**Université de Montréal**

# Exploring geolocation governance perspectives through the study of appropriation and collective action

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# Résumé

Ce mémoire de maîtrise a été rédigé dans l'objectif d'explorer une inégalité. Une inégalité dans les pratiques liées à la saisie et l'exploitation des données utilisateur dans la sphère des technologies et services Web, plus particulièrement dans la sphère des GIS (*Geographic Information Systems*). En 2014, de nombreuses entreprises exploitent les données de leurs utilisateurs afin d'améliorer leurs services ou générer du revenu publicitaire. Du côté de la sphère publique et gouvernementale, ce changement n'a pas été effectué. Ainsi, les gouvernements fédéraux et municipaux sont démunis de données qui permettraient d'améliorer les infrastructures et services publics. Des villes à travers le monde essayent d'améliorer leurs services et de devenir « intelligentes » mais sont dépourvues de ressources et de savoir faire pour assurer une transition respectueuse de la vie privée et des souhaits des citadins. Comment une ville peut-elle créer des jeux de données géo-référencés sans enfreindre les droits des citadins ? Dans l'objectif de répondre à ces interrogations, nous avons réalisé une étude comparative entre l'utilisation d'OpenStreetMap (OSM) et de Google Maps (GM). Grâce à une série d'entretiens avec des utilisateurs de GM et d'OSM, nous avons pu comprendre les significations et les valeurs d'usages de ces deux plateformes. Une analyse mobilisant les concepts de l'appropriation, de l'action collective et des perspectives critiques variées nous a permis d'analyser nos données d'entretiens pour comprendre les enjeux et problèmes derrière l'utilisation de technologies de géolocalisation, ainsi que ceux liés à la contribution des utilisateurs à ces GIS. Suite à cette analyse, la compréhension de la contribution et de l'utilisation de ces services a été recontextualisée pour explorer les moyens potentiels que les villes ont d'utiliser les technologies de géolocalisation afin d'améliorer leurs infrastructures publiques en respectant leurs citoyens.

**Mots clés**: GIS, *Geographic Information System*, gouvernance, OpenStreetMaps, Google Maps, appropriation, action collective, geolocalisation, ville intelligente, Montréal.

# Abstract

This master's thesis was started to explore an inequality. An inequality in the way users of mobile web services hand over data, and an inequality in the way this data are exploited. As it becomes commonplace for web companies to exploit their users' data to improve their services or generate advertising revenue, the public domain is left in the dark, with little data to work with to improve public services. Notably, as cities are increasingly striving to become 'smart', a lack of data and ethical ways in which to exploit what little data exists is becoming increasingly problematic. How can a city create georeferenced data to improve its infrastructures? How can this data be exploited whilst respecting citizens' privacy and security? Through a comparative study of the use of OpenStreetMap (OSM), an open-source mapping platform, and Google Maps, we have aimed to understand possible future uses of GPS technologies by government bodies. Through a series of interviews with OSM and Google Maps users, we have apprehended why users choose to use and contribute to a platform, and not to another. Using the concepts of appropriation and collective action, as well as critical perspectives from the study of immaterial capitalism, this data was then analyzed. This enabled us to understand the underlying issues behind use and contribution practices in the GIS sector. This understanding was then recontextualized in order to understand what government bodies could do to create ethical smart cities that take into consideration the preferences and concerns of the citizens these cities are increasingly designed to serve.



**Keywords**: GIS, Geographic Information System, governance, OpenStreetMaps, Google Maps, appropriation, collective action, geolocalisation, Montreal, smart city.

## Table of Contents

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# Chapter 1: Research questions

## 1) Context

This research project begins at a time where data is more prevalent than ever before. Through the highly documented personal computing and now mobile computing revolutions, data sets express with ever increasing precision information relative to individuals' purchases, incomes, healthcare statuses, socioeconomic and demographic groupings, location histories and communication records (amongst others). Wigan and Clarke (2013) state: "In less than a decade, the explosion in smartphone usage has resulted in almost the entire population in many countries having been recruited as unpaid, high-volume suppliers of highly detailed data about their locations and activities. This data is highly personal even before it's combined with loyalty card data, marketers' various sources of consumer data, and the locations and activities of other people" (Wigan & Clarke, 2013, p. 35).

This research project will focus on a certain segment of new information technologies, which spawns and exploits one data type: geolocation data (or simply, location data). The data that is stored in GPS data sets enables us to determine the time and date (a timestamp) at which the device communicated with the GPS service, the latitude and longitude of the device and thus its speed. The data also contains a tracker ID, which is a unique identifier given to each GPS device in a data set. This is essential, as without the Tracker ID it would not be possible to follow one device's path through space and time. This is also what causes the most issues from a privacy and data protection standpoint. Tracker IDs can be anonymized but will always remain pertinent to one device and thus to an owner.

Why have we chosen to study this form of data? Firstly, because it is an accessible data type, more so than certain other forms (for example banking or healthcare data is difficult

to access). Secondly, because this data is pertinent to everybody as the exploitation of this data can have implications for whole groups and populations. Geolocation data is also becoming more and more important and prevalent, defining the way users and citizens interact with the physical world around them**.**

Thirdly, because the research project will explore the implications of several forms of social and urban engineering that use location data sets as a starting point for infrastructure improvement and creation (i.e. smart cities). As individuals become more mobile, it becomes increasingly important to know where we are and where we are going.

The promise that new technology will lead to a better life for all is ubiquitous in today's media and in the collective unconscious, especially in the field of new telecommunications and information technologies. Websites, web services and applications are all bringing us closer together, as if we'd somehow drifted apart, and making us all more effective and efficient in our day to day lives. Many of these products rely on GPS geolocation data for contextualising interactions, and for the distribution of targeted advertisements. The owners of these services thus create and own the vast majority of location data sets that exist today. Products like *Google Maps*, *Foursquare*, *Facebook* and *Yelp* amongst others are heavily reliant on location data and in turn exploit and monetise these data sets which are provided to them free of (monetary) cost by the users of the applications and web services, who in return are granted access to the services (mostly) free of monetary charge.

Despite the existence of many data regulation advocacy groups, who fight for more data transparency, privacy as well as more user control over data (i.e. the EFF), users in North America continue to provide constant streams of geolocation data to private Internet service companies. However, recent scandals in the United States and throughout the world have revealed that citizens are more concerned about data collection when public institutions (i.e.: NSA, GCHQ) can gain access or ownership over data sets created by services owned by private corporations (Aamoth, 2013).

Along with the media, certain scholars are also painting a darker picture of the exploitation of big data for public governance. This pessimistic view of private enterprise and government exploitation of data has existed since the turn of the millennium: *"Les autoroutes électroniques, en facilitant la collecte d'informations sur les individus, aggravent les risques de fichage et de manipulation*" (Vitalis, 1998). Throughout his book *The Net Delusion: The Dark Side of Internet Freedom,* Evgeny Morozov (2012) describes the dangers of Internet-led government oppression as a larger percentage of citizens' communications are routed through the web, and are thus digitised, making information extremely easy to access and analyse.

This divergence between users' reactions to private and public ownership and exploitation of data sets brings forward the issue of data trust and data ownership. Who do users trust to store and exploit data relative to their location? Why?

Today, data is collected by government agencies in two ways: directly, via the creation of digital infrastructure (i.e.: countries with public welfare and health insurance systems) or by the mining (legally or illegally, secretly or publicly) of privately created data. For example, the latter method is the system that has been highly criticised since Edward Snowden's leaks concerning PRISM on the 20th of May 2012**.**

This demonstrates the increasing need for data to improve governance. This mirrors, albeit at a later date, the revolution seen throughout the business world in between 1995 and 2010 during which companies begun amassing and analysing data (or "big data" as it is now often known) in order to take more effective decisions and maximise efficiency and profits (The Economist, 2010).

What of positive, efficient and transparent data driven public governance? How can public governance be improved by harnessing the power of data? Can data sets be turned into positive, tangible results for the average citizen? Toussaint puts his finger on the issue in an accurate manner, and explains that there is a "*tension entre des aspirations à une certaine modernité et les craintes qu'elle suscite*" (Toussaint quoted in Millerand,

1999, p. 131). Governments must innovate and put data to use, but there are many obstacles, such as privacy, data security and achieving transparency in data related practices.

This brings us to the current forms of exploitation of geolocation data by public institutions and bodies. Several cities around the world are starting to launch networked, sensor-heavy city development projects in the aim of creating what are now known as smart cities. Examples around the world of these projects already show us that a wide array of possible projects exists, and that mixtures of private, public and citizen-based initiatives are possible. The technical knowledge required to launch these projects has been available for years (the first mobile based geolocation reliant services started becoming broadly used in 2007 with the arrival of the first iPhone). However, these projects, which create and depend on big data generation and exploitation, may run into ethical and regulatory issues when data sets are misused or misappropriated.

Instances of public data being released, or made open, exist. Researchers from The Transparency Policy Project at Harvard University are researching the impacts of rendering certain public data sets open to all - for example, making bus transit information accessible to all in a machine-understandable format (Hemerly, 2013)**.** This has been shown by Tang and Thakuriah (2011) to have increased public transport usage in Chicago, where real-time bus tracking data has been made public via the release of a developer friendly Application Programming Interface (or API) (Tang & Thakuriah, 2011). However, this example of accessible public data sets contains information pertaining to government run services (in this case, transit systems) and not information pertaining to citizens' transit times and locations within the city. Thus, the project is not confronted with the same order of difficulties from a privacy and data security standpoint. It does however show us that the intersection of public governance and technology can yield positive, tangible results.

Carlo Ratti and his colleagues at SenseAble lab at the Massachusetts Institute of Technology have explored the possibilities of making cities smarter throughout a series

of projects run in conjunction with telecommunications groups as well as local government bodies. In some of their work, data sets include information relating to individuals and not only to government services. For example, a project run in conjunction with the city of Rome and Telecom Italia showed that location data harvested from GSM data sets (location of a user during a phone call) were able to create maps that showed how romans moved around in their home city (Ratti & *al*, 2010). The strength of this project, at a time where data security and privacy is such an issue, is its non-invasiveness and respect of anonymity. GSM data is easily rendered anonymous and data pertinent to large swathes of phone users are confused and mixed during analysis. However, this means the data sets treated and analysed are not as accurate and rich as those that might be acquired by mining GPS location data sets, for example. The study underlines the need to find a balance between privacy and data security and richness and usability of data sets if we want to see truly *smart cities* emerge (*ibid*).

We are thus arriving at an interesting crossroads where governments and local public authorities are becoming increasingly interested in the creation and exploitation of data relative to citizens' needs, tastes, and locations. However, users are more accustomed and comfortable with using services and applications developed by private companies, although the fear of often secret government exploitation of private data sets is now more present than ever in the public arena after the scandals linked to Edward Snowden's leaks (Doug Aamoth for Time, 2013). This increased government interest in data has created a number of economic, ethical, and governance issues, some of which this research project will aim to explore.

## 2) Research questions

### 2.1 Services and data

Throughout this research project, we have understood and analysed the individual, group and political dynamics that characterise the relationship between a citizen-participant-user and his geolocation service of choice. This understanding was then mobilised in

order to explore current and future use cases of GPS data by corporations, non-profits and government bodies.

We have chosen to study the use and possible uses of GPS technology for several reasons. Firstly, it is the one of the richest forms of geolocation as it offers highly precise geolocation of devices compared to GSM geolocation or WiFi geolocation. GPS is also a highly invasive technology, meaning that GPS geolocation data can't be quickly and secretly acquired from large groups of individuals (unlike GSM geolocation data for example). This means that issues arising from the balance between invasiveness and quality of data arise quickly, enabling us to rapidly identify issues to analyse during the project. We have also chosen to study the use of this type of technology as the quantity of GPS-enabled devices, and as a result, GPS data, is growing rapidly (and has already attained a large quantity) as more and more North Americans (inclusive of Montreal residents) are equipped with smartphones and tablets, the majority of can connect to GPS satellites (ComScore, 2012).

### 2.1.1 Google Maps

In order to understand the dynamics relative to the use of GPS technology, we have chosen to study Google Maps (GM). GM is an application that can supply a user with maps of cities, roads, public transport lines, satellite imagery, etc. It also has a geolocation component, whereby a user can be located on the maps by via GSM, WiFi, or Global Positioning System (GPS) coordinates. Let us examine an example using GPS technology, which provides the user, and Google in turn, with much more detailed information.

As the user opens the application, Google's servers respond by sending maps covering the general area in which the user finds himself (this data is obtained by previous usage of the application, or other data like GSM location data). If the user has enabled GPS on his device, it will activate itself and wait to be located by a GPS satellite. Once the device has been located, the satellite will communicate with a Google server and push new maps

(including a geolocation visualisation) to the user's device. This process repeats itself constantly as the user moves around in his environment. It is important to note that a GPS trace system is activated by default on most smartphones used today – meaning that the Google Maps service will ping a device for its GPS coordinates at a regular interval in order to determine the speed and the direction in which the device is moving. This enables the Navigation and Directions components of the Google Maps mobile service to make predictions of transit times based on traffic density. This will be one of the main functionalities discussed during interviews, as it is what enables the creation of real time predictions of transit, as well as the creation of data bases through the aggregation of real time data which, when analysed, can prove highly valuable in city planning and infrastructure development.

Geolocation services such as Google Maps provide benefits to two parties: the users, who are able to navigate space in a more efficient manner, and Google, who monetises the service through data collection and geo-localised advertising strategies. The usage (navigation) and the data sets created by the service (traffic patterns and such), however, do not benefit public institutions (municipal, local or federal bodies).

### 2.1.2 OpenStreetMap

In our effort to understand the way users interact with GIS services, we have chosen to also study the way citizens use and contribute to OpenStreetMap, a collaborative, open source and open data mapping service. OSM is a non-profit organization that accepts user contributors of georeferenced data. Much like Wikipedia or similar projects, users are free to exploit all of OSM's data freely, which includes being able to download it for offline access, and to create other services and systems which exploit OSM's database. The OpenStreetMap Foundation is the organization's governing body, but local communities form a large part of the governance of the project, deciding on priorities and engagements for work that needs to be done at a local level.

Services that exploit OSM's data are extremely varied. For example, some services will aim to map social services in different neighborhoods to promote awareness of urban

inequality while others will create maps and services dedicated exclusively to cyclists, etc. OSM is a database that can be sifted and filtered as much as the technical knowledge of the user permits. There is also a feature in OSM that enables users to upload GPS traces. This is mostly done with the aim of improving roads or cycling paths.

OSM is inherently open in all aspects of the term; meaning that anyone is free to exploit its data as long as they agree to certain licensing rules put forth in the data licensing section which are based around the Creative Commons. This means that government agencies, as well as individuals and private companies, are free to use OSM as they please.

## 2.2 Maps as Social Objects

Academics have closely followed the rise of web-based cartography since the launches of two of the biggest services, OSM and Google Maps in 2004 and 2005 respectively. A large amount of work has been published about these two platforms. The main objective of many of these papers is to understand the technical specifications of Web-based mapping platforms (Plantin, 2014) as well as their social and political ramifications (Plantin, 2014, Lin, 2011, Denis & Pontille, 2013).

Plantin, in his book *La cartographie numérique* (2014) aims to understand the key characteristics of both OSM and GM by comparing the two services. For Plantin, maps are technical objects that cannot be separated from their social contexts and origins. He asserts that the goal behind the creation of Google's GIS correspond with Google's broader strategy – that is to create, own and understand as much data as possible (Plantin 2014). Plantin draws parallels between Maps and Search, explaining that Maps is simply another way for Google to index and serve information to its users (Plantin, 2014). For Plantin, OSM, as a socio-technical object, is different to GM, as it exists for a different purpose. According to the author, OSM was created and exists simply to create both a community of users and the largest possible database of georeferenced data. Plantin concludes his in-depth analysis of digital cartography by rehashing the principal

difference between this new form of cartography and classical cartography: the ability to combine or "mashup" maps (Plantin, 2014). The author explains that both Google's platform and OSM provide users with the ability to combine maps with other forms of data of their choosing. Plantin gives the example of a map created to show radiation levels after the Fukushima nuclear accident, which combines classical topographical map imagery with local radiation readings provided by a multitude of sources – this kind of mashup is possible within both OSM and GM. For Plantin, the main differences between OSM and GM thus rest in the original objective each service (commercial for GM and non-commercial for OSM) as well as the way each of the platforms are able to integrate new sources of data (Plantin 2014).

In their paper, Jérôme Denis and David Pontille also aim to understand OSM as a platform and differentiate it from other Web based GIS services (Denis & Pontille, 2013). The authors study the technical characteristics of the platform, but also the way that contributors act collectively and the ramifications of these collective actions. To these authors, the way that decisions are taken and implemented in OSM represent a clear-cut example of new forms of democracy that have been made possible by Web based collaborative projects (Denis & Pontille, 2013). They explain that OSM has taken the process of elaborating maps from a handful of experts and put it within the hands of a much larger group of amateurs collaborating through mailing lists and meritocratic systems (Denis & Pontille, 2013). The authors argue that this change, coupled with the systems OSM contributors use to collaborate (mailing lists) is making the process of map-creation much more transparent than it was before the advent of Web cartography. As the authors acknowledge that maps are made with a particular point-of-view or interest in mind, they put forth that platforms like OSM are redistributing the power behind map-making to a wider group of people (Denis & Pontille, 2013). Lin (2011) agrees with this posture, stating that "More importantly, by making all sources and changes of information available on the Wiki, it transparentises the map-making processes (in terms of techniques, data, content and members), and thereby opens up a bright new field that demonstrates alternative models of map creation and use" (Lin, 2011 p. 56).

The idea that mappers cannot make maps free of interpretation or personalisation courses through the study. Denis & Pontille argue that the work of an OSM mapper does not simply involve the transcription of real-world objects into a digital database, but involves a much deeper thought process about how to categorise roads, paths, intersections, etc. Lin states a similar opinion, explaining "[Maps] are the representations of the visions, the perspectives, the expectations, the cultures, the knowledges, the understandings, the epistemologies of the eras and of the makers when they were produced. As such, map-making has been considered as a highly political, cultural and socio-technical process" (Lin, 2011, p. 56). She also explains why maps can be seen as social, in the classical sense of the term: "mappers engage themselves with a variety of different tools that motivate them to share their knowledge and experiences with other mappers […] It is certainly emotional" (Lin, 2011, p. 61).

This continuation of this idea leads David & Pontille (2013) to the conclusion that Web based cartography is an interpretative activity, and is in fact an example of citizens appropriating the city space and participating in a technology-enabled democratic process (Denis & Pontille, 2013).

## 2.3 Research Questions

We have chosen to study these two GIS platforms, as it appears, intuitively, that they are very different. Namely, we believe that our research will reveal a fundamental difference in the way individuals and groups make use and contribute to these two different services. This comparative exploration will be used to envisage the way that the public sector could become involved in the GIS arena in the future.

### 2.3.1 Understanding users and contributors

At the heart of our exploration of these two platforms will be a study of the way individual users contribute and make use of each of the services chosen. This will enable

us to understand the dynamics between users and GPS platforms, namely when it comes to the exploitation of users' data. As we are comparing a service run by a for-profit web giant to an alternative service run by a community of enthusiasts, we believe our comparative analysis of these two platforms will rapidly lead us to critical applications of our chosen framework (to be detailed in the next section of this memoire). Notably, we believe this contrast will be very visible in the explanations of why users decide to spend time contributing to OSM – as it is not a for-profit project, we project that motivations will be of an ideological or ethical order. Users and contributors to non-profit, open-source projects are often driven by ideology as there is no payment or reward given for time spent contributing. How do users envisage their rapport with their service of choice? As a commercial transaction? A partnership? Why have they chosen this particular service in a crowded market of GIS services? How and why do users choose to contribute to their GIS of choice? What is motivating this decision? What incites users to not become involved with a certain GIS? As it is explained in Chapter 2 (Theoretical Framework), an understanding of the individual motivations and feelings of users and contributors will inform the subsequent study of the way collective action shapes each of the platforms chosen.

### 2.3.2 User groups

GIS services are networked technology enabling communication between users and between users and the service provider. Understanding individual users' motivations to use and contribute to a GIS is at the core of this project, but we must also understand the group dynamics behind contribution and use – as users are not isolated from one another in their use of modern, networked GIS technology.

When taking a first look at Google Maps and OSM it seems probable that the group dynamics that underpin contribution and use practices in each service are quite different from one another. This is apparent for two reasons. Firstly, the two services have a very different relationship with their users. Google Maps is a service offered by a large company, whereas OSM is a community built project with non-other than the community at the project's helm. The way individuals interact with their GIS is going to have a

bearing over the way individuals interact with each other, which leads us to believe that collective action works differently in OSM than it does in GM. Another differentiating factor here is the number and organization of users. Google Maps is the dominant mapping platform in the world today, whereas OSM is still a very alternative service with a fraction of the users. The fact that there are fewer users and that OSM is a community-run project indicates that there will more than likely be a stronger bond between OSM's user-contributors than GM's user-contributors. How do users communicate, if so? How is group action coordinated when it is required? What kinds of links exist between users, and what do they entail?

### 2.3.3 Critical perspectives

Asking questions about individual's motivations to use and contribute to either OSM or GM will enable us to compare the two services and their relationships with their users. Understanding the way both user groups behave in order to use and contribute to OSM or GM will enable us to characterize the way group interactions function within each service. The conclusions we will be able to draw from this set of questions, combined with a comprehensive set of critical analysis tools will then enable us to ask questions and understand the ideological and political realities that are spawned by each of the GISs we have chosen to study. How is value created in each of the systems studied? Who does it then belong to? Are users being exploited by their GISs? Are they being protected and taken care of when it comes to privacy and security?

As it seems apparent that the public sector is going to become more and more involved in web and mobile technologies, in the final parts of this memoire, we will utilize our research data and theoretical framework to aim to answer questions relative to the use of GIS technologies by public entities. By reviewing the answers to the research questions relative to individual use, group action and our critical perspectives, we will aim to understand the way that different modalities of use and contribution could be replicated by government agencies interested in exploiting these promising technologies. This will leave us with a rough guide of ways to reach citizens and implicate them in smart city projects without causing political or ethical issues.

# Chapter 2: Theoretical framework

The concepts and objects explored throughout this research project can be understood and exploited in many different ways. Key terms and concepts will be defined in the following pages.

## 1) A *sociologie des usages* and appropriation approach

Throughout this project we will aim to study users' relationships with geolocation services throughout this project. A user will be defined as someone who actively uses a geolocation service as we have defined it: using the maps supplied by the service, as well as the GPS location service. Whilst this project will be user-focused, one of the main interests of the research will be the presence of the user in data sets (whether it be GM's or OSM's data), as we will be examining the relationship between user data and governance. A user is thus defined as someone making full use of one or both of the geolocation services that will be studied, which entails that they are present in the data sets of the geolocation service providers.

We will employ methods and theories taken from *sociologie des usages*, a school of sociologie dedicated to understanding "*l'utilisation d'un objet, naturel ou symbolique, à des fins particulières"* (Robert de Sociologie, 1999 dans Proulx, 2005, p. 3) in order to explore cultural and political significations of the everyday use of objects. We will complement this theoretical approach with the concepts of digital citizenry, group action, and non-material labour.

In particular, we will employ theories centred around the concept of appropriation. Appropriation conceptions and theory focus on the point where innovations become social objects. The innovation and adoption processes are left aside and the focus of this school of thought is on the individualisation and collectivisation of usages of technologies. The usage of a particular technology is part of a larger life style constructed by the user (Millerand, 1999). This approach enables us to understand our main point of

interest: usage significations and values (as seen from the user's perspective): "*L'insertion sociale d'une NTIC, son intérgration à la quotidienneté des usagers, dépendaient moins de ses qualités techniques "intrinsèques", de ses performances et de sa sophistication, que des significations d'usage projetées et construites par les usagers sur le dispositif technique qui leur était proposé"* (Mallein et Toussaint, 1994 p. 318). This approach has been selected as it will enable us to understand the social projections that users create around objects and services, in order to answer our research questions. As we are aiming to explore the user perceived differences between private and public data ownership relative to GPS GL services, we will be focusing particularly on the *significations d'usages* and *valeurs d'usages* (or use values and significations) which will enable us to understand the motivations and reasons behind the use of geolocation services and products, and the potential use or intervention of a public body in this sphere.

Millerand states whilst analysing Vedel that there is a "*difficulté de représenter "les" usagers de façon institutionnelle (si l'on peut dire), qui constituent un groupe disparate, virtuel et qui parvient rarement à s'organiser en association politique*" (Millerand, 1999, p. 15). The appropriation approach will enable us to seize the use values and significations of users of geolocation services in Montreal in order to give this (even if disparate) group a voice regarding the issues of creation, ownership and exploitation of geolocation data sets.

Users will also be considered in their direct relationship with the service or application they are using. Serge Proulx *et al* (2011) bring up the concept of participatory culture that has been a large part of change brought on by the arrival of the *Web 2.0.*. The concept of participatory culture evolves throughout his reflexion, and Proulx arrives at the concept of "produsers" – initially put forth by Bruns in *Blogs, Wikipedia, Second Life, and Beyond: From Production to Produsage* (2008). Produsers are individuals who are simultaneously using a service, whilst contributing (or producing) it (Bruns, 2008). Proulx argues that these systems imagine "Users as simultaneously consumer and producer, with the important nuance that the content producer in *Facebook* is not in a position to control its distribution" (Proulx *et al*, 2011, p. 24). These produsers are

described as being the "invisible labor force supporting the new informational capitalism system" (Proulx *et al.* 2011, p. 9), and Proulx describes their work, or contribution, as being "simultaneously (possibly) alienating and (possibly) emancipatory) (Proulx *et al,* 2011, p. 10). Throughout the paper, Proulx describes the business model of large web companies: "The giants of the Internet industry are building their industrial and commercial empires through the aggregation of data supplied voluntarily and freely by Internet users" (Proulx *et al* 2011, p. 10).

As we can see, exploring use significations and the mechanisms of appropriation can lead us to a critical approach of the way new technologies are adopted, used and appropriated. The mobilisation of this subset of theories and concepts leads us from the individual motivations to the way a technology, in our case, GIS service, is appropriated in a social context.

