

PATCHPLASTIC

From waste to wellness

ABSTRACT

The PatchPlastic project, part of the Reality Studio course at Chalmers University, focuses on community-driven design within the Malusi community, an informal settlement in Pretoria, South Africa. Through a blend of frugal design principles, mapping of local waste materials, and participatory processes, the project aims to enhance resilience, circularity, and well-being at a local health clinic in Malusi.

By involving stakeholders as community members, clinic patients, and staff, the PatchPlastic project addresses critical issues such as waterproofing the waiting space, sanitation improvements, and creating engaging spaces for children and adults. Educational aspects are a focus of the project and all interventions showcase innovative DIY-methods and multipurpose principles that can be adopted by the community. Realized interventions and possible future interventions are outlined in a Masterplan with three stages: the **current situation**, **short-term**, and **long-term**.

Keywords: frugal design : circularity : recycled materials : empowerment : well-being

Realized interventions respond to the most urgent challenges of the **current situation**. This include a bench outside the main gate, a rain shelter, a children’s area and blackboards to share information and activate the kids. **Short-term interventions** include a composting center and gardening station, while **long-term plans** involve a flood-safe path and a market stall for selling garden produce.

The project’s success lies in its ability to empower the community, foster ownership, and inspire sustainable solutions that resonate with the local context. As the project progresses, the hope is for the interventions to be utilized, maintained, and further developed by the community, leading to a lasting impact on the area’s well-being and sense of community.



CHALMERS
UNIVERSITY OF TECHNOLOGY

Chalmers University of Technology
ACE570 Reality Studio

*Master’s Programme of Architecture and
Planning Beyond Sustainability (MPDSD)*

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TABLE OF CONTENTS

1. BACKGROUND	
1.1 Reality Studio	4
1.2 The Team	5
1.3 UN SDGs	6
<i>Aim and Vision</i>	
1.4 Process & Methods.....	8
2. INTRODUCTION	
2.1 Project Timeline	10
2.2 Project Context	12
<i>South Africa</i>	
<i>Pretoria</i>	
<i>Informal Settlements in South Africa</i>	
<i>Malusi</i>	
2.3 Collaborations	16
<i>Stakeholders</i>	
<i>Key People</i>	
3. THE PATCHPLASTIC PROJECT	
3.1 Problem-Defining Workshop	18
3.2 Stakeholder Interviews	
3.3 The Masterplan	22
<i>Development Timeline</i>	
<i>Resource Mapping</i>	
3.4 Overview & Circularity	24
3.5 Participatory Process	25
3.6 Interventions	26
<i>Rainproofing & Water Collection</i>	
<i>Kid’s-Friendly Area</i>	
<i>Educational</i>	
<i>Exterior Waiting Space</i>	
3.7 Future Improvements	31
<i>Stall Module</i>	
<i>Compost toilet & Recycled Pavement</i>	
4. CONCLUSION	
4.1 Project Handover	33
<i>Final Workshop</i>	
<i>Feedback Session</i>	
4.2 Reflection	34
<i>Learnings & Outcomes</i>	
<i>Community Feedback</i>	
4.3 References	35
5. APPENDIX	
5.1 Logical Framework	
5.2 Workshop Result Tables	
5.3 Instruction Sheets	

1. BACKGROUND

1.1 Reality Studio

Reality Studio is an interdisciplinary course within the master's programme of Architecture and Planning Beyond Sustainability at Chalmers University. The course is open to architecture students and students in the industrial design programme. Reality Studio takes place in developing countries worldwide aiming to broaden the students' perspectives on contextual architecture and bottom-up approaches to engage the community. The heart of the course lies within the UN Sustainable Development Goals focusing on a holistic approach to sustainability encompassing social, environmental and economic aspects.

This year, three groups of students embarked on a five-week field study trip to Bangladesh, Kenya and South Africa. The project sites were situated in informal settlements where the students' task was to propose creative projects that address the community needs by engaging local stakeholders and the community members into the design process.

The focus of the projects are to take the local context into account and strengthen the power of the people through creating ownership and forming connections. The approaches used in the process are carefully considered to be able to be adopted by the local residents and aims to support future bottom-up initiatives in the settlements.

PatchPlastic is one of the projects from this year's studio situated in South Africa. The project is centred around the theme of frugal design, increasing health and well-being and improving the quality of the built environment through innovative design interventions with waste materials. To bring the project forward, close collaboration with the residents of Melusi has been essential in the process and aspects like affordability, buildability and knowledge transfer are key values of the projects.



1.2 The TEAM

The Paparazzi Isabelle Olsson

Being the shutterbug of the team, Isabelle does not miss a single detail of the process. You will find our star photographer from Sweden with a camera in her hand to make sure the team gets the most out of every situation!



The Iron Lady Maude Jacquelin

Always ready to heat up the iron, our plastic-melting expert from France brings a lot of creativity to the team. No matter the weather or time of day, Maude never hesitates to do something practical!

The Question Master Albina Lampa

Taking the role of the interviewer, Albina shows her natural talent in asking endless of questions. The Swedish question machine works hard to help the team understand the context and form new connections!



The Plastic Whisperer Stina Palmlöf

With an incredible sense for polymers, our Swedish plastic guru always manage to select the correct type of plastic to fuse. Stina's wise mind never lets the team down in the search for useful materials and resources!

1. BACKGROUND

1.3 UN Sustainable Development Goals

The United Nations Sustainable Development Goals (SDGs) are a universal call to action to end poverty, protect the planet, and ensure prosperity for all. Adopted by the United Nations Member States in 2015 as part of the 2030 Agenda, the 17 SDGs provide a comprehensive framework for addressing the world's most pressing challenges. Each goal is accompanied by specific targets and indicators to measure progress.

The SDGs recognize that sustainable development requires a holistic approach connecting the economic, social, and environmental dimension to achieve long-term change. In the PlasticProject we touch upon many of the UNSDGs with an indirect positive impact as a result of the project. The main focus though centers around three of the goals being to improve **good health and well-being, sustainable cities and communities** as well as **responsible consumption and production** patterns where we aim for a direct positive impact.

AIM

Our goal is to explore the potential of local waste materials as resources for frugal design approaches in informal settlements. We aim to engage the community in hands-on projects that demonstrate innovative, multi-purpose principles for everyday use. Our objective is to repurpose household waste and other materials found onsite, reducing the pollution of water and air caused by inadequate waste management.

VISION

Our vision is to foster creativity among residents by encouraging the use of local resources in innovative ways and empower women in the community through confidence-building workshops on DIY approaches to design and creation. Simultaneously, we seek to raise awareness about sustainable lifestyles and highlight the benefits of circularity in the operation of the health clinic.

"Make cities and human settlements inclusive, safe, resilient and sustainable"

11.3. By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

11.7. By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities

11c. Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

11 SUSTAINABLE CITIES AND COMMUNITIES



PATCHPLASTIC AIMS TO...

... Work with participatory design processes to enhance the feeling of ownership in the community and strengthen the voice of the people and their ability to influence the development of the township. The project focuses on creating a safe space for primarily women and children that is resilient and resistant to flooding and other weather related issues such as extreme heat.

"Ensure healthy lives and promote well-being for all at all ages"

3 GOOD HEALTH AND WELL-BEING



3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries

3.d Strengthen the capacity for early warning, risk reduction and management of national and global health risks

PATCHPLASTIC AIMS TO...

...Improve the operation of the local health clinic to ensure that opening when raining is a possibility. PatchPlastic aims to waterproof the waiting space and create a multi-functional health clinic that in the future can cover more health aspects than just doctor's appointments. For example provide the residents with information and classes in cooking, life skills and family planning. The overall goal is to improve the function of the clinic to hopefully enable expansion in the future so that health care can be provided to a larger number of residents.

"Ensure sustainable consumption and production patterns"

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



12.5. By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

12.8. By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

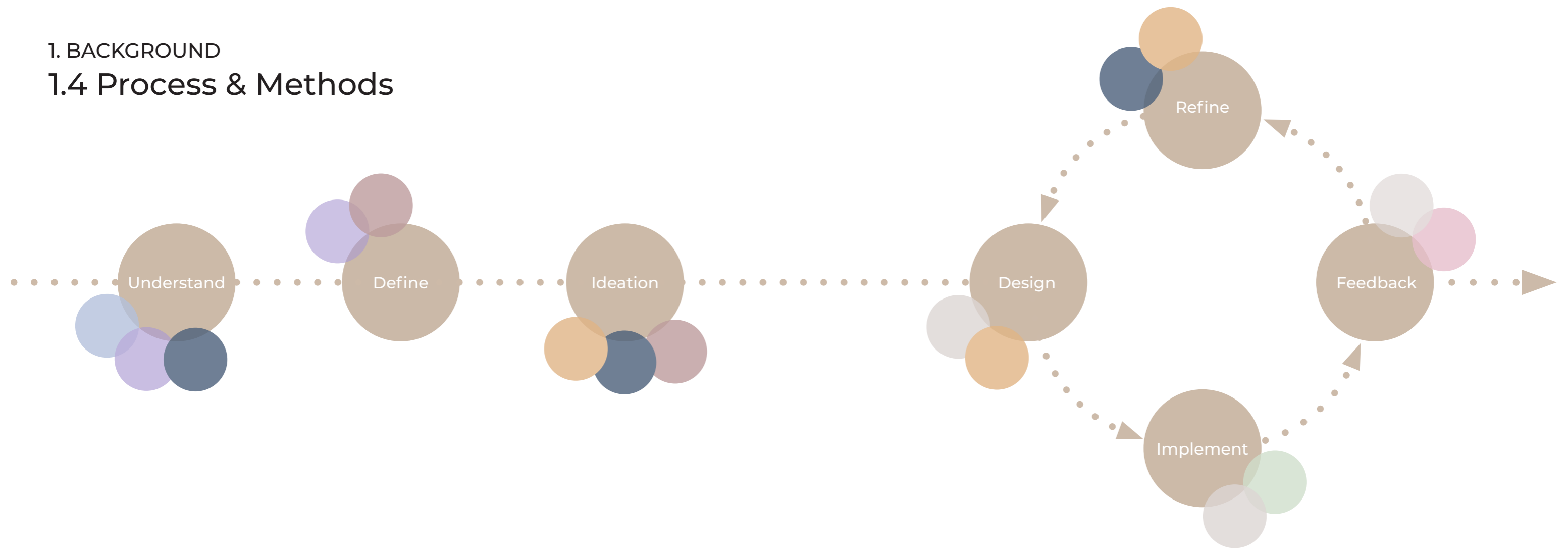
12a. Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production

PATCHPLASTIC AIMS TO...

...Implement circular strategies in the larger plan of the future operation of the clinic through composting waste from sanitation and food leftovers to be used in the garden combined with rainwater harvesting on site. Spreading the knowledge on innovative ways to use local waste materials will also minimize the burning of waste and improve air quality, water pollution and soil health.

1. BACKGROUND

1.4 Process & Methods



OBSERVATIONS

Working to understand the context of Malusi in Pretoria was an essential first step of the process. The settlement has its own economic system and informal operation of different functions which was challenging to grasp in the short amount of time we had. Spending almost every day on site, the aim was to walk around to observe and talk to residents in the area.

INTERVIEWS

To identify the main project partner being the health clinic interviews were conducted with community members, volunteers and employees at the clinic where we gained valuable insights into the challenges faced and opportunities for improvement. Listening to their experiences provided a deeper understanding of their needs and aspirations, guiding our design process forward. The interviews were informally structured and held with mainly women engaged in the clinic, but also shorter interviews were performed with other stakeholders such as the University of Pretoria, that funds the clinic, and the nurse working there.

WORKSHOPS

To identify the needs and opinions of as many patients as possible visiting the clinic need-finding workshops allowed us to engage directly with the community, fostering collaboration and co-creation. By facilitating discussions and activities, we identified key priorities and preferences, ensuring that our design solutions were rooted in the community's input and reflected their values. From these workshops the main challenges at the clinic became evident such as the non-waterproof waiting structure, lack of sanitation and kid-friendly activities in the waiting space. The patient's general comfort, interests and ideas for site-specific improvements was also examined.

PROTOTYPING

Prototyping played a central role in the design process, allowing exploration and testing of various solutions rapidly. Several prototypes of the plastic sheet and physical models of the structure enabled us to visualize ideas, gather feedback from stakeholders and refine the design iteratively.

THEORETICAL RESEARCH

Supplementing our process in finding relevant design methods literature studies was conducted to further explore building-with-waste-approaches and frugal innovations. Drawing on existing research on reusing plastic bags and scrap materials from cars, insights and inspiration was gained to inform our design decisions. Study visits to other health clinics in nearby informal settlements was also conducted together with Reba who worked for the University of Pretoria managing the clinics and their operation.

WORK & TALK

Regular work sessions together with the community in order to build and design the interventions facilitated collaboration and knowledge sharing. Using the work sessions to also discuss further ideas and thoughts with the residents was an effective approach to achieve a relaxed and comfortable setting for talking and exchanging information.

