the precious project.eu Newsletter

Editorial

The end of the PRECIOUS project provides an opportunity to reflect on the project achievements and challenges addressed in the project lifetime. Moreover, it comes at a right time for positioning of the project ideas and outcomes in this exciting and growing landscape of behavioural intervention technologies. It is therefore befitting that the spotlight for the final issue of the PRECIOUS newsletter points to the PRECIOUS showcase event for stakeholders held in the penultimate month of the project. The event attracted a wide range of participants, facilitated sharing of experiences with other projects and generated plenty of lively discussions amongst the stakeholders in attendance. This issue of the PRECIOUS newsletter also includes details of some of the user trials conducted in the final year of the project. Furthermore, it provides an insight from the developer, on the ecosystem of the PRECIOUS hackathon in September 2016. The results of the project will continue to be scrutinized, improved and exploited in new research projects and commercialisation initiatives. The PRECIOUS project consortium would wish to sincerely thank you, the reader, for your interest in this project and look forward to continued support and collaboration in promoting healthy lifestyles through technological interventions.

In this issue

In the spotlight: PRECIOUS seminar 23rd September 2016

On the 23rd September, the PRECIOUS consortium held a showcase event on the future of e-health and PRECIOUS an EU project on the development of a ubiquitous preventive health care tool. The event was held at Imperial College, London and was attended by a good mixture of representatives from academic, governmental and industrial stake holders.

During the day, there were three external speakers;

Jo Goossens from Shiftn who presented on; 'personalised nutrition: a new setting for nutrition and health business'

Dr Tim Lobstein from DAPHNE who presented on; 'Data-as-a Service Platform for Healthy lifestyle and Preventive Medicine (DAPHNE)'

Dr Felix Naughton from University of Cambridge who presented on; 'the role of mobile sensing in behaviour change- Q-sense; a context aware smoking cessation app'.

These presentations along with the talks about PRECIOUS generated a lot of discussion and showed there is a real need for continued development and forward thinking to reap the full benefits of e-health.

All the presentations from the day can be accessed at;
http://www.thepreciousproject.eu/?page_id=15.

Progress and achievement

WP3- Virtual Individual Model Building Motivation

Since the last update, the University of Helsinki (UH) team has been working very closely with the University of Aalto team to make a number of improvements to the PRECIOUS application that were identified in initial usability tests conducted over the summer. This includes the development of tutorials for new users which explain how the system works as a whole and how the mountain climber sub-app integrates physical activity data from various sources, allowing users to set realistic goals and plans. It also includes fixing a number of device-specific bugs that the tests identified.

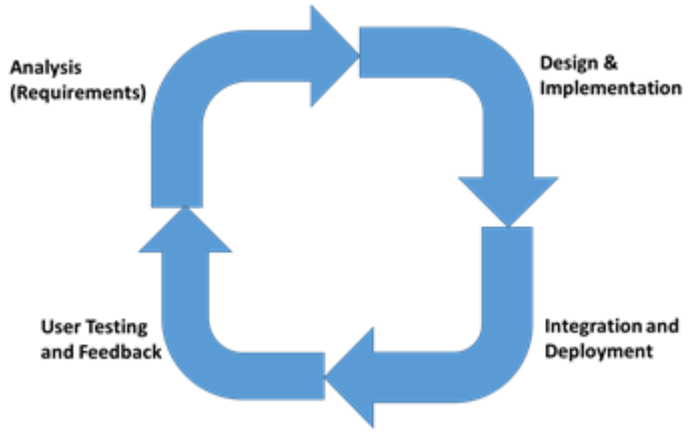
Much effort has also been put into planning and testing app functions for the 'n-of-1' trials, in which certain components of the PRECIOUS app needed to be turned on or off, depending upon which day of the study period a user is in. These scheduling systems are now fully operational, and are being used in the n-of-1 trials which were started in early October. To collect daily questionnaire data for the n-of-1 field trials, the UH team initiated a collaboration with the Netherlands Institute for Applied Scientific Research (TNO) for the use of their Ecological Momentary Assessment (EMA) app. This allows questions to be delivered to users over the course of the n-of-1 trials independently of their interactions with the PRECIOUS app, thus not interfering with user experiences in Precious. Recruiting individuals to participate in the n-of-1 field trials has also taken much work, but the trials are rolling now and we look forward to seeing the results!

