ETH-EiABC Workshop 2014

Addis Ababa, Ethiopia

IMPROVING PEDESTRIAN MOBILITY THROUGH BOTTOM-UP STRATEGIES

Final Report

Zurich | Addis Ababa, January 2015

We would like to thank everyone who made this workshop and trip to Addis Ababa possible.

Special thanks go to Sascha Delz, Catherine Lippuner, BinBin J. Pearce and Basil Vitins for organizing the workshop and for their patience in supervising and proofreading our work. Furthermore, we would like to thank the team of the Chair of Basic Architectural Design, Bisrat Kifle, Zara Gray and Fikreselassie Abey for their effort and support at the EiABC.

We would also like to express our gratitude to all speakers whose presentations and expertise added considerably to our knowledge and research:

Ato Fasil Giorghis
Dr. Solomon Kidane
Anteneh Tesfaye
Fantahun Tesfaye
Fikreselassie Abey

The workshop would not have been possible without the financial support of our main sponsors:

ETH sustainability
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

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Science and Policy
Platform of the Swiss Academy of Sciences
KFPE – Commission for Research Partnerships with Developing Countries

Stiftung Mercator Schweiz

Last but not least, we highly appreciate the institutional support we have received from:

EiABC

DARCH

USYS TdLab
Department of Environmental Systems Science
Transdisciplinarity Lab · Science-Society Interface

IVT Institut für Verkehrsplanung und Transportsysteme
Institute for Transport Planning and Systems

NSL Netzwerk Stadt und Landschaft
Network City and Landscape

Workshop Outline

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Bin Bin Pearce (ETH Zurich), **Basil Vitins** (ETH Zurich)

This workshop was designed as a follow up project to the 'ETHiopia' Summer School 2010, which has been co-organized by 'ETH Sustainability', the Department of Architecture of ETH Zurich and the Ethiopian Institute of Architecture, Building Construction and City Planning [EiABC]. The workshop also marked a new chapter of the steady partnership between the ETH Zurich and the EiABC of Addis Ababa University, and therefore aimed for extending the fruitful and positive experiences of previous academic staff residences and student exchanges. It is hoped that the workshop has further nurtured this relationship and allowed the participants to reflect on their own backgrounds, their practices, and on what sustainability within a context of design and urban planning could be.

Pedestrian mobility is a vital factor in urban centers of low-income countries. Research has shown that increased mobility of residents and workers are vital to the economic development of a location.[1] Mobility improves trading, specialization of businesses, and enables social contacts and exchange. Therefore, transport infrastructure investments are often used as a catalyst, and are essential factors within the development of any country. In socio-economic environments where public transport is scarce or too expensive, where incomes are dependent both on one's ability to travel to changing job sites, and access to street level pedestrian flows, the spatial configuration of urban transportation infrastructure becomes an essential feature. In many emerging economies, enhanced mobility is defined exclusively by increasing access to cars and highways. Addis Ababa represents an exemplary for investigating such mobility related issues:

First, the majority of its population can be allocated within the low-income group: as of 2008, the average monthly income of 60% of Addis Ababa's households was at USD68.[2] Related to this, and according to different estimates, over half of the city's population is generating its income in the informal sector.[3] People working in the informal sector rely on flexible and affordable transportation, because work locations usually change on a daily or weekly basis. Informal work is also dependent on availability of space that is easily accessible and open to pedestrian movement. In many cases – for example shepherds and goatherds – the business location is not fixed, and therefore basically distributed on the whole street level of the city.

Second, Addis Ababa is undergoing major socio-economic and spatial transformations. The city's average annual growth rate of approximately 2.5% has almost doubled its population from 1.8 to 3.0 millions between 1990-2010. By 2020, UN-Habitat estimates an additional million of inhabitants.[4] Among the many areas affected by these transformations, the large-scale extension and upgrading of Addis Ababa's road network has been one of the major and omnipresent effects. One of the initial interventions is the so-called Ring Road, which marks the first attempt to introduce an urban freeway. In parallel, the city's street network has been rapidly extended (+21% in total between 2005 and 2010.[5] However, while walking still represents the largest share of urban trips, only 35% of the roads have been built with walkways. This lack of walkways demonstrates that pedestrians have not been considered a priority for the city's planning strategy.[6]

Third, these road construction activities, coordinated by the Addis Ababa City Roads Authority (AACRA), are mostly characterized by a top-down planning culture. In view of the massive and rapid growth, a certain amount of coordinated, top-down ordinance is clearly unavoidable. Yet, in combination with applying urban transportation infrastructure solutions from industrialized Western (or Eastern) models, this version of planning sovereignty has basically omitted the development of road infrastructure specifically tailored to the local socio-economic and physical conditions. As a consequence, the predominantly car-oriented interventions have neglected the needs of pedestrians in many places.

OBJECTIVES AND STRUCTURE

Against this backdrop, the workshop seeks to address the challenges of the status quo with a bottom-up approach. Under the assumption that such interventions could potentially improve the pedestrians' daily economic activities and provide

a basis for sustainable, as well as economic, development, the workshop participants will be asked to design low-cost, adaptive and easily applicable ways of improving pedestrian mobility in Addis Ababa. The workshop is structured along three phases. During the first phase, the participants will carry out field work according to given tools, as well as their own devised methods to thoroughly understand the assigned neighborhoods and study areas.
The second phase will focus on a process of joint problem definition through team work. All data and findings will be collected and presented to the whole group in order to identify the major problems and challenges. For the third phase, the participants will be asked to create hands-on prototypes of possible solutions to improve pedestrian mobility in Addis Ababa at multiple scales. Based on punctual desk reviews and feedbacks the teams will have the opportunity to iterate on these initial designs and present their process and outcome in a final presentation. Incorporating the discussions, the group will ultimately compile their findings, texts and projects into a final report.

[1] See for example: Anthony J. Venables, "Evaluating Urban Transport Improvements - Cost-Benefit Analysis in the Presence of Agglomeration and Income Taxation," Journal of Transport Economics and Policy, 41, no. 2 (2007).
[2] UN-Habitat, Ethiopia - Addis Ababa Urban Profile (Nairobi: United Nations Human Settlements Programme, 2008), 8.
[3] UN-Habitat, Situation Analysis of Informal Settlements in Addis Ababa (Nairobi: United Nations Human Settlements Programme, 2007), 25.
[4] UN-Habitat, State of the World's Cities 2012/2013 - Prosperity of Cities (Nairobi: United Nations Human Settlements Programme, 2012), 134.
[5] Fantahun T. Demdime, "Integrating Public Transport Networks and Built Environment - The Case of Addis Ababa and Experiences from Stockholm" (KTH-Royal Institute of Technology, 2012), 37.
[6] See for example: Fantahun T. Demdime, "Integrating Public Transport Networks and Built Environment - The Case of Addis Ababa and Experiences from Stockholm" (KTH-Royal Institute of Technology, 2012), 38.

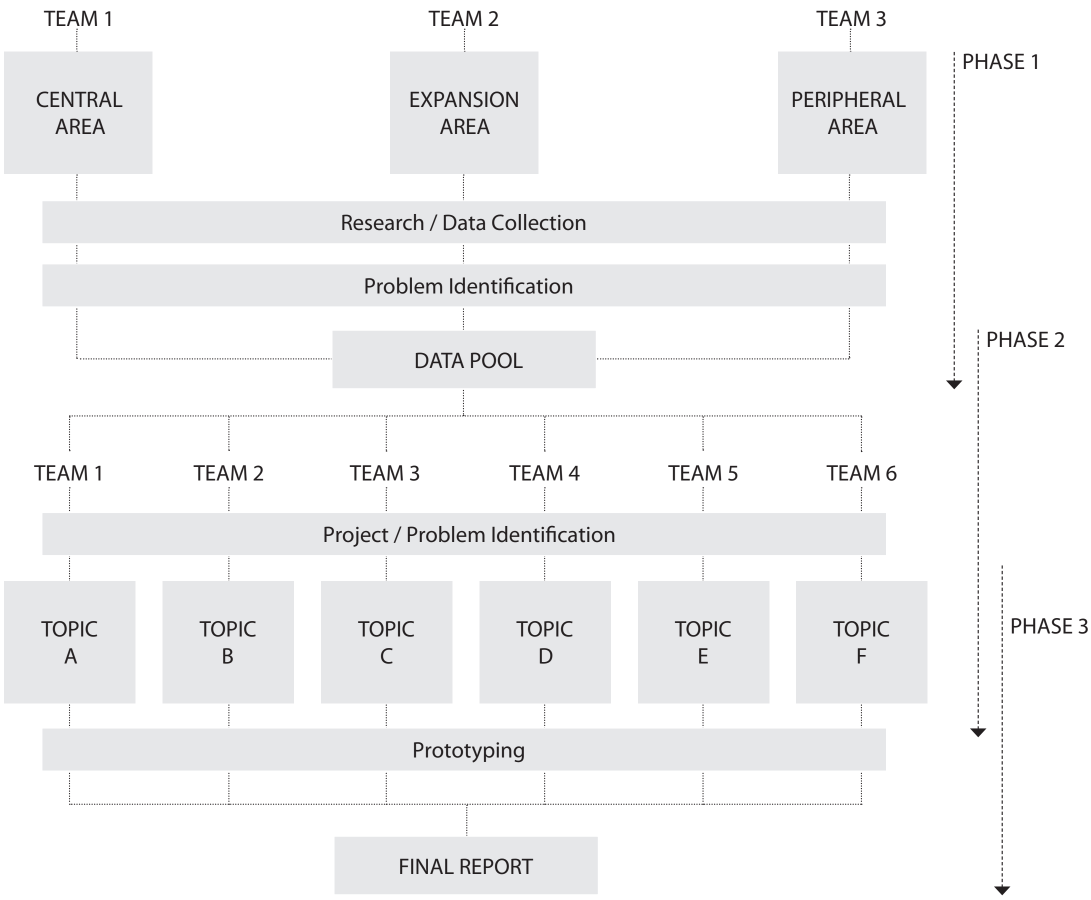


fig. 1: workshop structure

Executive Summary

Over the course of two weeks in 2014, 10 students from ETH Zurich and 10 from EiABC participated in a workshop on improving pedestrian mobility in Addis Ababa, Ethiopia.

The main rationale of the workshop curriculum was to combine research-oriented learning and design methodology within a real-world study area, the city of Addis Ababa. The students were encouraged to both frame problems based on empirical observations related to pedestrian mobility, and to develop creative solutions for the found challenges.

Focusing on a transdisciplinary planning and learning approach, students would mainly learn by experiencing and interacting with the real world, rather than solely through lectures in a classroom. This would enable the participants to assimilate and co-produce knowledge with involved stakeholders, such as those who would be affected by the developed projects. Overall, planning, designing and evaluating were intimately connected and applied during the whole workshop, allowing an experimental space for this new and promising teaching approach.

The workshop was structured along two phases. The first week focused on field research, data collection and problem framing. Here, the students had to choose between three focus areas within the city: the center, the extension areas, and the periphery of Addis Ababa. The resulting three groups –each with a diversity of backgrounds and expertise in design, planning, engineering, social and applied sciences – were asked to visit, observe, and collect data from their designated sites. After reviewing and analyzing this data, the groups were assigned to define two problem statements they found most pertinent to their area of study and verify these hypotheses with additional visits to the field site. In order to focus on all six resulting problem statements, each of the three initial groups was split into two teams.

During the second week, the students were challenged to use the acquired data and information to formulate ideas, possible solutions, and prototypes for their problem statements. Based on their own set of selection criteria, and after returning to their study areas to verify effectiveness and plausibility of their various prototypes, students honed in on the most feasible solutions. Finally, incorporating their site analysis, findings, and problem statements, students had to formulate a strategy and propose a physical design, which could integrate both the spatial complications and the social necessities of the urban environment. The following are the problem statements and their solutions identified by each of the groups:

1. *Minibus users need weather protection, because they have to wait for a long time for the minibuses.*
    - **Waiting Islands** that simultaneously serve as a waiting bench for the minibus users and as a protection for growing trees.
    - Transition from temporary to **concrete coverings** for street vendors to provide additional protection for businesses and minibus users.
    - **Strengthen existing structures** in the market around the minibus station.
2. *Pedestrians in inner-city crossings need to be less exposed to oncoming traffic because they are vulnerable to being hit by vehicles.*
    - Utilise the area underneath the new LRT infrastructure to create a **Pedestrian Boulevard** that can be used for recreation, relaxation, and business activities.
3. *Due to the variety of activities, such as street vending, along the main transfer paths of public transfer hubs passengers cannot transfer safely.*
    - **Build fixed concrete blocks**, which will allow street vendors to display merchandise without obstructing the walkways.
4. *Pedestrians crossing the Ring Road take the risk of jaywalking since no attractive alternative is provided.*
    - **Upgrade overpasses** in high-density areas to provide space for commercial activities.
    - **Demarcate jaywalk areas** where people can cross in low-density areas.
5. *Public bus users have to wait a long time in queues before boarding the busses.*
    - Establish a **prepaid** bus voucher system to reduce waiting times before boarding the bus.
6. *Within the public housing site of Jemo I, a lack of social interaction and daily pedestrian activities is confronted with fallow land and fenced off streets.*
    - Enable **spaces of 'social production'** adjacent to the fenced areas of Jemo I, in order to encourage social interaction, activate the street spaces, and provide additional means of livelihood.

This report highlights the process of how every group developed their problem statements and prototypical solutions. The participants hope that eventually these prototypes can serve as stimulators for new discussions, be further developed, and – with the help of Addis Ababa's authorities – even could be implemented in the real world.

Introduction

fig. 2: typical traffic situation in Addis Ababa

BACKGROUND

Pedestrian mobility is receiving more and more attention. Planners and developers are realising that a walking friendly environment contributes to a number of positive effects, such as local vibrancy, less noise and emissions, more social trust and urban market creation. However, in Ethiopia (and many other African countries), walkability is largely overlooked by planning strategies that focus on economic acceleration through automobile infrastructure developments. Paradoxically, walking remains the common transportation mode with 70% of Addis Ababa's inhabitants travelling by foot.[1] However, planning strategies favour the minor percentage of the capital's population using automobile transportation. While these strategies are arguably short-term economically feasible and cater to the city's automobile users (of primarily higher income), it overlooks the everyday-life consequences for the greater mass, still walking the city. In Ethiopia, the consequences are clearly visible. In the years 2000-2005, 300 people died each year in car accidents in Addis Ababa alone.[2] Many of these fatalities can be linked to new infrastructural implementations, developed largely with automobile/ drivers' aspirations in mind (fig. 2). The most notable recent upgrade of the infrastructural network is the Ring Road, both built and financially supported by the Chinese. It was initially planned as a frame around the city, providing a more efficient link for automobiles. However, as urbanization spread faster than expected, the road now cuts through the outer skirts of Addis Ababa like a knife, dividing neighbourhoods from each other.

SETTING

From August 25 to September 6 2014, twenty Bachelor, Master and PhD students from Eidgenössische Technische Hochschule Zurich (ETH Zurich) and the Ethiopian Institute of Architecture, Building Construction and City Development (EiABC) explored concepts for improving pedestrian mobility (tab. 1). The development of new ideas and strategies were framed by the workshop's focus on advancing viable ideas for low-cost mobility in an integrative and more equitable manner. A transdisciplinary setup served as foundation for a real-world problem solving process, and developed the capacity to reframe problems in novel ways. This report documents the process and the findings of the twelve-day experience, and describes the methods and tools used to enhance critical thinking as well as design capabilities. In addition, the whole workshop was independently documented on film, observing the teachers' and students' activities during the two weeks. The resulting short-film can be seen on the ETH Sustainability webpage (for more information see page 69).

The understanding of the local sites, the problem finding process, the development, design and communication of the possible solutions are laid out in the following chapters. Furthermore, the different sections of the report contain the student's working experiences with different stakeholders of the local communities, experts and the teaching team in an interdisciplinary and multicultural group.

FOCUS AREAS & PARTICIPANTS

Three focus areas representing main urban settings within Addis Ababa were chosen by the teaching team: the central area (city centre), the extension area (neighbourhoods around the recently built city highway, the Ring Road), and the peripheral area (newly built residential areas in the suburbs of the city). After collecting information and data on the focus areas in larger groups, students split into six teams, each of them investigating one particular site within the focus areas. The follwing chapters are accordingly subdivided into the three focus areas and six focus sites.

Although the teaching team (tab. 2) predefined the focus areas along representative road axes, neither specific research questions, nor the focal sites were defined beforehands. While team formation was setup to ensure a multicultural, interdisciplinary and resource-balanced setting, the groups freely decided which specific topic and area they would like to investigate.

Name	**Field of Study**	**University**	**Area**
Henok Fekadu	Architecture BSc	EiABC	Central 1
Panayotis Coucopoulos	Architecture MSc	ETH Zurich	Central 1
Samira Britschgi	Civil Engineering MSc	ETH Zurich	Central 1
Selome Mekbib	Architecture BSc	EiABC	Central 1
Amanuel Amare	Urban and Regional Planning BSc	EiABC	Central 2
Aurelia Müggler	Architecture BSc	ETH Zurich	Central 2
Ernst Bosina	Civil Engineering PhD	ETH Zurich	Central 2
Mitiku Woldesenbet	Urban Design and Development MSc	EiABC	Central 2
Aknaw Yohannis	Architecture BSc	EiABC	Extension 1
Dagmawi Tilahun	Architecture BSc	EiABC	Extension 1
Raphael Eder	Spatial Development and Infrastructure Systems MSc	ETH Zurich	Extension 1
Kalikidan Regassa	Architecture BSc	EiABC	Extension 2
Kim Helmersen	Sociology MSc	ETH Zurich	Extension 2
Melanie Imfeld	Architecture MSc	ETH Zurich	Extension 2
Firehiwot Nesro	Construction Technology and Management BSc	EiABC	Peripheral 1
Philipp Staudacher	Environmental Sciences MSc	ETH Zurich	Peripheral 1
Sarah Weber	Architecture MSc	ETH Zurich	Peripheral 1
Leulseged Tibebu	Architecture BSc	EiABC	Peripheral 2
Pablo Acebillo	Spatial Development and Infrastructure Systems MSc	ETH Zurich	Peripheral 2
Selamawit Teku	Architecture BSc	EiABC	Peripheral 2

tab. 1: participating students

Name	**Institute**	**Responsibility**
Sascha Delz	Departement of Architecture ETH Zurich	Design, Methodology
Catherine Lippuner	ETH Sustainability	Internal Affairs, Fundraising
Bin Bin Pearce	Transdisciplinary Lab USYS ETH Zurich	Curriculum
Basil Vitins	Transport Planning and Systems ETH Zurich	Transport Systems
Zara Gray	Chair of Basic Architectural Design I&II EiABC	Local Support
Fikreselassie Abey	Chair of Basic Architectural Design I&II EiABC	Local Support
Thomas Schärer	Mediation of Art and Design ZHdK	Documentation

tab. 2: organizing team

METHODOLOGY INPUTS

In the beginning, to lift everyone on the same level of information, the teaching team gave the students a few introductory inputs. The first input, introduced the students to the inductive and deductive reasoning model (fig. 3).[3]

In the second input session, the students were introduced to the specific data collection tools proposed by Jan Gehl on the one hand (human characteristics), and other general aspects of spatial configurations on the other hand (spatial characteristics)[4]:

Human Characteristics:
- Counting, e.g. Number of cars per hour
- Behavioural Mapping, e.g. shoe shiners and fruit sellers at the road side
- Tracing; observing how a particular place is passed by
- Tracking; observing where a particular person passes by
- Looking for Traces, e.g. food remnants, cigarettes
- Photographing
- Diary
- Test Walk; observing oneself's way to a certain target
- Interviewing

Spatial Characteristics:
- Street Sections, e.g. road width compared to walkway width
- Spatial Mapping; a common map
- Program Distribution; activities distributed on a common map
- Street Facades, e.g. shops, blank walls, park
- Pedestrian Infrastructure, e.g. zebras, lighting, holes in the walkway
- Public Transport, e.g. busses, taxis
- Public Spaces, e.g. parks, bus stops
- Urban Furniture, e.g. seating opportunities
- Surfaces/Material, Obstacles

The third input lecture introduced the students to several design thinking methods collected by Hasso Plattner[5]:
- Empathize, Define, Ideate, Prototype, Test
- What, How, Why?
- Saturate and Group
- Composite Character Profile
- Why-How-Laddering
- Point-of-view Madlib
- How might we?
- Brainstorming
- Brainstorm selection

FIELD WORK & PROBLEM FRAMING

Prior to the start of the workshop there was no problem statement specified. Therefore, the first thing the students had to acquire, was an understanding of the situation to formulate a problem. Before the first field trip, the students set a few questions they wanted to investigate. An example would be: 'How is the pedestrian safety affected by design in xyz site.' With these questions in mind, and the data collection tools in the pocket, the students strode out to get a first taste of their new worksite (fig.4). During this trip, the students had to define two focal areas, in which the main observations would take place. The sites had to be representative of the whole area and yet very different from each other.

Before the second field trip, the students tried to state the observed problems with the Point-of-View Madlib method. When they found two main

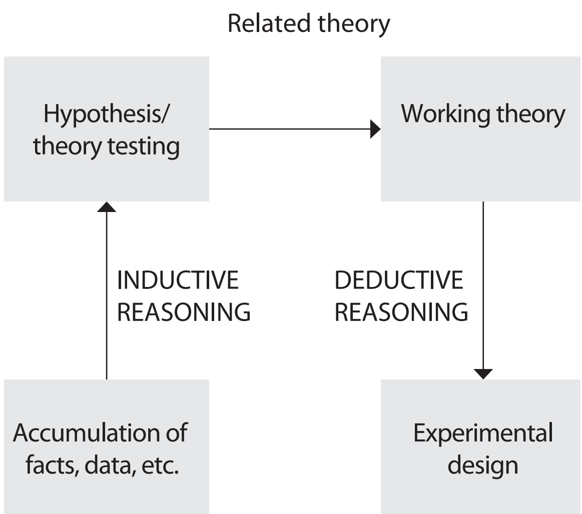


fig. 3: the inductive and deductive reasoning model (Gray, 2009)

problems, the students derived two goals on which they wanted to focus. Most groups split at this point in half, so that each sub-group might examine one of the problems. During the second field-trip, the same data collection tools were used as for the first trip. However, the focus was different, such as scrutinizing the newly-found problems and goals.

PROTOTYPING & PRESENTATION

After the data-collection and analysis phase, all groups continued with forming ideas on how to achieve the proposed goals. The first step was in most cases a brainstorming session, carried out either individually or in groups. After short presentations of these ideas within their respective groups, they proceeded by ranking the possible solutions according to criteria defined by themselves. Either due to weighted criteria or through discussions, each group decided on a solution to be examined further. While some students were more trained in data collection and analysis, others were enthusiastic to design their solutions now. At the end of the workshop, the results were presented in EiABC to a larger audience. The spectators used the opportunity to ask questions about the projects and gave their opinion on the ideas of the young minds.

[1] *http://www.mediaethiopia.com/Engineering/addis_ring_road.htm*

[2] *Fanueal, S.(2006). Analysis of Traffic Accident in Addis Ababa: Traffic Simulation; Unpublished MA Thesis, Addis Ababa University (AAU), Ethiopia*

[3] *David E. Gray – Doing Research in the Real World (London: Sage Publications, 2009). p. 13-16.*

[4] *Jan Gehl & Brigitte Svarre – How to study Public Life, Washington & London: Island Press, 2013. p1-35, p81.*

[5] *Hasso Plattner, 2009. Design Thinking Methods. Institute of Design, Stanford.*

fig. 4: collected results of the field study of all three groups (central, extension, periphery)

Central Area

fig. 5: central sites 1 and 2

The Churchhill Road in Addis Ababa was assigned to us to be the study area on which to improve pedestrian mobility (fig. 5, between marking 1 & 2). The lively, 3 km long axis runs from North to South and connects two significant building elements in the city, the city hall in the North and the old train station located at La Gare in the South. Several administrative and representative buildings, like the Ethiopian National Theatre, the main post office and the Commercial Bank of Ethiopia, are located along the road. It is therefore one of the most prominent roads in the city. Churchill road also serves as a main connection hub between all transport modes present in the area. The variety of functions is represented in the dimensions of the street. It is the first widest asphalt road in the city measuring 48 m in width, which even exceeds the Ring Road of Addis Ababa (37 m). Along its stretch, Churchill road has between two to four lanes for vehicles for each direction, sidewalks, several parking lots and greeneries of different kind. Along the stretch of the road, the quality of the pedestrian infrastructure is low due to poor maintenance. The sidewalks are used for several other activities, such as street vending, parking or as a storage area for construction sites. In several places it is, therefore, easier to walk on the street.

The group's task was to define a bottom-up solution to the problematics based on site studies and observations. 8 students involving 4 Ethiopian and 4 Swiss students split up in to two groups called central 1 and central 2. Each of them chose a different area on Churchill Road. Both, however, aimed to create a safe and comfortable zone for pedestrians next to motorized traffic. The first focus was put on the northern part of Churchill Road between Cunningham Street and Wawel Street/ General Wingate Street (fig. 6). A minibus station and a nearby street intersection are located here. It represents a section that is used daily by a large number of individuals. Seeming very chaotic and extremely lively, it stood as a typical example for many other minibus stations (fig. 7).

The second setting focused on the La Gare Intersection, in the South of Churchhill Road (fig. 8). The intersection presents a large flow of both pedestrians and vehicles. The recently constructed overhang LRT infrastructures is one of the main characteristics of this specific site. In the near future, two stations will be constructed at the La Gare intersection, which will further increase the flow of people and vehicles. We chose this site for its high level of traffic disorganization but also for its real-time capacity to be easily restructured as it is still under construction (fig. 9). This intersection provided us with the opportunity to avoid repeating the same mistakes that were made at the Boles Road, a typical poor example of newly built pedestrian and road infrastructure.

After the inputs on pedestrian mobility in Addis Ababa, the active part of the workshop had started. Our process was divided into field study, analysis and conclusions, prototyping and evaluation. On the first day of the fieldwork, we went out to formulate our first impressions of our sites. We explored the diversity of users surrounding the minibus station and observed how traffic, particularly at peak-hours, performed in conjunction with the to minibus and pedestrian flow. In the afternoon we walked south down Churchhill Road to reach the second area we wanted to focus on. Our first impression was that it was loud and extremely lively. We grasped the opportunity to climb up a building still in construction to get a panoramic view from above. There we used our time to discuss what we had experienced and what we thought the problems were.

fig. 6: nothern part of Churchill Road

fig. 7: minibus station

fig. 8: La Gare intersection

fig. 9: disorganized traffic flows

Upon reaching the second site, we felt the massiveness and the soothing cooling shade of the large LRT pillars starting from La Gare Intersection all the way to the mouth of Mesquel Sq. We witnessed the chaos and the danger reserved to pedestrians. These first observations confirmed our concerns for the comfort and safety of pedestrians. The second day began with a general site analysis according to the given tools. Different physical and organizational structures of our site were documented. We started using several counting methods during rush hour. Each group member was positioned on a different observation spot on the street to count vehicles or pedestrians for the duration of 30 minutes, three times ten minutes.

For the first site the counting involved (fig. 10):

- How many people enter and exit the minibus station?
- How many minibuses are leaving the station?

For both sites the counting involved:

- How many pedestrians use the sidewalk and how many walk on the street?
- How many pedestrians jaywalk across the road and how many use the zebra crossings?
- How many vehicles cross the road?

