

A Business Model Approach to Local mGovernment Applications

Mapping the Brussels Region's Mobile App Initiatives

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Keywords: Mobile Applications, mGovernment, Brussels, Business Models, Public Value.

Abstract: This paper uses business model theory as a framework to approach modern mobile government (mGov) applications and explore the role of public bodies within the volatile and complex mobile services sector. We propose and apply a new mapping methodology with a basis in business modelling that allows the comparison of mobile app initiatives by governments and can support the development or adjustment of a mobile strategy. We zoom in on the official applications released by different public administrations in the Capital Region of Brussels, Belgium. 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, quadruple helix approach and clearly formulated mobile strategy is quintessential to achieving this.

1 INTRODUCTION

The public sector has always been under some form of pressure to innovate along the speed of the market, both internally as an organisation and externally, towards the services it provides to citizens. In recent times, that high expected pace of innovation has only grown, together with demands and expectations from the public (Stylianou, 2014). As a strategy geared towards meeting some of these demands, organisations at different levels of government have begun to initiate or commission the development of mobile applications (“apps”) as a new or complementary channel of (two-way) communication with citizens (Hung et al., 2013), or as a means of increasing citizen participation in government processes (de Reuver et al., 2013). Shifting public service provision to mobile devices has also been referred to as mGovernment (as an evolution of the field of eGovernment) (Kushchu and Kuscu, 2003).

However, the mobile services and application sector is a highly volatile one, perhaps even more so than the ICT industry. Public administrations and cities are faced with a significant challenge in this regard, which mainly pertains to the high speed of innovation, a shift in culture and mindset of the organisation and the actual organisational aspects related to creating, providing and supporting mobile applications in a complex ecosystem that is – at least in the Western hemisphere – dominated by two US companies (Apple and Google) (Kahn, 2015).

It is in this complex context we propose business model thinking as a framework to tackle some of these challenges. Business models need to be defined in their wider context here and not for example be confused with business cases or the revenue models of single enterprises (Janssen and Kuk, 2007). Rather, we consider the entire value network surrounding a particular mobile service and offer a framework that allows public organisations to find their “strategic fit” (Stabell and Fjeldstad, 1998) within this complex ecosystem (Al-Debei and Avison, 2010). To better frame the discussion and help governments prioritise their mobile strategy, we propose a new mapping methodology that allows the direct comparison of mobile apps, based on the level of government involvement required in their development, as well as the potential public value they may generate. We apply this method to the Brussels Capital Region. As the capital of Belgium and Europe, the region is faced with many challenges that are representative of major metropolitan areas around the world. Additionally, the Region has a unique organisational and political structure that makes taking joint initiative challenging.

The main contribution of this paper then is to introduce this mapping methodology based in business model theory and immediately apply it to Brussels. This approach will give more insight into how business model thinking can help frame local m-government strategies and support government in setting up mobile service initiatives.

2 BUSINESS MODELS AND mGOVERNMENT

This section will briefly explore the role that business models may play in researching mGov strategies. It also develops the set of parameters that will be used as the foundation of the mapping methodology.

2.1 Business Model Thinking in mGov

We approach the concept of a business model similarly to e.g. Jullien (2004), Chesbrough (2006) and Gawer (2010) as a value network consisting of actors, roles and relationships that need to find a strategic fit (Stabell and Fjeldstad, 1998) to deliver value to end users. Using this operationalisation of the concept, the underlying logic when applying it to technological innovation is that it is not the technology as such that is a determinant of success, but rather the way in which the network of actors is configured in generating added value around the technology (Panagiotopoulos et al., 2012).

In this sense, business modelling can serve as a means of bridging the gap between theoretical work and the daily practice of policy makers and government representatives. Applying a business model logic or thinking to the public sector does not have to be contradictory and business modelling as a concept has already proved useful in the context of eGovernment (Janssen et al., 2008; Janssen and Kuk, 2007, 2008). Yu (2013) also shows how the concept of value proposition (an integral part of business modelling theory) can be a guideline in developing an integrated framework for analysing and designing mGov strategies. Although the term business model is naturally associated with a purely commercial ecosystem, applying it in the context of government does not necessarily imply imposing a “business logic” to the public sector (Panagiotopoulos et al., 2012). As mentioned, it rather serves as a framework that allows policy makers and government organisations to think about their position within a complex value network and prepare strategies as a response to potential issues of control and value. This idea is built upon in the following section, where the business model framework we will use to design the mapping methodology is explained.

2.2 mGov Business Model Parameters and Mapping Methodology

In recent years, the focus of business modelling (Hawkins, 2001) has gradually shifted from the single firm to networks of firms, and from simple to much more all-encompassing concepts (see e.g. Linder and Cantrell, 2000; Faber et al., 2003). Due to this shift, the guiding question of a business model has become “Who *controls* the value network and the overall system design” just as much as “Is substantial *value* being produced by this model (or not)” (Ballon, 2009).

