

# Siboniso Ngcobo

## Portfolio for GIT 713

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“The good cartographer is both a scientist and an artist. He must have a thorough knowledge of his subject and model, the Earth. He must have the ability to generalize intelligently and to make a right selection of the features to show. These are represented by means of lines or colours; and the effective use of lines or colours requires more than knowledge of the subject — it requires artistic judgement.” ~ Erwin Josephus Raisz (1893 — 1968)



## About Me

I am Siboniso Ngcobo, Born in KwaZulu Natal, Eshowe. I'm a Postgrad student at Stellenbosch University, where I am pursuing a degree in Geo-informatics. I am a dedicated and hardworking individual who is passionate about the field of Geographic Information Technology (GIT). In addition to my studies. I am a part-time learning, teaching and assessment assistant for one of my previous modules where I help guide and mentor other students.

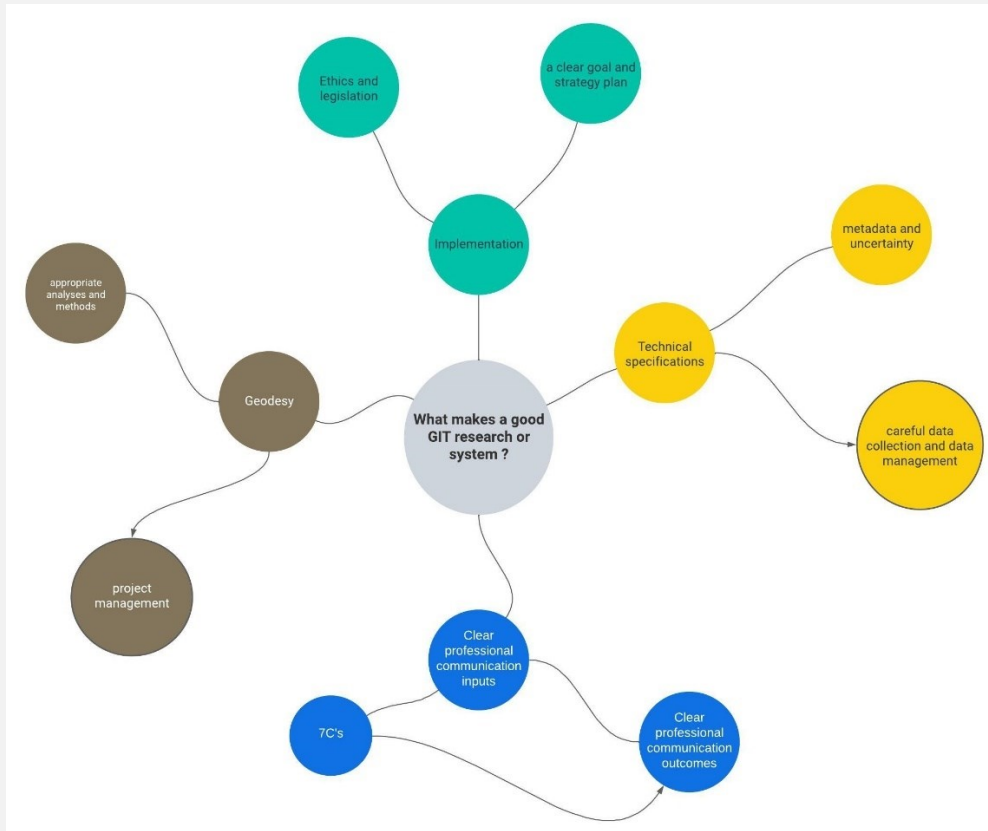
Today, I'll take you on a journey where I talk about the GIT 713, a module which gives an overview of the work environment and experience as a GIS professional & about the current project.

**More about me, [view CV](#)**

# Overview of GIT 713

GIT 713 is a module that provides students with a broad knowledge of Geographic Information Systems (GIS), including practical skills and theoretical concepts, and aims to prepare them for professional work in the GIS field. This module covers various topics, including GIS strategy and implementation, GIS legislation, business communication, ethics, GIS data management, databases, and metadata.

To explain how the interaction and connection of each concept makes a good geographical technology research or system, look at the mind map below.



For better understanding, [Click Here](#). This is brief explanation detailing the importance in the connection of the various components seen in the above.

