Recognising the Informal

urban design for environmental
justice in Manshiet Nasser, Cairo

Darcey Bil | Pattern Booklet

Introduction

Welcome to the Pattern Language Booklet, which provides an overview of Patterns in the context of the Zabbaleen, garbage recyclers in an informal settlement of Cairo. This booklet is derived from the graduation thesis titled "Recognising the Informal: urban design for environmental justice in Manshiet Nasser, Cairo,"

The patterns presented in this booklet are the result of an research and design project, which aims at creating an urban design for environmental justice for the Zabbaleen community.

These patterns can be used as an exploration and communication tool for architects, urban planners, and residents to engage in discussions on the future of the settlement. These patterns are based on the design lenses derived from the analyses and the vision and are aimed at adapting the urban fabric, acknowledging the community and optimising the recycling chain.

Colophon

Adapting Urban Fabric	Acknowledging Community	Optimising Recycling Chain

Pattern Language

Pattern Language was developed by Christopher Alexander to create a system of design principles based on recurring and context-specific solutions to common problems in the built environment. A pattern describes the relation between theory and design related to the overall topic of the pattern set.

In the case of this thesis the theory is derived from literature reviews and fieldwork observations that relate to designing for environmental justice in informality. The patterns in this pattern language are related to one or more of the approaches of participatory, context-based and vernacular design. Since all these patterns are related, they form a language that can be used by designers as well as other stakeholders to design urban spaces.
Each pattern contributes to one of the design goals of adapting the urban form, acknowledging community, and optimising the recycling chain, and is part of a pattern set. A pattern set is a combination of patterns that supports actions as part of achieving the design goal. Depending on the goal the patterns can be reshuffled by designers, inhabitants or other users to create new sets.
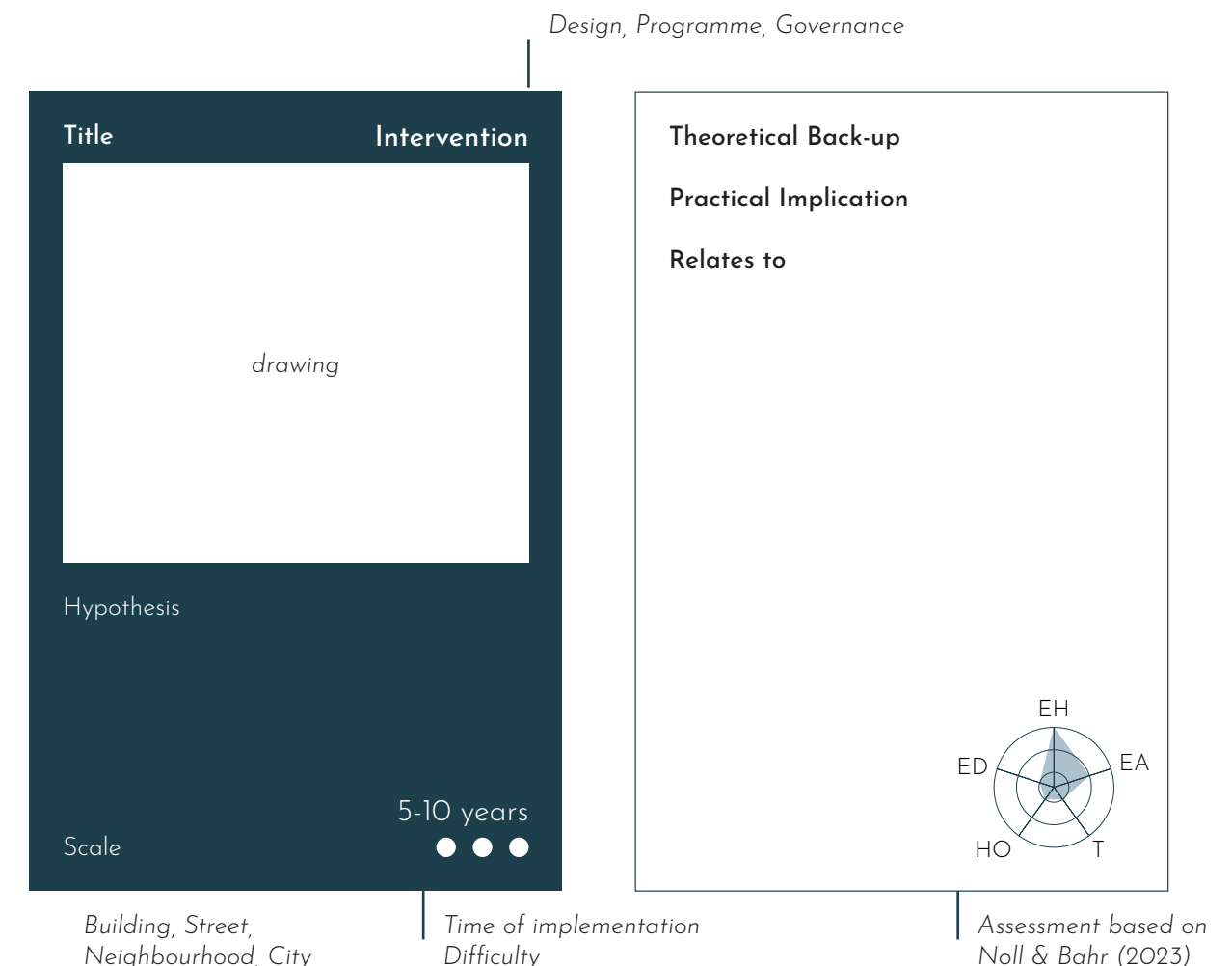
Pattern Card
I designed patterns in the form of a card as a small communication tool based on Bechmann (2023), as seen in the image below. The front side explains the pattern in a nutshell, giving a title, the type of intervention, the hypothesis, the scale and the implementation time of the pattern. This timespan refers to the time that would be needed to implement a pattern. The difficulty refers to the resources and support needed to implement a pattern. As a consequence, there are patterns with a short implementation time, but high difficulty, which means they could remain on the shelf until the right resources and support are available.

The backside contains more information on the theoretical background based on literature research or the site visit, practical implication in space and the assessment in the context of Environmental Justice. The assessment is based on the five categories from the framework for Equitable Cities by Noll & Bahr (2023). Each pattern is rated based on this framework and the assessment diagram on the back. The Pattern Language, all pattern relations and the (academic) sources can be found in the pattern booklet.

Relation of Patterns to the conceptual framework

Design, Programme, Governance

| Title | Intervention |

drawing

Hypothesis

5-10 years

Scale

Building, Street, Neighbourhood, City

Time of implementation
Difficulty

Theoretical Back-up

Practical Implication

Relates to
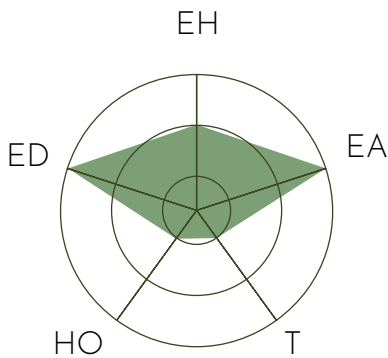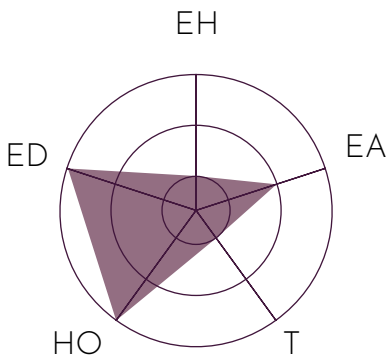
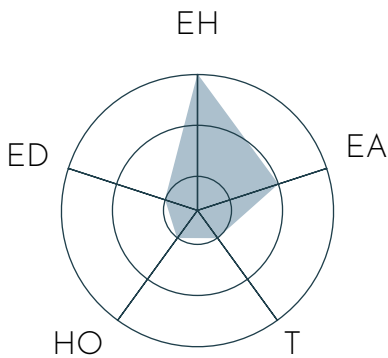Assessment based on Noll & Bahr (2023)

Assessment

The assessment is based on the framework for Equitable Cities by Noll & Bahr (2023). They developed five urban environmental justice categories that raise related concerns and examples of question that should be asked in the planning process related to these categories. The categories are:
- Environmental Health, concerns contaminants and health burdens
- Essential Amenities Access, concerns access to water, food, green spaces and health care
- Transportation, concerns the distribution and the access to affordable transportation
- Housing Opportunities & Displacement, concerns affordable housing
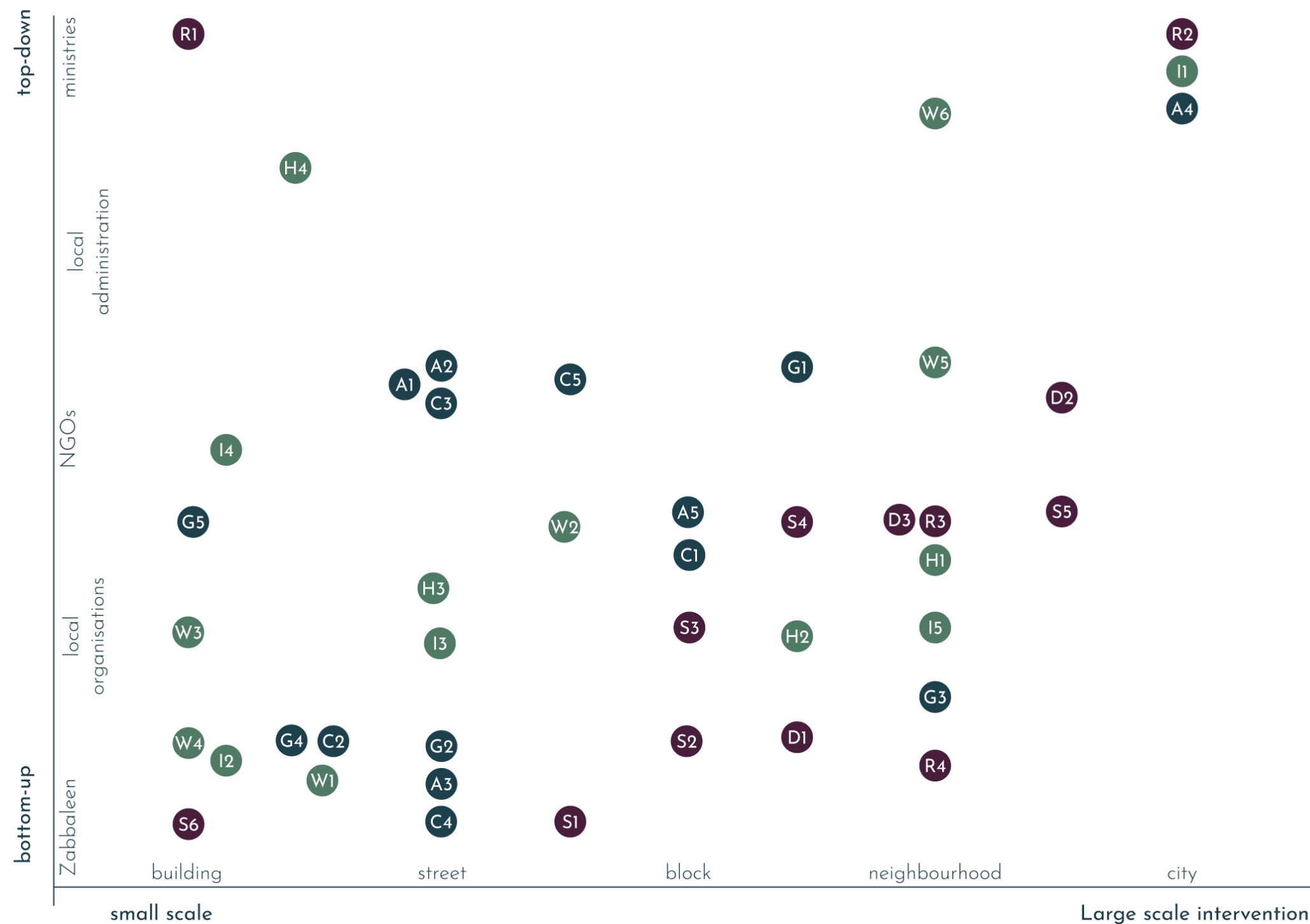- Equitable development, concerns stakeholder engagement and participatory decision making.

I have established the assessment based on the related concerns and common questions. The structure of the assessment can be seen on the right.
Each patterns is rated on a scale from 0 to 3. 0 is the lowest and increases the issue in that category, while 3 is the highest and innovates to address the issue.
Since each pattern is rated separately, the combination of patterns in a design makes it possible to rate the collective design on addressing issues in all five categories separately.

	0	1	2	3
Environmental Health (EH)	Causes pollution	Close proximity to pollution	Adapts to pollution and improves conditions	Mitigates pollution and improves health
Essential Amenities access (EA)	Removes amenities	No change in amenities	Improves existing amenities	Adds a new type of amenity
Transportation (T)	Removes roads or public transport access	No change in transportation routes	Improves existing transportation routes	Adds a new connection to roads or public transportation
Housing Opportunities & development (HO)	Removes housing or displaces people	No change in the housing situation	Improves existing housing, makes it more affordable or increases property value	Adds new types of housing or innovates in the property market
Equitable Development (ED)	Forces unwanted decisions upon people	No involvement in the decision making process	Improves equity and takes stakeholder opinions into account	Actively engages stakeholders in the decision making process

Pattern Field

Axes:
- Vertical (top to bottom): top-down → bottom-up; ministries, local administration, NGOs, local organisations, Zabbaleen
- Horizontal (left to right): small scale → Large scale intervention; building, street, block, neighbourhood, city

The pattern field shows the relation of patterns to each other. The patterns are organised from small scale to large scale implementation and from bottom-up to top-down, showing the stakeholders who are the main implementers of the patterns. Consequently in the bottom-left are patterns that can be implemented by the Zabbaleen on the building and street scale, while in the top-right are patterns that need to be implemented by the government on the city scale. The patterns are diverse in terms of scale, but mostly leaning towards bottom-up.