Based on the tension between these two questions, Ballon (2009) proposes a holistic business modelling framework that is centred around control on the one hand and creating value on the other. It examines four different aspects of business models: the value network, the functional (technical) architecture, the financial model and the value proposition. We build on these foundations, but expand the matrix to include qualitative parameters that are of additional importance when a public entity contributes to the value proposition. Given these organisations’ non-commercial logic, it is imperative we take these additional parameters into account when discussing (mobile) service business models that involve public actors (Walravens and Ballon, 2013). We propose an update to Ballon’s business model matrix, represented in Figure 1. The left-hand side of the matrix offers parameters pertaining to control and governance, whereas the right-hand side parameters offer more insight into value and public value issues.

Value network	Technical architecture	Financial architecture	Value proposition
Control parameters		Value parameters	
Control over assets	Modularity	Investment structure	User involvement
Ownership vs Consortium Exclusive vs other Influence	Modular v integrated	Concentrated v distributed	Enabled, Encouraged, Dissuaded or Blocked
Vertical integration	Distribution of intelligence	Revenue model	Intended Value
Integrated v disintegrated	Centralised v distributed	Direct v indirect	Price/Quality Lock-in effects
Control over customers	Interoperability	Revenue sharing	Positioning
Direct v mediated Profile & identity management	Enabled, Encouraged, Dissuaded or Blocked	Yes or no	Complements v substitutes Branding
Governance parameters		Public value parameters	
Good governance	Technology governance	ROI	Public value creation
Harmonising existing policy goals & regulation Accountability & trust	Inclusive v exclusive Open v closed data	Expectations on financial returns Multiplier effects	Public value justification Market failure motivation
Stakeholder management	Public data ownership	Public partnership model	Public value evaluation
Choices in (public) stakeholder involvement	Definition of conditions under which and with whom data is shared	PPP, PFI, PC...	Yes or no Public value testing

Figure 1: Expanded business model matrix.

The detailed, qualitative description of all the parameters of this expanded matrix allows for the thorough analysis and direct comparison of complex

business models that involve public actors in the value network. The parameters are quickly outlined below.

Value Network

Control over assets: anything tangible or intangible that could be used to help an organisation achieve its goals.

Vertical integration: the level of ownership and control over successive stages of the value chain.

Control over customers: looks into the party maintaining the customer relationship and keeping the customer data.

Good governance: refers to a striving towards consensus and harmonization of interests (and related rhetoric).

Stakeholder management: refers to the choices that are made related to which stakeholders (be they public, semi-public, non-governmental, private etc.) are involved or invited to participate in the process of bringing a service to end-users.

Technical Architecture

Modularity/integration: refers to the design of systems and artefacts as sets of discrete modules that connect to each other via predetermined interfaces.

Distribution of intelligence: refers to the particular distribution of computing power, control and functionality across the system.

Interoperability: refers to the ability of systems to directly exchange information and services with other systems.

Technology governance: highlights the importance of transparency, participation and emancipation in making technological choices and relates to the digital divide.

Public data ownership: concerns the terms under which data is opened up and to which actors.

Financial Architecture

Investment structure: deals with the necessary investments (both capex and opex) and the parties making them.

Revenue model: deals with the trade-off between direct/indirect revenue models.

Revenue sharing model: refers to agreements on whether and how to share revenues among the actors involved in the value network.

ROPI: refers to the question whether the expected value generated by a public investment is purely financial, public, direct, indirect or combinations of these, and how a choice is justified.

Public partnership model: explores how the financial relationships between the private and public participants in the value network are constructed.

Value Proposition

Positioning: refers to marketing issues including branding, market segments and identifying competing services.

User involvement: refers to the degree in which users can contribute to the value proposition.

Intended value: lists the basic attributes that the product or service possesses, or is intended to possess, and that together constitute the intended customer value.

Public value creation: refers to the justification a government provides initiating a specific service, rather than leaving its deployment to the market.

Public value evaluation: questions whether an evaluation of the generated public value takes place and if this occurs *ex-ante* or *ex-post*.

A purely textual description of all these parameters is not easily accessible and inspired us to translate this into a mapping grid, which finds its basis in the theoretical work of the matrix, but reduces the complexity of representation. In this grid, it becomes possible to compare divergent cases based on the two central parameter sets of the matrix: control and governance on the one hand and (public) value on the other. The grid represented in Figure 2 allows us to map different cases of (in our case mobile) city services and identify how they compare to one another.

