Scuola universitaria professionale della Svizzera italiana

SUPSI

e-mobiliTI, perché no? Cambia la tua mobilità per 90 giorni

Cerchiamo volontari, contattaci entro l'11 gennaio 2013!

SUPSI

e-mobiliTi

Using smartphones to profile mobility patterns in a living lab for the transition to e-mobility

ISESS 2013

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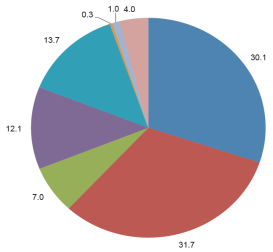
- The background: new mobility options
- The e-mobiliTI project
- Preliminary results and insights from the first 90 days of trip monitoring
- Advices for future experiments

The present society mobility style

- We are used to move easily and everywhere
- …at what cost?



- Mobility/transportation accounts for one third of the current energy consumptions

- And it is almost completely dependent on fossil fuels

The consequences

- At the local level: air pollution
- At the global level: climate change

A new mobility concept

Slow mobility

Inter-modal use of the public means of transport

Sharing of personal/individual transportation veichles

Electric vehicles

Diffusion of electric veichles

- It is the most promising option to abandon fossil fuels and for the transition to cleaner personal mobility

Can the Ticino Canton (Southern Switzerland) take this opportunity?

- 84% of the daily trips are shorter than 10 km

  73% of the daily trips are shorter than 5 km

- The Canton has a widespread and efficient

  public charging network

RiParTI

RiParTI 2.0

And yet …

- It is not only a technological matter!
- Diffusion of electric vehicles is still hindered by fears and psychological barriers, such as autonomy range, availability and diffusion of recharge points, performance
- Analysis of the social aspects is essential to understand the diffusion of innovation in the mobility sector
- An inter-disciplinlary approach is needed
- and it is necessary to directly involve the possible users

The e-mobiliTI project

- The project team examines behaviour of the potential users
  - providing them with the opportunity to personally test new mobility options

- Following them in their daily travels and interacting with them, e-mobiliTI investigates:
  - the process of adoption of electric vehicles
  - the capacity of electric vehicles to bring about a change respect to the dominant mobility options

- Real life users explore and experience new technologies complex, real-world settings

e-mobiliTI creates a living lab environment

Our research questions

The hypotheses we are investigating:

- Is it true that …

Main barriers to the use of electric vehicles are psychological and can be removed by means of experience?

Electric vehicles can be used in everyday life, without causing sacrifices or decrease in personal wellbeing?

- Does the availability of an electric vehicle …

Imply pure substitution between conventional and electric vechicles?

Act as a leverage for a wider transformation of the mobility styles?

LIVING LAB

Location and involved volunteers

- The experiment is run in the Lugano area (conurbation of around 135’000 inhabitants)

- December 2011: public open call, promoted via the local mass-media: participants come from a process of self-nomination
- Open to generic families (including singles)
- 350 families answered

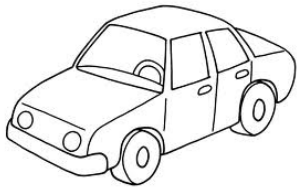
- Selection of an homogeneous group of subjects based on place of living, demographic features of the family (single, couple, couple with children) and on present use of mobility options

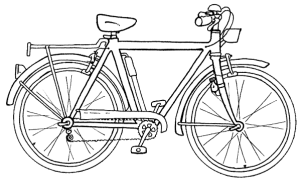
- We chose a set of sixteen families, for a total number of thirty persons actively involved

Mobility monitoring: two phases

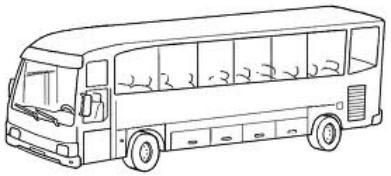
Spring 2013

The current mobility

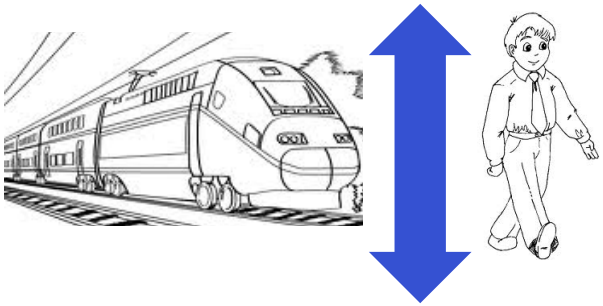




Monitoring of travels
90 days



Current mobility styles



Spring 2014

Test of new mobility options

Monitoring of travels
90 days

Future mobility styles

arcobaleno

mobility car sharing

velopass

Mobility monitoring - quantitative and automatic approach 1

- Development of an Android application which uses smartphone GPS devices and is able to monitor the trips travelled
  - on foot
  - with the bike
  - with the public transportation system (train, bus)
  - by car

