MSc Thesis in Geomatics for the Built Environment

Assessing an open spatial data infrastructure from a user participation perspective: A qualitative exploratory research of OpenStreetMap

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Abstract

Geographic Information (GI) has proven its value with its ability to be used in various fields, which left numerous questions about how this data should be stored, used, and managed. To facilitate the sharing and reuse of spatial data, Spatial Data Infrastructures (SDIs) emerged in the last decades and with the increase in Open Data, the belief emerged that not only the public sector should be involved in SDIs, but also companies and citizens should be included as part of the Open SDI. To evaluate its value and the success of open GI in relation to the participation of users and communities in open SDI is still a challenge. The possibility to improve user participation in open SDI, such as OpenStreetMap, needs to be assessed. This research used preliminary web-based surveys and semi-structured interviews as per Schmidt [2004] with users of the OpenStreetMap, as well as qualitative analyses and combined quantitative approaches, to explore the factors that foster user participation in the community of an open SDI, using a methodology that adapted motivational factors from Budhathoki [2010]. The selection of fundamental intrinsic and extrinsic motivational factors were used as indicators in user participation in OpenStreetMap, for both the survey and the semi structured interviews. Surveys showed that participants in this research were mostly heavy contributors, that primarily who are extrinsically motivated to participate mostly because they believe in the main goal of OSM, they value the community and the development of the platform, and trust the system and its users. Moreover, the users have intrinsic motivations to also participate for fun, instrumentality, altruism, to meet their own needs, alignment with the unique ethos and for learning. One of the conclusions that was drawn from this research is that OpenStreetMap is perceived as an Open Data Ecosystem among its users, yet some diving opinions to the perception about Open Spatial Data Infrastructures infrastructure. Future development points for OSM are the need for stricter standards and safeguards against hostile commercial or external takeovers if OpenStreetMap wants to effectively engage both the public and private sector. Applying a stricter standard for the metadata of datasets that are used by governmental and external parties should guarantee further re-use and provide sustainability for OSM. This includes an increase in their outreach through better marketing for the relevant potential users and provide further support systems for a new users. Furthermore, the expansion on different spatial data is also desirable, as well creating linked or integrated data with external open data providers. Current government or private SDIs that are in the process of transitioning into user-centric or open SDIs can apply these factors from this research into their own decision making processes if increasing user participation is their end goal

Keywords: Open Spatial Data Infrastructure (SDI), OpenStreetMap, User participation, Volunteered Geographic Information (VGI), Motivational Factors

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1. Introduction

1.1. Motivation

As we advanced technologically, Geographic Information (GI), gained importance with its ability to be used in various fields, which brought numerous questions about how this data should be stored, used and managed. This brought about the establishment of Spatial Data Infrastructures (SDIs) in the last decades, which is a framework of policies, access networks, data, standards and individuals that promote, coordinate and facilitate the dissemination and use of open GI for users in the spatial data community [Rajabifard and Williamson, 2002]. These infrastructures continued to be developed in response to attend the increased use of GI in our society, [Kotsev et al., 2020], consequentially, promoted the geospatial community, stakeholders and actors to become more interconnected and improved the way they exchange GI [Crompvoets et al., 2004].

At first, the production, distribution and access of geospatial data was limited to public sector bodies and national mapping agencies, however, within a short period of time, the way in which this information was used, produced and shared changed dramatically. The recent evolution and advances in Global Navigation Satellite Systems (GNSS), mobile devices and Global Positioning System (GPS) enabled devices allowed for common citizens to participate in the GI experience [Gómez Barrón Sierra, 2020]; [Costa Fonte et al., 2017]; [Budhathoki, 2010], which also became known as Volunteered Geographic Information (VGI) [Goodchild, 2007], such as is the case with the OpenStreetMap (OSM) project. OSM initially started as a project that could provide the means to supply GI to people did not have access to it, and for the intent to map roads and places that were not present at that time [Bennett, 2010]. Now, OSM has a wide selection of GI contained within its database, ranging from roads and places all over the world [Tanaka, 2017].

Similarly, a new trend for SDIs have begun to present a more 'open' SDI. Where citizens, businesses, academics and non-governmental actors are being included as stakeholders of the infrastructure [Vancauwenberghe et al., 2018]; [Vancauwenberghe and van Loenen, 2018]. While also providing an increased availability for participating in important governance and organisational decisions. However, this is still a theoretical concept rather than actuality. Likewise,Open Data Ecosystem (ODE) are a cyclical system, in which open data is used, re-used and re-cycled freely among data users and providers [Pollock, 2011]. In this sense, an open SDI is considered to be a valuable addition an ODE, since it enables the means to publish, find, assess, interact, and view data openly [Zuiderwijk et al., 2014]; [Izdebski et al., 2021].

Recently, the public sector has been taking the initiative to adopt the open data format, which is any data that is free, machine-readable, unrestricted and licence free [Vancauwenberghe and van Loenen, 2018], since this format facilitates the connection of GI with different providers that use the same standards. This enables people to innovate, use or create applications and Application Programming Interface (API) as they please and engage in public

decisions [Fox, 2013]; [Varga et al., 2022]. Although the increase of use of open data in the public sector exists, the re-use and sharing of the same is not guarantee. even if open data portals do provide the means to surpass data restrictions, the sole act of publishing does not guarantee that this data will be re-used, shared or processed for the generation of new data [van Ooijen et al., 2022].

As Goodchild [2007] mentions, citizens have the ability to supply valuable VGI to SDIs at a high technical level, as is the case with OpenStreetMap. This can lead to improve the level of participation of users in the SDI [Mooney and Corcoran, 2011]. The quality of VGI and its integrity has been researched previously [Mashhadi et al., 2015], as well frameworks to increase contribution to the public sector [Khan and Johnson, 2020] and the factors to contribute to OSM. Nevertheless, the connection between the essential factors to contribute to OSM and Open SDI has yet to be made.

To understand the status of GI in these open spatial data infrastructures and to identify the factors that motivate the users in a well-performing one, further research is required into how this user participation an open SDI can be assessed properly. However, to further evaluate the value and success of open GI in relation to the assessment of the participation of different user groups and communities in open SDI is still a challenge. The possibility to improve user participation in this open spatial data ecosystem needs to be assessed.

This thesis aims to assess an open SDI from a user participation perspective in relation to the key factors in developing a sustainable community for itself. This work is an exploratory research to see how theory can be put into practice to move open SDIs to the next level, as well to understand how the extrinsic, and intrinsic motivational factors build, or otherwise hinder, a sustainable participating community. It will include indicators developed through qualitative research by questioning and surveying the users of OpenStreetMap that are involved in developing spatial data within the ecosystem. An extensive bibliographical research will be performed to aid the exploratory nature of this research, along with preliminary surveys and semi in-depth interviews for the users OSM. The end result should be a qualitative exploration that identifies the most important factors that can be used to foster the user participation in open SDI, such as OSM. Additionally, to provide the better insights into how a sustainable community in open SDI functions and to serve as a foundation for future discussions.

1.2. Objectives and Research questions

This research aims to answer the following question:

What are the factors that foster user participation in the community of an open SDI ?

In order to answer question above, further sub-questions are required, of which:

- What are the intrinsic and extrinsic factors that motivate the users of OSM to participate in an open SDI?
- How and to what extent are users participating to OpenStreetMap?
- What can be done to motivate the community of users to participate in an open SDI?

1.2.1. Research Overview

The overview of this research is as shown in Figure 1.1. As an exploratory research, the initial method of approach will start with an extensive literature review by using Google Scholar, Scopus, Science Direct to search for articles, books, reports and other information about the essential factors that influence users to contribute GI to OSM and VGI, as well as what constitutes SDIs, open data, ODE, user participation. Followed by a general analysis of what types of spatial data can be contributed to OSM by users. This will form the theoretical framework that will be used for the development of the qualitative assessment of the user participation for Open SDI. After joining and establishing contact with the community of OpenStreetMap, preliminary surveys will be distributed within the active user communities, which afterwards will be used to contact and select user groups for further semi-structured in-depth interviews, which are proven to be one of the most important sources of information for case studies [Yin, 2009]. A qualitative analysis of the surveys and the interviews will be executed to examine what are the key indicators and motivations that were identified from the selected user groups to participate in an Open SDI. Thereafter, the results will be discussed and the final marks about of the study will be presented.

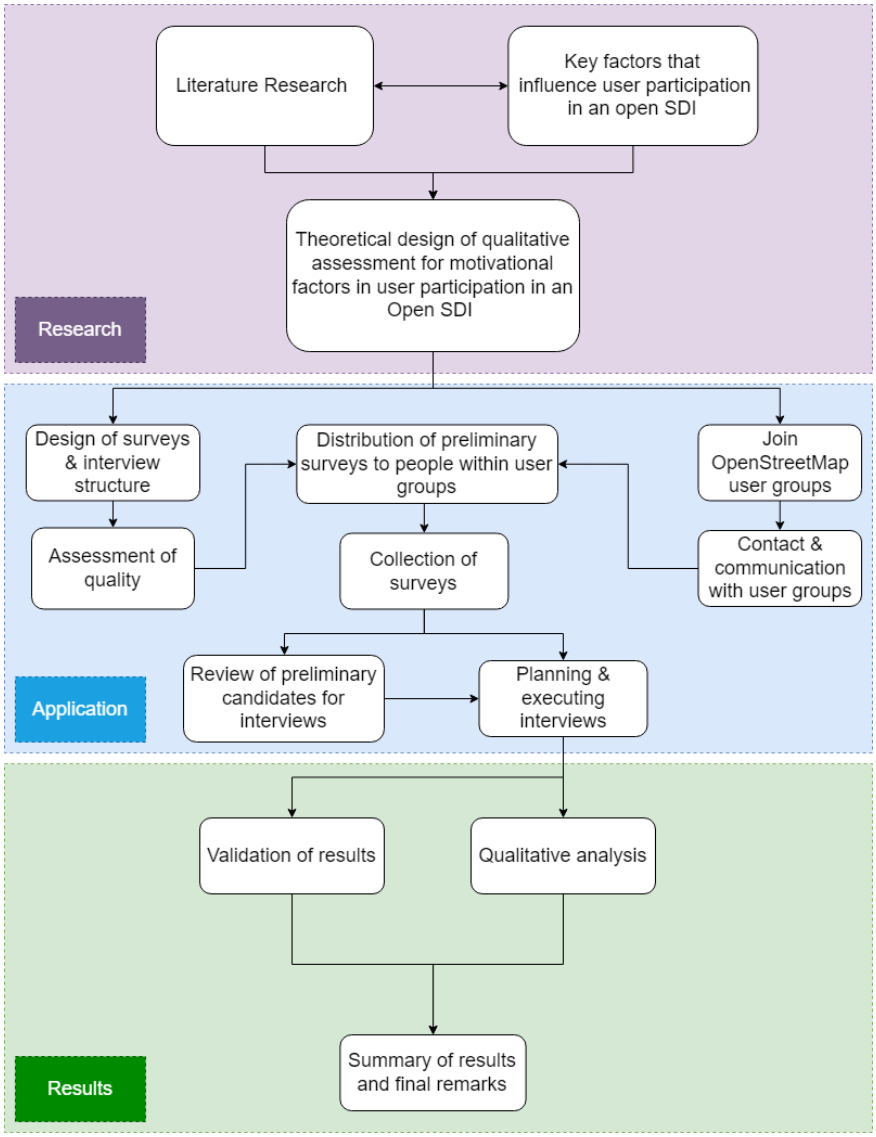

Figure 1.1.: Research outline

1.3. Reading guide

In this thesis, following this chapter of introduction, Chapter 2 contains the literature review as well as the related work that has been done, followed by the research methodology in Chapter 3. Afterwards, Chapter 4 elaborates on the results of the surveys and the interviews, while also providing more in-depth discussions. Finally, Chapter 5 provides an overview of the conclusions that can be drawn from this study, as well as the future work that can be developed and a self-reflection.

2. Theoretical background and related work

The goal of this chapter is composed of two parts: First, to summarise concepts related to this thesis, so the reader has a clear definition of what Open Data (OD), Open Data Ecosystem (ODE), Spatial Data Infrastructure (SDI), Volunteered Geographic Information (VGI), user participation and OpenStreetMap (OSM) are. Some of these theoretical topics, such as SDI, have evolved over time, spanning different generations, thus, a thorough and clear establishment of these concepts are critical. Secondly, to elaborate on the related work that has been done in relation to user participation with VGI and SDI, as well as the key motivations to contribute to OSM. Furthermore, this chapter will explain the theoretical connection between Open SDI and the state of OSM, as of writing this thesis. By the end of this chapter, the reader should have a greater understanding of all of the aforementioned concepts, including what factors will be used to assess user participation in Open SDI.

2.1. Open Data & Open Data Ecosystem

Open knowledge can be best defined by the Open Knowledge Foundation [2014] as:

> *Knowledge is open if anyone is free to access, use, modify, and share it — subject, at most, to measures that preserve provenance and openness. This essential meaning matches that of "open" with respect to software as in the Open Source Definition and is synonymous with "free".*

Open data is data that is available in a common, machine-readable format, which anyone can access, use and share without restriction or cost for any purpose. [Open Knowledge Foundation, 2014]; [Vancauwenberghe and van Loenen, 2018]; [Loenen, 2018]. In this way, the data should be under a license that allows for the re-use and redistribution with other data-sets by any person [Open Knowledge, 2015]. Loenen [2018] states that Open data is data that is allowed to be used and shared without any financial or legal restrictions, technical and intellectual barriers.

Open data indicator	Underlying concept
Known	- User should know that the dataset exists - Data should be recognizable - Data should contain identifiable information (i.e. metadata, tags, etc.) - User should know where to find dataset
Attainable	- User is able to physically access dataset without restrictions (by viewing or downloading via services)
Usable	- User can use the data for his intended needs and the data should uphold it's declared quality

Table 2.1.: Summary of Open Data supply indicators from a user perspective (adapted from [Welled Donker, 2017])

Figure 2.1.: Concentric shell model for open data and re-use [Van Loenen and Grothe, 2014] adaptation from Backx, 2003

In the last decades, governments and public sector institutions have started to adopt the open data policies, given the potential economic benefits it can create. Given that the private sector can develop services that use open public data, which in turn generates more benefits in relation to the cyclical economic and public value that the open data possesses, rather than solely relying on the commercial end-value that data has by itself van Ooijen et al. [2022]; Welled Donker [2017].

Valuable indicators have been developed to verify if open data is being effectively available for access to users, for example, this can be seen through the concentric shell model, in Figure 2.1, of Backx [2003] and further summarized in the table 2.1.

Traditionally, open data initiatives are elaborated in a single one directional process, by focusing only on the accessibility of the data. However, to take advantage of all the of benefits that open data has to offer, these approaches should also focus on the overall environment

in which it is situated in, which is also known as it's "ecosystem" [Pollock, 2011]; [Charalabidis et al., 2018]. The larger, geospatial ecosystem is composed of the entirety of the actors involved in producing and consuming GI. This envelops every user (citizens, organizations, institutions) that are interconnected with GI [Strobl, 2021]. For the purpose of this study, a spatial data ecosystem would revolve around a smaller scope, similar to SDI, pertaining to the data which is used in the environment of GI.

An open data ecosystem can be defined as a circular, inclusive, sustainable network, in which data is accessible, reusable, and oriented for the cooperation of its interdependent environment with its users [Boley and Chang, 2007], [Loenen, 2018]; [Charalabidis et al., 2018], where sustainability is defined broadly as functioning self-sustaining system that is preserved over time [Penzenstadler, 2013]. Generically speaking, the fundamental success to an ODE is amount in which the data is applied in reality. Furthermore, the more this data is used, the more socio-economical value it has, given more users allow for more use and a higher impact [Loenen, 2018].

A well-performing user driven open data ecosystem could potentially stimulate citizen participation, innovation, use and re-use of data between users and data suppliers [Zuiderwijk et al., 2014]; [Van Loenen et al., 2021].

2.2. Spatial Data Infrastructures - SDIs

SDI can be summarised as a set of instruments, such as policies, technology, data, institutional arrangements and individuals, that can provide the means for sharing and using GI through standardisation and protocols for compatible and available spatial data [Rajabifard and Williamson, 2002]; [Tonchovska et al., 2012]; [GSDI, 2012]; [Vancauwenberghe et al., 2014];. SDIs were also known as a Geographic Information Infrastructure (GII), which was defined as a framework that provided the means to efficiently facilitate the process of sharing, using and creating spatial data within a community or in between communities [Kelley, 1993].

In essence, SDIs can be divided into five key components: people, data, standards, access networks and policies, as shown in Figure 2.2 by Rajabifard and Williamson [2002]. Spatial data is made available to users through the access networks, such as geoportals and web services [Mulder et al., 2020], that allow the user to find, visualise and process GI within the access network [Welle Donker, 2010]. This data is provided with the condition of a policy of use, such as a license or guidelines, which determine what and how users are able to use, re-use and share this data [Sjoukema, 2021]; [Rajabifard and Williamson, 2002]. Standards provide the format in which data and web-services should be provided to the users [Martín Jiménez, 2019]; [Sjoukema, 2021].

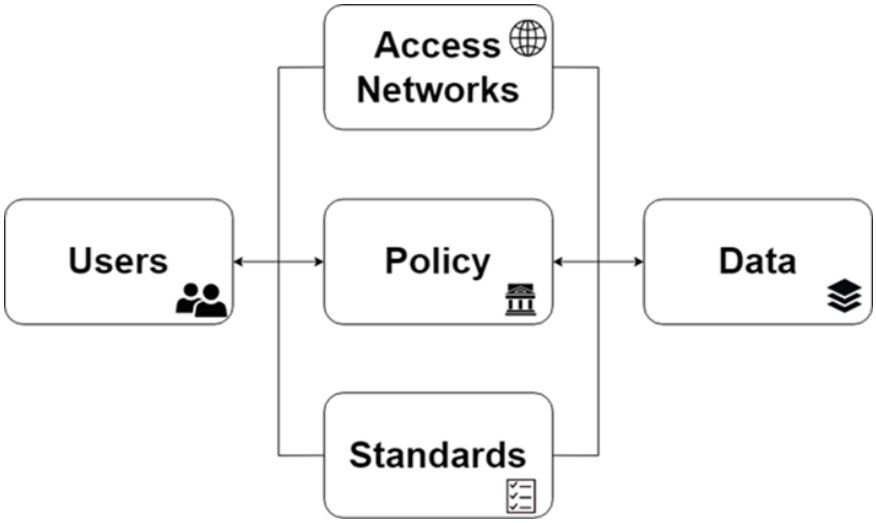

Figure 2.2.: Fundamental components of an SDI (adaptation from [Rajabifard and Williamson, 2002])

The evolution of SDIs can be divided into approximately three generations. In the mid 1980s, the first generation of SDIs, as depicted in Figure 2.3, were focused on the product-based design for the producer [Rajabifard and Williamson, 2002]. At the start, the SDIs had the objective to create, integrate, standardize and promote data inside the public sector bodies for economic development without the need for the user to be involved ([Sjoukema, 2021]; [Hennig and Belgui, 2011]; [Rajabifard and Williamson, 2002]; [Crompvoets et al., 2004]).

In the 2000s, with the advancements in technology, institutions and our society, the second generation of SDIs were developed to disseminate data to the users with the implementation of a process driven approach. [Rajabifard and Williamson, 2001]; [Sjoukema, 2021]; [Crompvoets et al., 2004]; [Hennig and Belgui, 2011]; [Loenen, 2006]; [Budhathoki et al., 2008]. The aim of this process driven approach was to enable the creation of an infrastructure that would provide GI to the users using web services as their key component to fulfil the needs of the users, facilitate the use of the GI and their standards [Crompvoets et al., 2004]; [Budhathoki et al., 2008]. This would also include both the different sectors as important developers, data integrators and data providers as users of the SDI [Vancauwenberghe and van Loenen, 2018]; [Hennig and Belgui, 2011]; [Martín Jiménez, 2019]. Even though the development of this generation was oriented towards the end-user, they were only considered passively, thus, without having their needs fully met. [Budhathoki et al., 2008].

The third generation of SDIs are "produser" driven, where the user is deeply involved and considered both the user of GI and the creator of this data. Furthermore, the needs of the user are considered the main objective of this generation, this is also an essential component to what defines it as a "user-centric" SDI [Budhathoki et al., 2008]. However, present user-centric SDIs are still not able to entirely fulfil the expected needs and purposes it proposes that it should do [Nedović-Budić et al., 2008]. This debate is due to the fact that the framework isn't completely focused on user preferences. Moreover, the contention is that the best course of action for user-centric SDIs is to include the end-users for both the designing and implementation process, rather than solely relying on the technical expertise and knowledge

of SDI-experts for the implementation and development of the infrastructure [Hennig and Belgui, 2011].

This user-centric approach to SDI has to also take into account VGI as a potential, yet, essential data source to SDIs, seeing as it can be used to improve and complete the already available spatial information in the SDI [Ngo, 2016]. With the realisation that users could be an important asset in an SDI. In fact, citizens are capable of being valuable resources for the collection of GI, due to their vast numbers, concurring movement on the planet and their local knowledge; a combination which could provide unique geospatial information [Goodchild, 2007];[Budhathoki et al., 2008].

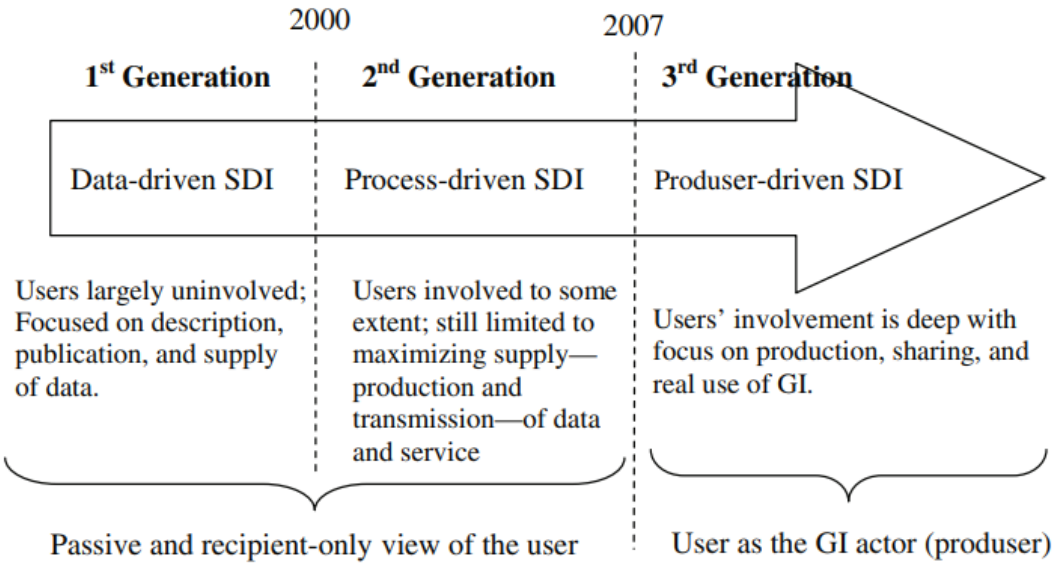

Figure 2.3.: Evolution of SDI (from Budhathoki et al. [2008] adapted from Rajabifard et al. [2006])

Currently, open data policies have become a trend for public administrations and countries to make GI openly available and without limitations for their users to use and share [Vancauwenberghe and van Loenen, 2018]; [Sjoukema, 2021]. Open SDI are defined by the application of these open data principles to the development and implementation of SDIs, where the spatial data should be open, freely available and shared between the different stakeholders. The stakeholders should consist of citizens, businesses, and any other groups that participate in the SDI or use the GI that exists within it [Loenen, 2018]; [Vancauwenberghe and van Loenen, 2018]. However, applying these open data principles to spatial data is only part of what open SDI development and application consist of, but as well as allowing for the open management and governance of the SDI to further stimulate the participation of the stakeholders [Vancauwenberghe et al., 2018]. In this case, SDIs are only truly open if the infrastructure allows for all of the stakeholders to develop and contribute their own data and components to the SDI [Vancauwenberghe and van Loenen, 2018]. To develop a new generation of Open SDIs, both open data and citizen participation need to be considered key components [Martín Jiménez, 2019].

2.3. VGI

The concept of VGI, is defined as collection of spatial data that is freely given from common citizens, where citizens can become providers of GI [Goodchild, 2007]; [Naghavi et al., 2022]. This concept of mapping geospatial data in a participatory approach have been in place since the 1960s, where humans would use mental maps to understand the different views of geographic locations in their surrounding [Pánek, 2016]. Currently, the growth and availability of communication technologies within everyday cell phones and applications allow citizens to provide a surplus of VGI [Mooney and Corcoran, 2011], for land administration information [Naghavi et al., 2022], as well as the ability for communities to effectively contribute GI in developing countries [Iliffe, 2017].

Previously, Goodchild [2007] had mentioned that the ability of citizens to supply VGI to SDIs, as is the case with OSM, at a substantially high technical level. With this, there is a clear increase in participation from both the specialists, citizens, and non-specialists in the development of connected GI [Mooney and Corcoran, 2011]. Furthermore, Mooney and Corcoran [2011] propose that there is indeed a potential application, for both consumers and GI producers, for the use of VGI from citizens to become a fundamental component of SDI after an experimental study of OSM in Europe. The inclusion of VGI in user-centric SDIs is important due to the fact that it can promote active user participation, to the extent that citizens and users participate in the further development of infrastructure projects [Shakeri, 2013]. If a community based VGI can be achieved for SDI, this would potentially save cost and time, produce more satisfaction within the users, and improved work and data quality [Balas et al., 2021]. With the use of VGI, SDI specialists and users raise the question: "Why aren't SDIs gaining more users while there is an excessive interest in participating in VGIs?" [Budhathoki et al., 2008]. Although the connection between SDI and VGI has been shown to be possible [Rajabifard et al., 2006], most of the work that has been done in relation to understanding the intrinsic and extrinsic factors that motivate user participation in an Open SDI which uses VGI has not been properly covered in practice.

2.4. User participation

Participation, in its board terms, is defined by (Havel [1996] p.3) as:

> *Participation is a process through which stakeholders influence and share control over development initiatives, and the decisions and resources which affect them.*

User participation indicates how much people are willing to engage on a personal and organizational level to contribute their knowledge on specific issues. As claimed by the study of Montalvo (2003, cited by [Rajabifard et al., 2006]), user participation in relation to spatial data contributions vary according to the amount of social pressure to be involved or to have a sense of inclusion in important components within organizations. This can result in a limited engagement the actors that are responsible for promoting data re-use in distinguished initiatives. Other studies have shown that some of the factors that play an important role to user participation in open data are mainly the quality of infrastructure and of the knowledge shared, the confidence the users had in the open data, how useful it was and if it was up to their expectations [Krismawati and Hidayanto, 2021].

In 1969, Arnstein [1969] developed a model for evaluating the level of citizen participation in the public sector, where each of the eight "rungs" of the ladder are divided into three different levels, "Non Participation", "Degree of Tokenism", and "Degree of Citizen Power". These levels represent a different degree in which citizens participate and influence over public decisions. Having real power, according to Arnstein, means that you can affect the outcome of decisions.

The model developed by Arnstein has been adapted by multiple authors and applied to different settings [Tritter and McCallum, 2006]; [Bruns, 2003]; [Connor, 1988]; [Olausson, 2016]; [Martín Jiménez, 2019]. This is due to the high flexibility the ladder possesses to adjust the indicators for participation. Each of the rungs in Arnstein's model represent a nominal scale for the level of control, where in the first rung, "Manipulation", represents total government control, and in the last rung, "Citizen Control", represents total control by citizens [Olausson, 2016]; [Martín Jiménez, 2019]. Each of the indicators for the rungs have been summarized by Olausson in Figure 2.4.

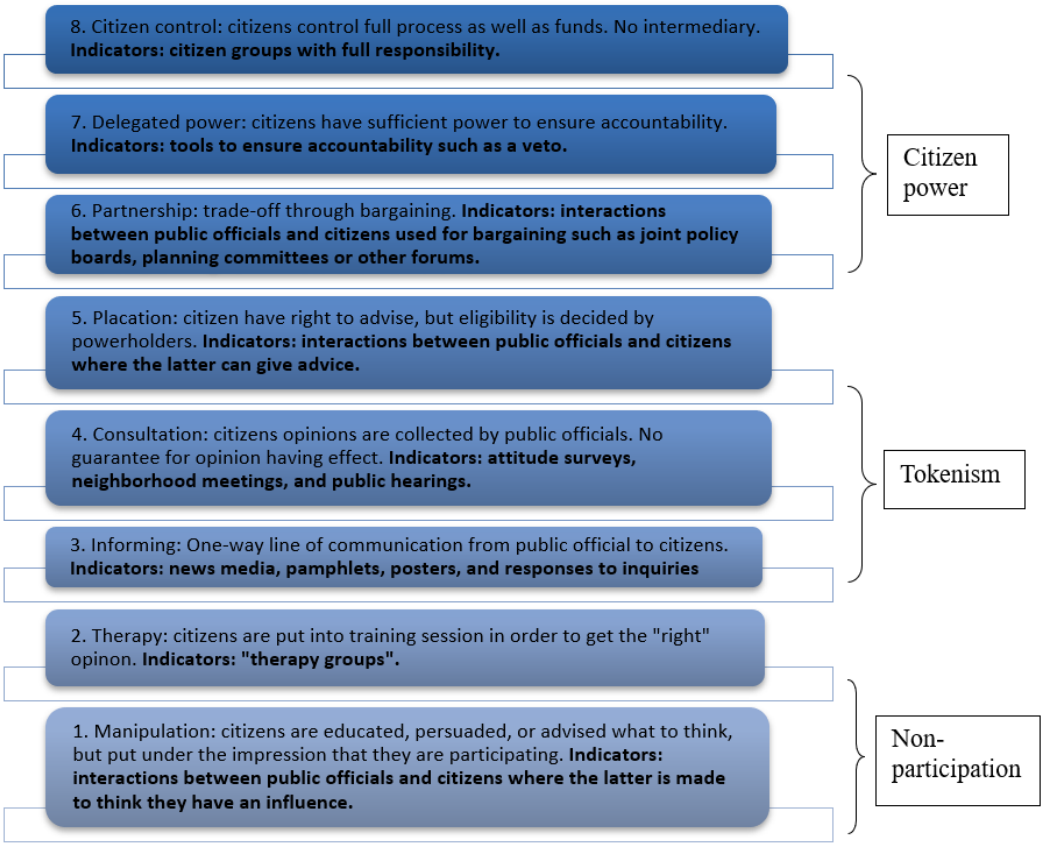

Figure 2.4.: Arnstein's ladder of participation(Arnstein [1969] (presented by [Olausson, 2016])

As for user participation for the supply of open data in the public sector, Olausson [2016] applies an assessment adapted from Arnstein. This method has also be used in Martín Jiménez's work to assess the level of satisfaction that users feel when they participate in developing

spatial data portals and what changes the public body decided to adopt. However, the participation in these public services are considered to have hardly any motivation to improve the engagement of the users. As part of assessing the different levels of citizen participation, the following model below (Figure 2.5) was created [Olausson, 2016]. Each of the rungs in the ladder has an indicator, where it serves to show the level of involvement that users participate with open data in the public sector, however, changes can be made to the provided indicators to better serve different research purposes. [Arnstein, 1969]; [Olausson, 2016].

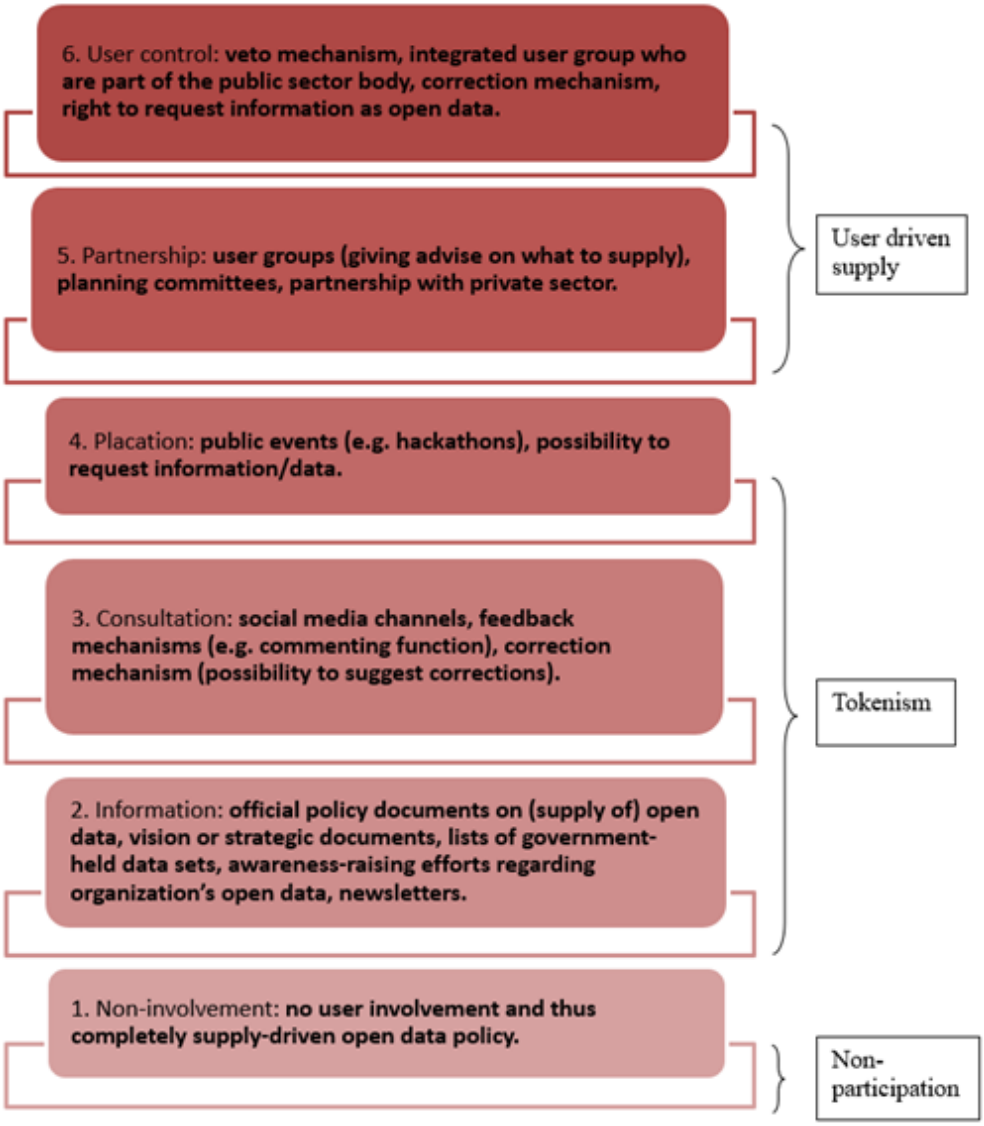

Figure 2.5.: Modified ladder of user involvement in supply of open data ([Olausson, 2016])

Recently, Santos et al. [2022] developed a study to compare VGI acquisition methods on informal settlements for São Paulo and Mexico City. Using Arnstein's ladder as a basis

for their comparison, they evaluated the opportunities and limitations of VGI in relation to citizen participation in mapping projects. Their framework is essentially divided into four assessment categories: required material resources; required Geographical Information System (GIS) literacy; user agency; and involvement of research subjects [Santos et al., 2022]. Each category has a score that ranges from 0 to 4 points, which adds up to a total VGI Participation Score (VPS). As Santos et al. (p.8) states:

> *Ultimately, the framework aims to improve VGI research and practice by making explicit the resources (e.g., material, informational, and capacity), the agents (i.e., the users, producers, and subjects of GI), and their involvement (e.g., agency and stages of direct participation) in the VGI processes.*

Their VPS scores build upon the ladder of participation, adapted from Arnstein, in relation to VGI, by creating a hierarchical assessment of the practices that involve users, use of technology and scientific data. This is presented in the Figure 2.6.

VGI participation score	Interpretation	Examples
13-16	Citizen empowerment	Participation and replication are possible even by the general population. Users have control over data reuse. Little to no resources are prerequisites.
9-12	Significant participation	Overall data controlled by researchers, there may be supervision or mediation by specialists. Non-specialized resources.
5-8	Limited participation	Participation is constrained to predetermined options of agency, technology, and goals. Some specialized resources are necessary.
0-4	Non-participation	Lack of GI knowledge hinders citizen participation, technology, and resources. Users have no control of the results (e.g., veiled GI collection).

Figure 2.6.: Table for Evaluation and interpretation of [Santos et al., 2022]

Their research presents how Arnstein can be adapted and developed the indicators for user participation in regards to VGI projects. Even though the goal of this is to investigate into the factors that motivate users to participate in an open SDI, all of the preexisting methods that applied Arnstein's ladder provide great knowledge to understand how to classify the reason behind the motivational factors that can be used as indicators to undestand how OSM users participate.

The scope of participation of users in SDIs has clearly been researched to a wide extent. The academic work that has been done has been in relation to user's involvement in the SDI, ranges from engaging their needs [Hennig and Belgui, 2011], developing user-centric SDIs frameworks for reusability [Benítez Páez et al., 2018], historical and heritage purposes [De Kleijn et al., 2013], land administration [Ngo, 2016]; [Naghavi et al., 2022], and discussing the quality of communication between users and the infrastructure itself [Alexopoulos et al., 2014]. Even though there has been some academic research on the qualitative assessment with academic users for the development and participation geoportals [Martín Jiménez, 2019], with VGI in the public sector [Sjoukema, 2015] and with public sector bodies [Olausson, 2016], the current research will seek to comprehend how the intrinsic and extrinsic

motivations that make a sustainable user community participate within open SDI and to understand how these user groups can be motivated to participate its infrastructure.

2.5. Open Street Map - OSM

Although, OSM is not by any means the sole repository for VGI data, though it is one of the most common. Initially, it was created in 2004 to map streets as a means to overcome licensing restrictions of certain maps at the time and to supply crowdsourced geographical information for users [Bennett, 2010]. The purpose for which it was made was intrinsically connected to gathering freely provide available spatial data which was previously restricted for small businesses, individual users and community organizations that could not afford, access or modify the traditional GI that was provided through the data steward [Budhathoki and Haythornthwaite, 2013].

OSM is considered to be a technical database infrastructure project built by VGI, where a large number of contributors collaborate to mutually edit the world map, along with a core structure for the software that enables the output of GI to be shared [Haklay and Weber, 2008]. The main goal of the project is to possess a digital twin of every possible geographic component that exists, from simple streets, waterways and up to more detailed features, like buildings, individual trees, and land administration information [Bennett, 2010]. One of benefits of OSM is that all the data is open, free, interoperable, and available for use, copying, modification and re-use, whereas that would not be the case with other crowdsourced services [Bennett, 2010]. People are able to contribute new data in many different ways, but the most traditional, yet most common is to use a GPS device to record data and then edit it in one of the available editors [Neis and Zipf, 2012]. According to Budhathoki and Haythornthwaite [2013] (p.557), volunteers choose to:

> *Build the geographic database and online maps, and others help develop and maintain the underlying technical infrastructure, such as software code for tools for uploading data, editing and rendering maps, maintaining transaction history, and implementing tagging schemas. Yet others participate in talk-page discussions that contribute to crucial decisions related to community norms.*

There are some community standards that apply for data in OSM, which is the case for obtaining data, editing standards and convention for maps [OpenStreetMap Wiki, a], styling or tags for the description of features [OpenStreetMap Wiki, c], however, these are community-oriented standards for the purpose of good practices. One can argue that by having a completely open standard for their data, by means of not conforming it to any standard, like Open Geospatial Consortium (OGC), enables the complete interoperability between any potential software or application and the theoretical commitment to the most open data standard possible. Furthermore, OSM does have certain licenses [OpenStreetMap Wiki, e], privacies, restrictions for disputed territories and usage policies [OpenStreetMap Wiki, f] to help the user to organize the sharing of spatial information.

As mentioned previously, SDI is considered to be a dynamic set of components, policies, people, data, and technological access network that enables the sharing, exchange, storage and use of geographical information between users [Budhathoki et al., 2008]; [GSDI, 2012]; [Tonchovska et al., 2012]; [Vancauwenberghe et al., 2014]; [Mulder et al., 2020]. By the fundamental concepts of SDI proposed by Rajabifard et al. [2006], or as it has been shown in Figure 2.2, there is a clear indication that OSM could be identified as an SDI, seeing what

it represents and provides for the world, although it claims to be a VGI database project. This could be taken even further by saying it could also be an Open SDI [Vancauwenberghe et al., 2018] because of the openness of the infrastructure and user-centric, non-profit nature in which non-government users or professionals can contribute to the development and the implementation of the GI on OSM. Therefore, by opening the participation aspect for all users to contribute, and even participate in the development of the infrastructure, it should be treated as an Open SDI and potentially be recognized as such by this research.

To further illustrate the perspective of how SDIs and OSM can be correlated in this way, the following table (Figure 2.7) by Minghini et al. [2019] was created to synthesise the characteristics between a well known SDI, INSPIRE, and OSM. This table represents the similarities between the two platforms, given the policies and organisational aspects, access networks, and the data. The main difference between the two is the underlying approach to the s then diving into more technical aspects about the data the policies, standards, data. As for the user component in SDI, it is known that theoretically, every citizen that has access to a computer and internet can be a user of OSM and a VGI contributor, although, in reality, not everyone is motivated to contribute [Sjoukema, 2015].

Characteristic	INSPIRE	OpenStreetMap
Approach	top-down	bottom-up
Spatial scope	34 environmental spatial data themes	any spatial object (verifiable)
Data structure and encoding	complex data model, GML encoding	flat data model, GDAL supported formats
Data CRS	INSPIRE-specific CRSs	WGS84
Data access	OGC-compliant clients, Geoportal	APIs, Planet File, predefined extracts
Data license	different, depending on MS data providers	ODbL

Figure 2.7.: Synthesised comparison between INSPIRE and OSM [Minghini et al., 2019]

2.5.1. Motivations to Contribute in OSM & VGI

Motivation to contribute to VGI is influenced by the technology that people have available, such as GPS enabled devices, computers storage and processing capacity enable people to feel motivated to voluntarily give their GI [Tanaka, 2017]. The most important component in VGI is the collective effort of the contributors, which differs from the traditional effort to produce GI, since there is no monetary compensation or someone to direct you on how to contribute. This way of producing GI is a resemblance of a Wikipedia style for generating new information [Budhathoki et al., 2008]; [Budhathoki and Nedović-Budić, 2010]; [Tanaka, 2017].