We mapped every activity on and along the street and tracked and traced people, to see which route they follow. We took photographs of human traces on the walkways, such as misplaced building material from the various construction sites, pedestrian infrastructure, like street lighting and handrails, public transport, like taxis, minibuses and buses. Public spaces, like coffee places, markets and the minibus station, urban furniture such as stones used as benches, obstacles of the building sites and surface material of the floor were photographed as well. In the afternoon we measured the walking speed on the walkway over a distance of 20 meters.

Trying to better understand the LaGare intersection, we counted:

- How many people cross on red light in comparison to green light?
- How much time do they need to cross on red or green light?

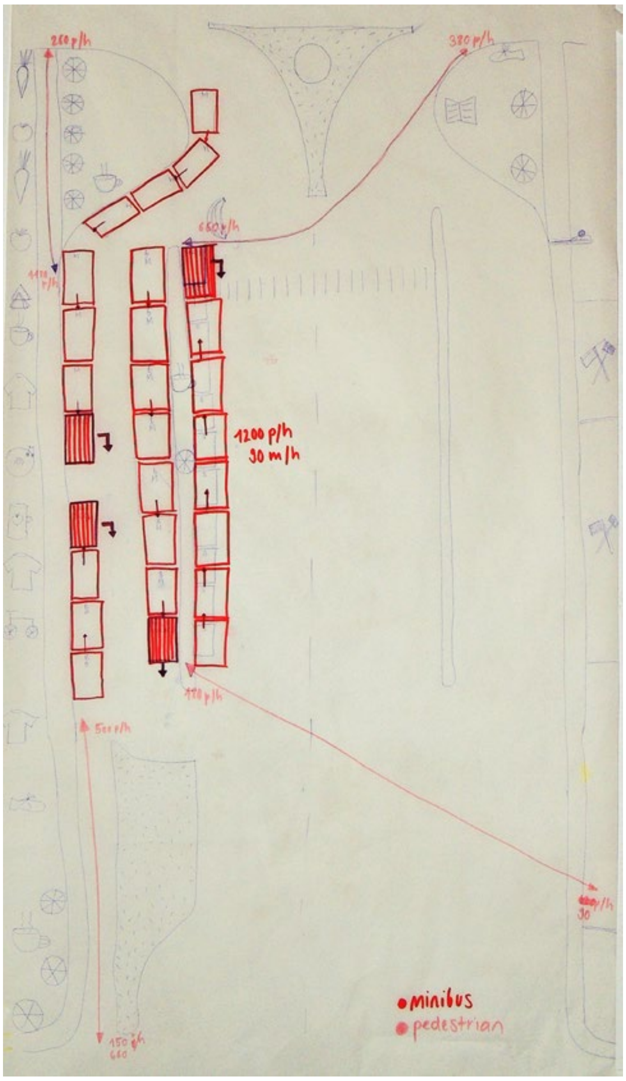


fig. 10: countings

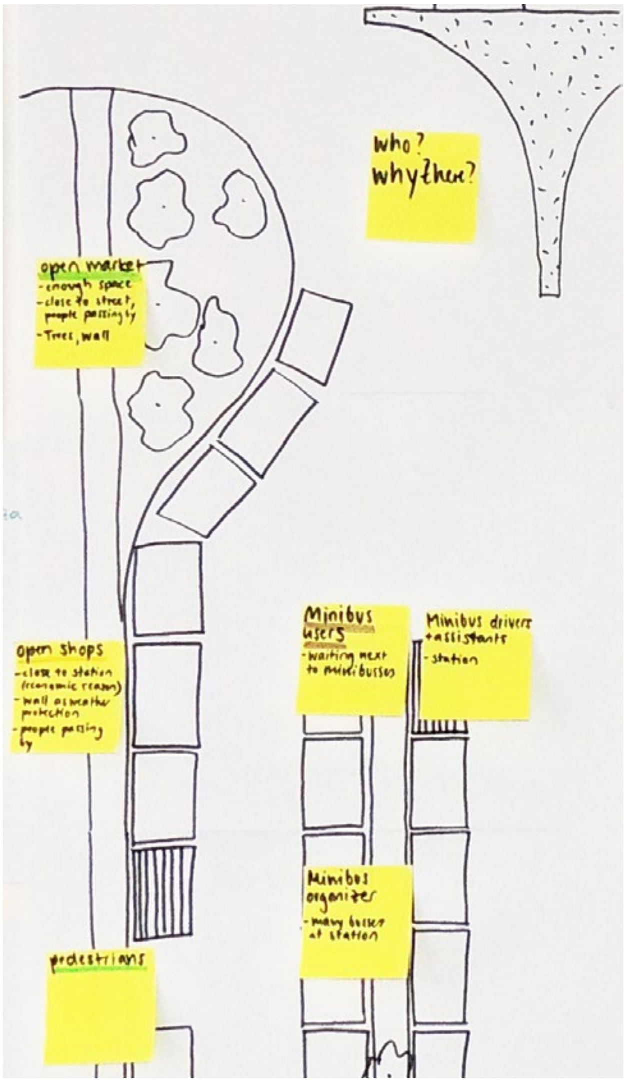


fig. 11: activity mapping

There were so many activities to observe. What in the beginning seemed chaotic for the ETH students, started to make sense (fig. 11). Many cultural and organizational questions from the Swiss students were gradually answered by the Ethiopians.

FRAMING THE PROBLEM

Back in the lab, we summed up the collected data material and formulated two problem statements. During our field trips to the minibus station, it could be easily noted that a lack of pedestrian infrastructure for minibus users was a major concern. Starting from the necessities of a user group, the following problem statement was defined:

"Minibus users need weather protection, because they have to wait for a long time for the minibuses."

The main problem we noticed in the second site through our observations and our field study, was directly correlated to the analysis results we previously had extrapolated. The problem statement was thus defined:

"Pedestrians in inner-city crossings need to be less exposed to oncoming traffic because they are vulnerable to being hit by vehicles."

Verifying these hypotheses was to be done on the third and final day of our field work.

Central Site 1: Churchill Road

Amanuel Amare (EiABC Addis Ababa), **Aurelia Müggler** (ETH Zurich),
Ernst Bosina (ETH Zurich), **Mitiku Woldesenbet** (EiABC Addis Ababa)

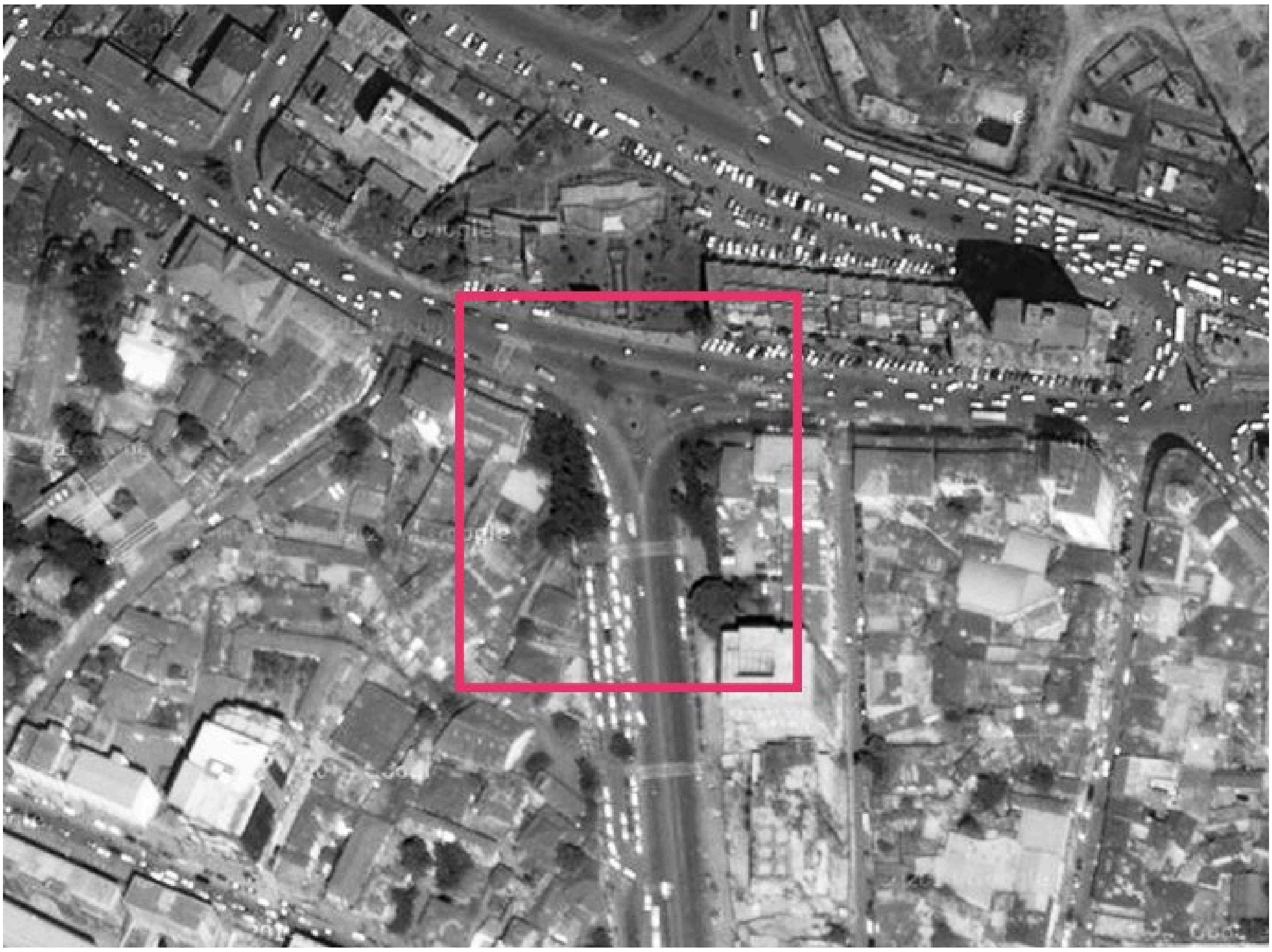


fig. 12: perimeter central site 1

FURTHER STEPS – ANALYSIS

Further progress found us focused on an analysis concerning the waiting time and the weather protection conditions for the users of the minibus station. First we performed different countings:

- How long do people wait for their minibus?
- How many people wait at the station?
- Where do they wait?
- Is there enough space for the different users?
- What kind of weather protection do they already have?
- Is there a need for other/further weather protection?

Secondly, we asked the local people what their general needs on site were. In order to better understand the minibus system we talked to a representative of the minibus authority who explained us the following facts. At the minibus station, four minibus lines are located. They all start at this station and then ride to Bole Michael, Bole Delidey, Mexico Kera and to Saris areas, all important locations in Addis Ababa. In addition, in the evening and early morning, an extra line is in service to the Jemo neighbourhood. In the morning, the minibus station is used by about 1200 P/h. Based on the data from the minibus station organisers, it can be estimated that up to 270 minibuses are operating the lines at the minibus station. The highest limit of capacity for these connections is about 50 - 100,000 minibus users per day. This number can vary strongly based on religious celebrations, weekdays and weather conditions.

Just next to the station there is an open market, where different fresh vegetables and fruits are sold. Several other commercial activities, like shoe shining, begging or selling fast food, are present due to the high number of minibus users. The minibus station is functioning now because of the invested interests existing between different direct and indirect stakeholders, such as minibus users, minibus drivers, driver assistants “weyala”, minibus owners, minibus associations, minibus station guiding groups, the transport authority of Addis Ababa and different business activities adjacent to the stations. In an effort to better comprehend the situation, we interviewed the market ladies, the pedestrians, the shop owners, street cleaners, minibus drivers and users. Every stakeholder group on site had its part in an interview (fig. 13).

One of the main outcomes of the field work, especially as a result of the interviews, was a detailed analysis of the stakeholders involved in the organisation of the minibus station and the minibus system (fig. 14). The Transport Authority serves as the origin of the whole organisational structure. Hence they have the administrative and legislative power to organise the minibus owners, the minibus associations and the organizers of the minibus stations. The minibus drivers and their assistants are then organised by these three groups. At the station, the organizers of the minibus station are the most important group of all, as they are responsible for organizing the minibus users waiting to board and the queues of the minibuses themselves. In compensation, they are paid by the minibus drivers and assistants. The minibus users are the end users and source of the whole structure, attracting and supporting all other activities taking place in and around the station. These activities are governed and generated by the offer/demand model created by the presence of so many individuals around the station. These are predominantly people selling goods, like the market ladies or the shop owners, but also homeless people, and/or people begging for money and food. Pedestrians crossing the area of the minibus station have to be considered stakeholders as well.

BRAINSTORMING AND PROTO-TYPING

Each member of the group wrote down different solutions on post-its. A self-made rating system based on a set of criteria helped us to evaluate the ideas on a rational level. The criteria were costs, maintenance, ecology, effectivity, implementation and socioeconomic benefit (fig. 15).
Each criteria was rated from -- (negative) to ++ (positive). The overview showed which ideas had the best rating, i.e. most ++ (fig. 15).
During the evaluation of the different measures we concluded that a combination of different solutions might improve the quality of our final solution. We therefore decided to not choose a single solution but to find the optimal solution for each specific location. The specific locations were:

- the waiting island on the street
- the open shops along the sidewall
- the open market beneath the trees

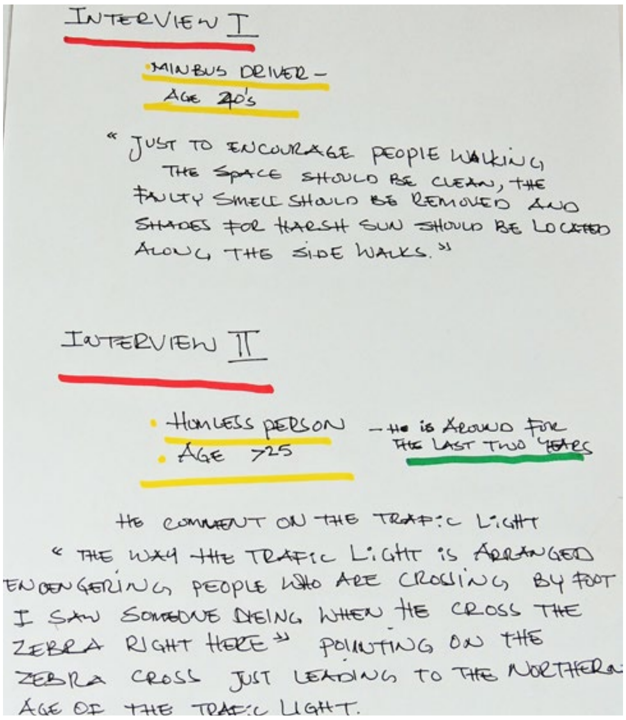


fig. 13: summary of two interviews

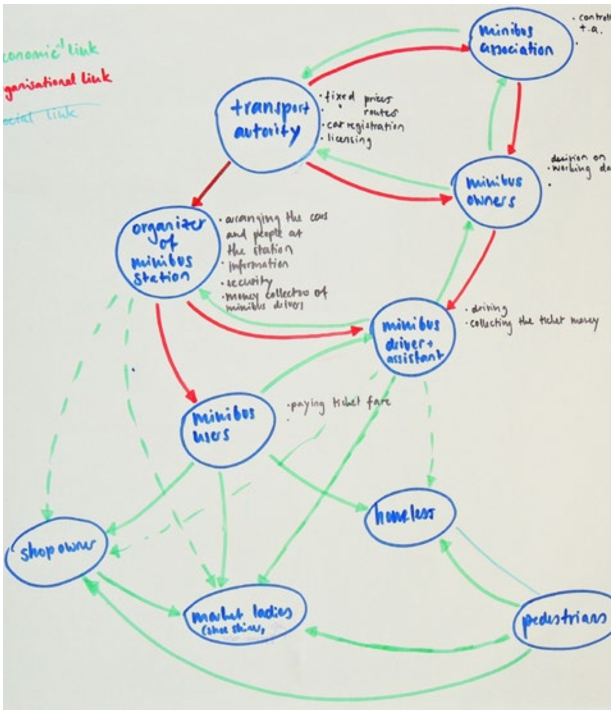


fig. 14: stakeholder analysis

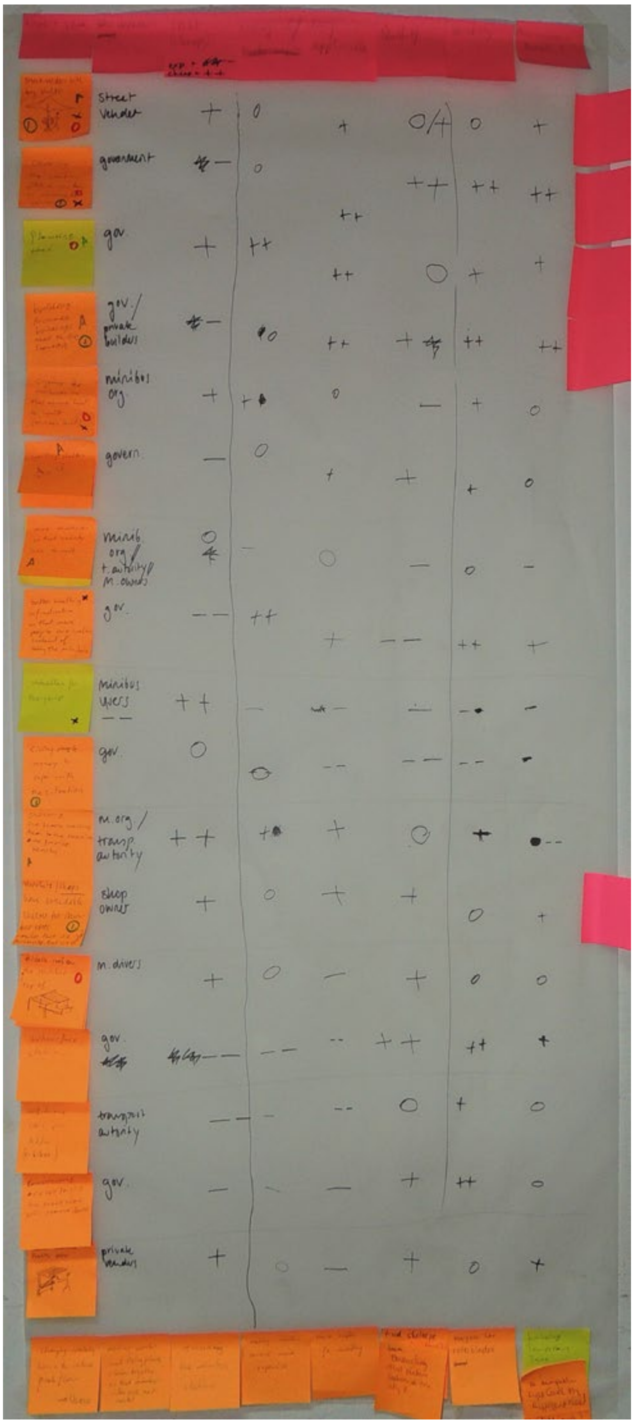


fig. 15: rating of solutions derived from brainstorming

PROTOTYPE

After the brainstorming, two approaches were formulated, on which the solution was based. Firstly, it was decided to maintain existing structures, both in the organization and the infrastructure of the minibus station. This was due to the fact that the minibus station is arranged based on the needs of the different stakeholders. Hence, the proposed solution should maintain and improve the situation and thereby will be backed up by the stakeholders. This approach rendered our intervention solution easily applicable and implementable.

Secondly, the observations showed that it was necessary to provide improvements for all stakeholders. Otherwise, the infrastructure (e.g. weather protected area for minibus users) would be used by different other groups and therefore be overused and not adequate for the minibus users (fig. 16). By providing weather protection for each of the other user groups, they can stay at their current location and the minibus user can benefit from their own dedicated weather protection. At the moment, the overuse of existing shelter can be observed at the open shops along the wall. During rainy weather, people seek shelter there, disrupting the business activities of the shop owners.

Using this approach, our prototype includes different measures for different locations (fig. 18). For all locations, four steps were employed to find the most suitable solution:

- Description of the location: Where is the location and what are the respective user groups?
- Existing structure: What kind of structures exist which can be used for the prototype?
- Needs: What are the needs at this specific location?
- Prototype: Which prototype will be used at this location?

MINIBUS STATION: WAITING ISLAND

At this location there are mainly people waiting for the minibus and the minibus drivers and assistants. In the current state the island has a muddy surface and a few small trees. The main need at this location is a protected and comfortable waiting area.
Based on the existing structures several improvements were proposed (fig. 17). To provide weather protection from the ground, a hard surface was proposed. In addition, the existing island shall be extended to about 3 m width to allow the introduction of seating facilities. In addition to the existing trees a line of trees will be planted to provide protection from the sun and rain. Because trees cannot provide a complete rain protection and it takes several years for them to grow to a reasonable size for protection, artificial trees are introduced (fig. 19). Artificial trees are tree-like structures that can serve multiple purposes. In the middle a normal tree will be planted, which will then be protected from harmful fators, like damage from humans and animals. When the tree grows it will cover the whole artificial tree from above, further improving the existing sun and rain protection. After the tree is fully grown, the artificial structure will not be visible anymore, thus a better integrating with the street architecture. Around the tree, seating facilities will be arranged in a circle. The seating facilities and the walking area nearby will be protected from rain and sun by means of the artificial tree.

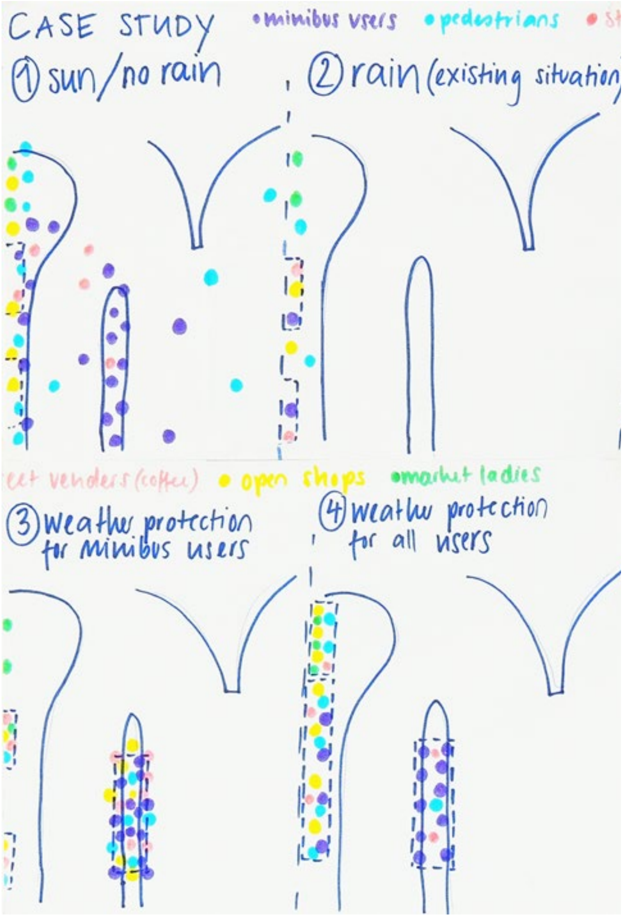


fig. 16: distribution of pedestrians depending on the weather and the weather protection: only weather protection provision for all users prevents the formation of overcrowded spaces.

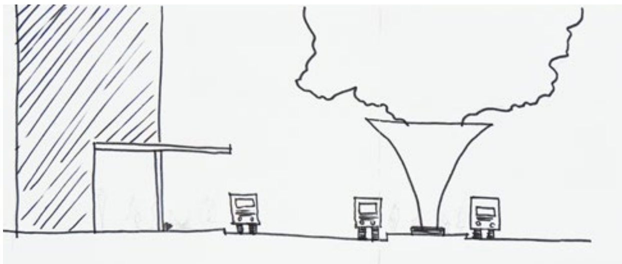


fig. 17: cross section of proposed solution

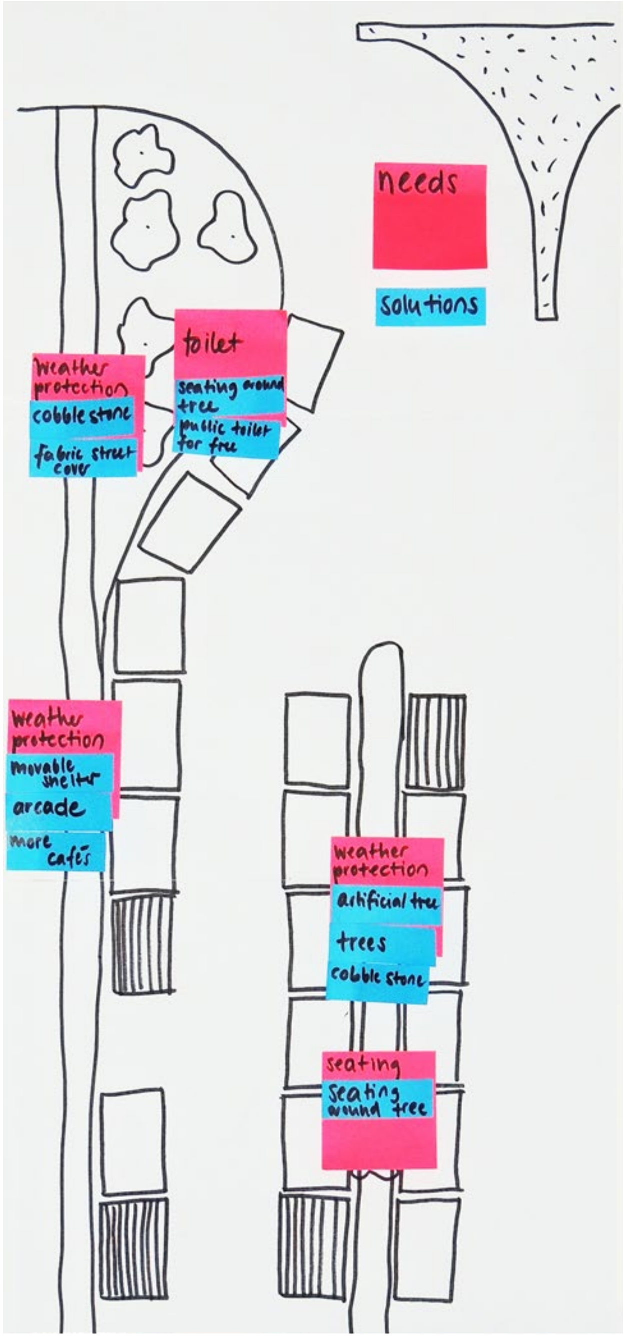


fig. 18: needs and proposed solutions

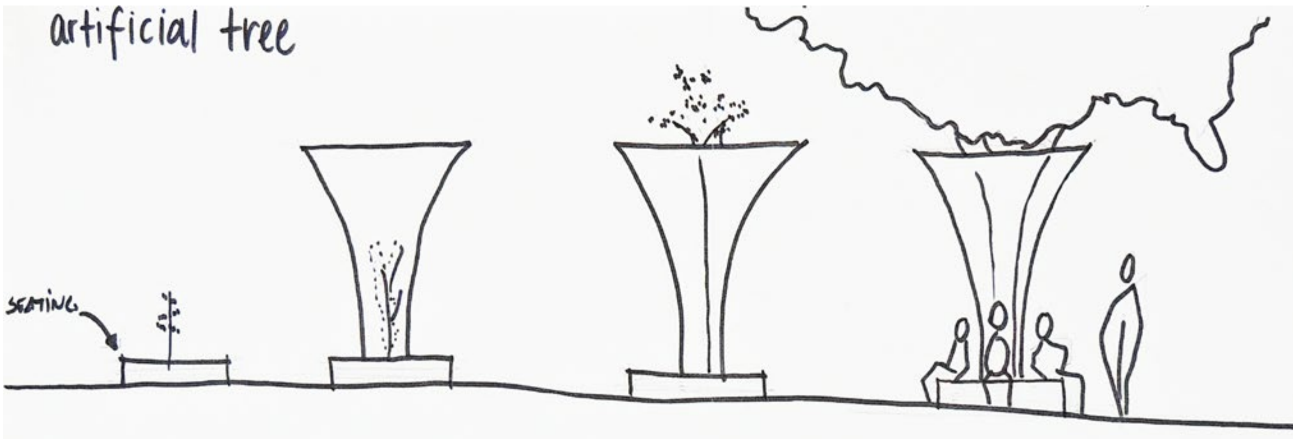


fig. 19: evolution steps for (artificial) trees

ALONG THE WALL: OPEN SHOPS

On the sidewalk next to the wall several open shops are situated (fig. 20). The sidewalk serves as a connection for pedestrians walking along the street and accessing the minibus station. At the moment, the only weather protection in this area are the plastic covers covering parts of the open shops. Inspired by the existing covers, the wall shall be used to further improve the situation (fig. 21). As a first step, the existing covers will be replaced by covers fixed on the wall. The covers will be arranged in such a manner that the shop owners can easily rearrange them based on their needs. In good weather conditions the cover can be folded and under harsh sun or during rainy weather, the cover will cover the whole extend of the shop area and walkway. The next improvement would be an extended concrete shelter which will cover the whole area of the walkway.

