



# Exploring the Barriers to Citizen Participation in Humanitarian Mapping

## Abstract

This project looks to explore the barriers faced by citizens who participate in humanitarian mapping. The main aim is to try and understand why there is hesitation when it comes to figuring out where to begin. With a variety of options available, people often question where they should begin and if their impact makes a difference. This project is aimed to help solve these questions by creating a website to act as a pathway for people who want to assist and help society. The website helps people find platforms that match their interests and shows the impact that citizen participation has. By using the Python library 'Pandas', graphs were created to prove to people that their contributions matter and to show what these platforms have to offer. In addition to easy-to-follow tutorials and images, the website helps people to feel confident using these platforms. Moving forward, the project looks to improve inclusivity and participation in humanitarian mapping.

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## Introduction

In a world where technology is expanding rapidly to give us brand-new innovations daily, it has also created new ways for humans to participate in humanitarian aid digitally. Humanitarian aid refers to the global efforts made by individuals, groups, or government organisations with the main goal of preventing human suffering (Rose et al., 2013). Thanks to technological advances in GIS, citizens can map crisis-affected regions, support vulnerable communities and participate in global challenges from the comfort of their houses or wherever they can get a WIFI connection. However, even though the concept of digital mapping for good is an excellent idea in concept and has so many positive impacts on a large scale, there is hesitation from people who want to participate. This could be for several reasons such as a lack of awareness. Digital mapping can be seen as a niche field as it is typically used by professionals who use geographic information systems or humanitarian organisation groups who specialise in providing aid to those who need it. Because of this, there might be a lack of awareness which can lead to this hesitation. There is not a lot of public awareness so it could be assumed that it may not be important. Since it can be viewed as a niche topic that is primarily used by these smaller organisations, it may be harder for them to promote what they do to a wider audience that has no clue what digital mapping is. OpenStreetMap (OSM), Humanitarian OpenStreetMap Team (HOT) and MapSwipe were the platforms selected for this project. This was due to its collaborative nature, focus on humanitarian aid and accessibility to the public. There could also be the issue of the required skill needed to use these platforms. For example when using OpenStreetMap or HOT, and looking at the projects or what they aim to solve, you could be under the impression that you must have expertise in the area or a lot of technical skill. This could turn off possible volunteers who are new to the concept and looking for opportunities.

That is what this project aims to solve. All the issues found through researching the barriers to citizen participation will be addressed in this artefact and project. The main goal is to bridge the gap between the beginner who may be on the fence about participating and a place to figure out how to participate and at the same time, educate you by showing the impact you could make. This is where the development of the artefact 'How Can I Help' comes in to solve the questions and concerns people may have. By using data from OpenStreetMap, Humanitarian OpenStreetMap Team (HOT) and MapSwipe, this website will help people decide which of these platforms best suits their interests and abilities. Instead of having to look across multiple

websites to figure out how to use these platforms, this website will prevent the need for any excessive searching and will present everything in a user-friendly site that is straight to the point and tells you everything you need to know. The project will utilize data from each respective platform to create graphs demonstrating how small contributions can lead to significant rewards as well as showing what they can offer in the hopes that it will convince the reader that they should contribute. By displaying these graphs, they aim to show the power of crowdsourcing and what humans can do for the world by participating. Giving people a sense of community. After the reader decides what platform works best for them, they can click on the link provided to direct them to a section of the website that has information about the platform as well as tutorials, guides and breakdowns of the platforms which can help the issue of not knowing where to begin. Overall, the main goal of creating this artefact is to help people be comfortable with using these tools and encourage long-term engagement in mapping for humanitarian aid.

In addition to this Introduction, the Literature Review will aim to look at the barriers to citizen participation in humanitarian aid. The biggest problem faced by humans interested in this type of mapping is that they have spare time on their hands and wish to contribute but as previously stated, they are unaware of where to start, don't know where to look and are unsure if their impact will make any difference. The Environmental Scan will look at similar projects that have and could potentially impact the design and content of the artefact such as the structure, layout and trends. The Tools/Methods/Design section will look at the tools used to create the artefacts, where the data was collected for the graphs and why they were chosen, how the graphs were created and the software used. The Design section will look into the layout of the website, the features, the interface and the reasons for the choices made. The Implementation/Artefact Design will look at the completed artefact, its functions, features and how well it connects users to opportunities and shows previous impact, as well as reflection on how everything was carried out. The Analysis will look at the impact of the artefact. Has it looked into and addressed everything that was initially discussed? Lastly, the Conclusion will recap the overall project including my key findings, contributions, and accomplishments as well as a reflection on everything done.

## **Literature Review**

### **Introduction**

In an era where rapid technological advances are changing how people experience everyday life, digitally mapping to participate in humanitarian aid has revolutionised how society responds to various disasters such as public health crises and natural disasters. By using satellite imagery, crowdsourcing, and spatial data, it is now possible to provide detailed real-life information on crises to help emergency responders. However, as the pros seem to outweigh the cons, there are still significant barriers that can limit citizen participation in humanitarian mapping. This literature review will attempt to explore and analyse these barriers. We will look at the beginning of humanitarian mapping, and from there analyse the barriers faced by users who want to participate and then conduct an environmental scan to explore projects like this one to see what is already out there for people to use.

### **The Start of Humanitarian Mapping**

A few decades ago, it would have been common knowledge that a university degree was needed to measure the earth and put this information on a computer or paper according to (Haklay & Weber, 2008). However, the removal of the selective availability of the Global Positioning System (GPS) led to new technological advances and the creation of GPS devices (Neis, 2014). Some of these advancements include OpenStreetMap which is one of the main tools used for digital mapping. The open-source nature of OSM makes it convenient for humanitarian efforts. It is considered to be one of the most successful VGI projects in the geographic information system community (Budhathoki and Haythornthwaite, 2013). OSM was created after the response to the post-election violence in Kenya where a web tool called Ushahidi was made to respond to this. On Ushahidi, through crowdsourcing, one could report any acts of violence through a text message and this created a map showing where each message came from. (Bryant, 2021) informs that after the success of Ushahidi in Kenya, it was then used for the 2010 Haiti earthquake which is considered as the birth of digital humanitarianism. Since then, OSM has been gaining more users reaching 5.5 million users in June 2019 with an average of 40,000 users a month so there is constantly new data being posted by people all over the world (Biagi et al., 2020). OpenStreetMap which started as a project was made at University College London in July 2004 and was founded by Steve Coast. His main aim for the project was to create various map data and make it open source so it was free and available for people to access and use while being licenced under copyright schemes. So, no matter what operating

system you use or device, you can access their tools as they have a team of software developers who develop tools to ensure OSM data is easily accessible (Haklay, 2008) states. (Bryant, 2021) made an interesting statement about how GIS can triumph over simple geography data due to how informative it can be. For example, these digital tools can show the potential impact of a disaster after it occurred such as flood and earthquake damage. Because of this potential, it is important to address the barriers that humans face when participating in digital mapping platforms like OpenStreetMap to make sure they continue to grow. By looking at factors like accessibility, technical difficulties and time investment, the knowledge gained from looking at issues can be used to offer guidance and help people find opportunities.

