

Walravens, Nils

Conference Paper

A critical exploration of the Brussels app economy and mobile city services scene

25th European Regional Conference of the International Telecommunications Society (ITS):
"Disruptive Innovation in the ICT Industries: Challenges for European Policy and Business",
Brussels, Belgium, 22nd-25th June, 2014

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Walravens, Nils (2014) : A critical exploration of the Brussels app economy and mobile city services scene, 25th European Regional Conference of the International Telecommunications Society (ITS): "Disruptive Innovation in the ICT Industries: Challenges for European Policy and Business", Brussels, Belgium, 22nd-25th June, 2014, International Telecommunications Society (ITS), Calgary

This Version is available at:

<https://hdl.handle.net/10419/101383>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

A Critical Exploration of the Brussels App Economy and Mobile City Services Scene

Nils Walravens

iMinds, Gaston Crommenlaan 8, 9050 Ghent, Belgium

SMIT, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium

+32 2 629 16 21

nils.walravens@vub.ac.be

Abstract

This paper combines quantitative and qualitative methods to take a first look at the app economy and mobile services landscape in the City and Region of Brussels, capital of Belgium and Europe. By scraping the iTunes App Store and Google Play market places we get a view on platform distribution, pricing, public vs. commercial, adoption, appreciation and popular categories of Brussels apps, as well as a view on the app economy in the city. This data is then complemented by qualitative expert interviews with actors in the field, such as cities, interest groups and developers. In the context of the current debate surrounding what constitutes a Smart City and the importance of smartphones and mobile in this area, we perform a reality check, using Brussels as a case. We find that the laggard position Brussels is currently in could be an opportunity to leapfrog in the field of mobile services, but that a focused vision and clear mobile strategy, while thinking of the city as a local innovation platform, is quintessential to achieving this.

Keywords

Business models, smart city, mobile services, mobile applications, Brussels, app economy

1. Introduction

The year 2008 signified a turning point in the field of Smart City and mobile research for three reasons. For the first time (1) there were more mobile than fixed broadband subscriptions active, (2) more “things” than people were connected to the internet, and (3) more than half of the world’s population lived in cities (Burger, 2012; EC Communications Committee, 2012, 2013; Evans, 2011). The first point shows the growing importance of mobile connectivity. As prices for smartphones decrease and their capabilities to run more advanced and appealing software increase, consumers are depending on these devices more and more when travelling in their own cities or other areas, using more services that can increase their productivity, efficiency, communication skills or create experiences that enhance their quality of life.

The second turning point shows how intelligence and network connectivity is increasingly added to physical objects around us. From internet kiosks in the street and streetlights equipped with light sensors that tell them when to switch on or off, over household appliances like fridges and vacuums, to new implementations of home automation with connected thermostats and light fixtures: they are all becoming connected and allow for new services and applications to be built on top. Sensors are gaining importance in this respect, while the prices for simple and complex sensors are decreasing dramatically (Silicon Labs, 2013), making more and innovative applications and services based on (real-time) sensor data a reality. Rather than relying on static or out-of-date data, sensor networks allow us to gather accurate statistics on a whole range of variables that can impact urban quality of life, and as a consequence, act on these variables.

The final point indicates that since 2008, more than half of the global population lives in cities. The UN estimates this number will only grow, to a predicted 70% by 2050 (UN Habitat, 2010). As more citizens (and consumers) move to urban areas, actors from the ICT and mobile telecommunications naturally become increasingly interested in offering services that are tailored to life in the urban environment. Cities and local governments are at the same time exploring the role that new ICT services and products can play in increasing the quality of life of their citizens. In recent years, this quest is often captured in the “Smart City” concept. The concept has become key in bridging the research, projects and initiatives exploring the role of technology in urban life.

These three turning points illustrate that the smartphone is - for now – turning out to be the predominant “interface object” that mediates a growing range of urban tasks and provides primary access to Smart City services (Townsend, 2013; Greenfield, 2013). Of course, the main layer between the end user – citizen in this case – and the smartphones they use are the applications and services running on the devices. They are the connecting layer between the physical location someone is in and the virtual and social information that can be linked to it. In this context, this paper focuses on the City and Region of Brussels. This city is an interesting case as it is the capital of Europe, has a very demographically diverse population that faces a wide range of urban challenges, but is still manageable from a research perspective and its mobile services ecosystem is still nascent. These conditions provide us with a good case and allow us to introduce some nuance in the mobile services and Smart City debate.

This paper starts with a brief overview of different approaches to the Smart City. Next, we dive into the case of Brussels and provide some more context to the city and its ICT and mobile policies, including a look at the status of open data in Brussels. Then, the methodology used in this article is highlighted, followed by an overview of the state of the art of mobile services available for Brussels. From this analysis, some trends are derived, followed by a reality check of the current state of the mobile ecosystem in the Region.

2. Smart Cities

The interest of the public, technology companies, academics and media in the Smart City concept has increased in recent years, pushing forward an often almost science-fiction like

discourse situated between concerns about control, freedom and privacy (see e.g. Hollands, 2008; Joroff, 2008; Koolhaas, 2011; Greenfield, 2013; Townsend, 2013) and enthusiastic accounts about increased efficiency, sustainability, and generally a better world and higher quality of life for everyone (see for example Caragliu et al., 2009; Lindsay, 2011; IBM, 2009). However, establishing an all-encompassing, final definition is as difficult as projects, opinions and initiatives in the field are diverse.

2.1. Different approaches to the Smart City

Today we can identify two juxtaposed approaches to the Smart City: top-down and bottom-up. The first approach adheres to top-down dynamics, often closely related to the technologically deterministic idea of a “control room” for the city. It aims at providing an ICT-based architecture to overview urban activities as well as the tools to (automatically) interact with infrastructures and adjust parameters to predefined optima (IBM, 2009). Certain kinds of top-down visions have been heavily criticized with the main argument that they are dictated by commercial interests, and that they entail questions of control and privacy (Graham, 2002; Greenfield & Shepard, 2007; Hollands, 2008; Greenfield, 2013).