According to Nielsen [2006], within online communities and social media, only 1% of people actively contribute, 9% contributes occasionally and 90% of users do not contribute at all

and are identified as 'lurkers'. Nielsen [2006] defines this as "Participation inequality", as displayed in Figure 2.8, and within Wikipedia, this inequality is even more disparaging with a 99,8% of the population characterized as 'lurkers' [Sjoukema, 2015].

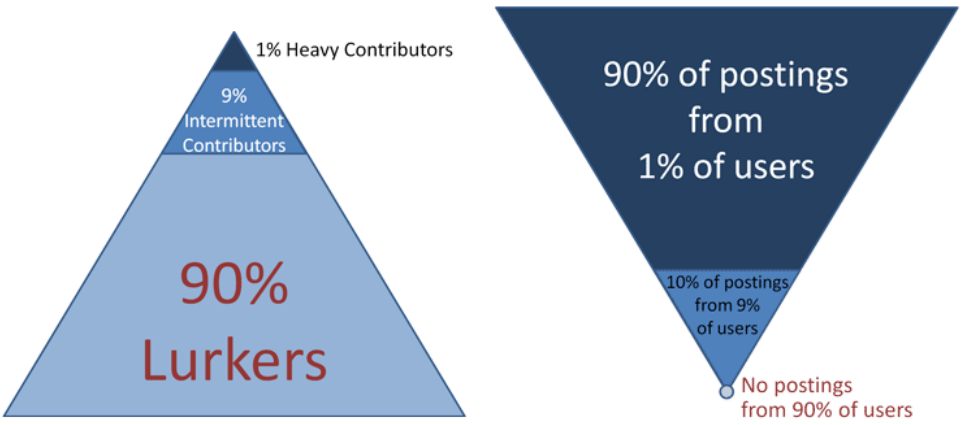

Figure 2.8.: Participation inequality [Nielsen, 2006]

Even in a well established VGI project like OSM, less than 10% of the users actively contribute more than 80% of the data to the database, and around 40% of users do not continue to participate after their first contribution [Budhathoki and Nedović-Budić, 2010]. In a similar study, Neis and Zipf [2012] also obtained corresponding results to the 90-9-1 rule that Nielsen [2006] states, where only 38% (192,000) of the registered members actually performed at least one contribute to the OSM database, and only 5% (24,000) of the entire community of registered members contribute actively to OSM. According to Neis and Zipf [2012], the majority of users are based in Europe (72%) (see Figure 2.9) and each individual user has an active area of contribution that can range from soccer field, up to 50 km^2.

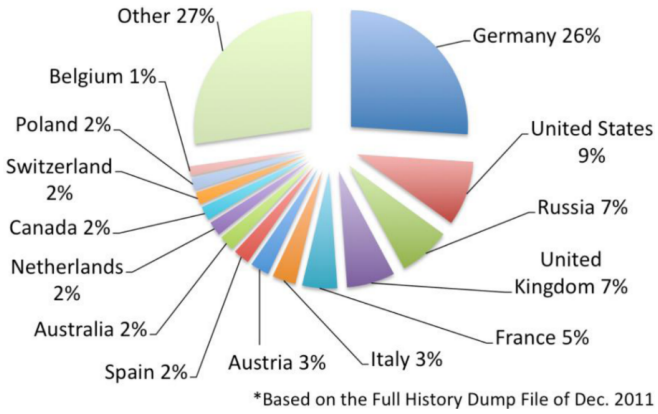

Figure 2.9.: OSM contributors per country [Neis and Zipf, 2012]

Budhathoki [2010]'s research elaborates about the motivations to contribute to OpenStreetMap, intrinsic and extrinsic motivational factors were identified for the users of OSM in table 2.2

and 2.3. Tanaka [2017] describes ”Intrinsically motivated” and ”Extrinsically motivated, respectfully as:

> *”that people are motivated with no apparent reward except for the activity itself”* and as *”people are motivated by an apparent reward”*

Hennig [2020] further elaborates that intrinsic motivation is derived from inner core values that motivate someone to participate, since it is not reliant on external factors from the outside world, where as extrinsic motivation is related to tangible external factors that surround us, such as financial rewards or outside recognition.

Furthermore, Budhathoki [2010] identified nine important motivations for users to participate in OSM, which was then qualitatively tested and a factor analysis was performed on the results, where seven of these motivational constructs were attributed to be important: Learning, Instrumentality of local knowledge, monetary, social , altruism, project goals and self needs, which was futher confirmed by Budhathoki and Haythornthwaite [2013].

There was also a variation between the motivational factors between casual mappers (i.e lightweight mappers) and serious mappers (i.e. heavyweight mappers), where factors that were related to community, learning, local knowledge and career motivations were more associated to the serious mappers, while casual mappers connected closely to the free mapping data aspect [Budhathoki, 2010]; [Tanaka, 2017]. The conclusion is also that OSM cannot fulfil its goal without the OSM volunteers to contribute to the project [Budhathoki and Haythornthwaite, 2013].

Given the previous studies, the intrinsic motivations resonated more with the users of OSM to contribute to VGI, although extrinsic motivations that provided monetary or virtual rewards could incentivize more users to contribute ([Budhathoki, 2010]; [Sjoukema, 2015]; Tanaka [2017]). Among all of the motivations, altruism, learning, local knowledge, interest and engagement with the project goal were considered to be the fundamental motivators [Budhathoki, 2010]; [Budhathoki and Haythornthwaite, 2013]. Given the scope of this research, the same factors will be adapted for the assessment of user participation within OSM and reflect on what important factors are still relevant to user participation in open SDI.

Intrinsic Motivations	Underlying concept
Unique ethos	Distinguishing ideals, values, sentiments, or guiding beliefs that are shared by the members of a volunteering community.
Learning	A volunteer gets an opportunity to learn from his own experiences as well as the experiences of other members of the community.
Personal enrichment	A volunteer seeks to increase his intellectual or spiritual resources, which is found in the accumulation of cherished and valued experiences resulting from the chosen pursuit.
Self actualization	It comprises the development and application of one's talents, capacities, and potential.
Self expression	A volunteer seeks opportunity to express one's skills, abilities and individuality
Self image	It is enhanced through the expression of unique skills, abilities and knowledge
Fun	An individual volunteers for hedonic gains that he derives from the pleasure of creation. Self gratification or the satisfaction of one's own desires pertains to depths of satisfaction that may be at once fun, but can also be profound and fulfilling.
Recreation	It is the process of forming anew or creating one's self again; that is, volunteers retain a sense of renewal, regeneration, or reinvigoration through their participation in volunteerism.
Instrumentality	An individual volunteers if he believes that his contribution is crucial to accomplish the goal of the project.
Self-efficacy	A volunteer contributes if he perceives himself as having the knowledge and skills to meet the expectation of others in the team.
Meeting own need	When an existing product/service does not meet his own needs, an individual joins a voluntary community to collectively develop the product/service.
Freedom to express	An individual participates in voluntary activities as he has freedom to choose tasks and exercise his creativity.
Altruism	Volunteered action is directed by altruistic reasons

Table 2.2.: Intrinsic motivations for contributing to VGI adapted from ([Budhathoki and Nedović-Budić, 2010])

Extrinsic Motivations	Underlying concept
Career	An individual uses the voluntary work as a platform to signal his skills for career opportunity such as future jobs, share in commercial companies or future access to the venture capital market.
Strengthen social relation	An individual volunteers to strengthen his social relation; participation in volunteerism depends on the reaction of his significant others.
Project goal	A volunteer carefully analyzes the goal of the project and its likelihood of attainment before participating in the activity.
Community	This pertains to efforts on behalf of the participants of a volunteering community to ensure that the community is maintained, continues to develop, and remains a cohesive unit
Identity	By joining a group, an individual develops his identity with the chosen pursuit and is inclined to use this to identify himself. Further, he behaves according to the norms of the group.
Reputation	A volunteer contributes to enhance his reputation and continuously seeks recognition from his peers.
Monetary return	An individual participates in volunteering activities seeking a direct monetary benefit.
Reciprocity	An individual volunteers if he believes that others will reciprocate and will not exploit his contribution.
System trust	The volunteer‘s contribution depends on his belief about the reliability of the underlying technical infrastructure.
Networking	An individual participates in voluntary activities to network with other members of the community. Denser the network one has, more is the contributions he makes
Socio-political	An individual participates in volunteerism to meet his sociopolitical motives.

Table 2.3.: Extrinsic motivations for contributing to VGI, adapted from ([Budhathoki and Nedović-Budić, 2010])

3. Methodology

3.1. Overview

This chapter elaborates on the methodology that will be followed to answer the research questions posed in the introduction. Given the literature review and the research done in Chapter 2, the research into motivational factors for user participation in open SDI is still not implemented in practice and still requires further application. An initial identification of user groups through the literature review will be briefly described, which will also be complemented by the results of the surveys later on in Chapter 4. Afterwards, the intrinsic and extrinsic motivational factors identified previously in Chapter 2 and similar research on user participation within OSM will be used as the qualitative basis for the preliminary web-based surveys that will be shared to the OSM community through their communication channels. Initially the platform was monitored, then the researcher's role and goal was transparently declared in the communication channels in order to understand the community and in regards to potential participants to the surveys and interviews. The surveys were be developed on the Qualtrics platform and will provide the means to contact and review candidates for the semi-structured interviews. The semi-structured interview will be conducted on a volunteer basis, which will further investigate the participant's personal motivations and knowledge of SDIs. The final purpose of this research is to present a qualitative assessment, derived from both the survey and the interviews, on the most important intrinsic and extrinsic factors to the users to participate in an Open SDI, as well as to analyze how OpenStreetMap's infrastructure is perceived by the respondents. The results will also be complemented and compared with existing research.

3.2. Research population / User groups

As of writing this thesis, there are currently 8.3 million registered users in OSM [OpenStreetMap Wiki, g]. In order to analyze who is part the population of active users in OSM, how or if they participate, some quantitative questions within the survey will be used for these purposes. The main focus of this study are the users within the OSM community that actively contributing GI to OSM, which will then be classified given the results of the survey.

This will enable us to firstly: randomly select individuals from OSM and determine if that person is not only contributing spatial data to the infrastructure, but is also involved in the community channels; secondly, understand the intensity in which that user participates within the OSM infrastructure, enabling us to determine if they are a casual mapper or a serious mapper; and lastly, to establish where people contribute from, which will allow the further distinction of the user groups.

However, given the participation inequality mentioned by Nielsen [2006], this can also indicate a potential volunteer bias within this research, given that both the surveys and the

interviews are optional for all of the users in OSM community channels to answer. This bias is also possible for people that have a desire or interest in the subject of the survey, which indicate that the results are representative of the ”heavy contributors” in the active population of OpenStreetMap. However, by providing anonymity to respondents, the wide range of channels in which the survey was shared, this bias can be avoided. According the comparison of the population of Chapter 4, it is clear that this research provides an accurate representation of the OSM users. In order to contact the user groups, a general call-to-participate statement was shared with the official Discord server of OSM, open Facebook groups, Telegram message groups and the official talk-mailing list.

3.3. Surveys and Interviews

3.3.1. Surveys

The chosen survey (Appendix A) in the current research is a web survey through the Qualtrics platform. A web survey according to Zanutto [2001], is an efficient, affordable and user-friendly tool, that enhances access and response rates and enables process, analysis and presentation of information. Qualtrics was the chosen software, as it is licensed by TU Delft, complies with GDPR regulations and user privacy laws. The chosen presentation method of the survey's questions was a screen-by-screen presentation, showing only one question to the participant at each time, to maintain a stable order of questions and keep open-ended questions towards the end of the survey [Dillman and Bowker, 2001]. The survey included 14 questions in total (see Appendix A),

The chosen questions in this research were developed according to the potential motivational factors identified by Budhathoki [2010]. The survey involves both qualitative and quantitative data, since they combine different closed questions, open questions and 5-point Likert scale type questions (i.e. ranging from fully agree to fully disagree). This was selected to understand the general perception the participants have in relation to OSM, the quality of the data and services it provides and how useful the community can be when the user is in need of help. This is critical to understand what makes a community perceives as essential in an open SDI. Initially, personal and background questions, such as country of residence, gender, age and education are asked in order to understand the active demographic in OSM and they are a key component to define the desired user groups.

3.3.2. Interviews

Following the survey, interviews (Appendix B) were conducted with the participants that responded positively to question 15 and identified as part of the active user groups in OSM. Yin [2009] identifies the main advantages of interviews as being focused and perceptive tools, that with an unbiased interviewer can lead to important insights on a case study. The participant has the option to not participate if desired and will be made aware that their answers will be transcribed to text and their identity will remain preserved.

The interview was conducted with one person at a time in a semi-structured interview form. Semi-structured is an interview that has a predetermined question set and topic, yet, allows space for new questions that help understand better the ‘why’ and ‘how’ [Adams, 2015].

Furthermore, It enables the possibility that not all of the respondents will understand the terms used in the interview the same way, thus, could produce unique answers or require further explanation to related concepts. This method usually incorporates a mix of open and closed questions, which in turn lead to several follow-up questions [Adams, 2015], and is ideal for a more exploratory research like the current one.

During the conduction of the interviews, the question set could be modified according to the knowledge of the interviewee on the subject and on their expertise/participation in OSM and other platforms, in order to explore new aspects from individual knowledge and experiences. The process for analyzing the semi-structured interviews, was based on Schmidt [2004] methodology and includes the following steps:

1. Execution of the interviews
2. Recording of interviews
3. Transcription of the interviews in two stages (exact transcript and a cleaned-up version)
4. Re-reading of transcripts along with identification/formation of Themes within the transcripts
5. Detailed definition of the identified themes
6. Categorization of answers into identified themes
7. Quantification of the categorizations
8. Combination of themes to produce useful insights and interpretation of results

The interview questions will further assess qualitatively the user's perception of SDI, ODE, what motivates them to participate in OSM, what barriers they personally face and how can the relationship between OSM and the public sector sector be improved. If in any case, the interviewee does not know the definitions related to this work, one will be provided based of the literature review of this study. Moreover, the interview will serve as the qualitative basis for to further understand the personal motivational factors of each user to participate in an Open SDI. In doing so, we are able to establish a connection between the theoretical qualitative framework of why users contribute to open SDI and create a hierarchy of user needs for participation in open SDI.

3.3.3. Supplementary Interviews

To complement the research, additional interviews with external sources, who were considered to be of value to this research were also included. The determining selection was for academics who have either had active experience and their expertise with OSM or understand the concept of SDI. These interviews were conducted using a similar structure as presented previously, but with more flexibility to the interviewee's field of research and their knowledge on the matter. Firstly, Jaap-Willem Sjoukema was considered, given his expertise in VGI, SDI and his involvement with the Dutch Kadaster, the Netherlands' Cadastre, Land Registry and Mapping Agency. Secondly, Wilko Quak, who is a long time academic at the Technical University of Delft with expertise in geo database management systems, SDI and familiar with the underlying data schema in OSM. Lastly, Dr. Pascal Neis, an expert academic who developed the web service of OSMstats [Neis, 2018], was also considered for an interview, but who was not able to participate.

3.4. Indicators for user participation

In Chapter 2, the primary intrinsic and extrinsic motivations to contribute to VGI and OSM were presented. However, in this research, the indicators that were used to assess user participation were adapted from Budhathoki [2010]'s findings on potential motivational factors and used as a suggestive framework for the elaboration of the questions in the survey and the interviews in order to maintain the participant interested in the web-based survey, as well as to keep it under 10 minutes. Therefore, the selection of the indicators for participation, in relation to the motivational factors in the survey were summarized as follows:

- *I believe in the goal of OSM for a "free wiki world map"*
- *Digital maps should be free for people*
- *The community is important to me and the development of OSM.*
- *I want to help others by providing free digital maps.*
- *I want to learn about new skills, perspectives, or the area I live in*
- *I like to contribute so I can provide accurate information of my environment*
- *I believe that the information I add is just as good as others*
- *I enjoy adding new information to OSM and I appreciate maps*
- *To use OSM data for my career, personal, business, or financial gain*
- *It gives me the freedom to map what I want*
- *Because OSM is reliable and will keep my contributions safe*
- *To create new map data since it does not exist elsewhere*
- *Other: (open text answer)*

In order to assess which motivational factors were important and to keep the options open for participants, some factors, such as monetary reward, were added to the career motivational factor, while others were excluded, in order for respondents complete the interview without feeling overwhelmed. The answers from the survey will be used for both the qualitative analysis proposed in this methodology and for the exploratory into open SDI user participation. Accordingly, each question from the survey will serve as indicators to both the sample population and to measure the intrinsic and extrinsic factors of the participation. In the interviews or surveys, indicators will selected and quantified when asked questions that pertain to motivation and the participants mention a certain key word in the open answers, such as "fun", "community", "open / free data", "learn", etc. or that have correlation to any the intrinsic or extrinsic motivators. This will serve as the primary indicators to understand both the intrinsic and extrinsic motivations of the participants. Following these questions are open questions to determine if the user accesses other types of spatial data ecosystems and if the participant believes there is any room for improvement in the OSM infrastructure. Further qualitative analyses from the semi-structured interviews and the open ended questions should also provide insight into indicators for user participation in an open SDI.

3.5. Qualitative analysis

The qualitative analysis approach that will be used in this research will be reflected through the results of the surveys and interviews. This assessment will provide a unique analysis into the OSM users perception on their motivations, needs and the infrastructure itself. For the quantitative parts of the survey, simple exploratory descriptive statistics will be used to describe the user groups that were involved in this research, which can provide smalls insights into who actively participates in the community channels. The qualitative answers from questions related to participants' motivations, purpose of use in OpenStreetMap, how they participate and why they participate will also be used to verify and compare if the previous research is still up to date and if the results from this research can be used a benchmark for future research.

4. Results & Analysis

In this chapter, the results for both the conducted web-based survey (Appendix C) and the interviews (Appendix D) will be discussed in greater detail. The results from the survey will be complemented by the profiling of the population that was surveyed and emphasise interesting responses and themes among the participants. As described previously in the methodology, themes within the interviews will be identified, categorized and combined with the selected qualitative indicators and literature research to produce useful insights. At the end of this chapter, an overall summary of the resulting themes users presented from both the surveys and the interviews will be discussed and associated in relation to the fulfilment of the research questions.

4.1. Results and Analysis of Surveys

As mentioned previously, the minimum amount of personal data was requested from the respondents, who also had the option to opt-out of the survey at any given moment, and all of the answers regarding Age, Gender, Country of Residence and Education Level included a "Prefer not to say" option. This approach was deemed suitable to avoid discouraging the respondents. The survey was supplied through the official communication channels of OSM, where approval was needed to share within the community. The results showed a total of 107 responses to the survey, of which only 7 cases (6.5%) were considered as blank responses (whole survey blank) and therefore excluded. From the rest, 86 out of 100 responses were considered as completed, given that the respondents went through the whole survey and replied to the some if not all questions, since participants could skip questions before reaching the final open-ended question. Therefore, a total of 100 valid respondents were considered for the quantitative results of this survey and the number of valid responses will be indicated by (n) for the qualitative analysis.

As shown in Figures 4.1, 4.2, and 4.3, the results show that the respondents (n=100) were predominantly male (90%), between the age of 25-44 years old (48%) and have either some university experience, a university bachelor's degree, graduate or professional degree (73%). This shows that the people who responded to the survey are in some form, highly educated or skilled individuals, which appears to be similar to what both Neis and Zipf [2012] and Budhathoki and Haythornthwaite [2013] describe the general population of OSM at that time to be.

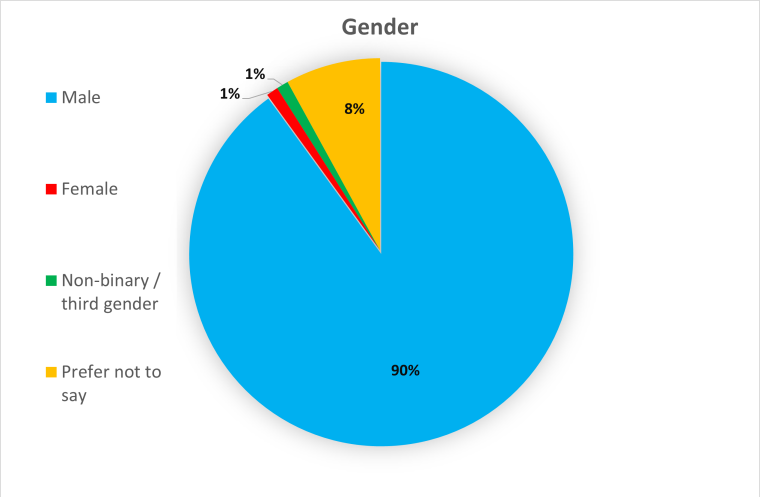

Figure 4.1.: Gender of respondents

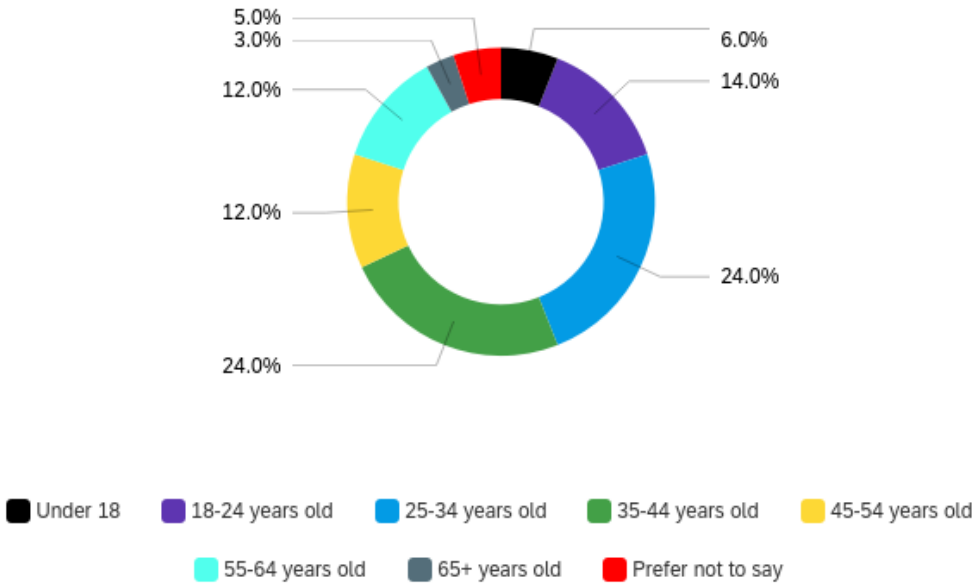

Figure 4.2.: Age of respondents

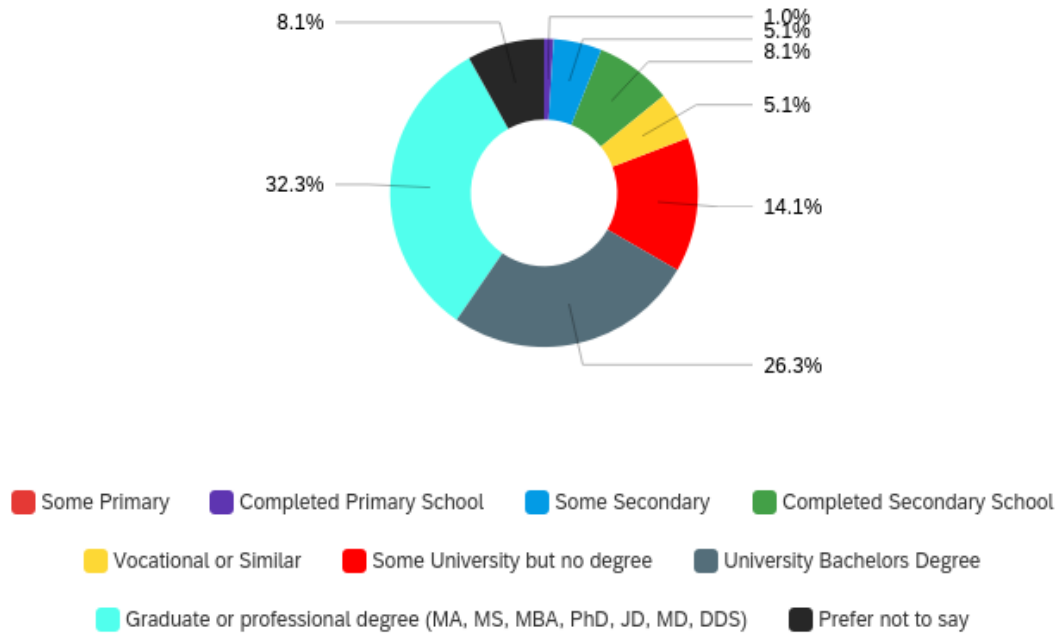

Figure 4.3.: Education level of respondents

The survey also showed similarities to the aforementioned studies in relation to the country of residence, where 57% of the respondents (n=100) were from Europe, 17% from North America and 14% out of South America. Of these, the majority were either from Germany (19%), United States (11%) or Brazil (10%). Even though the respondents volunteered to do the survey, the sample of participants seems to be representative of the community's usual active participants as previously described in Chapter 2. Additionally, users from a total of 34 countries participated in this study, which shows a promising outreach of the survey in relation to the users in OSM.

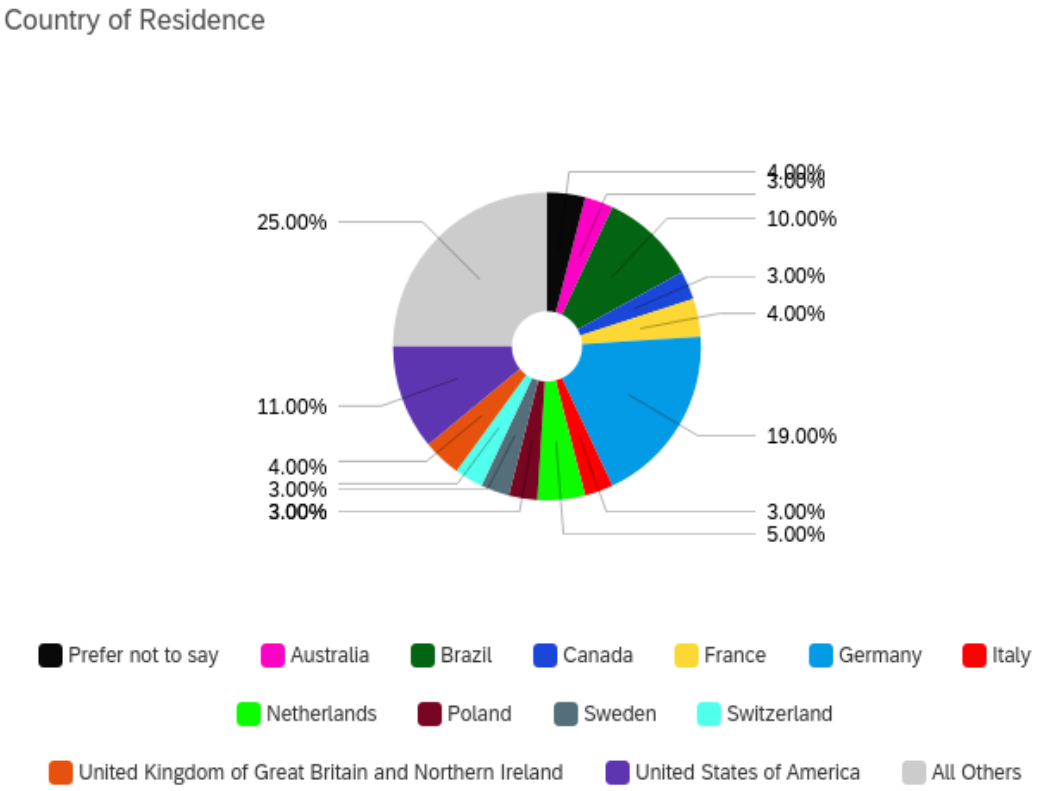

Figure 4.4.: Country of residence of respondents

However, given the time between these publications and this thesis, the number of registered members of OSM has grown from half a million registered members in 2011, to now over 9 million [Neis, 2018]. This could be attributed to the increase of interest in the project and the growth of easily accessible GPS enabled devices and tools within the global population. This change is also shown in Figure 4.5, where the GPS device used to be the predominant tool to participate in OSM [Neis and Zipf, 2012]. We can also observe that 82% of the sampled users utilize either a computer or a cellphone, or both, to contribute data to OpenStreetMap, by using them individually or combined through applications compatible with OSM. Some respondents also included the use of external cameras and other mapping related platforms, such as Mapillary (https://www.mapillary.com/), which is a crowd-sourced VGI platform from Meta that uses street level imagery to automate mapping with geotagged photos. Another external application that was mentioned was Strava (https://www.strava.com/), an online network service which records GPS data and incorporates social media functions to provide a record of the user's activities and global heat-map for athletes.

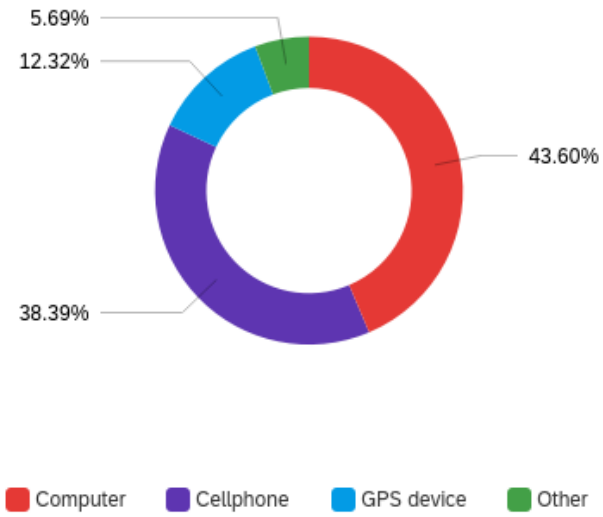

Figure 4.5.: Tools and devices used by respondents to participate in OpenStreetMap

In regards to the respondents' frequency of participation in OpenStreetMap, the average respondent would participate at least a few times a week in the platform (Mean 1.94). The majority of the participants would either contribute a few times a week (41%) or every day (36%). This highlights what was mentioned previously in Chapter 3, where the volunteers that participated in the survey are most likely "heavy contributors" to the project. Nevertheless, some respondents either contribute a few times a month (17%) or a few times a year (3%), with the minority being non-participants (2%), as shown in Figure 4.6. This means that the results will reflect more the active/frequent participants in the community, rather than the occasional contributors, which was a desired outcome since the beginning of this research. In terms of how useful the community is to aid users to participate in OSM, by providing services and data to users, Figure 4.7 shows that, on average (Mean 3.92), the respondent feels that the community provides very useful services and data (45%). In general, only a small minority of the participants (3%) consider the community of OSM slightly useful, which is sensible since majority of these respondents are frequent users. Furthermore, as shown in 4.8, on average, (3.99), the respondents (n=92) mainly agree that the quality of the services and data provided by OSM is somewhat good quality (57.6%). Impressively, none of the participants felt that the data and services were of bad quality.

The question on OSM community usefulness was mainly asked in order to understand how the respondents perceive the community in OSM as a whole, given that one person can potentially contribute to OpenStreetMap without ever having to interact with other users. Nonetheless, due to the high flexibility with standardization, such as is the case with tags, which are simple key/value pairs that describe elements in the map [OpenStreetMap Wiki, h], users are still recommended to follow the community guidelines to describe their data, even though they are free to define their own [Minghini et al., 2017]. In this regard, it was observed during the application of the survey that in the Discord international community channel users typically contact other OSM users to clarify potential confusion with data sets

and standards. This convenient online presence within the communication channels and the need to interact with one another could be an indication as to why the respondents perceive such utility behind the community, which will be further assessed later in the interviews.

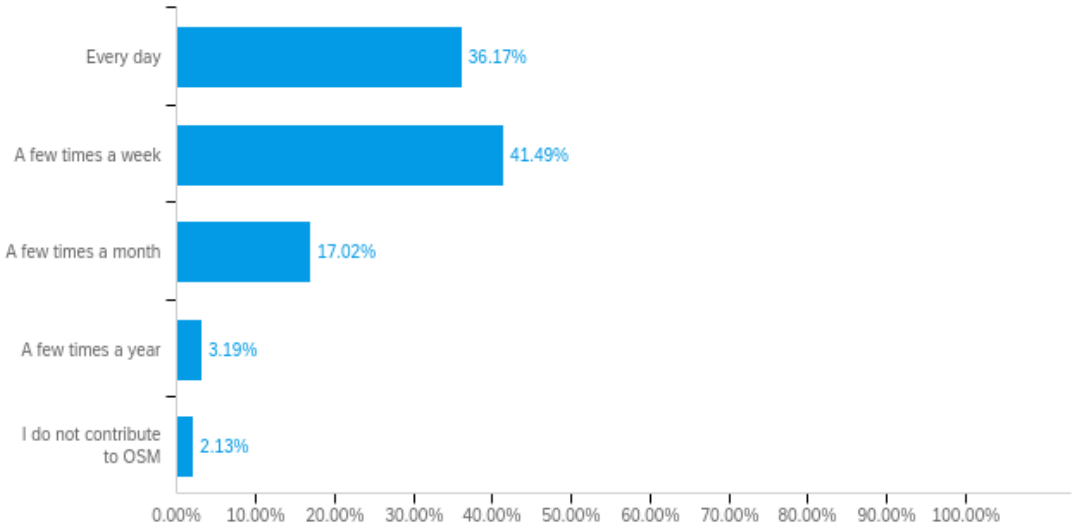

Figure 4.6.: Frequency of participation

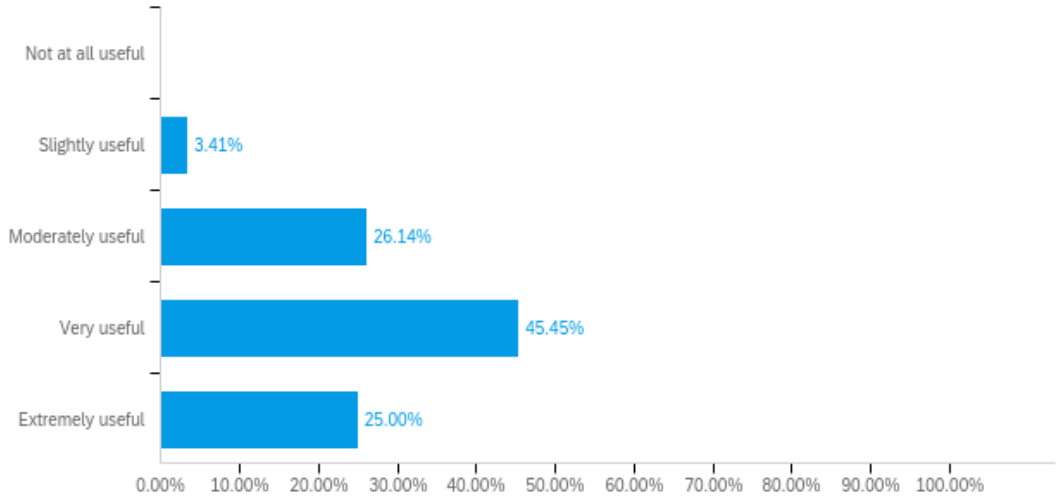

Figure 4.7.: Perceived usefulness of community in OpenStreetMap

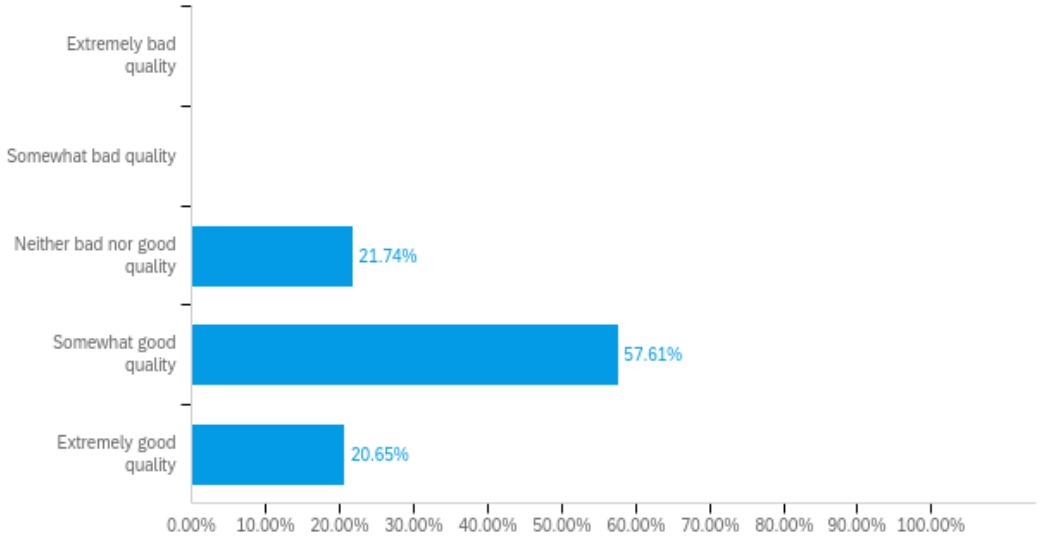

Figure 4.8.: Quality of services and data provided by OpenStreetMap

When asked about how difficult it is to use OpenStreetMap, Figure 4.9 shows that the majority of the volunteers who responded (n=96) to the survey indicated that the platform is somewhat easy to use (36%) or neither difficult or easy to use (30%) and no respondent considered it to be a very difficult platform to use. This question was meant to assess how difficult users perceive the overarching open data ecosystem behind OSM. However, this question did result in some confusion, given that it was too generalised and did not have a specific scope in to "what" was easy to use in the OpenStreetMap ecosystem. Ideally, it was associated with the difficulty in using the main editor, ID [OpenStreetMap Wiki, b], which is the first editor of the service that is provided through the main website (https://www.openstreetmap.org/edit). Because of the simple structure of the conceptual model of OSM, there are multiple editors for its database and various different ways, formats and sources in which the data can be accessed [Minghini et al., 2019]. Further statistics to the Likert style questions that were mentioned so far can be seen in Table 4.1.

Question	Min	Max	Mean	Std	Var	Count
How would you rate the ease of usability of OSM? (1: very difficult to use, 5: very ease to use)	2	5	3.44	0.96	0.91	96
How would you rate the quality of the data/services provided by OSM? (1: extremely bad quality, 5: extremely good quality)	3	5	3.99	0.65	0.42	92
How often do you participate in OpenStreetMap? (1: every day, 5: I do not contribute to OSM)	1	5	1.94	0.92	0.85	94
How useful do you find the community when participating in OSM? (i.e. in terms of quality of data/services provided) (1: Not all useful, 5: Extremely useful)	2	5	3.92	0.8	0.64	88

Table 4.1.: 5 point Likert Scale Results (Questions 5, 6, 9 & 12)

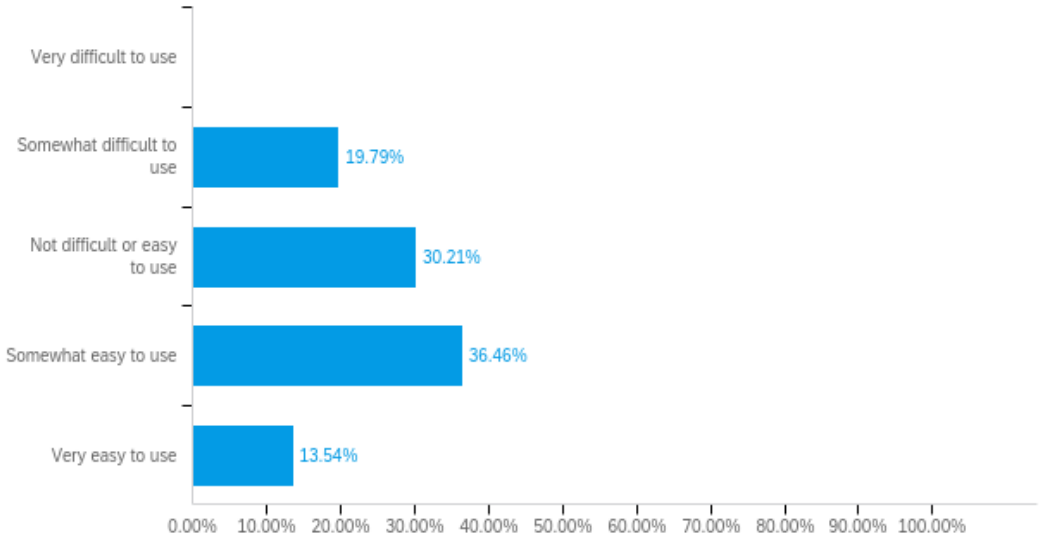

Figure 4.9.: Ease of usability of OpenStreetMap

In order to better understand the sample population, respondents were asked about the purpose of which they use OpenStreetMap. The response rate to the multiple choice question shows that the majority of users who responded (n=95), use OpenStreetMap for mapping purposes (90.5%), personal use (82%) and for routing and navigation (63%). As shown in Figure 4.10, a lesser response rate was given to the use in analysis (33.6%), development of applications (30.5%), commercial purposes (16.8%), Education (14.7%) and Imagery (13.6%). There was some confusion in relation to the imagery option, since OSM does not provide satellite imagery itself, but rather does so through compatible external providers, such as ESRI World Imagery, Bing, and the OSM Editor Layer Index project [OpenStreetMap Wiki, i], which manages an index of imagery sources that can be used in OSM iD editor. On other purposes (n=9) that OSM is used, respondents mentioned similar concepts to the options provided in the survey, such as development, development of games, and expression of positive feelings and enjoyment towards their use.