CO-CONSTRUCTING

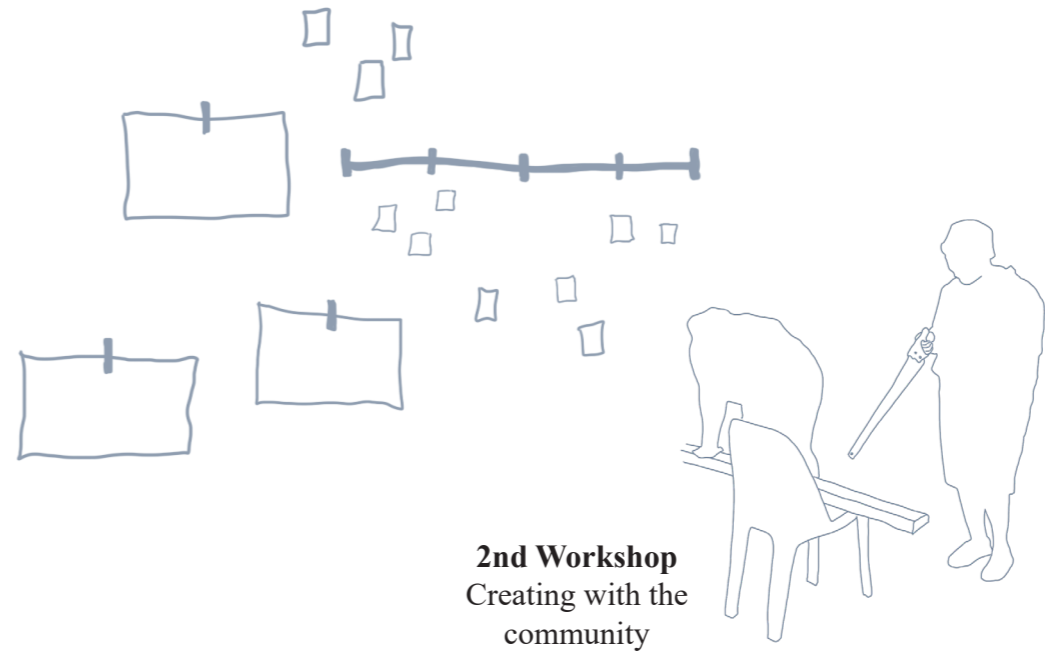
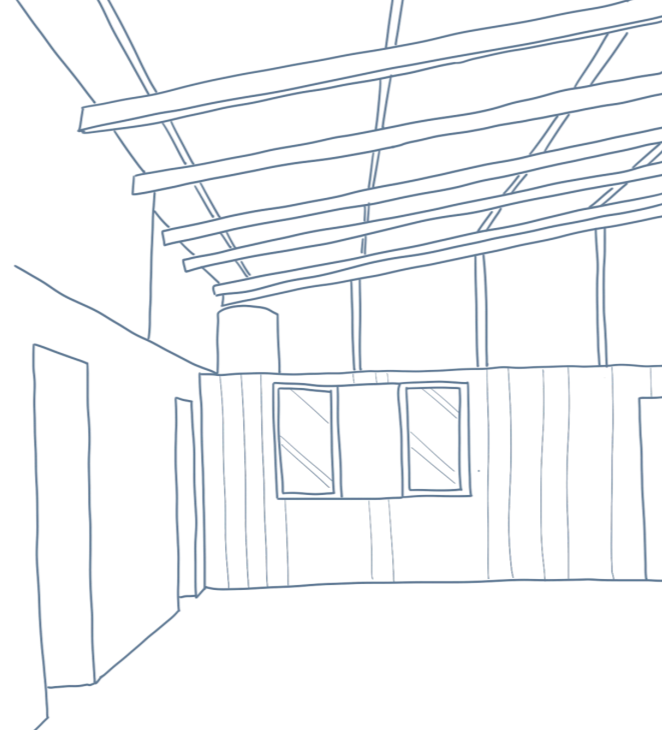
Embracing frugal principles in the construction, we leveraged local waste materials and simple techniques to engage the community in the building process. By using readily available resources and involving the residents as active participants the aim was to foster a sense of ownership and empowerment, ensuring that the final outcomes met their needs and were sustainable in the long term.

RECONNECTING

Continuously analysing and reflecting upon the prototypes and their possibilities together with the community enabled further understanding of the context and what makes a successful project. Reconnecting with stakeholders after the end of the field trip was also essential to receive updates and feedback on the final outcome of the project to continue the learning curve.

2. INTRODUCTION

2.1 Project Timeline



Reality Studio
2024
Hammarkullen

Group formation

Project and
stakeholders
selection

Stakeholder meeting
Interviews

1st Workshop
Mapping needs and
interests

2nd Workshop
Creating with the
community

Material search
Local waste and
available resources

3rd Workshop
Building with the
community

Last day on site
4th Workshop
assembling and
presenting to the
stakeholders

Postfield studies
Handover to the
community

18.03

22.03

10.04

17.04

24.04

05.05

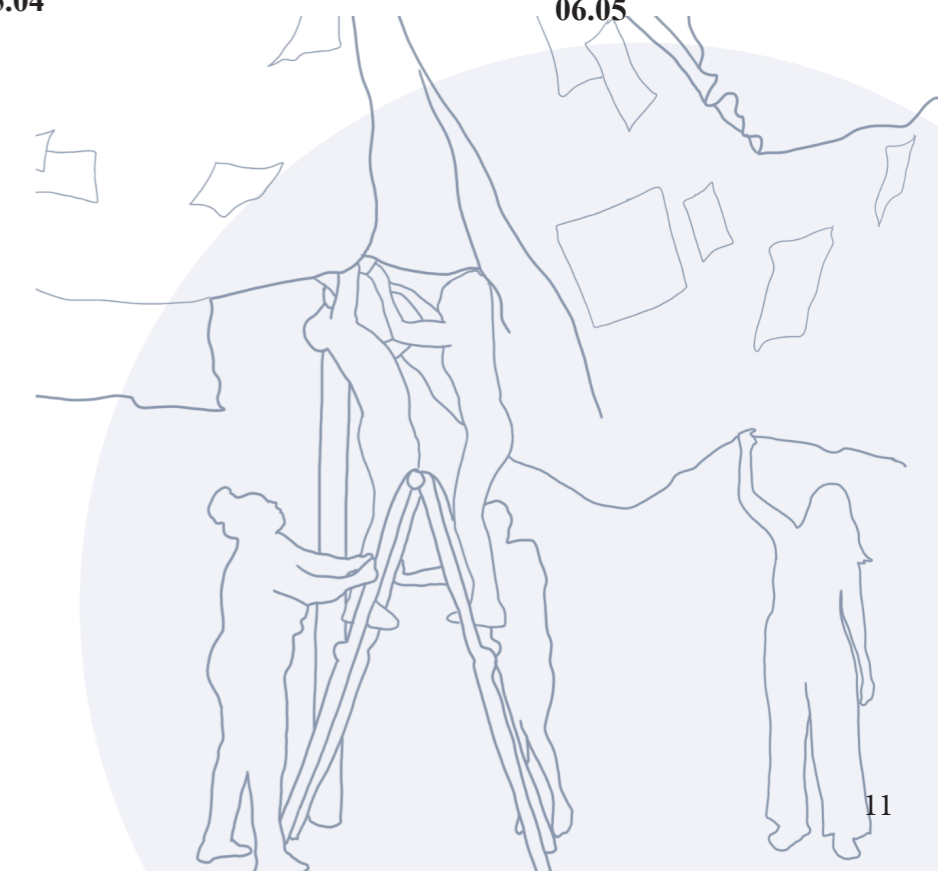
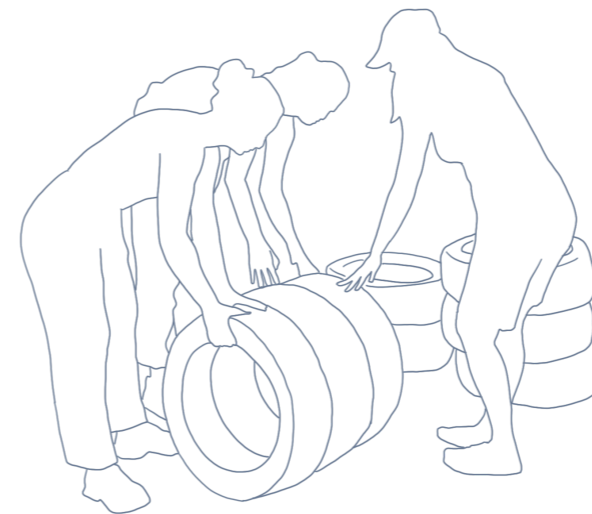
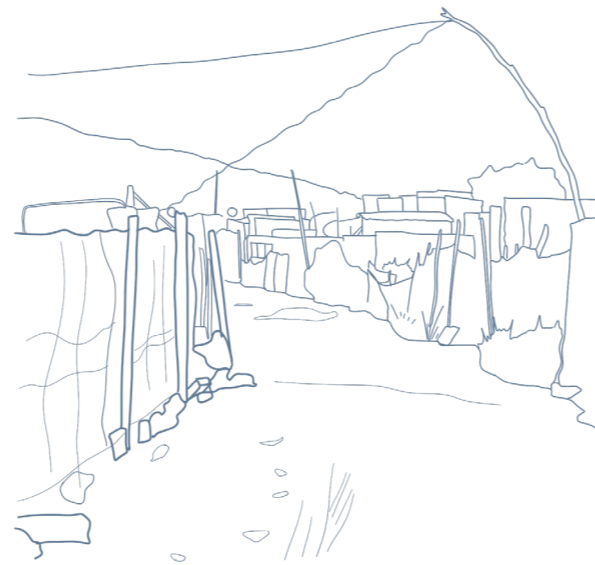
11.04

22.04

25.04

06.05

DAYS ON SITE



Timeline of The Patchwork project, from Hammarkullen to Pretoria.

2. INTRODUCTION

2.2 Project Context

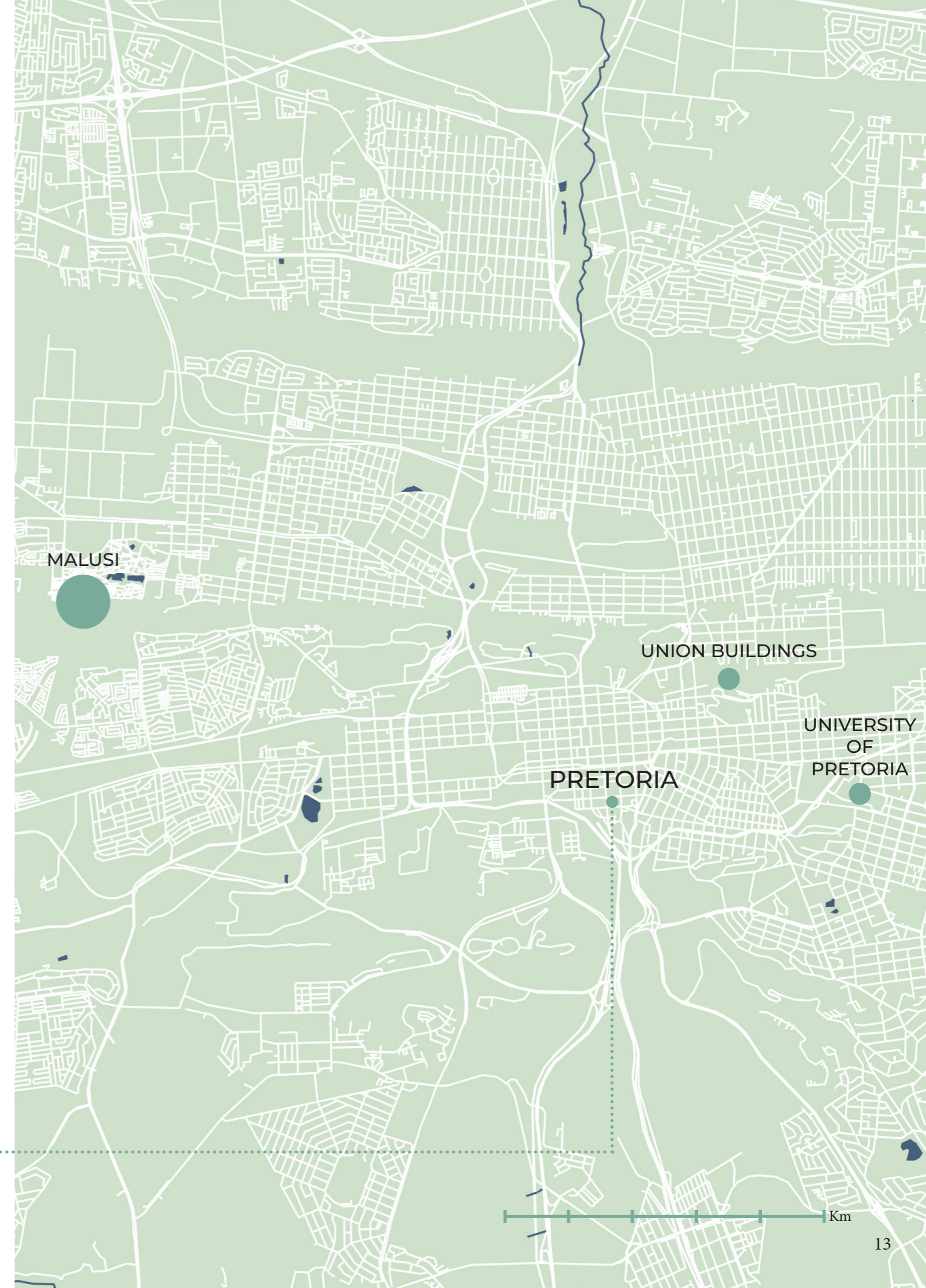
SOUTH AFRICA

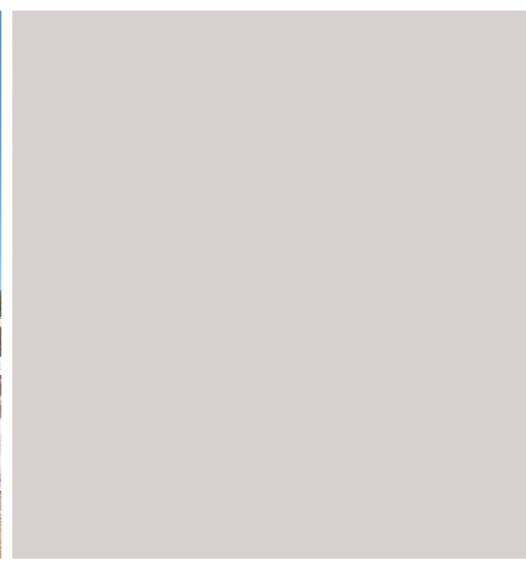
South Africa is one of Africa's biggest countries, located at the southern tip of the continent. It has a population of 62 million people with diverse ethnicities, with the largest group being Black Africans (81.4%). The country recognizes eleven official languages, reflecting its rich culture. Its main economic sectors are mining, transport, energy, manufacturing, tourism, and agriculture. South Africa has a complex history, with European settlers colonizing the country starting in the 1650s. In the 19th century, natural resources like diamonds and gold were discovered, leading to economic growth but also conflicts and war. Apartheid, introduced in 1948, enforced severe racial segregation. Resistance led to the end of apartheid in the 1980s, culminating in Nelson Mandela's election as the first democratic president in 1994. Since then, South Africa has been a democracy. (SAG, 2023)