These techno-determinist or top-down viewpoints are contrasted by a more experimental, bottom-up understanding of what a Smart City could be. In this perspective, change comes only from the people “using” the city. It dismisses any form of top-down urbanization, in particular with the involvement of powerful private companies (Lindsay, 2011). However, relying solely on bottom-up processes also appears unlikely or even unfeasible. Citizens are not detached from the wider urban context they live in (Hamdi, 2004; Berg, 2012), with other stakeholders playing (powerful) roles.

Since “change seldom arises from purely top-down or bottom-up systems and processes” (Shepard & Simeti, 2013) we propose a more nuanced interpretation, one that combines top-down and bottom-up approaches, and establishes the Smart City as a *platform* that fosters collective (local) intelligence of all affected stakeholders (Campkin & Ross, 2013; O’Reilly, 2011). This means looking at the Smart City as a local innovation platform, a meeting place where the public sector, private interest and citizens can come together to generate new value, to collaborate and innovate together. This idea has also been referred to as the triple helix (private sector, government and university actors) or even quadruple helix (including citizens, the public or the user, depending on the formulation) (Leydesdorff & Deakin, 2011; Yawson, 2009). Given that, for now, it has become accepted that the smartphone will be one of the most important interfaces to begin tackling Smart City challenges (Townsend, 2013: p.6, Greenfield, 2013), this role of the city as a platform is of particular relevance. It means focusing on the layer that connects people with their context via the smartphone; namely mobile city services and applications, and how all relevant stakeholders need to be involved to create useful and successful applications in an urban context. In the next section we take a closer look at four trends in this context.

2.2. Mobile in the Smart City

When looking at the mobile industry from the perspective of the Smart City, a few important trends and issues come to light. A first point is infrastructure and the evolutions in networking technology, or how mobile devices connect to the network. The trend of cities aiming to offer ubiquitous wireless coverage (using e.g. WiFi or WiMAX) to its citizens seems to be subsiding after several failed experiments around the world (Charny, 2007; Gardner, 2008; Lavalley, 2008; Rogoway, 2010). Although different business models were experimented with, today city initiatives have been outpaced by commercial WiFi projects offered by incumbent operators, or high-speed cellular networks like LTE. One area related to infrastructure where the city is more likely to play a role is the development and deployment of wireless sensor networks, connecting everyday items and city infrastructure (e.g. street furniture) (Naphade et al., 2011). This is often referred to as the “internet of things” and the amount of data that will be gathered by these sensors in the not too distant future is expected to be overwhelming (Evans, 2011).

A second important trend impacting the development of mobile services in a city context relates to open data (Batty et al., 2012; Komninos et al., 2011). City governments are currently “sitting” on a wealth of information related to different aspects of life in the city, but this data is either not publicly available or not easily interpretable. This has sparked a movement to encourage the opening of datasets, under the “open data” moniker, which is gaining traction across local and national governments worldwide (OKFN, 2012). Although many technical and business questions remain (related to machine-readability, standardization and interoperability of the datasets, as well as the business sustainability of open data based apps and services), these first initiatives are seeing increasing success and providing intriguing initial results (Stott, 2014). We take a closer look at the situation relating to open data in Brussels further on.

A third and very important business trend currently at play in the mobile industry is platformisation. This refers to companies employing divergent types of platform strategies, leveraging several “sides” of the market in innovative ways in order to try and attain dominance within the mobile industry in this case (see for example Gawer & Cusumano, 2002). Such strategies are well illustrated by the approach taken by Apple and mimicked by Google, Microsoft, Samsung and others of offering a tight integration between hard- and software (including media content) that creates an attractive value proposition for hardware manufacturers, developers, content providers and end users (Ballon, 2009; Walravens, 2014). These strategies simultaneously have led to and are the result of a highly competitive industry in which the power relations can quickly and dramatically change over short periods of time. This adds an important level of complexity for cities and government administrations that want to be active in this sector.

A final trend we can identify in this area is the changing role of the user within the value network. One of the effects of the democratization of ICTs has been the increased possibility for end users (or citizens in our case) to be more vocal about issues that are important to their context (Chourabi et al., 2012). This has led to new services that facilitate the communication between citizens and governments, but has also resulted in new methods in academia aimed at including a user perspective when developing new tools and applications (e.g. co-creation and Living Lab experiments, see e.g. Schuurman, 2012). An increased involvement of the citizen is thus often referred to as an integral part of the city of tomorrow (Yawson, 2009). Keeping these four important trends in mind, the following section will take a closer look at the specific context of Brussels related to the city’s mobile service initiatives so far.

3. The Context of Brussels

Although its *de facto* role as capital of Europe, the capital of Belgium and an interesting political construction in a rather small geographical area, Brussels is often neglected as a research topic in some fields, precisely due to this complexity. The Brussels Capital Region consists of the City of Brussels, combined with the 19 municipalities that encircle it and, with over one million inhabitants, makes up the third Region of Belgium next to the Flemish and Walloon Region. The Region, the City and the municipalities all hold competences related to ICT: for example, the City and the municipalities are responsible for their own websites and any online services they wish to offer to citizens (e.g. social media communications), but the Region operates an e-administration service called Irisbox, where citizens can download documents related to the Region’s competences (e.g. regional tax forms and soil certificates), as well as documents related to municipal competences (e.g. birth certificates, parking permits and so on), although the availability of these documents depends on the municipality. These distributed competences can make the development of common policies a challenge.

Although Brussels is known for many of its positive and negative facets and scores quite well on its competitiveness (The Economist, 2013), it is generally not perceived as a Smart City and usually scores very low – or is not present at all – in the various Smart City rankings and indices created by many different stakeholders (e.g. Cohen, 2012; Ericsson, 2013; GSMA, 2013; IBM, 2009). Brussels does take some initiatives related to ICT and innovative services, but for now they remain rather limited and often without much consequence. Although a

Regional ICT policy plan is in place for the period 2010-2014 it lacks an integrated vision related to mobile and in some cases in the execution of its promises.

One example of this is the City and Region's approach to open data. While the cooperation models and exact terms are still crystallizing across Europe and the world, it is accepted that open data is and will be an important component of innovative Smart City services (whether they be mobile or not) (Komninos, 2011; EC, 2012). In Brussels, open data initiatives are very distributed; GIS data is managed and opened by the Brussels Region Informatics Centre (BRIC) while more typical datasets (e.g. ATM locations, public toilets etc.) are the responsibility of the municipalities and in the case of the City of Brussels opened up by GIAL (Centre de Gestion Informatique des Administrations Locales), a non-profit that provides ICT-services to local administrations, including the City of Brussels. This again makes a common approach difficult.

