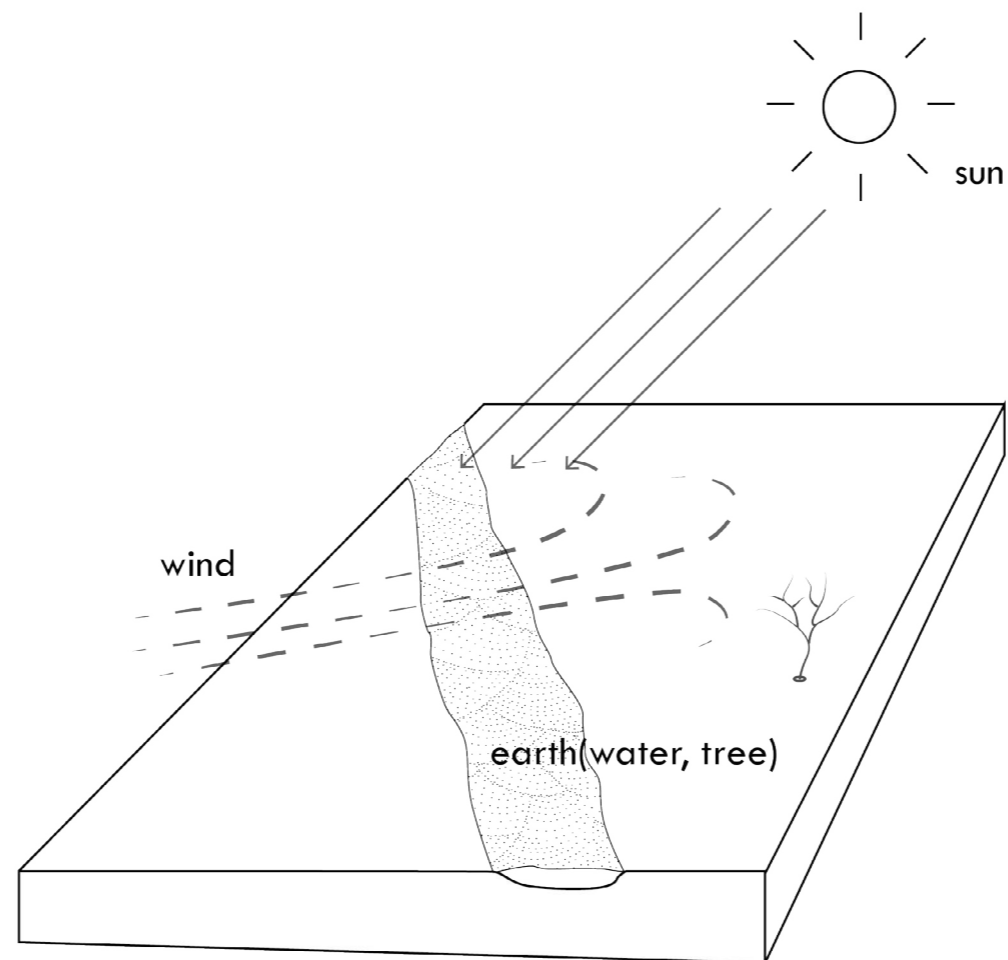


# BREEZING THE COMMUNITY

natural air-conditioned elderly housing in Heerlen



Xiangyu Zheng  
4319532

P2 presentation

Design tutor: Annebregje Snijders

Research tutor: Roel van de Pas

15<sup>th</sup> June

# INTRO

Problem statement  
Earth, Wind and Fire  
Research questions

# BABY BOOMING: 1946-1955

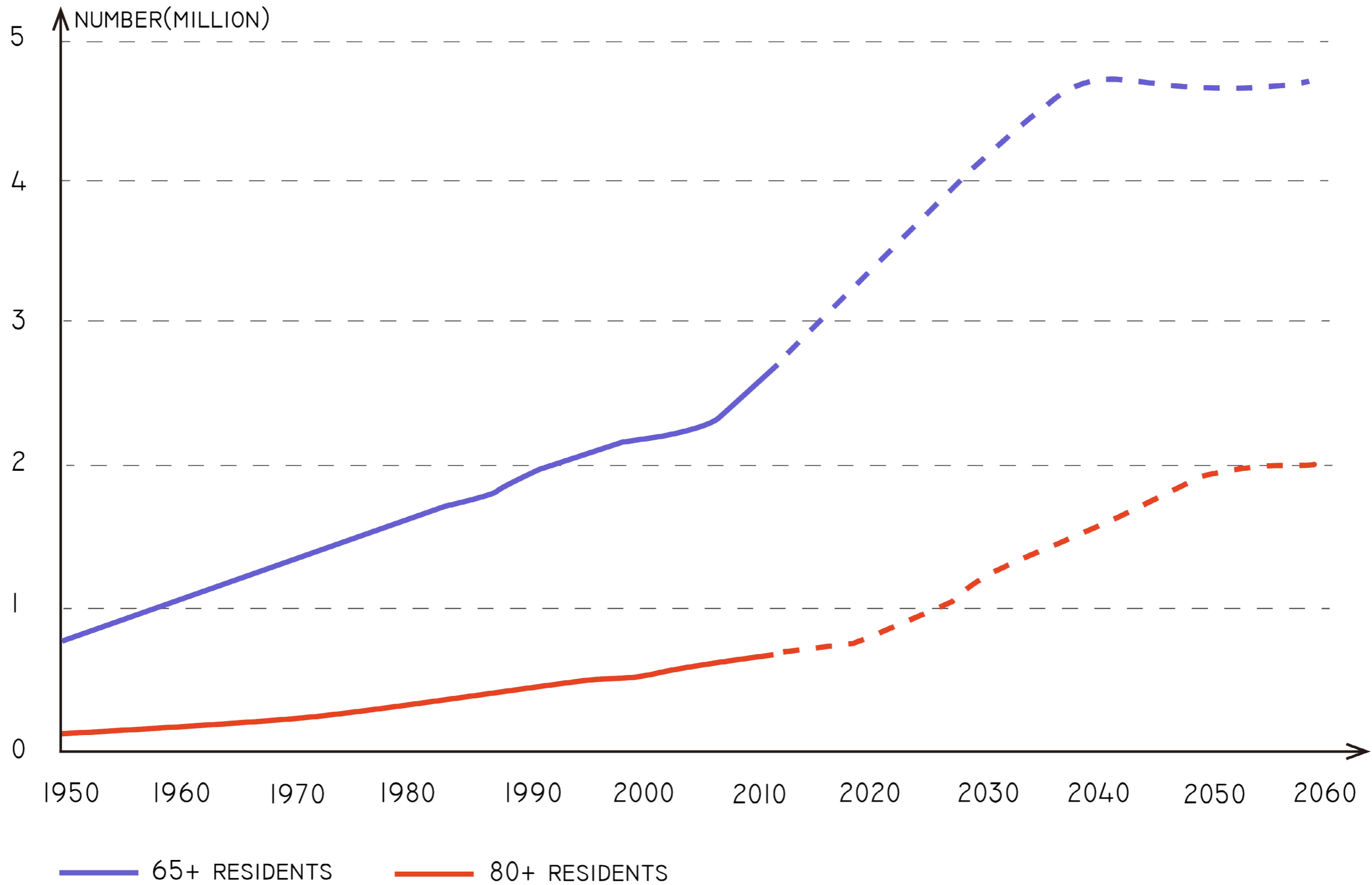


## GETTING OLD: AN INEVITABLE FUTURE



# ELDERLY HOUSING: AN INCREASING CONCERN

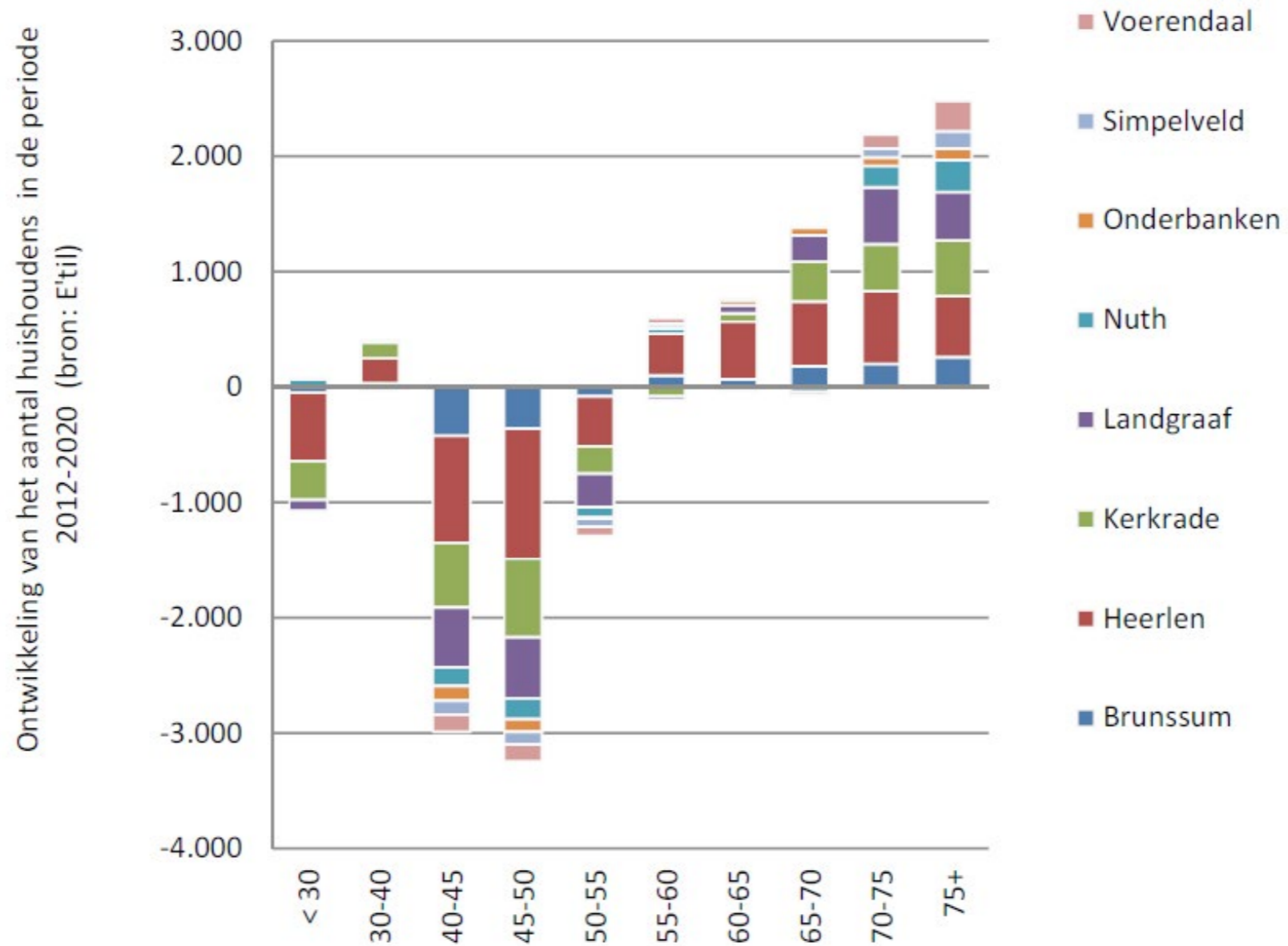
NUMBER OF ELDERLY PEOPLE IN THE NETHERLANDS



# IBA PARKSTAD



# INCREASING ELDERLY HOUSEHOLDS IN IBA PARKSTAD



# LONELY LIFE





# LOSING SOCIAL CONNECTIONS



Retirement crisis

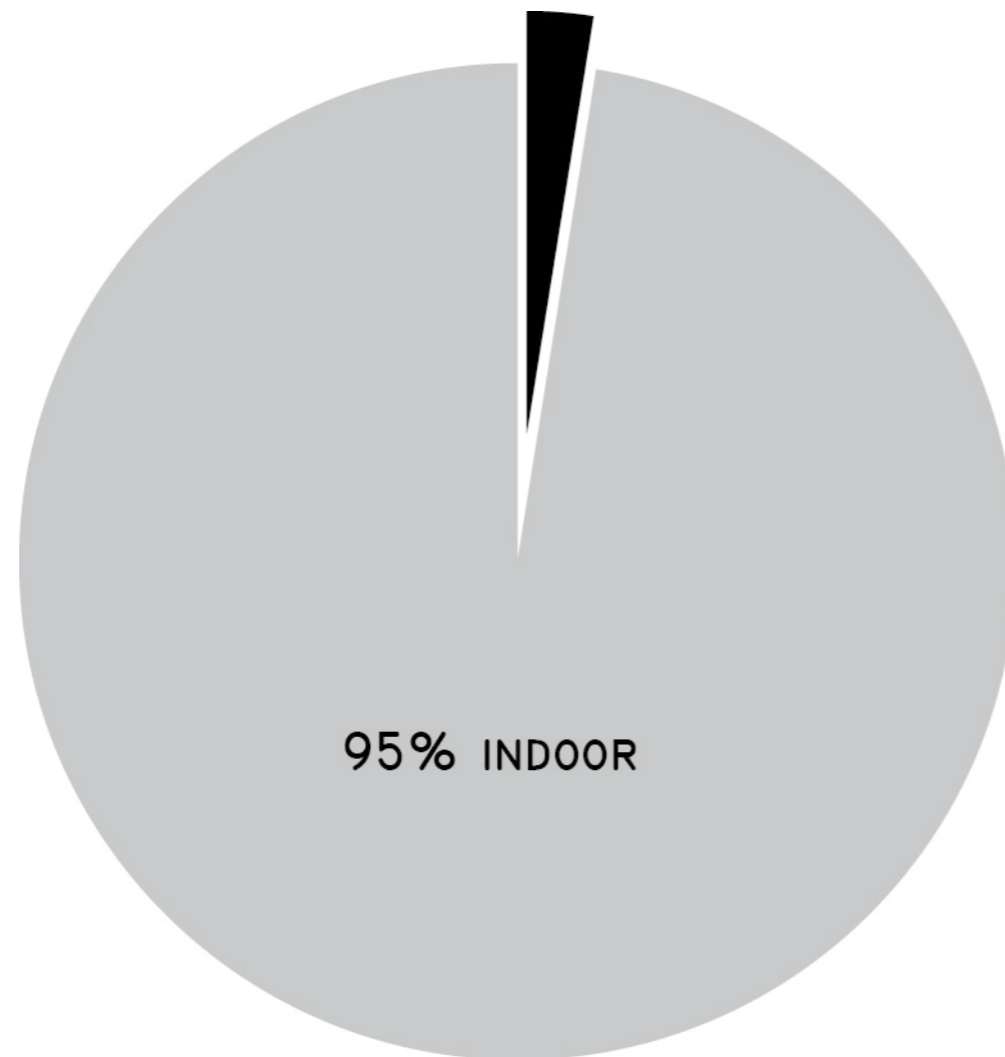


Friends passing away

# PHYSICALLY HARD TO REACH THE EXTERIOR LIFE



## RESULT: LONG TIME SPENT INDOOR



In average, elderly people spend 95% of their time indoors.

# COMMUNITY ACTIVITIES: AN IMPORTANT SOCIAL INTERACTION



Observing



Neighbour interacting



Community interacting

# UNSATISFYING INDOOR CLIMATE



Enclosed rooms

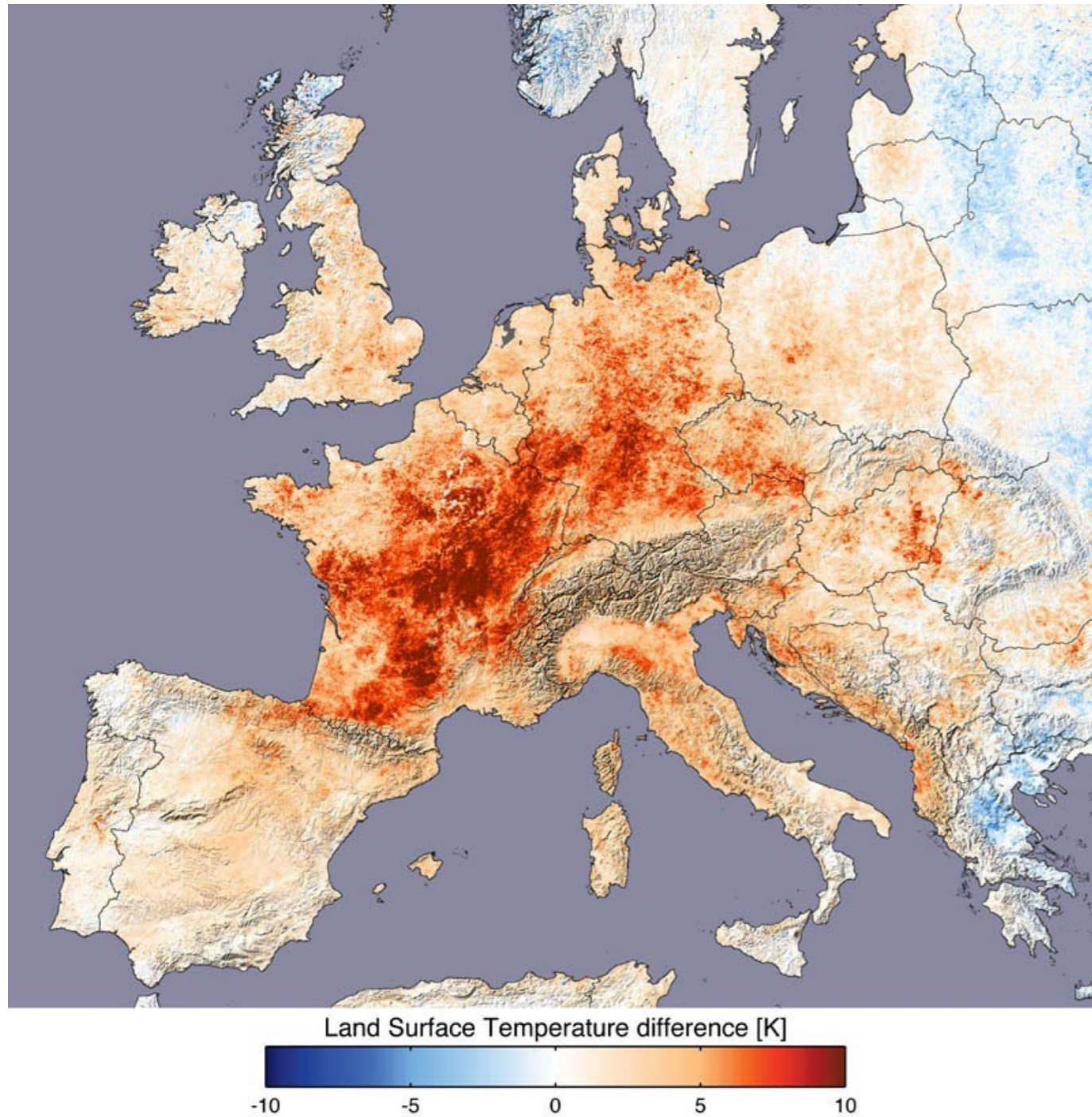


Climate-vulnerable atrium

# VULNERABLE TO CLIMATE CHANGE

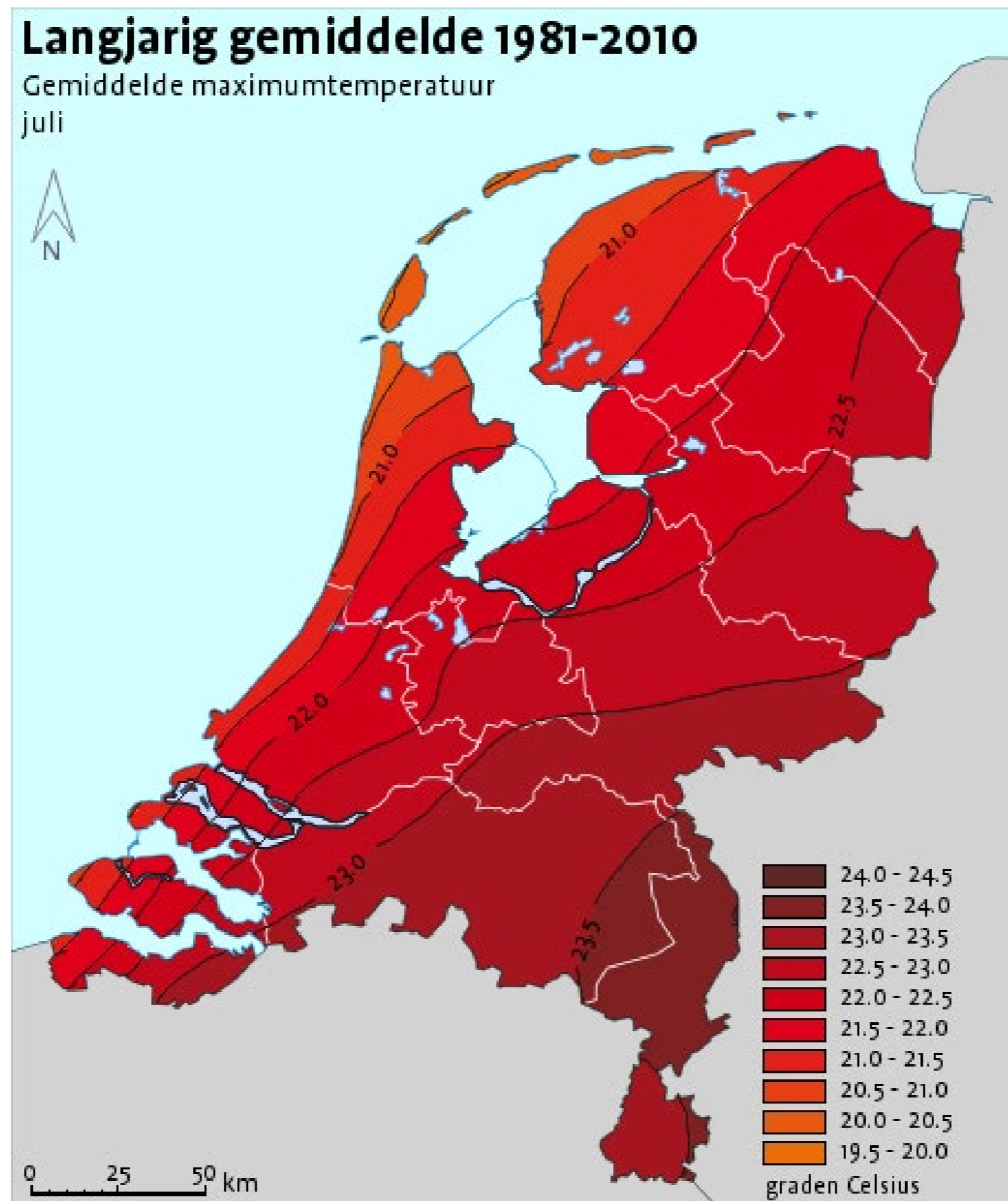


# 2003 EUROPEAN HEAT WAVE



Excess deaths	
France	14,802
Germany	7,000
Spain	4,230
Italy	4,175
UK	2,045
Netherlands	1,400
Portugal	1,316
Belgium	150
<b>TOTAL</b>	<b>35,118</b>