### **Barriers to Citizen Participation**

One of the main barriers that can be found and most common to the public is stated by (Giesekeing, 2018) who suggests that some GIS software can be complex, requires training and can have a steep learning curve. This thought process can have an impact on the motivation of citizens who want to participate in humanitarian mapping. People who have limited technical skills and have no experience using these tools may not have time to learn the techniques while also having the time to join in on some of the projects available on these platforms. In a similar journal by (Štampach et al., 2021) he looked at human motivation to participate in Mapathons which is an event where users come together in real life to contribute data for projects. Participants stated that they simply do not have the time to go and contribute. However, it is important to note that the perceived complexity of these platforms can be reduced with the right tools and assistance, allowing for a higher level of citizen participation in humanitarian mapping which is what this artefact aims to solve. In addition, in humanitarian mapping, there is often the question of data quality and the level of professionalism the users of these platforms have. (Haklay, 2010) discusses that in information-based activities, the majority of users are inexperienced and would not follow the standard procedures for data collection and verification. This absence of standardisation in data collected among users can cause significant barriers to citizen participation. Concerns regarding data relatability and trustworthiness can come from potential NGOs or users who want to participate. (Dittus et al., 2017) discusses something similar to this but regarding data quality at the time of a major crisis when the number of contributors is at a high level. Depending on the type of crisis, it brings in non-professional users for a rapid response. For example, the Nepal earthquake and typhoon and how the Humanitarian OpenStreetMap team responded to them. Although the participation was successful in completing the tasks for the disaster, people noticed a decline in data quality. It

was suggested that a project listing system would help solve this issue. This can address the problem of users being introduced to projects they probably have no interest or experience in. These barriers can contribute to a digital divide in society. (Lythreatis et al., 2022) describes a digital divide as a gap between individuals who have sufficient access to technology and those who have little to no access to technology. This can be the case for people who live in regions like Africa. (Young et al., 2020) says that data production can be unequal due to it being focused on English-speaking countries like the US. In this journal, they discuss a project involving mapping in Accra, Ghana to see the issues they face using crowdsourcing processes in that country. Some of the difficulties faced by these people involved issues you wouldn't necessarily see in richer countries. This involved internet connectivity issues which impacted their ability to access any helplines. To promote equal involvement in crowdsourcing initiatives and increase inclusivity in Ghana and other regions that have similar issues, these technological barriers must be addressed. A theme I found when reading these articles is the difference in issues between a poor and rich country. In contrast to the issues faced in countries like Ghana where the main problem was connectivity, (Štampach et al., 2021) spoke about a similar project in Czechia and Slovakia where participants in the Missing Maps project were asked why they stopped participating in their events and they gave reasons such as having no time due to family, higher workloads and not enough time to contribute and commute to these events. It is essential to tailor solutions based on the conditions and economic state of a region to truly promote humanitarian mapping and prevent these barriers.

## **Environmental Scan**

In addition to the literature review, an environmental scan will be conducted to look at various online platforms that promote digital mapping for humanitarian aid. The digital artefact 'How Can I Help?' is a platform that will serve as a pathway for people who wish to participate but are hesitant due to various factors. It will direct people as well as demonstrate the value of contribution. By analysing similar platforms, the end goal is to find some of the solutions that have been proposed, discover any innovative ideas, and see the overall standard that needs to be obtained to have a website in this field.

During the 2008 Kenyan election, a crisis mapping platform called Ushahidi was first created to allow residents to report acts of violence such as intimidation and voting manipulation that

the media outlets at the time were not covering (Macdonell, 2015). It is an open-source platform that allows users to report violence and crisis events, collect data multiple ways such as SMS, email and social media and allows you to display this data on graphs, maps etc. One thing Ushahidi does very well is provide users with a support section on their website. They have a few tutorials that show visitors how to use their platform. For example, giving users resources to help them get started, how to install Ushahidi Code and their manual. This was something that needed to be on this project artefact as you want people to your platform as confidently as possible, so it doesn't discourage people from using it. Creating videos or having tutorials will help people easily navigate a specific tool or platform that they haven't used before. In addition, they put a lot of emphasis on what they were able to accomplish which is a pull factor for people who are interested in using their platform. They advertise how through their 10 years of impact and global innovation they have been able to achieve over 50 million posts and have reports stating their accomplishments such as 10 million alerts sent to people in the crisis areas (Ushahidi, 2023). This overlaps with a part of the artefact where it needs to emphasize the impact people have made using digital mapping tools on sites like OpenStreetMap and HOT. Showing how a tool or your platform has made a huge impact on the world just by user contribution and crowdsourcing will give people faith that as a collective, you can change the world and make a big impact. Even though the main users of Ushahidi are NGOs and humanitarian organisations and the artefact being created aims to influence new users who want to begin mapping, Ushahidi's adaptability and emphasis on public interest in humanitarian aid make it a useful resource for anyone looking to make a positive change.

Another platform that is like this project's artefact is the Missing Maps project created by Doctors Without Borders. This platform was launched in 2014 to map the most vulnerable places in the world (Scholz et al., 2018). Both Missing Maps and this project share the common goal of supporting and promoting digital mapping. While Ushahidi looks more into reporting acts of violence or crime, the Missing Map's website has a section called 'Ways to Get Involved' and it aims to make participation approachable by giving new users a range of options that suit different interests and ability levels. This is one of the main ways the artefact will combat the barriers people may face when they are at the beginning stages of digital mapping. Providing a section like this on your website shows the importance of raising awareness and offering resources for you such as Mapathans which is a good starting point for individuals with no prior mapping knowledge. There are a few areas that are different between



the artefact being created and Missing Maps. On the website, there will be graphs showing some of the impact made on various platforms. While on Missing Maps, they just have statistics and figures pointing out the impact they have made on society. By showing graphs that highlight the effects of mapping, it can have the ability to increase the users' interest. Missing Maps may not place as much attention on visualising the outcomes but instead concentrate on the actual mapping process. One feature that was interesting on the Missing Map website is the 'Medical Issues' section. This section gives you a description of diseases and provides facts stating their causes and how they can be treated (Doctors Without Borders, (n.d.)). One issue that was never thought about is the fact that some people may be mapping for a specific disease or illness but can be unaware of how infectious or life-threatening an illness can be. Including this section on their website, can increase enthusiasm in users who want to participate as they can prevent the spread of diseases and in some cases prevent death.

## **Conclusion**

By conducting this literature review and environmental scan, it was clear how big citizen participation in humanitarian mapping was. By looking at the start of digital mapping, it could be seen how powerful first-hand can be and how it helped first responders who used platforms like OpenStreetMap during the Haiti 2010 earthquake. The event influenced the development of even more mapping platforms like HOT and MapSwipe which are the three platforms addressed in this project. By looking at the barriers that people face while participating, it can be possible to remove them by providing users with the right resources, direction and assistance with the tools through tutorials. When addressing the issue of inclusivity and ensuring people all around the world have equal opportunity to help society, it can be possible to support global disaster responses and promote equal involvement. The environmental scan and analysis of platforms like Ushahidi and Missing Maps inspired the creation of 'How Can I Help'. Key lessons learned included looking at tutorials and showing impact through the use of graphs and visualisations that can hopefully empower new users to contribute to humanitarian aid with no barriers to face.

## **Tools/Methods/Design**

### **Reclaim Hosting & WordPress**

For this project, several tools and methods were used to create this artefact. Starting with Reclaim Hosting to host the WordPress site and also using the Python Library Pandas to create the graphs. This section will discuss the tools and methods used for the research and artefact creation. When looking for the best place to host the server, there was only one option in mind. Reclaim Hosting. Reclaim Hosting is a web hosting provider that is usually used by people in the education sector. It offers a simple-to-use interface in addition to all the tools required for efficient website creation and management. It was the perfect fit for the project because of its low cost of \$30 a year, and wide selection of plugins and themes which gave extra customisation and functionality. Another important factor and reason Reclaim Hosting was chosen was because of their ongoing support. On the website, there is a user community that contributed to a Knowledgebase section of the site. There is also a ticketing system where they will support and guide you on how to fix your issue instead of doing it for you to build your confidence using their site (Zafaripour, 2020). For the website to look appealing and accessible for the user, choosing a suitable WordPress theme played a big part in this project. There were several themes to choose from with their look and feel. To find the best one, several themes were looked at to see which fit the project idea, supported customisable menus, and were visually appealing but also had some simplicity as something too flashy or too overstimulating was not something the website needed. Eventually, the theme 'Kubio' was chosen as it was easily customisable and was simple to edit. A suitable website name was something difficult to pick, but after discussing with the project supervisor, the name 'How Can I Help?' (howcan-ihelp.com) was chosen. Everything sort of fell into place after picking this name. It tackles the main issue of potential volunteers wanting to help but not knowing where to begin in a simple and direct manner. It is welcoming and easy to type into search engines. There is almost a sense of urgency in the name. For example, in a real-life situation where someone is happening and you are unsure what to do, you might say 'How Can I Help?'.