While there are certain issues and questions to be raised (for example on ICT-expenditure in Hillenius, 2013), the Region also takes positive initiatives in the area of mobile services, launching initiatives such as FixMyStreet Brussels (see *infra*). In what follows we will zoom in on what is currently available in Brussels related mobile apps, after detailing our methodology.

4. Methodology

One of the aims of this article is giving insight into the state of the art of the mobile services industry in Brussels for the first time. To gain this insight, in first instance we needed to gather as much data on available mobile apps as possible. The data for this article was collected in October 2013 and in that sense represents a snapshot of the situation in Brussels at the time. The two main data sources were the iTunes App Store and Google Play store and each of these mobile application storefronts were scraped for results related to Brussels, searching for the name of city in four languages (English, French, Dutch and German). Apple offers a search API (Application Programming Interface) (Apple, 2013) that returns a JSON file with the results, which was then converted to a CSV file. Google does not offer a similar search API for the Google Play store, so to gather this data an independent developer who created a scraping tool for Google Play was contacted and provided us with the search results for the platform.

One list of results for all three search terms was created for each platform (iOS and Android) and double entries were removed. Limiting the results to these two platforms is an informed decision as they are by far the most popular operating systems and application ecosystems globally and in Belgium. In November 2013, iOS and Android combined represented over 98% of the mobile operating system market share in Belgium (HowWeBrowse, 2013).

As a next step, these two lists of mobile apps were cleaned up to eliminate irrelevant information like repeating categories, different formats of categories, internal reference numbers (e.g. for seller ID) and so on. This resulted in a list of 185 applications relevant to Brussels on the iTunes App store and 136 mobile apps on the Google Play store. These two lists form the main dataset on which the empirical section of article is based and since no complex statistical calculations were required or performed, the data was analyzed using Microsoft Excel.

Apart from the statistical data, qualitative data such as policy documents, articles and expert interviews were also used as material. In the Spring of 2013, over 15 expert interviews with representatives from the City of Ghent, Antwerp, Mechelen, Brussels, the Flemish government, BRIC, GIAL and ICT industry interest group Agoria were conducted. The material serves as input on the current state of the mobile services policy in the Brussels Region and the country, and is referred to throughout this article. Combining qualitative and quantitative data provides us with deeper insights on the topic of smart mobile city services.

5. State of the Art of Brussels Apps

This section will take a look at different aspects of the mobile city services ecosystem available for the Brussels territory, zooming in on pricing, whether apps are publicly or commercially developed, popular types of apps and so on. We start with the distribution of apps over the two platforms under consideration.

5.1. Platform Distribution

As was already hinted at above and in line with the mobile use behavior in Belgium, iOS is also the more popular platform when it comes to the number of available apps related to the city of Brussels. Of all available apps, 58% work on iOS, while 42% run on Android. This is not a particularly surprising result and almost entirely in line with the popularity of both platforms in the whole country. It is however interesting to note how many applications were available on both platforms. In order to increase market share, developers or cities often create or commission mobile applications for both platforms. In the case of Brussels, 31 applications out of a total of 321 were available both for iOS and Android, representing just under 10%. In Belgium, this is a particularly interesting statistic, since in order for a developer, company or city to be present on 98% of the mobile platforms in the country, one only needs to create applications that run on both iOS and Android. However, only less than ten percent of these stakeholders appear to opt for this strategy.

5.2. Pricing

Historically the applications available via Google Play have been cheaper or free, since in the first years of the marketplace Google did not allow paid apps in its store. Paid applications were possible since the launch of the iTunes App Store, starting a stronger tradition of paying for iOS apps and today, developers hoping to gain revenue from their applications still have a better chance in the App Store than with Google Play: although Google Play surpassed the App Store in number of downloads for the first time in July 2013, the App Store still generated 2.3 times more revenue than Google Play (Clover, 2013). Google does not include pricing of applications in the scrapable data from Google Play, but an *at random* check seems to indicate most of the applications related to Brussels available on the Google Play Store are indeed free of charge, barring a few exceptions. Taking a closer look at the pricing in the App Store reveals that free applications remain popular here as well, with 62% of Brussels apps available at no direct cost.

10% of applications are priced at the lowest possible price setting in the App Store, 0.89 eurocents. 7% are available at €1.79, 9% at €2.69, again 7% are priced at €4.49 and only two applications were priced at the highest price point for all Brussels apps: €5,49. There is no particular theme connecting the highest priced applications, other than the fact that they seem to offer more detailed information or specific features (e.g. audio guides, a city game, walking tours based on cartoon murals in the city).

A recent report reveals interesting information related to the revenue models of mobile apps in the two major marketplaces (Schoger, 2013). It shows that the applications that generate the most revenue in both marketplaces are those that are made available for free, but offer in-app purchases of additional content or features. The number of apps that operate under this “freemium” model and generate the most revenue across the marketplaces even grew in the course of the year 2013. In January 2013, 77% of the iTunes App Store’s revenue share came from free apps with in-app purchases, growing to 92% by November. By the end of the year only 4% of revenue came from paid apps and another 4% came from paid apps with in-app purchasing. The number is even higher for Google Play, where in January apps under a freemium model accounted for 89% of the revenue share, growing to no less than 98% by November. This means that only 1% of the apps in Google Play are paid and another 1% are paid apps with in-app purchasing (Schoger, 2013). Unfortunately for our research, neither Apple nor Google reveal detailed information on whether in-app purchasing is possible in an app via their scrapable data. However, for cities, developers and other stakeholders interested

in generating direct revenue from their applications, adopting a freemium model would currently appear to be the most successful strategy.

5.3. Public and Commercial Applications

The number of official apps by the City of Brussels, the Region or any of its institutions is limited and represented in the following table. Ratings are only available for the App Store, while the number of downloads is only available for Google Play. These categories are explored in more detailed in the next section.