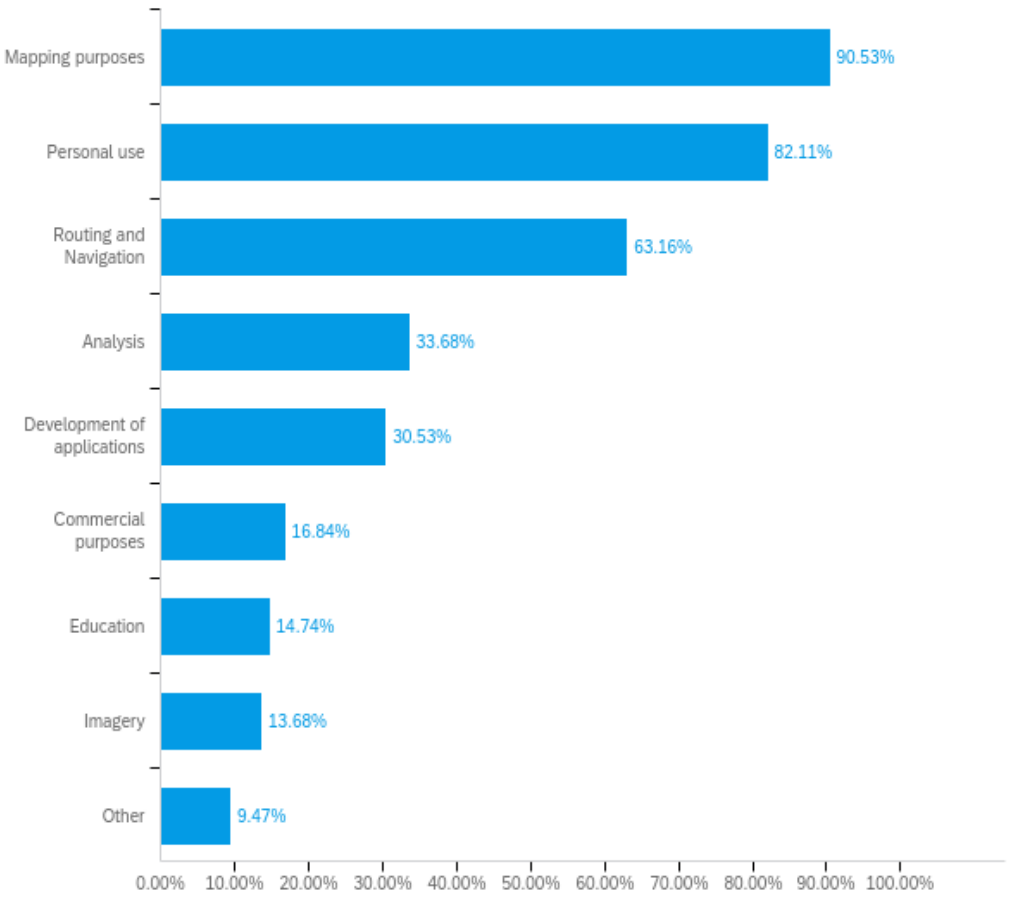

Figure 4.10.: Purpose of use in OpenStreetMap

When asked about how they participate, users' response rate (n=93) showed that the decisive majority provides map data towards the OSM platform (93.5%), as shown in Figure 4.11. People also indicated that they participate and/or follow the community channels (81.7%), which could include the official forum, mailing lists, social media networks and real time chat platforms, such as Discord, Telegram, Matrix, Slack and IRC. An interesting result is the amount of users who actually spend time to monitor or correct OSM data (77.4%). This further confirms what was discussed earlier about the sample population being somewhat representative of "heavy contributors". Further support to that also provides the high involvement in both the data management, data production and community monitoring aspects of respondents' participation within the platform, while only 29% solely uses the data the platform provides. A result which is also in line with the theory of participation inequality discussed in 3. Some interesting answers were provided in the open ended option, where participants stated they participate by providing software, tools or applications for other users (n=3), which in hindsight, should have been included in the options, given the amplitude of external applications that are developed with OSM data. Furthermore, options like participation for learning experience or public sector involvement were neither included and more interestingly nor mentioned by respondents, although it could have provided further insights to the participants' involvement with OSM. Nevertheless, such insights can be

also provided in the international Discord community channel, where users can opt to add a descriptive tag or role to themselves on what they are interested in, what editors they use and their specialities. In general, the purpose of this question was to understand the extent of respondents' participation and to show how the sample population of active users within OSM operates.

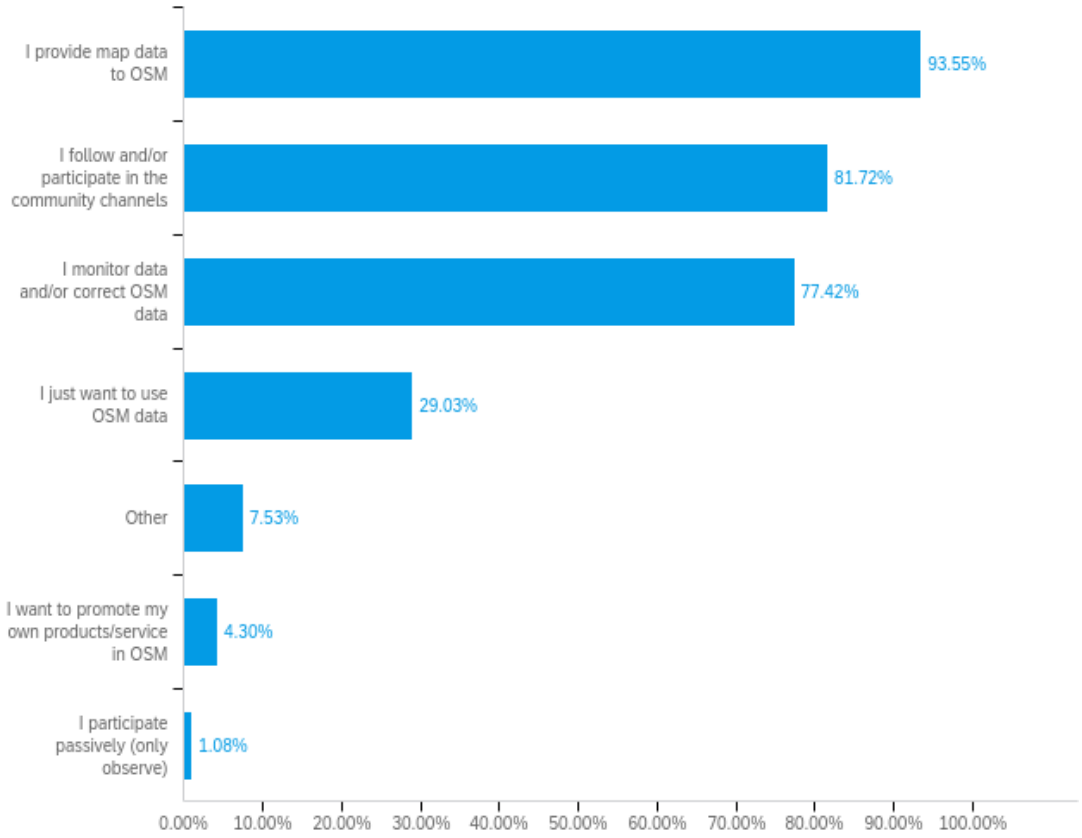

Figure 4.11.: How users participate in OpenStreetMap

Given the scope of this research, one of the most important questions of this survey was to see if the motivational factors behind the respondents' reason to participate in OSM would match with the selected indicators described in Chapters 3 & 2. In Figure 4.12, we can observe that the respondents (n=90) were aligned to the theory discussed previously. The highest valued extrinsic motivational factor among participants was the engagement with the project goal of OpenStreetMap (82.2%), followed by the value of the community to themselves and the development of OSM (43.3%), the belief in the integrity of the infrastructure (30%) and lastly for professional, financial and personal gain (20%). On the other hand, the majority of the participants sympathize with most of the intrinsic motivational factors of fun (81.1%), accurate contribution or instrumentality of local knowledge (80%), helping others in need out of the sense of altruism (75.5%), meeting their self needs (58.8%), personal alignment with the ideology or ethos of OSM (57.7%), learning (50%), sense of freedom (43.3%) and the belief in their own effectiveness (36.6%). Other responses recorded were related

to the community factor (n=1), freedom to map (n=1), and to provide OpenStreetMap data with external information or sources (n=2).

From the responses that were recorded in the survey, fun and the importance of respondents' contributions are similarly consistent intrinsic motivations for "heavy contributors" to both VGI and open source, wiki style projects [Budhathoki and Nedović-Budić, 2010], [Budhathoki and Haythornthwaite, 2013]. It can be noted that the intrinsic motivational factors for both learning (50%), and the extrinsic factor of community (43.3%) were lower than expected, given the community aspect of which people participate in OpenStreetMap, as shown in Figure 4.11, was amongst the highest response rates. In further regards to the aspect of learning and community, previous research all seemed to include this factor as a highly important motivator for users to contribute into VGI projects [Sjoukema, 2015]; [Budhathoki and Haythornthwaite, 2013]. A possible explanation for this is that the sample population could be users that are extremely familiar with most of the technical aspects and the capabilities of OpenStreetMap. Therefore, the desire to learn new skills or geoinformation could be relatively low for "serious mappers" and contact with other users or increase their knowledge of the community somewhat redundant, contrasting what has been researched in Budhathoki and Nedović-Budić [2010]. Another explanation for a lower response rate could be related to the completeness of geoinformation in the area where the participants reside. If one of the main reasons for a user to participate is to monitor or correct inadequate data, as shown in Figure 4.11, then they will contribute more if these flaws or missing data exist in the online map [Budhathoki, 2010]. This shift into a more "casual mapper" tendency of free mapping principles and enjoyment, while having a diminishing interest into learning and community engagement should be looked into further in both the open questions and the interviews. Further research is required on this matter.

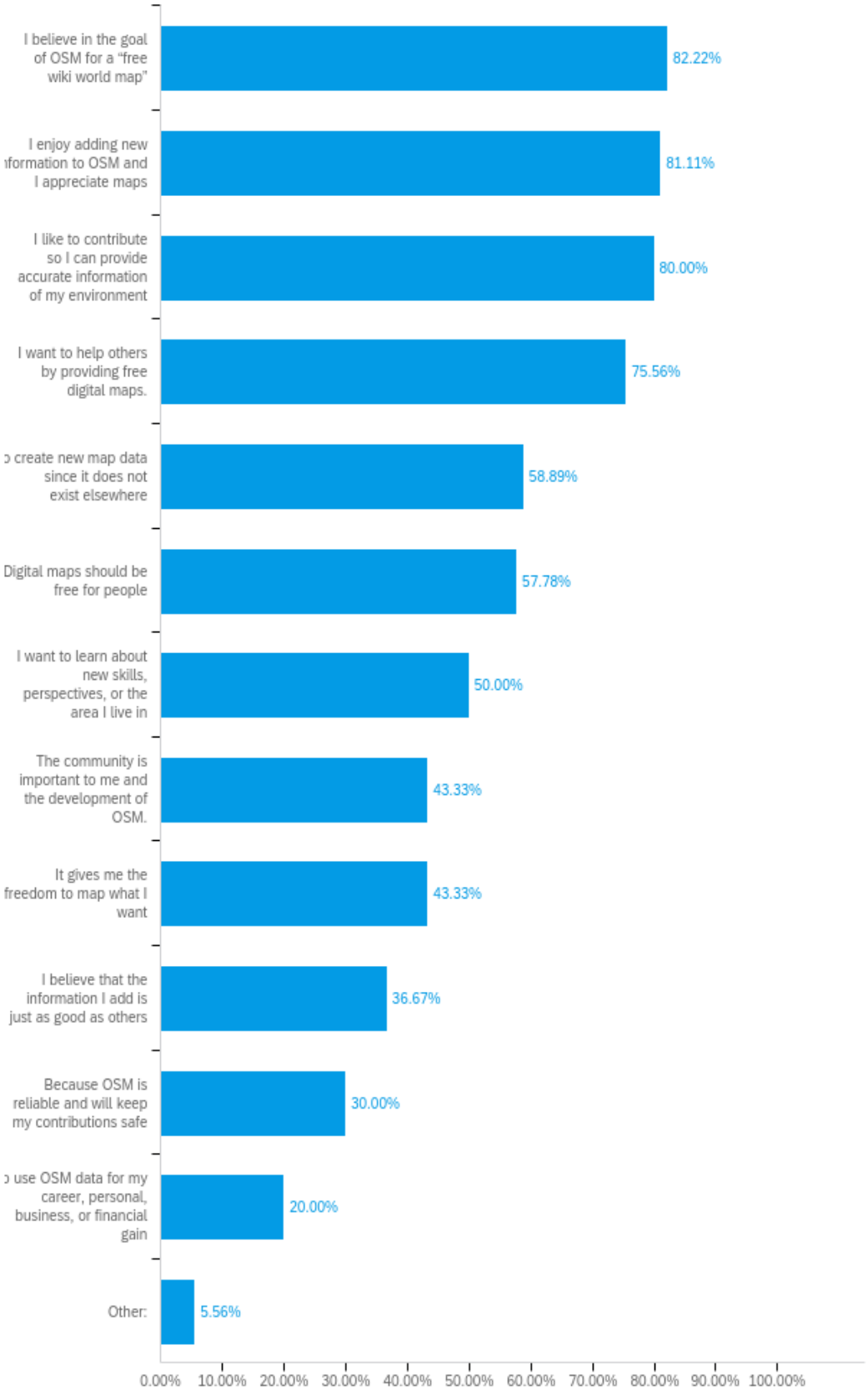

Figure 4.12.: Motivations to participate in OpenStreetMap

When asked about other open data services, tools, networks, or platforms that the participants use to access geoinformation, the respondents who answered (n=42) provided multiple answers, with some overlapping themes amongst themselves. From these, the majority (n=22) mentioned they use some form of open government data, either from local, regional, national or international open public spatial data infrastructures. These varied from the official government geoportal, land registries, utility networks to other geoinformation providers. Other popular answers were users' familiarity to Wiki style open databases or projects (n=7), as well as external open data mapping services and platforms, as mentioned previously with Mapillary, Strava, and OSMand (n=7). The participants also mentioned the use of external open access satellite imagery services, such as ESRI World Imagery, Bing and Google Earth Engine (n=5). Although, not all of the aforementioned providers are compatible with OSM, since Google Earth contains copyrighted data which would breach their licensing and therefore is not recommended for use by the community. Surprisingly, some respondents indicated none (n=6), and some others, editors that are used within the OSM community, such as Vespucci, StreetComplete and JOSM (n=2). These results were somewhat mixed but ultimately show that majority of the volunteers have knowledge of open data within the public sector and in which geoportals this data is stored. They also show clear signs of familiarity with other open source, open access and wiki-style projects, similar to what Budhathoki et al. [2008]'s research shows. In this case, (52.3%) of the respondents were familiar with open government data and with a lower response in relation to wiki data (16.6%).

Last but not least, people were given the option to comment on how to increase user participation within OSM, with a total of 61 answers. Again, some of the responses provided by users would contain multiple suggestions within a single answer. The main themes that were identified amongst the responses (n) were:

1. Improvement of tools, services and resources (n=28)
2. Improvement of internal communication and relationship within OpenStreetMap community (n=22)
3. Better external promotion and recognition of the OSM ecosystem (n=20)
4. Light Gamification of OpenStreetMap (n=6)
5. Safeguarding OpenStreetMap or limiting the access of interest of more powerful entities (n=5)
6. Uncertain how to improve participation (n=2)

The most common theme among the recommendations was to improve the overall state of the tools, services and resources for the users of OpenStreetMap. In general, respondents mentioned the need to improve the user experience design of the platform, which included better tutorials, editors, user manuals and the accessibility for different languages. More specifically, participants mentioned the simplification of the participation process, as well as improving the process of implementing or integrating more external user applications within the OSM platform. Secondly, the improvement of internal communication and relationship between the users of the OSM community was a wide spread concern, especially for the quality of life for new users, in order to make it more fun and easier to contribute data. This ranged from improving their ease of use to understanding more complex matters such as the roles of the OSM members, privacy issues and licensing. Moreover, users noted a saturation in the amount of communication platforms and indicated a desire to

eliminate older communication methods in order to transition to a single platform, which in this case was Discord. Participants also stated that OSM requires a larger visibility within its ecosystem, since it has a vast application in third party websites, governments, and external applications. One of the highlights was to improve of the relationship of OSM with potential academic and public sector users. Users also mentioned that a "Gamification" could increase the participation in the platform. This would entail a game-like system, where users would receive rewards or incentives based on their participation. Lastly, participants felt concern in regards to hostile takeovers from larger commercial companies, some of which were mentioned by name.

These comments provide a concrete reflection of the predominant extrinsic motivation for the alignment with the project goal of OSM and the intrinsic motivations of altruism that was shown in 4.12. Furthermore, even though the initial response for the intrinsic motivation of community and social interaction was lower than expected, we can observe the great amount of concern to improve this aspect, both within the community and providing the external recognition that OpenStreetMap deserves. Nonetheless, even if what was initially presented as positive from figures 4.7, 4.5, 4.8 and 4.9, the majority of recommendations referred to the necessary improvement of these aspects in OSM. A possible explanation for this difference in opinion can be only speculated to a general satisfaction with the platform as it stands but users present a desire for an idealised version of OSM. Furthermore, most of what has been recommended as generalized improvements for new users is similar to what Budhathoki and Haythornthwaite [2013] describes lightweight organization and collaboration to be. This indicates that the platform should be improved so users can participate in the simplest way possible, with no previous knowledge or skills, as well as fewer responsibilities to the quantity of contributions [Budhathoki and Haythornthwaite, 2013].

4.2. Analysis and Discussion

After the conclusion of the survey, all of the provided open-ended survey responses were taken into consideration for the development of the interview questions, since more clarity on these opinions would provide a useful insight into how OpenStreetMap can sustain itself as an Open SDI. A total of 48 people opted to be contacted for interviews and from these, 20 interviewees were selected based on their availability and knowledge of the OpenStreetMap ecosystem. Emails were sent as invitations to participate and a total of 13 interviews were conducted (Appendix D), along with the supplementary interviews with Wilko Quak and Jaap-Willem Sjoukema. The interviews were executed in accordance to the methodology described in Chapter 3, and the analysis in this section provides insight into the identified themes of the interviews and the categorization of the answers of the interviewees into said themes. The goal of the qualitative analysis of the interviews is to deepen the general understanding of users' value to participate in OSM, their opinions into what was emphasized in the surveys and their perceptions of SDIs, Open SDI, and Open Data Ecosystems ODE.

4.2.1. Analysis of interviews

Motivations and value to participate in OpenStreetMap

When respondents were posed with the question to the meaning of their participation to OSM, most of them associated their motivations to what was presented in Figure 4.12, of which, both the intrinsic motivations for fun, instrumentality and the extrinsic motivation for the alignment with the project goals were considered of equal importance (n=6). Some responses in relation to fun, instrumentality and the project goal motivational factors were:

> *"I found it very fun to contribute to the cartography of my area to improve it" - Participant 3;*
>
> *"I can still fill in blank spots on the map, which gives me a profound sense of personal satisfaction... a lot of the countries that I work on, are often are lacking this critical data that informs policy or informs analytics, as well as enabling the private sector and individuals." - Participant 6;*
>
> *"I think it actually starts with basically my first edit from the road just behind my wall. It was completely incorrectly drawn in, so I thought that I could just correct that." Participant 0;*
>
> *"I can maybe give a better cartography than the official geographical institute here in my country."- Participant 3;*
>
> *"I think the OpenStreetMap's biggest strength is the community because it's a cooperative project, so like the biggest asset is these people who keep it updated and it's something that wouldn't really be possible without all these people who just keep updating the map, the database." - Participant 5.*

This result was expected, given that both the survey answers reflected these factors, as well as the previous study into both the motivational factors to contribute geographic information to OSM by [Budhathoki, 2010] and how motivation operates behind VGI [Budhathoki and Nedović-Budić, 2010]. Participants share the feeling of importance in their participation efforts in OpenStreetMap and considering it an activity to be enjoyed. Other themes that emerged between users were the importance of the community to themselves and OSM (n=4), Altruism and the belief in the unique ethos of OpenStreetMap (n=3). Some unique responses included:

> *"I'm pretty active in several community channels. Of course, there are lot of them and by now it's too many to participate in all of them really actively. I prefer participating in the open ones, so the ones that are actually provided by the foundation itself and run on open source software. So that's where I'm the most active." - Participant 1;*
>
> *"I participate in the groups, in the message boards of the community in both national and regional here in my area or here in my state. I think that's the people there are talking about, news, changes, by generating several discussions there, which leads you to keep participating" - Participant 4;*
>
> *"I guess it's being able to contribute something that will be useful to other people. And it's a bit of fun for me in in the sort of programming side and going out and mapping thing side. It is also bit of an intellectual challenge to whether you can sort of piece together different bits of information to build up something useful" - Participant 7;*

> *"And so, I provide the information I can observe, in areas that I realise that there's fewer people mapping then I try to help the local community by doing what they do not do or what they cannot do." - Participant 8.*

These quotes illustrate that most of the people that were interviewed suggest a form altruism to some degree of their participation. This influence is in part similar to what Budhathoki and Haythornthwaite's research shows in relation to contributors of open-source projects, like Wikipedia, since mappers that have this motivation are also interested in providing help to others, while applying themselves personally to the idea of providing free open maps for society. Other factors, such as learning (n=2), self-needs and trust in the OSM system (n=1) were mentioned as well. However, most of the respondents were long time or already highly involved users. Some possessed technical backgrounds in the development of applications, softwares or editors that are currently available for use in OSM. Thus, the intrinsic and extrinsic motivational factors that influence the interviewees should be viewed as important for users that are already engaged with the platform. Further research should be done into assessing the first time contributors in an Open SDI.

External open data mapping services, platforms and communities

The majority of interviewees were quite aware of the existence of external mapping platforms in general (n=11), as well as the interoperability between them and OSM. This isn't surprising, giving the level of experience the participants have in relation to OSM and other open-source or open data platforms, which is to be expected of "heavy contributors" [Budhathoki and Haythornthwaite, 2013]. Generally, the interviewees mention the relevance and importance that these external mapping platforms have with the OSM ecosystem, although having little to no interaction with the community behind these other projects. This is illustrated by the following quotes:

> *"I think that they are very helpful to OSM editors. They may not have time or may not know how to contribute to OSM data directly, but what they provide, like their GPS tracks and the imagery is helpful to us" Participant 10; I use Mapillary as a client. I mean, I use with the information that people put there, but in my country, they hardly add anything to Mapillary." Participant 8.*

> *"I haven't interacted at all with any of the community of Mapillary, other than the Facebook page which I just joined recently. I think OpenStreetMap actually has a community and Mapillary, at least at this point from my perspective is just another data collection platform. Which can integrate with OpenStreetMap or not." Participant 6;*

> *"I'm kind of using them to help with OpenStreetMap stuff. I mean, I guess if I found a bug or had a feature request, I would probably submit it to either of those projects or anything else. But I'm sort of probably not likely to get involved in fixing things or implementing things in there" - Participant 7".*

From what was gathered, users have a sense of preference for OSM, given that the Mapillary platform is owned by Meta, which could imply restrictions and licensing barriers for the imagery, given that it is registered under the CC-BY-SA 4.0, Attribution-ShareAlike 4.0 International license (https://creativecommons.org/licenses/by-sa/4.0/). This could also be seen as an anti-corporate sentiment, which is closely connected to the project goal and ethos of OSM for providing free map data [Budhathoki and Haythornthwaite, 2013]. Furthermore,

this can cause some issues due to differences between OpenStreetMap's license as OSM Open Database License (ODbL) [Poole, 2017] and will be addressed in this thesis later on.

User experience issues and external influences

When asked about the issues that new users face and how their user experience could be improved, the general consensus (n=12) is that there are some mixed concerns, although it is easy to get involved at the surface level, the support mechanisms in place to aid new users, such as the OpenStreetMap wiki itself, tutorials in the editors and the numerous existing communication channels can definitely be improved. This is exemplified by following quotes:

> *"Yes, for people which who are accustomed to these tools, it's not a problem. But even so, you may have problems, simply to find the right sites to ask for help, the right persons to ask on Discord." - Participant 3*

> *"As I said mentioned in survey, there are many different platforms available for hosting the OSM community channels, like the forums, discord, mailing lists, telegram this can cause a fragmentation and among different communities". - Participant 11*

> *"So, it definitely is an issue, I still see people essentially "run against" the pretty deep learning curve and being discouraged by it. I mean, what is being done is essentially investing in developing software that makes editing maps on digital devices more accessible, making it run on more platforms, like making possible to edit OpenStreetMap on smart phones and other portable devices. I think that the other pretty much the only effective strategy is to improve the issue like in the long term." - Participant 1*

> *"In this first difficulty, perhaps that is the question of the knowledge itself, this difficulty of knowing how to do it. So, I think it's not a very easy thing for those who don't know anything about it yet, let's say the initial learning time is kind of high." -Participant 4*

> *"So, is it difficult to contribute information to OpenStreetMap? Yes, it is if you want to provide vector data that straight into the database. Because you have to have a lot of technical skills in relation to geospatial information, like aerial photography, which is not always immediate." - Participant 8*

Overall, most of the interviewees acknowledged the fact that, both the tools within OSM and the community of its users are extremely important for helping users to participate in the various editors, tagging schemes and data management within the ecosystem. This is in line with what was reported in the open-ended survey questions, where the improvement in the participation for new users is a necessary aspect to continue the sustainability of OpenStreetMap. In general, the time frame which users are no longer considered to need aid or to be considered as an active member was not part of this study, but shown in Neis and Zipf [2012]. For the participation of more experienced users, the trouble lies within more technical, licensing and standardizing data issues, as show in the following quotes:

> *"When I look back at with when I started OpenStreetMap, I had much to learn about the tagging scheme for example, and how is it done into OpenStreetMap. You have to have a little motivation in order to read something. It is a little hurdle, which you need to have a little energy to overcome in order to give good data into the OpenStreetMap database" - Participant 12*

> *"It's not an issue in itself, I think typically a new user will see a feature that is indecent in OpenStreetMap, but so he or she can go on openstreetmap.org., create a new account and directly add it or correct it. For a simple case like this, it's not a problem, but when you go deeper, and you notice that, keys like this don't exist or I don't know how to add it ... It's just when you try to go a bit deeper here, you will quickly encounter a problem, especially when you're not accustomed to the Wiki, mailing list and so on." - Participant 3*

As mentioned previously, to improve the situation, a more light-weight approach might be a potential solution to improving both new engagement and simplifying user for new users. However, some consideration for previous existing users must also be taken into account, so as barriers are not built for one or the other. This is a difficulty that is commonly reflected in most open data ecosystems, where meeting all of the user needs to their full demands is incredibly difficult Loenen [2018], given the scope of users of OSM can range from any global citizen.

Interviewees were also indecisive or split when it comes to external threats. Most of their concerns were related to commercial influences inappropriately taking over OpenStreetMap with their own employees and then assume the command over the policies, standards and financial aspects of OSM. These fears include, but are not limited to: changes in the financial system, restricting licensing for external use. Which is alignment with the anti-corporate sentiment presented by [Budhathoki and Haythornthwaite, 2013] and Budhathoki and Nedović-Budić [2010]. On the other hand it also regarded as a benefit, given that both the commercial or institutional users inevitably become a part of the OSM ecosystem and provide useful contributions to the infrastructure. Participants stress the importance of the transparency of both of these external influences, by identifying their intended purpose in using OSM. This uncertainty is best show in the comments below:

> *"Well, both. It's a bit of a benefit. I think it's almost necessary to interact with these institutions in some way, simply because they have the resources that we need to improve our platform to make the investment into a software that I mentioned previously. But definitely risky." - Participant 1*

> *"For me, if somebody like Apple or Microsoft is improving the data, then they might be improving the data in a certain place because it's advantageous to them. But that data is now free and open to the world, so anybody else can use it too, and they could have purchased that data and kept it proprietary and then nobody gets it." - Participant 6*

> *"There's other people who would just see OpenStreetMap as a source of income, of a justification for participating to projects and justifying expenses. The institutions, in my opinion, should not interfere with decision making and OpenStreetMap should try to convince them, to provide us with information, but I do not think that we should let institutions take part in this decision making. I'm thinking of governments and also companies. Companies are very welcome to use the data and to provide data to OpenStreetMap. I mean without Apple, Facebook OpenStreetMap would be a lot less precise, in many countries." - Participant 8*

> *" I hope that I don't have to pay if you if I do something. I started my first things (applications) with Google and now it doesn't work because Google created API keys and want money and you don't know how much money you have to pay." - Participant 2*

Since the OSM ecosystem envelopes both the public sector, academia and the commercial sector, the wide spread potential threat is a reality for some of its users, however, there is a

belief that the OSMF, the active users and the monitoring system that is in place, which is the case for VGI, will be able to manage these negative influences. This is best highlighted by the participant in the following quote:

> *"I like that the foundation now has an active membership to make sure it's not just some board members and some people and some companies that can actually decide, but it's anybody who contributes the data that can now decide that. I also get the feeling that a lot of people don't know that there is an active contributor membership." - Participant 0*

> *"So currently it's merely a potential threat. Not a threat by itself, beyond that, I think that the open nature of OpenStreetMap is a very good protection against that. ... OpenStreetMap contributors will quickly see that there is someone which is messing with the data and will quickly revert it. I think that open the open nature of OpenStreetMap protects it against such interface. Just as it protects Wikipedia against such threats. It can happen, but it will be quickly spotted and reverted." - Participant 3*

Relationship with open data

Almost of the interviewees (n= 11) have either knowledge of other open databases such as Wikipedia, government open data, access networks for open data, while others mention the clear benefits of providing and maintaining open data for all people, which could be correlated to the unique ethos and project goal of OSM demonstrated in the survey results (Figure 4.12.

> *"I think it's always good to have open data because when all the citizens pay for something, for example, for governmental purposes, then all the data should also be given back to the to the people because it's not a thing that only belongs to the government. I'm not very involved in different other open data things. I think it's good that OpenStreetMap is open data licence, because in that way, I'm sure that my work and my effort will be there forever." - Participant 12*

> *"I like the idea generally of open data, because it just opens up so many possibilities for people to use it. Like, either develop it into some kind of apps or using the apps or to use it in some kind of analysis. Like one thing is that it just allows so much more innovation to come out of it. I think open data just enables more innovation" - Participant 5*

> *"Well involved both personally and to support government. There is much more information which they don't have in their possession, but I can extract from OpenStreetMap with some effort" - Participant 2*

These quotes demonstrate the benefits of open data within the OpenStreetMap ecosystem, given the existing connection between both the public sector and OSM. Many remarks in relation to the development of open data were associated with the public sector. Interviewees considered them both as data suppliers for OSM but also included in the ecosystem of OpenStreetMap as potential end users as well. This is similarly highlighted in the theory of Budhathoki et al. [2008], where organizational and individual users become interconnected from the resulting integration of the VGI into SDI. This could be now seen as a reality for OSM as an open SDI. Users also mentioned the lack of government open data or missing geoinformation as a primary motive to participate in OSM. In this case, users feel that they provide useful information, both for OSM and their local government, which is further elaborated by

Budhathoki and Haythornthwaite [2013], where volunteers are able to help governments are to address the local issues more effectively.

OpenStreetMap as an Open Data Ecosystem or an Open Spatial Data Infrastructure

An overwhelmingly amount of responses n=(12) were positive in associating OSM as an Open Data Ecosystem. Most of the participants perception into what was comprised in the ecosystem was related to anything that contained or used OSM. This was an incredibly large scope, consisting of any third-party applications, editors, tools, public and private sector entities, on a global and regional level that used, provided, managed, distributed or sold OSM data.

> *"I used the term ecosystem quite a lot when talking about OpenStreetMap. Simply because most activity happens in some kind of decentralised way. Seeing that this activity is performed by many smaller groups that are structured more tightly internally, but also interact in some less structured way with or the other actors in this space, and I think calling it an ecosystem is the best way to get that across." - Participant 1 "Yes, it is. When I talk about the OpenStreetMap, I usually emphasize this because if the person sees it only as that site, openstreetmap.org, he won't be able to see all the other things that exist there" - Participant 4*

When asked about the openness of the processes and policies of OpenStreetMap, users seemed to unanimously agree on the openness of the data, but were split between the level of understanding in how the processes and decision-making methods occurred within the infrastructure of OpenStreetMap. Some interviewees would some to little understanding how the decision making happens and what the role of the OpenStreetMap Foundation was in these regards, while others would have a better grasp into how these processes would occur.

> *"I mean in terms of openness, think it's open, but not necessarily transparent as to how it works and how decisions are made. So, I mean it it's open in the sense that it's free and everyone can participate, but maybe it's hard to understand the processes and understand what's supposed to happen and also understand the outcomes of discussions." - Participant 7*
>
> *"As for the foundation and local chapters, I think the process is pretty open; like the for the foundation, they release the details like what kind of meetings they have, what was discussed, the minutes from the meetings" - Participant 5*
>
> *"From what I have learned about it, they are trying to be very open. There are kind of voting within the community for the managers of OpenStreetMap in an election process which you can participate. So, if you contribute enough, you can be a part of the OpenStreetMap Foundation, and you are then eligible to be elected." - Participant 12*

Moreover, when presented with the concept of both SDI and Open SDI, results were generally positive in relation to OSM and its infrastructure, but mixed (n=9), although some confusion was noted when providing accurate definitions. The term for both SDI and Open SDI was not popular known as much as expected, but most interviewees would attribute it to OSM before the question itself.

> *"What you're saying that it sounds like a OpenStreetMap is an implementation of this concept." - Participant 8*

> *"I think the definition fits. I also think that it's probably not a definition that will be used for communication in when I try to explain what OSM is to people who aren't familiar with the academic background or aren't involved in geospatial information in some way or form." - Participant 1*

This was consistent to Pollock [2011] and Van Loenen et al. [2021]'s definitions into what could be considered an ecosystem, as well as Rajabifard and Williamson [2002]'s essential components of a spatial data infrastructure. Given that OSM openly provides both the tools for contributing data, as well as an infrastructure to elect officials in the form of the OpenStreetMap Foundation. A membership in the OpenStreetMap Foundation is either earned by a minimum number of contributions or paid for one. To participate in the board, you must be elected by members within OpenStreetMap. The foundation acts a legal entity, data curator, financial supporter, license manager, and provides the support for the network of communication and working groups of OSM. However, users did mention the licensing, standards and interoperability issues with OSM data, which is a critical issue for the discovery and success of the geoinformation within VGI and SDI Budhathoki et al. [2008]. Further issues with OpenStreetMap's license, OSM Open Database License (ODbL), in relation to popularly adapted CC BY 4.0 licenses by open data governments could still infer certain restrictions for use within the OSM SDI.[OpenStreetMap Wiki, d]; [Poole, 2017]. Although, the license working group of OSM have enabled licensors to use this type of data, provided they ask for explicit permission via waivers. Other interviewees (n=2) mentioned the lack of centralized standardisation behind the metadata, given the differences of definitions that vary between countries, which would need to be addressed before OSM would be considered a complete international open SDI.

> *"I think it can be a component of SDI, a component of open SDI if you will. I would say it isn't there yet, it could be, but I think it would take a lot more work to do that. " - Participant 6*

> *"I think, by itself, it's not, given that definition means that the infrastructure would involve several things, maybe OpenStreetMap by itself, it's not all that. But I think it's an important tool within an infrastructure. I think if you think about it, if you are flexible, it could be that it's already an open spatial data infrastructure by itself." - Participant 4*

The other underlying issues with OpenStreetMap and government licenses, for example, with cadastral data, is that users will require the most up to date version of that data, which OSM and its users cannot consistently guarantee OpenStreetMap Wiki [d]. Yet, this relationship actually exists with a part of the Dutch Kadaster, where Jaap-Willem Sjoukema states:

> *"We publish the datasets, so with the buildings and the addresses, and OpenStreetMap imports that. So that's also nice that you can see for example the IDs of the same data set you can also find in OpenStreetMap in the Netherlands, so we can also link to it and when they see a mistake, then they go to our system, a system of which I am the product owner, and they report it. So that's the crowd source feedback system. For this we created a rest API and they (users of OSM) also wrote the plugin in their JOSM editor" - Jaap Willem Sjoukema*

This "linked data" between the public sector and OpenStreetMap is shown to be possible in the Netherlands, however, having an international linked database of open data between different governments, licensing and standards would be difficult to manage without direct communication between these entities and OpenStreetMap. An interesting point comes from Wilko Quak, where he explains:

"Of course, with OpenStreetMap, is that you never know about the completeness of the data set, so, I would say that can't be helped, but you of course can find tricks to do it or try to figure out measures of completeness that could work." - Wilko Quak

In this sense, establishing an indication of how accurate the data of OSM to an external open public database could provide the stability it deserves, as is the case in the Dutch Kadaster. To conclude, both Mr. Quak and Mr. Sjoukema agree on the theoretical definition of Open SDI for OSM. However, it is also important to note that OpenStreetMap, by itself, only provides map data, which would be another contention point for determining if it actually is an open SDI, although, in the most recent State of the Map meeting, vector tiles have been confirmed to be provided on the official OSM infrastructure.

5. Conclusions

5.1. Research overview

This research aimed to answer the following question:

What are the factors that foster user participation in the community of an open SDI ? In order to answer question above, further sub-questions are required, of which:

- What are the intrinsic and extrinsic factors that motivate the users of OSM to participate in an open SDI?
- How and to what extent are the selected users participating to OpenStreetMap?
- What can be done to motivate the community of users to participate in an open SDI?

This research used preliminary web-based surveys and semi-structured interviews with users of the OpenStreetMap, as well as qualitative analyses and combined approaches, to explore the factors that foster user participation in the community of an open SDI. Since the framework and the scope of the OSM ecosystem applies to the definition of an open SDI, the former was used as a valuable source of input for this thesis. To answer the main research question, several sub questions had to be further investigated in order to reach to satisfactory conclusions. A total of 100 valid responses from the survey were recorded and 13 interviews were conducted with any member who accepted the call to participate.

The main extrinsic reasons that were identified to foster user participation within the OSM community, hence, in an open SDI, were the belief in the projects' goal, the perceived importance of the community by the users to the development of OSM and its ecosystem. It is important to mention that users felt very strong about the positive impact the community has, not only in the project, but also as a feedback loop to the open data ecosystem which OSM is a part of. Simultaneously, it was also the main point of improvement for OSM according to some participants. Furthermore, in the interviews, users mentioned that they trust the technical infrastructure, the design and self-organisation of OSM, even though there could be potential improvements as well (System Trust as per Budhathoki and Nedović-Budić [2010]) and that especially the "heavy contributors" feel the reciprocity in the project, despite the interference of some users who do not follow the community guidelines, users still expect that mappers will contribute adequately.

Regarding the main intrinsic motivators, the mostly valuable were enjoyment of process, instrumentality, since users like to contribute their own knowledge to provide good quality data and accurate information, and altruism. Other important intrinsic reasons were: the alignment of the users under the same unique ethos that digital maps should be free and data open for everyone, the creation of data that does not exist elsewhere (meeting own needs), and learning. Also users feel free to express themselves through participation in OSM. What can be easily seen is that OSM users have more intrinsic drivers that make them participate than extrinsic, which is understandable considering that users do not really gain

any material goods through OSM or reputation, given it still is a Volunteered Geographic Information project.

As to how and to what extent OSM users participate in the community, most of the users that responded in the survey and indicated availability for interviews, were users that contribute at least a few times a month (95%) and on average a few times a week (41%). This could be either due to the fact that users in OSM participate as much, or most likely due to the volunteer bias. Since many users also showed high interest to learn the amount of participants that this research gathered, because they believed it is quite challenging to get responses for such requests in the community of OSM, I think that the high contribution in OSM is probably due to the latter. Nevertheless, further research could shed light on this matter. As to how users participate, the results show that they do so in order to provide data to OSM, follow and/or participate in the community channels and monitor or correct OSM data. This research will also be openly shared with the OSM community, to serve both as an expression of gratitude to the community and as a potential topic for discussion within the infrastructure.

Overall, the factors that could enhance user participation in an open SDI, such as OSM, as proposed by the users themselves, are better support mechanisms, tutorials for the multiple editors of OSM and centralization of one main communication channel as a reliable source of information. Moreover, more accessible editing on digital devices would also enhance user participation, since the users could contribute from more devices. Better set or more enforcing user guidelines would also help not only new users, but also the ones that already contribute. OSM is quite a complex platform with many factors that have to be considered before adding new data and therefore, there are guidelines and standards suggested by the community on how to do so in a uniform and accepted way. However, since community guidelines are not but suggestions, there is a lot of confusion and sole initiatives on adding new data. users mention that it provides such a steep learning curve that not all participants are ready to deal with it. Hence, a less overwhelming step could be included to bridge this gap either with more tutorials or videos.

In regard to OpenStreetMap, further research into the creation of a working group to interface both with local governments and external institutions would be useful if further expansion into the open SDI domain is desired. Furthermore, the OpenStreetMap foundation could take a stronger stance to establish a universal open standard license for future and current OpenStreetMap data by coordinating the members locally, but with aim for universal and international interoperability. Public and private sector entities that wish to transition from a traditional top-down SDIs to more user-centric or even fully open SDIs should consider the process of engaging users gradually, in relation to both their data availability and data supply.

5.1.1. Research Limitations & Future work

The main limitation for this research was the lack of ability for users outside the public sector to publish data on public or governmental SDIs, the availability of access and communication to the user community. In public SDIs, citizens typically require permission or licences to access and publish data in the SDI, yet the detailed information about their users and why they chose to participate in the SDI is not available to the public. Hence, the research could not be conducted by comparison or analysis of public SDIs and their user participation on

a GI data owner level, but rather by mirroring the experience of using an SDI from a citizen point of view within the open data ecosystem.

This work also did not have time to investigate how to further correlate the infrastructure of OpenStreetMap and theoretical concept of open SDI. This should be researched deeper with the OpenStreetMap Foundation to understand the entirety of the framework behind OpenStreetMap, its goals, both for its standards and the data within it. As an open SDI that is both wanting to retain their users, as well as bring in new ones, a larger range of motivators should have been used to understand more deeply the new and older contributors. A better application of qualitative and quantitative research methods could be applied again for this. Lastly, given more time, this thesis could have looked into the ethics behind what this study could be potentially used for and applied the results that were found into a framework of a ladder of participation for the open SDI of OpenStreetMap.

5.2. Self-reflection

This section establishes the main aspects between this thesis and the MSc Geomatics programme at TU Delft, as well as the contribution that it represents for the both the application in the field of Geomatics and society. It also includes a personal reflection of my performance and what I have learned from this whole process.

At first, when I applied to the Geomatics programme, I had the goal to improve my technical skills with spatial data management in order to further develop my career as a GIS specialist. However, during my studies, I learned far more skillsets than I could have imagined, and I began to understand the entire scope of spatial data collection, analysis, and management on a whole new level. On the other hand, I felt intrigued by the governance of spatial data infrastructures in relation to open data ecosystems, like OpenStreetMap, and I felt a need to look deeper into the relationship of its users. Since the programme was heavily reliant on code related activities, for me, this socio-technical field seemed underdeveloped in relation to the MSc Geomatics programme, both in research and in practice.