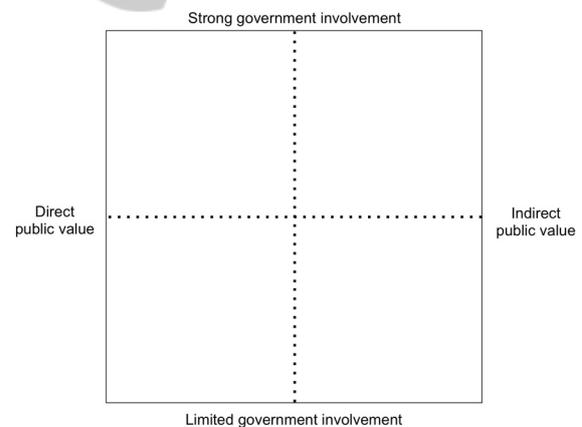


Figure 2: Governance and public value grid.

The vertical axis refers to the governance parameters described in the two left columns of the business model matrix and provide an indication of the level of control the city government has in providing the service to citizens. The horizontal axis provides insight into the type of value that is generated by the services (the two right columns of the matrix) and whether this public value is direct or indirect: direct public value refers to a more individual, short-term

Table 1: Overview of official Brussels mobile applications.

Name	Dev.	Platform	Last update	Category	Rating iOS (by x users)	Rating Android (by x users)	Downloads (April '14 Android)
Be.Brussels	BRIC	iOS/ Android	2012-12	Utilities	2 (1)	3,8 (29)	100-500
Brussels Gardens	Tapptic	iOS/ Android	2014-02	Lifestyle	4 (3)	3,9 (18)	1.000-5.000
City of Brussels	GIAL	Android	2015-02	Travel and Local	NA	3,3 (7)	1.000-5.000
Fix My Street Bxl	BRIC	iOS/ Android	2015-01	Social	1,5 (9)	3,5 (44)	1.000-5.000
STIB Mobile	STIB	iOS/ Android	2013-02	Travel	2,5 (229)	4 (3391)	100.000-500.000
Visit Brussels	Visit Brussels	iOS/ Android	2012-12	Travel	3,5 (14)	2,2 (132)	10.000-50.000

value and relates to “what the public values”; while indirect public value is more collective and long term, and relates to “what adds value to the public sphere” (Benington, 2011). This grid has been validated in (Walravens and Ballon, 2013) and will be used to map the official Brussels mobile city apps further on in this article.

To determine the precise relative position of the cases on the grid, a value or weight is attributed to each of the parameters in the updated business model matrix (see Section 4 and 5). In this sense, qualitative indicators are translated to quantitative ones in order to allow their direct comparison in a structured way (see for example Michailidis and de Leeuw, 2000). This approach is detailed and applied in Section 4 and 5.

While this comparison is represented in a simple fashion, it is based on an extensive qualitative analysis that is based in literature, desk research, policy document analysis and expert interviews with stakeholders involved in the cases. A total of twenty-two expert interviews was carried out in 2013 and 2014, tapping both national and international expertise on mobile apps in general, as well as specific insight into the Brussels cases.

3 THE BRUSSELS CONTEXT

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.

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 urban services (whether they be mobile or not) (EC, 2012). In Brussels, open data initiatives are 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 and these will be analysed using the framework introduced above.

4 OFFICIAL BRUSSELS APPS

The number of official apps by the City of Brussels, the Region or any of its institutions is limited. Table 1 provides an overview of the official apps for Brussels. For each case, all the parameters of the expanded business model matrix described above are discussed in a table, available in annex to this paper. The material for the cases was gathered from policy documents, publicly available information

and expert interviews with people involved with them. From this analysis, a score on a 5-point Likert scale is given to each of the parameters that help determine the position of the case on the governance and public value grid. This scale ranges from -2 (strongly disagree) to 2 (strongly agree), indicating the level of agreement with the statements in the tables in annex. This scoring allows us to compare the cases with each other and draw some conclusions on the Brussels approach to mGov services.

4.1 Be.Brussels

The Be.Brussels app developed by BRIC 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.

Given that the main goal of the app is providing information to individual citizens, we see a score that leans towards a direct public value. Although their relation is very strong, the fact that this app was developed by an individual organisation and not within a Brussels administration is reflected in the government involvement score. Since our data gathering phase, this app has been removed from Google Play and the iTunes App Store for unclear reasons. The breakdown of all parameters and scores can be found in annex to this paper.

4.2 Brussels Gardens

Brussels Gardens was created by Brussels Environment (IBGE), one of the Region's administrations responsible for the study, monitoring and management of air, water, soil, waste and nature. 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 and the conservation of plants and wildlife.

The almost neutral score in the public value column can in this case be explained by the fact that the app provides information to individuals, but its broader goal is to increase appreciation and use of green spaces in Brussels.

4.3 City of Brussels

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 (GIAL) than the one working for the Region (BRIC). It provides news, public transport

information, contact information, the city's social media and a map with points of interest.

Similarly to the Be.Brussels app, the fact that the app is not developed by a Regional administration is reflected in the lower government involvement score and the public value it generates is more direct.

