

# Selecting effective persuasive strategies in Behavior Change Support Systems

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**Abstract.** The Third International Workshop on Behavior Change Support Systems provides a place to discuss recent advances in BCSS research. The selected papers show that research into behavior change support systems is expanding: not only by trying to reach more and other people, but also by expanding the contexts where BCSSs are employed. A key point for all BCSSs, for each target group and for each context, is to select the right persuasive strategies. From the proceedings we can learn that there are several ways to select and evaluate these features, but this remains an issue that deserves continuous research attention.

## 1 Introduction

Technology is everywhere. Our homes and workplaces are filled with technology and people themselves carry more and more technology with them everywhere they go. Furthermore, persuasion is everywhere. From doing grocery shopping to reading the news online, we are being persuaded to buy certain products or behave a certain way. This persuasion is not new, only the way it is presented to us, is changing. With the ubiquitous presence of technology, there is also ubiquitous presence of persuasion through technology. However, because of the sometimes overwhelming possibilities and instances of persuasion, it is even more important to select the right strategies to actually influence the behavior of people and not just add to the ‘noise’ of persuasion all around us. This poses real challenges for researchers and practitioners in the field of Behavior Change Support Systems (BCSSs) [1].

The aim of a BCSS is to help people to change their behavior through technology. Two domains that have gained considerable attention are the health and the energy domain. In the health domain, BCSSs have been developed to support people to become more physically active, or to shop and eat healthier (e.g. [2,3]). In the energy sector, BCSSs have been created to help people become aware of their energy consumption and to reduce this (e.g. [4]). However, BCSSs also hold potential for other domains, e.g. in the context of the workplace [5,6]. BCSSs may support people to work according to protocols or to help them work more efficiently. In all these cases, the BCSS helps people to change their behavior, but there is always a certain level of

motivation to start with. It is the challenge for BCSSs to find the right way and the right moment to persuade the user to reach previously agreed upon goals.

Finding this right way of persuasion is a challenge that can be seen in the development and evaluation of many BCSSs, but has not always received very structured attention. There are multiple ways how to deal with this challenge. For instance, the Persuasive System Design Model (PSD-model) [7] provides guidelines for developing and evaluating BCSSs. It states that for developing BCSSs, the starting point is understanding the postulates that underline each persuasive system. After that, one should analyze the intent, event and strategy. Only then can developers decide on which persuasive features can be used to reach the goals of the BCSS. The persuasive features in the PSD-model are divided into four categories. Primary task support holds strategies that are aimed to make the main task of the BCSS easier for the user. Examples of strategies in this category are reduction (reducing complex behavior to simpler tasks) and tailoring (presenting information that is tailored to the needs and wishes of a target group). Strategies from primary task support seem to be used most in many BCSSs, from web-based interventions to mobile apps [8,9]. This emphasis on primary task support features seems logical from the perspective of the developers (i.e. most of the time the BCSS is built to support this primary task) and many individual features been shown to be effective in behavior change (e.g. the positive effects of tailoring are well known [10]. However, deciding which primary task support features to choose in which situation, is still a challenge. Moreover, primary task support is not the only category of persuasive features and research shows that other categories might even be more important for the persuasive power of BCSSs than primary task support [8,11,12].

Dialogue support, the second category of persuasive features in the PSD-model, is aimed at supporting the dialogue between the user and the system. Examples of features from this category are reminders, praise and a social role. Reminders are a feature that is well investigated and can play an important role in persuading users [13,14]. Not surprising, this feature has been used in many BCSSs (see e.g. [8,9]). Other features from this category have been used less often, although with the recent rise of gamification techniques, features as (virtual) rewards are getting more attention (see e.g. [15]). Research shows that dialogue support as a category seems to play an important role in persuading users [8,11,12].

Credibility support, or the ways to make a system more credible and this persuasive, has been used to some extent in BCSS [9,16,17]. Credibility is an important issue in our digital community, but selecting the right way to support credibility of BCSS seems to have gotten only limited attention.