Future city plans foresee the construction of new houses next to the street in this area. In this case, we propose to include the weather protection in the façade of the new buildings. As a minimum solution the walkway should be covered with a concrete cover as previously described. In addition, we recommend to include an arcade in the buildings. This arcade can be used partly for walking and partly as vending space. To provide the existing space for open shops also in the future, some of the arcades should be closed with a wall so that they can be used by the open shops (fig. 22). In addition elevated areas for seating and the offered goods will improve the situation for the open shops. To compensate the house owners for the loss of space allocated to the arcades, they can use the area above the walkway for commercial activities like cafés.

OPEN MARKET

The open market is currently situated under the trees next to the wall. The walkway in the middle connects the minibus station with the northern area. The market ladies take advantage of the shade cast by the trees but they cannot provide sufficient protection during the rainy season. For the improvement of the situation, the existing market structures will be enhanced. Currently

fig. 20: existing shelter structures

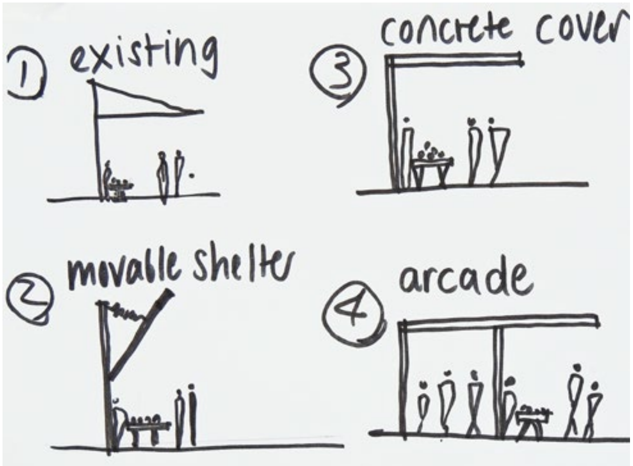


fig. 21: evolution of shelter

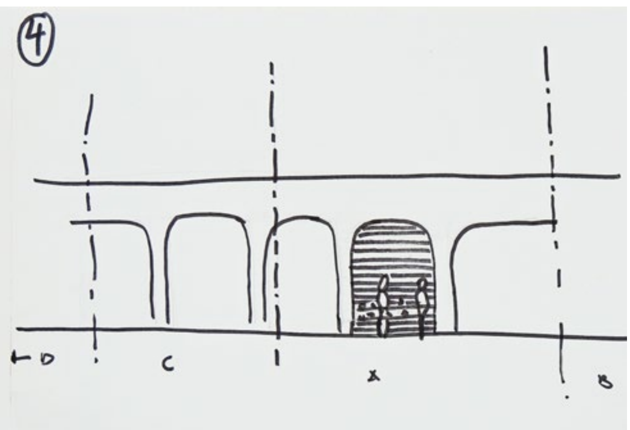


fig 22 : replacement for open shops

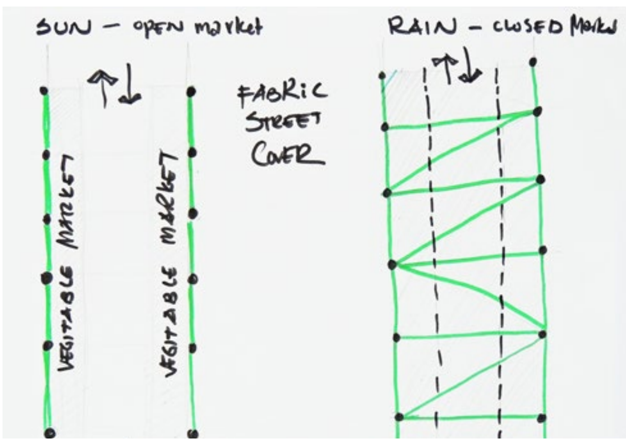


fig. 23: moveable shelters for the market area

the vegetables on sale at the market are placed on an elevated stone surface. This surface will be replaced by a concrete surface, for better quality. To improve the rain protection, moveable fabric covers will be installed between the trees (fig. 23). When raining, they can be unfolded to provide shelter. The open market also includes an open area with a few trees next to the street. Some artificial trees will be positioned there as well.

WHOLE MINIBUS STATION AREA
Providing better weather protection is not sufficient a factor to improve the overall situation of the area. Two equally crucial problems to be resolved are the availability of seating facilities and the sanitary situation. Bad smells and waste keep people from using these areas and therefore have to be avoided. Hence, it is deemed essential to improve the current toilet facilities. At the moment, only an urinal, which is neither clean nor free of charge, is provided. To improve the situation, clean and free toilet facilities will be provided next to the station.

PROCESS

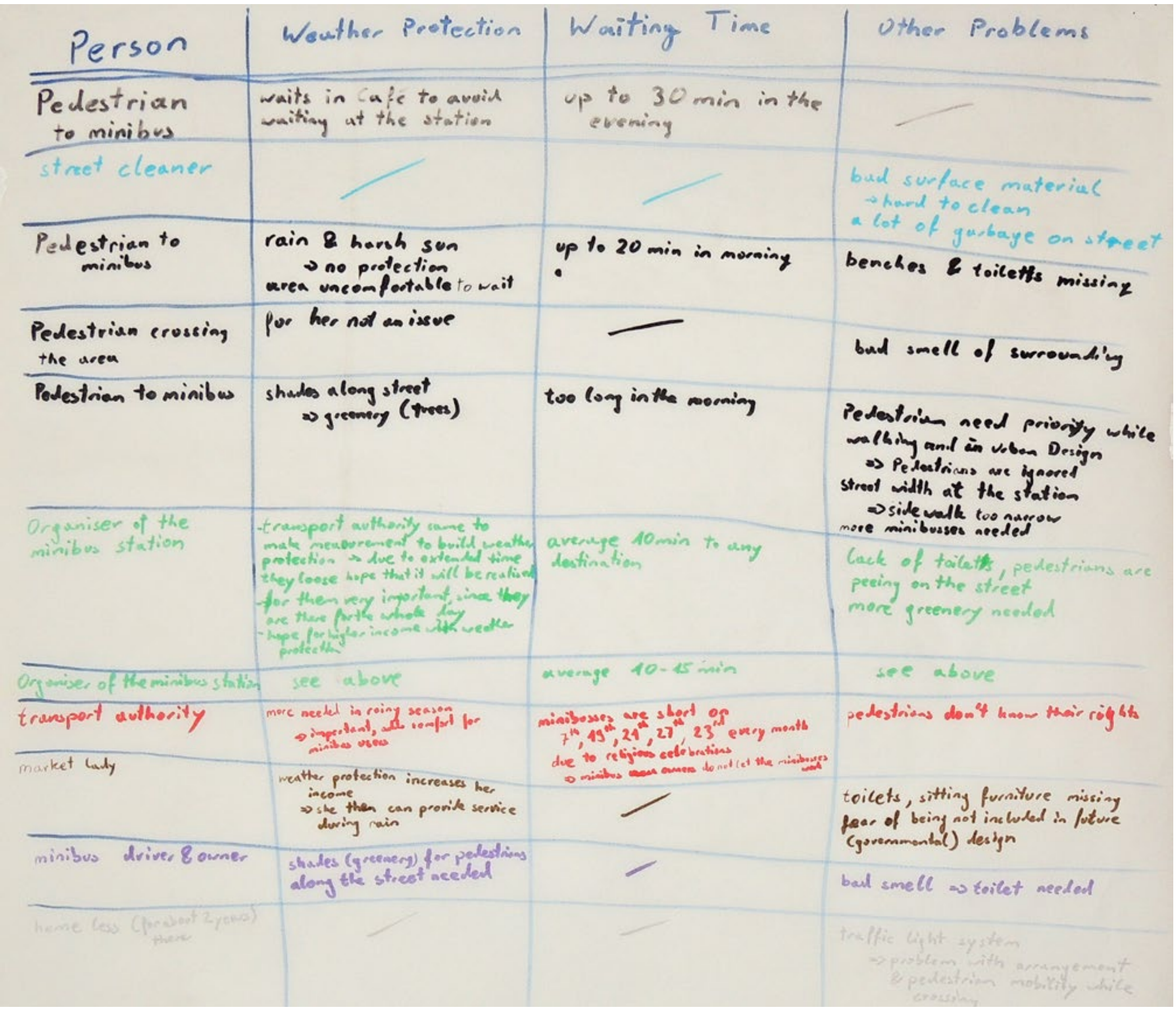
To design a solution that is accepted and used by all users, it is necessary to include the needs of all stakeholders in the area. As our original problem statement focused on one specific group of stakeholders and one problem, this had to be better addressed in a next step. During the evaluation of the brainstorming results it was concluded that a change to one part of the system will affect several other stakeholders and problems. For example, a weather protection needs to provide some comfort, so that people will use the facility. The necessary comfort includes sanitary facilities to keep the area clean and without bad odors and seating facilities.

STAKEHOLDER INVOLVEMENT

As we observed the site and were told in the interviews, not only the minibus users, but the market ladies, street venders and open shop owners need weather protection as well. Their economic activities could thereby continue during the rainy or sunny season. Therefore they want to actively participate in the implementation, operation and maintenance of the proposed solutions. The weather protection attracts customers and they can perform their activities without having to relocate their shed. The minibus station organizers, the major stakeholders, could support the weather protection proposal which would also provide better working environment for them. During the interviews, they were complaining about the lack of comfortable public spaces and sheds. They could assume the responsibility to manage and protect the proposed solutions.
Principally the market and shop sellers and the minibus station organizers will be asked to keep the infrastructure in working condition. We expect that the construction of the facilities will be carried out by the authorities, people who care about the area. Otherwise, as we deduced from our observations, almost no maintenance will ever take place. Given that the proposed solution provides improvements to their benefit, we expect them to be willing to help with the maintenance.

OUTLOOK

The next steps for the proposed prototype would be the finalisation of the prototypes and the expansion to other areas. In this work, the focus was accumulated on the needs and specifications of the prototypes. For the implementation operation, the final design of the prototypes, for example the design of the artificial trees, is still missing, but can be done in a subsequent project. Using the four steps described (Location, Existing Structure, Needs, Prototype) it is easily possible to introduce the prototype in other areas of the city. The main advantage of this method in comparison to existing reconstructions in Addis Ababa is that the necessary interventions are small and cheap, but the impact is still considerable and also allows the current organisation to stay intact. Our vision is to improve and enhance the existing and well functioning bottom up organization (functions), socio-economical activities and spatial layouts. The proposed interventions are punctual, incremental and eco-friendly, which can provide solutions from a temporary to a permanent scale.



Person	Weather Protection	Waiting Time	Other Problems
Pedestrian to minibus	waits in Cafe to avoid waiting at the station	up to 30 min in the evening	—
street cleaner	—	—	bad surface material → hard to clean a lot of garbage on street
Pedestrian to minibus	rain & harsh sun → no protection area uncomfortable to wait	up to 20 min in morning	benches & toiletts missing
Pedestrian crossing the area	for her not an issue	—	bad smell of surrounding
Pedestrian to minibus	shades along street ⇒ greenery (trees)	too long in the morning	Pedestrian need priority while walking and in urban Design ⇒ Pedestrians are ignored Street width at the station ⇒ sidewalk too narrow more minibusses needed
Organiser of the minibus station	-transport authority came to make measurement to build weather protection → due to extended time they loose hope that it will be realised -for them very important, since they are there for the whole day -hope for higher income with weather protection	average 10 min to any destination	Lack of toiletts, pedestrians are peeing on the street more greenery needed
Organiser of the minibus station	see above	average 10-15 min	see above
transport authority	more needed in rainy season ⇒ important, also comfort for minibus users	minibusses are short on 7th, 19th, 21st, 27th, 23rd every month due to religious celebrations ⇒ minibus owners do not let the minibusses work	pedestrians don't know their rights
market lady	weather protection increases her income ⇒ she then can provide service during rain	—	toilets, sitting furniture missing fear of being not included in future (governmental) design
minibus driver & owner	shades (greenery) for pedestrians along the street needed	—	bad smell ⇒ toilet needed
homeless (for about 2 years there)	—	—	traffic light system ⇒ problem with arrangement & pedestrian mobility while crossing

fig. 24: verification of the problem statement: Problems stated during interviews with different stakeholders at the study site

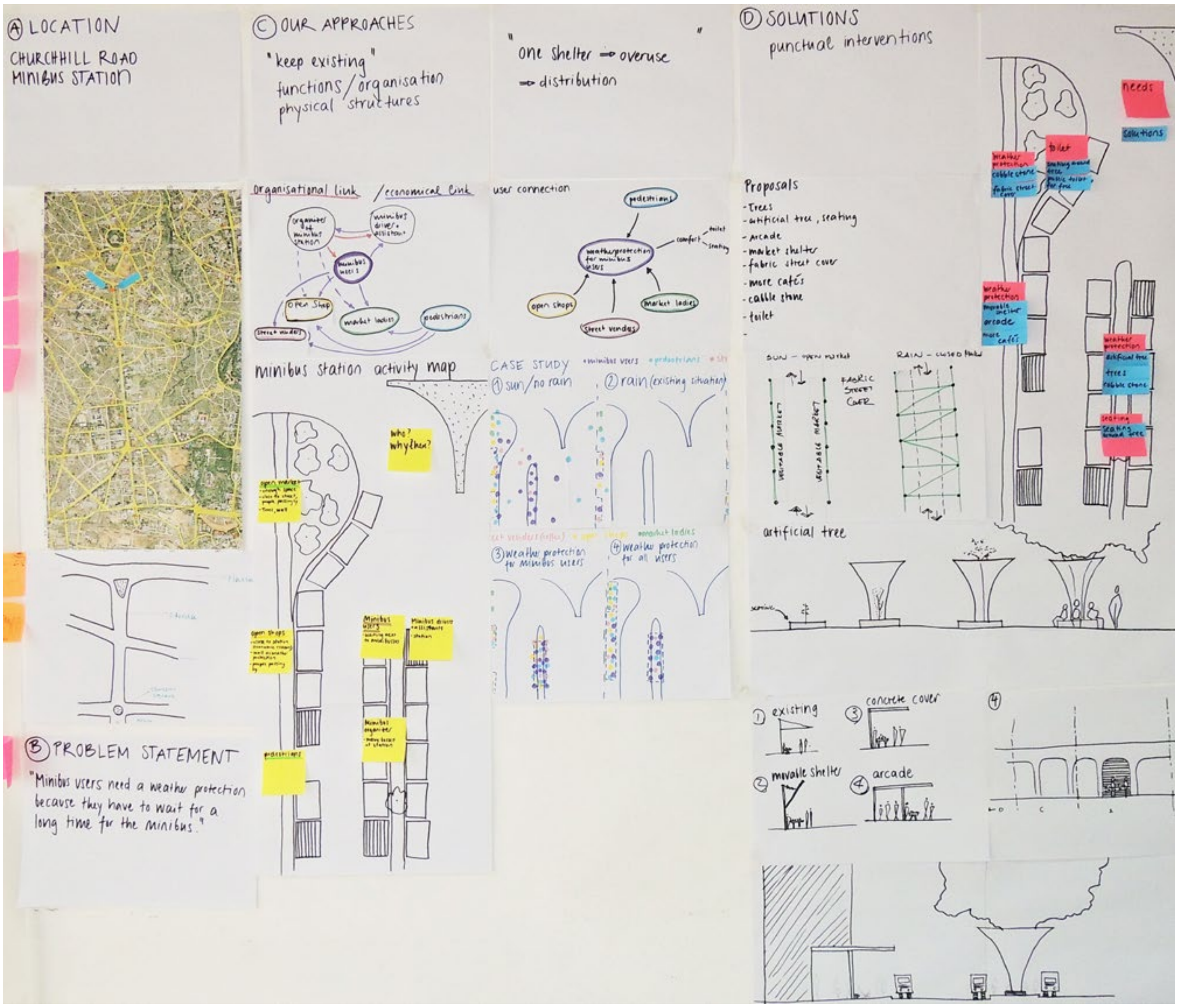


fig. 25: figures used for the final presentation at the workshop

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Central Site 2: La Gare Intersection

Henok Fekadu (EiABC Addis Ababa), **Panayotis Coucopoulos** (ETH Zurich), **Samira Britschgi** (ETH Zurich), **Selome Mekbib** (EiABC Addis Ababa)

fig. 26: perimeter central site 2

FURTHER STEPS – MEASUREMENTS AND ANALYSIS

By counting motorized traffic flow as well as pedestrian flows we got an important foundation for the development of our further approaches to resolve the situation at hand (fig. 27). To get reference values in terms of crossing time we conducted various time measurements with variable users and factors (fig. 28). Finally, we formulated and introduced a quantitative method to measure pedestrians' degree of exposure to oncoming traffic, as an instrument to investigate the influences of exposure on pedestrian safety (fig. 29). By subsequently analyzing the field study data, we discovered several relations between the various parameters which lead us to our first essential conclusions. An important conclusion was measuring the frequency and intensity of pedestrians' exposure in function of the time of the day and the amount of oncoming cars, as seen in fig. 29.

BRAINSTORMING AND PROTOTYPING

The next step aimed at collecting a broad range of possible solutions. At this point, it was essential to proceed as objectively as possible in order to not exclude any ideas from the beginning, and not unconsciously influence the problem-solving process. A variety of probable approaches was generated, and summarized into seven solution fields (tab. 3). Figure 30 shows some sketches made in the course of the brainstorming process.

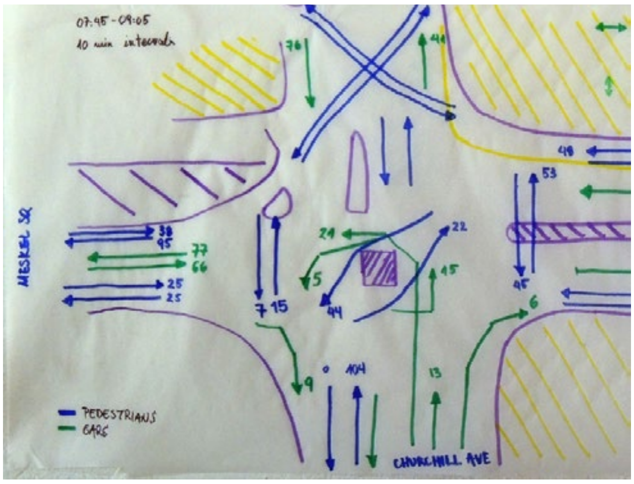


fig. 27: counting of car traffic (green) and pedestrians (blue)

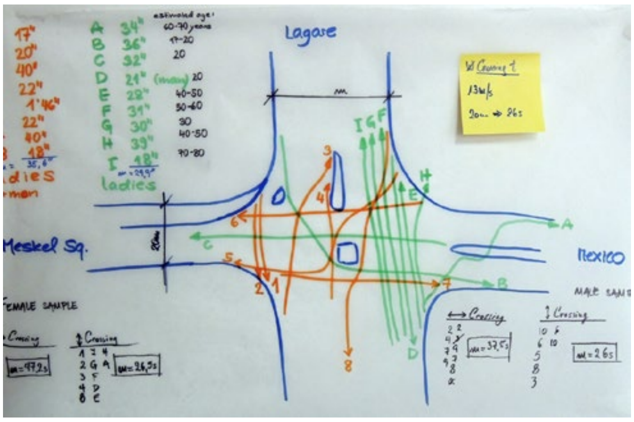


fig. 28: measurements of crossing' time

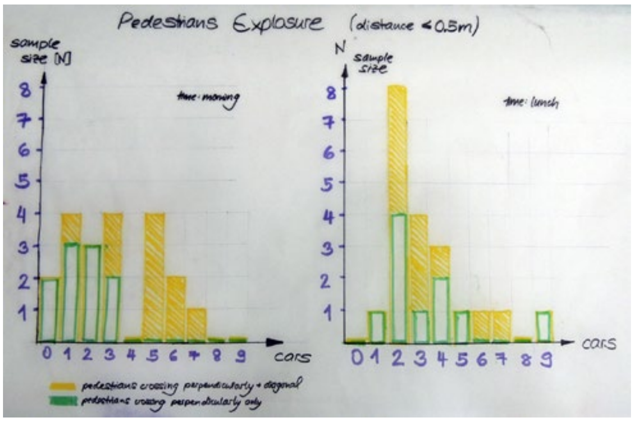


fig. 29: pedestrian's exposure to traffic

№	solution field
1	pedestrian boulevard and traffic lights
2	roundabout
3	regulation of car flow
4	regulation of pedestrian flow
5	restrict private car flow
6	small scale pedestrian protection
7	under-/overpass

tab. 3: possible solution fields

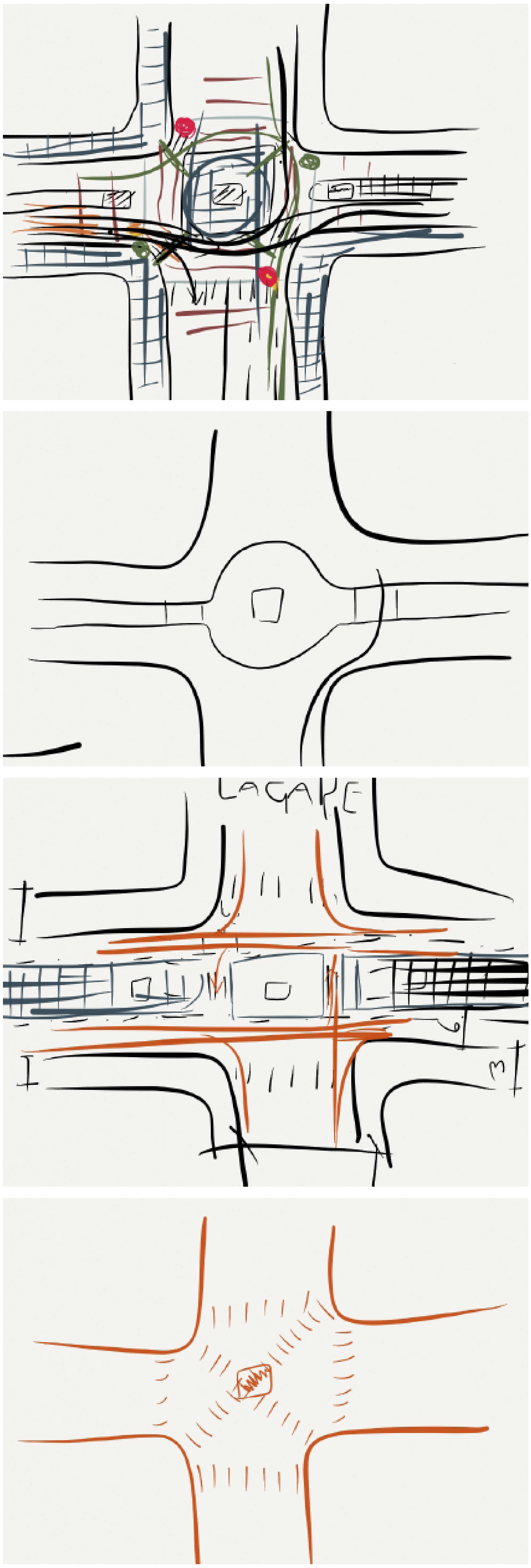


fig. 30: from top: roundabout, restrictions in car flow by island , pedestrian boulevard, pedestrian area (japanese style)

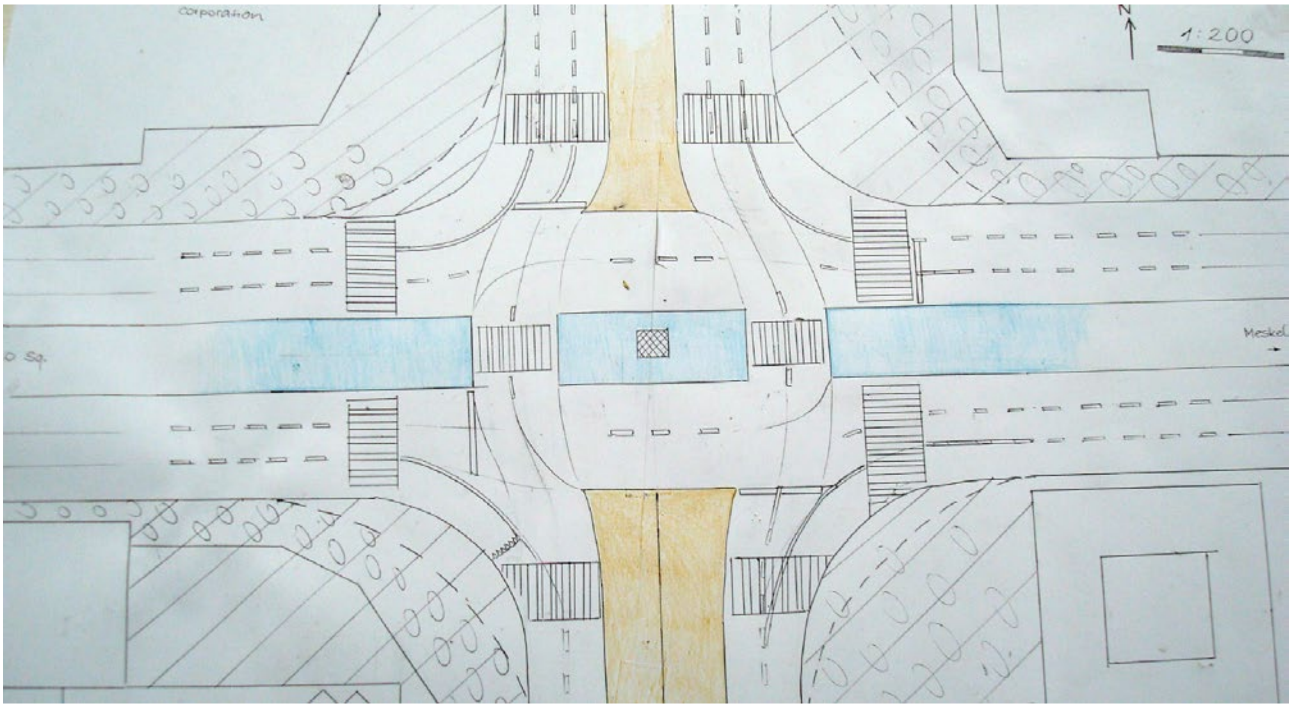


fig. 31: pedestrian boulevard (marked in blue)

EVALUATION

All seven approaches were rated in respect to 11 weighted criteria (appendix, fig. 37). We rated each criteria with a number from 1 to 5 where 1 signified very well and 5 signified very badly fulfilled.
The criteria were: degree of fulfillment, implementation time, crossing and waiting time, comfort while crossing, maintenance, construction costs, influence to vehicle capacity, urban quality (image), safety, bottom-up approach (yes/no), implementation efficiency. As the weighting process could have been criticized as very subjective, we assured the quality and objectivity of the evaluation processby means of a sensitivity analysis. By modifying weighting, in order to consider different points of interests such as financial, social, or traffic-related necessities, we ensured an objective and well-founded final evaluation.