4.4 FixMyStreet Brussels

FixMyStreet Brussels is the local implementation of the well-known issue reporting service, first developed in the UK. It allows citizens to report issues with city furniture or in the public space, but was until very recently limited to potholes, bad road surface or missing road markings in the case of the Brussels Region.

In this case a very high level of government involvement was required to make the app possible and the public value is aimed at the collective.

4.5 STIB Mobile

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.

Since the STIB acts as an independent company from the city government (even though it is publicly funded), the level of government control is lower in this case and the created public value is direct.

4.6 Visit Brussels

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 city guide. The app was developed by Visit Brussels and is based on an internal database of points of interest.

Similarly to the Brussels Gardens app, we notice a balance between a direct and indirect value in the case of Visit Brussels. This can be explained as a result of the combination of the individual information the app provides to visitors and the more long-term and collective goal of boosting tourism and the attractiveness of the city.

5 MAPPING

Bringing together the scores of the six publicly developed Brussels applications (see annex) allows us to map them on the governance and public value grid introduced in Section 2. The scores are directly translated to coordinates on the grid, which consists of two 20-point axes. The coordinates and the

mapping are represented in the following table and figure.

Table 2: Coordinates.

	Public value (x-axis)	Government involvement (y-axis)
Be.Brussels	-5	7
Brussels Gardens	-1	13
City of Brussels	-9	5
FixMyStreet Brussels	14	17
STIB Mobile	-7	-10
Visit Brussels	-1	10

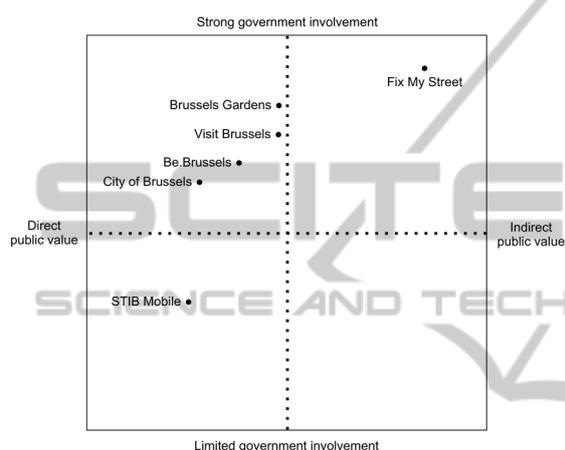


Figure 3: Governance and public value grid mapping Brussels' cases.

Although we of course expected most apps to score quite highly when it comes to government involvement (as all are developed by official government organisations), this is slightly more nuanced. In the cases of FixMyStreet, Brussels Gardens and Visit Brussels the official Brussels administrations were directly involved in the ideation, development or commissioning of the apps. Be.Brussels, City of Brussels and STIB Mobile were created by semi-public organisations that work directly for the Brussels Capital Region. As such and depending on their role, they score lower on the government involvement axis.

We clearly see that most apps were created with a direct public value in mind, meaning they are aimed at individuals and on providing information, without much possibility for interaction or a long-term approach. The only exception is FixMyStreet, which allows citizens to report issues that are acted upon by the local administration. The system has been integrated as a single point of contact into the daily operations of the Brussels Mobility administration and it is part of a long-term vision to add more types of reports (and related stakeholders)

to the list of options for citizens. The end goal is increasing communication with citizens and at the same time improving the general quality of life around the City and Region, pointing again to the app's indirect public value. By most definitions and operationalisations of the mGovernment concept (laid out in the first two sections of this paper), FixMyStreet is probably one of the better examples of what mobile government services (should) look like.

When interpreting the scores for these six official Brussels applications, we come to the conclusion that basic information provision to individual citizens appears to be the most popular strategy amongst administrations. This is also the most careful one. It is not surprising in the context of budgetary constraints that (local) governments face today, that more long-term, structural and participatory initiatives such as FixMyStreet are more exception than rule. Nevertheless, the interview round showed that the administration involved is serious about the service and that the investment made is too important to view it as an experiment. The other apps under discussion are more easily referred to as first try-outs in mGovernment and in most cases leave features or uptake to be desired. While experimentation certainly needs to be encouraged, we argue that in order to make a long-term impact in this area and begin tackling governance challenges through mobile services, the mobile application market and related economy has now sufficiently matured for governments to move beyond experimentation and take the lessons learned locally and internationally to develop a true mobile strategy. Since Brussels is playing something of a laggard role when it comes to both Smart City initiatives and mobile application creation, the opportunity to leapfrog in this space should be valorised today. The FixMyStreet case illustrates that involving all relevant stakeholders (municipal administrations, mayors, local energy and telecom players, citizens and civil society) in a quadruple helix approach is key to a successful and broadly supported mobile government service, but one that may require higher investments.