C | Cooling down
C1. Our ventilated courtyard
C2. Our wind tower
C3. Our street orientation
C4. Our versatile canopies
C5. Our set-back plinths

G | Space for green
G1. Our water independency
G2. My front garden
G3. Our Egyptian plants
G4. Our rooftop landscape
G5. Our rooftop veggies

A | Attaching to the city
A1. Our road to work
A2. Our road to 112
A3. Our multifunctional streets
A4. Our road to elsewhere
A5. Our walking bridges

R | Institutional recognition
R1. My own papers
R2. Our formal work
R3. Our collective design
R4. Our lantern pole

S | Space for community
S1. My coffee time
S2. Our private courtyard
S3. Their outside fun
S4. Our community building
S5. Our religious building
S6. Our splash of paint

D | Stimulating self-development
D1. My neighbourhood Nanny
D2. Their educational future
D3. Our place of expression

H | Increasing hygiene & health
H1. Our safety conditions
H2. Our neighbourhood farm
H3. Our purifying plants
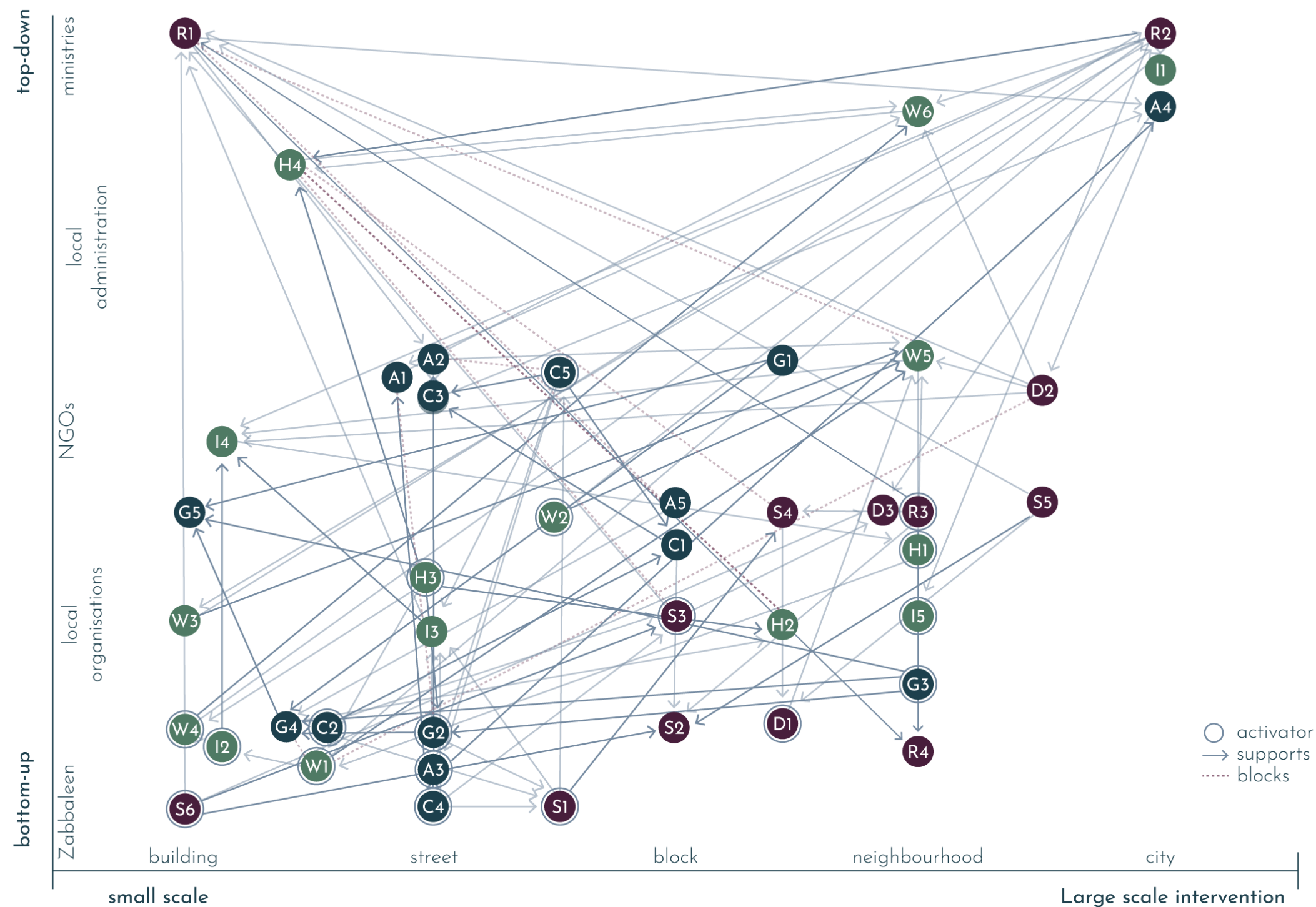H4. Our water treatment plant

W | Specialising workforce
W1. My sorting garage
W2. My repair shop
W3. Our upcycling workshop
W4. Our processing specialist
W5. Our recycling zone
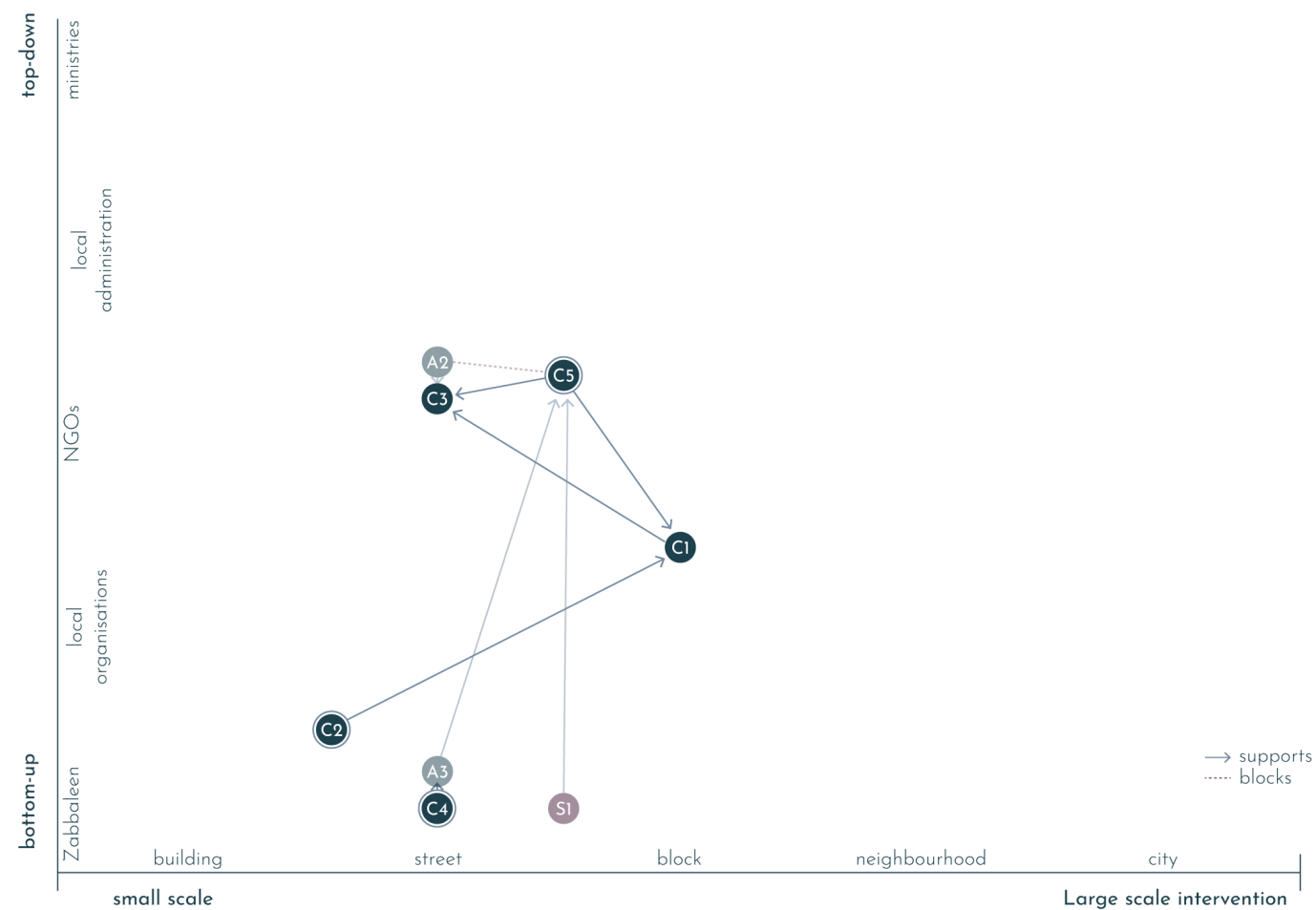W6. Our industrial area

I | Stimulating innovation
I1. Their separate bins
I2. Our Habibi co-op
I3. Our hand-made bazaar
I4. Our and their innovation centre
I5. Our foreign buyer

Pattern Field

The implementation becomes more complicated when looking at the relations and the patterns that support or block each other. Some bottom-up patterns are supported by top-down patterns, and some small scale patterns are supported by structural changes on the larger scale.

At the same time, some patterns compete for the same available space, and consequently block each other unless a compromise is found.
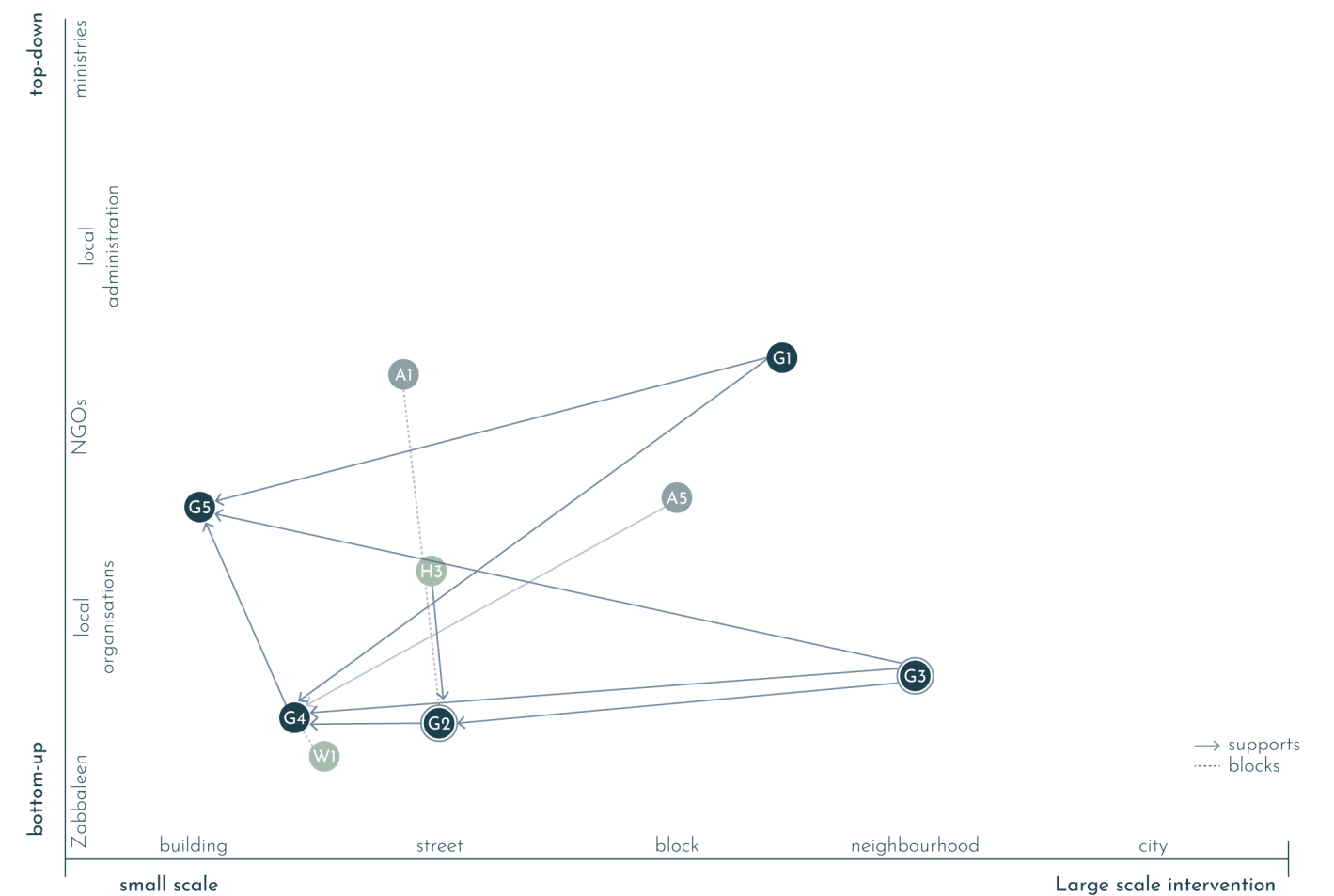
This shows the importance of a planning structure that creates various stakeholder support and compromises between spatial claims of different patterns.

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Cooling down

Legend:
→ supports
····· blocks

building · street · block · neighbourhood · city

small scale · Large scale intervention

The pattern set 'cooling down' creates a better urban micro-climate by improving ventilation and increasing shading. It consists of patterns executed by the Zabbaleen and NGOs mostly in the streets or in a block. The use of canopies and set-back plinths are stimulated in the first place, which support the transition towards more permanent changes such as breakthroughs for continuous streets. However, the need for wide streets for emergency service access makes the design for narrow streets with set-back plinths more difficult.

Space for green

Legend:
→ supports
····· blocks

building · street · block · neighbourhood · city

small scale · Large scale intervention

The pattern set 'space for green' adds greenery to the urban environment in the street and on the rooftops with functions ranging from shading, to recreation and small amounts of food production. It consists of patterns executed by the Zabbaleen and NGOs from buildings to the neighbourhood scale. The use of native plant species and funds for construction and maintenance creates support for more permanent greenery. However, spatial conflict arises in the rooftop landscape, since many roofs are used for sorting and storage, and in the streets, since garbage trucks still need to pass through.