Table 1. Overview of Official Brussels Applications

Name	Developer	Platform	Release date or last update	Category	Language	Rating (by x users)	Downloads
Be.brussels	BRIC	iOS/ Android	2012-12-19	Utilities	FR, NL, EN	NA	50-100
Brussels Gardens	Tapptic	iOS/ Android	2013-07-10	Lifestyle	FR, NL, EN	4,5 (2)	1.000-5.000
City of Brussels	GIAL	Android	2011-08-25	Travel & Local	FR, NL, EN	NA	1.000-5.000
Fix My Street Bruxelles	BRIC	iOS/ Android	2013-03-28	Social	FR, NL, EN	1 (1)	500 - 1.000
STIB Mobile	STIB	iOS/ Android	2011-04-26	Travel	FR, NL, EN	2,5 (179)	100.000-500.000
Visit Brussels	Visit Brussels	iOS/ Android	2011-11-15	Travel	FR, NL, EN	4,5 (11)	1.000-5.000

All these apps are available for free, with no in-app purchases required or possible. The be.brussels app applies to the Brussels Capital Region and offers a map with points of interest and useful phone numbers, as well as direct access to the Region's social media streams. Brussels Gardens was recently created by Brussels Environment, one of the Region's administrations responsible for the study, monitoring and management of air, water, soil, waste, nature (green spaces and biodiversity) and so on. The app provides an overview of the green spaces and their uses in the Region as well as information on the history of the green spaces, their special characteristics (classified site, nature reserve, archaeological site, etc.), and the conservation of the plants and wildlife found there. The City of Brussels app only pertains to this level of government (the City and not the Region) and is developed by a different non-profit organization than the one working for the Region, and is also responsible for the city website and social media accounts. It provides news, links to public transport information, contact information for the city's administrations, links to the city's social media streams and a map with points of interest. Already mentioned above, FixMyStreet Brussels is the local implementation of the well-known issue reporting service, first developed in the UK (Auquier, 2013). It allows citizens to report issues with city furniture or in the public space, but is limited to potholes, bad road surface or missing road markings in the case of the Brussels Region. STIB mobile is the official app of the Brussels public transport company and allows users to consult real time departures and timetables at STIB stops. The final official app is Visit Brussels by the tourism department of the Region, bringing together all kinds of touristic information and offering a comprehensive, offline city guide.

We will take a closer look at the success rate and download numbers of these official and other apps in the following section. We can however already note that there are not a tremendous number of official applications available for Android or iOS and that the ones that are there are not particularly innovative or provide deep levels of service to citizens.

5.4. Adoption and Appreciation

The next aspect we will look at is the success rate of the Brussels applications in the App Store and Google Play. The dataset presents us with a limitation however: for Google Play,

the only measure of success or adoption we have is an indication of the number of times an app has been downloaded, in quite broad ranges (e.g. 5.000-10.000 or 100.000-500.000). Apart from the broad ranges, the number of downloads does not tell the whole story: many apps are only downloaded once and not opened again if they do not meet the user's expectations. We have to use the number of times an app has been downloaded as a proxy measurement for success, since it is the only related criterion in the dataset. Additionally, this data is not available for all apps, but only for those that have been in Google Play for some time.

The most downloaded app (between one and five million times since its launch in January 2013) is Öffi, a "public transport buddy" that includes live departure times and maps of public transport networks in many cities across the globe. This is the only app related to Brussels that has been downloaded more than one million times, but this success can likely be explained by the vast amount of other cities and regions the app supports. There are only three apps that have been downloaded at least 100.000 times, two of which are international apps that offer information for other cities (Tripwolf and Airport Flight Status Tracker). The third one is interesting for our purposes, since it is the official app of the Brussels public transport company STIB-MIVB. This shows that there is at least interest with citizens for these types of applications provided by (semi-) public institutions, without making claims about actual use by users. The official app for the City of Brussels with local information on government services does not appear to be very popular with 500 to 1.000 downloads for the Dutch version and 1.000 to 5.000 for the French and English ones since its launch in August 2011. This app was only available for Android at the time of writing.

There is even less information available for apps in the App Store. No indication of the number of downloads is provided and the only proxy for the adoption or success rate of an app is the user generated ratings, ranging between one or five stars. Among the highest rated apps (5 stars) are the application for the yearly music festival Couleur Café, the Demandez Le Programme app that provides an overview of cultural activities in francophone Belgium and Brussels and a shopping app linked to a women's magazine. These highest scoring apps are all commercial in nature and not linked to city initiatives. The best scoring app related to official city services is the Visit Brussels application from the Region's tourism department, with four stars (rated by 11 people). The official public transport app from MIVB-STIB scores an average of 2,5 stars based on 179 ratings. The official apps for the Brussels Region (be.brussels and FixMyStreet Brussels) did not have any user ratings for iOS at the time of writing. The data for Google Play suggests these official apps are not very popular, with the be.brussels app showing 50-100 downloads and FixMyStreet Brussels at 500-1.000 at the time of writing. Although the MIVB-STIB app does not get very high ratings in the App Store, it is downloaded between 100.000 and 500.000 times for Android, indicating there is a need with citizens for a good public transportation app that is not being completely fulfilled. The Visit Brussels tourism app, although highly rated on the App Store, shows only between 1.000 and 5.000 downloads in the Google Play market place. For an app that needs to appeal both to local citizens and travelers, this number could be considered surprisingly low.

Without the fine-grained statistics that only Apple and Google have and keep as closed data, it is hard to get a full view on the success rate of the Brussels applications. However, when we take the proxy data, it would appear that the city's official applications are not downloaded very often. The only exception is the MIVB-STIB public transport app that provides real-time information on the bus, tram and metro networks, which is often downloaded, but only gets a very mediocre appreciation rating. Commercial apps (including paid ones) are downloaded more often and receive better ratings. Of course, we need to reiterate that this data only provides a snapshot and that this situation could evolve over time.

5.5. Popular Categories for Brussels

The next criterion we will explore is the types of application available in the respective market places. Both application stores use slightly different categorization systems, so we will provide results for both the App Store and Google Play individually, followed by a combined

overview that takes together some of the similar categories. All categories are relatively vague and broad, a point that is touched upon in Section 8 “Limitations and Remarks”.

In the Google Play Store, the largest part (52%) of available apps related to Brussels is in the “Travel & Local” category. This entails apps related to travel such as flight trackers, audio guides, public transport apps (although there is also a “Transportation” category), city guides and mapping apps. The second largest category at 11% is the “Transportation” category, which mainly consists of public transportation applications and real time transportation information. Other popular categories include “News & Magazines”, “Lifestyle” and “Business” at around 5%.

