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SMARTPHONE APPLICATIONS FOR PUBLIC TRANSPORT IN SWISS CITIES

A STATE OF THE ART OF CURRENT LOCAL APPS

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Executive summary

Switzerland is one of the countries where smartphone applications are more extensively used. In the field of travel and tourism, in particular, smartphone applications are able to support travellers' decision making, thanks to real-time and personalized information. Public transport operators are increasingly aware of their potential and are developing apps to enhance the quality of public transport. This paper presents the results of a comparative analysis of six public transport apps developed to serve, respectively, six Swiss cities. A contents and functionalities analysis pointed out which information pieces are provided and which services are offered to improve public transport use. A user scenario, then, was designed to test the performance of the six applications.

Introduction

According to Google's study "Our Mobile Planet", in no other European country smartphones are used as extensively as in Switzerland (Google, 2012). They are playing a major role in shaping consumers' behaviour, and are rapidly becoming one of the major sources for local information. Google's study reports that 91% of Swiss users declared to have looked up local information on a smartphone, for a number of different reasons, from business to leisure. Smartphone applications are nowadays so diffused, that the sentence "*There's an app for this!*" has become a common expression. They are, then, a new way to serve customers; they are designed and developed, indeed, by any kind of organization, software firms and also individuals and then provided to the end user through online app stores.

The possibility to get real-time information and context-aware information, mostly thanks to GPS systems, makes smartphones a powerful ally for transport companies and an effective help for travellers. One of the biggest challenges of urban public transport is, in fact, its reliability on schedules. The possibility to have updates about traffic conditions in real-time makes public transport more attractive to passengers, because it reduces their anxieties and worries about way-finding related to unforeseeable incidents, and it even seems to reduce perception of waiting time (Watkins et al., 2011: 839). Location-based services, like points of interests (POIs) or information related to local culture and history, represent, then, for travellers and especially for tourists a support for "on-trip" decision-making (Torun, 2011). This kind of integrated information, though, is still new in the field of public transport. In the Swiss landscape, the only one example of a smartphone app providing integrated information is the *PostAuto* app (*PostAuto Schweiz* is a subsidiary company of the Swiss Post, which provides regional and rural bus services throughout Switzerland): the app shows POIs and offers audio-guides on characteristic sites along the way.

Apps have an effective potential to improve the quality of public transport, and even to reduce the use of private transport means. This paper presents the results of a comparative analysis among six apps available in Switzerland for city public transport in June 2013. Contents and functionalities of each app were categorized, then compared and discussed through a user scenario technique.

Methodology

In 2013, in Switzerland there were six cities offering a smartphone application specifically devoted to public transport:

- Basel (BVB app)
- Bern (MEZI app)
- Geneva (TPG app)
- Lausanne (TL Live app)
- Lucerne (VBL app)

- Zurich (ZVV app)

The framework for the analysis of city public transport apps was constituted by the Online Communication Model (OCM), developed by Cantoni and Tardini (2006; 2010). OCM adopts a holistic approach, which looks at online applications as dynamic entities with a proper life and typical functions, like a shop or a press agency. The OCM ideally considers all the elements and the actors involved in the communicative exchanges taking place, distinguishing them in four dimensions or pillars:

1. *Contents and Services* - the more or less structured ensemble of information pieces and services provided, such as news reporting, storytelling, buying, polling, chatting;
2. *Accessibility Tools* - the collection of technical instruments and functionalities, which make such contents and services accessible, like hardware, software, and human-computer interface;
3. *People who Manage* - the group of people who design, implement, maintain and promote the site/app;
4. *Users/Clients* - the group of people who access the site/app.

The first two dimensions are related to *objects*, while the latter are related to *people*. Finally, there is a fifth dimension which completes the framework:

5. *Ecological Context or Semiosphere* – it refers to the relevant (web) market where competitors of the site/app work as well. Every element (i.e. 'sign') constituting the website/app acquires a specific value in a given context, which contributes to define what it is and what it is not, in comparison with other players.

