FuturePD. The future of personal data: envisioning new personalized services enabled by Quantified Self technologies

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ABSTRACT
Quantified Self is rising new challenges for user modeling and personalization. In this workshop we aim at exploring the future of personalized services enabled by Quantified Self technologies.

CCS Concepts
• Human-centered computing→Human computer interaction.

Keywords
Personal informatics; Quantified Self; Personalization.

1. INTRODUCTION
Quantified Self (QS), which is also known as Personal Informatics (PI), aims to use technology to collect personal data on different aspects of people's daily lives. QS tools, defined as "those that help people collect personally relevant information for the purpose of self-reflection and gaining self-knowledge" [10], allow individuals to self-monitor, facilitating new ways to gain self-awareness. However, these technologies can also be used to remember episodes related to one's own personal experience and to produce change in behavior. The diverse sensors also offer rich potential to enhance learning in many contexts, from formal education to lifelong learning.

Building on our previous successful experiences in organizing PI/QS workshops (e.g. at CHI 2010-13, BIBM 2014, UbiComp 2014-15), which gathered a large and unexpected number of papers related to the collection and use of personal data, in this workshop we want to explore how we can design for QS improving its effectiveness in specific domains, i.e. to trigger changes in behavior, help people remember their past and improve their broader learning.

2. BACKGROUND AND MOTIVATION
The knowledge about one's self, which QS systems can provide, can be employed in a variety of domains, potentially improving people's everyday life. By enabling people to reflect about themselves, for example, QS tools can trigger processes of *behavior change*, as the act of self-monitoring often changes behavior due to its reactive effects [12]. Moreover, self-awareness can be an effective means to help people move from a stage in which they have no intention of modifying their own behavior to one in which they decide that they want to take action towards achieving behavior change [13].

HCI researchers have designed a variety of systems for fostering a change in behavior by leveraging personal data (e.g. [9]). However, the availability of continuous data related to every aspects of people's daily life opens new opportunities for behavior change design, including the potential for more personalized, just-in-time and effective interventions, based on the knowledge of the whole range of the individuals' activities, in order to support behavior modification.

Another field of application of QS tools refers to the possibility of designing for *remembering*. The CHI community has, for some years, engaged in supporting people in capturing and recovering personal memories. Mobile and wearable technologies (e.g. MyLifeBits, Eyetap, Narrative Clips) have been designed to capture comprehensive records of a person's experiences, enabling a form of "total recall" of the past [6]. Van den Hoven et al. [14] reviewed how researchers have explored the role of HCI in designing for personal memories, developing novel devices for remembering or for supporting recollection with memory aids. QS technologies can now go further in this direction, enriching the retrieval process of personal memories with a plethora of contextual data, transparently collected during everyday activities, to support the user's reflection on the choices she made, her past behavior and objectives, and, through these, providing insights about her potential future options.

Finally, there are many *learning* contexts where emerging sensors can play valuable roles. In formal education settings, personal data can provide a potentially motivating context for mathematics and personal development and health studies. In learning a complex skill, video capture technologies could support review of work episodes to facilitate gaining post-hoc review of interesting performance episodes, be they ones that proved to be very

effective, or problematic. One other class of long term personal data capture may be in the context of mastering a skill that takes years. Data about this may be collected from diverse apps that support this learning and each capture data reflecting progress in learning. In learning contexts, an Open Learner Model - OLM [2] provides an interface to such data. There are important challenges in creating OLMs that support the range of key metacognitive processes of goal setting, self-monitoring and self-reflection [3].

As the current availability on the market of wearables and mobile applications for self-tracking is making it plausible that QS technologies will become pervasive in the near future, we have to start to explore how to employ personal data effectively, in different domains and for a broad user base. In fact, many issues still remain for the daily use of these technologies, mainly related to the continuity and the accuracy of the data tracking, the ability to merge various sources of personal information, and the meaningfulness of the interfaces and visualizations provided [5]. While many dedicated "quantified selfers" can overcome these problems because of their familiarity with self-tracking technologies and a strong motivation to track their own behaviors [4], the broader population does not have such skill, experience and willingness to overcome current hurdles to collecting and manipulating personal data.