## 2) Groups and collective action

The mobilization of concepts and theories laid out in the previous part of our theoretical framework enabled us to understand our interviewees' motivations for use and contribution to their chosen GIS. These theories also enabled us to place these individual motivations in their social context by mobilizing the concept of appropriation – enabling us to explore the point at which an individual usage of a service becomes a social construct.

We will now aim to explain a group of theories that will enable us to characterise and understand the way that collective action takes place – whether it is collective use or contribution to a GIS.

Throughout the twentieth century, a somewhat disparate group of authors has aimed to describe the economic order and the way it transforms society through the study of regulations and conventions. In essence, these scholars are aiming to understand how regulation and convention underpin all social relations between people and enable

individuals to act collectively even though the motivations of others, as well as the objective of a collective action remain uncertain (Dupuy & *Al*., 1989). Through these questions they are able to discover the existence of conventions and objects that enable collective action to continue despite participating individuals being plagued by uncertainty (Dupuy & *Al*., 1989). A critical undercurrent is present within this school of thought, as many of the authors are critical thinkers (Boltanksi and Thévenot's 1991 book, *De la Justification. Les economies de la grandeur* can be seen as a continuation of these ideas). This critical thought is visible in the way that conventions are defined and explored throughout the work created by this group of authors, as conventions – which define economic and social relations – are shown to be purely constructs of a particular place and time in history. This leads us to a place where we are able to use the concepts of convention and the objects on which they rely in a critical perspective.

Pierre Livet's work is firmly set within this research tradition, and we will mainly exploit concepts put forth in his book: *la communauté virtuelle: action et communication* written in 1994. In this book, Livet aims to understand what composes a group, and how collective actions are constructed in the social space through the use of different types of objects and the reliance on convention. He aims to establish a typology of different forms of collective action in order to create a model for understanding groups and the way individuals can act together. Livet's writings will enable us to understand the difference in the way groups are composed and collective actions are taken in the two user communities we have chosen to study.

### 2.1 Groups and collectives: virtual creations upheld by conventions

As the title of Livet's book indicates, one of the main points he puts forth is that all groups, or collectives, are virtual. Predating the creation of what is often named virtual communities today (players of an online game, users of a certain specialized forum, etc.) Livet understands the virtual in the classical philosophical sense first defined by Aristotle – virtuality is the potentiality of existence. He explains that when several individuals are working alone, yet in the aim of reaching a common goal, the collective aspect of the collective action they are striving to achieve is virtual. This can be explained by the fact

that in essence, individuals are still only striving to achieve their own goals – which happen to be shared by others. The collectivity only ever exists virtually, as not all the individuals are necessarily working together at the same time or place, and that the collectivity they believe themselves to be participating in exists only within their own minds. Livet explains an example that Hume discusses in his work: there are several rowers in boat, who are trying to row synchronously to make the boat advance in an efficient manner towards a decided point. They try to start rowing in time by adjusting their individual actions in accordance with a perceived collective action (the advancement of the boat caused by the actions of all the rowers aboard). Livet argues that the collective, which is invariably used by all the rowers to modify their rowing speed, is virtual: "*Ce collectif est lui aussi virtuel. Il est donc hypothétique, il ne se manifeste que dans les interactions locales qui sont ses effets. Les individus ne visent pas la réalisation du collectif lui-même, ils le prennent simplement comme repère hypothétique pour réviser leurs actions. Mais ils lui confèrent bien ainsi indirectement cette réalité virtuelle*" (Livet, 1994, p. 224). Rowers admit that they are participating in a collective action (rowing in a boat with others) and thus use this created collectivity to adjust their own individual actions.

But what is the precise occurrence used by individuals to synchronize their actions with the virtual collective in the example of the rowers? Livet explains that collective action relies on conventions between individuals. Livet goes on to define conventions: "*Les conventions sont des discontinuités immanentes à des actions collectives*" (Livet, 1994, p. 235). Livet goes on to explain that discontinuities can take on several forms. In the example of the rower, a discontinuity that enables rowers to begin rowing synchronously could be the point at which one rower begins marking his strokes with extra gusto, enabling other rowers to find the same rhythm. It could also be an individual who begins to chant a rhythm for the rowers to follow.

These two examples of discontinuities are also put into categories by Livet, who defines implicit and explicit conventions as the two types of convention necessary to collective action. The rowers who by chance begin rowing in sync after one rower begins marking

his rhythm more strongly exemplify implicit convention. Contrarily to implicit conventions, explicit conventions require a particular action, or *geste* – exemplified by the rower who chants a rhythm for the other rowers to follow. To create this distinction, Livet differentiates gesture and movement. A gesture is an action that is indicative but does not in itself create a discontinuity in the collective environment: pointing without touching, shrugging without lifting any weight with one's shoulders are examples of gestures. They exist only to demonstrate intention and communication. Movements, on the contrary, have an effect on the environment, directly creating a discontinuity – which can also be perceived as a sign of communication by other individuals. For example, marking one's rhythm with emphasis whilst rowing is a movement, as it has an effect on the environment (it pushes the boat forwards) but also serves as an implicit convention (other individuals can interpret this emphasis as an action aimed at forwarding the collective intention, to row efficiently and synchronously).

Livet goes on to explain the role of these gestures. He explains that collective action cannot be envisaged with certainty - it is impossible to know exactly what will happen ahead of time when dealing with collective action. For example, he explains that the conductor of an orchestra is not able to know exactly how a piece will go every time it is performed. From this observation, Livet theorizes that collective action must be built around un-decidability, and not a sense of certainty. All that gestures and conventions can do is prolong the un-decidability, as they are a concrete, decidable signal of un-decidable future collective action (Livet, 1994). This prolonged un-decidability enables collective action to continue, in turn making the objectives of these actions attainable. For Livet, language is the strongest form of convention, enabling un-decidability to be prolonged longer than other forms of explicit and implicit convention.

## 2.2 A typology of collective action

With discontinuity and convention defined, Livet goes on to explain different types of collective action that are possible. The author also details different types of objects that are used in the types of collective action detailed. This typology will enable us to

characterize and analyze our different user groups and the way they take collective action.

### 2.2.1 Common action

Livet begins by defining *action commune,* which we will call common action. He gives three main characteristics that define common action. Firstly, it does not require a common objective between individuals, only non-conflicting objectives from each participant. This means that two individuals can engage in concerted action even if they do not share the same objective – however, actions undertaken by individuals cannot hinder other individuals partaking in the same common action (Livet, 1994). Secondly, individuals must attempt to correct errors together. An example of this is given by Livet, who describes two pianists playing together: one is playing faster than the other, and in order to correct the slowness of the second pianist, slows down, enabling the second pianist to catch up and the error to be corrected. Livet adds a third characteristic to common action. He explains that the individuals must have defined the same limits for the action that is being undertaken, and if the limits of the action are to be revised by an individual, other individuals must accept them or the revision must be abandoned in order to continue the common action. For example, if the piano duet is normally played *lento*, the pianists will both think that the common action, the playing of the duet, must take place at *lento* speed. However, if one of the pianists decides to accelerate the pace to *adagio*, thus redefining the limits of the common action, the other pianist must accept the revision, thus continuing the duet at *adagio* speed, or the first pianist who has instigated the change must slow down and continue playing *lento* in order to continue the common action.

Livet explains that the intentions of common action are born within each individual attempting to participate in a common action: "*nous nous imaginons que ce que nous visons est ce résultat collectif, et donc que nous avons une intention proprement collective. En fait l'intention collective est autre que l'intention individuelle en ce qu'elle fait référence à une situation collective, un effet collectif virtuel*" (Livet, 1994, p. 253).

This means that individuals are in fact constructing their own intentions based on what they believe is a collective intention (which is virtual and only exists as a potentiality).

In common action, individuals rely on what Livet calls personalized objects. As he sees the root of common action within individual action (common action being the sum of interwoven individual actions), Livet explains that objects used in common action are in fact personalized by individuals. For example, the author explains that a particular tool in a workshop will have been used and worn in a particular way by its frequent user or owner. This means to use the tool in the most efficient way, another individual must adopt the main user's technique – as the tool has been marked through its use. Livet takes the notion a step further into the collective, explaining that a workshop will also be organized depending on the manner that its artisans work. Another team of similar artisans might need to reorganize the space in order to use it efficiently. This means that objects can be personalized by both common action (at its root, an individual action) or by a more straightforward individual action.

### 2.2.2 Crowd Actions

Having defined common action, the most graspable and basic form of collective action, Livet goes on to define what he calls *"l'action à plusieurs"* – which we will translate as crowd actions. He begins his definition of this type of action by stating: "*Pas toute action collective est une action commune*" (Livet, 1994, p. 253). What is to be understood here is that, although broad, the definition of common action does not entirely encapsulate all collective actions. He explains here that the collective action can be merely an aggregation of individual actions – there are fewer ties between actors in crowd action than in common action. Livet goes on to propose two main points to differentiate common action and crowd action. Firstly, there is no collective error correction in crowd action in the same way that there is in common action (the pianist who slows down to enable his partner to catch up, for example). Secondly, revision of one's actions is impossible in crowd action. Livet gives the example of a busy day during which many families are leaving on holidays from the same densely populated urban area. Even though actors will consider the crowd during their decision making (for example: if we

leave early we'll be stuck in traffic for less time), there is no collective error correction taking place: it is impossible to coordinate with one's neighbors and fellow urbanites to determine a perfect time of departure for all those involved. Once departed, an actor can only modify his own action by changing route or stopping – there can be no intervention of other actors in his error correction. However, Livet admits that there are often common actions taking place within crowd actions; for example, letting a fellow driver change lanes is a form of collective error correction which could happen during a mass departure on a holiday weekend. However this happens at a smaller, inter-individual scale. Livet explains the relationship between common and crowd action: "*Ainsi nous n'indiquerons pas aux autres automobilistes l'existence d'un chemin qui évite l'embouteillage. On peut en conclure que l'action à plusieurs, quand elle s'installe, prend le pas sur les actions en commun locales, mais qu'on revient à l'action commune lorsque localement l'action à plusieurs a conduit à des impasses*" (Livet, 1994, p. 255). This example is particularly relevant to this memoire, as we have explained that Google Maps does in fact utilize live user data to encourage other drivers to take les congested routes.

As he does for common action, Livet explains which kinds of objects are necessary for crowd actions. Contrarily to common action, which relies on individually or inter-individually personalized objects, crowd action relies on generic objects. Livet states that "*L'action à plusieurs tient son unité et sa clôture de cette relative permanence des modes d'utilisation des objets génériques*" (Livet, 1994, p. 269). The common (and limited) uses of generic objects are what enable crowd action to exist. Livet reuses the example of cars in traffic: all drivers use their cars in the same way, and are unable to circumvent the limits of a car (a generic object) to escape traffic, for example. However, a generic object is not necessarily a natural object. The uses of an artificial generic object (such as a car) are transported with the object, which cannot be used in another fashion – contrarily to a rock (a natural object), for example, which can be used in many different ways (as a projectile, or a construction material) depending on the situation, a car's usage is determined by its very nature and not by circumstance.

### 2.2.3 Action in unison

The final form of collective action that Livet defines is *l'action ensemble*, which we will call action in unison. Livet pushes the definition of this type of action further than for the other two, simpler types of action. After differentiating action in unison from crowd and common action, Livet goes on to explain the social and political aspects of action in unison. The author states: "*l'action ensemble devra donc se distinguer de l'action à plusieurs parce qu'elle accepte l'indécidabilité sous sa forme dynamique, et de l'action commune parce qu'elle a systématiquement recours aux conventions explicites*" (Livet, 1994, p. 258). Action in unison is thus distinguished by its acceptance of dynamic un-decidability, meaning that the collective continuously corrects actions and the limits of the action are continuously reviewed throughout the action. This is a strong differentiating factor between action in unison and crowd action, where this process does not take place. It also relies on explicit convention, distinguishing it from common action. This reliance on explicit convention has advantages and disadvantages. Livet explains that a reliance on explicit convention enables action to continue despite actors and actions being separated by both space and time. However, explicit convention is totally detached from action (chanting a rowing rhythm doesn't make the boat advance), meaning that actors must rely on un-decidability in order to pursue action in unison.

Livet continues nuancing the three types of collective action he has defined, and notably discusses the political side of action in unison, which is pertinent to our goal of analyzing politicized decision making within GIS communities. The author explains that modern democracy has favored action in unison over common action: an individual opposed to his government's actions and views of *la cite* (through his vote) is still an individual acting in unison with his fellow inhabitants, even though he is not working towards the same objective. He must, however, believe that the society he shares with his fellow citizens is a fragile collective that needs to be maintained by collective action (Livet, 1994). Livet likens this to a quasi-participation in an action in unison, explaining that: "*La quasi-participation suppose cependant que le bien collectif ne soit pas en danger, qu'il y ait plus d'actions individuelles concourant au bien collectif que nécessaire*"

(Livet, 1994, p. 261). Individuals can be part of an action in unison without providing any real help to the realization of its objectives if he defines the limits of the action in unison in the same way as his fellow actors.

What Livet continues to explain is that action in unison enables a variety of different levels of participation in collective action. Actors can be full actors, partial actors or quasi-actors (Livet, 1994). He also introduces another notion, that of the freeloader of action in unison. He states: "*Il faut en effet d'abord pouvoir définir globalement le bien collectif, et donc définir un seuil d'effort nécessaire pour l'atteindre. Ce qui est purement conventionnel, c'est la définition de la marge de manœuvre, puisqu'elle rend compte de l'indécidabilité de la coopération, et de la possibilité de "profiteurs""* (Livet, 1994, p. 263). Seeing as actors are able to participate to a varying degree in action in unison, there can be profiteers, who acknowledge the existence of a collective situation that requires work to uphold, but do not contribute as much as others – or reap more benefits from the outcomes of collective action.

As action in union depends on the constant continuation of un-decidability, it thus relies on convention. Livet names objects that are embedded with convention "*objets conventionnels"* (Livet, 1994, p. 270). These conventional objects are mainly artificial objects. Their specifications are often decided by negotiation between actors and these objects help decide the limits of the action in unison taking place. The author gives the example of paper money, which is an artificial object that has utility because of its negotiated value in any given monetary system. Whilst it may seem certain, or decidable, that a five-dollar bank note is worth five dollars, Livet explains that we can never be sure (it could be a fake, for example). Conventional objects thus serve as a tool to temporarily replace the un-decidability of certain situations, such as a purchasing of goods, with a more decidable situation. However, as we can never be sure the bill is legitimate, or that the value of the dollar might drop, the action in unison remains based on un-decidability. Conventional objects serve only to prolong the un-decidability to create a certain mirage of decidability during the action.

## 3) A critical approach

Now that we have defined the produser and understood the ways in which they act collectively, it is important to understand the relationship between the user and his geolocation platform of choice. This relationship can be effectively understood and studied through the lens of cognitive or what is also known as informational capitalism. The idea at the root of informational capitalism is that communication, knowledge and immaterial goods have taken on an important (or even primordial) role in the functioning of this modern form of capitalism. As Gollain puts it, "*la source première de la valeur économique était la force physique des travailleurs peu ou non qualifiés de l'industrie, ce sont désormais les aspects cognitifs, "immatériels" qui constituent sa source"* (Gollain, 2010, p541). Human intellectual capacities (amongst others) are no longer simply what are required to create wealth; in the sense that it is not the intelligence of the engineer that will create value on a factory floor, but it is the intelligence of the engineer that is wealth in itself: "*Les forces et les capacités humaines* […] *sont la richesse elle-même*" (Gorz dans Gollain, 2010, p. 556).

As we aim to define the relationship between users and geolocation services, it is important understanding the way the value of geolocation platforms is created by users within the scope of informational capitalism. Articles by Fuchs (2010, 2012) and Arvidsson & Colleoni (2012) will be exploited here to understand the value creation relationship between geolocation services and users' labour: "the notion that online content production can be understood as a form of "labour" […] has begun to enter into academic common sense" (Arvidsson & Colleoni, 2012, p. 135). Furthermore, in a Marxist conception, invisible data aggregation has been compared to the exploitation of a proletariat in the 'physical' capitalism that preceded the era of information capitalism in which we now live (Arvidsson & Colleoni, 2012). Taking into account this new conception of labour, how can we define the value of web services, and, more particularly, geolocation services?

As we search for an effective way to determine the value of geolocation platforms in information capitalism, we will assume that they fit into the category of "social media platforms", a category used to regroup many services of varying nature by Fuchs (2010, 2012), Arvidsson & Colleoni (2012). Without giving a strict definition, it seems that the defining element of these platforms is the element of user contribution. Google Maps relies on, through it's GPS traces component, a form of (even if passive) user participation. The user participation in OSM is more explicit, with users actively contributing to creating and maintaining maps of their areas (this is also possible to a certain lesser extent in Google Maps). This enables us to consider OSM and GM as social media platforms (SMPs) as we set forth to explore the concepts described by these authors.

Fuchs (2010, 2012) and Arvidsson & Colleoni (2012) differ in the way they aim to define value in web services. Arvidsson & Colleoni make a more marked departure from traditional Marxism, as pointed out rather vehemently by Fuchs (2012). Most importantly, they discount the importance of labour time, central to defining value in Marxism. To Arvidsson & Colleoni, value is a "relation between financial value and affective investments, rather than simply departing from a, however modified, notion of labour time" (Arvidsson & Colleoni, 2012, p. 135). The authors argue that the notion of audience commodity[1] is no longer valid in web services in the same way it is valid in the calculation of the value of television or radio channels and programs. They deem the current web media scape to be too fractured for the concept of the audience commodity (which is heavily related to time spent using a service, or "labour") to be effective. Arvidsson and Colleoni put forth a value system, deemed too subjective and imprecise by Fuchs (2012), based on affect and attachment to brands: "value is ever more related to the ability to create and reaffirm affective bonds, like the ties that bind consumers into a community of interest or "tribe", or the link structure that underpins the network

[1] Having X amount of users using a product for Y hours and selling advertisements based on the values of X and Y

centrality of valuable influencers" (Cova *et al*, 2007, cited in Arvidsson & Colleoni, 2012, p. 136).

When nuanced with Fuchs' proposed corrections to this valuation system, this system of valuation by affective investment will prove useful in exploring the value of the OSM platform, as indeed it is more federative of a "tribe" through the highly active nature of its users' participation in the platform. Arvidsson & Colleoni (who also rely on financial market value in their valuation system) however argue that the concept of value would not be applicable or explorable relative to an open-source non-profit service, when for Fuchs, even if the OSM platform is not being sold or generating revenue in itself (as a product or on financial markets), the concept of value is still pertinent and applicable, as ""exploitation of labour takes place before the selling of commodities". Even if a commodity is not sold, once it is produced, labour has been exploited" (Fuchs, 2012, p. 634). The notion of an "affect-based law of value" (Arvidsson & Colleoni, 2012, p. 142) is also applicable to Google Maps, as users perceive, 'affectively', the platform and its value. However, the concept seems less applicable due to much more passive forms of participation (mainly creating GPS traces to calculate traffic density, and for a smaller amount of users, proposing corrections or flagging issues in the maps).

Fuchs' framework (2010, 2012) seems more pertinent to exploring the value of Google Maps as a social media platform. Staying truer to traditional Marxism (in his view), Fuchs explores the "produsage/prosumer commodity" (Fuchs, 2010, p. 192) and its relationship with the value of web services. Importantly, Fuchs does not discount the importance of time in the creation of the value of web services and SMPs: "The more time a user spends online, the more data is available about him/her. Time therefore plays a crucial role on corporate social media (Fuchs, 2012 p. 639). This point is interesting, especially when we consider it in relation with the way that Google Maps works as a geolocation platform. As stated earlier, the Google Maps mobile application will create GPS traces of its users in order to increase the efficiency of the Navigation component of the application. The more users are out and about, the greater understanding the service will have of traffic flows in the particular area a user seeks to travel, making the

Navigation service more efficient and effective to the user. The Navigation component is a big part of the application, in the sense that it attracts many users to download and use the application. These users are then used as an audience commodity for advertisements (which can also be highly geo-targeted due to the GPS trace functionality). As it could be conceived that Google Maps is not a 'classic' SMP like Facebook or MySpace, we can modify the time-based value that Fuchs puts forth in an extension of Marxist thinking, into a mobility-based value system. Seeing as a user who is mobile in his area is contributing and improving the Navigation system (which in turn contributes to the attractiveness of the Google Maps platform) we can perceive a certain portion of the Google Maps value as being generated by mobility of users. In an indirect way, Google Maps commoditises mobility. This compliments the standard audience commodity that Google Maps offers as an advertising platform.

These two separate views enable us to understand the value of web services, and more precisely, of geolocation services. However, it seems apparent that the invisible and oft unknown data collection (in the case of Google Maps), even as it can be defined as exploitation in an economic sense, differs to the more traditional exploitation of the proletariat by capital and capitalists. As Arvidsson and Colleoni explain, the "political dimension of the concept [of exploitation] has led many authors to refute the applicability of the concept of exploitation to media participation. After all, people who "create value" for Facebook […] do so voluntarily without any kind of compulsion whatsoever. Indeed, people feel more than compensated (as already noted by Smythe) by the use value and gratification they derive from these activities" (Arvidsson & Colleoni, 2012, p. 136). The authors thus understand the concept of exploitation to be inapplicable to the case of data harvesting of users activity by web services, due to the political component of the concept. However, the authors do not present any data or concepts to assert this claim.

Fuchs, once again, sees the issue differently, and uses a Bourdieusian vision to conclude that users spend time on SMPs in order to gain social, cultural and symbolic capital (Fuchs, 2012). We can see that for Fuchs, the time spent on SMPs and the relationship between user and service is more politicised than the relationship that Arvidsson &

Colleoni describe as being driven by more 'innocent' use values and gratifications. However, as described in our context and research questions, there is an increasing link between private data collection and the exploitation of this data by public entities, which could cause a politicisation of the relationship between users and SMPs (for example, the Snowden leaks have caused people to delete their Facebook accounts). In this view, the interviews described and analysed later in this memoire will seek to answer questions regarding the political nature of a relationship between a user and a geolocation service.

The politicisation of the relationship between user and geolocation platform is also linked to the nature of the platform itself - Google is a commercial product, whereas OSM is a not-for-profit open source project. Gorz sees the evolution of cognitive capitalism differently to Fuchs or Arvidsson & Colleoni, and discusses a "cooperative model of self-production located outside market forces that would initiate a "civilized withdrawal" from productivist capitalist industrialism" (Gollain, 2010, p.556-557). Today, the closest model of production to the one envisaged by Gorz is the open source model. By extension, it can thus be envisaged that participation in open source projects, such as OSM, can be seen as a political act of opting-out of the current ubiquitous market economy – Gorz describes open source communities as "dissidents of digital capitalism" (Gollain, 2010, p.552).

These points underline the paradox created by participative web based technologies. They empower the user to produce and be creative, whilst at the same time limiting the user to a certain set of productive and creative possibilities, which are also creating value for the owner of the service in which the creation takes place (as explored in Proulx *et al*, 2011). This paradox will be important to our theorisation and analysis of the relationship between the user and his or her geolocation service of choice, as the value to cost relationship of a given service can be explored by analysing this paradox. This theorisation of the relationship between a user and a geolocation service (whether it be commercial or open source) will yield insights into the use values and significations of the users studied – as exploring their contributions to a service's database will enable us to understand their moral, ethical and political standpoints concerning the issue.

Furthermore, we will aim to explore the difference between crowdsourcing (small data contributions by many users) and community sourced data (larger contributions made by less users). Proulx *et al* (2011) put forth a framework based on the analysis of four characteristics which define the ties and relationships that exist between users, as well as the ties that exist between users and the project or service that they are contributing to These relationships can be distinguished by looking at four factors that characterise a service; its technical attributes, the social contextualisation of individual actions, the larger level social and political considerations of the users, as well as the business model on which the service is relying (Proulx *et al,* 2011).

Proulx *et al* (2011) use these techniques to analyse the different usages of Facebook and TeleBotanica, a collaborative botanical platform and is able to distinguish the key differences in the ways users interact which each of the services. The comparison between these two empirical objects is quite similar to that which will be explored throughout this research project.

# Chapter 3: Methodological framework

## 1) Fieldwork: interviews and observations

In order to obtain data pertinent to our research questions, we have conducted a series of interviews. We aimed to have a broad socio-economic grouping of interviewees who reside in the Montreal urban area. The interviewees are residents of Montreal who use either the Google Maps mobile service or an application based on Open Street Map data in their day-to-day lives. The conditions of selection were not more strict than these, (aside from allowing, as much as possible, a socio-economically representative mix of users) as we are aiming to create a broad view of thoughts and feelings of users of geolocation services who inhabit Montreal: from the power-user to the occasional user, the young to the old, the largest contributor to the smallest. These interviews enabled us to understand the GIS usage habits of the interviewees and their opinions regarding the involvement of government bodies in the realm of GIS technologies.

To complement these interviews and to gain a broader insight of the way the OSM community is organised, notes were taken during monthly OSM meetings from September 2013 to June 2014. During these meetings, members of the community discuss OSM related business, as well as a larger set of topics, such as open data, the most recent open source events, hackathons, etc. These meetings enabled us to gain valuable insight into the relationships between users as well as the functioning of the community as a whole. In order to deepen this understanding, two OSM mailing lists were also followed closely, as many opinions are voiced there, and it is often where decisions regarding OSM Montreal are debated and taken.

### 1.1 An approach inspired by critical ethnography:

Concepts borrowed from critical ethnography were used to guide the interviews and participation in group meetings: "(*Le chercheur s'astreint) à suivre les acteurs au plus*

*près de leur travail interprétatif (...). Il prend au sérieux leurs arguments et les preuves qu'ils apportent, sans chercher à les réduire ou à les disqualifier en leur opposant une interprétation plus forte*" (Boltanski, 1990, cité dans Proulx, 2005 p. 8). As we are aiming to explore the usage significations and values of our users, this concept was applied in all interviews conducted with the most rigour possible, as we are implementing a logic of *sociologie des usages* and not *sociologie de la dominance*, for example, where interviewees might be perceived as blind to the social forces surrounding them. This study aims to understand the entirely subjective point-of-views of the users studied in all their individuality

We operationalized Proulx's *théorie des usages* (Proulx, 2005) in order to create our analytical categories that were explored through our interviews, in order to answer our research questions. This methodology can be broken into five steps that guided our interviewing process.