We see a very similar picture in the App Store where the category “Travel” makes up 56% of all apps about Brussels. This is followed by “Lifestyle” at 12% and “Navigation” at 5%. Apps in this last category mainly appear to be general mapping apps and do not include public transportation apps; these are included in the “Travel” category in the App Store.

By combining some of the similar categories in both market places, it becomes possible to create a combined view on the type of applications related to Brussels that are offered most across Apple’s and Google’s platforms. Not surprisingly, “Travel & Local” and “Transportation & Navigation” make up the most popular categories, with the first at 54% and the latter at 8%. In the combined view, “Lifestyle” apps also make up a larger percentage of all available apps. This category consists of shopping apps, cultural event guides, green spaces location apps and several one-time event applications, which will be discussed in the next paragraph. The combined state of available categories is represented in the figure below.

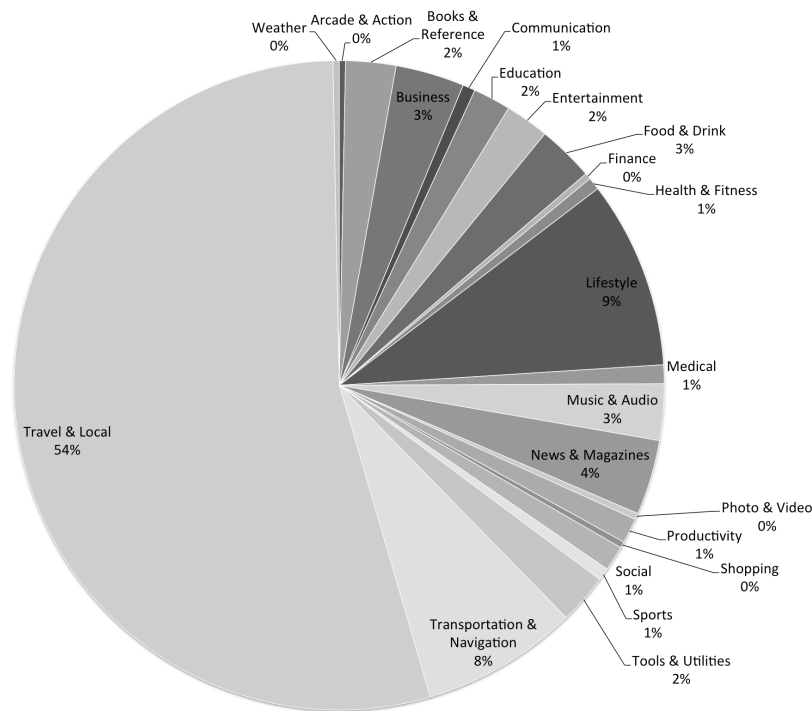


Figure 1 Application Categories in Google Play and the App Store

When working with the data scraped from both market places, it quickly became clear that a non-negligible amount of apps was created for one-time events such as workshops, fairs, shows, exhibitions and so on, or for yearly events like music festivals or cultural events. This turns out to be particularly the case in the App Store, which is not surprising given its popularity in the region (see above). In the App Store, 29 out of 185 apps related to Brussels, or 15.7% were for one-time or yearly events. In Google Play, 12.5% or 17 apps out of 136 were for one-time or yearly events. In the case of both stores this means that a significant number of apps is created for a one-time event and not updated or even useful after that event.

5.6. App Economy

Based on the data available via Apple's search API and the data gathered from Google Play it is difficult to draw conclusions on the app economy or developer ecosystem in Belgium and Brussels and there are no official statistics. One effort to get a clearer view on this economic activity comes from Agoria, a group that represents the interests of the industrial and technology companies in Belgium. They estimated that in 2012 around 400 app developers were active in Belgium, of which around 16% were based in Brussels (De Lestré, 2012, 2013). By early 2014 this number had grown to around 1.000 active developers (Konings, 2014). They saw that developers were becoming more professional around that time, starting up companies and moving beyond simple hobbyists or one-man companies. Almost 30% of developers at the time indicated their main business model was creating commissioned apps. We see this reflected in the datasets we have gathered, as there are several developers present with multiple apps in either the App Store, Google Play or both. These developers are usually responsible for the creation of apps pertaining to one-time or yearly events, even though they are not necessarily based in Brussels: TapCrowd and Appmiral are responsible for many Brussels event apps, but the first is based in Ghent and the second in Antwerp. Another one of these professionalized developers that is based in Brussels is MFM Digital and mainly creates apps for local hotels and restaurants. The apps for public or semi-public institutions are sometimes developed in house (STIB), by official non-profits contracting for the government like BRIC or GIAL, or are created under commission (e.g. Brussels Gardens and FixMyStreet Brussels). We have no official statistics on the origins of the developers creating apps related to Brussels, but based on the data we can estimate that a significant portion is not from Brussels, nor from Belgium. In many cases, these developers create simple mapping applications, or provide a PDF map of the metro packaged in an app, based on publicly available data. City guides and walking tours based on other publicly available information such as Wikipedia or Wikitravel also seem popular with international and commercial developers.

Perhaps unsurprisingly, the number of apps on Brussels has grown each year since the App Store launched in 2009. The oldest app related to Brussels is a flight tracker for the Brussels International Airport, which launched in February of 2009. The first official app launched by one of the city's administrations was the Visit Brussels app in January of 2010, followed by the STIB mobile in July of the same year. The most recent one is the be.brussels app that was launched by BRIC in August of 2012.

For now and based on the data we have, there does not seem to be a strong app economy or developer community present in Brussels, working on applications related to life in the city. In the next section we will draw some initial conclusions and perform a reality check, based on all the relevant aspects we could gather from the data discussed above.

6. Reality Check

Although still incomplete, the data gathered and presented above provides us with a first insight into the mobile services ecosystem related to the City of Brussels. The hype surrounding mobile apps and services in the context of the Smart City - which is also subject to some commotion, ranging from excitement to hysteria - needs to be placed into perspective, when we observe the situation in the Capital of Europe today. In this section we will link back to the Smart City trends and approaches we identified in Sections 2.1 and 2.2 respectively, and apply what we learned about Brussels to them.