The interdisciplinary content of this thesis required knowledge from various courses of the MSc programme throughout its development, in a combination which I've not seen before. Geo-information Organisation and Legislation provided me with the knowledge to assess SDIs, open data ecosystems, privacy, open data policies and principles, which were applied in this thesis. Moreover, the concepts that I have learned from Geoweb Technologies and Geo database Management Systems helped me to understand how OpenStreetMap works as a database, the data model behind it, and the services it gives to society, both through the web-services, standards, and the data it provides.

Understanding how the spatial data ecosystem of OpenStreetMap proved to be a demanding challenge, given the amount of time required for this thesis. Understanding qualitative research after 4 years of absence was also a challenge. This also includes the range of the database itself, the users who manage, produce, and disseminate geoinformation, and the overall arching infrastructure behind the community of volunteers. The topic I chose to address was relatively new to me, given my limited experience with qualitative data analysis, user participation and the motivational factors behind volunteered geographic information. The assessment of both the user participation within OpenStreetMap and the conceptual

framework behind SDIs required a great amount of research on to how both of them were theoretically connected.

Assessing user participation within an open SDI was a very demanding task, since no infrastructure at this time actually assumes it is one. Another challenge was the wide scope of people that use OpenStreetMap, given that their needs and demands could be completely different from one another. However, the quantitative and qualitative results presented in this thesis contributes to the wider social context of this research, by providing a greater understanding of how active users perceive open spatial data Infrastructures to be, what are the essential factors for them to participate in one and the underlying concerns of the open infrastructure itself.

All In all, this thesis provides a new perspective for Open SDIs in general, as well as the factors that motivate users to participate within an active community. Even though the ethics behind this participation or the inclusion of artificial intelligence are not fully addressed, I believe that the results and conclusions presented in this study satisfied the research questions that I had proposed. There were some clear difficulties at the beginning of this process, both with determining the scope of the research and my time management. However, in the short amount of time that I had to execute this thesis, I believe that it produced satisfactory results, even with some contradictions, it can now stand as a milestone for further practical research opportunities to be conducted within the field of Open SDI.

A. Survey Questions

Title: Assessing an open spatial data infrastructure from a user participation perspective: A qualitative exploratory research with OpenStreetMap.

Opening statement: Hi, my name is Guilherme Spinoza Andreo and I am a Geomatics master student at Delft University of Technology (TU Delft). For my thesis, I am exploring the motives that trigger users' participation to an Open Data Ecosystem (ODE), like OSM, and how such ODE is able to foster an active community around itself. The results will help further refine theory and policies on open data and spatial data infrastructures.

This survey will comply with personal data protection law, under the European GDPR. No personal data will be shared with external parties in any way. Your participation in this study is entirely voluntary and you can withdraw at any time. The data collected will be anonymous and will be used for research purposes only. It will not include any identifiable information. The results of the study will be published on the TU Delft repository. If you opt to take part to a subsequent interview, its content will be also included in the thesis, adhering to the same regulation.

By clicking through to the survey you'll agree with the Opening Statement.

Estimated time to complete: 8 minutes

Questions:

1. Where are you from? ("Prefer not to say", "Afghanistan", "Albania", "Algeria", "Andorra", "Angola", "Antigua & Deps", "Argentina", "Armenia", "Australia", "Austria", "Azerbaijan", "Bahamas", "Bahrain", "Bangladesh", "Barbados", "Belarus", "Belgium", "Belize", "Benin", "Bhutan", "Bolivia", "Bosnia Herzegovina", "Botswana", "Brazil", "Brunei", "Bulgaria", "Burkina", "Burundi", "Cambodia", "Cameroon", "Canada", "Cape Verde", "Central African Rep", "Chad", "Chile", "China", "Colombia", "Comoros", "Congo", "Congo Democratic Rep", "Costa Rica", "Croatia", "Cuba", "Cyprus", "Czech Republic", "Denmark", "Djibouti", "Dominica", "Dominican Republic", "East Timor", "Ecuador", "Egypt", "El Salvador", "Equatorial Guinea", "Eritrea", "Estonia", "Ethiopia", "Fiji", "Finland", "France", "Gabon", "Gambia", "Georgia", "Germany", "Ghana", "Greece", "Grenada", "Guatemala", "Guinea", "Guinea-Bissau", "Guyana", "Haiti", "Honduras", "Hungary", "Iceland", "India", "Indonesia", "Iran", "Iraq", "Ireland", "Israel", "Italy", "Ivory Coast", "Jamaica", "Japan", "Jordan", "Kazakhstan", "Kenya", "Kiribati", "Korea North", "Korea South", "Kosovo", "Kuwait", "Kyrgyzstan", "Laos", "Latvia", "Lebanon", "Lesotho", "Liberia", "Libya", "Liechtenstein", "Lithuania", "Luxembourg", "Macedonia", "Madagascar", "Malawi", "Malaysia", "Maldives", "Mali", "Malta", "Marshall Islands", "Mauritania", "Mauritius", "Mexico", "Micronesia", "Moldova", "Monaco", "Mongolia", "Montenegro", "Morocco", "Mozambique", "Myanmar, (Burma)", "Namibia", "Nauru", "Nepal", "Netherlands", "New Zealand", "Nicaragua", "Niger", "Nigeria", "Norway", "Oman", "Pakistan", "Palau",

"Panama", "Papua New Guinea", "Paraguay", "Peru", "Philippines", "Poland", "Portugal", "Qatar", "Romania", "Russian Federation", "Rwanda", "St Kitts & Nevis", "St Lucia", "Saint Vincent & the Grenadines", "Samoa", "San Marino", "Sao Tome & Principe", "Saudi Arabia", "Senegal", "Serbia", "Seychelles", "Sierra Leone", "Singapore", "Slovakia", "Slovenia", "Solomon Islands", "Somalia", "South Africa", "South Sudan", "Spain", "Sri Lanka", "Sudan", "Suriname", "Swaziland", "Sweden", "Switzerland", "Syria", "Taiwan", "Tajikistan", "Tanzania", "Thailand", "Togo", "Tonga", "Trinidad & Tobago", "Tunisia", "Turkey", "Turkmenistan", "Tuvalu", "Uganda", "Ukraine", "United Arab Emirates", "United Kingdom", "United States", "Uruguay", "Uzbekistan", "Vanuatu", "Vatican City", "Venezuela", "Vietnam", "Yemen", "Zambia", "Zimbabwe")

2. What is your gender? (Male, Female, Non-Binary / Third gender, prefer to self-describe, prefer not to say)
3. What is your age? (under 18, 18-24, 25-34, 35-44, 45-54, 55-64, 65+ years old, prefer not to say)
4. What is the highest level of education you have completed? (some primary, completed primary school, some secondary, completed secondary school, vocational or similar, some university but no degree, university bachelor's degree, graduate or professional degree (MA, MS, MBA, PhD, JD, MD, DDS)
5. How would you rate the ease of usability of OSM? (very difficult to use, somewhat difficult to use, not difficult or easy to use, somewhat easy to use, very easy to use)
6. How would you rate the quality of the data/services provided? (extremely bad quality, somewhat bad quality, neither bad nor good quality, somewhat good quality, extremely good quality)
7. Why do you use OSM?
   - Mapping purposes
   - Personal use
   - Education
   - Development of applications
   - Commercial purposes
   - Routing and Navigation
   - Analysis
   - Imagery
   - Other: (open text answer)
8. What tools do you use to participate in OSM?
   - Computer
   - Cellphone
   - GPS device
   - Other: (open text answer)

9. How often do you participate in OpenStreetMap? (every day, a few times a week, a few times a month a few times a year, I do not contribute to OSM).
10. How do you participate in OSM? (multiple choice)
    - I provide map data to OSM
    - I monitor data and/or correct OSM data
    - I just want to use OSM data
    - I follow and/or participate in the community channels
    - I want to promote my own products/services in OSM
    - I participate passively (only observe)
    - Other: (open text answer)
11. Why do you participate in OSM? (Multiple Choice)
    - I believe in the goal of OSM for a "free wiki world map"
    - Digital maps should be free for people
    - The community is important to me and the development of OSM.
    - I want to help others by providing free digital maps.
    - I want to learn about new skills, perspectives, or the area I live in
    - I like to contribute so I can provide accurate information of my environment
    - I believe that the information I add is just as good as others
    - I enjoy adding new information to OSM and I appreciate maps
    - To use OSM data for my career, personal, business, or financial gain
    - It gives me the freedom to map what I want
    - Because OSM is reliable and will keep my contributions safe
    - To create new map data since it does not exist elsewhere
    - Other: (open text answer)
12. How useful do you find the community when participating in OSM (i.e. in terms of quality of data/services provided)? (not at all useful, slightly useful, moderately useful, very useful, extremely useful).
13. What other open data (i.e. data that is openly accessible, exploitable, editable, and shareable) services, tools, networks, or platforms do you use to access geoinformation/spatial data? (Open ended answer)
14. According to you, how might OSM improve users' participation? (Open ended answer)
15. Thanks! Would you be available for a short follow up interview? (yes/no)

If yes, please leave your email and you will be contacted in the upcoming weeks to arrange the best schedule.

If you would like to see the results of this study, please mark ”interested” below.

Thank you for your time and response!

B. Interview Structure & Questions

Introductions

Present yourself, the research, its objective of its results and the purpose of this interview.

Hi, I'm Guilherme, as per the invitation, I am researching the factors that foster user participation in the community of an Open data ecosystem, like OSM, and what can be done to motivate the users and the community. As you have seen, I've conducted a generalized survey with the users of OSM for the motivational factors behind user participation. In this time, I'll be conducting interviews that dig deeper into what OSM is, what it could be and to understand the issues with user participation in OSM. You have been selected given for the indication of your availability for this interview and for your knowledge of the OSM community. You will remain anonymous, given this interview abides by the same privacy preserving structure as the survey. There are no wrong answers and any concept that you might have doubt can be explained if desired.

The following information can be used to explain concepts to the respondent in case they ask:

SDI: *"SDI can be summarised as a set of instruments, such as policies, technology, data, institutional arrangements, and individuals, that can provide the means for sharing and using GI through standardisation and protocols for compatible and open spatial data."*

Open: *"Open means anyone can freely access, use, modify, and share for any purpose (subject, at most, to requirements that preserve provenance and openness). This essential meaning matches that of "open" with respect to software as in the Open Source Definition and is synonymous with "free"."*

Open SDI: *"Open SDI are defined by the application of these open data principles to the development and implementation of SDIs, where the spatial data should be open, freely available and shared between the different stakeholders. The stakeholders should consist of citizens, businesses, and any other groups that participate in the SDI or use the GI that exists within it. "*

Open Data: *"Open data is data that is available in a common, machine-readable format, which anyone can access, use, and share without restriction or cost for any purpose."*

Open Data Ecosystem: *"An open data ecosystem can be defined as a circular, inclusive, sustainable network, in which data is accessible, reusable, and oriented for the cooperation of its interdependent environment with its users."*

Participation: *"Participation is a process through which stakeholders influence and share control over development initiatives, and the decisions and resources which affect them (Synonym for contribution)"*

Contribution: *"The act of giving or supplying something (time, geographic information, personal opinion) to help produce or achieve something" (Synonym for participation)*

Geographic Information / Spatial Data: *"Geographic Information can be defined as information about any phenomenon which occurs on the surface of the Earth."*

Preference in OpenStreetMap and motivation to participate:

1. How long have you been a member of OSM?
2. What does participation mean to you? What is the value for you to participate in an open platform, like OSM? What keeps you committed to OSM?
3. From the survey, around 12% of the users mentioned that they use other mapping related platforms (Mapillary, OSMand and Strava. If this applies to you, what are the differences in relation to the community of OSM compared to these other projects?

   Concerns of users:

4. From the survey, some concerns were mentioned in relation to user experience for new users and difficulties to participate in OSM, do you believe this to be an issue? What do you think could be done to alleviate these difficulties?
5. From the survey, emerged that there is a risk of external influences by parties, such as businesses, academics, and government bodies participating and affecting OSM. Do you feel this a concrete risk/reality? How would you say this affects the community? Do you consider them a part of OSM? Why (not)?

   Perception on OpenStreetMap and SDI:

6. How involved are you personally with open data?
7. In the survey, the concept of OSM as an ecosystem was mentioned by respondents, would you agree on this term for OSM? If so, how would you describe its ecosystem? If not, how would you describe OSM?
8. How would you describe the openness of the decision-making processes and policies of OpenStreetMap to be?
9. Have you ever heard of the concept of Spatial Data Infrastructure before? If so, what would you describe it to be?

   In any case: Interviewer introduces the definition of SDI and Open SDI.

10. After hearing this formal definition, do you think there is any relation between OpenStreetMap and these definitions?
11. Do you think open SDI applies to OSM? If not, what do you believe is needed to make OSM an open SDI?

Additional Questions:

Are there any questions that you think were unclear?

Do you have any other comments regarding the state of user participation in OSM?

C. Survey Results

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D. Interview Transcripts

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Colophon

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Interview with [Jaap-Willem Sjoukema]

G: Could you give me a short introduction of who you are, and where you work?

JW: Yes, yes, I'm [Jaap-Willem Sjoukema] and I'm currently working at the Dutch Kadaster, where I'm also involved in the crowd-sourced feedback system as we call it. Well, we talk about OSM but I'm not really an expert on OSM, but since I also studied volunteered geographic information, VGI around crowdsourcing actually, well, I did have some experience in the field. Uh, for myself, I'm not really an active member or something like that, although I have accounts and I did have some edits in OpenStreetMap. Furthermore, what I did / try to do, is also trying to bridge the gap between government data and object map data. Personally, I think we can learn from each other and also improve our data with each other's data. Well, I think OpenStreetMap is cooperating now, but the government is a bit reluctant in using OSM.

G: So, you wouldn't consider yourself an expert, but essentially, do you consider yourself a user?

JW: Yes, I also use it on holidays etc, but I'm not an active contributor. But I did have some experience on, for example the forum, OpenStreetMap forum, I also did like some discussion, so yeah, I'm a bit of an outsider, but I follow them with interest.

G: What do you consider the value for you to participate in an open platform like OSM? What does that mean to you to participate in?

JW: Well what I personally really like of OSM is the fast processing. So, if you draw a road, I think that within a day it's on the map. But I also sometimes participate in the humanitarian OpenStreetMap actions, so sometimes there's like missing maps, so I always participate in those, for example when it's organized with the Kadaster. So, I also have the feeling like I really contribute to help the world, help people who are potentially in dangerous areas. And personally, I also use it, so I use it and I see something, then you also think, OK, I have to remember that, then I have to correct that. So those motivations are like, well, improving the data and also improving the world a little bit.

G: Could you elaborate a little bit more on the humanitarian aspect of participation?

JW: Yes, so because OpenStreetMap is perhaps one of the only open datasets of the world and is showing a map, it's also really important for several NGO's, so, non-governmental organizations. Especially the Red Cross is really actively trying to get people involved. So they organize a day, which they call the missing maps mapathon, for example, and then they organize a branch of people who are willing to contribute to an area, for example, in a country which is prone to flooding because then they want to have a map of the current situation of the country. I think they also try to, within those countries, have some members who also try to assess the situation from satellite images, where you can see how here are some houses, here are some roads, although sometimes quite difficult to see, but they also need people on the ground. In this way, well, I think it's mainly the Red Cross. But also other humanitarian organizations try to map missing areas, so also areas where Google Maps is not really reliable.

G: From the survey, there was some concern of external parties like businesses, public sector, or academics, affecting OpenStreetMap, in the more negative way, do you think this is a concrete risk or is it a reality? Would you say it's a more positive external influence or negative?

JW: I think it's a positive thing, but what I've learned from literature was that in, for example, the United States, of course, OpenStreetMap emerged because there was no open data. So there were no open maps of the world, and governments were not willing to share their data which of course

sparked the upstream movement, and the community also has something to do and needs something to do, and of course there's mapping. I think I learned from literature and not sure which article correctly, that, for example, in the United States, the last navigation company, said, “Oh well, I'm willing to share my data, here you have the whole road network of the United States” and that actually killed the community of OpenStreetMap over there. So there you can see that there's a negative effect because, if there is nothing to map, yeah, why should you bother to contribute to OpenStreetMap? But if there isn't a community, well there is a road network, but it needs to get updates. Because the roads will change, and if there isn't a community then you have a problem, because then there's also nobody really caring about updating that. And in the Netherlands, we have a different situation and I think in the balance it works actually quite well. For example, OpenStreetMap says, well, we don't map houses, but we use the public key registry and building addresses which we as Kadaster need to maintain, and we import that and when we see something that isn't correct, we don't try to improve our data, but we will send feedback to the Kadaster and we will send it to the municipalities, saying that this building is wrong. Then we also have a big feedback loop, also because OpenStreetMap has other and more users perhaps than we have, so then you can reinforce each other and get into the best data there is in the world. But that is a bit of the risk with OpenStreetMap users, where they think, “I've nothing to do anymore, well, I find another hobby.”

G: So, you mentioned the Kadaster also has this feedback loop between users of OpenStreetMap, could you elaborate a bit more on that?

JW: So, what we see is that we publish the datasets, so with the buildings and the addresses, and OpenStreetMap imports that. So that's also nice that you can see for example the IDs of the same data set you can also find in OpenStreetMap in the Netherlands, so we can also link to it and when they see a mistake, then they go to our system, a system of which I am the product owner, and they report it. So that's the crowd source feedback system. For this we created a rest API and they (users of OSM) also wrote the plugin in their JOSM editor, so when they are working with the OpenStreetMap data and they see an error, they can directly send a message to us like, “hey, here's something going wrong.” So that's actually the loop. What we don't do yet, and perhaps we should do that, as Kadaster, is to check OpenStreetMap data and see what the differences between their data and our data are so that we can improve that as well. So now we are actually really well relying on the preparedness of the OpenStreetMap community to report.

G: So, this is important for both Kadaster and OpenStreetMap?

JW: Yeah, yeah, for both sides. Of course, the data quality is very important, and I think there was a discussion because we have buildings in the Netherlands which are part OpenStreetMap, but you also have roads and parks etc. and of course, we also have topographical maps, so there are questions like, should we also import those objects in OpenStreetMap? I think the community then said, “No, we shouldn't do that. So, what should we do next then?”. Also, I think OpenStreetMap is better than us also in up-to-date news: so If it's going fast, a topographical map could be updated within ½-1 year and that could also take 2 years, but in OSM when the new roads open or a new round-about is made, then they can directly improve it on the map the next day, or I think currently within a few hours and then you see it on the map. That's of course much faster than we do, ideally. Uh, would you say that?

G: Would you say that the integration of both parties is essentially one like entity or one component with the same goal?

JW: Ideally, what I would say is not really integration, but collaboration between those two parties, and of course there are also other parties, for example private companies, like Google Maps. Ideally, we would also collaborate with them to improve our data quality and also to get better data to them. I think that we should collaborate on improving the data quality and I think OSM is pretty good partner, which is able to do that. So they're really also focusing on data quality, but unfortunately from the Governmental side, it's a bit reluctant: so we are passive while they are giving active feedback to us. But in my ideal world vision, we should collaborate more.

G: Well, I know you're involved with open data, could you describe a bit more how you're personally involved with it?

JW: Yeah, so as Kadaster, we are like a big data disseminator or a big data broker. So what happens a lot is that people have other organizations, mainly governmental organizations, that are providing data to us, then we put it in a database and then we also disseminate it to other users as open data and we do that through the portal for the platform of PDOK, which is actually hosted by the Kadaster. I am also involved with PDOK, so sometimes discussing things around PDOK, but my main involvement is actually all the way around. Thus, if people use data and see an error in the data or something that changed, they can give feedback so that we can give the feedback then to the municipalities or other organizations so they can improve the data. Then we have a big circle of how we can improve the open data and of course one of those users is OpenStreetMap, so that then you have the complete picture of the full circle. The feedback session is now only for a few key registries, so only for buildings, addresses and topography and they're also extending it to cadastral data, cables and pipelines. And currently also doing a project with the Ministry of Defence especially on, well, aeronautical maps; so if there are high towers, in the details reported, that data can also be reported in this feedback and then we can also give them better data.

G: You mentioned this "big circle", it is interesting that you bring that up, because in the survey that was conducted, the concept of OSM as an ecosystem was mentioned by some of the respondents. Would you agree on this term for OpenStreetMap or how would you describe its ecosystem?

JW: Yeah, I think it's a difficult to define the ecosystem, but what you can see is that that we have the "circle" but OSM has its own "circle" where you can also report feedback to OSM if you are not able or you don't know how to share or contribute data to OSM. So, you can also report feedback there and then a contributor will assess it probably if it's correct. But what you can see, and you can see it also in what I explained about that process, they're also using the data in OSM, improving it and also giving it back.

So you can see that those "circles"" are merging or overlapping or connecting to each other and then a broader network, and perhaps you can cause an ecosystem indeed exists, hopefully emerges, and of course, perhaps one of the things that this ecosystem is, is ideally self-sustaining and I think that with those feedback loops, that you can speak of an ecosystem.

G: And I imagine you've already heard of the concept of the spatial data infrastructure. How would you describe it to be?

JW: I think the definition of spatial data infrastructures is overly complicated. What it is actually, well, on one side you have data providers and other side you have data users and all the spatial data infrastructure does is bridging that gap. So, it's providing you an infrastructure where they can put in the data and users can just download or through web services use that data. I think that's the whole point of a spatial data infrastructure. And of course, there are all kinds of other conditions like policies and laws and resources which are all necessary to have a healthy spatial data infrastructure,

and also part of the spatial data structures, of course very important, as you know, I did this PhD on the governance space that they have structured. So, there you can also see what is needed around the spatial data infrastructure, and even then, I consider for example, OpenStreetMap a spatial data infrastructure because there you also have multiple users and multiple data providers. There you can see that it also emerges without a policy on OpenStreetMap or law or heavy resourcing, there's not really going millions of dollars in into OpenStreetMap. But then it's yeah, especially the community who is putting it forward and then there's a lot of social capital instead of monetary capital to get that thing running.

G: Yeah, that was my next question. Given your knowledge, do you find that there is any relation between OpenStreetMap and the definitions of SDI or Open Spatial Data Infrastructures? Is there a concrete relation between open street map and open SDI? If not, what you what do you think is needed to make it an open SDI?

JW: Yeah, well, so some people say, well, let's see, I should provide multiple datasets. For example, OpenStreetMap only provides OpenStreetMap, so then people would say: “-Well, is it really an SDI? - Well no it only provides one data set”. So, it's also sometimes a discussion, since there are also some thematic SDIs in the Netherlands, for example datasets which have issues with risk, so potential risk-map where you can see a gas station for example and if it can explode and hurt people (risk situations). That's the kind of things they risk map, and also with flooding, if there is problem how many people are in danger? Is that an SDI or is that just a data set?

Well, personally for me it's not that important if there's just one data set of map product and/or multiple. But what I can argue why OpenStreetMap is also an SDI is that the data that is collected within Open Street map is also used for different purposes. So, some people are only interested in the roads, so they will only get the road network and they will build a navigation app for example. Other people though, are more interested in the national parks and they will build a nice map of National Park with it. So yeah, in that sense it is, I think, an SDI of course. I mean, you look at standards, it's quite open standards, so everyone can come up with a new object, so if I want to create a new object, then I'm able to, but then also the community is really involved, where they may say “Is it really necessary to have that so? ...Should you tag objects as this?”.

G: So, there's a community guideline for standards and policies.

JW: So, it's not really that enforced standard that we always have to follow it, but if I remember correctly, there were some discussions, for example on ice cream shops, so yeah how do we call them and then there were multiple tags for ice creams, and then they decided, well perhaps we should have it uniformed that we take ice cream shops and then yeah, they made a decision on it. Like that they also make decisions on a uniform basis using the data polls to standardize it.

G: So, just to recap, if there were other datasets available besides OpenStreetMap, it would be more of an open SDI?

JW: Yeah, well, I think some people will use that as an argument. That OpenStreetMap isn’t an open SDI because it only provides for one data set only a map, while in a normal SDI you have a bunch of different products, so It's not only one for one data set you can retrieve from it, but there are multiple. So that's perhaps why some people would say it isn’t really SDI. But what I think why OpenStreetMap is an SDI or an Open SDI is that people still make from OSM different datasets. So from this one product, you can still see that people use it as a base for some interesting potential data and can retrieve our datasets from it. So, in that sense, I think it's also an SDI.

But it's of course also always a semantic discussion, “what is an SDI?”. What you could say is the impact of OpenStreetMap in the world of course and also Google Maps. So yeah, I think you can’t neglect it and you can't say, well, I'm only interested in SDIs, and I was interested in OpenStreetMap. So, it's really what we discussed before, because it's part of the ecosystem.

G: You think it's an open SDI or do you think it's an SDI or something else?

JW: Yeah, then we have the discussion of what is an Open SDI and SDI. Yeah.

G: Yeah, I could provide some of the definitions if you want.

JW: Yeah, it depends on what definition, but yes obviously OpenStreetMap provides open data although there is a limitation. I know there is some issues with the share alike license that, like the proper attribution, but also that if you use OSM you have to also share your data in the same way as you provided it. That's the share alike license, and that also brings limitation to commercial parties because you can't use it and then sell it, because that's not an equal share. So that’s one limitation on the Openness of OSM. But I think it's open, I think it's a great product, of course, quality varies per community, per country or region. I would classify, or I could defend to say it’s an Open SDI.

G: Ok, that's all of my questions. Do you want to go over any of them or did you think that any of them was a little bit unclear?

JW: No, no. The questions were clear to me. Curious what you will make of it.

G: Do you have any comments regarding the state of participation in OpenStreetMap?

JW: Of myself or the platform?

G: Oh no, I was just saying if there are any comments regarding the state of participation, of user participation in OpenStreetMap, not of yourself, but of the community.

JW: Yeah, I personally experienced that, when we say about OpenStreetMap, we had talks about format errors and when we talk about format errors, we talk about that the users aren't professionals, that they are amateurs, but that is really incorrect. So, what I found out was that they are really experts, really hardcore technicians sometimes, and they do a lot more than only mapping, drawing. They also do a lot of scripting and other technical stuff, so I was really surprised about the technical level of the well, “the heart” of the core community. Of course, what you can see within OSM is that there are only a bunch of people who are really active on the forum and doing it, and also more the senior members and so that was something that I noticed. They also noticed when I contributed myself. For example, there was a road and it changed a bit, so I thought, “oh, I will change it also I will delete this route, and then I will draw a new road” and then I got all kinds of errors like, there’s also a bus line and other things, and then I was amazed about the complexity of the data, that can get quite complex and over the routing of navigation, so that's also one of my experiences. And the last observation in the OpenStreetMap community is also the hierarchy, so you think, well, community, everyone is equal, but that's not really the case. So, there are of course the senior members who are more like the supervisors about street map and also sometimes between communities. So, I think there's an international community and around the country communities, there is also sometimes friction and tensions between them. I didn't study it further, but it's really interesting how the governance of OpenStreetMap actually works out: that's one of my apps or a future product to further study and probably I will use your study as well.

G: Yeah, it's a very good way to put it in. With the governance of OpenStreetMap there exists a certain hierarchy.

JW: Yeah, although there are no laws and there are no physical hierarchies, there are implicit informal things, and that that's still quite interesting, yeah.

G: All right. Thank you.

JW: Yep. Yeah.

Yes, you're welcome.

Interview with Participant 0

Participant 0:

G: Around 12% of the users mentioned that they use other mapping related platforms (Mapillary, OSMand and Strava), do you use any of these platforms?

Participant 0:

I know about the Strava heat map and so on, but don't I use it. But I do have 50,000 Mapillary images personally.

G: Do you see differences between the community in OpenStreetMap and the other platforms?

Participant 0:

Yeah, I'm personally more a part of the OpenStreetMap community. It's also due to the fact that Facebook bought it some time ago now. So, a lot of people are now switching to like OpenStreetCam, which I believe is now called Carter View or something like that. Not sure whether that's anything better because it's owned by a taxi company, not everyone likes these commercial influences about it.

G: What would you say participation means to you? What's the value for you to participate in OpenStreetMap, besides, of course, the projects and applications that you've just shown me before.

Participant 0:

I think it actually starts with basically my first edit from the road just behind my wall was completely incorrectly drawn in, so I think that I could just correct that. I tend to use the data for navigation and so on. It's always fun being the first to arrive because you have good navigation. They use Google Maps and get stuck somewhere.

G: What keeps you committed to OpenStreetMap?

Participant 0:

I mean there is just the sheer amount of features that you can add from roads, it is OpenStreetMap after all, but also buildings you could add trees, you could even add manhole covers, land use, you can basically do anything. So, you basically have time to edit for the rest of your life. Just last week noticed, that there's a school missing in my town. That's weird. So now I can see it with the fans, the benches, the football pitch, well, everything, basically.

G: So, you can have enough work to keep you satisfied to participate. Do you feel sense of a community in OpenStreetMap? In the platform? Or the Discord Channel?

Participant 0:

That's always fun hanging out on the Discord channel, but I am also a bit more involved in the regional community, weirdly enough, I think basically met dozens of regional community members in real life. But developer community members yet.

G: So how important your regional community for you?

Participant 0:

They have interesting projects where they help to get some open data so we can import that. They, I believe they help to gather open like Mapillary images as well. I believe I have a camera ground, so you can just get a 360-degree camera and use it. I actually have one laying around here somewhere. To be honest my 360-degree camera started before OpenStreetMap.

G: From the survey, it emerged that there is a risk of external influences by parties, such as businesses, academics, and government bodies participating and affecting OSM. Do you feel like this is a reality or a risk, or how would you say it affects the community?

Participant 0:

I mean, in some ways there is really sort of a problem here because we are getting some edits from, I believe the TomTom editors, which can be questionable to say the least. Like changing road types for no apparent reason. and completely in contrast with what's described on the Wiki. Everybody thinks it's correct here, so, but I mean, Facebook also has their rapid ID editor which uses AI to detect buildings, which can be very useful. It's in some areas, but if Microsoft also provides also provide building footprints.

G: Would you say that they are part of OpenStreetMap?

Participant 0:

I mean like without Facebook and Mapillary, I think everything would be quite different in some areas. Since some commercial providers give street level imagery or other aerial imagery. If we go back to when this project started, we only had our own GPS trackers, no aerial imagery, no proper editor. There's a lot of contributions, but It is hard to make sure they don't have too much influence. I believe that's also one thing that some people are concerned about. Dozens of members joining the foundation as well.

G: There is a potential influence in the overall structure of OpenStreetMap.

Participant 0:

I think there are enough individual contributors us to help balance it out. But it also depends a bit on which area you're in. If I just look to what happens just across the German border, the percentage of commercial map editors is way higher? It's like Amazon is adding driveways that are usually quite crooked and weird. It's actually quite cool to see these companies using it.

G: One of the things that people mentioned was the visibility and the outreach of OpenStreetMap like, more representation in 3rd party applications and websites

Participant 0:

Actually, all the physical maps in my city are OpenStreetMap maps without an attribution, so that's slightly irritating.

G: So, it’s a government that uses OpenStreetMap? Or is it just the municipality? I'm just trying to understand.

Participant 0:

There are a lot of Belgium municipalities as well using it. Because they need to have some kind of database for this. So, if they want to build another application, where they have to maintain all of their data. Instead, they just put it into OpenStreetMap. 90% of our data might already be there.

And they don't have to do half of the maintenance. I believe the Government has also got a project about tourism, where you just have a map, so you can see benches, cycle paths, charging points for electric bicycles. toilets, picnic benches, playgrounds, and everything.

G: That's a very interesting then that there's an actual government body using OpenStreetMap. I saw another one that was with Poland. Which was the AED emergency devices.

Participant 0:

Honestly, when I saw that I thought that in MapComplete, we already have an AED layer in an editor that can let you view and edit them, so it feels a bit like the millionth thematic map which is already there, but.

G: How involved are you personally with open data?

Participant 0:

It's actually quite hard questions you answer, but I do generally tend to take a look through my local open data portal. Just browsing through it but...

G: What portal would that be?

Participant 0:

The local City Council has an open data portal which they have things like trees, Birds Eye view, imagery, everything a normal City Council will keep privately, they have publicly.

G: OK.

Participant 0:

As long as there isn't any privacy risk about it.

G: From the survey, the concept of OpenStreetMap as an ecosystem was mentioned by the respondents. Would you agree on this term for OpenStreetMap?

Participant 0:

Yeah, to be honest.

G: There's this discussion like it's a database, but I've seen a lot of these mentions of ecosystem. How would you describe the ecosystem?

Participant 0:

I believe Foundation officially wants to say it’s a database, but we also have map tiles. I believe there is finally some work on actually rendering or presenting vector tiles as well.

I think the main focus should really be the database, but just the plain database isn't anything you can easily use from. There might need to be some tools, but a lot of them are indeed developed externally, so ecosystem can be a bit fragmented. The ID editor is developed in house, so that's interesting, but the JOSM editor, which I also use often is not. The Belgian chapter has MapComplete belief there used to be Mercator as well. Then we also have a lot of applications use that Overpass Turbo, which almost feels like it is an official application of the Foundation, but is actually hosted like outside.

G:

Yeah, so would you describe the stakeholders or like the people that are in that are involved for the decisions and the policies behind these processes in OpenStreetMap? Or is it the users? Or is it just solely the board?

Participant 0:

Well now, I like that the foundation now has an active membership to make sure it's not just some board members and some people and some companies that can actually decide, but it's anybody who contributes the data that can now decide that.

I also get the feeling that a lot of people don't know that there is an active contributor membership. And I believe mine just expired yesterday.

G: Yeah, so I guess very important to be a part of the decision-making process.

Participant 0:

It's also the fact that you don't get it automatically, you need to renew it every year.

G: Is it like a licence or subscription?

Participant 0:

You just have to fill a form for the first time, like, Name, Country, e-mail address and that's about it actually.

G: There's no payment involved?

Participant 0:

There is a free plan if you if you have a certain number of contributions to OSM. The normal membership is actually like, £15 a year so.

G: Wait, so it is there to have the active membership you have to pay the foundation? I didn't understand.

Participant 0:

If you want to, if you want to be member of the foundation, you either have to pay or you have to contribute to OSM.

G: OK.

Participant 0:

But in either way you have to fill in a form and renew your membership every year so. They do remind you a few times if you don't renew it. There is also a link in the form that shows how out many mapping days you have and how did you contribute. So, we're again referring to a random external tool for it. If Pascal decides to host not it anymore, the link on the side of the OpenStreetMap Foundation would be broken.

G: It's interesting that you mentioned the Pascal Neis, I tried reaching out to him and I hope to get an interview as well, but I don't think he's replied.

Participant 0:

Yeah, I mean, sometimes it can be very interesting to watch your statistics or to see from how is my friend doing.

Participant 0:

I actually got one friend in into OpenStreetMap now he has 35,000 changes.

G: Have you ever heard of the concept of spatial data infrastructures, or SDIs?

Participant 0:

Don't think so, but I could be misremembering.

G: [Provides Spatial Data Infrastructure]

Participant 0:

So theoretically it could be used to describe the OSM ecosystem.

G: I'm looking into seeing if is also an open form of this infrastructure.

G: [Provides Open SDI definition]

Participant 0:

To be honest, it's actually quite easy to like import data into a postgreSQL database and use it for basically anything.

G: After hearing this, do you think there's any relation between OpenStreetMap and these definitions?

Participant 0:

Some ways maybe, but not really sure about it to be honest. I believe the foundation is also looking into like finally upgrading data model. We basically have a standardised data model, but you can also add any tag you like, we are still restrained to a key value pair. Whereas some data would have been better off if it would be some kind of object-oriented thing.

G: How would you describe OSM in its entirety? Like the users, the policies, and the whole ecosystem essentially?

Participant 0:

I think there are two short summaries. It's a bit of a mess, or it's like the Wikipedia of maps. We have all kinds of users, all kinds of contributors. We have like companies involved. There is a foundation that hosts some of the main infrastructure, but there's also some external infrastructure. It's quite a complex ecosystem to be honest, and that's also sort of what makes it great. Anybody can contribute, anybody can dream up new things. It can also be seen as a weakness from the lack of standardisation.

G: How would you describe the openness of the decision-making processes and policies of OpenStreetMap to be? Like the lack of standardisation as well.

Participant 0:

Like for important decisions from there is usually a voting process, so, if it's about financial decisions or actually decisions of the foundation, anybody who is actually a contributor or pays can vote. In

general, we or the community usually maintains wiki pages about everything, or about every tech or new thing we try to implement to OSM. There's also a proposal process in which anybody can apply to if they want to add this kind of data, like new tags. Then everybody can give feedback, we can vote after proposal is sort of done. Not everybody seems to find it or be interested in it.

G: So not all users are interested in this process?

Participant 0:

I mean, to be honest, I have actually never voted on anything. I have voted for board members, but that's actually about it. But things like StreetComplete, they do sort of point you there actually so. There are some apps trying to make an effort to make sure it is seen.

G: A From the survey, some concerns were mentioned in relation to user experience for new users and difficulties to participate in OSM, do you believe this to be an issue?

Participant 0:

Yeah, to be honest, when my friend started editing, he mentioned that the tutorial in the main OSM editor isn't working. He couldn't get out of it. I think there might be some concerns. It also depends greatly on how you get into OpenStreetMap. Some people just notice the app StreetComplete in the playstore or something and they start editing, which I personally think provides a great starting experience. It tries to not overwhelm you as much, like give some kind of tutorial, and as you move on, you can do increasingly more complex things. I mean, if I start to edit, I see like the tags that it actually uses, because that's something I might be interested in, but somebody who's just started out might think that that's too complex.

Well, I think that here are editors for every level you want. For the simple questions in StreetComplete, we have an editorial of MapComplete, which offers a bit more options like adding new points. The ID editor where you can draw routes, buildings or do simple things with relations and we have like the JOSM editor, which has an extremely steep learning curve, but there are tutorials. That's an editor I tend to use because it's extendable with basically everything. There are plugins that you can view in 3D as well. I believe we also have like a like some stack overflow like help page. I believe it's help.OpenStreetMap.org. Which I don't think everybody knows. Sometimes it's just very hard to find like all the services since it’s not integrated or something so. We have a telegram group for the country as well. As well as forum, Discord and have monthly meetings online. And then some of one of the admins did not know about this. I thought everybody knew that. It's announced in our discord, in forums, on the OSM calendar, which is also, I believe, in external servers, which lists like every event of OSM all around the world.

G: This would be important for maintaining people engaged.

Participant 0:

It would be nice for example if the OSM calendar would be integrated in like the main website or maybe just be placed next to other things that are there. Well, the help page is actually visible, never actually pushed on the button “help” in the main site. The help page does actually refer to a short manual the help form, mailing lists, old forms, new forms. Wait, there's an IRC chatroom still?

G: Yeah, one of the mentions in the survey was that there are a lot of different community channels. And that sometimes that it should be streamlined.

Participant 0:

Yeah, I think the OSM or the foundation is trying to do that with moving to Discord, I think. We have a new form which might be appealing for almost all use instead of no one. There's also the OSM community index for regional projects. You get a map with communities if I click on the Netherlands to see the telegram, the forum, the outdated wonder.me list, the mailing list and everything that's worldwide too. There's also stuff for specific region, it can be a great start, but it's like the Discord channel isn't in here, so. It's hard to keep this kind of thing up to date, so.

You're also in the discord, right?

G: Yeah.

Participant 0:

Yeah, I notice your welcome message.

G: Are there any questions that you thought were unclear that maybe want to readdress or go over again?

Participant 0:

Not really, actually so.

Participant 0:

OK.

G: And do you have any other comments regarding the state of participation in OpenStreetMap?

Participant 0:

I don't think I have anything that I haven't already mentioned before so.

G: Well, yeah, then I think that's so about it for the interview.

Participant 0:

Oh good.

G: Thank you for your participation.

Transcript of Interview with Participant 1:

G: How long have you been a member of OpenStreetMap?

Participant 1: I've been involved with OpenStreetMap in some way or another for over decades. I started out by just contributing to the map, and that's something I still do, but in the meantime, I've also contributed to the project in a lot of other ways. For example, I'm software developer by profession and so I'm also doing some software development for OpenStreetMap related project in my spare time. I've become a member of the OpenStreetMap Foundation Board of Directors four years ago. After volunteering for various other positions in the foundations, such as a communications working group and more recently the Engineering Working group. I've been involved with organising conferences and other smaller local events, doing a tutorial teaching events on OpenStreetMap editing.

G: I'm honoured then, I've seen you in the discord.

G: How active would you say you are in the community channels?

Participant 1: I'm pretty active in several community channels. Of course, there are lot of them and by now it's too many to participate in all of them really actively. I prefer participating in the open ones, so the ones that are actually provided by the foundation itself and run on open source software. So that's where I'm the most active.

G: Which one does the foundation provide?

Participant 1: Like the OpenStreetMap for, both the old and the new one, as well as community.osm.org, the mailing lists, the matrix channel that's provided, which is like an open standard for chat communications. But I'm also following weekly diaries or newsletter.

G: So, it's a very wide range.

Participant 1: I'll see a lot going on and I like to stay informed on what's new in the world.

G: What does participation mean to you? What is the value you feel when participating in an open platform like OpenStreetMap?

Participant 1: To me, participating in OSM isn't really something I get a direct benefit from, I know some quite a few people who contribute to all them professionally, but in my case I mostly treat it as something I do to eventually promote the cause of open data. Of course, a quite a few of these activities are kind of fun. There is a bit of intrinsic motivation as well, but, it's usually not the most fun I could have in any given hour, or definitely an element of altruism or idealism involved.

G: I've noticed that you mentioned that that more visibility would be better for OpenStreetMap. How would you describe the current state of OpenStreetMap's visibility and how could this be improved?

Participant 1: Essentially, OpenStreetMap is used by a lot more people and products, so OpenStreetMap currently is like one layer below the topmost layer. In most cases, though it's not something that people use directly, but that is used by the product that has been used by people. This is not uncommon in open source or open data projects. So, for example a Linux kernel would also be an example that is pretty widely used, which runs on all the Android phones for example, but still most people either don't know. They assume that it's something that they personally don't actually use, when in fact the smartphones, routers or the other device that actually do use it.

The problem with that is that these other projects also have a very small contributor base and are OK with that. I mean, the number of humans who can even have the skill to contribute to the Linux kernel is pretty small, and these potential contributors generally know about it. But with OpenStreetMap, we need a much larger and broader base of contributors. It also needs to be geographically distributed because we tried to map the world on the ground, eventually in many regions from scratch because many parts of the world either don't have digital maps or don't have them all available under compatible licence and so we kind of need to get the word out that OSM exists and is worth adding to, in order to attract the contributors we need. And that's why I think visibility is key.