Firstly, we aimed to understand the interaction between the user and the GIS tool(s) used in his day-to-day life. Secondly, we studied the coordination or relationship between the user and the creator of the service. Thirdly, we explored the users' day-to-day experience using the service (as they perceive it). These first three analytical steps described by Proulx enabled us to understand the way a user perceives his relationship with the service. However, as we are aiming to understand the use values and significations, questions were centred around perceptions, feelings (such as acceptance, rejection) and not on use habits or use cases.

This understanding was then applied in order to highlight the significance of the final two steps in Proulx's analytical method. Firstly, understanding the political and moral dimensions of the object's design, and the way that the user is virtualised within the service. Secondly, understanding the larger political and historical contextualisation of the usage as determined by the first three steps of Proulx's theory.

Questions based on this grid enabled us to explore the user's use value and use signification of his or her chosen GIS platform. We were also able to understand the way the user places himself amongst his fellow users of the same service, as well as the way he or she feels relative to the owner of the GIS platform. We will use this discussion as a springboard towards an exchange relating to perceived advantages, costs, and issues of a government involvement in GIS technologies, as put forth in our research questions.

## 1.2 Interview process

We used open questions during the interviews. As the research project seeks to be an exploration of use values and significations, as well as the politicisation of usages of mobile GIS technologies, open questions were deemed more appropriate. This leaves ample room for the subjects to express their opinions and views, using their own words; which is more conducive to an exploratory approach than a closed question system, where subjects' views could be warped by the questions themselves, or subjects could feel less freedom to express their positions on the issues discussed.

Now that the theoretical and methodological concepts have been detailed, we will detail how they were operationalized throughout the pursuit of this research project.

The theories and concepts underlined in the previous sections of this research will be explored through a series of interviews. Interviewees will be chosen relative to the creation of two categories: exclusive Google Maps (GM) users in one category, and, in another category, both exclusive users of OSM and users of both platforms. Ideally, a category for each type of user would have been created (OSM users, GM users, and dual users) but we were not able to meet enough OSM users to justify the creation of three separate analytical categories, due to the small number of OSM users and dual users in Montreal. This being said, the analytical categories are still effective, as even exclusive OSM users, in a way, are using OSM 'instead' of Google Maps, as Google Maps is the dominant mobile GIS application. This enables us to treat interviews with OSM exclusive users and dual users in a similar fashion, as both these groups of users, in a way, are explaining their choice to use OSM over GM (whether it is a choice to never use Google

maps or to sometimes use Google Maps). We can say this as the interviews with OSM users and dual users often slid of their own accord into forms of comparison between OSM and the dominant mobile GIS platform, Google Maps. This categorisation of users enabled us to organise and understand our data in terms of user type. Coupled with an analytical grid based on dominating themes discussed during interviews, we are able to understand the relationship between users and each of the services separately, and also to gain insight into the different usage values and significations of users who choose to use both services.

We conducted 8 interviews in total: 3 interviews with exclusive GM users, and 5 interviews with OSM users (exclusive and dual users combined). With this number of interviews, we were able to obtain enough data to effectively answer our research questions. Again, as this research project is exploratory, no quantitative analysis was undertaken; meaning a large quantity of interviewees was not necessary. Also, the number of OSM contributors in Montreal is quite small, and it was not possible to conduct interviews with the entirety of the group, as some members are disconnected from the community (and do not follow mailing lists, or attend meetings, making it difficult or impossible to organise interviews with them).

The interview protocol was pretested on several users in order to ensure that questions are well worded and enable us to discuss and understand points pertinent to our research questions in an effective manner.

### 1.3 Interview and recruitment process: Google Maps users

The interview process for this category of users was heavily based on Proulx's five step theory outlined earlier in this research theoretical framework, whereby we aimed to understand the relationship between the user and the service, with a focus on the values and significations of usage. The interviewees were guided through an open question interview in order to discuss moral, political and ethical issues linked to their usage of GM, as well as the possibility of government involvement in user facing GIS applications and services. As the interview process aims to leave as much room to the subjectivity of

the interviewee as possible, interviewees were asked what kind of government involvement in GIS technologies they would deem being effective and ethical, if so. Several examples were also discussed when interviewees had difficulties envisioning possibilities. We also aimed to explore the crowd sourced aspect of Google Maps as defined by Proulx et *al*. (2011) by examining the perceived value and cost of using the service, as well as the interviewee's relationship to his fellow Google Maps users.

Out of the two services studied, Google Maps is the most prevalent. In 2011, Google Maps had over 150 million users worldwide (Engadget, 2011) and has seen incessant growth since the publishing of that data. We interviewed people who use Google Maps on a mobile device, which provides both maps as well as geolocation to the user (GPS, WiFi and GSM based data is used to determine location). The majority of smartphone owners use the GM mobile service: 54% as of April-June 2013 (Business Insider, 2013). Smartphone users are very prevalent in the Montreal area, which this study will focus on, with a 36% adoption rate as of December 2011 (ComScore, 2012). This means that users of the service were easy to contact, and were easily found through social media, mailing lists, and the use of billboards posts in public areas (universities, coffee shops).

The main difficulty in finding users to interview was at times the lack of understanding of the research project and its implications. This somewhat confirms our intuition that Google Maps users are certainly less in the know when it comes to questions pertinent to data practices of private companies and governments and the implication of these practices.

### 1.4 Interview and recruitment process: OSM users

The interview process and direction will be very similar to that used for the Google Maps users, and will follow Proulx's five steps outlined previously. However, the users of OSM Montreal are organised as a user and contributor community (as previously defined). This entails that each user has a deeper connection to the service as such, as well as other users of the service. This enabled us to reach a level of abstraction that was mostly impossible to attain with users of Google's GIS, and often enabled us to harvest

more precise, detailed answers to our questions. This was due to the fact that the interviewees, as a group, were thought to, and then clearly demonstrated that they indeed do possess a deeper knowledge of issues linked to GIS technologies, data ownership, and the public sector's involvement in the GIS space (smart cities, open data practices…). This distinction was not always totally clean cut, with certain GM users demonstrating significant knowledge of issues related to our research questions, in a few cases more than certain of their counterparts in the OSM user category. This nuance will be further discussed in later parts of this memoire.

The recruitment of OSM users was quite different than the recruitment of Google Maps users, due to the highly different nature of the two services, and due to the fact that fewer people use OSM than GM. As mentioned, we predicted that the service would be based around a more-or-less tightly knit community of users and contributors rather than a larger and more disjointed group of users (as is the case with Google Maps). As such, contact with users and potential interviewees were made using the community's pre-established communications methods, namely, a large forum and wiki (which can be accessed freely here: http://wiki.openstreetmap.org/wiki/Main_Page and at http://forum.openstreetmap.org/). Users possess a username, which is used to access some of the site's functionalities, including a forum, which facilitates direct communication between users and contributors of the platform. Also, the users studied use two more or less local mailing lists: one which is dedicated to issues relating to OSM in Montreal, and other, dedicated to OSM issues throughout Canada (which also used by OSM users from the Montreal region to discuss topics with a broader scope than OSM in Montreal). These mailing lists, as well as the regular meetings of the OSM community in Montreal (which are discussed later), were the starting points for our fieldwork.

### 1.5 Interview and recruitment process: Dual-Users

As previously mentioned, Google Maps for mobile is a much more prevalent service than OSM for mobile. Thus, to find the dual-users necessary to our project, we first found users of a mobile OSM application. Then, we verified if the interviewee was also a

Google Maps user. If so, they were interviewed as dual-users, and questions were skewed to contain an aspect of comparison between the two services.

## 2) OSM Montreal: Contact and monthly meetings

As the research project advanced, I aimed to establish contact with the OSM Montreal community. Whilst browsing the web, OSM wikis, and Twitter, trying to find an entry point into the local OSM community, I came into contact with a newly launched OSM Montreal website, which was still being maintained, and where posts were still being published: <osmtl.org>.

Through the website, I heard about a meeting of the local community which was to be held at the Bitcoin Embassy Montreal. The meeting was also being promoted by FACIL, an association that aims to promote the "collective appropriation of open source ICTs" in Quebec (translation my own). At the meeting, practical contribution issues were the main topic: how to tag certain structures, roads, and other physical objects. The meeting had an educational vocation with more experienced OSM contributors explaining their strategies and walking us through their work on the database.

At the meeting I was able to meet David, one of the organizers, who so happened to be the creator of <osmtl.org>, who gladly handed over his contact information. He then introduced me to the mailing list, and from then on, I used this list to contact members of the community as well as find out about the monthly meetings. After a short explanation of my research topic, David (all names of OSM Montreal members have been modified to preserve anonymity) volunteered to participate in the study.

### 2.1 OSM Montreal: Meeting observations

#### 2.1.1 Introductions

Regular meetings of the Montreal chapter of Open Street Maps are a recent, and now

monthly, occurrence. This is mainly due to the newness of the formal organization of OSM Montreal compared to many other OSM communities, and the newness of the website that aims to federate the local chapter of OSM, <osmtl.org>.

On the website, the organizers describe the meetings as being a time and place for informal discussion of anything relating to OSM, and as being open to whoever wishes to attend and has an interest for OpenStreetMap – contributors and non-contributors alike.

As the formalized OSM community in Montreal is in its early days, the group is extremely open and its members friendly. The first meeting I attended took place in the private backroom of a restaurant in downtown Montreal, where a large table had been reserved for attendees. I had not yet been in contact with any of the people present, save David, whom I had met at the meeting at the Bitcoin Embassy. Within minutes I had been introduced to the attendees and prompted to participate in the conversation. Towards the end of the evening, David took the time to introduce me more formally, explaining I was in attendance to meet OSM users for a research project I was working on for my Master's degree. Thankful for his introduction, I quickly explained my research project and mentioned I would seek out participants via the mailing list. This turned out to be an error as I received a very poor response to my first email sent through the mailing list. David later explained to me after our interview that it was worded in an awkward manner and led people to believe I was only searching to interview users of both Google Maps and Open Street Map.

Over the span of the 6 meetings I attended, several major discussion themes arose. Here we will run through the primary topics in order to gain a general understanding of the happenings at these meetings, and of the organization and objectives of the OSM community.

### 2.1.2 OSM Montreal: at heart, a developer's community

OSM is an open source project that relies on user-contributors' contributions to thrive. However, contributing to OSM does not require computer-programming skills; meaning

that contribution is easier and more accessible than most other open-source projects, which require advanced programming knowledge. It is possible to liken OSM to Wikipedia, another open source project where the only requirements for contribution are knowledge of written language and of a particular topic. In the same way, valorizes the geographic knowledge of its contributor base. As I heard a contributor proclaim during one of the meetings "I know my neighborhood better than NavTec, and better than Google" (my translation).

However, as my interviews have shown, most produsers involved with OSM discover the project through other open-source projects, or through "geek literature" as one meeting attendee called it, read mostly by programmers and individuals interested in information technology (IT) as a hobby. Thus, even if programming knowledge is not required, most of the OSM contributors from the Montreal community are programmers: either by hobby or profession.

This fact is evident in the topics discussed during the informal meetings that were attended. GIS and GIS related technologies are discussed at length, as expected, but IT and programming techniques are also discussed frequently, and in depth – often leaving less tech savvy attendees out of the loop or slightly excluded from the conversations, which often become quite technical. Notably, Python[2] is often brought up, as many OSM projects are implemented using this programming language, known and used by several of the community's frequent attendees – this is also explained by the fact that many members of the OSM Montreal community are also involved with Python Montreal, a group that organizes hackathons[3] and other events for Python developers in the region.

[2] A widely used programming language

[3] Events during which programmers work rapidly to build a working piece of software that is a solution to a certain thematic problem or issue.

### 2.1.3 OSM Montreal: GIS technologies and uses

As was expected, many conversations held during the monthly informal meetings related to use of GIS technologies. Several topics related to OSM were also frequently discussed. Members often discuss new contributions that they or others have made to the map. Mainly local (Montreal and Quebec) contributions are discussed, but notable contributions to other parts of the map are also brought up. For example, semi-automated importations of large data sets are a frequent topic of discussion as they have the power to rapidly shape large portions of the data relating to a particular area of the world. Through these discussions it became apparent that much of the geographical information contained within the OSM database is added through these types of semi-automated imports of large quantities of data, which are mainly handed over by public bodies, and sometimes by private companies who are in possession of large quantities of geographic data. These large importations are also discussed in their technical aspect, as they are often imported to the OSM database through scripts, which enable the data to be correctly integrated with the OSM database in the correct format.

As well as novelties in the database, the legal aspects of OSM were also discussed at length – this mainly relates to the licensing of data. In order to be used in OSM, geographic data must be licensed in the correct manner. Originally, data used was required to be published under a Creative Commons license. This meant that any data that was to be incorporated into the data base, such as large data sets liberated by public bodies, had to be licensed in a specific way in order to be compatible with OSM. This still causes many issues, and requires communication between the OSM communities and their government counterparts to make sure the data is released in the right license. The license was changed to an Open Database License (ODbL) in September of 2012. Essentially, this required reviewing the whole database and confirming with contributors that they were happy to switch the license relative to the data they had contributed – whether it was data from their own mapping, or imports of other data. Certain of the datasets released by public bodies which were in use in certain parts of the world became incompatible, and the data was removed from OSM causing certain regions to lose

relatively important quantities of data. This change of license also led to what was described as a slight "exodus" (my translation) in meetings – although members of the Montreal community deem that the losses to the community were small, they foresee a possibility of another license change that could be more hurtful to the project.

As OSM is a database that can be exploited to create many different shapes and forms of maps, the creation of new maps is often a point of discussion. The community often discusses maps that are relevant to their individual centers of interest. For example, during a few of the meetings attended through the year, some individuals not known to the OSM community attended to inquire about the possibility of realizing certain projects. This ranged from using OSM to map the location and status of "public plants" for a local urban agriculture and food sustainability project, to using OSM to create a geo-Wikipedia of historical information about the inhabitants of Montreal. When new attendees were not present to discuss their projects, often members of the community would bring up and demonstrate (on a mobile device) a new project exploiting the OSM database. The project's implications and uses are then often discussed, as well as issues and problems apparent in the map or system. The technical aspects of these projects are frequently discussed as more experienced mappers debate the way in which the project was built.

### 2.1.4 OSM Montreal: Open Data and local administration

As the improvement of the data in OSM often requires the liberation of large quantities of high quality data by local or federal authorities (this entails posting the data in an accessible location, as well as with an appropriate license), members of the OSM community often discuss the data practices of the municipal and provincial governments. In Montreal, OSM contributors deem themselves luckier than some, as transparency and open data practices are discussed a lot in local politics (for reasons unrelated to maps of any kind). The community has frequent contact with some members of the municipal administration to discuss the liberation of geographic data pertinent to Montreal and the surrounding urban area. Interestingly, one regular group meeting attendee described the core of the OSM Montreal community as being lobbyists: they are frequently in contact

by email and at public events with members of the local administration to encourage the liberation of data. They most often communicate directly with the project manager for open data at city hall.

However, members of the Montreal community often feel short changed. In certain regions of the world, government authorities are much faster to liberate large and highly detailed databases of geographic information under the right licenses. Namely, many contributors are jealous of OSM community in the United States, where the authorities have released large quantities of data, making the maps of the nation quite accurate. Canadian mappers also have to deal with some extra issues regarding the use of postal codes, which belong to the crown corporation Canada Post. Any use of postal codes to mark addresses or demarcate areas requires a fee to be paid to Canada Post. This is deemed ridiculous by many meeting attendees who poke fun at Canada Post – but at the heart of their dismay lays a frustration with the speed of the local and federal administrations' arrival in the digital era, too often slowed by "administrative red tape" (my translation). Geolytica, a crowd-sourced repository of post codes, where individuals were able to indicate their street name, number, and postal code to construct a parallel database of post code and address correspondence, was sued by Canada Post in 2013. This lawsuit was discussed at length during one of the meetings, as the epitome of Canada's issues regarding the accommodation and use of ICTs in general.

### 2.1.5 OSM Montreal: Expansion prospects

As several members of the local OSM community described as themselves to me as evangelists or militants it was predictable that members would discuss expansion prospects during the monthly meetings. Expansion was discussed on two fronts: the data front, and the contributor base front. As the mission of OSM is to create a geo-referenced database of physical objects, it seemed coherent that the local chapter frequently discussed how to obtain more data to increase the size of the database corresponding to Montreal and its suburbs. Many of these discussions relate to the liberation of data by the city council, and the others are focused on discussing areas of the map that need attention.

Another efficient way of obtaining more data is to recruit more contributors – a subject heartily discussed during certain meetings. A will to educate the general population and raise awareness for the Open Street Map project as a whole was clearly visible during these meetings. As one meeting attendee put it: “There are so many more people we can interest in OSM! 90 percent of people don’t even know what OSM is yet”. Another attendee retorted: “Wow, that’s a really generous estimate!” to general laughter. This exchange brought the issue of education to the forefront of the conversation for a better part of the evening. Attendees discussed new initiatives to interest more people in mapping and participating in the OSM project, such as increasing the frequency of ‘carto parties’, an outdoor event during which a group of mappers will walk around a neighborhood in the aim of adding the most possible data to OSM and correcting existing data that is faulty. Attendees also discussed how to better publicize the events that were to be held once the warmer summer months arrive. In order to reach out to more people, certain attendees believe that OSM needs a clearer image, as it could be too rapidly associated with other open source collaborative IT projects, which often bear a high barrier to participation due to the technical skills required. Some members explained that carto parties can be an engaging activity for all demographics, and an ideal way to spend an afternoon with one’s family, enjoying the outdoors, learning about geography, and getting to know a new part of the city.

## 2.2 A heterogenic group of users

This part of the memoire will serve as a jumping off point for the description of our 8 interviews. Here, I will aim to introduce you to the Open Street Map, Google Maps, and dual-users that I interviewed. These introductions will enable us to better understand our interviewees during our thematic breakdown of the interviews, as their relation to their chosen GIS(s) are of course linked to their lives in a more general manner. Interviews were conducted in French and translated for the purpose of this research. The names of our participants have been modified for anonymity purposes.

### 2.2.1 Dual user 1: David

David was my first contact within the OSM Montreal community, and is the creator of <osmtl.org>. After having worked on OSM independently for several years, David decided to start the OSM Montreal project in order to federate users in the region and create a community. He is a contributor to the OSM Foundation, and has attended State of the Map, a yearly gathering of OSM enthusiasts, which generates the majority of the OSM Foundation's annual income.

Developer by profession, David is a very active contributor in Montreal and has in depth technical and legal knowledge of OSM and related issues. He chooses OSM in most situations by conviction, but also because the maps are downloadable for use offline, and he did not, until quite recently, possess a data connection on his mobile phone. A pragmatist, David has no issues switching to Google's maps when OSM doesn't suit his needs. He compares Google Maps to a show or theatre representation – something that he consumes but where his participation is minimal. On the other hand, he likens OSM to a workshop, in which his participation is inseparable from his use of the service.

### 2.2.2 Dual user 2: Jonathan

One of my final interviewees, Jonathan is a research associate at a university in Montreal. He develops various software tools used by scientists. Jonathan has been using OSM since 2006, and previously mapped a very rural area in the US. He became involved with OSM as he enjoys mapping hiking and mountain bike trails. Jonathan, as a developer, tries to promote open source alternatives as much as possible within the workplace, aiming to liberate as much of his work as possible under open licenses. As well as useful to his outdoor hobbies, he sees OSM as being a part of a broader philosophy in which he aims to embrace open alternatives to proprietary products. He has been an active member of the community in Montreal for approximately six months, and has become a frequent

contributor who is also knowledgeable about other issues relating to OSM; namely, legal issues and license use. However, Jonathan continues to use Google Maps in his everyday life, as he deems Google's mobile application to be much more useable and cohesive than applications which rely on OSM data.

### 2.2.3 OSM user 1: Alice

A close friend introduced Alice to the OSM platform. An avid Wikipedian, she is motivated by open access to information and collaborative online work, making OSM a logical choice when searching for a GIS to use in day-to-day life. She has contributed during carto parties, which she enjoys, but rarely contributes in normal circumstances, although she would like to find the time to add cultural hotspots to the database (museums, monuments, etc.). She values the feeling of community and sharing that OSM champions, making cartoparties and group meetings especially important to her.

### 2.2.4 OSM user 2: John

A long time OSM user and contributor, John describes himself as an open source militant. Programmer by hobby and profession, John first turned to open source software after being frustrated by the lack of free software in proprietary operating system environments (i.e: Microsoft's Windows, Apple's Mac OS). Ever since, he tries to fulfill all his IT needs with open source services and programs. He is an involved member in the Montreal community, and plays a major role in the organization of events and the maintenance of the website. He is proficient in data importation as well as licensing issues that relate to OSM and other open source platforms. He uses an Android application, OSMAnd[4], running on an mp3 player to get around. He does not own a mobile phone, as he deems them invasive of his privacy and costly. Thus, he runs the application totally offline, using his mp3 player's GPS to locate himself on OSMAnd's maps.

[4] OSMAnd is the most popular OSM application for Android devices.

### 2.2.5 OSM user 3: Harry

After the Snowden scandals involving the giants of the American web industry, Harry, a physics student, sought alternative services to replace his initial, more mainstream, commercial choices. This brought him to OSM as it is the dominant alternative GIS. Since, he has been an active contributor in Laval and in select places in Montreal. He is a keen cyclist and cross country skier, mapping trails and bike paths whenever he can. He imagines a day when enough contributors will render expensive maps at local cross-country skiing parks obsolete. Although his convictions are firmly placed in the alternative and open source software movement, he resorts to Google Maps when he is unable to find what he is after on OSM. An active contributor and open source enthusiast, Harry has only begun to discover the local OSM community. He feels a stronger sense of belonging and teamwork when working with the Humanitarian OpenStreetMap Team (HOT), where he contributes actively when the need arises, often during natural disasters throughout the world.

### 2.2.6 Google Maps user 1: Jane

A long time inhabitant of Montreal, Jane considers herself to be a normal user of Google Maps. She uses the service to navigate to new places she needs to get to, whether by bike, car, or on foot. Her usage is very mobile – she relies on a current generation smartphone to locate herself and guide herself through the city when the need arises. She is somewhat aware of issues concerning Google's use of her location data, but trusts Google to make fair use of data pertaining to her movements. She is unsure what the government could do to make cities better – but trusts that with the necessary education and information, citizens will accept increased data collection by government bodies in the aim of improving public infrastructures.

### 2.2.7 Google Maps user 2: Jessica

A traveller, Jessica mainly finds Google Maps useful in new places. Having newly arrived in Montreal, the application is very useful to her. Mainly, she appreciates being

able to calculate itineraries based on the timetables of the local public transportation authority to get around the city – this data does not exist in OSM. She finds that Google's maps service has become ubiquitous in her social circles – everyone is always aware of where they are, and how to get where they are going thanks to the platform, which she says, works very well. Having no particular affiliation with Google, she uses GM because it is, according to her, the most efficient and well-made application available on mobile today – when this changes, she will change application. This has already happened with some of her usage shifting towards another simple and streamlined application, which instantly displays nearby bus' timetables (finding the timetables is faster than in GM as the application is focused only on this).

### 2.2.8 Google Maps user 3: Robert

IT professional and self-described geek, Robert is passionate about IT, and has a marked interest for mobile devices and services. He frequently hacks and customizes his mobile phone in order to maximize its performance, and follows the consumer technology market closely through RSS feeds and Twitter. He is aware of open source technology and the ideals behind the movement due to his profession, but has never participated in any open source software projects. He is a Google user; his web service usage is mainly composed of Google services (Gmail, Google Calendar, Google Search, Google Drive) – however he is critical of the company when its services crash or fail to satisfy his needs.

# Chapter 4: Interview data

## 1) Reasons & Significations

### 1.1 Why use?

Throughout our interviews one of the main topics discussed was why users chose to use a particular platform. This was often the first major point discussed. Very rapidly, through the exploration of this point, the difference between OSM users and GM users made itself clear: often, OSM users are unable to distinguish their use from their contribution, and, on their own initiative, end up discussing contribution when queried about their use of OSM. GM users on the other hand easily discuss their usage and choice of GIS platform without discussing anything related to contribution (whether active or passive). This is linked to the fact that users perceive Google's Maps to be a product, whereas OSM is seen as a project, and sometimes even a sort of open-source, open data quest. We will explore this point further in this section.

#### 1.1.1 Maps – a dominant platform

Interviews with our dual-users and exclusive GM users indicate that users perceive, as expected, GM to be the dominant platform. Some users even discover Maps, and discover their need for a GIS after having begun to use Maps. Robert explains:

> I've been using it for a while… about four years I think. Pretty much since it's been available. Before that, I didn't use anything – I think Google Maps was the service that really made me understand the utility of having maps with me.

This points to the fact that GM is strongly implanted in it's user base's habits, and is often the service that forms use habits. Robert continues on to say that he feels a sense of loyalty towards the application:

> I think I've become a loyal Google Maps user… It's become a reflex to open the application when I need to find something. I can't really compare it to other applications in terms of functionality as I haven't really tried any of the others, but I know that Maps works for me, I'm happy with the service**.**

What Robert is explaining here is that he thinks Maps' functionalities are suited to his needs, but is unable to differentiate Maps from it's competitors, as he doesn't know much about their functionalities and potential advantages over GM. In a sense, he uses Maps blindly, trusting that it is the best service, most suited to his needs. Other users also indicate that they're unaware of the existence of other services that are as functional. Jessica states:

> It's the only one I know about, that's mainly why I use it. I think it's probably the most effective too, I guess there must be other mapping applications on Android… I'm not too sure. I guess I'm used to using Maps, and I've learnt to use the service, so I'll keep using it.

Other Maps users aren't quite able to put a finger on the reasons behind Maps' dominance, and are encouraged to use the application by their entourage. Jane explains, "People say it's the best… the search function works really well. […] I use it because others have told me it's the best application, I guess that's the main reason". This, again, underlines the idea that seems to exist in smartphone owners' minds: Google Maps is the best GIS available. This may also be linked to the fact that Google is already present in users' lives through other services, such as Search or Gmail – making Maps an obvious and easy choice when searching for a GIS.