PRETORIA

Pretoria is located in the northern part of Gauteng Province in South Africa. It serves as the administrative capital of the country, hosting the executive branch of the government situated in the famous landmark of the Union Buildings. Pretoria is part of the City of Tshwane which has around 2.9 million inhabitants. Pretoria is also known for its numerous universities and educational institutions like the University of Pretoria and Tshwane University of Technology. The City of Tshwane currently have 210 informal settlements including Malusi which is the location of the PatchPlastic project. (Ramadie, 2023)





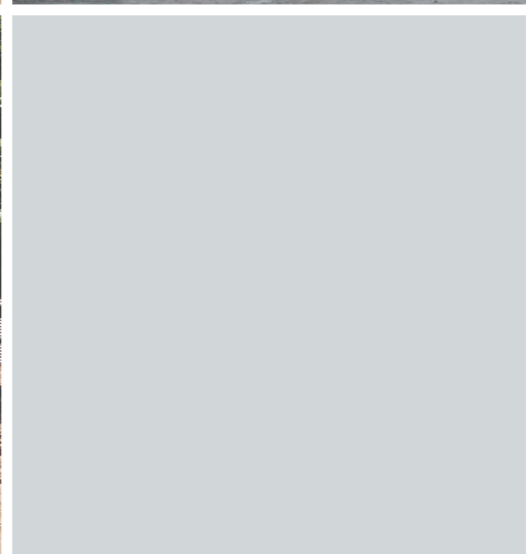
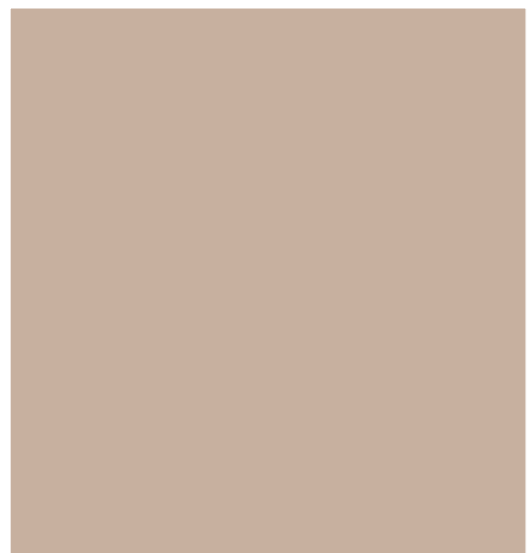
INFORMAL SETTLEMENTS IN SOUTH AFRICA

Informal settlements are unplanned and often overcrowded areas where people live in informal dwellings without legal land tenure or access to basic services like water, sanitation, and electricity. The lack of basic services leads to many problems for the residents of the informal settlements, such as flooding, fires, limited healthcare, high rates of infectious diseases, hazardous landfills, and a higher risk of crime and violence. There are both historical and contemporary factors contributing to the existence of informal settlements in South Africa. Apartheid legislation led to insecure land rights and a lack of housing for the majority of the population. High levels of poverty and unemployment contribute to the inability of many individuals to afford formal housing. It is conservatively estimated that between 2.9 and 3.6 million people in South Africa live in informal settlements and the number is increasing. (SERI, 2018)

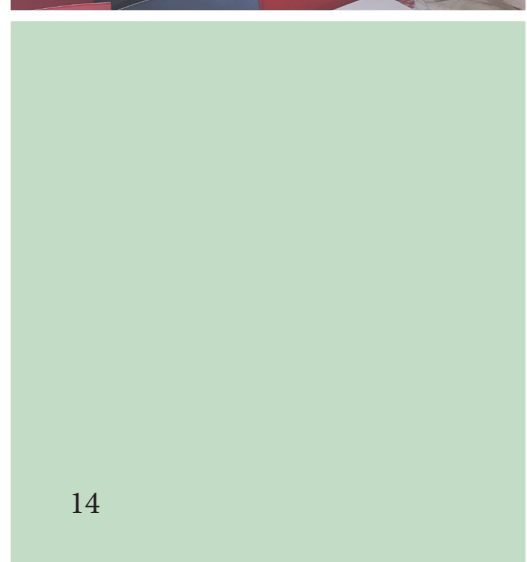
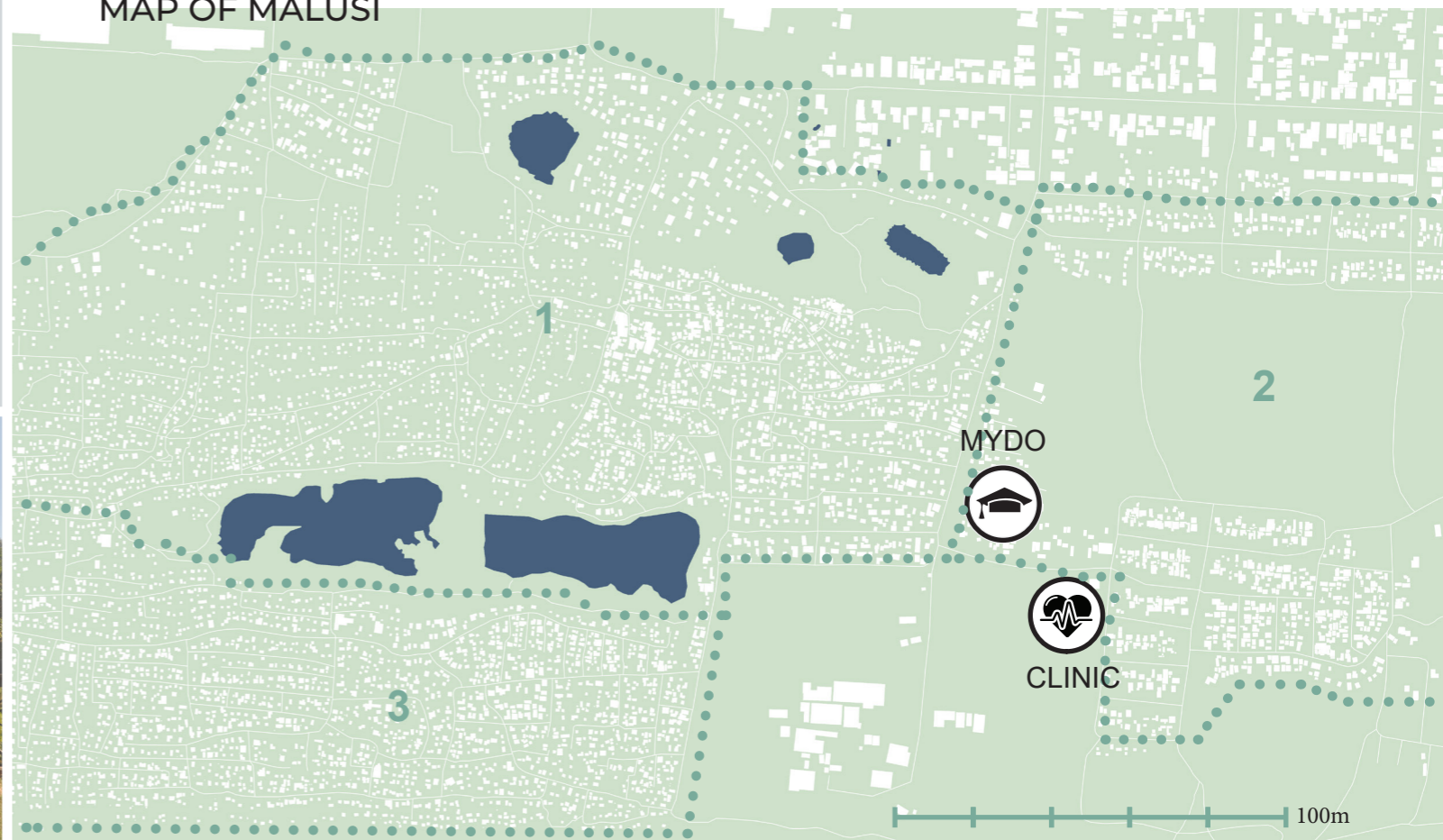
MALUSI

The project is situated within the informal settlement of Malusi, located in the west of Pretoria. Malusi is divided into three sections: Malusi 1, with formal access to tap water but informal access to electricity; Malusi 2, with formal access to both tap water and electricity; and Malusi 3, reliant on tanks for water and lacking electricity infrastructure.

In Malusi 1, there is a health clinic (Malusi Holistic Primary Health Centre) run by the University of Pretoria providing basic medical care to the community, with a focus on maternal and child health. It is open for a limited time, on Mondays and Thursdays. Additionally, the clinic supports the community by offering training in life skills and food, and has its own garden. Across from the clinic is Malusi Youth Development Organisation (MYDO), which provides educational support and afterschool activities for children in the area.

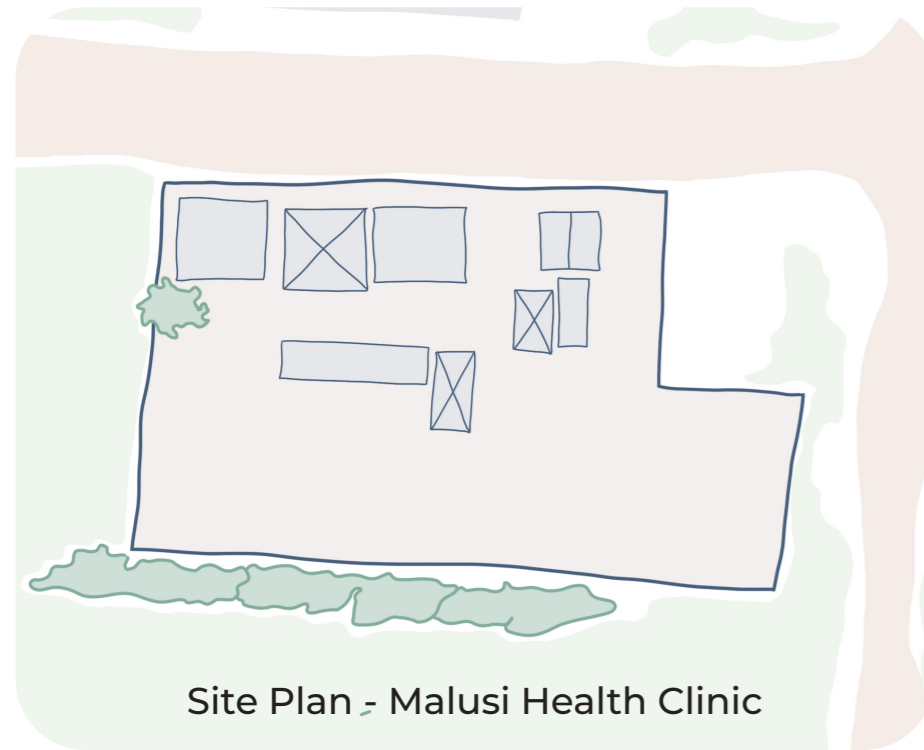


MAP OF MALUSI

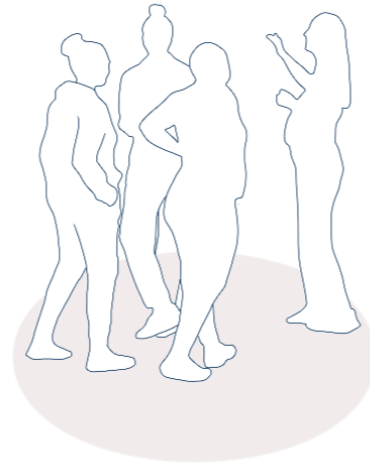


2. INTRODUCTION

2.3 Collaborations

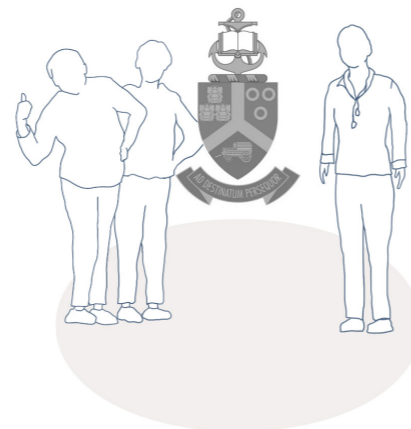


STAKEHOLDERS



The patients - residents of Malusi

The patients coming to the clinic are one of the most important stakeholders, as they are the users of our interventions. They represent a sample of the population of Malusi. We have involved them throughout the process, especially in the phase of identifying interests and needs at the clinic.



University of Pretoria

The University of Pretoria is the owner and one of the two funders of the clinic. We got to meet several employees such as Zimasa, the nurse, and Marione who brings groceries to the clinic every week. They gave us their approval for building our interventions at the clinic.