This module sets out several learning objectives, including but not limited to:

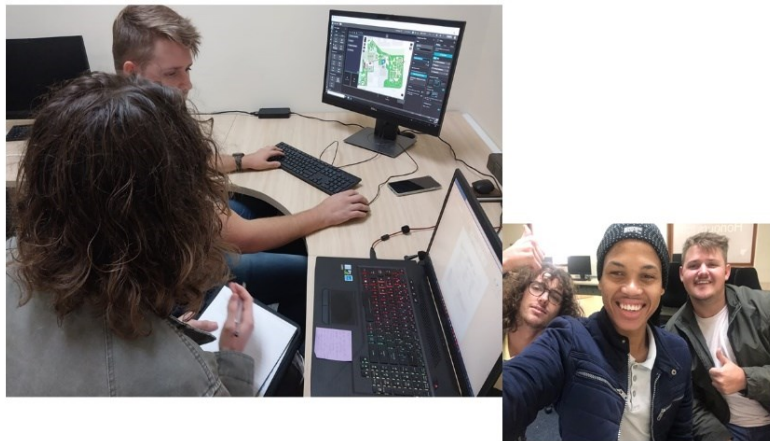
- Develop familiarity with various aspects of professional communication
- Gaining an understanding of professionalism and ethics in the context of working as a GIS practitioner
- Recognizing the impact of the geometry of the Earth on data collection
- Appreciating the significance of metadata and the quality of data sources
- Understanding the role of uncertainty in GIS
- Understand national legislation relevant to data and various aspects of the GIT profession
- Developing proficiency in strategy planning, database management and modelling.

## Role of Project Management

Project management is the use of skills, knowledge, and experience with agreed specifications to achieve a unique product. It involves planning the steps involved, how each step is to be executed, maintaining control over the budget, and ensuring the timely completion of each step. A project has a clear beginning and a clear ending. To conceptualize a project, numerous factors must be considered, such as budget, resources, tasks, and stakeholders. Project management can facilitate planning and tracking of a project's progress using tools such as mind maps, project charters, and Gantt charts.



### Related to the Botanical Garden Project



For this project, our client Dr. Don Kirkwood (curator of the botanical gardens) had a problem with the functionality of the current botanical garden map, and requested our aid as GIS Expert to make the map more interactive and user friendly. On this project we worked as a group of three, each individual had a unique skill set, so we

divided the work amongst us. Rutger attained the role of being the administrator as he has strong leadership skills while Joshua and I dealt more with the technical part since we were more experienced.

One of the challenges we experienced in managing the botanical garden project was ensuring that all stakeholders are aligned and working towards the same goals. Therefore, this meant that regular communication or meetings with the client, and other stakeholders was necessary to keep them informed of progress, address any issues or concerns, and ensure that everyone is working towards the same objectives.

Also, we used the Gantt chart to organize, sub-divide tasks, and track the progress. This helped us improve our overall efficiency and ensure that we met the deadline.

View [here](#) for our Gantt chart

We had a six-week timeline to complete the project which was not enough time considering the scope of the project, available resources, complexity of the tasks involved, and the experience of the team members. However, all the deliverables and objective were met, and we delivered the product on schedule. This experience gave me more insights on the importance of planning and organizing which can make the process of implementation more efficient.

## GIS Strategy and Implementation

A GIS (Geographic Information System) strategy is a plan for organizing, managing, and utilizing geospatial data to support specific objectives or goals. In the context of the project, after detailing and outlining our plan, the next phase was highlighting the important entities involved in the project and implementing our strategy. For this phase I understood how a good GIS strategy can play a significant role in the botanical garden project, from determining the mapping software necessary and data management to decision-making and improving the visitor experience.

As such we decided to utilize ArcGIS Pro and the online version for mapping and visual paradigm to compute our conceptual and logical design for our geodatabase. In some instances, we used excel to manipulate and update the point plant data.

The conceptual design phase was in the early stage in the development of a project. For this phase, we focus is on developing a clear understanding of the project requirements, brainstorming, conceptualizing, and creating a high-level view of the project.

