

Open Cities: The case of Montevideo

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1 Introduction

It is a dark June morning in Montevideo, and as usual he does not know which bus to catch. Signposts are not very helpful, particularly if you are young and a newcomer to the capital city. Locals and bus drivers usually tell him where to get off the bus, but sometimes they forget. He used to write down addresses and bus numbers on small pieces of paper, which he was used to lose. This morning he lost those little pieces of paper again. It was enough. He decided he would do something about it. Later, at night, he went on-line and found some data published about Montevideo's public transport system, and also geographical datasets. Things started to get in motion. A couple of weeks later, working mostly in his free time, he designed an application that would help everyone with a smart phone to figure out how to navigate the city public transport system. Later on, he teamed up with friends who were experts in design and usability and in two months, a beautiful and usable open data application named GxBus was born. There were no authorities involved, no access to information requests, just a Issue, creativity and a public dataset. More than 11500 users have registered so far and 5500 installation are still active in Ios and Android (GxBus team,2013). The aforementioned example is one of the early success stories of how open data can deliver change for city's inhabitants. GxBus, created out of frustration with the current transport system user interface, delivered innovation and allowed Montevideo transport users with a smartphone to plan ahead and be more savvy about the way they use public transport. As more transport data becomes open GxBus will be able to develop more features such as real time information about buses and even user feedback about the transport system.

Nevertheless evidence about the use of open data in the urban scene remains still anecdotal and unexplored. Cities around the world are releasing datasets about transport, health, public services, geographical information and even rats sightings¹ but there is yet not clear measurement of how the release of these datasets is going to improve the life of city dwellers. As the open data agenda advances, there is a question that policy-makers keep asking: How exactly open data will drive prosperity and social change in cities?

In Latin America 80 % of the population lives in urban areas (UNHabitat 2011), a clear indicator of how relevant cities are and will continue to be. Cities face similar Issues in terms of migration, transport, health, urban planning among other pressing Issues, but they tend to act in silos for several reasons, preventing innovation that could help to change citizen's lives (UNHabitat, 2011,Naphade et al 2012) . Unlike other policies, open data has been a case of successful policy dissemination, as globally an increasing number of cities already are releasing datasets in open formats mostly in the developed world but increasingly in Latin America as well. A pioneer example comes

¹The City of New York recently released a dataset containing information about pest control, including data about rats sightings Source available: <http://www.theatlanticcities.com/technology/2012/12/best-open-data-releases-2012/4200/> accessed 28th January 2013

from the Greater Manchester Region in the United Kingdom where open data advocates working with local authorities are trying to build a sustainable open data ecosystem². Another example comes from San Francisco where the city council is releasing a significant amount of data in hope that it can help to spark innovation and create economic value. Canada is also a pioneer on this topic at municipal level³. New York, London and other mega-cities are increasingly releasing public data as well. As cities go "open" a key question is to understand how this development fits in previous accounts of urban governance and growth. Are open cities also smart cities (Naphade et al 2012)? Are open cities creative cities (Landry 2008) or learning cities (Campbell, 2012)? Are cities using open data also intelligent cities? (Komminos, 2006) It is not possible nor desirable in this report to provide a full account of these views about cities, but it is important to describe some key concepts about them and initially link how open-data fits in these different approaches.

The most important conclusion of this case study is that just releasing public information in open standards (in short open government data or OGD) will not unleash social and economic change in the cities. Yet it does have the potential to do the former, if an appropriate set of incentives and institutional framework are available. Focusing on the case of Montevideo city, this case study will explore how a nascent environment of open data users and providers is emerging, and which are the key structural elements that allowed this particular environment to flourish. The study seeks to contribute towards an evidence-based approach to open data. It should help practitioners and decision makers in Montevideo and elsewhere to realise the value of open data and the opportunities and Issues ahead.

This is a qualitative case study (Yin, 2008). Information was gathered through a set of semi-structured interviews and a workshop in Montevideo where public servants, civil society and developers took part in several discussions about Open Data in the region. In the appendix section the questionnaire and participants of the workshop can be found. A total of 15 Interviews were granted between April 2013 and November 2013, under confidentiality and non attribution conditions mostly to public servants, developers and civil society advocates working in this field. Other sources of information include public reports, datasets and press reports. Most of the figures about application use were self-reported by developers and public servants.

First the study provides the basic framework to analyse and open data policy. Second the study looks how Montevideo's open data policy was designed and evolved. Third the case study provides an analysis of initiatives in Montevideo. In the Appendix section a list and description of all initiatives can be found. Finally the case study provides a discussion about the theoretical implications of this case and propose a typology of open data policies.

²A full description <http://futureeverything.org/ongoing-projects/open-data-cities-datagm/> accessed 31 Jan 2013

³A full list can be found here <http://datalibre.ca> accessed 31 Jan 2013

Table 1: Analysis Dimensions

Dimension	
Emergence	This dimension explores how open data policies were born. It looks at how ideas, policies and decisions mix to create a "window of opportunity" (Kingdon, 1984) to emerge
Design	This dimension explore the rationality of the policy and its design process. In particular it explores whether it was a top-down vs bottom up process and the implications for the policy
Data Provision	This dimension looks at the nuts and bolts of data provision, in particular how data is released, formats and Issues
Resources	This dimension looks at what kind of resources are critical for an open data policy taking into account material resources, infrastructure and human resources
Demand (users)	This dimension looks at demand, in particular who are the users of data provided by the city and the way data is used at a city level

2 A framework to understand open data policies

Open Data policies are a fairly new developments in cities around the world. Thus a set of very basic questions arise about the reasons behind the adoption of these policies, the necessary conditions to have them and their initial impact. The case study is built on an initial framework aiming to capture the complexity of emerging open data policies. The framework takes a descriptive approach, and is designed as an heuristic device to put open data policies in context. It does not seek to engage in more complex debates about the nature of the policy cycle or how policies are made, albeit open data policies could provide good example for such debates. Table 1 provides a description of the framework devised in the context of this research project.

3 An idea whose time has come? Emergence and design of open data policies in Montevideo

Montevideo was the first city in Latin America to have an open data policy back in February 2010. The rise of the open data policy in Montevideo was a combination of state capacity, political opportunity, public service entrepreneurship and progressive associated ideas.

