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ECO-FEEDBACK AND GAMIFICATION ELEMENTS FOR SUSTAINABILITY: THE *GoEco!* LIVING LAB EXPERIMENT

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1. HOW CAN WE REDUCE CAR USE?

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 and they could be used in inter-modal combinations to satisfy many travel needs: public transportation, slow mobility networks, 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 engage in more sustainable mobility lifestyles, reducing use of the car?

With the Switzerland-based project *GoEco!* we seek to overcome the traditional awareness-raising approach and develop a smartphone application (app) that leverages eco-feedback information, social norms and peer pressure, adopting a "gamification" approach.

The project is funded by the Swiss National Science Foundation – NRP71 and by the Swiss Competence Centre on Energy Research SCCER-Mobility.

2. METHODOLOGY: A «LIVING LAB» EXPERIMENT

The app will be tested in 2016 and 2017 in a "living lab" experiment, which is a field study involving real-life users in complex, real-world settings.

The *GoEco!* living lab will involve around 800 users with some degree of intrinsic motivation to change their mobility patterns.

The *GoEco!* smartphone application will leverage eco-feedback and game elements to motivate them to modify their mobility behaviour: it will track their trips, provide them with feedback on their mobility behaviour and suggest them meaningful low-impact, alternative modal options.

Building on self-achievement and competition mechanics, the *GoEco!* app will also nudge them to define personal goals and targets for change and to take part in mobility challenges, providing them with weekly feedback on their own progress, rewards (badges and trophies) for good performances and comparison with achievements by the other participants.

The lab is run in the Canton Ticino and the City of Zurich, two different contexts in terms of the mobility options available and the socio-cultural attitude of the population towards mobility.

The experiment envisions three mobility tracking periods: the first for the identification of the reference mobility patterns, the second for the identification of the nudged mobility patterns, under direct effect of the *GoEco!* app, and the last one to assess long-term changes. Focus groups and semi-structured interviews provide additional qualitative insight on the users' perceptions and attitudes.

To perform rigorous assessment of the effectiveness of the app, participants to the living lab are split in a treatment and a control group. Members of the control group will always only be monitored, without any feedback.

Recruitment of 800 users (treatment and control group)

TRACKING A
Reference mobility patterns
March 2016



Only tracking

TRACKING B
"Nudged" mobility patterns
September, October, November 2016



Tracking + eco-feedback + challenges + alternatives + badges + social comparison

TRACKING C
Long term mobility patterns
March 2017



Only tracking

Assessment of changes over the tracking periods and differences between Canton Ticino and the City of Zürich

Quantitative analyses

Qualitative analyses

3. ONE PROJECT, TWO APPS

TRACKING A (all), TRACKING B (control group), TRACKING C (all)
App: *GoEco! Tracker*

Mobility tracking and validation of the trips

TRACKING B (treatment group)
App: *GoEco!*

Mobility tracking and validation of the trips

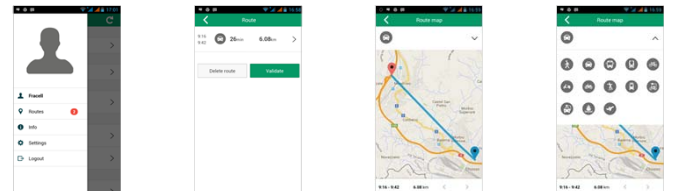
Gamified functionalities

- Definition of individual goals for change and related quantitative target
- Suggestion of alternative mobility options
- Participation to challenges
- Collection of badges
- Real-time eco-feedback information (kms travelled, modal split, energy consumptions, CO₂ emissions)
- Weekly progress towards individual goals, position in the leaderboard and visibility in the Hall of fame

4. THE *GoEco!* TRACKER APP

The *GoEco! Tracker* app exploits the APIs on the users position tracked by the commercial, free app *Moves®* (<https://dev.moves-app.com/>). *Moves®* tracks the points visited and identifies if the user is walking or cycling. The other means of transport are identified taking into account speed, acceleration and overlay between visited points and the graph of the public Swiss transportation system (stops and lines).

For every route tracked, the user is asked to validate the means of transport. An intelligent algorithm learns from the indications provided by the user, thus requiring the user less and less interactions as time goes by.



4. THE *GoEco!* APP

At the end of Tracking period A users receive a report showing their reference patterns, suggestions for alternative mobility options and their overall potentials for change.

At the beginning of Tracking period B they are asked to choose an individual goal for change and to indicate a numeric target value. Every week they get feedback on the progression towards their goal respect to their reference patterns and are rewarded with special badges if they fully achieve it.

We consider progression towards one's individual goal as the key motivational factor, both for the individual and the social comparison eco-feedback. Differently from most gamification processes, we do not rely on a scoring system: we do not want to patronize the user with a non-customized, over-imposed and not always transparent reference system for the attribution of points. Users are free to progress at their own pace and in their own direction.

