

## **Design of furniture and layout at the theater of the SmartXP-lab**

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The theater of the SmartXP-lab is an innovative and unique facility and is located at the University of Twente. Due to its technological infrastructure, movable trusses and flexible furniture it is suitable for multiple contexts of use. The supervisor of the theater has however stated that there is the desire to make improvements to the current set of furniture and its layout, so it fits the intended functions during the multiple contexts of use better.

To make these improvements and come to a concrete proposal for newly developed furniture and layout, the objective of the assignment is (a) to research the possibilities of new furniture for the theater of the SmartXP-lab in different contexts of use and (b) to design and make recommendations for the furniture and its layout in the theater of the SmartXP-lab.

To research the possibilities of new furniture, elaborate analyses were conducted into the various stakeholders and their needs, the multiple contexts of use and the current set of furniture. Surveys among students and teachers showed that the current educational environment lacks space for (non-) supervised project work, self-study and storage of large setups. Next to that, the rumour caused by the poor acoustics and open character of the theater create a restless learning environment during the educational contexts of use.

Another context of use involves research groups of the faculty EEMCS. This requires mobile furniture to create a wind-free area without exterior influences for testing drones. During all the context of use various pieces of furniture are used in different layouts. The transformation of layout in between contexts of use is done by the technician. This should be executed quick and without involving labour-intensive actions.

The outcomes confirm that the current set of furniture is not sufficient and needs additions to meet the intended functions during the contexts of use. In the development of new furniture, the emphasis is on the educational activities and to improve these, since they are the contexts of use with the highest priority. Since there are multiple problems and boundary conditions that need to be considered, solutions for the partial problems were transformed into five concepts. Using a ranking table and the opinions of the various stakeholders taken into account, concept roof was picked.

The concept consists of a roof shaped frame that hangs on the trusses with steel cables and could be raised and lowered. The roof shaped form evokes the feeling of home and a safe and enclosed working environment for users working underneath it. The acoustic materials could improve the rest in the theater and reduce the rumour. The LEDs can indicate which behaviour is desired, linked to the existing lighting system. Also, the adjustable lighting system provides suited lighting underneath the roof for various ambiances.

The concept was transformed into a real-life prototype. For the prototype (figure 1), the designed piece of furniture consists of roof shaped frame from PVC with cloth stretched in it. Underneath the roof LED-strips are placed, even as lights with adjustable colour temperature and light strength. Raising and lowering is not possible due to practical reasons.

Concluding, the newly developed furniture improves the educational contexts of use for both students and teachers. It improves rest by creating safe and enclosed working places, reduces the amount of rumour and is usable in various contexts of use. However, before implementation of a final design (figure 2), some recommendations can be made. More elaborate testing on the intended functions

need to be done to get a complete view on the improvement of the various contexts of use. Technical elaboration on the process of raising and lowering the roof is necessary to test if the transformation between contexts of use can be done easily and without labour-intensive actions involved. Testing with multiple roofs and improved absorbing materials and acoustic textile instead of stretched cloth must prove to which level the ambiance and rest can be improved and to what extent the product is used during various contexts of use.



Figure 1: prototype of concept roof

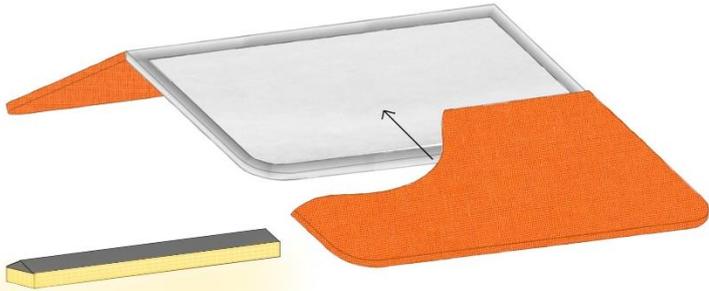


Figure 2: final design of roof