

## PROMOTING SUSTAINABLE MOBILITY STYLES USING ECO-FEEDBACK AND GAMIFICATION ELEMENTS: INTRODUCING THE GOECO! LIVING LAB EXPERIMENT

**Francesca Cellina<sup>1\*</sup>, Dominik Bucher<sup>2</sup>, Roman Rudel<sup>1</sup>, Martin Raubal<sup>2</sup>, Andrea E. Rizzoli<sup>1</sup>**

1: Institute for Applied Sustainability to the Built Environment (ISAAC)

Department for Environment Constructions and Design (DACD)

University of Applied Sciences and Arts of Southern Switzerland (SUPSI)

Campus Trevano, CH-6952 Canobbio, Switzerland

e-mail: {francesca.cellina, roman.rudel, andrea.rizzoli}@supsi.ch, web: <http://www.isaac.supsi.ch>

2: Institute of Cartography and Geoinformation

Department of Civil, Environmental and Geomatic Engineering

Eidgenössische Technische Hochschule Zürich (ETH Zürich)

Stefano-Francini-Platz 5, CH-8093 Zürich

e-mail: {dobucher, mraubal}@ethz.ch, web: <http://www.ikg.ethz.ch>

**Keywords:** eco-feedback, gamification, smartphones, mobility styles

### Abstract

*The present urban transportation system, mostly tailored for cars, has long shown its limitations. In many urban areas, alternative and effective transport modes are already available, ranging from well-established systems such as public transportation and slow mobility networks to emerging alternatives like vehicle-sharing systems. However, these transport modes still tend to be neglected due to a deep-rooted car dependency.*

*How can we encourage people to use them? In the Swiss-based GoEco! project we overcome the traditional awareness-raising approach. We develop a set of two smartphone Apps leveraging eco-feedback and game elements and create a medium to large-scale “living lab” experiment to test their effectiveness in motivating people to modify their mobility behaviour.*

*The GoEco! living lab is developed in two contexts differing both in the supply of mobility options and in the socio-cultural attitude of the population towards mobility: the City of Zurich and the Canton Ticino region. The experiment envisions three mobility tracking periods: the first one to identify the reference mobility patterns, the second one to identify the nudged mobility patterns, under the direct effect of the GoEco! App, and the last one, one year later, to assess long-term behaviour change towards less car-dependant mobility styles. Focus groups and semi-structured interviews with randomly selected participants will provide us with additional qualitative insight on the users' perceptions and attitudes.*

*After an introduction the GoEco! living lab experiment and methodological approach, we present preliminary insights on the data collected during the first mobility tracking period.*

## 1. INTRODUCTION

The present urban transportation system, mostly tailored for cars, has long shown its limitations. In many urban areas, alternative and effective transport modes are available, however their use still tends to be neglected due to a deep-rooted car dependency. How can we encourage people to use them and to change their mobility style?

In the Swiss-based *GoEco!* project we overcome the traditional awareness-raising approach, taking advantage of social psychology research and of the wide acceptance of smartphones.

## 2. METHODOLOGICAL APPROACH: ECO-FEEDBACK AND GAMIFICATION

*GoEco!* investigates if and how ICT-based eco-feedback, social norms and peer pressure can foster changes in personal mobility behaviour. To this purpose we created a set of two mobility tracking Apps and are testing them in a “living lab” experiment, which is a field study involving real-life users in complex, real-world settings. About 600 users are currently involved in a collective challenge that, by means of a smartphone App, leverages eco-feedback and game elements to motivate them to modify their mobility behaviour. The *GoEco!* app tracks their routes, provides them with feedback on their mobility styles (kilometers travelled, means of transport used, energy consumption and CO<sub>2</sub> emission) and suggests them meaningful low-impact, alternative modal options. Building on individual achievement and competitive game mechanics, the *GoEco!* App also nudges them to define personal goals and targets for change and to take part in individual mobility challenges, providing them with weekly feedback on their progress, virtual rewards for good performances and possibilities to compare their achievements with the other participants.