The OCM model guided both a) the analysis of contents and functionalities, suggesting criteria to distinguish different objects in the apps, and b) the creation of realistic user scenarios, where specific types of users were imagined to interact in a certain context and with certain objectives.

a) Contents and functionalities analysis

The elements of each app were classified into two categories:

1) *contents* - public transport related information provided by the app, like the list of stops or departure/arrival times;

2) *functionalities* - the technical features of the app which make it possible to access contents, like an itinerary function allowing to select points of departure and arrival, and the actions a user can accomplish through the app, like buying a ticket or directly calling the transport company.

The coding procedure followed the saturation method, which means that each object in the apps was listed in a grid and classified, until no new object in any app was found. The contents and functionalities analysis was used both as a benchmark tool, to compare the apps, and as a context-awareness tool, to have the complete picture of what apps for public transport in Switzerland do offer until now.

Table 1 reports the list of the objects in the apps, which were classified as contents. In the grid, '1' indicates that the app offered that content, while '0' indicates that the content was missing.

CONTENTS	BVB (Basel)	MEZI (Bern)	TPG (Geneva)	TL Live (Lausanne)	VBL (Lucerne)	ZVV (Zurich)
All stops	0	1	1	1	0	0
Accessibility Info	0	0	1	1	0	1
All departures	1	1	1	1	1	1
All lines	0	1	0	1	0	0
City map	1	1	1	1	1	1
FAQ	0	0	0	1	0	0
Info for travellers with bicycles	0	0	0	1	0	0
Info for travellers with dogs	0	0	0	1	0	0
Interchanges (connections)	1	0	1	0	1	1
Legal Terms	1	1	1	1	1	1
Network plan	1	0	1	1	0	1
Presentation of company	0	0	0	1	0	0
Tarif Info for tickets/travel cards	0	0	0	1	0	0
Traffic Info	0	1	1	1	0	1
Travel Time	1	0	1	0	1	1
TOTAL	**6**	**6**	**9**	**13**	**5**	**8**

Table 1: Contents provided by Swiss smartphone applications for city public transport.

The *iOS* versions of the apps were considered, and the analyses were performed between April and June 2013.

b) User scenarios

A scenario is a story developed to describe possible uses and navigation patterns of a certain application, as well as to detect missing functions or contents in relation to its intended goal. The narrative form of the story has several advantages: a given situation can be presented in a realistic way, it is easy to understand even without technical preparation, and it can be easily memorized (Cantoni, Di Blas and Bolchini, 2003). Users of an online application can be described in terms of *personas* and *roles*. Personas refer to the characteristics of end-users, whereas roles describe motivations for using the application. There are, then, *specific tasks* users wish to accomplish, and *soft-goals* they want to achieve (Cantoni, Di Blas and Bolchini, 2003). The six apps were tested against the following user scenario:

> A young woman has an invitation for dinner from one of her friends, who lives in one of the six cities. She goes there by car with some other invited people. After dinner, she wants to go back to her hometown and needs to take public transport, because the other guests stay overnight and can't give her a lift. She has first to reach the main train station of the city by bus, and then take the train. Thus, she launches the smartphone app to locate herself in the city and to find the fastest itinerary to the train station.

Figure 1: User scenario.

Using the smartphone application, the following tasks had to be accomplished in order to play the scenario:

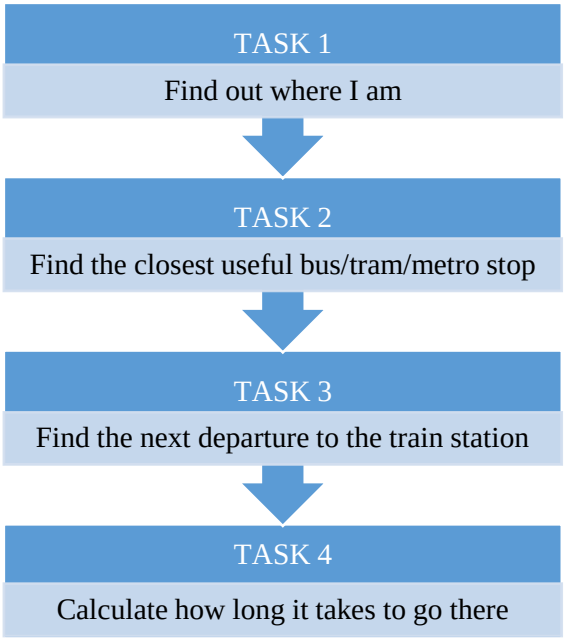

Figure 2: Sequence of tasks tested for each application according to the user scenario.