OSM users also acknowledge the dominant status of Maps, underlining its value in similar ways to GM users. Harry, a dual-user, explains that when he is unable to find information on OSM or other platforms, he resorts to Maps, acknowledging, begrudgingly, that GM is a polished service with an extremely comprehensive database. Another dual-user, Jonathan, admits that he uses Maps frequently as the data he is after is

more often in Maps than in OSM: “I’d like to be able to use OSM as my default GIS, to be able to find everything I need when it comes to maps”. He also goes on to explain that he finds Maps, especially on mobile, to be a more polished and usable product than OSM – from an interface perspective, and a data perspective. However, Jonathan explains that he is keen to move his main usage from Maps to OSM:

> I use Maps because the interface is easy to use, and the data I’m after is more often than not there, but it’s always been an objective of mine to input the data I use on Google Maps into OSM, to try to get away from Maps as much as I can.

Namely, one of the main issues is access to proprietary data. Jonathan continues to use Google Maps frequently as it includes the transit data of the local transport authority, the STM, which is not released under an OSM-compatible licence. Another dual-user, David, explains that his reasons for using Maps are mainly cosmetic: “Maps presents the data in a nicer way, namely the map is based off vectorial images, so they look really nice on high definition screens”. He explains that he uses an ultra high definition tablet, on which OSM’s data, through the application OSMAnd does not render as nicely as Google’s data. He attributes this to the fact that Google is a multinational corporation with enough funds to create high quality services that display in high definition, whereas applications using OSM data are unable to compete due to their open and mostly free nature.

Alice, an exclusive OSM user, explains a similar thought process - she tries to use open-source and open data services when they correspond to her needs, but she continues to use proprietary, commercial services when her needs aren’t met by open alternatives:

> If OSM didn’t correspond to my everyday needs, I wouldn’t use it and I wouldn’t contribute […]. For things like search, it’s hard to get away from Google, but for my mapping needs, OSM works really well.

She is able to replace her use of Maps with OSM, but in other facets of her digital life, she is unable to find open alternatives that are as powerful as their proprietary

equivalents. John has a similar view on his use of open services and software, and proposes a very interesting answer when queried about his choice to use OSM:

> I think your question is off – it needs to be inversed. The question should be "why use proprietary services?" By default, people should opt to use open source software and services, which belong to everyone, which use open data. If you can't find something you need in the open source world, then you can think about using a proprietary service or product. Asking why I use open source software almost makes no sense to me!

### 1.1.2 Google Maps – A Google application ?

Contrary to our initial intuition, certain users explain their use of Maps by its technical advantages, or by its dominance in the app marketplace, but do not necessarily make the connection between the mapping service and the Google Empire of web and cloud services. Jessica, an exclusive Maps user, explains:

> When I use Maps… I'm not really thinking about Google, Maps could very well belong to another company, I wouldn't care, it's just an application I use… I don't use it because it belongs to Google; I use it because I find it convenient and a pleasurable experience. It's not at all linked to Google in my mind, it's a stand-alone app, like any other.

Jane adds that she doesn't think about Google when using their application, and doesn't consider that she is using a Google product – she also sees Maps as an almost independent service.

Robert, a more web savvy user who works in IT, understands that Maps is part of Google's constellation of services, and partly explains his use of Maps by the company's values:

> In general, Google is a pretty open company who promote net neutrality. Their innovative in web communication services and IT in general. They try to

> diversify their business as much as possible, and they manage to create a lot of good products and services. Even though it's clearly a marketing behemoth, I still believe Google to be a company first and foremost run by engineers looking to innovate and make quality products – which are values I adhere to.

### 1.1.3 OSM: A flexible GIS platform

The first aspect of OSM's flexibility is directly linked to its very nature as a platform based entirely on open data: the maps are downloadable onto a phone's or a tablet's hard-drive, meaning no costly (and invasive) data plan is needed. John, an exclusive user, explains his point of view:

> I still don't have a mobile phone, I use a Samsung Galaxy mp3 player like a phone, except it has no cellular reception, and I'm only connected when I'm on a WiFi network. This means that using OSM is necessary for me, because you can download the data and use the application offline. So I've never really considered using Maps, because it wouldn't work without a constant connection… I mainly use OSMAnd, because it works well, and it has all the functionalities that I need on a regular basis, like routing, search, etc. I can even look to see if a business is open at a specific time, for example. Instead of opening up Google to look at the business' hours, I'll do it through OSM. OSM and OSMAnd are really core to my IT habits, every time I go out to do something I find myself using the service.

Harry admits that one of the main advantages of OSM is the '*downloadability*' of the data – which he then exploits using OSMAnd, the dominant OSM application for Android and iOS operating systems.

OSM is also flexible in other aspects. As several users stressed during interviews, OSM is not a map, but a database of geo-referenced information. This difference is important to individuals involved with the OpenStreetMap project, and the true nature of OSM if oft

misunderstood by the general population. John explains the strength that lies behind this distinction:

> The difference between data and maps is that with data you can generate as many different maps as you want. If you want to make a map for routing, you don't need to include all the data that exists in OSM… You need roads, but you don't need to be able to see buildings for example. If you look at the map that's on osm.org, you can see that it's terrible for routing – there is too much information, with all the buildings being very visible and prominent. Having extra data on a map creates an over abundance of information, and makes a map harder to read.

For John and other users, this means that it is possible to create useful maps that correspond to one use case or a particular group of users, rather than a map that tries to cater to all users and all use cases. John goes as far as to say that <osm.org> should not contain a map, but rather explications about the project, as well as links to a variety of maps created using the OSM database. However he accepts that this view is somewhat extreme and would confuse potential users even more. Alice is a good example of such a user: "First I discovered OSM as a map… and then I discovered data entry, and all the possible uses linked to OSM, and I understood what was really important and interesting about the service". She might have been confused by the absence of maps on OSM's main website initially. She now understands the strength of OSM and what the project is really about.

### 1.1.4 Mapping platforms: more than data and an interface

As expected, our users are attached to their GIS of choice. Often, amongst our interviewees, it is a service used daily that presents significant value to the user in his or her day-to-day life. However, a GIS seems to be more than a list of features or solutions to daily problems.

Aside from its features and polish, certain users feel an attachment to Google's platform

as a form of loyalty, developed through years of daily use. Others see this attachment as trust formed with Google through the use of Maps – this will be explored in a later section of this memoire. This being said, most Maps users justified their use of the service by enumerating practical, feature-based aspects of the service.

Validating our initial intuition, it appears that OSM users have a much stronger attachment to their GIS platform, which goes deeper than features or practical aspects. For some, OSM is a part of a much larger choice to use and promote open software and services. John explains:

> I began using open source software in the early 2000s… mainly for the wrong reasons, as I was mainly using open source stuff to avoid cracking applications on Windows, which is really tedious sometimes! But now I understand what is behind the movement and open source is key to everything I do digitally.

Jonathan explains that he too aims to push for open software and services at his workplace, and even spent a month listening to open licence music with the goal of extending this open source ethos to the way he discovers and listens to music. As he says: "Mainly, it's ideological… Open source is something I try to introduce to all the facets of my life". Alice explains that she begun using OSM through the discovery of related topics: "I think I begun using OSM through a broader discovery of open source software and services, as well as the open data movement". She also puts forth an interesting idea, that using OSM makes her feel like she is encouraging the spread of the platform. Many other users express similar ideas, but stating that they contribute to encourage the platform, whereas Alice feels use also encourages OSM as a whole.

Harry expresses explicitly his search for an alternative GIS after revelations linked to material linked by Edward Snowden in the spring of 2013:

> I started using OSM about a year ago, I wasn't aware of its existence before. I mainly started because of all the scandals around PRISM, I was fed up with

> Google and I wanted to move all my services away from their empire, and start using more alternative, independent services. That's how I discovered OSM, and started to invest time in the platform.

We can see that interviewees mainly explained their choice to use OSM as a choice to use alternative services to those proposed by the giants of the net industry. As later parts of the interviews revealed, this choice is mainly linked to a loss of trust in large Internet companies, linked mostly to opaque and invasive data exploitation practices. This will be discussed in the third section of this chapter.

### 1.2 Why not use?

Similarly to justifications expressed relative to use, users explained, when queried or of their own initiative, why they chose to not use a specific GIS platform. Most of this section covers OSM users' reasons to not use Google Maps, but also why some current Maps users would like to stop using Google's service.

Users express doubts over Maps' true objective as a GIS: is Google really trying to create the best possible mapping service, or simply a way of rendering search queries geographically? Harry explains:

> In Maps, when you search for 'breakfast', why do they show you the Subway nearby? Because Subway was the highest bidder, and paid a premium to show up first on the map. I have an issue with that. I'm searching for a place to have breakfast, I don't care who or what Google thinks is best for me, I'd rather decide myself or have other users recommend places. Google shouldn't get to pick what should be most prominent on the map.

David expresses a similar point of view:

> Maps exists to serve users, but also businesses. It's objective is to do more than just create geo-referenced data. There's a commercial objective behind maps too. Basically, Maps is a geo-search tool; it doesn't aim to the be the most complete, or the most precise mapping platform, it's there to present search results for routing.

Maps users (and dual users) also express misgivings regarding the US government's surveillance practices in which Google has been implicated. Robert explains how he feels about this:

> No, it hasn't had an impact on my use yet, but it really should… it should have. I guess I'm too lazy; I lack the conviction necessary to stop using all their services. Ideally, I should. Google has clearly been ousted for doing some bad things, being too close to the US government and all that, and that's definitely turned on a warning light in my head, and if something happens again, if they get caught again, I'll definitely have to seriously rethink my use of their services – not just maps, but all their services. I guess I'm giving them a last chance – but clearly there are some problems with the company.

Harry, in other parts of the interview, also expressed concerns linked to the US government's exploitation of Google's data – this is what initially caused him to stop using Maps and other Google products and seek out alternatives. He states that he only uses Maps when he has no choice – when the data he is searching for is not in OSM. When he connects to Google's services, he aims to do so anonymously, often connecting through TOR[5] to hide his IP and to make his behaviour incomprehensible to Google. Similarly, Alice explicitly explains what other users hinted at during interviews: "In general, I try to avoid everything linked to Google, Facebook, etc… it's a moral issue for

[5] A network enabling users to anonymously access the web and circumvent censorship.

me, I try to avoid using services owned by these large companies that are oppressing everyone. I try to use as many alternative services as possible". Many OSM users feel similarly, and, due to the ideological nature of their attachment to OSM, refuse to use Google Maps – or at least, aim to use it as little as possible.

Robert also proposes another reason for his increasing reluctance to use Google Maps: their business model. He explains that he finds targeted advertising to be a high cost to pay for using Maps. He thinks this form of advertising, which he deems extremely effective (as it is by far the main income source for Google), can be dangerous. He deems that most users are not aware that their personal data is used to target advertisements, which he finds worrying – and adds that even though he is aware of Google's practices, he still feels they are dangerous and corrupting.

In Google Maps, contribution and use are hard to separate. Are users aware of this? Do they choose to participate in Google's service? In OSM, contribution and use are two separate things that rely on different mechanisms – are the motivations behind contribution the same as those behind use?

## 2) Why Contribute?

Whilst much of the data recorded regarding use of GIS technologies was collected during interviews with GM users, the vast majority of data in this section originates from interviews with OSM users. This is clearly linked to the highly different nature of the two platforms studied. Several users explicitly mention that they spend more time contributing to OSM than using it: Harry states "Clearly, I contribute more than I use the map". Jonathan adds: "I'm more of a contributor than a user!" whilst most Google Maps users are either unaware of their passive contribution or weary of it. Firstly, we will explore Google users' feelings towards contribution to Maps.

## 2.1 Google Maps – a platform driven by passive contribution

Whilst many users are aware that they contribute in some way to Google's mapping service whilst using it, it appears that this contribution is not always clear to the user, or well defined in their thoughts.

Certain users believe that their usage contributes to statistical data, which enables the creation of a ranking system, much like PageRank[6]. Others believe they are traced in their movements by their smartphone, which helps Google understand traffic flows. Both of these mechanics (amongst others) exist within Google Maps, but it is interesting to see the differing levels of knowledge of these contribution mechanisms amongst Maps' user base. Often, uncertainty is present in the voice of interviewees when asked about contribution to Maps. David, a proficient OSM user and IT professional, seems uncertain when he explains: "Passively, I'm sure I contribute to Maps when I use it… one way or another. Clearly, when using Maps, I'm contributing to user statistics, like contributing data which helps ranks businesses in Montreal…". Other users are aware of similar contribution mechanics, and find them distasteful. Robert explains "When I click on something that interests me in Maps, I'm sure Google is aware, and this data goes into statistics. If I look at a restaurant, they know I've looked at it. Through this they can understand my interests and tastes, and serve ads that are targeted at these tastes, which are susceptible to interest me. I find that kind of mechanic to be really dangerous and worrying".

Comparatively to this sort of statistical contribution mechanism used to create ranks and generate preference information regarding users, interviewees were more aware of Google's tendencies to track the localisation of smartphone users via their application. Jessica explains:

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[6] Google's algorithm used in their search engine, which ranks pages depending on criteria such as keywords and the quantity of visits and links amongst others.

> I know that Google can track my movements, through Google Maps on my phone… they can localise me, and then use the data to know about traffic patterns and such… it's really useful for us, as users, and each user is helping other users, making the service better for all.

Robert, aware that Google tracks users of Maps, doesn't find this to be to his advantage. When asked if he disables this mechanic, he answers:

> Yes, absolutely. I don't really need to use the routing functionality, as I'm often going to the same places over and over, and I don't use the travel time prediction service either. When I'm driving, I use the routing, which means that the location tracking is intrinsically activated on my phone… But the passive contribution of localisation data is always deactivated on my phone.

Robert may be an advanced enough user that he knows how to disable the main data-mining component of Maps, location reporting, but this highlights the fact that many users are not aware of data mining practices and how to opt-out. Jessica says that:

> I guess I could say that Maps isn't very honest, we don't exactly know how it tracks us, there is no warning, no little message that lets us know our data is going to be used… It might be a clause we sometimes have to accept, but I don't quite remember… I'm not sure.

Jonathan, a savvy Maps user and an OSM user, explains how he feels about location reporting:

> I feel bad when I deactivate location reporting, because I'm using the service, and I'm exploiting that fact that 95% of people are too ignorant to know that their phones are sending localisation data to Google… I think most people aren't aware their phones are acting like this, and if most people knew, they'd deactivate the functionality. I'm kind of making use of other peoples' ignorance

> to have a service, which is really powerful! It's a real ethical problem, I'm always wondering about these kinds of issues.

He understands that his knowledge of GIS and data related issues is rather advanced, and later concedes that this is definitely due to his involvement in open source projects, and OSM in particular. Even Jonathan, aware of these issues and an advanced user of both platforms seems to have a complicated relationship with Google's services.

## 2.2 User-Contributors and Google Maps – an uneasy relationship

Even as Robert explains that he deactivates location reporting, and as Jessica explains that she finds location reporting to be a powerful tool that makes GM a better service for everyone, our users seem to have second thoughts about their contributions to GM. Often contradicting themselves, users paint a conflictual portrait of their relationship with Maps – in which they rely on Google's powerful mapping service, but at the same time are uneasy with the way Google makes use of their data.

After having praised the location-reporting mechanic, Jessica goes on to explain:

> It's definitely not explicit enough when you use Google Maps, that our location is being exploited… people are unaware that Google is using their data, but at the same time, knowing isn't going to make me stop using Google Maps… I don't think Google Maps is an exception, where always being followed and watched on the net, I really don't like the fact that this is happening, but I'm not sure how to escape it either. It's kind of like I don't have a choice, I'm going to be tracked if I want to use this application, which I need to use on a regular basis in my everyday life. The application is so useful that it's difficult to stop using it, even though I have issues with the way it works.

This statement, in combination with her statement attesting to the power of mining user data, shows that she is uneasy in her relationship with Maps as a user-contributor.

Robert on the other hand, after having expressed negative feelings towards Google Maps regarding the harvesting of user data, explicitly explains "I think Maps is worth it when I look at what I'm gaining and what I'm giving to Google". He goes on to explain that he hands a very large quantity of data to Google through their mapping service, including his home and work addresses, his tastes and habits, and his location. He explains that the only way to avoid handing over all this data would be to change service, and substitute Maps for a less powerful and practical service that would not ask for as much data – as he believes GM is the best service because of their passive data mining mechanics. He is not yet ready to abandon Maps, despite his strong feelings, explaining this as a form of laziness, or lack of willpower. He explicitly states: "Of course, like all other free services on the Internet, free being a very loose term, I have a conflictual relationship with Maps".

Jane, exclusive Maps user, is the user who feels the most comfortable with her relationship with Google's GIS. She doesn't feel particularly proud of her contribution to Maps, but she finds it normal that a service that costs her nothing financially has another form of cost:

> If I choose to buy a product from Quebec instead of a product from the USA, that's a strong choice, a statement. I'm going to use these apples and carrots in my cake… I have a strong feeling that I'm encouraging this local farmer through my purchase. I don't ever feel like I'm helping Google when I use Google Maps… It's useful, and it's a free service. Using Maps is similar to paying taxes to the municipal government – they offer a service, and I pay a tax. The tax with Google is that they exploit my data, and I'm comfortable with that.

When asked about the difference between contributing to Maps and contributing to OSM, David, a dual user, states:

> Yes, contributing to Maps costs me in privacy. OSM is different, contribution consumes time… I feel implicated, compelled, but not forced to contribute to

> OSM. Maps has a cost in the sense that Google is mining my data, which could one day, for example, help the police find me… who knows. The data is sent to the NSA and all that… Maps definitely has an invisible cost… it's a social cost, and a privacy cost.

It is visible in this statement that David is more at ease with his relationship with OSM than with Maps. This, to David, is explained by the fact that OSM requires active, conscious participation, whereas Maps is more insidious in its contribution mechanics.

## 2.3 OSM and its contributors

An open project, OSM is entirely dependant on its users – all the data is added by users, whether they themselves have mapped, or whether through importations of public domain geographic data. What drives these individuals to contribute can be separated into two rough categories. Firstly, we will look at OSM as a part of the larger open source movement. Secondly, we will go through other data that indicates that an open source ethos is often not the only motivating factor for users.

### 2.3.1 OpenStreetMap and the Open-Source movement

Whilst it may not be the only explicative factor, many OSM user-contributors interviewed have a strong penchant to support open source projects and services in a more general manner. Several of our interviewees described themselves as being strong supporters of the open source movement; Jonathan describes himself as an "evangelist" of open software and open data, John as an "open source militant", for example.

As a result, many interviewees mention other open source or open data projects during their interviews. Jonathan, when queried about how he came to know OSM, answers:

> I started using OSM because I was a Linux user, I develop scientific software for a living, and I'm always the faculty member who is trying to pull projects

> towards open source, to attach open licenses to our software. I think it was in 2006 that I stumbled upon an article discussing OSM on a site dedicated to open source news.

John recounts a similar experience. Fed up with cracking software in a proprietary environment, he is advised by a friend to switch to a Linux environment, where much more free software exists. After switching, and finding Linux and its related software more than adequate, John begins to see the ethos behind open software. When he begun to start using maps, OSM was an obvious choice. An avid Wikipedia contributor, Alice begins to use and contribute to OSM for similar reasons: "There's a noble idea behind OSM, a humanist ethos… Sharing and diffusing knowledge freely and openly are what interests me, which are the same things that interest me in Wikipedia". Harry and David also begin using OSM after having used other open source services and software.

During our discussions, some interviewees explain that certain users discover OSM through a passion for maps and geography, but a large part, and in fact all of our interviewees, begun using OSM after a broader introduction to open source services and open data. Jonathan frames his thoughts regarding the question interestingly:

> I build programs for a living, and I always try to liberate as much code as I can. There's something that just doesn't sit with me, when you produce an intangible good, whether it be software, music, text, data, in a digital format, and you charge for it when reproducing it costs next to nothing. That idea is for me a big motivator when it comes to contributing to OSM – I want to contribute to a project that won't charge users for a simple control C control V, copy paste of data.

At the heart of his motivation to contribute to OSM lies the fact that OSM data is digital – and is reproducible, recyclable, reusable to an almost infinite degree, for almost zero cost. John believes that OSM is an important part of the open source movement, which affects all aspects of his digital life:

> OSM is part of the broader open source movement, which includes open source programs and code, but also everything related to the Creative Commons and such. I think OSM truly has its place within this movement, upon which I wish only success.

### 2.3.2 OSM – a superior, more practical service

As well as justifying their choice to use and contribute to OSM on an ethical level, many interviewees believe OSM is (or has the potential to be) a superior mapping platform. Although our users express a strong link to the open source and open data movements, they also insist on OSM's distinguishing feature set which, in their eyes, make it a competitive GIS.

Jonathan mentions that although his contribution is linked to an ethos, he also contributes from a utilitarian perspective. John also admits his ethical penchant is a reason behind his contribution to the project, but adds: "It's also important to me that I can help someone, who say is travelling, and cannot access Google Maps because of a lack of connectivity. That's a very pragmatic example of why I choose to contribute to OSM". To Harry, the strength of OSM goes inherently hand in hand with its community sourced model:

> OSM has the potential to offer better, more precise data than a service like Google Maps, because it's local people with on the ground experience who are contributing. I like exploring Maps in Europe, and particularly in Germany – it's just crazy, the amount of detail that there is there. Together we can build something which can be much more useful that Maps. […] I dream of a day in 5 years or so, where OSM will really be a better mapping solution than Google Maps, and that people will start making the switch. Clearly, that's a goal of mine and something I'd love to see happen.

David explains that OSM enables users who have an obsession for detail to model a map exactly to their required specifications. Users who only want a map to represent the

density of fire hydrants, or of security cameras, for example, are able to do so without cluttering their map with unnecessary data.

Unsurprisingly, users find OSM's contribution tools to be much more effective than their Google counterparts, asserting that the tools are more flexible, more accessible, and easier to use than Google's Map Maker. Jessica, an exclusive Maps user, attests that contribution is difficult on Google's platform: "I might want to contribute, but I don't know how. It would have to be more accessible for the basic user like me… I just don't know how".

### 2.3.3 OSM contribution – selfish or altruist?

A lot of the discussion relative to contribution in OSM was centred on for whom contributors were contributing. Are users contributing for their own needs? Are they contributing for their community and the prestige of the OSM project? Or as an altruist donation of knowledge to the commons?

David explains his views on the question:

> Contributing to open source and open data projects is not selfish. Sure, often the contributions we make help us personally, but the true power behind these projects is that our contributions will help other users too! Often people will be focused around their own interests, sure, but there isn't only that. Many people feel a sort of calling, a real desire and necessity to contribute. I contribute to OSM because it's useful to me, but also because I know the data will be used on the local transport authority's website, and help other users do things I cannot even imagine. I feel compelled to contribute for myself, as well as for others.

Clearly, we can see that user-contributors add data to OSM for a variety of reasons. This reflects why users choose to use OSM – as explored previously – partly because it suits their needs, and partly by social or political conviction.

Alice brings a different view to the table. For her, it is not only about for whom she contributes, but also with whom:

> I probably contribute more to Wikipedia than to OSM… but it's because I like the idea of building something together, participating in a project, investing ourselves in something of value. I contribute with others, and also for others.

This highlights the idea that, for Alice, OSM is as much about the process than it is about the final result. She contributes for others, but also with others. She explains that it's important to create something together, and not only to use a finished product and criticize it when it does not meet one's needs.

Jonathan is proud of his contribution, and feels that part of the project belongs to him in a way: "A part of OSM belongs to me, I'm proud of all the data I've placed on the map. When I see data on the map I helped create, it's satisfying". David shares a similar view: "OSM doesn't belong to me, it belongs to everyone – but somewhere I think I can say there's a little piece of it which belongs to me" as does Harry: "Yes, there's definitely a desire in me to see my neighbourhood well mapped in OSM". Alice goes on to explain that the feeling of ownership is not what is important to her; and insists on the collaborative project aspect of OSM to justify her contribution.

Harry has a similar discourse to most of his fellow contributors, but also adds that to him, OSM contribution is like science: "Every time we push knowledge further, an application will be found for the knowledge – often at a later date. Someone might come along and create something great with data we've entered into the project. That's how i see OSM".

He goes on to explain that his contributions to OSM are like the LHC[7] - he is adding information to the database of human knowledge: it might not be useful right away, but someone will find a use for it someday.

Most OSM users interviewed tend to contribute exclusively in areas in which they live or work, which reveals, in a certain way, that users contribute at least partly in order to have a more usable map in areas in which they travel, live, or work. On the other end of the spectrum is Harry, who spends a lot of time contributing with the Humanitarian OSM Team (HOT). HOT provides other organisations with mapping support during humanitarian crisis (floods, earthquakes…). Harry explains why he chooses to spend hours contributing with HOT:

> When I contribute to HoT I really feel like I'm doing something useful. When you follow the mailing lists and everything, you get feedback from people who are working in crisis zones, it's really enjoyable and you feel a sense of purpose – more so than when I'm entering data into OSM in my neighbourhood, in which I think I'm the only user! People are usually pretty receptive to the HOT project, I feel it's my way of helping out, I'm a student so I can't help financially so I help by contributing to HOT. At the same time, it's not something I force myself to do. When I'm sick of contributing and helping with HOT, I can take a break – I don't feel obliged to contribute or anything.

Interestingly enough, Harry mentions fun when talking about his contributions to OSM. This is another element that often came up in discussions relative to users' contributions to OpenStreetMap.

[7] Large Hadron Collider: the world's largest particle accelerator, a multi-billion dollar project often criticized for its lack of applicable, useful results.

### 2.3.4 OSM Contribution – a fun, engaging activity

It was quite clear during interviews and group meetings, in an implicit manner, that users enjoy contributing to OSM. However, this came up in more explicit terms during several interviews.