### **Website Interface & Logo**

'Kudio' was used to provide more customisation, and visuals and improve the user experience of the website by customising text and transitions when first entering the site. By using Kudio, it allows you to design, and add interactive and eye-catching components to your website such as scrolling efforts, animated headlines and sliding texts. The effects these give your website

make it more enticing and interesting which can have the ability to lure users to explore the contents of this site. For this artefact, it was important to have this on the homepage of the website as you want to make a good first impression on the users. So upon entering the website, emphasis was put on the name of the site 'How Can I Help?' and also the 'Get Started' and 'About' sections, so Kudio was used to add a fade in and a sliding animation for those two buttons as it takes you straight into the 'Get Started' section where the user figures out what platform works best for them or you can go straight to the 'About' section to get information about the creator and the project inspiration.

The primary colour of the website is green. When choosing what colour to represent this artefact, the colour had to fit with the concept of humanitarian aid and support which is why green was chosen. Initially, the colour red was an option due to most aid symbols containing this colour such as the Irish Red Cross or even HOT. But I wanted green to be the main colour as it is the universal symbol of 'go'. Immediately when people see the green logo and the colour of the overall website, it will make them feel calm, not overwhelmed and make them want to keep reading. (Kurt & Osueke, 2014) state that green can help people adjust to new environments which is why designers sometimes incorporate green into restaurant lobbies, hotels and office spaces. Since people who come onto this website will mostly be new users who haven't explored digital mapping much before might experience this exact feeling and it will have a positive impact on their learning. In regards to this project, it represents growth for both the person who is contributing and also the growth of society as more people are engaging. Green is a reminder of the possibility of good change and the strength of group collaboration in tackling global issues, just as it symbolises the flourishing life in nature.

When creating the logo, Looka.com was used. Looka uses AI and your design preferences to help you create your logo without any prior design experience. Upon entering the site, you put the name of your website, and click on a few terms that relate to your project theme such as 'Care' and 'Humanity'. The site then generated an extensive collection of pre-designed templates that can all be modified to meet the requirements and preferences you may have. Initially, the logo was only supposed to have the name 'How Can I Help' but Looka suggested a logo that had a handshake symbol which fit the concept perfectly. A handshake is a representation of action, community, confidence and most importantly partnership. These are crucial components in the field of humanitarian aid. It is an indication of the formation between

volunteers and non-profit organisations. Encouraging trust in the platform and the possible influence of their work.



*Figure 23 Artefact's Logo*

### **Timeline JS**

Timeline JS is a tool which is important in Digital Humanities as it allows you to show stories between people and involving actors visually (Sim, 2021). It is open-source and allows you to create dynamic and interactive timelines. Creating a timeline that can highlight the development of digital mapping with timeline JS interactively can make the website more eye-catching and provide the users with the experience of looking at the story being told in addition to images and YouTube videos to give more context. To begin the process, you must go onto the website <https://timeline.knightlab.com> where you can get the template to begin creating the timeline. Upon entering the website, they provide you with all the information you need to create your timeline. This includes sample timelines to see the capability of their tool, tips and tricks as well as a step-by-step tutorial. The Google Doc they provide you contains different columns for things like the start and end date of your event, times, headline, text and media which can be seen in Figure 1. This is used to create the timeline.

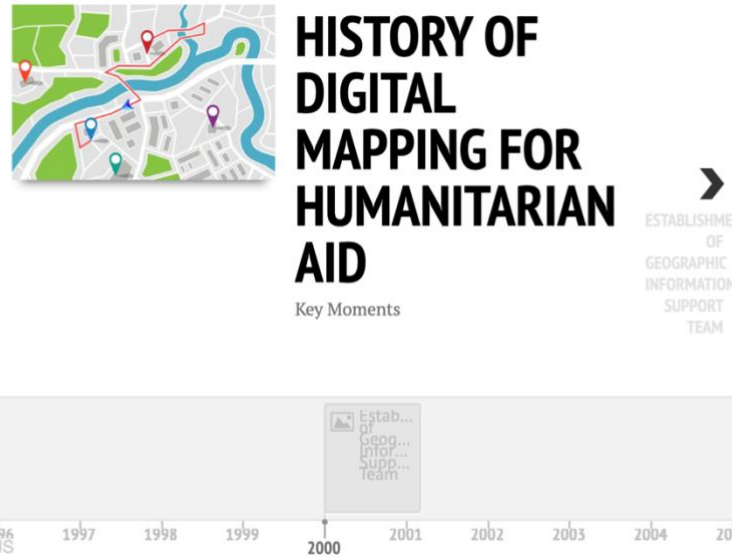
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Year	Month	Day	Time	End Year	End Month	End Day	End Time	Display Date	Headline	Text	Media	Media Credit	Media Caption	Thumbnail
2										Google Spreadsheet Example	This is a test of using google spreadsheets as a source for the timeline tool. This is a 'title' slide, so it doesn't need a date. It automatically occurs first, and doesn't appear in the timeline below.	<a href="https://www.flickr.co">https://www.flickr.co</a>	Zach Wise/verite.co	<a href="http://www.flickr.com/photos/zachwise/6115056146/" title="Chicago by zach.wise, on Flickr">Chicago by zach.wise</a>	
3	2011	11	1		2011	12	15			Another Flickr Example	It's Easy to Make Your Own Timeline	<a href="https://www.flickr.co">https://www.flickr.co</a>	Zach Wise/verite.co	Chicago to NYC	
4	2011	11	16	05:58:44	2011	11	16	07:30:00		Vimeo Example	Illustrate your Timeline with photos, videos, tweets and more.	<a href="https://vimeo.com/1">https://vimeo.com/1</a>	Knight Lab	A video about how to make timelines!	
5															
6															
7															
8															
9															

Figure 1 Pre-edited Google Doc

For the timeline, only the 'Year', 'Headline', 'Text' and 'Media' columns were required for the information that was to be put on the timeline. The images associated with each event were acquired from Google Images and the link was acquired by right-clicking the image and copying the image address. This was then pasted into the 'Media' section of the document. For the YouTube video linked onto the OpenStreetMap part of the timeline, the link to the video was pasted into the same section. The final document can be seen below in Figure 2. By saving the document, and copying the URL, you can paste it onto the Timeline JS website to obtain your embedded link for the timeline.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Year	Month	Day	Time	End Year	End Month	End Day	End Time	Display Date	Headline	Text	Media	Media Credit	Media Caption	Media Thumbnail
2										History of Digital Mapping for Humanitarian Aid	Key Moments	<a href="https://www.natic.gov">https://www.natic.gov</a>			
3										Establishment of Geographic Information Support Team	The United Nations establishes the Geographic Information Support Team (GIS) to support the use of Geographic Information Systems (GIS) in humanitarian aid and peacekeeping operations.	<a href="https://nmsj.edu/eeq">https://nmsj.edu/eeq</a>			
4	2000									Founding of OpenStreetMap (OSM)	OpenStreetMap (OSM) is founded as a free and editable map of the world, becoming a valuable resource for humanitarian mapping efforts.	<a href="https://youtu.be/d6in">https://youtu.be/d6in</a>			
5	2007									Haiti Earthquake Response and Emergence of HOT	The Haiti earthquake prompts the rapid deployment of digital mapping tools and volunteers to assist in disaster response efforts, leading to the emergence of the Humanitarian OpenStreetMap Team (HOT) as a key player in coordinating volunteer mapping activities.	<a href="https://avatars.github">https://avatars.github</a>			
6	2010									Launch of Missing Maps Project	The Missing Maps project is launched by HOT, Médecins Sans Frontières (MSF), British Red Cross, and American Red Cross, aiming to map areas vulnerable to humanitarian crises.	<a href="https://upload.wikim">https://upload.wikim</a>			
7	2012									Nepal Earthquake and Digital Mapping Response	The Nepal earthquake and subsequent humanitarian response highlight the critical role of digital mapping in disaster preparedness and response, with thousands of volunteers mobilizing to map affected areas using OpenStreetMap.	<a href="https://i.natigeofe.co">https://i.natigeofe.co</a>			
8	2015									COVID-19 Pandemic and Acceleration of Digital Mapping for Public Health	The COVID-19 pandemic accelerates the adoption of digital mapping for public health responses, including contact tracing, disease surveillance, and resource allocation, emphasizing the importance of geospatial tools in crisis management.	<a href="https://admin.concer">https://admin.concer</a>			
9	2020														
10															