The usability of the apps was assessed in terms of five *usability attributes* (Nielsen, 2003; Zhang and Adipat, 2005):

- *Efficiency* - how quickly a task can be performed; it has to be assessed against specific conditions, since the app might be efficient for a person who is expert of the place, but misleading for a first-time visitor with the same need.
- *Effectiveness* - if a certain task can be fully completed; using an app for public transport, for instance, a traveler might be able to reach the desired destination but not to correctly calculate travel time.
- *Simplicity* - the degree of comfort while accomplishing the task; an overload of information and frequent pop-up messages, for instance, negatively affect simplicity.
- *Comprehensibility* - how easily a content can be understood; in the case of apps for public transport, icons and names corresponding to common design conventions make contents and functionalities highly comprehensible.
- *Satisfaction* - the user's feeling while using the app in relation to the task accomplishment; it is considered, for instance, if the design helps the navigation.

Results

a) Contents and functionalities analysis

Smartphone applications for public transport in Swiss cities offer: 15 types of contents and 31 types of services. Table 2 shows contents and functionalities shared by at least 3 out of 6 studied applications.

Contents	• All departures • City map • Legal terms • Connections • Network plan • Traffic information • All stops • Accessibility info
Functionalities	• Geo-localization providing nearest stops • Active map showing course of line • Search engine for stops • Navigation history • Itinerary search with complete routing • Itinerary search with time and date selection • Map with direct link to timetable • Link to transport company website • Link to directly call transportation company • Email button to send feedback

Table 2: Common contents and functionalities provided by mobile apps for public transport of Swiss cities.

Only three types of *Contents* are provided by all the applications: all departures from a

stop (i.e. departure time and bus number), city map, and information about legal terms of the transport company. Four apps show the network plan, highlight the connections for a selected bus stop, and give real-time information about the traffic in the transport network. Three apps, then, offer accessibility information (like whether buses or trams can be boarded with wheelchairs), and list all the bus stops. None of the apps gives information about points of interest (POIs). TL Live (Lausanne) offers most of the information contents; it is the only app that presents tariffs and prices for the entire transport network, includes a FAQ section, and shows information for users with dogs or bicycles. Even though, it does not mean that it is the best application. In fact, if VBL (Lucerne) is considered, for instance, which is the application with the lowest number of information contents, a precious kind of information can be found – missing in all the other apps – that is the map of connections among bus lines, which allows to calculate the route from a point of the city to another. ZVV (Zurich), instead, is the only app listing all the arrivals of a certain stop: this represents a key information to avoid waiting times at a bus stop.

As for the *Functionalities*, only two of them are common to all the six apps: a link to the homepage of the transport company and the "locate-me" function, that is the geo-localization system. The app for the city of Bern (MEZI) has an augmented feature for geo-localizing the user, who can use the phone in order to directly receive indications about the nearest bus or tram stop and the next departure. Unlike all the other apps, instead, MEZI (Bern) lacks a direct link to call the company. Three, then, are the functionalities shared by five apps: a map of the course of line, which gives access to information about the different stops of the line ("active" map), a search engine which also proposes stop names, a navigation history. Four more functionalities are common to four apps: an itinerary search providing both complete routing from a point to another and the possibility to set time and date, a map with a direct link to the timetable, the possibility to send an email to the company with feedbacks. TL Live (Lausanne) and ZVV (Zurich) are the only apps to provide traffic information directly on the chosen itinerary, MEZI (Bern) sends, instead, pop-up messages to the mobile phone, whilst the app for the cities of Basel (BVB) and Lucerne (VBL) don't have any functionality at all to access this kind of information. On the other side, BVB and VBL are the only apps allowing to decide for the fastest connection or the fewer interchanges and, together with ZVV (Zurich), they allow to save the itinerary and the respective connections on the iPhone's agenda and to send it per email or sms. BVB and VBL have been developed by the same company and are, in fact, very

similar in the range of information and functionalities they offer.