Alice explains her view on the place of fun in the pursuit of her contribution to OSM:

> OSM really makes you pay attention to the city around you, to open your eyes. It's an interesting project because of the ethos behind it, but it's also a lot of fun. I'm not motivated enough to learn to code to help open source projects, it's something I feel capable of doing, but OSM is fun, accessible, I can help out. I'm learning about OSM as I help, it's pleasant to contribute during cartoparties[8], it's a fun way to learn. It doesn't demand too much time or effort on my behalf, and I still feel like I can make a difference contributing at my own level, in my own way.

To her, contributing to OSM is a fun activity, especially when it is during cartoparties. Also, seeing as Alice is not able to code, she is able to contribute to OSM – as she would not be willing to learn to code in order to support an open source project (she says this in a way that lets us understand that she finds coding boring and uninteresting). There is also the aspect that contributing to OSM is a good way to learn about maps and cartography.

Harry was the user who was the most insistent on the entertaining aspect of contributing to OSM. As well as acknowledging the utility of his contributions for his own use and for the use of others, he explains that he would not have been able to become truly dedicated to OSM if contributing were not fun for him. He compares OSM to a relaxing puzzle that

[8] Events during which OSM contributors gather and walk around a neighbourhood with the objective of adding as much new data (and correcting existing data) as possible.

one does after a day of work and study. Once again, he also compares OSM and open data to scientific work (he studies Physics): "I actually enjoy every little part of contributing, it's like scientists pursuing a research goal, without knowing if they're going to discover anything… you have to enjoy the day-in, day-out aspect of the work. If I didn't enjoy it, I wouldn't do it."

## 2.4 Why not contribute?

In the same way that users explain why they would contribute to a service, they also explain why they would not contribute to a certain service. This interview topic was mainly discussed with dual users and OSM exclusive users, and consists mainly of OSM users explaining why they chose to avoid contributing (passively or actively) to Google's Maps. However, there are also certain cases of Maps exclusive users explaining why they try to avoid contributing to Maps. Users refuse to contribute for several reasons, which we will explore in this section.

### 2.4.1 Ideology

Ideological or ethical reasons are one of the most common justifications for contribution as described by our interviewees – in much the same way, they express ethical and ideological concerns regarding contribution to certain platforms. Harry makes a comparison between GIS platforms and political parties when asked if he contributes to Google Maps:

> I feel an attachment to OSM, to the project. I see OSM and Google Maps as competitive services, even if they're not exactly the same… but yes, it's a form of competition. It's like I wouldn't go and help a political party that is opposed to my party of choice. It's based on ideology for me.

When asked to further develop his ideas, Harry seems at loss for words, and states: "I wouldn't correct errors in Maps… because… I simply don't like Google. I don't know

what else to say".

Alice and Jonathan both explain that they refuse to contribute to Maps for ideological reasons: they are both strongly implicated in the OSM project for ideological reasons, and contributing to GM, a proprietary, for-profit platform, is seen as contradictory to their ethos.

### 2.4.2 Maps: a proprietary platform

Many users explain that OSM's adherence to open data principals is at the heart of their motivation to contribute to the platform. In coherence with their preference for services that publish their data for anyone to use, users were also clear that contributing to a service not adhering to these principals didn't appeal to them.

David expresses himself clearly regarding this:

> Google Maps could disappear tomorrow, and that would be it. If there's another private player who enters the GIS market, and who creates a better product than maps, Google's service could simply disappear. Everything people have contributed would disappear. I would only contribute to Maps if I had a business – I'm not going to go adding places and objects to Maps because it would be time wasted, which wouldn't serve the community at large, and also because I wouldn't have access or power over the data I contributed. Google tries to encourage people to get involved with things like Map Maker, but there's definitely something strange going on… It's kind of like a trap. I wouldn't feel proud of having contributed to my neighbourhood map on Google's service. It doesn't belong to me, or to you, it belongs to Google. OSM isn't mine either, but belongs to everyone. I like to the think a little part of it is mine, like if it was my little piece of land. Google Maps isn't my map.

Amongst his chief concerns is the fact that Google can delete Maps' data at will, and users have no way of preserving the data they have contributed to the platform. David

brings this up several times during the interview, explaining that data contributed to OSM will exist for much longer than Maps data, which will cease to be accessible or usable when Google decides to shut the service – as they have several other web services in the past years – because OSM data can be downloaded by all its users and stored completely out of the OpenStreetMap Foundation's control.

Jonathan and Harry express similar concerns to those expressed by David – data entered into Google's platform does not belong to them, and is not open for everyone to use, but essentially belongs to Google, and can only be used and accessed via modalities entirely under the control of the web giant. Harry once again compares Google Maps directly to OSM explaining that the two platforms are competitors, and that his aim is to see OSM's open data become richer and more widely used than Google's closed database. For John, the question comes down to the fact that he doesn't want to be an employee of a proprietary data giant: "In a proprietary environment, my contributions no longer belong to me. I would be giving them to Google – and I don't want to work for Google for free! Or at all for that matter… It seems like common sense!"

### 2.4.3 GM: an unattractive contribution platform

Users express a variety of other reasons for not wanting to contribute. Jessica, an exclusive Maps user, explains that knowing that Maps belongs to Google, a giant web company, discourages her from contributing. Similarly, Jonathan explains:

> Google have enough money to pay people to make their maps better, if they really wanted to. […] Even if they paid me to contribute to their map, I wouldn't do it, because they probably wouldn't pay all too well and I don't really need the two dollars. I have time to give, but I prefer to give my time and my contributions to someone who doesn't keep them locked in a proprietary environment.

Alice expresses a similar opinion, and explains why she favours contributing to OSM over GM: “I would never contribute to Google Maps! It’s a commercial project… why would I? OSM isn’t a company, they don’t make money, and you can’t buy shares…”

Users also explain that there are technical limitations in Google’s mapping service. Jessica explains that she has never been able to find the functionalities in the service that would let her fix or signal errors in the data. Jonathan explains that when he began contributing there was simply no way for users to contribute to Maps – and that he thus turned to OSM, and has continued to contribute there since.

Several users also explain that privacy and surveillance are issues when discussing Maps’ passive contribution mechanics. David explains his perspective interestingly:

> To me, it makes more sense and it is more respectful to incite voluntary contribution over passive data mining which is hidden from the user, like a GPS logger. I could almost say that I don’t care about being tracked on Google Maps… but it does bother me. I don’t think people really realise the costs associated with what is called free software and services… They see ads, and perceive that as a cost, but that’s not what the real cost is. I don’t think this is a realisation many people have had unfortunately.

## 3) Exploring relationships through the concepts of Money, Data and Time

Throughout our interviews, with all our user types, the notion of cost was often discussed when users were describing their relationships with the two GIS platforms studied. The subject of cost, mentioned sometimes in concrete terms (dollars and salaries) and other times in more abstract ways (time, effort, data, exposure to advertisements) was often discussed when users were explaining their motivations to use and contribute to a certain platform (as well as in their decisions to not use or contribute). When asked to define

their relationship with their GIS of choice, users often describe the business practices (or lack thereof) of their chosen platforms. This will also be explored in this section.

## 3.1 Google Maps and OSM: free services?

### 3.1.1 Data & Money

As Google Maps has no direct financial cost to its users, users present interesting and insightful explanations of how they *pay* for the service. Robert, an exclusive yet cautious Google Maps user, proposes his view of his relationship to Google Maps, which he defines as contradictory:

> Maps is clearly not free, seeing as I'm providing Google with a lot of data about myself. We cannot talk about Maps as if it was a free web service, but yes there is no monetary compensation. If Google decided to create a system where I could pay 2 or 3 dollars a month in order to use Maps without Google using my personal data, I would definitely be ready to pay for it. I use the service almost every day; it wouldn't bother me to pay a few dollars a month in order for them to keep away from my personal data. Unfortunately, this isn't something that Google seems particularly interested in doing. I think I'd rather pay than give data because I believe data to be very valuable, and increasingly so. I don't want to give my data to any random web company that wants it in exchange for a free service. As soon as a company starts exploiting your personal data, the relationship, for me, becomes one of a certain type of conflict… Data is definitely going to be worth more and more as the age of information continues to become a bigger and bigger part of our society. Information is now power. And yes, I think that data is also money for these companies, and for me to – in the sense that I believe my data has a value, and the fact that I don't want to give my data away. Every service has a cost… I'd rather pay that cost in dollars than in data.

Here, Robert accords a higher monetary value to his data than Google does – and would thus prefer a more classical financial transaction to gain access to Maps. He believes that to companies like Google or Facebook, who draw the majority of their revenue through the monetisation of user data via targeted advertisements, data is indeed a form of money, or capital.

David, a dual user, presents a similar point of view. When discussing the possibility of a municipally owned GIS service that would be free to access, and funded through taxes, David points out that money and data are analogous. Citizens provide financial resources through taxes to the city, and in exchange, open data is presented to the citizens through a GIS – in essence, a return on the citizens' investments. Jane, an exclusive Maps user, presents a similar point: "It's convenient, the fact that the service is free. We pay taxes for services in the cities in which we live, if to use Google's services, they get to exploit the data that I give them, I'm comfortable with that". In the same vein, Jonathan has no qualms with the need to exchange data for access to Google's free services. However, he sees a problem with this exchange when it comes to government owned geographic data:

> Especially in the USA, there is a lot of data produced by the federal government. For me, it seems logical: we pay taxes in order to pay people to create maps and geographic data, but then they sell the data back to us… I don't understand. In Canada we have similar problems with the Crown's intellectual property. To me, this makes no sense… Canada is no longer a British colony… We really need to get rid of these issues.

Jane is the only user who feels that she pays for access to Google Maps in the more traditional sense:

> It costs me more money to have data on my mobile phone. Without data, and without Maps, I used to be able to get around just fine. I probably would use Maps more on my computer I guess. But now I have to pay to have data on my phone, so that's kind of a cost to use GM.

For Jane, Maps incurs an indirect cost through the necessity to have a data connection – several OSM users mention the opposite effect, explaining that OSM's offline accessibility means that they do not need to subscribe to a data plan on their mobile device.

### 3.1.2 Time & Money

As well as expressing cost in monetary terms, users also measure the cost of using a GIS in time. The relationship between cost and time is usually expressed relative to time spent viewing advertisements for Google's service, and time spent contributing for OSM.

As we have seen in previous sections, Robert is an exclusive Maps user who experiences a conflictual relationship with Google's service (and most other free to use web services), mainly due to the advertising based revenue model of Google's free services. Robert explains that he feels that the more he uses Maps, the more it costs him. To him, this is due to two things: firstly, that the more time he spends using the application, the more time the application, and Google, will have to understand him – the way he moves around in the city, the way he searches for things to do or things to purchase. Secondly, the more time Robert is exposed to the application, the more time he is exposed to Google's targeted advertising, a form of monetisation that he finds dangerous and unethical. Jonathan expresses a relationship between contribution time and money when asked if he would consider contributing to Google Maps:

> I have an ideological objective to have access to open geographical data, and I work towards that objective by giving my time to OSM. I contribute to OSM often, every time I see something change in the city around me, I go and check if it has been changed on OSM Google has enough money to pay someone to do that if they really want to. There's definitely an ideological side to it: if I contribute to Google, no data is being freed or opened; my contribution is forever in Google's closed garden. When I contribute to OSM, the data is available to everyone. Contributing to Google Maps doesn't really do anything

> for me. Their business model is selling advertisement in exchange for free services. Even if they offered to pay me, I wouldn't accept their money because I'd rather spend my time giving to OSM.

Here it is clear that the time he invests in OSM is seen as a form of cost, but that even if paid he would not contribute to Google Maps – underlining his ethical stance explored previously. John, an exclusive OSM user also explains that he considers the time he spends contributing to OSM as a form of cost. To him, the time he spends contributing has a similar value to a monetary contribution.

### 3.2 Maps and OSM: at heart, two different services with different objectives

Aside from underlining the defining role of money and data in their relationships with GIS services, questions relating to money and finance were also frequently brought into the discussion when users aimed to define the nature of Maps and OSM.

All OSM users and some dual-users interviewed have issues with the fact that Google Maps is a commercial product that exists to generate revenue for a multinational corporation. To these users, in comparison, OSM was seen as a not-for-profit project, often conferred quasi-charity status. Alice explains that she would not contribute to Google Maps because it is a for profit service. In contrast, she sees OSM as a service with quasi-charity status. This duality David has a similar point of view, and explains that he feels Maps is a commercial product when using it – contrarily to how he feels about OSM. John adds that he sees, in a way, OSM and Maps as competitive services by their nature:

> Several times in the past couple years Google has had to cut the prices of their maps, and I think one of the reasons behind this is that OSM is getting to the point where it is equivalent or superior to Google's solution, only free. This kind of dynamic is something that interests me and motivates me to contribute, I must admit.

Jonathan, a dual-user, explains his views on the topic:

> When I think about the trust I have for different public and private bodies, I definitely feel I have a tendency to trust someone who isn't making money from my data, who isn't paid to look after my data, over someone who is monetizing it. Someone could pay Google to have access to their database, which contains information about me; all that's stopping them is the fact that they'd certainly lose users if people found out about it – which would make Google lose money. I don't think there's someone in charge of thinking about the way our data is used at Google, who says 'ok we shouldn't be doing this' or 'this is ok, let's do it'. I don't think I subscribe to an anticapitalist ideology; it's more utilitarian than anything else. Once something has been produced, and the reproduction of those goods costs nothing… it doesn't sit well with me to charge for access to something like that.

Jonathan clearly objects to Google's monetization on two fronts. Firstly, he believes that it is unfair to charge for virtual goods, which can be reproduced for almost zero cost. Secondly, he feels that a monetized system is inherently less trustworthy than a service that isn't driven by profits. Many other users share this vision when it comes to comparing commercial products with public, government owned services, as we will explore in the next section of this chapter.

### 3.2.1 Monetization of OSM

John, an exclusive OSM user, is highly engaged in the project. He, more so than most other interviewees, is interested in the development and future of OSM as a project. He isn't only interested in the growth of the database; he is also interested in the evolution of OSM as a project, and as an organisation. Notably, he is concerned with the financial future of OSM, and the increasing involvement of private companies in the project:

> I'm not necessarily on board with some of the choices made by the OSMF. I'm a member of the foundation, and I pay a yearly fee of 35 pounds… Membership is open to everyone. There are sometimes discussions through mailing lists that freak me out, like people discussing monetisation, putting advertisements on <osm.org>… so far these are just discussions, I hope they don't ever become anything more. If that happens, I think it will be time to fork[9] the project […]. As the project advances, the bigger the part played by private companies becomes. These companies are having a large influence over the evolution and future of the project, as they participate in the OSMF, mainly by developing quality tools that are then put back into the commons and can be used by anyone. I believe this is belittling the voice of the common, standard contributor within the OSMF. I want the average contributor, the average citizen to be represented and heard within the OSMF. Civil society needs to play an important roll in the continuation of the project; or OSM will become a tool of private companies, and nothing more.

John has not paid for the application he uses, OSMAnd, preferring to compile it himself. However, he is the only user interviewed who has paid the annual membership free to the OpenStreetMap Foundation.

### 3.2.2 Government GIS and private GIS: a monetary difference?

As the interviews progressed, questions turned increasingly to the possibility of the existence of a government owned GIS and its implications. Here, we will explore interview data that differentiates government services from private services from a monetary perspective, before exploring the subject more broadly in our next segment of this chapter.

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[9] Often, open source projects split into several separate projects when different user-contributor groups have incompatible visions of the direction the service or program should take. This is called forking.

Harry explains his perspective: "Yes, I'd be ready to hand over data to the government, if its to the right people and that my anonymity is guaranteed. When data is used in a context other than to make money, I have trouble imagining what wrongdoing could be achieved". Alice shares a similar perspective:

> In the end, the difference between a potential public mapping system and Google Maps is that the public, city-run system would not be aiming to make a profit. In the end, some of the problems are the same however, like having to hand over a lot of data.

Jonathan presents a more nuanced view of the issue. To him, in a private company, a few powerful people make most of the decisions unchecked, leading to risky situations when it comes to the exploitation of user data. On the other end of the spectrum is an organisation like the OSMF, where even a single dissident, unhappy with a decision can have a large impact on the way the project is managed (by deleting resources, or creating public awareness of an issue). In between these two extremes rests government projects – where money is not a factor in the same way it is in private industry, making changes that could be harmful to users happen more slowly – thus creating more opportunities for individuals in the organisation, or end users, to oppose changes. We can see that the very nature of an organisation, defined by its relationship to monetisation, have a large impact on the way Jonathan understands different types of organisations. John presents a similar point, explaining that the problem is with the longevity of choices made in the private sphere:

> I'm definitely more inclined to trust a public entity than a private company. I believe things like healthcare and such should be dealt with in the public sphere... I think seeing the city as a continuity of this sort of thing makes sense. The city is a public domain, and the city could very well offer some kind of mapping service. It's exactly what the city is there to offer! I think an important point is that the city doesn't have to handle monetisation or profit; they do not

> need revenue to survive in the same way a private company does. A company can be totally ethical one day, and a few years later decide that they can make more money by doing something that could be considered unethical…

This brings us to the final section of this chapter where we will discuss and explore interview data related to how users feel about subjects related to open data, government use of GIS technologies, surveillance, and the role of community projects in the public sphere.

## 4) Groups and Governance:

In this final section of the chapter we will explore data pertinent to our final set of analysis themes: citizen participation, surveillance and privacy, trust in private and public entities, and the differences between crowd and community sourced models of participation.

During our interview, Harry underlined the importance and political significance of Maps (which we will explore in this section) when asked about the way public bodies use mapping services and technology:

> I once read an interesting article, a blog post about OSM, which explained that maps in general kind of define the world in which we live… the person who creates and owns the maps is going to have a big impact over the way it develops… cities will use the maps to build new suburbs and roads. There's definitely a political power in maps.

### 4.1 Digital citizenship and participation

This first theme was an important part of the third section of our interviews. When asked about the intersection of government bodies and geographic information systems, users

answers were highly heterogeneous; including answers relating to open data, local politics, how to fix the pothole problem in Montreal, participation in elections, etc.

### 4.1.1 A government owned GIS

During our interviews, users were asked to imagine what a government owned and exploited GIS would imply.

Several users begin by explaining that the level of government involved in the creation or operation of a GIS would make a big difference to them. Jonathan explains how he feels about the creation and operation of a government owned GIS relative to the level of government involved:

> If the federal government launched a GIS, I would have a pretty strong tendency not to use the service I think. The same goes for the provincial government. I think if it was being run at a municipal level, I might get involved and use the service. The difference I guess is that the City of Montreal doesn't have all my financial data, and all that kind of stuff. There's a lot of data the municipal government doesn't have access to. They would have to be able to convince me that they wouldn't send any geolocation or use statistics to higher levels of government. […] Of course, there's also the issue that even without any bad intentions, the more users there are participating in a GIS, the more effective it becomes… which might encourage cities to share data, to cross-reference what they know about us to make the service work better. If it starts becoming a provincial thing and the cities lose control, I would stop using and contributing to the service straight away. I guess they could convince me, but it would have to be a pretty awful system for me not to be worried. As soon as it works well, and becomes efficient, and attains a higher level of government, I would opt-out.

We can see that the level of government involved is important to Jonathan. We can also see that party politics has an effect on the way Jonathan would envisage a government

owned GIS: he mentions that "now" he wouldn't be comfortable with a federal service – in other parts of the interview, he expresses his discontent with the current federal political situation. Harry expressed a similar opinion relative to the level of government that could be involved in the creation, or operation of a GIS:

> I think that we need a system with as little intermediaries as possible. If it was only the City of Montreal that was offering a GIS service, and they were able to guarantee that only they would exploit the data, that the data would stay within the city, and that our anonymity was guaranteed… that my identity would be transcribed into a code, a number… I don't want them identifying me by my name.

Robert adds a similar thought:

> I think we need to nuance what you mean by public entity… if it was only the City of Montreal that wanted access to my localisation data through some form of GIS, I don't think I'd have an issue with that – but I would like to know exactly how the system works and what they're doing with my data, to make sure it's only used for public infrastructure, and such… And I would also want the system to be anonymous, that's a big condition for me. Probably even the biggest condition.

Users often felt the need to explain their feelings towards a potential government owned service by comparing it to the current norm – privately owned services. Harry explains that he would rather see the government create a service alone, without contracting or interacting with private companies:

> I don't know if it would be positive to subcontract or work with a private company if the city wanted to create a GIS or have access to localisation data… I don't think it would be a good thing. The city should create and exploit their own data… if they were to buy data, for example, from Google… I think it

> would be the taxpayer who would lose out in that agreement… as Google is a company that exists only to make money. I'm not sure what the best way to create a public GIS would be… it would be hard for the city to convince people to install an application which would enable them to collect data for planning and infrastructure purposes. It would definitely be interesting… I wonder what they use currently, for example to route ambulances and such, if they can know exactly what is happening on the roads at any given time. Maybe they use Google Maps.

Alice has a conflicted opinion of the matter. To her, having the ability to chose is very important. Alice explains that it is the role of the public sector to propose alternatives to private sector services:

> I think it's important for cities to contribute and become involved with projects like OSM, but also to create their own sometimes… the European Union created a search engine to create some competition for Google, for example… I think it's important for the public sector to become involved with things like that and not let the private sector have free reign… For example cities and governments create archives, which are stocks of data… they take it upon themselves to preserve and distribute the information.

However, faithful to the importance she places on choice, she believes that a public sector GIS alternative should not follow in the footsteps of current market leaders. She explains that companies like Google and Amazon aim to guide users' choices using a form of digital blinkers that exist to change users' perceptions of their choices and possibilities. She explains that a local government operated service would do the same thing; for example telling its users the fastest way to go from one place to another, or the best place to buy lunch, which she sees as negative – Alice believes peoples possibilities and choices should not be dictated by a service. However, she still believes that having the choice between a privately operated and a publicly operated service would be a positive thing for GIS users.

Many users thought, when queried, that a city-operated GIS could be effective and useful to citizens. Harry embodies most interviewees views' when he states that "Yes, if the city started a GIS, from the moment that it's of noble intention and that everyone can benefit from it, it'd be happy with that". However, most interviewees don't believe a government created and operated system is an optimal solution.

Harry thinks that the city should, instead of building a system from the ground up, contribute and sculpt OSM for its needs. Similarly, Alice explains that a city owned system would be impractical:

> It would take a lot of effort, the way I see it… it would require a whole strategy, teams would need to be recruited and formed. We need to focus on changing the way we think and act. For me it's a question of responsibility, I think people need to participate, along with the city, in the improvement of the public space. It's important to encourage people to contribute, to invest their time and effort into public life. The city should create a broader, neutral project, which people can then adapt and use in any way they want, to do things that are precisely interesting to them. […] The city should be encouraging projects, should be pushing people to contribute themselves, and build applications like some that we have made, or the one David developed for Montreal's public bike stations… The city should be saying, if you want, I'll give you the possibility and framework to report problems. People can then report problems that they care about, so if you're a cyclist, you can report issues relating to that… those who aren't interested aren't forced into anything.

David, whilst admitting a city run system could work, also expresses misgivings about the city's ability to launch such a complex service, as well as fears about what would happen with user data:

> It's safe to say the city doesn't have every expertise, doesn't know how to do everything. It would be acceptable to me that they could call upon local entrepreneurs to help when needed. It would be acceptable for them to have data, GPS traces of users… but there would have to be clear limits regarding what can and cannot be done with the data, what the entrepreneurs can see and do with the data… and especially limits regarding what people cannot do with the data. The data, which is paid for and created by public money, should never be used by private companies for their own profit. The data would be ours, would be the city's, and would be created by us. It would be our data. That's the charm of open data.

Jane believes the problem with a city-operated system would not lie in the technical details, but more so in the approach:

> I think the technical aspect is important… but it would mainly be the approach for me, when the city would try to sell, to explain the system to us, to get us on board… the political approach, explaining everything clearly, all that would be very helpful I think. That's what's important to me. The city needs to explain why they're getting involved with digital services, what the goals and benefits are.

### 4.1.2 Citizen participation and communities

When pointing out that the government wasn't the ideal body to implement GIS services for the good of the city and its citizens, several users explained that they believe small to medium sized communities of user contributors will (and should) play a large role in the creation of smart cities.

Jonathan explains that he would prefer to see a community project create data sets that could then be exploited by public office to solve problems in Montreal, rather than see local authorities collecting data about citizens' whereabouts:

> If there was an open data, open source kind of group, who made an application that would turn my cellphone into a location tracker… and put all the data into an open data base that everyone has access to… I would be interested. If all they did was gather data, anonymize it and protect it, I would probably trust them and be happy to participate in such a project. I would install their app. Doing the same thing with Google scares me a bit… […] But if it was an open project, kind of like OSM, with volunteers giving their time, with a secure, encrypted application – so that the data is encrypted from the get go – and if their only goal was to collect this data for the public good, then I'd do it – if it wasn't connected a government. […] I think that if we all do our part, we can totally bypass the need for government intervention and we can get to the point where the government, instead of saying lets spend 50 million dollars to map this region, would simply participate in an open project that belongs to everyone. They'd say, look at what these people are doing, their service works really well, the data is of really high quality!

John shares a similar opinion, and explains that he sees an important role for community projects like OSM. To him, citizens can become involved in public life by contributing to citizen-operated projects which in turn can be utilised by local authorities or government bodies: "That's why people get involved with projects like OSM, it's so what they build might get reused at a larger scale, with a broader impact, which will benefit everyone". To him, it is important that individuals' needs remain as the heart of the project's vision and direction. He explains that increasingly, private companies are playing a role in determining the direction of the project. As John sees it, this poses a problem; firstly, because he sees OSM as a service that caters to the needs of its user-contributor base, and, secondly, if the project is then mobilised by public entities, it will be tainted by corporate interests and influence. John insists over the course of our interview that OSM is a project that is built by and used by a base of individual user-contributors, a community of mappers creating a service for the common good.

Alice sees the situation differently, and explains that local government bodies should be

there to support community-led projects:

> I think citizens, people should be the ones who create specific applications and services – anything that's public belongs to everyone… what the public sphere should be offering is neutral projects, things that can really benefit everyone. They should be there to encourage people and open the possibilities, to create opportunities others can exploit. I don't think the city should be creating such specific projects, the questions should be how can the city and the government help projects that already exist. For example the city can make an effort to give as much data as possible to citizen projects, to open as much data as they can… The city should be there to open the field of what is possible, not to propose specific projects or solutions. The city belongs to everyone. Specific projects should be citizen-led.