Figure 2 Completed Google Doc



## Creation of Graphs

The best way to demonstrate the impact already made by OpenStreetMap, HOT and MapSwipe, was to create graphs. Creating insightful and eye-catching graphs was an important part of showcasing the data and stats for this project. To do this, the Python library ‘Pandas’ was used. This library offers tools that make it easier to access, process and visualise data. The NumPy library is one of the libraries that Pandas draws upon. Additionally, it is frequently used with graphing libraries like Seaborn and Matplotlib (Hunt, 2023). The concept of using Python and Pandas to create graphs for data visualisation was introduced in the 2<sup>nd</sup> year of the course in a module called ‘Data Analytics for Digital Humanities’. In this module, they introduced the process of downloading datasets and creating graphs with them using Google Colab to run the code. Using Pandas opens the possibility of creating different graphs such as bar charts which can be used to compare different values vertically or horizontally, pie charts that can summarise a set of categorical/nominal data while emphasizing the difference in proportions and line plots which can be used to show many values over time. Google Colab is a free-to-use service that is cloud-based and uses the Jupyter Notebook environment by Google. It enables users to carry out machine learning, data analysis and visualisation tasks as well as develop and execute code in many languages such as Python and this case, Pandas. Due to its user-friendly interface, accessibility and ease of access, it is often used by students, software engineers and data scientists (Sukhdeve & Sukhdeve, 2023).

## Data Collection

### - OpenStreetMap

When collecting the data for the graphs, there was no such struggle as platforms such as OSM and HOT are open-source and you can access a lot of their data through various channels and websites. For the OSM graph, a few sites were visited to see what type of data they could provide. The main site that showcases a variety of statistics is <https://wiki.openstreetmap.org/wiki/Stats>. This site is sort of like an online repository for technical documentation, support material and marketing information to all things OpenStreetMap. Used by contributors and users for instructions and anything related to mapping with their platform. A section of this site contains statistical information relating to the expansion and growth of the OSM database and community. Upon entry, It was very overwhelming and difficult to navigate and find a place to collect the data as there were so many websites to visit and a variety of data to use. Eventually, if you scroll towards to bottom of the page, there is a section labelled 'External sites with active statistics and reports' and this is where the data for the graphs were collected. On <https://osmstats.neis-one.org> you can find statistics about OSM users and elements. For the OSM section of the artefact, the graph was to show the amount of created edits made in the top 5 countries. By doing this, it would serve as a motivator to convince people to contribute. Also, it might give potential users a feeling of friendly competition and show a potential digital divide.

No.	Country	Contributors (organised)	Map changes (organised)	Created	Modified	Deleted
1.	<a href="#">Germany</a>	932 (0%)	135583 (0%)	56928	60087	18568
2.	<a href="#">United States</a>	745 (6%)	393332 (0%)	309248	66763	17321
3.	<a href="#">France</a>	439 (1%)	96179 (0%)	52967	36009	7203
4.	<a href="#">United Kingdom</a>	270 (2%)	79743 (0%)	52199	23319	4225
5.	<a href="#">Poland</a>	259 (1%)	79297 (0%)	50660	20381	8256

*Figure 3 Top 5 Contributing Countries in OpenStreetMap*

The part of this list the data was taken from was the 'Created' section which ranged from 50,000 to 250,000 as seen in Figure 3. It was difficult to get the exact date the data was extracted as the statistics are constantly changing as it shows live information so the information may be slightly different from what you see today.

The figures were then taken and used to create a bar graph on Google Colab. Once the data was collected, matplotlib was used to create the bar charts.

```
import matplotlib.pyplot as plt
import pandas as pd
```

```
created = [57138, 250573, 62850, 65827, 70549]
country = ["Germany", "US", "France", "UK", "Italy"]
```

*Figure 4 Importing the Library and Creating the Lists*

In Figure 4 the Matplotlib and Pandas library were imported but were given an alias of 'plt' and 'pd' to make it easier to access the functions. Then by using the data found on <https://osmstats.neis-one.org>, it was defined and two lists were created to store the number of edits created and the other to store the country names.

```
ys = range(len(country))
```

*Figure 5 Creating a List Using Functions*

To show the range of the bar chart for the 5 countries, A function was created to calculate the number of indices for the 'country' list which gave each of them a position from 0-4.

```
plt.barh(ys, created)
plt.yticks(ys, country)
plt.title("Number Of Created Edits in Top 5 Countries")
plt.xlabel('Number of Created Edits')
plt.ylabel('Countries')
```

*Figure 6 Creating the Bar Chart and Labelling the Axis*

To create the bar graph, the plt.barh code was called upon as well as creating the axis for the country and creating lists. The title of the bar chart was added alongside labelling the x and y-axis (Figure 6)

There were a few limitations when creating these graphs and it came down to personal knowledge. It had been a few years since using Pandas for data analytics so any previous knowledge was forgotten or a bit blurry. Past notes and lettuce slides were available on Canvas



to gain more knowledge when it came to cleaning up the chart. When the graph was created, I noticed that the sections for the UK, France, Italy and Germany looked quite similar length-wise as their figures were drastically different from one another. To avoid confusion when reading the graphs and not knowing who is in what place, sorted\_function was used (Figure 7). Arranging the countries and edits in ascending order (Figure 9)

```
sorted_data = sorted(zip(created, country), reverse=False)
created, country = zip(*sorted_data)
```

