Implementing a Framework for Qualitative Assessment of New Technical Solutions: A Case Study on CLT

Charlotte Svensson Tengberg¹ and Carl-Eric Hagentoft²

¹ Department of Architecture and Civil Engineering, Chalmers University of Technology, 412 96 Gothenburg Sweden and Skanska Sverige AB, Sweden, charlotte.tengberg@chalmers.se

² Department of Architecture and Civil Engineering, Chalmers University of Technology, 412 96 Gothenburg, Sweden, carl-eric.hagentoft@chalmers.se

Keywords: Serial Failure, Hygrothermal Performance, New Technical Solutions, Risk Assessment.

1 Introduction

In an interview study exploring introduction of new technical solutions in the Swedish construction industry, a common lack of (use of) thorough methods for evaluation of new solutions was identified (Svensson Tengberg and Hagentoft, 2019). The objective of this paper is twofold, firstly to investigate the potential of a framework for qualitative assessment in a case study and secondly to collect data on risks associated to the case study. The case study chosen was defined as: *Fulfilment of functional requirements related to building physics using technical solution of cross-laminated timber in a multi-dwelling building.* The work was performed according to a framework based on (Bednar and Hagentoft, 2015) shown in Figure 1, with strong emphasis on an expert workshop for risk identification and assessment as suggested in the framework.

![Figure 1. Work Flow adapted from (Bednar and Hagentoft, 2015). This paper focus on qualitative assessment.](image)

According to the participants at the expert workshop, the issue of far most relevance was moisture during the construction phase, specifically *Precipitation during construction.* Other risks of high relevance were noted: *Hygrothermal performance of external wall (including façade), Window connections, Balconies and Walls with membranes on both sides.* It can also be noted, *Water leakage from pipes* was lifted as the effects were considered highly unknown. An example of influencing parameters and a suggestion of which type of uncertainty associated with them are shown for *Precipitation during construction* in Figure 2.
2 Conclusions

- The general perception of the workshop was positive, and the workshop was perceived to give a lot of new insights to the participants.
- A well-prepared workshop with preparation material and hand-ins will help the process, starting from a more advanced level, spending less time on background or trivia.
- Setting up appropriate boundary conditions of the workshop is important and will affect the level of the result significantly. Preferably, the workshop format is repeated on increasingly more detailed levels throughout the process.
- Likelihood and consequences of different events are perceived as difficult to assess when introducing new technical solutions. This was handled at the workshop with focusing on establishing a thorough list of relevant uncertainties.
- To have different competences at the workshop was perceived as a prerequisite to enable a fruitful risk identification.

Future work will take two main paths. Firstly, continued analysis of the case study, with the aim to address and reduce risks in multi-dwelling buildings with CLT. Secondly continued adaption of the framework to the scope of introducing new technical solutions.

ORCID
Charlotte Svensson Tengberg: https://orcid.org/0000-0002-8648-0871
Carl-Eric Hagentoft: https://orcid.org/0000-0002-1616-361

References
Bednar, T. and Hagentoft, C.-E. (2015). Risk management by probabilistic assessment. Development of guidelines for practice, IEA Annex 55, RAP-RETRO. Göteborg: Department of Civil and Environment Engineering, Chalmers University of Technology.
Svensson Tengberg, C. and Hagentoft, C.-E. (2019). Introducing New Technical Solutions in the Swedish Construction Industry - Interviews with Key Actors. ASHRAE Thermal Performance of the Exterior Envelopes of Whole Buildings XIV International Conference (pp. 810-817). Clearwater, Florida, USA.