Safety Helmet 2.0,  
A Brainstorm Based Approach

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Abstract. This paper presents the concepts that were developed during a brainstorm, organized to develop concepts of safety gear that would be widely accepted by industrial workers. It describes the process the participants went through, their results (prototypes and concepts), and looks forward to the study and use of such new products.

Introduction

The Saxion University of Applied Sciences has recently started the project “Safety at Work”. The objective of the project is to increase safety at the workplace by applying and combining state of the art artifacts from the three disciplines: 1) Ambient Intelligence, 2) Industrial & Product Design and 3) Smart Functional Materials.

One strong factor that influences safety is human behavior. In the areas of marketing- and neuropsychology there are many examples of influencing human behavior [1, 2]. Interviews [3] with project partners and literature [4–7], show that often industrial workers do not wear all the prescribed safety gear (safety helmets, safety goggles, etc.). An especially big problem for industrial environments is that many workers are not willing to wear helmets simply because they are not comfortable [4, 5], or they expect the dangers of not wearing one to be negligible.

Acknowledging this problem, we decided to introduce factors of marketing- and neuropsychology to Industrial Design students. These students participated in a full day creative session in which they attended a master class about the concepts of marketing- and neuropsychology, participated in a brainstorm and developed concepts of products that influence safe behavior.

This paper focuses on the process of the brainstorm and concept development, it also gives an overview on the final concepts that delivered.
Method

A convenience sample of fifteen participants (9 male and 6 female) was invited to attend the workshop. Six participants were in the early stages of their studies, 9 in their final year. All the participants studied at the Life Science, Engineering & Design department of a Dutch University for Applied sciences.

None of the participants had any specific knowledge about the psychology of persuasion, or influencing human senses. Therefore they were all treated to a master class in these topics. In the master class basic concepts from the work of Cialdini (2008) were introduced, and related to safety. Another master class introduced them to the concept of influencing human senses, which were also related to safety.

After the master class, the participants were randomly divided into four teams (3*4, and 1*3 participants), and given a case. The case stated that, as found in previous studies, safety helmets are often not worn because of comfort issues, a lack of sense of necessity, or ignorance. In order to make workers wear their helmets more frequently and more voluntarily, the participants needed to come up with key design aspects to tackle this problem.

First a mood board with the basic concept of a team was designed to make the problem more visible. After presenting their idea, other groups and a team of experts (N=4) commented on the ideas. The next step for the teams was to work out their ideas into a concrete concept based on the knowledge gathered during the master classes.

After finishing the mood board, and describing the general concept, a presentation was given by all the teams to discuss the ideas with their fellow participants, industry representatives, and the inspirator of the master class. This session made it possible to create a mutual understanding of all concepts, and to clear out any obscurities.

During the remainder of the day, the teams elaborated on their concepts.

Results

The teams worked individually on their concepts. However, similar key aspects have been found among multiple teams. All teams developed concepts to persuade workers to wear their helmet and safety gear.

<table>
<thead>
<tr>
<th>Team</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common goal</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>
Table 1: Concept categories for improving safety gear.

As can be seen in table 1, most teams came up with concepts in which the safety gear was more personalized, or that had a multifunctional purpose.

Typical concepts in the category of multifunctional purpose were wearing the helmet as a time registration tool; building in safety goggle or sunglasses; building in a music and radio system; using head up displays for work related instructions, and applying a noise cancelling system to the helmet. Typical concepts in the category of personalization were using stickers on surface of the helmet that relate to the image of the worker; placing personal lockers that showcase the helmets; give the helmet a name; give the helmet a strong personality through colors, images, and exterior; give the helmet a clear corporate identity.

In the final product development phase, several physical and strategic concepts were combined. The final combined concept was a helmet, designed like a snowboard helmet, enriched with lightning, build-in ventilation, safety glasses, and earplugs. These earplugs are not only used as an active noise cancelling system, but also as a worker-to-worker and management-to-worker communication device. The digitally
enhanced safety glasses have a build-in display for work instructions. In order to ensure successful implementation of this system into the workers-population, a campaign-team of physically attractive young women are sent into the field. These women supply the workers with omelets, bean soup, and other popular snacks during lunch breaks.

**Conclusion & Future work**

The creative session led to a diverse set of concepts, which in the future can be further explored. The results and directions of this session will be used in future studies in the project Safety at Work. A first step is to physically design a prototype of the helmet. This prototype will be used in work field questionnaires and interviews. A redesign of the helmet will be made, and a field trial will be run in a protected environment in order to test the feasibility, suitability, and acceptance of the concept.

Further work is needed in order to strengthen the foundation of the concepts developed. An acceptance study for helmet innovations in the industry is needed to enlarge the change of a successful implementation of these new types of helmets.

**References**


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