# LIMBURG: THE HOTTEST AREA IN NETHERLANDS

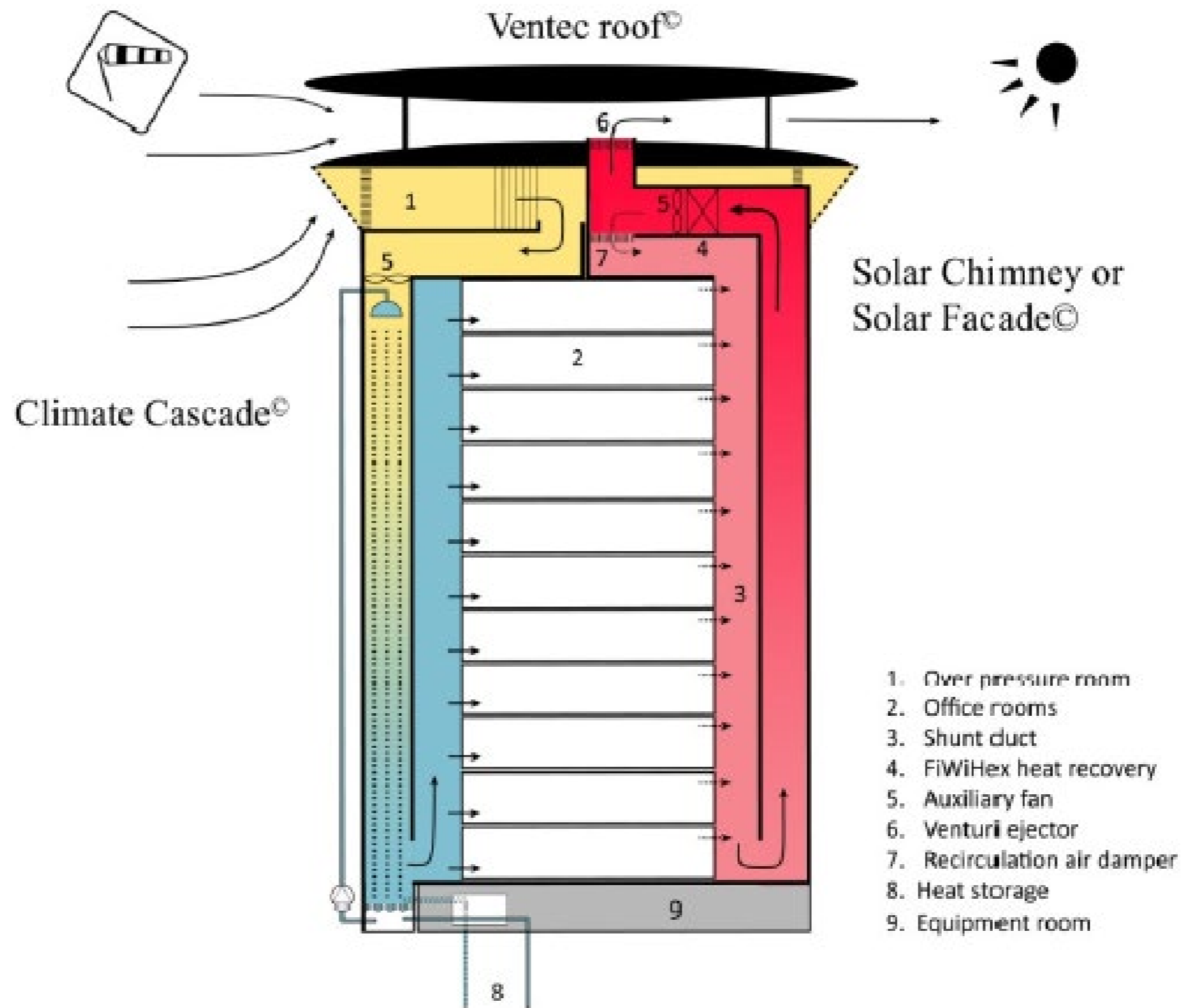




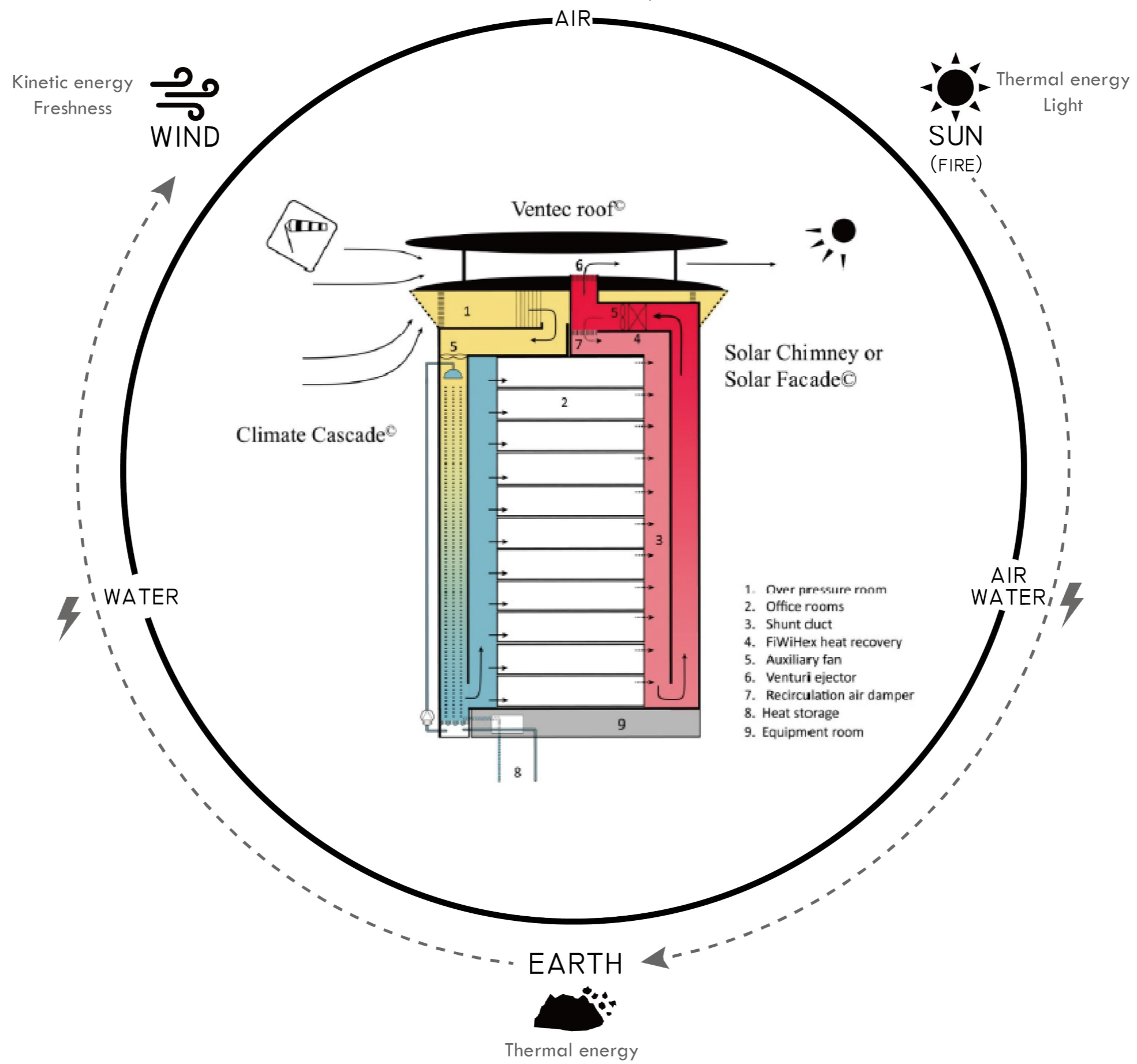
# INTRO

Problem statement  
Earth, Wind and Fire  
Research questions

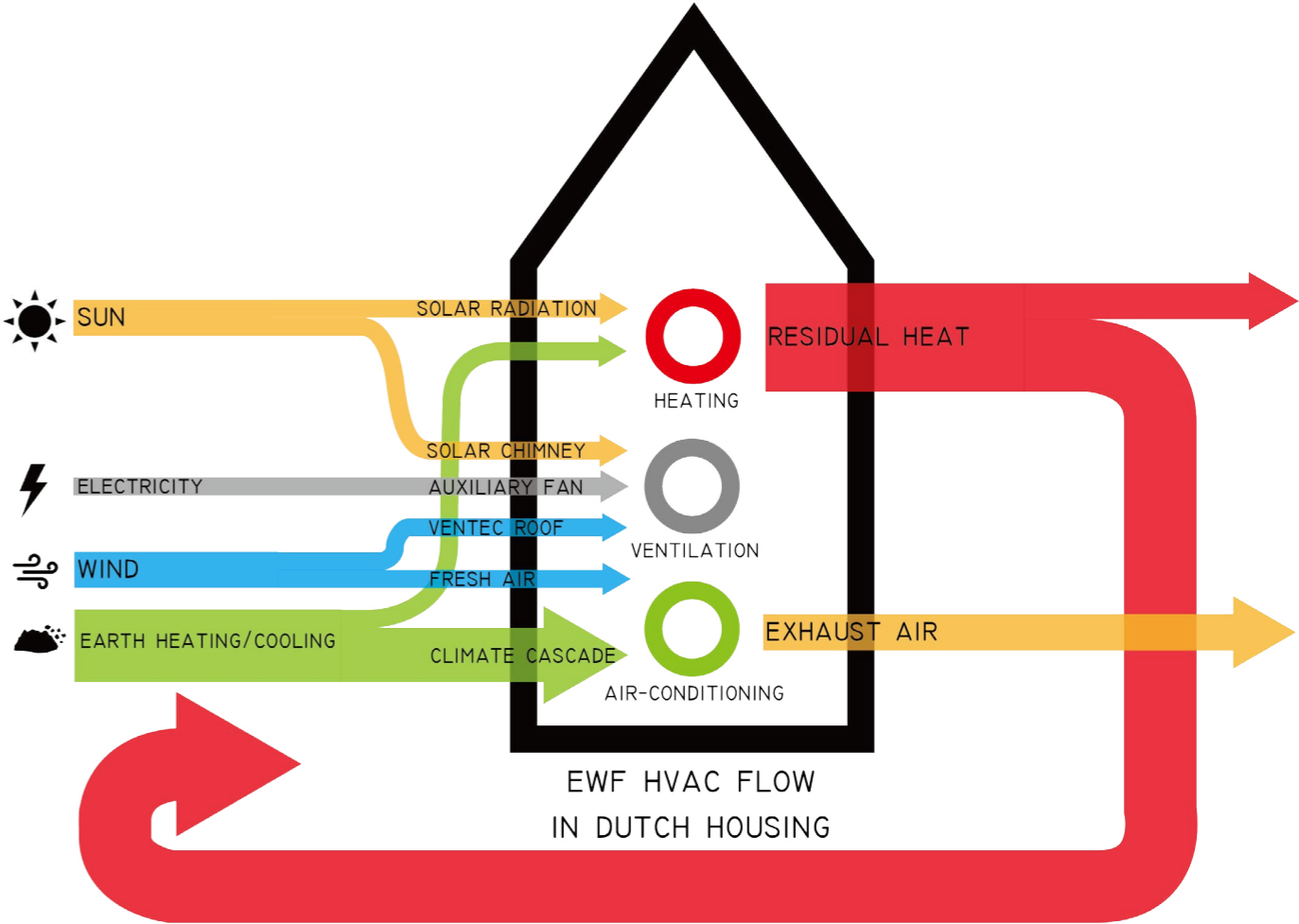
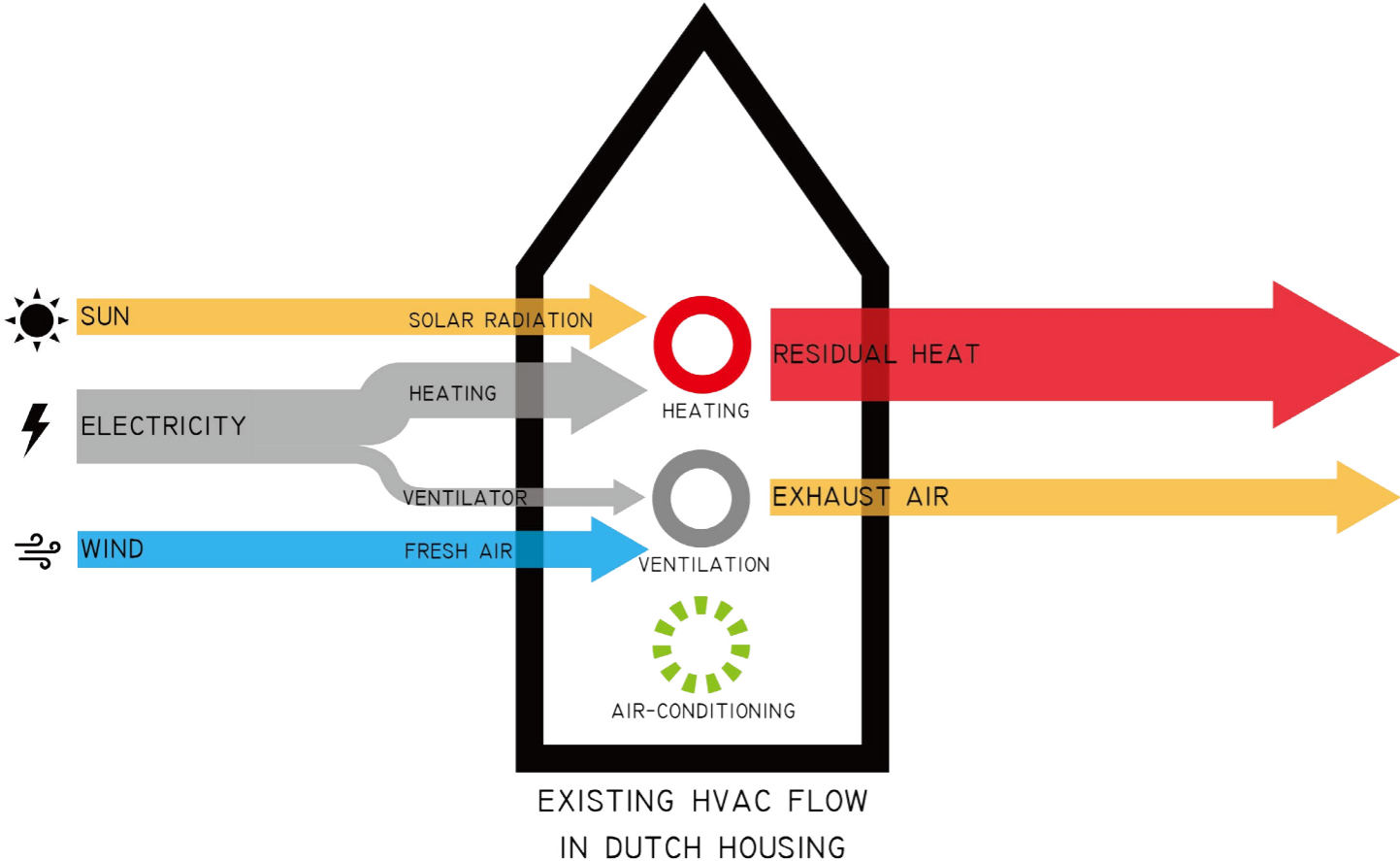
# NATURAL AIR-CONDITIONING SYSTEM: EARTH WIND & FIRE



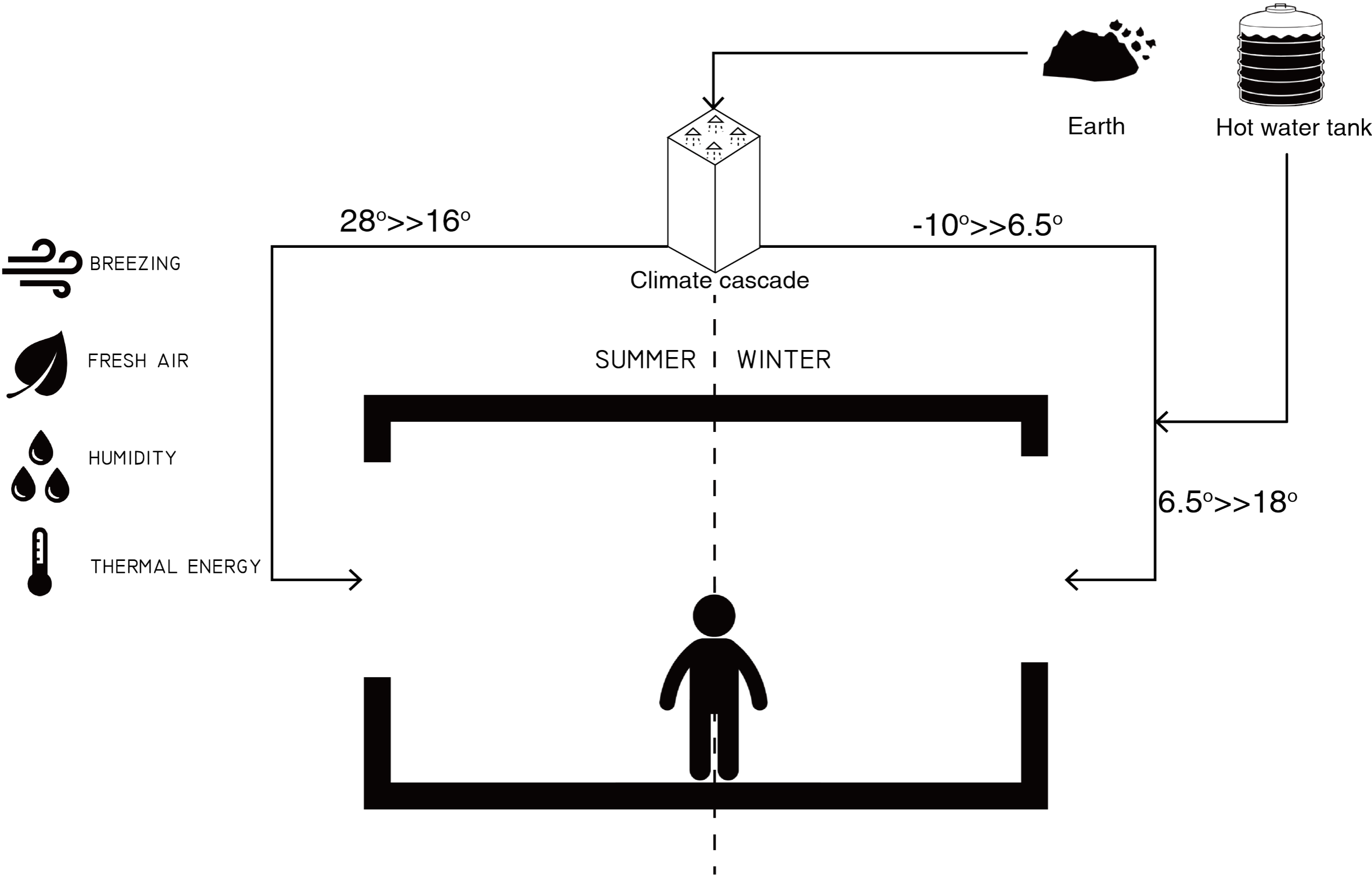
# 3 ENERGY SOURCE, 2 MEDIA



# EWF FLOW: MORE NATURAL ENERGY UTILIZED

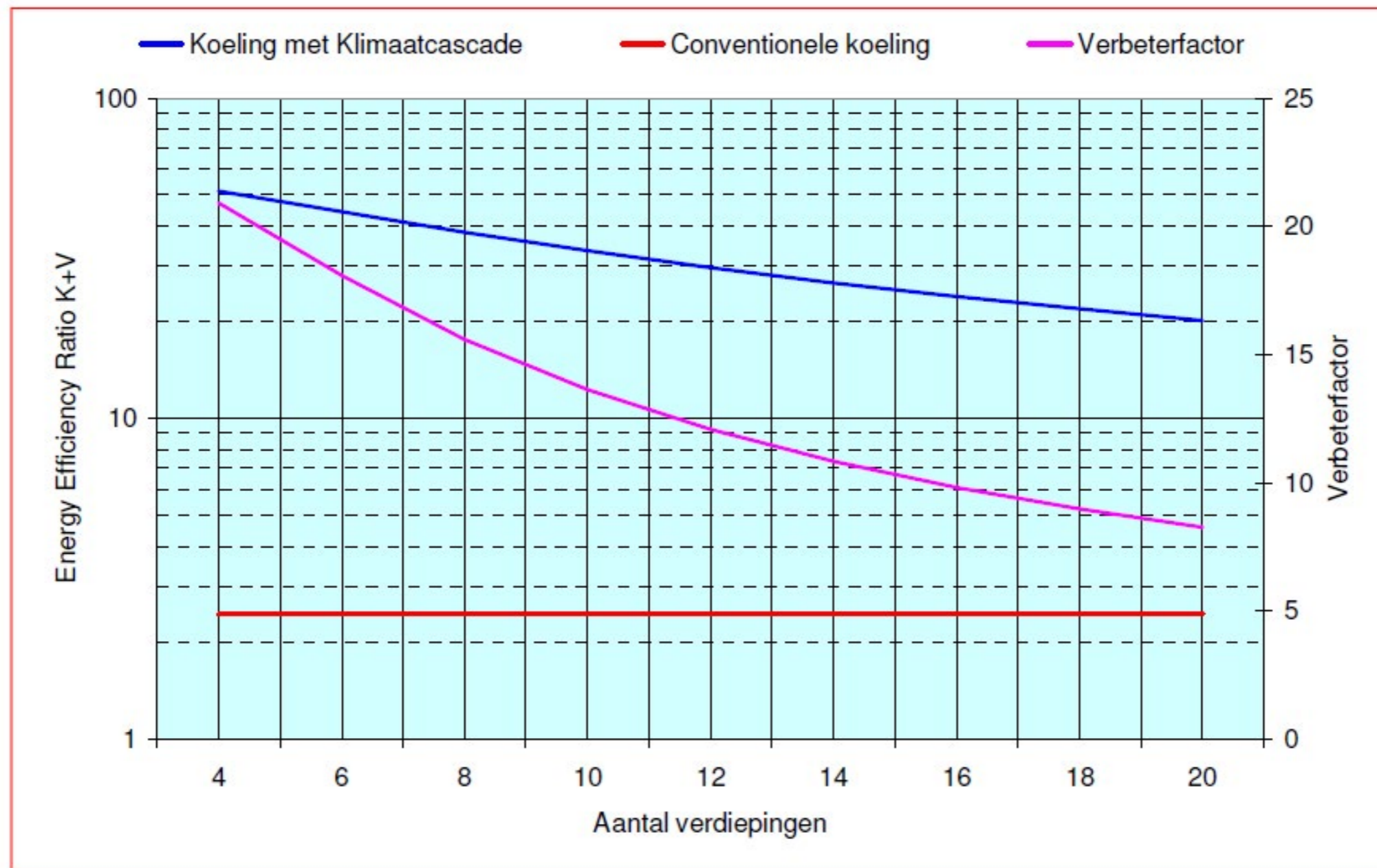


# OPTIMAL THERMAL COMFORT

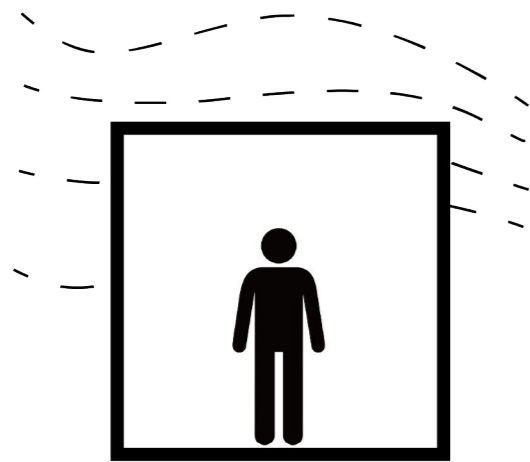


# HIGHER ENERGY EFFICIENCY

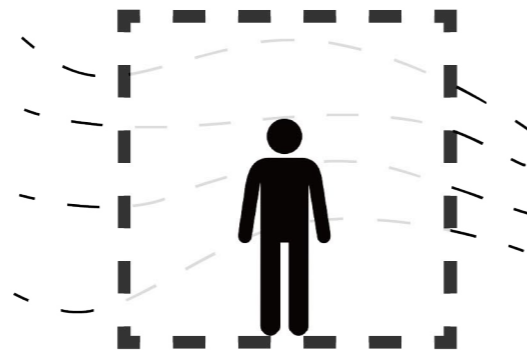
Coefficient of performance(COP) with number of floors



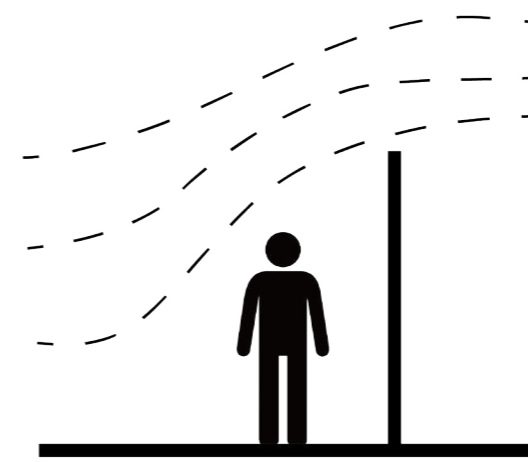
# 4 LEVELS OF ACCESS TO NATURE



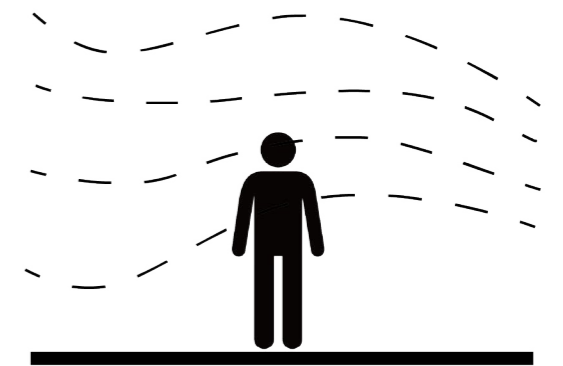
1. CLOSED



2. CONTROLLED

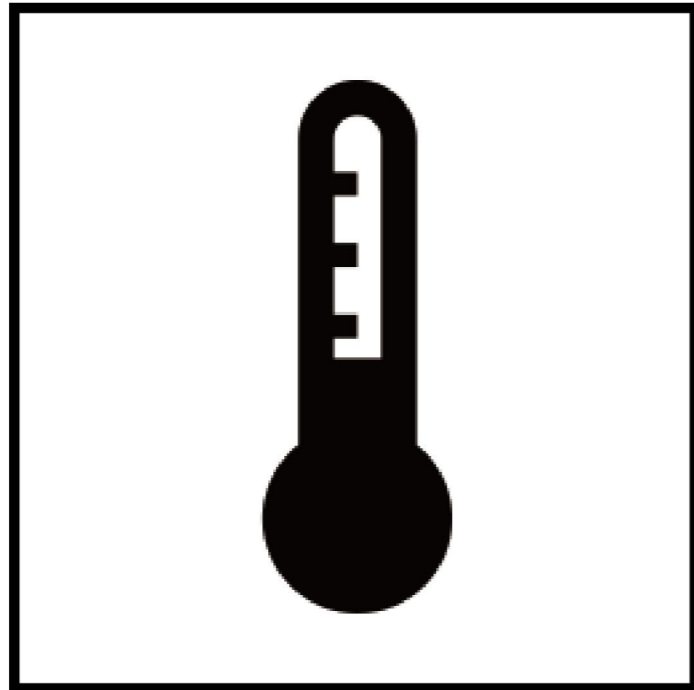


3. SHELTERED

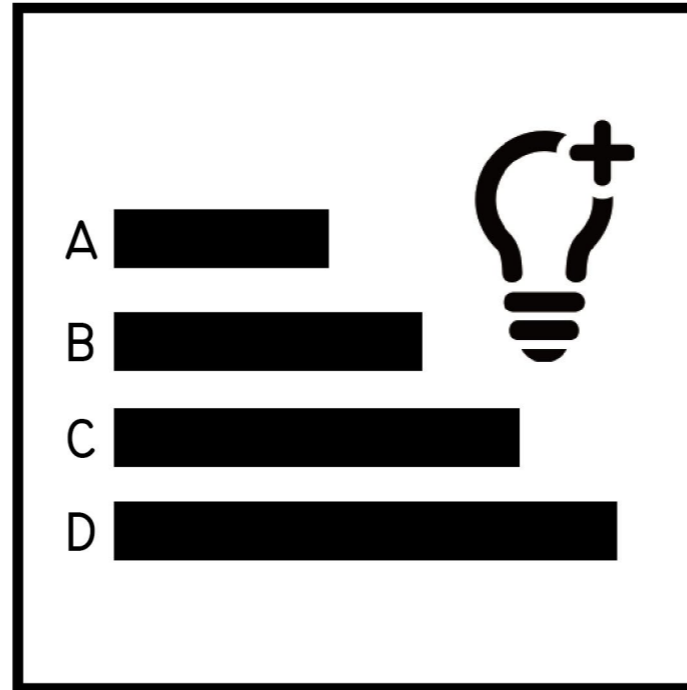


4. OPEN

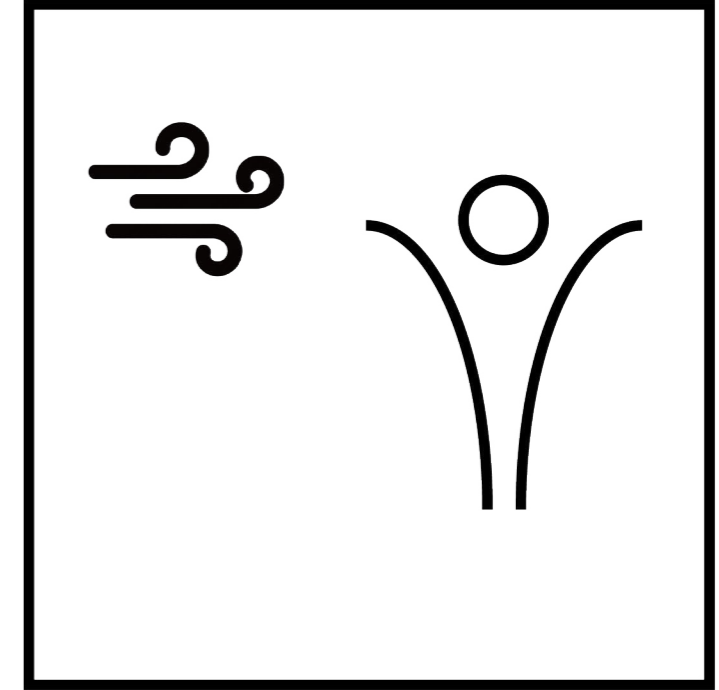
# ADVANTAGES OF EWF



THERMAL COMFORT



ENERGY EFFICIENCY



NATURAL PLEASURE



# INTRO

Problem statement  
Earth, Wind and Fire  
Research questions

## RESEARCH QUESTIONS

How can we use the **EWF** natural air-conditioner concept to provide better **thermal comfort** and **natural pleasure** for **elderly housing** in IBA Parkstad?