Given the current state of the La Gare intersection, an ongoing construction site as part of the newly implemented Light Rail Transit System (LRT) infrastructure, we considered it to be easier to discuss the proposal with the Addis Ababa City Road Authority and Transport Ministry. The implementation of the proposal will be a top-down process emerging from a bottom-up strategy.Finally, the responsibility and maintenance is in the hands of the local community (users) like the coffee ladies, Listros (shoe shiners) and street vendors.

SOLUTION

Our solution consists in proposing a pedestrian boulevard for our given intersection. The idea behind the proposal is to devise a site-specific solution, capable of affronting the problems of our chosen site, but also applicable in a wider context all through the city of Addis. The proposal consists of different implementations that regulate both pedestrian as well as vehicular traffic.
Initially, we propose a 6-meter wide island between the two directions, on the Ras Mekonen Street. Moreover, we propose a roundabout encircling the pilaster in the middle of the intersection (fig. 31). Finally, we implement eight zebra crossings on all four directions and two connecting the middle roundabout to the pedestrian islands. Part of the proposal is the introduction of three lanes per direction on the Ras Mekonen axis and two lanes per direction on the road in front of the La Gare railway station.

The question that arises is how our proposal improves the current situation and why it is more efficient than the other solutions. We will now proceed with describing the benefits of such proposal. Firstly, as already mentioned, the site we chose is currently lacking any regulation or hierarchy that distinguishes and guides the flow of vehicular and pedestrian traffic. Therefore, our proposal seeks to both regulate flows and better make use of the space provided to pedestrians. Deriving from our analysis, with our proposal, we manage to decrease crossing distance at an average of 40%, thus decreasing pedestrians' exposure to oncoming

fig. 32: pedestrians moving along the LRT

vehicles. Furthermore, by appropriating and widening the walkway between the two directions, pedestrians gain an extra 50% of dedicated space and a better distribution of flows between all walkways, thus decreasing the congestion on the lateral sidewalks. One of the main ideas behind this proposal was to take advantage of the natural shade cast by the infrastructure of the LRT, currently in construction. By observing people on site, we noticed that 80% of them tended to walk alongside or under the LRT bridge trying to avoid exposure to the scorching sun or to the heavy rainfalls that occurred during our field study (fig. 32).

In parallel to the improvement of pedestrian infrastructure, a main component of our proposal was to maintain and maximize car flow on the Ras Mekonen axis. Being the principle axis that connects Meskel square to Mexico square, both traffic hubs of great importance to the city of Addis, the flow of cars is considerably substantial. Yet, we noticed and surveyed that traffic congestion on this intersection occurred mainly because of the incorrect and unruly positioning of the vehicles on the road. Thus, we decided to downsize the road width from four to three lanes per direction and in parallel implement a new traffic light program that, in strict collaboration, maintain the current flow capacity of the road.
More in detail, our traffic flow study consists of a 4-direction intersection that provides separate green time for each direction and continuous green to the right-turning lanes. The traffic flow study tries to balance pedestrian and vehicular flows, dedicating more crossing time to pedestrians. As a result, each zebra crossing is served at minimum every second green light phase (fig. 33). The idea of this system is to permit the maximum flow of cars on the Ras Mekonen street, as it consists 2/3 of the total traffic flow passing through this intersection.

Our next motivation for opting for the solution of the pedestrian boulevard was the question of space. At the time of our field study we noticed that all along the Ras Mekonen street, beneath the LRT infrastructure, a two-meter wide central island was built between the two carriageways. Our study showed us that people tended to remain on these islands for long periods of time during their crossing. This, in combination with the observation of the Torailotsh overpass (where people were engaging in various economic and social activities in the spaces beneath the bridges, as shown in fig. 34) lead us to consider appropriating these remnant spaces of the city fabric. This decision was strengthened by the fact that during our observations, almost all pedestrian flows were running beneath the LRT infrastructure, taking advantage of the natural shading it provided, regardless of the presence or not of pedestrian infrastructure or safety whatsoever. This innate tendency of seeking shade in a city of nearly 11 months of sunshine, consolidated our idea of using the islands between the carriageways and extending their use. Thus, the basis of the pedestrian boulevard' idea derives from the necessity to accommodate pedestrian traffic in parallel to car traffic, while also protecting pedestrians from the natural weather conditions.

Therefore, our proposal consists in widening the existing islands from the present two-meter width to six-meter wide spaces that can host a series of activities linked to Addis Ababa's city life. Our proposal goes further into proposing ways of materializing this idea. In detail, we propose a series of pre-fabricated modular elements that act as walls, which through their careful placing within the space lead to the creation of a series of spaces. By strategically choosing how and where to place these elements, we create different moments, through different spatial dispositions, that permit the development of very different and distinct activities (fig. 35). These walls would moreover function as sound barriers, minimizing the sound pollution deriving from oncoming traffic (fig. 35, lower sketch). These elements are conceived, as previously stated, as modular pre-fabricated elements that are steadily fixed to the ground and constructed out of metal or concrete, thus reducing possibilities of theft or removal. These walls could come in variations of design, incorporating benches, tables or other elements that could facilitate activities such as shoe-shining, street vending or provide spaces for sitting, all the while keeping a low-cost and low-maintenance approach to their design and implication.

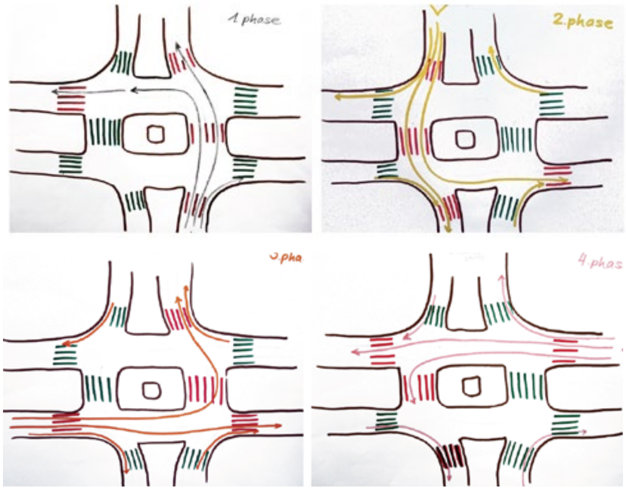


fig. 33: phase 1 - 4 of the traffic light system (zebras in green show green phases

fig. 34: economic activities under the Torailotsh overpass

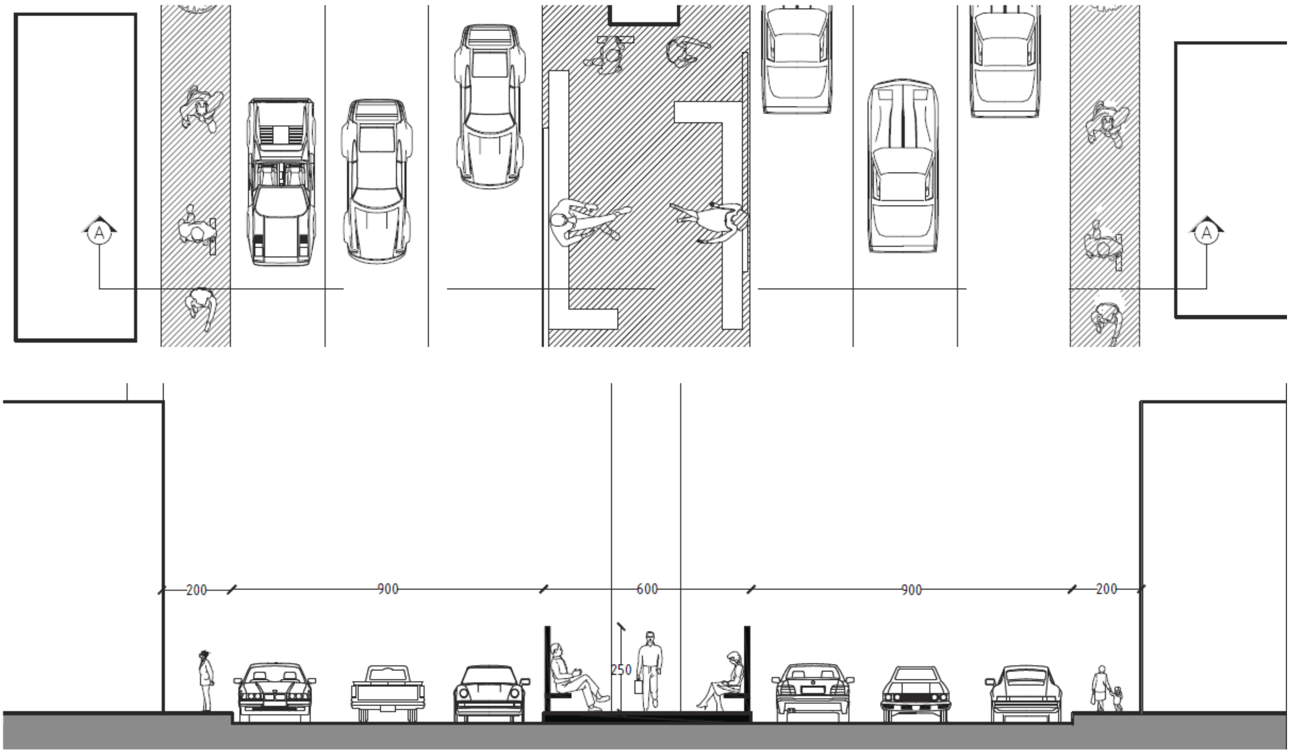


fig. 35: possible solution for space appropriation

CONCLUSION

Following our field study and analysis, we came up with a series of concepts capable of confronting the problem of pedestrians' exposure to oncoming traffic and their vulnerability overall (fig. 36). By carefully weighing our options at hand and through a process of evaluation that took into consideration pedestrian safety, crossing times, implementation efficiency and cost, we arrived at the option of constructing a pedestrian boulevard as the solution that better fulfilled our criteria. We chose this solution because it managed to improve pedestrian crossing times, thus reducing pedestrian' exposure to oncoming traffic and, therefore minimizing fatality rates. Yet, this solution seemed to accomplish the above, while combining other aspects, such as: taking advantage of existing infrastructure, not affecting vehicular flow at the junction, considering local weather conditions.

The pedestrian boulevard is a top-down solution with a bottom-up approach. The approach is bottom-up as it considers pedestrians as its main stakeholders, while maintaining a balance and not disregarding other stakeholders/users of the traffic junction, as are private car owners, public transportation. We are convinced of this solution, but also conscious that it cannot resolve all current problems of pedestrian mobility. We are also conscious of its spatial implications and the fact that it does not consist the ideal walking way, given the presence of traffic on both sides of this island and the pilasters of the LRT all along the middle part of the way. Yet, our attempt and intentions were those of trying to make the most of the infrastructure we had at hand without implementing massive amounts of new infrastructure that any investor would be hesitating to finance in the interest of pedestrians. This process testifies again our top-down solution with a bottom-up approach way of thinking.

Finally, we value the effectiveness of our solution based on the implementation possibilities it provides. The specificity of our site and the detailed assessment of the problematic of the given site lead us to create a site-specific tailored solution that could be generally applied to any similar space and problematic. This means that our solution as a concept could be easily, with the necessary analytical process and approach every time, implemented to almost any inner-city crossing that presents similar characteristics as the one analyzed. Moreover, with the ongoing construction of the LRT all through the city, the pedestrian boulevard could be applied to all streets where the LRT is currently being built in order to improve pedestrian circulation and urban space quality in total (appendix, fig. 38).

fig. 36: current pedestrian infrastrucutre at La Gare intersection

APPENDIX

DAILY ROUTINE

Sunday_24/08/2014
Participants of the ETH-EiABC workshop meet for the first time.
Small-scale city tour with Fasil Ghiorgis.

Monday_25/08/2014
Introducing each other
Everybody writes his expectations for the next two weeks
Input lecture // about the workshop by Sascha
Grouping and site selection: “Central area” from Churchill road up to La Gare intersection and part of Mesqel Square.
Presentation // our plan for the field work tomorrow

Tuesday_26/08/2014
Input lectures // on “research and data collection methods” by Binbin and Sascha respectively
First site visit! We decide to split our group in two for looking at the site we’ve chosen and try to schedule tomorrow’s fieldwork.

Wednesday_27/08/2014
Full day: Field study
Activities: counting, photographing, analyzing the existing problems according to the context.

Tursday_28/08/2014
Thesis presentation // by Fikeresilase and Fantahun
Summarizing collected field data to fill into the grid
Presentation // about the field study, our three main observations and discussion on our two problem statements.
Final grouping into two sub groups.

Friday_29/08/2014
Input lecture // on Urban Design by Basil
Revising the problem statement
Formulating thesis
Presentation and Feedback // on problem statement and thesis
Discussion // on Saturday’s schedule for fieldwork.

Saturday_30/08/2014
Full day: field study
counting, tracing, tracking, interviews, safety check, exposure
10 min video study in the afternoon

Sunday_31/08/2014
Free

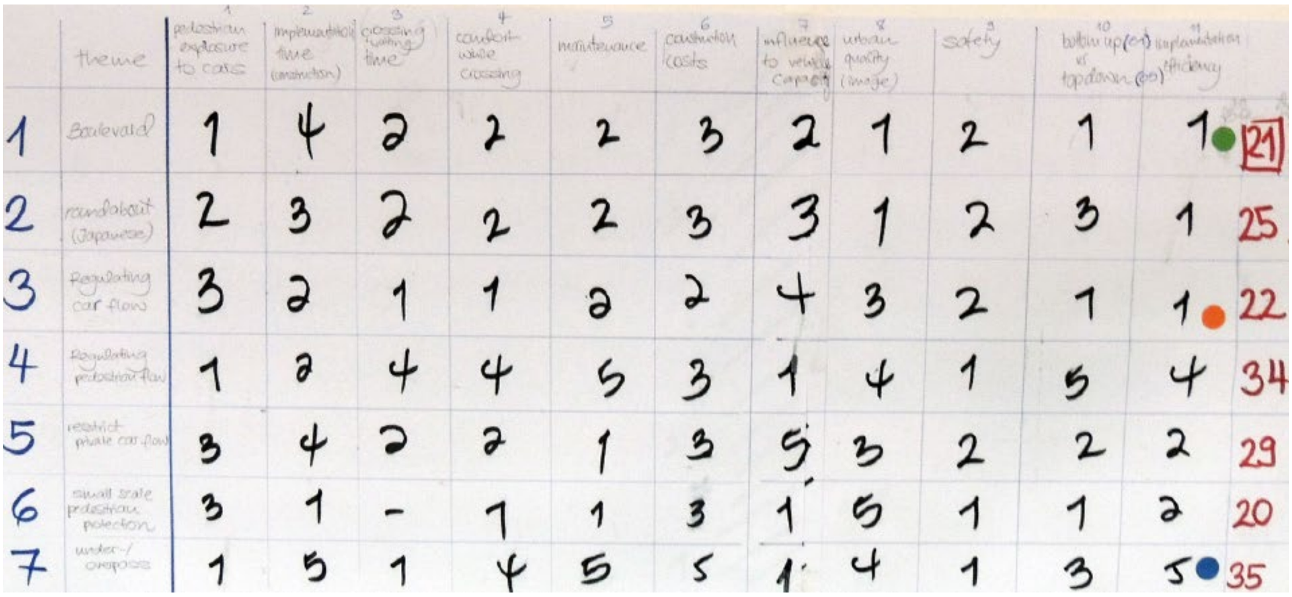
Monday_01/09/2014
Incorporate findings
Changing the data into readable representations like graphs and drawings.
Presentation // about our findings
Brainstorming by posting ideas that cross our mind.

Tuesday_02/09/2014
Rearrange and organize our ideas.
Presentation // about our ideas and we take a feed-back on them.
Presentation // PhD project by Sascha
Summaries and categories our proposal concepts and we evaluate them by doing a matrix of their characteristics.
Start prototyping

Wednesday_03/09/2014
Working on the proposal for final presentation

Tursday_04/09/2014
We finalize our presentation
FINAL presentation //students but also external guests
Closing Dinner at Hebir-Ethiopia cultural restaurant.

Friday_05/09/2014
Discussion // reflection on the workshop
Start working on report writing
Closing Ceremony



	theme	1 pedestrian exposure to cars	2 implementation time (construction)	3 crossing waiting time	4 comfort while crossing	5 maintenance	6 construction costs	7 influence to vehicle capacity	8 urban quality (image)	9 safety	10 bottom up (01) vs topdown (00)	11 implementation efficiency	
1	Boulevard	1	4	2	2	2	3	2	1	2	1	1	21
2	roundabout (Japanese)	2	3	2	2	2	3	3	1	2	3	1	25
3	Regulating car flow	3	2	1	1	2	2	4	3	2	1	1	22
4	Regulating pedestrian flow	1	2	4	4	5	3	1	4	1	5	4	34
5	restrict private car flow	3	4	2	2	1	3	5	3	2	2	2	29
6	small scale pedestrian protection	3	1	-	1	1	3	1	5	1	1	2	20
7	under-/overpass	1	5	1	4	5	5	1	4	1	3	5	35

fig. 37: evaluation of the approaches through several criteria (rows)

fig. 38: lack of integration of the LRT all over the city

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Extension Area

fig. 39: extension sites 1 and 2

A piece of the Ring Road – from Meganagna in the north to Bole International Airport in the south – was assigned to us as study area for the workshop on pedestrian mobility. The area is called ‘the extension’, demarcating a transition zone between the central Addis Ababa and the newly built (and rapidly increasing) peripheries of the city. Within this area we were to come up with a design to improve pedestrian mobility based on a bottom-up data framework and our first task was to pick a sight.

Before going to the field, we studied the characteristics of the Ring Road as a whole, looking closer at a map of Addis Ababa. We were to pick in total two study sites, as our initial six-man group would be split in to two groups, each focusing on one site. We decided on two criteria for choosing our sites: First, it should be representative of the Ring Road as a whole and second it should include a certain pedestrian traffic flow, making it interesting to study. Based on these two criteria, we decided to have a closer look at the Meganagna intersection as our first site (fig. 40). Meganagna is an infrastructural knot of Addis Ababa, which clusters private automobile-traffic and pedestrianism with minibus and bus services and a future LRT line serving the increasing peripheral area of east Addis Ababa (fig. 41). As our second site we chose an intersection further to the south of the Ring Road, where a minibus station services the area Yeka with people coming from either Bole Airport in the south or Meganagna in the North (fig. 42). The intersection includes an overpass, making it possible for pedestrians to cross the Ring Road

fig. 40: extension site 1 – Meganagna Intersection

fig. 42: extension site 2 – Ring Road direction towards Bole Intersection

fig. 41: exentsion site 1 – pedestrian flow

fig. 43: jaywalking across the Ring Road

without slowing down oncoming traffic. The overpass is the only formal way of crossing the Ring Road for pedestrians on the stretch between Meganagna in the north and the Imperial, 1 km south of the overpass.

On the first day of the fieldwork, we went out to test whether these two areas matched our criteria, using simple observations. We started up on a tall hotel's observation platform next to the intersection of Meganagna and gained first impressions on how traffic, particularly peak-hour traffic at this large crossing, performs. Luckily, a new bridge overcrossing the entire area was closed during our time of observation and we could use it as a perfect second observation spot. Soon we discovered that Meganagna is much more than a simple intersection; it is rather a place of various activities, of which traffic is just one part. In the afternoon, then, we walked down the Ring Road to reach the second area we wanted to focus on. There, in particular, we witnessed how many pedestrians would jaywalk to cross the Ring Road, although they also had the possibility of crossing the road using the overpass (fig. 43). These first observations confirmed our concerns about the Ring Road and we decided that this area would be suitable for further studies.
On the second day of fieldwork, we set out to collect better structured data, mapping out the pedestrian mobility of the two areas. We observed and sketched the pedestrian traffic flow, tracked pedestrians on their way from A to B, recorded the level of noise at different sites in the area, noted down activities such as industries, shopping and modes of transportation and we photo referenced the spatial characteristics of the areas – quality of surface, greenery, urban furniture and street lighting (fig. 44 & 45).

FRAMING THE PROBLEM

Back in the lab, we summed up all the data material and formulated two problem statements.
During our field trips, we observed that the lack of pedestrian infrastructure along with the multiple activities on the streets, left few to no space for pedestrians to cross, thus jeopardizing their safety. Given the fact that the Megenagna intersection is a main hub for public transport in Addis Ababa, the following problem statement was defined:

“Due to the variety of activities – such as street vending – along the main transfer paths of public transfer hubs, passengers cannot transfer safely.”

Moreover, we had also witnessed the jaywalking phenomenon and it’s status as the ‘alternative’ mode of crossing in relation to the overpass, at the studied intersection. Based on these new insights and our general background knowledge of the jaywalking problem in Addis Ababa, we posed our second problem statement:

“Pedestrians crossing the Ring Road take the risk of jaywalking since no attractive alternative is provided.”

Verifying these hypotheses was to be done on the third and final day of the field work. This was also the time, when we split the group in two, one focusing on the Megenegna intersection and one focusing on the overpass intersection.

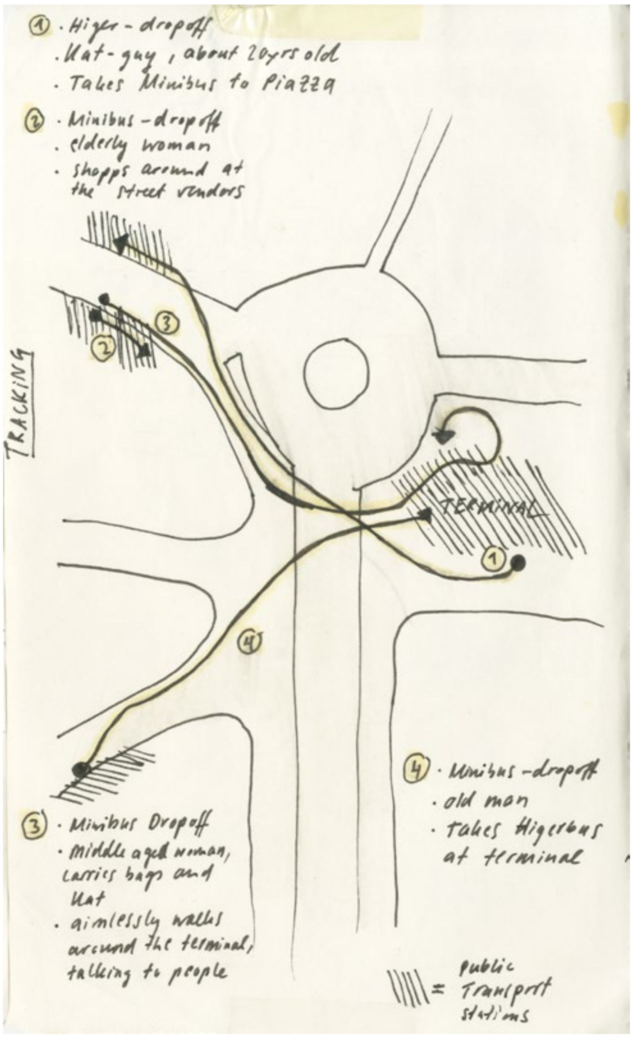

fig. 44: main transfer paths of public transfer hub passengers

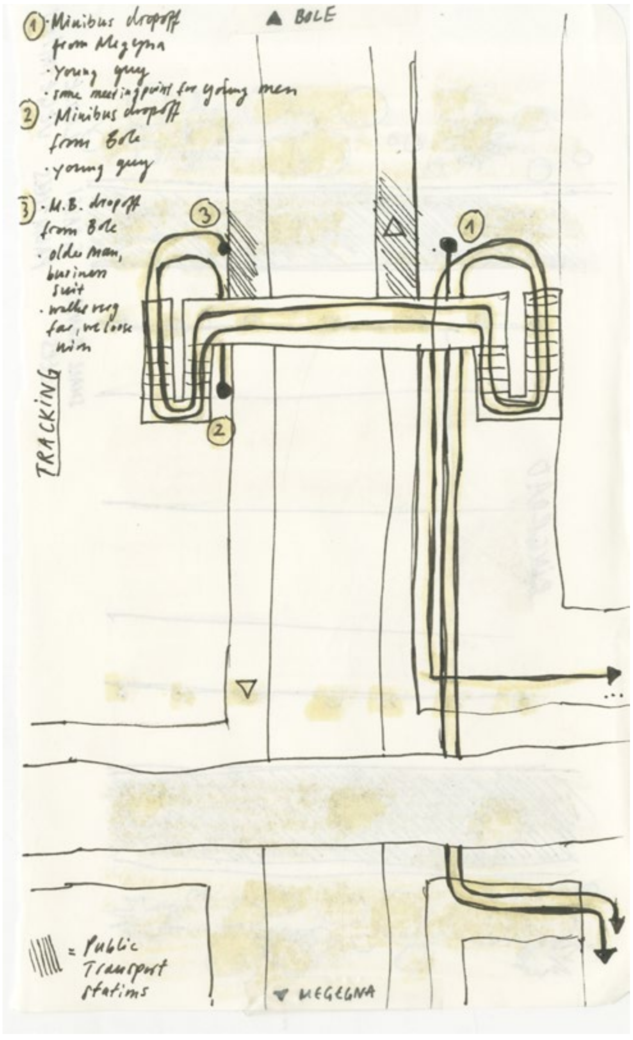

fig. 45: main paths of pedestrians using overpass

Extension Site 1: Meganagna

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Raphael Eder (ETH Zurich)

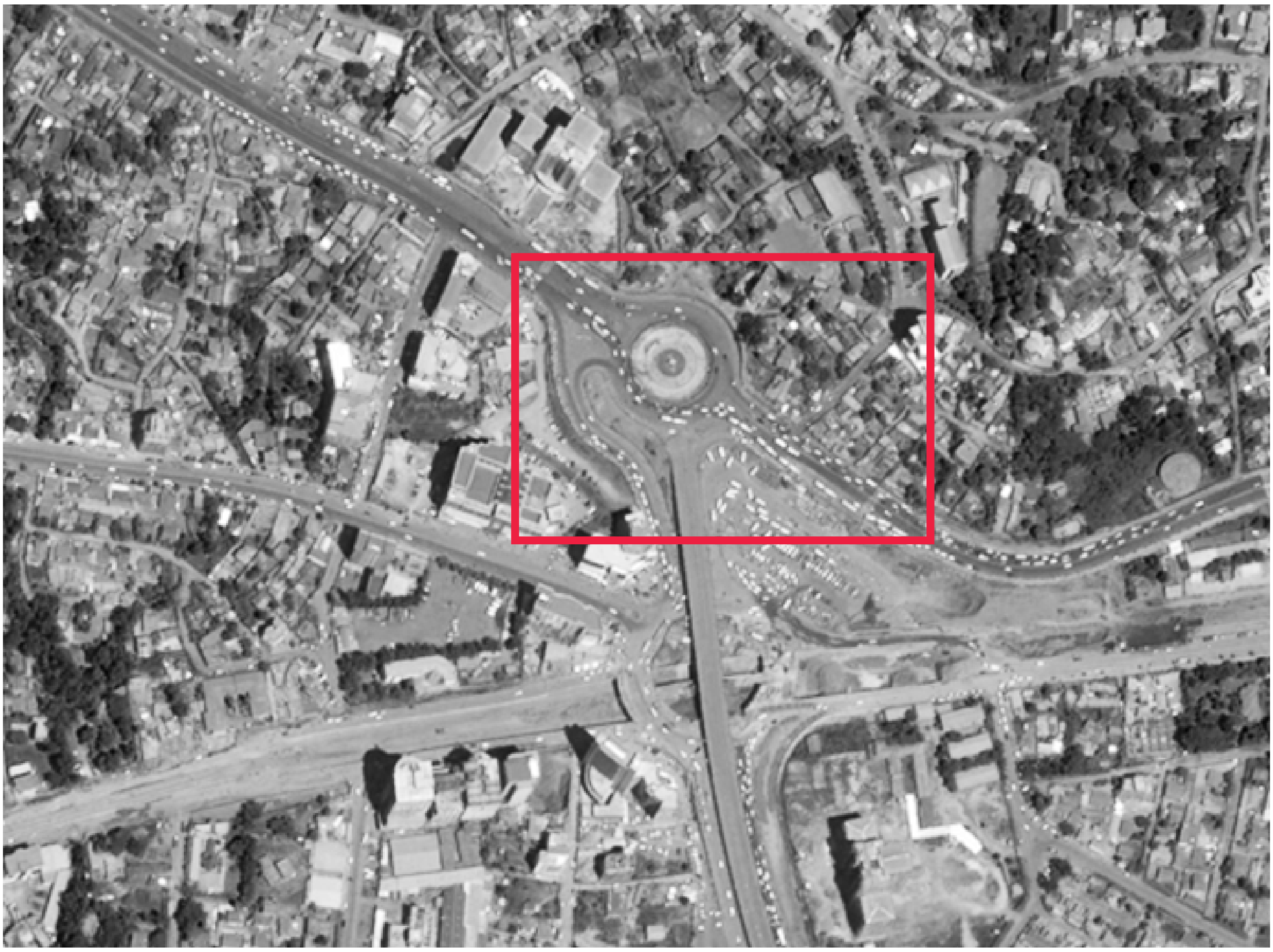

fig. 46: perimeter extension site 1

FURTHER STEPS – MEASUREMENTS AND ANALYSIS

In order to verify the hypotheses, three representative main pedestrian transfer paths were selected and the following data was collected:

- Test walks by ourselves to count the unsafe points we faced (subjective – personal experience)
- Unsafe issues at the sites (objective from a planners perspective)
- How much time does it take to walk down one path
- Who are the users of the pedestrian walk way along the specific path and what is their spatial occupancy.