Again, this is explained by the importance she places on choice. She believes the city should help people and communities realise their projects, but should be forcing particular services or solutions onto users.

### 4.1.3 Citizen participation and government

One of the main themes discussed in this section was citizen participation. This topic often begun to appear in interviews when users were talking about how GISs could help the city run more effectively, and how users often felt the desire to help the city improve its services. For example, Jonathan states:

> I would definitely install an application made by the city that would let me actively contribute and say, 'here there is a pothole in the street, come and fix it' and to be able to send a photo for example. I would definitely be willing to contribute to a project like that and I believe some cities are already implementing similar solutions, some using Twitter for example. Jessica agrees, explaining that if a GIS existed that could help the city's services run more efficiently, she would use it.

John was particularly vocal on the subject of citizen participation and GIS technology:

> "I think I'm quite receptive to anything concerning citizen participation today. If everyone participated, contributed, in the two areas they go everyday, their home and workplace… it would be great. I'm now at a stage where I've contributed to OSM much more than I've used it, because I do a lot of semi-automated data imports. I think that geolocation in general is going to have a huge impact on our lives, and that a lot of different services will appear over the next few years. The government has done its job by creating satellites that enable us to do great, new things. I think its now up to local communities to participate, and I'm really happy to see that it's starting to pick up. Here, in Montreal, during the last elections, the elected mayor had a part of his platform dedicated to that kind of thing… I was really happy to see that. I think that the digital natives are now coming of age and participating more and more in political life, and it's definitely going to have a big impact over the way that things are run in the next few years, in a general way. I'm happy to see that things are happening locally, here in Montreal and Quebec. There are a lot of people in City Hall who really want to change things, to make a difference, to put data into the public domain, to help open source projects. But unfortunately there's still a lot of bureaucratic issues and red tape that is stopping this from all happening efficiently – I think it won't be an issue in a few years.

Alice explains that she sees participation in GIS projects to be a new form of political participation, akin to voting or other civic duties:

> We can see that across the board, people are voting less and less… participating in these kinds of projects is another way of participating in politics, of engaging with the public sphere. It definitely is a different way of thinking about what it means to be a citizen. I think the city and government need to have an

> educational approach, to help people understand, to make people feel like they're responsible for the city they live in. I think that in general, the people I know who work in public service aren't yet aware of these kinds of issues and problems… I'm not sure they're ready to start working on these kinds of projects, with these new ideas and notions. I don't think it's going to change very quickly either, making something like a city run GIS a long way off. I think a better solution is something, for example, that lets you say when there is a problem in the city, a pothole or something. This makes citizens feel like they're responsible for their city… that they have to help find the solutions. I think it might be a little bit utopic, but I think it's possible… The city needs to find ways to let people contribute to public life in little ways like that. Things like services that let you know if there are any bikes parked in a particular location, or if there are any public bikes in X or Y area…

Sharing a similar opinion, David explains that participative GIS services are an open invitation to citizens looking to contribute and participate in local public affairs.

Many users mention that they prefer to participate in an active manner in their local communities, rather than in a passive way (contributing to statistics etc., like Google Maps' user contribution systems). Harry explains how he feels about participating in public affairs and the link to open data:

> I want to be able to chose what I get involved with. I'm definitely going to be more motivated if I'm able to choose the way I participate in public life, it'll give me greater pleasure and energy to contribute to something targeted that I care about. I want to be able to choose, to be asked what I want to help with. I see open data like a return on the taxes we pay… a form of redistribution, of retribution. I don't think it's something we're exactly entitled to, that's taking it a bit far… but transparency is very important, and adhering to open data practices is a good way of attaining transparency.

## 4.2 Surveillance, privacy and trust

Although they were not subjects explicitly discernible in our questions, surveillance, privacy and trust were often mentioned and sometimes discussed at length during interviews with all our user types. As these issues are all intertwined (lack of trust often ensues from fear of surveillance for example) we will broach them simultaneously, aiming to understand each interviewees take on the subjects.

Jessica has a mixed opinion on the matter. As she explains, she thinks surveillance is negative and resents companies and governments that track their users and citizens respectively. However, she believes new technologies, such as GPS tracking integrated into a smartphone, could present important advances for local authorities in the way they manage traffic and road systems. She is aware that there exists a point of friction between anonymity and usefulness of a database, explaining that unfortunately, in her view, for data to be useful, it cannot be fully anonymized. Jessica also mentions that she feels current forms of user tracking aren't explicit enough. She explains, in a non-direct manner, that if surveillance and tracking were more explicit (whether done by private companies or government bodies) it would bother her less, as she acknowledges the legitimate usefulness of these mechanics for certain purposes.

Alice has strong opinions regarding surveillance, in line with the importance she places on choice:

> If we discuss the example of your phone logging your location every 30 seconds, it definitely scares me to think that the city could have access to data like that. It scares me as much as thinking that Google could have data like that about me if I had a smartphone. The fact that it's the city does not make me feel less scared and worried. […] I find this pervasive surveillance horrible, the fact that companies and governments want to control everything all the time. It's a personal thing I guess. But I don't like having things that organise my life, that

> control me. […] If the city started doing things like that… you wouldn't know when they're looking, you don't know what data they're saving, or how they're using it… You feel like you're useless, that you've simply been mined of data for no purpose. If we let people contribute actively and choose what they want to do, the dynamic is inversed.

To Alice, surveillance leads to suggestions and control, which means a loss of choice – something she values highly.

Harry explains how he feels about private companies and their use and collection of his data:

> I stopped trusting Google after the PRISM scandals. People keep telling me that I should have nothing to hide, but that's not even the problem, it feels like… Big brother is watching me or something. I can't continue using services which make me feel like that. The same goes for Apple, Microsoft, and all the big American web companies. When you don't need a judge to search through data that relates to a particular person it's clearly a problem. […] Google decides what Google does at the end of the day, and it is a for-profit company, which exists to make money. They don't care about ethics or what is right. When I have to use Maps, I connect through Tor… at least I try to, sometimes it's a bit slow so I have to connect normally, but I try to use Tor whenever I can.

Concerning government exploitation of his data, he adds:

> Honestly, I trust the local government much more than I trust the American government or Google for that matter. There are government watchdogs which make sure that everything happens the way it should, they can't do whatever they want – we as citizens have an influence over what they do too.

We can see, as we have in previous instances, that the PRISM scandal has left Harry feeling jaded about the US government, as well as most of the large American IT corporations. He also feels that a use of his data by local authorities would be less invasive and more ethical.

Jonathan explains that his acceptance of a government-operated GIS depends mainly on the trust he has for the body that creates and runs the service. He explains that he doesn't trust private companies in the same way as he would a locally run government service, or a community run open source project:

> What worries me is privacy. When I deactivate location reporting on my phone, I do it mainly because I distrust Google, not because I feel particularly strongly about that kind of data. Every time an app tries to access my location, I deny the request… The issue isn't with the data; it's with the fact that its exploitation is determined by often badly written and unclear privacy guidelines.

Once again we can see that the difference comes down to the monetisation (or lack there-of) of a service:

> When I think about trusting a service provider, I definitely think I have a tendency to trust an entity that isn't making money from my data or my usage over one that is. Some other company could pay Google to gain access to its data, there isn't much stopping Google from accepting such propositions, aside from the fact that they'd probably lose some users, and as a result they'd lose some money. I don't think there is really a system in place within Google which is capable of deciding whether something is ok, whether something is ethical or not. In an organisation where everyone is volunteering his or her time, everyone has access to the core system that runs the service… All it takes is someone who believes that what is happening is wrong to pull the plug and stop everything.

Jonathan continues to explain that the problem to him is the concentration of data by one

player. Once an actor (whether it be governmental or private) has too much data about him, he feels like he would lose trust in said organisation:

> It depends who is running the service… if it's just the municipality, then I might be interested… if it's a group of cities, or a provincial or federal government, I would be concerned and not willing to participate. The issue here is the concentration of data that one public entity can have… the federal and provincial governments have lots of financial, legal, insurance and healthcare information about me, for example. If I also hand over my localisation information I'm worried that my data could be cross-referenced and used against me, or other people. They could say 'you only declared 70 000$ in revenue last year, but I can see you're often around this factory, what is that about?' It's a bit stupid, but it could happen. If it was Quebec or Canada that was running a GIS or a similar service, I wouldn't participate and I'd even encourage people I know to stay away from it – it just gives them too much data. It's better now that Snowden has made his revelations, before when I'd mention this to people, they'd call me paranoid or crazy. Now it definitely seems possible, possible that we'll see other governments misuse citizens' data. I don't think its fair or right to say that governments are above this kind of thing, they clearly aren't. […] If your insurance company, for example, always knows where you are, they could cancel your contract if they see you're going rock-climbing. That kind of dynamic is dangerous and wrong.

After our interview, Jonathan continues talking about this point, explaining that in the US and Quebec, some insurers offer decreased premiums to customers willing to install a GPS tracking device in their vehicles (in order to determine speed, for example, at the time of an accident). He believes this to be unethical and not a practice he would engage it, whether it is with a private or public insurance body. Jonathan also has increasing problems with mobile phone manufacturers:

> I know that my phone company can ask my phone at any time for its coordinates and know where I am… it annoys me that on my new Android phone, I can't

> completely turn off geolocalisation. Before, you could totally switch it off, and no service or application would be allowed to access your location. It's a question of privacy, and there are laws that protect us from the government a bit… but there are many less laws that protect us from companies like Google.

John presents a highly nuanced and technical view of the matter of tracking and surveillance by private and public bodies. He begins by explaining that one of the main reasons he does not have a mobile phone (he uses a WiFi-enabled mp3 to use OSMAnd) is to avoid being tracking – signalling that, when it concerns him personally, he is against most forms of tracking and surveillance. However, he admits the utility of tracking services, namely in the improvement of public infrastructures, but offers a technical distinction to differentiate what is acceptable and what is not:

> I think I would be very bothered if the City decided to track me. But there is a nuance to be had. For example, it is acceptable for a police car to scan licence plates automatically to search for stolen cars. But only if the database of stolen cars is actually present locally, inside the computer which is in the squad car. Every morning, the car can download a new list of stolen vehicles that have yet to be recovered, and then when licence plates are scanned, they are cross-referenced locally with the data on hand. It is however unacceptable that the police vehicle is constantly connected to headquarters, and asks every time it scans a car, "this car was here at this time, is it stolen or not?". Because with this kind of dynamic, there is a data trace left that X car was in Y place at Z time. This is pretty much unavoidable, there will be traces left in the system. If we look at parking, it's fine if the city is able to simply say 'yes or no' this spot is available, and I think that cities should start doing that kind of thing to avoid letting private companies fill too many gaps in the way our public infrastructure works. I think it's something that's happening… the municipality needs to get involved with this kind of thing, to modernise the city, and not just wait for a private company to do so. I don't think that kind of system would be too intrusive.

Similarly to Jonathan, who also has a good technical understanding of such issues (both John and Jonathan work in IT), John has issues with the consolidation of data by one company or government agency. For a government GIS to be effective, he adds

> For me, the police and other similar agencies aren't part of civil society. Of course, this doesn't stop the transfer of data from civil society to law enforcement, but I believe it should be totally illegal. The nuance is in the laws, and I don't think it's right for a citizen to be spied on without the intervention and OK given by a judge in court.

To John, one agency must not consolidate too much user data, and data mustn't be shared between civil and non-civil agencies.

John even goes as far as to explain that he would rather see a local government offer GIS services rather than private companies, envisioning a greater role for public agencies in the GIS arena. This is mainly due to a lack of trust he has for for-profit driven enterprise, explaining that something that a company that could be considered ethical at one point could easily slip into unethical and dangerous behaviours in the name of profits. However, he adds that he doubts the city would ever need such precision when it comes to tracking inhabitants with the objective of increasing traffic flow, explaining that the negatives (being tracked) would still outweigh the positive gains (a better traffic system). John believes the current system (using traffic cameras and weighted red light stops) provides enough information to local authorities.

David shares some similar opinions on the matter of mobile devices, surveillance and data collection. He carries a mobile phone with a data connection, but realises this makes him traceable to companies like Google who's service he sometimes uses:

> If I turn off my mobile phone, I become invisible. Maps definitely has a cost, especially when I'm connected to the Internet. […] I'm sure data is aggregated by Google, and certainly sent to the NSA and everything… although I could say that I don't really care that much about being tracked by Google…

Although it is clear he feels conflicted about the issue, David doesn't feel as strongly about private companies tracking his movements as John and other interviewees do. Also a savvy GIS user, David discusses the pros and cons of mobile-GPS tracking, and draws a fine line between what is a proper and efficient use of data, and what he considers invasiveness:

> The only way of collecting this kind of data in a respectful, ethical manner is to group the data into statistics and averages… but then you lose the individuality of the data, rendering it less useful. […]. It would be intelligent for the city to have more data about the movements of inhabitants, but unfortunately I think it would only be OK if the data weren't open. It's sad to say… but it's not the kind of data that I want to be accessible to everyone. It would be too easy to identify a car and determine its trajectory. But yes, it would be useful to improve urban planning and public transport systems… We could make certain systems in the city much more efficient than they are now. But you can't do whatever you want with the data once it has been collected, there must be strict limits to what can be done, restrictions over who has access to the data, and for what purposes. I think there are many governments that wouldn't be capable of creating and adhering to the strict rules that would be required… so I guess I would be for public data collection, but the data would have to stay closed, and be strictly monitored and kept under lock and key.

He admits a government GIS with tracking capacities would not be able to adhere to the open-data ethic as it would be too dangerous and too costly in privacy for users, and he explains why:

> I don't think I could really support a usage of location data if it were open… it makes no sense. The crazy thing is that when something is anonymous, it can actually give a huge amount of data and information about someone! Someone that follows the way you move about the city could cause a lot of issues, and I find that implementing such a system would be a lack of respect for a city's citizens. Namely it would be a lack of respect for the privacy of its citizens. You cannot anonymize data like that… even if you change people's names, addresses, you can always figure out profiles. There are ways of reversing the work that has been done to anonymize the data. This kind of data can thus not be open.

David also sees data collection by private companies and public bodies differently. He explains that it is quite an ambiguous situation: on one hand, private companies have a lot to lose if user data is misused, or stolen (loss of users). On the other hand, the terms of use are explained in a legal document that has to be agreed on by the user. For public bodies, David sees the situation quite differently, explaining that a public body has less to fear if it is discovered misusing or losing data, as citizens will be quite powerless to react in a way that will harm the governments efforts (the government cannot "lose clients" in the same way a private company can). However, David says he would probably feel more comfortable with a government mining his location data, as the terms of use would be signed into laws and acts and governed by the constitution, rather than a simple document produced by a company's legal division. At the same time, he feels that it would probably be impossible to opt-out of government location tracking or another similar mechanic, as is it possible with private companies[10].

David also adds a new perspective on the question of traceability and contribution to GISs, explaining that even contributing to OSM makes him traceable:

[10] For example, in Google Maps' mobile applications, it is possible to turn off location reporting, as mentioned by Jonathan previously.

> I've uploaded GPS traces to OSM a few times. I definitely lose a part of my anonymity when I do that. For example, even just by looking at my contributions, you can see that I was in London during X period, for example. You can see I was there because I contributed there when I was travelling. This data that indicates my location is going to stay in OSM for a long time, who knows how long, and it definitely is a loss of privacy for me. However I'm doing this voluntarily, I'm tracing myself, individually. Clearly, it would be easy to figure out where I live too, because I contribute a lot in the neighbourhood in which I live. If I moved, I'd started contributing in a new area, and you'd be able to deduce that I have moved pretty easily. I don't think that was something I realised when I begun contributing, I don't think I realised I was giving up a part of my private life by adding data into OSM, it wasn't obvious. But clearly it's a more respectful of privacy when a contribution is voluntary… a hidden or passive form of contribution, like a GPS logger, isn't as respectful.

Jane and Robert are both users of several Google services, and both share a similar level of trust in Google. Jane also believes information should be free, and that in a certain way, people shouldn't really care if a company or government body has access to their location – however she would like be able to opt out of such tracking for certain purposes.

Robert's opinion is more nuanced. He trusts Google with his location data but would potentially prefer to hand over such data to a government agency:

> I guess I've chosen to trust Google over a lot of other companies and services. […] I trust them… I was going to say I don't have the choice, but I guess I do – I have the choice to use services that aren't as powerful that don't harvest as much data about me. I've chosen to use the more powerful service in exchange for my data… I guess for me, the main danger in these kinds of dynamics is targeting advertising. I'm not really handing over any very sensitive data, there is nothing about my political opinions, or anything really personal, which I

> would never give to anyone in exchange for a service. […] Giving over localisation data doesn't bother me that much, and I can't really see how they can exploit that kind of data commercially. I guess there have been issues, recently, with the NSA and everything… I guess the data can become sensitive in the case that it is given to governments, where they can be exploited differently… not a commercial exploitation but more a security or law enforcement related form of exploitation… Google has definitely messed up concerning that kind of stuff, but they said they'd stop. I don't know if they really want to stop giving data to the government, or if they really even can stop… But it definitely bothers me that my data is seen and exploited by a government.

Jane shares a similar opinion, explaining that she has no problems with handing localisation data over to government agencies if security and police departments do not use it. Robert agrees, explaining data should not be used by security and police forces. He is more pessimistic than Jane, and envisages situations where he would not want to the government to have access to his geolocation data:

> I definitely have a problem with the surveillance of citizens, with the policing of populations. People will always say, don't worry, you have nothing to worry about, but that doesn't change anything, that's not where the problem is. It shocks me profoundly, I don't want a government to know where I am, or what I'm doing, and as a citizen I am completely against such practices. My right as a citizen is that the government has no oversight over me, no vision of what I'm doing and where I'm doing it. That kind of thing definitely shocks me when it comes to governments and the public sphere, but its clear to me that the private and public sectors are both totally different and separate. I don't think there are many cases in which the government will exploit data relevant to one person in particular… I guess it must happen, and even if today I have nothing to hide, maybe in ten or fifteen years I will be a political dissident, and I will decide to

> oppose a government I deem illegitimate… and I definitely wouldn't want them to have that kind of data about me.

## 4.3 GIS services: crowd sourced or community sourced models

As interviewees described their relationships and their visions of Google Maps and/or OpenStreetMap, it became clear that users of each platform perceive their roles within each GIS differently.

### 4.3.1 OSM: A community run platform

OSM users and dual users were the most vocal about their feeling of belonging to a group or community of users. Some users see OSM as a community (and database) building endeavour – John states clearly: "OSM exists simply to collect data and form communities".

Several users mention that they contribute to OSM to help others, as well as themselves. David explains that he contributes for himself, at a certain level, by for example adding data to OSM that is directly useful to him – for example to navigate home by car. He goes on to explain that often personal contributions made to collaborative projects like OSM are often centered around personal interests, but that the power and beauty of open source and open data projects is that a so-called selfish contribution can also help others. He explains that every contribution belongs to everyone, so even if a contribution is selfish, it will still help other people in ways he cannot imagine or predict. Alice agrees that contribution isn't only driven by selfish desires, adding that she contributes for other people, and with other people (Alice is a frequent contributor during cartoparties).

Users explained, as above, that they contribute to help the community. They also explain that the community encourages and motivates them to contribute. Jonathan states:

> I'm new to Montreal, but when I lived in New Mexico, I was the only

> contributor! I didn't have a community. Here there is definitely a feeling of community, I'm still discovering the local community here, something that I didn't have before in the USA. Having a community around me leads me to new places and to experience new things, like getting involved with the open data movement, with government transparency…There is a community around all these issues in Montreal, of people from different walks of life. It's all new to me and very interesting. It definitely pushes me to learn more, to invest myself more. Before, I would just contribute in my own way, in my little corner, which I was satisfied with… and then, boom, someone used federal data to remap the area in which I had been contributing! I was happy doing what I was doing, but now I'm definitely learning more things, extending my knowledge and skills, playing with tools and data… having a community has definitely brought me to do and learn things I otherwise wouldn't have.

However, he also goes on to explain that the OSM community, to him, is a local affair. He feels detached from the OpenStreetMapFoundation and members in other parts of the world:

> Yes to me, everything is local… I try to contact people to talk to them about OSM, but I have no official title or qualification, I can only really represent myself. I'm just some loser who is trying to convince people to use OSM; there is no reason in particular that you should listen to me! I still consider that I have a right to do that kind of thing though, even though I'm not affiliated with the wider OSM community – I try to represent OSM, but I also just represent myself I guess! It's strange. If I got involved with open data projects like *Montréal Ouvert* or *Québec Ouvert* I guess I would have a little title that would tell people I come from an organisation, and that I have a right to preach to them about OSM! Maybe people would listen to me more. If I started paying my yearly contribution to the OSMF, will that really make me more legitimate? I don't know. The OSMF feels a long way away… *Québec Ouvert,* for example, gives you something more concrete… it's a small group, everyone knows each other.

> You're a member of something local, concrete, which exists. If you're associated with OSMF people are going to ask you, 'who are you?'… That's my impression anyway. The OSMF isn't an effective tool to use locally when trying to convince people to take a look at what we do.

John agrees with Jonathan, explaining that the community in Montreal is small and somewhat weak. John explains that he thinks this is why the map in Quebec is of worse quality than the maps that can be seen in France or Germany. He goes on to add that more effort needs to be put into building the community and helping new members. Alice also agrees with Jonathan' other point, explaining that even though she contributes to OSM, attends local group meetings and cartoparties, she does not contribute to the OSMF, whether it be financially or in terms of time. She knows little about the OSMF, other than that it takes care of technical and legal aspects, as well as organising and creating communication between local OSM communities.

Within the local community and between communities, OSM user-contributors contribute to decision making via mailing lists. John explains that this is how his voice is heard:

> I guess my voice is heard through the mailing lists I contribute to. If I wanted to have a stronger decision making power, I would have to become part of a work group[11], and I don't really feel the need to do that yet. I would definitely try to save OSM before abandoning it if something were to go wrong, and differ from the vision I have of the project. OSM is an open project… it's a meritocracy. For now, I speak out through mailing lists, I express my opinion, and I propose solutions to problems, ideas… Then members of work groups work everything out in detail, they work on specific, precise parts of the project as a whole.

[11] What John calls work groups are groups of OSM contributors who take it upon themselves, within the OSMF, to handle certain issues. There is, for example, a legal work group, who handles legal questions and licensing issues.

Harry adds:

> I follow the Montreal mailing lists, as well as the humanitarian OSM lists. I read them, I follow what is happening. I think I'll start feeling more included in OSM as a project if I start attending more meetings with the Montreal community, but up until now I've been alone in Laval, tucked away in an area where I feel I'm the only user and contributor! I would like OSM to grow, it's frustrating to me in its current state. It's a great project… we keep advancing, and advancing, and growing, only to realise how much there is left to do!

Harry, a frequent contributor to Humanitarian OpenStreetMap Team (HOT) explains the feeling of community is stronger than in the Montreal area:

> Clearly there is a feeling of community in HOT. When you download the updated maps, regularly, whilst working on a project, you can see things appearing progressively, you can feel that there is someone working on the piece of the map right next to the one that has been assigned to you. It's stimulating, you feel like your part of a team, it pushes me to help out. Knowing I'm having an impact, doing something useful also helps a lot. One day I hope that the more general OSM project will become like that… When I tell people I help HOT, they don't really understand, but when I tell them we interact with the Red Cross, who really appreciate our work, they're always much more interested. It's nice to be recognized for the work we're doing.

### 4.3.2 Google Maps: a constellation of individual users

Most Maps users admit using Google's GIS for personal gain, without thinking of fellow users or of Google itself. Jane explains:

> My use of Google Maps is very selfish. When I use it, I'm using it for me, and me alone. I don't do it to help others, or to help Google. I don't open the application thinking that I'm going to contribute data that will help Google, or

> other users for that matter. It's totally selfish. I use the application, and it doesn't bother me if Google or others can benefit from my usage… but it's definitely not something I consider when using the application.

Jonathan and David, both dual users, explain that in contrast to OSM, Google Maps feels like a commercial transaction between a user, who could be called a customer in this scenario, and a corporation. David explains:

> I would only contribute to Google Maps if I owned a business. I'm not going to go and map in Google's GIS, because I think it's time wouldn't be well spent, and wouldn't be helping the community. I, and others, wouldn't have access to the data I contribute.

When discussing the location reporting mechanic in Google Maps, Jonathan admits that he deactivates it – meaning his location does not contribute to live data used to calculate traffic density – but takes advantage of the other users who aren't aware of this mechanic, and don't disable the feature. This is an interesting example of a savvy user seemingly exploiting a group of less savvy Google Maps users, who don't understand how the service works, and who are probably also less aware that they are part of a crowd of users being leveraged by Google to create a better service. To Jonathan, this leads to the idea that Maps users are not aware of one another, are not aware that they are part of a crowd of interconnected users.

As we have now detailed the most pertinent parts of our fieldwork, we will now aim to analyze and discuss our findings through the scope of the theoretical references laid out in chapter 2.

# Chapter 5: Discussion

After having explored our research methodology and detailed our interviews, we will now discuss our findings relative to our research questions, intuitions and theoretical references put forth in the beginning of this memoire.

Keeping with the order in which our interviews were conducted and then explored in the pages of this project, we will begin by discussing use and contribution, continuing on to notions of governance, surveillance and trust, stopping between the two to discuss group coordination, community and crowds.

Following our initial research intuition and what our interview data leads us to believe, this chapter will gravitate around the fashions in which ideology shapes the way individuals choose, use and contribute to GIS services. However, after having conducted our interviews, the notion of ideology has become much more nuanced then it was at the beginning of this research project.

## 1) Users and Uses

Aiming to understand the differences between our three groups of users (OSM exclusive users, Google Maps exclusive users and dual-users) we began to try to differentiate them through their usage and choice of their GIS(s).