KEY PEOPLE



Malusi Youth Development Organization

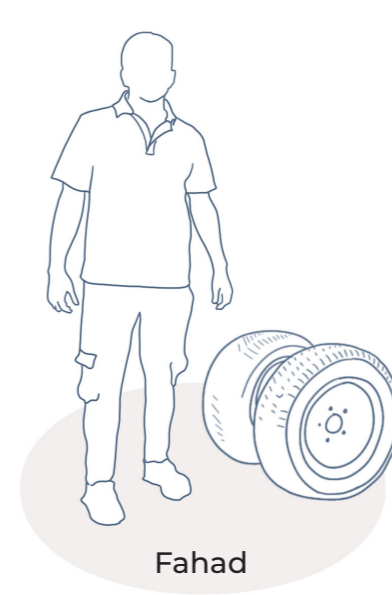
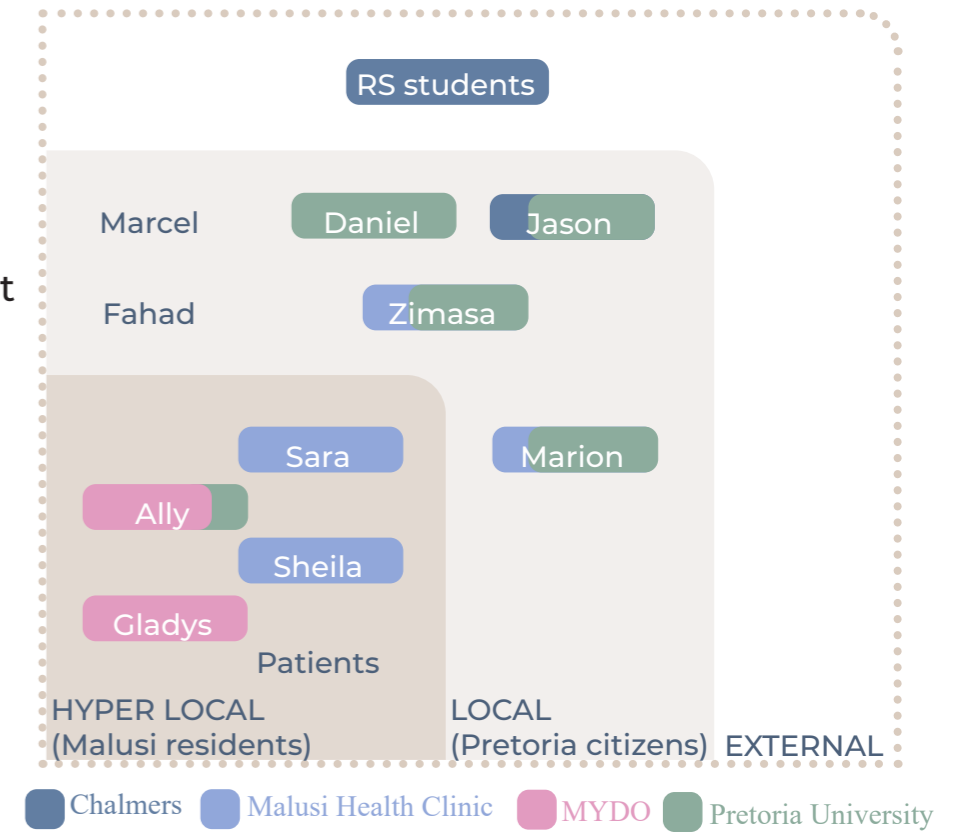
Several people from MYDO helped us throughout our time in Malusi. Ally, a young resident of the settlement, played an important role in connecting us with the people and was a contact person when needed. We also met Gladys, who works at MYDO, during a workshop and she came by several times to help during the process and show her support.



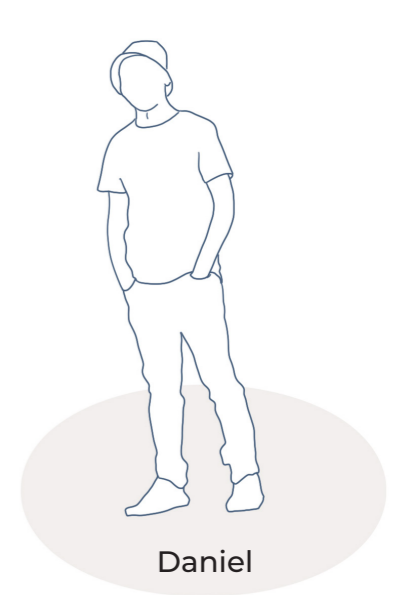
Materials & Tools

Marcel, the owner of the hostel where we were staying, helped with transport and lent us many tools during the building process. He also provided us with useful construction tips and ideas for how to assemble the interventions.

STAKEHOLDER MATRIX



Fahad and his family run a car recycling centre. We met him by chance and he kindly helped us in the search for materials, giving away old car tires and helped in finding scrap wood. He had several times before donated materials to kindergardens and schools in the area.



Daniel is a student at the University of Pretoria. He lives near Malusi and knows many people in the settlement. He studies architecture and is familiar with the place and where to find certain resources. He made it easy for us to connect with the community and helped us collect plastic bags in the area.



Malusi Health Clinic Workers

Sara is the main stakeholder at the clinic. She has worked there since 2020. She likes gardening and has introduced permaculture to the site. She also takes care of the place in a wider perspective and coordinates the different actors when the clinic is open. Sara knows a lot of people from Malusi and has a great potential to motivate the community.



Sheila is the clinic's cook. She volunteers twice a week when the clinic is open to prepare lunch for the patients. She tries to give the people healthier meals, including vegetables as much as possible. She believes that introducing better nutrition at the clinic can influence people and encourage them to do the same at home.

3. PATCHPLASTIC PROJECT

3.1 Problem Defining Workshop

- Mapping needs and interests

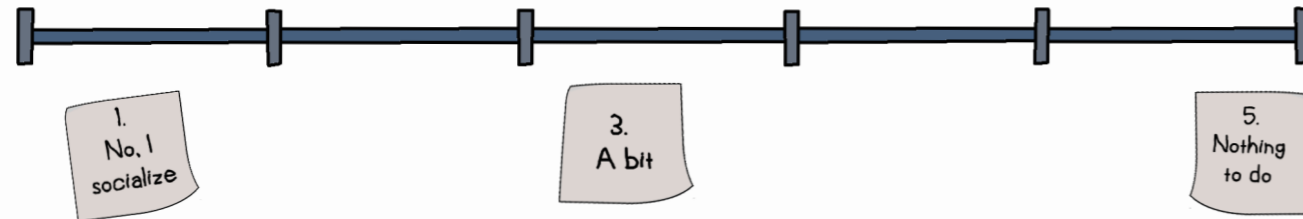
AIM & METHOD

To find out how visitors perceive the location, a workshop was organized with patients waiting in line at the clinic. The purpose was to identify potential desires and needs from an architectural perspective. During the workshop, participants were asked questions and responded by placing a post-it note, rating on a scale from 1 to 5, and leaving comments if desired.

Children were provided with a canvas, colors, and crayons while the adults were answering the questions. This allowed for the exploration of children's creativity, playfulness and energy level during their time waiting.



Example: Do you feel bored while waiting?



RESULTS

Based on the results, it was observed that weather conditions significantly impact the clinic’s open hours and the ability for patients to visit. Most participants indicated that the **lack of protection when it rains** is one of the major issues with the waiting area.

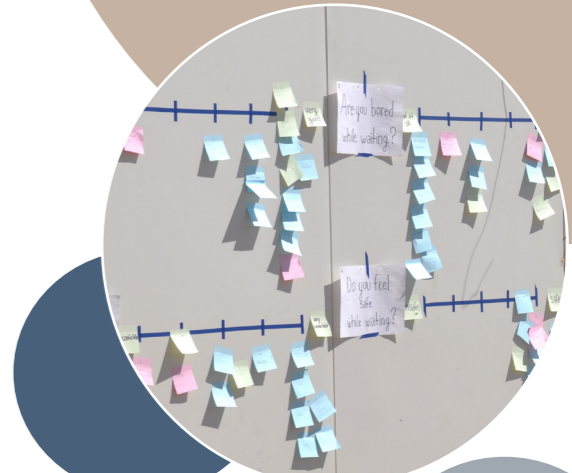
There is a wide variation in how participants felt about boredom. Those who interacted with others did not seem particularly bored, while others were **bored due to the lack of activities**. Most brought their phones to entertain themselves, while few brought anything else to pass the time.

Regarding physical comfort participants were generally satisfied with chairs, sightlines, etc. They also felt very safe at the location because it’s a public space. However, it was mentioned that there were **no seating options before the clinic gates open** in the morning and that they are often **hungry while waiting**.

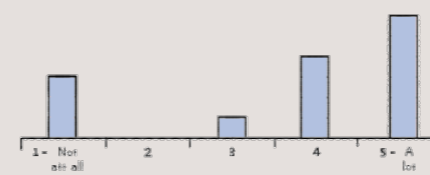
Additionally, participants mentioned the lack of kid’s activities on site and expressed interest in making the location **more child-friendly**. Questions were asked about the interests of both children and adults, which provided insight into preferences and hobbies.

A significant number of participants believed that the clinic’s main issue is the **availability of more doctors and healthcare**, which explains why many chose to place their notes under “other”.

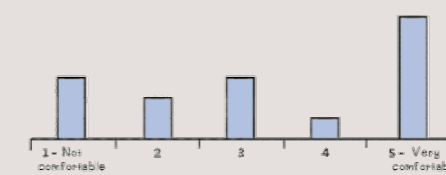
”
The waiting area is not protected from the weather



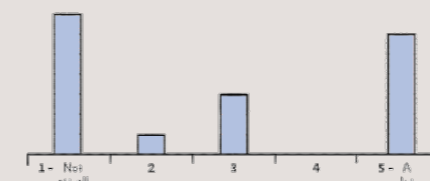
How much does the weather impact your visit at the clinic?



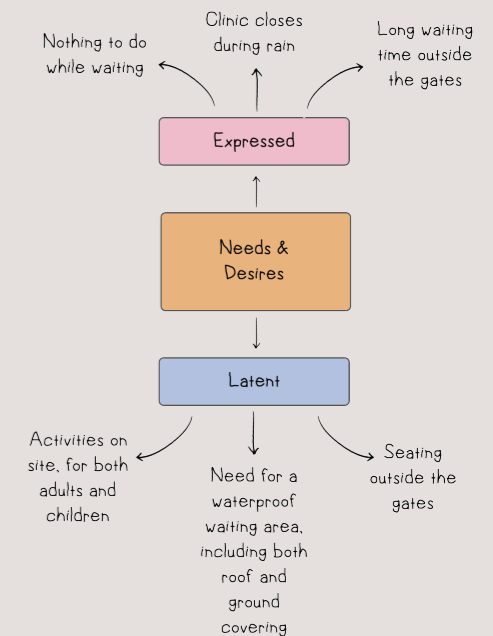
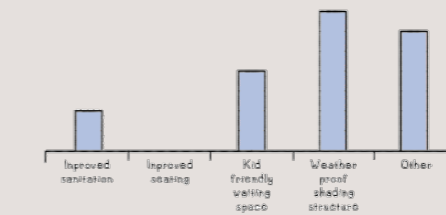
How comfortable are you while waiting?



Are you bored while waiting?



What’s the biggest problem at the clinic?



See complete results in (Appendix 5.2)

3. PATCHPLASTIC PROJECT

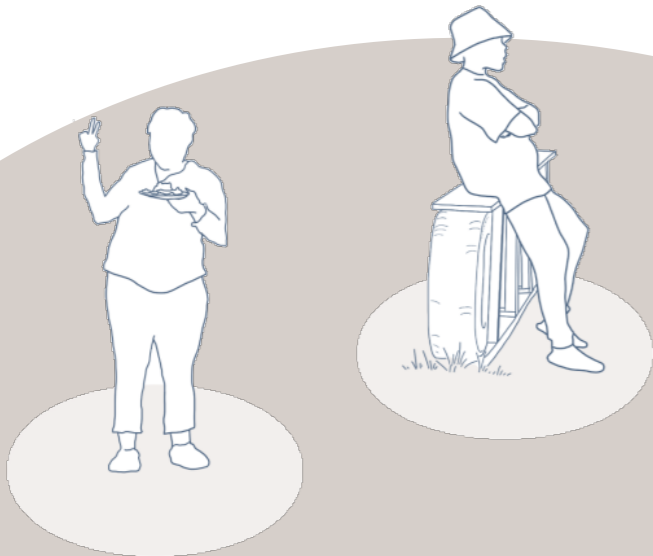
3.2 Stakeholder Interviews

Formal interview with Sara, Sheila and their friends, employees and volunteers at Malusi Health Clinic - Malusi Holistic Primary Health Centre, April 17

It is noticeable that the **lack of healthcare** is a major issue. The friends discuss how they used to have more doctors, but now patients are often turned away in the morning, when they have already been waiting for a long time outside the clinic gate. Independent **sponsors are needed**. Marione, a nutritionist working with the clinic, has secured support from some sponsors and brings food every week that Sheila cooks in the clinic's kitchen. The women would like to share healthy recipes with the patients, as many in the area are unaware of the meaning of **healthy nutrition** and barely consumes vegetables. Sheila's goal is to offer cooking classes and sell her culinary creations on-site in the future.

When it comes to the **child's perspective** at the clinic, linked to the waiting time, it is mentioned that children become bored and restless. According to the women they need activities to engage with, such as playing games, gardening, educational readings, or learning new skills.

The women also talk about the **toilet conditions**. They are poor with no maintenance, leading to concerns about hygiene and the spread of diseases.



“
The children become bored, so they need activities to engage with
”

When it comes to societal issues related to problems such as teenage pregnancy, infections, and drug abuse the women conclude that it's due to lack of construction activities to keep the youths busy and increase the value of education in order to influence their visions of the future.

It's crucial for the community to understand the importance of education and to have opportunities for personal development to stay motivated. The friends explain that there is unfortunately a lack of knowledge, support, and suitable living conditions, along with a high level of violence in the area. There is a pressing need for a security guard at the clinic.

“
It's crucial for a community to understand the importance of education
”

Formal interview with Zimasa, nurse employed by University of Pretoria - Malusi Holistic Primary Health Centre, April 22

Zimasa has a degree in clinical medicine since 2019, and has previously worked in the private sector but is now employed by the University of Pretoria. She spends her workdays at various clinics in informal settlements around the area of Malusi.

The clinic in Malusi operates only half-days on Mondays and Thursdays, which means she often has to cut the line in the mornings to make sure she has time to help all patients waiting. The situation is very frustrating for both the patients and her. As a result, patients arrive very early, sometimes as early as 5-6 in the morning, while she herself does not arrive until 8 o'clock. Unfortunately, there is no place for them to sit during this time making them stand for several hours waiting outside the gate.

She explains that when it rains, the clinic has to close because there is no sheltered waiting space and the mud becomes a dangerous contaminator due to the limited sanitation and inside space. Therefore, on rainy days, it becomes even more difficult for the community members to receive care. Also, the ground becomes muddy and slippery causing a risk for patients to fall and get hurt.

When it comes to the kids, many children run around when in line since they have nothing to do which can interrupt her work. Zimasa also express a worry that they sometimes run out on the street when the gates are open which is not safe.

Additionally, the clinic faces problems with theft. For example the clinic's solar panels were stolen and they cannot bring any proper kitchen equipment to site even though they have received donated stoves.

