Mobile Services for Green Living

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Context

Mobile technologies are important not only for digital transformation but also for the consequent transformation of urban planning, wellbeing, environmentally friendly behavior, citizen engagement among others. Cities have improved their transport systems based on mobile technologies while its benefits are relevant for citizens since they are constantly moving in daily life (Roche, 2014).

Efficient flows of people, goods and information are possible just when transport systems are optimized and integrated with the city (Tolley & Turton, 2014), alternative transport systems pretend to decrease environmental impacts produced by traditional transport. Cycling is not only an efficient mode of transport with neutral CO2 emissions (Smith, 2015) but also a well known practice since nineteen century (Oldenziel et al. 2015), therefore cycling is commonly promoted by Open Smart Cities.

Although mobile apps and games are commonly during spare time, cities and some others are look for improving their Apps to effectively engage citizens with with public policies and promote behavioral changes (Matallaoui et al. 2017). Citizens routine include physical displacements and a combination of mobile technologies, gamification and green living actions could help on achieving better use of transport systems, promoting alternative commuting and decreasing private car usage, enabling open smart cities research

Figure 1. Data Collection and Analysis process

Challenges

Although Information and Communication Technologies - ICT have simplified communication processes between cities and citizens, there are lack of engagement with environmentally friendly practices. The environmental impacts of urban activities keep affecting people's life and force stakeholders to improved their policies. Main challenges identified during research are:

1. **Is still difficult to engage citizens** with alternative transportation, specially with urban cycling. Common frictions argued are climate conditions, topography, physical effort needed, safety, travel distances, among others; there should be offered alternatives to tackle them
2. Urban cycling is a mode of transport with **complex patterns difficult to understand**, therefore current public policies do not take advantage of existing geospatial technologies for tracking and analyzing. Lots of existing frictions remain active slowing down transition to alternative commuting
3. **Gamification strategies are not effectively used** to promote behavioral changes towards greener life, cities still need to understand both positive and negative issues of them. Not enough experiments and guidelines are available for cities to adopt those strategies

Actions

Methodology has following phases:

Definition, where an extended literature review is done as well as a selection of datasets and existing APIs that will support experiments
Experimental Framework, where game mechanics will be designed and tested together with citizens to define strategies
- *Experiment 1*: A group of cyclists using the location tracking App "Cyclist" and getting personalized feedback, then a workshop for getting participants impressions
- *Experiment 2*: A second group of cyclists will use a new version of "Cyclist" with more gamified tools, then a workshop for discussing participants experience

Build and Test, where the mobile platform is developed, analysis tools defined while guidelines are documented based on experiment results

Impact

There are two main actors that would be reached:

Citizens wiling to contribute, analyze and understand how environmentally friendly are cities as well as able to participate and support policy making towards green living.

Cities supporting alternative commuters with open crowdsourced datasets useful for policy makers, and able to provide personalized feedback trough mobile Apps

Mobile devices will be used to actively participate in urban planning and transport systems could be improved from a joint effort between cities and commuters. Delivered OCT tools will facilitate communication and interaction, therefore external actors could use it to empower not only cycling or walking activities but also associated businesses.

Results

Game Elements as mobile component to be integrated with mobile Apps that promote Green Living Actions

An evaluation of existing APIs able to track user displacements and identify mode of locomotion

Data visualization components for cyclist displacements, paths and infrastructure (Figure 1), useful for urban analysis - **OCT**

A mobile App for tracking cyclist (Figure 2) optimizing mobile resources (I.e. battery, memory, and data connection) - **OCT**

A fully anonymized compilation of cyclist tracks, compatible with GIS and web services - **OCT**

A set of guidelines for promoting alternative commuting based on personalized feedback in smart cities - **OCT**

Scaling Up

Open software components could be easily reused and integrated into mobile applications for bike sharing, bike rental, cycling navigation or routing, then any cyclist could contribute with their own data while using those Apps.

Marketing strategies will be designed including gamification strategies and associated business could take advantage of them. Green initiatives should improve their financial platform to evolve with the mobile transformation.

Researchers will have tested gamified tools to be used for multiple projects, software components could be integrated into future experiments and prototypes.

Cities will adopt research outcomes to improve policy making and reduce frictions, then citizens could be engaged and wiling to participate.

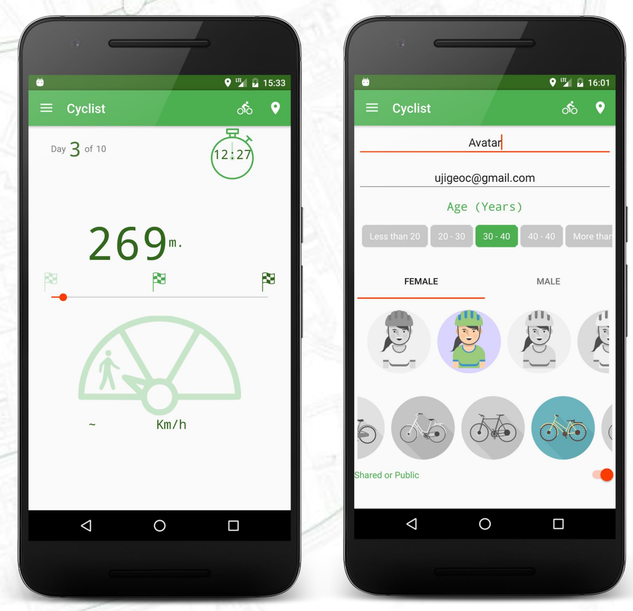

Figure 2. Mobile App current interface

Consortium

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http://www.geo-c.eu/

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