Attaching to the city

Institutional recognition
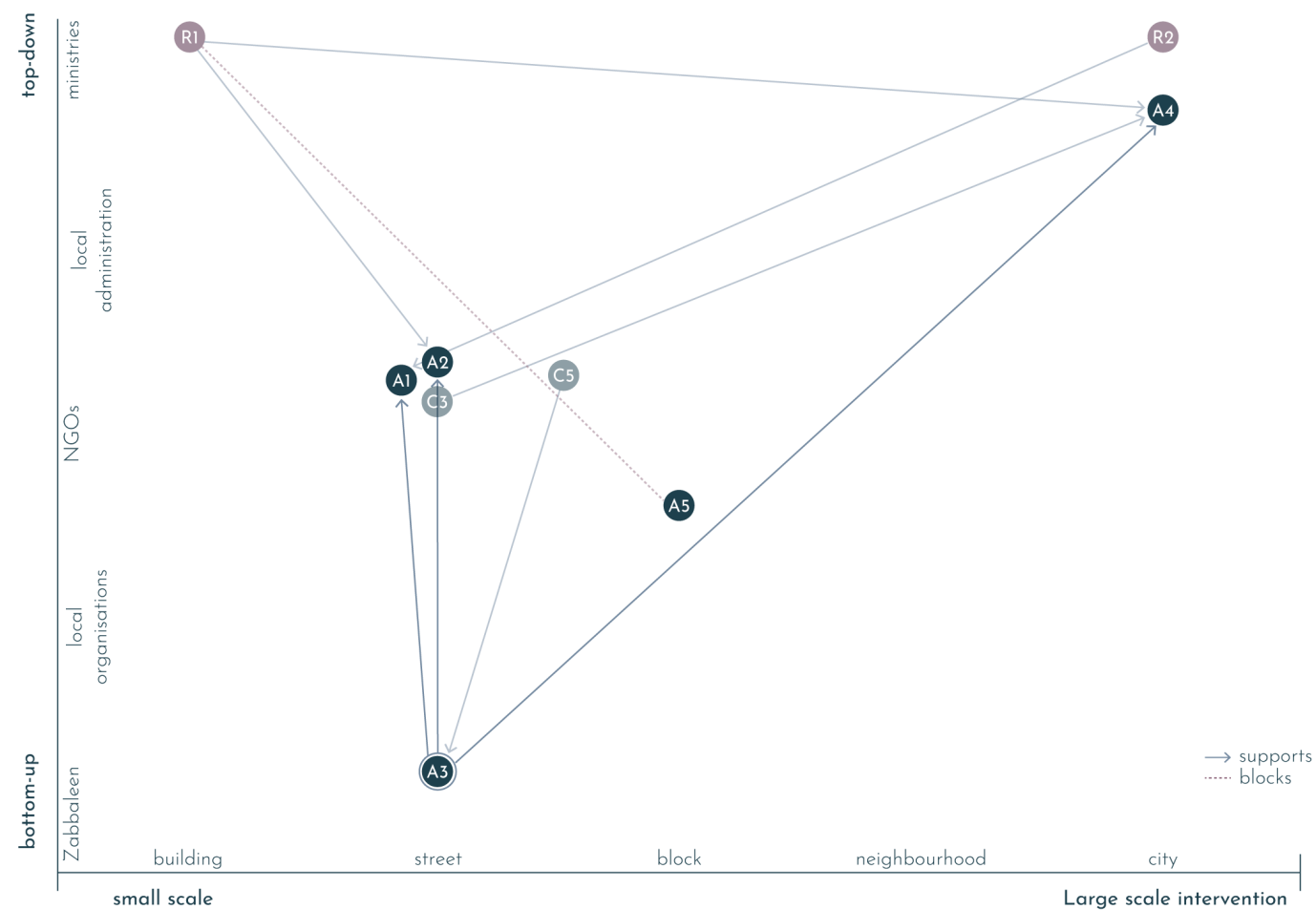
The pattern set 'attaching to the city' focusses on connectivity by improving infrastructure. It consists mostly of patterns executed by the (local) government on the street and city scale. The width and quality of the streets are improved for work and emergency service access, while creating more street diversity for slow traffic, public transport and walking bridges. These changes are mainly supported by institutional recognition, since these streets have to be part of the city network. Conflict arises when breakthroughs are made to create continuous streets and rooftops of private property is connected by walking bridges.
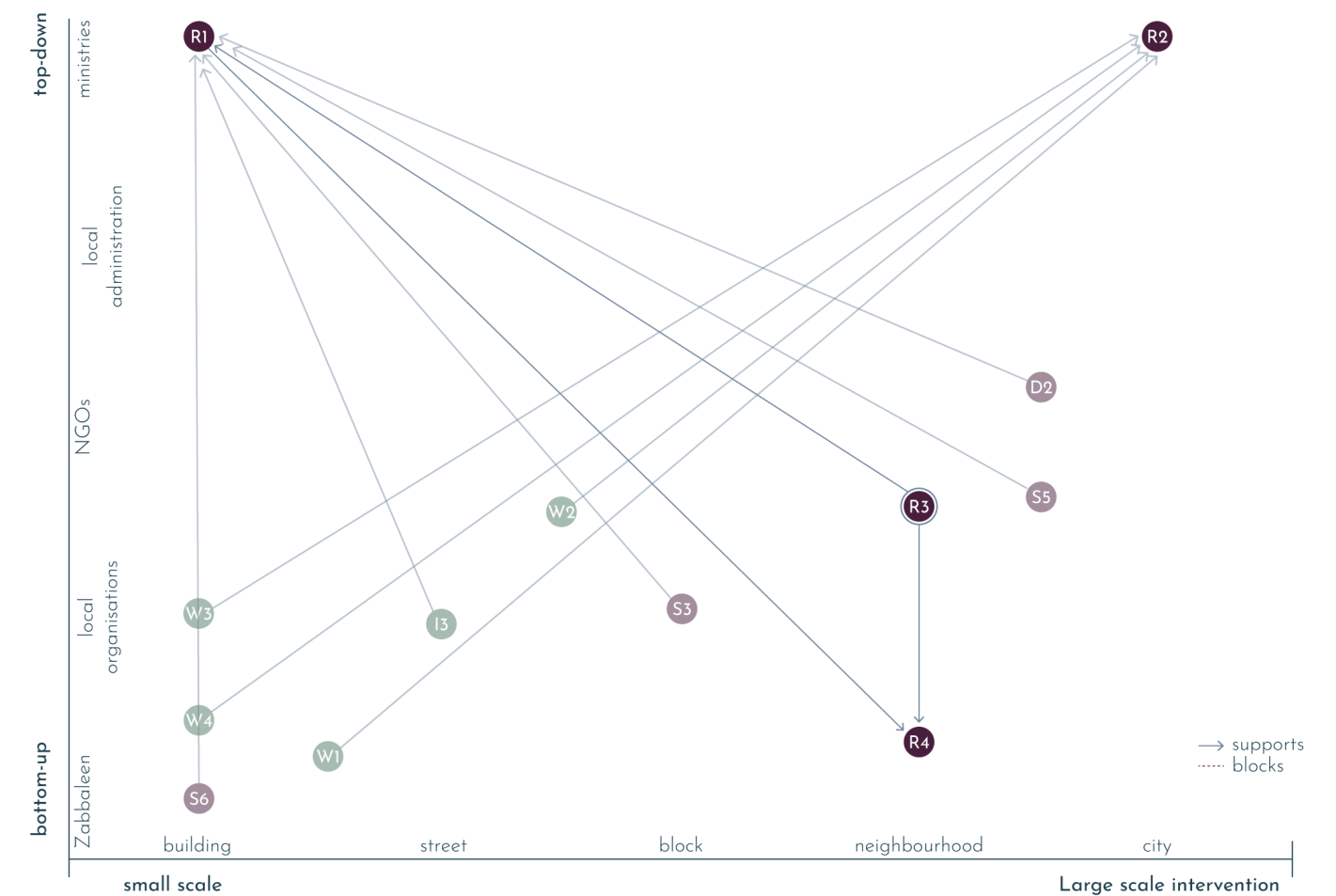
The pattern set 'Institutional recognition' focusses on the on paper recognition of the inhabitants of Manshiet Nasser by the government. The ownership of housing and their role as garbage collectors can lead to structural improvements and collaboration in development projects. The recognition can be 'forced' by bottom-up improvements in the housing quality and the specialisation of the garbage recycling process, so these key players can no longer be ignored.

