MSc. Geomatics

Assessing an Open SDI from a user participation perspective: A qualitative exploratory research of OpenStreetMap

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Presentation Overview

1. Introduction/Motivation & Research Questions
2. Related work & Literature Review
3. Methodology
4. Results & Analysis
5. Conclusions & Future work

1. Introduction & Research Questions

Introduction

- Spatial data or geographic information has shown its importance in various fields throughout the years.

- How should this data be **stored**, **used** and **managed**?

- Development of **Spatial Data Infrastructures** (**SDIs**), in response to attend the increased use of GI in our society.
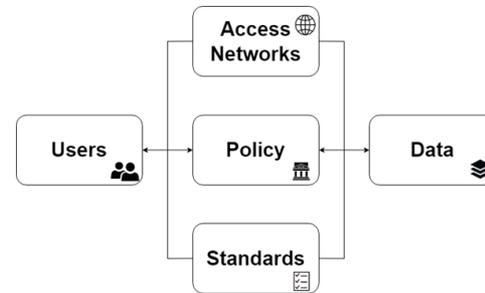

Figure 1: Fundamental components of an SDI (adaptation from [Rajabifard et al., 2002]).

Introduction

- Initially **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**.

- Moving towards: Open Data initiatives, User-centric SDIs, and Open SDI.

open source initiative

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Introduction

- Advances in Global Navigation Satellite Systems (GNSS), mobile devices and Global Positioning System (GPS)

- OpenStreetMap (OSM) – Collaborative project that provides open map data under Open Database License (ODbL).

- Motivated by restrictions on use or availability of map data

- Citizens can now supply valuable information to SDIs at a high technical level

Introduction

- What motivates users in an Open SDI?
- Limited studies in user participation within Open SDIs.
- Limited access to public sector SDIs and their users.

- User participation can vary, important to understand how to engage users on a personal and organizational level

- How can we effectively understand and evaluate the value of open geoinformation, in relation to the **participation** of users and communities in open SDI

Research Questions

Research Question:

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

Sub Questions:

• *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 users participating in OpenStreetMap?*

• *What can be done to motivate the community of users to participate in an open SDI?*

2. Literature review & Related Work

Literature review

- Open data initiatives are elaborated into a one directional process, typically focusing on the accessibility of the data.

- Focus should be into the overall environment which it is in, i.e., its **Open Data Ecosystem**

- A well performing user drive ODE could stimulate citizen participation, use and re-use of data between users and data suppliers.

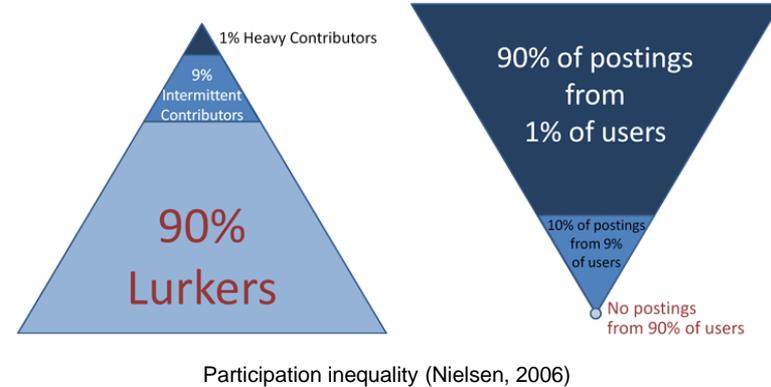- What motivates people to participate to contribute Geographic Information voluntarily?

Open Data

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

Intrinsic Motivational Factors	Extrinsic Motivational Factors
Altruism, Learning, Self need, Fun and Instrumentality of Local Knowledge	Monetary, Community, Career, Project Goal

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Literature review

- User participation in relation to spatial data contributions **varies** (social pressure, sense of inclusion, importance).

- Participation inequality: Online communities **have 1% of active or heavy contributors**, 9% occasionally and 90% non contributors and 90% of users do not contribute at all.