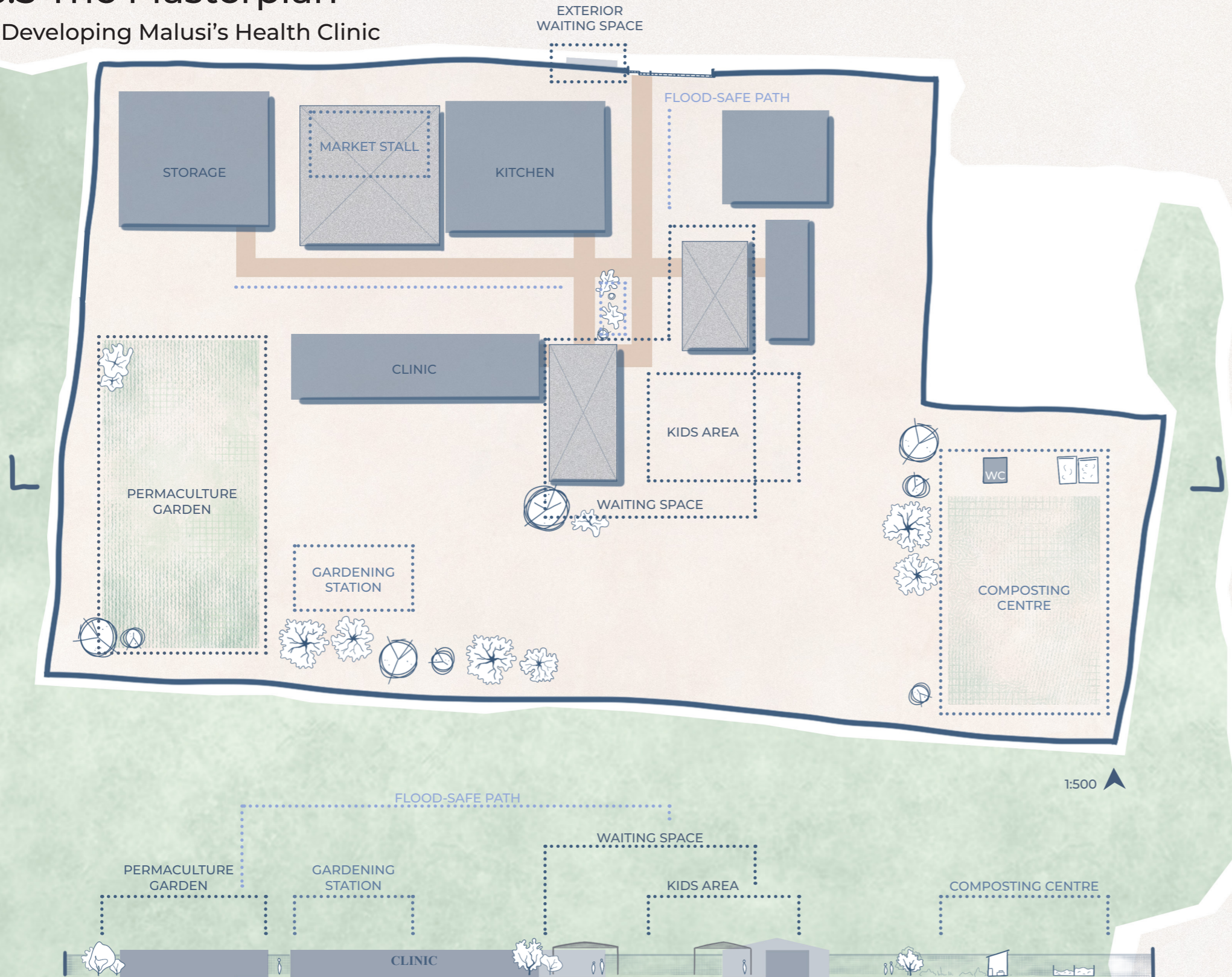


”
When it rains, the clinic has to close. There is no sheltered space for patients to wait in
“
“
The patients arrive early and have nowhere to sit
”

3. PATCHPLASTIC PROJECT

3.3 The Masterplan

- Developing Malusi's Health Clinic



Development Timeline

This masterplan outlines a potential development for Malusi's health clinic. To assess the feasibility in terms of time and resources for the different interventions, we are considering three stages in the development: the current situation after the Reality Studio, a short-term stage, and a long-term stage.

The current plan of the clinic includes a permaculture garden, a kitchen where meals are prepared for the patients, a storage building, some bathrooms, and the clinic itself.

A bench outside the main gate, a rain shelter, a children's area and some blackboards were added during the Reality Studio project.

In the short term, the clinic could develop a composting center in the empty space to the southeast. The center would include composting toilets to address issues with the current flush toilets. Two compost containers would also be placed in this area to handle waste from the composting toilets and the kitchen. A gardening station next to the permaculture garden would provide storage for tools and seeds, as well as a counter for gardeners to work comfortably.

In the long-term stage, the clinic could be equipped with a flood proof path to allow patients to access the clinic during heavy rain periods. The path would be made of recycled materials such as crushed bricks, and some planted areas would help guide water flow.

A market stall could be set up on site to sell some of the fruit and vegetables from the garden.

Resource Mapping



WOOD



CRUSHED BRICKS



LOGS



PALETTES



PLASTIC WASTE

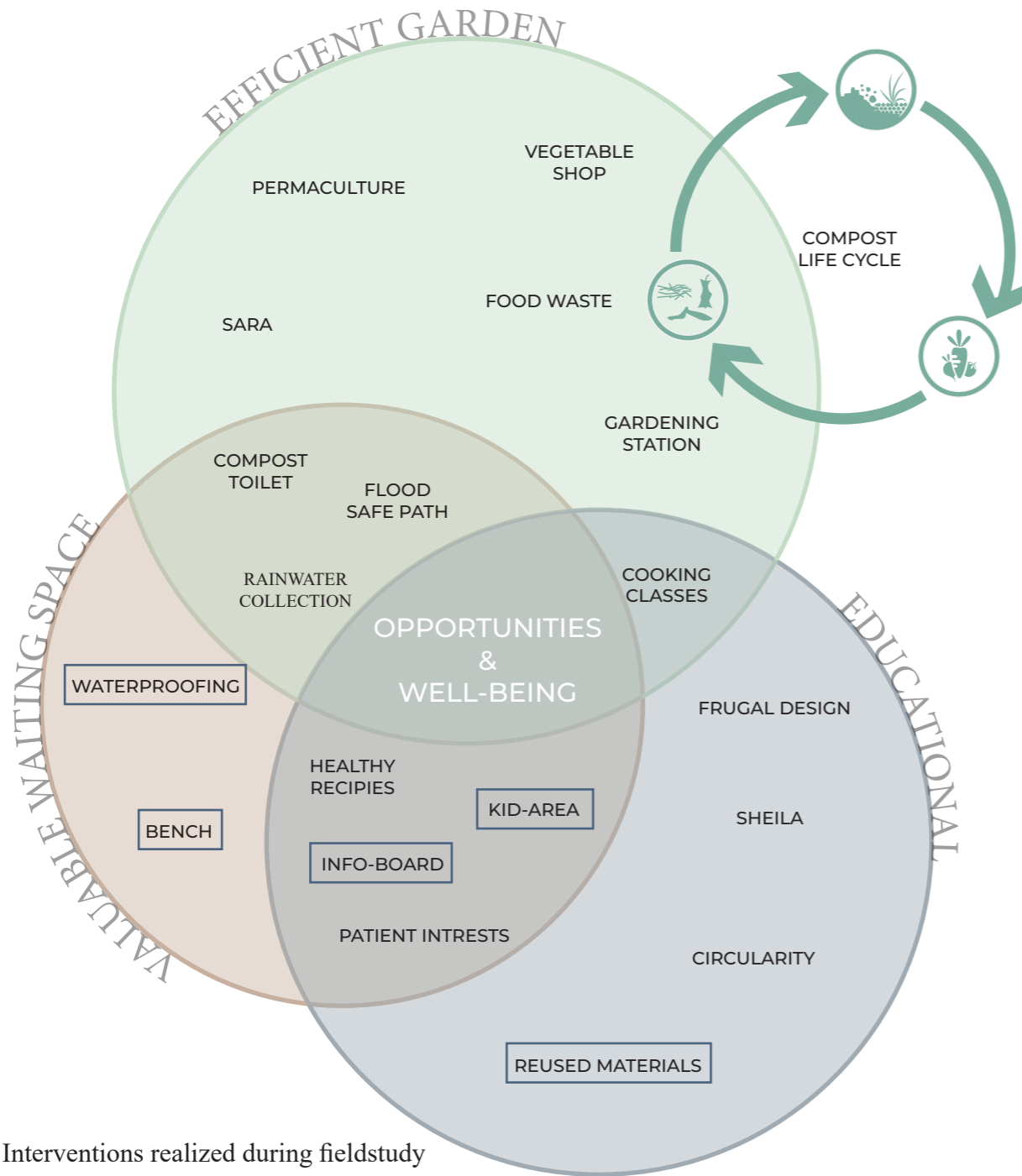


CAR TIRES

The project aims to use resources and waste available in the area. Here are some examples of materials found in the settlement that could be used for future interventions.

3. PATCHPLASTIC PROJECT

3.4 Overview & Circularity



Sustainable development

The future development presented in the masterplan aims to take advantage of existing stakeholders and resources on site to create more opportunities for learning skills and promote a healthy and sustainable community. Currently, the activities on site are connected both through people like Sara and activities like cooking for the patients using food from the garden. In the masterplan we want to further strengthen these connections and find missed opportunities to solve problems with

resources/activities already existing at the clinic, garden and kitchen. This would make the site more self-sufficient while also creating more value to both patients and the people working on the site. For example, the sanitation issue could be solved by a compost toilet that could then benefit the garden with fertile soil for growing more vegetables that could be used for cooking for the patients or hosting cooking classes. The food waste could then go back into the chain as part of the compost.

3. PATCHPLASTIC PROJECT

3.5 Participatory Process



CURIOSITY

Explore & Discover

The starting point for engaging with the community is to listen attentively with open questions and soak up all information to deepen our understanding of the context and challenging our biases. This was done through observing the networks of Malusi and having informal conversations with stakeholders like Sarah and MYDO.

Knowledge gathering

Diving further into specific areas with planned workshops and prepared interviews. Participation and creating relations was crucial in this step as the inhabitants of Malusi and workers at the clinic hold all the information of the situation at the clinic; what the issues are and how to prioritize them.



INCLUSION



CREATIVITY

EDUCATIONAL

Sharing ideas & Prototyping

Sharing our knowledge and prototyping together with people from the community to inspire, and create a sense of ownership and involvement. It's also important in order to identify potential site specific problems for the iteration process.



OWNERSHIP

EMPOWERING

Spontaneous workshops

Being present on site and engage people in informal workshops during all steps of the process was a great way to gather people that were curious and interested in the project. Allowing ourselves to let someone else who had ideas take the lead when running in to problems.

3. PATCHPLASTIC PROJECT

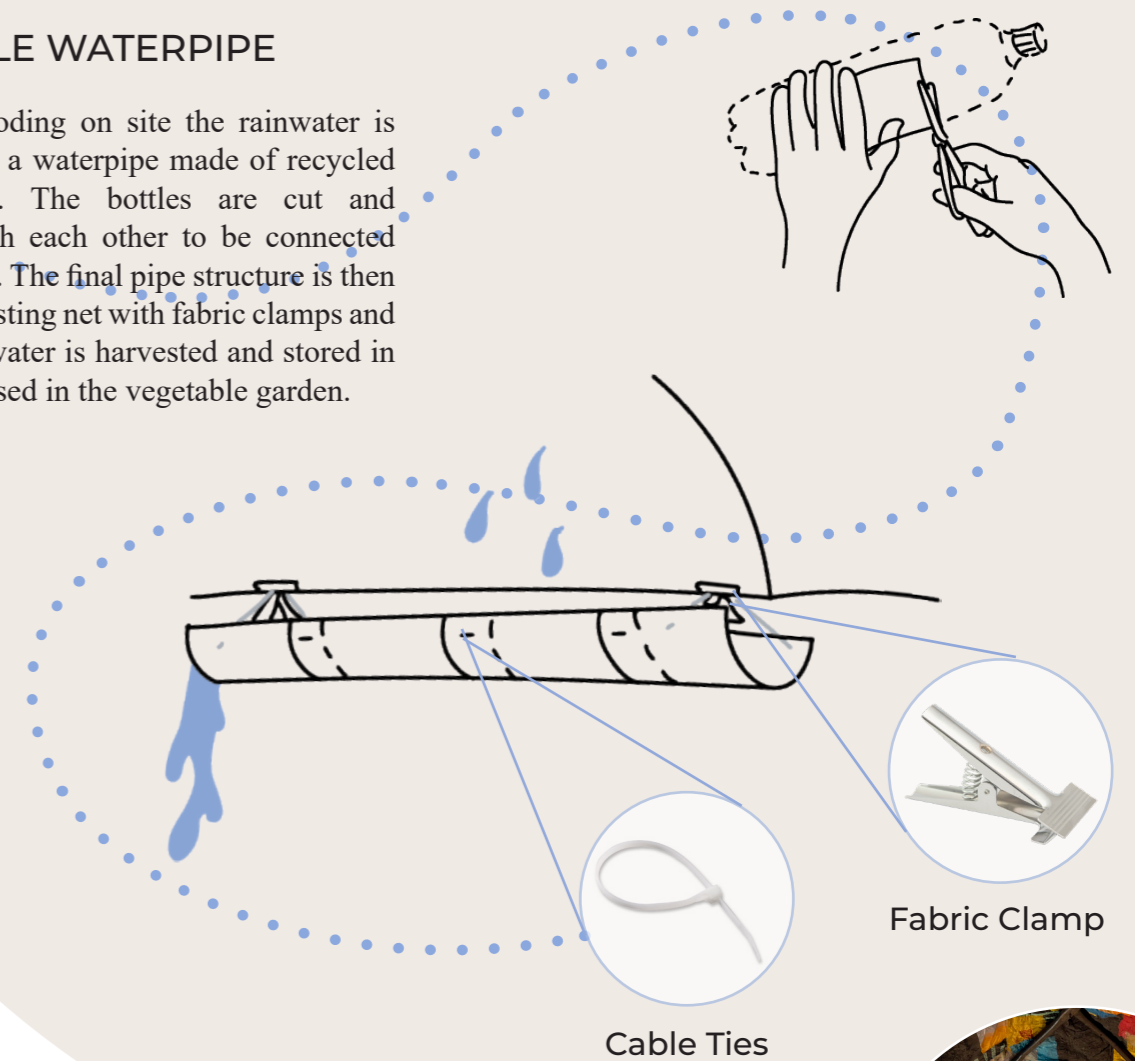
3.6 Interventions

- Rainproofing & Water Harvesting



PET BOTTLE WATERPIPE

To prevent flooding on site the rainwater is collected using a waterpipe made of recycled plastic bottles. The bottles are cut and overlapped with each other to be connected with cable ties. The final pipe structure is then hung on the existing net with fabric clamps and rope. The rainwater is harvested and stored in buckets to be used in the vegetable garden.