6 DISCUSSION

A government body can use the grid to map any mobile service initiatives it has running or plans to undertake, to identify whether their level of involvement has the desired results related to the public value it wants to generate, and thus if the actions they take are aligned with the policy goals

they want to achieve. The different quadrants of the grid give insight into the approach taken by government: the strategy in the bottom-right quadrant focuses on creating a positive climate for long-term innovation and improvements to the general quality of life for as many citizens as possible; the bottom-left quadrant aims to stimulate projects and initiatives that have a more immediate and clear benefit to citizens that potentially show signs of engagement themselves; while the top-right quadrant sees a more integrated approach to solving long-term issues typical to major metropolitan areas, wherein the city takes a leading role; compared to the final top-left quadrant that sees an applied approach by the city to create some immediate value for individual citizens, by increasing the ease-of-life and attractiveness of their city. These represent four quite different strategies to providing mGov services to citizens to be considered by government authorities and public bodies looking towards or providing those services.

While this mapping offers a visual representation of the Brussels Region's mGov initiatives, the main value of the analysis lies in the business model approach taken to this challenge. By considering all the business model aspects pertaining to a modern mobile service initiative, and including parameters that are specific to public sector involvement, it has been our aim to provide policy makers at the local, regional or national level with a way to better consider the implications of a mobile strategy. As was mentioned earlier, business modelling as a framework should not only be associated with commercial initiatives, but rather be seen in a broader context. When operationalised in a methodology comparable to the one presented in this paper, business modelling can provide more insight into the challenges pertaining to mobile in the public sector as well.

A limitation of this work pertains to the focus of the original matrix on the relations between firms and organizations and not so much on the internal organizational structures of companies or agencies. Since the newly introduced parameters build on the original matrix, there is no specific attention to internal organizational processes. As government is also a system of systems with different actors and roles, this aspect should be further explored.

7 CONCLUSIONS

This article set out to frame how business modelling may also provide a framework to mGovernment, rather than being confined to purely commercial

initiatives. We did this by expanding on an existing business model framework to include parameters specific to the public sector. We then apply this to all official Brussels apps, map them on the newly-developed grid and come to the conclusion that these apps are mostly aimed at short-term public value generation and providing localised information to individual citizens. FixMyStreet is the only Brussels case that shows a mid to long-term strategy that has a mobile application at its core. It is then also a showcase of how an urban challenge can (begin to) be tackled through a qualitative mGov application that is well thought out and enables citizen participation.

Our conclusion then is that Brussels is taking careful steps when it comes to smart mGov apps, but that this hesitance can for the most part be explained by the institutional complexity of the Region and the (for now) lack of a single mobile strategy as a consequence. The FixMyStreet case shows that it is possible for the Region to set up a long-term and integrated approach, but this is likely to take more time and resources. Nevertheless, we believe Brussels can learn from the increasing maturity in the mGovernment and apps sector and leverage its potential to leapfrog in this space. To do so and label itself as "smarter" than before, an integrated and open-minded approach to mobile services, which involves all relevant stakeholders in the city through a quadruple helix approach, will be a *conditio sine qua non* to achieving this.

ACKNOWLEDGEMENTS

This research was performed at the Vrije Universiteit Brussel and iMinds, and supported by an Innoviris PRFB grant (Brussels Capital Region).

REFERENCES

- Al-Debei, M. M., Avison, D., 2010. Developing a unified framework of the business model concept. *European Journal of Information Systems*, 19(3), 359-376.
- Ballon, P., 2009. Control and Value in Mobile Communications. PhD thesis, Vrije Universiteit Brussel, Belgium.
- Benington, J., 2011. From Private Choice to Public Value? In Benington, J., Moore, M., eds. *Public Value: Theory and Practice*. Palgrave MacMillan, pp. 31-49.
- Chesbrough, H., 2006. *Open Business Models: How to Thrive in the New Innovation Landscape*, Harvard Business School Press. Boston, Massachusetts:
- De Reuver, M., Stein, S., Hampe, J. F., 2013. From eParticipation to mobile participation: Designing a