- 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

1% Heavy Contributors

9% Intermittent Contributors

90% Lurkers

90% of postings from 1% of users

10% of postings from 9% of users

No postings from 90% of users

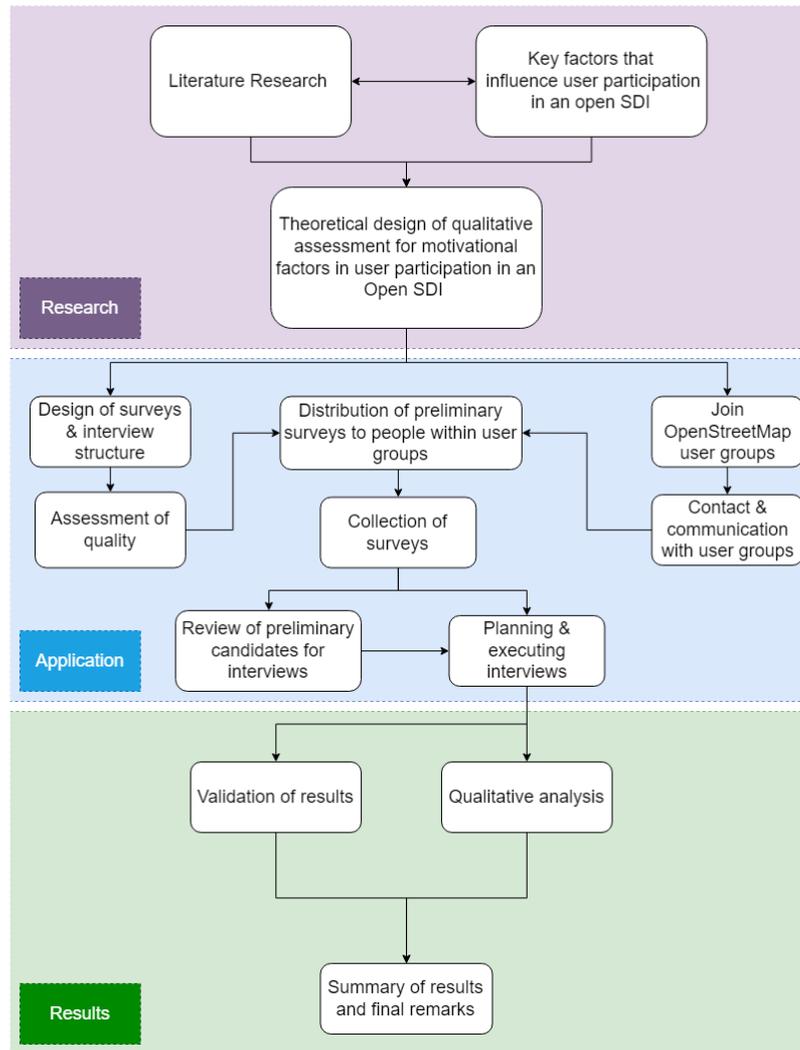Participation inequality (Nielsen, 2006)

Literature review

- **What does it mean to be an open SDI?**
- All 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.

- Need to assess OpenStreetMap as an Open SDI and the motivational factors behind its users' participation

Related Work

Assessing motivational factors	Assessing participation
Budhathoki, N. R. (2010). Motivation to contribute VGI to OSM	**Olausson, K. (2016).** Assessing user participation in the public sector
Budhathoki, N. R. and Haythornthwaite, C. (2013). Motivation for OSM wiki/crowdsourced collaboration	**Vancauwenberghe, G., Valeckaite, K., Van Loenen, B., and Donker, F. W. (2018).** Assessing openness and user participation of SDIs
Sjoukema, J. (2015). Using VGI for the BGT	**Martin Jimenez, G. (2019).** Assessing user involvement in geoportals
Tanaka, Y. (2017). Motivation in OSM with a developing country	**Santos, A. P., Colombo, V. P., Heider, K., and Rodriguez-Lopez, M. (2022**). VGI comparison framework based on user participation