Space for community

Stimulating self-development
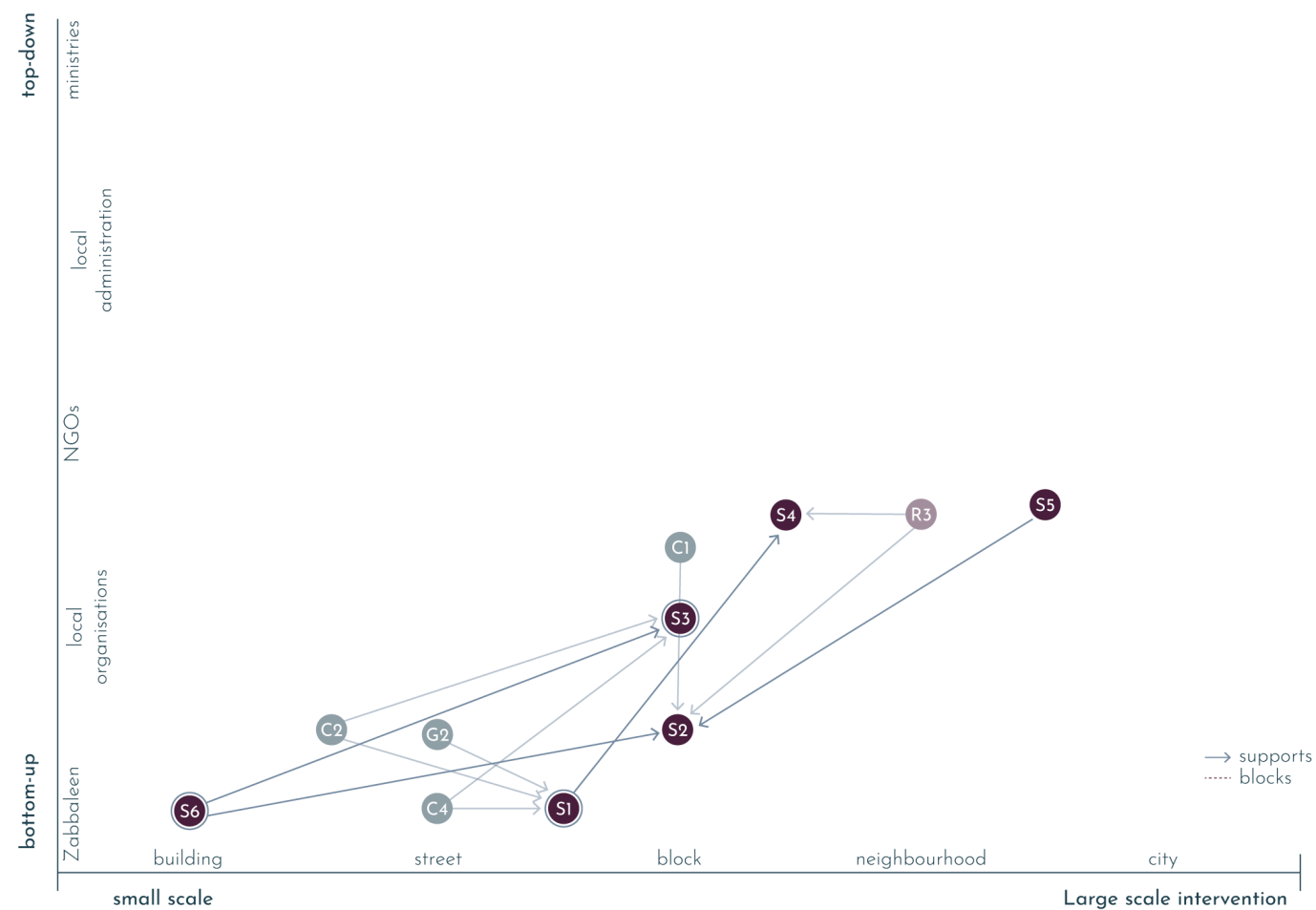
The pattern set 'space for community' stimulates community feeling and be-longing in the urban environment by making space for important activities. It consists mostly of patterns executed by locals from the building to the neigh-bourhood scale.
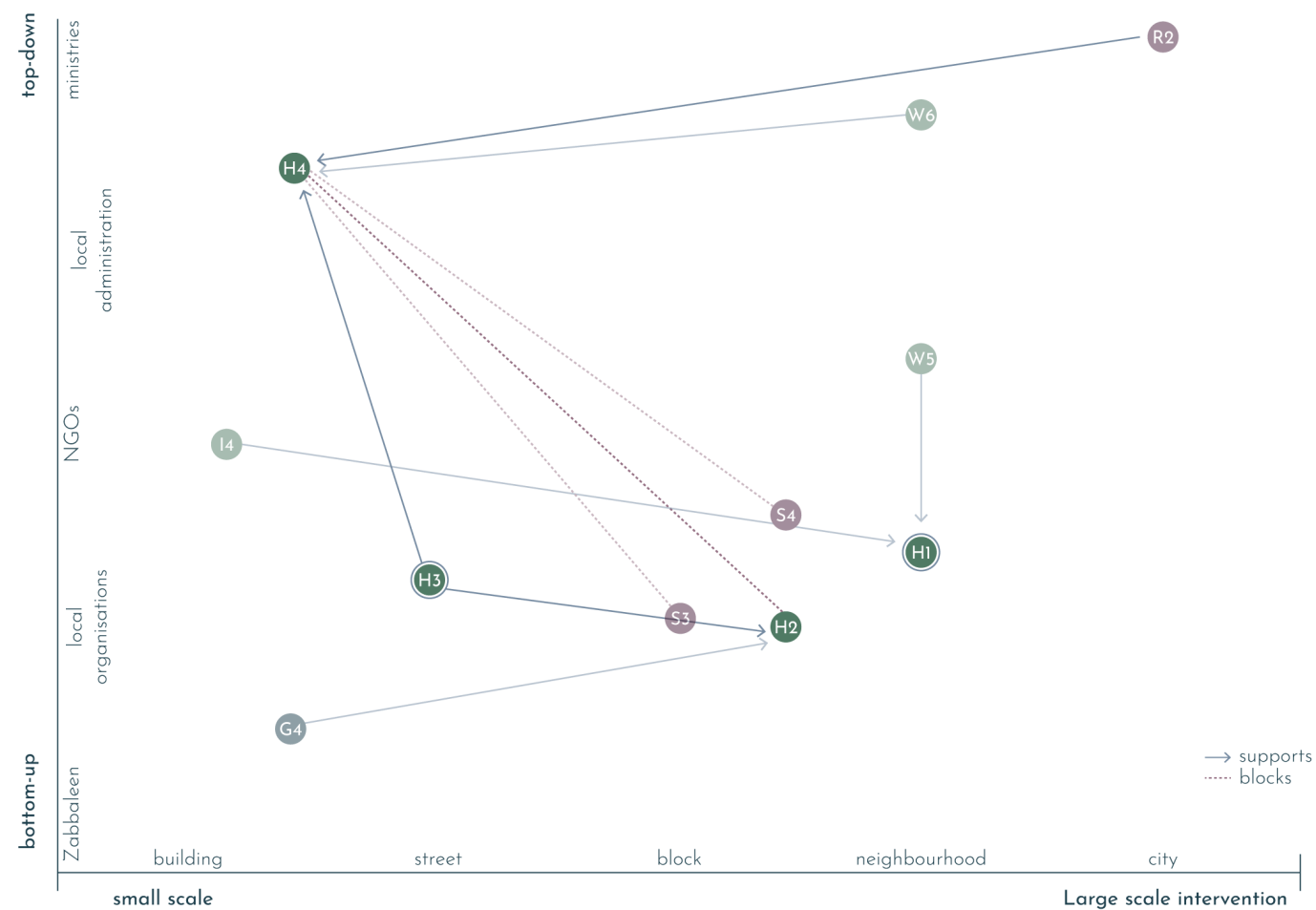
Ahwas, playgrounds and community spaces increase the feeling of ownership and are stimulated by collective design and by improving the micro-climate for outside activities.
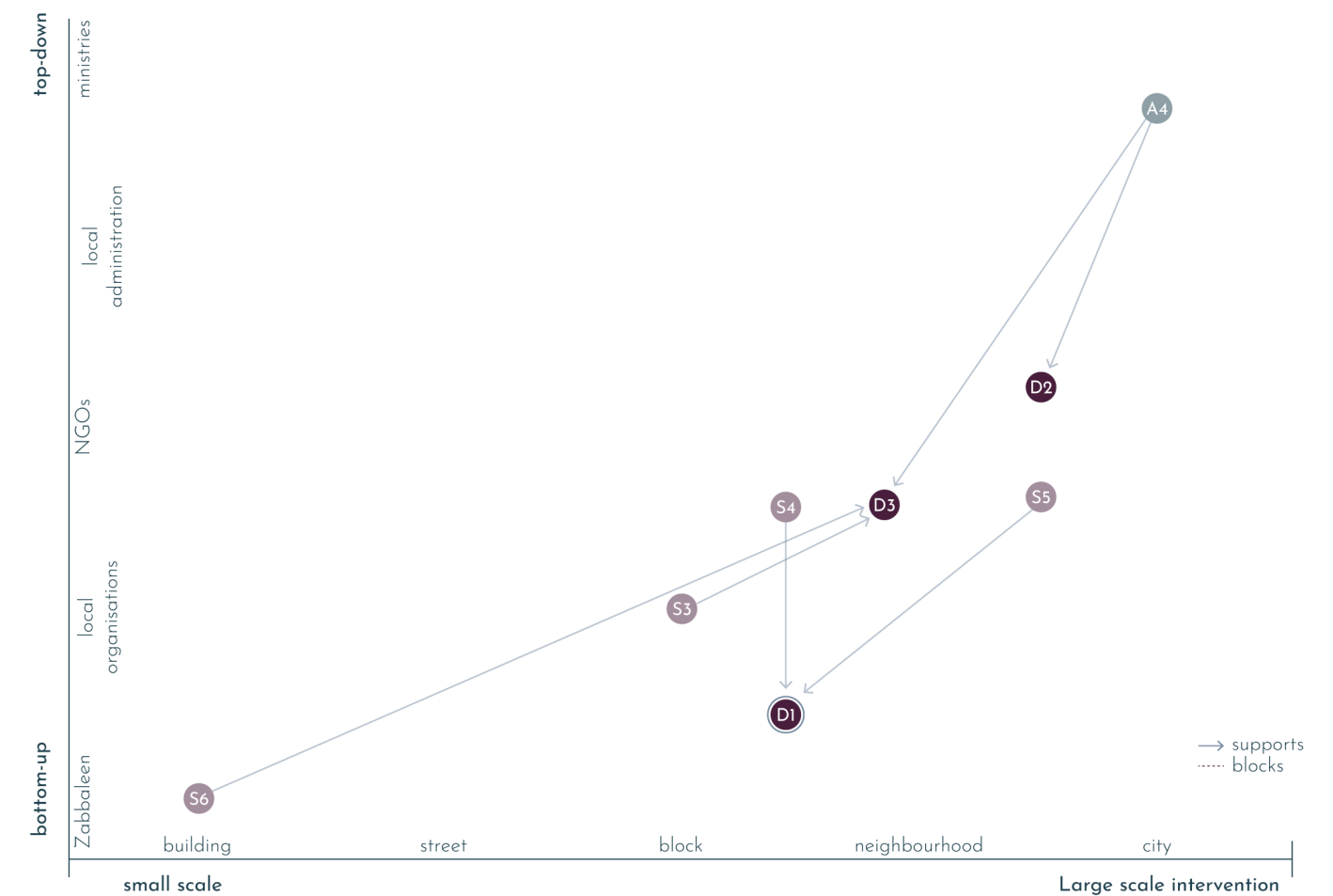
The pattern set 'stimulating self-development' stimulates permanent change in economic and personal opportunities by providing access to education and lessening the care burden on working mothers. The patterns are mostly on the neighbourhood scale, but they require the support from both locals and the government. Training educators and providing day-care can happen locally, but a good connection to the city network makes different types of activities and higher education more accessible.
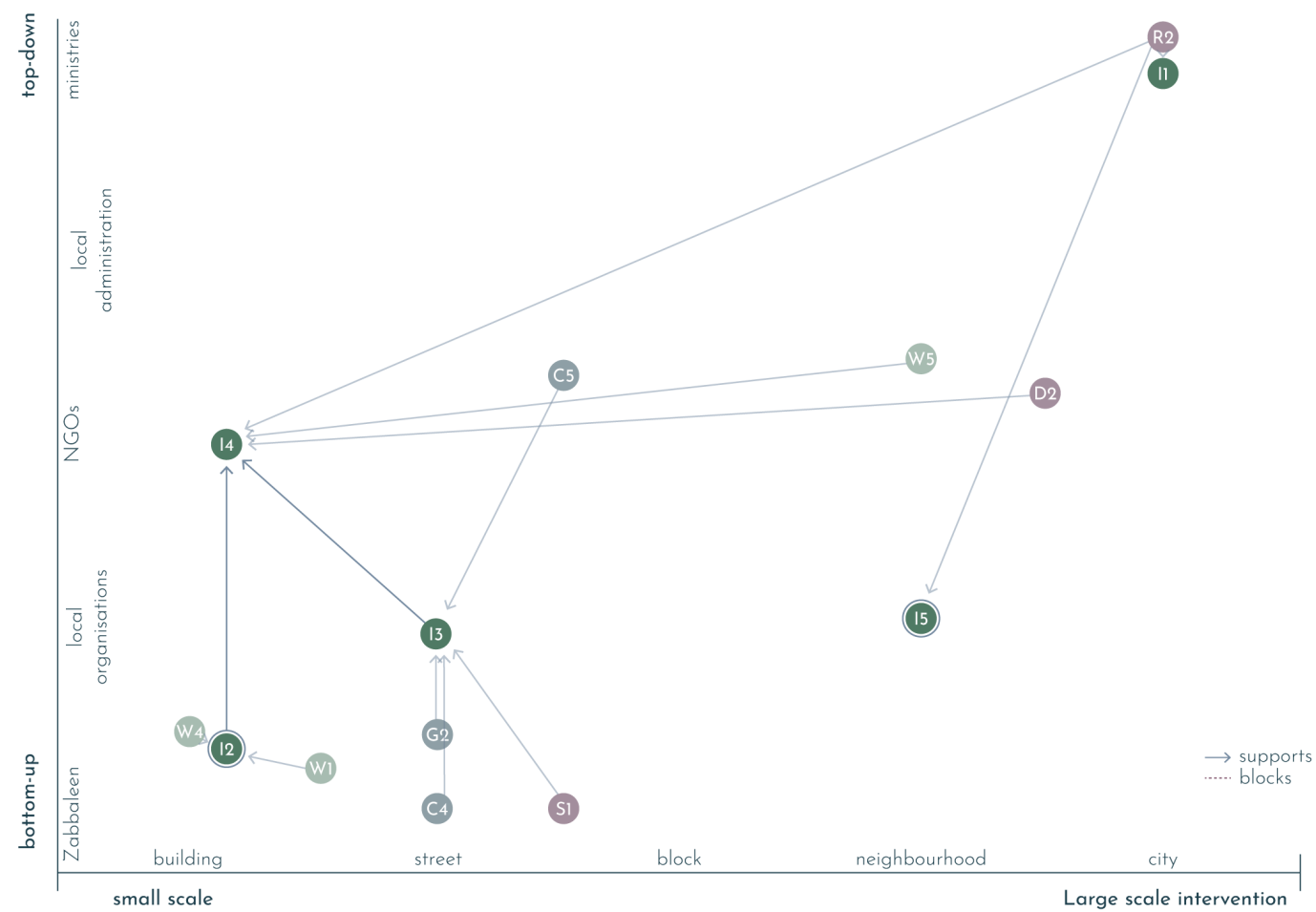
Increasing hygiene and health

- top-down
- ministries
- local administration
- NGOs
- local organisations
- bottom-up
- Zabbaleen

→ supports
······ blocks

building street block neighbourhood city

small scale   Large scale intervention

Specialising workforce

- top-down
- ministries
- local administration
- NGOs
- local organisations
- bottom-up
- Zabbaleen

○ activator
→ supports
······ blocks

building street block neighbourhood city

small scale   Large scale intervention

The pattern set 'increasing hygiene and health' decreases work hazards and pollution by focussing on safety procedures and taking care of polluted water. The patterns are executed from the street to the neighbourhood scale and require the support of locals as well as the government. On the small scale the focus is on mitigation by sharing knowledge, whereas on the large scale a sewage water treatment plant could provide a more permanent solution for toxins. Bottle necks are related to the space allocation of the treatment plant, which is in conflict with other large scale developments as well as outside space for the community.
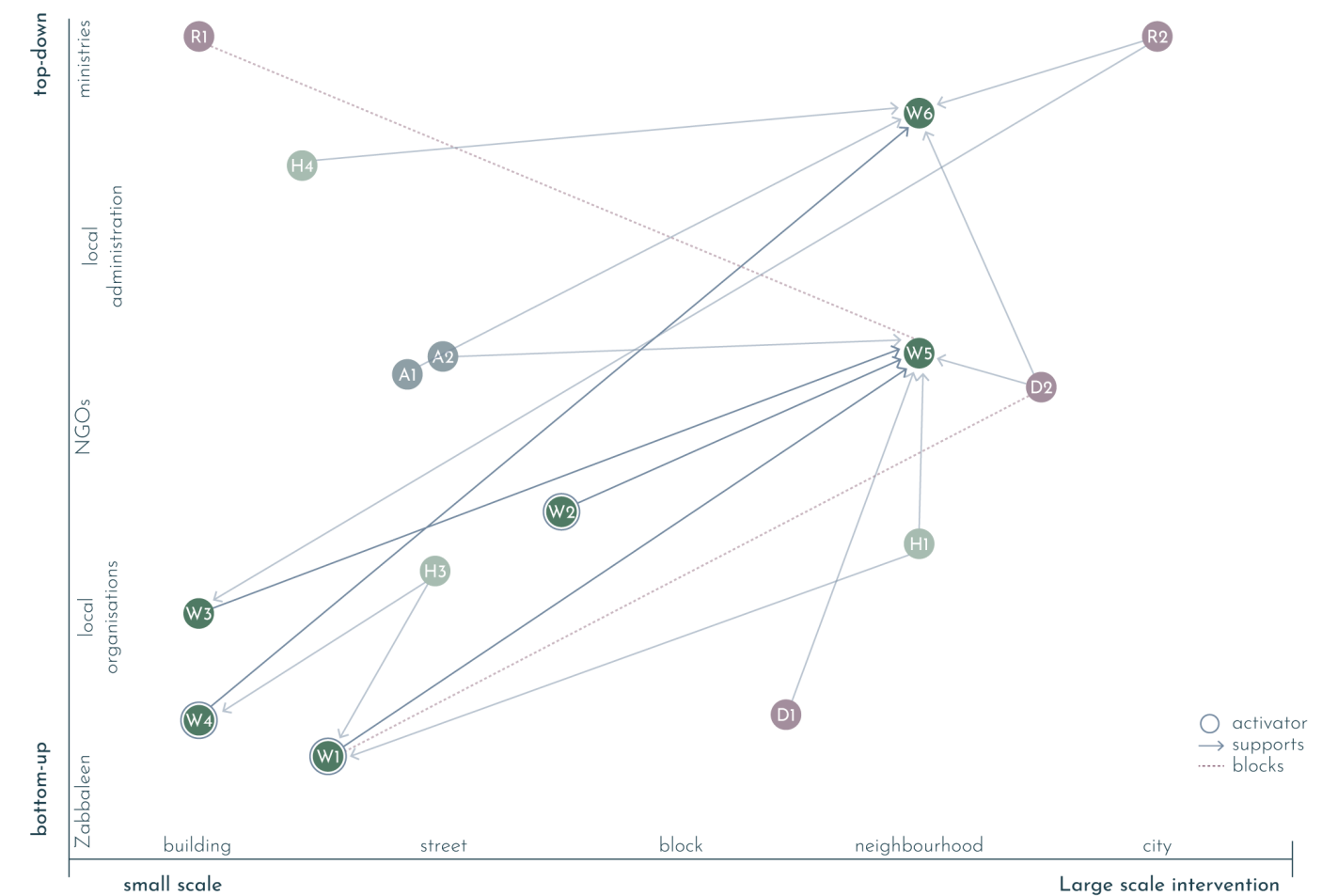
The pattern set 'specialising workforce' is the most complicated, since the creation of a recycling and industrial zone require a mindset change of the Zabbaleen, as well as financial support from the government. Bottom-up patterns relate to reinforcing the current recycling process (e.g. sorting, repairing and processing) in strategic spaces, whilst mitigating hazards and pollution. These spaces can then grow into specialises zones. Recognition of house ownership might actually block the development of the recycling zone, since some inhabitants will need to move their 'official' housing. Increasing the education quality might reduce the willingness of Zabbaleen to work as sorters, since it would give them other opportunities. However, education will increase other types of business opportunities, relating to specialised work in upcycling, repairing and processing in specialised zones. Especially for the industrial zone government support is needed to create safe roads to connect the different working zones.