## RESEARCH QUESTIONS

How can we use the **EFW** natural air-conditioner concept to provide better **thermal comfort** and **natural pleasure** for **elderly housing** in IBA Parkstad?

Sub-questions:

What are the necessary elements in EWF natural air-conditioning concept?

What can the EWF elements contribute to the experience of users?

What are the composition variations of these elements?

What are the needs of elderly people in housing?

How are the typologies in existing elderly housing?

What are the special needs in IBA parkstad?

# RESEARCH

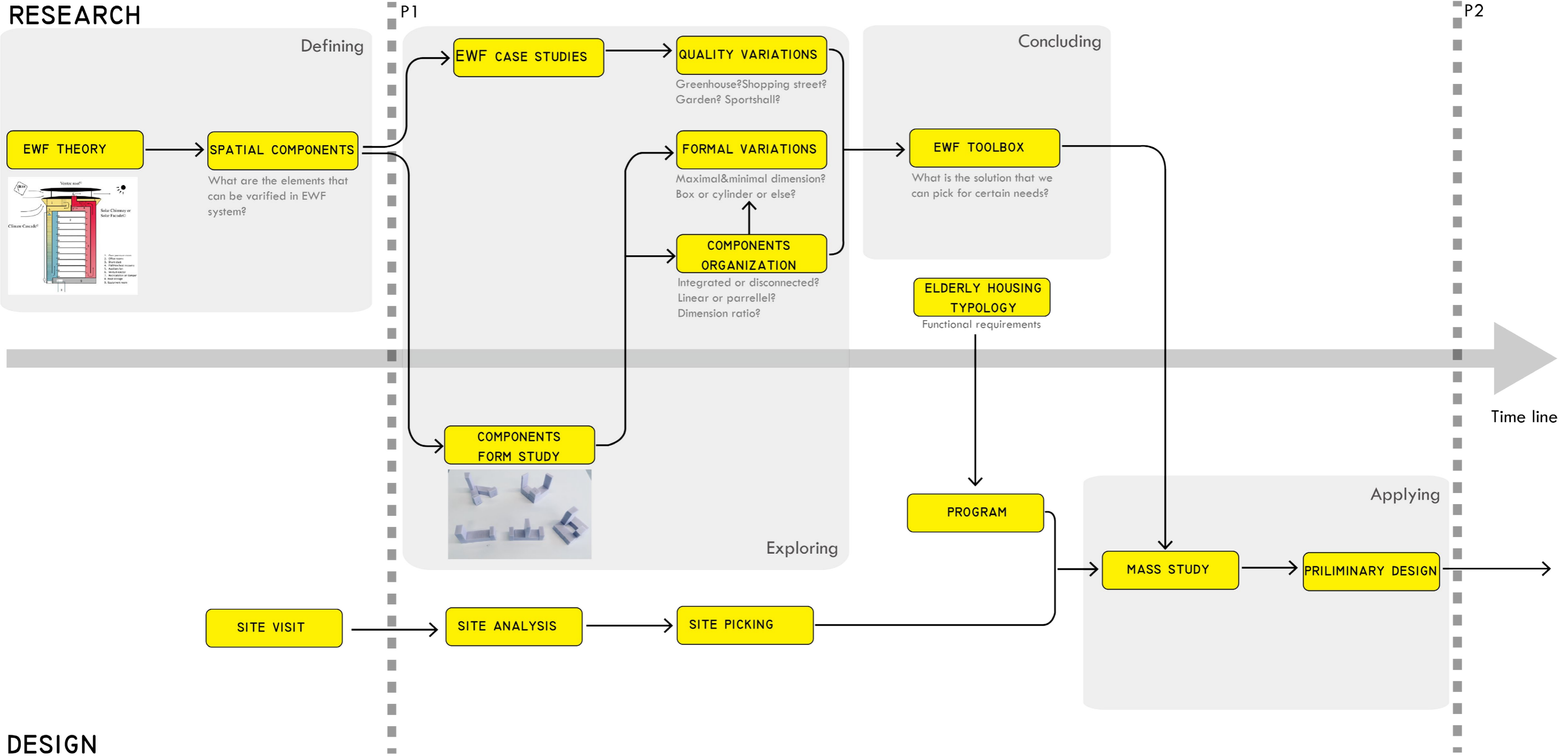
Methodology

Part I - case study of elderly housing

Part II - literature study of EWF

Part III - form study of EWF housing

# RESEARCH



# DESIGN

# RESEARCH

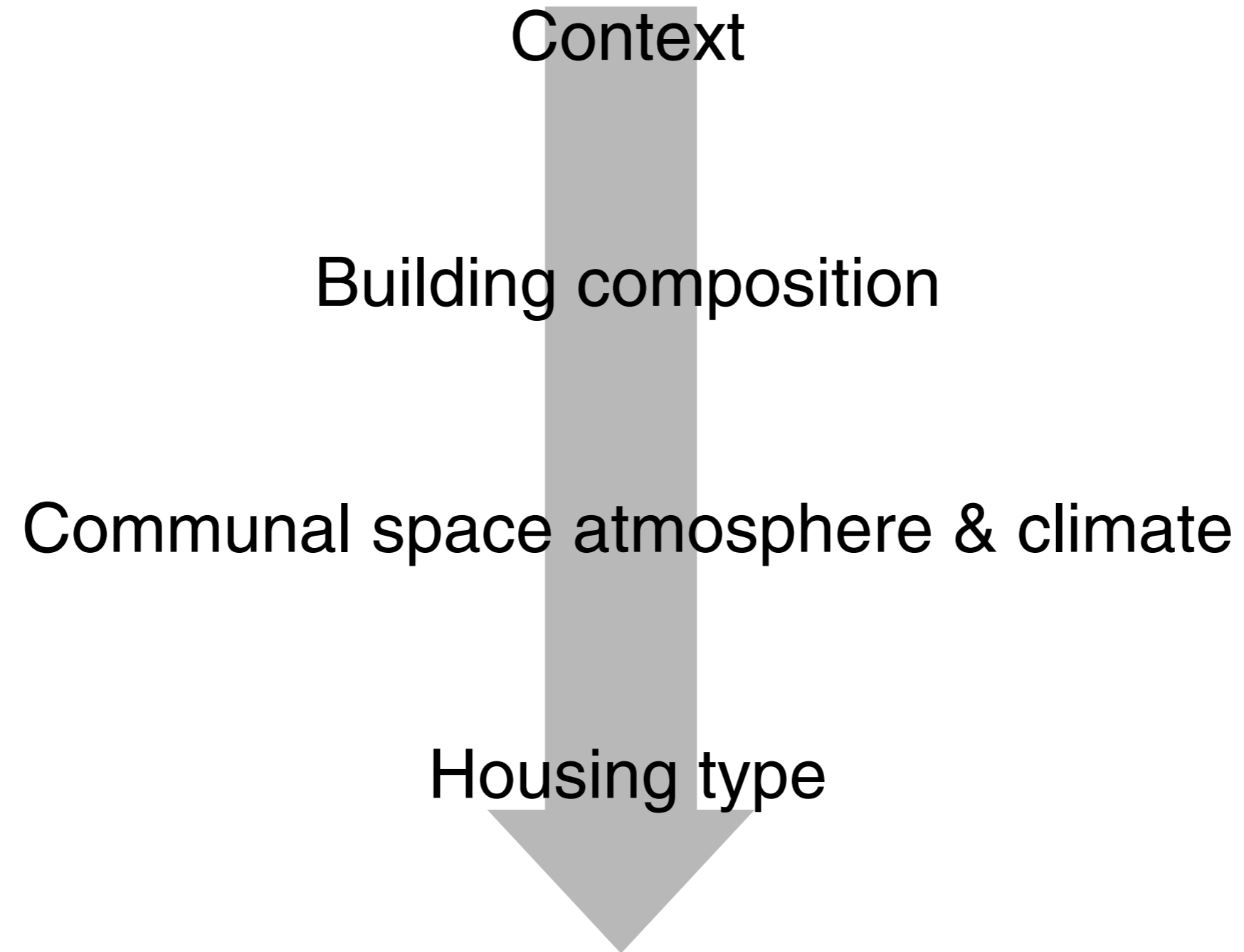
Methodology

Part I - case study of elderly housing

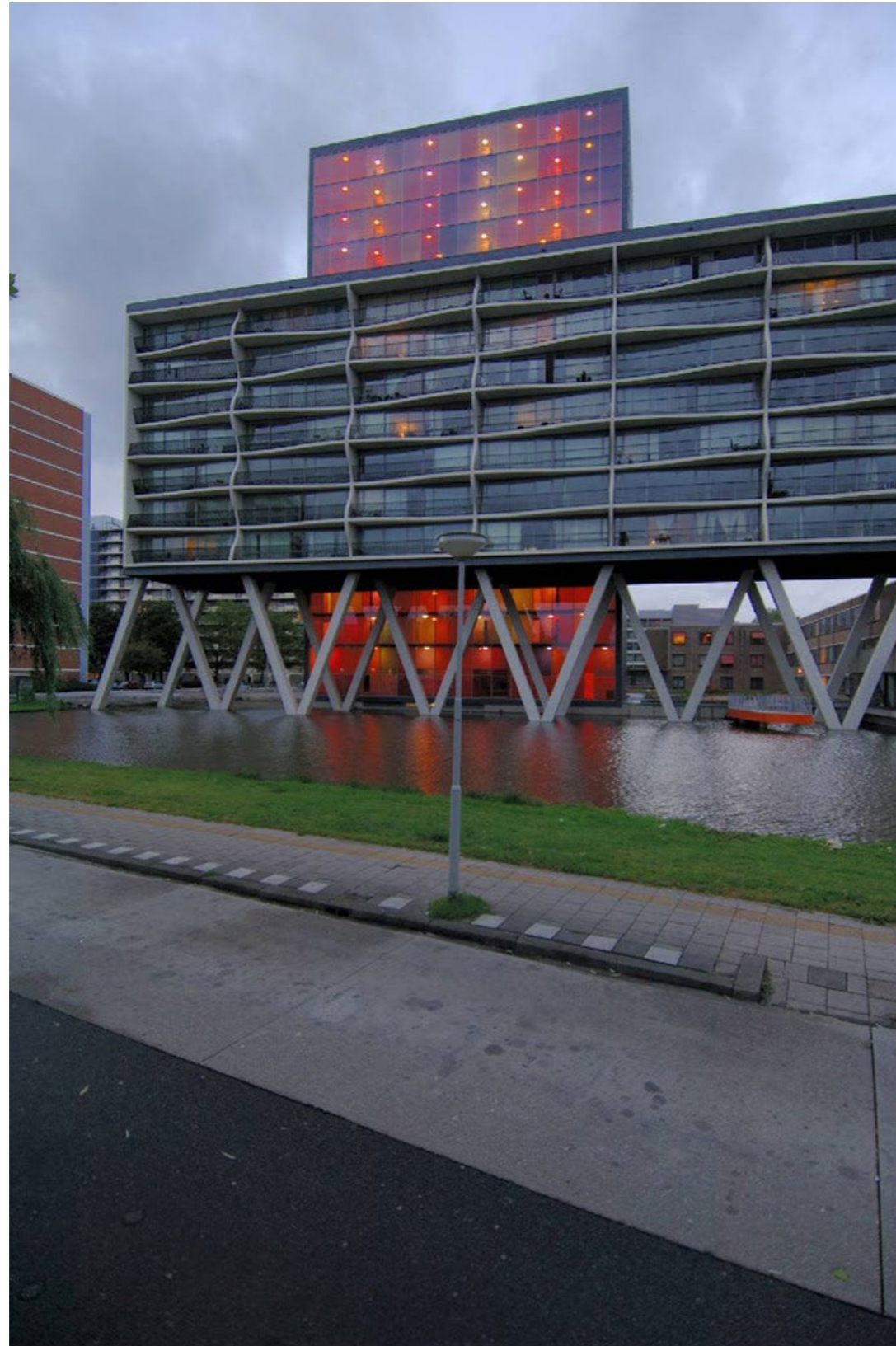
Part II - form study of EWF housing

Part III - EWF elements research

# CRITERIA OF CASE STUDY



## 2 CASES



De Plussenburg



WOZOCO



# CASE STUDY I: HIP - DE PLUSSENBURGH

Location: Rotterdam

Year: 2010

Architects: Arons&Gelauff architecten

Purpose: Elderly housnig for 55+

Characteristics: denial of aging by proposing a playful, coloured apartment block.

Programme:

101 apartments,  
51 parking places,  
recreational center,  
library.

Location: Delfgauw, the Netherlands

Year: 2000

Architects: KCAP

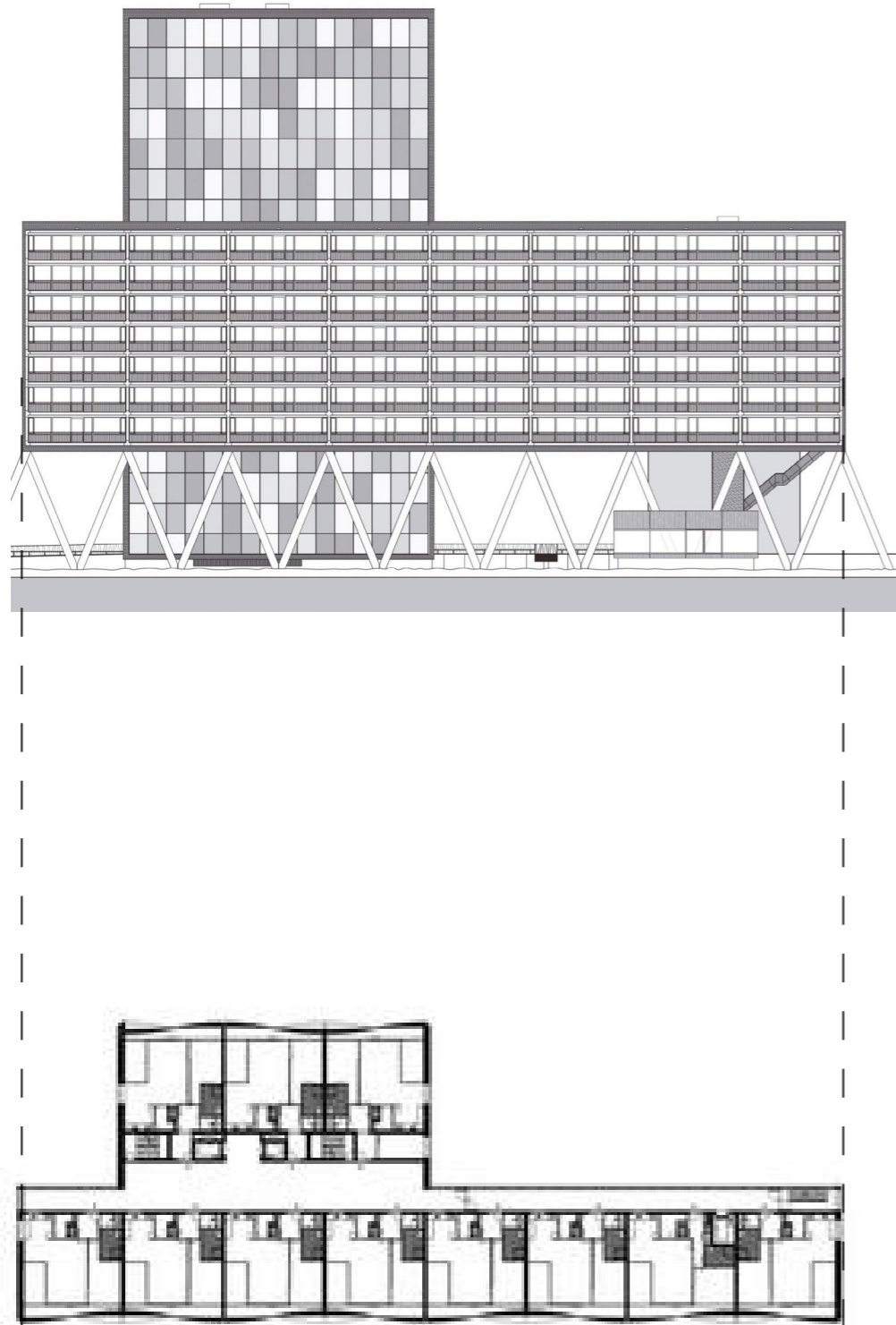
Purpose: Elderly housnig for 55+

Characteristics: Big atrium as communal space

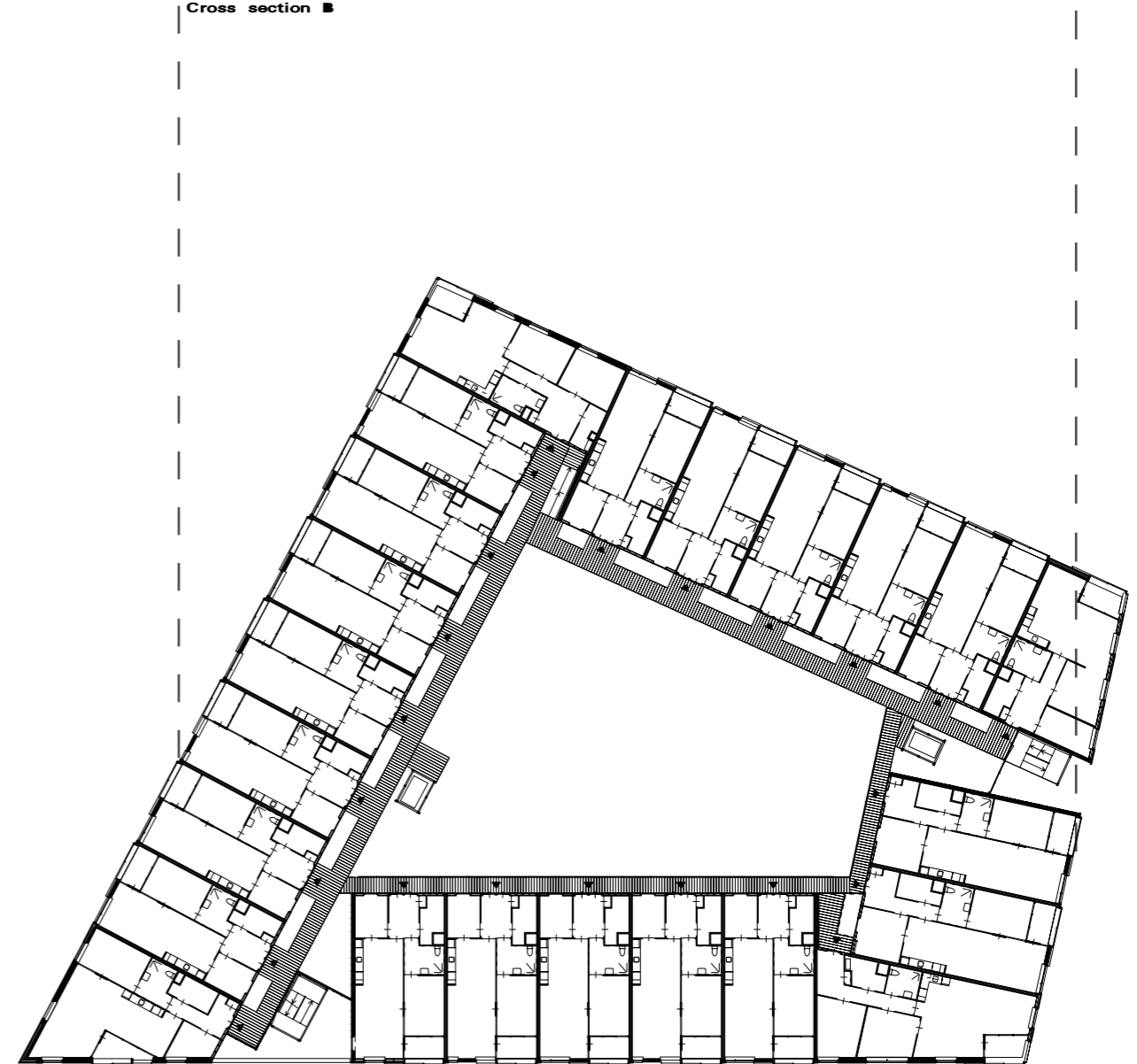
Programme:

115 apartments  
38 parking places,  
general practitioner,  
hairdresser,  
community center.

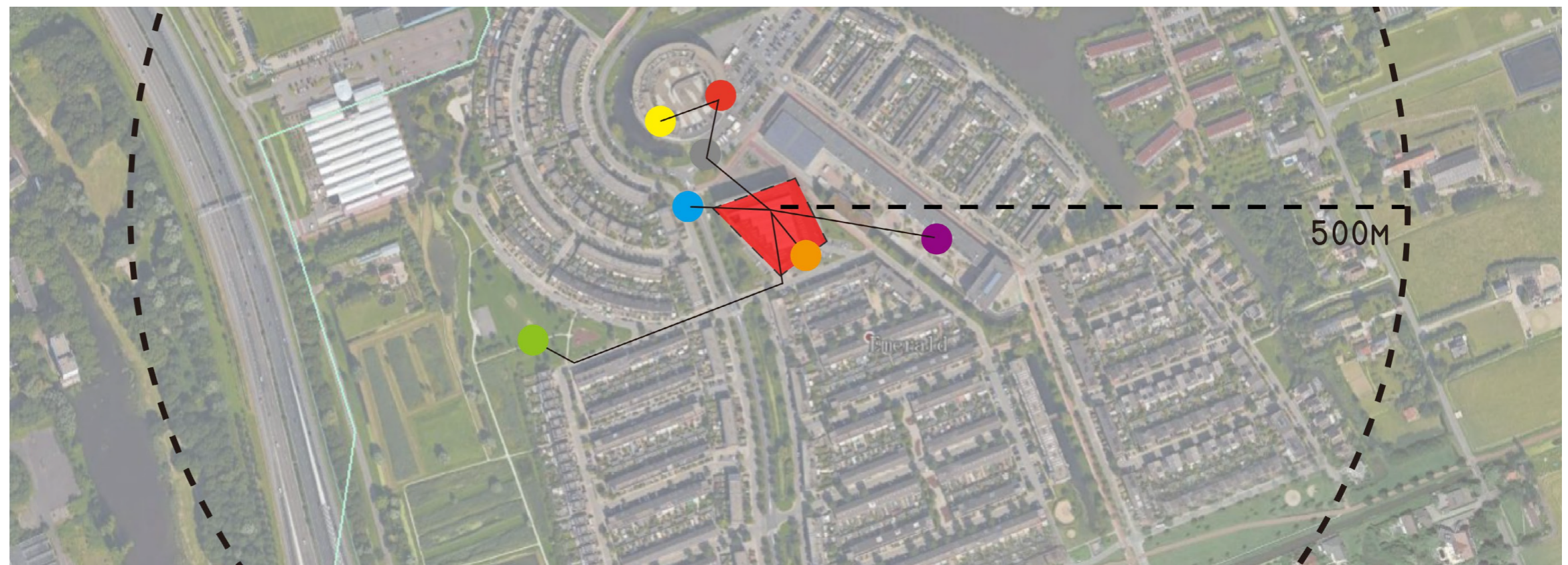
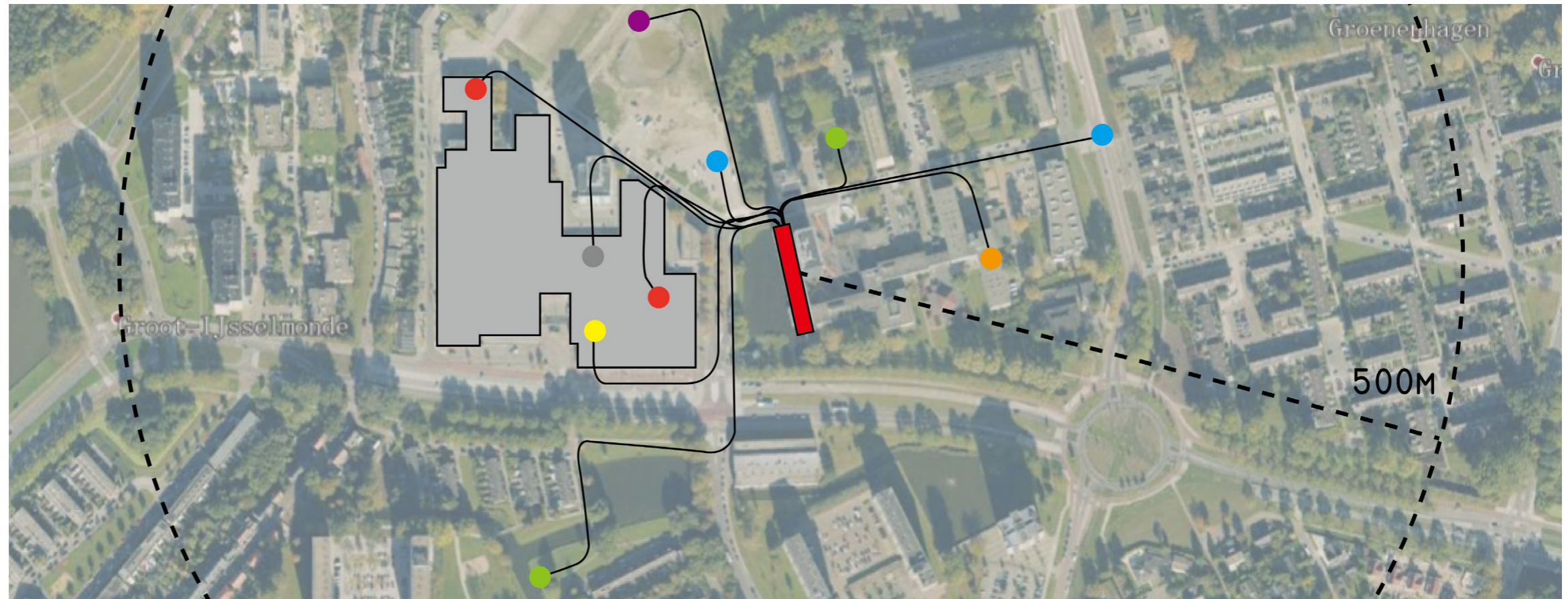
# HOUSING TYPE