PATCHED PLASTIC SHEET

The existing waiting space consists of two steel structures with a net on top to provide shade for the patients. In order to waterproof the structures a plastic sheet made of recycled bags from the area was created together with the community and placed in between the steel frame and the net. The sheet was fused together with an iron but the principle also works without electricity using a heated pan or flat stone. The same approach could be used in the future to also create roll-up walls on the side for when the winds are cold. The feedback received from residents during the Work & Talks were positive and they saw many opportunities for the plastic principle to be used.

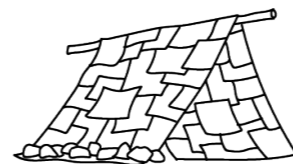
Gardening



Repairing



Shelter



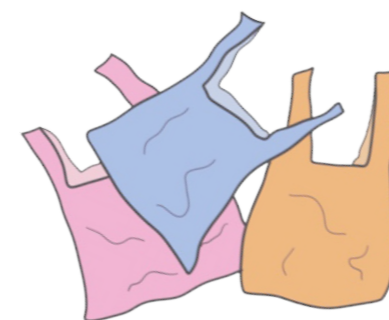
Clothing



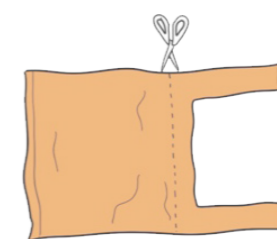
MULTIPLE PURPOSES!

"I want to make a handbag!"

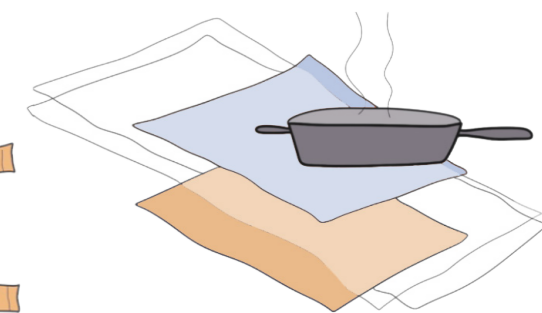
"I would like to make a raincoat for my daughter!"



1. COLLECT



2. CUT



3. MELT

3. PATCHPLASTIC PROJECT

3.6 Interventions

- Kid's Area

One of the **workshops** revealed that patients usually don't bring physical entertainment to the waiting area, but there is interest in making the place more child-friendly. Interviews with clinic staff, volunteers, and the nurse expressed concern that children have nothing to do during the wait, suggesting that this time could be used for learning and play. In response to these findings, small interventions tailored for children were built, serving as a start to the master plan's child-friendly area. Hopefully, this will provide children with meaningful activities while they wait, engaging them in play, learning, and interaction with other children. As the nurse mentioned in the interview, this could also enhance safety, as children will be more likely to stay within the clinic's area if there are interesting things for them to do.

Seesaws

Two movable seesaws were constructed using recycled tires and wood. Building them in Malusi was challenging due to the requirement of numerous tools. However, in order to actively engage and inspire the community in the project, the seesaws were designed and painted together with patients waiting in the queue.

Blackboard and Game box

The results of the workshop showed that the children's interests were fairly evenly distributed, but with a strong interest in creativity. According to Sara, Sheila, and their friends, they would have liked to see some form of educational activity in the area. To combine these two interests, a flexible solution was created for the children; a blackboard with an accompanying box. It can inspire creativity as well as serve as a learning activity. The box acts as a stand for the blackboard and can hold various materials, such as crayons, games, books, etc. It was made from leftover pieces of wood and paint from other interventions. To involve the community, the blackboard was painted together with the residents of Malusi.



3. PATCHPLASTIC PROJECT

3.6 Interventions

- Education

Informational Blackboards

Having a few blackboards on site serves several purposes. As well as a child-friendly board, there are also two for adults, as it's an easy way to communicate information. For example, Sheila the cook can share her recipes with patients and inspire them to improve their diet. The boards can also be used to communicate other types of information, such as opening hours or special events.

Leaflets

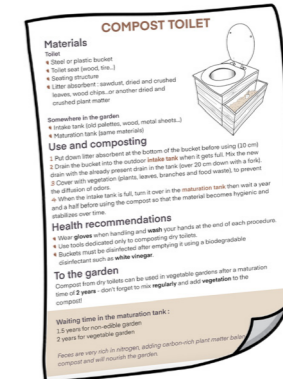
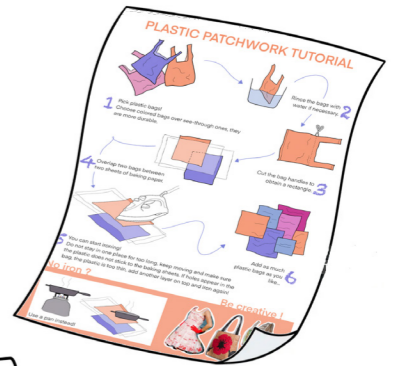
Two leaflets were printed, laminated, and handed to Sara. (Appendix 5.3)

The first one describes how the rainproof plastic sheet was made and gives examples of other interventions that can be done using the same technique. It also shows how to create a plastic sheet without electricity, using a pan instead of an iron. The aim is to inspire and empower people to solve small problems like a hole in their roof, or perhaps something more creative like a bag or a raincoat.

During an interview, some of the women at the clinic discussed the conditions of the flush toilets, which are often out of order and cause hygienic problems. The second leaflet describes a composting toilet, its construction and use, and its role in promoting circularity in waste management and gardening.

Social and Educational Games

Two versions of board games were created, drawing inspiration from popular games in the area as suggested by our key person, Daniel. Individuals who experienced boredom while waiting in the queue were typically those without any activities, whereas those who didn't feel bored often engaged in social interactions. These games aim to facilitate socialization among patients by providing an entertaining activity.



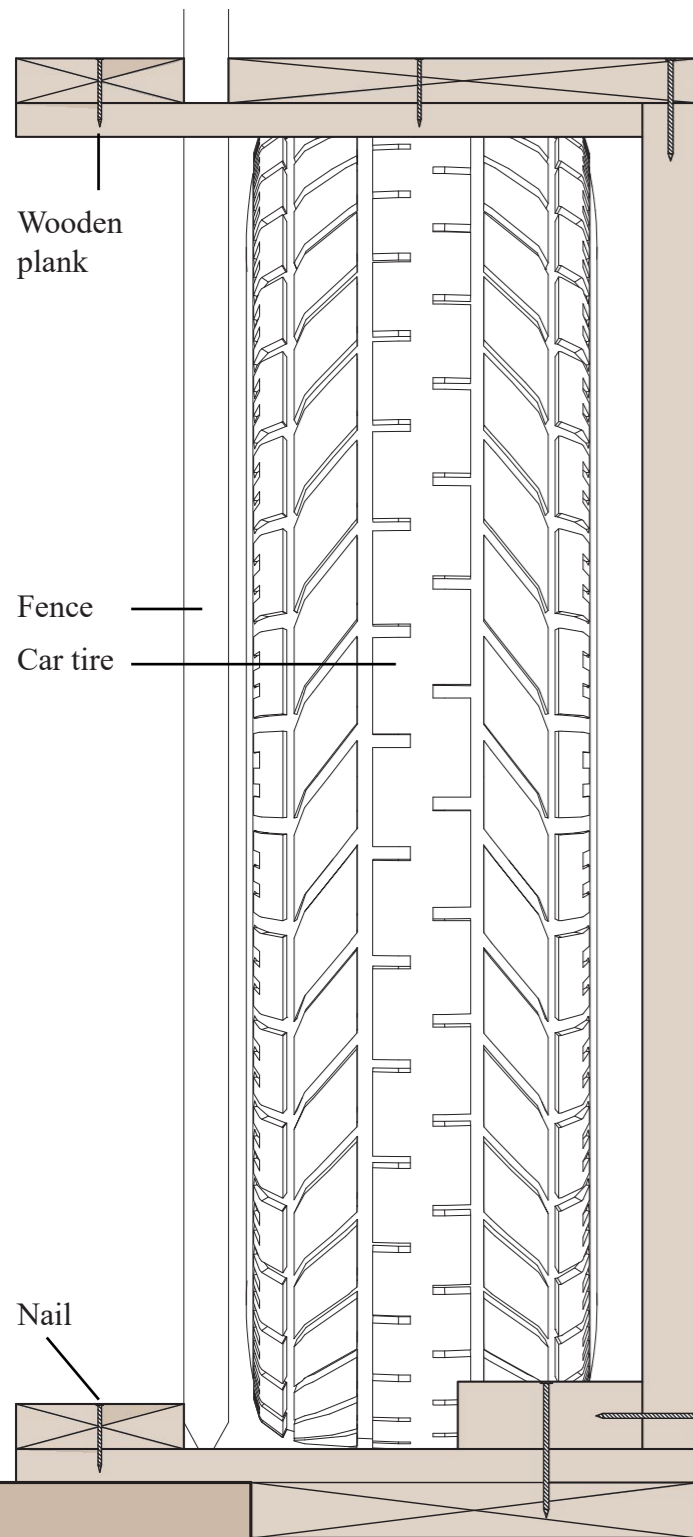
3. PATCHPLASTIC PROJECT

3.6 Interventions

- Exterior Waiting Space

The result from the workshops were positive regarding the comfort level of the current waiting space. The patients usually feel safe at the clinic since it is a public space where lots of people pass by.

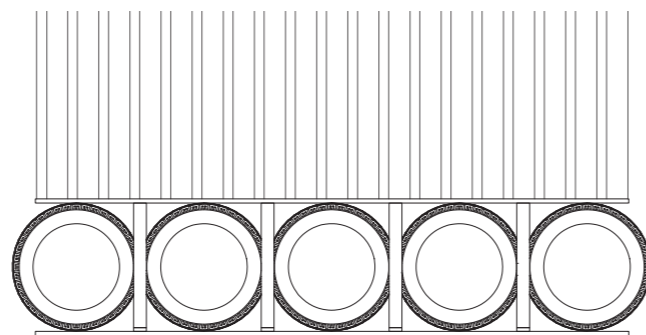
However there were one severe problem mentioned by the patients - the lack of a place to sit while waiting for the clinic gates to open early in the morning.



A bench made of old tires

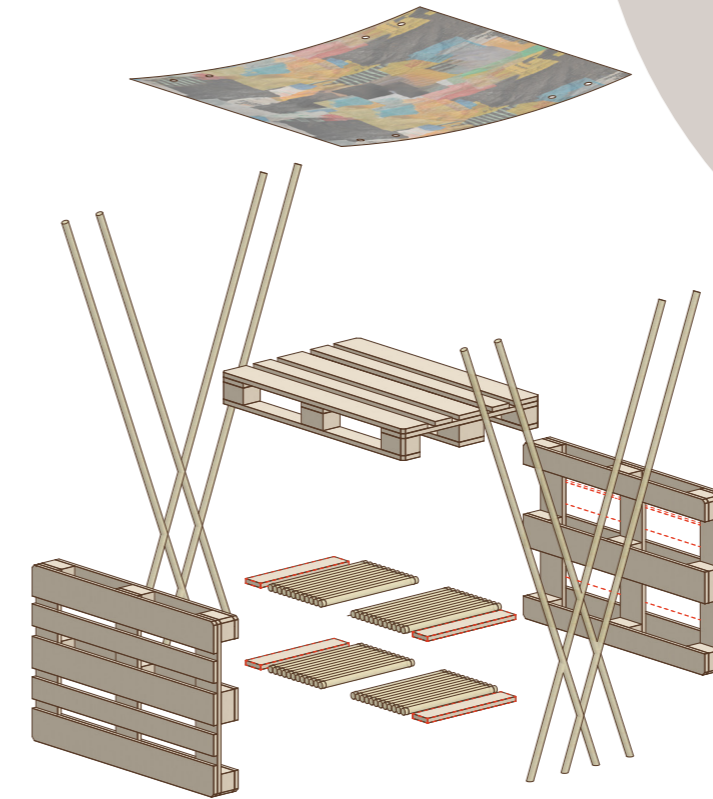
When designing a place to sit outside the gate it was of importance to build it in a way so that it could not be stolen, as the interviews revealed that theft was a big problem. With this in mind, a bench made of recycled car tires and wood and attached to the clinic fence was imagined. The dimensions of the car tires resulted in a slightly high bench for people to lean against, facing the street. Smaller vertical planks go through the fence and attach to a long wooden element behind the fence.

The painting of the tires and the main seating plank was done in a workshop with some of the patients and community members.



3. PATCHPLASTIC PROJECT

3.7 Future Improvements



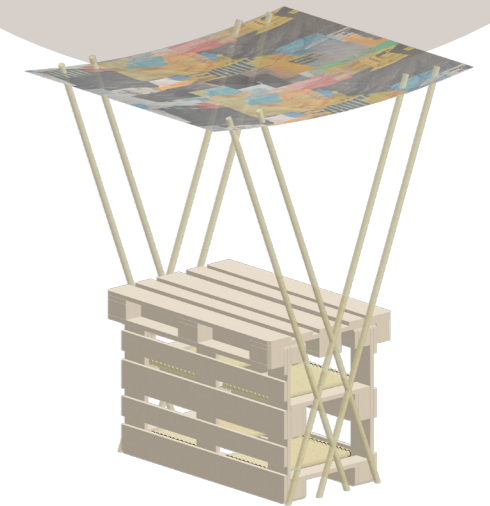
Stall Module

EASY TO BUILD

REUSE

QUICK AND EASY MODULE

Here is a simple way to build a stall with a protective roof using locally sourced or reused materials. The pallets need very little modification and the parts can be assembled using either rope or nails.



