

# New frontiers of Quantified Self: finding new ways for engaging users in collecting and using personal data

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## ABSTRACT

In spite of the fast growth in the market of devices and applications that allow people to collect personal information, Quantified Self (QS) tools still present a variety of issues when they are used in everyday lives of common people. In this workshop we aim at exploring new ways for designing QS systems, by gathering different researchers in a unique place for imagining how the tracking, management, interpretation and visualization of personal data could be addressed in the future.

## Author Keywords

Personal Informatics; Quantified Self; Self Tracking.

## ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

Quantified Self (QS), also known as Personal Informatics (PI), is a school of thought that aims to use technology for acquiring and collecting data on different aspects of the daily lives of people. The purpose of collecting these data is the gaining of self-knowledge or some kind of change or improvement (behavioral, psychological, etc.). QS commercial systems can mainly be apps running on users mobile devices (such as Moves) or they can be ad hoc smart devices (such as the Jawbone UP bracelet). In spite of the fast growth in the market of these kinds of tools, many

issues arise when we consider their usage in the daily lives of common people, such as: i) Motivation in tracking data and accuracy of the data tracked; ii) Capability of managing and integrating different kinds of personal data; iii) Understandability of the gathered data; iv) Meaningfulness of the visualizations provided and the ability to make data actionable; v) Motivations for long-term usage.

Building on our previous successful experiences in organizing PI/QS workshops (e.g. at CHI 2010-2013, BIBM 2014, UbiComp 2014), which gathered a large number of papers related to personal data, we aim to tackle some of these issues, going beyond the Quantified Self to explore both new technologies and design techniques that could be applied to this field. The UbiComp and ISWC communities are progressively designing and developing new wearable and ubiquitous systems for self-tracking and monitoring physiological parameters, such as respiratory and heart beat rate [2], behaviors, such as sleep [9], psychological states, such as stress [6]. However, the advances in technologies for automatically collecting personal information are often not matched by the critical work needed to make the gathered data more manageable, understandable, and useful for common users who are not able to manage a great quantity and variety of information. We see important potential benefits from a workshop that enables UbiComp and ISWC researchers to focus on these kinds of issues, sharing ideas and possible solutions on how to harness the increasing amount of personal data that is becoming available for people.

## WORKSHOP BACKGROUND AND TOPICS

QS and PI systems have been defined as “those that help people collect personally relevant information for the purpose of self-reflection and gaining self-knowledge” [4]. This act of collecting personal data is known as *self-monitoring* in clinical psychology [3], an assessment method to gather information about behaviors that only the patient could observe and record. QS tools enhance self-

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monitoring activities allowing people to track data almost everywhere at any time, potentially enabling the arising of self-awareness [7]. They are also used for changing one's own behavior, because the process of recording behavior causes the behavior to change [8]. To reach these aims QS systems should not simply aim to relieve users from the burden of the tracking activities; it should also provide meaningful data that can be easily understood and used in their everyday lives. This is even more important when we consider the needs of the general public. While “expert users” may have familiarity with QS technologies and be strongly motivated to track their own behaviors (investigated by e.g. [4, 5, 10]), the broader population does not have such experience in self-monitoring and the manipulation of quantitative data. Nor can one assume that they are driven to put effort into collecting information about their own life (e.g. for managing a chronic disease or changing an unhealthy behavior). This audience can now be reached by the widespread availability of many commercial QS applications and devices, but these systems should be rethought in order to better fit their needs and desires.

In regard to *data tracking* many issues will be likely addressed in the coming years thanks to the advances in ubicomp and wearable technologies. While making some data gathering automatic, there will remain many aspects of human behavior that will still rely on self-reporting. Emotions, for example, have a cognitive and interpretative dimension that is difficult to reliably recognize automatically; and systems that do so may be unacceptable. For these data, novel design techniques, such as gamification, or new ways for interacting with QS systems, such as using smart objects, tangible interfaces, or new affordances specifically designed for wearable devices, could provide ways to motivate users to undertake self-reporting. However, lightening the burden of self-tracking will not be sufficient if it is not paired with an enhancement of the perceived benefits that all these data could provide, by simplifying and enhancing their management, interpretation and visualization.

