The 10th Annual Workshop on Behavior Change Support Systems

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1 Introduction

The behavior change support system (BCSS) workshop is, by nature, a multidisciplinary gathering of researchers and practitioners in the field of persuasive technology. Such technology is present today in our lives in many formats, be it smartwatches, smartphones, fitness trackers or many other tools we are presented with to improve our lives, society, and environment, to mention but a few domains [1,2,3].

The use of technologies as persuaders can reveal new aspects regarding the interaction process of persuasion and influencing attitudes and behaviors. Yet, although human-computer interaction is social by nature and people often do see computers as social actors, it is still often unknown how these interactions re-shape attitude, beliefs, and emotions, or how they change behavior, and what the drawbacks are for persuasion via technologies. Humans re-shape technology, changing their goals during usage. This means that persuasion is not a static ad-hoc event but an ongoing process.
Validated and suitable evaluation methods, as well as mixed methods approaches, are needed to measure engagement, emotions, and social influence of persuasive technologies in various environments. BCSSs pose a number of specific challenges, such as personal goal setting, personalized feedback, support for computer-mediated communication, 24/7 availability, feasible business models, as well as suitable methods and processes to develop scalable software platforms and architectures for these systems.
The persuasive technology field is becoming a linking pin connecting natural and social sciences, requiring a holistic view on persuasive technologies, as well as a multi- disciplinary approach for design, implementation, and evaluation. So far, the capacities of technologies to change behaviors and to continuously monitor the progress and effects of interventions are not being used to its full potential. Specific aspects of the intervent ion (its content or the system) contributing to the results and user adherence often remain unknown, known as the 'black box' phenomenon [4].

Research and development of BCSSs has a solid base in existing research and validated models to build on, e.g. [4,5,6]. Such work offers various fields both theoretical approaches as well as more practical toolkits or measurement instruments. In addition, and with an objective of supporting the practitioner in the field, identifying and

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aggregating knowledge regarding best practices and lessons learned in various contexts would extend the practice-oriented applicability of BCSS research. Research projects evaluate their success and the results of, for example, an intervention designed; However, we could learn more about the exact strengths and weaknesses in a variety of situations. There can be many practical benefits from learning more about effective and functional approaches, namely, best practices in the field. The technologies and data available now can be a combination of technologies and data sources, such as robotics, sensors, analysis methods, etc. When setting out to develop new persuasive technology, what can be done to support developers and designers in their quest to match the best approaches and technologies to their behavior change support system objectives and contexts? Such questions are at the core of the BCSS Workshop.

2 The 10th International Workshop on BCSS

BCSS workshop, already running for the 10th time at Persuasive Technology (2022 in Doha, Qatar), is a workshop that builds around the concept of systems that are specifically designed to help and support behaviour change in individuals or groups. The highly multi-disciplinary nature of designing and implementing behaviour change strategies and systems for the strategies has been in the forefront of this workshop from the very beginning. The organisation for online BCSS 2022 Workshop included Laurence Alpay (Inholland University of Applied Sciences, the Netherlands) and Piiastiina Tikka (University of Oulu, Finland) as co-chairs, Sanaul Haque (LUT University, Finland) as the organising chair, and Harri Oinas-Kukkonen (Universtity of Oulu, Finland) and Lisette van Gemert-Pijnen (Twente University, the Netherlands) as general co-chairs. We wish to thank the Programme Committee for their work and support:

- Arakawa, Yutaka (Kyushu University, Japan)
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This year, 2022, the BCSS workshop was arranged as a mini workshop with only four selected papers and more time dedicated to workshop activities around this year's workshop themes of 'best practices' in BCSS design and implementation. BCSS research is evolving and increasingly being applied in different domains such as healthcare, education, marketing, work, energy consumption. The workshop activities

aimed at discussing the lessons learned from using BCSS in various contexts and examining whether (common) guidelines can be extracted from their design and application of BCSS.

3 Presented work

The papers in the workshop in 2022 addressed a range of topics and approaches to behaviour change. In their paper '*Using persuasive features to promote physical activity for older employees – Report from the AgeWell project'* Hungerländer, Merizzi and Sili (in this workshop proceedings) present the design and development of one part of a larger AgeWell project, namely the construction of an 'activity reasoner' used in the system to personalise a user's activity goals in a dynamic, changing manner. Using user-centric methods and building on the PSD model [4] and a taxonomy of behavior change techniques (BCTs) [7], a set of requirements were identified for a virtual coach. The system in question has to identify the physical activity capability and level of its users and then be able to set initial activity goals that will then be adjusted based on actual activity over time. As persuasive elements, the system used means for the user to select what to perform and when. It offered weekly new goals that were adapted to each user, offered positive communication on past success, offered feedback on behavior, and used reminders for upcoming events.

In their paper '*Preliminary study on the correlation between gratitude activity and prosocial behaviour*', Kashimoto, Sakai, and Arakawa (in this workshop proceedings) delve into a more foundational level of behavioural aspects of behavioral impact. The paper studies the effect of gratitude activity on prosocial behavior, hypothesising that show of gratitude predicts prosocial behaviour via self-efficacy and social worth. The authors conclude that gratitude "promotes "interpersonal help", "concentration on the job", and "supporting the organisation". This would conclude that even when facing challenges, workers in an organisation would feel supported by their colleagues and can have the confidence to overcome those challenges. Workers who become aware of gratitude can notice the support they have from their colleagues, gain confidence to meet challenges, and are likely to help their colleagues (prosocial behavior) given how they value interpersonal relationships with others. The implications to BCSSs from this preliminary research is the potential for interventions to promote prosocial behaviors through stimulating self-efficacy or by stimulating their sense of self-worth by using a system where appropriate messages can be directed at colleagues.

Giving attention to a different problem domain in everyday behavior, Ohira, Nakamura and Arakawa (in this workshop proceedings) constructed an apparatus and means of monitoring and visualising the degree to which elevators were crowded in buildings where it was also possible to take the stairs. The premise for nudging physical activity was to show people waiting for an elevator how full the elevator was and thus indicate there would be a waiting time to have the elevator empty enough to adhere to covid-19 distancing recommendations. Such indication of waiting time was expected to prompt people to choose taking the stairs instead of the elevator. The study did not measure the actual outcome in terms of how many people did take the stairs Instead, the focus of

the study is on the feasibility of the method for measuring crowdedness of the elevator space.

Finally, the fourth paper in the workshop by Paajala, Agyei and Karppinen (in this workshop proceedings) presents us with a discussion over the potential uses of Blockchain in persuasive system design. In this paper the authors strive to define possibilities and identify possible hindrances or obstacles in how Blockchain could be used in support of BCSS. The key application areas identified in the paper involve largely health related systems, where individuals' health data is naturally sensitive and confidential. Downsides involve environmental factors given the energy consumptive nature of Blockchain technology.

Overall, the contributions to this year's BCSS workshop offered the interactive session an opportunity to discuss what sort of best practices from different fields can be identified in BCSS design and implementation. The workshop provided some basis to identify not only the facilitators, but also the obstacles and the barriers to best practices as well as taking into account the relevant stakeholders.

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