GoEco!
A community based eco-feedback approach to promote sustainable personal mobility styles

PI: Prof. Roman Rudel
University of Applied Sciences and Arts of Southern Switzerland (SUPSI)

Co-PI: Prof. Martin Raubal
ETH Zürich
Background

- Private motorized transport still being perceived as positive and desirable.
- Mobility patterns are strongly embedded in everyday life.
- Changes in mobility behavior are hindered by social & psychological barriers
  - fear of sacrifices; returning to the past
  - fear of losing social prestige (car as a status symbol)
Even though effective alternative mobility options to reduce energy consumption are already available!
Research questions

Can eco-feedback information and social interaction (social comparison and peer pressure) be effective triggers to:

• foster changes in personal mobility behavior?
• facilitate the long-term challenge to reduce private motorized transport?
• promote a transition to more energy efficient mobility options, such as vehicle-sharing, intermodal use of means of transport, public transportation and slow mobility?

We run a medium-to-large-scale Living lab experiment with a significant number of users sharing information about their mobility behavior and receiving feedback on their choices.
GoEco! - Unique Features

<table>
<thead>
<tr>
<th>Meta Study on Gamification (Hamari et al.)</th>
<th>GoEco!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Size</strong></td>
<td>Small sizes (around N=20)</td>
</tr>
<tr>
<td><strong>Control Group</strong></td>
<td>Some lacked control groups</td>
</tr>
<tr>
<td><strong>Timeframe</strong></td>
<td>Often very short (Novelty effect: Skewed results)</td>
</tr>
<tr>
<td><strong>Evaluation</strong></td>
<td>Many used only descriptive statistics</td>
</tr>
</tbody>
</table>

=> Current studies lack rigorous methodologies

Source: Hamari et al. (2014). Does Gamification Work? In 47th Conf. on System Sciences (HICSS)
Approach

- Participants in the Living lab test a smartphone app developed on purpose, that:
  - tracks their trips
  - provides them with eco-feedback on their mobility performances
  - suggests alternative, low-impact modal options
  - lets them define personal reduction objectives and targets
  - sets up a social comparison rewarding scheme within the community of the users

- The Living lab is run both in Canton Ticino and in the City of Zürich => differences in the supply of mobility options and in the socio-cultural attitude of the population towards mobility.
- To get deeper insight into perceptions / attitudes, a selection of participants is closely followed with focus groups and interviews.
The GoEco! Living lab design

Overall 600 active participants (testers) + 200 passive participants (control group) in the City of Zürich and in Canton Ticino.

- **Current mobility behaviour**
  - 1 month
  - Only tracking

- **Persuaded mobility behaviour**
  - 4 months
  - Tracking + eco-feedback and peer pressure + suggestion of energy-efficient alternatives

- **Long term mobility behaviour**
  - 1 month
  - Only tracking

Advisory board, social media and communication

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

- **Quantitative analyses**
- **Qualitative analyses**

Policy recommendations for local authorities
Previous app: e-mobiliTI
Quantitative analysis
Key methods

- Inter-disciplinary, bottom-up approach, based on direct interaction with the end-users.

- At the intersection of different research areas
  - Energy sciences: going beyond the traditional awareness raising approach
  - Behavioral sciences & Sociology: assessing effectiveness of eco-feedback and competitive schemes in triggering collective behavioral change (persuasive technology approach)
  - “Gamification”: using game design elements in non-leisure contexts
  - Information & Communication Technologies: exploiting smart mobile devices for inexpensive sensing of mobility behavior (crowdsourcing) and to suggest energy-efficient alternative mobility options (intelligent transport systems ITS)
  - Geomatics and Artificial Intelligence: using machine learning and data-mining techniques to understand mobility patterns (trajectories and motivations)
Implementation and dissemination activities

- Advisory board follows the whole project – from the very beginning
  - Federal authorities in the mobility, energy and sustainability fields, including EnergieSchweiz
  - Experts from the academic world: SCCER “Efficient Technologies and Systems for Mobility”
  - Transport associations: Pro Velo, VCS Verkehrs-Club der Schweiz, TCS Touring Club Schweiz

- Periodic dialogue with local mass-media, starting with a communication campaign for the recruitment of the participants.

- Final project conference for the presentation of the “Policy recommendations for local authorities“ and release of the GoEco! smartphone app to the general public.

- Scientific publications and conference participation.
Expected results and benefits for the Energy strategy 2050

- Deeper understanding of the main opportunities & barriers for sustainable personal mobility and how feedback mechanisms work in the area of mobility.
- Concrete suggestions for local public authorities regarding land-use and transportation planning.
- Guidelines for addressing the long-term challenge of reducing private motorized transport.
- Comprehensive study of mobility behavior for 2 different types of Swiss environments: City of Zürich and Canton Ticino.
Meeting Mobility Demands of the Future

- Seamless integration of all forms of mobility, taking into account user context and preferences.
- Meeting user demands with options in close vicinity and by sharing goods and mobility infrastructure.
- Automated suggestions for meaningful rearrangement of daily schedules to optimize use of mobility offers and infrastructure.
- Online algorithms to maximize capacity utilization in fleets of (self-driving) taxis, carpooling, car sharing, and public transportation.
Challenges

- Ethics: How to weigh societal benefits against personal choice?
- Privacy: Meaningful sustainable mobility options rely on personal (spatio-temporal) data. How to avoid misuse?
- Scalability of Impact: From individual behavior to societal change.