- service platform and business model for mobile participation. *Information Polity*, 18(1), 57-73.
- Faber, E., Ballon, P., Bouwman, H., Haaker, T., Rietkerk, O., Steen, M., 2003. Designing business models for mobile ICT services. *Proceedings of 16th Bled E-Commerce Conference*, Bled, Slovenia.
- Gawer, A., 2010 Towards a General Theory of Technological Platforms. *Proceedings of DRUID 2010*, Imperial College London Business School, June 16-18.
- Hawkins, R., 2001. *The Business Model as a Research Problem in Electronic Commerce*. STAR Project Issue Report No. 4, SPRU – Science and Technology Policy Research, Brighton.
- Hillenius, G., 2013. *Jurisdiction Stops Brussels Region from Sharing FixMyStreet*. Joinup, European Commission, 14 June.
- Hung, S. Y., Chang, C. M., Kuo, S. R., 2013. User acceptance of mobile e-government services: An empirical study. *Government Information Quarterly*, 30 (1), 33-44.
- Janssen, M., Kuk, G., 2007. E-Government business models for public service networks. *International Journal of E-Government Research*, 3(3), 54-71.
- Janssen, M., and Kuk, G., 2008. E-Government business models: Theory, challenges and research issues. In M. Khosrow-Pour (Ed.), *E-Government diffusion, policy, and impact: Advanced issues and practices* (pp. 1-12) IGI Global.
- Janssen, M., Kuk, G., Wagenaar, R., 2008. A survey of web-based business models for E- Government in the Netherlands. *Government Information Quarterly*, 25(2), 202-220.
- Jullien, B., 2004. Two-Sided Markets and Electronic Intermediation. *IDEI Working Papers 295*, Institut d'Economie Industrielle (IDEI), Toulouse, France.
- Kahn, J., 2015. iOS and Android increase duopoly on smartphone market to 96%. *9to5mac*. 24 February.
- Konings, R., 2014. Belgische app-ontwikkelaars ondertekenen eTIC-charter voor mobiele applicaties. Agoria, Press Release, 14 May.
- Kushchu, I., Kuscü, M., 2003. From e-Government to m-Government: Facing the Inevitable. In *Proceedings of the 3rd European Conference on E-Government*, pp. 253–260, Dublin, Ireland.
- Linder, J., Cantrell, S., 2000. *Changing Business Models: Surveying the Landscape*. Institute for Strategic Change Report, Accenture, New York, NY.
- Michailidis, G., de Leeuw, J., 2000. Multilevel Homogeneity Analysis with Differential Weighting. *Computational Statistics and Data Analysis*, 32(3/4), pp.411-442.
- Panagiotopoulos, P., et al., 2012, A business model perspective for ICTs in public engagement. *Government Information Quarterly*, 29(2), 192-202.
- Stabell, C., Fjeldstad, O., 1998. Configuring Value for Competitive Advantage. *Strategic Management Journal*, 19(5), pp.413-437.
- Stylianou, A., 2014. Mobile by Default? Leveraging Mobile Technology to Extend eGovernments Reach and Scope. *Workshop Policy Brief*, ePractice, European Commission. 30 June.
- Walravens, N., Ballon, P., 2013 Platform Business Models for Smart Cities. *IEEE Communications Magazine*, 51 (6), June, pp.2-9.
- Yu, C.-C., 2013. Value Proposition in Mobile Government, In Wimmer, M., Janssen, M., Scholl, H., eds., *Electronic Government*, Springer Berlin Heidelberg, pp. 175-187.

APPENDIX

The business model parameter descriptions and the scores of each case are appended to this paper.

Tables 3 and 4: Business model parameters and scores for Be.Brussels.

Control and governance parameters		Value and public value parameters	
Value network	Technical architecture	Financial architecture	Value proposition
Control over assets: with BRIC, gathering official information	Modularity: not particularly modular approach, uses BRIC's URBIS maps	Investment structure: budgeted in short term by BRIC	User involvement: limited to social networking links
Vertical integration: quite integrated into the city organisation, although BRIC is an independent entity	Distribution of intelligence: an internet connection is required to access main functions	Revenue model: indirect, public funds	Intended value: access to POIs and city contact information
Control over customers: with the Region, marketed as the Region's app	Interoperability: available for the two most important platforms	Revenue sharing: no revenue sharing	Positioning: towards individual citizens looking for information
Good governance: not particularly used in surrounding rhetoric	Technology governance: inclusion not emphasised, distribution of info	ROPI: one-way information channel	Public value creation: mainly one-way information channel
Stakeholder management: BRIC is the only involved stakeholder	Public data ownership: all used data is publicly available elsewhere	Public private partnership model: no structural PPP present	Public value evaluation: internally evaluated

Tables 3 and 4: Business model parameters and scores for Be.Brussels (cont.).

Limited to strong government involvement		Direct to indirect public value	
Value network		Financial architecture	
Control over assets with city	1	Investment structure goal is long term/collective	-2
Vertically integrated within city organisation	-1	Revenue model is direct or indirect	0
Control over customers with city	2	Revenue sharing set up over long term	0
Good governance aspects emphasised	-1	ROPI is long term	1
Stakeholder management organised by city	1	PPP model is structural	0
Technical architecture		Value proposition	
Modularity: control over modules with city	2	User involvement: individual or collective	1
Distribution of intelligence: centralised with the city	1	Intended value: short or long term	1
Interoperability emphasised	1	Positioning aimed at collective	-2
Technology governance: inclusion and openness emphasised	0	Public value creation aimed at long term/collective	-2
Public data ownership defined by city	1	Public value evaluation organised	-2
Score	7		-5
higher=more involvement		higher=indirect	

Tables 5 and 6: Business model parameters and scores Brussels Gardens.

