Faster boarding time is just one intervention away

A design study that researches design solutions to cause effective crowd deviation on Dutch platforms using behavior change theories.

This design study focuses on the problem statement: *Dutch train platforms need an innovative design direction to motivate travelers to locate themselves towards their optimal position regarding a minimalized boarding time for trains in the Netherlands.* Currently, travelers are not moving to the optimal waiting position. Optimal in this context indicates an even spread crowd on a platform. As per 2030 the national number of 1,3 million train travelers per day will be increased with a percentage between the 30 and 40 (*Meer en snellere treinen*, 2019). In order to reach this target, the boarding time has to be minimized, as that is the major cause of current delay. The higher train frequency requires a more even crowd deviation. To get the travelers to wait in a better location, a design intervention for behavior change is researched in this study. Internal user data of platform 5 of Utrecht Centraal from ProRail shows that current travelers are halting around the ascending and descending point on platforms. These halting points include escalators, elevators, and stairs. This study focuses on behavior change techniques to help travelers spread out more evenly on the platform. This approach will be developed and evaluated through a design intervention.

The aim of this study is answering the research question : *"How can a design intervention for train platforms motivate travelers to locate themselves towards their optimal position regarding a minimalized boarding time for trains in the Netherlands?".*

The design approach during this assignment was iterative. The process is divided into various phases to thoroughly explore possibilities for this design study. The chapters are *research, requirement formulation, intervention design, evaluate, conclude, discuss, and recommend*. The chapter *research* elaborates on effective factors to motivate travelers to change their behavior, based on literature research. This literature research is conducted focused on *human behavior, behavior change, nudging, decision making, persuasion, social proof, framing, colors, and patterns* to answer the sub question 'Which behavioral, visual and physical factors are effective in motivating travelers to move to their optimal waiting location at platforms?'. Additional to the literature research, a comparative analysis was conducted to explore previous piloted solutions. Also, a train type and configuration material research are performed to get insight into train usage data on platforms. The chapter *requirement formulation* translates insights collected from the literature research about the prospect theory, gain-framing (Zikmund-Fisher, 2008), and color and patterns association (Ramachandran & Hirstein, 1999) into design requirements. The chapter *intervention design* rates various solutions based on set requirements, considering the clients opinion.

The resulting short-term design solution *Let's link* implements uniformity into the current system. The concept uses a simplified train icon to communicate the wagon and its location. The short-term solution integrates Berlyne's model stating that *complexity*

determines the level of arousal when processing information. The prospect theory (Kahneman, 1979) describes that losses are more decisive on decisions than gains. This is integrated in the resulting long-term design solution *InfoView*, by indicating crowdedness with color. The red and crowded areas communicate a loss in the sense of a longer waiting period. The green and less crowded areas communicate a gain in the sense of a shorter waiting time. The chapter *evaluate* analyzes the possible effectiveness of the selected interventions using the House of Quality framework and elaborates on the feasibility of the proposed solutions. The chapter *conclude* answers the main design question on the short-term and long-term. *Discuss* evaluates the research, and reflects on points of improvement and future research opportunities. Lastly, the chapter *recommend*, states follow-up activities for this study.