We begin with the trends mentioned earlier (infrastructure, open data, platformisation and the changing role of the user). When it comes to infrastructure and connectivity, it is understood that mobile connectivity is a prerequisite for all the innovative and interesting services that make up the contemporary interface between the physical and the virtual in the Smart City. As we illustrated, the trend of providing city-wide WiFi networks has subsided, after mobile data internet boomed after the launch of the iPhone. However, mobile internet in Belgium was only used by 25,9% of the population in 2012, staying far below the European average of 47,8% and scoring the second to last place of all EU27 countries, only performing better than

Hungary (EC Communications Committee, 2012). In January of 2013 (the last available data at the moment of writing), the situation had only slightly improved with the number of active Belgian users of mobile broadband at 33%, still far below the average of 54% for the EU27 (EC Communications Committee, 2013). Although the infrastructure may be present, actual adoption of mobile internet connectivity and the related services appears to be a different matter.

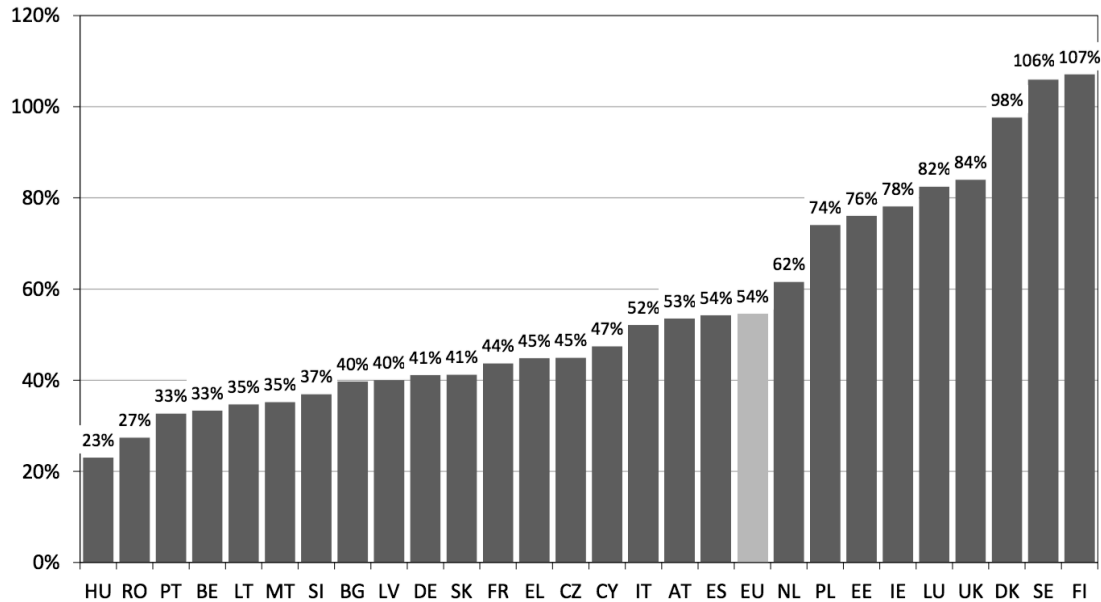


Figure 2 Mobile Broadband Penetration in the EU27 (EC Communications Committee, 2013)

The second Smart City trend we highlighted was the growing success of open data and the involvement of Europe in order to make “open by default” a reality. Opening up data previously controlled by the city is seen as a requirement to building more innovative services, without the city needing to make heavy investments. When we look at the City and Region of Brussels however, we find that the initiatives are distributed between the two levels of governance and not coordinated in any way. The Region offers GIS information in various formats, while the city opens up more typical open data sets such as public bathrooms, Wi-Fi locations, parking spaces for the disabled and so on. This data then only applies to the geographical area of the City and not the Region. Individual administrations such as Brussels Environment and Brussels Mobility also open up data, independently of each other. Additionally, the availability of all this open data is not promoted by the City nor the Region in any way.

As far as the next point of platformisation is concerned, there do not appear to be particular issues in relation to the City of Brussels. The City or Region do not seem to take up any particular platform role when it comes to the creation, promotion or distribution of mobile services. In relation to platform dependency, there does not appear to be an issue either, as almost all official apps are available on both iOS and Android, representing almost 99% of the smartphone market in Belgium.

The final point we identified as a Smart City trend was the changing role of the user, becoming a more vocal citizen and using innovative services to reach out to local government and attempting to effect change. The Brussels Region has taken steps in an attempt to facilitate this communication, for example by launching an adapted version of the FixMyStreet app that enables citizens to report certain issues in the public space. However, as was mentioned above, due to the complex organization and the distribution of responsible city and regional administrations, only four types of issues can be reported through the app, whereas much more is possible in other similarly sized cities, e.g. in the UK and US (Auquière, 2013; FixMyStreet, 2013; SeeClickFix, 2013). Another good example of a user-

led initiative aiming to effect change is the app “Bashing” that is available for iOS, Android and online. It tackles the very real problem of verbal or physical abuse against the LGBT community, or gay bashing, in Brussels and was developed by a citizen movement fighting discrimination. The launch of the app led to a discussion with the competent ministers of the city in an attempt to better tackle the problem (Bambust, 2012).

Looking at these four trends, we see Brussels is performing in some areas, but a Smart City vision or mobile services policy plan is not in effect or sight. This is reflected in the limited number of relevant apps available for the city, with a limited amount of downloads for these apps. As we saw, the most important category of apps is related to travel and transportation. These apps also appear to be popular with citizens and travellers as the most downloaded apps can also be found in these categories. However, an important side note needs to be made here that does not only apply to Brussels: since many of these apps are easy to make in their most basic form (a map, an overview of metro lines, a bus schedule), there are also a lot of “spam” apps in both market places. These spam apps often originate abroad and are made with publicly available information from public transport sites or Wikipedia and as such, offer a very limited value. In spite of rating systems, identifying quality apps can be a daunting task for users and citizens, which often leads to disappointment. The actual quality and usefulness of mobile apps and services is a concern, especially in the constantly growing flood of apps in the market places (Allard, 2013; Andries, 2013; Auquier, 2013). This is an example of an area where a city can play a role; testing and identifying high quality apps that can increase citizens’ quality of life, without the city having to spend large amounts on in-house development and is exactly what the city of Barcelona did with the apps4bcn.cat website.