1. Test walks by ourselves to count the unsafe points we faced (subjective). (fig. 47)

- Path 1: Morning 10 unsafe points
  Afternoon & Evening 12 unsafe points
- Path 2: Morning: 7 unsafe points
  Afternoon & Evening: 18 unsafe points
- Path 3: Morning: 11 unsafe points
  Afternoon & Evening: 13 unsafe points

2. Unsafe issues at the sites:

- Unsecured street crossings
- Holes
- Electric/inclined poles
- Blocked sidewalks (fig. 48)
- Narrow sidewalks/crowded spaces
- Level difference/slippery surfaces (fig. 49)
- People suddenly stopping

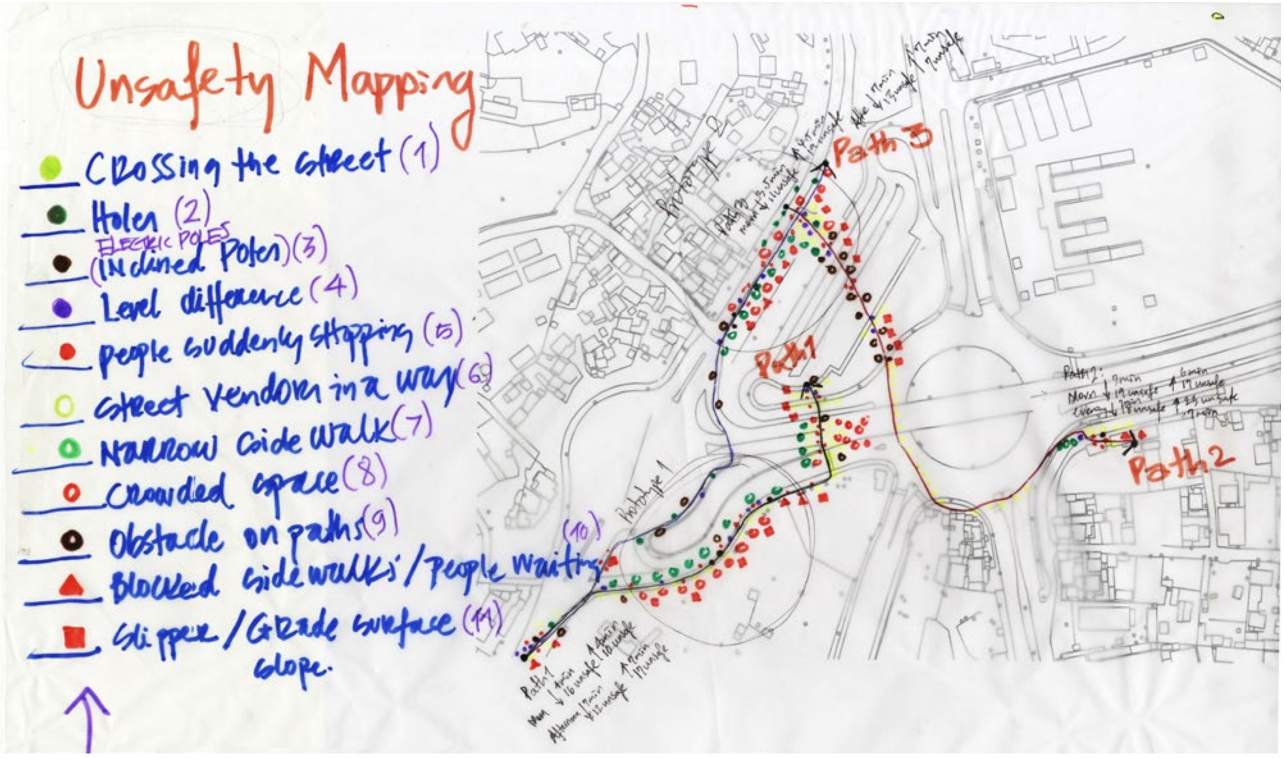

fig. 47: unsafe points along the main transfer paths

3. How much time does it take to walk down each single path?

- Path 1: Morning: 4 minute walk with speed similar to the pedestrians
  Afternoon & Evening 7 minute walk with speed similar to the pedestrians
- Path 2: Morning: 3 minute walk with speed similar to the pedestrians
  Afternoon & Evening: 6.5 minute walk with speed similar to the pedestrians
- Path 3: Morning: 3.5 minute walk with speed similar to the pedestrians
  Afternoon & Evening: 7 minute walk with speed similar to the pedestrians

4. Who are the users of the pedestrian walkway along the specific path and what is their spatial occupancy? (fig. 50)

- Street vendors: people selling clothes, people selling shoes, people selling fruits and vegetables, people selling other related goods…
- Shoe shiners
- People shopping
- People walking
- People stopping/waiting

BRAINSTORMING AND PROTOTYPING

After having proven our problem hypothesis a so called 'how might we…' list was created which would help us to come up with suitable ideas during the brainstorming. The brainstorming was conducted among all members of the extension group. Next, all ideas were evaluated using five major criteria, which were also defined by the group:

- Integrated solution for safety issues
- Self-maintainability
- Allowance of co-existence between activities
- Consideration of multiple age groups and disabled people
- Funding by operators

A range of potential solutions along with the mentioned criteria can be seen in fig. 59 (appendix).

As a next step, all potentially involved stakeholders were identified and their needs were listed (tab. 4). Table 4 only includes stakeholders who either need pedestrian infrastructure or might contribute to its funding. Given the introduced criteria and the stakeholder analysis we realized that street vendors can take over a core role in solving our defined problem. So it might be possible that not prohibiting but enabling the street vendors can lead to a solution which benefits all. And at this point the idea that the entire sidewalk infrastructure could not only be organized but even funded by street venders was born. Thus, a closer look into the street vendors' business was needed: WHO are street vendors in Addis Ababa?

- People selling clothes, foods, shoes and other related goods in the street
- Officially their work is illegal.
- They are blocking pedestrians.
- Selling goods along the main pedestrian paths; about 10 vendors per 5 meter stretch

fig. 48: sidewalk obstructed by other infrastructure

fig. 51: weather protection for waiting transfer passengers

fig. 49: surface quality on one stretch of a main transfer path

fig. 52: public transport passengers transferring

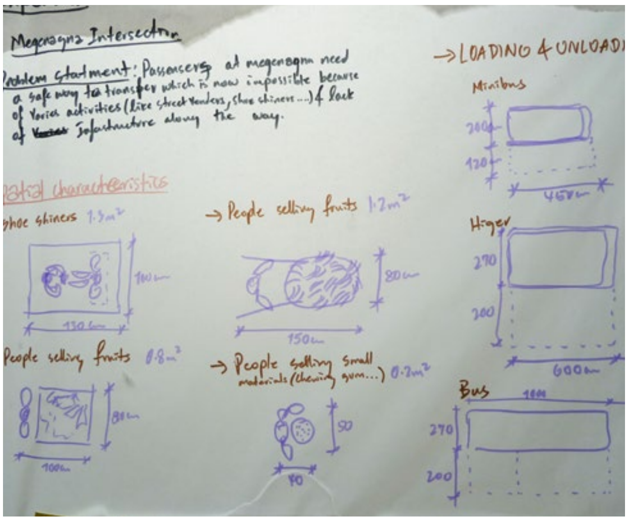

fig. 50: overview of spatial needs of various street vending activities

fig. 53: view on stairs connection two main parts of the transfer hub

Stakeholder	Need
Pedestrians	Safe infrastructure for all ages & disabled people, clear guidance, no congestion
Street Venders	Selling space along main pedestrian paths
Public transport operators	Designated space for (un-) loading passengers, waiting areas
Government	Minimum funding and maintenance cost

tab. 4: stakeholder analysis

What are their needs?

- they need income,
- they need space to sell
- they need a position where people are usually attracted to

What would the incentives be for the street vendors to pay for infrastructure?

- Legal frame
- Infrastructure – shade, pavement, ...
- Regulation of competition
- Organization in a community

Hereby, providing the street vendors a legal frame and having them organize in a community can be seen as the core of this proposal. It would allow them, by paying a low daily fee, to execute their selling activities legally without being prosecuted by the local police. All administrative activities such as the daily rents, construction and maintenance work would be managed independently by the street vendors' community. However, it is advisable that the local government keeps a supervisory role. Moreover, legalization of street vending for one particular community could even lead to additional tax income.

PROPOSED SOLUTION

Once again we want to recall the initial problem statement (fig. 51-53):

"Public Transport passengers need safe way to transfer which are now blocked due to a lack of proper infrastructure and the various activities taking place."

...and propose the following solution:

Standardized blocks will be put every 2 Meters along a newly to be constructed sidewalk. These blocks can be rented on a daily-base by street vendors who are part of the local community. One block will provide the exclusive right for one street vendor to sell one's items. Specific regulations such as sharing one block over day etc. should be set up by the street vendors' community in order to achieve high compliance. The cost for one block per day should represent the initial construction cost of this 2 Meter stretch of the sidewalk plus a 100 % maintenance rate over a 10 years period. Taking current costs as a basis (see fig 54) this would result in a daily fee as low as 5 ETB per block.

IN DETAIL

Phase 1: proposed blocks

The size of these blocks is proposed to be 100cm x75 cm x 50 cm constructed with stones and a top out of concrete (fig. 55). Accordingly there will be one street vendor renting one block per 2 meter stretch of the sidewalk.

The same block can also be used as urban sitting furniture during the time when the street vendors are not present selling their products.

Phase 2: block along a 2 meter sidewalk stretch

After the single-ownership blocks, the sidewalk is stretched to the front with a 200 cm wide cobble stone paved shopping lane, a 175cm wide concrete tile paved free walkway catering to the comfort of the different user groups, in particularly people with mobility problems (fig. 56-58).

Recalling the stakeholder analysis, it can be seen that most of their needs can be achieved and looking at the street vendors' incentives, we concluded that all of them would be willing to pay this fee for providing them the mentioned benefits.

Our "urban block" provides an integrated solution for the pedestrian safety issues seen at the Megenagna intersection. The block itself is the dedicated area for the street vendor which should lead to less blocking of the sidewalk. As street vendors are obliged to pay a low daily fee of 5 Birr it is unlikely that additional street vendors will simply squeeze within the sidewalk as the paying street vendors or their community would not allow it. The fact that the proposed infrastructure decreases the number of street vendors by almost two does not necessarily mean that jobs will be lost as blocks can be shared over the day, administrative jobs within the community and for maintenance will be created and due to the legalization revenue of all street vendors will raise as 'no-selling' time due to the fact that police enforcement will be eliminated. Having analyzed the needs of street vendors we concluded that most of the street vendor would be willing to pay this low daily fee to obtain a legal permit and infrastructure to sell their goods. Simultaneously, as no significant operation costs arise, this money is used for the initial set-up and the maintenance of the sidewalk infrastructure. So, in conclusion, the needs of street vendors and of transfer passengers of all ages are served (tab. 5).

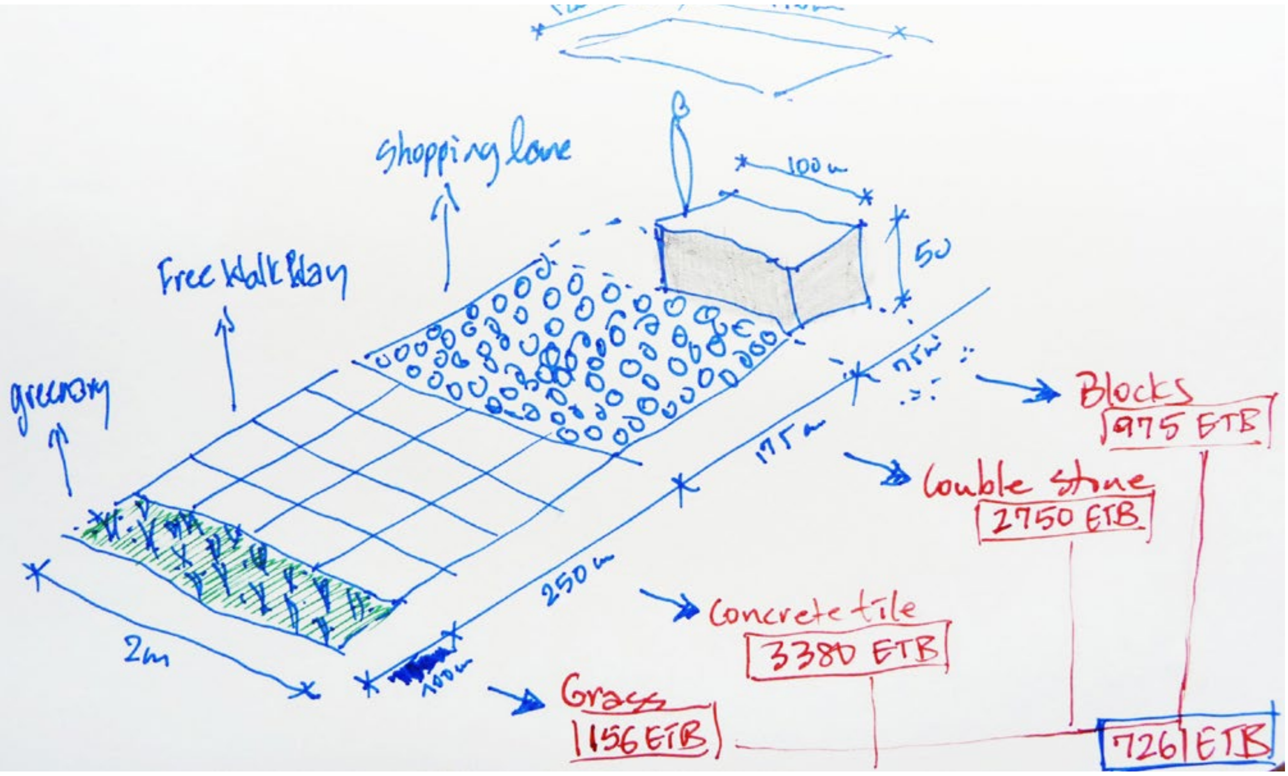

fig. 54: urban block and sidewalk dimensions along a 2 meter stretch

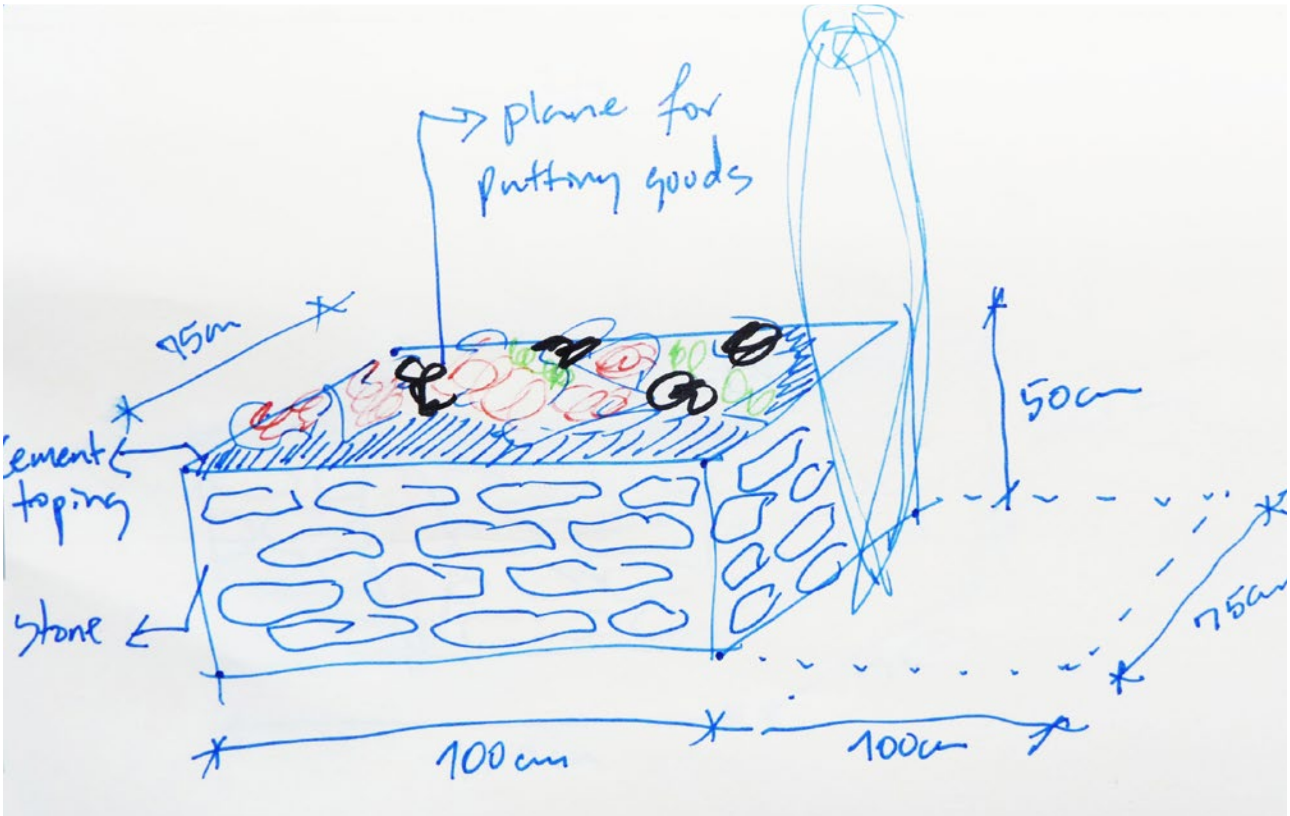

fig. 55: conceptual design of urban block

fig. 56: illustration of urban block sidewalk

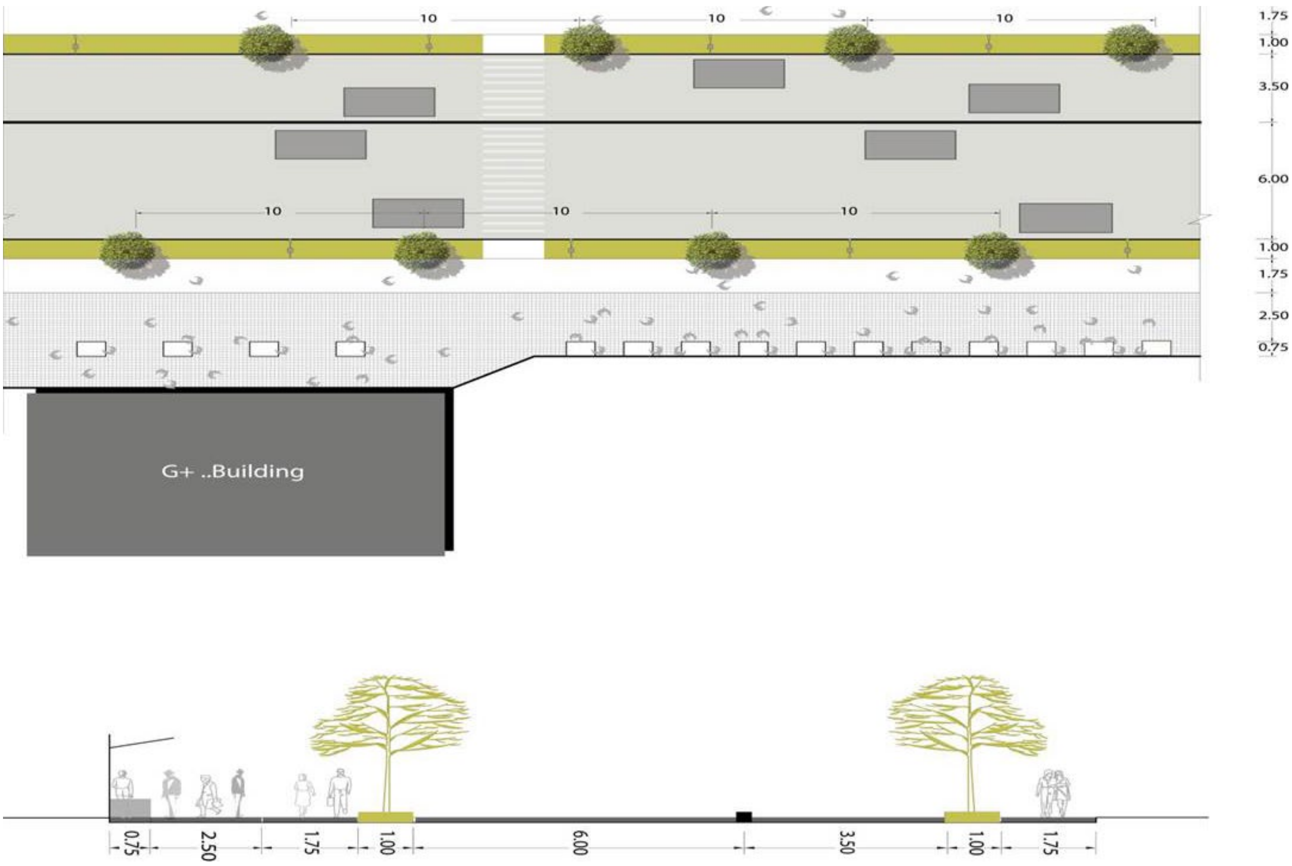

fig. 57: full-scale layout of urban block sidewalk

fig. 58: chcking dimensions of urban block and sidewalk in 1:1 scale

Stakeholder	Need	Achieved?
Pedestrians	Safe infrastructure for all ages & disabled people, clear guidance, no congestion	Check
Street Venders	Selling space along main pedestrian paths	Check
Public transport operators	Designated space for (un-)loading passengers, waiting areas	Not exactly
Government	Minimum funding and maintenance cost	Check – there is even no public money needed. But the government has to provide a legal frame for the street venders

tab. 5: review of the stakeholder analysis

Having pointed out the benefits of this proposal the stated stakeholders have to be contacted.
As the street vendors and their future community take over a core role, it seems only logical that this idea is initially discussed thoroughly together with them. As a next step, representatives among the street vendors should be chosen, who will then propose the idea and all its benefits to the government. Its support is still crucial, as it would provide the legal frame to allow the setup. Pointing out the win-win situation for both parties, proceedings should be achievable, however moderation and guidance from an unbiased facilitator would be beneficial.

Looking into the future, it can be said that our idea of setting up urban blocks can be implemented along any high flow sidewalk strip. As it is purely financed by street vendors the role of the government is limited to providing a certain legal frame. Legalizing street vending could, moreover, even lead to a significant additional tax income. As the proposed solution creates a win-win situation for all involved stake-holders there is, logically, no big concern as to whether it can be implemented (tab. 5). Setting up a try-out at one sidewalk for several years could lead to additional insights and may also help in convincing the involved parties about this concept.

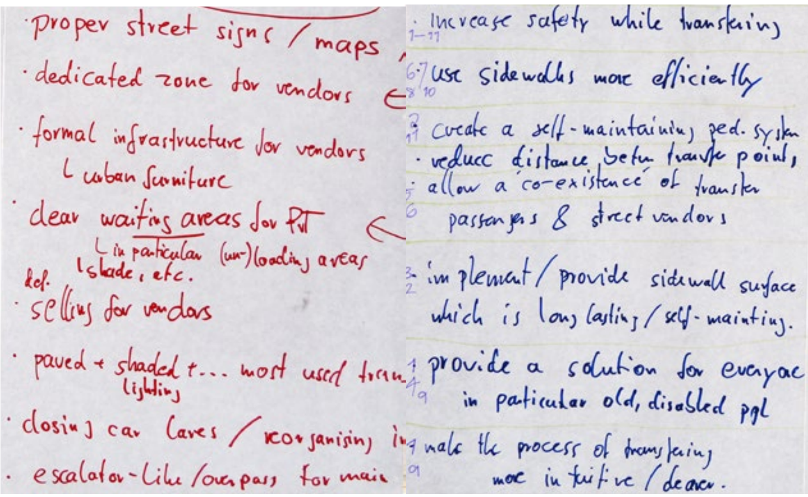

fig. 59: 'how might we...' thoughts during the problem solving and brainstorming process

benefits	challenges
Safe pedestrian infrastructure	Willingness of government to allow a legal street vendors' community
Costs for construction and maintenance covered	Ability of street vendors' community to manage blocks (finances, maintenance)
Providing a legal frame for street venders	Reasonableness of a 10-years maintenance period
Allowing co-existence of activities	

tab. 6: benefits & challenges of proposed solution

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Extension Site 2: Ring Road

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fig. 60: perimeter extionsion site 2

FURTHER STEPS – REFINING AND TESTING THE PROBLEM

On the final day of the fieldwork, we went into detail with the study of jaywalking (fig. 61). Already knowing that our users were people crossing the Ring Road, we now wanted to know whether the users could be clustered into usergroup(s) and what basic characteristic would define such user groups. This led us to a small survey, where we asked twelve people crossing the overpass and twelve people jaywalking about their main purpose of crossing and how long they thought it took them to cross. In addition, we noted down the age and gender of the person interviewed. Besides helping us to characterize our user group the questions served two purposes: First, to give us an understanding of our user's needs by asking them their purpose of crossing and second, to test their perception of time, giving us a more user-oriented indication of choices between crossing modes.