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3. Methodology

Research

- Literature Research ↔ Key factors that influence user participation in an open SDI
- Theoretical design of qualitative assessment for motivational factors in user participation in an Open SDI

Application

- Design of surveys & interview structure
- Distribution of preliminary surveys to people within user groups
- Join OpenStreetMap user groups
- Assessment of quality
- Collection of surveys
- Contact & communication with user groups
- Review of preliminary candidates for interviews
- Planning & executing interviews

Results

- Validation of results
- Qualitative analysis
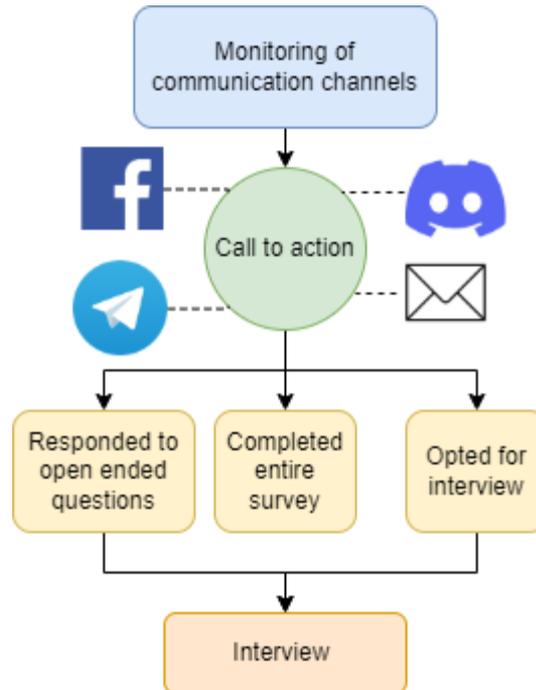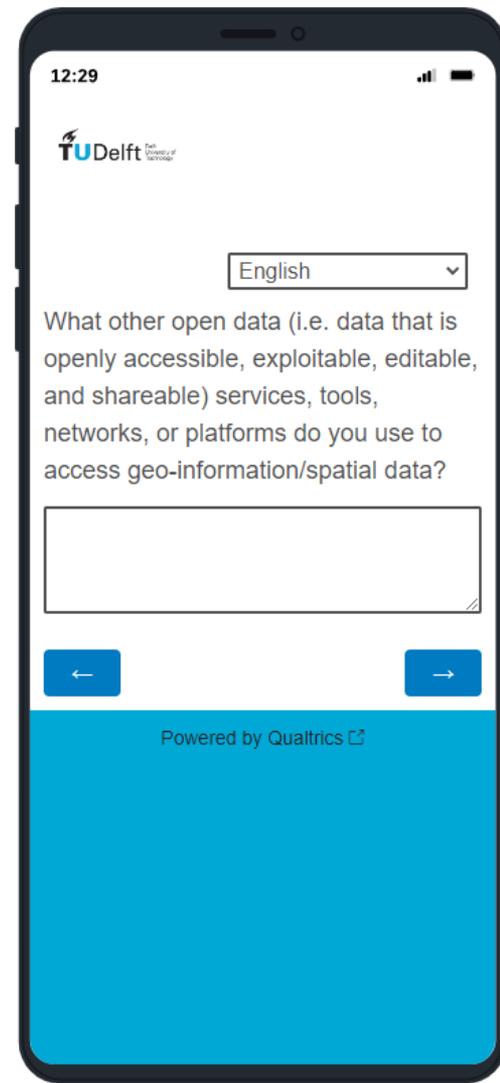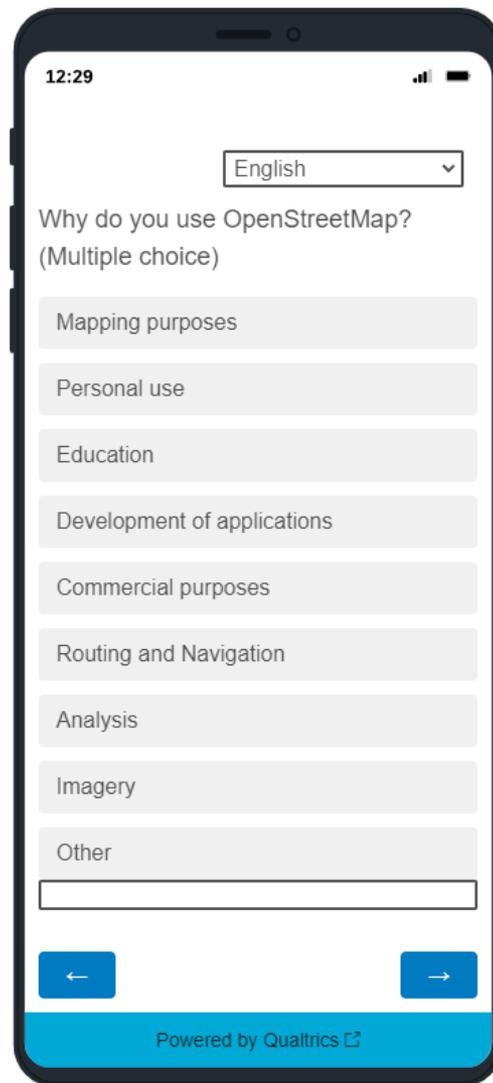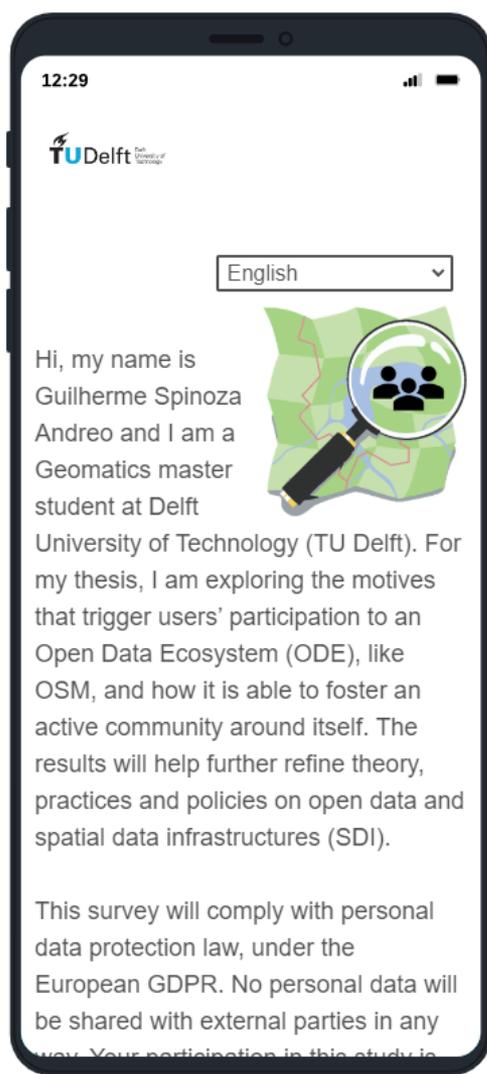- Summary of results and final remarks

