sccer mobility
Swiss Competence Center for Energy Research
Efficient Technologies and Systems for Mobility

In cooperation with the CTI
Energy funding programme
Swiss Competence Centers for Energy Research
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Confederation
Commission for Technology and Innovation CTI

# Challenges and Results from Deploying the *GoEco! Tracker* App

The project *GoEco!* takes advantage of the wide availability of smartphones, in order to overcome the traditional awareness-raising approach used to foster sustainable mobility and exploit eco-feedback, social norms and peer pressure elements in an ICT-based motivation system. In particular, it uses a smartphone app to analyze how we can encourage people to engage in more sustainable mobility lifestyles.

This poster discusses the various challenges we faced when deploying *GoEco! Tracker* (an app using the Moves® fitness tracker to collect mobility measurements), and provides a summary of results obtained by one month of large scale testing within the *GoEco!* living lab performed in Switzerland, allowing us to collect baseline mobility data for the sample of voluntary participants of the *GoEco!* living lab.

Dominik Bucher, David Jonietz, Martin Raubal
Institute of Cartography and Geoinformation, ETH Zurich
Stefano-Franscini-Platz 5, 8093 Zurich, Switzerland
dobucher@ethz.ch, jonietzd@ethz.ch, mraubal@ethz.ch

Francesca Cellina, Roman Rudel
Insitute for Applied Sustainability to the Built Environment, SUPSI
via Trevano, 6952 Canobbio, Switzerland
francesca.cellina@supsi.ch, roman.rudel@supsi.ch

Francesca Mangili, Claudio Bonesana, Andrea-Emilio Rizzoli
Dalle Molle Institute for Artificial Intelligence, USI - SUPSI
Galleria 2, 6928 Manno, Switzerland
francesca@idsia.ch, claudio@idsia.ch, andrea@idsia.ch

## Introduction

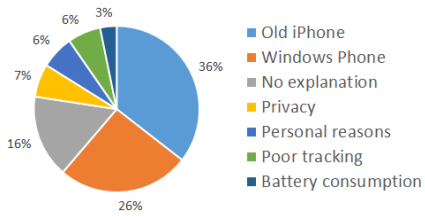
The present urban transportation system, mostly tailored for cars, has long shown its limitations [1]. Even though many alternative and effective transport modes are already available [2], they still tend to be neglected due to a deep-rooted car dependency [3].

How can we encourage people to engage in more sustainable mobility lifestyles, reducing use of the car? *GoEco!* tries to overcome the traditional awareness-raising approach and, building on recent research in social psychology and behavior studies, to take advantage of the wide availability of smartphone devices (cf. [4]).

This poster discusses results from one month of large scale testing of the *GoEco! Tracker* app aimed at automatic mobility tracking, with a few hundred users within the *GoEco!* living lab performed in Zurich and Ticino.

## Living Lab Challenges and Choices

Building *GoEco! Tracker* on top of the Moves® app guaranteed a high tracking accuracy, availability on many devices, and low battery power consumption, at the cost of higher complexity (multiple apps) and privacy issues and communication delays (cf. [5]).

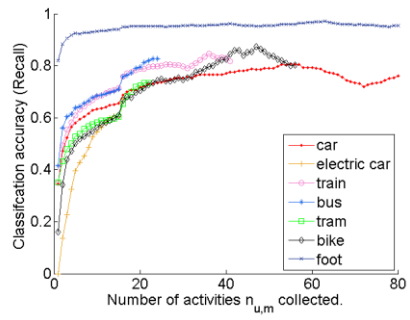



Reasons given for leaving the study (by ~30 users)

651 persons signed up for the living lab after a widespread marketing campaign in January 2016, 461 actually downloaded the app, and around 200 provided tracks during the whole baseline recording phase (4 weeks in March / April 2016).