Montevideo City has a long tradition of in house services for developing information systems. This is the result of a traditional public service approach in terms of hiring human resources, which in turn creates institutional memory and state capacity to advance IT policies. As a result most of the information systems are built with the same logic ,which allows for a relatively easy way to retrieve and publish public data. Furthermore the logic of open data is reinforced by the logic of open public software, an approach that has now been formally adopted by Montevideo City. Moreover Uruguay has recently adopted a national law promoting the adoption of Free Software and Open Standards in the Public Sector ⁴.The former approach assumes an open software development framework where all the software purchased or produced by the State, is by default open. As a result, more transparency is embedded in the development, and there are savings in terms of licenses and other services. Montevideo was a pioneer in terms of using open source-and free software in the Uruguayan State, and quite recently the government approved a new nation a law promoting the use of Free Software and Open Standards. The law 19179 explicitly requests public administration to give open source products preference and force the state to store and release information in at least one open standard ⁵. The first steps towards an open data policy in Montevideo evolved from the publication of geographical information. A group of mid-level public servants (mostly software engineers) working with topography and cartography data saw value in publishing this data for free so everyone could use it. Thus, before the term open data itself was popular, the Geomatic Service ⁶ was already publishing some datasets in open formats. To sum up Montevideo public service is well versed on open approaches to software and open data was not an alien topic to them.

Through several internal workshops Montevideo's engineers kept discussing ways in they could use more efficiently public data, agreeing that it would be optimal to release more datasets. Initial research led them to the 8 Principles of Open Data, which they decided were aligned with their objectives. Furthermore engineers found out about the recently approved Uruguayan access to information law (18831), which helped them to frame the policy. Initial discussions among public servants led to the conclusion that, in order to sustain

⁴Regulation can be found at <http://monolitos.montevideo.gub.uy/resoluci.nsf/WEB/Intendente/5328-12> accessed 20 April 2014. It should be noted that while Free and Open Source Software are not exactly the same the law and resolution language could provide room for different interpretations. The spirit of the regulation is clearly to avoid using proprietary software

⁵Law 19179 is pending second level regulation (decrees) and implementation

⁶<http://sig.montevideo.gub.uy/>

the effort, an official mandate from the Mayor would be needed. Yet, policy needed to be simple enough to facilitate the release of data without significant problems. Engineers agreed to push for a policy but, as most of them were mid-level managers they did not have direct access to the Mayor. The group decided to promote the policy among senior management, who usually has political backing and eventually managed to persuade the then Montevideo's mayor, to approve a policy. In the meantime some civil society groups had also advocated for opening public data to improve services and accountability in the city (Defensor del Vecino, CAINFO, 2009)

As a result and unlike other processes at a comparative level, Montevideo case was mostly pushed by middle management, who initially tried to solve a very defined problem, and then found open data as part of the activities they wanted to promote. This is the case of a bottom-up policy that managed to emerge due to state capacity available, and spirit of of public service entrepreneurship, political opportunity and progressive ideas.

In February 2010 Montevideo passed the resolution 640/10⁷ which states that the government has a specific interest in publishing open government data and set conditions for release them such as

1. In principle all data is public except if there are issues of privacy or security
2. All data should be published as raw data
3. Data should be published as soon as possible
4. Data should be available to the largest audience possible
5. Data should be in machine readable format
6. Data should be published in a format in which no entity would have absolute control over it (open standards)
7. Data should be free to use and re-use, no copyrights applies.

The resolution also set up a working group to lead the open data release, in the Division of Technology and Software Development of Montevideo City.

The whole development of the policy was done away from traditional policy channels. For instance there was no contact between the Freedom of Information Department and the group developing the open data policy. The former is another indication that open data and freedom of information might be conceptually related but usually designed in departments that do not necessarily talk to each other. As the policy evolved and through several requests for datasets through www.quesabes.uy- a website designed to foster access to information requests online - both departments started conversations to move forward a comprehensive policy. Currently authorities explore how to release FOI replies in open standards.

⁷The formal resolution can be found at <http://monolitos.montevideo.gub.uy/resoluci.nsf/de053405568724cf832575ae004f0467/7ada> accessed 20 April 2014

4 Data Provision and Resources

The initial criteria to get the data out was fairly simple: to use what already was available. In this way Open Data Working group set up a website where 42 datasets were made available progressively. Most of the initial Datasets contained geographical information and transport information, which was among the first datasets used by groups developing applications. The datasets were not specially curated to be published, the formats in the website are usually the most accepted open standard for the respective dataset⁸. The decision to use what was already available put the policy in motion. It is also likely that early datasets available influenced the availability of applications in Montevideo as most of the applications available are related to transport or other geographical based services.

The second step was to put files that were in formats easy to convert to an open format such as csv. An example of the former is the city's budget file which was converted to open format, but the process did not take significant amount of work. After the initial datasets were released the Open Data Working group developed an "active listening" strategy, gauging demand through emails. As a result an emergent strategy evolved to a set of fairly simple standards of practice:

- Publish first datasets already available that demand none or low use of resources
- Disseminate information across the community of users that data is available
- Provide meta-data and indications about the datasets where possible
- Listen carefully to users and provide support processing all inquiries.
- Keep publishing, where possible following demand from users.
- If you cannot process a query from your community of users, do explain the reasons behind it

The above best practices apply in a context where state capacity is relatively high and there is a certain degree of centralization of datasets and information. Montevideo has a fairly good system to centralize municipality information, and as a result is relatively easy to search for data and publish it.

There is an obvious tension between publishing data in an acceptable but not perfect quality. Publishing data according to Berners Lee well known 5 star model demands significant efforts. Montevideo Open Data working group believes that while, initially is desirable to publish data in the highest standards, the problem is the cost in getting it done. Such a standard assumes a team

⁸An example is that most of the geographical datasets is published in shapefile, which is the most accepted open standard for geographical information. Nevertheless the Open Data Working group is considering the provision of files in other open and more usable formats such as KLM

devoted to open data. The conversion process is costly because it requires critical resources (mostly human resources) and, after public data is usable, the marginal revenue of standardizing it, diminishes significantly.

In terms of indicators debates among engineers are still evolving. Initial indicators such as number of datasets downloaded, number of queries and site visit were discussed but consensus is that they do not show much of the outcome of the policy. So far, Montevideo Open Data Working group most valuable indicator is the set of applications that have emerged as a result of the policy, which shows the value of the data. Discussion about whether to develop some sort of register system to know who is downloading the data are considered not practical, and to some degree opposed to the principles of the policy.

Setting in motion Montevideo Open Data Policy did not demand a lot of resources as it was a low cost policy. The most significant resource are human resources able to collect, collate and eventually release open data. The former is done by a team of 6 engineers with collaboration of human resources from other department. Montevideo decided to join efforts with the national E-Government agency and contributed their datasets to the national open data catalogue datos.gub.uy while also keeping them on their website. The decision not to install an open data software manager was based in that initially there were not many datasets and would increase internal costs. To scale the policy the office would need different kind of organization such as: liaison roles with other departments, data curators, liaison roles with the community and eventually more engineers on the development team. As a bottom-up policy in the context of a traditional civil service approach, one of the crucial resources to scale up the policy is a certain degree of institutionalisation.