G: It's interesting that you mentioned these other projects. From the survey around like 12% of the users said that they used other platforms like Mapillary or OSMand. What would you say are the key differences between the OSM community and these other communities, if they exist?

Participant 1: Could you narrow it down to some specific set of communities? Because I believe depending on what other communities talk about the differences will be will vary a bit.

G: Which one would you say is the most similar to OpenStreetMap?

Participant 1: Most similar. Maybe think like Wikipedia or wiki data because it's also a Crowdsourced collection of knowledge that is essentially gathered by people who are not specialists, though there is a pretty close parallel here. It's also openly licenced of course, and it's comparable in the number of contributors that needed to build this kind of product. Compared to those projects, I believe, one major difference is that OSM is a lot more software heavy, so the technology to edit text on the web and to compare the difference between 2 versions of tags and so on is pretty mature. It already was available when project like Wikipedia first got started. It has asn't really fundamentally changed since then. So, if you look at a MediaWiki, which is a software that powers Wikipedia as it is today, compared to what it was in the beginning, it hasn't undergone any really revolutionary shifts. In comparison, OpenStreetMap, there are issues when editing a map in a way that allow for millions of people can do it without having major conflicts. This is something we are still figuring out on how to make a proper user interface for, though this means that over the lifetime of OpenStreetMap, we have needed to invest a lot more energy into developing software. We have seen editing tools go essentially out of style entirely or replaced with newer ones. It's much more of a software project, in addition to the data collection, compared to the more purely data or text collection project under the umbrella of the Wikimedia Foundation.

G: There were some concerns in the survey that some users have a more difficult time to participate in the software and then in OpenStreetMap community itself. Would you say this is an issue? What do you think could be done to alleviate this this issue if it exists.

Participant 1: So, it definitely is an issue, I still see people essentially “run against” the pretty deep learning curve and being discouraged by it. I mean, what is being done is essentially investing in developing software that makes editing maps on digital devices more accessible, making it run on more platforms, like making possible to edit OpenStreetMap on smart phones and other portable devices. I think that the other pretty much the only effective strategy is to improve the issue like in the long term. At the same time, of course, we also have to make sure that we don't build until artificial barriers, like unnecessary complexity in our data model or things like that which would also make it harder to bring in new people who aren't already familiar with the intricacies of our way of modelling. So that's perhaps a more social dimension to keeping the project accessible.

G: From the survey some users mentioned the gamification, but they were worried about the loss in the quality of data.

Participant 1: True, that's a bit of a balancing act. I mean, gamification is also aimed at essentially encouraging additional contributions but making it more fun and more of a natural progression to contribute additional data but of course it introduces incentives that aren't perfectly aligned with what's best to make the map better. I mean, it's all almost impossible to design a gamification reward structure that rewards exactly what you want, and it's impossible to gain. So, you will have problems with people who contribute in a way that gets in the most points and not in the way that makes a good map.

G: In the survey, it emerged that there is a risk of external influences by parties, such as businesses, like Meta, Apple, academics, and government bodies participating and affecting the decisions and the platform itself. Do you feel this a concrete risk/reality or a benefit? How would you say this affects the community?

Participant 1: Well, both. It's a bit of a benefit. I think it's almost necessary to interact with these institutions in some way, simply because they have the resources that we need to improve our platform to make the investment into a software that I mentioned previously. But definitely risky. Most of the groups you mentioned multiple orders of magnitude larger than the OpenStreetMap Foundation in terms of budget, in terms of person power. So, interacting with them needs to ensure that, we can eventually protect our interests against any kind of takeovers or influence. So, it's another balancing act.

G: Do you consider them a part of OSM?

Participant 1: I mean, you can view them at the part of the community, it's just that there is a different path of the community is including, different kinds of organisations that contribute, but of course also the volunteer contributors all need to have their concerns respected and it shouldn't happen that the organised contributors can essentially entirely own the discussion due to their better resources, so they can be better organised and promote their interest in a more structured fashion. We have to make sure that that doesn't happen because I have seen volunteer contributors lose motivation when they are confronted or in conflict with groups of organised editors because as an individual it feels pretty overwhelming to have an editing conflict or something with a larger group of people who are essentially do being paid to participate in that conflict, right. You are doing this by could be out having fun. So, it's not really something that you can just let it happen on its own, but there needs to be some kind of structure to make sure that the different kinds of contributors all get to have their way in the community.

G: To make sure that everybody's voice is equal essentially.

Participant 1: Absolutely.

G: In the survey there was a mention of concept of OpenStreetMap as an ecosystem. So, the OpenStreetMap ecosystem. Would you agree on this term for OpenStreetMap or how would you describe it to be?

Participant 1: I used the term ecosystem quite a lot when talking about OpenStreetMap. Simply because most activity happens in some kind of decentralised way. Seeing that this activity is performed by many smaller groups that are structured more tightly internally, but also interact in some less structured way with or the other actors in this space, and I think calling it an ecosystem is the best way to get that across.

G: Have you ever heard of the term of a spatial data infrastructure before?

Participant 1: No, not specifically, no. I don't think it doesn't ring any bells.

G: I'm going to just say a quick definition just so I can try to get the questions across,

[gives provided definition of SDI and Open SDI]

G: I would want to know if after you hearing this definition, do you think that there's any relation between OpenStreetMap and this definition? Or if OpenStreetMap can be defined as something else than just a database?

Participant 1: I think the definition you quoted fits OpenStreetMap pretty well. So, by your definition you could call OpenStreetMap an open SDI. I guess, but I wasn't familiar with the term.

G: No, it's a very specific term I would say that has been in development for a while now, but it's essentially. A framework or an infrastructure where spatial data is provided to users through an access network. So, there are certain example geoportals that you can use to get access to geo-data or geoinformation and then that geoinformation would have a certain standard behind it or maybe just an open standard for use and It would have a certain policy dictating on how it should be used and how it should be in specific format, which format it should be, and essentially there's a governance behind this infrastructure.

G: So, after hearing these definitions if you think it is in the open SDI? Or if it's something else? Or if you could maybe describe it in your own words?

Participant 1: Again, I think the definition fits. I also think that it's probably not a definition that will be used for communication in when I try to explain what OSM is to people who aren't familiar with the academic background or aren't involved in geospatial information in some way or form.

G: You mentioned that there's a certain level of hierarchy within OSM, like there's board and there are certain levels in which people were responsible for the decision-making process and policies in OpenStreetMap. How would you describe the openness in this decision-making process? Like the determining the tagging of a certain element or implementing a new feature into OpenStreetMap?

Participant 1: Actually, many of these decision-making processes happen in an informal of democracy-based way. So, the decisions aren't really taken by any strictly defined hierarchical decision-making group, but instead usually writes organically. Which of course doesn't mean that there aren't like people who are more influential than others or something like that. Informal positions of power definitely do exist in any larger group, but this is not something that we usually put into some kind of a more strictly defined framework. Theoretically the board has the ability to make decisions on pretty much anything, but eventually by custom, we refrain from doing so on many areas of OpenStreetMap activity.

G: And there is a certain process into becoming a board member?

Participant 1: Absolutely. I mean, the board becoming a board member is a very, formalised process, simply because it is an institution that's defined by British laws, so it has legal power and legal authority on what the organisation can do and its employees. So yes, there is definitely a process outlined in our association that is pretty much a democratic vote of all the members of the OpenStreetMap Foundation.

Becoming a member used to be something that pretty much anyone was able to do. Though we relied on only people who are actually interested in OSM or in some way even entertaining the idea

of becoming an OpenStreetMap Foundation member. More recently, we've set some expectations that people who want to become a member had previously contributed to the project in some way.

G: There it has to be at least some activity to the to the project and platform.

Participant 1: This is part to make sure that the value of OpenStreetMap assets, like the brand and also simply the amount of cash that's collecting in our coffers, is growing. This is also to make sure there are some safeguards, so it’s not easy to like to send in like a thousand people and take over the foundation.

G: OK, I have one additional question, but this is something I've just found out as well. There's this state of the map meetings as well, where you discuss the progress of OpenStreetMap and like looking into the future of OpenStreetMap. I've seen one meeting that was related to providing vector tiles by OpenStreetMap. Do you know anything about this or plan to do?

Participant 1: Essentially, the main OpenStreetMap, default map on the web site, has been using raster tiles for a very long time and people are increasingly unhappy with that because vector tiles are pretty much state-of-the-art by now. There are several projects that provide vector tiles based on OpenStreetMap data. I mean OpenStreetMap being an open ecosystem, that is something that definitely we encourage people to do independently from the website. But of course, we still want to at some point also have vector tiles on the website itself. It would also solve quite a few of the limitations that currently holds about that back, such as to provide localizations in different languages. It should allow people to make their own variations on the style, or even host completely different styles without having the expertise and cash to set up a huge tile server with a content delivery network and whatever. Though there are plenty of reasons why we want vector tiles, so at the moment the operations working group, which is one of the volunteers run working groups of foundation. With some help of our paid senior side for reliability engineer or methods admin, they are eventually looking into how to set up a vector tile sever for OSM and of course there are different software stacks for producing vector ties. There is a popular one: OpenMapTiles and they are attempting to, firstly: establish themselves as the most popular standard way to turn OpenStreetMap into vector tiles.

G: Is supported by the board?

Participant 1: At the moment the board is supporting the operation working groups efforts to set up a vector tile server. The board has no official position on which technology should be used to achieve that. I mean the board is generally not involved in decision at that level of detail. The board is supposed to be a governance body and not a group of nerds talking about software. So we try to leave these kind of conditions with working groups.

G: Were there any questions that you think were unclear or did you want to address some of the previous questions?

Participant 1: No, I think the questions are pretty clear. I mean, I asked for clarifications in one or two cases, but otherwise, I don't think I have anything to add.

G: OK. And do you have any other comments that you want to add regarding the state of the user participation in OpenStreetMap?

Participant 1: No, I not at the moment I'm pretty much just curious what your results will be eventually.

G: Ok, Thank you

Interview with participant 2

G: How long have you been a member of OpenStreetMap?

Participant 2: I think around four years or something like this, but I was a user for a long time, much longer, but I think four years ago I decided to become a member because I think it's a very valuable contribution and what I can contribute is not so much mapping, but I'd just spend money because I'm using it heavily, I take the data a lot of data from OpenStreetMap and I use it and I estimate it very much.

G: So, you use it for external applications or developments?

Participant 2: Yes, we do the bicycle route planning in, there is a bicycle route plan from 2002 and we are a civilian organisation which forced the Government to do more for the bicycle infrastructure and when we started, we found that the administration does not know very much about the bicycle infrastructure. So, I created a web page based mainly on OpenStreetMap data, but on also other publicly available data like traffic incidents, planning needed improvements.

G: You interface with the local government, essentially?

Participant 2: Yes, yes, the government.

G: Interesting.

Participant 2: And yes, it's really amazing what they don't know and what is possible, what is available in OpenStreetMap

G: Could you elaborate more on this?

Participant 2: For example, they don't know how many kilometres of bicycle routes we have in the city. They have their own numbers somewhere, but they are old, and we can them in OpenStreetMap. As well as which bicycle routes are next the street, which are on the street, if they are separated from the car traffic or if they are in the lane directly. This data you can all take out of OpenStreetMap. In other cities they have done much more. They have for example analysed how much parking space they have in each street by mainly using OpenStreetMap data. They have enhanced an OpenStreetMap and made a connection with it, given that all of this information are necessary for local government to make decisions, but they personally don't have it.

They ask the police; they call them and ask: “It's this a dangerous space on the street” and the police says: “well we don't know”, but if you look at statistics, you can find that there have been let's say 6 bicycle related accidents in the last five years.

That's not OpenStreetMap. That's other information. But you can overlay all this together based on OpenStreetMap.

GL: How would you say they respond to you?

Participant 2: Open, very open. They are happy that somebody is helping them.

G: So they usually accept or implement your changes into to their system?

Participant 2: Ah, implementation is in in another chapter. We are in the planning phase and, well, they are working hard to implement it, but it takes a long time. You see the last bicycle route plan is from 2002 and now, 20 years later, the administration starts the next iteration. They should have

done it after 10 years, but now it's 20 years because we pushed them, and we bring data from the outside. In addition, besides OpenStreetMap, I use Strava data. Do you know Strava as an app?

G: Yeah, one of the questions that I mean to ask is that around 12% of users from the survey mentioned that they used other mapping related platforms like Mapillary, OSMand, Strava and well, what would you say is like the key differences between the community of OSM compared to like Strava of these other projects?

Participant 2: I don't. I don't use the map; I use the data Strava gives me. It's Metro Strava, how many bicycle riders are crossing the streets. The local government has only six points where they measure the bicycle traffic. with Strava, I can show the bicycle traffic in the whole town down to each single street. The we can decide if we start with a bicycle route in this street or should we start in another route? Then, I can say, well, here have 1000 bicyclists per day and here are only 500. So, we should start there where 1000 is. They (local government) don't really know this information. So, they send the police and the police roughly estimates that it's heavy bicycle traffic or low bicycle traffic. Strava gives me, let's say, some kind of more valuable or objective information, and more valuable than a policeman looking 10 minutes on the street. I don't need the Strava map, but I need their data.

G: So, you're not really engaged with other communities?

Participant 2: Just the data from the metro Strava.

G: OK.

G: Besides what you told me with the project, what keeps you committed to participating in OpenStreetMap? I mean, what is the value to you?

Participant 2: Well, you see other things. There is a service from the University which is a spin off for very intelligent routing algorithms for bicyclists. And, I've now made a tour in certain parts of Germany, Czechia and Poland and I planned the route with their route service, they have a special routing possibility for mountain bikes. They take the data from OpenStreetMap. What is the length? What is the descent and ascent? I was hiking and so I could add some hiking routes which were not present there. But this is not the main value, to add hiking routes, but I think it's a great idea to add a route it is located on the ground as it is.

G: Yeah, I imagine that is very good reason to participate,

Participant 2: Also, if you try to find routes with a bicycle through hilly areas, like in Germany, this open route service based on OpenStreetMap gave me really nice routes. Sometimes very strange ones in Poland around a certain area. I got the impression that the Members have different ideas than I, but I can correct this. I do these corrections and things that I've seen that route. Let's say it does not exist anymore. I will correct this then in OpenStreetMap for others. I think that's it.

G: From the survey, there were mentions to user experience for new users having some difficulties to participate. Do you think this is an issue and what do you think could be done to alleviate these difficulties?

Participant 2: Well, you see, I'm computer engineer, so it's not an issue for me to read the data. We need to get the data and we had just questions, such as: "how many kilometres of the streets in the region?" "What if we have a bicycle lane that is separated from the street?" Well, if you would ask a normal user from Google Maps, they couldn't specify this, but it's very easy if you have done the first steps in OSM and I would say a lively community here in my city. They meet every four weeks, and if

I have a question, I can go to them and ask them, and they can give me an answer. I can write to them. I had the question of: “where are the bus stops in my city?” This is because the administration is not allowed to publish the bus stops in city for certain for certain strange reasons, so we don't argue.

Participant 2: But with OpenStreetMap I can find the bus stops and other data that I could combine and find out how many bus stops there are, how many stops in one hour at this bus stop, etc. That's for our bicycle planning. If you have a bicycle route along a bus stop when the bus stops only three times a day. This helps with the planning of the routes since the government doesn’t have this information.

G: Would you say you have a personal involvement with open data? How involved would you say you are with open data in this sense?

Participant 2: Well involved both personally and to support government. There is much more information which they don't have in their possession, but I can extract from OpenStreetMap with some effort. To be honest, it took me I think 2 days to get all these data working. It's lots of gigabytes, but it's working.

G: From the survey, there was a concern or a risk of external parties like government bodies, businesses like Facebook or Apple, and even academics, participating and affecting the infrastructure of OpenStreetMap itself. Do you feel like this is a concrete reality or if it's a positive or a negative thing?

Participant 2: I follow the discussion and to be honest, I have no idea. I see the concrete danger. This is worth lot of money, which is in OpenStreetMap. This information is a lot of value in that, valuable. Companies like Facebook and others also try to get hands on it. They at least try to manipulate it for their purposes, and I have no idea. I see that only a few people are apparently capable to see the danger and to work against it, but to be honest I see it as a danger, but I can't say what the best solution is. I hope that the few people which I see, which are on the mailing lists and so on, that they will find a way. When I have to support them, I would but I don't know how.

G: Do you consider them a part of the OpenStreetMap community, the businesses, academics, and government bodies?

Participant 2:

You see, it's always open. OpenStreetMap is one of the big valuable data which is not commercialised in the moment. Besides you see, you see something like Komoot they commercialise, and I hope they give back. It’s a big danger and might be that in five years we, sit there and say well was a nice dream but now it's commercialised. I hope that I don’t have to pay if you if I do something. I started my first things (applications) with Google and now it doesn't work because Google created API keys and want money and you don't know how much money you have to pay. This was around more or less 10 years ago. But now I do it with OpenStreetMap and now I no fear that I have to pay something or something like this. But in five years, we don't know.

G: In the in the survey there was this concept that OpenStreetMap was mentioned as an ecosystem. Would you agree on this term for OSM?

Participant 2: Yes, yes.

G: How would you describe it to be? What would you consider part of the ecosystem?

Participant 2: Well, the one thing is that it has lot of value. It's very, very valuable, and there are a lot of very engaged people, some of them only a few, I think, much too much engaged to you see, if you do things for free. People are sometimes like a little bit religious or something like this. But I think the main part of the community are really people who are engaged and do it for free because they think it's a good thing to do it for free and paying people for this is a difficult thing. It could be sometimes necessary. But there are mechanisms which are maybe not written well, probably they're written down in all these wikis when somebody wants to do a big change which is in on the whole city or something like this. But it seems to work, so the community of a few knowledgeable people and a lot of people which develop these apps like StreetComplete, Vespucci and so on, which are I think good ideas. Also, the value of the data, and apparently the data is still somehow clean. You can use it. It's not too difficult. You see probably you talk to people who design routing algorithms, they probably have more issues because data are not consistent. But if it's a commercial.

G: So, it's not just essentially one point of data it's made into other data.

Participant 2: Yes, it's the basis for a lot of different industries, like the tourist industry and routing. I see that in government it would be very helpful for them if they could use it much more. But it's well, but here in my city they don't use it.

G: Have you ever heard of the concept of Spatial Data Infrastructure before? If so, what would you describe it to be?

Participant 2: I can imagine what you mean, but I don't really know.

G: [Introduces the concept]

After hearing this formal definition, do you think there is any relation between OpenStreetMap and these definitions?

Participant 2: Well, I think the "open point" is the management, who manages this, who makes the rules and who controls that the rules are obeyed, that if the rules are followed and you did not mention this. But this is I think this the main part of it, not just the technical aspect. What are the elements, the objects and so on? In OpenStreetMap has their objects and so on, but they have not a lot of written rules. Well, in the wikis there's something written but and it's very difficult to catch people which don't follow the rules.

G: I know that there's a community guideline and some licencing, but could you elaborate a bit more?

Participant 2: Well, you see, if somebody in the world introduces new tax. Well, if it's not too obvious, probably nobody will see it, or somebody will see it. But sometimes all of the sudden it gets more used. it's not a democratic process.

G: Is there is a certain hierarchy?

Participant 2:

There is no hierarchy, you see. It's a people who do much have more influence as people, which are probably more competent but don't have the time. You see the same issues in the Wikipedia. They have solved it somehow, I see that, apparently, OpenStreetMap solves it in the same way. I think OpenStreetMap is not as stringent or enforcing like Wikipedia. It's interesting to see the different government mechanisms in Wikipedia and OpenStreetMap. But the government rules, government

mechanisms and how they are enforced, I think that's the main issue. Which is like pudding on the wall.

G: Are there any questions that you think are unclear or you want to elaborate?

G: No, I know that I had this in your email and so on. But tell me a little bit about your goal. What's your goal? What you want to reach?

G: Well, my goal is to understand the user participation within OpenStreetMap. And how this is related to essential factors to what keeps someone motivated to participate. So, the internal factors as well as, understanding the infrastructure itself and actually is more than what it appears to be. So, understanding if it's an open data ecosystem or if it is actually an open spatial data infrastructure. My goal is to create a guideline to understanding of how to get more users to participate to this. As well as to motivate them in future spatial data infrastructures, that are that are essentially open access, open data principle applied infrastructures.

Participant 2: But you do this now as a student or at the university?

G: Yes, yes, I'm a master's university student at TU Delft.

Participant 2: OK, great. Yeah, but, probably with your knowledge. Facebook, Apple or whoever. Will grab you then later on? Yeah, probably. Then that will be very good to see your experience then.

G: Who knows? Yeah, that would be great. So, do you have any other comments regarding the state of user participation in OpenStreetMap?

Participant 2: No, no.

G: Alright, so I'd like to thank you for joining me.

Participant 2: OK good luck for you and success.

Interview with Participant 3

G: How long have you been a member of OpenStreetMap?

Participant 3: I think my first contribution was maybe in 2016, so it's been six years since I first contributed to OpenStreetMap because I was already involved in some open source projects such as Wikipedia, being the main one, and I discovered OpenStreetMap because I noticed that the cartography in my area was very bad because here in Europe ,often land uses and natural areas are drawn from a CORINE land cover (Copernicus service), a European project, maybe you know it. It was it was very bad because the precision was very bad. It was a 10m metres away from their real locations and so on. So, I tried to improve it and then I was captivated because I found it very fun to contribute to the cartography of my area to improve it and maybe give a better cartography than the official geographical institute here in my country. So, it was a yes, so some sort of a game for me. To give a better cartography than the official institute. In fact, at first OpenStreetMap, a bit like a game.

G: So there the participating into it felt more like a game to you than an obligation.

Participant 3: Yeah, yes, I completely agree. And it also, it forced me to discover my area because, back then I was a computer scientist, but back then I was system administrator, and it in some ways, forced me to go outside and understand my surroundings so. Maybe OpenStreetMap led me to change my job. Because now I'm working as a forest Ranger.

G: Very nice

Participant 3: Yes. Maybe that's not totally an OpenStreetMap influence, but definitely OpenStreetMap helped me to change my views about nature and my surroundings.

G: Yeah, I completely understand. I have. I have that similar feeling too. Because as a TU Delft master student, I just sit in front of the computer for long periods of time. I just want to get out and I love nature as well.

G: From the survey, around 12% of users mentioned that they use other mapping related platforms like Mapillary, OSM and Strava. Does this apply to you?

Participant 3: I used Strava for a while but then Strava forced to registration to use the Heat Map, so I stopped using it because I didn't want to open an account just for the heat map. I also use OSMand, but I do not use it very often because in in most cases when I must use a route planner, I use the one which is in my car so, I'll use this tool more. OSMand is more of a second choice when the route planner of my car doesn't know the place where I am going or when it is not precise enough. I have used Mapillary by adding new roads to it. I have a device which allows me to use a mobile phone in my car and I use it when I use new roads which I know are not currently present in Mapillary. I tried to not add roads which are already mapped on Mapillary because that creates duplicates and I think it's a waste of disc space.

G: In in these other projects, what would you say are like the differences between OpenStreetMap in comparison to Mapillary, OSMand, in relation to the community?

Participant 3: I've gotten involved a bit in other projects too, but, I have not been involved apart from adding new images. I did some feature requests for OSMand because I thought that some minor features can be improved. For example, when you go to an intersection, OSMand will show you the directions of a road you should use. For instance. I don't know, a highway, in OpenStreetMap, one can add a colour to the destination sign, the colour of some destination

symbols, such as the highway motorway symbol, etc. And OSMand currently doesn't display that. I think it's a drawback because most route planners, which are embedded in cars, allow to display that and I think that this difference is a major drawback when it comes to the use of OSMand. But it's minor, I didn't request anything else. I also contributed to the OSRM route planner.

G: In the development process?

Participant 3:

In the development, but it was mostly a feature request. In fact, in my country, you can have, city names with articles. Yeah, I think it exists in the Netherlands, like the Hague. Yes, but here, you must adapt the sentence to this case. You must merge the two words and also OSRM didn't allow me to do that. So, I asked them to add this feature and I helped them to design it to allow for a correct use, but it was also pretty minimal. Most of my contributions are OSM data contributions. I also designed some wiki proposals to improve the map, for instance sinkholes. I'm the author of a proposal which added the sinkhole key.

G: For OpenStreetMap?

Participant 3: For OpenStreetMap, yes. I think you can find that on the Wiki.

G: And in the survey there were some mentions, I think you also mentioned that there's some concerns related to user experience for new users and the difficulties to keep them participating in OpenStreetMap. Do you think this is an issue?

Participant 3: It's not an issue in itself, I think typically a new user will see a feature that is indecent in OpenStreetMap, but so he or she can go on openstreetmap.org., create a new account and directly add it or correct it. For a simple case like this, it's not a problem, but when you go deeper, and you notice that, keys like this don’t exist or I don't know how to add it. I don't know, for instance, how to map a power line, then the openstreetmap.org site can help you a bit, but then you have to go on the wiki. You have to go on chat rooms or set such as, like Discord, or you must use a chat rooms mailing list. The Mailing list are not easily usable for people which are not accustomed to it. And then, as we say, the **** hit the fans. We feel it is way more difficult to understand what to do, where to do it, who to ask, and so on. Here lies the problem. But for a simple use cases, it's not a problem. It's just when you try to go a bit deeper here, you will quickly encounter a problem, especially when you're not accustomed to the Wiki, mailing list and so on.

G: So, after going, over the surface level, you're saying that, when you try to contribute on a deeper level, it gets a little harder.

Participant 3:

Yes, for people which who are accustomed to these tools, it's not a problem. But even so, you may have problems, simply to find the right sites to ask for help, the right persons to ask on Discord. Let's imagine a person in about 40 years old, who uses the Internet a bit, but it is not an expert, which will go on the discord chat room and then who will see, upon first glance, a lot of “noise” or a lot of chit-chat and it's not necessarily easy to understand but some people are here just to just to “troll” some people. There just to say I'm so “done” with it and so on. So, it can be very difficult because there is so much information, so many messages, but it could be a bit overwhelming.

G: People in the survey, it emerged that there is a risk of external influences by parties, such as businesses, academics, and government bodies participating and affecting OSM. Do you feel this a concrete risk/reality? Do feel this is a good or bad thing?

Participant 3:

It's can be a threat, I think, because for instance, the issues about China and Taiwan borders, there was a dispute about this. It's also happened around the Crimea. But I think that it's mostly only a threat that must be watched, but currently not a big one. For instance, some years ago Facebook bought the Mapillary, but currently, Mapillary data are still available. You can still view that data, add new data, use it, and so on. So currently it's merely a potential threat. Not a threat by itself, beyond that, I think that the open nature of OpenStreetMap is a very good protection against that. Let's say for instance, there is a promoter which will build houses in a in a field. If he or she already has an official permit to do that, then maybe, he can use OpenStreetMap and draw on it the road to the river that will be built, the houses to be built, and so on. This will then attract attention. But I think that in such cases, OpenStreetMap contributors will quickly see that there is someone which is messing with the data and will quickly revert it. I think that open the open nature of OpenStreetMap protects it against such interface. Just as it protects Wikipedia against such threats. It can happen, but it will be quickly spotted and reverted, I think. Of course, such interventions can be a very carefully crafted, and for a while be unnoticed.

G: Would you say these businesses, academics, and government bodies participating in the community as a part of OSM?

Participant 3:

I would say so because, for instance, I work for the National Forest Office in my country. It's the public national operator which manages public forests. And for instance, forest compartment data are very difficult to gather because there is so much surface. I think that here in my country, we have, about 10 million hectares of public forests. That's very important. We have 100 hundred thousand forest compartments. So, it's can be very difficult to map it individually, to go underground and to individually map forest compartments, but happily this data are made available by the operator, so in such cases I think that businesses or public operators, state operators and so on, have a very important role in that they have data which can be very useful to OpenStreetMap. I think that this is the main role for such operators, for business state operators and so on. It's to make data available to integrate or not integrate enough for OpenStreetMap, it depends on the usability, the data quality and so on.

G: The open data of governments and the OpenStreetMap is important to you?

Participant 3:

Yes, I think it's very important, but not only, state government data here in my country. For example, there many powerlines that are underground, and there are no markers for that. There are no markers such as pipeline markers. So, it can be very difficult to say where the power lines are, how many cables, which voltage and so on and here, power line operators are practically mandated by the law to publish the data simply because when you dig underground, you will be happy to know that there is a power line and you should not dig too deep. So, it's mandatory under law and this data is reusable, so we use it match in the country to add a power line data. For instance, I added a very many power lines, around 200,000 volts. These are very important because when you dig inside there will be no power. I think it's a bit important to know where they are.

G: In the survey, the concept of OSM as an ecosystem was mentioned by respondents, would you agree on this term for OSM? If so, how would you describe its ecosystem?

Participant 3:

Can you repeat? I didn't quite understand.

G: There's a concept that OpenStreetMap was mentioned as an ecosystem by some respondents in the survey. Would you agree on this term for OSM?

Participant 3:

Yeah, I would I yes, I would agree because, it's not just the openstreetmap.org project. There is also for instance GeOsm the other editors, but also data users who can directly use openstreetmap.org, maps, or generate their own maps from OpenStreetMap data. There are state or corporate contributors such as the one I talked about. There also the users, wiki chat rooms, and it's a bit of a “nebula”. In the sense that there are no definitive clear limits between what is in the OpenStreetMap ecosystem, and which is not in OpenStreetMap ecosystem. And I think that it's an important point. In that, on the borders of “nebula”, it's very difficult to know who is who, which person does what and so on. So, I think it's one of the difficulties with OpenStreetMap. For instance, for instance, I still don't know what exactly the role of the OSM Foundation. I know they pay for their servers, but what do they do? I don't quite understand and I the wiki doesn't help me, because there is so much information. The problem is that when people look for such information, it must be simple to understand, because it's. If it's not simple, say, oh **** maybe later. And after it will never come. They will never dig.

G: It's very interesting that you mentioned that there is a certain governance behind the open foundation, but you don’t have a clear understanding to what it does.

Participant 3:

Yeah, definitely.

G: Have you ever heard of the concept of a spatial data infrastructure before?

Participant 3: Spatial data what?

G: Spatial data infrastructure.

Participant 3: How are these spatial? Ah, spatial data infrastructure? OK, you mean the database?

G: It's called an SDI.

[Provides SDI definition]

Participant 3:

I think like more like user than a technician in this case is. I mean, I add that in OpenStreetMap here in my country in the National Forest Office, we also had geographical information systems, but I'm mostly a user. When it comes to administration and the how the different entities interact, I must admit I'm quickly lost.

G: Yeah, it's OK. It's a little complex. I mean it's been changing and it's a broad concept to just indicate a framework to efficiently facilitate the process of sharing, using, and creating geographic information within a community or in between communities.

G: So, it has users and data on one side, so there's users wants that data on one side and then it's provided through access networks, protocols or licences, standardisation and through policies as well. It's like the use of data and all those things.

Participant 3:

Honestly, I terminated my sysadmin job because I started to think that such thing was way too complex and that I wanted things to be simple.

G: Yeah, I agree.

Participant 3:

But that is, such as jobs and persons are also needed to allow some projects such as OpenStreetMap to live. But it's not, it's just. Not for me.

G: Yeah, it's all right. It's just mostly just to get you familiarised with the subject for my next question.

[Provides Open SDI definition]

Participant 3: OK. I understand.

G: Do you think Open SDI applies to OSM?

Participant 3: Yeah, completely, I think it's a completely like that, but I think that the roles of in OpenStreetMap are different. Parties in OpenStreetMap Foundation, wiki, especially the work around the foundation should be clarified, because currently I think it is not clear enough who does what. For instance, even if I donate to the OpenStreetMap Foundation to pay for the service. I think the essential problem is around the foundation because the foundation is behind the many things, like the events such as the state of the map, but what does the foundation do and when? For instance, when is the foundation involved in disputes and issues? What issues can the foundation manage, what can it do not manage? And so on. That is not clear, but I think it's the role of the foundation, to be involved in such problems, but they are not. So, I think that many people who active that ask: “what's the purpose of the foundation? why are they here for?” That's not clear, and I think that should be improved.

G:

How would you describe the openness in the decision-making process and the policies of OpenStreetMap?

Participant 3:

I think it's open, there are these discussions with debates which are public. But there isn't much visibility I mean, for instance, when you have a Senate, the Parliament, the Parliament of a country, debates are broadcasted later, you can watch them on TV and so on. But when it comes to the OpenStreetMap Foundation, it's not clear where do they meet. What do talk about? And so on. That is not clear. I think that for instance some people announce when there is a meeting on a public channel like the talk mailing list or on the Discord. A chat room could help people to understand what are they talking about, why are they talking about it, what are the decisions and so on. I think this could be greatly improved, because sometimes you hear about internal discussions, like with Quality guidelines, like, don't be mean, don't be rude, don't insult women, not insult over races and so on. And there was a bit turmoil about this this question. I know that the foundation made the decision because maybe was it good. But, why did they take this, this decision? What is there in the document? Why is it so much disputed? I understand why people could dispute such a poll, because it may prevent or discourage users to get involved. But you see, I got news about the dispute. But

why? Where? Who? I don't know that's problematic because I'm convinced by that the foundation did that to help us, but it simply dropped from the sky. It came from the sky. What? What is that?

G: I think that's all the questions I have.

G: Are there any questions that you found were a little unclear or that I should or want to readdress?

Participant 3:

No, no, no, no. I think it was a pretty, a pretty good. I don't have a specific question, so I think we can go on.

G: Do you have any comments regarding the state of user participation in the OpenStreetMap?

Participant 3: No, no real addition. I honestly, I didn't really think about it, but no I think we had a pretty complete chat, so I think it's OK for me.

G: Alright, thank you so much

Interview with Participant 4

G: How long have you been a member of OpenStreetMap?

Participant 4:

I think I started mapping in 2015 if I'm not mistaken.

G: So, what does participation mean to you? What is the value for you to participate in an open platform like OSM?

Participant 4: I'm a big believer in this open knowledge and open data thing, I think it's pretty much any, if not every form of knowledge should be open. So, for you to have this thing open and then, if you don't have any big company overseeing it, the participation of people is also important. So, collaboration is important for you to be able to have this database.

G: What keeps you keep participating, is there's something that makes you committed to participate?

Participant 4: Yes, I participate in the groups, in the message boards of the community in both national and regional here in my area or here in my state. I think that's the people there are talking about, news, changes, by generating several discussions there, which leads you to keep participating. I think this is interesting, not only just that you're doing something without having any contact with anyone or any source of information. But I have the motivation because I coordinate a project that is based on OpenStreetMap, so it's a cycle map infrastructure map of cities. When we started the project, we decided that it would be better to use OSM as our database, instead of having our own database. I always have this motivation of trying to keep that as updated as possible.

G: I understand. So, is there a connection between what you're doing and your local government or is there some level of public sector that is involved with you in this?

Participant 4:

No, it's not. It's a civil society project who finances it, because actually it's not continuous funding, but it's something that happens occasionally, but generally recurring, financed by two civil society organizations. it's the union of cyclists in the country, which is an association, as if it were an NGO and the other is an institute of public policies for transport, which is an international NGO, In this case, their headquarters is here in my country, which is also interested in this, exactly to be involved and be able to carry out this research, to be able to collect this data to be used in public policy.

G: From the survey, around 12% of the users mentioned that they use other mapping related platforms (Mapillary, OSMand and Strava). If this applies to you, what are the differences in relation to the community of OSM compared to these other projects?

Participant 4:

This one, yes. Of the ones you mentioned, I know all of them, sometimes I also like to do a photographic surveying with Mapillary. I think it has an interesting value, both for you to use it to insert data in OpenStreetMap, as well as for you to show it too in pictures. Because there are people who are not familiar with maps, with cartography, with that kind of thing, and then you can show them in pictures which is sometimes much clearer. I use Strava in the case, not for mapping too, but

for it's more to record my activities and such. I like to run, I like to cycle, I like to go on nature trails, so use Strava for all that. OSMand, I don't even know how to pronounce it, but I also use it sometimes for routing, so I find it interesting, especially when you're traveling somewhere you don't know well. Having some options of different map applications. Everyone knows Google Maps, but sometimes you can't use it, either because you don't have a mobile network, or for some other reason, like If you go to a more remote place, it won't be as up to date and sometimes you have an open option where someone went there and dedicated himself to mapping that place well, so sometimes it ends up being a good choice. I think I could mention a few others, in this same type, there is maps.me which is like OSMand, other specific applications like wikiloc, which is very good for nature trails, and it has a few others here and there

G: And what are the differences that you see in relation with OpenStreetMap community with these other projects in relation to participation?

Participant 4:

Well, wikiloc is also based on collaboration, because if you want to do a trail somewhere, and if It's somewhere that you don't know, then you go there, look for trails recorded by other users on the map and then you use that as routing, you download there the GPX file to use as routing. It only exists because of the collaboration of users. Strava is more of a community thing, but I see it more as a social thing. There are numerous apps out there for you to do this activity and record it. But I think Strava stands out precisely because of its social issue, you interact with many people you give “likes” to the person's activity, you comment, then people share things, routes, and such. So, I think that in this thing, not collaboration for you to build data, to build knowledge more in this social interaction.

G: From the survey, some concerns were mentioned in relation to user experience for new users and difficulties to participate in OSM, do you believe this to be an issue?

Participant 4:

Yes, I believe it is. Even in this project in where I coordinate the cycle map, we have to make an effort for the community, for the public because I think the community within cycling are people who are already connected to the subject matter and who would be interested in this data. Of course, the data is there for any type of use, but these people would perhaps be the ones who would use it more for public policy. Then we realize this difficulty to start for people who are still not familiar with OSM mapping. So, I think that's an issue, yes. Maybe there could be easier ways to get started.

G: In relation to the difficulty in participation of OpenStreetMap, what do you think can be done to alleviate these difficulties that new people face?

Participant 4:

Yes, there is this difficulty. In this first difficulty, perhaps that is the question of the knowledge itself, this difficulty of knowing how to do it. So, I think it's not a very easy thing for those who don't know anything about it yet, let's say the initial learning time is kind of high. The effort is kind of high and then, besides that, I also think there's a question of when you start participating in mapping, then you start participating in the community groups, then you get in touch with people and get feedback on what you're doing. But if you don't join those groups, you're done. I think that by being too isolated, you won't get any feedback, you won't get any kind of information about what you're doing, what others are doing, So yeah, you have to be active in that search for help. For example, on Google Maps, if you make any kind of contribution, given that it’s not open and that there is a

company behind everything, there's still a lot of contribution that's about places, specifically. So, if you evaluate a place or you correct information about the place to something like that, then they kind of gamify it there, You, “level up”, it counts how many contributions you've made, and I think this is interesting feedback. You get this from time to time, showing you how well you're among the community. I think this is interesting. It's one thing that could, perhaps, generate more interest in for people.

G: From the survey, it emerged that there is a risk of external influences by parties, such as businesses, academics, and government bodies participating and affecting OSM. Do you feel this a concrete reality? Do you believe this to be a positive or a negative influence?

Participant 4:

Yeah, I think it's natural, right? Companies are interested, because the amount of data and the number of collaborators that they have there in the OpenStreetMap ecosystem, it's something of great value. I don't know if any of these companies have ever tried to evaluate to see exactly how much value there is in OpenStreetMap, because we end up doing everything for free. Dedicating time, dedicating effort, knowledge, and we don’t think about how much it is worth. So, there are companies that see that there is a good market here that I can explore, for a company, it's natural that, given the format of the license and everything, they see this possibility of exploitation, even commercially. But maybe companies could give more back too. So, I know that there are companies that have already made contributions of great value and I think there are others that just really exploit the system and maybe don't contribute as much. But I don't see it, at least so far, I don't see that much danger of harming OpenStreetMap. I think either they contribute positively, or they exploit without contributing much, but I don't know if it's negative though.

G: I Understand. Do you consider these companies, academics and the public sector, a part of OpenStreetMap?

Participant 4: Yes. I think we talked a lot about companies, but I think it's interesting that the academics use open databases and they also contribute, if possible, to these databases. Instead of using data that is private and confidential or something like that, it's much more interesting for research to be done with open data. In relation to the public sector, sometimes, in the contacts that we have within the activism of the public sector, we keep trying to get them to open the data too, although the public should already be open, but in my country things are not that simple. We keep trying to get them to also open the data or adopt open databases as well, like, to contribute to the growth to OpenStreetMap or other open databases and adopt these databases as a standard, instead of using private closed models.

G: That's pretty much the basis for my next question: How personally involved are you with open data? Like from the government or any kind of open data. You mentioned the project you work with cyclists, but if you could elaborate a little more on this aspect.

Participant 4: Yes, inside of the activism there is more than just this data. It is georeferenced data that the community is interested in. So, given that you are participating in a political issue there, like a public policies, there's other data on budget data, traffic issues, from dead and injured in traffic, speed limits, etc. There are several things there that also matter, and it is expected that government data are also public data, but they are not always. There's a lot of fighting there. Sometimes even depending in the scope of public power the data is made available relatively easily, with a simple request, without much bureaucracy and all. But the fight is to make this is even easier, transparent, So they make it available and you don't need to have a more active search, where they have already

made available through a portal, in a simple way and using open formats. Because when you want to search for a very large data table to work with, you want it to be in a format, CSV, or plain format for you to work with, but sometimes it's in a PDF or tables that the staff made into images, then you have to go through process of converting everything. It's complicated, so we even have a fight there for the data to be public and to be in an open and easy-to-read format.

G: Got it. Yeah, I understand

G: In the survey, the concept of OSM as an ecosystem was mentioned by respondents, would you agree on this term for OSM? How would you describe its ecosystem?

Participant 4:

Yes, it is. When I talk about the OpenStreetMap, I usually emphasize this because if the person sees it only as that site, openstreetmap.org, he won't be able to see all the other things that exist there. A clear example: the project that I coordinate. If you open the site, you don't immediately see all the information about the cycling infrastructure on that standard map, So, but the information exists, so you need another website or another app or another renderer, another layer background for you to visualize this information. So, I think that all these applications, these other sites and such, are part of this ecosystem.

G: Have you heard of the concept of a spatial data infrastructure before?

Participant 4:

I don't think with that name.

G:

[Introduces the concept of spatial data infrastructure and open spatial data infrastructure]

G: After hearing this formal definition, do you think there is any relation between OpenStreetMap and these definitions?

Participant 4:

Yeah, I believe that it can be part of this infrastructure. You mention, for example, I believe that legislation is something external to OpenStreetMap. Sometimes the stakeholders are also something external, but they can be a tool. I imagine that they are an important tool, in the case of spatial data, within this infrastructure.