Stimulating Innovation

top-down

ministries

local administration

NGOs

local organisations

bottom-up

Zabbaleen

— supports
...... blocks

building street block neighbourhood city

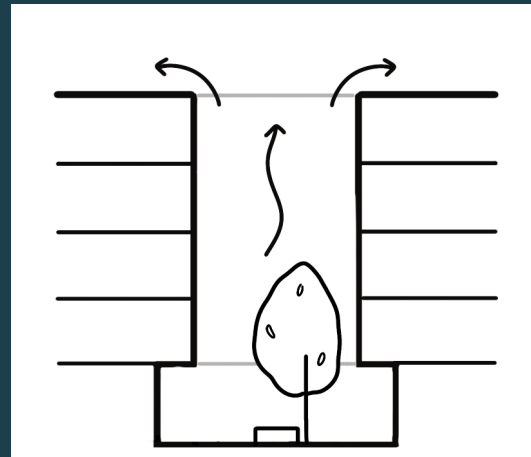small scale Large scale intervention

Patterns

The next section shows all the pattern cards in the different sets, with title, hypothesis, scale and difficulty in the front, and theoretical back-up, practical implication and relations on the back.

The pattern set 'stimulating innovation' banks on more diverse business opportunities in the area. The patterns are executed from the building to the city scale and require the support of locals as well as the government. On the small scale the focus is on evolving the recycling business by investments, collaboration and innovation. In order to make the hand-made bazaar attractive, there need to be locally produced products and a comfortable urban climate and services to accommodate inhabitants, Cairenes and tourist to visit.

Cooling Down

C1 Our ventilated courtyard   D

Courtyards cool down the urban environment.

block   5-10 years
● ● ●

Theoretical back-up
In domestic Islamic architecture private courtyards functioned as thermal regulators: wind moves from large courtyard to the smaller ones. (Hassan et al.,2015). In the modern design of Masdar city this concept was applied to public space by creating urban courtyards of different sizes to generate air flow to increase thermal comfort outdoors.

Practical Implication
Make strategic breakthroughs in housing blocks to create urban courtyards.

Relates to
Our private courtyard
Our wind tower

C2 Our wind tower   D
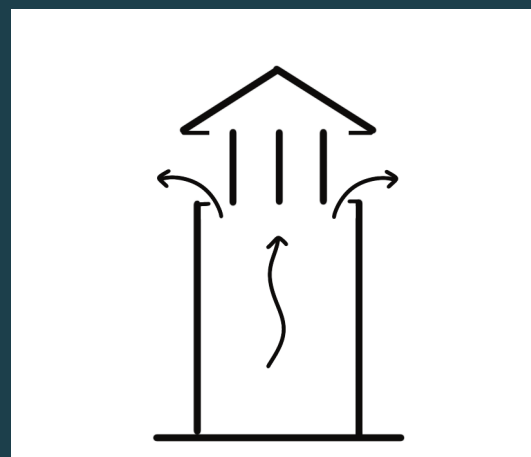
Urban windcatchers increase air quality

street   1-3 years
● ● ○

Theoretical back-up
In domestic Islamic architecture wind towers affected the inside of buildings by capturing cooler air and forcing cross ventilation (Hassan et al., 2015). In the modern design of Masdar city these wind towers were super sized with modern techniques to affect temperatures in public spaces. Canopies at different heights also enable natural ventilation (Lotfata et al., 2024)

Practical Implication
Urban wind towers and/or canvas canopies at different heights in streets and public spaces.

Relates to
Our ventilated courtyard
Our street orientation
Our winding streets

C3 Our street orientation   D

Street orientation in the predominant wind direction improves microclimate

street   5-10 years
● ● ●

Theoretical back-up
Old Cairo has a comfortable microclimate due to the Northwest-Southeast orientation for optimal wind flow coming from the north (Hassan et al., 2015; Mahgoub 2013).

Practical Implication
Breakthroughs in NW-SE streets for a longer street with cross-ventilation.

Relates to
Our ventilated courtyard
Our winding streets
Our wind tower

C4 Our versatile canopies   G

Street shading reduces sun radiation and improves microclimate in outdoor spaces.

street   1 year
○ ○ ○

Theoretical back-up
The practice of using stone or wooden coverage was used in old Cairo to improve microclimate (Mahgoub, 2013). This is also observed in the streets of al-Zarayb, where inhabitants have sewn and placed fabric shading. In a survey done by Khalil et al. (2018), inhabitants of informal settlements suggested to take the responsibility of maintaining shading devices themselves.

Practical Implication
Provide funds to civil construction and maintenance of wooden pergolas, fabric sheds and other types of street shading.
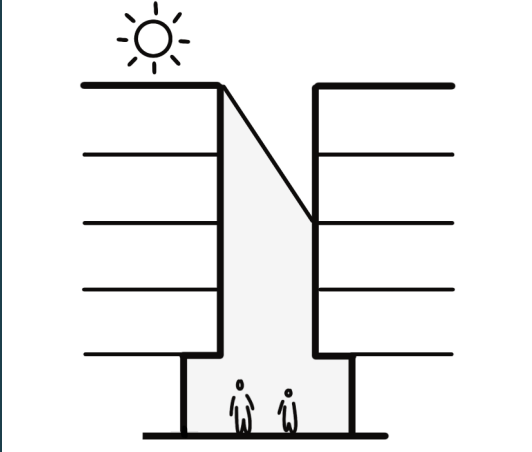
Relates to
Our winding streets
My front garden
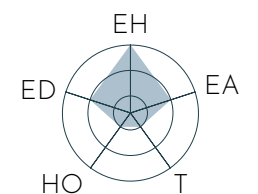
C5 Our set-back plinths — D

Narrow streets with set-back plinths improve microclimate.

street

1-3 years

● ● ○

Theoretical back-up
High street-building ratios have a posititive effect on the micro-climate by increasing shading (Hassan et al., 2015; Mahgoub 2013). However, these narrow streets suffer from increasing temperatures at night due to heat release from buildings (Khalil et al., 2018).

Practical Implication
Recommend less densified areas for building high street-building ratios to increase shading.
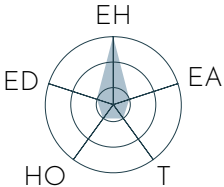
Relates to
Our ventilated courtyard
Our street orientation
Our wind tower
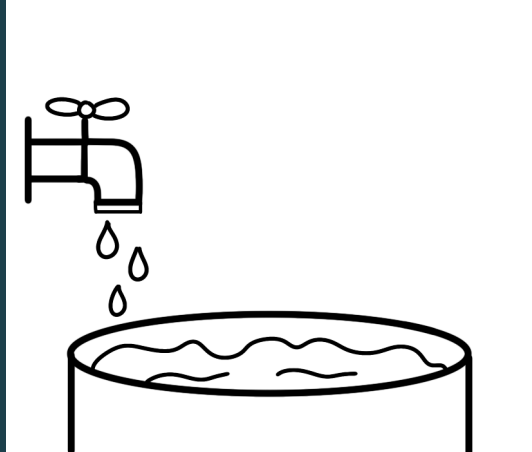
G1 Our water independency — D

Collection and reuse of grey water decreases water dependency

block

5-10 years

● ● ○

Theoretical back-up
Informal settlements in arid areas are vulnerable to changing water supplies, leading to poverty, food and water insecurity (Thorn et al., 2021). In al-Zarayb water is supplied by the governmental water utility company, making inhabitants depended on institutional goodwill and suffering from price fluctuations. The collection and reuse of grey water is a buffer for water use in the recycling industry.

Practical Implication
Installation of grey water collection, filtering and storage per block to use for recycling purposes.
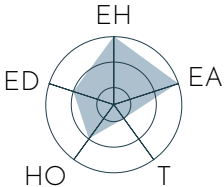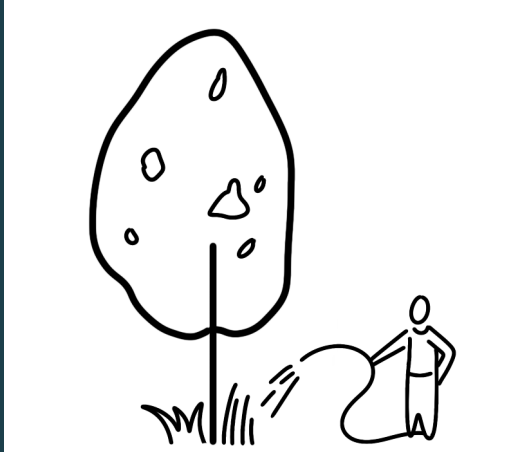
Relates to
My front garden
Our rooftop landscape
Our Egyptian plants

G2 My front garden — G

Stimulating greenery improves micro-climate in outdoor spaces.

street

1-3 years

● ○ ○

5 years

● ● ○

Theoretical back-up
In al-Zarayb greenery in the streets is owned by citizens and planted in front of their houses or on their terrain.
Vegetation provides cool air; the absence of vegetation and shading decreases thermal comfort (Khalil et al., 2018). In a survey done by Khalil et al. (2018), 55% of the inhabitants in informal settlements favoured the use of trees to improve the micro climate. In narrow streets climbing vegetation is more suitable, since trees, shrubs and ground covers could trap longwave radiation, block wind and impair movement (Lotfata et al., 2024).

Practical Implication
1-3 years: Provide plants and seeds for civil planting
5 years: Make a civic maintenance scheme of street greenery profitable

Relates to
Our rooftop landscape
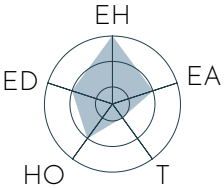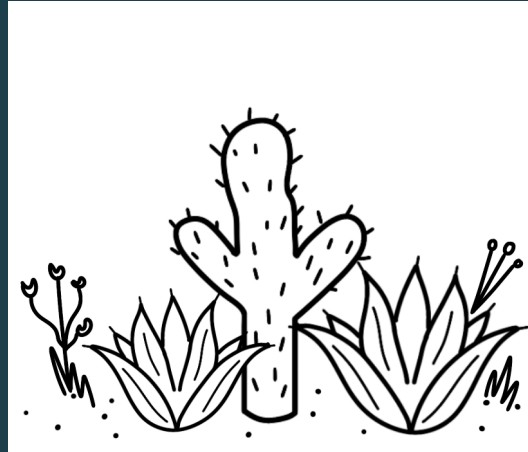Our water independency
Our Egyptian plants

G3 Our Egyptian plants   D

Native plants are suitable for the desert climate increasing sustainability.

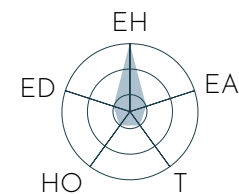neighbourhood   1-3 years   ● ○ ○

Theoretical back-up
Al-Azhar Park is a green lung in Cairo, designed with sustainability and environmental awareness as key priorities (SITES). Sites International developed a plant list of native species to enhance sustainability. In the design special attention was given to drought tolerance, soil stabilisation and erosion prevention (Mostafa & Kamel, 2013). Specifically dry, succulent plants were used on the western slopes to prevent erosion.

Practical Implication
Organise workshop sessions for effective gardening and maintenance in desert areas and provide succulents, ground coverers, Date Palm, Acacia, Sycamore, Olive tree, Bamboo Palm.

Relates to
My front garden
Our rooftop landscape

G4 Our rooftop landscape   D

Urban rooftops are suitable as an extension for greenery.
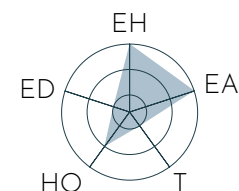
building   1-3 years   ● ● ○

Theoretical back-up
Roof and facade greening improves urban climate in Cairo (Khalil et al., 2018) The potential for using rooftops as an extension of urban activity is visible in al-Zarayb. Inhabitants use rooftops for functions that have no space allocated on ground floor level, like garbage storage, rearing animals and working.

Practical Implication
By stimulating house owners and workers to move work related activities to allocated recycling areas, the rooftops will become available for greenery. Shrubs can be combined with ground covers to prevent trapping of longwave radiation and blocking of wind, and to prevent covers from damage by stepping (Lotfata et al., 2024)
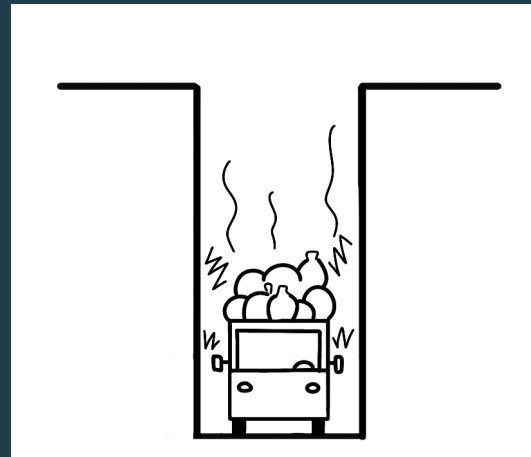
Relates to
My front garden
Our Egyptian plants
Our industrial area
Our recycling station

G5 Our rooftop veggies   G

Community gardens increase community feeling, food independency and agricultural knowledge

building   1 year   ● ○ ○

Theoretical back-up
NGOs such as the A.P.E. have created space for agriculture on their grounds.

Practical Implication
Rooftop agriculture on community buildings, such as schools, community centres and NGOs

Relates to
Our rooftop landscape
Our Egyptian plants
Our community building

Attaching to the city

A1 Our road to work   D

Streets for waste delivery are prone to an uncomfortable microclimate.

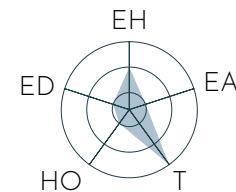street   5-10 years   ● ● ●

Theoretical back-up
Cars and trucks are used to collect the trash in Cairo and bring it to al-Zarayb for recycling. Streets connected to working areas have to accommodate cars coming in and out. Therefore these roads are usually wider, without trees and more polluted with exhaust fumes and noise. In the design these challenges need to be taken into account and improved as much as possible.

Practical Implication
Design these main roads as a two way street, further away from housing and communal areas with safe way to cross by foot within Zarayb.