It is necessary, then, to try to rethink the design of these tools, making them better fit the needs and desires of this new kind of potential users, and to explore which benefits they could be provided in the future. For example, in regard to data tracking, although many improvements will come from the advances in wearable technologies, many problems will persist, related, for example, to the collection of complex states or events, such as the user's cognitive and emotional states, or the important episodes she experiences in her everyday life. For these data, it is essential to imagine new design techniques that can improve the user's motivation in reporting them.

However, lightening the burden of self-tracking will not be sufficient if it is not paired with an enhancement in the perceived benefits that all these personal collected data could provide [11]. The CHI community should then find new ways for making them more understandable, actionable and effective in reaching concrete purposes. We believe that useful applications of QS technologies can be found in technologies for behavior change, memory and learning. Addressing some of the design challenges that QS tools are currently facing, they could help users in modifying a undesired habit, relive their past through an enriched experience, and improve their learning processes. For example, designing effective tools for the management of the data tracked is crucial to provide users with a comprehensive and understandable mirror of themselves, able to enhance their self-awareness and trigger processes of change.

On the other hand, understanding how to model users' habits and everyday activities, for example through user modeling techniques [1] based on real-world data, could provide each user with personalized feedback and recommendations, going beyond a one-size-fits-all approach, which has already showed its limits [8]. Moreover, selecting significant contextual details of an event, connected to the user's emotional experience, and finding new ways to represent the data collected could improve the reminiscence, enabling users to relive their past episodes and recall the emotions connected to them.

3. SHORT BIO OF THE ORGANIZERS

Amon Rapp (main contact). Research fellow at Computer Science Department of the University of Torino, where he directs the Smart Personal Technology Lab. His research areas are QS and behavior change technologies, investigated from an HCI perspective.

Federica Cena. Assistant Professor at the Department of Computer Science of the University of Torino. She is currently the head of Smart Society Lab at the Center for Innovation for the Territory. She is working on user modeling and personalization, with a special focus on the implications of IoT for user modeling.

Judy Kay. Professor of Computer Science at the University of Sydney, Australia. She heads the Human Centred Technology priority research cluster. Her primary research focus is on surface computing and infrastructures for managing personal data with the user in control. Key applications are in life-long and life-wide learning, with data supporting metacognitive processes, including reflection and goal setting.

Bob Kummerfeld. Associate Professor of Computer Science at the University of Sydney, Australia. His research is mainly on systems for the management of User Model data as well as novel interfaces for gathering and managing personal data.

Frank Hopfgartner. Lecturer in Information Studies at University of Glasgow. His research to date can be placed in the intersection of information retrieval, recommender systems, and data analytics. He co-organized various workshops on heterogeneous sensor data, Quantified Self and Lifelogging (e.g., at ICME, UMAP, Hypertext, BIBM) and is co-chair of Lifelog, a pilot task for the evaluation of lifelogging and retrieval techniques at NTCIR-12.

Jakob Eg Larsen. Associate Professor in Cognitive Systems at the Technical University of Denmark, Dept. of Applied Mathematics and Computer Science, where he heads the Mobile Informatics and Personal Data Lab. His research interests include HCI, personal data interaction, data visualization, personal informatics and quantified self. He has organized several workshops on personal informatics and quantified self.

Elise van den Hoven. Associate Professor in the School of Design at University of Technology Sydney and part-time associate professor in the Department of Industrial Design, Eindhoven University of Technology. She has two honorary appointments: honorary senior research fellow in Duncan of Jordanstone College of Art and Design, University of Dundee and associate investigator with the Australian Research Council's Centre of Excellence in Cognition and its Disorders. Her research interests span different disciplines, including human-computer interaction, design and psychology, including people-centred design, designing interactive systems, physical interaction and supporting human remembering.

4. ACCEPTED PAPERS

1. Marieke M.M. Peeters & Mark A. Neerincx. Human-Agent Experience Sharing: Creating Social Agents for Elderly People with Dementia.

2. Nabil Bin Hannan, Felwah Alqahtani, & Derek Reilly. JogChalking: Capturing and Visualizing Affective Experience for Recreational Runners

3. Amon Rapp, Alessandro Marcengo, & Federica Cena. Accuracy and Reliability of Personal Data Collection: An Autoethnographic Study

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