IDENTIFICATION AND COMPARISON OF LCA-BIM INTEGRATION STRATEGIES

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3D or 4D visual representation
Assembled BIM

Submodel security
Submodel energy performance,…
Submodel water appliances
Submodel air conditioning
Submodel light
Submodel ….
Submodel electricity
Submodel LCA,…

Submodel structural integrity
Submodel structural fire aspects
Submodel structural acoustics
Submodel architectural design
Submodel interior design
Submodel ….

DATABASES

DATA
ANALYSIS
TOOLS

“Clash” detection
Quantities & Price estimation
Primary Energy consumption
Overheating aspects
Daylight calculations
Acoustics
……..

Slide courtesy: Bart Ingelaere, BBRI
Goal of research

- Identify **feasible workflows** for LCA analysis based on BIM models
- Provide guidelines for **structuring LCA data** for use in BIM workflows

Approach

- Following up on normalisation work BIM and LCA
- Screening of existing tools and methods
- Focus group discussion with BIM and LCA experts from construction sector
- Cases
Concept LCA profile

LCA data for a certain *material type* or *combination of materials*

- represented through set of environmental indicators
- Generic set
- EPD (Environmental Product Declaration)
- Combination of both
WORKFLOWS FOR INTEGRATION OF BIM AND LCA

Main strategies for integration

1. Geometrical and material information to specialized LCA
WORKFLOWS FOR INTEGRATION OF BIM AND LCA

Main strategies for integration

1. Geometrical and material information to specialized LCA
2. Adding LCA data to the BIM model
WORKFLOWS FOR INTEGRATION OF BIM AND LCA

Strategy 1: Bill of quantities export
WORKFLOWS FOR INTEGRATION OF BIM AND LCA

Strategy 2: IFC import of surfaces
WORKFLOWS FOR INTEGRATION OF BIM AND LCA

Strategy 3: BIM viewer for linking LCA profiles

Diagram:
- BIM software
- BIM viewer
- LCA profiles
- Dedicated LCA software
- LCA results

Example: eveBIM
WORKFLOWS FOR INTEGRATION OF BIM AND LCA

Strategy 4: LCA plugin for BIM software
WORKFLOWS FOR INTEGRATION OF BIM AND LCA

Strategy 5: LCA enriched BIM objects
Objective of the LCA study

- Structural works
  - LCA in early phases feasible, due to low variety in used materials
- Architecture / Early design
  - LCA on building element rather than building level
- Technical installations
  - Too complex?

→ Conflicting modelling conventions for different disciplines / phases
→ Different levels of detail for different disciplines / phase
State of play

- BIM is the new way of working and efficiently exchanging information in the construction industry
- Environmental performance (LCA) becomes part of “general” building assessment
  → Practitioners want to use LCA, but integration and use must be “easy”

Types of integration in practice

- Notions of LCA → Gaining insights in environmental performance based on available data and models
  - OVERALL BUILDING ASSESSMENT: basic check in BIM environment (cfr. EPBD)
  - SPECIFIC MATERIAL CHOICES: basic comparisons within the BIM environment (cfr. BIM objects with manufacturer data)
- LCA expert assessment → Performing detailed assessment for environmental optimisation
  - Consider effects of different assumptions, compositions, …
  - Need for expert LCA environment but with easy transfer of data on building composition

→ Different needs depending on goal of integration
→ Need for more insights on needs throughout the design and construction process
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