5 Demand for Open Data in Montevideo

A general characteristic of the emergence of applications in Montevideo is that is indeed an spontaneous process in the private and public sector. In the private sphere, none of the applications got specific funding or guidance from the City to tackle specific issues. In this way just by releasing the public data, users figured out how it could help them to solve their Issues. Echoing the famous phrase attributed to Chinese leader Mao Zedong "Let a hundred flowers bloom and a hundred schools of thought contend",⁹ the mere existence of public data in open formats allows several ways to frame and use the data. As potentially everyone with a basic understanding of datasets can get hold of this public data, possibilities are endless, particularly when combining data from different sources at a national and local level. On the public sector side of the equation

⁹The experiment happened under the so called A hundred flowers campaign in 1956 and Mr. Zedong's exact words are in a speech titled On the Correct Handling of Contradictions Among the People, a full history of the speech is available at <http://blogs.smithsonianmag.com/history/2012/09/the-silence-that-preceded-chinas-great-leap-into-famine> accessed 5 Feb 2012

publishing and using open public data had a logic behind, but it was not public sector programme. It was mostly the initiative of a group of engineers already working on the topic, which quite spontaneously advocated for a policy and developed applications using their own public data.

In this section, the report will explore the current status and promise of open data in Montevideo urban scene¹⁰ will provide an analysis of the current status based on four analytical dimensions:

- **Drivers:** This dimension analyses motivations behind designing and launching the software. Examples of drivers are curiosity, reputation incentive and emulation of other initiatives. In simple words it describes the reasons behind the creative process of an application
- **Issue addressed :** Most applications are created to solve specific problems for users. While some of them resolve several problems, the beginning is usually simple and very focused. This dimension describes the key questions or Issues applications designers want to tackle.
- **Enablers and software development:** By enablers this dimension explores what made possible the software to emerge, from datasets to skills and materials developers used , as well as the process of refinement of this application
- **Impact:** By impact this report looks at basic metrics as well as more qualitative impact of the software in urban life and also impact from the developer's perspective.

This analysis is based on 11 open data apps coming from the public and private sector that are until now operating in Montevideo Open Data Eco-systems

5.1 Drivers

In Montevideo Open Data setting drivers to create application can be divided in three: experimentation, commercial purposes and solving public services Issues. Most of the initiatives are experimental but some of them were created with an specific experimentation purpose such as Montevideo Bus. The idea was not to set up a business but to understand how to use data and explore the possibilities. Commercial oriented applications in the tourism sector emerged initially from curiosity and willing to experiment with technology. The driver of commercial applications was not initially profit but to check whether it was possible to set up such application and eventually evolved into commercially oriented services. On the other hand the state sector also developed its own applications (mostly in the transport sector) in order to reach more users and citizens, mostly due to the absence of private initiative, but also to provide an authoritative source of information on a key public service. A recent trend is the association between public sector and civil society to deliver improved

¹⁰A full list of all the projects reviewed can be found in the appendix section

Table 2: Initiatives

Application	Topic	Organization
Por mi Barrio	Public Service delivery	Data (Civil Society)
GiTour	Tourism	Marcelo Ferrer and Luis Santana (Private Sector)
Artur	Tourism	Matias Preciozzi and Pablo Blanco (Private Sector)
Montevideo Bus	Public Transport	Jose Lezama (Private Sector)
Acavamos	Public Transport	Neo (Private Sector)
Montevideo LBS	Public Transport	Michael Hobbins (Private sector)
Como ir	Public Transport	City of Montevideo (Public Sector)
When is the next Bus	Public Transport	City of Montevideo (Public Sector)
GxBus	Public Transport	Diego Rostagnol (Private Sector)
Montevideo Cartography	Land Management	City of Montevideo (Public Sector)
Where do I recycle?	Environment	Data (Civil Society)

Source: Author's elaboration.

public services such as the case of Por mi Barrio. In the former case drivers are closely associated to promote innovative solutions to traditional problems of urban city management such as potholes, waste management and other urban incidents. The state sector sees value in partnering with creative civil society organizations to provide new kind of services.

5.2 Issues

As the table shows most of the Issues so far are related to public transport. Issues are not usually defined from the outset, but evolve through the development of the projects. The Issue usually start as a simple idea than later derives into more complex Issues. In the public sector the Issue to set up new application is usually mediated by several transaction costs, but usually are clearly defined from the outset. For instance to develop a website such as Como ir there was a clear definition from the outset on the objective and data available.

5.3 Enablers

Most of the initiative could not exist without public data provided by Montevideo City. Furthermore support from Montevideo City in terms of queries was also signalled as an important enabler. As initiatives become more complex just open data is not enough. Investments in terms of capital, human resources and eventually certain level of political support are necessary. For instance the project Por Mi Barrio could be potentially developed with the geographical datasets already available and provided by the City of Montevideo. Nevertheless if the portal is not acknowledged as a legitimate one by the City it loses

all its potential to fix urban governance Issues. Furthermore some level of integration between services and native systems in the public sector is also needed to deliver better services. Most of the projects in the table above mentioned did not have access to capital or other kind of support.

5.4 Impact

The City of Montevideo is still trying to define indicators for its open data policy. In terms of the initiatives themselves the most used indicator is number of users or visits. Thus there is room to develop qualitative and quantitative indicators about the use of open data. Nevertheless in this nascent state it is difficult to individualize one indicator. Participants in the workshop held in Montevideo last year noted that setting up a base line to evaluate the development of the sector is still difficult and more study and experience is needed to determine which indicators are a sign of success or failure of a policy of this kind.

6 Theoretical Implications: Cities, Models and Institutions

In this section the report provides a set of theoretical discussions that Montevideo case study helps to illustrate. Three key Issues are discussed: the Smart City concept, models for open data work and institutional aspects of open data. The first sub-section draws in comparative literature about Smart Cities posing the question where open data fits in this agenda. The second sub-section analyses possible models to understand how civil society and entrepreneurs are using open data and discusses state involvement in this agenda.

6.1 From Smart Cities to Open Cities?

Smart Cities is an ubiquitous concept¹¹, and to some degree several (and usually very different city initiatives) fall under the brand "Smart Cities". As noted by Hollands (2008) many cities claim to be "smart" in order to attract investment or to become competitive at a global level. IBM, a company promoting the idea of Smarter cities defines it "as one that makes optimal use of all the interconnected information available today to better understand and control its operations and optimize the use of limited resources" (IBM, 2011).

An alternative definition of a Smart City, is a city that investment in human and social capital and traditional and modern (ICT-based) infrastructure fuel sustainable economic growth and a high quality of life with a wise management of natural resources, through participatory government (Caragliu A, Del

¹¹A similar terminology is "intelligent cities" which is defined by Komminos (2006) as territories that bring innovation systems and ICTs within the same locality, combining the creativity of talented individuals that make up the population of the city, institutions that enhance learning and innovation, and digital innovation spaces facilitating innovation and knowledge management

Bo C, Nijkamp P 2009). Thus, in the former view and in others Smart Cities are not only about systems, but people being empowered by the use of technology.