Relates to
Our road to 112

(radar chart: EH, EA, T, HO, ED)

A2 Our road to 112   D

Wider roads allow for emergency services access.

street   5-10 years   ● ● ●

Theoretical back-up
Major streets are 6-7m wide and slightly twisting. Minor street are 2-3m with dead-ends as well. The narrowness of the roads impedes emergency vehicles when they respond to emergencies (Tadamun, 2020). Fire trucks require road widths of at least 4.5 metres, with 3.25 metres of paved road and a height of 4.20 without obstructions (Bouwbesluit 6.37)

Practical Implication
Connect housing blocks to access roads that are widened to 4.5 metres of unobstructed access.

Relates to
Our road to work

(radar chart: EH, EA, T, HO, ED)

A3 Our multifunctional streets   D

Street should have multiple functions that house different activities throughout the day

street   1-3 years   ● ○ ○

Theoretical back-up
Egyptian urban culture is diverse and compact with shaded space to withstand the harsh desert climate with greenery needing continuous irrigation (Elmouelhi, 2019). New Towns that segregate, facilities, housing and industry haveot grown as planned and needed decades to reach acceptable occupancy and functionality.

Practical Implication
(Residential) buildings should have space on the groud floor level for inhabitants to run shops, ahwas, bars or other facilities.
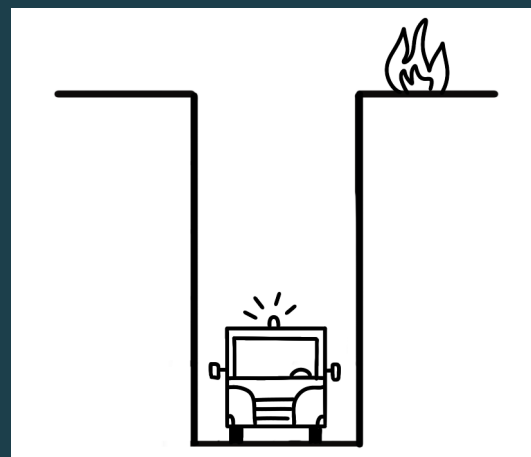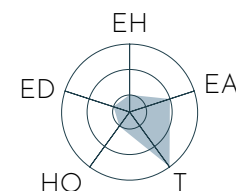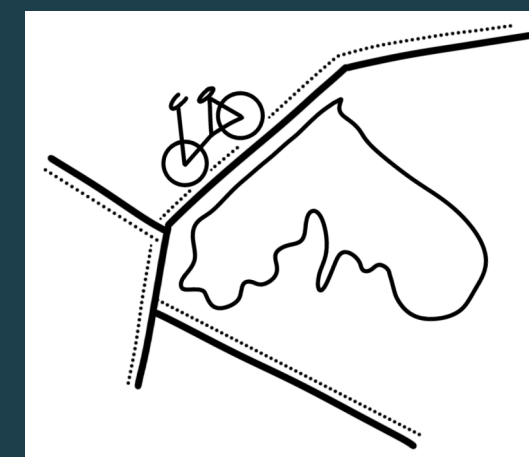
Relates to
Our road to work
Our handmade bazaar
My coffee time

(radar chart: EH, EA, T, HO, ED)

A4 Our road to elsewhere   P

Public transport lines and slow traffic lanes increase connectivity to education, public parks and other facilities

city   3-5 years   ● ● ○
   10-15 years   ● ● ●

Theoretical back-up
The car the most predominant mode of transport in Cairo. El-Nasr road with 2x3 lanes of cars blocks the accessibility of Manshiet Nasser for pedestrians.
The Cairo governorate is currently working on promoting sustainable modes of transportation. It launched a bike sharing programme in 2022 in Downtown with planned expansions to Garden City and Zamalek (unhabitat, 2022), with Cairo University and Ain Shams University in the future. Therefore it is possible to capitalise on this development and plan to attach Manshiet Nasser to this network.
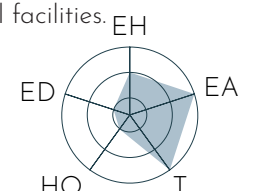
Practical Implication
5 years: Make public transport stops on al-Nasr road
15 years: Make bike lanes as part of a larger scale bike sharing programme that connect to universities and after school facilities.
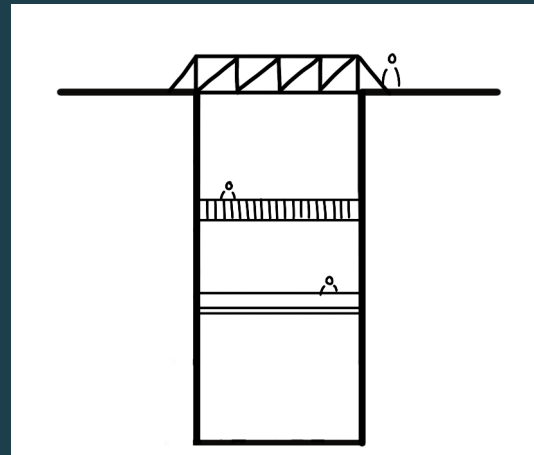
Relates to
Their Educational Future

(radar chart: EH, EA, T, HO, ED)

A5 Our walking bridges　　D

Connecting rooftop (gardens) with walking bridges creates a new semi-public level

block

5-10 years
● ● ●

Theoretical back-up
In traditional Iraqi architecture, particularly in historic urban areas like Baghdad, buildings were often connected by elevated walkways. These structures provided privacy, facilitated community interaction, and offered protection from the harsh climate. They also optimised space in densely populated areas (Haraty et al., 2018).

Practical Implication
Connecting houses with rooftop (gardens) to each other and community buildings

Relates to
Our rooftop landscape
Our rooftop veggies
Our ventilated courtyard
Our mulitfunctional street
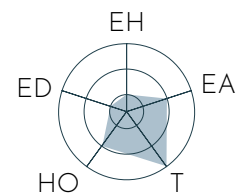
R1 My own papers　　G
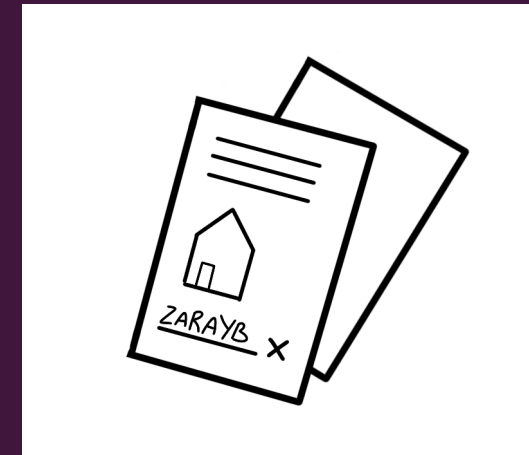
Recognising land tenure and house ownership is essential to fullfill basic human needs.

building

5 years
● ● ●

Theoretical back-up
Maslow's hierarchy of needs suggests that people must meet basic needs, before they can focus on personal growth or reaching their full potential (McLeod, 2024). The basic human needs are physiological and safety, these include shelter, job security, health, and a safe environment. Without these basic provisions, people are trapped in a state of insecurity, afraid of eviction and unable to move forward in their personal or societal development.

Practical Implication
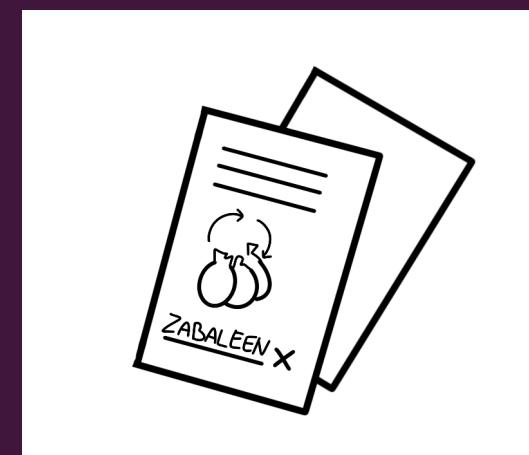The government legalises land tenure and house ownership on paper.

Relates to
Our formal work
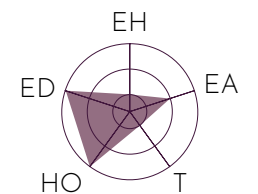
R2 Our formal work　　G

A formal economy gives workers financial and social stability and allow the state to profit from local projects and products.

city

5 years
● ● ●

Theoretical back-up
Zabbaleen have tried to gain official rec-ognition for their work from the government (Tadamun, 2020). They want to become active partners in the garbage collection of Cairo, without the government blocking access to waste and employing foreign trash collection services. Many Zabbaleen already have a commercial registration and a tax card and wish to be "key actors in developing the recycling industry and expanding their scope of work" (Tadamun, 2020)

Practical Implication
The government recognises and registrates the Zabbaleen workforce on paper. Agreements for reponsibilities are made on paper. Both actors collaborate in the development of the recycling system in Cairo.

Relates to
My own papers
Our processing specialist
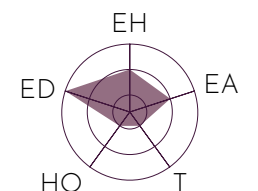
R3 Our collective design G

Involvement of residents in the redevelopment process creates project support and increases agency.

neighbourhood 1-15 years ● ● ●
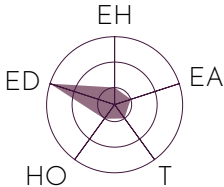
Theoretical back-up
Redevelopment processes should benefit the needs of the community (Thorn et al., 2021). The collaboration of experts and inhabitants makes it possible for inhabitants to "understand their perceptions of themselves and their role in the wider society" (Tadamun, 2020). Achieving better solutions that top down decisions that do not take the whole picture into account.
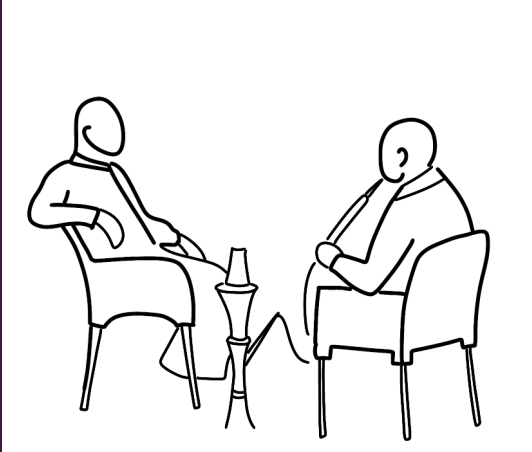
Practical Implication
Co-creation sessions are organised during the redesign and development process of design interventions.

Relates to
Our lantarn pole

R4 Our lantern pole G

Civil maintenance of design interventions requires a supportive scheme.

neighbourhood

1-3 years ● ● ○
5 years ● ● ●

Theoretical back-up
Maintenance is one of the biggest challenges of design interventions (Thorn et al., 2021). Residents can learn to implement and maintain interventions by being involved in the construction process and learning the techniques. This is especially true if the intervention uses local materials and easy techniques. However, people need an incentive to be involved. Without financial gain, like rent or maintenance fees, they won't engage, as they must prioritise supporting their families.

Practical Implication
1-3 years: Civil participation in the construction phase
5 years: Make civil maintenance schemes profitable.

Relates to
Our collective design

S1 My coffee time P

Ahwas are essential as outside meeting spaces for men.
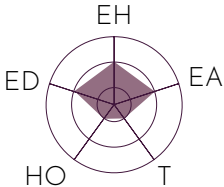
block 1 year ○ ○ ○

Theoretical back-up
Cafes, or Ahwas, are places where mostly men come to have a coffee, play backgammon and smoke waterpipe. Every street has several Ahwas and each Ahwa has their own regulars.
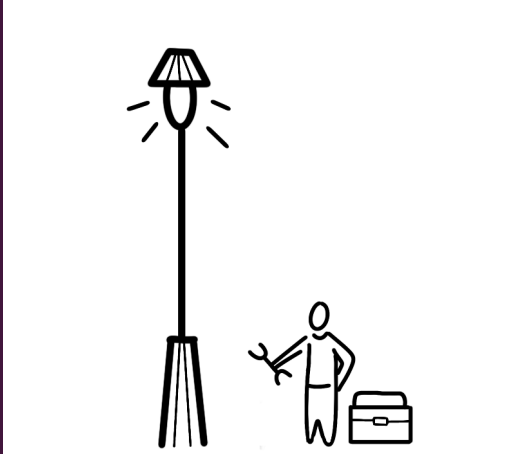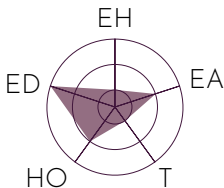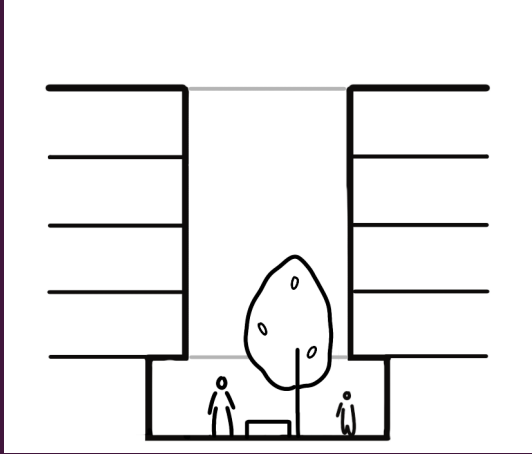
Practical Implication
Allocate space for the Ahwa with shading, greenery and a street terrace in public buildings or active streets.

Relates to
Our versatile canopies
Our private courtyard

S2 Our private courtyard D

Urban courtyards are essential as semi-private outdoor meeting spaces for women and children.

block

1-3 years ● ○ ○
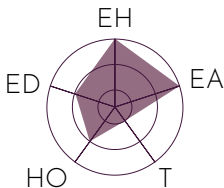5-10 years ● ● ○

Theoretical back-up
Historically, the courtyard was the centre for family activities, especially used by women and children. It had a fountain, greenery and provided privacy. Nowadays, Islamic lifestyle has shifted more from private places to public ones, which increases the need for public plazas and streets like in the design of Masdar city (Hassan et al.,2015). Especially women in Manshiet Nasser lack a place to go outside of their homes during the day.

Practical Implication
1-3 years: Redesign existing open areas within housing blocks into semi-public plazas.
5-10 years: Transform open areas created by strategic breakthroughs in housing blocks into semi-public plazas.