Figure 7 Sorting Data in Ascending Order and Put into Separate Lists

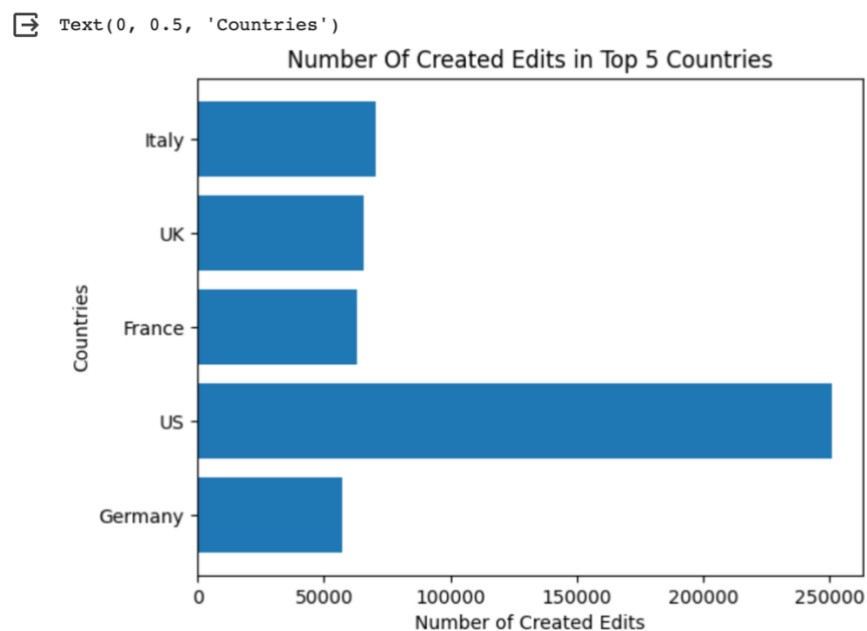


Figure 8 Bar Chart Before Ranking

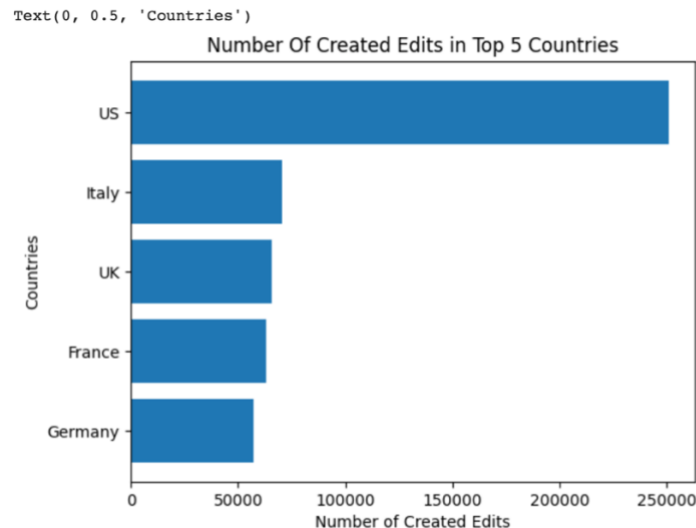


Figure 9 Bar Chart After Ranking

### -Humanitarian OpenStreetMap Team (HOT)

When collecting the data for the Humanitarian OpenStreetMap Team graph, a lot of thought was put into what sort of data would convince people to contribute. Upon entering the homepage of their website, they had a section in 'Our Works' that displayed all the projects available for people to work on and it gave me the idea of compiling all the projects they had into sections and displaying them on a pie chart for new users to look at. There were 89 projects displayed on the website and they were organised into four categories; 'Disaster Response/Activation/Recovery', 'Geospatial Data/Mapping Projects', 'Capacity Building/Training Programs', and 'Other Projects/Initiatives'. By categorising the information in this way, it makes it easier for the user on 'How Can I Help' to see what types of projects are available, the amount they have and eventually lead them to the official HOT websites for them to find specific projects they are interested in. The pie chart also illustrates the impact of the organisation's work and can inspire people to become more involved and want to change the world in a real way.

Similar to creating the bar chart, The 'matplotlib' was imported as 'plt' as well as 'Pandas' so Data Frames could be used. A dictionary was used so I could pair the key with the values so I added the project categories with the amount of projects in each one.

```
import pandas as pd
import matplotlib.pyplot as plt
```

```
data = {'Disaster Response/Activation/Recovery': [26],
        'Geospatial Data/Mapping Projects': [30],
        'Capacity Building/Training Programs': [20],
        'Other Projects/Initiatives': [13]}
```

```
df = pd.DataFrame(data)
```

Figure 10 Importing Pandas & Matplotlib and Placing the Data into a Dictionary

Next was to create the actual pie chart by using `plt.pie`. The pie chart had to look as clean as possible so the percentages were set to 1 decimal place by using the `autopct="%1.1f%%"` code (Figure 11). As well as cleaning up the percentages, The project names that were displayed on the pie chart were moved to make it look more neat, a legend was added so the users could match the colour of the slice to the colour of the project group in the legend. It was quite difficult to find out how to move the legend of the pie chart because when it was first displayed, it would only show up in the middle of it instead of moving over to the space on the right. After some research, it can be accomplished by using `loc=(1.1, 0.5)` which would move the legend over towards the right-hand side (Figure 11)

```
df = pd.DataFrame(data)
```

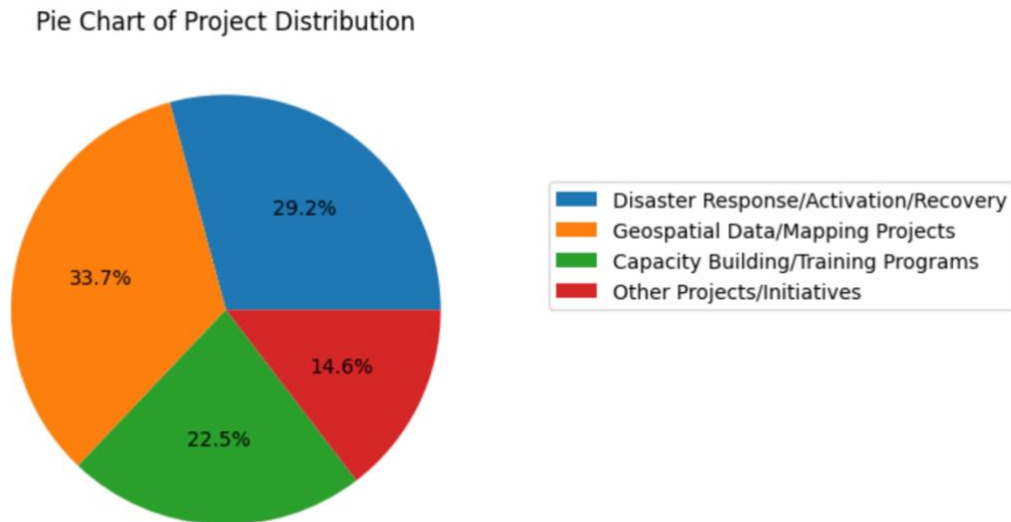
```
pie_chart_slice_labels = df.columns.tolist()
```

```
pie_chart_slice_values = df.values.tolist()[0]
```

```
plt.pie(pie_chart_slice_values, labels=None, autopct="%1.1f%%")
plt.title("Pie Chart of Project Distribution")
plt.legend(pie_chart_slice_labels, loc=(1.1, 0.5))

plt.show()
```

Figure 11 Extracting Values from the Dataset, Setting Values to 1 Decimal Place and Naming the Pie Chart



*Figure 12 Pie Chart Displayed*

The process of categorising HOT projects and initiatives using Pandas, and Matplotlib and displaying the data on a pie chart offered users an insight into what HOT aims to help society with. Therefore, giving new users interested in mapping for humanitarian aid a visual way to understand the opportunities available for them if they align with their interests. Which addresses some of the barriers people face when wanting to participate.

### **-MapSwipe**

As MapSwipe is the only mobile application of the 3, The data for the graph aimed to look at the amount of time people spent contributing to this application. Recognising the impact of commitment to humanitarian initiatives and viewing the total amount of time spent contributing each year might give people the push to spend even a small bit of time to help improve the quality of life for those in need. This process was probably the easiest data to collect in comparison to the other 2 platforms. On the [mapswipe.org](https://mapswipe.org) website, they have a section called 'Community' that contains all the data they have collected from their users such as total swipes, and contributors, and the 'Community Statsboard' that contains community data that you can view from today and other years. They had a section called 'Time Spend Contributing' which could display the information in days, months and years. For the sake of convenience and readability, The data was converted into days as it would be difficult to display data that have different values such as displaying '7 months' and then '1 year and 3 months'.

Similar to creating the pie chart for HOT, you would call for both the Matplotlib and Pandas libraries. A dictionary was created and called 'data' which contained the 5 years alongside the number of days for each one. The DataFrame was created for the data dictionary (Figure 13).

```
import matplotlib.pyplot as plt
import pandas as pd

data = {
    'Year': [2019, 2020, 2021, 2022, 2023],
    'Days': [234, 425, 517, 1395, 395]
}

df = pd.DataFrame(data)
```

*Figure 13 Importing Matplotlib and Pandas. Creating Two Lists for Years and Days*

When displaying the graph, kind='line' was called for to get the line graph, and the opacity was set to 1 as the graph had to look like a line instead of having it filled in. The dimensions were set to 10'6 (width and height) (Figure 14)

```
df.set_index('Year', inplace=True)

df.plot(kind='line', stacked=False, alpha=1, figsize=(10,6))
plt.title('Amount of Time Spent Contributing')
plt.xlabel('Year')
plt.ylabel('Days')
```

*Figure 14 Creating the Line Graph, Ensuring it's not Stacked, Setting the Opacity, Height and Labelling this Axis and Graph*