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Methodology

- **Stage 1: Surveys**
- Preliminary web-based surveys (developed on Qualtrics) with users of OpenStreetMap.

- Quantitative and Qualitative analyses with combined approaches, to explore the factors that foster user participation in the community of an open SDI

- Selection of indicators in user participation in OpenStreetMap, both in the survey and the semi structured interviews.

Methodology

Stage 1: Survey

Phone 1:

English

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 it is able to foster an active community around itself. The results will help further refine theory, practices and policies on open data and spatial data infrastructures (SDI).

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

Phone 2:

English

Why do you use OpenStreetMap? (Multiple choice)

Mapping purposes

Personal use

Education

Development of applications

Commercial purposes

Routing and Navigation

Analysis

Imagery

Other

←   →

Powered by Qualtrics

Phone 3:

English

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 geo-information/spatial data?

←   →

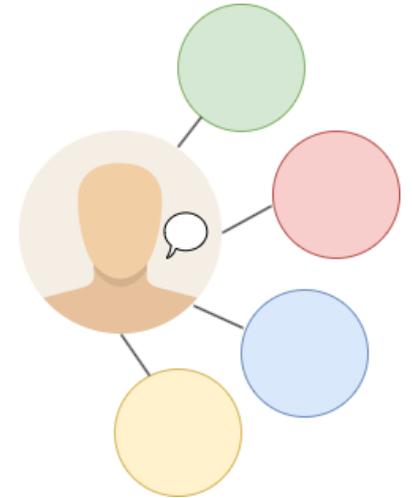Powered by Qualtrics

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Methodology

Indicators:

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

Methodology

Stage 2: Interviews

- Volunteer based semi-structured interviews per Schmidt (2004)

- The interview questions will further assess qualitatively the user's perception of SDI, ODE and OSM

- Connection between the theoretical qualitative framework of why users contribute to open SDI