WP4- Systems, Sensors and Feedback Tools

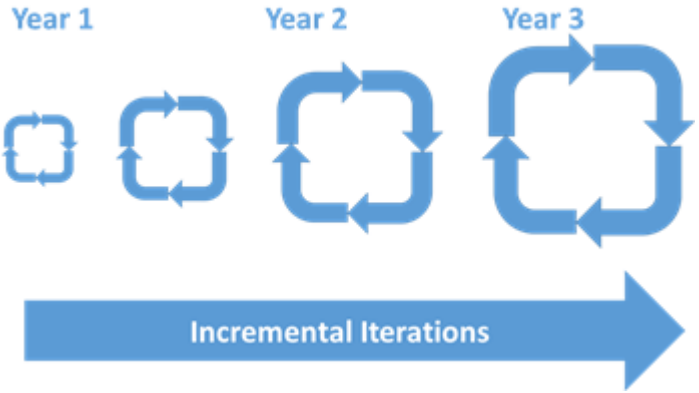
The WP4 activities in the final six months of the PRECIOUS project has focused on further refining the PRECIOUS system and application based on feedback and experiences from the user trials. Before proceeding further with this update, it is useful to note once again that PRECIOUS, as a system constitutes a number of components or subsystems. Each of these components or subsystems (apps, sensors, backend etc.) are interdependent elements built to achieve a given PRECIOUS objective by performing a specified function, but which on its own does not satisfy the complete end-user needs.

This system modularity served a number of useful purposes. This includes enabling the development and release of part of the system early in the project lifecycle to facilitate user testing and feedback from within the consortium, as well as enabling parallel developments of subsystem developments and deployments at different partner sites before eventual integration. The integration activities occur at various levels, from component level, subsystem level to full system level. A typical example is the pairing of newly introduced sensor devices with a PRECIOUS app and relaying the sensor data to the backend servers for further analysis or archiving.

In the PRECIOUS project, we adapted an iterative and incremental development approach, whereby continuous implementation and integration of the parts of the system were carried out in each iteration until the complete (or deployable parts) system was ready for deployment and testing by the users. Each iteration included a number of key phases depicted in the figure below. The analysis phase provided an understanding of the user requirements and the usage scenarios. In the design and implementation phase, the different features, components and subsystems have been the system developed. These included the PRECIOUS apps, rules system, motivational services, and so on. These were then coupled together into an operational system during the integration and deployment phase. The user testing and feedback phase has been the predominant phase of the final year of the project.



The insights and user experiences from the different PRECIOUS real-world trials have been valuable in challenging some of the initial design assumptions and identifying design flaws that went undetected during the design and integration phases. The project's iterative process has developed incrementally throughout the project lifetime with each iteration encompassing the different phase described previously. As illustrated in figure below, the successive iteration provides lessons and insights that are useful for the continued design and implementation of the system and constituent components.



The valuable lessons from the trials and subsequent WP4 developments in the final year have positioned the PRECIOUS system and its constituents for further research in other continuing projects, as well as providing elements that will be considered for further commercialisation.

WP5- System Validation

VHIR - Pilot test

The pilot test carried out at Hospital Universitari Vall D'Hebron- Fundació Institut De Recerca Vall D'Hebron (VHIR) is coming to an end. During 3 months, 31 patients have participated in our pilot to test the PRECIOUS system. Our main goal has been to study the usability, acceptance, satisfaction and effectiveness of PRECIOUS system. This system consists of an application -the PRECIOUS app (https://play.google.com/store/apps/details?id=aalto.comnet.thepreciousproject&hl=es)-, that can be combined with a wearable, n the case of our pilot, the wearable was the Bodyguard 2 (http://shop.firstbeat.com/all-products/bodyguard.html#.V_oiW-CLS00). All patients have been recruited from outpatient consultation in the University Hospital Vall d'Hebron (Barcelona, Spain). They are patients with a body mass index higher than 30 and therefore, all of them are regularly followed by medical specialists such as endocrinologists. We designed an experimental study and randomized the patients to three conditions:

1) Treatment as usual. This consisted of self-registration of diet and physical activity habits, the use of the BodyGuard, and follow-up appointments with the researchers.
2) Intervention group 1. This consisted in the use of the PRECIOUS app, the use of the BodyGuard2, and follow-up appointments with the researchers.
3) Intervention group 2. This consisted in the use of the PRECIOUS app, the use of the BodyGuard2, and follow-up appointments based on motivational interviewing techniques.

Preliminary results have shown that usability and acceptance of PRECIOUS system are satisfactory. However, satisfaction with PRECIOUS app has to be improved since the Diet module is described as backbreaking and lacking of feedback. Although final results are not still available, initial analysis seems to indicate that PRECIOUS is effective to change people intentions concerning healthy habits. A high percentage recognised that using PRECIOUS has help them to "think" about changing their habits and "to start" to take some actions to this purpose. If you want to be up-to-date to our results, check regularly the PRECIOUS website (http://www.thepreciousproject.eu/?page_id=15) where we will publish final results. You can also view the full protocol of our study in clinicaltrials.gov (https://clinicaltrials.gov/ct2/show/NCT02818790?term=PRECIOUS&rank=1) with the following identifier NCT02818790.

Campden BRI Field Trial - Effects of motivational and self-regulation components on diet

The aim of this field trial was to investigate whether these motivational techniques could have an impact on the user's usage of the tool and perceived motivation in monitoring their food diet.
The study assessed two different elements of the PRECIOUS food intake tool (Food Diary and Fruit and Vegetable Challenge), with two groups of participants (control and experimental) per element. After confirming consent to participate and completing an online attitudinal questionnaire, all four groups downloaded and used either the Food Diary element or the Fruit and Vegetable Challenge element of the tool for 14 days. During the trial, usage data was captured and regularly monitored. Participants also provided self-reported data by completing an online survey assessing perceived experience/usage, attitudes and behaviours at the start (Day 0), throughout (Day 7) and at the end of the study (Day 14). At the end of Day 7, the motivational elements of the PRECIOUS food intake app were remotely switched on for the experimental groups. 49 participants completed the trial using the Food Diary and 46 participants completed the trial using the Fruit and Vegetable Challenge element of the app respectively (based on both usage and survey data). In all groups, participants' feedback suggested that to some extent the app contributed to an increase in their awareness of what was consumed on a daily basis, but some improvements were required to the design of the app to increase appeal and user-friendliness. The outcomes from this study will help the PRECIOUS consortium assess whether the novel motivational aspects have the potential to positively affect usage and motivation of the users of the PRECIOUS food intake tool.