In addition, we timed in total 15 people jaywalking the ring road and crossing by the overpass, testing the actual time for each mode and comparing it with the pedestrians' perception of time. This was done to give us further insight into the pedestrians' needs. Finally, we counted the number of people crossing the Ring Road, testing the extent to which the jaywalk phenomenon really occurs. (fig. 62-64) Summing up on our results, we were able to further identify our user group as younger males, who would jaywalk to save time, typically on their way home or to work. In addition, we learned that jaywalking indeed is a frequent phenomenon (1 out of 6 pedestrians crossing the Ring Road jaywalks) and that jaywalking is an almost three times faster mode of crossing than the overpass. On top, we figured that crossing times are perceived much longer than the actual times, helping to explain the reason for the existence of jaywalkers (fig. 65 & 66). With this knowledge at hand, we further refined our problem statement and started our prototyping.

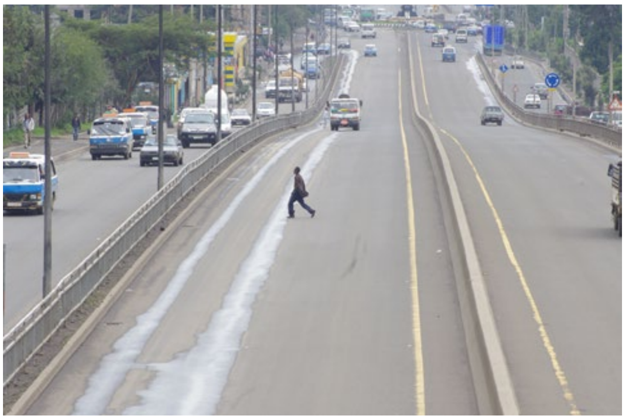

fig. 61: person jaywalking

FINDING A SOLUTION

Actively using our data, we started generating ideas for possible design solutions and came up with a number of ideas from which we chose two, based on a dogma. For each of the two modes of crossing – road (jaywalking) and overpass – we wanted to propose a design, which doesn't prevent people from following their aspirations (by prohibiting jaywalk or building higher fences), which is not expensive and which doesn't have dramatic influence on the present urban environment (new constructions or changes to infrastructure systems).

TWO DESIGN PROPOSALS FOR TWO EXISTING MODES OF CROSSING

We ended up choosing two different but complementing solutions to the problem of jaywalking. While the first addresses denser areas of Addis Ababa, where existing overpasses are already provided, the second addresses the least denser areas, where no pedestrian crossing possibilities are provided at the moment.

HIGH-DENSITY AREAS

As a first design proposal we suggest that the already existing overpasses should be upgraded with new design elements paving the way for a more active use of the public space (fig. 67).

As a human-pace mode of transportation, walking is subject to a large number of urban design qualities. From the exposure to weather, to the quality of surface and the amount of greenery, urban design qualities influence the general experience of walking. In addition, market opportunities and local vibrancy influence the walking experience and can help to (cognitively) shorten the pedestrian's journey from A to B, by mixing plain transportation with daily activities. Transparent window facades or street vendors invite pedestrians to engage in market activities and social interaction, making time seem more efficient and joyful. Thus, by cutting down on the perceived travel time, we suggest that jaywalkers can be attracted to using the overpasses.

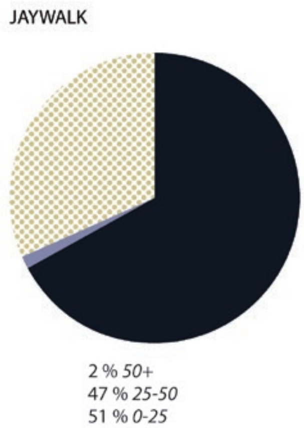

fig. 62: age of people jaywalking

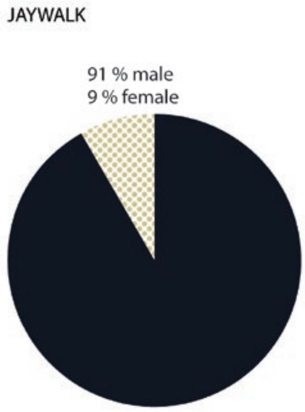

fig. 63: gender of people jaywalking

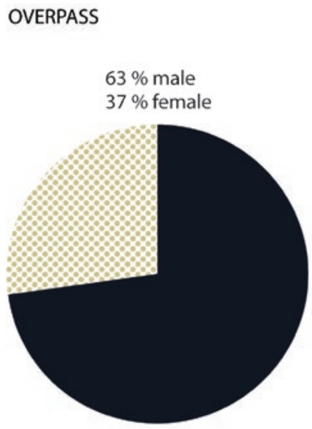

fig. 64: gender of people using overpass

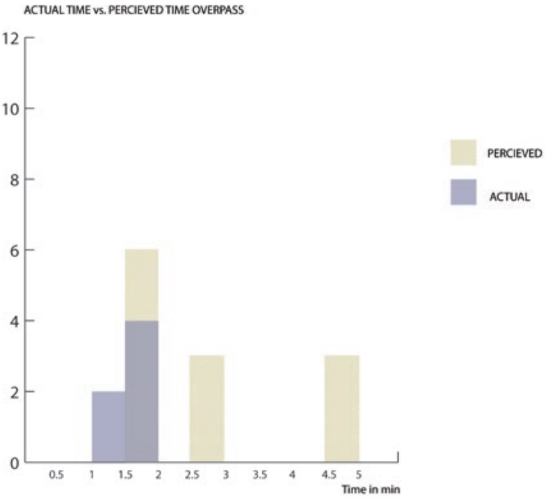

fig. 65: actual and perceived time using overpass

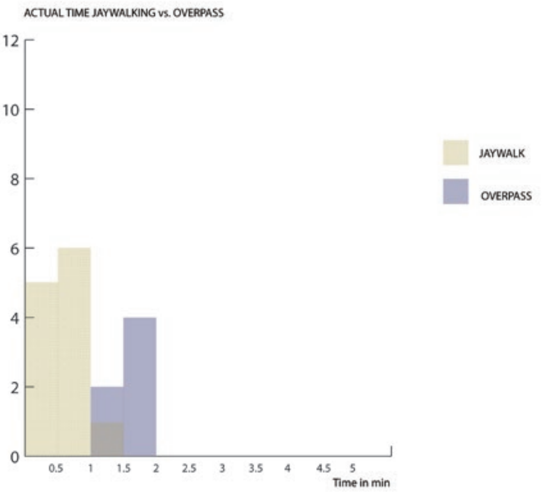

fig. 66: actual time jaywalking vs. using overpass

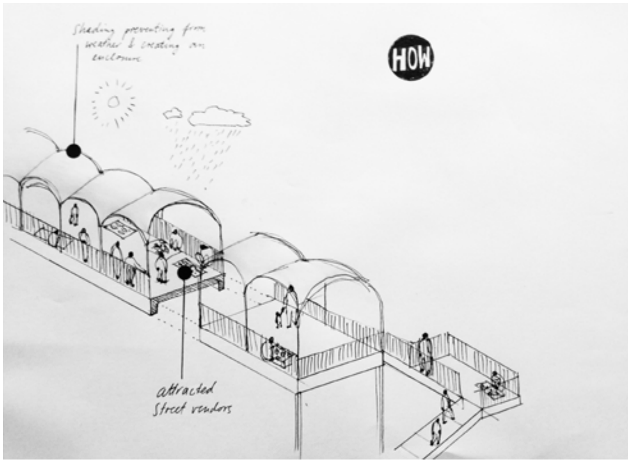

fig. 67: conceptual design of upgraded overpass

Since overpasses are built in dense areas, on busy pedestrian routes, they are spaces of strong urban market potentials. With that said, overpasses ought to be upgraded from their current state if these potentials should be realized. The overpasses have almost no design qualities at the moment and could be upgraded in a number of ways. Most urgent, however, is the lack of shading. Addis Ababa is subject to a very strong sun-exposure at midday due to its high altitude and some heavy showers during the rainy season and umbrellas are up in both sun and rain. Besides providing shelter from sun and rain, a shaded overpass will increase the level of enclosure (room-like feeling), which is non-existent at the moment. Both elements are core qualities of an inviting walking environment, and can even invite people to take a hold and interact with one another or the environment. Further, having a shaded roof on the overpasses paves the way for the implementation of lighting as well. This will make it easier to navigate at night, heighten the sense of security and prevent the homeless from taking up the overpasses as living spaces.

In our second design proposal we suggest that jaywalk zones are demarcated in less dense areas without overpasses (fig. 68). By doing so, we want to empower jaywalkers in following their aspirations rather than prevent them from doing so. At the moment, jaywalking as a crossing mode lies in a grey zone, where it is not being either actively prohibited or enhanced. We suggest that jaywalking should be acknowledged as a mode of crossing (fig. 69), by demarcating jaywalking zones on the Ring Road. Arguably, this will increase awareness of jaywalking and potentially limit the phenomenon to the assigned zones.

Painting the road surface in an effective color is an obvious tool of demarcating a jaywalk zone. In the long run, the color can be associated with jaywalking and serve as a general warning sign for jaywalkers. In addition, we suggest that a passage is cleared for jaywalkers in the zones, by cutting through the fences of the Ring Road. Besides reducing crossing times, clearing a passage will decrease the risk of jaywalkers stumbling over one of the three fences of the Ring Road.

FINDING THE RIGHT PEOPLE

Finding the right people is almost as big a concern for the outcome of the project as it is to find the right design solution. Who funds the design implementation and future maintenance of jaywalk zones and shaded overpasses? And who facilitates the process and organization?

For the upgrade of existing infrastructure (overpasses), it may seem obvious to engage government forces. However, as the upgrades are directly related to a potential local market creation, we suggest that private users and investors are involved from the beginning of the process. The first step is to find a facilitator, who can engage the different local stakeholders and mediate between them. The local Kebele is the obvious choice as they have direct knowledge of the people living and working in the area of interest. Kebele means ‘neighborhood’ in Amharic and is a tight system of neighborhood administration and control in urban Ethiopia, each comprising around 500 households. As the facilitator, the Kebele would also be responsible for finding the private investors. We suggest that the overpasses are funded through advertisement. Since overpasses are located in high-dense areas with a considerate flow of people passing by, billboards hanging on the overpasses would be an effective exposure of a brand (fig. 70). To bring one example, Tomoca Coffee could buy a billboard on the overpass, for which they will pay for the design upgrade of the overpass.

While the local Kebele could run the project of upgrading overpasses, we suggest that the project of demarcating jaywalk zones is orchestrated by central forces. There are no obvious private investors for the demarcation of jaywalk zones, which is part of a large-scale road strategy with only one objective (increasing safety for jaywalkers). In light of this, we see the government as the main facilitator and funder of the project, which is also more effectively implemented top-down (fig. 71).

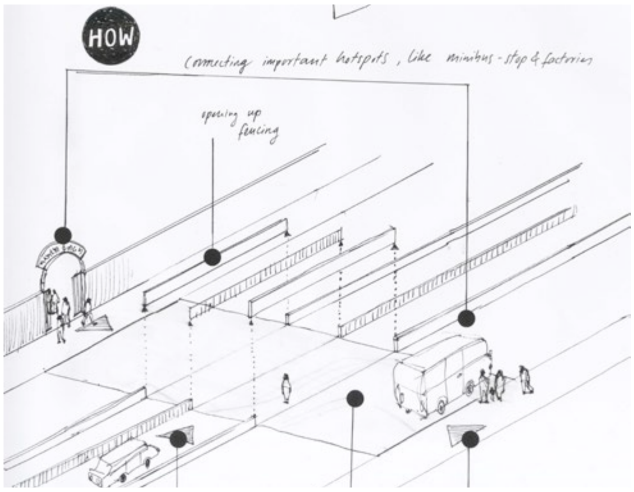

fig. 68: conceptual design of jaywalking zone

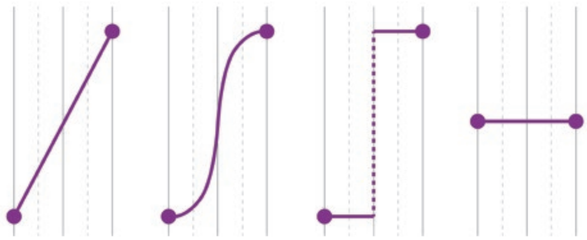
fig. 69: jaywalking typologies

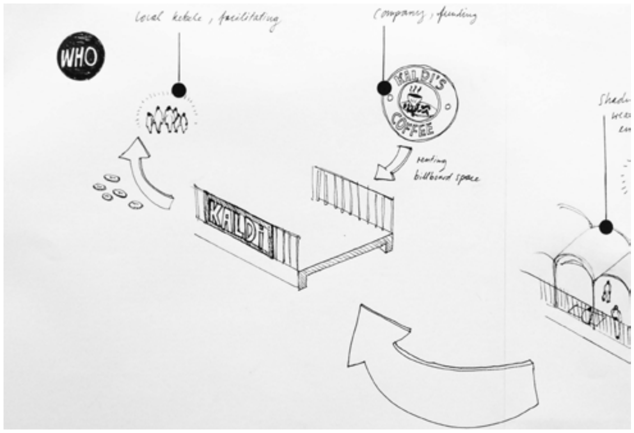

fig. 70: overpasses: financing & facilitation

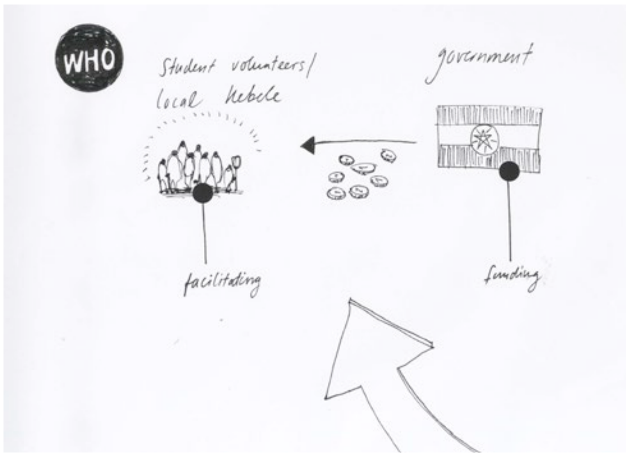

fig. 71: jaywalkzones: financing & facilitation

CLOSING REMARKS

The outlined proposals include a two-level content. First, they are actual walkability design proposals, addressing a contemporary urban problem of Addis Ababa. Second, they are more general suggestions for the future urban development of the city. Following a bottom-up approach, we propose that local communities could be used more actively in the urban (and financial) development of the city. In addition, we suggest pedestrianism to be viewed as a resource of the city instead of an informal element of a car-oriented city. Besides being a more sustainable and safe mode of transportation, walking brings a stronger social cohesion to a city and the location of urban markets are persistently linked to the pathways of pedestrians.
With our design proposals, we do not promise that the number of jaywalkers will decrease, but awareness of the jaywalk problem should be increased. Again, this is a problem, which can be linked to general planning strategies of Addis Ababa, giving favor to automobile transportation.

fig. 72: observations first field trip (pink: bus stop, green: vending, shaded: industrial buildings)

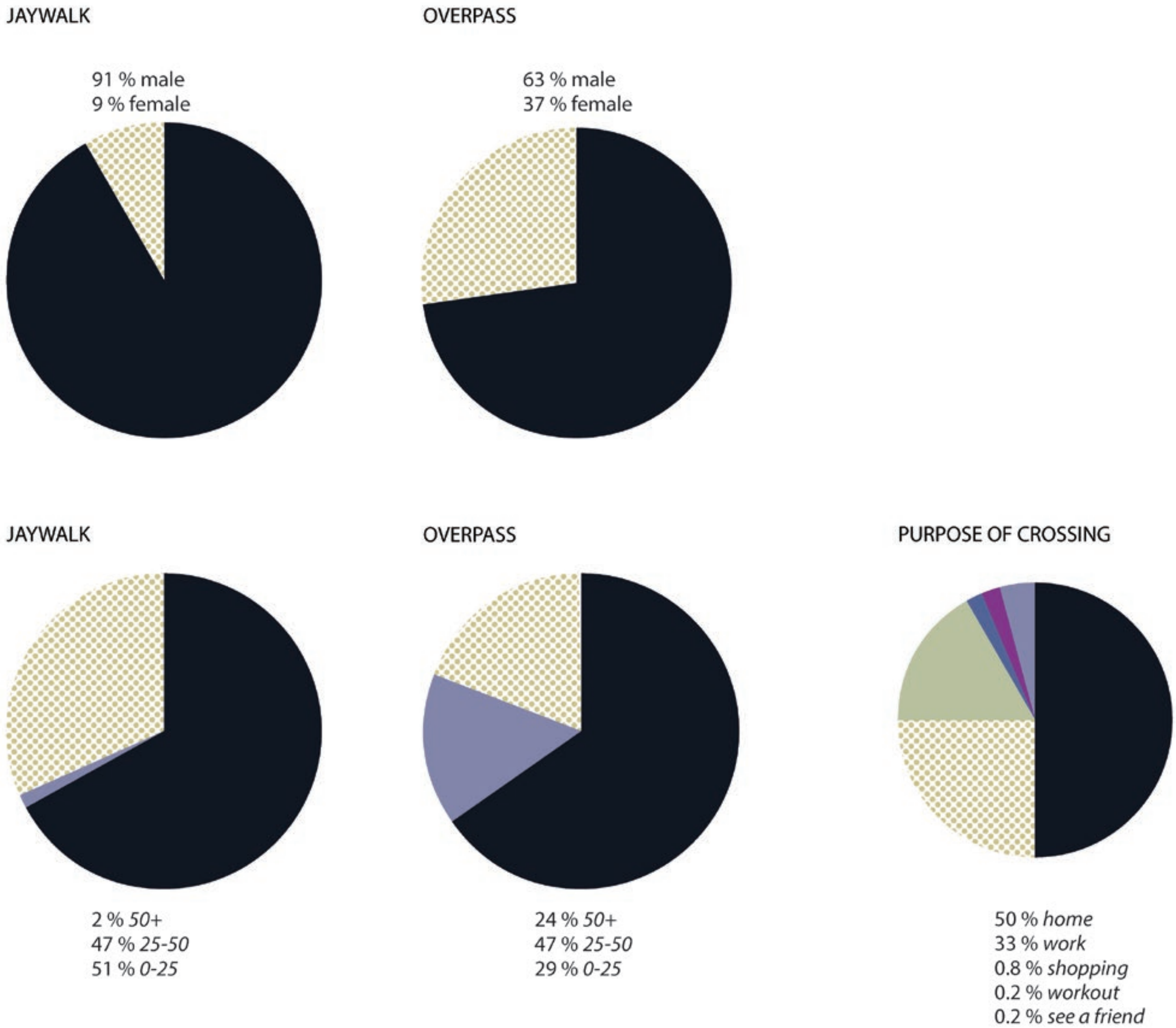

fig. 73: user studies on age, gender, purpose

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Periphery Area

fig. 74: periphery sites 1 and 2

Addis Ababa is a fast growing urban area. The city has grown significantly over the past few decades pushing the city borders away from the original core. Our group was assigned to look at the southwest end of the city where there is a new residential neighbourhood consisting mainly of condominiums up to 5 storeys (fig. 74).

The so called Jemo I, II and III neighbourhoods are satellite cities approximately 8 km southwest of Addis Ababa city centre. They were built starting around 2006. Originally the Jemo neighbourhood was designed as social housing. But due to high rents it is now a living place for middle class people, formerly living in the city centre. It is mainly a residential area with a few cafes and small commercial activities. Standardized building types and mono-functional use has led to weak street interaction. Both focus sites were chosen for the reasons that they are representative of the problems the inhabitants of many Grand Housing Project condominium sites are facing all over Addis Ababa.

The first focus site deals with the accessibility of the satellite towns. Within Jemo I we chose the main intersection between the offshoot road from the Ring road and the road leading into Jemo I as a study site. This intersection is a public transport hub for Jemo I, II and III (fig. 75). The city busses, the minibuses as well as taxis and bajajs stop at this intersection to drop and load passengers from or to Jemo I, II and III. The Intersection is mainly a threeway intersection surrounded by a vegetable market and many muddy and empty voids (fig. 76).

The second focus site deals with the social aspect of the Grand Housing Project which is the lack of social interaction (fig. 77). Initially the task setting asked to set the project perimeter along the main road. However, we encountered stronger potential within the condominium neighbourhood. As a result, the second focus site's project perimeter was situated south of the intersection between the main road and the street leading towards Jemo I neighbourhood, covering more or less an area of 8.5 ha.

On Tuesday afternoon, August 26th, our group first went into the Jemo area. We were supposed to find the two previously mentioned focus sites within Jemo I, II and III. For about three hours we explored the three residential areas (fig. 78). We then quite quickly decided to focus on Jemo I as it is already inhabited for a couple of years, whereas Jemo II and III are still under construction. For example, roads and sidewalks are yet to be paved, and some houses are still uninhabited.

INITIAL AND FURTHER QUESTIONS

Our initial focus was on the following six topics:

- How safe are pedestrians within and around the condominium area?
- How is the access to and from the city centre?
- What are the main transportation problems and where is congestion taking place?
- What is the relation between the land use and the street activity?
- Who is the average resident?
- What are possible centres within the area and how are they composed?

To investigate these questions we mainly used the data collection tools proposed by Jan Gehl in 'How to study Public Life'. After discussing the results from these collection methods, we tried to state the observed problems with the Point-of-View Madlib method proposed by Hasso Plattner from the Institute of Design at Stanford.

PROBLEM STATEMENT

We stated the two following main problems:

"Public bus users have to wait a long time in queues before boarding the busses." (fig. 75)

"Within the public housing site of Jemmo I,a lack of social interaction and daily pedestrian activities is confronted with fallow land and fenced off streets." (fig. 77)

Therefrom we derived two goals:

- Improve timing and routing for public transport users.
- Improve social interaction for residents.

fig. 75: queues at a bus stop

fig. 76: mud terrain on the intersection

fig. 77: fences around the condominiums

fig. 78: typical situation within the condominium area

With these two goals in mind, we went back to the field site to obtain more data. Firstly, we again used the Jan Gehl tools, now with this particular focus. Mainly, we used counting (for example of people waiting for public transportation, or the number of busses/minibuses etc), activity mapping, tracing and tracking. Secondly, we used Interviews with preformed questions.

PROTOTYPING

After we shared the new gathered data with each other we continued with brainstorming ideas on how to address the observed problems. We did this individually and then discussed the derived ideas. We decided on several possible solutions for the first problem and second problem. To choose our final solution we set up six criteria which we then individually and subjectively rated fulfilled low, medium or high (the weight of the criteria was decided by averaging the proposal by the six initial group members). The criteria and their weight are:

- 22.5% Involvement – Level of participation in decision making process and execution
- 18.3% Costs – Estimated total monetary costs
- 10% Finance – Share of cost for users
- 22.5% Relevance – Level of goal achievement
- 8.3% Time – Duration of implementation
- 18.3% Acceptance – Estimated level of use by potential users

Initial ideas for the first focus site ranged from:

- Reorganizing the entire vehicle flow by a big roundabout using the middle part for a separate public transport area (the Bucheggplatz in Zurich served as a reference for this idea)
- Using the surrounding and numeral voids for designated public transport stops
- Designing bus niches
- Improving the communication with the government for example by a questionnaire or a handbook with proposed study questions to assess the needs of the users
- A prepaid bus ticket system

For the second problem statement, ideas ranged between:

- Building a community center
- Providing social working/gathering space
- Relocating kebele into Jemo
- Removing fences
- Creating a manual/questionnaire for the government in order to facilitate communication
- Buliding sanitary infrastructure

After evaluating the results of the weighting, we decided to propose a prepaid bus ticket system for the first, and to provide production spaces for the second problem statement.

Periphery Site 1: Jemo I Junction

Firehiwot Nesro (EiABC Addis Ababa), **Philipp Staudacher** (ETH Zurich), **Sarah Weber** (ETH Zurich)

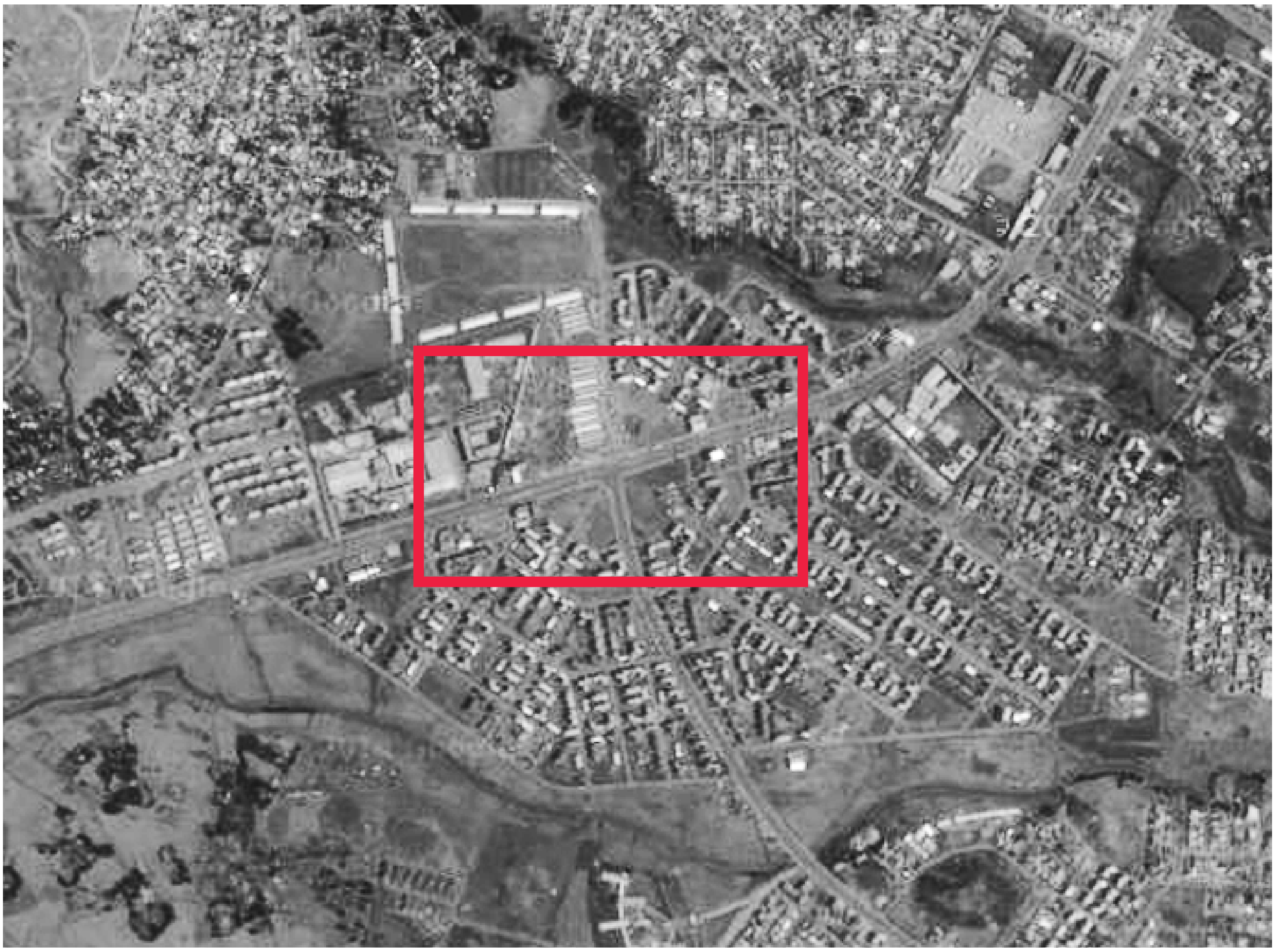

fig. 79: perimeter periphery site 1

FURTHER STEPS – HYPOTHESIS

The findings of the fieldwork and our group discussions lead to the hypothesis that there is a lack of access to public transport on our site. Jemo I (as well as II and III) were designed as satellite towns with mostly residential use. Residents need to travel a long way every day to either go to work or to pursue other activities like groceries shopping, leisure activities and socializing. This leads to an increase in the need of public transportation towards the city but also other areas. The access to other parts of the city needs to be easy and cheap. Connectivity for satellite towns, although they were designed to be self-sustainable, needs to be well organized and granted at all time. On a smaller and more physical scale, there are many obstacles within the neighbourhood that hinder the access to the public transport. Such obstacles include physical characteristics (holes in the pavement, lack of designated crossing areas for pedestrians, littering due to lack of bins, unpaved pedestrian ways, flooding of streets due to lack of sufficient drainage during rainy season) or organizational characteristics (waiting queues blocking the sidewalks, long waiting hours for public transport, street vendors occupying the sidewalk, animal herds preventing a smooth pedestrian flow).