- Supplementary interviews with experts and academics

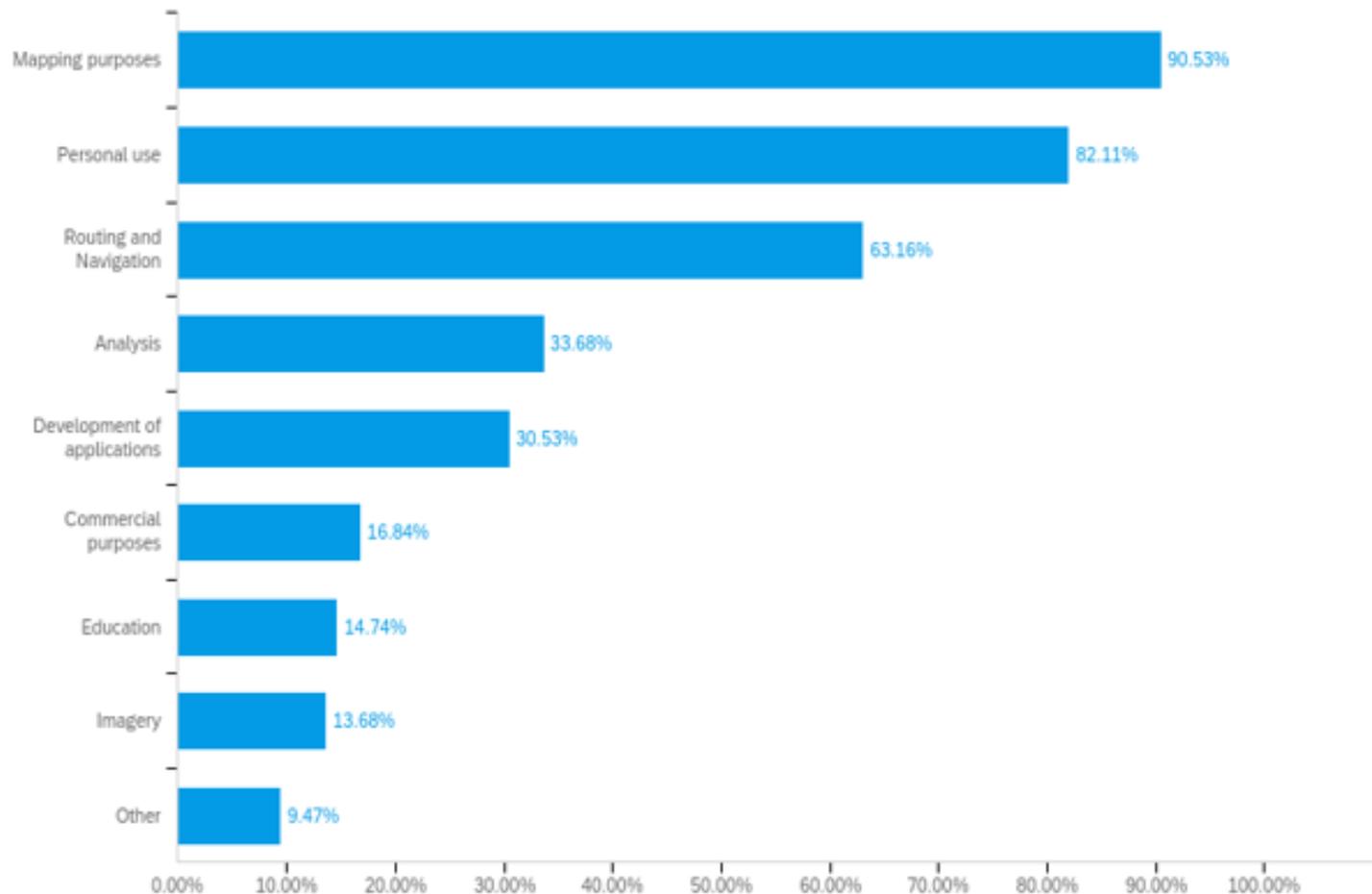# 4. Results & Analysis

Results

Stage 3: Results

Who participates?

- Total of 100 responses and **86 complete survey responses** and **15 interviews.**

- **Men** (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%).

- Majority **(57%) of the respondents were from Europe**, (17%) from North America and (14%) out of South America

- On average participate **at least a few times a week** (41%) **or every day** (36%) by providing map data (93.5%), following the communication channels (81%) or monitoring or correcting data (77.4%)

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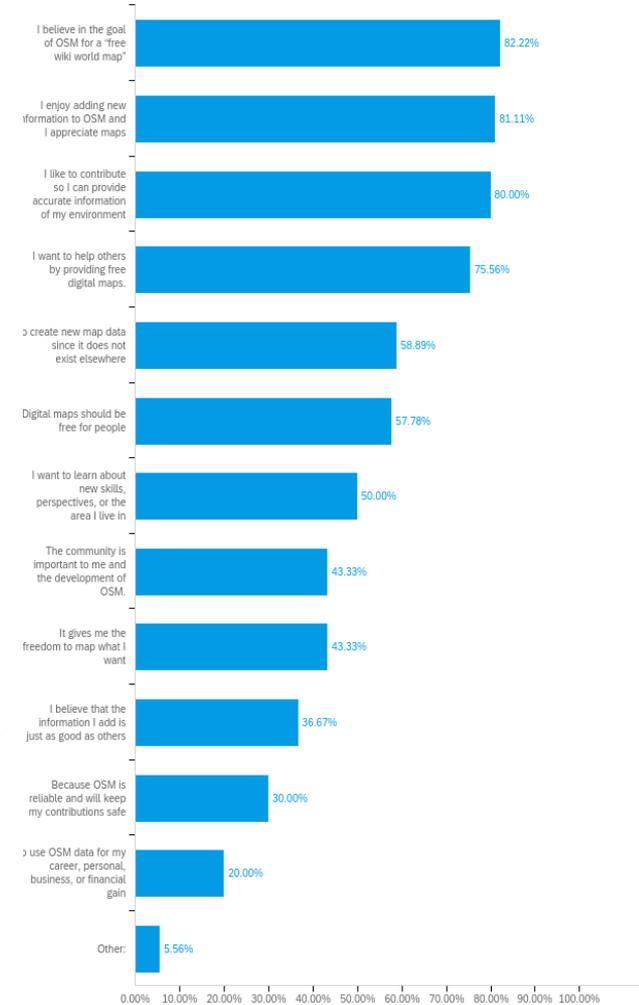
Results

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)

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Results

- Main motivations identified in the survey (response rate):

- Extrinsic: Project Goal (82%), Community (43%), Career (20%).

- Intrinsic: Fun (81%), Instrumentality of Knowledge (80%), Altruism (75%).

Motivations to participate in OSM

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Results

The main themes that were identified amongst the responses in the interviews to improve user participation 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)

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Analysis

- Heavy contributors have light contributor motivations, which differs from what has been shown in the previous studies into motivational factors of OpenStreetMap.

- 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.