News from the partners

AALTO University

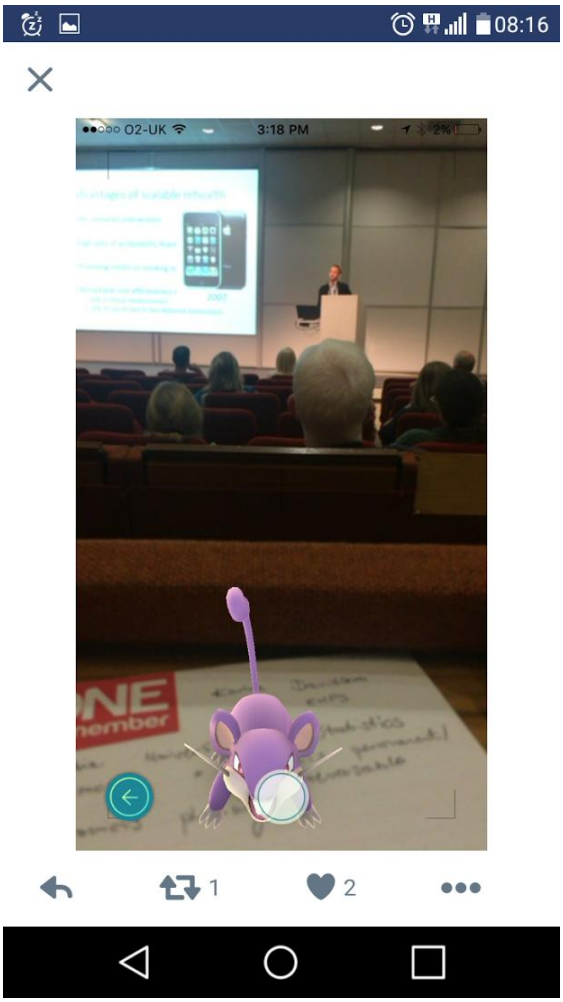
A former PRECIOUS team member from Aalto University, Tea Latvala had her Master's Thesis formally accepted in August 2016. The thesis titled "*Mobile Interface Design for Evoking Motivation: Design Implications from Self-Determination Theory and Motivational Interviewing*" was based on Tea's work on user experience design in the PRECIOUS project. This study aimed at finding ways to structure a mobile user interface in a way that it evokes user's inner motivation toward a behavioural change. More specifically, the user interface design of the thesis targeted at eliciting change talk and making the user feel understood by the use of reflective listening while simultaneously supporting user's autonomy. The techniques implemented were adapted from a face-to-face counselling method, motivational interviewing. Moreover, self-determination theory was applied as a theoretical framework.

Some of the most important results of the thesis include asking the user to think before revealing multiple-choice answer options in order to facilitate user's higher-order thinking process, providing both simple and deep reflections and a possibility to fine-tune previous answers in order to support the user's feeling of being understood, and letting the user be always in control to support user's autonomy. However, further research is needed to study if the research aims are met with real users in real use situations, as well as the effectiveness of the design for behavioural change.

The complete thesis document can be downloaded from:

http://urn.fi/URN:NBN:fi:aalto-201608263039

University of Helsinki



From the 23rd – 27th of August, members of the University of Helsinki team attended the conference of the European Health Psychology Society in Aberdeen, Scotland. In a symposium on mHealth interventions, Johanna Nurmi presented some results from the initial Precious usability tests she conducted with users, which revealed the presence of a so-called “smartphone mode” that users enter when interacting with mobile applications. Questions and discussion from the audience following her talk indicated that other academics working in mHealth had encountered similar finding in their own usability tests, with users finding it difficult to introspect and deliberate about presented information behavioural changes. This is a challenge for future mHealth research to address – improving user introspection during app interactions. The symposium also included presenters from the Health Psychology group at University College London and University of Cambridge who had developed mHealth applications targeting alcohol reduction, smoking cessation, and was followed by a discussion led by Keegan Knittle. The audience was following the discussion with active social media presence and with certain elements from gamified augmented reality that fit the theme very well.

On September 2nd, the University of Helsinki hosted FiDiPro Professor Martin Hagger (Curtin University, Australia & University of Jyvaskyla, Finland) at a symposium on self-determination theory research. Professor Hagger has published an extensive body of research examining self-determination theory in the context of physical activity and exercise, and has also written a seminal text on the use of motivational interviewing in promoting physical activity. In the symposium, we discussed how the **PRECIOUS** application draws on the principles of motivational interviewing to foster behaviour change, and got his expert opinion how this can best be done. The discussion highlighted some of the challenges faced when trying to replicate motivational interviewing in a digital setting, including also the so-called “smartphone mode,” and led to a couple of ideas on how the existing motivational interviewing components in Precious might be improved in the future.

University of Vienna

The University of Vienna recently held a Hackathon in order to evaluate several aspects of the PRECIOUS platform from the perspective of a key stakeholder essential for future exploitation endeavours: developers. As we are planning to integrate 3rd party elements into our system in the future, we have tried to find out how the tools, concepts and ideas that we have come up with during the course of the project are viewed by developers. For this purpose, we have implemented a simulated environment in which developers have easy access to information provided by PRECIOUS, and in which apps can be created and tested very rapidly. We then asked around 15 participants to use this environment in order to create a mHealth app that could fit into PRECIOUS in a 24h coding marathon.