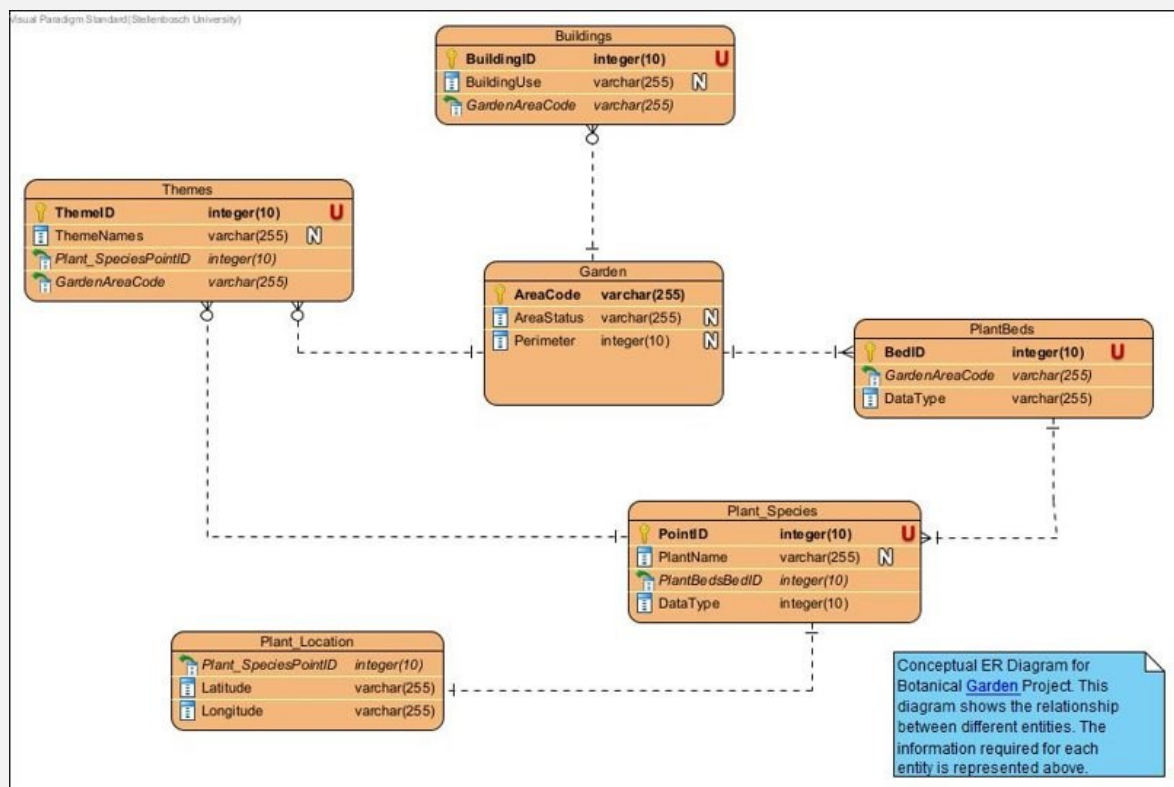


Figure 1 This is a conceptual diagram aids to help stakeholders better understand the project's goals and objectives

This was followed by the logical design phase. Since we now understood the scope, and conceptual functionality of the map. The logical design phase detailed the software and hardware, and determining the specific data needed to create the map. This also included how the web map will function, how data will be processed or analysed, and how the web map will be utilized.

This **logical** schema aided in ensuring that we had all the necessary data needed to produce a product that is technically sound and can be implemented efficiently.



## Data Collected

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The client was generous to give us the plant point data. Although the plant point data was given in an Excel sheet, it had some attributes missing. Additionally, the digitized polygon shape file of the botanical garden was provided, but the digitization of buildings was inaccurate with some buildings overlapping. We learnt the inaccurate data can lead to the propagation of errors which result in additive uncertainty. Figure 2 below shows the data provided and with data quality issues that needed to be addressed.



Figure 2 (a) Botanical Garden polygon shapefile with infrastructure, (b) plant collection shapefile

## Data wrangling

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Now this is where the fun begins! Data wrangling is the process of cleaning, transforming, and preparing data for analysis. In order to make an accurate and reliable interactive map of the botanical garden, it is essential to have complete and accurate data. Data wrangling makes this possible. For example, the missing attributes in the plant point data were edited via excel and filled in by contacting the data provider.

The incorrect digitization of buildings in the polygon shape file were corrected by using satellite imagery and visiting the botanical garden to manually update the polygons. Unnecessary polygons were also removed

The Figure 3 below shows the process of editing and digitizing some of the building polygons in ArcGIS Pro to make a faciaity layer or shapefile.



Overall, the project was a great learning experience. I learnt that managing a project and meeting its goals on time requires precise planning and management. Also, implementing the right steps at the right time is crucial to the project's overall outcome.