Cross section ■



# CONTEXT



- supermarket
- bank
- greenery
- mailbox
- GP
- public transport
- culture facility

# A PLACE TO SOCIALIZE

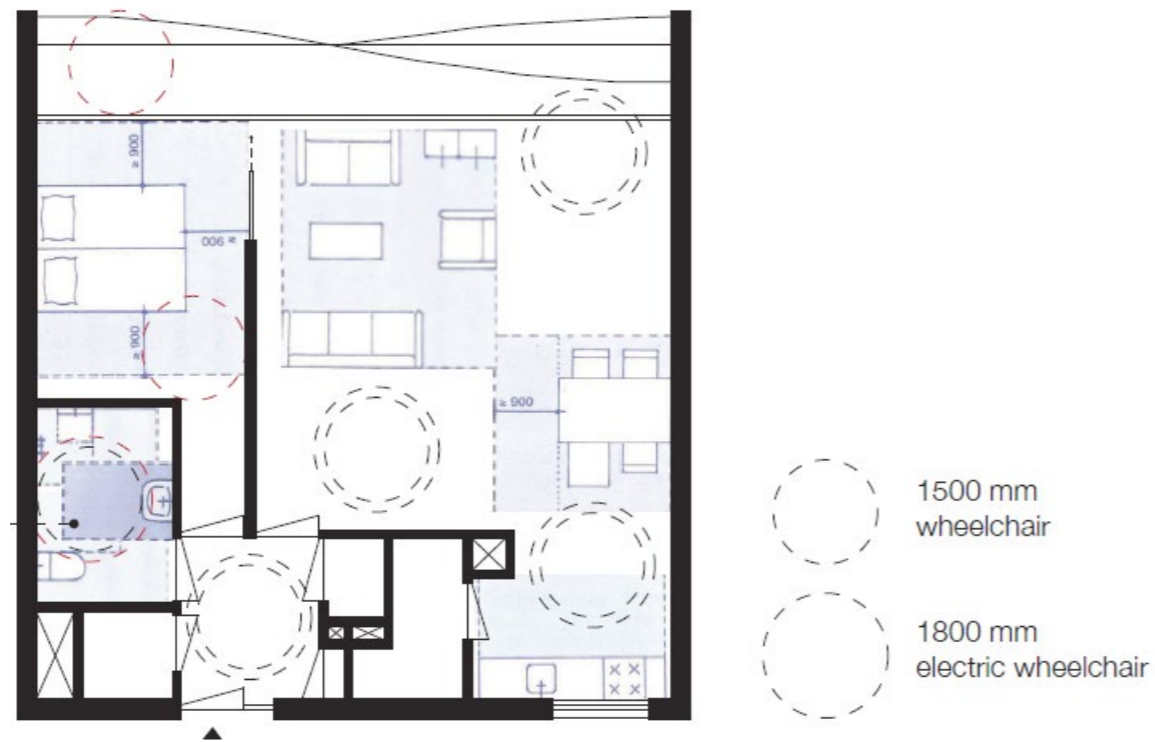


Communal space as social space



Hierachies of social space

# DWELLING TYPOLOGY

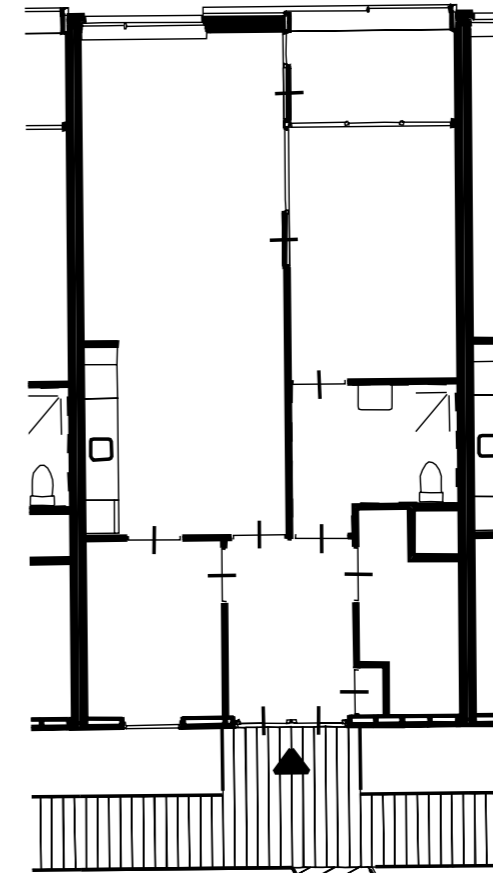


## PROS

- Large amount of daylight from the balcony
- Flexible connection between bedroom and living room
- Good privacy

## CONS

- Not completely wheelchair friendly
- Not enough interaction with the city



## PROS

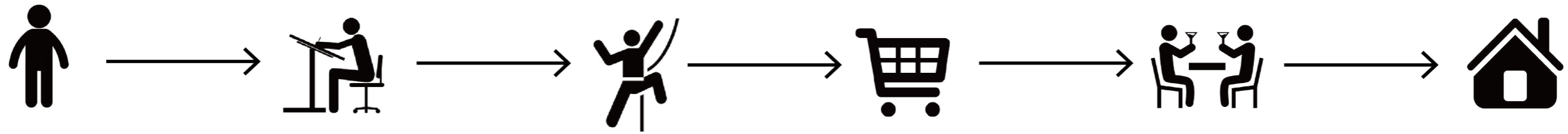
- Access to outside and indoor communal space
- Circular route
- Spatial interaction between floors

## CONS

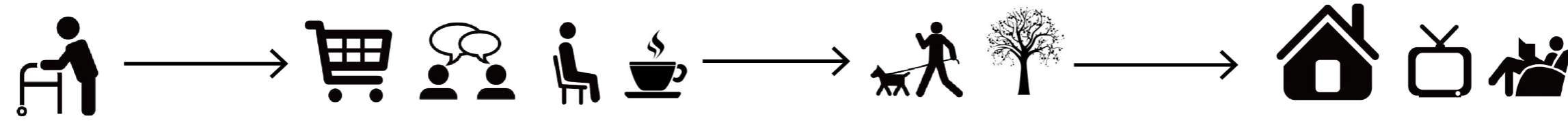
- Too small for big wheelchair

# CONCLUSION I: DIFFERENCE IN LIFE STYLE

YOUNG MAN: SEPERATE DESTINATIONS



ELDERLY: INTEGRATED DESTINATIONS



# CONCLUSION 2: THE REQUIREMENTS FOR ELDERLY HOUSING

## ENVIRONMENT



Primary facilities <500m

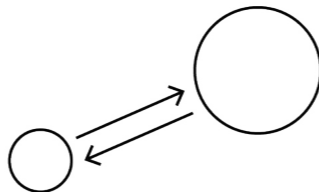


Secondary facilities <800m



Access to nature

## BUILDING



Enhancing communication



Necessary care facilities

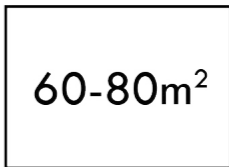


Wheelchair friendly

## DWELLING



Privacy & interaction balance



Surface area 60-80m<sup>2</sup>



Wheelchair friendly

# RESEARCH

Methodology

Part I - case study of elderly housing

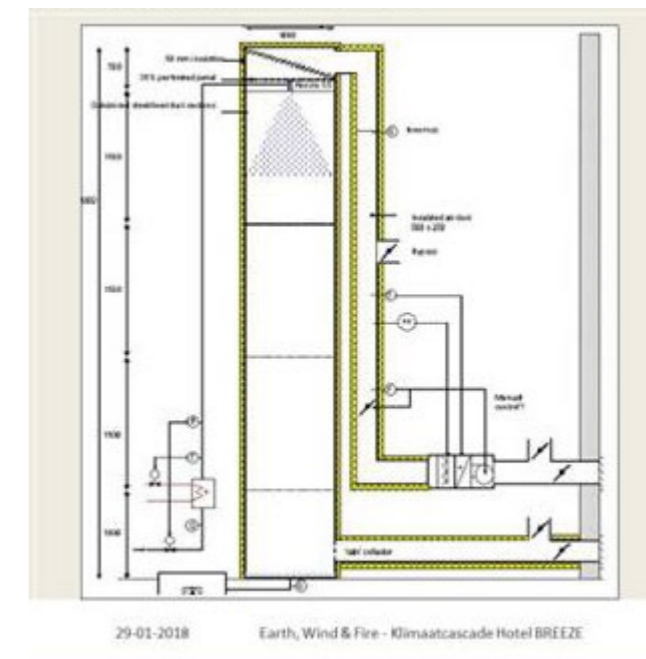
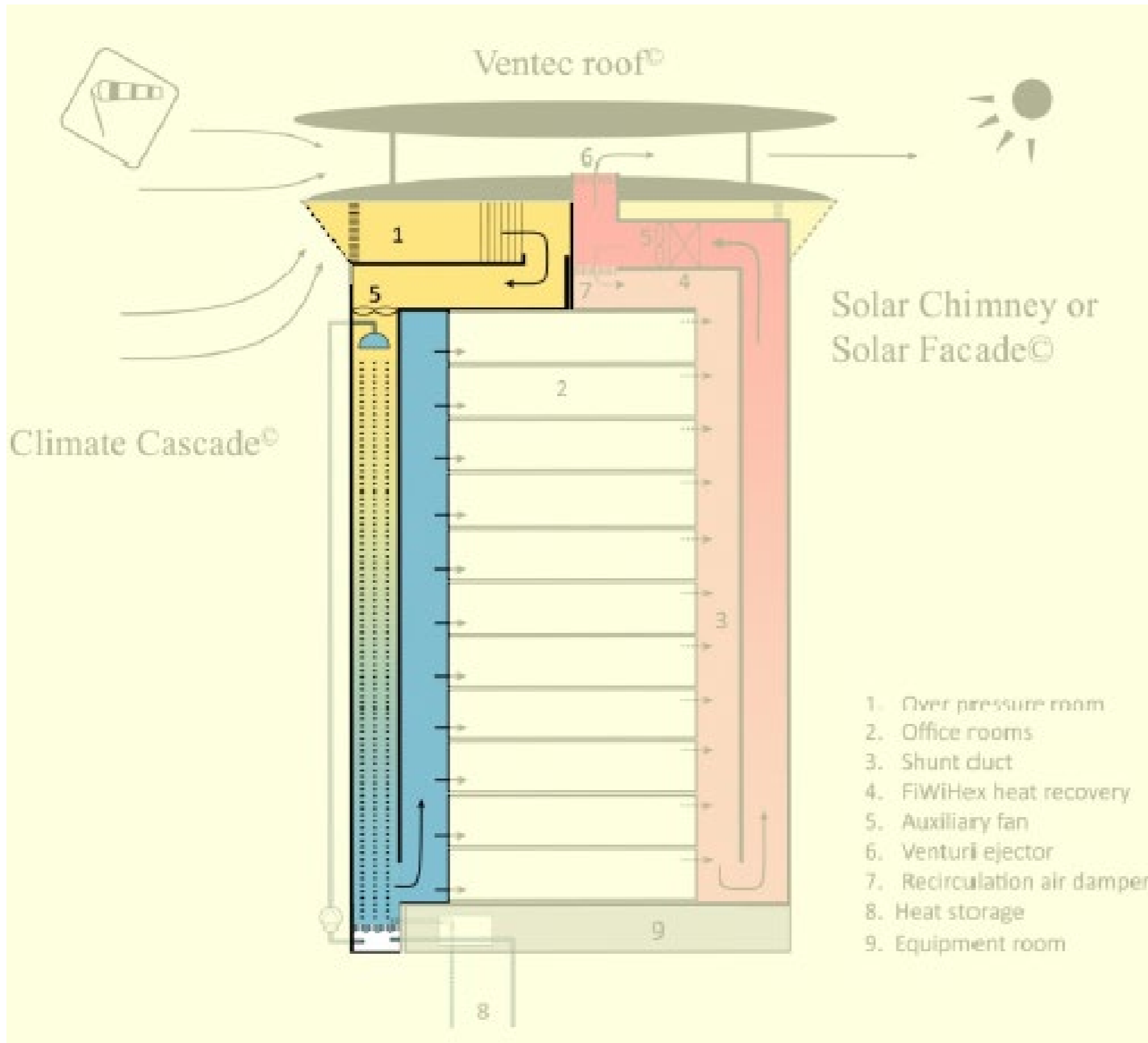
Part II - form study of EWF housing

Part III - EWF elements research

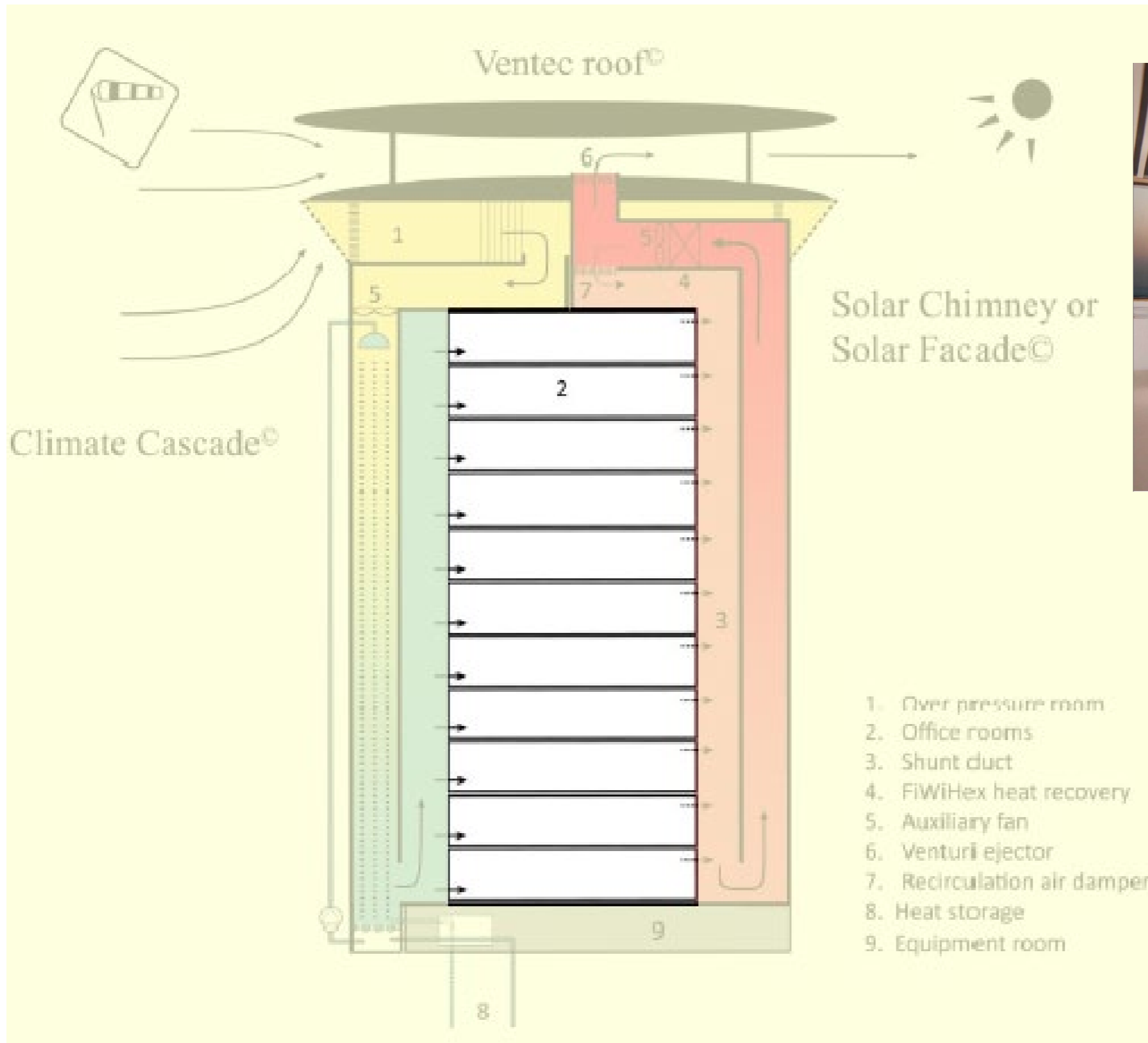


EWF + HOUSING + COMMUNAL SPACE = ?

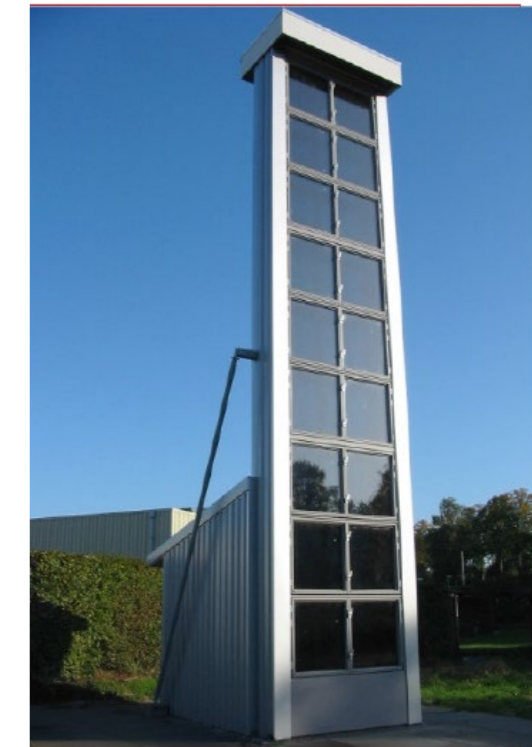
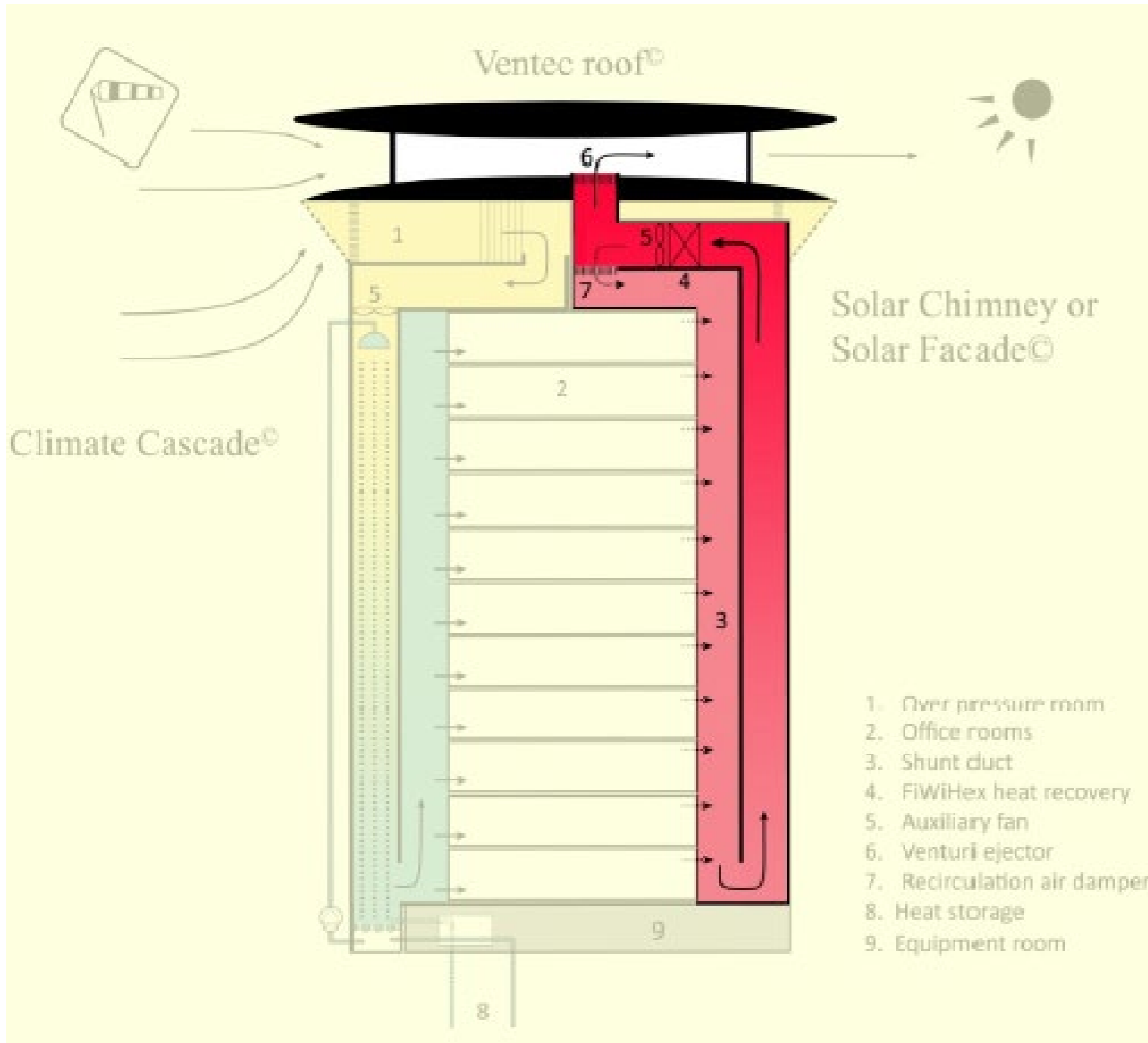
# COMPONENT I: CLIMATE CASCADE



# COMPONENT 2: MAIN BODY

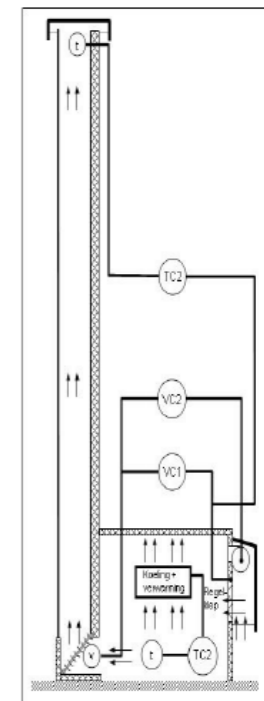


# COMPONENT 3: SOLAR CHIMNEY



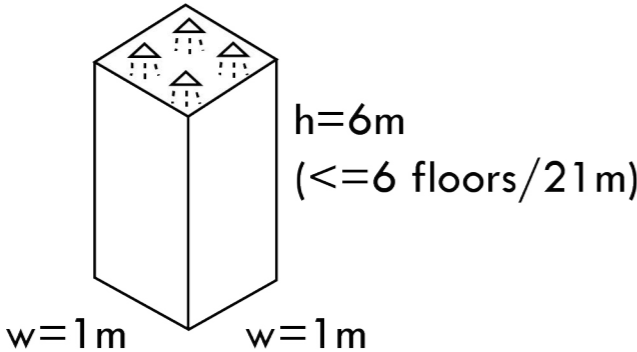
## Regeltechniek

- VC1 = snelheidsbeperking d.m.v. regelklep
- VC2 = snelheidsregeling d.m.v. ventilator
- TC1 = ruimtemtemperatuur-regeling d.m.v. warmtepomp
- TC2 = maximaalbegrenzing schoorsteentemperatuur d.m.v. regelklep
- t = temperatuursensor
- v = luchtsnelheidsensor

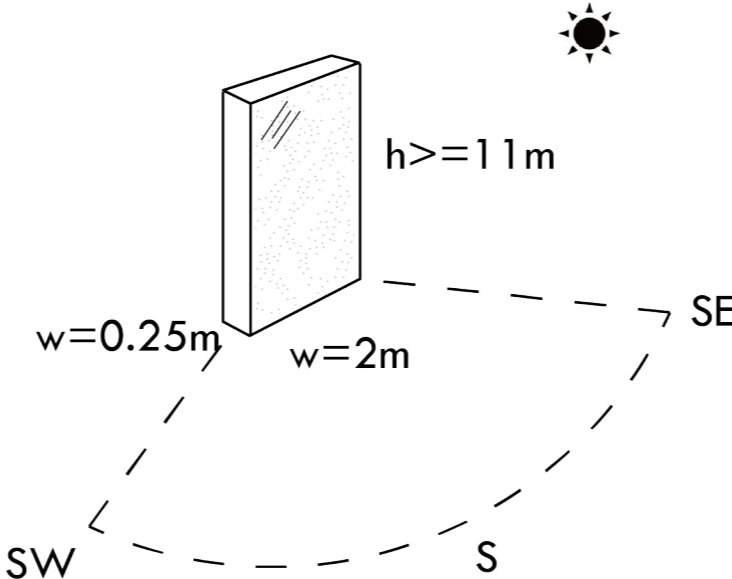


# EWF FACT SHEET

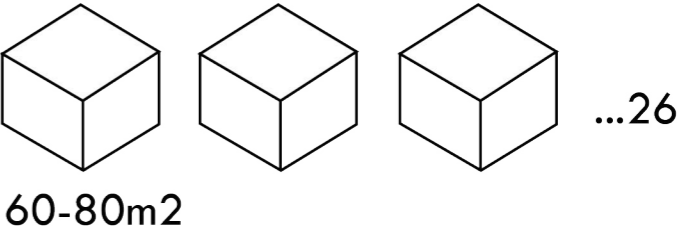
Climate cascade(1800m<sup>3</sup>.h<sup>-1</sup> )



Solar chimney(1800m<sup>3</sup>.h<sup>-1</sup> )