We were really impressed with the results developers came up with, and awarded the three best ideas. During the Hackathon, we held interviews with every participant about their backgrounds, expectations and how they viewed the provided tools, along with a survey asking about optimal aspects of a mHealth framework. Generally, our development environment was received really well, and we learned a lot about potential improvements to our platform. One of the key elements that developers have noticed is the lack of standardized user-interface components. Even though flexibility and adaptability of every component was regarded as crucial, developers still asked for a way to easily access and display UI-related components in order to facilitate rapid-prototyping. Overall, we believe that the Hackathon was a great success and that we managed to get a valuable list of areas that the PRECIOUS consortium needs to address with in the future.

Institut Mines-Telecom

Analysis of the heart rate acceptability is now done. Here are the main results.

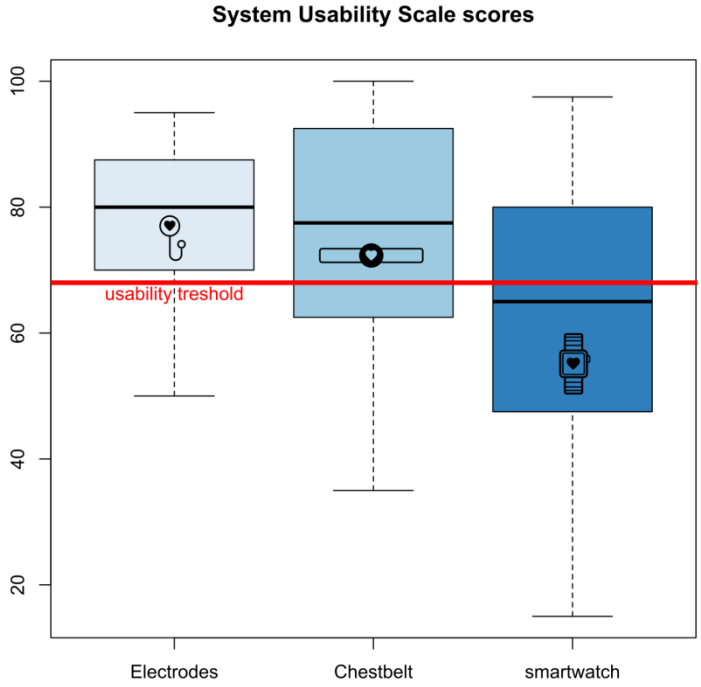
The 29 participants experience of the round the clock heart rate monitoring system mainly revealed that the electrodes and the chestbelt were more usable. More precisely, persons with chronic disease found more acceptable the electrodes and healthy and sporty people gave more credits to the chestbelt. There is a consensus about the smartwatch which was

perceived as less acceptable and even not usable in general because of the battery autonomy limitation and the low reliability. However this conclusion could be partially linked to the equipment we used for this experimentation. Indeed, nowadays new equipments propose at least better autonomy.

Considering the different tasks, results revealed that the electrodes seemed better to sleep, the chestbelt seemed better to play sport and the smartwatch could be better to manage stressful situations. These previous results were partially explained by the requirement of reliability during the night in any sleeping positions and during sport. The need for real-time display was also explaining these results.

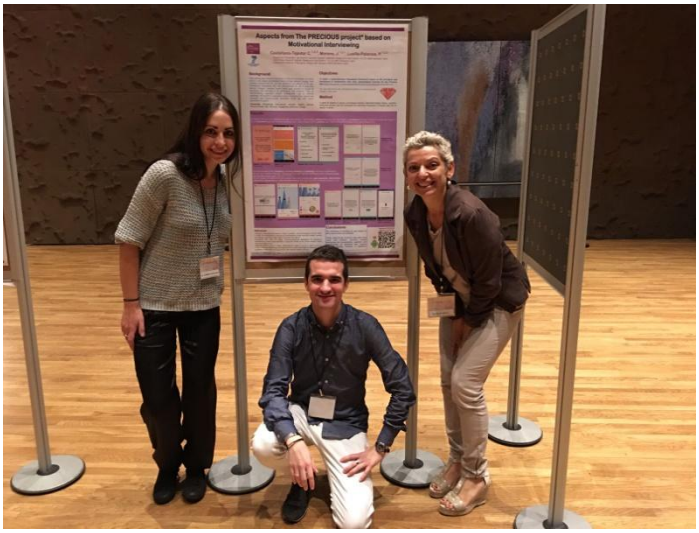
Besides, it also appeared that the monitoring system would mainly motivate participants to improve their physical activity. One limitation pointed out by the users was that they did not know how to improve their sleep quality and their reaction to stress.