Mobility monitoring - quantitative and automatic approach 1

- Development of an Android application which uses smartphone GPS devices and is able to monitor the trips travelled
  - on foot
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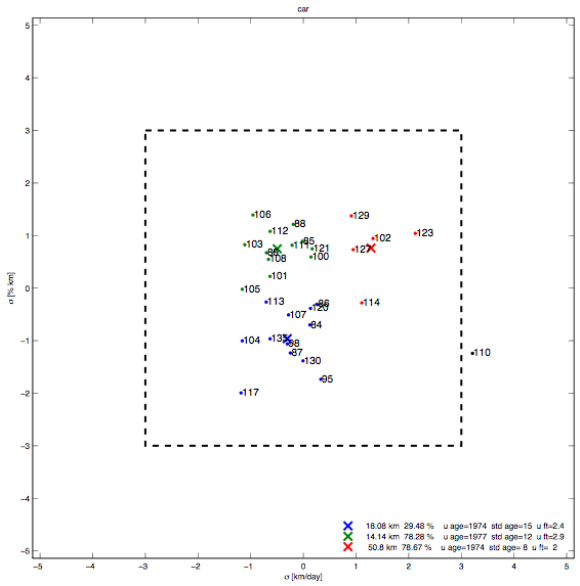
- A daily report provides the user with the list of the segments travelled (a trip is made of all the segments from home to home)

Mobility monitoring - quantitative and automatic approach 1

- Development of an Android application which uses smartphone GPS devices and is able to monitor the trips travelled
  - on foot
  - with the bike
  - with the public transportation system (train, bus)
  - by car
- A daily report provides the user with the list of the segments travelled (a trip is made of all the segments from home to home)
- For each segment, the report requires the user to enter:
  - the reasons for the trip,
  - the means of transport used (however suggesting one)
  - the labels for the starting and arrival point

Mobility monitoring - quantitative and automatic approach 2

- The application posts GPS data to a centrally hosted database
- After 90 days of monitoring: a great amount of data
- Data are processed with data-mining techniques to identify the mobility styles of the users



Mobility monitoring - qualitative approach

- Group meetings of the users to talk about personal experience (focus groups)
- They allow to understand perceptions and motivations
- and to investigate
  - pros and cons of the mobility options being tested
  - barriers and opportunities
  - possible changes of perception over time

This provides specific advices to support the transition to new mobility options, and especially electric mobility, at the local level

What we asked to the participants…

- We provided everybody with an Android smartphone and related Internet connectivity
- and asked them:
  - to always keep the phone on
  - to keep the GPS and bluetooth devices on, even though they increase battery consumption
  - to use the smartphone and Internet connectivity almost only for the monitoring of their trips
  - to check and integrate the report of the monitored trips, on a daily basis
  - to take part to the evening project meetings (four meetings, so far)

… and what we obtained from them

- The initial enthusiasm gradually decreased during the monitoring period, since:

  In many occasions the application did not work correctly, due to poor GPS and Internet connectivity in some specific areas or when travelling on the train – GPS devices in smartphones in fact have lower quality and resolution than those in navigator systems.

The users lose their faith in the application and do not insert the requested information with the attention it would require

… and what we obtained from them

- The initial enthusiasm gradually decreased during the monitoring period, since:

  The daily reports are quite complex and time demanding, because so far the algorithm is not able to distinguish between real stops (for example in changing from one modal option to another) and artefact stops (for example, in queueing at the traffic light) and the user is asked to insert information also for the artefact segments

Since they are participating on a voluntary basis, the users tend to postpone filling of the information requested by the application, ending not to remember the correct information or even not to insert it any longer

… and what we obtained from them

- The initial enthusiasm gradually decreased during the monitoring period, since:

  The qualitative information the users are requested to indicate is not always unambiguous. For example: which reason for the trip should the user choose if she is travelling back home from work and at the same time stopping for a quick shopping for dinner? Or also: how to put labels on the visited places in order for them to be semantically useful for later analysis?

In some cases the users did not know what to indicate and ended in inserting no information at all.

Or, even if they inserted it, we do not know whether it is correct or not. Therefore, some of the qualitative information requested by the application cannot be used at all!

… and what we obtained from them

- The initial enthusiasm gradually decreased during the monitoring period, since:

  The users did not get immediate compensation for their efforts in filling the daily reports in, neither in terms of testing the new mobility options (this will happen in the second monitoring phase) nor in terms of getting a feedback on their mobility habits.

  And ninety days are really a long a period!

In some cases the users motivation dwindled, since they had not personal benefit in filling the daily report in and therefore were led to disregard their duty to do it.

(this was a choice of the project, however, in order to gather the real behaviour of the users. Providing the user with feed-back information could in fact influence their behaviour.

Advices for the second phase monitoring activity

Problem	Possible solution
1 . Poor GPS and Internet connectivity	None
2. Daily reports are quite complex and time demanding	Better algorithm definition (directly avoiding the identification of artefact segments) or better user interface design (allowing the user to indicate artefact segments and to skip them/treat them in an automatic way)
3. The qualitative information the users are requested to indicate is not always unambiguous	Better user interface design: identify only the information that are really necessary for the analysis and find a way to limit ambiguity
4. The users did not get immediate compensation for their efforts	This will probably solved during the second monitoring phase, since they will get both eco-feedbacks and the new mobility options

Appraisal of the first monitoring phase

- The e-mobiliTI living lab relies on the strong involvement of the users
- Main open isuses:
  - users' motivation to actively participate in the project can dwindle;
  - automated data collection covers only quantitative data, while qualitative data collection (e.g. the reason for the trip, the number of people travelling together and the overall satisfaction for the trip) presents some challenges
  - the size of the sample is small, and thus the general validity of the output of the project, the policy guidelines, can be criticised (no general representativeness can be attributed to the mobility patterns and lifestyle observed within the e-mobiliTI living lab. The project in fact cannot provide results capable of representing the whole Lugano region inhabitants behaviour and perceptions)