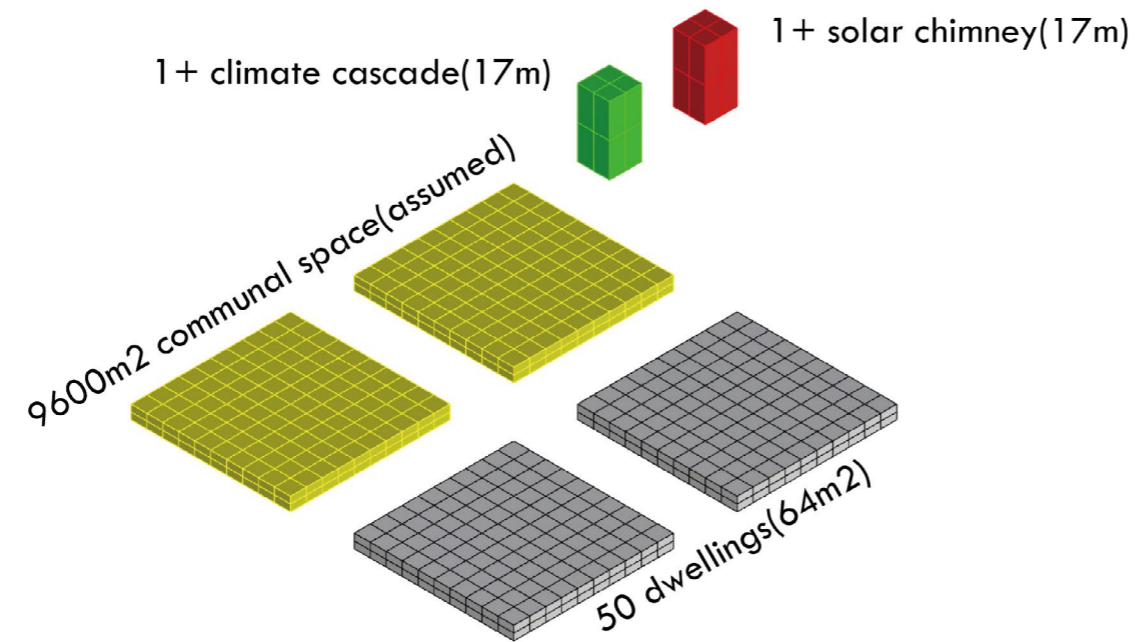


living unit

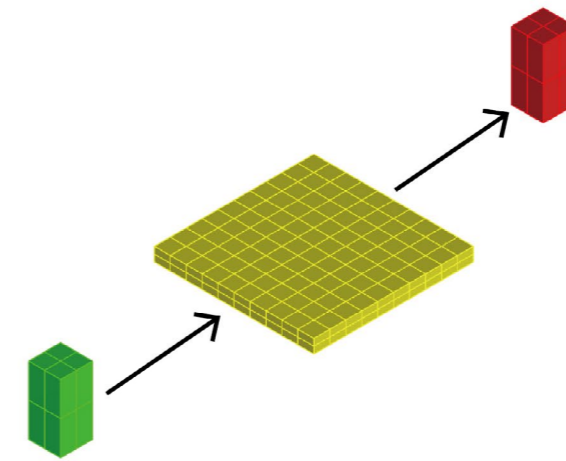


# CONCLUSION: RULES FOR EWF FORM STUDY

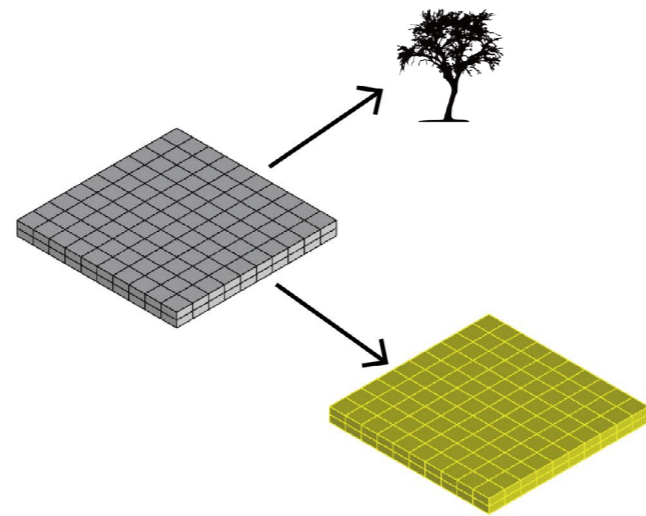
## 1. FOUR BASIC ELEMENTS



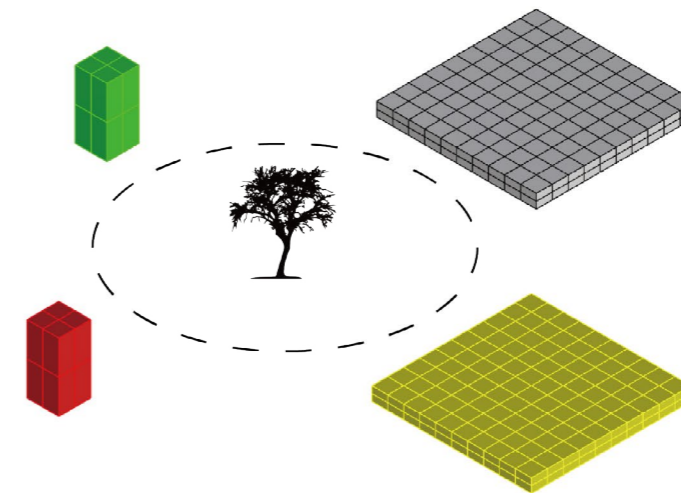
## 2. LINEAR CONNECTION



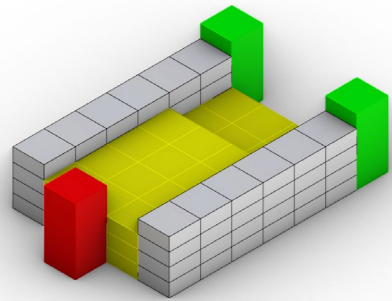
## 3. DWELLING SHOULD FACE AT LEAST ONE FACE TO EXTERIOR



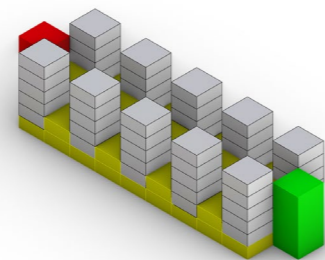
## 4. CREATING RICHER ACCESS TO NATURE



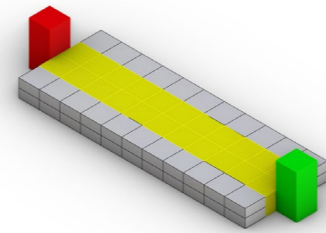
# EWF FORM STUDY RESULTS



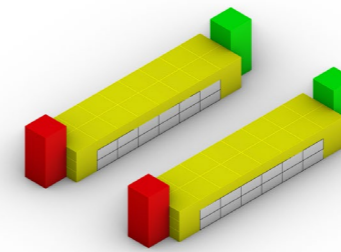
Atrium housing



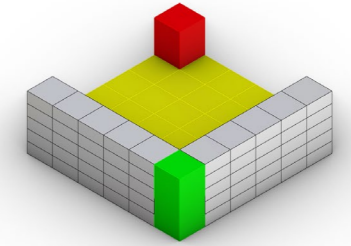
Blocks on the market



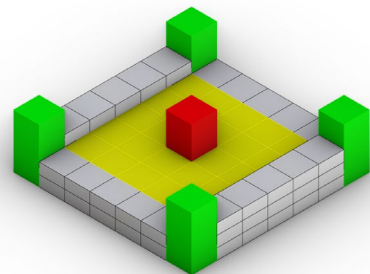
Rowing housing



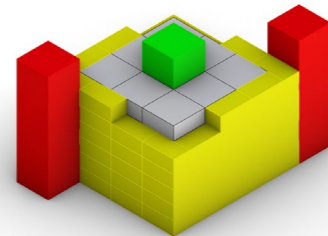
Roof garden houses



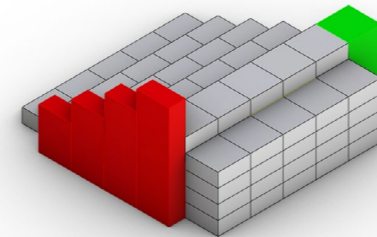
Neighbour market



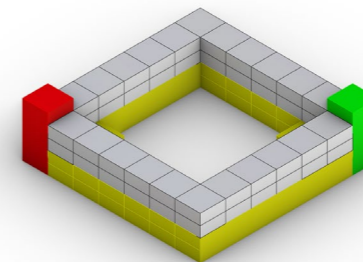
Solar courtyard



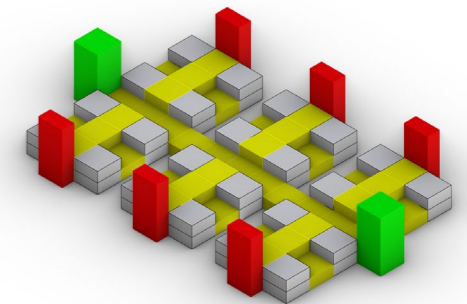
Solar space housing



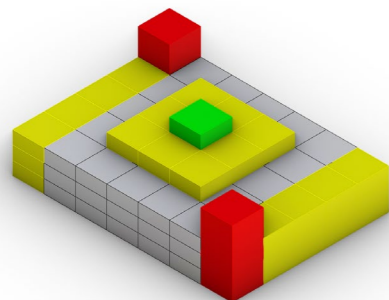
Terrace



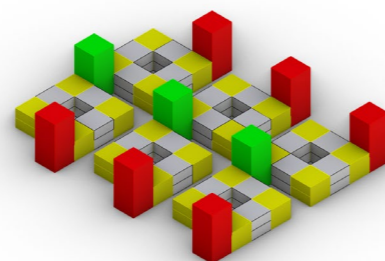
Nature-EWF-housing



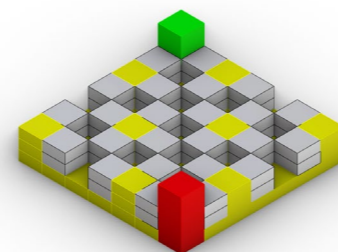
8-house clusters



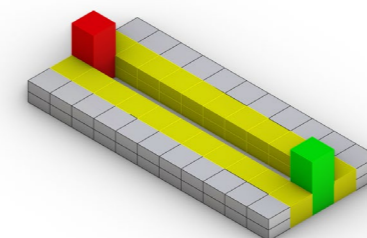
EWF courtyard



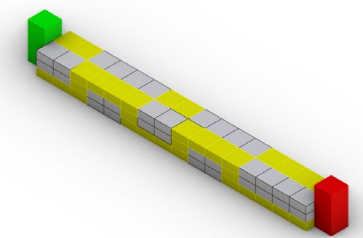
Courtyard clusters



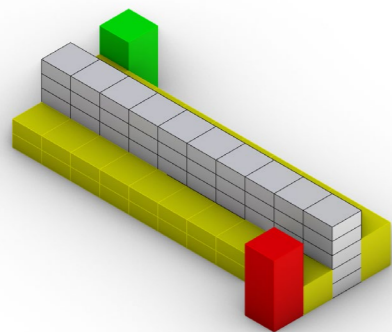
EWF-nature cluster



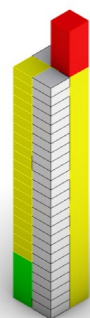
Rowing housing courtyard



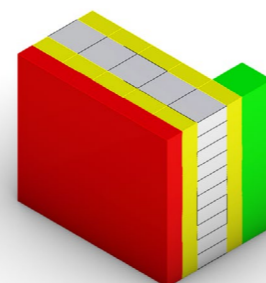
Serpentine housing



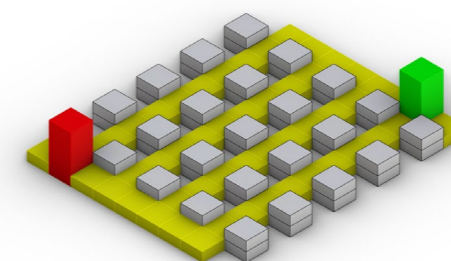
Living on the neighbourhood



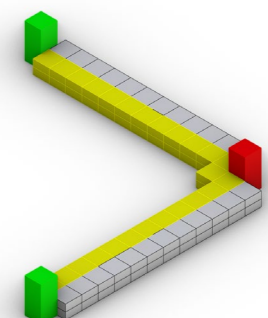
Skyscraper



'Sandwich' EWF housing



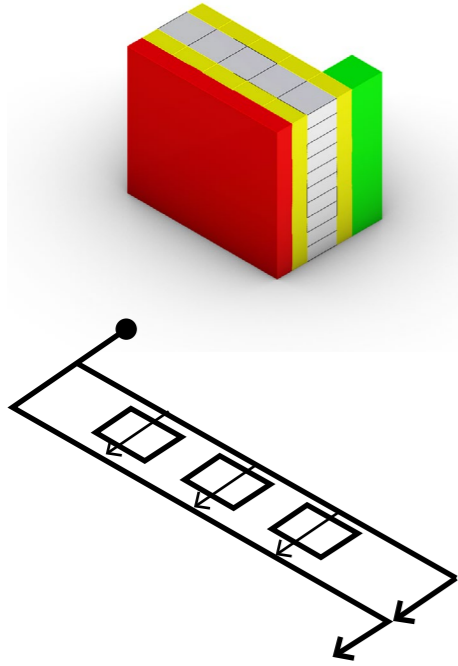
Street neighbourhood



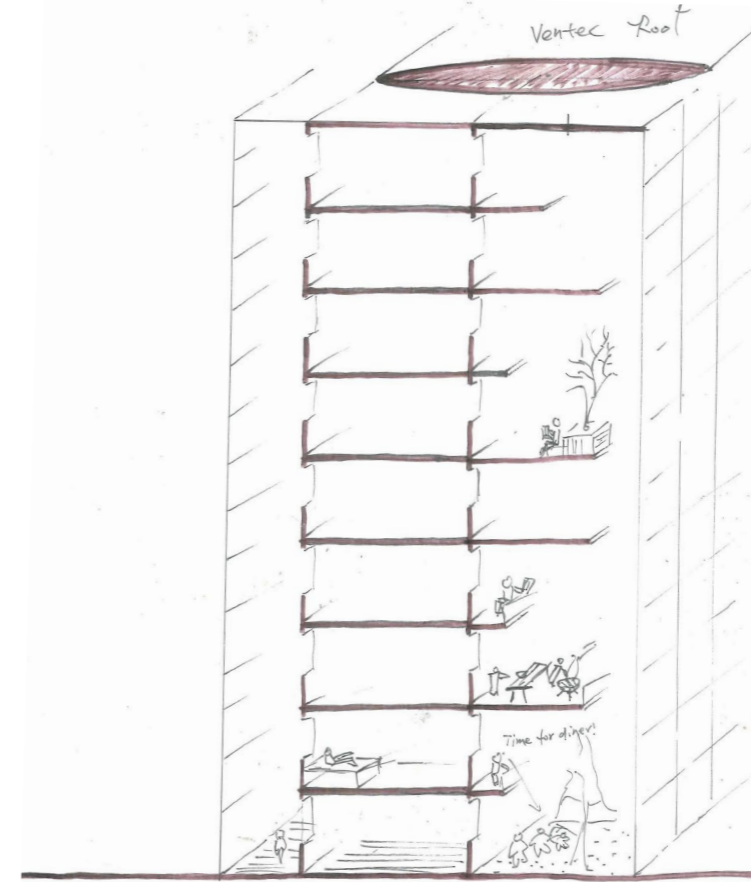
Cool-Warm dwelling

# EWF WRAPPING DWELLINGS

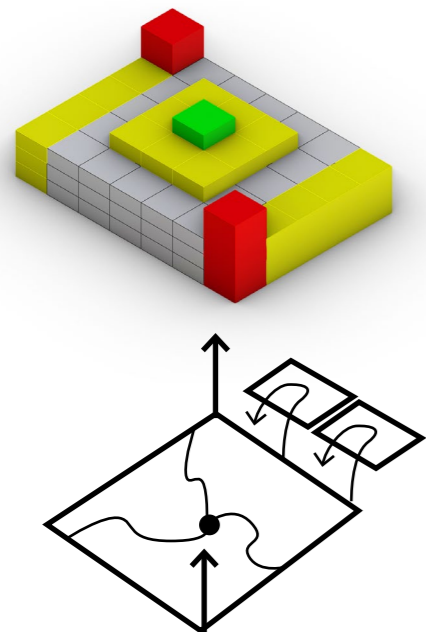
## TYPE: Gallery housing



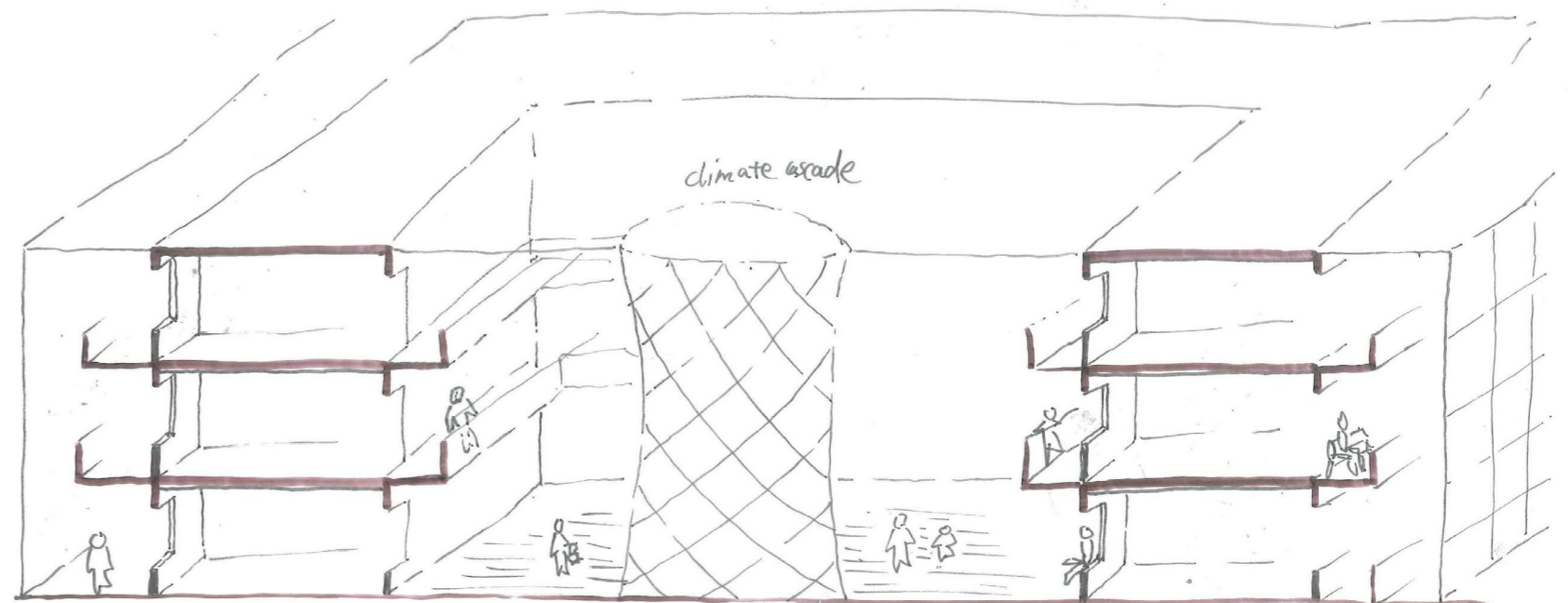
2 communal space are located between the dwelling and the solar chimney/climate cascade. This arrangement is potential to be applied in existing gallery flat and new collective housing. Two linear space are connected and ventilate the space inbetween. It is a typical EWF ventilation method.



## TYPE: Courtyard housing



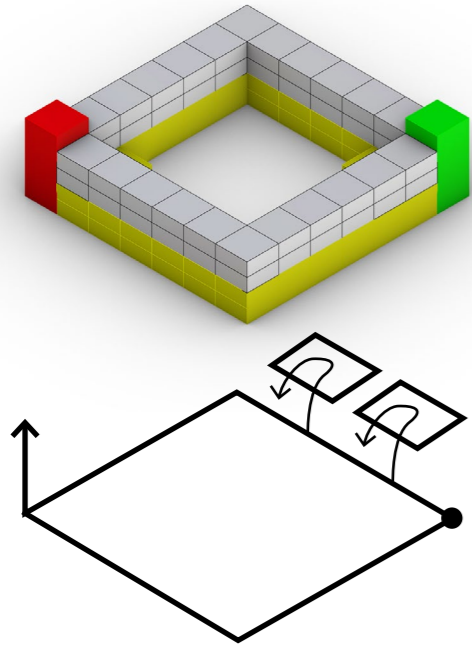
The climate cascade forms the central communal space, and all the dwelling are located around it. It forms a very compact block.





# ONE SIDE EWF AND ONE SIDE NATURE

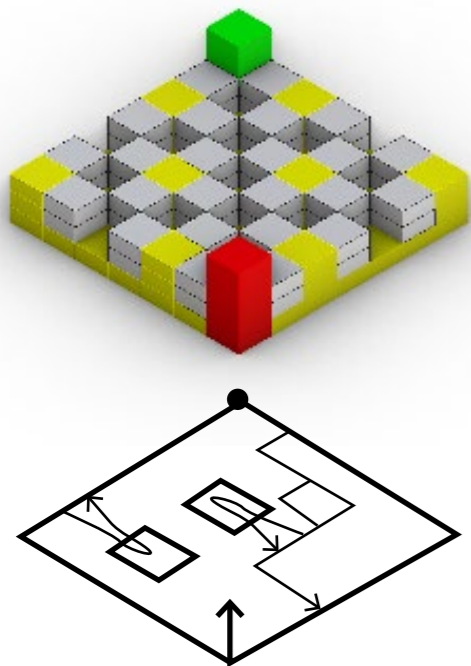
## TYPE: Courtyard housing



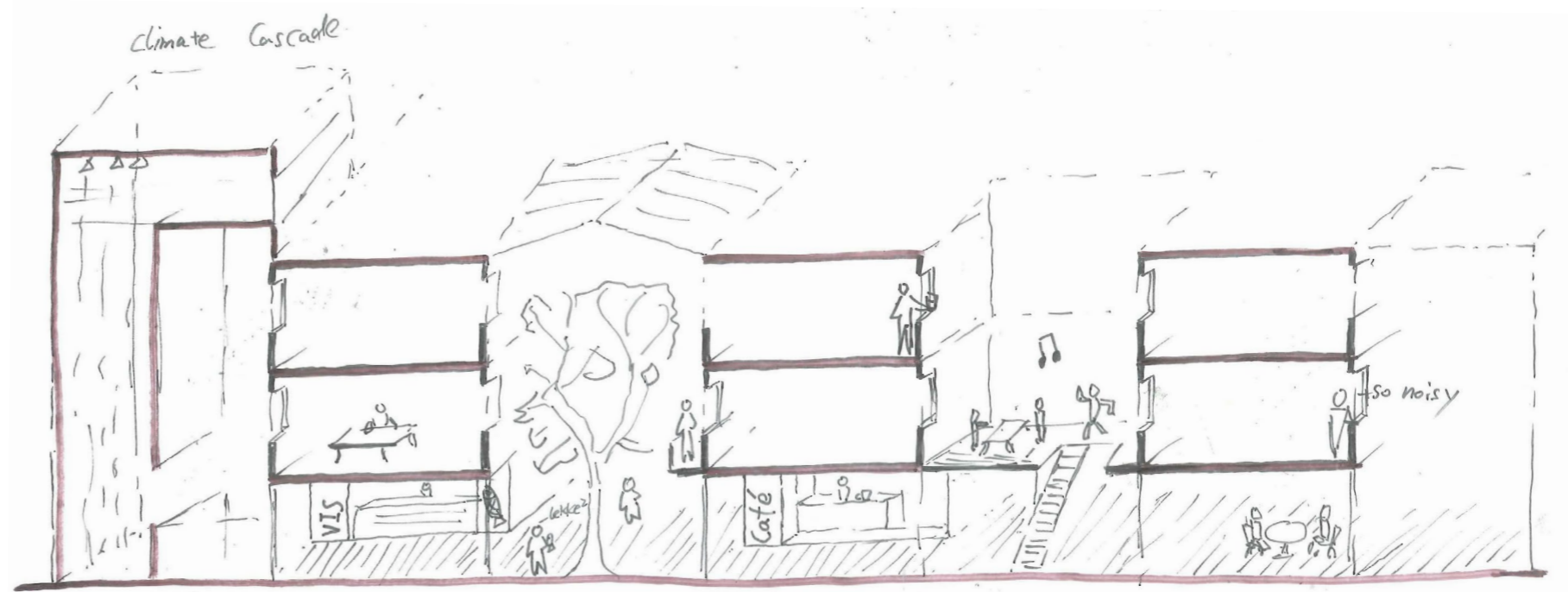
The living units are on top of the communal space, and they form a space enclosing the communal exterior space in the middle. The communal space is the connecting the solar chimney and the climate cascade. The rooms can simply be ventilated by opening windows to the communal



## TYPE: Cluster

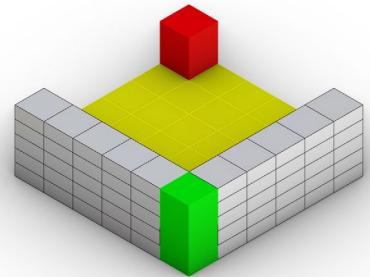


Living units are on top of the communal space, and all the communal space have access to both exterior and EWF space. The communal space can be regarded as the main ventilation duct, while all the small spaces and rooms are connected to these main flow to ventilate. When necessary, duct can be added to some far away corners.