As noticed by Campbell (2012) and Holland (2008) , among many others, the label smart city has been used in very different ways, some of them extremely associated with technology systems able to centralise information, use of sensors to gather data about the public space and even a redesign of the public space according to these new trends. On the other hand, smart cities can be integrated and participative spaces where citizens can inform policies through collective action. Crucially in all versions of smart cities open data policies do play a role. In a centralised approach, open data helps breaking internal silos in order to achieve a full picture of the services and information that the city holds, in order to increase efficiency gains and get a tighter grip on the administration. On the other hand, from a participatory perspective, citizens are empowered due to the use of open data and are able to provide feedback and take part in the decision- making process. As noted by Komminos et al (2012) some definitions of smart cities are associated with a top-down approach, while others are associated with a bottom- up approach. In the context of "Open Government" (Latrhup and Ruma, 2010) which includes as default elements participation, transparency and collaboration, a bottom-up or participatory approach seems to be more suitable to the "Smart City". If governments are to become really more participatory, open and accountable then design of systems that underline this view, needs to be aligned from a normative perspective.

This is to say, that technology behind the open government movement needs to incorporate some of its key values to live up to the standard proposed. This begs the question whether open source or free software should be adopted as platforms for open data policies, or more generally embraced by cities. Montevideo case study shows that there is a correlation between open source software, public software movement and open data. The fact that the city embraces open approaches to infrastructure also helps to the adoption of open data policies. The former derives from the similarities in the "open philosophies"

The raise of wireless networks, embedded systems and ubiquitous Internet access with mobile devices, enables the use of technology to deal with much of cities problems in real time, due to the constant flow of information. Yet as more information is available, several solutions could emerge without control of local authorities, which then lead to discuss new ways of governance between citizens and authorities. While traditionally the government has been at the centre of development in the IT and services space in the cities, an open data ecosystem may benefit from a more diverse type of approach where government steer the process, in what will become a multi-stakeholder governance environment.

Komminos et al (2012) argue that, in order to take advantage of the data revolution cities should follow three pillars:

- Share more and develop less: If it is already available use technology

already made to solve the same Issue. This goes hand in hand with the idea of open/free software, and in the Latin American contexts with the idea of public software as key component of any smart city strategy ,

- Look forward: Planning ahead and monitor emerging trends and crucially work with other communities,
- Spend less: As open source or free software becomes available, the need to pay licences diminishes. Furthermore experimentation can take place in small settings, which usually is a cost effective way to approach new solutions.

The tension between a centralised and top down approach vs. a bottom up-decentralised approach will be always be an Issue in this new open context. Rati and Towsend (2011) argue in favor of less control from the government and put users in the drive seat to advance changes in services. Nevertheless, citizens need to become aware that they are able to sit in the front seat, and to do this, they need to develop new capabilities and new forms of association and interaction, which also poses Issues to civil society movements.

A significant question is to which extent a city can be "smart" and open at the same time. By open it means that most of the datasets that a city holds should be public, in an open format, and as a result accessible by anyone with an interest, will and resources to use them. In this way an open city probably could not aim to have a control and command centre from where it could direct which services and how they are going to be created. Nevertheless it has the possibility to influence the agenda by enabling civil society and the private sector to produce new services or modify current services based on open public data . New governance arrangements will emerge, but it is highly unlikely that these arrangements will take a centralised form. An open government agenda on open data at a city level should have a bias towards enhancing citizen participation. Open standards and technology does not mean, automatically, that cities become more participatory. Quite on the contrary openness can also be a tool for control and surveillance. Thus, open data needs to be properly framed in the cities debate, as smart cities is not a synonym for participatory city. Lenses about urban development are crucial to have a consistent approach to open government data at a local level.

6.2 Initiatives looking for models: What this case study can tell

At the moment there is a discussion globally whether open data drives prosperity and increase economic value (Deloitte. 2013). There is yet no significant evidence about the former but the cases developed here shows that there is indeed social value. As a result of the release of open data several initiatives flourished, and are now providing services to citizens. Some of these services were developed by the city itself while others were developed by entrepreneurs, civil society or just curious people. As a nascent field, this is still

an open and unexplored territory. There is evidence that cities are learning from each other, and will continue to do so, which means that there is room to fully explore impacts and model. The focus then, should be experimental rather than normative in the context of an open data agenda.

With the evidence available, there are at least three ways to understand the way open data environment works from the demand side, depending on the leadership role in each scenario

In terms of creating public and social value the public sector and the civil society can provide significant input into the process of using open data to help to solve cities Issues. When the data is already available in a reusable format social innovators can access it and create new tools or as in the case of Where can I recycle in Montevideo they can improve existent services. Montevideo does have available the social capital for this kind of interactions to happen in the public, private and civil society sector.

As public value starts being created Issues arise in terms of how to actually make it sustainable and scalable. This is to say how to structure the offer side of open government data at a city level. For instance two key questions are at the core of any policy in terms of open data at a City Level:

Should the City pour more resources into publishing and cleaning datasets, as well as developing APIs so developers can use it ?

Should the City hire more staff or contract out providers to develop new applications for the citizenry and if so under which terms?

At the current stage Montevideo is basically a state led environment, but it is still fragile. As many other initiatives around the world is based on free time of public servants who happen to have a particular ethic about the public service and an interest in open data. To this regard the City is able to keep its efforts but it is unable to fully expand policy and services without a proper institutional setting and crucially human resources working on it. On the demand side civil society might continue to provide good examples of uses of open data but again it might not be able to scale it without some sort of backing from funders or the State itself. Montevideo is a relatively small market for civil society and business applications, and this is a new area where several applications could be developed successfully either emulating initiatives overseas, or developing new ones. The hacker and developer culture in Montevideo is a plus for this kind of environment but, also there is a need for a framework in the way community of users and the State interact, to develop cost efficient and agile solutions. The risk of Montevideo becoming a merely state-led environment is that it could crush innovation coming from other sources. Rather than focusing solely on the provision Montevideo City could develop creative ways to partners with civil society to create new services, that could be run and could be supported with a mix of public, private and volunteer funds. Crucially due to the particular characteristics of Montevideo information polity, there is room to develop a laboratory for civic initiatives due to the high take up of the Internet and relatively high penetration of smartphones.¹²

¹²Data is scarce one source indicates that Uruguay could have up 1.2 million smartphones by

Table 3: Models of Open Data Environment

Type/ Characteristics	State led environment	Civil Society led environment	Entrepreneur led environment
Objectives	Promote the use of social services	Use of social services, transparency and accountability	Profit Making
Resources	Data already available, if in open format spurs intra-agency and inter agency innovation. Possible contractors and in house teams carrying out the work	If data is available civil society is able to improve current services and develop new ones based on volunteer work, or specific grants.	If data is available entrepreneurs devote their own time or funds from investors to projects.
Focus	Provision of Public Goods	Provision of Public Goods	Provision of private and public goods if it is aligned with Profit making incentives
Sustainability	If embedded in city s strategic activities applications can be sustainable	Depending on civil society resources and volunteer	Depending on data availability and market value of the service
Replication	Ideas replicable and technology as well depending if public software was used.	Ideas replicable and technology as well depending if public software was used	Ideas replicable depending on business model and scale