PROBLEM

The main issue that we decided to address in our intervention on the junction into Jemo I was the extensive waiting time for the busses coming and going mostly into the city (e.g. Mercato, Mexico) or also into Jemo II and III. There are many waiting queues in the area at different points for different kind of transportations, for example, people queuing for minibuses wait on the sidewalk along the street leading into Jemo I whereas people waiting for the city bus to go into the city wait at the second street light, queuing perpendicular to the sidewalk. The most problematic were the waiting queues for the city busses. People had to wait the longest for city busses and whilst doing so they were blocking the pedestrian flow because they were waiting perpendicular to the sidewalk and therefore blocked the entire sidewalk (fig. 80). What was very intriguing to see is that a future bus passenger has to wait up to 20-25min until a bus arrives. But the problem is worsened if we also consider the boarding time, which can be 25-30min. So the person standing first in line has to wait at peak hours up to 45min-1h until his/her journey on the bus can begin (fig. 81).

fig. 80: waiting queue at the bus station

SOLUTION

We considered the prepaid bus ticket system as being the most effective and the most successful, should it be implemented. The extensive boarding time of the busses can be significantly decreased by the prepaid approach. As a first step, we are envisaging a pilot study for all the buses to and from Jemo, if successful this could be implemented in the entire city of Addis Ababa. This solution aims to involve the current system and minimise the scale of change from it. Tickets would no longer be sold from the ticketer whilst boarding the bus but could be bought from any supermarket, kiosk, bus counter or from one of the many street vendors around the bus stop. They can be bought as a single ticket or multiple at a time for later use (fig. 82). The street vendors would be motivated to be integrated in this new system by allowing them to buy the tickets for a discount prize (if a ticket would cost 1 birr, they might get it from officials for 98 cents leaving them with a profit of 2 cents per ticket). If we consider now how this would work on an individual level: As a future passenger, I can get a ticket from a street

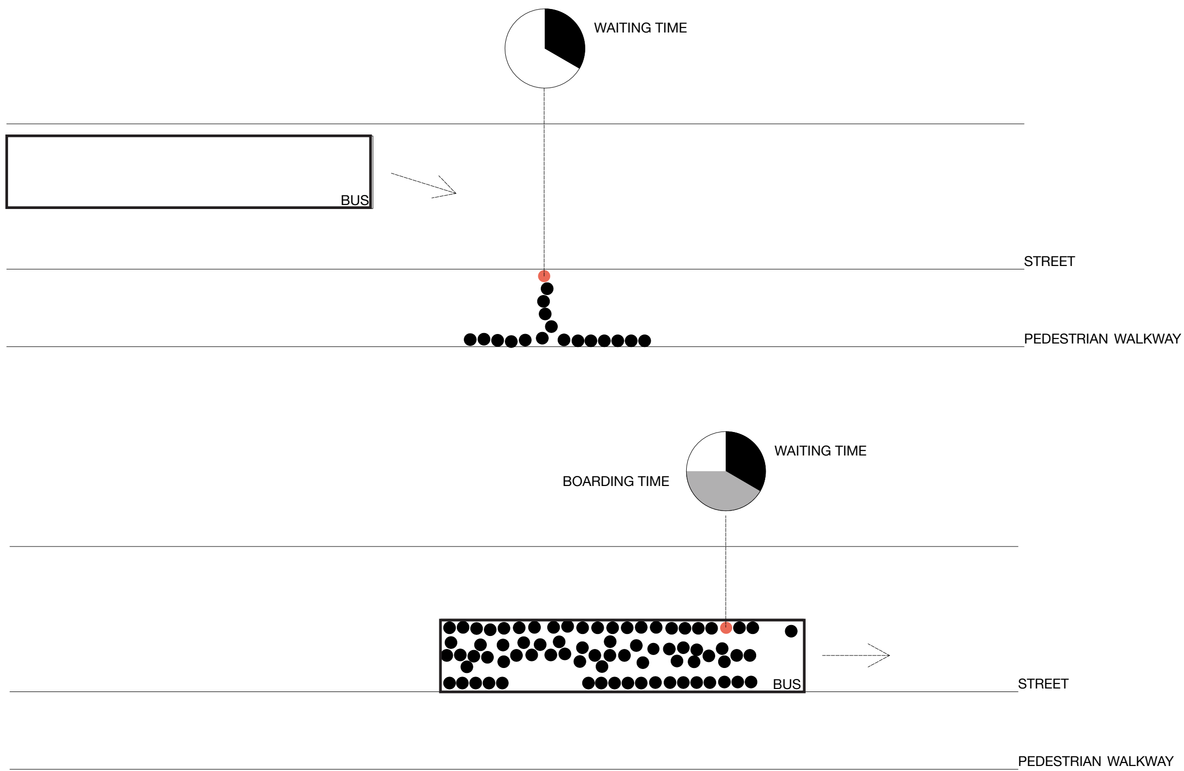

fig. 81: current waiting and boarding times

vendor or take one that I have already at home. I will still have to queue at the bus stop. But the ticketer would only have to clip the ticket to make it invalid for further use. The boarding time is only ½ to 1/3 of the previous system. Also, the bus driver could be included, dividing the queue in half and therefore speeding up the process of boarding even further (fig. 83).

The prepaid approach does not aim to make the queue disappear in a first step. Removing the queue would only shift the problem from one point to another but would not actually deal with it. We therefore understood that the problem could not be solved in a first step by building means but should be addressed on an organizational level.

The significant change that I experience as a passenger is the reduced boarding time. I do not have to wait for 25-30min anymore until all passengers have boarded. The boarding time can be reduced to 10-15min. This means that the bus can leave the bus stop faster, which eventually leads to an increase of the bus frequency. This then also leads, at a further step, in the reduction of the waiting time of the passengers waiting at the next stop and then eventually in a reduction of the overall queue length (fig. 84). Physical proposals on how to make the waiting time more confortable can be implemented at a further step.

METHOD CRITICS

Before having gone to the site the group had listed the problems that we imagined could exist. The first day on the site was used for orientation purposes and locating the two focus areas. On the second day we used all the tools given to us to derive problem statements. But after having gone to the site we found that the things we did not expect to be problems, such as long boarding times and interaction problems, were actually more important than the ones we had postulated before. There are other methods that could have been used to come up with more problems that need solving. One of these is actually taking the bus from the focus area and following it throughout its journey back to its starting point.

PROTOTYPE CRITICS

Our thesis stated that there is a mobility problem in our specific focus area and of the many obstacles, we have observed the waiting and boarding time for the city bus are the core obstacles that cause much trouble to the pedestrians trying to pass through the queue and the users of the city bus waiting for the bus to arrive and then waiting to get the tickets from the ticketer. And we decided that by removing this obstacle we could solve more related problems. Let's consider what a man who wants to take a city bus would do at the current situation. He goes to the bus station, stands in the queue and waits for the bus to come. Once the bus arrives he would have to wait for the others in front of him trying to buy the tickets and then buy one for himself and wait for the others behind him to buy tickets and board before the bus can leave.

Let's now consider what a woman in the new system would have to do to get into the city bus. She would have bought prepaid bus tickets from a kiosk or many other possible vending locations and have them ready to present to the bus conductor and have

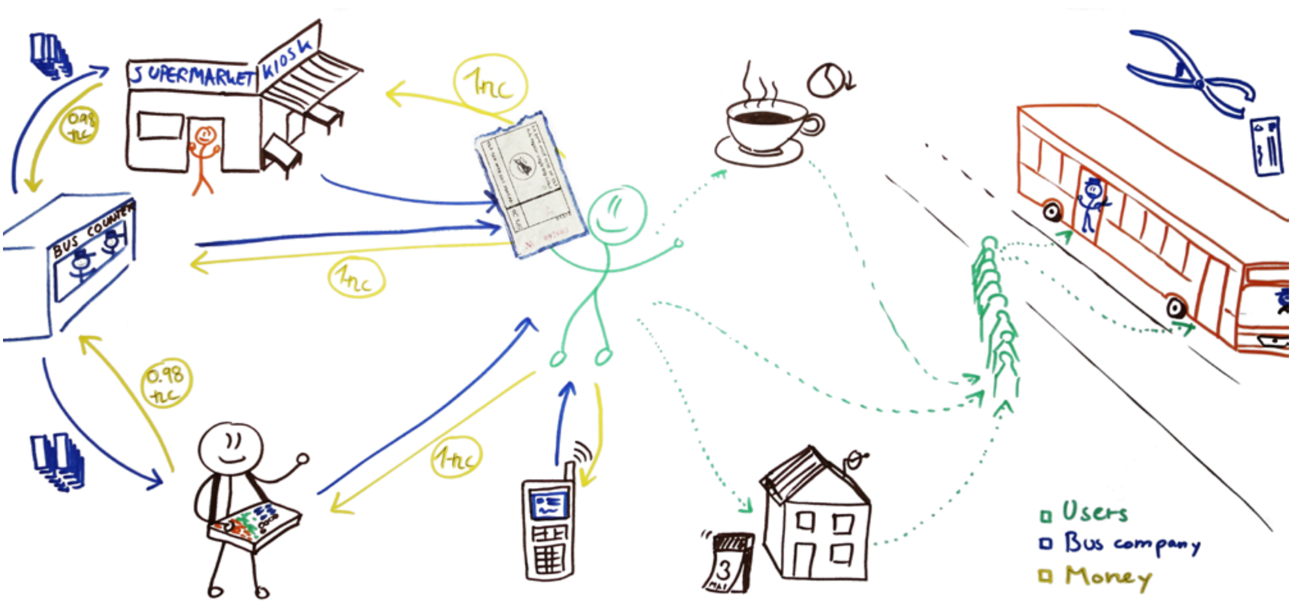

fig. 82: possibilities of the prepaid ticket system

them clipped, leaving a mark that makes the ticket void for reuse. This effectively reduces the time she would have had to wait queuing herself to purchase the ticket and the time she would have had to wait after boarding the bus until all other customers have been served and have boarded the bus. Another advantage this system offers is the shorter en-route time for a bus enabling it to return to its starting station for its next journey considerably faster than the older system, thereby serving more people.

The new system will have four major stakeholders: the government, the bus company, the vendors and the users. The implementation will have to use these stakeholders as rings to climb up to a successful integration of this new system into society. Before this can happen though, a pilot study will need to be carried out in order to determine if its integration is actually useful. To kick it all off, the detailed working schemes of the system will have to be presented to the government (fig. 85). With thorough negotiations/discussions the scheme can be bettered and tailored to fit to the society's needs. Once the government approves of the scheme the next step will be to negotiate with the bus company. Further amendments can be made to the system based on feedbacks from the bus company, upon the completion of which the most important phase of the implementation process will begin: setting up the infrastructure that will allow the system to function. In it are schooling the bus company's employees, setting up the marketing structure, finding and informing vendors, putting the needed infrastructure in place and finally informing the society. Among the needed infrastructures will be separate bus ticket counters that will at all times be equipped with plenty tickets at all stations on the specific route chosen for the pilot study, a person on the bus with a clipper (he may also be replaced with an automatic clipping machine with time indication) and tickets that are difficult to make counterfeits of. This is the part that will take the longest. We predict that the pilot study will be more or less a success

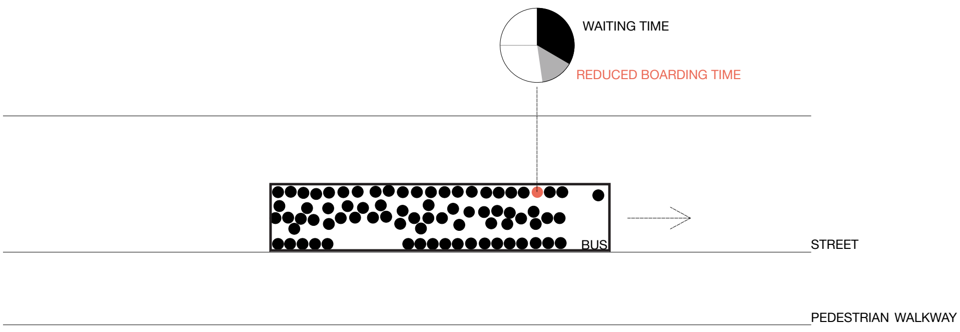

fig. 83: reduced boarding time

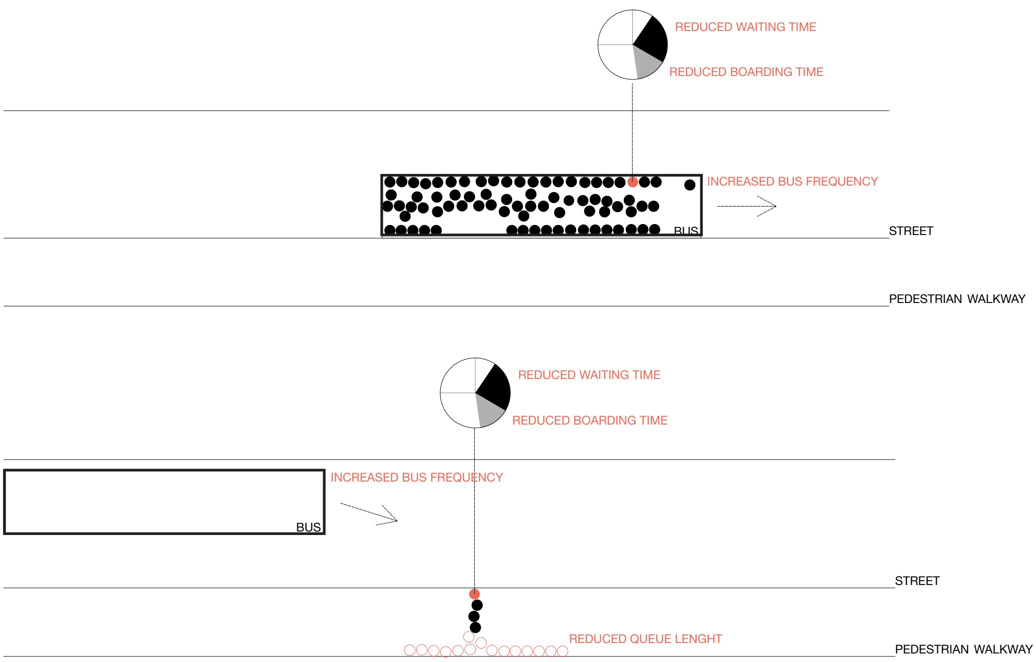

fig. 84: increase of bus frequency and reduction of queue length

because we will have informed the society ahead of the start of the pilot study and it will also continue while the pilot study is in place. Moreover, the tickets will not only be found in ticket counters but almost everywhere such as in kiosks, supermarkets and with street vendors.

The final part will be the actual pilot study, through which we will observe ticket availability at designated vending posts, continue spreading the word and evaluate the overall feasibility of the system. Once this is done, the crucial decision of whether this system was a success or a failure will have to be made. If feasibility is assured it will be implemented on more routes/bigger areas. This prototype has many advantages. It will save time, increase bus frequency, reduce queue length, increase bus tickets sale (possibly shifting users from minibuses to buses), provide additional income for vendors and reduce pick pocketing. But it also has disadvantages. Initial investment, loss in profit from ticket wholesales, inflexibility to deal with changing gasoline prices, possibility of illegal ticket printing and possible rises in ticket price are all foreseeable disadvantages the system might face. But it is our belief that the pros do outweigh the cons since some of the disadvantages can be tackled relatively easily.

OUTLOOK

We know that by merely solving the waiting time problem we will not solve every mobility related problem. After having implemented this pilot study and its feasibility is assessed, we would like to set up supporting ideas and infrastructure that will further strengthen and supplement it. One aspect of the old system that we will not be able to completely remove is the queue, since people will still have to stay in line to have their tickets clipped. Providing waiting areas where queues can be made can decrease congestions to a significant level. Congestions don't affect pedestrian mobility only, but also vehicle mobility. Integrating a bus lane throughout the city's road will undoubtedly increase the buses' frequency as heavy traffic is a very important problem in the city. We also envision an environmentally cleaner ticket system via mobile phones – as has been applied in other countries (e.g. Kenya).

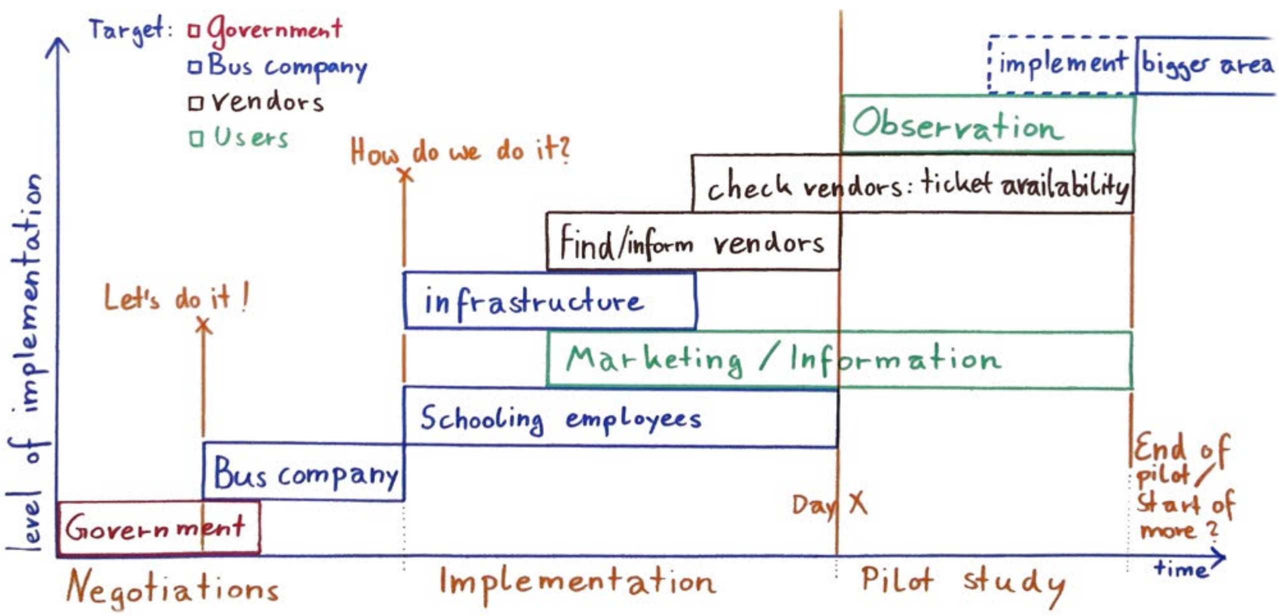

fig. 85: step-to-step implementation of the ticket system

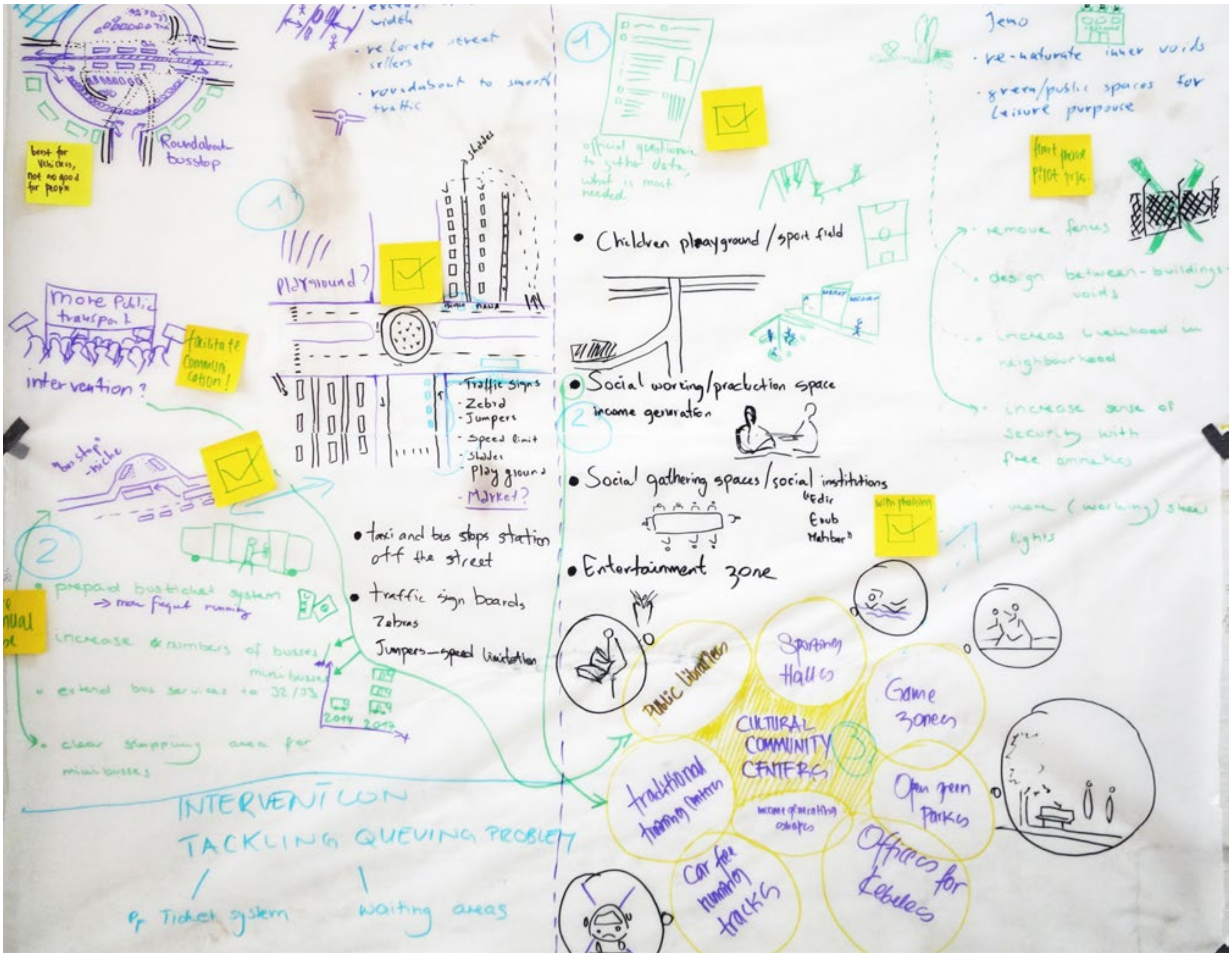

fig. 86: brainstorming

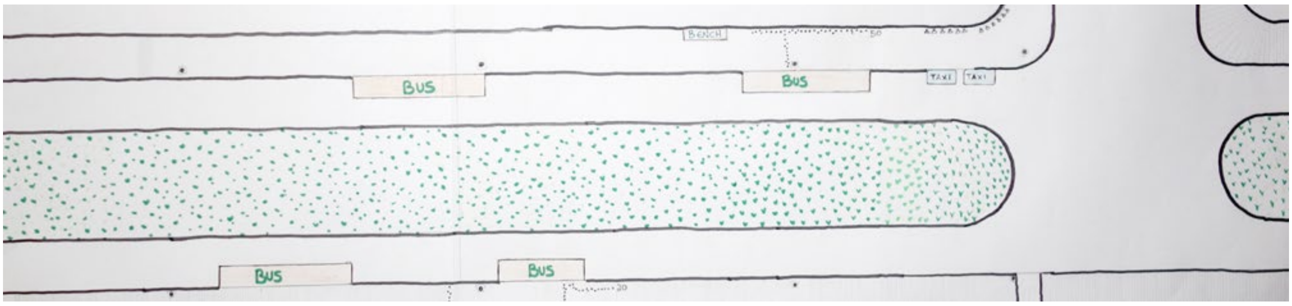

fig. 87: sketch of existing situation of the intersection

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Periphery Site 2: Jemo I Housing

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fig. 88: perimeter periphery site 2

FURTHER STEPS – HYPOTHESIS

The hypothesis that we came up with was that there is a strong lack of public facilities and social interaction in the area (fig. 90). We were hardly shocked by the fences surrounding the condominiums in the site. Several streets were deprived of any kind of commercial activity acting as transit spaces along compound fences. We immediately recognized the influences these fences should have in the interaction among residents. Especially in the relation between the inner-voids left between the condominium buildings and the public street. These voids covered with grass and mud, were mainly used as informal parking spots or laundry areas. There was no strong social life undertaken there. Supporting this hypothesis were the Ethiopian group members who explained to the Swiss students that this was in fact a common factor of many condominium neighbourhoods. Residents all over Addis Ababa complain about the condominium neighbourhood; that they are not able to provide the traditional and vibrant social life that people were used to in the old urban tissues. The majority of residents in these areas suffered a displacement from their original homes that were located in the city center to the peripheral areas. Here, the lifestyle and the interaction among each other does not correspond at all with the previous one.
In order to confirm (or dismiss) the primary hypothesis (lack of social interaction), so as to proceed with the provision of Production Spaces, we set a list of methods to be used in the last field study (30.08.14).

METHODS AND ANALYSIS

The methods should be relevant to prove the lack of social interaction among the residents. *Fences mapping*, *Activity mapping*, *Tracking* and *Interviews* were the tools chosen to be deployed during the field study. On Monday afternoon (01.09.14) all the group members met in EiABC to discuss the collected data. Regarding the results, a fence mapping plan (fig. 89) and an activity mapping (fig. 90) showing were people met and how they did that, were presented.

The main conclusion after this analysis was a correlation between the fences' location along the streets and the activity happening on them (fig. 91). In fact, main street activity was happening in places where retail and commercial businesses were present (fig. 92). On the contrary, streets delimitated by fences were barely used as public spaces. This, as we shall see was taken into consideration for the final intervention. The Ethiopian colleagues conducted many interviews with residents asking them about their social life quality. All the residents coincided on the fact that the condominium neighbourhood could not meet their former vibrant social life. Their complaints were focused on the lack of public facilities or traditional production spaces among others and were seriously worried about their children spending the majority of their time indoors instead of outdoors, as they did before. Many women also stated their concern about their inability to interact and meet the resident neighbours, in contrast with their former life style.