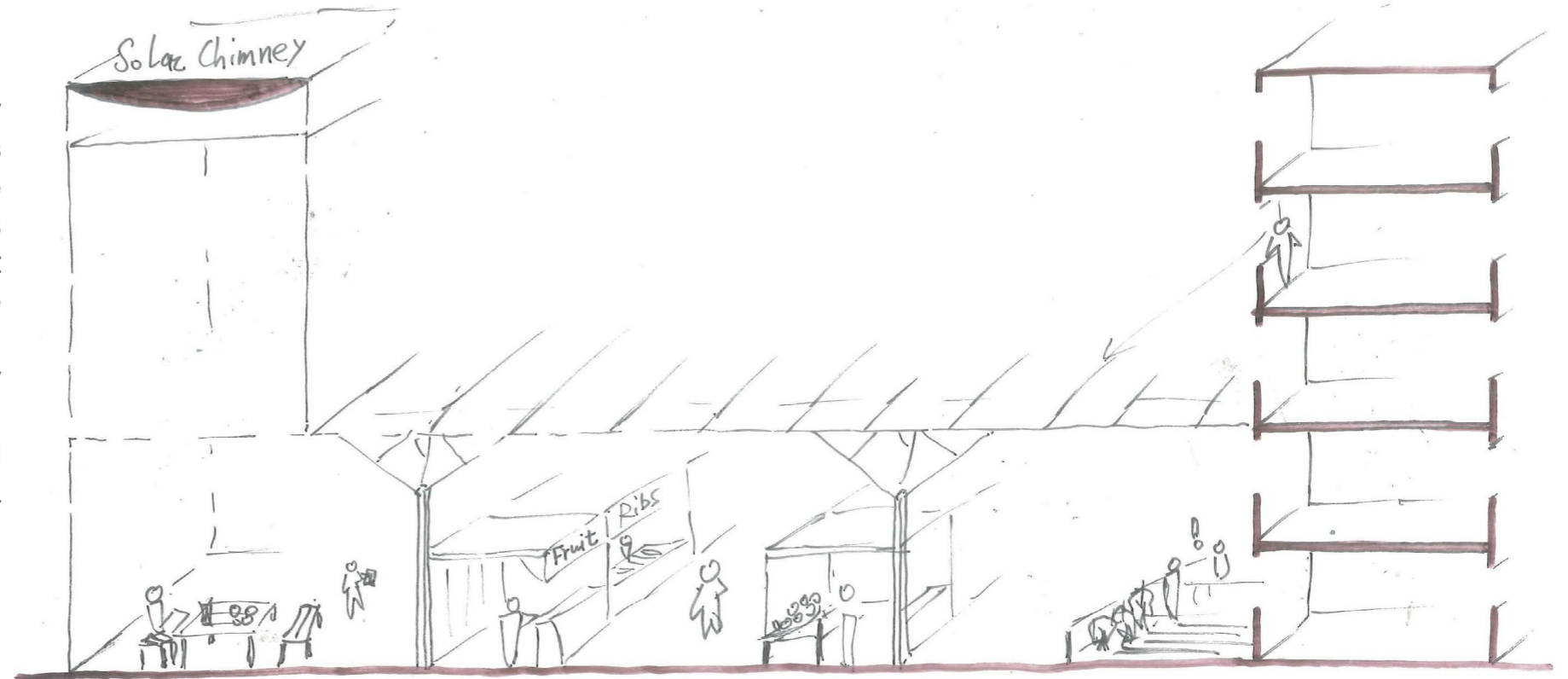
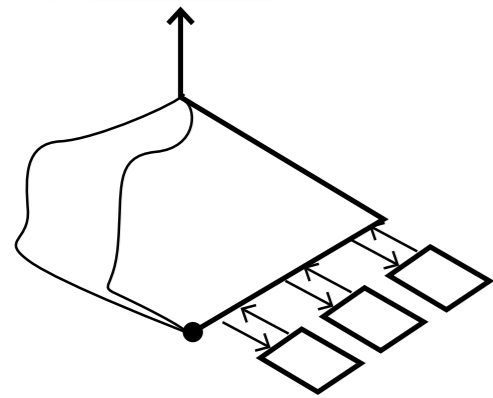


# DWELLING DETACHED FROM EWF

## TYPE: Gallery housing

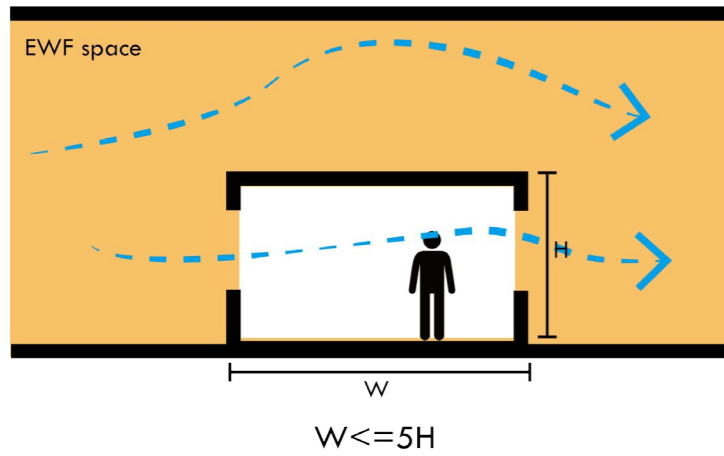


The housing are built in a conventional gallery typology, which is highly densified. The communal space is organized together next to the dwelling. There are 2 modes in this building. Rooms are simply ventilated by the ducts, while the communal space is ventilated in a natural way.

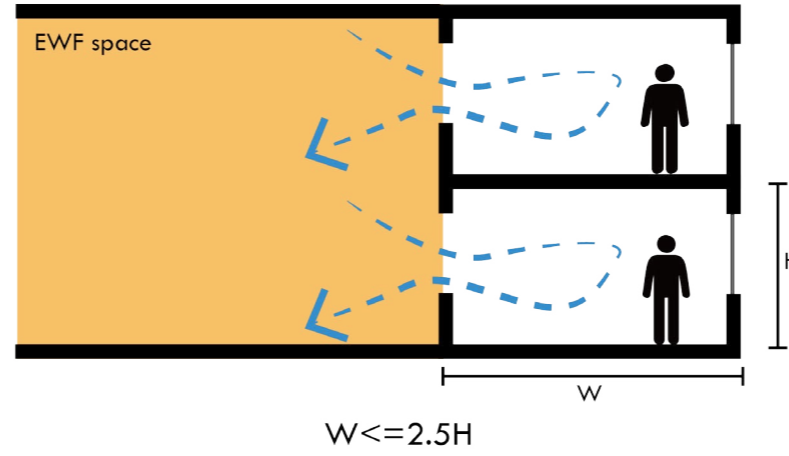


# CONCLUSION: 3 TYPES OF EWF SPATIAL ORGANIZATION

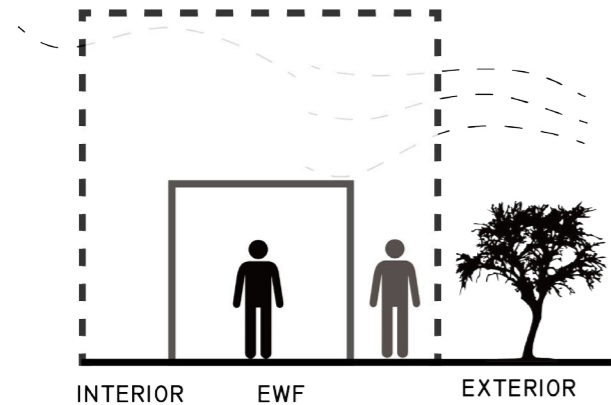
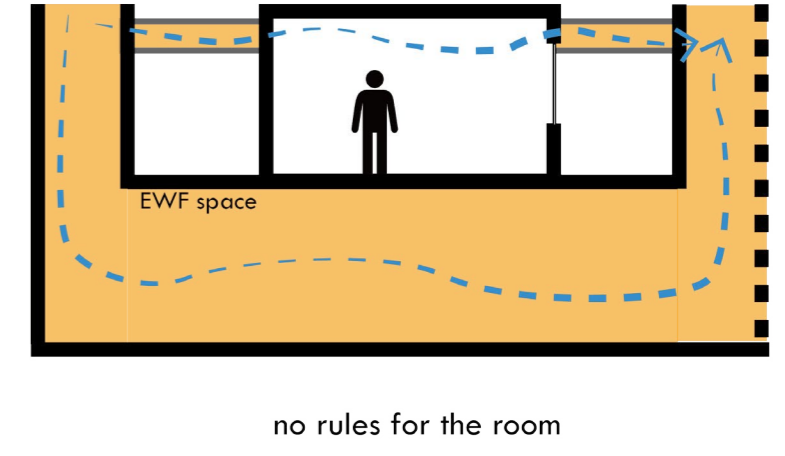
1. CROSS VENTILATION



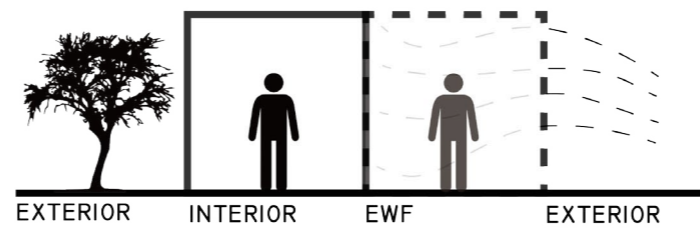
2. SINGLE-SIDED VENTILATION



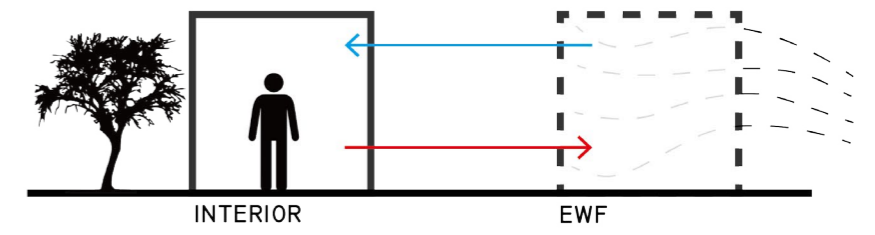
3. DUCT SYSTEM



A. HOUSING IN THE EWF SPACE



B. HOUSING NEXT TO EWF SPACE



C. HOUSING DISCONNECTED FROM EWF SPACE

EXPERIENCE

+

++

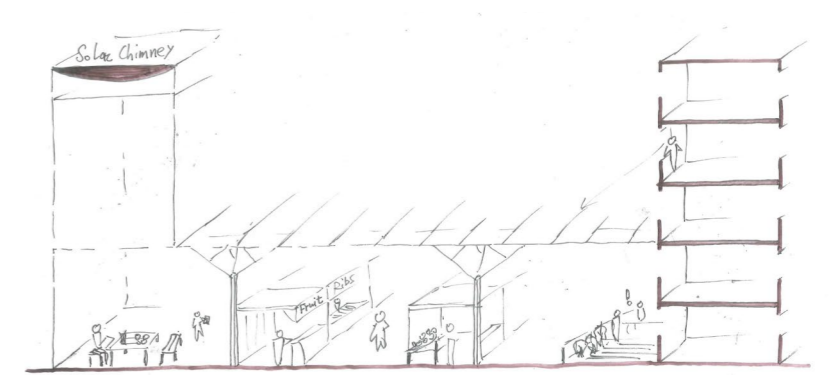
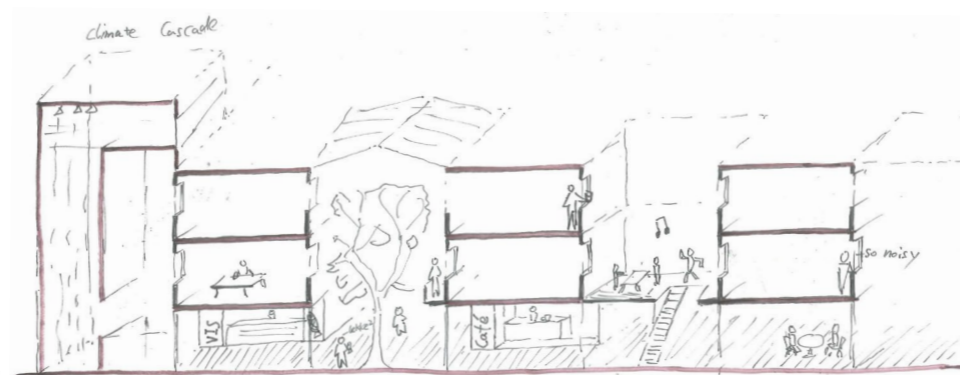
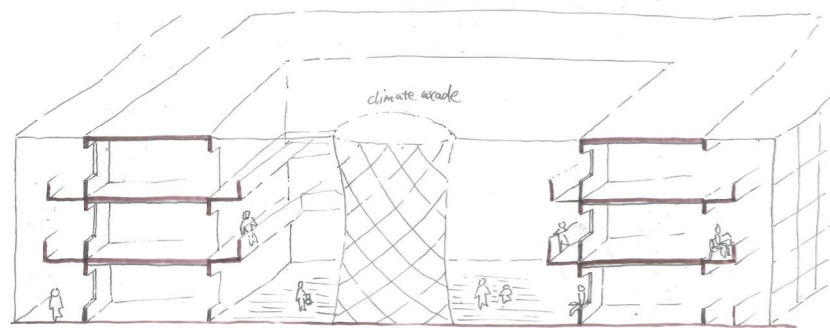
-

FLEXIBILITY

+

+

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# RESEARCH

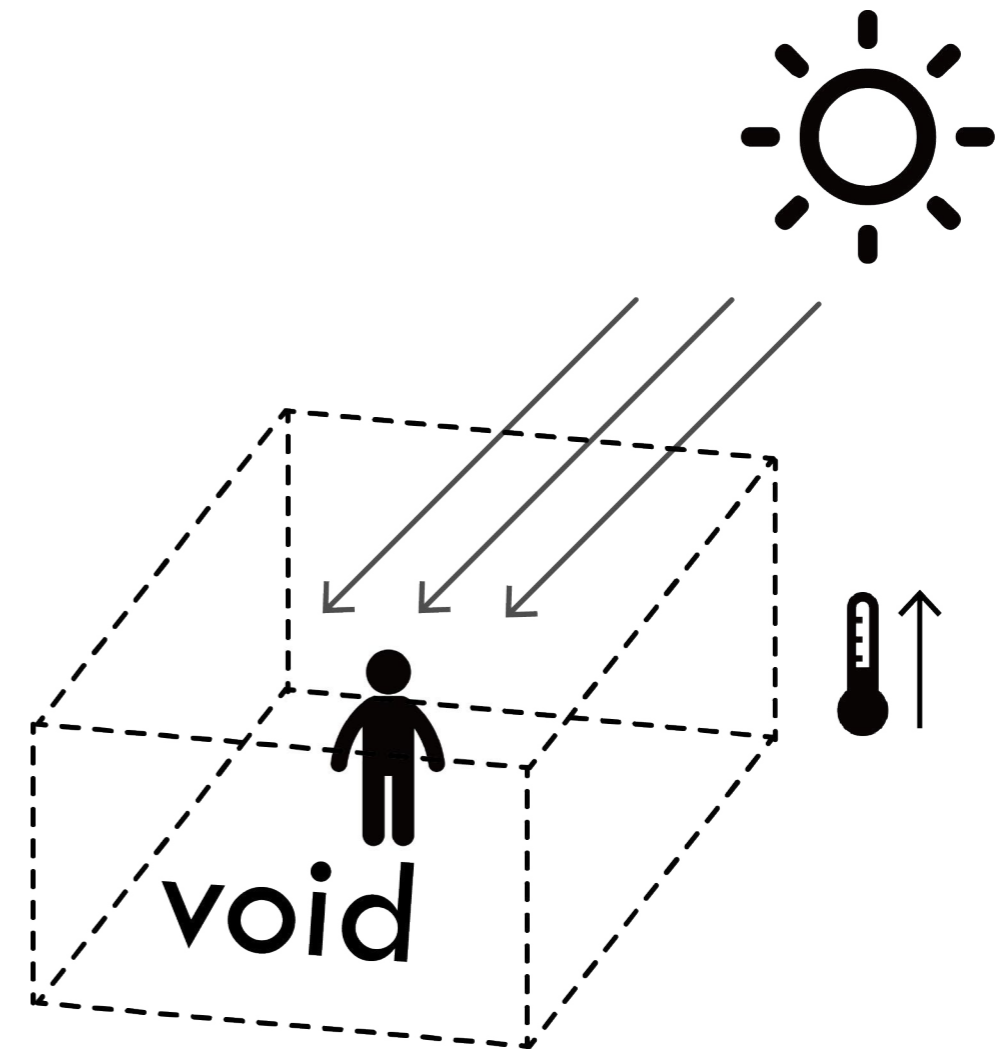
Methodology

Part I - case study of elderly housing

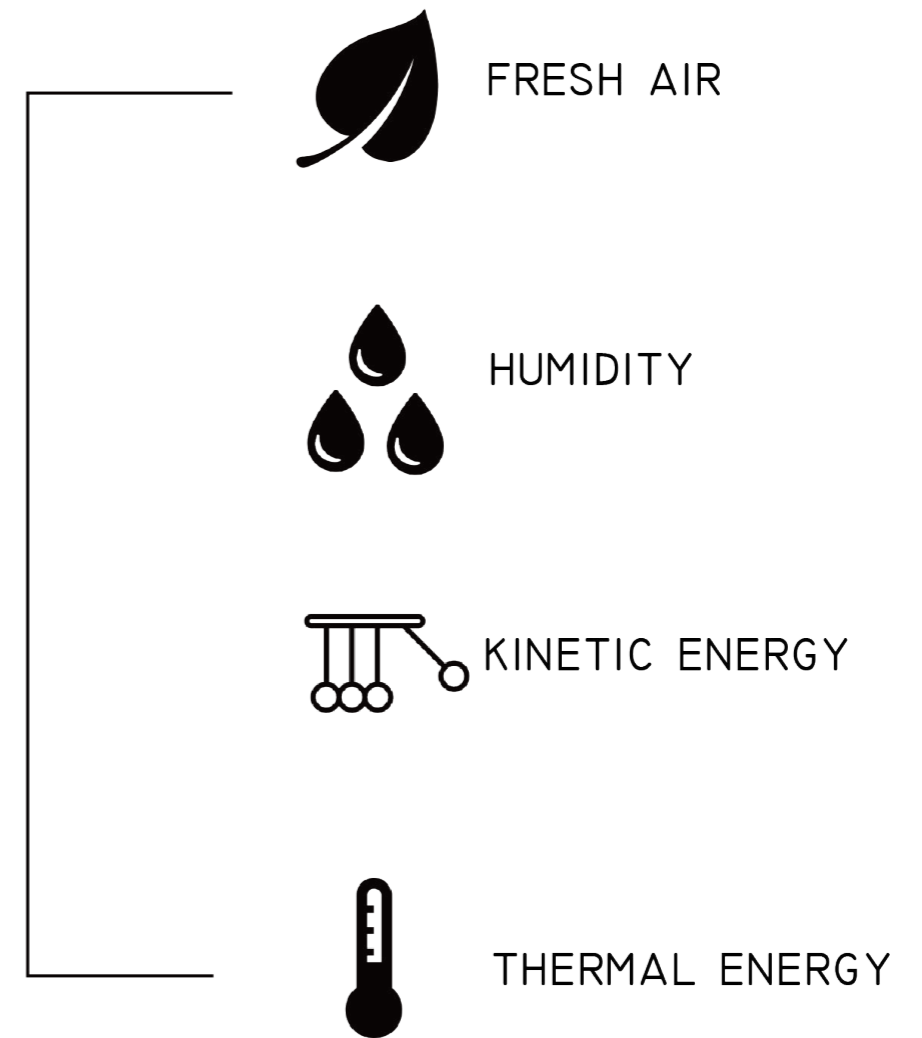
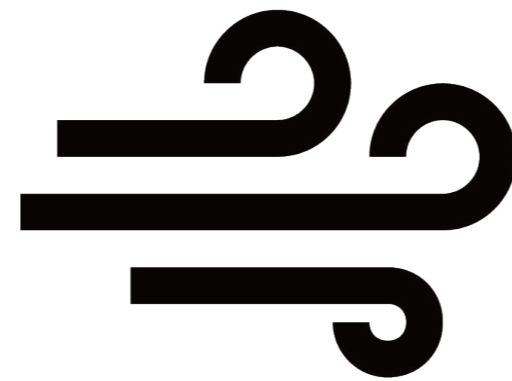
Part II - form study of EWF housing

Part III - EWF elements research

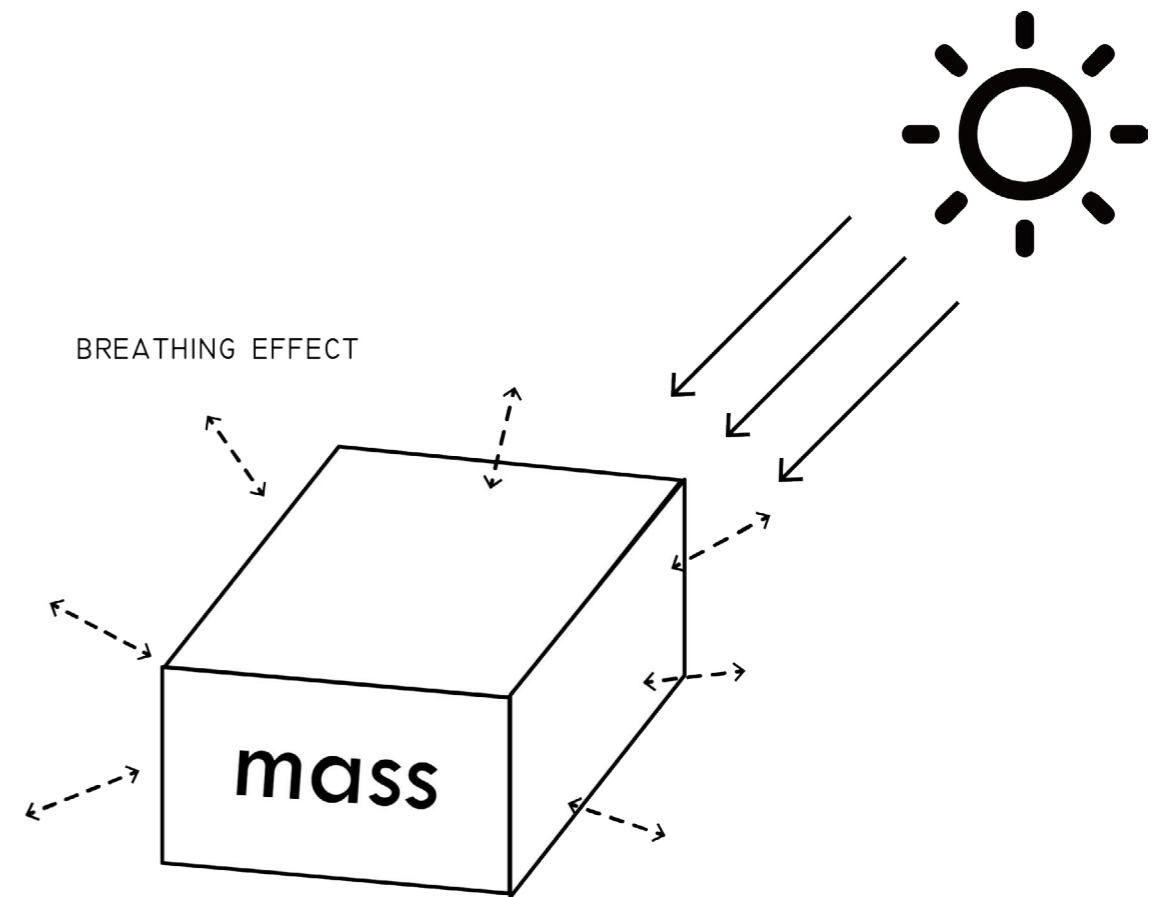
# SUN



# WIND



# EARTH

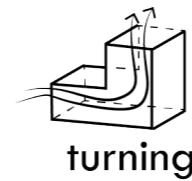
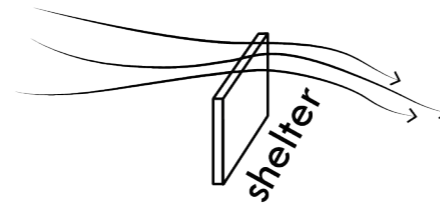
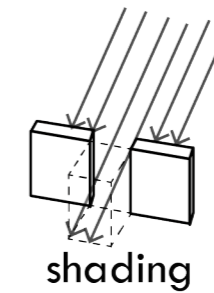
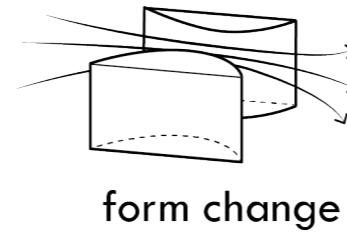
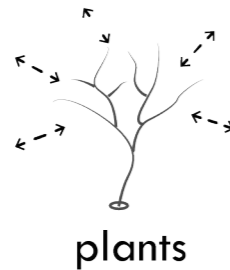
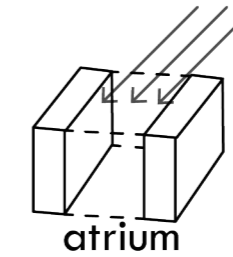
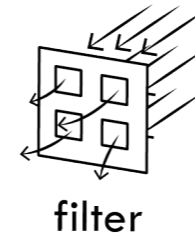
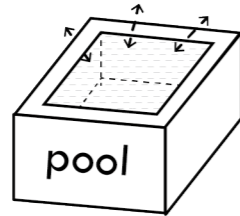
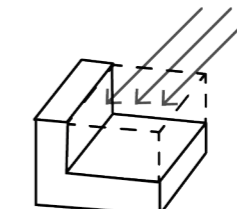
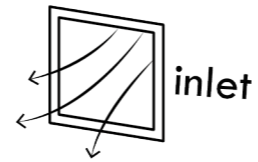
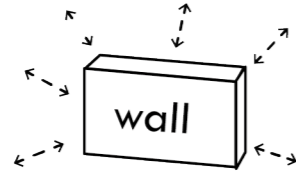
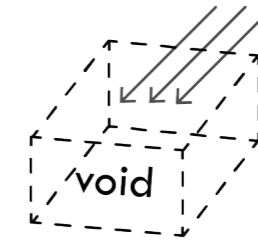
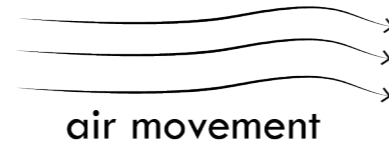
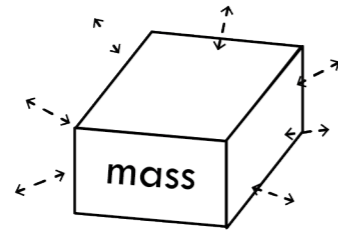


# CONCLUSION: HUMAN SCALE ELEMENTS EXPRESSION

EARTH(ENERGY SAVER)