Entrepreneurs are present in this environment but there are no business models well developed yet. One possible choice is for entrepreneurs is to collect personal data and monetize their products by selling this data or selling adverts related to the content they provide. In this case they would also need to comply with certain privacy regulation turning their business more costly. Another possible revenue stream could be advertisements from local companies but there is a strong need to reach out potential businesses that would benefit from application, potentially using social media publicity agencies already established in Montevideo. Montevideo offers relatively low ceiling for entrepreneurs as it is a small market but provides a sizable opportunity for those willing to test their ideas. The Issue for this kind of entrepreneurship (familiar also to social actors around open data) is access to initial capital that could turn current initiatives in business. This kind of capital in the Uruguayan case is not easily accessed, but it should be considered by research and development agencies as relatively small grants could have significant impact in the city landscape.

6.3 Open Data: as a rule of the game in the city

As datasets become increasingly available expectations rise. It is something we now expect to be available . The former is linked to the idea of open government data as an institutional rule of the game. A rule of the game is something expected (and potentially demanded) such as other services local government provides. Data should be there as we expect roads to be clean or pavement to be fixed. The idea of a rule of the game can also be linked with the idea of open government data as public infrastructure (Moncechi, 2012) where the city provides the basic public digital infrastructure so users can take advantage of this. The analogy often employed is to understand open data as public roads. The city builds public roads for everyone to use, with no discrimination policies and the should be kept in good conditions. In this view open data is not only about publishing data, but also services and computational power the government has to foster the open data environment. The logic behind is that besides being more efficient it is exactly what government should do to foster public knowledge. While I agree that open government data could be treated as infrastructure it is always worth mentioning that data is socially constructed and as result rights of data holders (particularly individuals) are crucial in any convention.

Albeit . Open data is not merely a commodity, thus as with other social conventions rights of individuals who generated the data, and which could be affected by its use should be taken into account. For instance Crawford and Schultz (2014) argue it is imperative to think about possible harms big data (and in some cases open government data) could cause to privacy.

If open government data will become a convention there are 4 points that

2017 <http://latinlink.usmediaconsulting.com/2012/11/latams-emerging-internet-markets/> accessed 21st May

define the basics of this convention:

- Proactive Publication of Data Sets
- Privacy implications
- Reuse policy
- storage and processing of public information

In terms of proactive publication of data sets a Issues are about the cost of publishing particularly in small organizations with low IT capabilities in house. There options in the market available in terms of helping organizations publishing and visualizing public data, but small teams would be able to publish data with a certain degree of confidence if the data is obtained from pre-existent systems that perform. Most of the public data already available was not created for the purpose of being published, but for other purposes, thus it is only reasonable to use it in the formats originally available. Granted, this usually does not comply with Berners Lee open data model (2006), in which ideally every dataset would be in a particular format but it is still good enough for developers to work with it. In terms of privacy regulation is context dependent, but cities usually do not handle large amounts of datasets with private information. Where private information could be exposed (e.g. the route one particular person took x day around the city using data from the transport system) then clear procedures to ensure the anonymity of the data should be in place, and should be constantly tested in order to ensure minimum chances of privacy harm. As a result cities should take minimum safeguards with some of the datasets involved.

In terms of reuse policy licenses complying with a maximum standard (such as the open definition) are indeed useful to foster data use as it provides almost non existent transaction costs between data and the users. Yet, as users become increasingly dependent on public data, storage and processing of public information becomes critical, which actually feeds into each organization's information management policy. The fact that open data becomes a rule of the game, "something expected" does not mean it has to become a fossilised policy. As a matter of fact the case of Montevideo shows that it is possible to build, in an evolutionary and pragmatic way behaviours that actually encourage people using data, as well as improving data or services developed by the City. To keep this flexible approach, relationships in the "information polity" must be fluid, as no rule can live without a community that is able to sustain it. Available evidence at hand, albeit preliminary, shows that city governments might be able to steer an open data environment rather than to fully control it. As a matter of fact it is highly desirable that cities develop capabilities to monitor services to improve them, as well as to encourage innovation coming from inside their organizations and from outside. In this way open government data could become the foundation of a new way of urban governance where citizen organizations could lead the way to a more participatory kind of governance.

As a result information about public and private organizations and activities that are critical to citizen's lives should be available, accessible and actionable (Fung, 2013) as in Archon Fung's Infotopian version. To conclude it is too early to determine which path Montevideo open data ecosystem will follow. It is a small, active and creative community giving now its first steps in terms of innovation shaping its basic rules. Whether Montevideo open data policy will honour the old adage "the air of the city sets you free" time and significant decisions by local authorities will tell.

6.4 The many meanings of Open Data for cities

Even if we think about open government data as key to public digital infrastructure or as rule of the game, a powerful convention that set up the convention of an open government environment, there are still issues to think about how open data can be used to foster democratic government in local contexts. As the open data advances in several areas, it also risks becoming a buzzword, such as "Smart Cities". Indeed each city can have a vision about its future, which could include or not becoming a "Smart City". Nevertheless the evidence at hand, albeit preliminary, shows that city governments might be able to steer an open data environment rather than to fully control it. As a matter of fact it is highly desirable that cities develop capabilities to monitor services to improve them, as well as to encourage innovation coming from inside their organizations and from outside. In this way open government data could become the foundation of a new way of urban governance where citizen organizations could lead the way to a more participatory kind of governance. As a result information about public and private organizations and activities that are critical to citizen's lives should be available, accessible and actionable (Fung, 2013) as in Archon Fung's Infotopian version. The former view challenges us to think beyond the traditional public/private division to think about data relevant to protect and empower citizen's rights.

There are of course other uses of open government data at a local level, for other purposes but if cities honor the old proverb "the air of the city sets you free", then uses of Data should be about expanding citizens freedom and human development, a true sign of a smart city.

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7 Appendix I: Initiatives in Montevideo Open Data EcoSystem

Gxbus was designed originally by Martin Rostagnol, an Uruguayan developer . The application main objective is to allow users to navigate Montevideo transport system, providing information about how to reach a specific destination and when the next bus is coming to the bus stop. Currently Gxbus is available on Smartphones for two operative systems: Android developed by google and OSx (Apple).

7.1 Gxbus

7.1.1 Drivers

The core driver for building this application was a very real need to get around Montevideo . In the words of Gxbus developer

“ When I first came from the countryside to Montevideo, two years ago, I spent a lot of time without using bus services, because I had no idea which one to take, to go where I wanted to go, particularly if I was on the street without a computer”(El Pais 2011).