The app for the city of Zurich (ZVV) provides most of the functionalities, and distinguishes itself for a special attention to tourists, thanks to a link to the touristic website of the city and to the possibility to buy special tickets with free entry to museums; ZVV, then, is the only one app allowing to directly publish comments on Facebook and Twitter. Together with the app for the city of Basel (BVB), ZVV is the only one allowing the user to buy bus/tram tickets.

b) User scenarios

In order to be tested against the user scenario, each application had to be used in the city it was developed for.

Table 3 reports the performances of each application for the four tasks. The check mark means that the task was fully accomplished without any problem, the cross-like tick means that the user was not able to accomplish the task, the dotted check mark means that a user would encounter some difficulties.

Task/ App	TL Live	TPG	ZVV	VBL	MEZ I	BVB
Locate-me	✓	✓	✓	✓	✓	✓
Find next stop	✓	⋰	✓	⋰	✓	⋰
Find next departure	⋰	⋰	✓	✓	⋰	⋰
Travel time	✗	✓	✓	✓	✓	✓

Table 3: Performances of the six apps in the accomplishment of the user scenario tasks.

The accomplishment of the tasks using the ZVV app (Zurich) was easy and fast. The geo-localization system of the app automatically selects the user's position as departure point; once the destination has been selected, then, the necessary information to find the next bus/tram/metro stop (2nd task), to find the next departure to the train station (3rd task), and to calculate how long it takes to reach the destination, are displayed at a glance (see Figure 3).

Figure 3: Screenshot of ZVV app, results of itinerary search.

The other apps require, instead, several passages backward and forward to get the itinerary results. TL Live (Lausanne), for instance, allows to quickly localize the user on the city map by selecting a tab called "réseau" (i.e. network) (see Figure 4), but the lack of an itinerary function, then,

makes it difficult to select the right line for the destination one wants to reach and to know if a change of bus/tram/metro is necessary.

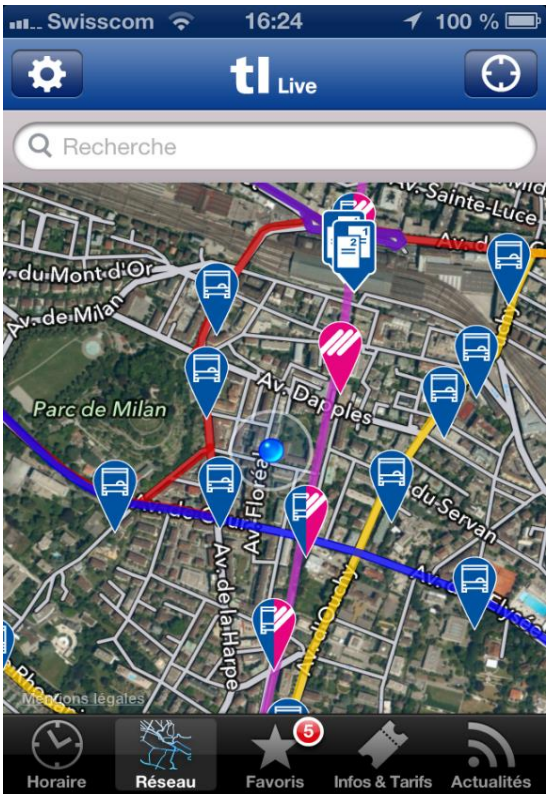

Figure 4: Screenshot of TL Live app, results for geo-localization.

The TPG app (Geneva) offers a similar localization function (the respective tab is called “nearby”), but when it comes to the itinerary search (tab “route”), it redirects the user to the TPG’s main website by opening a new browser window, negatively impacting on efficiency, simplicity and user satisfaction. MEZI (Bern), instead, lacks both of an itinerary function and of a network map, making it very hard for the user to find connections, especially for visitors who do not know stops names.

ZVV is, finally, the most comprehensible application, also thanks to its similarity to the widespread SBB (Swiss Federal Railways) application and the use of symbols commonly employed within the public transport system in Switzerland. Despite the style appeal, some design choices result to be more appropriate than others: the choice of TL Live, for instance, which presents the network of all the lines on a city satellite map – which makes it very realistic –, reduces comprehensibility when searching for the itinerary: it is, in fact, more comprehensible for identifying interchanges and stop names to have them displayed on a separate network map, as the ZVV and the BVB (Basel) applications do (Figure 5).

