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User surveys for construction ecology and building optimization

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Abstract

The quality optimization of buildings demands the consideration of the principles of life cycle assessment as well as occupant satisfaction, particularly with the aim to create sustainable buildings and high comfort standards. The goal of the research project MOFNUG (Modular questionnaire for the user satisfaction in buildings), carried out by several Austrian Universities of Applied Sciences, is to determine the whole spectrum of user compliance in buildings by implementing different work packages, ranging from scientific research over purchasing of measurement tools to the improvement and optimization of the questionnaire, which is one of the main topics of the research group at the FH Wels.

1 Introduction

To fulfil the requirements of a sustainable and optimized building („High Performance Building“) it is necessary to take into account user satisfaction, the highest and most difficult objective to be achieved in the planning and operation of buildings [2].

Four universities of applied sciences where cooperating between 2013 and 2016 to shed light on this broadly diversified issue from different perspectives like marketing, psychology, energy technology and facility management. One main focus has been developing an online survey platform, which is used to “measure” relevant aspects of a building by creating modular questionnaires. This tool is able to respond to different circumstances (changing types of buildings or user structures) in a flexible way as it is constructed modularly [1][5][6].

The participation of the different universities has an impact on the variety of the modules and therefore on the increased platform flexibility. These modules range from aesthetic aspects and social interaction opportunities to building service engineering oriented topics. Improvements of already existing questionnaire parts (so called clusters) and generation of new modules have been done during the whole project.

2 MOFNUG Online Platform

To ensure easy usage of the platform for participants and prospective customers too, a clear and simple structure is necessary. Future customers can extend the questionnaire with minimum effort due to the modular design. Figure 1 shows the current visual appearance of the MOFNUG-project (just available in German). The different Clusters, as well as the number of included questions can be found by clicking “Fragen-Katalog” (questionnaire). If the page is scrolled down, each question of the currently open cluster can be seen.

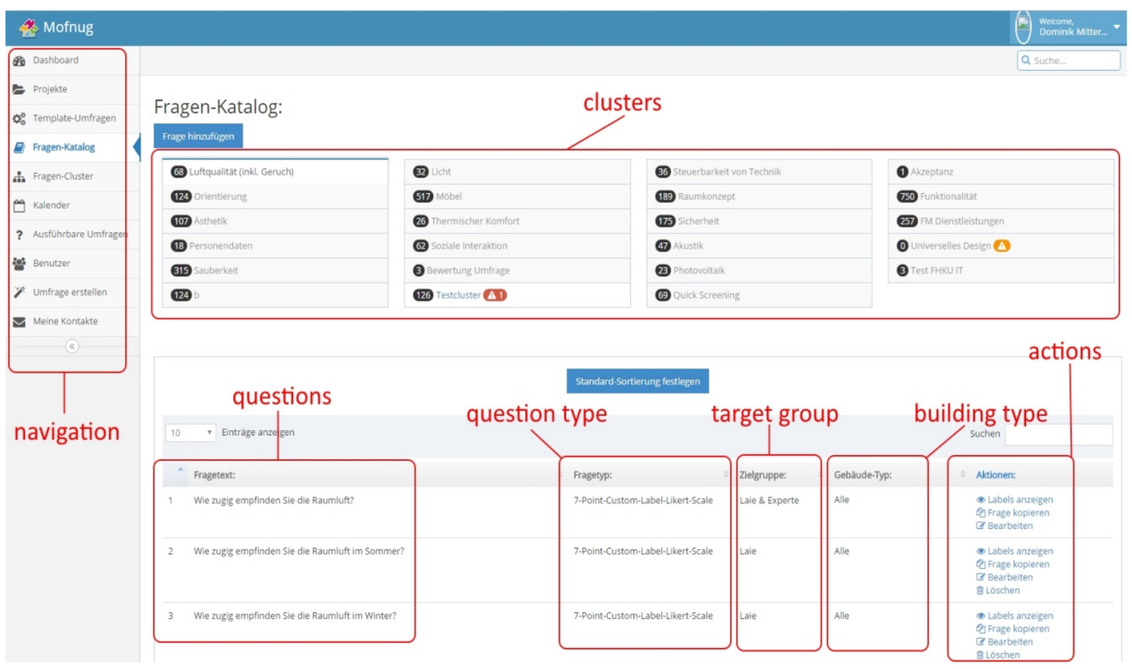

Figure 1:Showcase for the MOFNUG-tool with explanations in red [4]

The cluster “Thermischer Komfort” (thermal comfort) has been checked and optimized by practical measurements, simulations and interviews after comprehensive literature research [1].