The former insight encouraged Rostagnol to take the first steps to develop the application. Later on a Issue set up by Artech,¹³ Rostagnol saw an opportunity. The Issue involved the use of Genexus Evolution 2 tools to programme an innovative application and Gx Bus won the Smart Issue from Artech, the company that developed Genexus

7.1.2 Issues

The Issue initially was fairly simple: to allow users to know where to go using Montevideo’s transport system from their cell phones. Thus the mobile element was present from early beginnings of the application.

7.1.3 Enablers and Development of the project

The project’s key enabler was the existence of open public datasets provided by the City of Montevideo. Without those datasets the project would have been fairly difficult to create and implement. During the project Rostagnol teamed up with an usability expert, Daniel Carranza, and a designer, Martin Cedes to provide the platform with better design and to turn this into a more usable an intuitive platform. Technology played a key part, particularly the

¹³An Uruguayan technology provider. One of the key products Artech developed is Genexus, a software that allows programmers develop in several platforms

use of Genexus X Evolution 2¹⁴ in which Rostagnol was well trained. In terms of management the team tried to secure funding providing users with a bank account where they could deposit money as a donation. Albeit e-banking is emerging in Uruguay (and as a result is not widely used) there was very little collaboration in terms of raising capital from the public.

7.1.4 Impact

The site has around 11500 users registered, and about 5000 applications installed in cellphones based on Android and OsX. Active applications are actually the clearest sign of success, meaning that daily 5000 users rely on this application to navigate Montevideo Transport System. Media profiling and social networks helped to raise profile for the application and also generate more users. As an example Gx Bus has more than 3500 fans in Facebook and uses other social media channels to provide updates for users. Members of the project agree that GxBus gave them visibility and also increased their reputation in their own field of expertise.

¹⁴GeneXus is a Cross-Platform, knowledge representation-based, development tool mainly oriented to enterprise-class applications for Web applications, Microsoft Windows and smart device platforms according to Wikipedia accessed 15 Feb 2012

7.2 acavamos

Acavamos (www.acavamos.com.uy) was originally designed by Cubox, an open source software development company based in Montevideo.

7.2.1 Drivers

Cubox has long had a philosophy of open source development and the use of public datasets to develop applications that could be innovative. One of Cubox programmers, Federico Sanguinetti, decided to tackle the Issue of public transport in Montevideo as a company's project. The project is currently supported by Cubox.

7.2.2 Issue

The Issue was to provide an easy interphase to locate an address in Montevideo. Furthermore acavamos could be used to create more application based on geo-referenced information.

7.2.3 Enablers and project development

A key enabler for this project was the data available from Montevideo City through its open data initiative, yet not in a direct way but taking advantage of Open Street Map project¹⁵

7.2.4 Impacts

The application was developed as an experimental tool and remains operative. There is no data available about traffic or other applications developed based on acavamos.

¹⁵OpenStreetMap is a free, editable map of the whole world. Unlike proprietary datasets like Google Map Maker, the OpenStreetMap license allows free access to the full map dataset. This massive amount of data can be downloaded in full, but also is available in immediately-useful forms like maps and commercial services. Open Street Map accessed 5 February 2013

7.3 GiTour

GiTour was born in 2010 as a collaborative project for the final project to obtain an university degree ¹⁶ Marcelo Ferrer and Luis Santana designed the prototype of application to help tourists explore Montevideo. The insight came one day at the popular "Plaza del Entrevero" (a popular public square in Montevideo) where Santana and Ferrer observed a large number of tourists unable to navigate their way through the city, using guides that were not updated and old maps. GiTour was the first application using Tourism public information in Uruguay.

7.3.1 Drivers

The main driver for Santana and Ferrer was to find a challenging project, not only from a technical perspective but also from a social and entrepreneurial perspective. The decision to develop for mobile devices was particularly innovative at the moment (in 2010 the smartphone sector was not a popular market in Uruguay). There was also a driver that involved creating something new, that could show the skills they gained while studying at the University.

7.3.2 Issue

The Issue to solve was to provide tourists with a simple, up to date tool that help them to navigate cities tourist's resources at zero cost for the user. At the moment the software provides access to key information on android platform allowing users to calculate distance to key service providers (5000 thousands listed on the platform) , or to get data about historical and political facts of the country. It also provides information on basic economic facts and weather about the country, which are provided by third parties

7.3.3 Enablers and Development of project

A key enabler for this project is the availability of public information. Systems can be perfectly designed but without information they become useless. To get the crucial public information the programme needed, Gitutr's team asked for collaboration from the Ministry of Tourism to get hold of the database that maps all tourist service providers. The Ministry provided this database, as it was public information, under the condition that information could not be sold. The process to get the information was straightforward, but at the time there was no regulation. The application also uses information coming from other public sources. The project was further developed by Santana an he chose Android platform over others, basically due to the open-source philosophy that would allow him to develop the code further, and integrate it with other Google products. Also some users are more familiar with Google style

¹⁶The project was developed at ORT University in Montevideo to fulfil the requirements of the degree Analyst in Information Technologies.

products adding some marginal advantage in terms of usability The strategy to promote the website has been done largely through social networks and other informal ways of diffusion. Fixes and new developments are usually incorporated after the high season (summer) finishes, to prevent possible disruptions in the service. A particular problem the project found was the inability to commercialise the application or services related to it, through Google store, due to the fact that, when it started, it was not possible to use this service in Uruguay. The project is sustained on part-time efforts, and Santana aims to build on this application to set up a commercial venture. Due to privacy regulation, as well as other ethical consideration the application does not collect personal data.

7.3.4 Impacts

The application has been downloaded by 4000 users and is currently active in 2800 mobiles. Most of the users are tourists from Argentina, Brazil and the United States of America. The application won the contest dateidea.uy designed to promote open data in Uruguay by the Electronic Government Agency (AGESIC) . It has also received media coverage which helped to promote the website locally.

7.4 Artur

Artur is a mobile application developed by Devxtend, a young company owned by Matias Preciozzi and Pablo Blanco in 2010. Artur uses augmented reality technology to help users to navigate Montevideo.

7.4.1 Drivers

The main driver to develop Artur was a competition organised by the local firm Artech. The competition invited coders to use Genexus platform to code an innovative application. While other tourism applications were on the market, Devxtend decided to produce Artur due to the possibility to use Augmented Reality technology through a partnership with the firm Digital Sense technologies.

7.4.2 Issue

The Issue of Artur is to provide tourism information in an easy and accessible way. Information includes: rent a car services, exchange services and maps. Users are able to use their position to get a sense of what is next to them, as well as they are able to bookmark places they went to. Furthermore users are able to get information about public monuments through the Augmented reality (AR) technology¹⁷. Artur's code is not open at the moment.