Control and governance parameters		Value and public value parameters	
Value network	Technical architecture	Financial architecture	Value proposition
Control over assets: almost completely with Brussels Environment	Modularity: not particularly modular, but uses Google Maps	Investment structure: in short-term budget of IBGE	User involvement: limited to none
Vertical integration: app was created by external developer but is managed by IBGE	Distribution of intelligence: internet connection required to load data	Revenue model: no revenue model	Intended value: access to green spaces and environment
Control over customers: free app clearly from IBGE	Interoperability: both iOS and Android versions available	Revenue sharing: indirect, public funds	Positioning: towards individual citizens looking for green space
Good governance: quite present given the topic of the app and focus on sustainability	Technology governance: inclusion not specifically emphasised	ROPI: information distribution	Public value creation: promote green spaces in Brussels
Stakeholder management: IBGE is the only main stakeholder	Public data ownership: most presented data is publicly available but not centralised	Public private partnership model: no structural PPP in place	Public value evaluation: evaluated internally
Limited to strong government involvement		Direct to indirect public value	
Value network		Financial architecture	
Control over assets with city	2	Investment structure goal is long term/collective	-2
Vertically integrated within city organisation	1	Revenue model is direct or indirect	0
Control over customers with city	1	Revenue sharing set up over long term	0
Good governance aspects emphasised	2	ROPI is long term	1
Stakeholder management organised by city	0	PPP model is structural	0
Technical architecture		Value proposition	
Modularity: control over modules with city	1	User involvement: individual or collective	1
Distribution of intelligence: centralised with the city	2	Intended value: short or long term	2
Interoperability emphasised	1	Positioning aimed at collective	-2
Technology governance: inclusion and openness emphasised	1	Public value creation aimed at long term/collective	1
Public data ownership defined by city	2	Public value evaluation organised	-2
Score	13		-1
higher=more involvement		higher=indirect	

Tables 7 and 8: Business model parameters and scores for City of Brussels.

Control and governance parameters		Value and public value parameters	
Value network	Technical architecture	Financial architecture	Value proposition
Control over assets: based on public information, developed by GIAL	Modularity: not particularly modular	Investment structure: short-term budget of GIAL	User involvement: very limited to none
Vertical integration: internally developed	Distribution of intelligence: need for internet connection	Revenue model: indirect revenue, public funding	Intended value: information channel, static
Control over customers: with the City of Brussels	Interoperability: only Android, based on open data sets	Revenue sharing: no revenue sharing	Positioning: marketed as the city's app
Good governance: not particularly emphasised, info distribution	Technology governance: only available on Android	ROPI: information distribution	Public value creation: wider access to information
Stakeholder management: GIAL is the only main stakeholder	Public data ownership: publicly available data (as open data)	Public private partnership model: no structural PPP	Public value evaluation: limited internal evaluation

Limited to strong government involvement		Direct to indirect public value	
Value network		Financial architecture	
Control over assets with city	1	Investment structure goal is long term/collective	-2
Vertically integrated within city organisation	-1	Revenue model is direct or indirect	0
Control over customers with city	2	Revenue sharing set up over long term	0
Good governance aspects emphasised	-1	ROPI is long term	1
Stakeholder management organised by city	1	PPP model is structural	0
Technical architecture		Value proposition	
Modularity: control over modules with city	1	User involvement: individual or collective	-2
Distribution of intelligence: centralised with the city	1	Intended value: short or long term	-2
Interoperability emphasised	1	Positioning aimed at collective	-1
Technology governance: inclusion and openness emphasised	-1	Public value creation aimed at long term/collective	-2
Public data ownership defined by city	1	Public value evaluation organised	-1
Score	5		-9
higher=more involvement		higher=indirect	

Tables 9 and 10: Business model parameters and scores for FixMyStreet Brussels.

Control and governance parameters		Value and public value parameters	
Value network	Technical architecture	Financial architecture	Value proposition
Control over assets: shared between BRIC, cabinet and Mobile Brussels	Modularity: quite modular architecture, links to other services possible	Investment structure: public funds from regional ICT cabinet	User involvement: primordial to use of the service
Vertical integration: growing internally	Distribution of intelligence: centrally hosted, data connection required	Revenue model: indirect, public funds	Intended value: increased internal efficiency and fixing issues
Control over customers: with the city/region	Interoperability: open source, middleware required to link to existing systems	Revenue sharing: no revenue sharing	Positioning: branded as government service
Good governance: emphasised, transparency highlighted	Technology governance: Android and iOS, phone number available but differently branded	ROPI: both internal and external efficiency gains, transparency	Public value creation: increased citizen interaction, fixing issues
Stakeholder management: challenging and organised by external consultant	Public data ownership: collected reports not open data	Public private partnership model: not present	Public value evaluation: internally evaluated, stimulation towards municipalities

Tables 9 and 10: Business model parameters and scores for FixMyStreet Brussels (cont.).