G: Yeah, I think maybe legislation might have been the wrong word, but it is more related to policies. So, an infrastructure that provides spatial data through access networks, like geoportals, websites, databases etc. It has a certain format or a standard, and it's managed through policies, so there's a certain politics behind the data and how are they provided. Like policies of use, policies of how the data can be used. I've tried to clarify a bit more on the concept.

Participant 4:

But I think it still applies as a part. So, even if I'm not talking about legislation, because legislation is sometimes something that is more up to the public power, but if we are also talking about community policies as well, I think it's one thing little external, because I imagine that in the most common sense, when you say: "what is OpenStreetMap?" someone imagines more the part of maps from the database. There's not a lot of thought into the policies, documentation, and such. But I

believe that it's all within that ecosystem. In this case, this spatial data infrastructure is in the larger set, I think. So, I believe that OpenStreetMap is a smaller part within the larger set. In this other part of community relations, standards policies, forms of use, it's stakeholders, etc, it's a bigger part of that.

G: How would you describe the openness of the decision-making process and policies of OpenStreetMap to be?

Participant 4:

Honestly, I don't get too involved in these more important decisions or decision in a more global level but is by my choice. I believe it has a good openness, it has a good level of transparency and it follows the standards that are open for everyone to know. They follow democratic rules, so it's not run by any kind of person who decides things or who runs everything, and they're elected people to be part of the decision-making group as well as other groups, so I think the standard of openness is very good.

G: I think if you could just clarify if you think OSM is a spatial data infrastructure or open data or an open spatial data infrastructure or neither?

Participant 4:

I think, by itself, it’s not, given that definition means that the infrastructure would involve several things, maybe OpenStreetMap by itself, it's not all that. But I think it's an important tool within an infrastructure. I think if you think about it, if you are flexible, it could be that it's already an open spatial data infrastructure by itself. You might even think so, maybe missing some things there.

G: Could you elaborate a little bit more on what could be missing to make it an open spatial data infrastructure?

Participant 4:

Well, I don't know if I see it as something that is missing, it's not like that. Maybe if you think about it, there's the whole technology ecosystem in OpenStreetMap, the OpenStreetMap community and all the documentation produced by this community, the methods, all of that, I think all of that would be in this definition of a complete infrastructure and this open spatial data infrastructure. But it’s not when you think of just only OpenStreetMap alone. It ends up being defined something a little smaller, but if you take all of what that it involves, I believe that yes, that it can be considered as an open spatial data infrastructure.

G: Well this is the end of the interview. Are there any questions that you think were unclear or do want to elaborate a little more on a question?

Participant 4:

No, I don't think so.

G: Do you have any comments regarding user participation status on Street maps?

Participant 4:

Yeah, I don't think so, I think I’ve said it in the previous questions. I think that maybe we need a little more contact with the users for feedback. If you use one of the applications, like Strava, or some other application that uses data from the OpenStreetMap, you don't even know sometimes that the

application is using OpenStreetMap data, so there's no invitation to collaborate, so maybe, It could be clearer that this is a database that everyone can collaborate with, so you can help too. Then, when the person starts to collaborate, to have a greater contact with the beginners and having better feedback from what the person is doing and what the community is doing, there is a better interaction for the community, I think this could encourage more people to participate.

G: Well, thank you very much.

Interview with Participant 5

G: How long have you been a member of OpenStreetMap?

Participant 5 (P5): Oh, to be honest, I don't remember, but it's been a few years. I think, at least five years. I don't remember when I first heard about it. Like, I remember that we used it at work, at one of the places I used to work at, which was yeah, about, you know, five years ago. So maybe I heard about it before, maybe I participated in it before, but I started to read about the project more and use it more around then.

G: And what does participation mean to you? What is the value for you to participate in an open platform like OpenStreetMap?

P5: Well, for me, OpenStreetMap is mostly a good data source. Like it's open data, and I think it's good that something like this is available. It allows creating your own analysis, maps, or apps, whatever you want. I think this is a worthwhile effort because of that. Mostly for me, it was about this open data platform and access to data and being able to use the data and add the data, improve the data. But yeah, now I'm also a little engaged within the community so it's also nice talking to people who are also interested in this stuff.

G: So, is the community important to you?

P5: It's nice.

G: Ok.

G: Please continue.

P5: Yeah, the community of OpenStreetMap. I'm most engaged with the local community, like the local chapter for our country. But in general, I think the OpenStreetMap's biggest strength is the community because it's a cooperative project, so like the biggest asset is these people who, keep it updated and it's something that wouldn't really be possible without all these people who just keep updating the map, the database. But it's also I think one of OpenStreetMap's biggest problems: the culture, which sometimes hampers the progress.

G: Could you elaborate more on that? On the issue of the culture?

P5: Yeah, that's just my opinion, but generally, I think OpenStreetMap culture is a little I would say anarchistic? Maybe. So, it's very decentralised. It's like mostly just everyone doing something for themselves and most of the rules or standards that are sometimes not very well described or generally there are not many roles. This is sometimes a problem because, for example, you can map things in multiple ways, which can cause problems at least for data consumers. Because when you're trying to parse the data and you need to implement every way that this feature that you're interested in is mapped, that's kind of problematic. But if community could reach some kind of consensus that's like "ok, this is how we do this thing", there are a lot of resources, for example as in Wiki that tries to kind of describe all these things. So, if you don't know what kind of tags to use to describe the data or like how to map it, then there is probably someone who has described it in OpenStreetMap Wiki. But I encountered situations where people would just say like "The wiki is not binding, so it's just a suggestion", you know. And can you do anything to force anyone to adhere to it or just generally kind of...?

G: Community guidelines you mean.

P5: Yeah, it's guidelines. So that's going to be annoying. Because if you want to establish consensus on something, there is really no process where you can kind of do the discussion and then maybe vote or something and just have the community accept that the majority/ super majority decided that like we want to do this way or move in this direction and then just do it. But there is no way to force anyone to do anything. So, it's just like, “Sure we can just discuss this” and maybe you will convince someone. Sometimes you can't convince anyone. Sometimes you just can't convince someone that your idea is better. Like they're just going to ignore you and do whatever they want. So, it can be sometimes annoying.

G: From the survey that was done, there were certain concerns in relation to user experience and new users to difficulties to participate in OpenStreetMap. Do you think this is an issue?

P5: Yeah, I think so. Like for the user experience, it's kind of difficult because well generally most open-source software has pretty terrible user experience and user interfaces, and OpenStreetMap is not deviant from that. A lot of the applications like editors or applications using the data are somehow, you know, targeted. That's power users or people who like to tinker and set up the application they want and sometimes the user interface is not streamlined for the casual user.

In relation to the applications at OpenStreetMap, I think a lot of them could use some improvements. Like some of them aren’t really bad. For example, the default editor, the ID as it's called for OpenStreetMap: I think it's pretty good at being accessible to someone new to the project because the user interface is nice and it has these pre-sets that the user can just look up the feature they want to map. For example, you know, a forest, McDonald's or whatever and it will assign the correct tags automatically. So, it's not all bad, but yeah. Another problem is that OpenStreetMap really tries to position itself as more of a database or infrastructure. So, there is not one official app where community could centralise its efforts on. Then there is just a lot of different apps made by different people and hassle again. It's pretty decentralised which makes it difficult, but it's kind of similar to Linux and general open-source trends.

G: In the survey there was also mention of external influences affecting OpenStreetMap. Businesses like Facebook or Meta and Apple and also academics and government bodies. People thought this was a risk. Do you feel like this is a reality? Do you see this as a risk or a benefit?

P5: For me, I think it's an opportunity. But they’re voices about that that are pretty split, like the community is pretty split. Some people see the danger in that and some people don't. For me, it's more of an opportunity.

G: And these external parties, you know, the businesses, academics and the public sector, government, do you consider them to be a part of OpenStreetMap?

P5: I think so. Like it depends on what do you mean.

G: Well, if they’re part as users or people that are involved in deciding certain standards, like community standards and providing data.

P5: For me, yes. I think they are a part of OpenStreetMap.

G: And how involved are you personally with open data?

P5: What do you mean?

G: On what level are you involved with open data in the essence of public sector open data or if you develop open data into other platforms or essentially, how do you use it in your personal life?

P5: Well, I used to work in the public sector, but not anymore. I like the idea generally of open data, because it just opens up so many possibilities for people to use it. Like, either develop it into some kind of apps or using the apps or to use it in some kind of analysis. Like one thing is that it just allows so much more innovation to come out of it. I think open data just enables more innovation. Because without it, for example, if there was no OpenStreetMap or if the governments did not raise their data, it would just need to come from some company. Some company would need to make a huge investment to gather the data and then they would want to recoup their investments, get return. So, I would just sell the data and it would be kind of: whatever they come up with as a product, you kind of have to use it. You can't try to do anything new with it. For example, if there was no OpenStreetMap, you would just use Google Maps for example and whatever they give you in the API. Like you can use that, but not much you can take out of it...

G: It would be limited.

P5: So, if you have open data, the focus moves from just the gathering of data to how to actually use it. If all the data is free, then the company that wants to make money will need to come up with a product based off of that to sell. So, they need to come up with some smart use for the data and then companies and people will compete on the use of the data instead of gathering the data. And you don't need to be a huge company that has the capital to make the initial investments to gather the data. You can just make a start-up with a few people can come up with some good use for the data and like start coding on that and release a product with minimal investment. I think that's why it's a huge deal to have these open data sources. Whether it's a government too, because the government is in the perfect position to be this kind of public service infrastructure thing where they are the data source or they can already make the investment and share it with everyone, so it can help the growth of these new innovative companies. For example, for addresses it's the government that assigns the addresses, creates the addresses. So, they are the perfect entity to raise that data and do it. Also, if the government already gathers some data for land usage or routes or whatever, then yeah, it would just be a waste of efforts to do it all again, you know, as either a private company or some project. So, whether it is governments or some open projects like Wikipedia, OpenStreetMap, Wikidata or whatever else. I think this brings a huge value to society.

G: And in the survey there was this concept of OpenStreetMap as an ecosystem that was mentioned by some of the respondents, would you agree on this term for OpenStreetMap?

P5: I'm not sure if I understand what they meant. Like what they understand as an ecosystem.

G: Well, I could help by maybe giving you a small definition of what it could mean. So open data ecosystem can be defined as a circular, inclusive, sustainable network where data is accessible, reusable and oriented for the cooperation of its independent environment with its users.

P5: Ok.

G: So, in a broader sense, it's a larger ecosystem of OpenStreetMap, where all the data is accessible, reusable, and it's made to work together, even if the users are in an independent situation.

P5: I guess it fits the definition. As long as we keep, you know, enough people mapping, abiding OpenStreetMap, then the ecosystem can be sustained. Wait, wait. Not just people mapping, but you know, also people who maintain the software that supports that. And as long as there is interest from data consumers. Ok, these three things, as long as we give these three things, it will be alright.

G: Have you ever heard of the concept of a spatial data infrastructure before?

P5: Yeah, I have. I used to work as a kind of GIS analyst, so yeah, I heard it then.

G: Could you describe it, the way you perceive it to be?

P5: Well, all of the times I heard the spatial data infrastructure, it was described as you know when for example a company has its own internal database for analysts. So, you know, they have a database and maybe other software like Map server which can visualise the data so people within the organisation can use it. Something like that.

G: Yeah, like very similar to that. So, I think what you just described is more of a private spatial data infrastructure.

G: [Provides Spatial Data Infrastructure and Open Spatial Data Infrastructure definition]

G: Was that clear or do you want to explain it more?

P5: Yeah, yeah, it's clear.

G: So, after hearing this, do you think there's any relation between OpenStreetMap and these definitions? So, between OpenStreetMap and spatial data infrastructures or Open SDI?

P5: Yeah, I think that OpenStreetMap fits, you know, that kind of space. Because there is a lot of tooling created for OpenStreetMap data that can be used by other users. The data, of course, is also available. There are tools targeted at users that can help them utilise the data. And as for access policies, there is a licence, an open database licence, and usage policies for the resources provided by the OpenStreetMap foundation, the core infrastructure and what can be done with it and well, if something can be done with it and where you need to foster some kind of your own infrastructure that just uses the OpenStreetMap data. So, I would say that it fits the definition.

G: How would you describe the openness of the decision-making process? The policies of OpenStreetMap?

P5: There is no process. It's anarchy.

G: It's very open?

P5: Yeah, like depends which part. Because there is the OpenStreetMap Foundation, which kind of serves as this legal entity to represent the projects. And then there are the local chapters which gather the local communities. As for the foundation and local chapters, I think the process is pretty open; like the for the foundation, they release the details like what kind of meetings they have, what was discussed, the minutes from the meetings. I'm not member of the global OpenStreetMap Foundation, but I know that the Members then vote on choosing the board for the Foundation and then there are these working groups within which also I think are pretty transparent in what they do.

G Would you say there's a difference between the local chapter and the international community?

P5: No. I think both the Foundation, the local chapters are the part that's like pretty organised. Because usually they work depending on the local law but in every country, they have some kind of non-profit organisations or associations. So, it's kind of these associations, which need some structure to function as an association, given legal framework for each country. So, I think that's the part that is organised and open. As for other parts, this becomes like, I think, less clear. I mean, it's all pretty open because pretty much everything happens in some public space, like mailing lists or

forums or somewhere. So generally, all this it’s pretty open. But for a lot of the other things, like decisions on tagging or even what's rendered (so what's shown on the map on the main page), or all other things which there is sometimes either no process or it's heavily dependent on maintainer of given project which is not part of the core of OpenStreetMap (because the core of OpenStreetMap is very small) and a lot of the other things are just some projects by some random people, individual people. So, the projects that are created and maintained by individual people, it's kind of like their own project where they can do whatever they want. It depends on if it's part of OpenStreetMap or complementary to OpenStreetMap, it's yeah, a bit more nuanced.

G; Yeah. Yeah. Those are all my questions. Do you find that there were any questions that were a little unclear or would you like to go over any of them?

P5: No. Like maybe just to add to one of the first Questions, where I said that the community's the best and worst thing about OpenStreetMap. Like to add to the positive side, I think the strength of OpenStreetMap community is that no single company could gather, you know, so many people and resources to maintain a project. Which kind of gives OpenStreetMap an edge because we can keep the map more detailed and there are a lot of like features which are only in OpenStreetMap. Other companies just choose not to include them at all in the maps, because they don't use them in their product and maintaining them would be just unfeasible because it requires so many people to keep it updated. Yeah, I think that's pretty much it.

G Yeah. So, thank you so much for joining me.

Interview with Participant 6

G:

How long have you been a member of OpenStreetMap?

Participant 6:

I think at this point it's been about five or six years. I think I joined in 2016. If my memory serves me correctly, I'd have to check my OSM profile to double check, but that is what sticks in my head.

G: What does participation mean to you? What is the value for you to participate in an open platform like OpenStreetMap?

Participant 6:

For me, it's twofold. There's the personal and the professional side of things. On the personal side of things, when I was younger, I was intimately aware of the value of having accurate spatial data in the form of maps. At that age I also wanted to be an explorer, obviously most of the world has been explored, but it actually hasn't. That's where OpenStreetMap comes in. I can still fill in blank spots on the map, which makes which gives me a profound sense of personal satisfaction. At the same time, I am a consumer of OpenStreetMap data and so therefore professionally I have to have it, and a lot of the countries that I work on, are often are lacking this critical data that informs policy or informs analytics, as well as enabling the private sector and individuals. So professionally I need it and personally I like it. If I have a rough day I can go map for a little. Bit and feel better. It's kind of a win from that perspective.

G: Yeah, I understand.

G: From the survey, around 12% of users mentioned that they use other mapping related platforms like Mapillary, OSM and Strava. If this applies to you, what do you think are the differences between the community of OpenStreetMap compared to these other projects?

Participant 6:

I basically only use Mapillary in addition to OpenStreetMap. I haven't interacted at all with any of the community of Mapillary, other than the Facebook page which I just joined recently. I think OpenStreetMap actually has a community and Mapillary, at least at this point from my perspective is just another data collection platform. Which can integrate with OpenStreetMap or not. It can also just go straight into a GIS (Geographic Information System), which is currently how I've been using it.

G: From the survey there were concerns in relation to user experience for new users and difficulties to participate in OpenStreetMap. Do you believe this to be an issue?

Participant 6:

Yeah, having something so easy to interact with like OpenStreetMap is really is easy, whenever you have the barrier of entry solo, you'll get mistakes. For me that's fine, but I'm on a number of the communication channels that are that talk about various issues in relation to uploads and data quality, especially for new users often comes up. It’s a lot like writing. It's a lot easier to edit than it is to create. Now, obviously, if the writing is just truly bad, then yes, you do have to, you know, completely do it again. I do have to delete features and redo them from time to time. But I just see

that as part of it. If we make the barrier higher for entry, you have to complete a certain training before your account is considered verified or whatever. I think we will lose what makes it most powerful, that is the sheer volume of people that can be involved. And, you know, even if somebody only adds one thing, maybe they just add the little shop at the end of their informal settlement. Maybe they just add one thing? Well, great, and if it's kind of in the wrong spot, I don't really care. It's not just the data, it's not just the outputs, it's also a way for some people to develop digital skills.

The biggest challenge that I run into is that people are afraid of partial data. Well, we need a complete data, like a building census or, something like the building footprint products or the Google Footprint products. Well, we don't actually need that. The question is: “can we use some of the data here to answer a relevant policy question?” If the answer is yes, great, so now we can ask the question: “where is the data good enough to do that?”, and “where do we need to make investments?” If it works, it's worth investing in. Great. Now go invest in these other things.

I know there's a tension between organised mapping and the “true” community of mappers. That's because the quality control of the organised mapping is quite high, and the volume is massive. Although we would like to think of them as scrappy folks around the world digitising their little community and the spots get filled in on the map organically, it doesn't actually happen like that. It can, and it does, but not to the degree that any of the people who are completely against organised mapping would want.

For example. In a specific country, we needed building footprint data for a number of provincial capitals for food aid programme. Well, that data didn't exist in the public domain. So, we could go buy it from somebody else, but that for me violated the ethos of keeping data open. So, we just hired an organisation to go digitise every single building footprint in 13 Provincial capitals and the overall country capital. There were some buildings in there before, but I think they digitised a million buildings manually and this work was done in like 3 months. You're not going to get that organically; you're not going to get the quality. You've probably seen in your research that once you seed an area with at least a reasonable amount of data, often other data starts to emerge, as people see this area.

G: Yeah, I think you've answered the question the previous question but, I would like to move on if that's OK.

G: From the survey, emerged that there is a risk of external influences by parties, such as businesses, academics, and government bodies participating and affecting OSM. Do you feel this a concrete risk/reality? How would you say this affects the community?

Participant 6:

I think it is in general a positive thing. I also think that it certainly can be a negative thing. Uh, you know, if you think back to the early days of Wikipedia when anybody could make any change they wanted, and it was just kind of a “free for all”, that was a crazy time. We like to think of governments as being benign, but not all of them are. They can create data, shift data, whether they view it in the National Defence context, or possibly even just malicious. They all have different interests and they all have different knowledge. So, for example, I worked with the road engineers for the Transport Ministry, for actually the two ministries that were responsible for roads in the country. Now, these were the people who built these roads. They knew what the specifications were. They knew the carriage width; they knew the depth of the of the asphalt; They knew all of these things, so they were able to input all of the engineering data that no random mapper would know, measure that or have anything to do with that because they just don't care.

If you look at the Open Cities project at the World Bank, they get involved in very micro level mapping, down to centimetres. Your casual Mapper is not going to do that. Where I think some of the tension comes from is because you have certain you have people who have a certain view of what OpenStreetMap is. But it is in fact open. Which means, you know, businesses can use Apple uses it, Microsoft uses it, TomTom uses it, and they improve it. There was a woman owned taxi company, where they had female taxi drivers picking up female clients to keep people safe. The app that they developed was using OpenStreetMap. Now they didn't actually improve the data or anything like that, but they were able to do a general good thing, by using it and harnessing it. For me, if somebody like Apple or Microsoft is improving the data, then they might be improving the data in a certain place because it's advantageous to them. But that data is now free and open to the world, so anybody else can use it too, and they could have purchased that data and kept it proprietary and then nobody gets it.

G: So, do you consider them a part of OpenStreetMap?

Participant 6:

Yes, I do. I see governments as part of, you know, every level of government from national to the local levels. If you look at the road network in the United States, it wasn't until the Tiger Line data set was uploaded that you really got the backbone across the entire USA. We can't really get away from the authoritative data sets, and we don't really want to. Otherwise we will have to duplicate and triplicate work effort, when if you have a municipality who has fantastic data and they're willing to upload it. Why would we say no to that? If they use that data, such as the routing to optimise their solid waste management. Fantastic. Then they save money, which is actually good for the citizens living there too.

What you have is a bunch of data creators and data consumers and they're often the same people. I create data and then I turn around and download it and use it. But what you have is a lot of different actors in in the same space and I haven't come across anybody who's a corporate purist who thinks that OpenStreetMap should only be for businesses or governments, because that would just be a silly argument. But people do mention that corporate entities should not be there or that they're not welcome. I don't see an issue with that if they're contributing to the general good. I haven't been to the state of the map or any of these other conferences because of the pandemic, but I would love to sit down with someone and basically hear their arguments as to why the inclusion of other entities is problematic. Because I haven't actually seen a cogent argument against it, and I would be open to it.

G: In the survey, the concept of OSM as an ecosystem was mentioned by respondents, would you agree on this term for OSM? If so, how would you describe its ecosystem?

Participant 6:

In my profession, believe in a sustainable data ecosystem. For me that is actually way bigger than OpenStreetMap, but OpenStreetMap is a part of it. I would say OpenStreetMap is huge, it is a microcosm for me in the broader data ecosystem. But if we if we just focus down onto OpenStreetMap, then I would say yes, it is an ecosystem, in part because you have big players, smaller players, meaning not of importance, but just, you know, people who are only interested in, say, doing all of the park benches in their municipality. I would describe it as micro mapping, there's a whole section on that. You have people like me, who put in, you know, thousands of kilometres of road data. I don't really care about the park bench, but I understand that people are that are interested in that and that's totally cool. I think everybody contributing different things and in different spaces. It doesn't necessarily have to all be a part of a planned bigger picture. It's just being

created. So, everything that develops organically, I do think it's an ecosystem because it develops organically. You have different interests and focuses, and these are in different places and there are changes over time. One of the biggest challenges I see right now is that I haven't seen a particularly good way to look at the changes of features over time. The only changes I've seen are when a certain feature is adopted, say through the tools or through HOT (humanitarian) OSM. I guess it's just like an ecosystem where you have people consuming, providing and different influences, ranging from small to large. You know, some people are only interested in national parks and that's all they do. And so, I think the ecosystem label works.

G: Have you ever heard of the term or the concept of a spatial data infrastructure before? How would you describe it to be?

Participant 6:

Yes, I have. So, I would say it is the entire construct. Its scale can be done at any level, but for the creation, management, hosting, exploitation and sometimes dissemination of geospatial data and critical enablers there too. I work on SDI projects too.

G: [Provides the definition of spatial data infrastructure and open spatial data infrastructure]

G: So, my next question would be after hearing definitions of the concepts of SDI and open SDI. Do you think there's any relation between OpenStreetMap and these definitions?

Participant 6:

I think there certainly can be. I think OpenStreetMap could play a role in that. The main thing that I want to be clear about is, when somebody says, “an SDI”, they're usually talking about a single thing. And that I don't think actually exists. I think what we have is there's a lot of critical enablers, some of which are in the spatial environment. Some of them are just like Internet access. You can't have a traditional SDI if the servers don't have power. That doesn't work because then the access and retrieval and dissemination of data components just don't work. I think there's a lot more that goes into it than just the data creation, management, and dissemination. You mentioned standards as well. I think what OpenStreetMap, it does provide some standards, but presently the standards are not really enforceable at all, and sometimes that's a good thing but sometimes that's a frustrating thing from a data user perspective. I think it can be a component of SDI, a component of open SDI if you will. I would say it isn't there yet, it could be, but I think it would take a lot more work to do that. I mean just a lot of the things, on say just topology. There's just so much still to do.

G: What would you say is needed to make it into either an SDI or an open SDI?

Participant 6:

I think it can be a component of that, but it is not that in of itself. Because even if you have, access to electricity, access to the Internet, then you also have to have the education systems that are pushing people to actually use spatial data to inform policy. People in high income countries use this stuff all the time. At my old university, people do geospatial analytics all the time, but in high income countries, they are used to using data. Where everyone just pulls out their phone and searches for something. Well, how did all of that stuff come together? How did you, the end user, know that you could just pull out an app on your phone, that works, you have reliable power, and you make enough money that you have a phone that can do that type of thing. All of these things come together to make something work, and it's not just the data creation. What is missing is a lot of the metadata, a lot of the topology. There are regional standards set up by the communities, but it's

hard to actually find which standards are being applied where. If you're talking about road class alone, you know a tertiary road in South Asia is not the same as a tertiary road in Africa, because the communities have defined them differently. That's totally cool and fine within the OpenStreetMap community. But within a classic SDI, you don't get that level of flexibility where you would have the same entry, meaning potentially 3-4 or more different things, and so even knowing where the rules are being applied or which type which topology is being applied is not easily found. While the data itself is easy to query all kinds of individual features, but are you talking about the same thing around the world. This is usually not case. From my experience in South Asia and my experience now in Central and West Africa. That makes it difficult because one of the critical components of a traditional SDI is this standardisation, so when you are pulling data from the servers the same way every time, the data is structured in a way that's not going to change, at least not frequently and there will be some sort of topology that is being applied. The road networks can be actually connected to each other. I saw in MapRoulette, somebody from Apple, where all they were doing was just connecting all of the disconnected roads that existed. So, that's where a corporate entity had to hire people to correct data. If there was a stronger topology inside of OpenStreetMap, you wouldn't be able to just leave that error hanging, you would have to fix it. We can toss around grandiose words, but I think OpenStreetMap is not an SDI. I don't think it's an SDI by my definition. I think it can play a significant role in that. For example, there was a project in Vietnam where the government was using OpenStreetMap data to flesh out their own data, and at the same time, they were doing this using an automated method and they were contributing that their data back into the OpenStreetMap world.

G: So just to recap, you think OpenStreetMap is an ecosystem but not an SDI, so how would you classify it essentially in in relation it's openness in the decision-making processes and the policies behind OpenStreetMap.

Participant 6:

Are you a subscriber on any of the community channels?

G: I'm in the talk mailing list, Telegram and in the Discord channel.

Participant 6:

OK, so you see some of the craziness behind some of the discussions that fly back and forth. Some of those things can get acrimonious pretty fast. Something being an ecosystem and not being an SDI like that, I see no issue with something being an ecosystem but not being SDI. I think that could just come down to differences of definition of SDI and perhaps I'm too wrapped up in the traditional top-down government-oriented SDI. I think it's hard for OpenStreetMap because there is very little maintenance of the data. You'll get somebody who puts the data in, and then if there's a glaring hole that annoys them, like a routing issue, where gives incorrect directions to the other side of the neighbourhood, some people aren't going to go back and maintain the data. Why would they? I think the form of stewardship and curation aspects I think are largely absent, since the people are just relying on the people contributing around the world, then all of the edits will be made eventually. How does the expression? "if you have a million monkeys typing randomly? Eventually, they will spontaneously create the works of Shakespeare." It can create a functional ecosystem, but it's not authoritative. You don't know at any point how good the data is. You can say how complete it is, but you have no measure of how good it actually is. With a traditional SDI, at any point they should be able to say exactly how good it is. I think, could it possibly evolve in that direction, but I think it would take a lot of money and a lot of effort to do that. And I think the corporate entities

who are currently contributing, don't really have any interest in doing that because they only use the data component of OSM, to then use as it as a storage access and retrieval system. Then they just bring that into their own environment and that's it.

If you want to call it as SDI light for a municipality who has one GIS person and no servers, where the person have experience or resources to perform very difficult analyses, then OpenStreetMap can do a lot of these things in by itself.

So, I think it can it fulfil some of the roles of what I think a traditional SDI is, but in my eyes that does not make it an SDI. I don't actually think we want to try to morph it into something else, because, well, to show my true “dork” colours: “if you try to develop the one ring to rule them all, it usually doesn't work.” It's usually very expensive and it's missing something. There are just so many moving parts in geospatial data. With satellite imagery, even when using the three main satellite imagery layers in OSM. They're all historic. It is like if you were driving forward while looking in the rear-view mirror, which is a phrase they often reply to economics. An SDI can’t really afford to do that unless all of the features have a timestamp and you know the point of the data creation and the date of when it was checked and curated. So, you can check that this entry is still valid. I think every country should be able to have a census of their entire road network, at least every five years. Something like OSM can certainly help with that, but unless you have the curation side built into that or you know some analytics and all of the other critical enablers, I don't see it as an SDI. I see it as a as a data ecosystem, a data input to these other things.

G: Those were all of my questions. Do you have any more comments regarding the state of user participation in OpenStreetMap?

Participant 6:

So, I think for me the biggest thing, you know, given that everybody has different interests, accessibility, and willingness to come back, so, it's kind of a numbers game. For all of the Mapathons that I've done, if I have a Mapathon of 30 people are there and if one or two of then map for an additional six months, that's great. There's a huge loss rate and some people just don't have the time; they get bored or they don't have access. For me was, these people didn't have access to Internet at home or laptops. For me, getting more efforts, like youth mappers to engage people in universities, high schools and getting people to think about these things.

You have historiography, you know, the study of history and how history is written and who's writing it. But we don't really look at data in the same way. I don't even know what type what word we would use for that. In relation to high income countries, they can use Google Maps, Apple Maps, OSM, but where is this data coming from and how did it get there? In the vast majority of cases, it came from government spending. That's who made it first, and then it was modified. But to get people more involved and getting more people, not less. And just knowing that 95 to 98 and even 99% of them are going to get leave that ecosystem very quickly. That doesn’t mean there's a problem with the ecosystem, it’s just people have different interests and sitting in front of a computer making lots of clicks doesn't really seem fulfilling for many people. I can certainly see why. I think it needs more engagement and especially, more diverse engagement. A lot of the people that are interested in OpenStreetMap look a lot like us, and we map certain things, other people of different backgrounds, incomes, ethnicities, genders, sexes, all of these things, map different things. I think if we actually want to start moving towards a more complete data picture, we absolutely must expand the diversity of the of the user inputs.

G: All right, thank you for your time

Interview with Participant 7

G: How long have you been a member of OpenStreetMap?

Participant 7: Oh, quite a long time. I think actually when I can find this out, but probably about 10 to 15 years, I think.

G: Wow

Participant 7: Yeah since, 2008.

G: Yeah, it's a long time.

G: How involved are you personally involved with open data?

Participant 7:

It it's all just as a sort of hobby thing really? I guess it's mostly from an OpenStreetMap point of view, given that in my country there's quite a lot of government collected data that traditionally hasn't been available openly. And still have an issue with the official national address dataset. You have to pay large amounts of licencing fees to access.

G: With the government agency?

Participant 7: Yeah, and all the mapping data of the agency as well, but some bits have been released and I've been quite keen to get hold of whatever is available and make tools to help people use that in OpenStreetMap.

G: What does participation mean to you? What is the value for you to participate in an open platform like OpenStreetMap?

Participant 7:

I guess it's being able to contribute something that will be useful to other people. And it's a bit of fun for me in in the sort of programming side and going out and mapping thing side. It is also bit of an intellectual challenge to whether you can sort of piece together different bits of information to build up something useful. For example, with the addresses. Various things have been released without the full addresses, but you can use various different datasets to interpolate and work out what what's going on. For instance, what's been released for post codes is a single coordinate for each post code, but a post code covers multiple houses. But if you understand how post codes are assigned, normally, each post code will just be one street, although there might be multiple post codes on a street, but you can if you know where all the houses are, you can kind of guess which houses have which post codes just from using the centre points that we're given. It is fun being able to work out what's going on in the background and how the post codes must be assigned.

G: From the survey, around 12% of the users mentioned that they use other mapping related platforms (Mapillary, OSMand and Strava). If this applies to you, what are the differences in relation to the community of OSM compared to these other projects?

Participant 7:

So yes, I use Mapillary images quite a bit more recently. I think mainly because I've worked out or I have more confidence that there's more likely to be images on there than they used to be. I've have

built in links to it in some of my tools and I found there's a neat Firefox extension, which if you're looking at OpenStreetMap, you can you get a drop down that will take you to all sorts of other different websites easily in the right place on the map. So, I guess reducing the friction in using that in addition to other things has made me more likely to use it. I also use organic maps on my phone, both as a map to navigate by, and for creating notes on things that I want to add or change in OpenStreetMap. So, there's a bookmarking tool in there that was sort of my “go to thing” if I spot something while I'm travelling and I want to make a note of it, so, I'll add a bookmark in there and then come back to it later.

G: And do you participate in the community of these other projects?

Participant 7:

No, I don't think so.

G: Are there any differences in relation to OpenStreetMap?

Participant 7:

I'm kind of using them to help with OpenStreetMap stuff. I mean, I guess if I found a bug or had a feature request, I would probably submit it to either of those projects or anything else. But I'm sort of probably not likely to get involved in fixing things or implementing things in there.

G: From the survey there were some concerns in relation to user experience for new users and some difficulties to participate in OSM. Do you believe this to be an issue?

Participant 7:

I think so. I don't know if there are any good answers to this, but I think it's quite a complicated sort of system to get involved with, even if you just want to map a few houses on your street. It's not necessarily intuitive what you're supposed to be doing. The ID editor, while it sort of tries to be nice and user friendly, it hides the details of the tagging from users, which may or may not be a good idea. So, you'll often get people complaining, but that value isn't in the drop-down list that I get, and they don't realise that you can just put anything in there. Maybe. It's good for the first-time users to try and simplify things, but it also creates a bit of confusion later on. There's sort of issues about snapping roads to join up the highway network, for instance, whether they're actually joined at a node or not. All sorts of things, basically that you kind of pick up as you go along from experience that you don't necessarily know to start with. It's hard for more experienced people to think what it was like to be new and realised what the barriers are and stumbling blocks. So yeah, I don't really know how much of an issue it was when I join OpenStreetMap, since the documentation and editors available were very different to from what they are today. I don't know if people are still looking at this by getting completely new users and sitting them in front of a computer and watching what they try and do, which is probably what we should be doing. There's also an issue about the tagging etiquette and whether you believe what the wiki says or says or not, and sort of what's a rule and what's just a guideline and how much you can deviate from things and do your own thing. Whether it's better to use an existing tag that's a good approximation, but not quite right, so is it's better to invent something else so you don't confuse matters with what an existing tag means.

G: How would you describe the openness in the decision-making process and the policies behind OpenStreetMap?

Participant 7:

I mean in terms of openness, think it's open, but not necessarily transparent as to how it works and how decisions are made. So, I mean it it's open in the sense that it's free and everyone can participate, but maybe it's hard to understand the processes and understand what's supposed to happen and also understand the outcomes of discussions.

G: From the survey, it emerged that there is a risk of external influences by parties, such as businesses, academics, and government bodies participating and affecting OSM. Do you feel this a reality? Or if this positive or a negative influence for the community.

Participant 7:

I think there's a few different issues, for at least from what I've seen. So, there's an issue that I think that The OpenStreetMap Foundation is currently looking to address and how much of an issue it is or not I'm not sure. But there's a worry that some big company might try use the membership of the OpenStreetMap Foundation with their own employees, and then sort of take it over, simply because we want to have a low membership fee. To allow people across the world to join and then a company could just put in a relatively small amount of money to them and buy lots of memberships. And so, there's some requirements in relation to participation before you allow people to join to try and prevent that, although, if a company really wanted to take it over. They could just instruct several employees to go and participate for a while and then pay their membership fees, so I'm not sure that's particularly helpful. I mean that the sort of hostile takeover is potentially a bit of a worry. And I'm not sure what could be done to prevent that. I think companies like Facebook and Apple are so well-known, that will probably be enough of a political backlash they wouldn't want to do it, but some other capitalist funded company might well take it on. I think probably there would be enough mobility just to move away from their version of it and take the community with us to make that not feasible.

The other issue I think is around sort of organised editing. So, if a company decides it wants to improve OpenStreetMap and pays a number of people to do it. There have definitely been issues in the past where people have sort of jumped in without enough experience and have been changing things in in ways that the community didn't appreciate. Whether that's making mistakes or using incorrect tagging or leaving a mess behind or something. I think things have probably improved a bit. I think there's a more explicit guidance on the wiki that people are more likely to be able to find now. And better rules and the data working group are more able to step in and stop people. Because now they can see they're violating the guidelines more clearly.

I mean, there's a general clash between people who want to map everything individually themselves, given they have gone out and surveyed and people that want to do bulk edits based on aerial imagery with machine learning. And then there's a question about sort of the quality versus quantity that you can achieve with those methods and what the best way of doing it is. And there's a similar disparity between people who want to do big imports and then people that prefer to check everything carefully. I guess there's a trade-off between the two viewpoints, and I think I'm probably more towards the individual or craft mapper side of things. It's better to sort of check things individually, but there's a place for sort of larger scale bulk edits, although you do have to make sure you've got the quality there as well.

I think there's been quite a lot of imports of buildings in my country for instance, which is probably generally helpful, although, the dataset has simplified outlines of buildings, so what you get out from the datasets doesn't match aerial imagery. It will sort of merge adjacent buildings together that aren't necessarily joined in reality, well, it's a good sort of starting point for the map and makes it

look better to start with, but it's actually a bit of a pain to clear up. If you actually want to map all the individual buildings properly, it's often easier just to delete the original outlines that aren't really right.

Another issue is a sort of technical issue. I think that the buildings aren't always aligned correctly because a national mapping agency has its own coordinate system. And the transformation from that to WGS 84 have approximations to it, which are fine for most purposes, but they may be one or two metres incorrect. When you're at the level of mapping houses on streets, you can see that difference. So, you often get all these imports that are all sort of shifted by two or three metres. And again, it sort of takes time to clear up, although, you know, maybe it's a good thing to have that data in there to start with.

G: Do you consider them a part of OpenStreetMap and its community? The government, like the public sector?

Participant 7:

No, there are all sorts of people who supply data for sort of general reasons, and then the OpenStreetMap community makes use of that data.

G: How would you classify the academics or the businesses that use OpenStreetMap?

Participant 7:

I guess it depends on exactly what they're doing. You may get businesses that take the data and do cool stuff with it and but don't necessarily contribute anything back. I would sort of put them as a sort of downstream user type of group. There are some businesses that that do try and actively contribute because it's in their interest to get a better map.

So, I think there's a thing that I've noticed, but I am not sure whether it's Amazon. But they're obviously using it for their deliveries, and they'll be leaving notes asking: “can you get through here or not?”. Then the driver reports that this route was blocked, so they're obviously using it for routing. They also flag mistakes, which is sort of good for us to get that feedback. So, they're kind of more part of the community.

Then there's people that are actively developing tools. So Mapillary is owned by a large company now. And I think there are some people doing some AI based stuff and flagging things up, so they're sort of more involved in the community. I think it is a shame that that often with these projects where companies try and launch their project may not as part of the Community as they could be. I guess it's just a consequence of them being a business and working on this specific thing. It would be nice if the people running it were more active in the forums and got to know how to map and how the community works and things rather than coming in more of an outsider. It’s a shame it doesn't quite work like that, but you know, presumably as a business, they don't really have time to get as involved.

Actually, on the sort of a good end of things, I've been sort of tangentially involved with a charity project in my country, which owns a lot of land and historic houses. They exist to preserve them and open them up to the public. They're wanting to use OpenStreetMap to help record all the paths that they've got on their land and for their own internal business purposes to have a map of them and they want to be able to record what access is there, what parts they have to check and stuff. They've actually gone about it in quite a nice way with engaging with the community. By talking to us first and having lots of discussions, trying out mapping, getting feedback and working with us, at least

from what I've seen, they've worked a lot more closely with the community than a lot of other companies have done. Perhaps because they're a charity and they are more wary of public perception than existing for the public benefit, they're more predisposed to that sort of engagement.

G: From the survey there emerged the concept of OpenStreetMap as an ecosystem. Would you agree on this term for OpenStreetMap?

Participant 7:

Yeah, I think so. I mean, there's a lot of tools, applications and things that have been developed for it, both to help mappers do various things more efficiently, but also for people who want to take the OpenStreetMap data and go and use it in a downstream or end user way. So, there are mapping libraries and things for passing the database, that sort of thing. I think probably calling it an ecosystem is probably quite a good word.

G: Have you ever heard the concept of spatial data infrastructure before?

Participant 7:

I'd probably heard the term, but I wouldn't be sure exactly what was meant by it.

G:

[Provides the definition of spatial data infrastructure and open spatial data infrastructure]

G: Do you think there's any relation between OpenStreetMap and these definitions?

Well, it seems that OpenStreetMap in some sense fits your fits your definition. It's probably has more human intervention than people might envisage when they're talking about it. So, in OpenStreetMap there's a lot more individual human decision making, individual mapping going on, whereas other people might envisage it as just a system for people to dump spatial data in and get spatial data out.

G: Do you think open SDI applies to OpenStreetMap?

Participant 7:

I would have thought so, yes.

G:

Could elaborate more on the openness in the decision-making process and the policies of OpenStreetMap?

Participant 7:

I think what I said before and I think it's open in the sense that everyone can participate. It's maybe not easy for people to be able to follow what's going on or what has been decided and how to interpret the decision. So, whether it's a guideline, or a role etc. At least part of that is just that the world is complicated and there are complicated rules and etiquette and things to follow, so, it's not an easy problem to solve. But I think on the whole, it's open for participation and you know the decisions are discussed in an open forum, you can read the wiki and you can read the mailing lists and it's all there. But it's not necessarily always easy to find things. So, depending on what your definition of open i0s, you may regard that as more of an issue or not.

G: Well, I think those where are all my questions. Do you have any doubts or some questions that were a bit unclear that we want to elaborate a bit more on?

Participant 7:

No, I think that's probably OK.

G: And do you have any more comments regarding the state of participation in OpenStreetMap? I think you mentioned to provide more tools for other mappers.

Participant 7:

Yeah, so that's something that I'm involved with. I've got a few tools that will sort of take government datasets and compare them to what's in OpenStreetMap and a lot of them we don't have permission to use directly. So, you can't just see a post box here that's missing and add it. You have to go and look at the post box yourself. A lot of the tools do a comparison and flag up the differences, then you can go and investigate on the ground. What ground truth is and then map based on that. That's sort of one of the one of the things that I do for my participation, as it were.

