

Digital Innovation in the Pre-Demolition Phase

Danish Technological Institute

Innovative solutions for circular construction
"Sustainable Places 2023" Conference
16th June



MOBICCON-PRO

MOBILE AND INNOVATIVE CIRCULARITY FOR CONSTRUCTION PRODUCTS



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Agenda



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



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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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Demolition, Hazardous
substances in Building
Materials



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?



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- 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?



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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?



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- 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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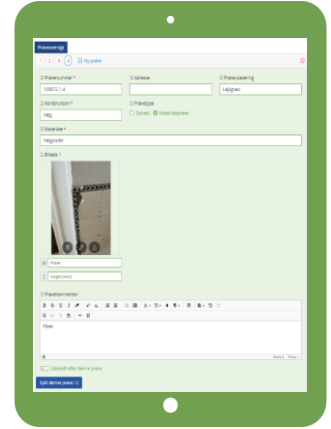


Role of digital technologies

- 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



Role of digital technologies

Use of 3D-scanner

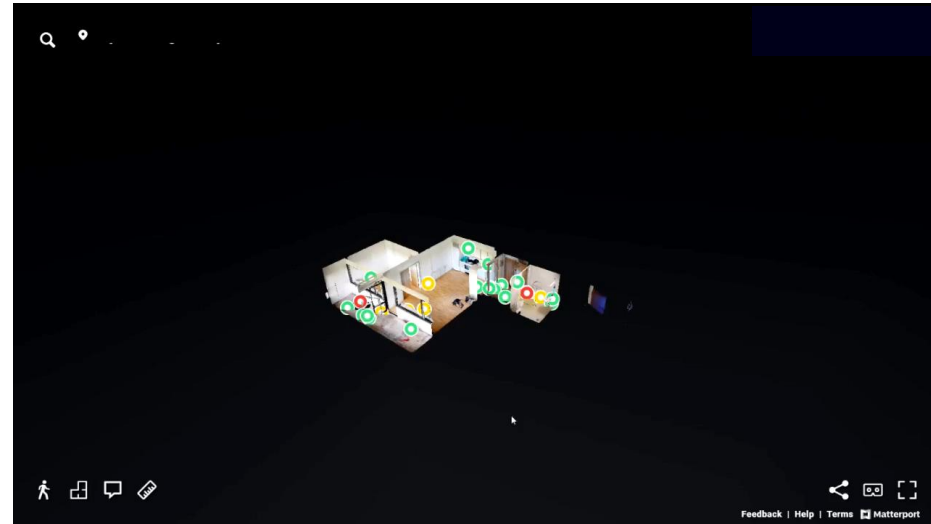
- Generating 3D model of the building
- Easy labelling, measurement and visualisation of information



Photos: Matterport



Scanned digital model with sample points



Video: DTI





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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