Relates to
Our ventilated courtyard
Their outside fun

S3 Their outside fun   P

Community playgrounds give a place for children to meet outside and have fun in a safe way.

block

1-3 years
● ○ ○

5 years
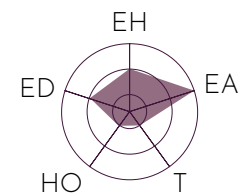● ● ○

Theoretical back-up
Children can only play in privately owned terrains like schools or community centres, that are not accessible to everyone. Consequently many children play at home or on the street, which leads to hazardous and unsafe situations due to trash, fumes and traffic.

Practical Implication
1-3 years: start outside activities in multiple designated areas per building block, or at a maximum distance of 10 minutes walking.
5 years: Transform the area with the most potential in a community playground.
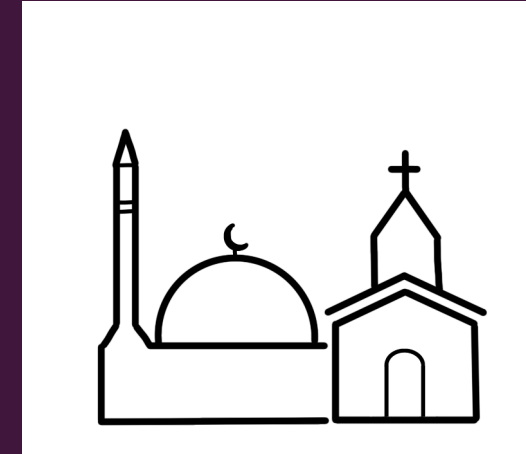
Relates to
Our community building
Their ballet class

S4 Our community building   P

The combination of amenities in one building makes it possible to increase welfare.

neighbourhood

5-10 years
● ● ●

Theoretical back-up
Education, health care and social facilities are available in the area, but they are usually dispersed, do not offer a wide variety of services and not not accessible for everyone.

Practical Implication
Make one community building per neighbourhood in the area with the most potential. Each community building combines amenities like day care, health clinic and after school activities with working spaces.

Relates to
My neighbourhood Nanny
Their ballet class

S5 Our religious building   P

Religious buildings are a place for community expression and increase tourist value

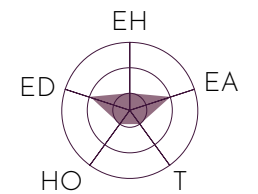neighbourhood

1-3 years
● ○ ○

Theoretical back-up
The Cave Church is one of the most important places for the Zabbaleen community. They built it with the support of Father Samaan and gave them a sense of belonging leading to the community building permanent homes in 1975 (Tadamun, 2020). The Cave Church is also the main tourist attraction of Zarayb since it is the biggest church of the Middle East and it was created by carving into the rock of Moqattam mount.

Practical Implication
Create slow traffic and public transport access to important religious buildings.
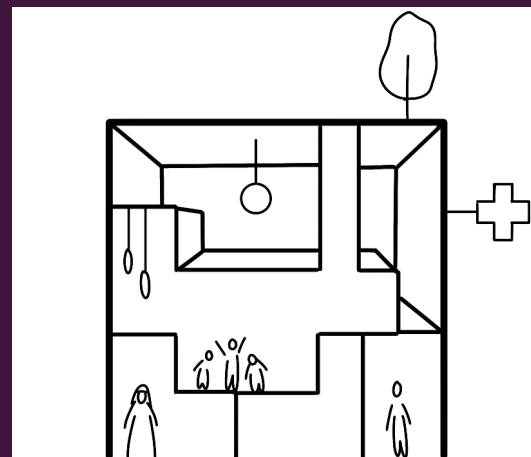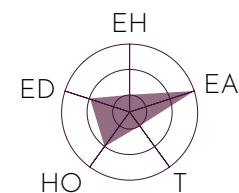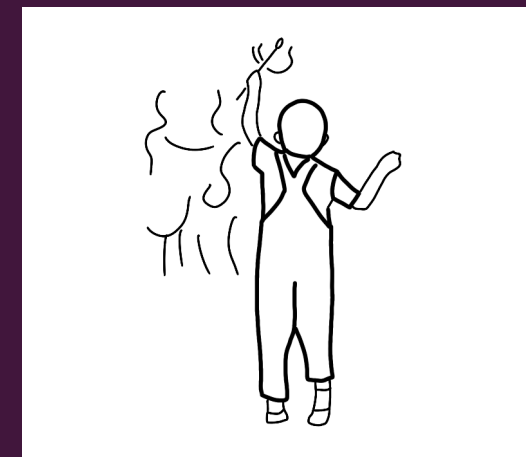
Relates to
Our community building
Our place of expression

S6 Our splash of paint   P

Painting walls and facades creates a feeling of belonging for the inhabitants

building

1 year
● ○ ○

Theoretical back-up
In 2016, French-Tunisian artist eL Seed created "Perception," a large-scale anamorphic mural across 50 buildings visible only from a specific vantage point. The artwork featured Arabic calligraphy of a Coptic quote and aimed to challenge the stigma around the Zabbaleen community. The project involved collaboration with the local community, fostering pride and recognition of their role in waste management. (Rogers, 2016)

Practical Implication
Decorate the walls and facades of public buildings with inhabitants and paint and colour newly constructed buildings

Relates to
My own papers
Our place of expression
Their outside fun
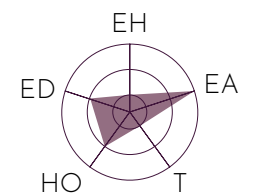
Stimulating Self-Development

D1 My neighbourhood nanny P

Daycare in close proximity to working areas increases safety for children and lessens the workload on mothers.

1-3 years
● ● ○

5 years
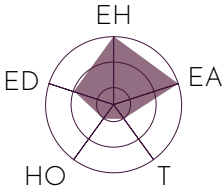● ● ○

neighbourhood

Theoretical back-up
Mothers have to watch their small children while sorting garbage. These children are exposed to health hazards from a young age and suffer from diseases like lung infection and asthma. A daycare would provide a secure environment for young children away from health hazards. Additionally mothers will be able to focus fully on their work. A short distance to the day care makes it easier for mothers to manage time and to fulfil their care task (Ikink, 2024).
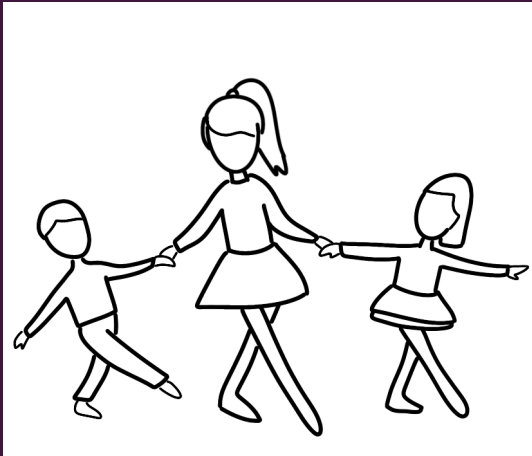
Practical Implication
1-3 years: Set-up several potential spaces for day-care in each neighbourhood in close proximity to working areas.
5 years: Expand the facility with the most potential.

Relates to
Our community building

EH
ED — EA
HO — T

D2 Their educational future P

Access to all education levels gives youngsters a better future.

1-3 years
● ○ ○

5-10 years
● ● ●

neighbourhood

Theoretical back-up
Education gives youngsters a basic skill set, learns them to reflect and provides opportunities for different types of jobs. Manshiet Nasser has several public schools, however the quality of public education in Egypt is low. Additionally these schools are for lower education, accessibility of higher education outside the area is a challenge. High School students take the bus for almost 2 hours to El-Abaseya.

Practical Implication
1-3 years: Teachers from schools in the area have monthly training by volunteering professionals. Primary and middle school is accessible by foot in each neighbourhood.
5-10 years: High school and university is accessibly by public transport and slow traffic lanes.

Relates to
Their ballet class
Our road to elsewhere

EH
ED — EA
HO — T

D3 Our place of expression P

Activities for youngsters outside of school promotes self development.

1-3 years
● ○ ○

5-10 years
● ● ●
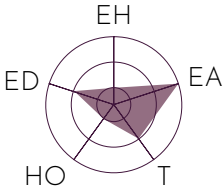
neighbourhood

Theoretical back-up
After school activities allow children to explore interests outside the classroom and to develop their social, emotional and cognitive skills (NJI). NGOs in al-Zarayb organise activities for children like ballet and yoga, or trips to the beach in summer. However, they are limited by organisation size and financial means.
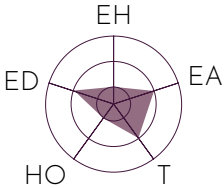
Practical Implication
1-3 years: Each neighbourhood has a space appointed for a range of after school activities.
5-10 years: Specific activities outside of the neighbourhood, like swimming, are accessible by public transport and slow traffic lanes.

Relates to
Our community building
Their outside fun
Our road to elsewhere

EH
ED — EA
HO — T

Increasing health and hygiene

H1 Our safety conditions   G
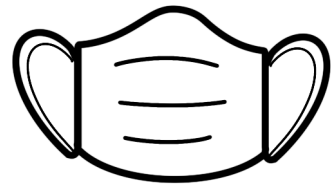
Using hygiene and safety measures at work enhances working conditions and extends life spans.

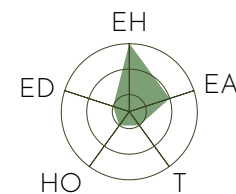neighbourhood   1-3 years
● ○ ○

Theoretical back-up
Zabbaleen collect, sort and process garbage into new materials or products. Workers experience dangers of working by hand without safety equipment like masks and glows. Hands get stung by hospital syringes, fingers get cut off by buzz saws or feet get crushed by aluminium crushers. Additionally toxic fumes are released from melting plastic or aluminium or from disassembling electronic devices.

Practical Implication
Information sessions for Zabbaleen on safety precautions, provision of material and the construction of designated work areas.
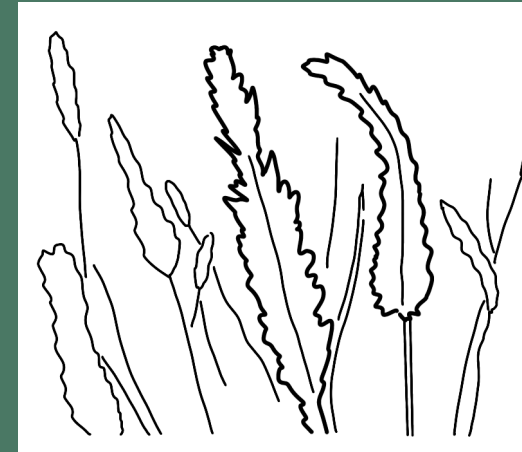
Relates to
Our industrial area
Our recycling station

H2 Our neighbourhood farm   P

Keeping animals in designated areas improves hygiene and food safety.

neighbourhood   3-5 years
● ○ ○

Theoretical back-up
Animals like goats and pigs are kept in the al-Zarayb area for milk and meat. They are being kept in sheds on the roofs or in the streets. They eat the organic waste that is separated from household garbage. These conditions leads to health hazards due to ingestion of polluted organic waste and the spread of animal diseases.

Practical Implication
Animals are kept in a community farm in a designated work area in al-Zarayb. Owners have to possibility to keep and secure their animals in separate compartments.

Relates to
Our safety conditions
Our recycling station
Our rooftop landscape

H3 Our purifying plants   D

Native desert plants offer a sustainable solution for mitigating environmental pollution

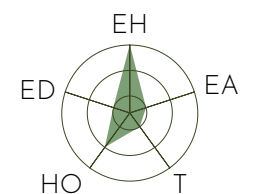street   3-5 years
● ● ○

Theoretical back-up
These plants have demonstrated the ability to accumulate phytotoxic metals from soil, effectively reducing contamination levels. Their resilience to harsh conditions and minimal freshwater requirements make them ideal candidates for absorbing toxins and contributing to urban sustainability in arid environments (El-Keblawy et al., 2024)

Practical Implication
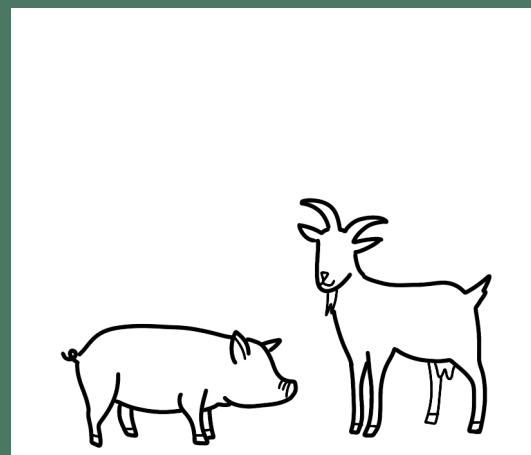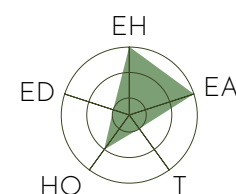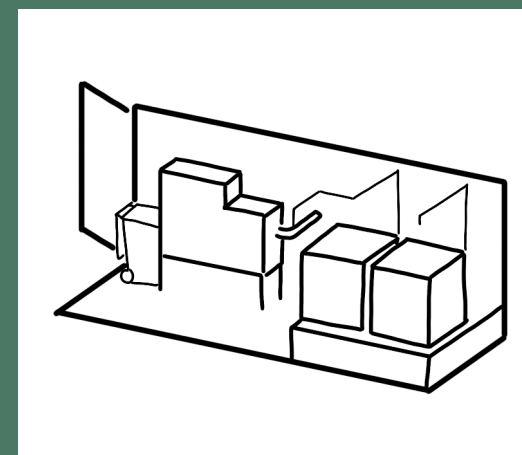Use of Pennisetum divisum, Tetraena qatarensis, and Brassica tournefortii next to recycling facilities.

Relates to
Our Egyptian Plants
Our recycling zone

H4 Our water treatment plant   D

Waste water generated during the recycling process is a hazard unless treated properly

building   10-15 years
● ● ●

Theoretical back-up
Industrial wastewater generated during recycling processes can contain hazardous substances, including heavy metals and toxic chemicals. Pretreating this wastewater is essential to remove contaminants before discharge, thereby protecting water quality and public health. Implementing effective pretreatment systems not only ensures compliance with environmental regulations but also facilitates the recycling of water within industrial operations, promoting sustainability. The use of chemicals in the treating process could be an additional hazard unless managed by the proper workers (ChemREADY, z.d.; Daphtary, 2024).