## 3. DESIGN OF THE LIVING LAB EXPERIMENT

The *GoEco!* living lab is run in two contexts differing both in the supply of mobility options and in the socio-cultural attitude of the population towards mobility: the Swiss City of Zürich, a dense urban area, characterized by high levels of accessibility to public transport and infrastructures for slow mobility, and the Canton Ticino, a Swiss region characterized by urban sprawl, where effective alternatives to individual car use are often lacking.

Participants to the living lab, volunteers recruited by means of a public communication campaign, are randomly split in intervention and control group. The *GoEco!* experimental design envisions three mobility tracking periods, allowing us to assess the long-term effect of the *GoEco!* App in nudging changes towards less car-dependant mobility styles.

During the first tracking period (A, March – April 2016) all the participants use a basic *GoEco! Tracker* App, which only tracks their baseline mobility data (kilometres travelled and means of transport used), without any attempt to influence their choices. In the second tracking period (B, September – November 2016), members of the intervention group use the full *GoEco!* App, thus exploiting the potential of eco-feedback and gamification functionalities, while members of the control group are again monitored with *GoEco! Tracker*. In the third monitoring period (C period, March – April 2017), all participants are again monitored with *GoEco! Tracker*. Focus groups and interviews with randomly selected participants provide us with further qualitative insight on their perceptions and attitudes.

#### **4. DISCUSSION: PRELIMINARY ANALYSIS OF ADOPTION RESPONSE DATA**

At the end of the communication campaign we got 602 applications (278 in Ticino and 324 in Zurich). The living lab experiment started in March 2016 with tracking period A and we are currently analysing the data gathered, in order to identify the baseline mobility styles of the participants. Therefore, we cannot yet provide results on the effectiveness of the *GoEco!* approach. However, data collected so far allow us to draw preliminary considerations on the appeal of our approach and the level of commitment by the participants.

The *GoEco!* application form included a basic survey allowing us to identify the socio-economic features of the sample of applicants and to perform a preliminary classification of their baseline mobility styles, based on their prior declarations. Answers to the survey show that many of the applicants have already performed the main change in mobility styles that we hope to stimulate with *GoEco!*: many of them, especially in the Zurich region, declare neither to own nor to use cars. *GoEco!* might however nudge them to increase slow mobility use.

Even more importantly, answers to the survey suggest that those who could get greater benefits by *GoEco!* (car users) were not motivated enough to apply for participation: initial barriers to even start thinking of changing one's own mobility styles remain very high, even if a playful, informal approach is proposed. Further analyses will allow us to verify if prior declarations are coherent with mobility data collected and if the above considerations can be confirmed.

Preliminary considerations can also be made on the activity rates of the participants during A tracking period. Of the 602 applications received, 576 respected eligibility criteria and were admitted to tracking. Only 461 participants, however, downloaded the *GoEco! Tracker App*. Moreover, only around 200 of them, equally distributed between Ticino and Zürich, were as active as expected in collecting their routes and validating the means of transport suggested by the App: they either left the project early or downloaded the App late. Reasons for this will be investigated during individual interviews; according to the feedback we had by the helpline we set up to support participants during tracking, we suppose main reasons are:

- lack of understanding of the living lab “terms and conditions”: participants applied just to get the App, without being aware we would have asked them (simple) interactions over time;
- too busy daily routines: participants applied because they were intrigued by the idea, but then were overwhelmed by their daily activities, lacking time to even think downloading the App or to perform basic daily interactions with the App to validate the data gathered;
- lack of satisfaction with the quality of the tracked data;
- too high consumptions of phone battery power, due to enabled location services.

Maintaining a total number of 200 participants, being tracked for several months, would still allow us to produce innovative results, compared to mobility tracking experiments performed in the past, and to generalize results of the *GoEco!* living lab experiment. Further reductions, instead, would be critical. For the next tracking periods we are thus committed to keep at least the tracking period A active participants engaged. Availability of the full eco-feedback and gamification functionalities of the *GoEco!* app will definitely support us in such a challenge.

#### **ACKNOWLEDGEMENTS**

*GoEco!* is funded by the Swiss National Science Foundation NRP71 “Managing energy consumption” programme and by the Swiss Competence Centre on Energy Research - Mobility.