- Mixed feelings related to the concern of commercial influences inappropriately taking over OpenStreetMap (over the policies, standards and restrictive licensing for external use).

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Analysis

- Fun, instrumentality and alignment with the project goals were considered of equal importance in both the surveys and interviews

- Users trust the infrastructure, even though there could be potential improvements and that especially the "heavy contributors" feel the trust, design and self organization in the project, despite the interference of some users who do not follow the **guidelines**.

- Understand the benefits of open data within the OpenStreetMap ecosystem, establishing a higher **standard** for external users (public sector & academia)

- Recognize the role of OpenStreetMap in the larger open data ecosystem (i.e., Public sector, countries, National SDIs) and the open data ecosystem which envolps OpenStreetMap (External data & apps developed with OSM data).

Analysis

- Experts and interviewees acknowledge the underlying issues with OpenStreetMap's licenses and standards.

- **Linked data** should be possible, however international standards would be difficult to manage without direct communication with external stakeholders or internal working group in OSM.

- OpenStreetMap, by itself, only provides map data, which would be another contention point for determining if it is an open SDI. (vector tiles in development in the OSM infrastructure).
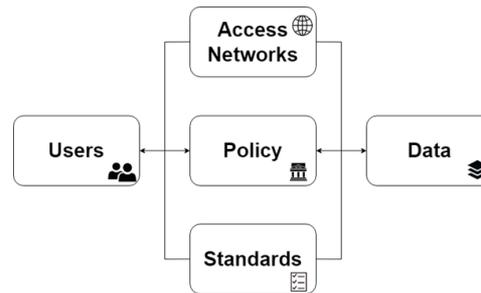

Figure 1: Fundamental components of

an SDI (adaptation from [Rajabifard et

al., 2002]).

5. Conclusions & Future Work

5. Conclusions

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

- To engage both potential new and long-time users in an efficient, user friendly, light-weight manner is a balancing act.

- Maintaining an active community requires engagement on a personal level, where transparent or more enforcing user guidelines would also help not only new users, but also the ones that already contribute.

- Requires a very detailed, well-defined and transparent data collection procedure supported by manuals and tools.

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5. Conclusions

Sub Questions:

• ***What are the intrinsic and extrinsic factors that motivate the users of OSM to participate in an open SDI?***

- Believing in the goal of the open SDI, feeling of usefulness and having fun while providing valuable geographic information that can be re-used openly.
- Heavy contributors, with light-weight intrinsic motivations

• ***How and to what extent are the users participating in OpenStreetMap?***

- 95% contribute data, participate in the community or monitor and correct OSM at least a few times a month, and on average a few times a week (41%).

• ***What can be done to motivate the community of users to participate in an open SDI?***

- Better support mechanisms, tutorials, and centralization of one main communication channel as a reliable source of information.
- Improve learning curve for both new users and long-time users. Provide means for external entities to cooperate in an interoperable way

5. Conclusions

Recommendations

OpenStreetMap
- Creation of a working group to interface with local governments & external institutions if expansion is desired.
- Official OSM standard
- Standardization: bottom-up approach, start locally, aim globally.

Public & Private Sector
- Slow process that needs to engage the users gradually.
- Understand the scope of their open data ecosystem
- Creating linked data with OpenStreetMap

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5. Conclusions

- Limitations
  - Lack of availability and access to other Open SDI user groups in public sector
  - New users / First time contributors' motivations
- Suggestions
  - Assessing the OpenStreetMap Foundation to understand the entirety of the infrastructure
  - Ethics behind increasing user participation

- OpenStreetMap is perceived as both an **Open Data Ecosystem** among its users and as an **Open SDI** amongst the experts, yet there were dividing opinions to the perception about Open SDIs in relation to OSM.

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5.1 Future Work

- Creating a hierarchy of needs for the different stakeholders / users in OSM and Open SDI.

- Further correlation with OpenStreetMap's infrastructure and Open SDI using OpenStreetMap Foundation.

- Assessing the infrastructure of OSM as a comparison / benchmark for government SDIs to transition to.

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Thank you for your attention!

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