## Transport Mode Identification

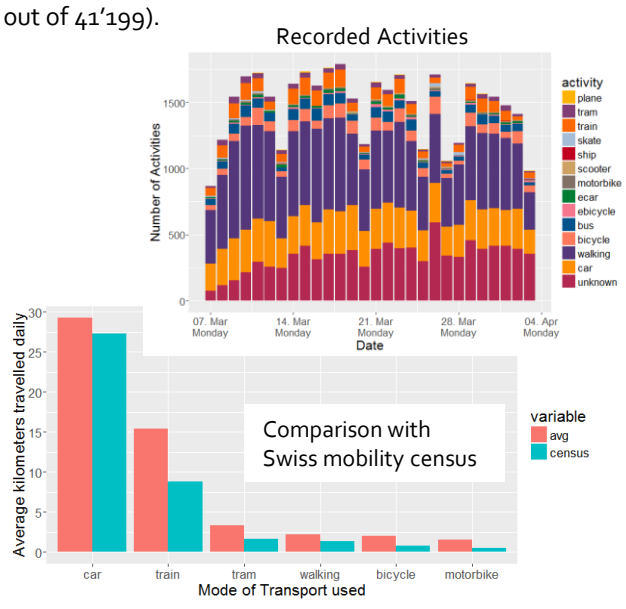
As Moves® only provides mode identification for *walking*, *running*, *cycling*, and a general *transport* mode, we built our own classifier on top of Moves® data.




This naïve Bayes classifier refines the mode of transport using route data, such as *average speed*, *total distance*, *heading change*, and various metrics obtained by comparison with street network and public transport timetables. It uses new data to improve itself and achieves an accuracy of around 80%.

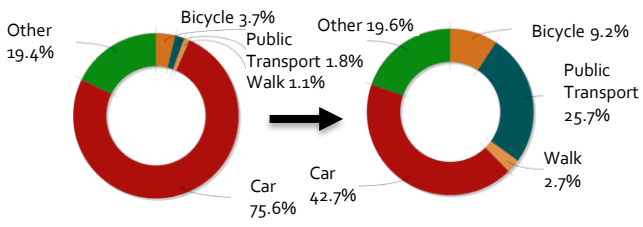
## Accuracy of Tracked Data

On average, we recorded 7.4 activities per user per day, of which 77.1% were actively validated by users (31'782 out of 41'199).




## User Reports and Change Potential

As a form of feedback, users receive reports on their mobility behavior. Next to a detailed summary, we provide an analysis of the current mobility patterns with respect to possible improvements.




Current mobility patterns  Potential mobility patterns

These possibilities for change are computed for systematic routes (e.g., home to work and back), as well as on a general level, i.e., for all routes a participant took. The figure above shows the possibility for change of a single user, who could travel more by public transport, and thus save energy.

## Expected Impact

The impact, which a system like *GoEco!* can have on energy demand and GHG emissions, is mostly determined by users who travel by car on a frequent basis. In our currently ongoing analysis, we found that many could realistically reduce the kilometers traveled by car between 10% and 50%, resulting in energy savings in the order of magnitude of multiple 10 kWh per user per week. Of course, many people have good reasons why they use the car, so it is yet to be seen if *GoEco!* manages to incentivize people enough to actually perform this behavior change.

An overall assessment is mostly determined by the second study phase (Fall 2016), during which the full *GoEco!* app is deployed. In case this phase successfully manages to change mobility behavior, it would be required to make the app available to a wide part of the population, in order to have the desired overall energy savings effect.

## References

[1] Miller, H.J.: Beyond sharing: cultivating cooperative transportation systems through geographic information science. Journal of Transport Geography 31, 296–308 (2013)

[2] Kramers, A.: Designing next generation multimodal traveler information systems to support sustainability-oriented decisions. Environmental Modelling & Software 56, 83–93 (2014)

[3] Diekstra, R., et al.: Cars and behaviour: psychological barriers to car restraint and sustainable urban transport. The greening of urban transport: planning for walking and cycling in Western cities, John Wiliy & Sons Ltd (1997)

[4] Weiser, P., et al.: Towards sustainable mobility behavior: research challenges for location-aware information and communication technology. GeoInformatica 20(2), 213–239 (2016)

[5] Bucher, D., et al.: Exploiting Fitness Apps for Sustainable Mobility-Challenges Deploying the GoEco! App. ICT4S (2016)

## Partners

ETH zürich
FNSNF
71 NRP Managing Energy Consumption National Research Programme
Scuola universitaria professionale della Svizzera italiana SUPSI