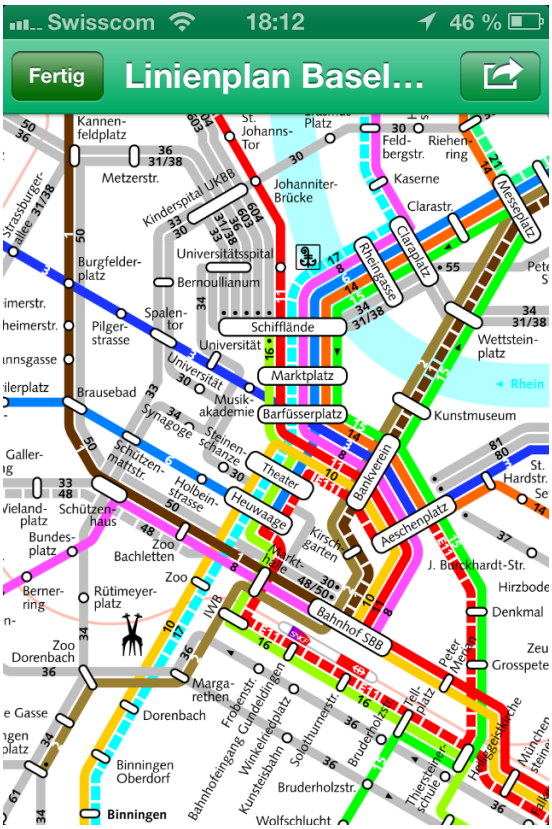

Figure 5: Screenshot of BVB app, network map.

The interface of the ZVV application, in addition, is a good balance between

simplicity and attractiveness; the user feels comfortable while using the app and is able to comprehend and employ all the features immediately.

VBL, the app for the city of Bern, also obtained a high performance in the user scenario test: tasks were performed quickly without major difficulties, the design is very comprehensible – maybe a bit too sober –, allowing to easily get information. However, two drawbacks negatively impact on effectiveness: the geo-localization system, which does not automatically localize the user, and the search functionality, which does not guess English names (e.g. "train station" instead of "Banhof").

Concluding remarks

A public transport user needs quick and precise information to plan his/her travel, and to take the greatest advantage of public transport. The study reported in this paper intended to draw a picture of the smartphone applications for public transport available in 2013 in the main Swiss cities.

Six applications were analyzed and compared in terms of the contents and functionalities they provide, and their usability was checked against a user scenario.

The analysis pointed out that all the apps provide the basic information to allow users to locate themselves and reach the destination desired within the city, but they present significant differences in the way such information is made accessible (i.e. in the functionalities) and in the services available directly on the smartphone.

Most of the apps give information to facilitate the user's search – like the list of connections and travel times, and a few of them also include information for travelers with special needs – like travelers on a wheelchair – or travelers with animals. Traffic information, which represent one of the most important added values of a smartphone app for public transport, is still not provided by all the apps. Information about points of interests, then, which might facilitate significantly the travel of certain users like tourists, have still not been integrated at all.

Different strategies have been developed to facilitate the access to the information contents, from active network maps, to geo-localization function and augmented reality. The usability test showed, however, that to reach their intended goal –to help travelers to make an efficient use of public transport – it is more important to satisfy a few requirements than to provide advanced technological functions or an appealing design. Main requirements for a successful smartphone application for urban transport can be summarized as follows:

- give clear and precise information, avoiding, for instance, unrequired details or pop-up messages of update;
- reduce the number of clicks that are necessary to access information, for

instance automatizing the geo-localization function;

- include smart built-in search engines, which are able to guess both proper names of bus/tram/metro stops and generic transport-related names (e.g. train station) in different languages;
- provide information on nearby POIs;
- include an itinerary search function which provides complete route and connections;
- give the possibility to buy tickets.

Smartphone applications for public transport represent a powerful communication tool for transport companies, which can exploit them to improve the quality of their service and, that way, to improve the quality of city life.

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