The Sixth International Workshop on Behavior Change Support Systems (BCSS 2018): Using extensive data in design & evaluation of BCSS

In conjunction with the Annual International Conference on Persuasive Technology

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1   Background

With its ever-growing possibilities, it is impossible to imagine our everyday life without smart technology. Technology is not only embedded into our homes or workplaces, people are carrying more and more technology with them throughout the day. This increased pervasiveness of technology enables us to use real world data tracked in daily life over longer periods of time in persuasive systems [1]. These developments shed a new light over the design and evaluation of Behavior Change Support Systems (BCSSs) [2].

The increased use over time of persuasive systems also introduces a number of challenges. For example, the data that is being collected via BCSSs provides great opportunities for data-driven coaching to enhance and retain health and wellbeing of users. Large amounts of valid, real-time data generated by technologies (e.g., log data [3] and monitoring data) allow for advancing models and theories of behaviour change to support individuals in changing their behaviour and that enable the personalization of technologies [4, 5]. However, these opportunities pose as well a number of challenges. For example, chosing the timing, modality, content, and possibly the device of persuasive strategies that support users in performing certain behaviors is an important challenge for research and the development of persuasive systems in different contexts, such as health [6], energy, or the everyday workplace.

At the same time, this increase of valuable quantitative data introduces challenges for the evaluation of BCSSs as well. Up to now, traditional evaluation approaches do not always provide insight into the interaction process between the user and the technology and how the technology supported the user in performing certain behavior is missing from these evaluations [7]. Furthermore, to accommodate to the complexity of behavior change, BCSSs

often consist of multiple components that people can use in many different ways in terms of elements used, and frequency, time, and place of use [8, 9]. The experienced content might therefore differ across all users because through its use, technologies are tailored and personalized to an individual. Current evaluations however, provide limited insights into the process outcomes or how the use of the different components of the technology has contributed to healthier living, improved wellbeing, or a user's ability to conduct daily tasks [7, 9, 10]. Thus, the characteristics of more pervasive technology and the influence of the user and the context in which the technology is implemented and used, change the way evaluations should be conducted [3, 11]. Therefore, it is necessary to develop and evaluate innovative approaches that allow for a close look into the process by which users find and share information, and a more holistic view on how users gain benefits out of the persuasive technology [12, 13].

The BCSS workshop aims at connecting researchers, practitioners, and experts with a great variety of backgrounds who are developing, implementing and/or evaluating BCSSs. During the workshop we will discuss, share, and develop insights about the use of more and more types of data for better fitted persuasive systems and development and/or evaluation thereof.

2   Workshop Organizers

Programme Co-Chairs: Floor Sieverink and Randy Klaassen (University of Twente, the Netherlands)
Organizing Co-Chairs: Robby van Delden and Jobke Wentzel (University of Twente, the Netherlands)
General Co-Chairs: Lisette van Gemert-Pijnen, Dirk Heylen (University of Twente, the Netherlands) and Harri Oinas-Kukkonen, (University of Oulu, Finland)

3   Workshop structure

All submissions were reviewed by at least two reviewers. Authors of accepted papers were invited to present their work at the workshop. The workshop proceedings include the accepted papers and an introduction by the organizing committee. The proceedings is published via the website of the workshop and through CEUR Workshop Proceedings (CEUR-WS.org).

The workshop consists of short presentations from the authors of the accepted papers, followed by questions and discussions. To facilitate a mutual and broader understanding of Behavior Change models in BCSSs, the main themes and challenges emerging from the accepted papers will be discussed in smaller groups. The workshop will be concluded with all groups presenting the outcomes of their discussion, providing this vibrant community an important step to make a difference.

4   Topics/Themes

Topics for submissions as advertised in the call for papers included, but were not limited to:

- Smart monitoring for persuasive coaching especially in (but not limited to) the area of health and well-being.
- Developing just-in-time persuasive prompts and feedback to support behavior and to create adherence and engagement to different technologies, using data generated by smart sensors, self-tracking devices, wearables, etc.
- Engagement, integration, connectivity, personalization, and changes in Persuasive Technology.
- Interactive visualizations (including virtual coaches and dialogues) for personalization and social support.
- High tech, human touch/humanizing technology.
- Connectivity designs for social support, e.g. for lifestyle change and improving wellbeing.
- Design guidelines for the design, implementation and evaluation of BCSSs.
- Persuasive strategies related to different outcomes (engagement; resilience; attitudes; compliance; behaviors) and levels (individual; community; society) of change.