The result of this assignment is a short-term and long-term design intervention proposal. The short-term intervention (Figure 1) would be implementing uniformity into the current system. The current system uses the NS application, information screens and physical signs with three varying visual cues. The proposed design solution *Let's link* uses visual clarity to upgrade the current system with already existing materials and sources. This concept proposes presenting the icons used on the mobile application like the icons on the digital signs on the platform.
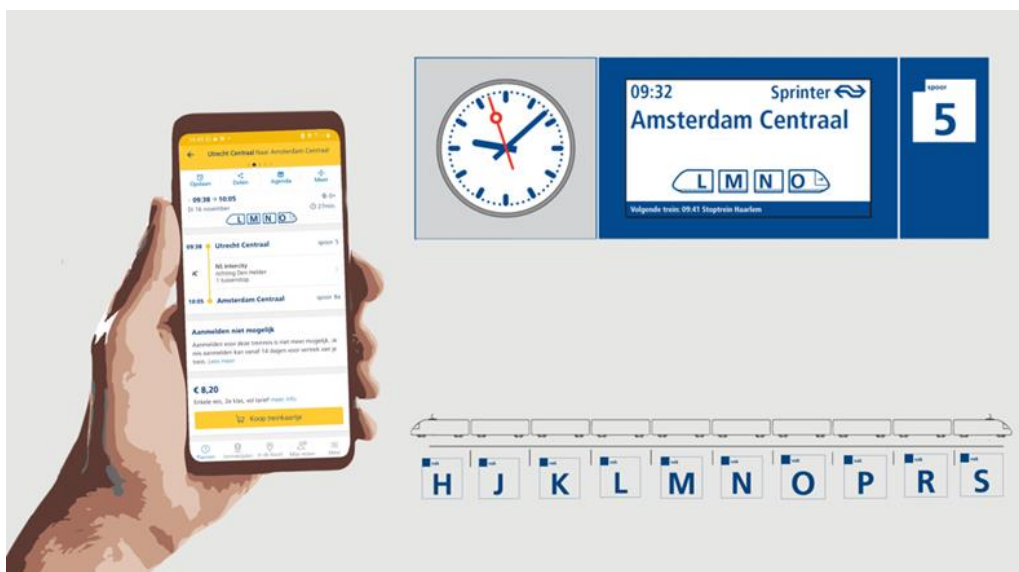

Figure 1 Short term uniformity solution

A promising long-term solution (Figure 2), resulting from this research, uses augmented reality to inform travelers on a platform. This proposed solution displays a filter in the reality a traveler is in. *InfoView* is designed to smoothly let travelers interpret the information, directly in the complete context. This filter contains information about crowdedness and platform orientation. Augmented reality is an up-and-coming technology and can be expanded in its implementation for not only the platform, but the station as a whole.
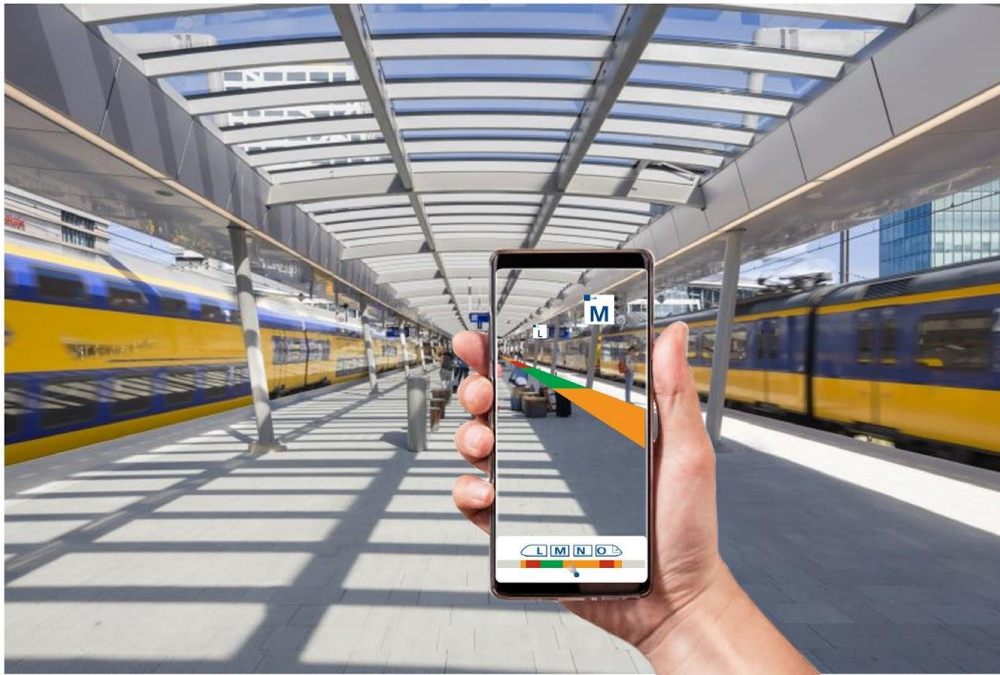
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Figure 2 Long term augmented reality solution InfoView

Future research in this field should look further into the ethical impact of augmented reality as an information provision tool. This technique determines the perspective of users. To individualize the information for users, the application could offer personalizable options like displaying toilet locations and sheltered waiting areas. Lastly, prototype testing falls out of the scope of this study, but is required to optimize the concept in the future.

References

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