MULTIPURPOSE

The module can be used for multiple purposes and can be extended as time and materials become available. It can serve as a gardening station, providing shade and an ergonomic workspace for planting seeds and cleaning harvested vegetables. It has four convenient shelves and a shading roof. In the future, it could also be used as a market stall to sell vegetables. The low-tech design makes it easy to move if needed and to assemble and disassemble.



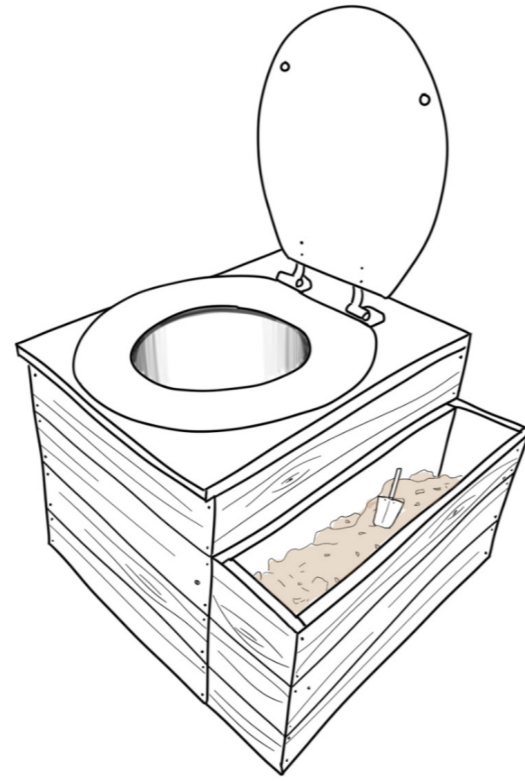
3. PATCHPLASTIC PROJECT

3.7 Future Improvements

Compost toilet

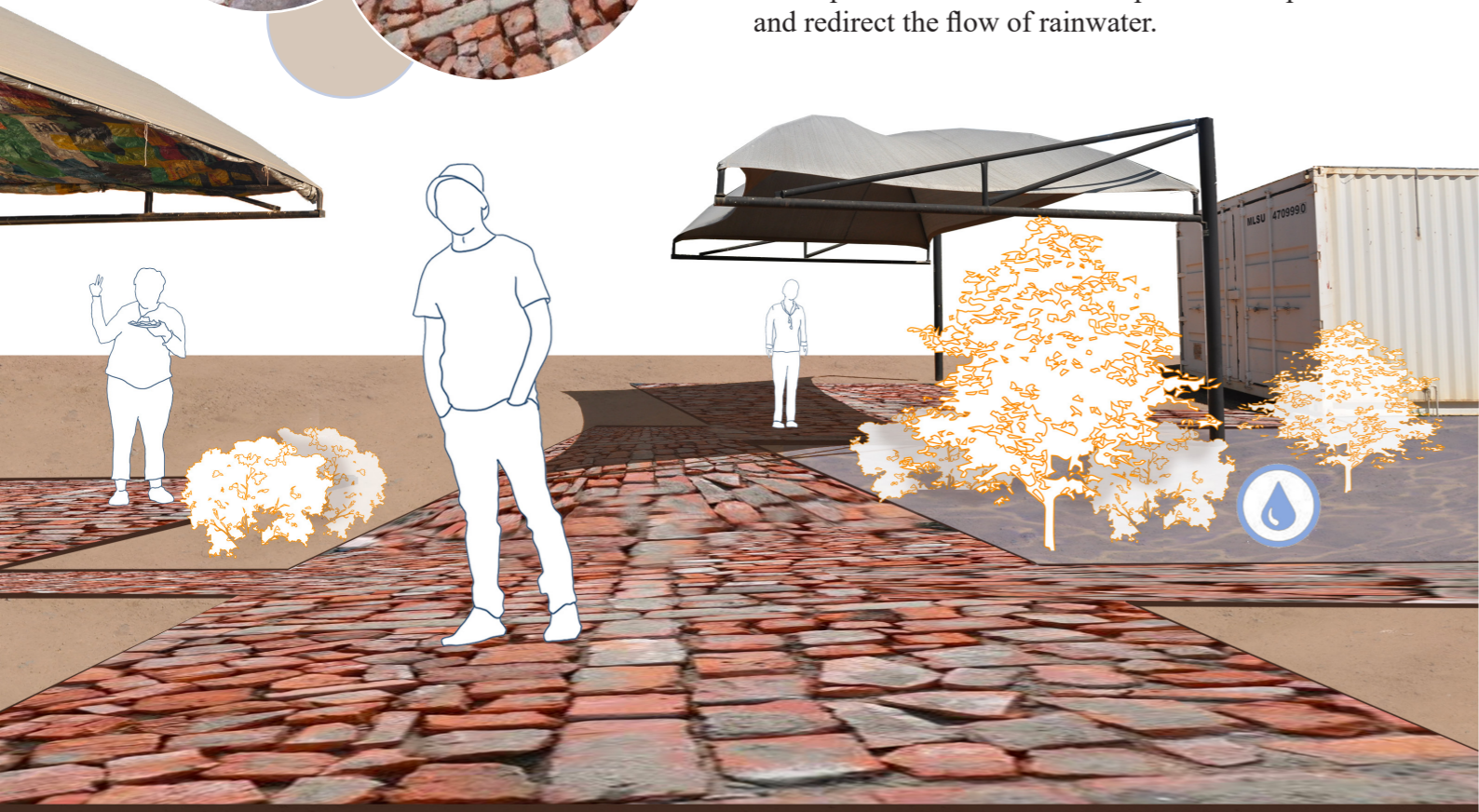
Through the workshops it became evident that the flush toilets currently on site were often out of order and the clinic was lacking proper hygienic toilets. The stakeholders interviewed were very positive on the idea of installing a compost toilet on site. This intervention aims to be built by the community using local materials and will provide nutritious soil for the garden while taking care of the waste in a sustainable way.

An important factor is to provide enough dry plant matter when using the toilet to keep it hygienic and odourless. Someone will have to be responsible for cleaning the various elements, maintaining them and taking care of the composting cycles. If the installation works properly, after two years it will produce some great compost ready to be used in the garden!



Recycled Pavement

The clinic has no pavement, and when it rains the ground turns into slippery mud, creating a danger of falling. Walking through the settlement, we noticed some piles of old bricks. The idea is to reuse these bricks and make a walking path out of them to provide a safe way around the clinic when it rains. Some planted areas next to the path will help absorb and redirect the flow of rainwater.



4. CONCLUSION

4.1 Project Handover

The hope for the final step of the journey, which is really just the beginning of a continuation, is that the interventions will be used and maintained, and that the community's ideas will continue to develop and be implemented in the area.

It is hoped that all the workshops conducted, the relationships built, and ideas created together have brought joy and inspiration for the future.

The final day on site was a presentation of the work done with the stakeholders. The plan for the day was to also put up the plastic sheet on the existing shade structure. Many people were involved in the installation of the plastic sheet, contributing their suggestions and finding genuine solutions to the challenges encountered.



4. CONCLUSION

4.2 Reflection

LEARNINGS & OUTCOMES

There are some questions that may arise about the project. For example, is it worth investing all the time, electricity and materials, such as irons and baking paper, to make a large sheet of recycled plastic bags? And how sustainable is it to buy new materials and tools to assemble projects using recycled materials? A tarpaulin is not particularly expensive in South Africa, so when you factor in the time and electricity used, it might even be cheaper and more environmentally friendly to buy a new, eco-friendly tarpaulin. But answering that question is not the purpose of this project. The aim of the plastic sheet at the clinic is to try to inspire more innovation, both large and small, and to use the materials available locally. The hope is that a large sheet of recycled plastic bags will attract attention, inspiration and the joy of making something together.

Another important aspect that has been considered is community engagement, from the perspective that interventions should be sustained over time. Some of the interventions were difficult to build on site and the patients who were involved in the design, for example of the seesaws, may find it difficult to continue the project as there are different visitors to the clinic each week. It is hoped that those who work or volunteer at the clinic, such as Sara, Sheila and their friends, as well as the staff at MYDO who helped with much of the construction, will feel ownership of the interventions and keep an eye on them.

An example of this is the waiting bench. The week after it was set up, there was a protest in the area against the municipality's intention to remove all informal electricity. The tires from the bench were then stolen and burned to create large clouds of smoke and make it difficult for the police. What is needed now is for someone to take ownership and responsibility for the wood and nails that remain from the bench so that no one gets hurt on it. It is hoped that we have built up good relationships with those who visit the site and that they will either want to repair or remove the remaining parts of the bench.

Some issues, such as inadequate resources and the shortage of doctors and healthcare services, are very difficult to address from an architectural perspective. Hopefully, the demonstrated commitment to the clinic will attract more attention and ultimately more resources, allowing it to remain open more often.

Continuing to create a welcoming and beautiful environment may also attract more medical students to the clinic. In this sense, architecture can contribute to the general improvement of the site, increasing its attractiveness and thus its resources and potential.

Comments from Stakeholders

Marione "

Hi Ladies... I saw some of the boards you made and loved the welcome one. And the ones in the kitchen that you write on for the kids. I commented to our bosses when Reba send your report that you really identified important aspects that needed improvement. Your fresh eyes. Loved also what I saw of how You engaged the community.

Reba "

Beautiful work

Marione "

Thank you for making a difference

FEEDBACK - FINAL PRESENTATION

During the feedback session in the presentations, there was much reflection on the importance of the handover process and how it is concretely carried out. The interventions serve as a start and inspiration, while the information sheets will serve as part of the continuation. We discussed that we had managed to carry out so many different interventions, but also considered the hierarchy and which part of the project is actually the most important. The project places great emphasis on the plastic-patching part, but to encourage a more resilient and bottom-up driven development of Malusi, the other interventions can actually be equally important. In conclusion, we want to say that we are very happy and proud of the project. We want to thank everyone for the help we have received and are grateful for all the people we have met.

REFERENCE LIST

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<https://www.ohchr.org/sites/default/files/Documents/Issues/Housing/InformalSettlements/SERI.pdf>

5. APPENDIX

5.1 Logical Framework (NAIL)

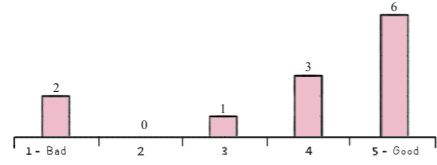
	Project Description (Strategy of Intervention)	Performance Indicators	Monitoring (Means of Verification)	Assumptions (Risk Assessment)
	<i>What the project intends to do (strategy of intervention)</i>	<i>Indicators measure whether the objectives on each level are achieved</i>	<i>Means of verification indicate where and in what form information on the achievement of objectives/indicators can be found</i>	<i>Assumptions are conditions which could affect the progress of the project but which are not under direct control of project management.</i>
Overall Objective	<p>What is the overall objective that the project will contribute to?</p> <p>Simplifying the operation of the clinic by improving the waiting space - making it waterproof, comfortable, educational and active - and implementing circular strategies for the future use of the clinic.</p> <p><u>Definition:</u></p> <p>How is the Project important to society in terms of the long-term benefits? which may not be achieved by the project alone</p> <p>The health clinic is a key function in the community and the project would be a first step to make it work more efficiently</p> <p><u>Scope of project:</u></p> <p>How will the project partially achieve the overall objective?</p> <p>By providing a long time plan, and directly solving some of the most urgent issues on site, the project will hopefully improve the clinic's waiting space</p>	<p>What indicators are linked to overall objective</p> <ul style="list-style-type: none"> * Testing the prototypes for waterproofing * Measure the use of the interventions and the satisfaction of its users * Patient feedback, how long the waiting time feels <p><u>Definition:</u></p> <p>Measures the extent to which a contribution to the overall objective has been made. Features which can be measured or at least described precisely in terms of quantity and quality</p>	<p>What are information sources for the indicators? e.g. reports of ministries, project reports, laws, statistics, assessments, etc.</p> <ul style="list-style-type: none"> * Iterative prototyping * References on waterproof roof materials and structures * Manuals for waste recycling and easy-to-build approaches 	<p>Not required for overall objective</p>
Project Purpose	<p>The purpose of the project is to encourage the development and improvement of the current space at the clinic, involving the community's needs, skills, ideas and participation in the building process.</p> <p><u>Scope of project:</u></p> <p>The attainment of the purpose is primarily dependent on the project results(outputs), but depends also on factors beyond the project's control.</p> <p><u>Hint:</u> Projects or programmes should have one purpose.</p>	<ul style="list-style-type: none"> * User's feedback on the rainproof structure * Relationships built throughout the project * Test of the rainproof structure on a rainy day * Use of local, recycled materials <p><u>Hint:</u></p> <p>Include appropriate details of quantity, quality and time. Helps understand whether the purpose has been achieved</p>	<p>What are information sources for these indicators?</p> <p>The information can be found on site by interacting with the users, site analysis and testing the materials. The patients, children, and people working at the clinic can give us feedback and indicators to measure the level of achievement.</p> <p>Mentioned Above</p>	<p>Factors and conditions not under direct project control, but necessary to achieve the overall project objective?</p> <p>Maintenance of the structure by the clinic</p> <p>Risk of theft</p> <p><u>Hint:</u>To ensure proper vertical logic, it is essential to attribute assumptions to the corresponding level of intervention (in this box assumptions at purpose level which are relevant for achieving the purpose).</p>

