

The Motivational Safety Helmet Redesign Suggestions Improving the Intrinsic Motivation of Construction Site Workers to Wear their Safety Helmet

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Abstract. In reaction to the lack of intrinsic motivation of construction site workers, to wear their safety helmets at all times, a series of research projects studied causes and possible solutions. Goal is to gain an inspirational discussion to get the design onto the next level.

Contribution statement. Persuasive technologies are implemented in product design, such as using motivational theories and smart systems

Keywords: persuasive technology, behavior, motivation, stimulus, intrinsic, extrinsic, safety, construction site

1 Introduction

Improving the safety helmet is part of the project Safety at Work, that takes place at the Research Centre for Design and Technology at Saxion University of Applied Sciences, the Netherlands. It appeared that construction site workers are not always intrinsically motivated to wear their safety helmet. Being obligatory to wear safety helmets at construction sites, we see a mostly extrinsic motivation among construction site workers [1].

2 Purpose of the system

Therefore, a series of projects have taken place, focusing on the possibilities of persuasive technology. The two main directions in these projects were finding out 1) to what extent there is a limited intrinsic motivation to wear the safety helmet, and 2) how to increase the intrinsic motivation of construction site workers to wear their safety helmet at all times on construction sites. Purpose of the system is a new design causing an improved intrinsic motivation to wear the safety helmet.

3 Status of Implementation and Deployment

From qualitative usability studies with construction site workers [2, 3], the most restricting aspects appeared to be the frequency of bumping the head while wearing the safety helmet and the lack of comfort, such as a warm head during hot summer days.

Important from a safety point of view, we discovered an unawareness or lack of attention for the possible material deterioration of the helmet after impact as well.

We want to present two newly developed prototype helmets that are tested in a usability study [3]: a prototype showing the possible new design and a functional prototype with embedded smart technologies (see fig. 1). The design is based on motivational theories. Deci & Ryan [4] explain that motivation can be divided into an intrinsic and extrinsic motivation. The obligation to wear safety helmets at construction sites results in an extrinsic motivation. Bumping the head, for instance, weakens this motivation to wear the helmet at all times. Therefore the intrinsic motivation should be addressed. Usability studies showed that there are several disturbing aspects of the helmet which could be addressed via the design.

Highlights are the smart sensor system warning for approaching obstacles, the photochromatic sun visor to improve the upward view, the soft shell to decrease impact and protect the hard shell of the helmet.



Fig. 1. From left to right: the new design, the visual prototype and the functional prototypes

Evaluating the usability study with construction site workers, it appeared that the smart system was appreciated, but not in its current form. Most comments on the design regarded comfort related aspects, which relate to current helmets as well. Think of the heavy feeling weight of the safety helmet and the (un)comfortable fitting of the helmet on the head. Moreover, from a technical point of view, embedding sensors through the shell is possibly not accepted due to strength qualifications.

Currently, new suggestions for an improved safety helmet design are being made, integrating theories by Malone and Lepper [5] on the diversification of (intrinsic) motivation and stimuli. Combined with results from the second usability studies [3], we suggest a lightweight sensor system. Perhaps the parking sensor systems in cars may form a solution. More attention on comfort is part of the focus as well.

From the project Safety at Work perspective, we are looking for ways to connect the smart system of the safety helmet to a smart sensor shirt which is being developed within the same project.

4 What Do We Want

We want to discuss the two prototypes, the used underlying intrinsic motivation theories and the newly raised possibilities for implementing persuasive technologies to further improve the safety helmet.

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