GoEco! A smartphone application leveraging eco-feedback and gamification techniques to nudge sustainable personal mobility styles

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1. Aim and objectives

How can we encourage people to engage in more sustainable mobility lifestyles? We overcome traditional awareness-raising and develop a smartphone application (app) that leverages eco-feedback information, social norms and peer pressure, adopting a “gamification” approach (cf. Weiser et al. 2015). The app will be tested in 2016 using a “living lab” approach (Higgins and Klein 2011), addressing users with some degree of intrinsic motivation to change.

2. Key functionalities

Step 1 (four weeks)

- Tracking and validation of the trips
- Gamified functionalities
  - Individual goal of change and related target
  - Alternative mobility options
  - (Individual and Collective) Challenges
  - Badges
  - Real-time eco-feedback information (km travelled, modal split, energy consumptions, CO₂ emissions and progression towards goal)
  - Hall of fame

Step 2 (up to twelve weeks)

- Tracking and validation of the trips

3. Tracking and validation of the trips

The GoEco! 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 by overlap between Moves points and the graph of the public transportation system (stops and lines).

The reason for the trip is inferred by means of map-matching algorithms and adopts the same set of values as the Swiss Micronensus Mobility and Transport (BFS, ARE 2012).

The user is asked to validate the means of transport and the reason for the trip.

4. Suggestion for alternative options

The user gets suggestions for alternative mobility options both at the end of Step 1 (in a static, final report) and during Step 2 (directly in the app).

Alternatives are identified for single trips whenever meaningful, e.g., using information from existing databases such as the SBB public transportation route tables (http://www.fahrplanfelder.ch).

5. Eco-feedback

At the end of Step 1 the user receives a report showing her/his progression patterns:

- On average, you travel 160 km per week.
- Your energy consumption is 5.4 kWh per week.
- Your CO₂ emissions are 0.033 kg per km.
- You travel 4.1 kg CO₂ per week.
- Your CO₂ emissions are 0.04 kg CO₂ per km.
- In a year, this is 0.04 kg CO₂ per km.
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The report also indicates the potentials for change in case she adopts suggested alternatives:

- Decrease in the % of kilometers you travel by car 57
- Increase in the % of kilometers you travel by public transport 36
- Increase in the % of kilometers you travel by bicycle and foot 82
- Decrease in the total amount of kilometers you travel 0
- Decrease in your energy consumptions 12
- Decrease in your CO₂ emissions 51

A corresponding eco-feedback is offered to the user on a weekly basis in Step 2.

6. Individual goal

At the start of Step 2, the user is asked to choose an individual goal for change in reference to the mobility patterns and to indicate a specific target value:

- I will decrease the percentage of kilometers I travel by car
- I will increase the percentage of kilometers I travel by public transport
- I will decrease the percentage of kilometers I travel by car and public transport
- I will decrease the total amount of kilometers I travel
- I will decrease the energy consumptions due to my mobility needs
- I will decrease the CO₂ emissions due to my mobility needs

Besides the weekly eco-feedback (See Section 5), in Step 2 the user also gets feedback on the progression towards her/his personal goal: she is shown the percentage of her individual goal she managed to achieve (average weekly values from the beginning of Step 2).

Your personal goal is:

- I will increase the percentage of kilometers I travel by car by ...
- I will increase the percentage of kilometers I travel by public transport by ...
- I will increase the percentage of kilometers I travel by car and public transport by ...
- I will increase the total amount of kilometers I travel by ...
- I will decrease the energy consumptions due to my mobility needs by ...
- I will decrease the CO₂ emissions due to my mobility needs by ...

From the beginning of Step 2, on average she achieved 42% of her goal.

If you can achieve your goal in step 2, you will...

7. Challenges and badges

In Step 2 every week the user is offered new challenges. If the system detects she manages to complete her challenges, she is rewarded with a publicly visible badge – in addition to the intrinsic reward produced by getting aware of the progression towards her individual goal.

Week after week, the level of difficulty of challenges might increase:

- This week I will go to work by bike if the weather is fine
- Once effectively completed

- This week I will go to work by bike every day, no matter the weather

8. Social comparison: the «hall of fame»

In Step 2, every week the users’ performances are compared based on the percentage of achievement of their own individual goals. The “hall of fame” section awards users who:

- achieve the highest percentages of their own goal;
- obtain more badges or are the first to obtain a new badge.

An highly visible pie chart also shows the distribution of the other users respect to the level of achievement of their own individual goal.

9. Discussion

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 respect to which attributing points. The user is free to progress at her own pace and in her own direction.