Practical Implication
Sewage network in the recycling zone connected to the water treatment plant. Placement of water treatment plant per subsection of the recycling zone. Size depending on the discharge.
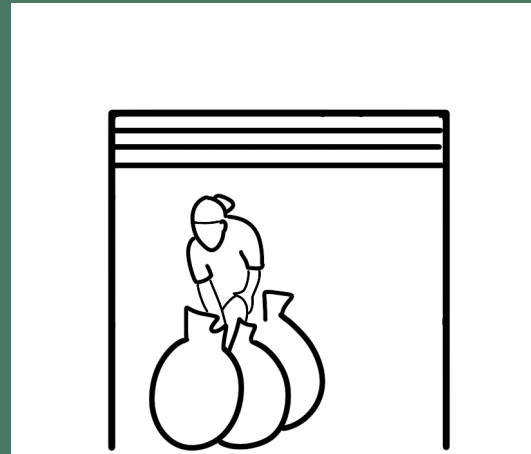
Relates to
Our recycling zone
Our purifying plants
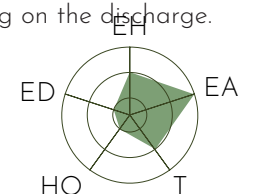
Specialising the workforce

W1 My sorting garage — D

Garbage sorting and processing requires one private work space per family.

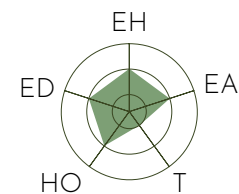building — 1-3 years ● ○ ○

Theoretical back-up
Garbage is stored and sorted in private work spaces like garages and rooftops or semi-private spaces like dead-end streets. Usually the whole ground or top floor of a family home of around 100 m2 is used for this activity.

Practical Implication
Construct (semi)private work spaces of 100m2 on average in (re)development areas for interested families. With passive or active ventilation and day-light

Relates to
Our recycling station
Our safety conditions

W2 My repair workshop — D

Reparation of small appliances is good for business diversity and income opportunities

building — 1-3 years ● ○ ○

Theoretical back-up
Selling repaired appliances can generate an alternative source of income.

Practical Implication
Placement of repair workshops close to recycling areas for both inhabitants and outsiders of the area

Relates to
Our hand-made bazaar
Our repair workshop

W3 Our upcycling workshop — D

Locally upcycled products increase business opportunities and generate more diversity in income.
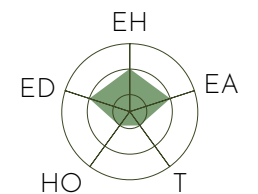
building — 1-3 years ● ○ ○

Theoretical back-up
A.P.E. currently upcycles paper, plastic, textile and glass into bags, pillows, cards and decorations. These are being sold to tourist and relatively generate a lot of money.

Practical Implication
Offer workshops and micro-credit to people wanting to start an upcycling business
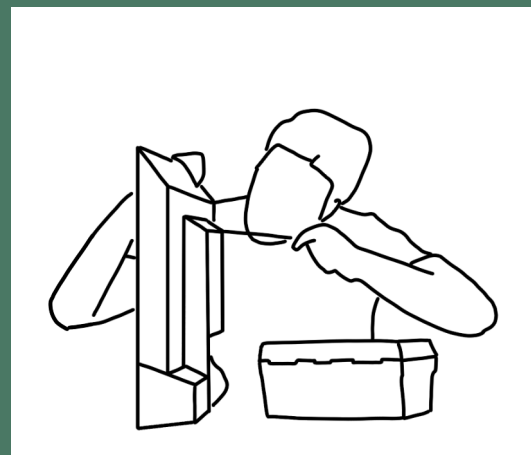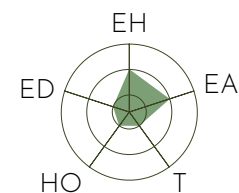
Relates to
Our hand-made bazaar
Our repair workshop

W4 Our processing specialist — G

Processing businesses are essential for the proper disposal of different waste flows and opportunities for upcycling

building — 3-5 years ● ● ○

Theoretical back-up
Processing is one of the most hazardous parts of recycling = most smells, contaminants and by-products.
different types of waste requires specific machinery and knowledge. Therefore businesses specialise in processing plastic, aluminium or paper. Processing also produces polluted by-products such as contaminated water and plastic.

Practical Implication
Processing businesses need to be located close to recycling facilities, while being situated in a specialised area that has a separate sewage systems and can dispose of polluted by-products.
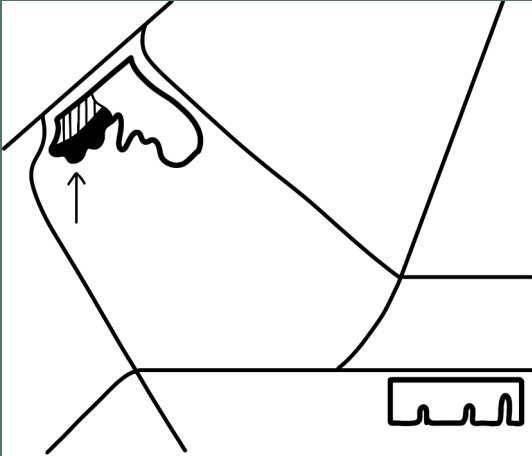
Relates to
Our industrial area
Our recycling station
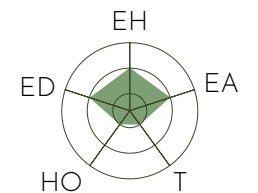
W5 Our recycling zone — D

Hazardous work is moved in al-Zarayb to a designated working area to improve working and living conditions.

neighbourhood   5-10 years
● ● ●

Theoretical back-up
A building in al-Zarayb typically consists of work on the ground floor, top floor and streets, and housing on the other levels. Sorting garbage, keeping animals or producing paper are hazardous, but under the right conditions this work can be done safely. This also resonates with the Zabbaleen community who have asked the government to stay in the al-Zarayb area and make it "a large intermediate station with recycling workshops" (Tadamun, 2020). In this way the Zabbaleen do not have to move all their work outside of the area and risk loosing their livelihood.
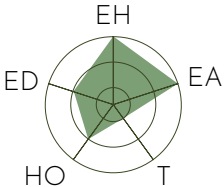
Practical Implication
Stimulate the development of working sites in al-Zarayb into recycling stations at a 20 minute walk. Safety conditions like working with masks, gloves, exhaustion and washing rooms are taken accordingly.

Relates to
Our safety conditions
My garage box
Our neighbourhood farm

W6 Our industrial area — D

Extremely hazardous work is moved from al-Zarayb to areas on the edge of Cairo to improve working and living conditions.

city   10-20 years
● ● ●

Theoretical back-up
A building in al-Zarayb typically consists of work on the ground floor, top floor and streets, and housing on the other levels. Work like melting PVC or aluminium produces toxic fumes and chemical waste that seeps into the soil. This causes extremely hazardous situations for health and the environment. Zabbaleen know these dangers and have started moving this work to areas like Katameya at a 40 minute drive.

Practical Implication
Stimulate the development of existing sites as industrial areas capable of handing these processes. Safety precautions like site preparation, chemical disposal and personal safety are taken into account. In addition appoint new industrial areas at a maxium 60 minute drive.

Relates to
Our recycling station
Our safety conditions

I1 Their separate bins — G

Household waste separation improves the work flow of waste collectors.

city   5-10 years
● ● ●

Theoretical back-up
Zabbaleen sort the garbage by hand in and around their houses, since collected garbage is not pre-sorted into different types of waste. This is a full time job done by women from 8am to 5 pm. Due to the mix of different types, not all waste can be recycled, because it gets wet, torn or polluted. Household waste separation would increase the quality of waste and reduce the workload of the Zabbaleen.
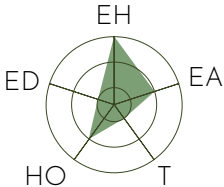
Practical Implication
The government sets-up a waste separation campaign to raise awareness and obligates household trash separation.
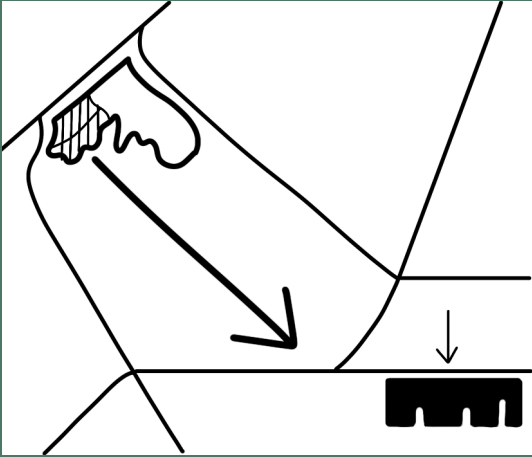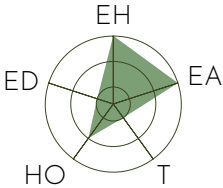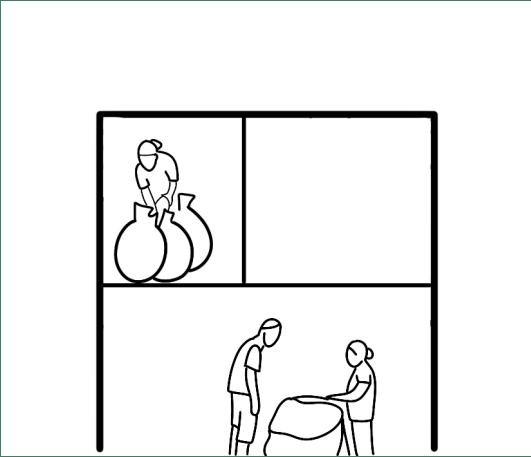
Relates to
Our safety conditions
My garage box
Our neighbourhood farm

I2 Our Habibi Co-op — D

Business collaborations of families or friends increase work efficiency and profits.

building   3-5 years
● ● ○

Theoretical back-up
Zabbaleen families or good friends set up (local) business collaborations to invest in workforce, equipment and specialise in a certain product. Through this collaboration they are able to increase efficiency and profit.
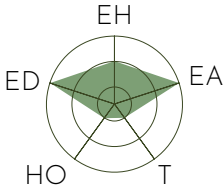
Practical Implication
The working site in Zarayb houses recycling stations in different sizes. Recycling stations can be built in units of 1, 2 and 3 to accommodate different types of collaboration.

Relates to
My garage box
Our recycling station
Our innovation centre

13 Our hand-made bazaar P

Locally made products increase material value and boost business opportunities.
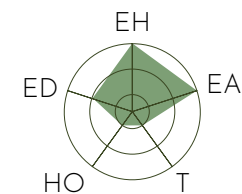
neighbourhood

5-10 years
● ● ●

Theoretical back-up
Zabbaleen collect, sort and process garbage. Locally upcycling material into new products happens only at the A.P.E. on a larger scale, even though market value of new products is higher than of raw material. Additionally locally made products attract visitors or tourists, similar to the bazaar of Khan El-Khalili, which is a popular tourist destination.
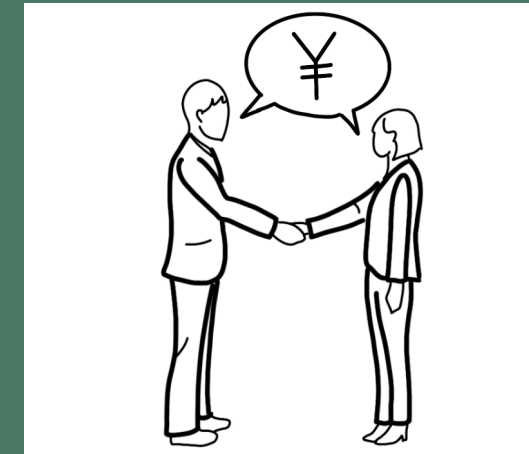
Practical Implication
Stimulate the development of a bazaar in working sites in al-Zarayb. Connect Zabbaleen to upcyclers or specialists to share knowledge and ideas.

Relates to
Our and their innovation centre
Our processing specialist
Our habibi co-op

14 Our and their innovation centre D

An innovation centre promotes the exchange of knowledge and ideas for new products.

building

5-10 years
● ● ●

Theoretical back-up
Locally upcycling material into new products increases market value and creates new jobs. However, Zabbaleen may lack the skills, knowledge of relevant machinery and type of investments. By connecting interested Zabbaleen to upcyclers or specialists they are able to share knowledge and ideas.

Practical Implication
Place an innovation centre in the Zarayb working district.

Relates to
Our hand-made bazaar

15 Our foreign buyer P

Waste processing in al-Zarayb is part of the national and global economy.

international

3-5 years
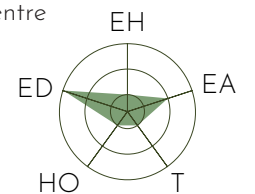● ● ●

Theoretical back-up
The Zabbaleen recycle 90% of Cairo's waste. Materials like plastic and paper are sorted, processed, and sold to recycling companies, which operate both nationally and internationally. For example, Chinese companies purchase recycled PET bottles to create new products, while higher-quality recyclers produce items for brands like IKEA. These companies benefit from a well-organized recycling hub like the Zabbaleen community, using it to promote investments in recycling and boost both production and profits.
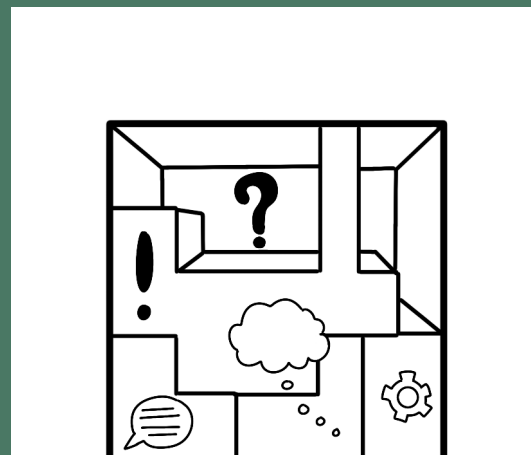
Practical Implication
Stimulate recycling businesses to invest in the development of al-Zarayb area and Zabbaleen companies.

Relates to
Our and their innovation centre

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