Eventually participants would mainly share their physical activity reports only with relatives and doctors. Most of the participants found sleep and stress reports more private.



HOSPITAL UNIVERSITARI VALL D'HEBRON - FUNDACIÓ INSTITUT DE RECERCA VALL D'HEBRON (VHIR)

This last month of September, VHIR team has participated in the Third Forum of the GETEM (http://getem.org) held in Madrid (Spain). GETEM is a multidisciplinary Spanish group of professionals working with Motivational Interviewing (MI) techniques in different settings (i.e. healthcare, education, social work, etc.). In this Forum, different applications of MI have been presented and discussed. VHIR team offered an overview of the PRECIOUS project, with a special emphasis on how the philosophy, principles and core elements of MI have been adapted and implemented into the PRECIOUS app. To these purposes, an oral communication entitled "Motivational Interviewing and smartphones in health prevention. Is it possible? The PRECIOUS project example"; and two posters, entitled "Aspects from the PRECIOUS project app based on motivational interviewing" and "Motivational Interviewing to Foster Adherence to a Personalised, Sensor-based Smartphone Intervention for Healthy Lifestyles: The PRECIOUS project", have been presented in the forum. These contributions can be accessed on the PRECIOUS website.



Additionally, **good news!!**

The PRECIOUS app has been recognised and registered in the **TicSalut Foundation** health app observatory (http://www.ticsalut.cat/observatori/en_apps/261/precious).

The TicSalut Foundation (Fundació TicSalut) is an agency based Spain within the Ministry of Health that works to promote the development and use of ICT and networking in the field of

health. TicSalut acts as an observatory for new trends, innovation and monitoring of emerging initiatives and provides services for the standardisation and accreditation of products.

Recent and upcoming events

On October 25th & 26th the University of Helsinki, together with the Finnish National Institute for Health and Welfare, hosted the annual Finnish Health Psychology Days. Speakers and attendees included intervention developers, researchers and other individuals working across various public health settings, as well as individuals from some health start-up companies operating in the Helsinki region. At this conference, Ari Haukkala presented the results of the initial PRECIOUS usability tests conducted over the summer, and how we have digitalized elements from motivational interviewing and highlighted the idea of "smartphone mode" to some of the attendees working in e/mHealth areas. Ari will also present these results at the Finnish Social Psychology Days hosted by the University of Tampere on November 25th & 26th to get advice from a social psychological perspective on how this might be overcome to create more introspection in users of mobile applications. Johanna Nurmi has submitted a Precious abstract to the 3rd CBC Digital Health Conference: Harnessing digital technology for behaviour change in London, UK.

Upcoming event, next 22-23 February 2017

3rd CBC Digital Health Conference: Harnessing digital technology for behaviour change

http://www.ucl.ac.uk/behaviour-change/events/digi-conf-17

Consortium partners

Co-ordinated by AALTO University, the PRECIOUS consortium includes 8 beneficiaries from academia, research centres and industry. Combined research expertise covers information communication technologies, physiology, nutrition, motivational techniques and cognitive analysis.

Aalto University

Campden BRI

European Food Information Resource

Firstbeat

Hospital Universitari Vall d'Hebron,

Institut de Recerca VHIR

Telecom Bretagne

University of Helsinki

University of Vienna

Contact us

Dr. Jose Costa-Requena

AALTO University

Otakaari 5 A

02150 Espoo

FINLAND

Email: jose.costa@aalto.fi

www.thepreciousproject.eu

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