7.4.3 Enablers and project development

In terms of data, most of the public data comes from the Ministry of Tourism and Montevideo City. Also the application uses Wikipedia as another source of information, particularly in terms of information about public monuments. Technology behind the project is Genexus and the project has evolved basically through the company's effort. The company had some limited support from a University business accelerator service. A crucial enabler is the partnership Devxtend established with Digital Sense technologies, enabling the application to provide a distinctive technology, which could make them also scalable. Users can add photos to the database, which later are validated by the team behind Artur, and new sites can be added, potentially all over the world. Artur runs on Apple and Android systems and users need a smart phone or a tablet to use the application.

¹⁷An AR system supplements the real world with virtual (computer-generated) objects that appear to coexist in the same space as the real world. While many researchers broaden the definition of AR beyond this vision, we define An AR system to have the following properties: combines real and virtual objects in a real environment; runs interactively, and in real time; and registers (aligns) real and virtual objects with each other Azuma et al, 2001

7.4.4 Impact

Artur had significant media coverage in local newspapers, radio and television. This coverage helped the application to get 3000 users among android and apple users. Most of the users are locals, albeit increasingly tourists are also using it. In the short run Artur will incorporate new languages and more features. A significant impact is how the platform is valued by several users in Google Store. As a result of this application Devxtend has been contacted from Miami, Lima and other cities to check the viability to expand the application, and also to work on software related to augmented reality.

7.5 Montevideo Bus

7.5.1 Drivers

Montevideo Bus was the first website aimed to help people navigate Montevideo Transport system in 2009 when there was no open data policy or datasets available . Jose Lezama, who is behind the website observed the lack of transport data, and the real need for a service. It was initially a hobby born out of curiosity.

7.5.2 Issue

The Issue at the time was to provide users with key information about Montevideo bus systems, setting up a platform where they could crowd-source the information. The website then, not only had a very defined objective but also had a secondary goal which was to crowd source information. After 3 years, Lezama created a mobile version. At the time Montevideo City did not have one. As a result the Issue was expanded to provide information not only online but on user's mobiles.

7.5.3 Enablers and project development

The key enabler for this website was the technology available through Google libraries and Google apps.¹⁸ Users also contributed with line numbers, destinations and bus stops due to the absence of data at that time. When Montevideo City open datasets became available it helped to double check the information on the website. The code of the application remains closed mainly due to time constraints to polish it. Hosting is hired by Lezama, and the website produces income through publicity allowing a certain degree of sustainability. The website could scale but funding (mostly to put into developer's and designers time) would be needed.

¹⁸which allowed the use of Google maps and other functionalities. With this free and open technology at hand, Lezama managed to build the website, programming basically in Python

7.5.4 Impact

The application has an average of 3000 visitors per day, and around 10 % are coming from mobiles. The numbers are quite significant for a small town such as Montevideo. Due to the expansion of Smartphones the trend towards mobile phones will increase. Also the website got a significant amount of coverage in local news which helped to raised the website profile as well as the developer's profile. As a result of this website there were professional gains for the developer, in terms of prestige and possibilities of further expand his work, albeit not through the project itself

7.6 Montevideo LBS

Montevideo LBS is a service based on the Location Based Service approach which essentially uses geographical information about the user and service to highlight users proximity to certain relevant venues of the city through mobile devices. At the moment the application developed provides information about theaters, public interest points, auditoriums, libraries and museums.

7.6.1 Drivers

Montevideo LBS was developed by Michael Hobbins who found out about Montevideo Open Data Policy on-line in October 2012 . Hobbins has significant experience programming for mobiles and was puzzled by the data provided by Montevideo City. Furthermore, Hobbins also found out about the Issue presented by the local E-Government agency in the contest [dateidea.uy](#) . LBS technology (location based service) was not being used by other applications so he decided it was a good opportunity to explore.LBS is a set of computer programme level services that provide time and location as control features for computer programmes. In short LBS technology allows to pin point the location of objects or persons making them discoverable through social networks or mobile services.

7.6.2 Issue

The Issue was to provide an easy to use application that would help users to identify key venues close to them using their mobile service using LBS technology for the first time in Montevideo.

7.6.3 Enablers

A key enabler for this service was the data provided by Montevideo City. Furthermore, not only data but actual help desk support helped Hobbins to understand better the data and deliver it. As a result Hobbins experience as a user of public data, was enhanced by actual support from the City. Today the service works on Tablets, and Android and Iphone services. The application was developed in programming language PHP and code is not yet open.

7.6.4 Impacts

Hobbins mentions that the app are still evolving in terms of public and reach. As a result of this development he has been contacted by public authorities willing to know more about the application and developed services based on this technology. Hobbins mentions that initially the application was an experiment that turned out to get attention, and allowed him to improve his abilities as a programmer and get himself acquainted with the world of open data.

7.7 Como ir

Como ir (How to go) is a service developed by Montevideo City , and has been on line since may 2012 . The project's main objective is to provide an easy guide to navigate the city using several alternatives such as public or private transport .

7.7.1 Drivers

While several cities across the world developed similar initiatives, one of the key drivers for Montevideo City was the fact that such service was not provided by any other public or private provider at the time. Engineers saw an opportunity to provide a new service for the increasing number of users of the City's website

7.7.2 Issue

The main Issue was to build a service that could be usable and accessible to everyone. The service was not developed specifically for mobile phones but it was optimized for them.

7.7.3 Enablers

In order to develop this service two enablers were essential: availability of public data, state capacity to develop the tool. Data was already free by the time the service was built, and crucially it was reliable and complete. Montevideo City also has a division in charge of developing web tools, which is able to produce and deliver the service.

7.7.4 Impacts

Impacts of the website can be easily measured by the visits it has monthly since its inception. In 40 months the website has around 2.000.000 visits, which leads to an average of 483.000 visits. In the last month visits reached a peak of 800.000.

7.8 When is the next bus?

When is the next bus is a service developed by Montevideo City to help transport users to navigate Montevideo's bus transport system

7.8.1 Drivers

There was no service providing this information for free when the service was created. Montevideo¹⁹

¹⁹There is a service provided by the company Movistar and the private concessionary of bus services Montevideo Cutcsa, which cost users 3 Uruguayan pesos to use. The service is based

7.8.2 Issue

The Issue was to create a free service for citizens to consult buses schedule in Montevideo. The service was not developed specifically for mobile phones but it was optimized for them.

7.8.3 Enablers

In order to develop this service two enablers were essential: availability of public data, state capacity to develop the tool. Data was already free by the time the service was built, and crucially it was reliable and complete. Montevideo City also has a division in charge of developing web tools.

7.8.4 Impacts

The website has an average of 12000 visit per month, which makes it the most used web service of its kind so far in Montevideo.

on public information coming from the Transport System of Montevideo. Governance about who is able to use this information, and the reasons behind one private company (Movistar) having privileged access to information from the STM are still unclear at the moment of writing this paper

7.9 Cartographic Information System -Montevimap,

Montevideo System of Cartographic Information (Montevimap) is one of the pioneers in terms of data liberation in Montevideo City's government structure. Engineers in charge of these systems has been releasing data since early 1990's about key aspect of the city.