After this analysis, our hypothesis proved to be correct and the prototyping phase for the Production Spaces in Jemo I could begin. We started thinking about how these spaces should look like and where they could be implemented. Other questions that arose, were the desired involvement of the Jemo I Kebele to manage the needs and problems of the residents in the area. Kebele's are Ethiopian neighbourhood associations, which are located in different parts of the city. Their main purpose is to provide the residents with advice and assistance in case needed. They also act as meeting points among residents and provide economic support for them. Since the bottom-up aspect in the project was a major one, we concluded that the local Kebele should be involved in the process.

We started designing a Pilot-Project Process in which the Kebele would be involved in many aspects such as the project site decision, construction material provision among others. Another criteria was the involvement of the final users in the construction of the Production Spaces. The first thoughts for these spaces were low-income constructions, which would be built along the most deprived streets. However, at some point we came up with the idea

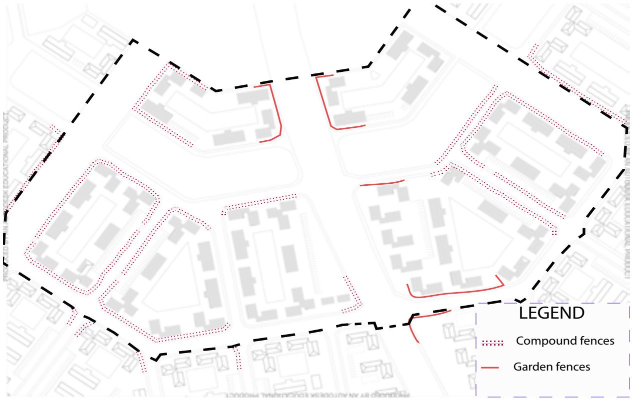


fig. 89: fence mapping

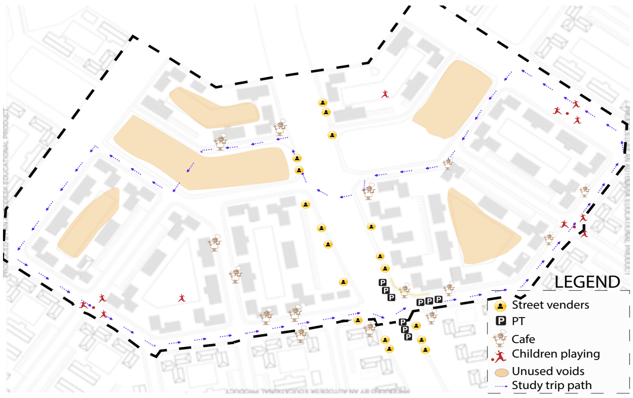


fig. 90: activity mapping

fig. 91: correlation

fig. 92: centre of the residential area

of using the oppressive fences in this process. We didn't like the fact of completely removing them since it was not feasible. Thus, we started to design a way of re-using them parallel to the production spaces provision.

This group proposes the implementation of production/selling spaces for traditional items, which will enhance the social interaction among residents. These spaces will be deployed by re-using existing fences along the streets. Moreover a nighttime use in the new spaces is desired. They should act as production/selling points during the day and meeting points for residents during the night. In that way, deprived streets will be activated increasing the safety and quality of pedestrian mobility. To reach this outcome, a Pilot-Project Process to guide the implementation process was designed. The steps are as follows:

1. *Observing & Interviewing in field*: The experts will first analyze the area in search of possible improvements. Interviews with residents will be a key tool as to research about the main concerns of the people.

2. *Handing out findings to Jemo I Kebele*: The outcome of the field study (in this case, the lack of social interaction and the desire provision of production/selling spaces) will be handed out to the local Kebele. In this particular project, potential sites for the project implementation will be identified in the area. (fig. 93)

3. *Kebele chooses first site to work on:* Kebele chooses the first site to work on out of the potential sites previously proposed. (fig. 94)

4. *Kebele provides space and material for construction*: The local Kebele is also responsible for providing the land for construction so as to verify, in collaboration with the local authorities, the correctness of the land use regulations. Moreover, they also provide the materials needed for the construction.

5. *Kebele provides flexible design layout for the users*: The Kebele will provide a flexible framework on which the users can work. The final users should be able to build the spaces with little external support. This flexible layout will be described during the Prototyping phase.

6. *Kebele provides skilled person from small Mahiber to train/help neighbours with construction*: As for initial support, the local Kebele will provide a skilled person to train the residents on how to build the spaces they will use. This skilled person will be chosen out of a Mahiber, local handcraft associations where skilled people in these disciplines are easily found.

7. *Prototyping*: Here the physical implementation begins (will be described later).
8. *Kebele sets criteria for users selection*: The local Kebele is also responsible for setting certain selection criteria for the future users of the production/selling spaces. The two main criteria are the resident character of the users in Jemo I and an unemployment situation. Further criteria can be proposed after agreement with the Kebele.

9. *Residents appropriate new spaces*: Implementation phase is completed and operational phase begins.

PROTOTYPING

Following the *Prototyping* phase will be looked into more closely (step 7):

1. *Current*: Here the present condition of the fences is unaltered. Fences act primarily as a barrier between the private condominium courtyards and the external public sphere (fig. 95).

2. *Transforming*: As a first step, several fenced unit mashes are opened and flipped to the top. From a barrier function, they open becoming a roof provision (fig. 96).

3. *Delimitating*: Once opened, the depth and the space required for the production and selling purposes are defined. For this, additional structure (same as from the former fences) is provided (fig. 97).

4. *Materializing*: During this phase, material is added to the structure. A fiber tent covers the whole space providing sunshade and waterproof. At the end of this step, the project can be inhabited (fig. 98).

5. *Detailing*: Light bulbs are financed and provided by the users so as to provide for night use (fig. 99). Also fixed furniture incorporating a storage space for the storage of the produced items during nighttime is constructed (fig. 100).

6. *Financing*: Finally the finance budget for one unit is indicated. After estimations (fig. 101), residents should be responsible for ~30% of the total expenses whereas the local Kebele for the rest.

The idea of providing Production Spaces by re-using former barrier structures and at the same time leaving them open allowing a public space to form during nighttime is the very core idea of this project.

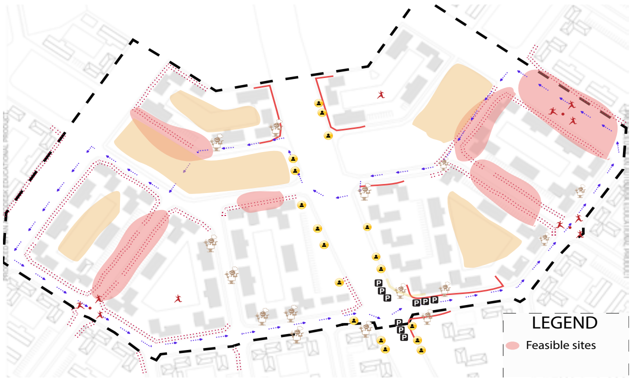


fig. 93: feasible sites

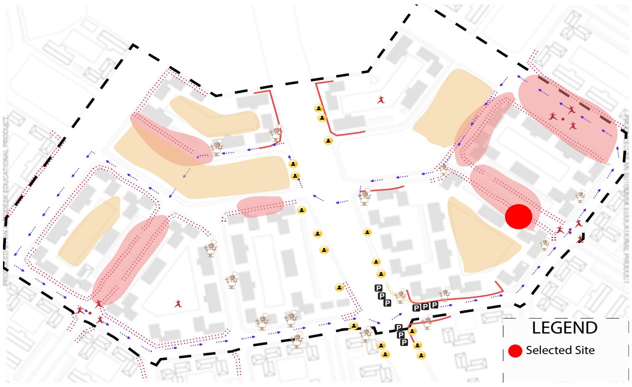


fig. 94: selected site for pilot project

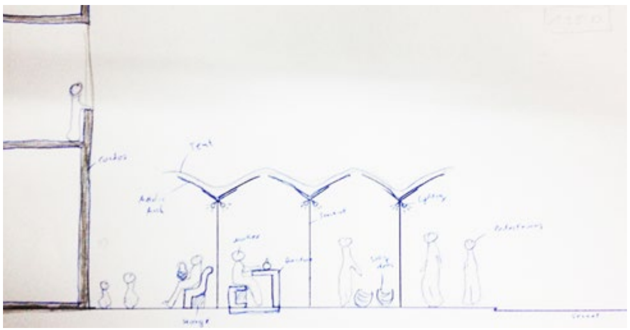


fig. 99: detail section of the production space

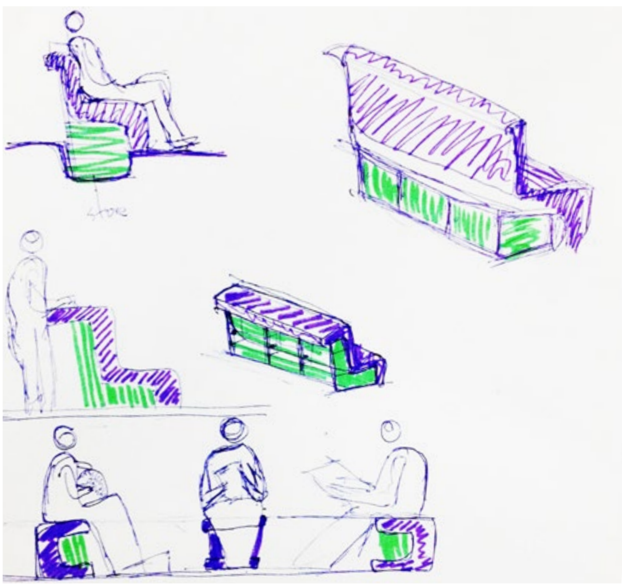


fig. 100: detail on furniture

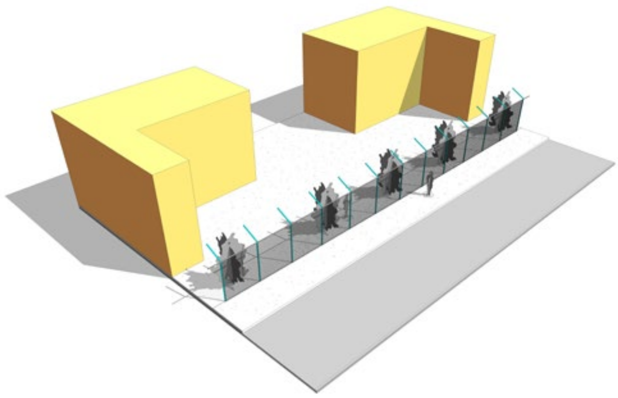


fig. 95: current

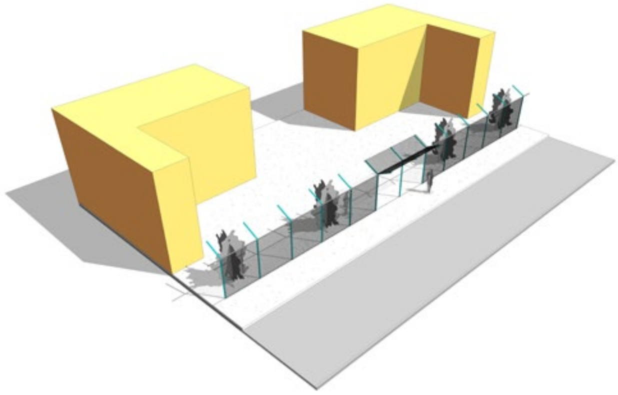


fig. 96: transforming

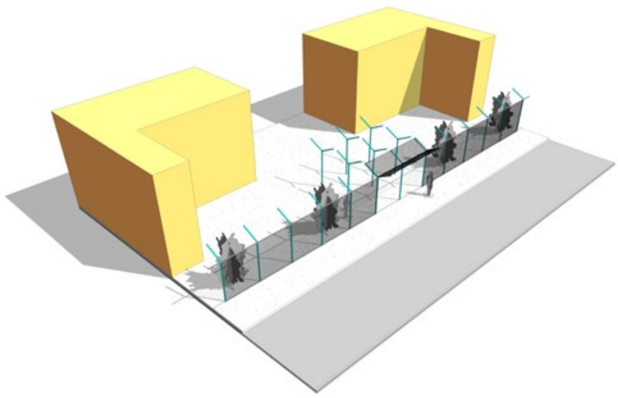


fig. 97: delimitating

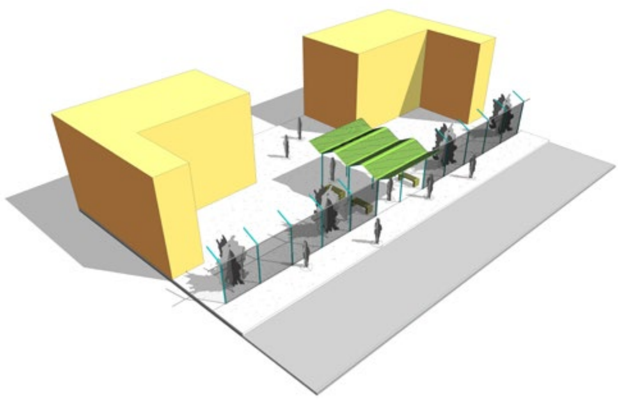


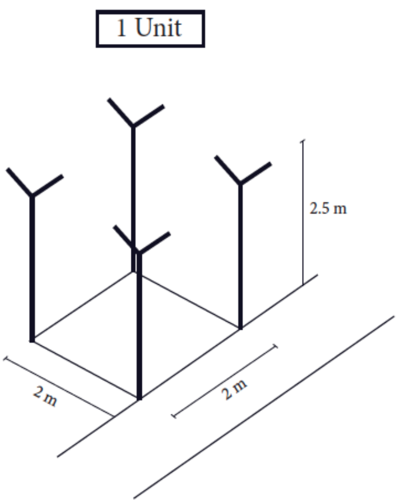
fig. 98: materializing

We chose this solution after realizing the primary characteristic of Jemo I area, the mono-functional condominium character which is deprived of any kind of street activity on the ground floor. We are convinced that one way to indirectly improve the pedestrian mobility of the area is to first improve the street quality and safety of the neighbourhood. We think that structural approaches should be prioritized over epidermic ones. In our opinion, pedestrian mobility is a consequence of the urban system performance, not a premise to it. Our thesis is that by improving the urban system, the pedestrian mobility will also improve. Only by providing paved sidewalks with trees and benches to sit down may contribute to a (fictional) improvement of the pedestrian mobility but won't act at the root of the problem. This is especially true in emerging and underdeveloped countries, where the basic infrastructure is not even guaranteed. For this reason, we are convinced that our approach that acts on a very basic social need is the right way to proceed.

Adding to this point the strong desire stated by the residents of having spaces where they could meet and produce traditional items as they did in their former urban tissues, we concluded that designing these spaces would contribute to a better social life in the area.By implementing this idea in regards to the fences along the streets, we believe that we will be able to develop and recuperate one of the most critical aspects of the area. Thus, we are convinced that this approach will both improve the social interaction among the residents and the street quality in the area.

Regarding the implementation feasibility; it will be conditioned by the Jemo I Kebele's willingness to take part in the process. As we showed, the Pilot-Project Process seeks to directly involve both the final users and the local Kebele association. Bottom-up strategies are a key aspect of the project. We think that the more the local people and institutions are involved, the more feasible the project implementation will be. This is because residents will appreciate the consideration the local authorities show towards them. Residents will be responsible for building the spaces they will use in the future, they will provide lighting to the new spaces and they will finally produce and sell items made by them. With the revenues of the business, residents will be able to manage and maintain the new structure. This self-sustainable condition is key to both the local institutions like the Kebele and to the residents in order to to minimize costs. The residents will be not only economically but also emotionally linked to these spaces by managing and financing them themselves. The housewives will teach their children and family members their handcraft skills. The Kebele officials will follow up the ongoing process and solve whatever problems arise.

We believe that this project will not only provide spaces for people to produce, sell and interact but will also increase the street safety and quality and thus contribute to a better pedestrian mobility in Jemo I.



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FINANCED BY	ITEM	COST [ETB]
Users	TENT	1500
Kebele	LABOUR	80
Users	LIGHTING	44
Kebele	FURNITURE	3000
Kebele	STRUCTURE	80
TOTAL		**4704**

EXPENSES SHARE [%]	
Users	32.8
Kebele	67.2

fig. 101: budget for one unit

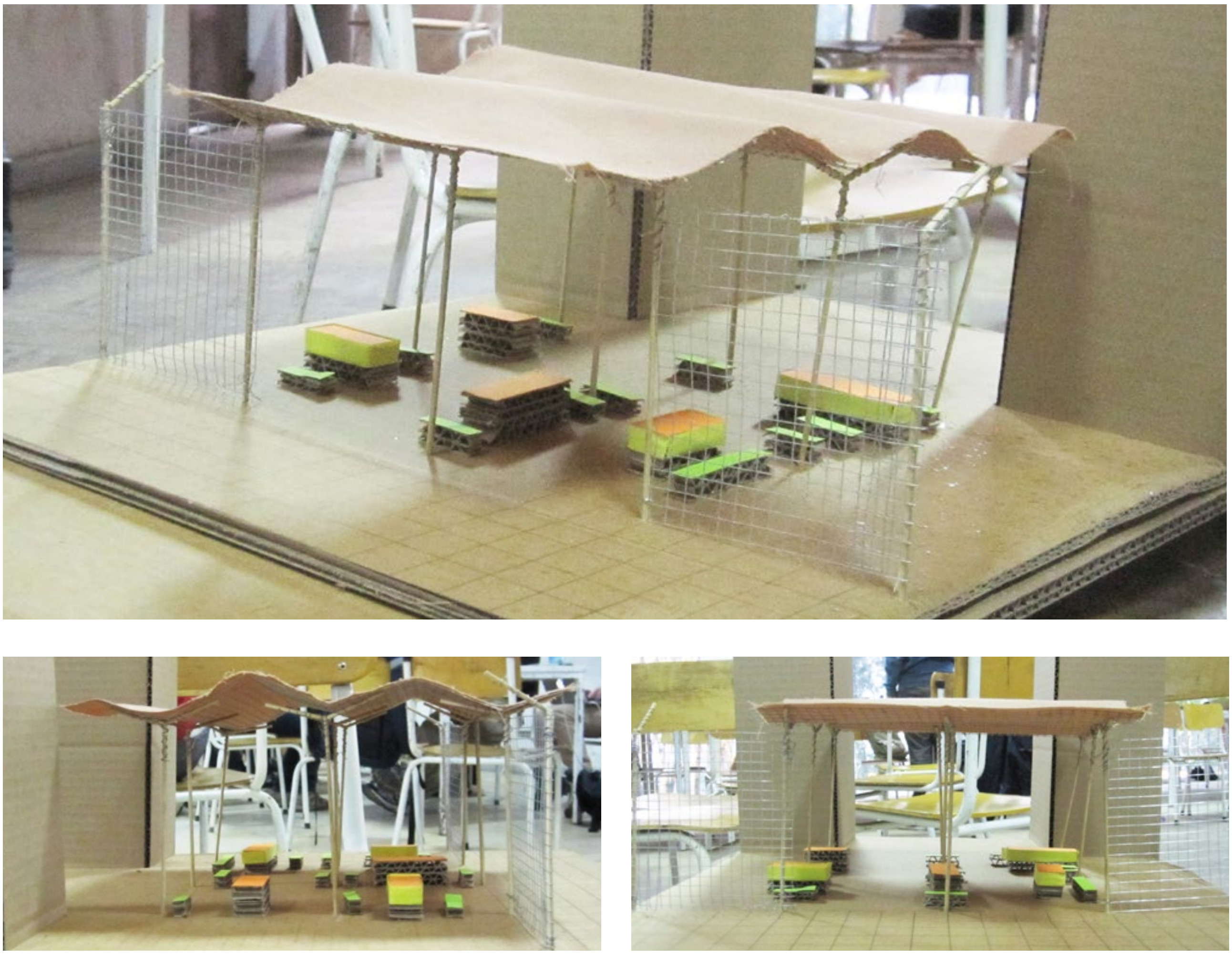

fig. 102: model images

TENT	
m2	cost/m2
1	250
6	1500

LIGHTING	
#	cost/item
1	11
4	44

STRUCTURE	
#	cost
1	20
4	80

FURNITURE				
table #	chair #	cost/table	cost/chair	cost
1	1	1000	1000	3000
2	2	2000	2000	

fig. 103: cost estimates

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Conclusion

Without question, the two weeks in Addis Ababa has been a vivid experience for all of us. But What can be said about the general output of the ETH-EiABC Workshop? Where did it succeed, where did it fail?

Amongst different goals, one focus was set on enhancing critical thinking and design capabilities. There are a lot of ways where you can go wrong in finding a solution to a problem. We were guided through the whole process from getting data, identifying a problem up to a design proposal itself. Throughout this whole process we constantly had to ask ourselves: Is the hypothesis I identified really a result of my observations? Is it really a problem? Is my solution really an answer to the problem I identified? What sometimes seemed to be a problem wasn't one at all. Often, the problem was somewhere else where one wouldn't expect it. Almost all of us had at least one epiphany by observing the streets of Addis. This forced us to realize that the seemingly obvious truth sometimes has to be reconsidered.

To some of us, the methods introduced certainly were more familiar than they were to others. Whereas architects tend to make decisions in designing based upon intuition, in the field of a civil engineer, using methods deriving from business consultancy is a common practice. However, the intensive support and the commitment of the teaching staff helped to clarify many uncertainties during the design process. Perhaps understanding the method of designing was more important than improving individual design capabilities. European students will never fully comprehend the mini-bus system, nor is it important for a traffic engineer to make atmospheric drawings of a city-scape, or for an architect to understand statistics within two weeks. Since this workshop was transdisciplinary, it was about applying individual skills intelligently in order to contribute to a fruitful result.

This insight may also be valuable for another goal that has been defined beforehands, namely transdisciplinary and multicultural teamwork for the sake of solving real world problems. From the impressive amount of information gathered within two weeks, it seems that working in these diverse teams was successful. This was also due to the equal representation of professions and nationalities in every team, which fostered a very active distribution of knowledge.

Yet, getting to a result was far form easy. First of all, almost no one was speaking in his or her native language. This complicated precise communication. Secondly, organization is always very difficult in large groups. Additionally, with only two weeks of time we had to produce an output before even really knowing each other. Furthermore, a certain imbalance in the discussions was a common observation: ETH-students had a tendency to take over the discussion and be the ones to decide, whereas EiABC-students were rather reserved. This might be a result of culturally different habits of discussion or because the teaching methods were somewhat one-sided. Perhaps, not only transdisciplinary but also multicultural diversity in the teaching staff would have made sense and might have made it easier for some of the EiABC-students to get involved.

Despite these difficulties every group managed to organise itself and come up not only with a large pool of data but also a solution that was an outcome of the observations made. Apart from this, many friendships have formed that will outlast the workshop. Maybe the variety of beliefs and also the struggle we had working as a team show us how much we're still in the dark about the feasibility of the solutions we came up with. We struggled with the scale of our solutions. On the one hand, the small scale interventions that we presented seemed like „band-aid“ solutions, which was a common criticism at the final presentation. On the other hand, in a political context like Ethiopia, it seems quite impossible to implement larger infrastructure systems into the city of Addis without particular connections to the local government.

Only a real world implementation of our design prototypes could answer these questions. This can also be seen as an outlook for following workshops. In this sense that small scale of our design proposals is definitely an advantage – they can be implemented with little risk or cost. Yet, if not implemented, there is still a large amount of valuable information that can serve as a starting point for further investigations.

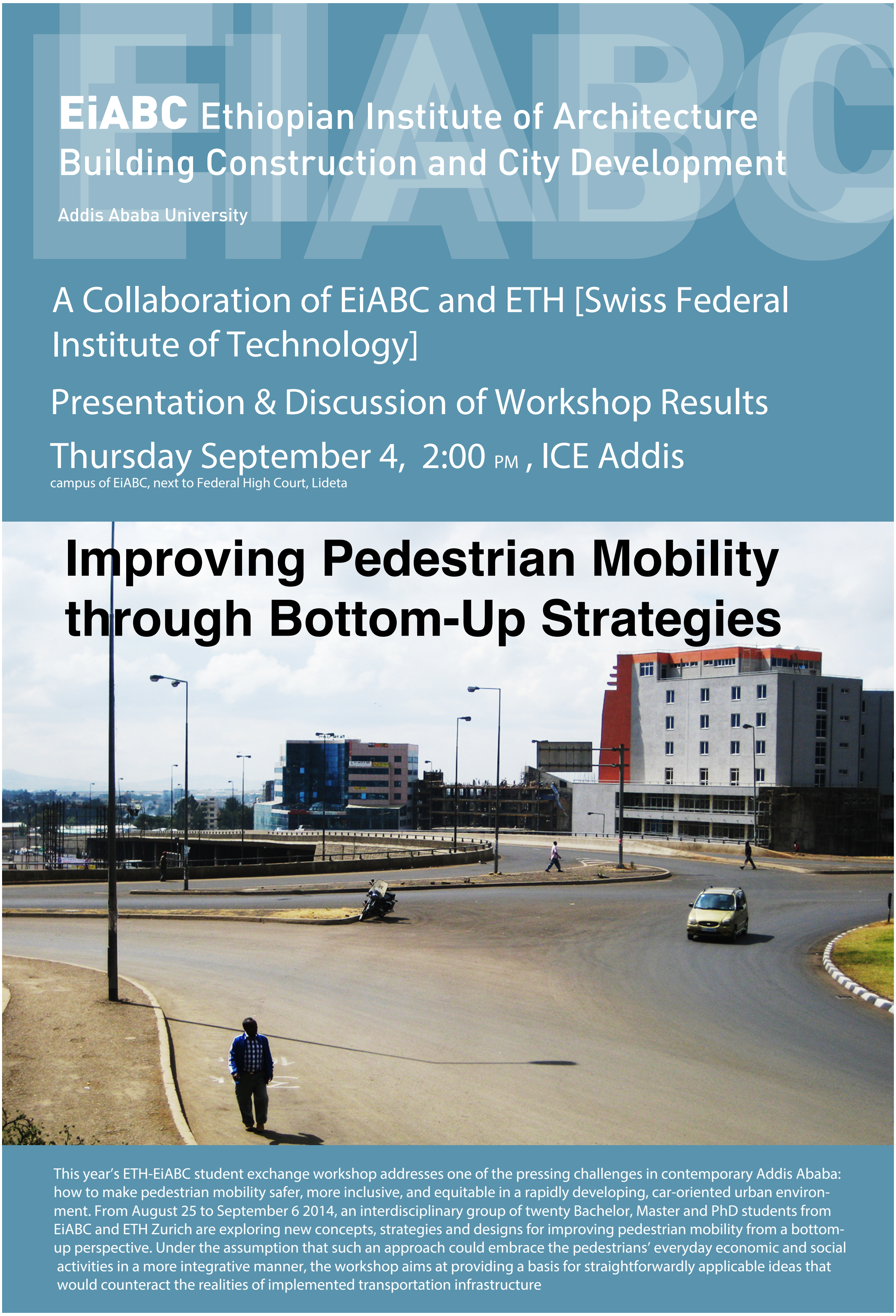

fig. 104: final presentation poster

fig. 105: workshop participants

fig. 106: film stills from documentary by Thomas Schaerer, movie obtainable at:
https://www.ethz.ch/en/the-eth-zurich/sustainability/education/summer-and-winter-schools/eth-eiabc-student-workshop.html