The last category of persuasive features in the PSD-model is social support, or the ways to design the system so that it motivates users by leveraging social influence. Social support through technology has received a lot research attention (see e.g. [18-20]) and seems to provide huge opportunities to persuade people in our social environment, which takes place more and more in our online world. The humanization of the web [21] plays an important role in this respect. In this light, is it even more surprising that social support features are used so little in BCSSs [8,9,16,17].

## 2 Advances in BCSS research

The Third International Workshop on Behavior Change Support Systems provides a place to discuss recent advances in BCSS research. The six papers presented at the workshop all cover the timely topic of how to select and evaluate effective persuasive strategies. The first session includes three papers that are about selecting persuasive strategies to increase the reach of BCSS. The second session covers three papers that show the importance of the context of the BCSS.

### 2.1 Persuasive strategies to increase reach

*Triggers in the environment; increasing the reach of Behavior Change Support Systems by connecting to the offline world* by Ludden and Offringa [22] discusses why many BCSSs have limited reach and provides an alternative approach to increase reach; design for stages of change. Through a case study, the authors show that triggers in the environment can be designed that may reach a larger group than an online BCSS. By connecting these offline triggers to the BCSS, reach may be increased.

*Enhancing persuasive features of Behavior Change Support Systems: the role of U-FADE* by Wiafe and Frempong [23] builds on earlier work on the three-dimensional relationships between attitude and behavior (3D-RAB) model [24] and addresses the issue of changing user needs during the use of BCSSs. When BCSSs are not ready for these changing needs, they become obsolete for a group of users, thereby diminishing its reach. The Unified Framework for Analyzing, Designing and Evaluating persuasive systems (U-FADE) provides an approach to evaluate and select persuasive features based on the (changing) needs of the targeted users. Application to an existing weight management intervention shows the possibilities of this approach.

*How Persuasive are Serious Games, Social Media and mHealth Technologies for Vulnerable Young Adults? Design Factors for Health Behavior and Lifestyle Change Support: Sexual Health Case* by Kulyk, Den Haas, David and Van Gemert-Pijnen [25] aims to identify effective persuasive features for a specific target group which is not reached by regular interventions. They use the case of improving the sexual health of vulnerable young adults and employ focus groups to gain insight into the needs and attitudes of these young adults towards persuasive features and design factors that contribute to the use and uptake of existing and new health technologies.

### 2.2 Importance of context

*About the persuasion context for BCSSs: analyzing the contextual factors* by Halttu, Oduor, Tikka and Oinas-Kukkonen [26] emphasizes the importance of taking the context into account for designing and evaluating BCSSs. They present the event model, which is a conceptual tool for identifying which contextual factors are important and how to take these factors into account. This event model is an extension of the persuasion context of the PSD-model and provides more concrete factors that potentially play a role in the everyday lives of end-users and should be taken into account when investigating a BCSS.

*Behavior Change Support Systems for Privacy and Security* by Kegel and Wieringa [27] proposes to use a BCSS for a specific domain, namely information security. For this specific context, the challenges seem to differ from areas that have received more attention in the BCSS-field like healthcare and energy consumption. Challenges that have been identified are motivation and change type, and the dynamic nature of security threats. The authors propose the Personal Information Security Assistant (PISA) as a possible solution to these challenges.

*Persuasive information security: a Behavior Change Support System to help employees protect organizational information security* by Busch, Patil, Regal, Hochleitner, Fröhlich and Tscheligi [28] also tackles the issue of information security, but in the context of the workplace. They present a Behavior Change Support prototype that implements persuasive features (points, quiz, challenges, statistics, personalization and risk communication) to support employees to comply with information security policies. Preliminary results of user studies show that this is a promising approach for influencing user attitudes and behaviors regarding secure work practices.

### 3 Discussion

The selected papers for the workshop show that research into behavior change support systems is expanding: not only by trying to reach more and other people, but also by expanding the contexts where BCSSs are employed. The workshop provides an opportunity for researchers to discuss new steps in these directions. A key point for all BCSSs, for each target group and for each context, is to select the right persuasive strategies. From the proceedings we can learn that there are several ways to select and evaluate these features, but this remains an issue that deserves continuous research attention.

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