This was followed by an extension of the literature research and an inclusion of additional modules by cooperation partners, for instance acoustic or visual comfort, cleanness or the room layout. For a high degree of visual comfort, an even illumination without considerable disturbance is required as well as individual adaption to the individual user’s needs. A visual connection to the outside world allows the user to inform about daytime, location and weather subconsciously and therefore should not be underestimated in importance.

3 Project Results

A main goal of the project was to generate an online platform where the modular questionnaire can be used to create surveys, perfectly tailored to the current needs. Each step, from developing an inquiry to its analysis can be done online without leaving the platform. At the moment, the first surveys have been performed to check and improve the online tool.

These surveys were performed within two master theses. Respondents receive an E-Mail, including a hyperlink which is valid only one time. As soon as the link is clicked, the survey opens and the first cluster is ready to be answered. After sending invitations, the survey builder can check how many people already have finished the poll. Moreover, an evaluation of the current results is possible immediately.

4 Building Automation Survey Results

One of the major surveys, “Gebäudeautomation an der FH Wels – Wie zufrieden sind Sie?”.(“Building automation at the University of Applied Sciences Wels – Are you satisfied?”) within one of the master theses took place in pursuance to test the MOFNUG-tool and to acquire information provided by experts as well as layman. As a result arising from the analysis, figure 2 compares the satisfaction of the interviewed employees with the indoor climate during summer and winter time. The amount of dissatisfied in summer is significantly higher than during winter time, which could be explained insufficient air conditioning systems resulting in a hot, humid indoor climate [3].

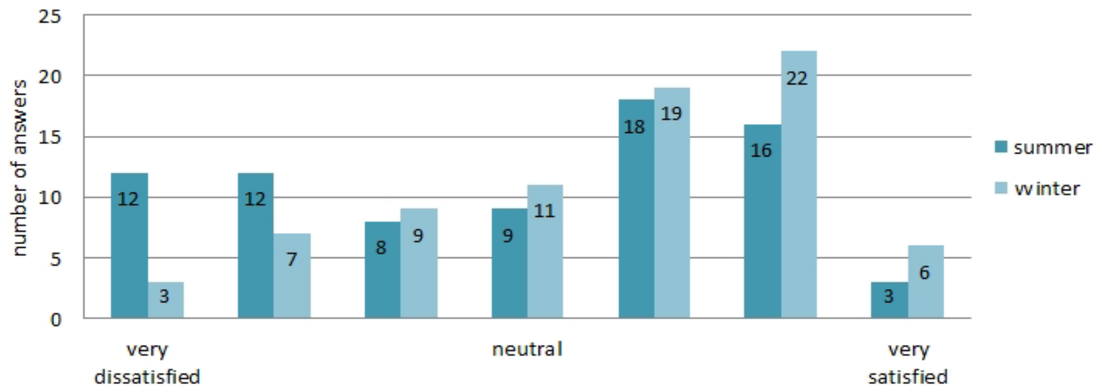

Figure 2: Comparison of occupant satisfaction regarding indoor climate [6]

For the creation of a survey it is crucial to have knowledge regarding the building, its automation systems and occupants. It should be differentiated whether the respondents are layman or experts in the assessed technical issues and subsequently to create varying surveys.

The MOFNUG-tool provides the possibilities to create and adapt surveys in a flexible and accessible way and is able to generate evaluations of the responses automatically. As an example, Figure 3 shows an automatically generated “Wordcloud” out of an free-text field of the poll [4].

Figure 3: word cloud about what could be done to lower the noise level [4]

4 Conclusion

The research project MOFNUG offers the opportunity to the involved parties to modularly tailor questionnaires on the subject`s requirements. The integration of measuring instruments allows a comparison of the knowledge obtained by the surveys with precise measurement data.

The MOFNUG platform is available from now on as a supportive instrument to push forward the optimization of buildings in a broad range of fields. The online presence ensures a successful application in commissioned projects as well as in teaching and research.

References

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MOFNUG

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