This year, we especially welcomed papers regarding the evaluation of BCSS:

- Methods for measuring the impact of BCSSs and smart persuasive environments on individuals, community, and society.
- Methods for measuring the effect of persuasive strategies on task adherence (e.g., via fractional factorial designs).
- Methods (including mixed methods approaches) for measuring various aspects of BCSSs in the wild; considering context and including process and product measurements in a real-life setting.
- Methods or approaches to evaluate the persuasiveness of different technologies for BCSSs (mobile, ubiquitous, ambient technologies, virtual environments, sensor-based, etc.).
- Advanced big data analytics for analyzing and interpreting usage data and self-tracking data from (multimodal) sensors.
- Translating the outcomes into multimodal feedback cues, and their effects on adherence and outcomes.
- Advanced analytics to predict adherence and to identify usage patterns and its effects on adherence.
- Implementation strategies to deal with proprietary closed algorithm layers to gather reliably gather data of daily use, using commercial sensor devices.

5   Important Dates

Submission deadline: February 12, 2018.
Notification to authors: February 26, 2018,
Final version due: March 12, 2018,
Workshop date: April 17, 2018,

6   References

1. Op den Akker, R., Klaassen, R., Bul, K., Kato, P., Van der Burg, G.J., Di Bitonto, P.: Let them play: experiences in the wild with a gamification and coaching system for young diabetes patients. In: Proceedings of PervasiveHealth '17 11th EAI International Conference on Pervasive Computing Technologies for Healthcare. (2017)
2. Oinas-Kukkonen, H.: A foundation for the study of behavior change support systems. Personal and Ubiquitous Computing 17, 1223-1235 (2013)
3. Sieverink, F., Kelders, S., Poel, M., van Gemert-Pijnen, L.: Opening the Black Box of Electronic Health: Collecting, Analyzing, and Interpreting Log Data. JMIR Res Protoc 6, e156 (2017)
4. Michie, S., Yardley, L., West, R., Patrick, K., Greaves, F.: Developing and Evaluating Digital Interventions to Promote Behavior Change in Health and Health Care: Recommendations Resulting From an International Workshop. J Med Internet Res 19, e232 (2017)
5. Patrick, K., Hekler, E.B., Estrin, D., Mohr, D.C., Riper, H., Crane, D., Godino, J., Riley, W.T.: The Pace of Technologic Change: Implications for Digital Health Behavior Intervention Research. American Journal of Preventive Medicine 51, 816-824 (2016)
6. Klaassen, R., Van Delden, R.W., Cabrita, A.M., Tabak, M.: AIRPlay: Towards a 'Breathgiving' Approach. In: Proceedings of the Fifth Interna-tional Workshop on Behavior Change Support Systems (BCSS'17) in conjunction with the 12th International Conference on Persuasive Technology, pp. 38-45. (2017)
7. Resnicow, K., Strecher, V., Couper, M., Chua, H., Little, R., Nair, V., Polk, T.A., Atienza, A.A.: Methodologic and Design Issues in Patient-Centered e-Health Research. American Journal of Preventive Medicine 38, 98-102 (2010)
8. Moller, A.C., Merchant, G., Conroy, D.E., West, R., Hekler, E., Kugler, K.C., Michie, S.: Applying and advancing behavior change theories and techniques in the context of a digital health revolution: proposals for more effectively realizing untapped potential. Journal of Behavioral Medicine 40, 85-98 (2017)
9. Hekler, E.B., Klasnja, P., Riley, W.T., Buman, M.P., Huberty, J., Rivera, D.E., Martin, C.A.: Agile science: creating useful products for behavior change in the real world. Translational Behavioral Medicine 6, 317-328 (2016)
10. Han, J.Y.: Transaction logfile analysis in health communication research: Challenges and opportunities. Patient Education and Counseling 82, 307-312 (2011)
11. Wentzel, M., Nijdam, L.: Understanding eHealth use from a Persuasive System Design perspective: an Antibiotic Information Application for Nurses. International journal on advances in life sciences 6, 210-219 (2014)
12. Jong, N.d., Wentzel, M., Kelders, S., Oinas-Kukkonen, H., Gemert-Pijnen, J.: Evaluation of Perceived Persuasiveness Constructs by Combining User Tests and Expert Assessments. In: Proceedings of the Second International Workshop on Behavior Change Support Systems co-located with the 9th International Conference on Persuasive Technology (PERSUASIVE 2014), pp. 7-15. (2014)
13. Sieverink, F., Kelders, S.M., Braakman-Jansen, L.M., van Gemert-Pijnen, J.E.: The added value of log file analyses of the use of a personal health record for patients with type 2 diabetes mellitus: preliminary results. Journal of diabetes science and technology 8, 247-255 (2014)