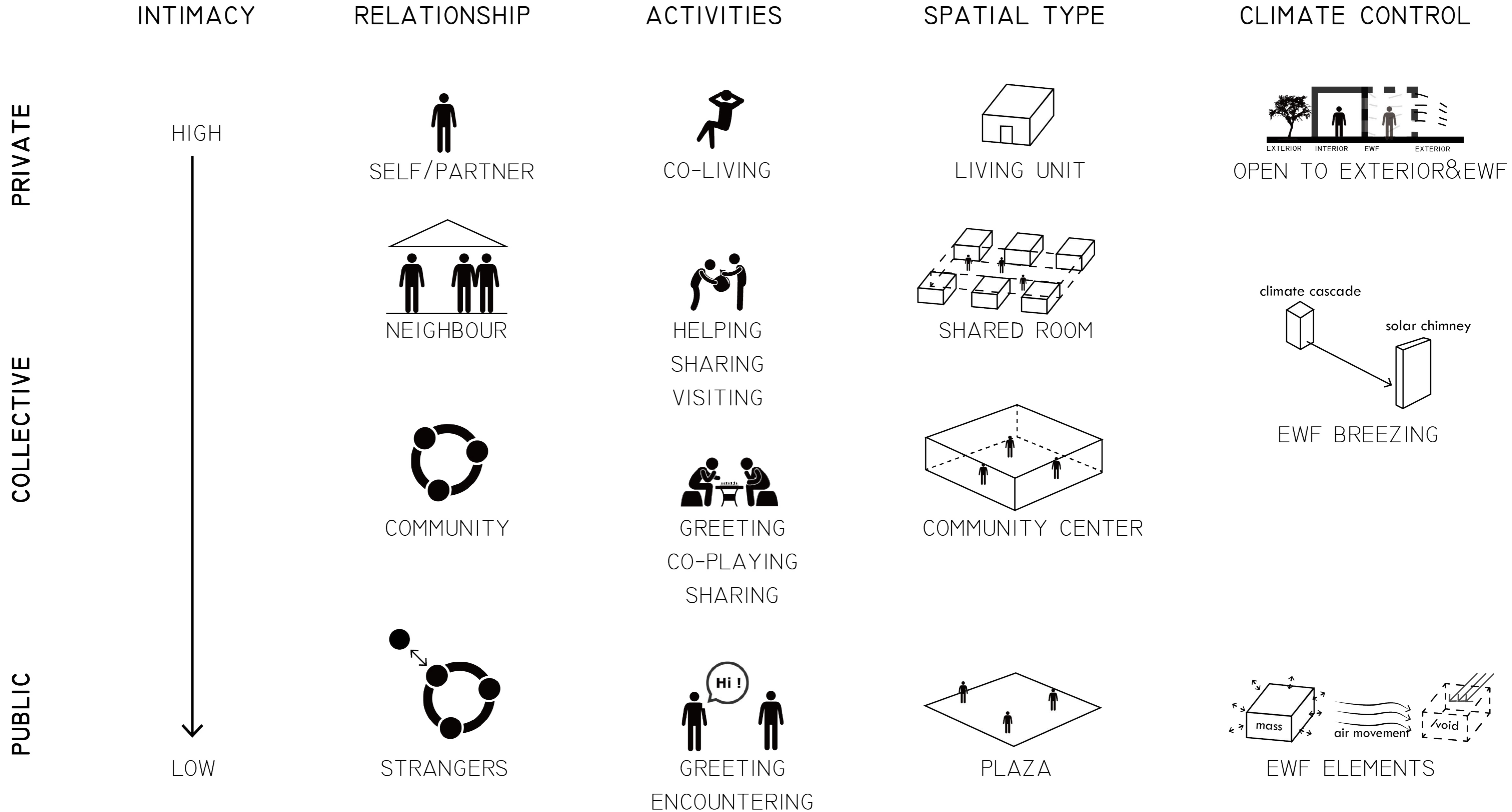
WIND(ENERGY MOVER)

SUN(ENERGY SOURCE)





# CONCLUSION: DESIGN STRATEGIES



# ARCHITECTURAL TRANSLATION

Context & location

Program

Priliminary design

KINDERSTAD

NEDERLANDS MIJNMUSEUM

# HEERLEN

MAANKWARTIER/STATION

URBAN EXPERIECNE

SCHUNCK

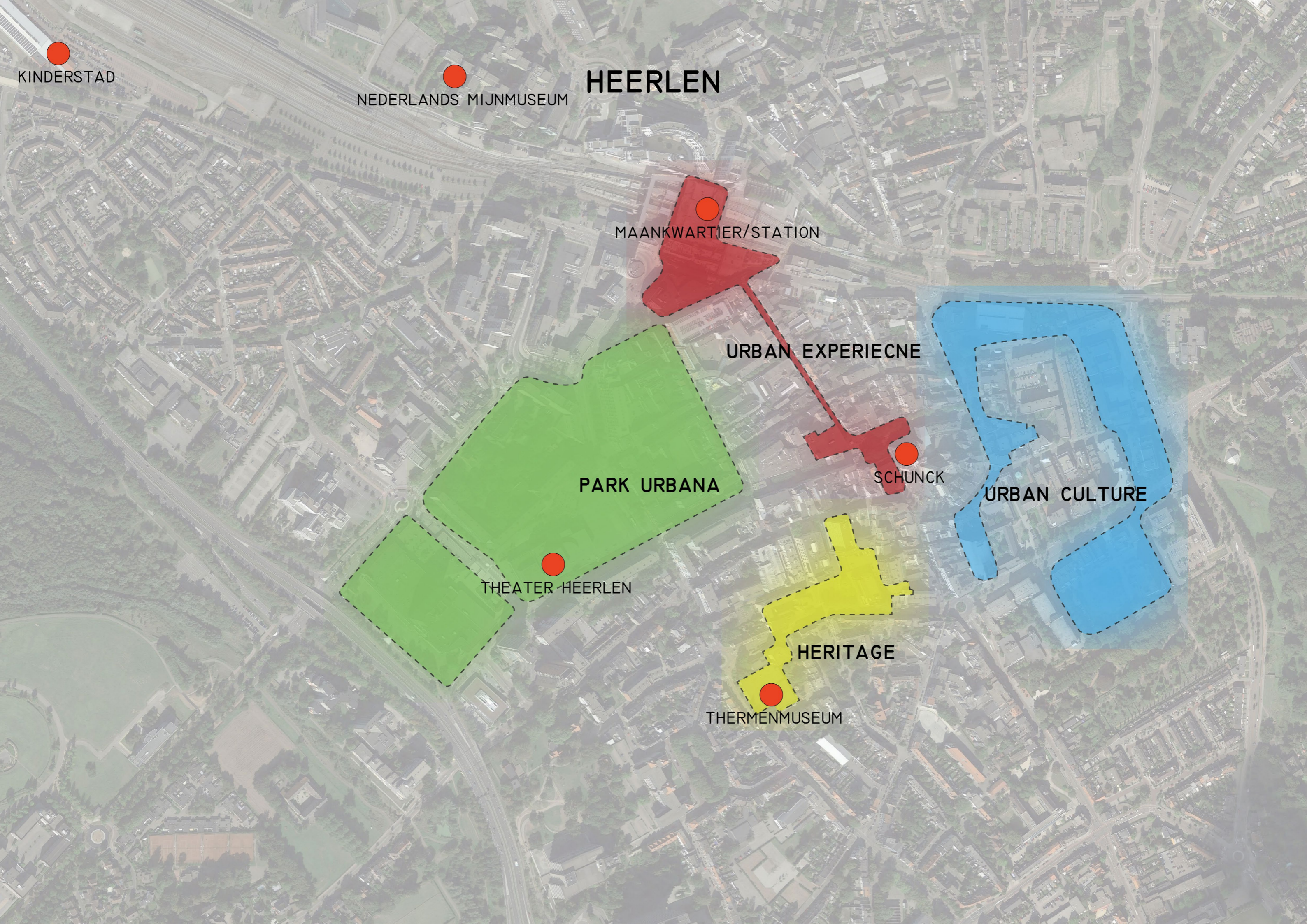
URBAN CULTURE

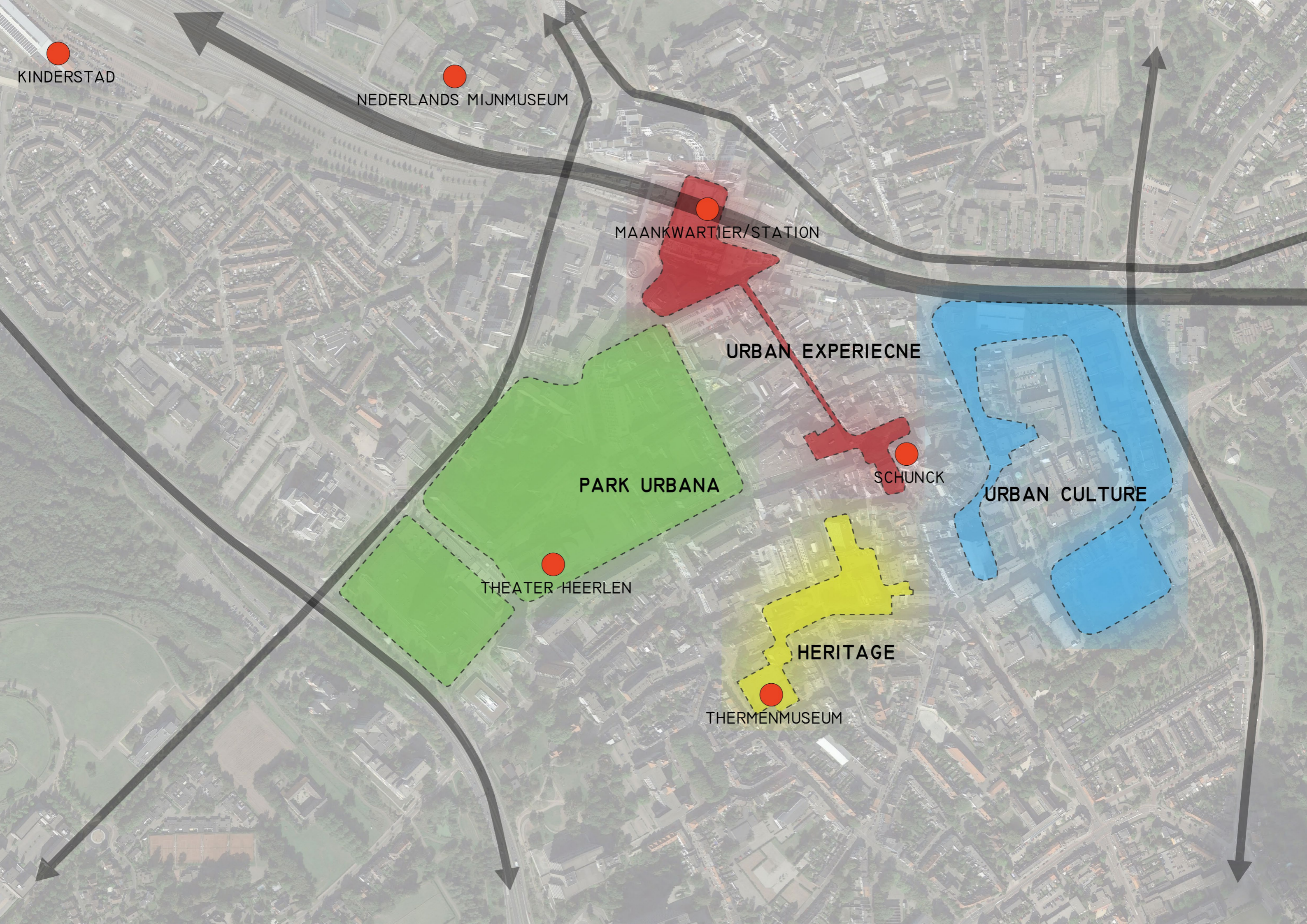
PARK URBANA

THEATER HEERLEN

HERITAGE

THERMÉN MUSEUM





KINDERSTAD

NEDERLANDS MIJNMUSEUM

MAANKWARTIER/STATION

URBAN EXPERIECNE

PARK URBANA

SCHUNCK

URBAN CULTURE

THEATER HEERLEN

HERITAGE

THERMENMUSEUM

KINDERSTAD

NEDERLANDS MIJNMUSEUM

MAANKWARTIER/STATION

URBAN EXPERIECNE

PARK URBANA

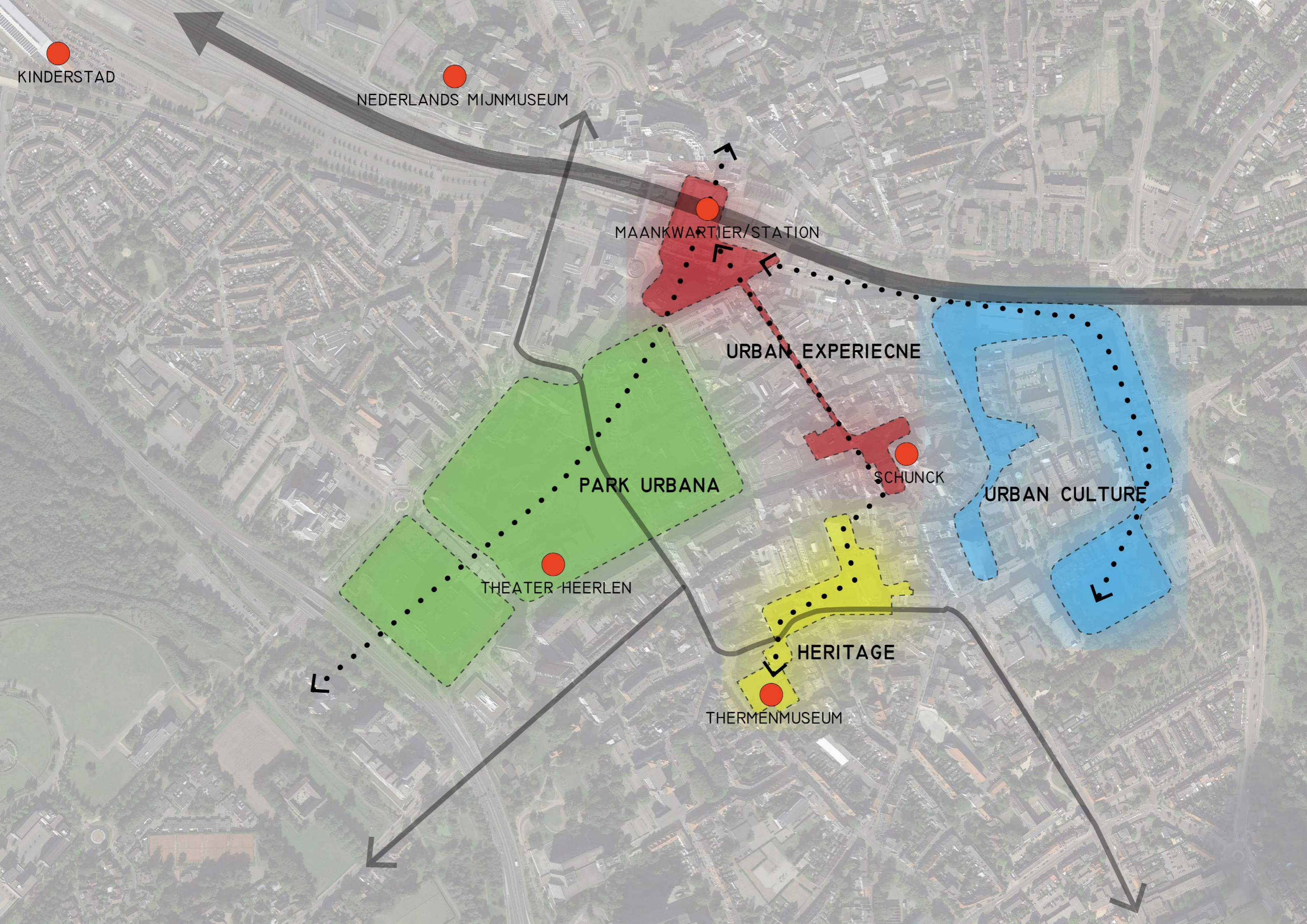
SCHUNCK

URBAN CULTURE

THEATER HEERLEN

HERITAGE

THERMÉN MUSEUM



KINDERSTAD

NEDERLANDS MIJNMUSEUM

MAANKWARTIER/STATION

SCHUNCK

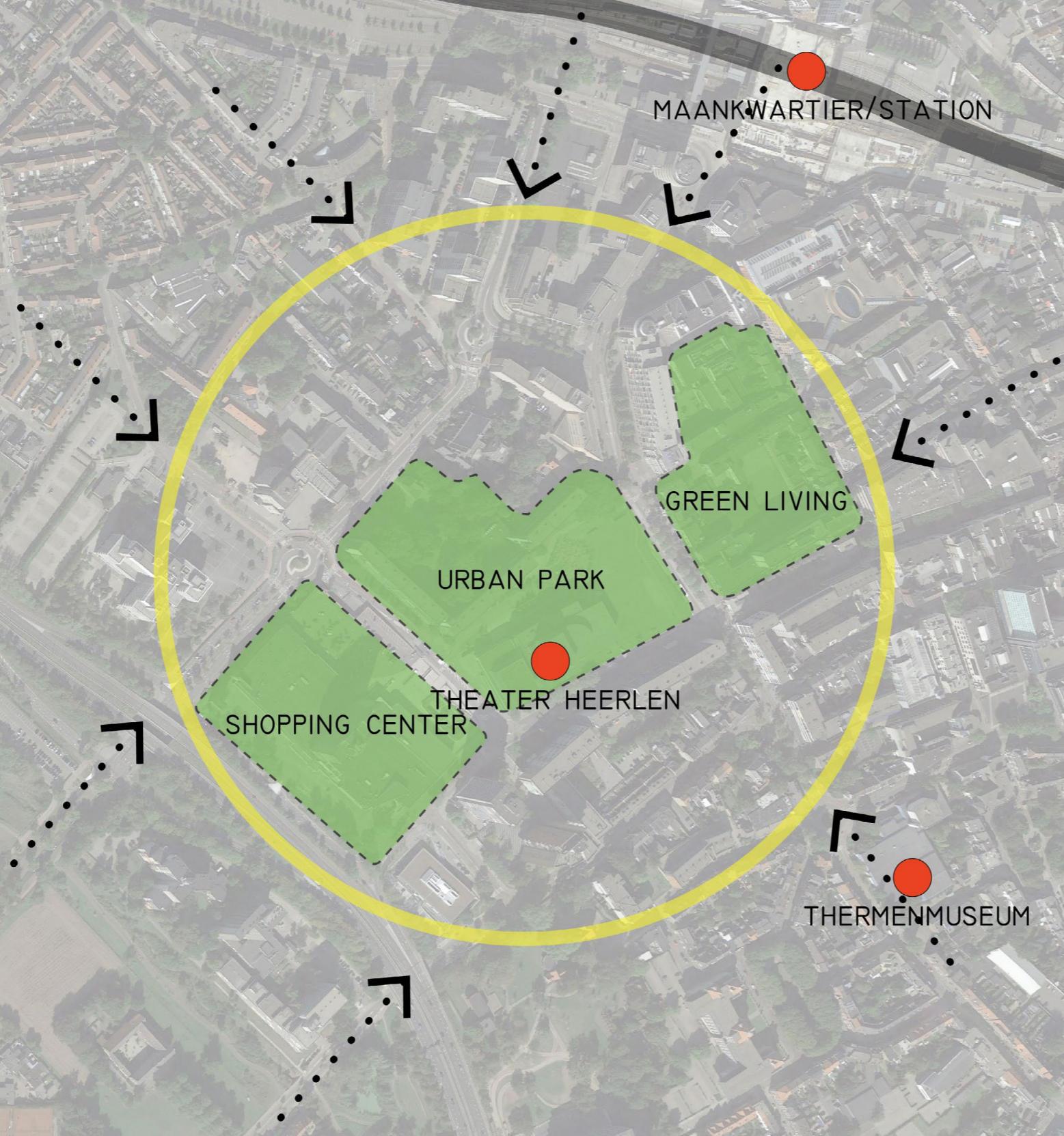
GREEN LIVING

URBAN PARK

THEATER HEERLEN

SHOPPING CENTER

THERMENMUSEUM







- + Rich green space
- High-rise unsuitable for interaction
- Existing block with only one side to exterior
- Slightly far away from GP

- + Very close to urban life
- + Quiet living environment
- Environment with high office blocks
- Slightly far away from GP

- + Shopping center as social center
- Too much noise
- Slightly far away from GP

- + Very close to urban life
- + Quiet living environment
- + Future park with green space

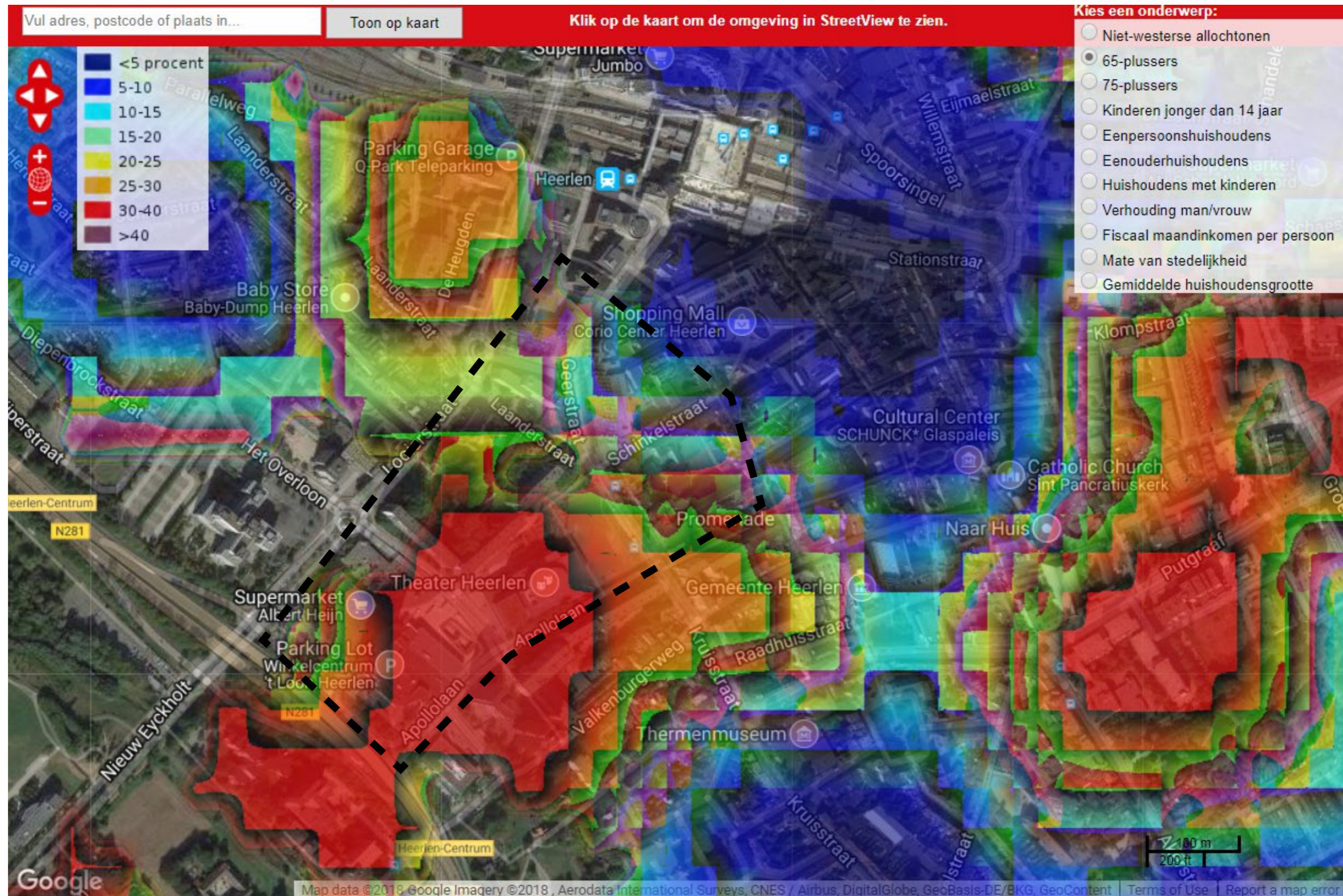


# FACILITIES & MISSING GREEN

- supermarket
- bank
- greenery
- mailbox
- GP
- public transport
- culture facility



