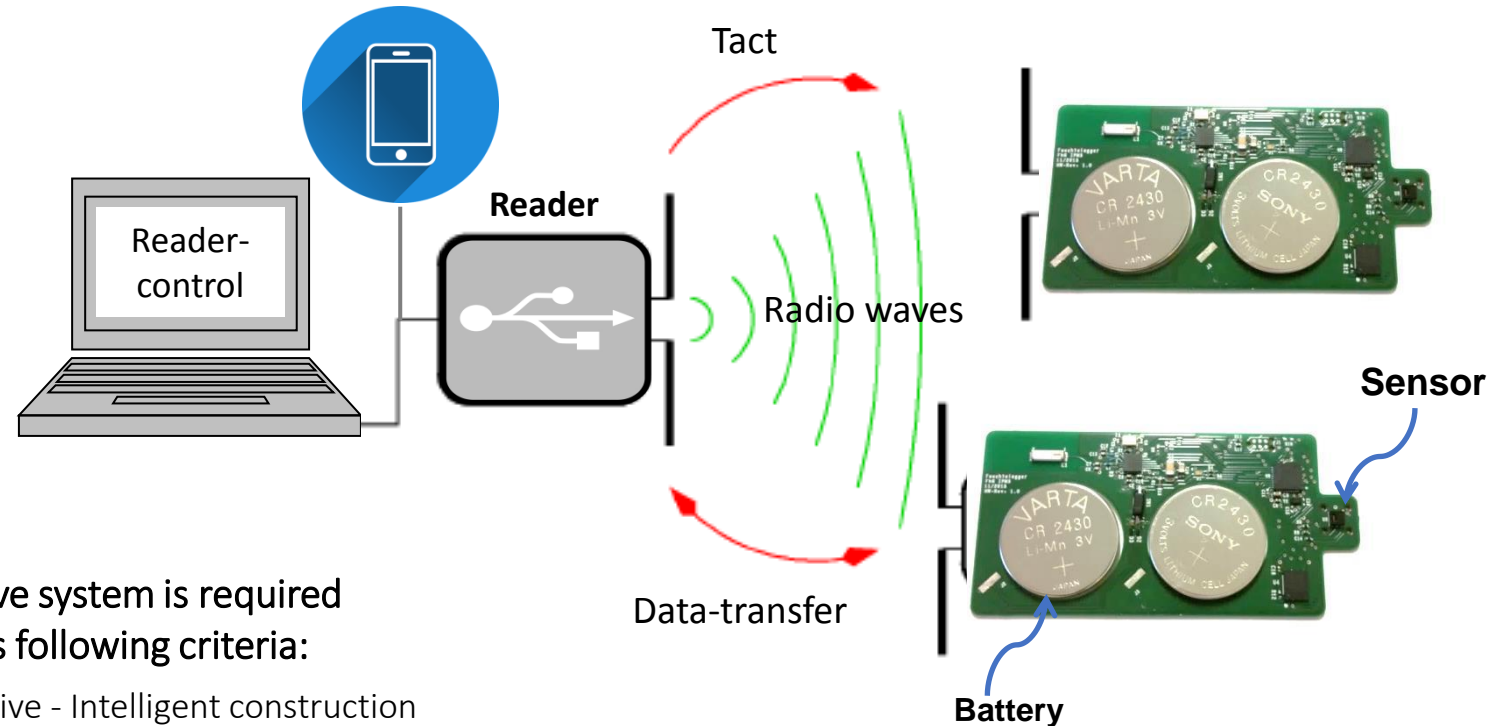
Insulation materials

Hemp
Wood fiber
Mineral wool
EPS

MEASUREMENT CONCEPT



INNOVATIVE WIRELESS TRANSPONDER SYSTEM



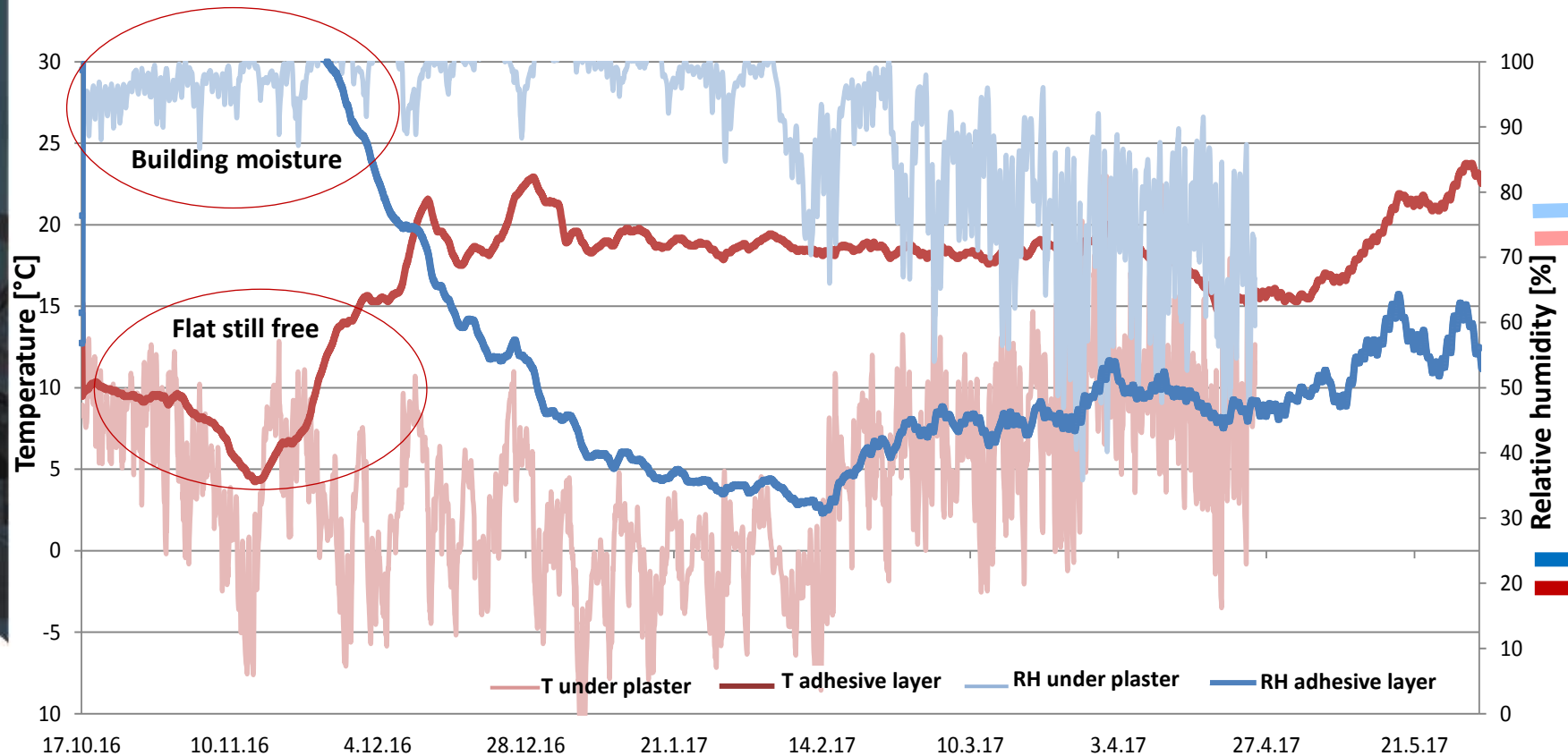
An innovative system is required which offers following criteria:

- Non destructive - Intelligent construction
- Material identification - Cost reduction
- Quality intensification - Culture enhancement