It's an interesting question about the idea of OpenStreetMap sustainable, I guess sustainable perhaps isn't quite the right word, but are there enough participants to generate the quality of map that you would want. And I think it's definitely been a success for some aspects of mapping. I mean, speaking in relation my country because, that's what I know about, we've pretty much got the road network done many years ago and then places like schools are pretty much 100% matched. But if you're talking about individual houses and addresses, we're still a long way off. It's not obvious to me whether you get enough people to manually add all the addresses, or whether we need something else, and if it might be possible to do anything better.

There's a project going on at the moment to try and encourage people to map addresses in my country. There's a tool to try to make this easier that will run on your phone, where you get a map of the street you're on and you can just sort of "tap" on their houses, add the numbers, then it fills in street names and other things for you. Which is all great, but the question is how we would encourage enough people to get involved and do that for it to actually make a meaningful contribution? I think there are some people thinking about that, but I'm not sure I have a good answer.

It's sort of a question of how do you motivate people to contribute their addresses to OpenStreetMap as a good thing. I think it's probably a bit of a hard sell because to all intents and purposes, if you as an individual want to find a map with addresses, you can do that relatively easily, it's just not an open map. And someone is paying for that somewhere along the lines. So, all the companies that have address data are essentially paying the government for it and that's then going on to consumers bills. But because it all works for the consumer, why do I need to do this? Are we not just putting money into the pockets of businesses by saving their licencing fees? I think trying to sell the benefits of open data to the person on the street who already has adequate access. To it even if it's not open, it's quite a hard thing to do.

So, I'm intrigued to know if people can come up with a good argument. I mean there are a few digitization projects that sprung up during lockdown that were incredibly successful, where people had a lot of paper records that were scanned and digitised. A few of that sort of took off. During the pandemic, they were done very quickly with a large number of people each doing a little bit. And if you could get something else like that for sort of simple tasks within OpenStreetMap, you could

collect a lot of data very quickly, but it's just getting it to go viral and having a good story and motivation behind it.

G: Yeah. So, thank you. That's those are all my questions.

Interview with Participant 8

G:

How long have you been a member of OpenStreetMap?

Participant 8:

I think it around about the beginning of March 2010 when I discovered that I could improve the map.

G: How involved are you personally with open data?

Participant 8:

I am a great fan of not only open data but since I promote a GPL software, which is a procedural information, in my opinion, so it's sort of the same. Ah, well, I have trouble with closed data, like you want to validate some scientific information and you have to pay for accessing it. That's absolutely immoral in my opinion.

G:

And what does participation mean to you? What is the value for you to participate in an open platform like OpenStreetMap?

Participant 8:

As I said, I think that that information should be a common. And so, I provide the information I can observe, in areas that I realise that there's fewer people mapping then I try to help the local community by doing what they do not do or what they cannot do. Thinking of places like Chad, Nigeria, Morocco, but also here in my country.

G:

Around 12% of the users in the survey mentioned they used other mapping related platforms. Does this apply to you?

Participant 8:

They use other mapping platforms?

G:

Yeah, like Mapillary, OSM and Strava.

Participant 8:

Oh yeah, I'm. I use Mapillary as a client. I mean, I use with the information that people put there, but in my country, they hardly add anything to Mapillary. I know of Strava and I've been using it, but again, here very few people provide information to Strava. I think these are the ones I use. There's also Microsoft Building contours. Then it's our artificial intelligence and Mapillary works with them, so Facebook, actually. So Facebook has managed to get Microsoft into their own platform for artificial intelligence, and I I'm using that.

G:

And do you participate in these communities as well and what would you say are the differences in relation to OpenStreetMap and these other projects?

Participant 8:

No, as a community, I only participate inside of a OpenStreetMap and I am in frequent conflict with HOT (Humanitarian OpenStreetMap Team) and youth mappers.

G:

Could you elaborate a bit more on that?

Participant 8:

Yeah, Hot in particular, they started as a very good project. But, around 2015 they started accepting help from institutional United States financers, and that attracted a different kind of people locally here in this so-called developing world. I say it this way because people here really reason differently than in Europe. They are not going towards what we towards our concept of developed world. Most people are content with what they have and that's fine, and others are just trying to get the money that streams into these countries. That is what happens with in my opinion. That's what happened with HOT and then it's very difficult to deal with open data when there's people who have no interest in open data, they only want to justify expenses.

G:

Yeah, in the in the survey there were mentions in relation to user experience for new users and the difficulties to participate in OpenStreetMap. Do you think this is an issue?

Participant 8:

It is an issue in the sense that it is difficult to find the easiest way to do that, but there are very easy ways to contribute information to OpenStreetMap. There's software like StreetComplete, which is an extremely easy to use. But you get challenges like: "is this street illuminated or how many levels is this building?" Basically, with the starting information, you complete with the map with information that cannot be seen remotely. That's StreetComplete.

Something more that local people can do, and they don't do, and hardly they hardly ever do, is to contribute GPS traces. It would be very easy if people would record these traces. That is a very easy thing to do with OSM tracker for Android. But then when you propose it in a group and they approve the project, means that we can see if we find people giving us money to do that. There is no need for money to do that. You only have to convince people to start recording the GPS traces. There is no there is no difficulty. The difficulty is getting people to do things.

So, is it difficult to contribute information to OpenStreetMap? Yes, it is if you want to provide vector data that straight into the database. Because you have to have a lot of technical skills in relation to geospatial information, like aerial photography, which is not always immediate. Sometimes you have to adjust the images since the georeferencing from Bing could be incorrect. It is an approximation and you have to correct it, that's not easy. Other difficulties like finding the correct tags for representing an element. So, there's lots of people providing descriptive names, they are given in the hope that someone else who knows better will tell them what to do and corrects the input. It is also difficult adding information about government offices because the concepts are based on Europe and UK, and then you come to another part of the world, and offices don't exactly match. So you can't find your office in the options give provided by the database.

G: So, there are some conflicts in relation to standards?

Participant 8:

Yes, another example of conflicts of standards is the difficulty in translation. is the track, which would be pista in French or trocha here. And the definition of track in OpenStreetMap is agriculture or agroforestry rout. But, then pista and trocha are roads which are unpaved and may serve a rather important function in the in the road network. Yet people will put it as track. Even Apple does that. Apple mappers put tracks all over the place in Morocco because of misunderstanding. Highway is track.

G: From the survey, it emerged that there is a risk of external influences by parties, such as businesses, academics, and government bodies participating and affecting OSM. Do you feel this is a reality and if it is a positive or a negative influence?

Participant 8:

Around OpenStreetMap There are several communities, and one is responsible for managing the servers, but then many other communities just rotate around the database enjoying the its presence. It is very possible that you have a completely anarchistic society somewhere using OpenStreetMap and happy to contribute to it without caring about anything else but their own privacy.

There's other people who would just see OpenStreetMap as a source of income, of a justification for participating to projects and justifying expenses. The institutions, in my opinion, should not interfere with decision making and OpenStreetMap should try to convince them, to provide us with information, but I do not think that we should let institutions take part in this decision making.

G: Institutions? Do you mean government or academia?

Participant 8:

I'm thinking of governments and also companies. Companies are very welcome to use the data and to provide data to OpenStreetMap. I mean without Apple, Facebook OpenStreetMap would be a lot less precise, in many countries. But then the community is very weak against, such powerful organisations. They can come with 10 people and they map the whole country, coastline of your country in in three days and they redo everything that you have done during the last three years. and after three days you realise that they have redone everything. They changed it in in a way that they did not understand. OpenStreetMap should keep a tighter control on such big interests for our platform. We should use them as sources. But not give them the power to massively change our content.

G: Do you consider them a part of OpenStreetMap or something else?

Participant 8:

They are part of OpenStreetMap. because they the way OpenStreetMap works, it's letting the individual employees map as members of OpenStreetMap, as contributors. Then there's this conflict in trying to get to get a grip on it. I mean, took 3 months to convince Apple to declare that their editors belong to Apple. I can't remember the issue, but if you look on the Apple Data team, and it's quite ridiculous how long it took to convince Apple to add the four characters #ADT (Apple Development Team) to their changesets. Otherwise it's just individual mappers and you have no idea who they are or what they change in database. They can come massively, then they disappear or

never answering to your questions. That's not the way an anarchistic project can work because anarchistic projects can be sabotaged by such actions and anarchy works for grown up people, not for not for employees.

G: And in the survey there was this concept of OpenStreetMap as an ecosystem. Which was mentioned by the respondents. Do you agree on this term for OpenStreetMap?

Participant 8:

Yes. In this ecosystem you have many communities or many individuals who do not even want to be part of a community. I think that's a good term.

G: And the how would you describe its ecosystem? What is a part of it or how big is it? Among those things.

Participant 8:

OpenStreetMap provides services to stay in contact and does not contrast staying in contact with other members outside these their services. They provide the database, mailing lists, a community, a discourse site, channels, but yet, mainly it's the database and we mappers we can decide how to stay in contact with each other. It is like, the world provides us with air and grass. And we decide what to do with it?

G: And how would you describe the openness of the decision-making processes and the policies of OpenStreetMap to be?

Participant 8:

I've been briefly member of the foundation and I did not like the resistance. It could be better but given the limited amount of time that people have and given the fact that we are spread out communities, it is understandable. Not acceptable, but it is understandable that people may perceive it as not transparent. We do what we can. And some people try to avoid and try to keep their own control on their own small little cage, but in general, I think we have the tools for making it better. Any Mapper who has map contributed enough can become member of the foundation at 0 cost.

G:

Yeah. You mentioned that it can be improved the openness, in what way besides, I mean you mentioned transparency, in what way do you think it can be further improved?

Participant 8:

I's democracy. So, in democracy you participate, or you do not, and you cannot blame the system if you're not participating. At the moment I am not inside the foundation for my choice, so I cannot criticise the foundation because I'm not member of it.

G: My next question is if you've ever heard of the concept of a spatial data infrastructure before?

Participant 8:

No. What do you mean before what?

G: No, if you have, if you've heard of a concept called spatial data infrastructure.

Participant 8:

Not in these terms. Probably I know the concept, but not under this name. What do you mean?

G:

[Introduces the concept of SDI]

Participant 8:

What you're saying that it sounds like a OpenStreetMap is an implementation of this concept.

G:

Yeah, that's what was going to be my next question. But there there's another type of SDI, which is an open SDI.

[Introduces the concepts of Open SDI]

G: My question is that after hearing this concept, do you think that there's a relationship of relation between OpenStreetMap and these concepts?

Participant 8:

Yeah it sounds like a generalisation of OpenStreetMap. What you describe, OpenStreetMap sounds like an implementation of it.

G: Of an SDI? Or do you think it's an Open SDI?

Participant 8:

An Open SDI, the second one.

G: OK, those are all my questions.

Participant 8:

OK.

G: Do you have any questions that you think were a little unclear that you might want to go over again?

Participant 8:

There's people copying official sources, copyrighted sources into OpenStreetMap. That is a difficult issue in particular because there's national borders and there's a lot of ignorance or difficulty of crossing borders. Between whom was responsible for letting us respect the ownership handles, who's tricking and was twisting the texts and making them less clear than they are?

G:

Could you elaborate more?

Participant 8:

There's people contributing things. It is nice to have a good map and it is difficult to find people contributing in in places where the concept of voluntary work is hardly present. So, if you want a good map of your country, you either build up a community of 300, 500 hundred voluntary contributors that are contributors. Or you just simply copy from the official maps and the 2nd is a lot easier.

G: Are people doing this with OpenStreetMap?

Participant 8:

Regularly, yes here in my country, in Costa Rica, Nicaragua and the local people do not care to block it because they are contributing to it, so it they are making much better. So, who cares? And people from Europe or UK, they don't want to intervene. Not because they do not want to patronise their ex colonies.

G: People are using OpenStreetMap data and commercialising it essentially?

Participant 8:

No, that's fine, that's fine. The opposite. People are entering commercial information into OpenStreetMap.

G: OK, now I understand.

Participant 8:

The strength of OpenStreetMap is that you can make a commercial product based on it. There's people who contribute to it because they have a commercial interest. So, they start organising people, maybe even paying on them, or trying not to pay them to make a better map of the area of their interests, so that they have a very good map of the area where they are. I think that's the only the only part worth mentioning that you probably missed.

G: And there's many other comments regarding the state of user participation in OpenStreetMap?

Participant 8:

I don't know if how they do it in Europe because in Europe, they also have very high tides, like in England and in the North Coast of France. But here it is very difficult to see the high tide and low tide and people mapping remotely do not know the concept of mangroves. Mangroves grow in the sea. So, the coastline is behind mangroves, but then you see plants and you think there's ground below it, so the coastline here is completely messed up. But then it's again a concept that Europeans and the UK do not exactly care to define it. It is difficult since it is a global project. And it is an anarchistic project. It works with very little resources, and there's external people who want to have their voice inside of it, and they are much stronger than me or any other happy mapper of their own. Now, as Winston Churchill said of democracy, it's a very bad system, but it's the it's the worst system and the best we have something like that.

G:

Although those were all my questions.

Participant 8:

OK.

Participant 8:

I'm glad to have helped.

Interview with Participant 9

G: So how long have you been a member of OpenStreetMap?

Participant 9 (P9):

More than 10 years. You can look up my actual first edit dates or whatever, you have that information, right?

G: Well, yeah, I assume it's open, but I just wanted to hear it from you. And how personally involved are you with open data?

P9: You know, I'm not involved in OpenStreetMap particularly because I care about open data. I mean, open data is nice, but mostly I like the community aspect of it. Basically, I got involved because I was looking for a hobby and because I was a retired software developer that wanted to develop some more. You know, work on something interesting. And OpenStreetMap was an interesting project to work on. So that's kind of what my motivation was.

G: And what does participation mean to you? What's the value for you to participate in an open platform like OpenStreetMap?

P9: I mean, what I said previously about open data, it doesn't mean that I don't think open data is important. It just wasn't the main motivation for me getting involved. So, I'm sorry, could you repeat the question?

G: So, what does participation mean to you? And the value for you to participate in an open platform like OpenStreetMap?

P9: I mean, for me it's being able to make contributions, have those contributions be recognised by other people, being able to fix things that I think are wrong and kind of influence the quality and quantity of the data. And then, you know for my personal thing, because I'm writing software for the project, it's to facilitate making that easier for other people to do as well.

G: From the survey, around 12% of users mentioned that they use other mapping related platforms. Do you participate in any other platforms?

P9: No.

G: Ok. No problem.

P9: I guess it depends on what you mean by participate, you know.

G: If you use them in any way or...?

P9: Of course, I use the major map providers, you know, Apple Maps or whatever, and I'll provide, I'll contribute to those when I see problems or things that are missing occasionally, but very, very rarely.

G: Do you participate in the community within?

P9: I do not, no, because there really isn't any community that I'm aware of.

G: Ok. From the survey there were some concerns in relation to user experience for new users and difficulties to participate in OpenStreetMap. Do you believe this to be an issue?

P9: Uhm, yes, yes. It is definitely an issue.

G: And what do you think can be done to alleviate these difficulties?

P9: Oh well, you have people who come to the project, but they don't understand what the project is or what the project is trying to attain. There's a lot of confusion about, ok, is this a data collection effort which it is, versus is this a map provider, which it is not. So even for my app, people will download the app and they'll try to use that as a navigation app. It's not designed as a navigation app. It's meant to contribute to the project, right? And so, you have confusion there. So, you have those types of people and then all of these pieces of software are fairly complicated and just getting the user interface getting, you know, the initial user training down correctly is difficult. And if you've gone to any of the hot… Probably you have not gone to any of the hot meetups. But the humanitarian OpenStreetMap which primarily… Are you familiar with that organisation?

G: I'm aware of the humanitarian efforts within OpenStreetMap.

P9: Yeah, but what they'll do is, usually at a university or something, they'll recruit maybe 50 totally brand-new people to come in and contribute to OpenStreetMap for an hour or two. And they'll provide some snacks. And because these people are usually people who have never heard of OpenStreetMap before, they always have to do, you know, like 20 or 30 minutes of training before they begin. And even so, even with that training, there's always a lot of data quality issues. Not with everybody, but there's always at least a couple people who just, you know, don't get it right. And so, there's a lot of, I don't know, kind of bad feelings within the community about ok, what can we do better? How can we train these people better? So, it's just a constant issue.

G: So, from the survey it emerged also a risk of external influences by external parties like businesses, academics, government bodies participating and affecting OpenStreetMap.

P9: Right.

G: Do you feel like this is a concrete risk, or how would you say this affects the community?

P9: I think that it's great if private companies want to use the data, want to be involved more. You know, I look at it as if you compare it to Linux, Linux definitely matured by having more corporate use. It went from being “Ok, this is like a hobby project that a bunch of hobby people care about” to being “Ok, this is like a very mainstream, serious project that a lot of corporations depend on and are willing to invest a lot of money to ensure that the quality stays very high”. And I think that OpenStreetMap benefits in the same way by having tighter integration with corporate users.

G: So, would you consider the businesses, academics and the government bodies part of OpenStreetMap?

P9: Yes.

G: Ok.

P9: I mean, just if you look at efforts like the map with AI that Facebook has done and some of the other efforts. I mean, those are directly contributing to and enhancing the project.

G: Yes. And in the survey, there was this concept that was brought up which mentions OpenStreetMap as an ecosystem. Would you agree on this term for OpenStreetMap?

P9: Uhm, sure, yeah.

G: How would you describe it to be?

P9: I guess, there's the larger GIS ecosystem of software and OpenStreetMap inhabits some portion of that GIS ecosystem. You know, I don't really know how to draw a box around it well.

G: I mean, if you need a little bit more of a help on open data ecosystems, I could maybe provide you a definition.

P9: Ok, go ahead!

G: So, an open data ecosystem is a circular and inclusive sustainable network where data is accessible, usable, and oriented for the cooperation of its independent environment with its users. Essentially, it's a network of data which is circular within the independent users, and it's oriented for the cooperation of the independent environment.

P9: Right. I mean yes. And I think if you draw the circle around the various connected projects correctly, then yes, it is. But there's definitely projects that are outside of that which are still using the data. Right? Do you agree with that, if I'm understanding you correctly?

G: Well, if it's using OpenStreetMap data, I would imagine it's inside still.

P9: Ok, so something like the organic maps' app, navigation app, which doesn't really contribute anything back to OpenStreetMap, but it does use the OpenStreetMap data and it's like one of the better expressions to end users of the data.

G: How would you describe the openness behind the decision-making processes and the policies of OpenStreetMap to be?

P9: Oh, it varies a lot. You know, there's a lot of controversy about like the website itself, which is fairly siloed and not very open versus other parts of the project, like how things get tagged and things like that, which is extremely open. So yeah, some parts, yeah, some parts, no.

G: And have you ever heard of the concept of a spatial data infrastructure before?

P9: Of a spatial data infrastructure... Probably not. I'm not a GIS person, so.

G: No, it's fine. That's one of the reasons I'm doing this interview. It's to understand how you perceive it as well.

G: [Provides SDI definition]

P9: Ok.

G: [Provides Open SDI definition

P9: Ok.

G: Is that clear?

P9: Yes, I think so.

G: Ok. And after hearing these definitions, do you think there's any relation between OpenStreetMap and these definitions?

P9: It sounds like it.

G: Do you think an open SDI applies to OpenStreetMap?

P9: It seems like it would.

G: Ok. I mean if you want to elaborate a little more though, that would good, but you don't need to.

P9: [Laughs] No because I cannot. It's just not something I can talk authoritatively about. So…

G: All right. No, no worries. That's the end of my interview. Are there any questions that you feel like were unclear or that you want to elaborate a bit more on?

P9: Uh, no. You know, I think that I'm probably not a completely typical OpenStreetMap user. You know, just because I do have so much more of a focus on the software side and not so much on, you know, maybe the data side.

G: I mean, maybe if you want to elaborate a bit more on that, that'll be fine too. On how you use OpenStreetMap data with your software development? That would also be fine.

P9: Oh, ok. Well, I maintain the iPhone app for contributing.

G: For what? I'm sorry, I didn't understand.

P9: For contributing data.

G: Ok.

P9: It's an app called Go Map, which is, if you're familiar with this Vespucci on Android, it's kind of the iPhone equivalent of this Vespucci. So, I'm more on that side of ok, how can I make it easy for people to contribute? Not so much I'm going to go out and do a lot of contributing myself. Although I do that as well. But it's just not as much my primary focus.

G: So, what are some of the difficulties you encounter when it comes to people contributing to this application?

P9: Uhm, you know, it's largely just a one-person thing. So, there isn't like a development team or anything. It's essentially a hobby project for me.

G: Ok. Well, if you have any other comments regarding the state of user participation in OpenStreetMap, any additional comments in regards to that?

P9: Uhm, no. I do wonder, you know. I know you sent out this survey link. How many responses did you get to the survey request?

G: I think it was 86.

P9: Oh, ok. Yeah, you know, it just seems like it's very difficult to get a large number of responses, and maybe even harder to get a representative set of responses. I think the number of people that are on the mailing lists and who reply to things like that, it's just, you know, a very self-selecting group unfortunately.

G: Yeah, it's a specific scope I would say. But ok, yes. Thank you for your time.

Interview with Participant 10

G: So how long have you been a member of OpenStreetMap?

Participant 10 (P10):

Let me think, well I think that created an account in I think 2017 or just I think 1 year or two before 2019, but like 2019 is the year that I actually started like regularly and actively contributing. Like before, there's just one occasion where I decided I would like to add a new role in construction. So just one-off contribution but in 2019, that's when I really started do some edits regularly.

G: What does participation mean to you? Like what is the value for you to participate in an open platform like OpenStreetMap?

P10:

Well, actually my motivation is partly from my experience in Google. You know, Google Maps has an option to send corrections for them. But like the Google office here is not very responsive. The edits that I suggest to them are not accepted quickly. So that's one reason why I found that OpenStreetMap is very responsive and also, a very open platform that I can immediately add and also correct any wrong data on it.

For example, in Google Maps that everything is like determined by Google, you know, one problem that I have with it is the classification of different Points of Interest (POI). They have some very strange definitions of different shops or features like apartment complexes. But in OpenStreetMap you can use any tag you like, and also, it's very clear and open. The objects can have different relations, routes, nodes. They're also very clear. I can immediately select them, add them, and also share with other users to discuss that. Whereas in Google it’s a very awkward process, where you have to select a different feature that they only show to you. I think in this point, OSM, has an easier feedback mechanism to grow the whole database quicker.

G: And from the survey, around 12% of users mentioned they used other mapping related platforms like Mapillary, OSM and Strava. If this applies to you. What are the differences in relation to the community of OpenStreetMap compared to these other projects?

P10:

I have fun really contributing to those platforms for like full street level imagery and also GPS. But partly because my life doesn't really involve going out for taking GPS tracks for hiking, jobs or I don't take photos when I when I go the street every day. But I think that they are very helpful to OSM editors. They may not have time or may not know how to contribute to OSM data directly, but what they provide, like their GPS tracks and the imagery is helpful to us. So, I think we have different types of contributions, so it's very good, but the problem will be for example with GPS tracks that have bad quality, especially in places with tall buildings, so the GPS gets inaccurate. You can see this problem in GPS tracks uploaded to OSM too. Our platforms are slightly different, but they are our silent contributors.

G: Are you involved at all with other open source communities?

P10:

Open source community, let me think... Well, we maybe WikiData. I did do some edits on WikiData, OSM, like to add those weekly data. Yeah, mostly wiki data I think since it's the most related to OSM. Well like I don't have time for contributing to many, many like open data communities, so this is the most.

G: So mostly just OpenStreetMap.

P10:

And wiki data for sometimes.

G:

From the survey there were some concerns in relation to user experience for new users and difficulties to participate in OpenStreetMap. Do you believe this to be an issue?

P10:

Well, I think the most difficult part is not how the new users reach out to us or how are the more experienced users like us, like myself, respond to them. As I said mentioned in survey, there are many different platforms available for hosting the OSM community channels, like the forums, discord, mailing lists, telegram this can cause a fragmentation and among different communities.

I think the most active community around my place is on telegram, but I don't really use telegram, so I'm not interested or motivated to reach out to them. Another difficulty for new users would be to actually find every community. They may not always read the whole wiki pages of different communication channels, so they might miss out some communities, for example in USA and Japan they use Slack, and in China they may use like telegram, QQ or WeChat. Each platform may give different answers based on the what users using those channels. On discord, we have OSM world, so it represents users from every part of the world. But like if they are using more well closed regional platforms on different channels, then they will get more regional specific answers. Sometimes this may be more relevant to what they're editing, but sometimes they lack a more global or a different perspective from other countries. This could cause confusion with tagging. They may have different solutions to the problems they have, so it's more specialised sort of speak.

G: And from the survey it emerged that there is a risk of external influences by parties like businesses, academics, government bodies participating in affecting OpenStreetMap. Do you feel like this is a concrete risk, and how would you say this affects the community?

P10:

Both. I think the opportunity of the government providing open data academics, like you for example, doing the research and contributing some analysis of based on OSM data or related data. Companies that actually provide either a satellite imagery, street level imagery, or actually hiring those people to make edits there. This increases the resources and also the manpower available to like grow and further expand OSM to different users. The risk is from corporate editors when they may have some different ideas or guidelines. Since they are employees, so they may not be individually motivated or guided to follow our follow community guidelines. They may like follow their own and since like we don't always communicate with each other with the normal OSM users or the companies and also their corporate editors they make their own thing.

I think a lot of companies try to invite us to comment on there what they are doing and also their guidelines. I think they recognise this as a problem, but so then they're trying to solve it. I'm not very

pessimistic about it. I'm so I think there is a great future working with different parties, including companies.

G: Would you consider them a part of OpenStreetMap? The businesses, the academics, and the government bodies.

P10:

Yes, well they are part of OpenStreetMap like just like the users of applications of OSM such as external applications. They may not be directly present and involving in the communities we have here, but they we do communicate with each other, so I think they're definitely maybe a party in the ecosystem.

G: And it's very interesting that you mentioned the concept of ecosystem. How, involved are you personally with open data? Like open data portals or platforms.

P10:

As I said, I'm not a programmer or developer, so I'm mainly a user for some personal projects or maybe my hobbies and interests. When I was a student in my university, I did use a lot of open data in my school projects, from anything like OpenStreetMap, to scientific spatial data. I did research in waves and time maps, so this is open geospatial data. I'm definitely a user in open geospatial data, but I'm not contributing a lot to it. I did provide some like feedback to companies that make open source software if this counts. Yeah, so that's it.

G: So yeah, as you mentioned this concept of OpenStreetMap is an ecosystem was mentioned. Would you agree on this term and if so, how would you describe it to be?

P10:

The concept I'm more interested or that I'm more curious about is like the role of a “garden”. It’s like you are making a garden in your backyard. So, after you plan all the plants and you have to water it, you have to cut the grass and those kind of things. I think in OSM there is someone else who has written some articles about the concept of garden. They have to maintain and care for the data, it’s quality and also care to discuss the issues with different users. I think it's less about like how to grow a broad ecosystem in terms of the data quality and quantity, but it's more about how we take care of the ecosystem, whether it's gardeners or maybe like as caretakers, monitors or those kind of those kinds of different roles inside the ecosystem. We should focus more on the methods that take care of the ecosystem, rather than like the outputs, inputs, or processes of the ecosystem.

G: Yeah. It's a very interesting perspective of how the management of the ecosystem is.

P10:

Well, that's what I'm doing. I have more like experience or awareness of this.

G: So, would you say it is this concept of OpenStreetMap as an ecosystem? Is a suitable term for OpenStreetMap?

P10:

Yes, or maybe you can say it's a society since we have different people trying to contribute or discuss within it. But I think the term ecosystem does capture that we have both a society of different people and also the data that we create, and we use. Sometimes there are external users, that

maybe do not directly participate, like the end users of applications and also companies. They may not be directly involved our in our society or community, so to speak, but they are participating and using OpenStreetMap. In many different ways they are affect and shape our development. An ecosystem would be a better definition rather than a society or community. It encompasses everything.

G: And have you heard of the concept of a spatial data infrastructure before?

P10:

Maybe... I'm not too sure of what is included by it, but for example, I think my government does try to create a platform for all geospatial data to do different studies. And assess the impacts of different projects, so they also like provide a 3D model of the entire city, and they try to integrate climate data and especially microclimate data for like ventilation and temperature. I think I do know. I do know what it is actually.

G: Yeah, it's quite similar to that.

G: [Provides SDI and Open SDI definition]

G: After hearing this formal definition, do you think there is any relation between OpenStreetMap and these definitions?

P10:

I would use the example of ESRI, as that what I use the most. Aside from their proprietary software and data that they get from cooperating with other companies, they have an open data platform where they source data from couple of different government agencies and from OSM that they host. There's a vector layer for that is created from OSM. What I think is that maybe OSM itself is not the main platform that people might use in open data, so to speak. People may use open data from map applications and GIS editors more. There are more responsibilities and opportunities by these platforms and applications to provide a sort of platform or channel where users can use, interact, and contribute data to OSM or other open data services.

A lot of contributions to OSM comes from apps themselves, like StreetComplete. Although this is more indirect, where they are not using the main editors like JOSM and ID, but they also contribute data. But there some controversial examples where people map as visitors. This has caused troubles to OSM for a long time, but I think we should recognise them as an external service trying to use OSM for open data. They are also trying to provide some feedback and contributions to us even though like their contribution may not be a perfect quality or in a very good standard, but at least they are trying. The main difficulty or the challenge is how to make everyone work with each other. We should start with providing a platform where we can you see different sorts of open data and also, we can use them easily. In this perspective I think platforms like ESRI and also maybe QGS are doing this. They're in a more influential position to us and also like different applications and mobile apps using open data like OSM.

G: Do you think this open SDI applies to OpenStreetMap?

P10:

Yes. Like I said, aside from the data we provide, different projects within OSM, like OpenHistoricalMap, OpenSeaMap, OpenRailwayMap. So, we are a collective of different projects, so you know. OpenHistoricalMap are a totally different database from OSM. I think we all provide open

data about different subjects and themes too. So there are global uses in different parts of the world. So yeah, so I think not only we are participating in the world of open data, we also providing our own set of open data to the world.

G: How would you describe the openness behind the decision-making processes and policies of OpenStreetMap to be?

P10:

First of all, on a fundamental level, we kind of make decisions every time we edit something. Although it's very small, as a result, like we have different patterns tag usages, different ways that we draw some representative features or areas. Whether we use multi Polygon appropriately. In the level of office, for example OpenStreetMap Foundation, they mostly handle the money. We need money to fund different projects, the services we use, and also sometimes developers that maintain applications. Recently they commissioned a study to work on our data model. They have to handle more than individual users. This is the requirement that they face. It's natural that we have to elect a board out there and let them take care of more complicated issues, as well as some boring things to us. Although it's boring, but it's important and also it matters since is the members of the OpenStreetMaps Foundation are paid. I guess they are like representative of us. At least try to be. They try to be accountable and also help us do our work and our everyday contributions to OpenStreetMap, while letting us use OSM as we please. This is kind of necessary even though some people may not like it because it's like a more centralised body of decision making, but I think some decisions have to be made by them. But what's more important is that should take into account community comments and also like try to form a consensus with us. I guess they are generally beneficial.

G: So those were all my questions. Do you, are there any questions that you think were a little unclear that you maybe want to readdress?

P10:

I think it's fine. How many people have you interviewed?

G: So far. Are you? I think you're the 10th person so far.

P10:

OK, OK, just a question of my curious curiosity.

G: Do you have any other comments regarding the state of user participation in OpenStreetMap?

P10:

I guess the new issue or development that we've had is that we are trying to move into Discord from the openstreetmap.org. It is best that we like move to the new platforms quicker. They are retiring the old forums and by the end of this month, so I guess it would be more beneficial since not only is a newer interface, but users won't have to sign up for the all the different platforms, like the mailing list, forums and the other community channels that they have. So, I think this is a good development and I hope that it will be like done quicker. That's all.

G: Okay, so thank you so much.

Interview with Participant 11

G: How have you been a member of OpenStreetMap?

Participant 11:

I have to look at it, I think, for something like 10 years.

G: OK, how involved are you personally with open data?

Participant 11:

Open data in general, yes. That's not an interesting thing for me. I'm specialised on OSM, OpenStreetMap.

G: As in you work with this or...

Participant 11:

No, it's not my profession. I've studied in informatics, computer technology, computer science. But as a student, I've been working as a technical drawer, so we had to make the plans for pipelines, where they lay in the street and where's the next point where a small pipeline goes away. And that was my student time. I did like it and I do something similar to that in OpenStreetMap.

G: And what this participation mean to you? Like what is the value for you to participate in an open platform like OpenStreetMap?

Participant 11:

Well, it's something like a hobby, it’s challenge for me to get something that will use the data, the GPS data, the positioning to construct it in JOSM, I'm working with JOSM. That's my primary interest.

G: From the survey, around 12% of users mentioned they use other mapping related platforms., do you use any other open mapping platforms?

Participant 11:

No, as a user, as a conductor in the car or something like that I use Google Maps of course, and then for mapping, active mapping, I just use JOSM and the OSM platform

G: And do you participate in the communities of these other platforms?

Participant 11:

No, I've been thinking about it, but do not enough time to. We the meetings the local meeting here in Hamburg. I have not enough time to be there. I just do it on my own.

G: OK.

G: Another thing that emerged from the survey were some concerns in relation to user experience for new users and difficulties to participate in. OpenStreetMap. Do you think this is an issue?

Participant 11:

That is an issue of course. When I started, I made a lot of mistakes too. Because it's very complicated. If you change something and then you mark the wrong parts in the map. It was not clear for me but marking all the points in lines in a special area and tag something and I've tagged much more than I thought. And I published this change and then I was informed that it was not correct what I did so I had to take it back. It was really easy for me. And to start once again with a with a right selection. I do use the Wikipedia documentation. But the problem is that it's often described the tags and they have some examples and how they work together, but you can combine and mix them together just as you like. In Hamburg, it seems that they “tag” in another way. For example, the House numbers. I miss clear concepts that are something like a standardisation, where that is the standard way, we do it. It's often OK. It's an open platform and there are no leaders. But it feels like it everyone can do it like he wants to do it. And if you look at the wrong example, you're doing the same errors that someone else. And, well, I would like more standardised information or more standardisation, more information about this how to be sure that what I am doing is correct.

G:

I understand.

Participant 11:

For example, this House number. Some put an entrance point, mark it, and tag it with the house numbers, other just take the entire house. Mark it and to tag it with the House number so there are different concepts and I don't know what is the right concept. That's one small example for it.

G:

From survey, emerged the risk of external influences by parties. Like businesses, academics, government bodies. Participating in affecting OpenStreetMap. Do you consider this a risk or reality? How would you say this affects the community?

Participant 11:

it's really a dangerous point, I think. There this telegram chat, which I'm looking at it from OSM in my local group and they had described this problem where company does take several things, just for them. It seems that they do it on their own benefit, not for the use of the community, but only for their own use. Those who have analysed this tagging of the company were not sure whether they destroyed other information just to put their information into the spotlight.

G:

Do you consider, the businesses, academics, and the government bodies part of the of OpenStreetMap?

Participant 11:

Well, yes, especially the government should be part of it because they have a lot of data. And then they could use it much more and in an easier way to place information. I think just in Germany they don't see the opportunity that it is. There are a lot of the organisations that are doing it on their own with other maps or our own maps. I think there could be more companies and in government information placed in OpenStreetMap.

G:

Yeah, especially because in Germany I think has the most active users of OpenStreetMap, one of the biggest communities there too.

Participant 11:

It's the biggest, but that what I'm reading is the scale of how useful it is. And it's not the German community, which is the most important community, but something like Africa. As we have the high-quality maps in Europe already, mapping the street from one small town to another, say in Uganda is so much more important than to map the opening times of a supermarket in Germany. That is next problem I see. There are too many micro geoinformation are attacked in an OpenStreetMap, like opening times for the supermarket. In my opinion it's enough to have the link to the website of the supermarket for example, where you can get the information. If they changed their opening time, you have to be sure that someone in OpenStreetMap makes the update, and I'm not sure whether this will happen. So, this detailed information have less value for me because I'm not sure whether they are correct.

G:

And from the survey there was also the concept of OpenStreetMap as an ecosystem mentioned by some respondents. Would you agree on this term for OpenStreetMap? If so, how would you describe its ecosystem?

Participant 11:

Ecosystem would be the combination of different systems to work together and to interoperate, I think. And then well... maybe some companies that use OpenStreetMap information and combine them with own information. My company does do something like that, but not with OpenStreetMap. They put layer layers about the map to describe where a floods may arise after a storm or heavy rain. And then mix the map data with their own information that they've calculated, then simulate it. Whether the water builds down in the street, which houses are in danger etc. Something that happened in Germany last year with a lot of people who died, and a lot of houses and valleys were towns were damaged. And in this sense, OK, it's an ecosystem, but I don't think it's for the open community.

G: What do you mean?

Participant 11:

Where I think that OpenStreetMap is part of an ecosystem is in use for commercial or government uses, maybe, but in first for commercial use. But they combine information and present them together with OpenStreetMap, but I don't think that they share this information with the community. So, they use it as an ecosystem that looking from our situation, it's not an ecosystem, it's just a database with a graphical interface for them.

G: How would you describe the openness of the decision-making processes and policies of OpenStreetMap to be?

Participant 11:

I've written some articles in Wikipedia, and when I compare Wikipedia and OpenStreetMap, I think that the structure and the existence of a leading person that provides rules as one person or as a team, in Wikipedia much more than in OpenStreetMap. OpenStreetMap seems to be without any leader. That is not an advantage or disadvantage, it is just a description.

G: OK.

G: Have you ever heard of the concept of spatial data infrastructure before?

Participant 11:

Ah, no.

G: [Provides SDI and Open SDI definition]

G: Is that clear enough?

Participant 11:

The description I've seen seems to be the commercialization of OpenStreetMap.

G: Could you elaborate a bit more on that? I mean on what, what do you feel like there's a relation between OpenStreetMap and SDI and open SDI?

Participant 11:

I feel that the description of SDI and is related with the goals they claim. On the one hand, they want to get a structure into it. They want to reduce the duplication of efforts and something like that. That's OK. That's what I said is perhaps a little bit in the missing leadership. But establish key partnerships between initiatives and academia, countries, and cities, and they want to organise something. That's OK. But I fear that the next step is that there will not be an open data infrastructure, but that it will change from an open to a closed.

G: In relation to OpenStreetMap?

Participant 11:

Yes

G: Do you think open SDI applies to OpenStreetMap?

Participant 11:

I think there are different goals. That OpenStreetMap is this community that will end up dancing for others. Because I don't need to protect the opening hours of the supermarket, because I know the opening hours of the supermarket, so I do it for someone else. And that what I'm reading here about SDI seems to be that they won't use something for themselves.

[interviewee appears to be reading about SDIs, but seems confused, so I explain what SDIs is again]

G: Well, it's, it's mostly about facilitating the geographic information within the community and in between communities. So, promoting it in an open way and where people have access to it, and it's provided through open policies and standard.

Participant 11:

That's where I'm not sure whether this open to the community will stay for the future. You know, “Googleisation”. First you get the information for free and after some years you have to pay for the information that is behind the paywall or something like that. And that's what I mean with the commercialization of OpenStreetMap and that's just my interpretation. And that is described in context with SDI.

G: OK. Those are all my questions, Thomas, are there any you think are a little unclear or you want to go over again maybe?

Participant 11: No, I think I did answer everything I wanted to. And I think you did understand what the what my opinion is.

G: Do you have any more comments regarding the state of user participation in OpenStreetMap?

Participant 11:

One thing in Germany is that there are young folks and destroying information just for fun. Comparing this with Wikipedia where they have for the option to revert articles. I think it's a good way to have a quality check. I'm not sure whether it works in in OpenStreetMap. I've not learned enough about OpenStreetMap, but I think there are people that are trying to change that to check them. But I don't know if they do it on their own or if it is part of the structure and the rule of OpenStreetMap. In Wikipedia, there's a rule that articles from newbies have to be checked. That could be interesting for OpenStreetMap to check the quality of the changesets. Not only in random, but in regular users.

G: OK, Yeah, that's all my questions. Thank you again.

Interview with Participant 12

G:

So how long have you a member of OpenStreetMap?

Participant 12:

I'm registered since 2008. Was not very active in the beginning, only in the few last years that I became really active.

G:

And how involved are you personally with open data?

Participant 12:

I think it's always good to have open data because when all the citizens pay for something, for example, for governmental purposes, then all the data should also be given back to the to the people because it's not a thing that only belongs to the government. I'm not very involved in different other open data things. I think it's good that OpenStreetMap is open data licence, because in that way I I'm sure that my work and my effort will be there forever.

G:

And what does participation mean to you? What's the value for you to participate in an open platform like OpenStreetMap?

Participant 12:

If you are asking a more general question for my personal motivation is that I always liked good hiking maps. In 2008, when I was starting, I looked at OpenStreetMap and their data was very sparse at my region. There was a lot of work to do in order to get a good map in the beginning and it was unbelievable amount of work to do and so I really had no interest because it was too much. Several years later, I looked back into OpenStreetMap. Maybe I made little contributions at the beginning, but not many. Then later I saw that the maps really started to grow, and all these houses, all the things were already mapped, which wasn't in 2010 or so 2009. And then I started to participate especially for hiking trails. So, I had a special interest in hiking trails. I made a lot of studies of historic maps here at the local government, in my province. In their geoportal you can have a look at older maps and so I made comparisons with older maps and the current state of the map and it really was hiking and searching like a Pathfinder. I really felt like a Pathfinder, searching the path in the mountains, so it was really like a like a mixture of sports, a bit of little data. Not so much as a community thing I really don't know any OpenStreetMap mapper in person, so it's more like an Internet thing. It's kind of nature and everything in between and seeing the different things. Because when you go through the streets with the OpenStreetMap Mapper, you get a different look to your environment because you see things you would not have seen before.

G:

And from the survey, around 12% of users mentioned they use other mapping platforms like Mapillary, OSM and or Strava. If this applies to you. Do you see any differences in relation to the community of OpenStreetMap and these other projects?

Participant 12:

And I really don't know exactly what you mean because OSMand is just an app which uses OpenStreetMap data and Mapillary is an imagery-based service. I think now it's belongs Meta or Facebook. One thing is OpenStreetMap and the data and on the other hand, you can look at the apps and with the data users. I personally use OSMand for example when I go outside. I think you did not make a clear explanation.