One of the main challenges in *managing* different types of personal data is that they come in heterogeneous and often very unstructured form. The information gathered by QS tools is scattered across autonomous silos. It can be challenging to bring together in order to provide users a complete and satisfying mirror of their “selves”. To address the associated technical problems, machine learning techniques offer promise for analyzing data originated from different devices and applications to understand the underlying structure, while Semantic Web techniques, like ontologies, can provide them with a structure. There is a need for designing mash-up systems capable of aggregating data with different formats.

All these data could be further structured by employing, for example, User Modeling techniques [1] that can provide useful insights for reasoning about the information

gathered, as users often have difficulty in *interpreting* their own data. They are in search of insights of relevance for them among a plethora of meaningless information. They also need useful suggestions on how to use this information to help improve their habits and behaviors. In fact, although QS tools have at their disposal huge amount of data on user behavior, they are not currently exploiting them to provide people with personalized actionable recommendations.

Then, as to data *visualization*, people need to navigate information in more intuitive forms, far away from the mere display of numerical data. Taking inspiration, for example, from the world of narrative, through storytelling, or videogames, through avatar representations, could be a way of making the visual exploration of personal data more engaging, enjoyable and actionable. Also the techniques actually used for visualizing social data could suggest new ways for displaying behavioral information in meaningful manner. Then new forms of interactions, for example through gesture-based or spoken interfaces, could provide a more immediate involvement in manipulating all these data. Another important pair of topics concern *privacy* and *control* issues for the data gathered, since users perceive much QS data as extremely private and many are worried about their final destination and uses.

To summarize we are looking for:

- New modalities for engaging users in self-reporting their data through new approaches such as tangible interfaces, gamification, smart objects, etc.
- New solutions for integrating heterogeneous kinds of personal data to provide users with a more comprehensive picture of their “selves”: through e.g. machine learning techniques, mash-up systems, etc.
- New tools for simplifying the management and interpretation of the gathered data to provide thought provoking insights on users' current behaviors and useful suggestions for improving their habits: through e.g. user modeling techniques, data mining, etc.
- New meaningful visualizations of human behavior data to turn data into affordances for action by taking inspiration e.g. from the entertainment world (narratives, video games, etc.), social data visualization, or leveraging new interactions techniques, such as natural interfaces.

#### Relevant topics

Relevant workshop topics include but are not limited to

- New technologies for self-monitoring (e.g. new wearable devices or ubiquitous systems) and new design techniques for engaging people in tracking their data
- Suggestions for interacting in new ways with Smart Objects embedded with data gathering functions.
- Personalization and (lifelong) user modeling techniques
- Interoperability, semantic web and machine learning techniques

- Techniques for protecting personal data and make users perceive a greater control on them
- New forms of data visualization and new interaction techniques for manipulating personal information
- Methodologies for evaluating the subjective experience of QS applications
- Use cases that investigate the effectiveness of novel solutions for QS
- Suggestions for fostering the long-term usage of QS applications

**WORKSHOP OBJECTIVES**

The first objective of this workshop is to provide a shared forum for researchers interested in Quantified Self, who are looking for new inspirations for designing novel systems able to motivate and engage the larger audience of common users. We believe that researchers need a common interdisciplinary space where generating many new ideas in a short time span, trying to imagine how the self-tracking technologies will evolve in the next years and what could we do to make them closer to the users’ needs and desires. The long-term objective of the workshop is to foster a community interested in sharing new ways for helping people track, manage, interpret and visualize their own data, making them useful to a larger audience of users. This includes researchers coming from different areas, from engineers and computer scientists, to designers, social scientists, ethnographers and psychologists. We hope this workshop will be a starting point for researchers to join and share their knowledge, experiences and insights, which could continue after the meeting, through a continuous exchange of perspectives.