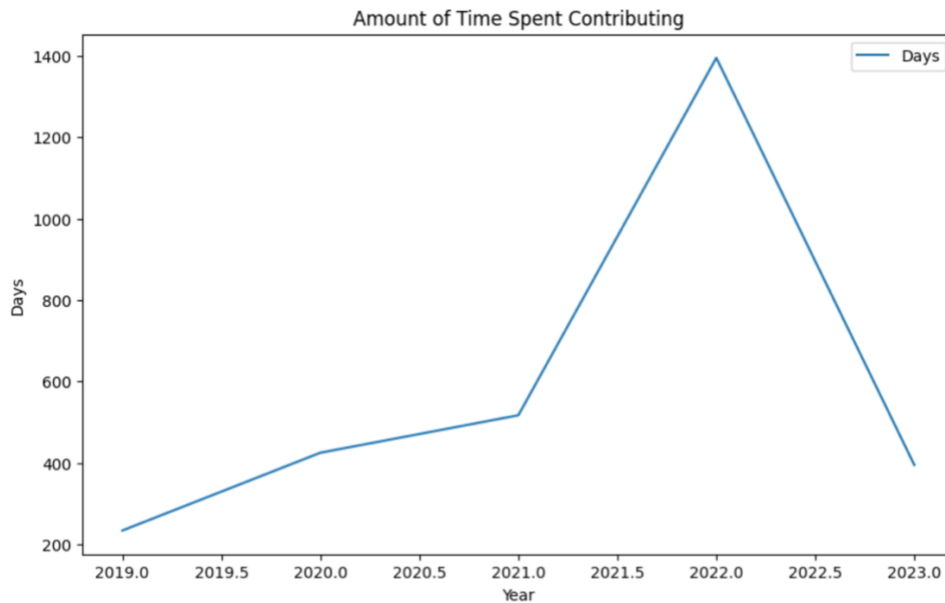


Figure 15 Completed Line Graph

For this graph, The data needed to be displayed from 2019-2023 as it can show the impact COVID-19 had. During COVID, we were mostly stuck at home as everywhere was locked down, so most of us spent our time on phones or our computers. Inevitably, at the end of lockdown and when things started opening back up again, people started spending less time on technology and returned to normal life. According to (Jonatan et al., 2022), the COVID-19 pandemic made mobile devices even more crucial for social connections and general wellbeing. As well as people needing to stay home and carry out their everyday tasks virtually such as work. This could be the reason why there was a huge increase in 2022 and then a sharp decrease thereafter. This can be a huge pull factor for getting people to join the MapSwipe community.

## Implementation/Artefact Design

This section will talk about the implementation and design of the artefact 'How Can I Help?'. This website acts as a place for new users who are interested in digital mapping to get started and find a platform that they are interested in and may need a helping hand in getting started. The overall goal is to combat the barriers that people may face at the beginning stage so users can start to make meaningful impacts on society. To do this, the website had to be designed in a way that would easily guide users and navigate them to the information they need.

## Website Features

In the beginning stages of planning this website, most of the focus was put on understanding the target audience. Since the website is for new users who have little to no mapping

experience, everything had to respond to issues that they may experience during this time. But it had to be explained simply so it would be easy for people to understand and follow along. After completing the literature review and environmental scan, a plan was made on how the website would be created and what it would contain. This involved graphs that convey the positive impact already made on these platforms to new users, a ‘Get Started’ section that has a brief description of the functionality of each platform, and its compatibility such as whether it is PC or Mobile. This will help with the confusion people have when it comes to accessibility. Some applications can have both a mobile and PC application so to avoid this confusion, it is stated at the end of each platform if it's PC or mobile only. A lot of the websites contain clickable links that will direct them to a page where it talks about the platform they choose. For example in Figure 16. ‘The OpenStreetMap’ is highlighted in blue so it catches the user's eye and can click on it to see the OSM section of the website. The same goes for the other platforms.

#### 1. OpenStreetMap

Are you interested in a building and creating a map in a community and collaborative driven way? If so OpenStreetMap is for you! On this site you can use your local knowledge to add missing details to your hometown or neighbourhood, make sure businesses and tourist attractions are accurate, map roads, routes, points of interest and buildings. Make your contributions come to life. The data submitted by its users can be used for a number of projects that involve urban planning and disaster response. Due to this flexibility, your contributions impact multiple areas. (PC only)

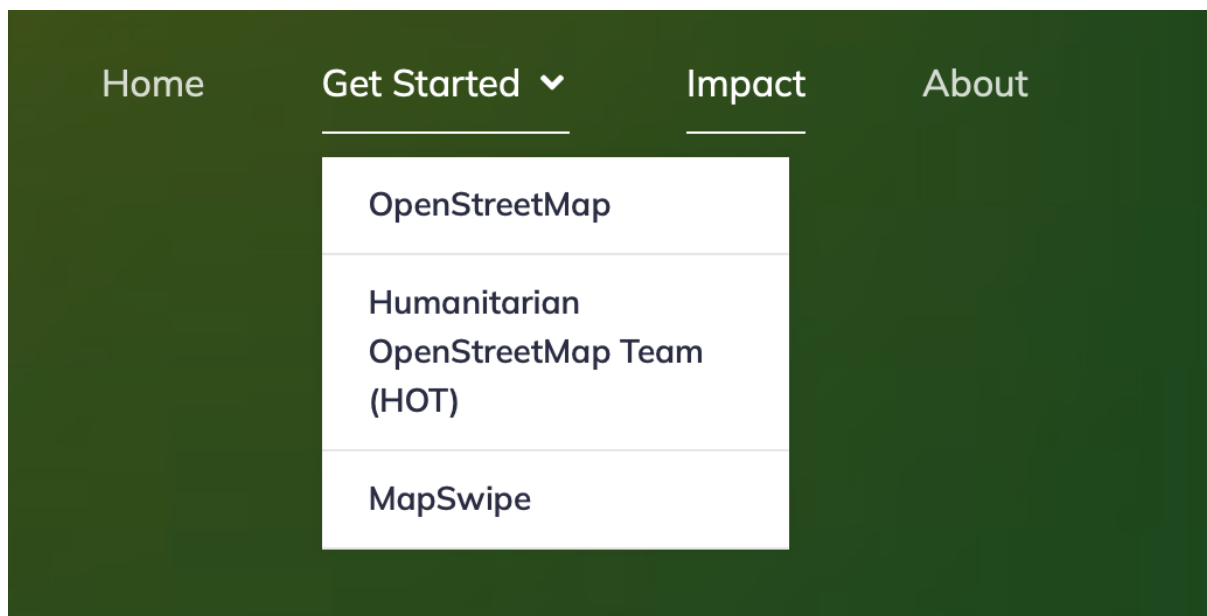
*Figure 16 OSM Section on the Get Started Page*

Upon clicking the link of the platform chosen by the user, they are brought to a new page that contains a video or multiple screenshots demonstrating how to use the tool. The OpenStreetMap page gives users a short introduction to what they aim to do and its role in society. In addition, there is a video recorded by me which demonstrates what it looks like to participate in a project. These tutorials are an important part of the website as they provide users with the knowledge and abilities they need to confidently take part in humanitarian mapping. These videos and screenshots are part of the approach to try and remove the barriers to participation as some users may assume that the software involved is complicated due to their limited experience but the videos, will prove to them that it is an easy process that gets better with more experience and time. The videos can be used as a reference point if one were to get stuck and unsure of how to map buildings or save their changes. In a study done by (Luke & Hogarth, 2011) where they asked students their opinion of videos for independent learning, one stated that when you inevitably get stuck, you can go back and watch videos to ensure you understand everything correctly. Users can learn at their own pace and gain the skills needed

to make valuable contributions to mapping projects with the help of these tutorials. This will hopefully guarantee the quality of data submitted by these users are accurate which is an issue questioned by more experienced users on these platforms.

### **-Menus**

As addressed in the Tools/Methods/Design section, selecting a theme played a big part in designing this artefact. The theme ‘Kubio’ was chosen as it was aesthetically pleasing and user-friendly. The responsiveness of the theme was taken into account as it had to look good and work with no issues on both PC and mobile. The website was starting to become an engaging place for new mappers to learn how to contribute to humanitarian mapping. Promoting the feeling of inclusion will hopefully aid in motivation also. The theme allowed the use of menus. By using menus, the users can navigate the website to find what’s relevant to them. The menu layout on ‘How Can I Help?’ makes it simple for users to browse through the website to find the different pages. In Figure 17, you can see the menu items listed on the website.



*Figure 17 Menu of 'How Can I Help?'*

To bring attention to the important features of the website and entice users to participate in humanitarian mapping, the menu layout was made to be organised and straight to the point. To increase the likelihood that users will act and participate in humanitarian initiatives, a dedicated menu area for ‘Get Started’ directs users to the featured platforms. The use of a drop-down

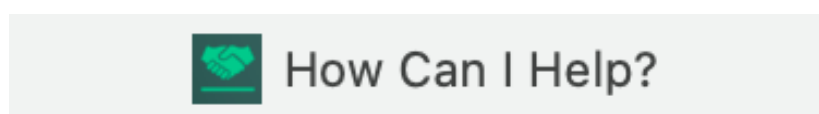


menu for that section was presented in a visually appealing way to increase the discoverability of content and increase engagement with the website.