7.9.1 Drivers

Much of the philosophy behind the system is based on local engineers coming from open source and free software movements, who embedded in a strong public service ethos, decided that this information should be public and used by everyone. When they were doing this, there was not such a thing as open data movement. The initial target audience was a specialized group of users, but with the evolution of open data this audience has been expanding to developers and other people looking for crucial information about the city.

7.9.2 Issue

The Issue was to provide as much information about the city as possible. Today the system provides users with data about:

- Land registry information (land register, empty land, waste land, gardens, tax area)
- Aerial pictures
- Sectoral division (judiciary division, postal code, administrative divisions etc)
- Land management information (Zones, Use of land, occupation factor, cooperatives location etc)
- Local services (public works, sewers repairs, offices etc)
- Local roads (directions, traffic lights, cargo roads, national routes, etc)
- Cultural and Social information (schools, business regulation, libraries, hotels, squares, occupied land plots, etc)
- Geodesic information
- Environmental information (air quality, location of special garbage bins, recycling information, etc)
- Census information (age, sex per area, etc)
- Participatory budget (public works developed through participatory budget)
- Basic cartography (streets, door numbers, divisions, public spaces, Hydrography, several layers of information)

7.9.3 Enablers

Much of the information available has been collected through several services that the Municipality has, and put together by a team of dedicated public servants. As a result previous systems in place are a key advantage. Enough resources and state capacity is also important as most of the datasets presented has also meta data that helps users to understand the meaning of the data, and other specifications.

7.9.4 Impacts

There is no easy way to measure the use of this data, but it provides services with a reliable data infrastructure to set up several applications.

7.10 Donde Reciclo?

Where can I recycle? is a initiative from the DataUy an NGO focusing on transparency and human development in Uruguay. The main aim of the website is to help people to find the closest recycle point in Montevideo City . In their own words the Issue was that

“Recyclable waste containers in Montevideo are scattered across the city and take one kind of waste each (plastic, glass, metal or batteries). For those willing to recycle, this means multiple trips and trying to memorize where each container is located. Often, youll end up walking a few blocks just to find out that you actually needed to go somewhere else.”(Data,2013)

The application was originally designed by Agustin Diaz and Agustin Kryger, supported by Gabriela Rodriguez. Communication and usability expert Daniel Carranza was in charge of improving user experience. This case is an example of building creatively on public data and Montevideo’s city work, a clear sign of the new dynamics open data brings in terms of public service provision. The application allows to identify batteries, plastic cans and glass recycling sites.

7.10.1 Drivers

Data team observed that the local council had a very basic feature allowing people to access recycling points data. Furthermore DATA has been a long time supporter of the Open Data policy developed by Montevideo’s civil servants. Up to this intitiave DATA has not been able to use any of Montevideo’s Datasets due to intense work in other initiatives. This opportunity then was ideal to probe the value open government data has for the city.

7.10.2 Issue

The Issue was to create a better service than the one already provided by the Council, allowing a better user experience and use of mobile phones.In this way the Issue became to create a better application that the one that was already available.

7.10.3 Enable

In order to develop this service two enablers were essential: availability of public data and user of open source software. The website was developed entirely with Sublime Text 2 in Ubuntu, using Git for versioning control and Heroku as a hosting platform. The team also used bower to handle the dependencies to other libraries.

7.10.4 Impact

The website received substantial media coverage and significant traffic since its inception. Yet the team decided to keep a low profile as expanding the website would demand more resources in terms of development and outreach. The Team developed a Next Steps document for the application. The document outlines new developments in terms of software but crucially in terms of outreach to possible users through social media. The team indicates that if resources are available they could scale up the project and replicate it in other cities. The application was also converted to Linux/Ubuntu by volunteers and is now part of the Ubuntu Software Center.

7.11 Por Mi Barrio,

Montevideo System of Cartographic Information (Montevimap) is one of the pioneers in terms of data liberation. The systems has been releasing data since early 1990's about key aspect of the city.

7.11.1 Drivers

Much of the philosophy behind the system is based on local engineers coming from open source and free software movements, who embedded in a strong public service ethos, decided that this information should be public and used by everyone. When they were doing this, there was not such a thing as open data movement. The initial target audience was a specialised group, but with the evolution of open data this audience has been expanding to developers and other people looking for crucial information about the city.

7.11.2 Issue

The Issue was to provide as much information about the city as possible. Up today the system provides users with data about

- Land registry information (land register, empty land, waste land, gardens, tax area)
- Aerial pictures
- Sectoral division (judiciary division, postal code, administrative divisions etc)
- Land management information (Zones, Use of land, occupation factor, cooperatives location etc)
- Local services (public works, sewers repairs, offices etc)
- Local roads (directions, traffic lights, cargo roads, national routes, etc)
- Cultural and Social information (schools, business regulation, libraries, hotels, squares, occupied land plots, etc)
- Geodesic information
- Environmental information (air quality, location of special garbage bins, recycling information, etc)
- Census information (age, sex per area, etc)
- Participatory budget (public works developed through participatory budget)
- Basic cartography (streets, door numbers, divisions, public spaces, Hydrography, several layers of information)

7.11.3 Enablers

Much of the information available has been collected through several services that the Municipality has, and put together by a team of dedicated public servants. As a result previous systems in place are a key advantage. Enough resources and state capacity is also important as most of the datasets presented has also meta data that helps users to understand the meaning of the data, and other specifications.

7.11.4 Impacts

There is no easy way to measure the use of this data, but it provides services with a reliable data infrastructure to set up several applications.

8 Appendix II: List of Workshop Participants

- Guillermo Monccechi (IMM)
- Marcos Scalone (IMM)
- Daniel Carranza (DATA Uruguay)
- Victoria Esteves (Data Uruguay)
- Marcio Vasconcellos (Avina)
- Lucia Abelenda (Avina)

9 Appendix III: Questionnaire

Guide Questions

- How did local open government data policies come into place?
- In particular what factors led these local government to adopt open government data policies?
- How OGD policies were designed?
- What kind of characteristics these policies have?
- Who are the key players in terms of designing policies?
- What kinds of governance mechanisms are in place to solve controversies?
- To which extent these policies comply with the 8 Open government Data Principles?

- What kind of information is provided?
- Which kind of platform cities use to publish raw data?
- What kind of Issues cities face to publish data?
- Which resources cities need to establish these policies?
- Who is using raw data?
- What kind of interest drives users?
- What kind of data users find more helpful?
- What kind of data would users like to see and in which terms?
- What kinds of applications are being built based on open data?
- How should impact be measured?
- What application could be built if data was available?