RESULTS



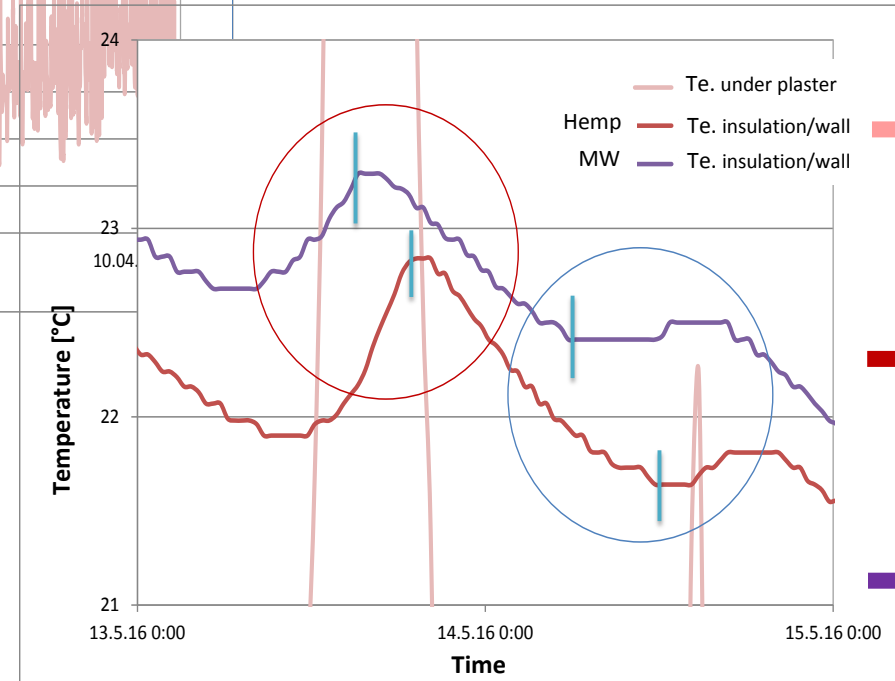
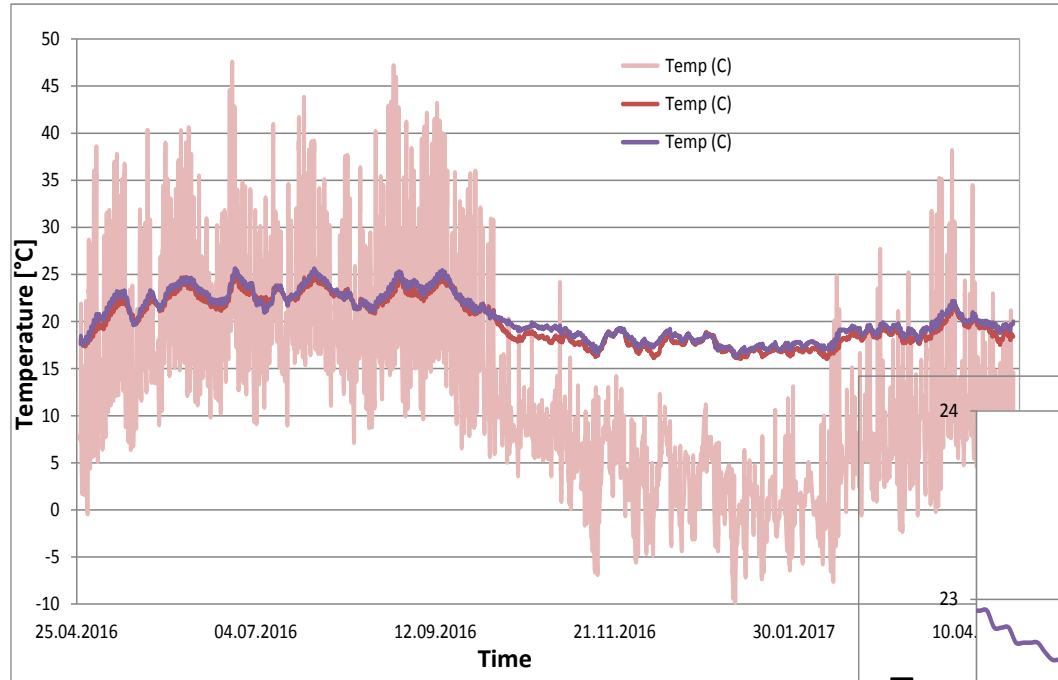
Measured T/RH on hemp under plaster level and in adhesive layer