The 'Home' page contains a small introduction to the website stating what it aims to do and the mapping platforms it addresses making the objectives clear to the user. The timeline created using 'Timeline JS' is also featured here. This interactive timeline explains the history of digital mapping and how it has progressed through the years. This engaging feature has multiple advantages. It gives users a better understanding of their potential contributions by offering insightful educational context on the development of digital mapping, it promotes user engagement by showing historical data with images and videos to increase interest as well as highlighting the beneficial effects of the groups that respond to crises. At the bottom of the page, there are clickable images of the logos of OpenStreetMap, HOT and MapSwipe to improve the user experience. Having the logos of well-known popular platforms can aid in credibility and trust which could pull users onto the website. Furthermore, making the logos clickable and embedded with a link to the respective pages of each platform provides a convenient way for users to get straight to the tutorials which speeds the navigation around the website.

The 'About' page gives users a more intimate and personal link to the project as you can learn some information about the author and what influenced him to create this project. Using strong phrases like "Discover how you can make a difference!" makes clear the main goal of the site and will hopefully inspire people. Establishing a personal connection with the users and sharing my enthusiasm for humanitarian aid and mapping will hopefully promote participation.

To add to the website identity, using a site logo provided a visual connection for the user. When visiting the site or searching it on Google, the logo helps to create a recognisable and unique identity as seen in Figure 18 that is special to the website and the overall message. Having the logo on the right-hand side of the website adds to the site navigation and functionality as when it is clicked, it brings you back to the homepage (Figure 19)



*Figure 18 Website Logo on Web Browser Tab*



Figure 19 Logo Displayed on Right-Hand Side of Site

## Analysis

This section will look at what was learned from completing the literature review, environmental scan and how this knowledge translated into the creation of the artefact ‘How Can I Help?’ The analysis will look at various aspects such as technological considerations, the platform's effectiveness when it came to achieving the original goal, unexpected challenges and issues encountered during the development of the artefact and a reflection.

### Literature Review & Environmental Scan

When analysing and understanding the barriers faced by users who participate in humanitarian mapping, the literature review was a key factor in analysing some of the difficulties. The research revealed that socio-economic issues, including differences in access to technology and lack of time, were some of the major issues. Furthermore, issues with the quality of data and its consistency demonstrated how crucial it is to improve user skills and strengthen verification procedures. The review also showed the differences in the barriers faced by users in different regions which showed the need for solutions to be customised for a wide range of users to close this digital gap that was found. The environmental scan offered useful information on the platform currently available to us. Platforms like Ushahidi and the Missing Maps project demonstrate various methods used to encourage citizen participation and tackle social problems. By analysing the characteristics, tools, and impact of these platforms, it was then used to develop ‘How Can I Help?’. For example on the platform ‘Ushahidi’, inspiration was taken from their use of video tutorials. The significance of tackling the issue of users worried about the complexity of these platforms was a barrier that needed to be solved. Tutorial videos were then put onto the artefact to guide users through the process of participating in a project from mapping buildings and saving your changes. By using these visuals, it also aims to simplify the mapping process and equip users with the knowledge needed to contribute successfully. Previous to creating the artefact, creating videos and screen recording was something new to me so knowledge had to be gained on what preinstalled screen recording software was available and if it worked smoothly while participating in the projects that would

be posted on the website. Although it was successful, it took a few tries and takes to get the perfect video without making any mistakes and with no hesitation in my actions. In the end, the videos ended up the way it was envisioned at the beginning stages. WordPress made the process of adding videos straightforward. Using the integrated block editor was the best way to do it. By placing the block and adding the media from the device's files, WordPress will incorporate the video onto the page immediately. Which was helpful when wanting to avoid any complications or having to use code to embed your video. The same goes for integrating the timeline onto the homepage of the website. After learning the history of digital mapping from the literature review and adding knowledge already learned, it made it easy to add information to the timeline for users to interact with. Timeline JS was a tool used previously in assignments so there was some familiarity when it came to using the tool and putting it onto the website. After filling in the Google Doc and copying the code, the Custom HTML block was used to paste the code and display the timeline. Just like integrating the videos, WordPress made this process so much easier and combatted any technical complication that could have arisen if another route had been taken.

### **Creating The Graphs & Data Collection**

The impact section of the website showed some of the importance of public participation on OpenStreetMap, HOT and MapSwipe and some of the projects available by creating appealing and easily understood graphs. This was done using Google Colab and the Python library Plotly which is used for data visualisation. By combining these, it was possible to create insights into the technical aspects of displaying data in an interesting and approachable way.

Using Google Colab and Plotly when creating the graphs for the impact section of the website proved to be an easy task after doing some revision. Although the graphs were not interactive, they provided valuable information and insight into the platforms. The static graphs still effectively showed the trends that could be found on each chart. The bar chart that showed the number of created edits in the top 5 countries in OpenStreetMap showed the global aspect of digital mapping for humanitarian aid. When analysing it, the main issue found was a digital divide as we could see the most edits created in the US, and Italy and not much in other countries which goes with what was discussed in the literature review where the socio-economic issue of digital mapping was found. Similarly, creating the pie chart for the HOT projects showing the project distribution showed the range of projects that are available for users to participate in and the line graph for MapSwipe the technical experience gained can aid

in any future project visions. Creating the graphs helped to enhance the overall technical skills previously had.

Finding suitable data to use for the graphs turned out to be quite a challenge at the start. This was because of the amount of data available online regarding digital mapping. It was overwhelming and since multiple sites had different kinds of information, It was difficult to locate trustworthy and accurate data that involved the three platforms. For example, on OpenStreetMap, they have a statistics page that contains various websites that have statistics showing the growth of the platform as seen in Figure 20.

<b>Statistics</b> tracking the remarkable growth of OpenStreetMap's database and community	
<a href="#">Database statistics</a>	Normally automatically updated every day. Performs analysis on the database that makes OpenStreetMap work – shows the number of ways, nodes, relations, etc. in the database. That page also shows the leaderboards for people uploading data. There is a <a href="#">historical dump</a> of this full data going back to 2007 and some basic data going back to 2005.
<a href="#">Taginfo</a>	<a href="#">Taginfo</a> analyzes OSM tag usage. Has many different reports on tags and also on the number of objects in the database.
<a href="#">Server statistics</a>	Showing the disk, memory, I/O, bandwidth stats of each of the OpenStreetMap <a href="#">servers</a>
<a href="#">very basic wiki statistics</a>	Showing basic statistics ( <i>for the <a href="#">job queue</a>, see <a href="#">site info statistics</a></i> ). Please note: more extensive statistics <i>distorted</i> from 2007-10-12 due to Proxy-Cache running in front of webserver.
Feature requests	Put your request on the <a href="#">talk page</a>

## In summary

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Figure 20 Multiple Websites for OSM Data

Towards the bottom of the page, there was also a section for external sites to obtain data (Figure 21). A lot of these websites had downloadable CSV files that contained data. Navigating these datasets to create the graphs proved to be challenging, especially since past experience with CSV files were downloaded from Kaggle and used for assignment practice, which left uncertainty regarding their complexity. So it was best to steer away from that direction and try to find data and create a unique dataset using the figures found on one of these sites. As stated in the Tools/Methods/Design section, the website <https://osmstats.neis-one.org> was chosen to collect the data. This was the best way regarding my technical skill in handling data as it helped to my deepen decision-making skills as you need to figure out how much data you want to use or how complex you want your graph to look.