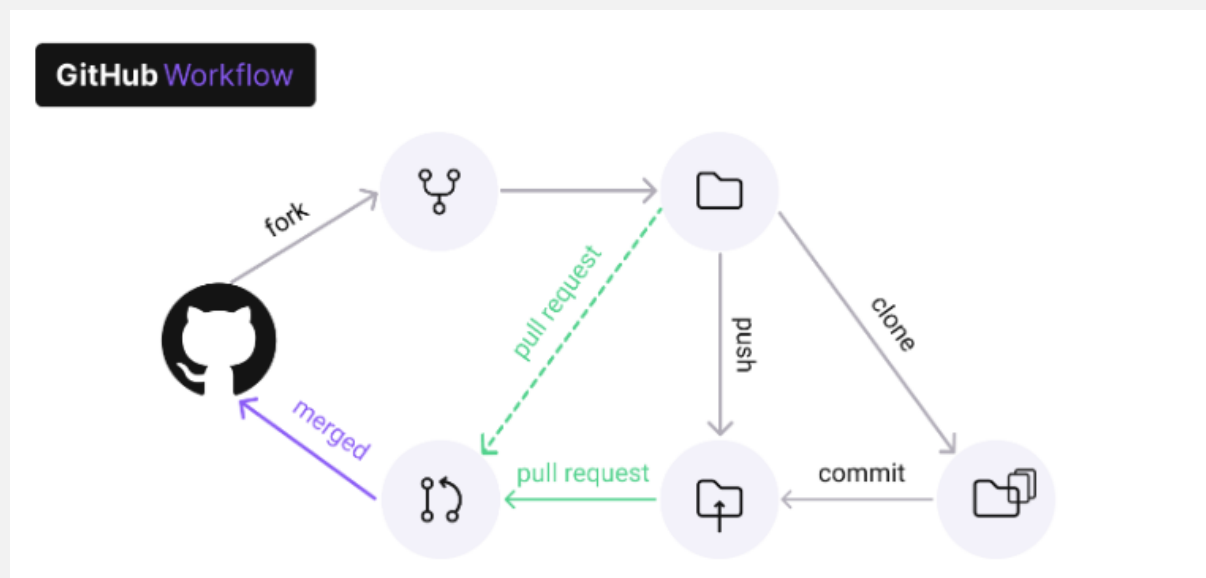
## Software development management

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Software development management is the process of overseeing the creation of software from its inception to its release. It involves managing resources, timelines, budgets, and teams to ensure that the project is delivered on time, within budget, and to the required quality standards. The process includes several phases, such as planning, designing, coding, testing, and deployment.

During the duration of the module, we had an opportunity to learn about software development management from the Centre for Geographical Analysis (CGA). We were introduced to a non-traditional approach to project management called SCRUM. SCRUM is an agile technique that emphasizes adaptive planning, continuous improvement, and evolutionary development instead of planning and following a Gantt chart for workflow and deliverables. Basically, the project is scoped, and a list of products/deliverables is created, followed by collaborative development.

They also introduced GitHub, A web-based platform that I wasn't exposed to which provides tools for version control and collaboration on software development projects. It allows developers to store, manage, and share their code with others. GitHub also provides a range of features, such as issue tracking, code review, and project management tools. In the context of the botanical garden project, we didn't have the opportunity to use GitHub as we were working on ArcGIS Online and Microsoft teams which provides the same functionality but focuses more on geospatial data.



However, I understood that GitHub can be used to facilitate communication and collaboration between team members. The issue tracking feature allows team members to report bugs and suggest improvements, while the code review feature enables team members to review each other's code and provide feedback.



## Closing Reflections

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Throughout the module and the project, I have improved existing and acquired new geographic information system (GIS) skills that will be useful in future. Throughout the module there are specific concepts that were interesting. Geodesy is one of the concepts, it is an interesting field of study because it helps understand the Earth's shape, orientation, and gravity field. This knowledge is essential for mapping positions, especially as a GIS Professional.

The other one is Participatory Geographic Information System (PGIS). PGIS is a fascinating field of study because it has the potential to contribute to more inclusive and democratic decision-making processes that are better informed by local knowledge, experiences, and value. This was a valuable experience and with the knowledge I plan on applying it in my research project.

I think the knowledge and skills I gained from this module exceeded my expectation, Professional communication is one of the valuable skills of which I think will be very helpful in one of my part-time jobs, as a learning assistant. With the range of skills I acquired, I was able to complete the Botanical Garden Project with efficiency. I gained more experience with our interaction with the client.

This experience will help me be prepare for my career in GIS and be better equipped to handle real-world projects and challenges. It is important to note, despite the range of skills I acquired, I still need to improve my skills in software development management, particularly version control, and social GIS(GitHub).

Overall, this was a great experience and I was able to configure how professional communication, ethics and legislation, and uncertainty connect or link.