This then links back to the different approaches to the Smart City we saw in Section 2.1 and the different potential strategies cities can undertake in achieving some “smart” goals. While it is not as pronounced as in some other cities or initiatives, the approach of Brussels mainly appears to be top-down when it comes to the mobile smart city services it offers. The official applications provided by different Brussels administrations and discussed in this article, were not developed in a triple or quadruple helix model, but rather at the request or initiative of the departments themselves. There are a few bottom-up initiatives that appear in the dataset (e.g. the gay bashing app that was mentioned earlier), but what so far has not become apparent is a local innovation platform style approach in which a broad cooperation is set up to achieve more integrated services with a higher potential value (with the only exception perhaps being FixMyStreet, even though not all of the 19 Brussels municipalities currently participate).

Although there are great national and international examples of mobile apps that provide new and interesting services and experiences to citizens, in many cases these cases are outliers or anecdotal and their actual use limited. This is at least our finding for the City and Region of Brussels: there is clearly a nascent sector and there are interesting public and private initiatives, but there is a vast amount of room for growth and a potential that is currently not addressed. The reasons for this are manifold and complex. In the particular case of Brussels, there is little doubt that the complicated political organization with distributed competences across the city, region and surrounding municipalities as well as the national and supranational level, creates obstacles. Also the lack of internal change agents in the administrations could be an inhibiting factor to a flourishing mobile app economy in the city (Washburn et al, 2010; Rosseau, 2013). Another explanation is of course that policy does not think the city has a role to play in the creation, promotion and distribution of mobile city apps, a vision for which arguments can also be made in the current context of budgetary constraints.

7. Limitations and Remarks

There are a few limitations related to this research and they mainly relate to the data we have to work with. For example, no pricing or indication of pricing is available for Google Play, where it is for the App Store. In general, more data is available through the public API that Apple provides. Both market places only provide very generic categories for the apps in question e.g. “Lifestyle” or “Travel” and these categories are given to the applications by the

developers, meaning they are likely to be assigned inconsistently. Finally, we have only very limited insight in the actual success of these applications: for Google Play the number of downloads is indicated in very broad ranges, e.g. 1.000-5.000 or 10.000-50.000, and a high number of downloads does not necessarily mean high usage of an app. These are the limitations in which we have to operate, but given that this information has not been put together in any form for the Brussels Capital Region before, we believe it remains an important first step nonetheless.

8. Acknowledgments

This work was carried out in the framework of a Prospective Research for Brussels project funded by Innoviris and the Brussels Capital Region and performed at iMinds-SMIT, Vrije Universiteit Brussel.

9. Conclusion

The main goal of this article was to provide insight into the current state of the mobile services ecosystem in the capital of Europe and Belgium. In the context of the global rhetoric surrounding the Smart City concept in both academic and industrial circles these days, it is accepted that the smartphone and the mobile services running on them will be the primary interface to engage with the city in new ways. As there were no official statistics or follow-up from policy, we set out to gather our own data from Apple's App Store and Google Play, to gauge the situation in Brussels. We found that iOS and Android are almost equally popular as operating systems and that travel and transportation apps are by far most present in both market places. Only a very small set of apps is developed by the City or Region, without much direction, quality control or a particular vision behind their launch. As a consequence, the most downloaded apps are commercial in nature. We also found that a significant number of Brussels apps relates to one-time or yearly events and that many apps are created outside of Brussels and Belgium. Comparing our findings to the Smart City trends identified at the start of the article we come to the conclusion that while some efforts are ongoing in Brussels, the industry is very much a nascent one in the Region, falling behind many smaller and larger national and international cities. This does mean many lessons can be learned from existing initiatives, both locally and abroad, and that the current laggard position could be the starting point of a "leapfrog" in the sector, fully exploiting the potential that is currently unaddressed. This can only be achieved if enthusiastic internal change agents within the administrations are able to act under a single vision for mobile services and application and a true mobile strategy for the city and the region. This strategy would need to take into account all relevant stakeholders in the field (see quadruple helix model) and consider the role of the city as a local innovation platform that mediates between all these actors.

10. References

- Allard, P., 2013. Expert Interview. GIAL. 29 April. Brussels
- Andries, T., 2013. Expert Interview. City of Mechelen. 6 March. Mechelen
- Apple, 2013. Search API. Apple Inc. Available online:
<http://www.apple.com/itunes/affiliates/resources/documentation/itunes-store-web-service-search-api.html>
- Auquière, E., 2013. Expert Interview. BRIC. 6 May. Brussels.
- Ballon, P., 2009. Control and Value in Mobile Communications: A political economy of the reconfiguration of business models in the European mobile industry. PhD thesis, Vrije Universiteit Brussel, Available online at <http://papers.ssrn.com/paper=1331439>.
- Bambust, F., 2012. Gaybashing-app will homofoob geweld zichtbaar maken, Zizo Online, 18 January.