### 1.1 Defaults, choices and significations

Sociologists of innovation and design study the embodiment of the user in a service or product whilst asking: is it possible for a designer to create a service without a user in mind? In her article about non-use, Chirumamilla (2014) explains that it is not feasible to imagine innovation without its potential users and quotes Frowe (2003) to strengthen her point: “[objects] translate human interests, carry and transform desires and strategies”

(Frowe in Chriumamilla, 2014, p.1). If a service or product that is offered translates the innovator's will, does the use of a product translate a user's will? In the specific case of this research project, does using one GIS over another imply the existence of thought-out decision making on the part of the user? What drives this decision making process?

Our data shows that the answers to these questions are nuanced, both for OSM users and GM users (as well as dual-users). Whilst we expected OSM users to be highly driven by ideology and ethics, we discovered that many were also attracted to the platform for other reasons. For example, some users begun using OSM because its inherent features corresponded more with their uses of mapping services – such as being able to store the maps offline whilst mountain biking in remote areas without a data connection. Others explain that the attention to detail and flexibility of OSM – once again, technical features and not ideological differences – drew them to the service. However, every OSM user interviewed also (partially or entirely) explained their choice by ideological (ethical or political) factors. For the majority of our OSM users, the choice to embrace OSM is also a broader choice to embrace alternative services (whether only in the GIS space or in their computing uses in general). This can be seen as a refusal to use mainstream GIS platforms, epitomized in Google's dominant mapping service. The initial path to becoming an OSM user is thus obscured by an often-multifaceted explanation of why users came to use the service. Does using OSM, an open source and alternative service lead to a change in ideology in its users – who, made aware of the conflict between proprietary services and open projects, become partisan of the open source movement? Or do OSM users already adhere to such ideals and happen to find the feature set presented by OSM mobile applications ideal? Even the strongest believers in the open source and open data ethos amongst our interviewee group explained that if OSM and its mobile applications didn't present the right feature set to suit their needs, they would not use OSM. It would thus appear that it goes both ways, and in varying amounts depending on the user.

However, we can assert more strongly that OSM users have indeed made a conscious choice to use the platform. By "conscious" we understand a choice made in

consciousness of its implications, and not only a conscious choice in the sense of a choice made voluntarily (this notion will be further explored with the help of Livet's work later in this chapter). This choice is made as OSM users, who are mostly savvy computer and GIS users and often developers themselves, identify with the ideals and ethics behind the OpenStreetMap project. However, analyzing OSM and the values and ethics the project embodies without considering its community-based, open-source nature is not a complete approach; we must also consider the ideas and ideals brought to the project by users: « Dans le cadre de ce processus d'innovation « à base coopérative » – tels les logiciels libres ou l'encyclopédie Wikipédia – les usagers concepteurs apportent des solutions différentes en fonction de leurs besoins et intérêts propres » (Proulx & Couture, 2006). As stated earlier, many users mention being attracted to OSM because of its flexibility as a GIS – OSM is a database that can be added to and shaped in infinite ways in order to correspond to a user's own values and objectives.

For example, during an OSM community meeting, a user contributor explains how an activist can show that his suburb is unsafe by calculating the amount of fire hydrants per square kilometer throughout the city and comparing his under-developed suburb to wealthier parts of the city in order to catalyze social and political change. This user is thus infusing OSM as a project with his own objectives and values. In this example, a technical feature (the flexibility of OSM) enables the user-contributor to use the service in the way he wants – the user-contributor in question is appropriating the service and using it in his own individual and social context. According to Mallain & Toussaint (1994), the adoption and appropriation of an IT system or service is more so defined by the projected use significations that are constructed by users than by technical features. The individual appropriation of OSM as a platform can happen in an almost infinite amount of ways, depending on the individual's needs, perspectives and motivations – as a vast amount of use significations can be projected by each user onto the platform. For certain users, using OSM is using an open source service; separate and independent of giant web corporations. For others, OSM is a gateway into open data and the smart cities movement, etc.

Individual Maps' users also offer several (albeit less) reasons that they use Google's mapping platform. As users acknowledge during interviews, they use the application because it is already there, often pre-installed on their phones, or highly recommended in their mobile device's app store. Other users admit using Maps because peers had recommended it. Despite Maps being recommended by friends, family, app store algorithms and often the media, there seems to be no sense of community or belonging amongst users of the service. For example, Jane acknowledges that friends incited her to download and use the application, but knows nothing of her friends' usage of the application – stating only that in a very general fashion, it is known and was recommended to her as being the best GIS available. Other users explain their use of Maps by its features – claiming it renders better on high definition screens, or that the interface is clean and user friendly. Even as Maps users claim to like Google as a company and use many of their services, they explain that they do not use Maps because it is a Google product – this further underlines the detachment that exists between users and the service – it is nothing more than a practical mapping platform, no more than a commodity to be used and discarded. As the reasons behind use of Maps do not appear transcend practicality and convenience, users do not feel strongly attached to the service or to their fellow users. The exception here may be the feeling of trust users have in Google, which will be analyzed in a later part of this discussion.

A collective, social use signification that would unify Maps users by through their use of the application was more difficult to spot in our data than with OSM users.
However, implicitly, Maps users provide a relatively homogenous account of what it means for one to be a Maps user: a user who may not be particularly interested in GIS technology, who seeks ease of use and simplicity above all. In a way, users express that, as a collective, using Maps is more a non-choice, a default, than it is a real choice that has been thought-out by users.

On the other hand, despite the variability of user significations at an individual level for OSM, use significations seem to have common elements amongst users who were interviewed. The strongest common element present amongst all our interviewees is the

attractiveness of a GIS that lets users mold and shape it the way they want, by adding data relevant to ones' needs and desires, and by being to exploit that data in a variety of different ways (whether it be by creating new and different maps, different applications, etc.). It seems that above all, as a group, users value the participatory nature of the platform.

OSM users interviewed insisted on the value of the participatory nature of OSM. This reflects the many ways an individual user can appropriate the service: OSM is a flexible platform, enabling users to mold and customize their usage of the GIS platform to their taste. Again, this underlines as many users did explicitly during interviews, the difference between OSM, a platform which can spawn an infinite amount of services, maps, and mobile applications, and Google Maps, a service available on different computing platforms, but which nevertheless displays the same data in the same way across platforms.

### 1.2 Active and passive users: types of participation

We have shown that OpenStreetMap users have made an active choice to use OSM – that they have opted-in to use the service. Contrarily, Maps users seem to be using the platform as more of a default – their usage of the service results more from a non-choice than from an active decision.

This is reflected in the way that OSM and Google Maps users interact with their application(s) of choice. As mentioned during OSM community meetings as well as in individual interviews, users of OSM are also contributors – every OSM user interviewed has also contributed. Furthermore, OSM users during their interviews claimed to not know a single OSM user who does not at least occasionally contribute or participate in OSM related events. Google Maps users claim they do not contribute actively to the platform – and they only would if they owned a business or had some form of personal stake in the service. However, Maps users do contribute passively through location reporting and other forms of data mining, which are built into the service. As revealed by

our interviews, many users are not aware of this passive form of contribution, which is built into Google's GIS platform. What does this mean? Are users of Google Maps contributors in the same way that OpenStreetMap users are?

The difference between passive and active contribution is analogous to the difference between users choosing a GIS because it suits them (in terms of ideology and functionalities) and users defaulting to the most popular, widespread service available. Once again, the difference comes down to the choice to participate (or the non-choice) in ones' GIS of choice. Participation can be made actively, by seeking out a service and spending time consciously contributing to the service – fixing bugs in the data, discussing possibilities and future projects, as is the case with participation in the OSM project. Participation can also be passive, in the case of Google Maps - in a similar way in which we have shown that use can be a default – users can contribute to Google's platform without knowledge they are contributing, without having made a choice or an effort to contribute. Is it possible to say that users of Google Maps (who's data are mined) and users of OSM (who contribute actively) are produsers in the same sense?

Bruns (2008) defines a produser as being both a consumer of a product or service and a producer (or contributor). Proulx introduces the important nuance that the user-producer, or produser, is not in control of the distribution (and thus the commercialization) of the content or service he contributes to or produces with his peers, as explained in our theoretical framework. However, these notions merit nuance in the face of the two platforms we have chosen to study. It is important to define what a contribution consists of, exactly what kind of services can be discussed in this framework, and who these produsers are. Proulx and his colleagues explain: "We will argue that crowds are not simply masses of people whose work is harnessed by some corporation or other higher power, but that the individuals participating in collective content production may experience empowerment as they enact a power to act" (Proulx *& al*, 2011, p. 10). He adds, when discussing Google, Facebook, Yahoo and other Internet giants, that "[…] there are online contributions of Internet users who participate massively sometimes even without being aware of it" (*ibid*). As the title of his article puts forth, the produser is a

paradoxical entity – at once alienated and exploited, whilst being empowered by use and contribution to online services. How does this framework encapsulate our Google Maps and OSM produsers?

As mentioned, users can contribute to a service, becoming produsers, without being aware. This was the case for the exclusive Maps users interviewed – they were unaware that Google was tracking their location in order to create a real time traffic model. Proulx *et al* (2011) argue that whilst being exploited for their data, users are also empowered by their use and contribution to web platforms, citing cultural studies articles that mention that web platforms have become rich knowledge environments for their produsers. However it would seem that what produsers mainly contribute to Google Maps (location data and statistics) is void of any forms of possible enrichment for their fellow produsers. Users can learn about the world and different places through Maps' data, but users' contributions are not leveraged and shared in an open, understandable format – they are compiled into statistics to predict traffic and search terms. Of course, these contributions are useful to other users, and enable them to avoid traffic and select the most efficient routes when moving about the city. Certain types of user contributions can be more interesting to other users, such as reviews, but our interviewees admit to hardly ever leaving reviews. In quantity, it seems that the main contribution of the user base studied is location data and statistics rather than reviews of businesses and places in Google Maps. Where does this leave the Google Maps produser? As Proulx explains further in the same article, contributing to online platforms requires at least some form of link or relationship with the other people interacting on the same platform (Proulx *& al.* 2011). How is this possible in the case of a contribution where users are mainly unaware they are contributing? We will aim to answer this question in the next part of this discussion.

OSM is an open source collaborative project who's users can be analyzed within Proulx's theory of the produser – as he also uses this model to explain interactions between produsers and other open source collaborative services. Produsers contribute data to OSM and are able to exploit their own data, and others', by using and creating maps that render the data. There is a nuance here with the typical produser associated with services such as

Facebook however, as OSM produsers are (somewhat) in control of the distribution of their contributions (and those of others), as users can download, modify, exploit and even delete OSM's data in any way they choose (including producing services and products with the goal of generating revenue). Proulx describes produsers as both "empowered" and "alienated" (Proulx *& al.* 2011) by their use of modern web services. Yet it would seem that OSM users could be more empowered than they are alienated by their usage and contribution to the open GIS, compared to say a produser of Facebook's or Google's services – who create value and are able to communicate and learn through the service, but are unable to control what they have contributed to the service. Does this leave OSM produsers in a less conflictual relationship with their GIS? OSM users interviewed insisted that being a user and a contributor was an investment of time, effort, and for some, money. However as a group they were more committed and invested in their relationship with their GIS than the group of Google Maps users, who often mentioned feeling somewhat used or exploited by large corporations. This will be further explored during this chapter, in the section relative to the critical theories introduced in our theoretical framework.

## 2) Groups, crowds and collective action

Having explored our data and theoretical concepts in order to understand the relationship between users and their GIS of choice, as well as differentiating the produser dynamic in Google Maps and OSM, we will now discuss the relationships between users and the way they form groups and act collectively. We will mainly seek to analyze our data in light of Livet's work, explained in Chapter 2, Section 3.

As Proulx states, "online contribution requires at the very least weak ties between people interacting on the same platform" (Proulx *& al.*, 2011, p. 12). What are these ties? How do they manifest themselves? Are they of the same nature for OSM users and Google Maps users?

Pierre Livet, as explained in Chapter 2, Section 3, attempts to understand the ties between

individuals during different types of collective action. Contribution to both OSM and Google Maps can be seen as collective action, as many users are acting collectively to enrich their GIS platform of choice. But are they acting together?

## 2.1 Contributing to Google Maps - a form of collective action

In the case of Google Maps, users are mainly contributing statistics and location information (as well as reviews). How can these forms of contribution be understood through Livet's typology of collective action? In this section, we will explore an example given by Livet and contrast it with our findings.

Livet uses an example which is extremely pertinent to this memoire, that of traffic. He explains that individuals who aim to leave on holidays very early in the morning to avoid traffic later in the day (for example) are participating in a crowd action. As they anticipate what others will do, without having any particular discussion with other individuals who are driving their cars the same day, this is a crowd action, based on expectations of a collective action's results. This is a relatively straightforward example of a crowd action and the behavior of an individual depending on an anticipated crowd action. Livet states that in this situation: "*nous n'indiquerons pas aux autres automobilistes l'existence d'un chemin qui évite l'embouteillage. On peut en conclure que l'action à plusieurs, quand elle s'installe, prend le pas sur les actions en commun locales, mais qu'on revient à l'action commune lorsque localement l'action à plusieurs a conduit à des impasses*" (Livet, 1994, p. 255). The only reliance on common action is locally, when a driver lets another pass in front of him, for example. Otherwise, the interactions between users take place in the context of a crowd action.

However, the situation becomes more complex if we discuss the same example, but in which all individuals concerned are using Google Maps to navigate (and thus avoid congestion via the location tracking data Google uses to calculate routes). Indeed, as in Livet's example, it is not the direct communication of individuals which allows them to reach their respective destinations more efficiently, but Google's navigation system

which is data mining users' positions in order to determine which roads are congested and those on which traffic is flowing freely. Once the state of crowd action has been reached, Livet explains that there can be no further negotiations or modifications of the crowd action, a part from abandonment, or correction once the action is completed. However, in our example, users are prompted by the application to change routes frequently during periods of intense congestion, enabling them to renegotiate their part in the crowd action taking place. What does this mean? Can the action taking place in this example still be defined as a crowd action?

The nuance between our example and Livet's comes from the introduction of the use of Google Maps by the drivers discussed. Livet also introduces a framework for characterizing objects depending on their effect on group action. He explains that crowd actions are mediated by generic objects, which work in the same way for all users, no matter the situation in which they are used. It would seem that the use of Google Maps in this situation would render its characterization as a crowd action impossible, as users are able to correct their routes as they are driving. However, in common action and action in unison, negotiation to redefine the scope of the action must happen between participants in said action. Here, there is no such negotiation happening directly between users – Google Maps is creating an anonymous, mass modelization of drivers' routes. Each individual driver is then exploiting this data in order to renegotiate his route.

Livet explains that crowd action requires generic objects to function. Generic objects are what limit the crowd action and ensure that everyone is acting in a similar fashion, using similar tools. In this example, we can clearly see that Google's map is indeed a generic object – all users are using the same version of Google Maps in the same way in order to coordinate their actions.

During our interview, Jonathan mentions that he deactivates location reporting in Google Maps on his mobile device. Jonathan explains: "I turn it off, knowing very well others don't… I haven't decided if it's a fair thing to do… But I'm worried about my privacy – I mainly deactivate location reporting because I don't quite trust Google to protect my

location data adequately". This is an interesting example of crowd action, which again comes to nuance Livet's example of drivers leaving on holidays on a busy weekend. What Jonathan is explaining is that he knows that his participation in the location reporting mechanic is not required for the routing system to function properly. He is fine with letting others do the work by handing over their data. When Livet is discussing action in unison, he explains that before beginning an action in unison, actors must "*d'abord pouvoir définir globalement le bien collectif, et donc définir un seuil d'effort nécessaire pour l'atteindre"* (Livet, 1994, p. 263). Even though we are discussing an example of crowd action, it seems that here some aspects of action in unison can be used to describe what is happening in this example. Jonathan is able to renegotiate his participation in the crowd action by deactivating location reporting on his device, as he has estimated that there is already enough effort going into the action to guarantee it's success (being able to drive on a busy day and for all users to be able to take the most effective, traffic-free route). This makes Jonathan action definable as an action in unison. He is estimating the effort necessary for the accomplishment of an action and becoming a profiteer of the action by contributing less and reaping equal benefits, as described by Livet. He is aware of the result of the collective action (contributing location data) when he launches the navigation on his device, and can clearly see which streets are congested – meaning he doesn't have to contribute his data. Again, the difference in between Livet's example and ours is created by the use of Google Maps, which enables users to be more aware of other drivers' locations and routes. Users are not communicating directly to plan their routes but are doing so through the use of Maps. However, in Jonathan' situation, he is not only using the data contributed by other drivers, but also estimating and calculating that there are enough contributing drivers for his efforts to be superfluous. In light of this difference, it remains difficult to characterize Jonathan' efforts as part of a crowd action – from which he seems disjointed, thanks to his technical knowledge (knowing how to disable location reporting and knowing there are already enough contributors for it to be effective for everyone). This technical knowledge is permitting Jonathan to use his Google Maps differently to other users (disabling location reporting) – meaning that we have strayed from the definition of a generic object put forth by Livet. Crowd actions depend on generic objects to delimitate their scope and process; thus

Jonathan is no longer taking part in a crowd action with other users, but creating a form of common action through his opting-out of location reporting.

## 2.2 Contribution to OSM – a form of collective action

As we have done with Google Maps, we will now aim to analyze OSM use and contribution actions through the scope of Livet's framework of collective action.

Users' contributions to Google's GIS are automatic and generalized through most of the user base, as discussed in the first section of this chapter. Users are not actively contributing but rather being mined for data in order to improve the service. As seen, OSM is entirely different, with users contributing actively, often being members of user-contributor communities and involved with the OpenStreetMap Foundation (OSMF). How can we understand the different forms of collective action taken to maintain and improve OSM? How are different user groups acting collectively? What tools are they using to ensure that they are acting efficiently and effectively? What are the goals of these communities?

### 2.2.1 Lone contribution

During interviews and monthly meetings of the OSM Montreal chapter, I often heard about or met what I will call lone contributors. Sometimes community members would discuss them after seeing modifications made by a user in the local change log, and at other times, user-contributors who had been working for months or years on OSM would show up for a first time at a meeting. This for example was the case with Harry, who showed up one day at a local meeting. Previously, he had had no interaction with the local community – his only way of knowing he wasn't alone contributing in the greater Montreal area was seeing changes appear on the map and in the change log. Sometimes during meetings other users like Harry would be discussed, especially after they had made lots of changes or sometimes after having made damaging changes to the data that needed fixing.

These users, disconnected from the local and global OSM communities, will be called lone contributors. Many contributors involved in OSM communities were once lone contributors (such as Jonathan and Harry) and through their interviews we were able to understand why and how they contributed before meeting other OSM enthusiasts.

It seems that we can qualify lone contributors work on OSM as part of a crowd action. As explained to me during interviews, these contributors follow the general OSM change logs in their areas and plan their contributions in accordance to with the collective result of others' contributions. Without any direct communication to coordinate their actions with others', they contribute in areas that are most important to them and rely on the crowd of other contributors to fill out the remaining areas of the map relevant to the areas they frequent. Lone contributors rely on generic objects such as change logs (open to all via contribution interfaces) to plan their actions – in a similar way to drivers who rely on generic maps to plan their routes in Livet's example. These contributors also rely on the map itself, which plays the role of a generic object in this situation – helping the lone contributor coordinate with the result of a crowd action of contributions.

In this category of action there are also new contributors who sometimes create inaccurate data or make inexact modifications to existing accurate data. These contributors are acting as a crowd with other users as they are not interacting with other users, even if they are hindering the efforts of others (in the same way that a driver will hinder another during traffic, even if both drivers are heading in the same direction).

These types of contributions do not make up a very large part of overall contributions – most user-contributors are involved with OSM as a foundation or with local OSM communities as we will explain in the next two points of this section. However it is important to note that not all contribution and action related to OSM is community related and motivated, and that some individuals contribute for their own personal gain (having better data in areas they frequent) or amusement.

### 2.2.2 OSM contribution and common action

Common action is an action by two or more people who do not share contradictory goals, and who help correct each others actions (Livet, 1994). As Livet explains, in a sense, it is the most powerful form of collective action – common action creates a stronger bond and a stronger collective action than in action in unison. This is because in action in unison, an individual acts off another's intentions and promises put forth by explicit convention, whereas in common action, an individual is acting directly in relation to his peers' actions – common action is not disjointed in time and space as action in unison is. We can see forms of common action in community contribution to OSM, notably during two events: group meetings and cartoparties.

During cartoparties, OSM community members decide on an area to map, and proceed to walk around the designated area adding points to the map and correcting inaccuracies. Users are working together, and even if some have different goals (for example, some will aim to add bins and fire hydrants whilst others will be focused on adding bike baths) these goals are not contradictory, a necessary condition for common action to exist in Livet's framework. Users help each other add complex points and objects into the map when necessary, and sometimes several contributors will measure the position of an object in order to pinpoint its coordinates with more precision (this is an example of individuals helping others to correct their errors during common action). During group meetings, OSM contributors also sometimes make corrections to data that is being discussed, or help a newer member add a new entry. This qualifies as common action in the same way as actions taken during a cartoparty would, as user-contributors are actively adding to the map together, rather than discussing changes that need to be made. These actions, during cartoparties or group meetings, rely on personalized objects – as each user-contributor has his own devices, techniques and services to add to OSM's data. Community members must adapt themselves to others' contribution workflows (or explain their own) when explaining technical intricacies of contributing to OSM.

Cartoparties and group meetings epitomize the collective action that is the most removed from the collective action that Google's platform creates. Users acting together, in the same time and space to create a better dataset to be exploited by all through different maps is something we absolutely do not see when it comes to contribution to Google Maps. This leads us to envision Google Map's user-contributor group as a form of gas; free-moving, individual particles that do not communicate, but that share a common existence – although they may hardly even be aware of it. OSM's user-contributors (in the community examples given above) can be seen as a tight-knit group of individuals who meet on a regular basis to work on a common project, even though they may be looking to fulfill different objectives with their contributions. These groups exist all over the world, and even throughout Quebec for example, and must thus employ forms of action in unison to coordinate their actions on a larger scale.

Throughout our interviews users often refer to ideology as an explicative factor of their contribution to OSM. However, by observing group meetings and listening to interviewees talk about cartoparties, we can see that their motivations go deeper than simple individual ideological attachment to OSM or ideas that OSM represents. These users are also being pushed and encouraged to contribute by forms of convention, which are upheld by specific, personalized objects that exist in these common action situations. Interviewees explain that they contribute with others and for others – they are actually referring to implicit and explicit conventions, upheld by objects, which push them to continue contributing to the platform. These conventions and objects are especially present during group meetings and cartoparties, and can be seen as the forces that underpin these interactions.

### 2.2.3 Contribution and decision making: forms of action in unison

In the last part of this section we will examine the concept of action in unison as put forth in our theoretical framework in order to understand the way that more disjointed collective actions are realized within and between OSM communities.

OSM communities, such as the local Montreal chapter, are sometimes somewhat dispersed. For example the local Montreal chapter is seeking to become a wider reaching Quebec chapter of the association, meaning that not all members of the group will be able to attend the same cartoparties and meetings. Currently, members who are outside of the Montreal area are usually not present during events, communicating with the more tightly knit Montreal group via mailing lists. These mailing lists (there is one for Canada and one for Montreal and Quebec) are the main communication methods for OSM members throughout Canada and Quebec. They function similarly to a forum, with emails being sent out to the entire mailing list. All subscribers may then answer the question, or suggest an alternative to something that has been planned or decided. It is mainly through these mailing lists that decisions are made (with the exception of group meetings and private conversations between contributors). It is thus with the help of mailing lists, which here are conventional objects carrying with them explicit conventions, that the wider Quebec and Canadian communities of OSM users can decide on what needs to be done, how, when, and by whom. These mailing lists are the main vectors for the continuation and perpetuation of un-decidability, which are key to the existence of action in unison. They are what enable the continuation of collective action despite the fact that action is asynchronous and dispersed in space. Livet explains the precise role of convention embodied by conventional objects: "*Autrement dit la convention semble réduire les questions sur la coopération à la satisfaction d'un critère décidable. Mais en fait elle conserve son indécidabilité à l'horizon. Elle n'utilise le décidable que comme substitut de l'indécidable*" (Livet, 1994, p. 271). What these mailing lists enable is a semblance of certainty of future actions to be taken by members of the community, and the community as a whole, which enables the pursuit of collective action. We can thus understand that one of the biggest differences between collective action in Google Maps and OSM is the use of explicit convention (promises and planning), upheld by the use of conventional objects (mailing lists, to-do lists, etc.). These conventions enable collective action to continue and pull OSM user-contributors into a strong social contract with their peers, which pushes them to continue contributing on the project. This is a force that is as strong as personal ideologies, and enables the continuation of the project despite the fact that users may have slightly conflicting or differing views of what OSM really should be.

As we saw with the example of Jonathan who choses to contribute less to Google Maps by deactivating location tracking, variable levels of contribution are possible in the case of OSM. Via meetings and mailing lists members of the community will decide on goals at a local, regional, national or international level. To meet these goals, individual contributors will gage the amount of effort necessary, and the amount of work they believe others will input. This leads each individual to his own evaluation of the amount of work he or she must do in order for the group to meet its objective – explaining why even with similar objectives, and a similar understanding that OSM is a collective enterprise, different users will contribute in different ways and amounts. As explained in our theoretical framework, even users not contributing to the completion of collective goals can still be considered to be contributing within the scope of an action in unison, as in a democracy. For example, a user ignoring the regional communities goal of improving highway mapping might believe that mapping all the lakes in Quebec is more important – he is still contributing to the action in unison, as he shares a common vision of the existence of a commons (OSM) even though he choses to contribute to it differently.

Even though action in unison is the result of a group of individuals working in different times and spaces, it is still a strong form of collective action, which requires explicit ties and conventions between users in order to perpetuate itself. Again, this is not something we can see in the way users contribute to Google Maps – in fact, the way that OSM produsers contribute to OSM is closer to the way that Google employees and engineers contribute to Google Maps – using group emails, schedules and objectives to plan collective action. This is clearly due to the open source collaborative nature of OSM, compared to Google Maps, which in essence, is a product created by a for-profit company. OSM's contributors and users are hardly distinguishable – it is even more difficult to distinguish a level of ownership or responsibility that exists above the level of contributor: contributors are what make OSM what it is.