**CONDUCTING THE WORKSHOP**

**Pre-workshop preparations**

The workshop website will go online before the call for participation is sent to all the major UbiComp and ISWC mailing lists. The organizers will then publicize the call in their home organizations and among their peers. We will also invite directly researchers from diverse disciplines, such as UX designers, developers, data mining and data visualization experts, social scientists and psychologists, to participate. Finally, we will advertise the workshop and distribute the CFPs among the main QS blogs and forums. We will accept both position papers and research papers, case studies, future research challenges and reflections, two-to-six pages long, suggesting new ways for exploiting the plethora of personal data becoming increasingly available by ubicomp and wearable technologies. Papers will be reviewed by the program committee based on their pertinence with the workshop topics, quality of the exposition and, mainly, potential to trigger discussions and insights for inspiring the design of new solutions during the workshop. Each paper will receive three expert reviews. We also plan to give two types of “best paper awards”: the first determined by looking at the reviews, the second one as a

“best presentation (audience) award” which will be decided by all participants at the end of the presentation session.

**Expected results**

We will not define a minimum or maximum number of accepted papers in advance: the paper presentation will be used as means for providing insights for the following design phases of the workshop. We plan for accepted manuscripts to be included in the ACM Digital Library and supplemental proceedings of the main conference. All workshop papers must be up to six pages long in the SIGCHI Extended Abstract format, and be ready for inclusion into ACM digital library and the supplemental proceedings by July 17<sup>th</sup>, 2014. In total we expect to attract 20-25 participants (including the presenters and organizers).

**Important dates**

Deadline for submissions: 20<sup>th</sup> June  
 Response to authors: 7<sup>th</sup> July  
 Camera ready submission deadline: 10<sup>th</sup> July  
 Workshop day: 7<sup>th</sup> September

**Workshop structure**

The workshop consists of a single paper-track. We will follow a one-day format. In the morning the organizers will give a 15-minute presentation about the motivations for having organized the workshop and about their personal ongoing work on the topic as well. Then, participants will present their papers during maximum of 8 minutes, followed by a 2 minutes discussion. This session will have the main function in inspiring the following workshop phase. In the afternoon session, participants will be divided in small groups and each group will have to define collaboratively at least 1 “design challenge”. A design challenge is formulated as a sentence beginning with “How might we...” and is intended as a main issue related to the tracking, management, interpretation, and visualization of personal data that should be overcome in the next years. Then, each participant, in each group, will have to imagine individually new solutions for addressing the design challenge individuated. Finally, the group should select the most promising solution to be presented to all the other members of the workshop. The workshop will conclude with the presentation of the ideas produced and selected in the work group.

**Schedule**

09:30 - 09:45 Introduction  
 09:45 - 10:30 Paper presentations: Session 1  
 10:30 - 11:00 Coffee Break  
 11:00 - 12:30 Paper presentations: Session 2  
 12:30 - 13:30 Lunch  
 13:30 - 15:30 Paper presentations: Session 3  
 15:30 - 16:00 Coffee Break  
 16:00 - 17:30 Work group: idea generation  
 17:30 - 18:30 Work group: presentations

**After the workshop**

To foster the discussion even after the end of the workshop we plan to: i) include all the participants in a mailing list

where they can easily discuss new ideas related to the workshop topics; ii) organize a special issue on the topic in an International Journal (e.g. UMUAI).

#### BIO OF THE ORGANIZERS

**Amon Rapp.** PhD in Sciences of Language and Communication. At present he's a researcher at Computer Science Department of the University of Torino in the AI and HCI group. His main research areas are HCI, game design, Quantified Self systems and wearable technologies.

**Federica Cena.** Assistant Professor at the Department of Computer Science of the University of Turin (Italy). She is a member of the AI and HCI group. She is working on user modeling, personalization and ubiquitous computing. In the last years, she is mainly devoted in studying the implications of Web of Things 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 chair of Lifelog, a pilot task for the evaluation of lifelogging and retrieval techniques at NTCIR-12.

**Till Plumbaum.** Director of the Competence Center Information Retrieval and Machine Learning at DAI-Labor, TU Berlin. He has chaired a number of workshops on user behavior and lifelong user modeling. His main research interest is on understanding and modeling human behavior with a current focus on lifelogging and personal informatics.

**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. He has chaired several workshops on personal informatics and quantified self. His research interests include HCI, personal data interaction, personal informatics and quantified self.

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