Limited to strong government involvement		Direct to indirect public value	
Value network		Financial architecture	
Control over assets with city	2	Investment structure goal is long term/collective	2
Vertically integrated within city organisation	2	Revenue model is direct or indirect	0
Control over customers with city	2	Revenue sharing set up over long term	0
Good governance aspects emphasised	2	ROPI is long term	2
Stakeholder management organised by city	1	PPP model is structural	0
Technical architecture		Value proposition	
Modularity: control over modules with city	2	User involvement: individual or collective	2
Distribution of intelligence: centralised with the city	2	Intended value: short or long term	2
Interoperability emphasised	2	Positioning aimed at collective	2
Technology governance: inclusion and openness emphasised	1	Public value creation aimed at long term/collective	2
Public data ownership defined by city	1	Public value evaluation organised	2
Score	17		14
higher=more involvement		higher=indirect	

Tables 11 and 12: Business model parameters and scores for STIB Mobile.

Control and governance parameters		Value and public value parameters	
Value network	Technical architecture	Financial architecture	Value proposition
Control over assets: with STIB	Modularity: app links to real-time position system of STIB	Investment structure: public funds	User involvement: not enabled
Vertical integration: integrated with STIB location system	Distribution of intelligence: internet connection required	Revenue model: no revenue model present	Intended value: access to real-time information
Control over customers: with STIB, no explicit reference to city or region	Interoperability: no open data, closed approach	Revenue sharing: no revenue sharing	Positioning: branded as STIB service
Good governance: not particularly emphasised	Technology governance: Android, web and iOS apps	ROPI: access to real-time location of public transport	Public value creation: increased and real-time information provision
Stakeholder management: STIB is only main stakeholder	Public data ownership: closed data owned by STIB	Public private partnership model: not present	Public value evaluation: no public evaluation of app

Limited to strong government involvement		Direct to indirect public value	
Value network		Financial architecture	
Control over assets with city	-1	Investment structure goal is long term/collective	-2
Vertically integrated within city organisation	-1	Revenue model is direct or indirect	0
Control over customers with city	0	Revenue sharing set up over long term	0
Good governance aspects emphasised	0	ROPI is long term	-2
Stakeholder management organised by city	-1	PPP model is structural	-1
Technical architecture		Value proposition	
Modularity: control over modules by city	-2	User involvement: individual or collective	-1
Distribution of intelligence: centralised with the city	-1	Intended value: short or long term	-2
Interoperability emphasised	-2	Positioning aimed at collective	1
Technology governance: inclusion and openness emphasised	0	Public value creation aimed at long term/collective	1
Public data ownership defined by city	-2	Public value evaluation organised	-1
Score	-10		-7
higher=more involvement		higher=indirect	

Tables 13 and 14: Business model parameters and scores for Visit Brussels.

Control and governance parameters		Value and public value parameters	
Value network	Technical architecture	Financial architecture	Value proposition
Control over assets: mostly with Visit Brussels	Modularity: uses Open Street Map	Investment structure: public funds	User involvement: none, apart from social media sharing
Vertical integration: integrated in Visit Brussels organisation	Distribution of intelligence: a large initial download is required, offline	Revenue model: no revenue model present	Intended value: providing touristic information on map
Control over customers: with Visit Brussels/the Region	Interoperability: closed system	Revenue sharing: potential revenue sharing with event organisers	Positioning: branded as City/Regional service
Good governance: present in general communication	Technology governance: Android, iOS, no web app	ROPI: increasing information on and attractiveness of Region	Public value creation: individual information provision
Stakeholder management: Visit Brussels is main stakeholder	Public data ownership: no open data for POIs, Open Street Map	Public private partnership model: not present	Public value evaluation: internal evaluation

Limited to strong government involvement		Direct to indirect public value	
Value network		Financial architecture	
Control over assets with city	1	Investment structure goal is long term/collective	-1
Vertically integrated within city organisation	2	Revenue model is direct or indirect	0
Control over customers with city	2	Revenue sharing set up over long term	1
Good governance aspects emphasised	1	ROPI is long term	2
Stakeholder management organised by city	1	PPP model is structural	0
Technical architecture		Value proposition	
Modularity: control over modules with city	1	User involvement: individual or collective	-1
Distribution of intelligence: centralised with the city	1	Intended value: short or long term	-2
Interoperability emphasised	-1	Positioning aimed at collective	-2
Technology governance: inclusion and openness emphasised	1	Public value creation aimed at long term/collective	1
Public data ownership defined by city	1	Public value evaluation organised	1
Score	10		-1
higher=more involvement		higher=indirect	