Results (Outputs)	<p>What are concrete , visible results to contribute to the realisation of project purpose? What changes and improvements will be achieved by the project?</p> <ul style="list-style-type: none"> * Rainproof structures that provide shades along the day * Comfort * Child friendly area * Education * Master plan of a long-term development of the clinic <p><u>Definition:</u></p> <p>Tangible products and services delivered or competences and capacities established directly as a result of project activities by the completion date.</p> <p><u>Scope of project:</u></p> <p>Results that are under the control / responsibility of project team</p> <p><u>Hint:</u> For clarity a minimum one result statement for each corresponding project component is recommended (Maximum 4 total).</p>	<p>What are the indicators showing whether expected results have been achieved?</p> <p><u>Definition:</u></p> <p>Measures of the quantity and quality of results.</p> <ul style="list-style-type: none"> * Feedback from stakeholders * Measurements on how efficient the clinic is in number of patients and their impression of the experience there * Measurements on the flooding issue 	<p>How will the quantity and quality of each result/output be measured?</p> <ul style="list-style-type: none"> * Collecting feedback * Observing, taking notes and asking the patients visiting the clinic about the interventions * Measuring the amount of water on site after heavy rain (if possible) 	<p>Factors and conditions not under direct project control, but necessary to achieve the project purpose?</p> <p><u>Hint:</u> Formulate assumptions at each result level.</p> <ul style="list-style-type: none"> * Risk for stealing and vandalizing? * Risk for landowners not approving the project * Risk for time not being sufficient to finalize the construction on site
Activities	<p>What activities are required and in what order, in order to achieve the expected results ?</p> <ul style="list-style-type: none"> * Interviews * Workshops * Co-designing * Receiving stakeholder feedback on prototypes <p><u>Definition:</u></p> <p>Specific tasks to be undertaken during the project's lifetime in order to obtain results.</p> <p><u>Scope of project:</u></p> <p>Critical factors for carrying out activities are professional skills, the availability of sufficient financial resources and the absorption capacity of the local partners as well as of the target groups and beneficiaries.</p> <p><u>Hint:</u> The matrix should not include an entire list of project activities, but focus on what the project is to deliver and not on how (maximum 10 total).</p>	Resources (means)	Costs	<p>Factors and conditions not under direct project control, but necessary for results to be achieved as planned?</p> <ul style="list-style-type: none"> * Risk for people not wanting to participate or do not understand our workshop *Permission from UP <p><u>Hint:</u> Formulate assumptions at activity / input level which are relevant for achieving them.</p>
	<p>What resources are required for implementation of each listed activity?</p> <ul style="list-style-type: none"> * Materials for workshops and prototypes * Engagement, time and a planned schedule <p>Indicate what are the inputs required, main resources to be applied e.g.: technical assistance, personnel, equipment, training, studies, supplies, etc</p>	<p>What are the costs for each of the means, if any?</p> <ul style="list-style-type: none"> *Recycled materials = no cost *Workshop materials (Potential crowdfunding if needed) 		

5. APPENDIX

5.2 Workshop Result Tables

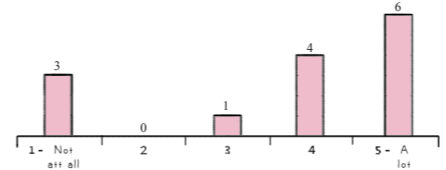
How do you feel?



- 1 - stomach fever
- 3 - tired
- 4 - small fever
- 4 - small fever
- 4 - small fever

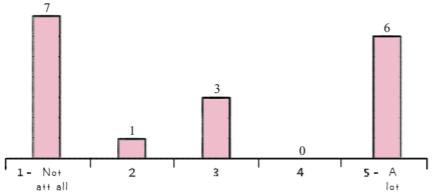
1 - I'm feel write because clinic work fast, the children you keeping ...?

How much does the weather impact your visit at the clinic?



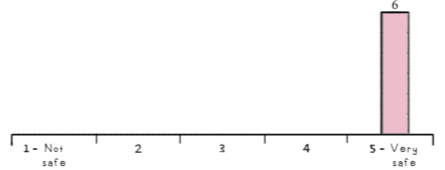
- 1 - would go anyways, go inside kitchen area
- 3 - the rain and winter is the problem
- 4 - the waiting place is not safe from the weather
- 5 - Rain, cold
- 1 - would go anyways
- 4 - we cannot come here if it rains
- 5 - if it's raining I would go next week
- 1 - don't mind rain and wind
- 4 - wait for the rain to go
- 5 - if it rains goes to the other clinic (clinic) and book appointment there
- 4 - the wait + bad weather makes it hard to come when sick
- 5 - if raining choose to go next week
- 5 - rain, cold, go next week

Are you bored while waiting?



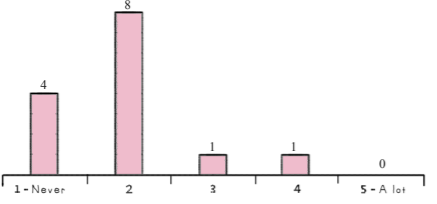
- 1 - socializing
- 2 - no electricity, very tired and need something to keep us busy, receive
- 3 - sitting down, get tired
- 5 - nothing to do
- 1 - socialize, chatting with others
- 3 - maybe we have books to read
- 5 - nothing to do
- 1 - not bored, socialize
- 5 - nothing to do
- 1 - socialize, communicating, like to talk and meet people
- 5 - nothing to do
- 1 - socialize, meet new people
- 5 - nothing to do
- 1 - socialize, meet new people

Do you feel safe while waiting?



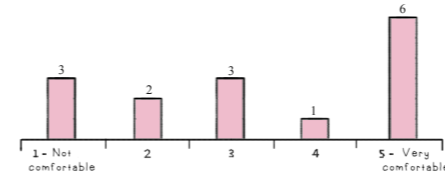
- 1 - yes, public space
- 1 - yes, public space
- 1 - many people

Do you bring anything to keep you (and your kids) busy?



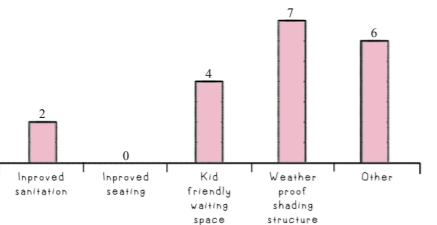
- 1 - bring nothing
- 2 - Phone
- 3 - Phone and food
- 4 - Snacks, toys for baby
- 1 - bring nothing
- 2 - Phone
- 2 - Phone with internet
- 2 - Phone with internet
- 2 - Phone with internet
- 2 - Phone with internet
- 2 - Phone with internet (kids use too)

How comfortable are you while waiting?



- 1 - too hot
- 2 - hungry
- 3 - hungry
- 4 - hungry
- 5 - nice seating not too hot/cold
- 1 - cold while waiting, hungry
- 2 - hungry
- 3 - hungry
- 3 - hungry
- 5 - good I'm very patient (chatting with others)
- 5 - good but a bit sunny

Whats 's the biggest problem at the clinic?

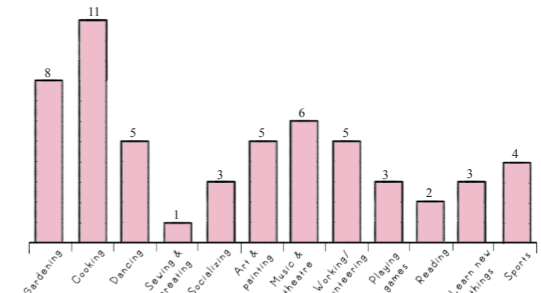


- Other - not enough doctors, long waiting time
- Other - they tell us to bring our own pregnancy test, they should provide them
- Other - nothing to say

What do your kids like to do?



What are your interests?



5. APPENDIX

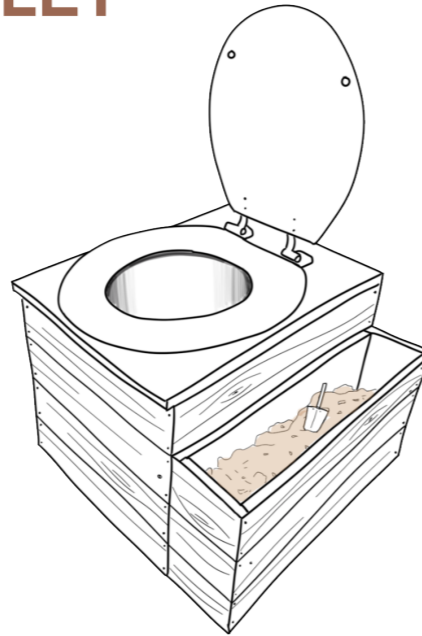
5.3 Instruction Sheets

COMPOST TOILET

Materials

Toilet

- Steel or plastic bucket
- Toilet seat (wood, tire...)
- Seating structure
- Litter absorbent : sawdust, dried and crushed leaves, wood chips...or another dried and crushed plant matter



Somewhere in the garden

- Intake tank (old palettes, wood, metal sheets...)
- Maturation tank (same materials)

Use and composting

- 1 Put down litter absorbent at the bottom of the bucket before using (10 cm)
- 2 Drain the bucket into the outdoor **intake tank** when it gets full. Mix the new drain with the already present drain in the tank (over 20 cm down with a fork).
- 3 Cover with vegetation (plants, leaves, branches and food waste), to prevent the diffusion of odors.
- 4 When the intake tank is full, turn it over in the **maturation tank** then wait a year and a half before using the compost so that the material becomes hygienic and stabilizes over time.

Health recommendations

- Wear **gloves** when handling and **wash** your hands at the end of each procedure.
- Use tools dedicated only to composting dry toilets.
- Buckets must be disinfected after emptying it using a biodegradable disinfectant such as **white vinegar**.

To the garden

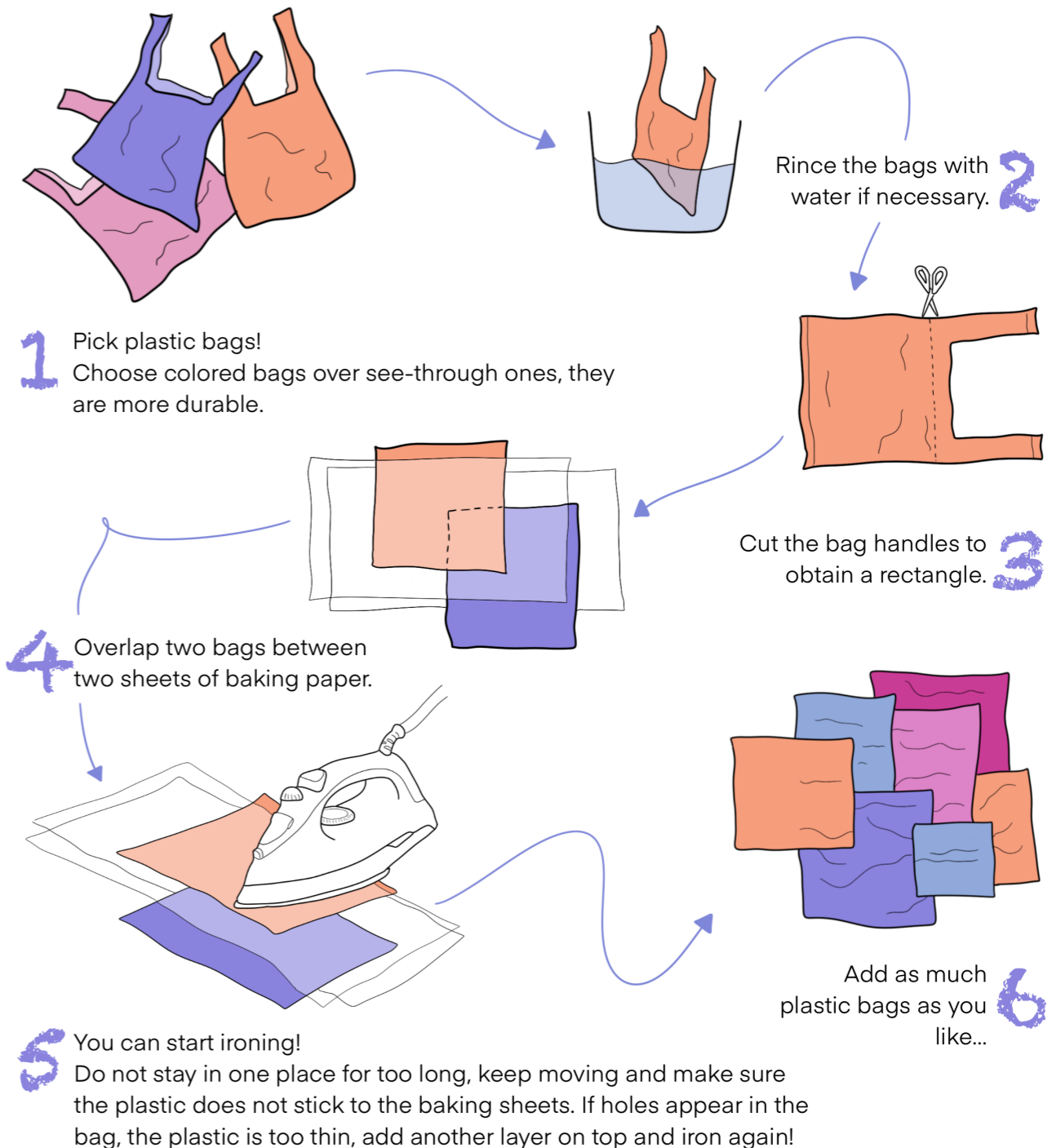
Compost from dry toilets can be used in vegetable gardens after a maturation time of **2 years** - don't forget to mix **regularly** and add **vegetation** to the compost!

Waiting time in the maturation tank :

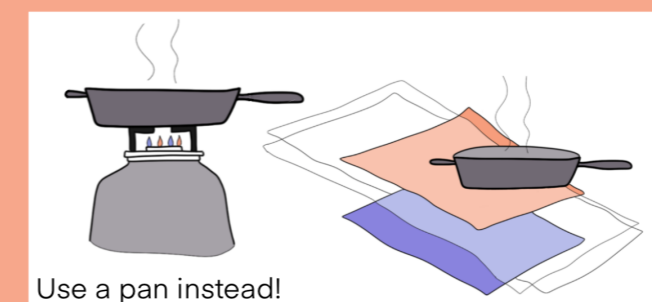
- 1.5 years for non-edible garden
- 2 years for vegetable garden

Feces are very rich in nitrogen, adding carbon-rich plant matter balances the compost and will nourish the garden.

PLASTIC PATCHWORK TUTORIAL



No iron ?



Be creative !

