

Reflection

Within this research several products are developed: 11 requirements for better usable OFE's, an OFE design meeting these requirements and a factsheet and Design Guide to help architects in using the information for the design of better usable OFE's in the future.

The process preliminary to these products originates from the interest in operable windows or shutters, which has already been there for years. During an internship at DGMR, in the summer of 2015, Atze Boerstra suggested graduating at BBA Binnenmilieu. Just after that, in September 2015, Stanley Kurvers initiated researching Design Criteria for operable windows because some openable windows are not operable in practice. From there, the rough research design was developed. The graduation project started with a literature survey about office environments, effects of Operable Façade Elements (OFE's), aspects of OFE's and usage of OFE's with a focus on the indoor environmental factors thermal environment and air quality. An analysis of the BBA database provided knowledge why OFE's cannot always be opened adequately in practice. An interesting alternation between theoretical and practical information. Subsequently, a context mapping study was done to avoid a narrow view and overlooking essentials and to communicate directly with users. One of the lessons learned is that qualitative research by using generative sessions can lead to new insights for improvement or the design of new products.

This combination of methods provided a wide overview of theoretical, practical and user-centred knowledge. Due to varying types of information, the results were not directly comparable and difficult to systematically turn into final requirements. In this respect, it is learned that using diverse methods is valuable for a broader interception but combing results merit attention.

Within the study a rating list was made to help architects in their design of better usable OFE's. This turned out to be a complicating approach. Therefore, the factsheet and Design Guide were developed instead. The learning point was the value of more intensive preparation, especially to empathize the target group more deeply in advance.

This broadly intercepted research leaves room for optimization. Tests and evaluation of OFE's designed with the help of the Design Guide, for example the OFE design made in this study, would give more insight if the goal is reached. Though, making a 1:1 element and properly test whether it improves the usability or not was considered not feasible within the resting timespan.

This study identifies a broad spectrum of OFE related aspects and suggests sub-studies which would be interesting for further knowledge in enhancing the usability of OFE's. Means for designing better usable OFE's are provided, despite the difficulties with aggregation of the results and absence of tests in practice.

The developed requirements were the input of the OFE design, which is made to provide an example for inspiration in which design directions can be thought to meet the requirements and design better usable OFE's. The relation between research and design could be called "research for better design". The subject of this research fits within the Sustainable Design graduation studio, because it assists in improving the amount of OFE's designs that are appropriately usable in practice. In addition, in my opinion it is sustainable to offer user control and opportunity to improve air quality to occupants, which generally improves their health and workplace satisfaction while it does not need to cost extra energy, money or material. This affects a wider social context because it even leads to reduced sick leave, more productive occupants and better work.

REQUIREMENTS for OPERABLE WINDOWS that offer user control

Operable windows are often inappropriate usable in practice. The requirements and keywords in this factsheet help to enhance the usability of operable windows to improve personal control over thermal environment and indoor air quality. Each requirement contains a design suggestion to meet the requirement and an example which not meets the requirement.