## External sites with active statistics and reports

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Some external organisations reviewing/comparing OSM data statistics:

- [1] [Map Metrics](#) for OSM
- [Ohsome Dashboard](#) generates accurate statistics about the historical development of OSM data for custom regions, tags and time ranges. [OhsomeHeX](#) shows heatmaps of selected OSM features ([OhsomeHeX](#)).
- [OSMStats](#) – Shows statistics by Pascal Neis about OSM users and elements in the database.
  - [How did you contribute](#) – Statistics about every individual mapper.
  - [Statistics about added OpenStreetMap Notes](#) – Statistics about the [Notes](#) feature.
- [OSMQualityMetrics](#) – A set of Python scripts you can use to roll your own statistics, works with full history files as well.
  - [Brave Mappers](#) – A script that processes the output of aforementioned OSMQualityMetrics output into a [visual historical overview](#) of mapper activity for an area.
- [The most densely mapped locations in OSM](#) – (image and [link to a sloppy map version](#)).
- [Density Maps and Mapping Speed](#) for a few selected countries
- [live.openstreetmap.fr](#) – Pulse OSM Mapping (world)
- [OpenStreetMap servers - prometheus](#) live statistics
- [Statistics about tagged roads](#) length for each country with history, possibility to display info about specific road class. Last update of data in 2019.
- [OSM contribution statistics](#) monthly updated interactive statistics about contributions to OpenStreetMap using the editing changesets.

## External sites with archived statistics and reports

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- [Walking Papers](#) had some statistics on the usage [archived version](#)
- [Tutorial email](#) on how to measure highway length per country (November 2011).
- ["Geo-Analytics on OpenStreetMap Road Data" from Beyonav](#) – Old reports for 2009-2011.
- [Germany 2007-2011](#) – Pascal Neis paper analysed in detail.
- [Fossgis 2018 - Lügen mit Statistik, OpenStreetMap Edition](#) (de)

## See also

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- [Wiki:Statistics](#)
- [Research](#) – academic papers plus other research and university involvement
- [Quality Assurance](#) – tools for tracking (and sometimes statistically analysing) bugs in the data or the data itself
- [History of OpenStreetMap](#) – a prose description of the evolution of the project

Figure 21 External Sites Section of Website

Because of the issue and complication of trying to pick a website to get the OpenStreetMap statistics, it was decided to look at the official HOT website to find data for the graph. Instead of looking at quantitative data, qualitative data was used. The extensive search for data on the OSM site was a small bit confusing so this was an option to try out. In comparison to creating the OSM graph making a pie chart with the HOT projects was much easier and straightforward. However, it was a time-consuming task to try and organise the projects into their respective group as there were around 89 projects to sort through. But with patience and time management, you can learn how to find ways to speed up the process. By starting with projects related to disaster response, recovery and activation, it was easier to then sort the other projects as this one was the majority of the list. (<https://www.hotosm.org/projects/>)

When looking at data for the MapSwipe graph, it was again easier to acquire as they have a dedicated page ‘Data’ section on their website that contains the data they have collected from the users’ contribution (<https://community.mapswipe.org>). After looking through this part of the site, it was clear that MapSwipe has a well-organised system for collecting data on user

contributions, primarily on contribution and time spent contributing which is what influenced the creation of the graph on the artefact.

### **Overall Reflection**

When looking back at the artefact and the original goal set before the project, everything that was to be completed thankfully was achieved and in some cases even more. The website had to act almost like a support page that would answer issues and questions a new user would have when beginning their mapping journey as well as showing users statistics to try and show that their impact matters. Creating the graphs was successful though it would have been more impactful if the graphs were interactive. Nevertheless, hopefully, they will be able to showcase the data effectively to the user. Originally, there was no plan to include a timeline on the homepage but while finishing the artefact, there was a lack of interactivity available to the user. Adding this in filled that gap and had something for users to interact with. It was surprising how easy and quick it was to create as that was one of the main issues due to the amount of time left.

When looking back at the website design and layout, it came out a lot better than anticipated. The design of the website was something that wasn't the most important thing to work on as the creation of the graphs and UI of the site was more important to do. From looking at the platforms Ushahidi and Missing Maps and looking at their design for the environmental scan, these both had a unique logo and colour palettes. Thinking of how a logo would give the website its own visual identity along with a respective colour to evoke a certain mood which could affect how the user feels upon entering the website turned out to be a good way to keep engagement. Using Looka to create the logo was the best idea as it generated a logo for me based on the information I provided.

The knowledge that was gained from creating this artefact is something that will be valuable going forward. The most important thing gained and learned was the need to have a plan and to stay on top of the schedule you created. This was something that was created before starting but due to a few changes in the project idea, things got delayed and the original plan changed. Research played a big part in creating this website and by allocating your time correctly and spending the right amount of time on certain aspects can allow you to have the necessary skills and knowledge to achieve your goals. When comparing this artefact to other platforms like Ushahidi and Missing Maps, it isn't on the same level in regards to content, design and

interactivity but when looking at it from a beginner's standpoint, the artefact still shows that effort has been put in to provide a website to help society in a meaningful way. Overall, 'How Can I Help?' has achieved what was planned from the start and become a valuable tool for citizens who are interested in humanitarian mapping. The achievements and insight gained from this project provided the skills for any future improvements to the website as well as promoting the importance and need for mapping for social good.

## **Conclusion**

As this project concludes, reflecting on the development of 'How Can I Help?', shows the challenges addressed and ways to solve these issues. Due to planning, research for the literature review and environmental scan, the project was successful in combating some of the barriers faced by citizens participating in humanitarian mapping. Extensive research into the history of digital mapping and various barriers provided the information needed to sculpt the foundation of the website. This helped when creating the video tutorials and making the timeline to increase user engagement and interaction. Using Google Colab and Pandas to create the impact graphs was the best option for trying to show users how these platforms have been used in the past and how their impact makes a difference. Colab provided a coding environment where graphs could be created just by importing the Python library 'Matplotlib' to make visualisations like bar charts, pie charts and line graphs. Using Colab prevented the need to install any sort of coding language onto your device which avoided confusion. The choice of using WordPress and Reclaim Hosting as the foundation and host of the website was helpful when it came to the cost of hosting the website because they allow you to create a website for a low price. In addition to the low cost, WordPress provides a variety of themes and plugins that can be used and tailored to your needs and what your website requires.

When looking at aspects that could have been included or approached differently if there was more time available, it would be figuring out how to make my graphs interactive. Although the static graphs displayed the information appropriately, the interactivity between the user and the graph would have increased engagement. Exploring other 'Pandas libraries like 'Plotly' would have helped reach this goal by allowing users to interact with certain aspects of the graph to deepen their understanding of the data. Rather than using Looka to design and create the artefacts logo, utilising the multimedia skills gained in previous modules would help in the creation of a logo from scratch. Preferably using an application like 'Inkscape' that was used

to make logos for a website in 2<sup>nd</sup> year. There would have been a more personal feeling and uniqueness that would have been felt from a logo that was created from nothing. Having a forum for new users to ask questions and collaborate with other people on the same level as them was considered towards the end of the project but due to time constraints, it had to be left out. If included, it would have boosted morale among users having a place, to be honest, and ask for help without feeling like the questions you're asking aren't important enough to be answered. It would almost act like a safe space for people. Adding in profiles would make this experience better as users would be able to add in their interests or location on their profile and maybe other people with experience can help direct them to platforms they have heard about and can direct message them to point them in the right direction. In addition to the three platforms spoken about on the website, it would have been nice to have even more platforms to talk about to increase the variety of options for users to learn about. If users weren't interested in the platforms discussed, the website would not be of use to them so if there was more time, it would have been used to research more platforms. Preferably ones that are different from each other to cover all bases.

There is a lot of room for the future development and growth of 'How Can I Help?'. The main hope would be to collaborate with other platforms and groups to make the community bigger and promote digital mapping for humanitarian aid. For example, 'How Can I Help?' collaborating with OpenStreetMap officially could provide users with the opportunity to participate in workshops in person or online to try and help users get used to their software and a dedicated environment that will allow them to make mistakes as it improves their technical skills. Or even MapSwipe, if there was a section on their website that linked to 'How Can I Help?' to provide users a place to gain experience expertise on digital mapping in general would increase the number of users joining the website as well as advertising their platform and what they're capable of doing for society.

To finally conclude this project, 'How Can I Help?' has accomplished several milestones that were set out from the beginning but there is still much room for improvements and expansion in the future. Through partnerships with other platforms, increased interaction through the use of graphs, using multimedia skills to create logos and give the website its own identity, it will allow for this artefact to be a key player in the field of digital mapping for humanitarian aid and be a tool used to combat any future barriers faced by citizens.



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