- Batty, M., Axhausen, K., Giannotti, F., Pozdnoukhov, A., Bazzani, A., Wachowicz, M., Ouzounis, G. and Y. Portugali, 2012. Smart Cities for the Future, *The European Physical Journal*, 214, pp. 481-518.
- Berg, N., 2012. *The Official Guide to Tactical Urbanism - Nate Berg - The Atlantic Cities*. The Atlantic Cities.
- Burger, A., 2012. ITU Finds Two Times More Mobile Than Fixed Broadband Subscribers. ITU. 15 October.
- Campkin, B., & Ross, R. (Eds.), 2013. *Future & Smart Cities - Urban Pamphleteer (Vol. 1)*. London: UCL Urban Laboratory.
- Caragliu, A., Del Bo, C., & P. Nijkamp, 2009. "Smart Cities in Europe", *Proceedings of the 3rd Central European Conference on Regional Science (CERS)*.
- Charny, B., 2007. San Francisco formally ends citywide WiFi effort. *Market Watch*.
- Chourabi, H. et al., 2012. Understanding Smart Cities: An Integrative Framework, *Proceedings of the 45th Hawaii International Conference on System Science (HICSS)*, 4-7 January, pp. 2289-2297.
- Clover, J., 2013. Google Play Downloads Passed App Store Downloads for the First Time. *MacRumors*. 31 July.
- Cohen, B., 2012. The Top 10 Smart Cities on the Planet. *Co.EXIST*, January 11.
- De Lestré, T., 2012. De App Economie. Presentation at the BRIC Annual Congress. 14 December.
- De Lestré, T., 2013. Expert Interview. *Agoria*, 4 September. Brussels.
- EC. 2012. Digital Agenda: Turning Government Data Into Gold, 2012. Press Release European Commission, 12 December.
- EC Communications Committee. Broadband lines in the EU (Situation July 2012), 2012. Communications Committee, DG CNECT.
- EC Communications Committee. Broadband lines in the EU (Situation January 2013), 2013. Communications Committee, DG CNECT.
- Ericsson. 2013. *Networked Society City Index 2013*. Research Report.
- Evans, D., 2011. The Internet of Things. *Cisco Blogs*. 15 July.
- FixMyStreet, 2013. FixMyStreet for Councils. FixMyStreet, MySociety. Available online: <http://www.mysociety.org/fms-faq/>
- Gardner, D., 2008. EarthLink to Shut Down New Orleans. *Information Week*. Municipal WiFi, 25 April.
- Gawer, A. and M. Cusumano, 2002. *Platform Leadership*, Harvard Business School Press, Boston: MA.
- Graham, S., 2002. Bridging Urban Digital Divides: Urban Polarisation and Information and Communication Technologies. *Urban Studies*, 39 (1), pp. 33-56.
- Greenfield, A., 2013. The City is Here for You to Use. *Wired*, 5 February. Greenfield & Shepard
- GSMA, 2013. Smart Cities. Mobile Industry Report. GSMA. Available online: <http://smarcitiesindex.gsma.com/smart-cities/>
- Hamdi, N., 2004. *Small Change: About the Art of Practice and the Limits of Planning in Cities*. Routledge, London, 184p.
- Hillenius, G., 2013. Jurisdiction Stops Brussels Region from Sharing FixMyStreet. *Joinup*, European Commission, 14 June.
- Hollands, R., 2008. Will the Real Smart City Please Stand Up?. *City*, 12 (3), pp. 303-320.
- How We Browse, 2013. Mobile OS. November, Available online: <http://howwebrowse.be>
- IBM, 2009. How Smart Is Your City?, IBM Institute for Business Value, Executive report.

- Joroff, M., 2008. Reshaping the Cities of the 21st Century, MIT School of Architecture and Planning. http://sap.mit.edu/resources/portfolio/reshaping_cities/
- Komninos, N., Schaffers, H. and M. Pallot, 2011. Developing a Policy Roadmap for Smart Cities and the Future Internet, Proceedings of the e-Challenges Conference, 8p.
- Konings, R. 2014. Belgische app-ontwikkelaars ondertekenen eTIC-charter voor mobiele applicaties. Agoria, Press Release, 14 May.
- Koolhaas, R., 2011. "Interview with Star Architect Rem Koolhaas", Spiegel Online, 16 December.
- Lavallee, A., 2008. A Second Look at Citywide WiFi. The Wall Street Journal. 8 December.
- Leydesdorff, L., & Deakin, M., 2011. The Triple-Helix Model of Smart Cities: A Neo- Evolutionary Perspective. Journal of Urban Technology, 18(2), 53–63.
- Lindsay, G., 2011. Not-So-Smart Cities, New York Times, 24 September.
- Naphade, M., Banavar, G., Harrison, C., Paraszczak, J. and R. Morris, 2011. Smarter Cities and Their Innovation Challenges, IEEE Computer, 44, 6, pp. 32-39.
- OKFN, 2012. What is Open Data?, Open Knowledge Foundation, Open Data Handbook.
- O'Reilly, T., 2011. Government as a Platform. Innovations: Technology, Governance, Globalization, 6 (1), 13–40.
- Rogoway, M., 2010. Portland set to dismantle, donate abandoned Wi-Fi antennas. Oregon Live. 19 January.
- Rosseau, B., 2013. Expert interview. E-Strategy City of Ghent, 14 March. Ghent.
- Schoer, C., 2013. Year in Review. Distimo. Available online: http://www.distimo.com/blog/2013_12_publication-2013-year-in-review/
- Schuurman, D., Baccarne, B., De Marez, L. and P. Mechant, 2012. Smart Ideas for Smart Cities: Investigating Crowdsourcing for Generating and Selecting Ideas for ICT Innovation in a City Context. Journal for Theoretical and applied Electronic Commerce Research, 7 (3), pp. 49-62.
- SeeClickFix.com, 2013. Top Performing Cities. SeeClickFix. Available online: <http://en.seeclickfix.com/>
- Shepard, M., & Simeci, A., 2013. What's So Smart About the Smart Citizen?, In D. Hemment & A. Townsend (Eds.), Smart Citizens (Vol. 4). Manchester: FutureEverything Publications.
- Silicon Labs. The Evolution of Wireless Sensor Networks. Silicon Labs, 2013. Available online: <http://www.silabs.com/Support%20Documents/TechnicalDocs/evolution-of-wireless-sensor-networks.pdf>
- Stott, A., 2014. How to get your open data uses, Presentation at the Data Days, 19 February, Ghent, Belgium.
- The Economist, 2013. Hotspots 2025: Benchmarking the Future Competitiveness of Cities. Research Report.
- Townsend, A., 2013. Smart Cities. New York: Norton & Company.
- UN HABITAT, 2010. State of the World's Cities 2010/2011. UN HABITAT. Available online: <http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2917>
- Walravens, N., 2014. The Smart City as a Service Platform: Identification and Validation of City Platform Roles in Mobile Service Provision, in: Wei, J. (ed.) Mobile Electronic Commerce: Foundations, Development and Applications, Taylor and Francis.
- Washburn, D., Sindhu, U., Balaouras, S., Dines, R. A., Hayes, N. M., and Nelson, L. E., 2010. Helping CIOs Understand "Smart City" Initiatives: Defining the Smart City, Its Drivers, and the Role of the CIO. Cambridge, MA: Forrester Research, Inc.
- Yawson, R.M., 2009. The Ecological System of Innovation: A New Architectural Framework for a Functional Evidence-Based Platform for Science and Innovation Policy The Future of Innovation Proceedings of the XXIV ISPIM 2009 Conference, Vienna, Austria, June 21-24.