G: Yeah, let me further explain. The question is if you participate in other, you know, community groups of these projects like a Facebook group of Mapillary or anything that helps you to essentially use the platform.

Participant 12:

Like a platform thing in the end, so whether users can really interact with you in that at that level, yes.

G: And communicate with each other and saying there's something wrong here, or...?

Participant 12:

Yes, I'm I know there's an OpenStreetMap forum and they're shifting to the Discord platform currently and they also have telegram channels, and sometimes I'm using telegram channels. When I have a very special questions, I think the regional users from my area can maybe help me with tagging schemes or so on. No, I do not really get the feeling to be in a community in person with the community here at the local group. It's kind of different feeling from here.

G: From the survey there were some concerns in relation to user experience for new users and difficulties to participate in OpenStreetMap. Do you believe this to be an issue?

Participant 12:

When I look back at with when I started OpenStreetMap, I had much to learn about the tagging scheme for example, and how is it done into OpenStreetMap. You have to have a little motivation in order to read something. It is a little hurdle, which you need to have a little energy to overcome in order to give good data into the OpenStreetMap database. I when I see a new contributor in my vicinity here, and you can see the registration time at OpenStreetMap. And when they make something wrong, mostly they really don't know, then you can always send a comment to the changeset. And I'm regularly do that when I see something which should be mapped differently, or when I know for sure that something should not be there. When you can really communicate and comment on the changesets.

G: From the survey it also emerged that there is a certain risk of external parties influencing OpenStreetMap so external parties being businesses, academics or government bodies participating in, affecting, or influencing OpenStreetMap. Do you feel like this is a reality? And if this is a good or a bad thing?

Participant 12:

I think this is a reality. I saw this thing with my hiking trails for example. There are different kind of interest groups in the mountains. There are the tourists who want to have a good path and relaxation. Then there are wildlife hunters and the forestry guys and the nature preserving guys, who think that you are not allowed to go into nature on the other natural lands. When I found some routes, which are not really known to the public at the moment and I'm drawing them into OpenStreetMap, I bring them to knowledge to the public. And then, in a month, all the 22 million

remote users will have new hiking trails into the map. It's like people should have the freedom to do everything with the data they want. And there's a special interest because the hunters maybe want their path to be deleted or not shown in the mapper. So, it's, another field of difficulty, yes. You're talking maybe about bigger companies?

G: Yeah, more in relation to like Facebook/Meta, like these companies or even, you know, private tech companies, governments, academics, people affecting the community of OpenStreetMap.

Participant 12:

I think they affect the tagging scheme in a special way which will fulfil their needs and maybe it's not good for other OpenStreetMap users, then you could really gain some influence into the OpenStreetMap community on this, which not be good. This could be the case. It's more of how to map data. But it could be the case that maybe they also need some kind of data source provider. If they want to use Google Maps, they have to pay the bills of Google and they don't want to pay the bills. So, they're looking to use open data for all the logistics at Amazon and Facebook. But I really don't understand why we have they would do the mapping of all the little streets. But if I have the capacity to do so, why not? It's good for the community. I think we want to be independent of Google and other services, and this is the reason why they're putting data into the project which currently is helpful for them. If it's made in a way that is only helpful for them, then it should be discussed. But in the end, everyone and every company is also free to contribute to OpenStreetMap and all the companies of course.

G: In the survey there is also a concept of OpenStreetMap as an ecosystem. Mentioned by some of the respondents, do you would? You agree on this term for it? How would you describe it to be?

Participant 12:

Yes. The ecosystem is a complete system consisting of people, the software, the servers, the publicity and all the things. So, it's a complete ecosystem.

Yeah, it's just a definition when you say OpenStreetMap ecosystem, you mean all the different parts that can make something about it. What do you want to ask me about the OpenStreetMap of ecosystem? I will ask you back. There OpenStreetMap ecosystem exists, so it's just a matter of definition what is included and what not.

G: How would you describe it, in general?

Participant 12:

Yeah, it's kind of data driven. It's like a made of many geeks or some kind of specialists, and all the normal guys. In the real world different, they are a different kind of person, different interests, different communication skills, etc. Basically, what I know is from the OpenStreetMap forum, from the interactions with the users and all the discussions from the changeset. This is my basic communication method. This is where I get to know the ecosystem of OpenStreetMap, and I know some software projects and the open source of the projects like OSMand. So I also make bug reports on the issue tracker of OSMand when I see some bugs. I'm not a developer but I can write down some bugs. So this is the kind of ecosystem I'm also living in.

G:

How would you describe the openness behind the decision-making processes and policies of OpenStreetMap?

Participant 12:

From what I have learned about it, they are trying to be very open. There are kind of voting within the community for the managers of OpenStreetMap in an election process which you can participate. So, if you contribute enough, you can be a part of the OpenStreetMap Foundation, and you are then eligible to be elected. I'm do not really get much information from it. I looked at the persons and I saw their main interests and I tried to give them my vote, so that my main interests also are reflected in the persons I vote. We try to be open. I see no real issue with non-openness.

G:

Have you ever heard of the concept of a spatial data infrastructure before?

Participant 12:

A spatial?

G:

Spatial data infrastructure.

Participant 12:

So that the data is not saved on a certain location, but spread it over a bigger area or what?

G:

[Introduces the concept of SDI and open SDI]

G: Was that clear or do you want me to explain further?

Participant 12:

Yes. And then what is your question about it?

G: If you think there's any relation between OpenStreetMap and these definitions of the spatial data infrastructure, or an open spatial data infrastructure? Or if you don't think it applies.

Participant 12:

I think I kind of don't know what exactly. No, I don't think what to say here.

G:

I could say I'll try to help you a little bit more on to understand what it is

[Further explains SDI concept and Open SDI]

Participant 12:

Yes, OpenStreetMap is a kind of thing you've just told now where you have some kind an open ecosystem for getting data, for communicating. So OpenStreetMap is the thing you just told me. So it's a kind of realisation of that, yes.

G: I think those were all my questions. If you think you have any questions, or any questions that were a little bit unclear or you want to elaborate a bit more on.

Participant 12:

Yes, you're trying to answer the question of how to bring more people into our community like OpenStreetMap. So, we're trying to know the working principles behind and what you what you can learn from such a big community or ecosystem thing. Which can be knowledge that maybe can could be transferred to other kind of not only OpenStreetMap. You chose OpenStreetMap because there is a kind of ecosystem and so some much thing going on.

G: Yeah, pretty much. There's been a lot of studies done into both things and into Open SDIs, with spatial data infrastructures and volunteered geographic information, with OpenStreetMap and other projects like that. And the idea is to, essentially, transition into this and from an OpenStreetMap style project or to other spatial data infrastructures. What can they learn from this? How to motivate these people, how to keep the people active and participating, and what's important to them?

Participant 12:

Did you think that SDIs, are in parallel to OpenStreetMap or OpenStreetMap as a kind of a spatial data system with an open licence? You were talking about what other systems can learn from with OpenStreetMap, so do you think that the other systems with an open licence can learn from this? Or do you all think on parallel systems like OpenStreetMap or what do you think on?

G: I'm going to probably address that in my discussions, but yeah, so do you have a lot of governments that provide spatial data infrastructures for people, but a lot of them either have restrictive licencing or barriers that don't allow people to participate in the decision making processes and the policies and where people can say if the data itself is not bad and provide feedback. It's mostly for a guideline for them to make it more open.

Participant 12:

Yeah, but I know the one main issue with like a governmental or open data things which could be used for OpenStreetMap, but in the end cannot be used is because of licence issues. But then some data is made public, but under a licence which is not compatible with OpenStreetMap. Then the data cannot be imported into OpenStreetMap. Then we maybe need some guys talking to like governmental organisations and trying to make their data up public under different licenses. It's like in the software world with GPL and different licences, and here with the license in which OpenStreetMap data is published on and I think this is all the main concern for not using data.

G: Yeah, if it's OK, I will stop the recording now.

Participant 12:

Yes. Thank you.

Interview with Wilko Quak

G: Yeah, if you could just give yourself a short introduction of who you are and where you work.

Wilko:

OK, I'm Wilko Quak, I've two jobs. I work at TU Delft University for four hours every week, and there teach two courses, one on spatial information modelling and the other on spatial databases. My other job is that I work at Geonovum and that is an organisation that tries to streamline spatial data for the Dutch Government. That means that everything that we can help the Dutch Government with regarding spatial data, we do that, and my specific task is to make information models. So, I'm making these information models for spatial planning and sometimes I help with underground cables etc. Well, it happens in Geonovum that I'm personally not involved.

G: Right.

G: Would you consider yourself a user of OpenStreetMap or how are you involved with OpenStreetMap?

Wilko: Yes, I'm a user. I love this. Maybe I should say not officially, but I'm a personal user of OpenStreetMap, that in many cases that I use a GPS for fun and if I have the chance, I use OpenStreetMap for undergrounds and for my GPS log. And in all the research projects, where we collected GPS logs of other people. I also used OpenStreetMap to make an analysis of the GPS tracks. So, when you add the GPS track and if there's a road in OpenStreetMap that is close to the person, when the person moves, you can say, well this person was on the road.

G:

What do you consider the value for you to participate in an open platform like OpenStreetMap? What does participation mean to you?

Wilko:

Well, I personally like this whole idea of being open and being able to contribute. So if I found an error in the data, I can fix it myself. In a way I like to contribute, in other way around, the data of OpenStreetMap is definitely useful for me. If I would need to get the data somewhere else, like for the Netherlands it would work, because, I mean, in the Netherlands most of the topographic data is freely available, but this doesn't have world coverage. So, if I need more extensive coverage and if I'm working at the university, and I am doing stuff with the students then, you can buy the dataset, but it's usually too expensive. It's really convenient that OpenStreetMap is freely available and freely downloadable without having to do all kinds of tricks like finding someone who's lending the data to you. There’s lots of utility, and that's why we use it. Around 10 or 20 years ago, we did some database testing and we tested the database using realistic data. I think at that time we use the non-public datasets from the Kadaster. Then we published some research paper on that and what happened was that other people wanted to redo our experiments. So, you can build on the work of others, and they ask how can we get your data and replied: no, sorry, this is data is from the Kadaster. At that time, we basically decided if we do it again, we will use OpenStreetMap, because then we won’t have that problem anymore.

G: Did you end up doing it with OpenStreetMap data?

Wilko:

No, it's still in the planning. We never did the database benchmark after that. Well, there was a student that had to experiment with this specific database, and because of this, he used OpenStreetMap data for it.

G:

And I know you're involved with, the university and you are a part of the Geonovum, but how involved would you say you are with the community in OpenStreetMap?

Wilko:

Currently, not at all.

G: Previously before you were?

Wilko:

Oh well, I joined the discussions sometimes because I wanted to take a specific route and probably did not like how it is modelled. So, I joined the discussion. There was a time when I was giving lectures or I was at meetings where I was presenting about linked data and somehow, exactly on the same meeting there was this Dutch guy who was giving presentations on OpenStreetMap and I discussed a lot with him during that time, but I know that doesn't happen anymore. I still like OpenStreetMap and if I talk to people, I talk a lot, but I'm not active as much.

G: Yeah, because I did this survey in relation to user motivations and some issues within OpenStreetMap, there was some concern or risk of external influences by parties, such as businesses, academics, and government bodies participating and affecting OSM. Do you feel this a concrete risk/reality? How would you say this affects the community?

Wilko:

Oh no, I don't think I can give a sensible answer on this. I don’t know of examples where OpenStreetMap community was affected by external parties in a bad way. Because sometimes it's also good that you get influenced by others. It sounds now as if people put pressure on OpenStreetMap in specific ways which are not so good. I don't know about that.

G: In in your career as an academic and with OpenStreetMap. How would you describe the decision-making processes behind OpenStreetMap and their policies to be?

Wilko:

Well, well, Frederika sends you to me, but I'm not sure that I can give useful answers, because also in this right, so it's about the policy behind OpenStreetMap. I haven't checked on that in years. I know that they migrated from one public licence to another, but I was more involved in in contributing than in figuring out what licences were used. So no, I don't know much about it either.

G: I mean, I think that your expertise comes to the database itself, so maybe if I ask you a different question. What are some of the key components of OpenStreetMap to you? What are the essential elements behind OpenStreetMap that make it work the way it does?

Wilko:

So, you come closely to databases, etc. And then for me OpenStreetMap is essentially a dataset.

And with the underlying data model to store topographic data. Well, you can see that this data model is has evolved and during the years and I'm a bit lost how it is now. But I remembered that it started as this street map, and now it's closely becoming more polygons and objects, etc. I remember that the data model was a bit tricky under the hoods, but yeah, it's pretty hard to change that now and but it works in a way. What would be interesting, and I don't know what the what the developments are to try to make them a more useful object model underneath, but that would also help in making more useful data because then it will be easier to query the data.

G: Could you elaborate a little bit more on the object models and the polygons OSM uses? Do you think that exists in OpenStreetMap or if it can be implemented?

Wilko:

Well, if you edit OpenStreetMap, then you're basically editing ways, which are lines, and then if the first endpoint of a line is the last endpoint of a line, you basically close the way and then you can add labels to it. So, this whole dataset and the output street map is basically a collection of lines with labels on it. If you edit this data, you need to understand that. But if you want to query the data, it's just a bunch of lines with labels and that wouldn't work querying, so, then you need processing to make useful data out of the OpenStreetMap. I understand why the data set of OpenStreetMap is the way it is but if you would reverse engineer the data model, you could probably end up with a different data model.

G: Or maybe if additional things can be added, like a vector tile-based data model or the vector tile-based data model?

Wilko:

Yeah, that's an interesting question. It would be nice to figure it out with what's possible or not for sure. I would like to go slightly towards a more object model instead of a model with tags.

G: So, having better metadata essentially.

G: Yeah, in the survey there is this concept of OpenStreetMap being an ecosystem by it's by the respondents. Would you agree on this term for OpenStreetMap?

Wilko:

Yeah, I think so. People that work with OpenStreetMap, they know how to operate in this ecosystem of how the model works. Yeah that fits.

G: Yeah, how would you describe it? Because a lot of people just regard it as a as a database or a project. But how would you describe its ecosystem?

Wilko:

It's not only a database, but there's also lots of APIs that are built on top of the database, and everything in a way is interconnected. If you use the word ecosystem, I also think that it's a bit closed. So, if you want to move to something else, you cannot just replace one thing with the other. Either you have to go all the way in OpenStreetMap or go all the way in Google Maps for it, for example. In that sense, it’s a platform or ecosystem, so it's all tightly integrated. And yeah, that's true.

G: I imagine you're familiar with the term of spatial data infrastructures, right

Wilko:

Yes.

G: Could you could you describe it to me in the best way you can?

Wilko:

What is spatial data infrastructure is?

G: Yes.

Wilko:

For me it's a spatial data infrastructure is a way of getting data from the place where it's created... So, it's not only about getting data, but it ends with people that need the data and it starts with the way of providing it. It's the whole infrastructure that gets data from the place where it is created to the place where it is needed, in the most efficient way. And all that belongs to it, so also digital rights, transfer standards and acquiring data, everything.

G: Yeah, it's fairly accurate, I think.

G: [Provides SDI and Open SDI definition]

G: Do you think there's any relationship between OpenStreetMap and these definitions?

Wilko:

Yes. I would say that the success of OpenStreetMap would make people who were previously involved in closed SDIs think: "Well this is nice and this works. we should do the same." I mean, definitely for governments, it fits with the goals of governments to get the civilians to participate.

G: Yes, and do you think open SDI applies to OpenStreetMap?

Wilko:

The other way around. Yes.

G: What do you mean?

Wilko:

Is your question do you think OpenStreetMap is an open SDI?

G: Yeah, if the concept of open SDI applies to OpenStreetMap. If it's similar...

Wilko:

Yeah, definitely so. Well for me it is. OpenStreetMap is an open SDI.

G: Right.

Wilko:

Open data, open protocols, freely available, yeah.

G: Yeah, I think that what we discussed, is that the thing that might be missing is a certain harder standard, I imagine, between the data.

Wilko:

Yeah, that's one of the problems. Of course, with OpenStreetMap, is that you never know about the completeness of the data set, so, I would say that can't be helped, but you of course can find tricks to do it or try to figure out measures of completeness that could work.

G: Yeah, like that the community is responsible for it and they end up having a crowdsourced governance.

Wilko:

Yeah, I know that from a long time ago that they did comparison of a topographic data of the Netherlands from the topographic service and of OpenStreetMap, to figure out which of these is more accurate. And the topographic service they have, well, they have a process to define accuracy, where they do a survey every four years and they basically make pictures, so they know how accurate they are. But with OpenStreetMap here I have no idea because it depends on these participants. Then it turns out that in in some cases OpenStreetMap is more accurate than the topographic maps. In that case I would choose to use the OpenStreetMap, even if I cannot prove that it is more accurate. Well, in a way, it would be nice for OpenStreetMap to have some sort of indication of how accurate it is. And that would be a nice spatial puzzle to figure out how to do that.

G: Yeah, like to the idea to motivate user groups or working groups within OpenStreetMap itself to do this.

Wilko:

Yeah, or maybe you can do it with statistics about how often the land changes. You can count how many changes there are on the map. And then you can figure out all the inconsistencies. There are so few changes here in OpenStreetMap that this cannot be up to date. Would be nice student project.

G: What would you say is the main limitation for users to participate in OpenStreetMap?

Wilko:

I would guess the complexity of editing the data correctly. Well, in my case, close to where I live, there are so many participants right here, that the problem is I cannot find a street that is wrong.

G: Yeah, what to do after now? After that?

Wilko:

Yeah, but I think for most people, the problem is that that they don't know where to click to make it right, and it's really complicate Well, it's used to be complicated to add streets in. But I must say, I haven't tried to in the last five years because all roads were present in my neighbourhood.

G: OK, Wilko, I think those are all my questions.

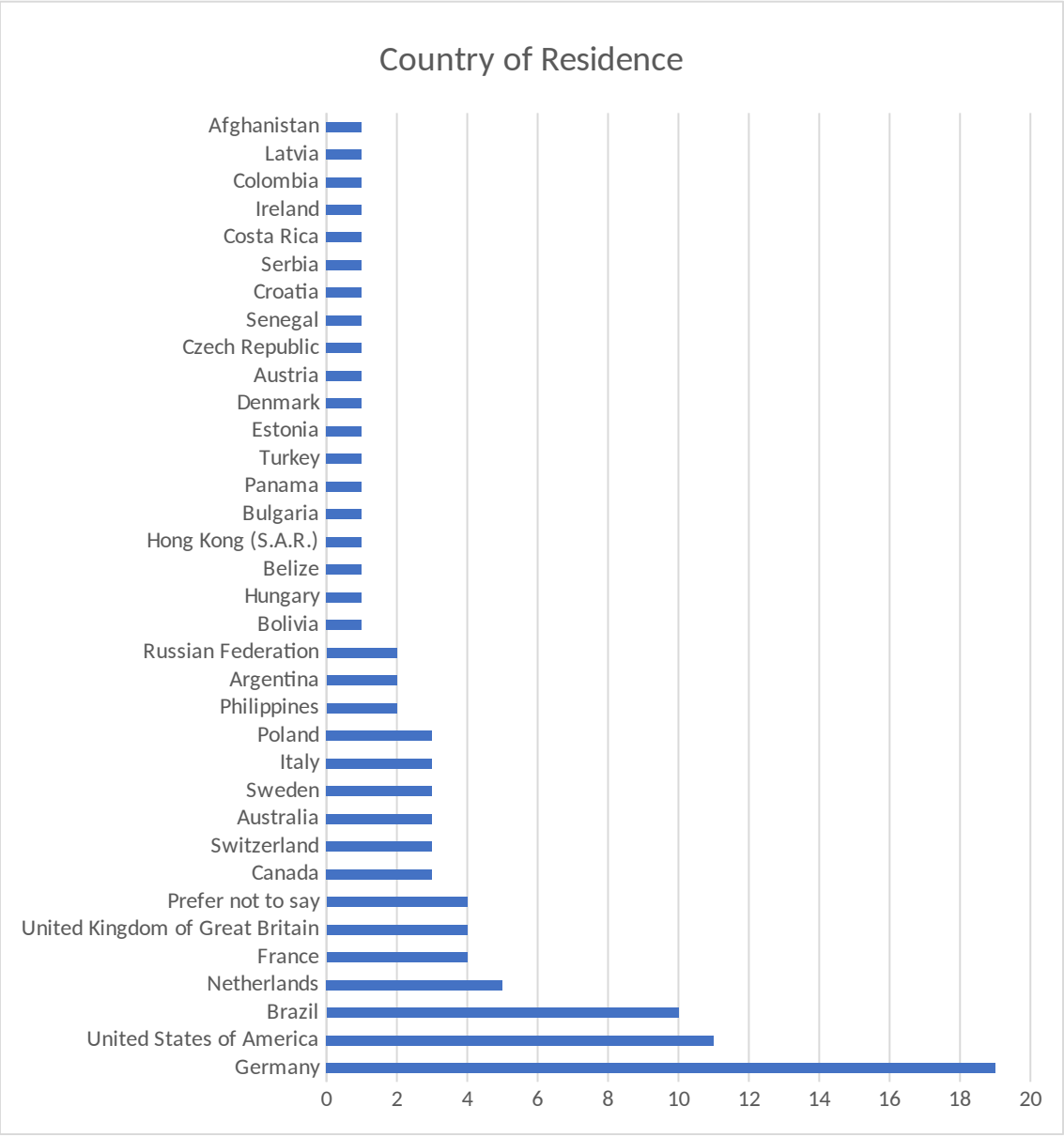
Wilko:

OK. Well, thank you. I hope you do very well.

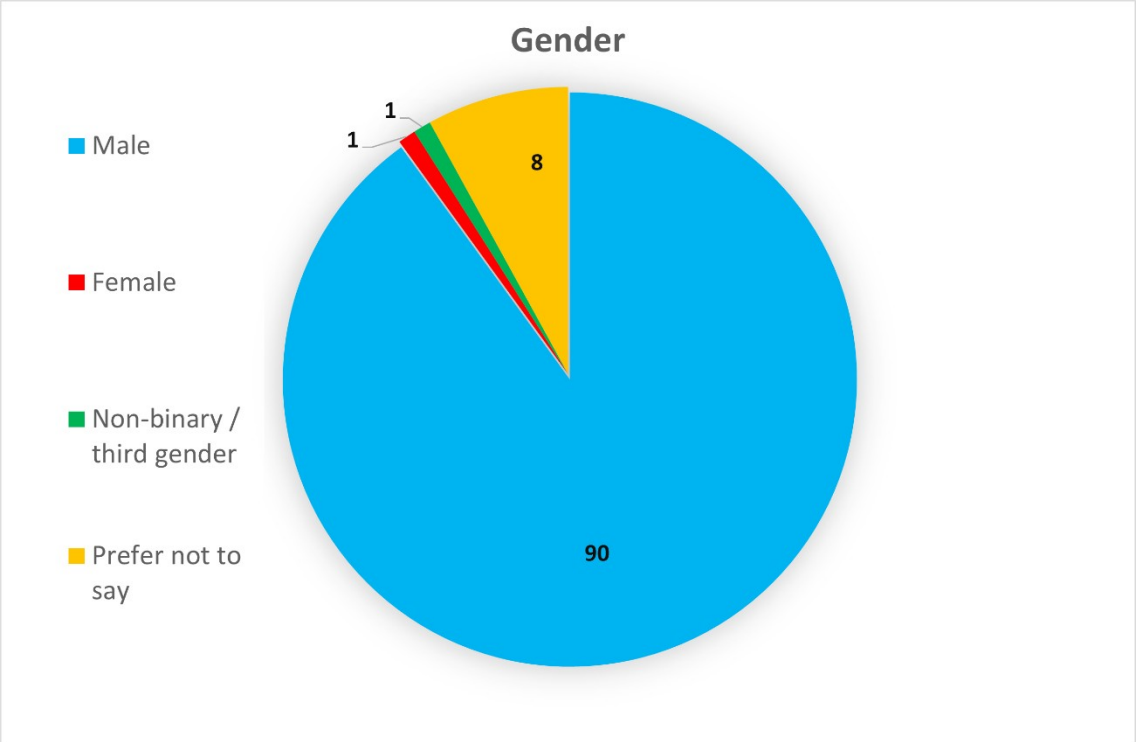
G: Thank you!

Results of the Survey

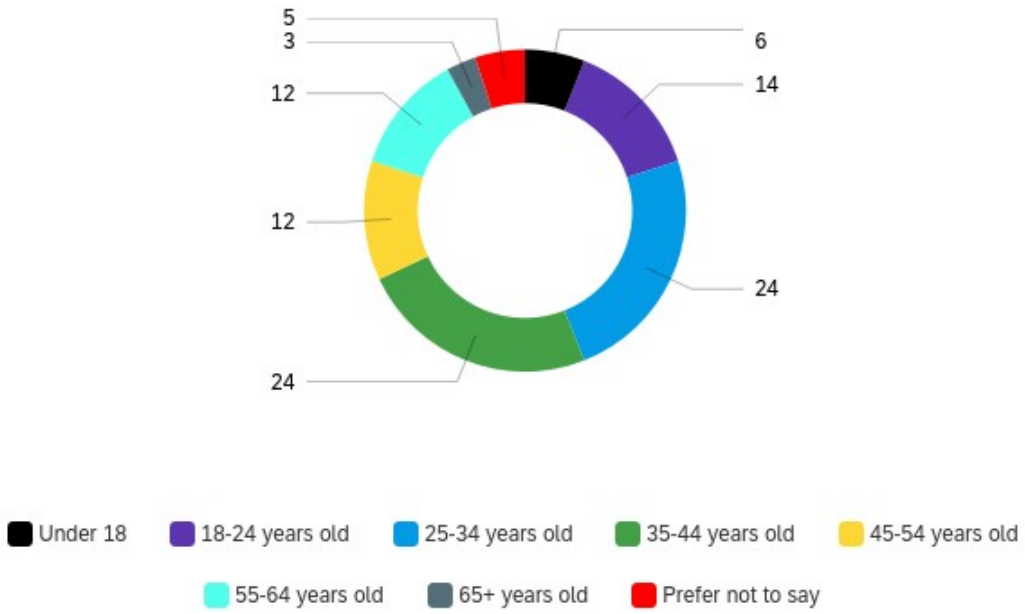
1. Where are you from?



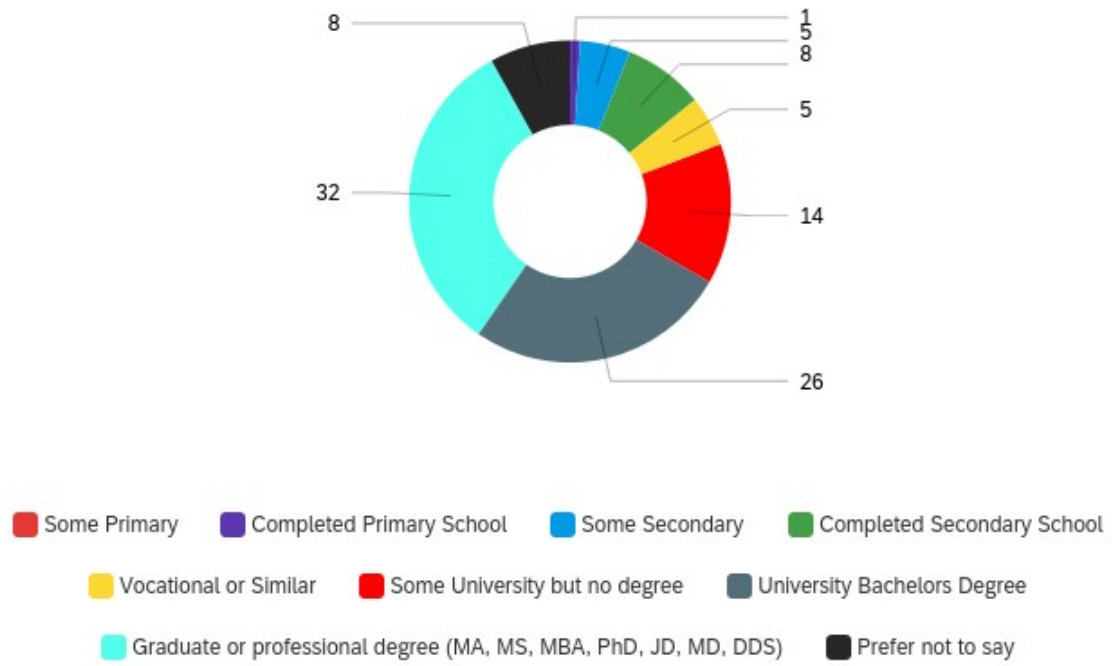
2. How do you describe yourself?



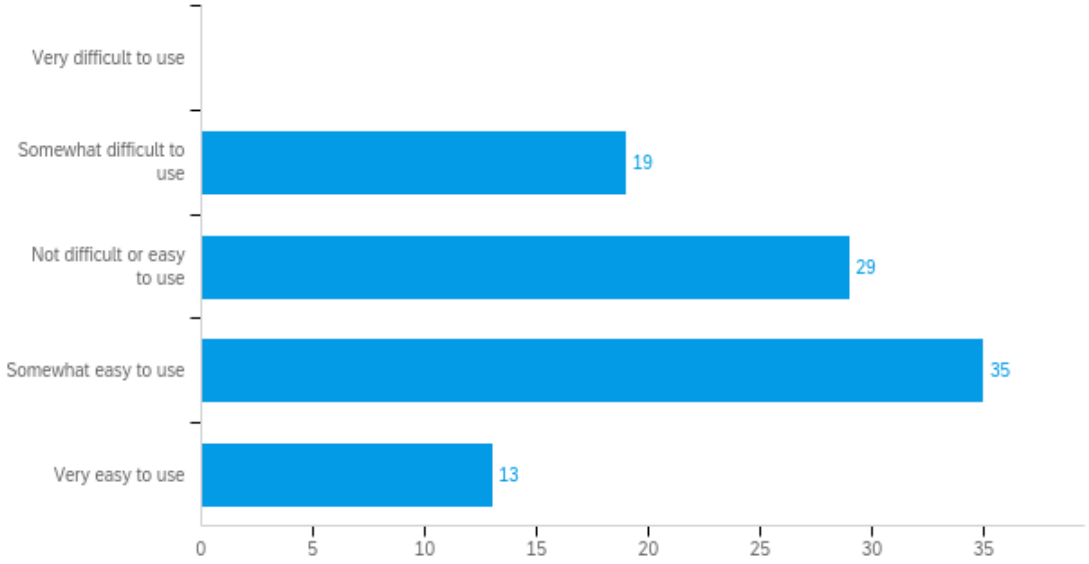
3. How old are you?



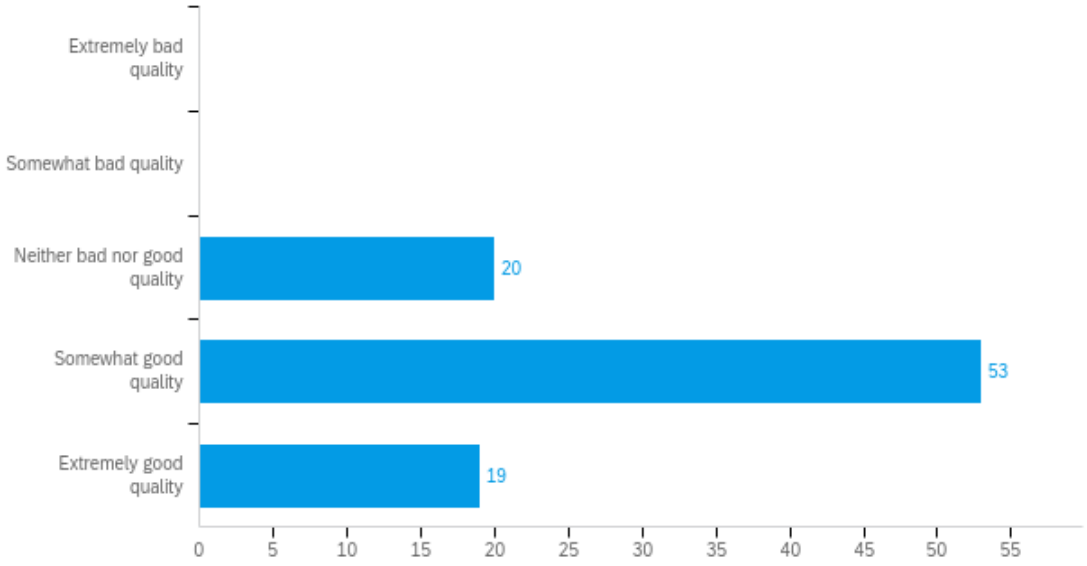
4. What is the highest education level you have completed?



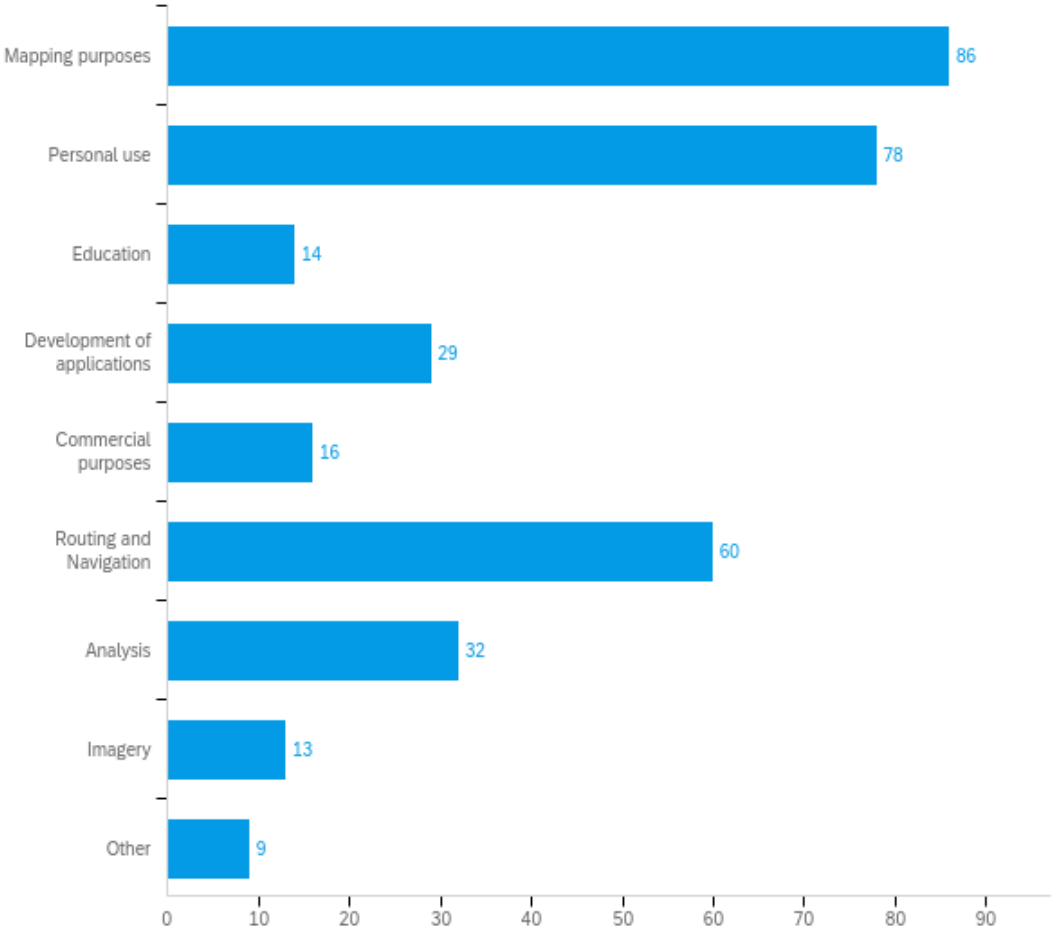
5. How would you rate the usability of OSM?



6. How would you rate the quality of data/services provided by OSM?



7. Why do you use OSM? (Multiple Choice)



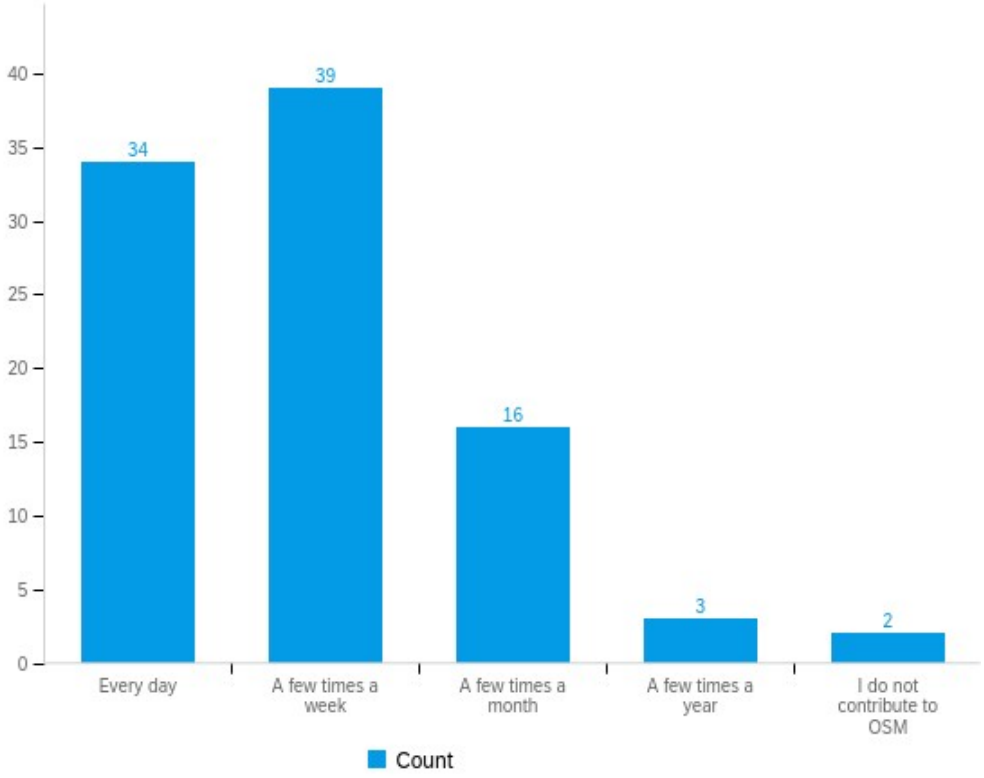
Answer	%	Count
Total	100%	337
Mapping purposes	25.52%	86
Personal use	23.15%	78
Routing and Navigation	17.80%	60
Analysis	9.50%	32
Development of applications	8.61%	29
Commercial purposes	4.75%	16
Education	4.15%	14
Imagery	3.86%	13
Other	2.67%	9

8. What other tools to you use to participate in OSM? (Multiple Choice)

Answer	%	Count
Computer	43.60%	92
Cell phone	38.39%	81
GPS device	12.32	26

	%	
Other	5.69 %	12
Total	100 %	211

9. How often do you participate in OSM?



Answer	%	Count
A few times a week	41.49 %	39
Every day	36.17 %	34
A few times a month	17.02 %	16

	A few times a year	3.19 %	3
	I do not contribute to OSM	2.13 %	2
	Total	100%	94

10. How do you participate in OSM? (Multiple Choice)

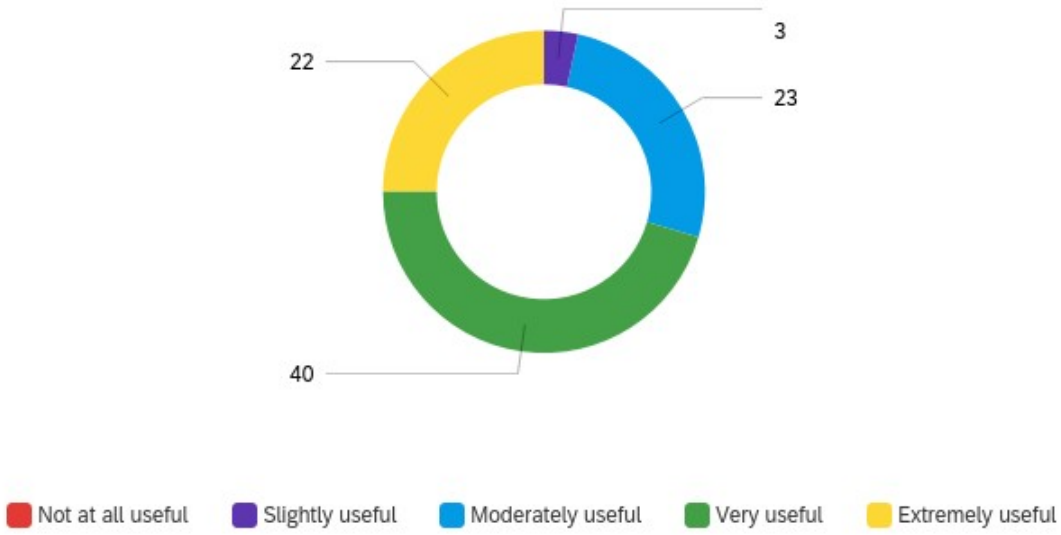
	Answer	%	Count
	I provide map data to OSM	31.75%	87
	I follow and/or participate in the community channels	27.74%	76
	I monitor data and/or correct OSM data	26.28%	72
	I just want to use OSM data	9.85 %	27
	Other	2.55 %	7
	I want to promote my own products/service in OSM	1.46 %	4
	I participate passively	0.36 %	1

(only observe)

11. Why do you participate in OSM? (Multiple Choice)

Answer	%	Count
I believe in the goal of OSM for a "free wiki world map"	12.37%	74
I enjoy adding new information to OSM and I appreciate maps	12.21%	73
I like to contribute so I can provide accurate information of my environment	12.04%	72
I want to help others by providing free digital maps.	11.37%	68
To create new map data since it does not exist elsewhere	8.86%	53
Digital maps should be free for people	8.70%	52
I want to learn about new skills, perspectives, or the area I live in	7.53%	45
The community is important to me and the development of OSM.	6.52%	39
It gives me the freedom to map what I want	6.52%	39
I believe that the information I add is just as good as others	5.52%	33
Because OSM is reliable and will keep my contributions safe	4.52%	27
To use OSM data for my career, personal, business, or financial gain	3.01%	18
Other:	0.84%	5
Total	100%	598

12. How useful do you find the community when participating in OSM (i.e. in terms of quality of data/services provided)?



13. Would you be available for a short follow up interview?

Answer	%	Count
Yes	55.81%	48

No	44.19%	38
Total	100%	86