## 2.3 Dual Users, ideologies and collective action

Livet's framework has been particularly powerful in explaining the way collective action takes place within our two user groups. However we can push the use of this theoretical framework further by using it to analyze the actions of our dual-users.

During interviews our two dual-users both presented points indicating that they were ideologically attached to OSM, drawn to it and invested in it because of what the platform represents – ethically, politically, and morally. However, they are also Google Maps users, and they both express misgivings over the way Google Maps mines user data, as well as having issues with the potential links between Google Maps and US government agencies. Both these users seem quite at ease with their dual-usage, and do not appear to experience any cognitive dissonance as might be expected.

Both use and contribution to OSM and Google Maps can be considered as forms of collective action, as explained throughout the parts of this memoire that exploit Livet's work. Forms of collective action are dependent on different types of conventions, which themselves are reliant on different types of objects. Livet's work, when applied to our understand the actions of our dual-users has helped us understand that user-contributors are not only implicated and invested in their GIS of choice through ideology or preference, but also through more group-based social factors.

OSM and Google Maps have two totally different social dynamics when it comes to use and contribution – and that is what enables our dual-users to live such a paradoxical situation without expressing any real problems. Use and contribution to Google Maps happens through crowd action, underpinned by implicit convention and generic objects, whereas use and contribution to OSM happen through a mixture of implicit and explicit conventions underpinned by personalized and conventional objects – as detailed in the two previous parts of this section. This enables our dual-users to separate and differentiate between OSM and Google at more than just an ideological level: the

difference between these two platforms is also a social difference, entailing different relationships with fellow users as well as with the service itself.

This idea can be extended to our single platform users. User-contributors are not only involved with a platform or practical or ethical reasons, but also bound to their platform of choice through a set of conventions and objects that entail specific – and very different – forms of collective action. These forms of collective action form habits that bind users to their GIS, adding to what is a practical or ideological attachment to begin with.

## 3) Critical perspectives: value and the commodification of the user

In this part of the discussion we will aim to explore critical concepts put forth in our theoretical framework in relation to our interview data. Namely, we will seek to understand the way that value is created and exists within OSM and Google Maps.

### 3.1 Value and GIS platforms

The concept of value is essential to the critical theories that we will exploit in this part of the discussion. As explained, Fuchs has a classic Marxist vision of value and applies it to the way value is created in participative web services. For Fuchs, time is central to the valuation of a service and the valuation of labor by users. He explains that the more time a user spends using a service, the more value he will create for it (Fuchs, 2010, 2012). Arvidsson and Colleoni use the newer concept of affect to explain the way value is created and exists in web platforms; explaining that the affective link between a user and a service is can in fact be used as a measure of value – as affective investment creates tribes and communities of users which are valuable to the owners of the service (through advertisement, for example) (Arvidsson & Colleoni, 2012). How do these two different models of value apply to the two services we have chosen to study?

### 3.1.1 Value in Google Maps

It would seem that the notion of value would be easily expressed when examining a commercial product created by a for-profit company. However, the way are able to define value in Google Maps differs greatly on the theoretical framework chosen to evaluate this value.

Firstly, we can examine the notion of value using the scope of Fuchs' work. Fuchs explains that value web platforms based on user contribution is heavily linked to the time the user group spends using the service. As with television and other older media, value is created by audience commodity and calculable by measuring the amount of users and the amount of time each user spends on the platform. In relation to Google Maps, this means that users are creating value for Google whenever they are contributing or using the service – as during use they can be exposed to advertisement, and when contributing (location and traffic information). As explained in the theoretical framework, Google is attaching value to mobility – commoditizing the mobility of its users. It would seem that Fuchs' vision of value has a straightforward application to Google Maps, enabling us to understand the way the platform creates value by instrumentalizing its users. The application of Fuchs' framework leads us to believe that Google's GIS is a very valuable web property indeed; being the most widely used platform by far, as well as been used frequently for long periods of time by its users, the value created by the commodification of audience and mobility must dwarf that of any other available services – and probably all alternative services combined.

Secondly, we can examine the notion of value using Arvidsson and Colleoni's work described in our theoretical framework. As they explain, "value is ever more related to the ability to create and reaffirm affective bonds, like the ties that bind consumers into a community of interest or "tribe", or the link structure that underpins the network centrality of valuable influencers" (Cova *& al*, 2007, cited in Arvidsson & Colleoni, 2012, p. 136). It would be difficult to argue in the conventional sense that as a piece of

Internet real estate, Google Maps has low value. However, using the framework put forth by Arvidsson and Colleoni, it would seem that the service lacks value due to the lack of affective bonds (expressed through a brand or product image) tying together user and service, as well as users and their peers. As expressed by Google Maps users during interviews, they are not users of Google Maps because they feel a strong connection to Google; for instance, Jane states that she does not use Maps because it is a Google product, but simply because it is available and effective. Users do not feel attachment to their fellow Google Mappers either, claiming that they don't really think about other people when using the service, and mostly use it when alone for personal gain. Users are mainly unaware of the location tracking functionality contained within Google Maps for mobile, and are thus totally or mainly unaware that they're contributing to the service and helping their fellow users and motorists. Arvidsson and Colleoni point out that affective investment in a service is usually linked to a high valuation on the stock market, remarking that companies based on services that rely on user contribution rarely have high revenue, and instead rely on financial markets to prosper. Google Maps in itself is indistinguishable from Google on the financial market, but it would not be a stretch to argue that Google's very high financial value is at least in part due to Google Maps, an important part of their business, which is growing larger and larger, notably with the increased adoption of mobile devices throughout the world. How can we interpret this discrepancy between an apparent lack of affective investment and a high market valuation? Perhaps the nuance exists precisely within the fact that Google Maps is part of the Google services empire, and thus benefits from an association between positive feelings felt for other Google services and Maps. Viewed differently, perhaps affective investment can simply be understood as user loyalty and market domination, both of which are clearly observable when it comes to Google Maps. Again viewed differently, we could understand that the interface created by Google, which relies on user contributions (maps indicating traffic density is the most straightforward example), is in reality a communicative medium enabling a semblance of relation between users. Arvidsson and Colleoni give examples relating only to the simplest and least ambiguous forms of contribution, such as 'liking' a post or sharing a link through Facebook, and leave us with somewhat few tools to apply their framework of affect based financial

value to any platform in which user contribution is important. Their tools are however perfectly suited to understanding value within OSM.

### 3.1.2 Value in OpenStreetMap

OSM and Google Maps are, in the way they generate value and interact with their users, profoundly different services. It is as a result unsurprising that exploring value in OSM is very different to exploring value in Maps.

In their 2012 paper, Arvidsson and Colleoni explicitly mention that affective value is linked to the creation of tribes and user groups. Clearly, this is much more relevant to OSM than it is to Google Maps, as OSM federates communities of motivated, often evangelical users at local, provincial, nation-wide and even international levels. However as Arvidsson and Colleoni explain that modern web service firms rely on market value rather than transactional income to determine the value of web services, their model, even if as first appears to fit OSM more than it fits Google Maps, requires modification before being directly applicable to OSM – which is not a product that can be traded on a financial market.

In a sense, Fuchs proposes a solution to this problem, explaining that in traditional Marxism, exploitation of labor takes place before the commodification of labor – meaning that OSM's contributors are creating value, even if this never translates to a monetary value, or to value on a financial market. The addition of Fuchs' correction to Arvidsson and Colleoni's approach enables us to understand in a seemingly more comprehensive way OSM's value – which is indeed linked to the potential value that OSM's communities and tribes of contributors bring to the table. Affective ties (over labor time) seem to make for a more effective measure in understanding the value behind OSM as a project. This is because the nature of contributions in OSM and Google Maps are very different – indeed, as Arvidsson and Colleoni explain, the web service landscape has become too fractured for the notion of audience commodity to be directly applicable: the value of OSM produsers' contributions cannot be as easily quantified as hours spent watching advertisements or hours spent unknowingly contributing data to a service

(Arvidsson & Colleoni, 2012). Contributing to OSM requires expertise and at least minimal training; in the same period of time, a seasoned contributor will be able to create much more value in the OSM dataset than a newcomer (due to the use of scripted automated data imports, and a better general knowledge of contribution tools and techniques).

Clearly, this vision of value conflicts with that of Fuchs', even if we admit that value exists before commodification, as we are discounting the importance of time, central to Fuchs' vision of the problem of defining value and explaining value creation in web services. As explained it seems more pertinent to measure affective value in relation with labor (or contribution) rather than time in order to understand the value created by OSM contributors because of the variability of contributions that can have different value to OSM and to contributor communities. Value in OSM is inseparable from the social aspects that underpin the platform: as value is created before commodification, the value of each contribution is relative to its utility to other OSM users. A selfish contributor who only maps roads neighboring his rural property will be providing less value to the Montreal OSM community than a user who spends time correcting data in the center of town, an area frequented by a much larger portion of the population. Value is not only dependent on geography, but also on interest; an avid cyclist's contributions will be of no use for someone searching for a bookshop, for example. These are examples, coupled with the fact that contributors have varying levels of technical skill, that show why Arvidsson and Colleoni's approach is more pertinent to the study of value in a geolocation platform.

Whether we understand value in GISs to be linked to affective ties or labor time, produsers are creating value for either OSM or Google Maps through their contributions. Where does this value go? Who benefits from it?

## 3.2 Exploitation in OSM and Google Maps

The critical authors mentioned throughout our theoretical framework are mindful of the exploitation that is taking place in the age of immaterial or informational capitalism. Participatory platforms have become a lucrative business, replacing the exploitation of factory works with that of Internet users (Gollain, 2010, Fuchs, 2010). Again, Fuchs' opinion differs to Arvidsson and Colleoni's when it comes to defining exploitation in web services. Are users empowered by their capacity to interact with new media, or simply exploited by large corporations?

### 3.2.1 Exploitation in OSM

Exploitation is the appropriation of surplus wealth created by labour by capital, and according to Fuchs, happens before the commodification of value created by labour (Fuchs, 2012). Arvidsson and Colleoni argue that if there is no commodification, value has not been created as it has not been sold or labelled with a price (Arvidsson & Colleoni, 2012). Arvidsson and Colleoni argue that exploitation can only take place if value is monetized (via transactions or financial markets). The authors also explain that users of web services are free of constraints and use contribution based web services because they find them more empowering than alienating (Arvidsson & Colleoni, 2012). Where does this leave our OSM users?

The issue with exploring the concept of exploitation in relation to OSM's users is the lack of capital or ownership. In essence, OSM is composed of geographic data. This data is stored and served to users by the OSMF's servers, but can also be copied, stored, distributed and even monetized by anyone (certain contractual conditions must be respected). Individual contributors with a passion for mapping create most of the data, as we were able to understand during interviews and monthly community meetings. The OSMF is mainly composed of individual contributors who have decided to take on a greater role in the organization of OSM – there is no board of trustees or CEO. The capital required is generated largely through The State of the Map, an annual conference in the United Kingdom attended by OSM contributors from throughout the world, who in

a sense pool their capital to guarantee the continuation of the project. OSM produsers are thus contributing to a true commons that they themselves own as much as anyone and can exploit in a manner they see fit. Is there any real exploitation taking place in this situation?

There are two crucial points that we must discuss in order to attempt to answer this question. Firstly, the notion of governance is important. When Fuchs, Arvidsson and Colleoni attempt to define and describe exploitation in informational capital, they are mainly discussing private for-profit corporations and their relationships with their users. If we take Facebook as an example, as do our authors, we can see that the corporation decides how Facebook works and evolves. Facebook is creating a very closed grid, or frame, in which users can then contribute in a very limited amount of ways. Things as simple as changing the colors of one's profile page are not possible despite users asking for this possibility, for example. This is a clear example that shows us that Facebook, like most other private companies, operates according to a hierarchy in which users inhabit the bottom wrung – they are thus unable to contribute to the way the platforms works or participate in decision-making. By contrast, OSM presents a much more level playing field, where typical contributors and volunteers form the main decision making bodies which decide on how to operate OSM and how to develop the project. It seems that it is indeed difficult to apply the concept of exploitation to OSM, because of the unclear distinction between who is exploiting and who is being exploited.

Gorz understands the situation differently. Gollain analyzes Gorz's thinking, explaining that Gorz envisions a form of collaborative digital economy separate from traditional industrial capitalism (Gollain, 2010). Perhaps it was difficult to observe exploitation taking place in OSM, as the platform, by its very nature, is not part of a market economy, and cannot be analyzed using a typical Marxist approach. It seems that the digital nature of the commons created by OSM might exempt the system from such things as exploitation – as the commons produced are infinitely reproducible, and distributable quasi-instantly throughout the world for little cost.

OSM contributors interviewed for this research, who were clearly aware and motivated by the fact that OSM was an opportunity to exit the typical product-consumer dualism, often shared Gorz's vision. For certain users, such as John, contributing to OSM is a form of protest or revolt against companies like Google and Facebook who dominate the digital landscape. Participation in OSM can be seen as a will to resist the market economy that governs our lives, and create a more participative, open, and democratic system afforded by the unique properties of digital goods and services. Users are happy and proud to be able to shape OSM to their wishes, whether through data contribution, or taking things a step further and playing an active part in the governance of the project by participating in mailing list conversations and local meetings and events.

### 3.2.2 Exploitation in Google Maps

It seems, intuitively, that the notion of exploitation would be clearer when discussing our Google Maps users – as Google Maps is a for-profit company. These two different visions of the notion of exploitation once again spawn two different approaches to the question of exploitation in GIS services. When we ask ourselves if users are being exploited, it is necessary to understand what users are gaining through their interaction with GIS services – are users exploited as much as they are empowered?

Fuchs argues that users spend time using contribution based web platforms in order to gain social, cultural and symbolic capital (see Chapter 2 Part 4) (Fuchs, 2012). In their desire to further themselves individually, users hand over data to private companies that exploit and monetise these commons. It is clear that in Fuchs' view, Internet giants are in fact exploiting their users, as their users are providing more than they receive in exchange through their use of web services. Fuchs view leads us to understand that even if Google Maps is a very useful tool for an individual, Google is still the profiteer in the relationship; as the user (as a part of a cloud of users) creates more value than he consumes when using the service. This value creation is proportional to the time spent using the service – the more an individual uses Google Maps, the more useful it is to him, but the more value he is creating for Google. In this relatively simple dynamic it is clear to us that through the scope of Fuchs' work, Google Maps users are indeed exploited.

Again, Arvidsson and Colleoni propose a different approach that will lead to a different interpretation of Google's exploitation (or lack thereof) of its users. The authors understand the concept of exploitation to be inapplicable to contribution based web services, as users are using and participating without being subject to any form of coercion on the part of the proprietors of the service. The authors explain that the use value of contribution based web services is higher than the cost (in time or privacy, for example) to users, meaning they cannot be subject to exploitation (Arvidsson & Colleoni, 2012). The authors explain that the political factor central to the definition of exploitation in Marxism is absent in the case of contribution based web services. However it seems that the relationship between contributor and service owner is becoming increasingly politicized.

# Chapter 5: Conclusions and perspectives

As stated in our research questions, this research was pursued with the objective of understanding the relationships between GIS users and services in order to explore the ramifications and possibilities of government intervention in this sector. Through an analysis mobilizing several approaches and research traditions, we have been able to understand motivations and beliefs that underpin use and contribution practices, as well as the motivations and mechanisms behind collective use and contribution actions. Finally, we have mobilized critical theories to understand the economic and social dynamics behind contributive web services in immaterial capitalism.

Through our interviews and personal reflection, we have aimed to understand how users of both GIS platforms would react to government bodies participating in the sector of GIS services, by creating an application or by exploiting data provided by a community project or company. In this conclusion, we will continue to exploit our theoretical framework and interview data, as well as the three sections of our discussion, which will inspire the three sub-sections of the first part of this conclusion.

## 1) Active and passive contribution models: a question of contributor engagement

Throughout the first part of our interviews, users often discussed the way in which they contribute to Google Maps or OSM. Namely, several of our interviewees expressed strong opinions about the active or passive type of contribution they undertake when using their GIS of choice. When queried about the possible existence of a public GIS, users were quick and adamant about the ways in which they would like to be able to use and contribute to this theoretical GIS.

In one of the few moments of similarity seen throughout this comparative study, both OSM and Google Maps users would have preference for an active type of contribution to

a possible government owned or exploited GIS. This preference was even more marked and emphasized amongst our OSM users, who both saw passive contribution mechanisms as a sub-optimal way of involving citizens with a city operated system. This is potentially due to the active nature of participation within OSM and the positive feelings OSM users have towards the open-source mapping platform – OSM users area already enjoy active participation in a GIS. OSM users are also accustomed to greater flexibility in their contributions and use of their GIS of choice, and care deeply about being able to contribute data that is important to them – cyclists contribute information about bike lanes, etc. – this was reflected in the way OSM users imagined themselves participating in a public GIS. Many users mentioned that they would want to be able to participate in a public GIS in the same way, being able to contribute information and help the city relevant to subjects which they consider important.

In a display of coherence, OSM users express disdain relative to passive contribution mechanisms because they are unable to choose which data is mined and how it would be used. They explain that they would feel used or useless if forced to contribute data in a passive manner, as they would be unable to see how their participation helped and how their data was used by the city. For our OSM users in particular, active participation is linked to stronger engagement and investment in a platform than passive participation. This is one of the points our interviewees frequently mentioned; being able to choose how, when and for what reason they contribute is explicative of the high engagement and investment OSM users have in the platform. The opposite can be said for Maps, with users explaining that they feel no particular attachment to Google's platform and that if a better service were to be created they would have no qualms about switching. We can thus understand that active participation breeds attachment and implication, and that the opposite can be said for passive contribution. Interviewees explain that they believe this would work similarly if a public entity were to create a contribution based GIS, and that as a result, it would be much more effective to work with an active contribution based system. Alongside this penchant for an active contribution system, users of both Maps and OSM were clear that an opt-in system would be preferable to a system where everyone was obligated to give up data or contribute to a public-owned GIS system. This

reflects both OSM users' desire to be able to chose and control their contributions, as well as Google Maps users' fear of surveillance, which we will discuss later in this conclusion.

Another condition of user-contributor engagement in a public GIS platform is the fair utilization of contributions. Both user groups were adamant that contributions made by citizens must benefit all inhabitants of the city - there were to be no forms of favoritism and the interests of all must be taken into account. This stems from the belief that anything done by the city, or any other public entity, must be open and belong to all. Interviewees with a greater understanding of notions related to governance and technology mentioned that ideally all data collected and used would have to be published with an open license in order to insure the transparency of the project. Certain users, such as David, express doubts about the ability to render such data public, which will be discussed further in this conclusion.

## 2) Forms of collective action and their ramifications

Livet's framework enabled us to characterize and understand collective action within OSM and Google Maps. Notably, we were able to conclude that different forms of collective action were underpinned by different conventions, themselves supported by different types of objects. On top of ideology or practicality, it is this grouping of conventions and objects that binds the user to his or her platform of choice. So what does this mean for a potential public use or GIS technology?

Our application of Livet's framework enabled us to determine the differences between forms of collective action, namely when it comes to contribution. As outlined by our interviewees rather uniformly, a government GIS service or tool must do several things to be efficient and effective: encourage users to participate, help users feel safe and comfortable in their use and contribution, and generate trust. However, each form of collective action comes with advantages and disadvantages.

When it comes to use and contribution, creating a system that would put in place mechanisms of crowd action would enable the creation of large datasets for the government to exploit. However, during discussions with our Google Maps users and dual-users that participate in crowd action through their use and contribution, many negative sides appeared. Notably, users feel used and alienated by the service to which they are contributing due to a lack of transparency and feedback associated with the anonymity and one-size-fits-all approach of crowd use and contribution. Often during interviews, both OSM and Google Maps users claim they wouldn't be on board with such a system – and if they were willing to participate in such a system, that they would do so more by default than willingness. Crowd action would also be somewhat effective as it relies on generic objects, enabling the government or municipality to create a system that would be usable in the same way by many user-contributors.

We were able to find examples of common action in contribution to OSM during cartoparties and community meetings. As Livet explains, common action is, in a sense, the most binding form of collective action as individuals are acting in response to another individual's actions that are happening in the same time and place (Livet, 1994). In the objective of creating a service that citizens are happy to use and contribute to, forms of participation based on common action could be an effective way to rally citizens around a potential GIS project at a municipal level. The issues here are the modalities of common action – encouraging whole portions of a city's population to become involved with a government GIS would be difficult or impossible due to the small amount of individuals who could participate in such common actions.

Action in unison presents many of the advantages of common action with few of the disadvantages. A GIS system build around the use of explicit convention and conventional objects could, on one hand, encourage large groups of citizens to become involved with a government run GIS project, and on the other hand be a bilateral system which enables citizens to communicate with each other and the operators of the service. The issue here is keeping citizens motivated enough despite the lack of actions taking place in the same time and place.

Our exploitation of Livet's work has enabled us to understand the strengths, weaknesses and modalities of different forms of crowd action. Through the analysis of our interview data, it seems clear that the best system to encourage collective use and contribution to a government run GIS system would be a system that combines different types of collective action.

Crowd action can be a powerful tool to collect data, as it is used in Google's mapping service, and would provide a public entity seeking to run a GIS with enough data to effectively improve public infrastructure. Common action, which could be pursued through the organization of user group or neighborhood meetings, would ground the project and keep citizen-contributors interested and engaged with the project through the use of direct, synchronous forms of action. Finally, forms of action in unison would guarantee that the project remains an open and transparent dialogue between the city and its citizens. The combination of these approaches could lead to many different forms and modalities of user engagement in the project – which, according to our interview data, was a very important criterion.

## 3) Exploitation, privacy and trust

Through direct questions about exploitation, privacy and trust during interviews and critical analysis through the scope of our theoretical framework, we have a clearer vision of what user-citizens would expect of a government run GIS when it comes to these important issues.

Both OSM and Google Maps users liken the collection of data to the collection of taxes when discussing the way a publicly operated GIS could function in Montreal. Notably, this point arises during interviews with OSM users who are frustrated with the fact that they pay taxes, which are then used (in part) to create maps and geographical data – but are not liberated back into the public domain. OSM users explain that this is wrong and that data they pay for should be open and free for all to browse and use. Google users who brought up this point did so in a more transactional manner, explaining that if the

city were to offer a GIS system to its citizens, that paying a form of data-tax would be a fair exchange – in the same way that citizens pay taxes to have access to roads or other public utilities. Throughout our interviews and our critical exploitation of the notions of value and exploitation, it seems that the most important point to users is that they feel they are getting as much value back from a city-operated GIS as they pour into such a system. This would be necessary for users to avoid feeling exploited and alienated by a data-hungry public entity.

Another easily perceptible conclusion of our interviews and analysis is that interviewees were much more comfortable with the concept of a city-run GIS over a provincial or federally run GIS. Several times users explicitly explained that if a GIS run by either the federal or provincial governments of Canada existed, they would not be interested in using it or contributing to it. This distaste for higher echelons of government is linked to two factors.

Firstly, interviewees express their concern over their data being used by law enforcement agencies, which are more prevalent at provincial and federal levels of government. The misuse of location data by federal governments, as revealed during the Snowden leaks for example, was a frequent case of the misuse of citizen data discussed during interviews. Users were adamant that they would not contribute data to a service that could potentially leak data to law enforcement agencies.

Secondly, certain users (mainly OSM users) were concerned about the concentration of data that could happen if federal or provincial bodies were to be involved with running a GIS. Users are concerned that location data, at a provincial or federal level, could be combined with financial, insurance, healthcare and other sensitive data. This is perceived as intrusive by our interviewees, who explain that a high concentration of data could present many disadvantages for citizens – such as government bodies being able to cross-reference different types of data in order to understand citizens' intentions and actions.

Another issue that arose frequently during interviews was anonymity. Both Maps and OSM users insisted on the fact that a government-run GIS would have to guarantee the total anonymity of its users. This poses problems for several reasons.

Firstly, the anonymisation of data can create a loss of value in the data, as David explained during our interview. If you cannot determine exactly where an individual begins his or her journey and where it ends because the individual has been anonymized halfway through his or her journey, some of the value of the data is lost.

Secondly, the condition of guaranteed anonymity could conflict with the will of our interviewees to feel part of a system and to feel links between themselves and other citizen-contributors. The anonymisation of data and identities could lead citizen-contributors to feeling lost and worthless in their interaction with a city or government-run GIS – leading to scenarios of disengagement and alienation as discussed in the previous section of this conclusion.

Another problem relating to privacy of citizen-contributors is the way data is used and kept. All our interviewees who were involved with OSM mentioned that a city-run project would have to adhere to open data practices in some way or form. However, David, a savvy dual-user, explains that it would not be possible to open the GPS location traces of citizens – as even with strong anonymisation, it would still be possible to bypass the anonymity created by the system and be able to deduce individual contributors' movements through the city.

As it became clear that fostering citizen engagement in the project was the key point in our previous retrospective section, it is clear that a government-run GIS would also need to create a strong bond of trust between itself and its users (and between users themselves) to be effective. This would need to be done through a combination of proper anonymisation and data sharing practices, as well as guaranteeing the exclusive access of civil services to the data – and thus the exclusion of any law enforcement agencies.

## 4) Research perspectives

Throughout this memoire we have aimed to understand the way users interact with GIS services as individuals and collectively. We have done so in order to discuss ways that government bodies the could become involved in this sector. Before discussing what was initially our key research interest (potential and current government use of GIS technology), we had to first understand the user and the communities they compose. As a result, we were not able to discuss government GIS use with our interviewees as much as hoped, and were not able to push our analysis of these discussions as far as would have been ideal. A continuation of this strain of research would be necessary to understand the view of citizen-users relative to the government use of ICTs.

As the public sector continues to investigate new ways to use ICTs in order to organize urban space, it becomes ever more critical to understand the implication of the adoption of these technologies. Notably, the discussion relative to the development of smart cities has been monopolized by big business (IBM for example is a highly active player in this area) and various governmental entities. More research would be required to understand the wishes of citizens in this domain, as well as understanding the effects of these projects on the inhabitants of the spaces that will be inevitably reconfigured by big data. In the search for efficiency, ethics and moral questions can often be forgotten. Further research is required to be sure that smart cities develop to be efficient and productive spaces whilst respecting citizens' wishes, security and privacy.

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