Digital Innovation in the Pre-Demolition Phase

Danish Technological Institute

MOBICCON-PRO

MOBile and Innovative Circularity for CONstruction PROducts

Innovative solutions for circular construction

"Sustainable Places 2023" Conference

16th June

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Agenda

- Why digital innovation in pre-demolition phase?
- Digital technologies and innovation in MOBICCON-PRO

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MOBILE AND INNOVATIVE CIRCULARITY FOR CONSTRUCTION PRODUCTS

- Sustainable Construction Center:
  - Circular economy, LCA/LCC/sLCA, sustainable construction practices
  - Selective demolition and reuse/recycling of CDW and building materials
  - Pre-demolition audits (PDA)
  - EPDs: LCA-consultants + program operator (EPD Denmark)
  - Digital solutions for the building and construction sector

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Why?

- CDW largest waste stream in EU (> 30%)
  - 160 tons/person
- Large recovery potential
- Quality concerns
- EU CDW Management Protocol (2016):
  - Improved waste identification, source separation and collection
  - Pre-demolition Audits (PDA)

What?

- Helps identify CDW generated (hazardous, polluted, clean)
- Implement proper deconstruction (dismantling and demolition practices)
- Ensure workers safety
- Increase quality/quantity of recycled products (clean streams, local recovery)

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How?

1. Collects data:
   - Identification of all generated CDW: type, quality (pollution?), quantity, location.
   - Requires expert knowledge (what are we looking for where?): asbestos, PCB, PAHs, metals, chlorinated paraffines…
2. Gives information:
   - materials to be (mandatory) separated at source (e.g. hazardous waste)
   - materials to (not) be re-used/recycled
   - Management of the (non-hazardous/hazardous) CDW (e.g. recycling possibilities)

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And so?

- Thorough sampling campaigns of buildings + analysis
  - Experienced workers (building techniques, materials, hazardous substances, demolition techniques, CDW treatment, local markets)
  - Lack of standards
- Manual work
  - Sampling
  - Ensuring documentation/traceability (pics, layouts, sample ID)
- Time- and cost-intensive
  - Implemented?

PDA - Screening and sampling of hazardous materials

Photos: DTI

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State-of-Art
Traditional approach

- PDA report

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Undersøgelse af skadelige stoffer i lejlighed

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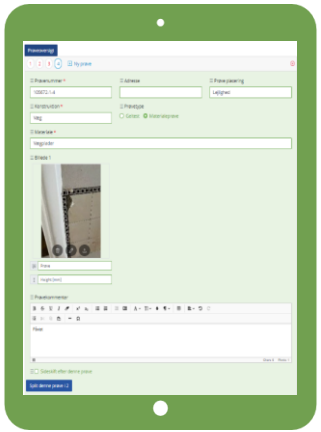
Role of digital technologies

- App for collecting building information
- Technology integration with e.g.:
  - 3D scanning
  - Portable devices (IR, XRF)
  - Laboratory results
  - Augmented reality devices
- Automatic generation of PDA reports

PDA - Screening and sampling of hazardous materials



Mobile app for streamlined PDAs

Portable XRF

3D scanner

Photos: DTI

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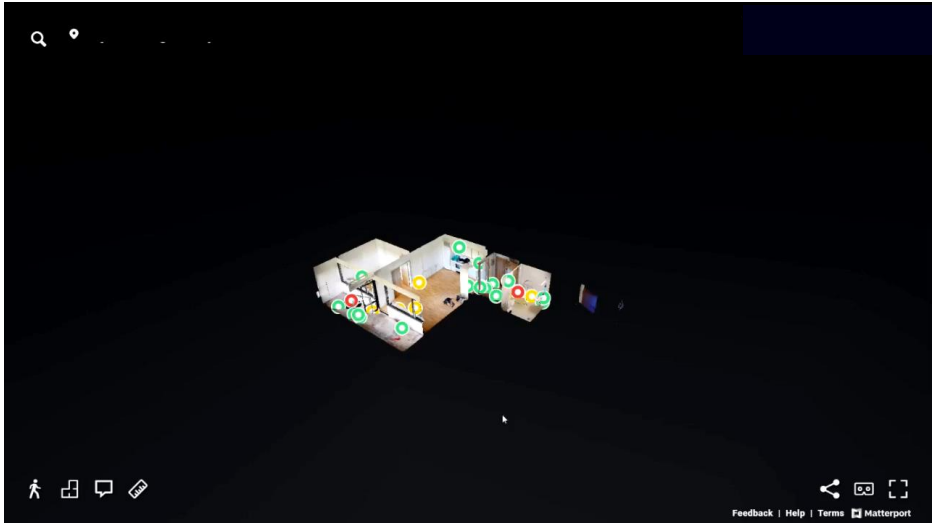
Role of digital technologies

- Use of 3D-scanner
  - Generating 3D model of the building
  - Easy labelling, measurement and visualisation of information

Photos: Matterport

Scanned digital model with sample points



Video: DTI

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Role of digital technologies

- Virtual/augmented/mixed reality devices:
  - Easy visualisation of information

Augmented reality for data visualization in the field

Construction sites visualized in Mixed Reality with HoloLens

Video: Afca (https://afca.ch)

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Thank you for your attention!

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