RESULTS



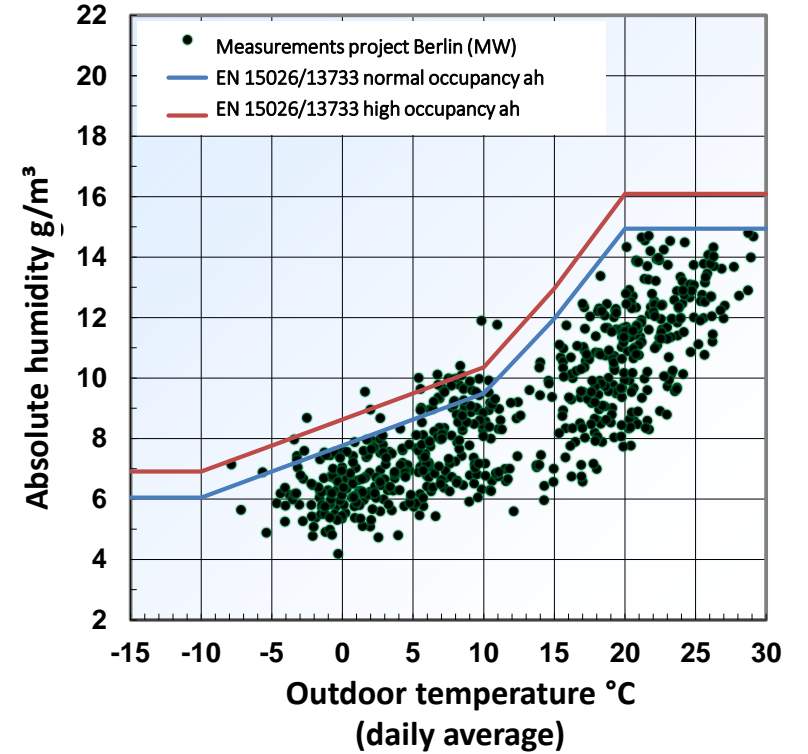
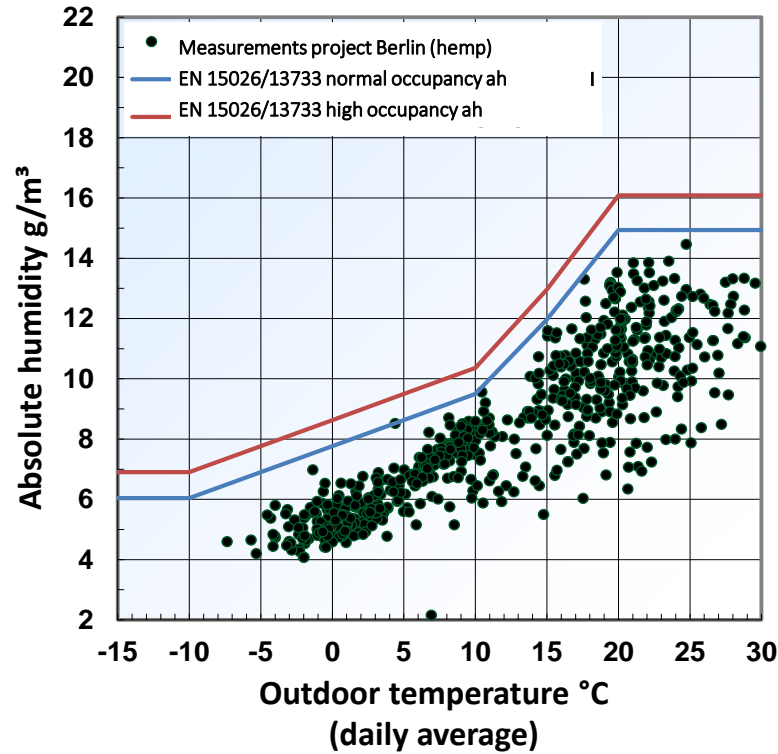
Evaluation of measured temperature on both sides of hemp and mineral wool



RESULTS



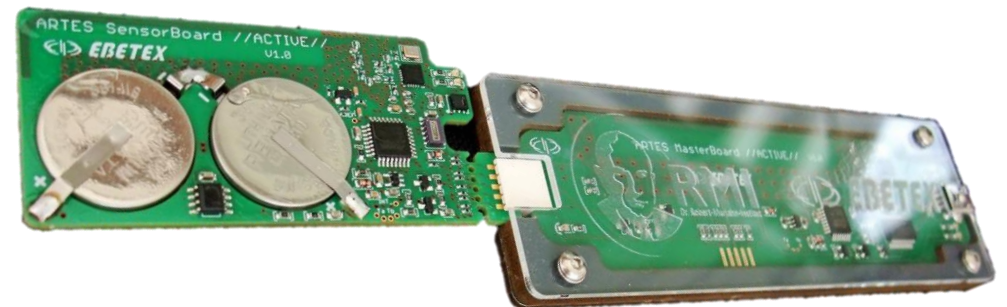
Evaluation of mold growth conditions on the inner wall surface for hemp and mineral wool (Relationship between outside air temperature and absolute indoor air humidity)



CONCLUSION



- Development of a user interface and sensor system for construction sites.
- Reliable recording of environmental conditions and activities on site using advanced combination, eye tracking and body-close sensors.
- Implementation of a platform and installation sensor system in the construction show good accordance between all construction- site participants and provides information about machine maintenance, material consumption and its current state.
- Through measuring for two years the results of the wireless system show:
 - ETICS has a positive effect on summer heat protection.
 - Conditions for mould growth on the inner wall surface are not given.
 - Avoidance of construction damage
- **This study proves that, an intelligent building with integrated wireless- sensor system guarantees a fluent workflow on the construction site and a long-term, damage-free construction during building use by “looking into” the construction.**



CONCLUSION



THANK YOU FOR YOUR ATTENTION



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