# HIGH DENSITY OF ELDERLY RESIDENTS



# POOR QUALITY IN COMMUNAL SPACE



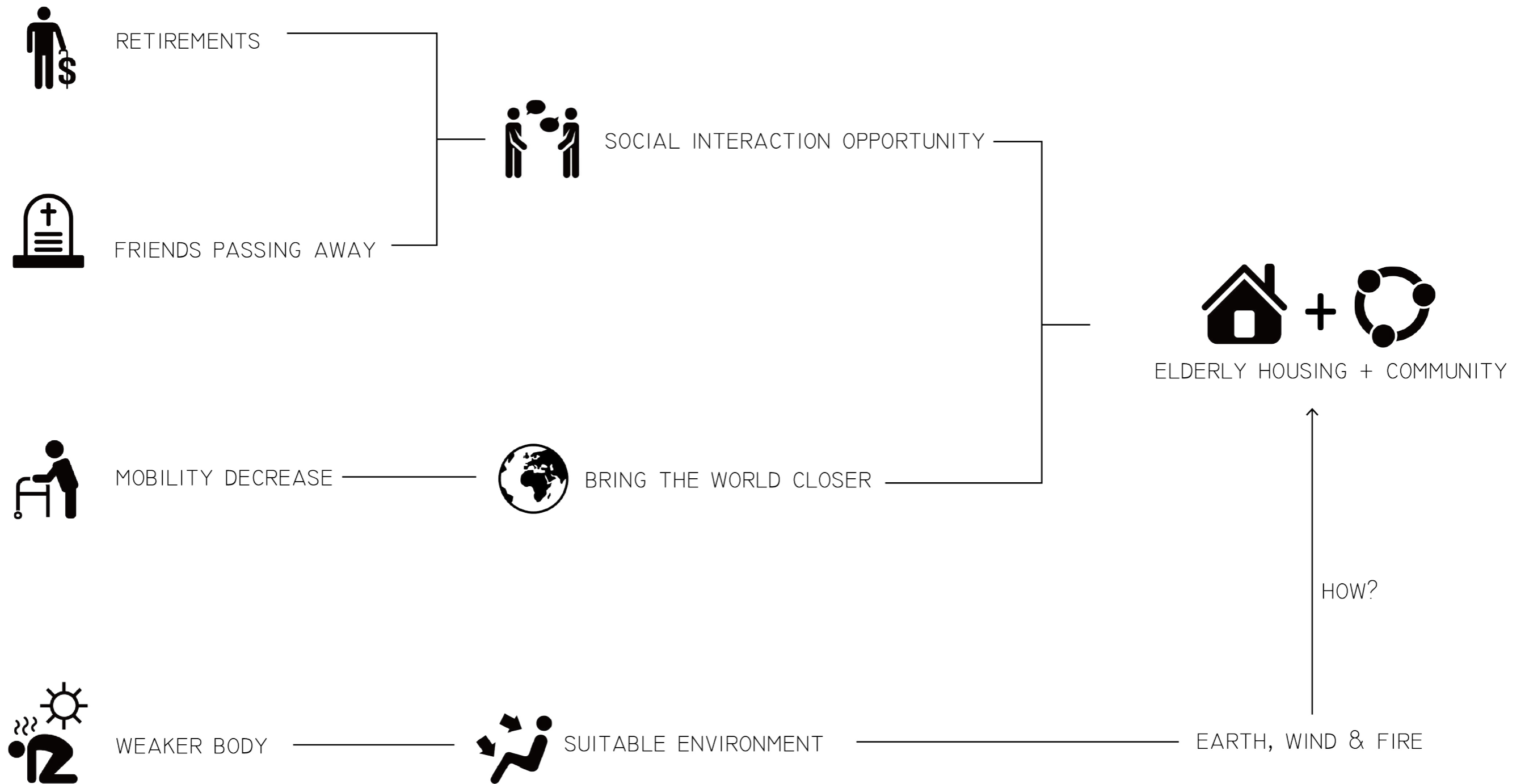
# TEDIOUS PUBLIC PLAZA



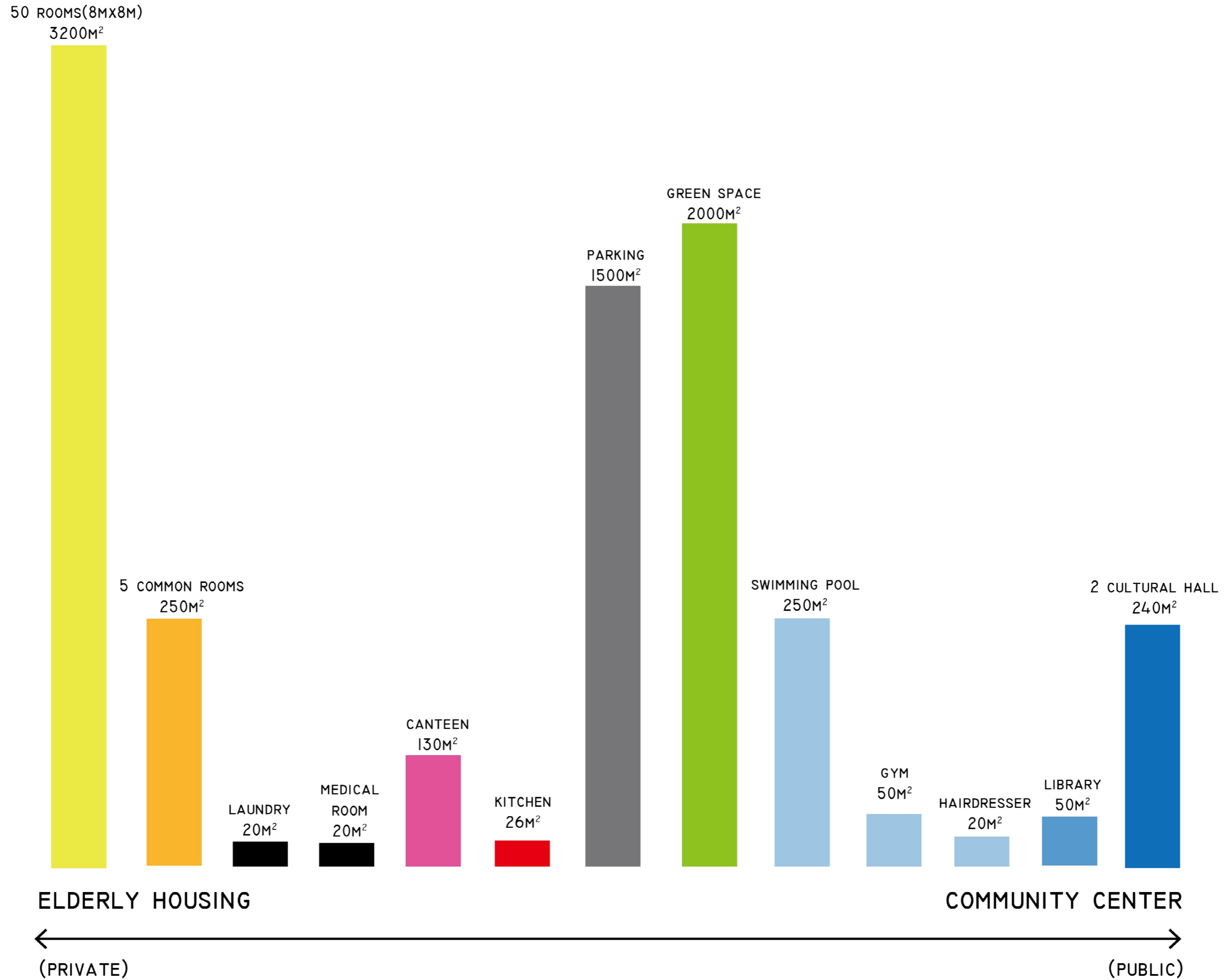
# LACK OF COMMUNAL SPACE FOR PERFORMANCE



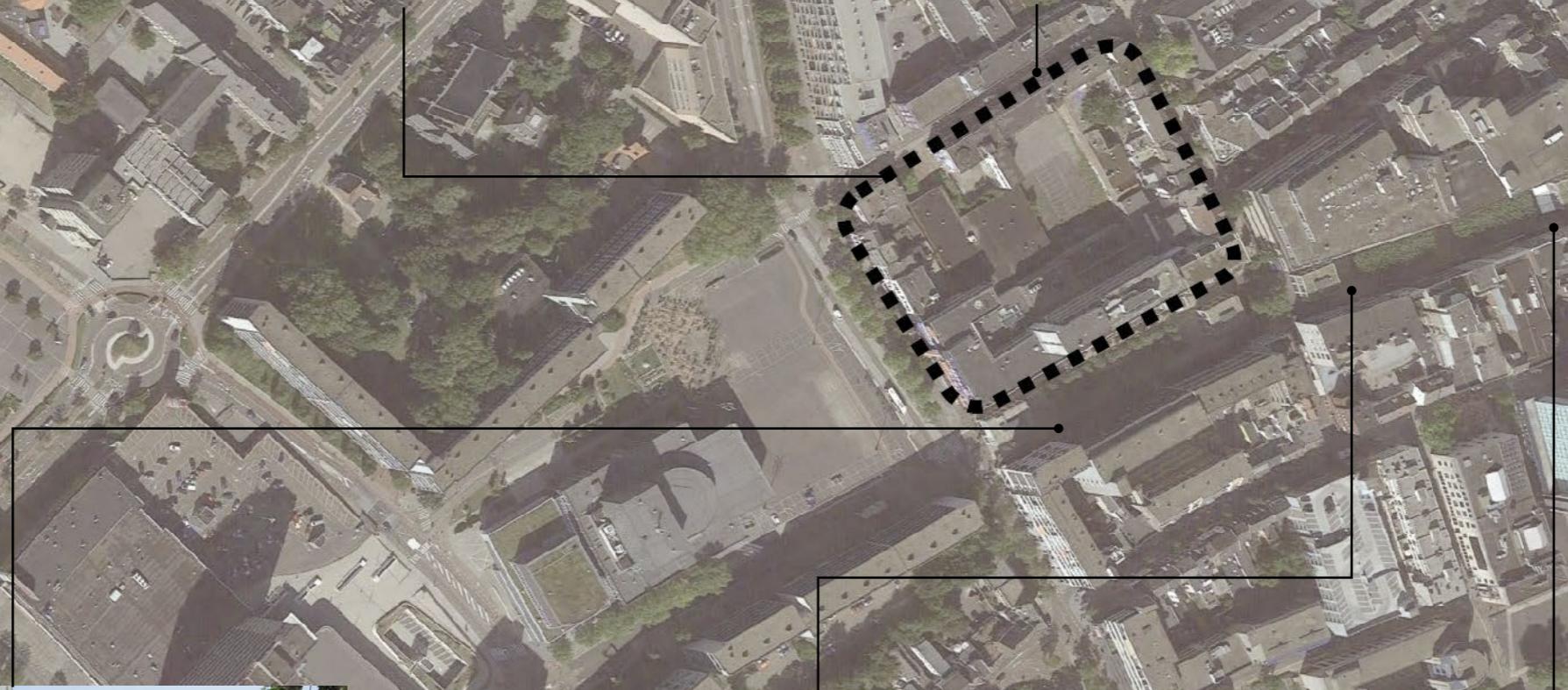
# AN INFORMAL SOCIAL PLACE TO ENCOUNTER



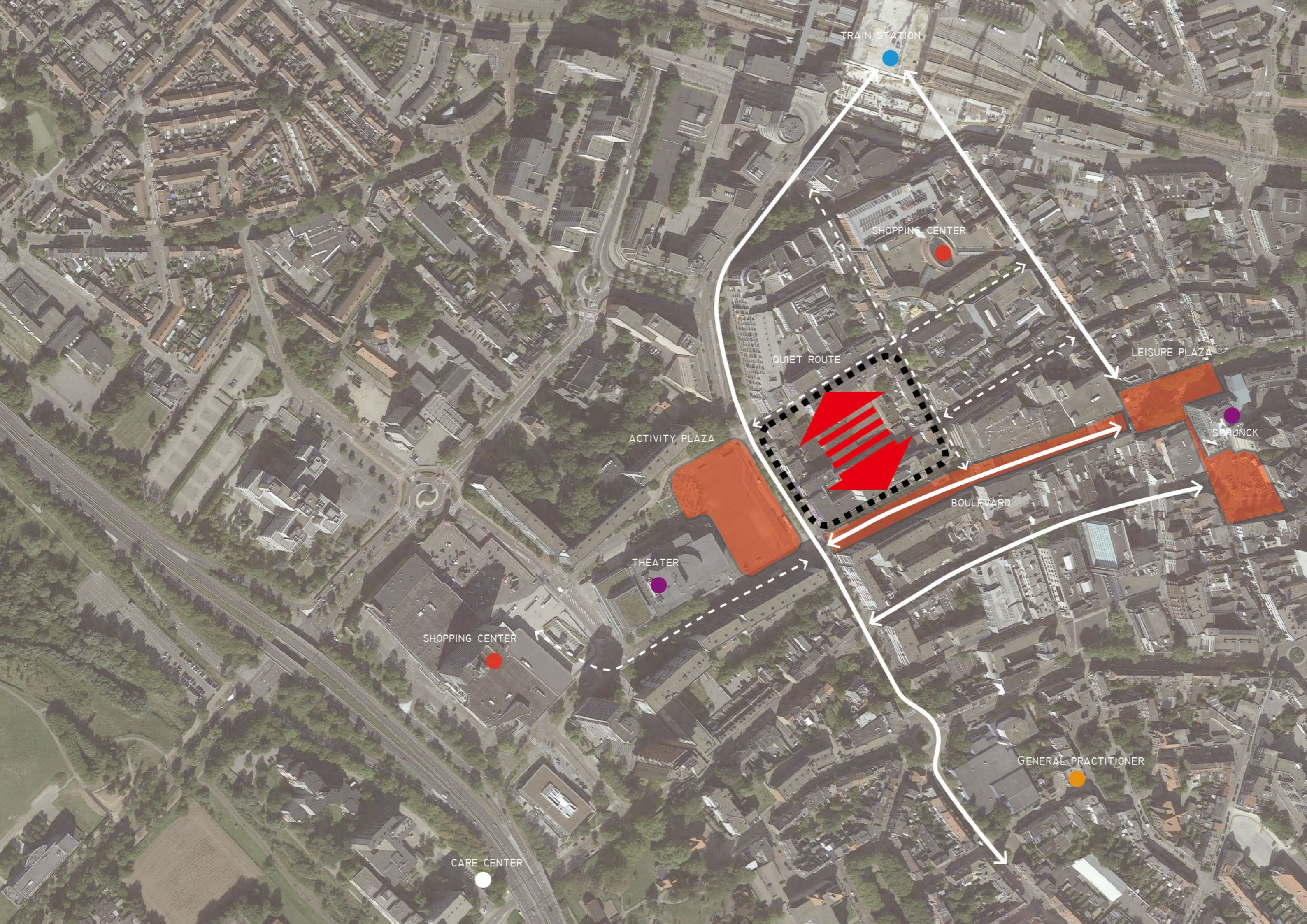
# PROGRAM PROPOSAL



# IMPRESSION







TRAIN STATION

SHOPPING CENTER

LEISURE PLAZA

SCHUNK

ACTIVITY PLAZA

QUIET ROUTE

BOULEVARD

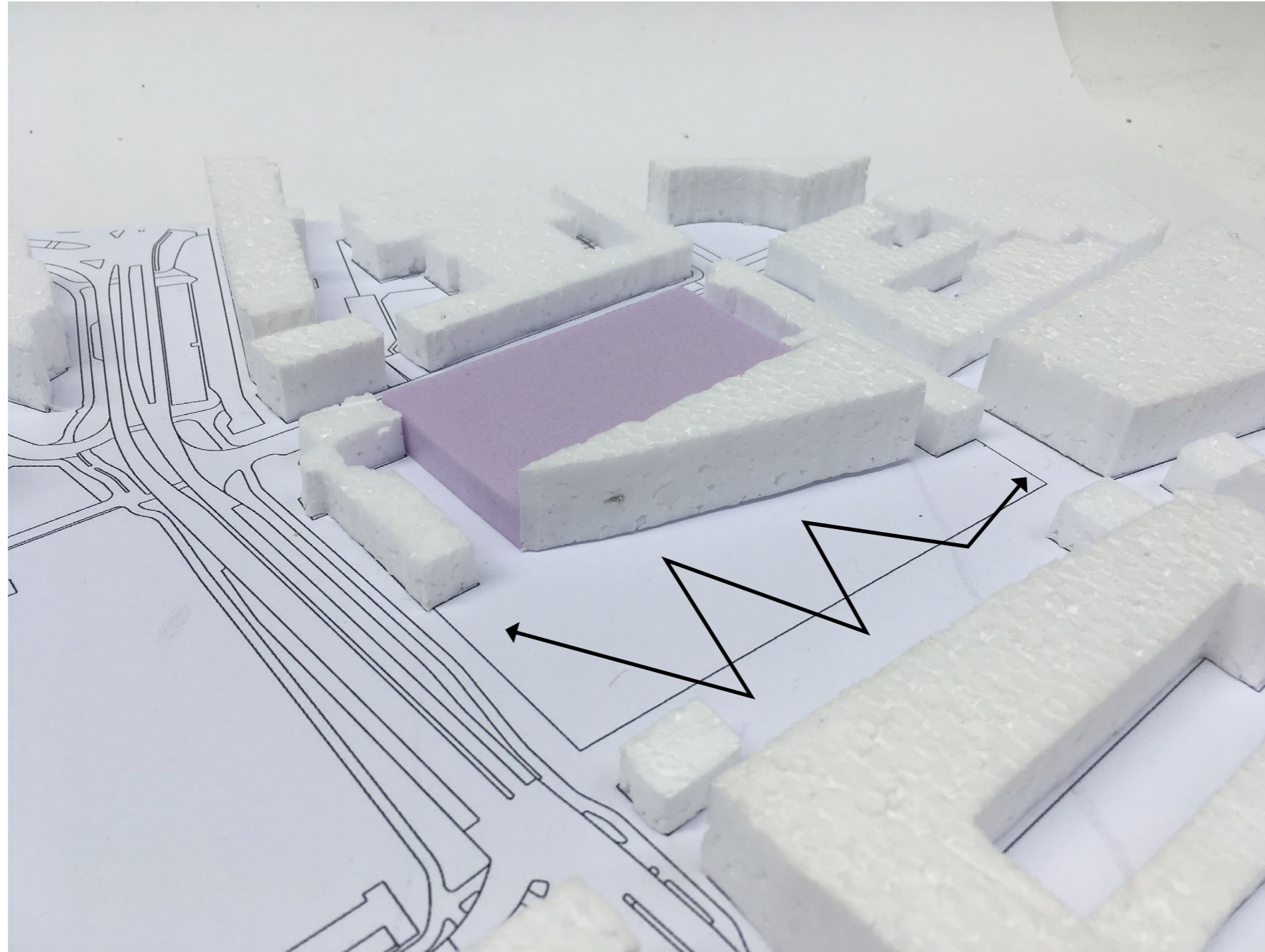
THEATER

SHOPPING CENTER

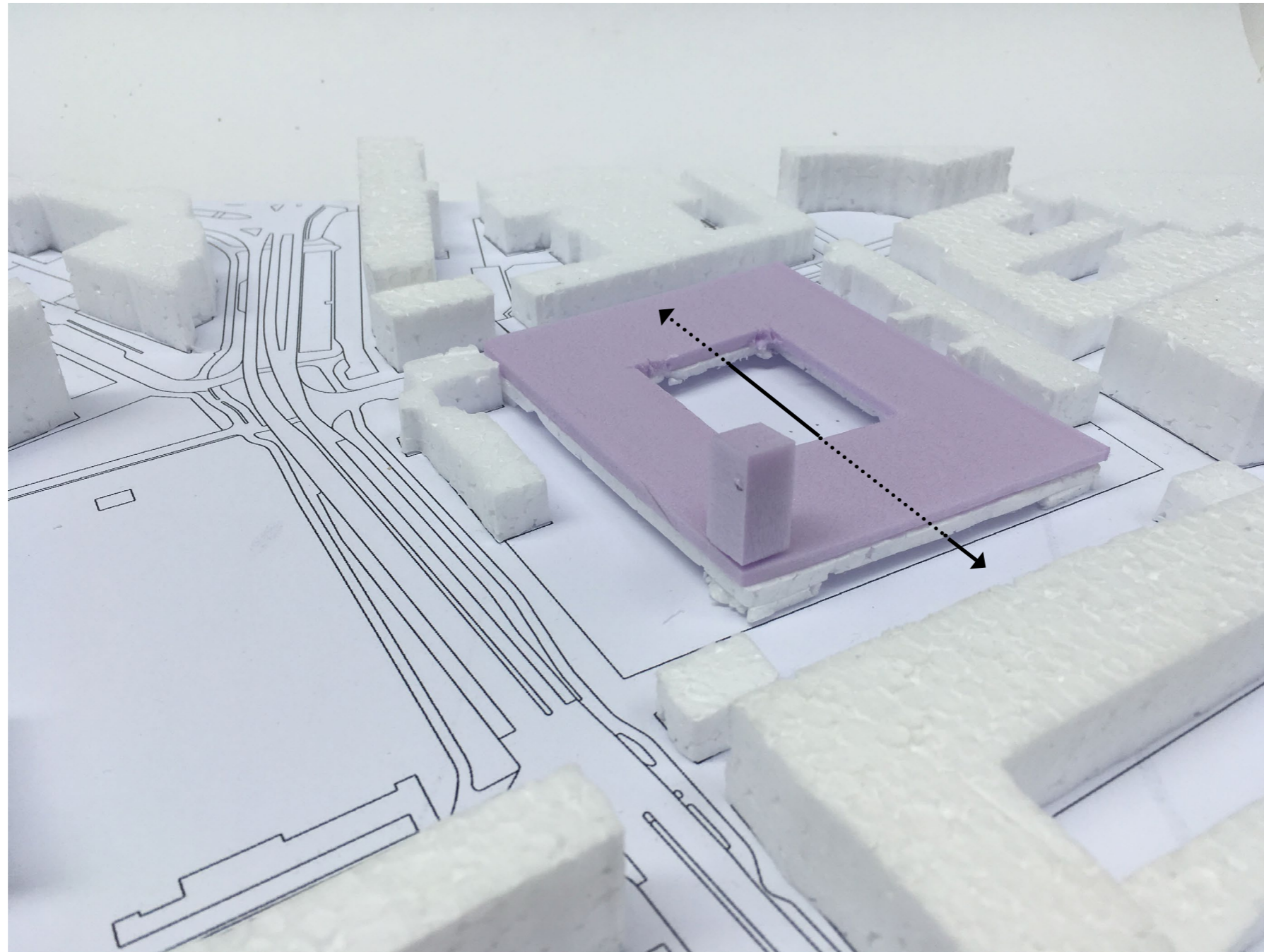
GENERAL PRACTITIONER

CARE CENTER

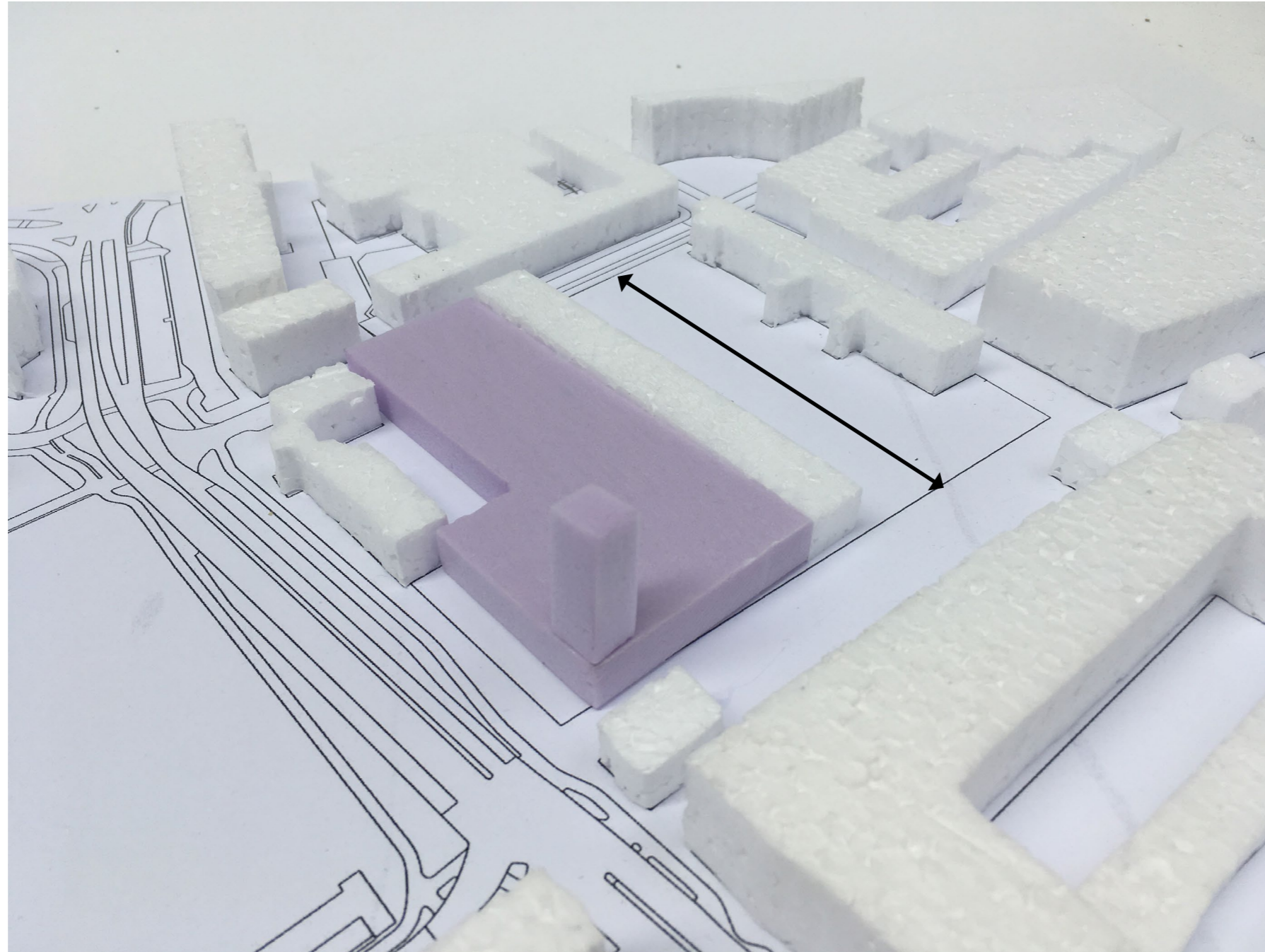
# MASS I



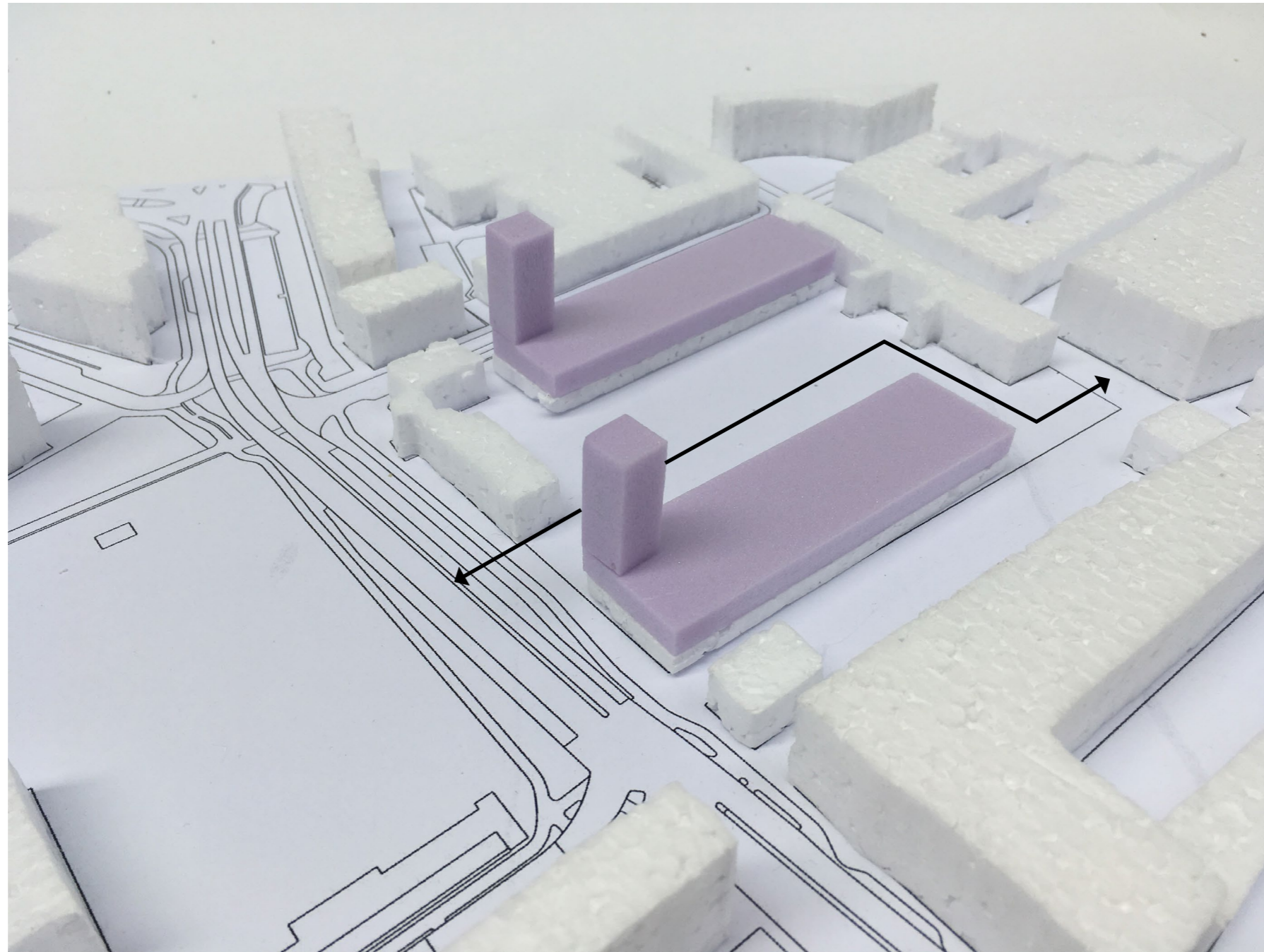
# MASS 2



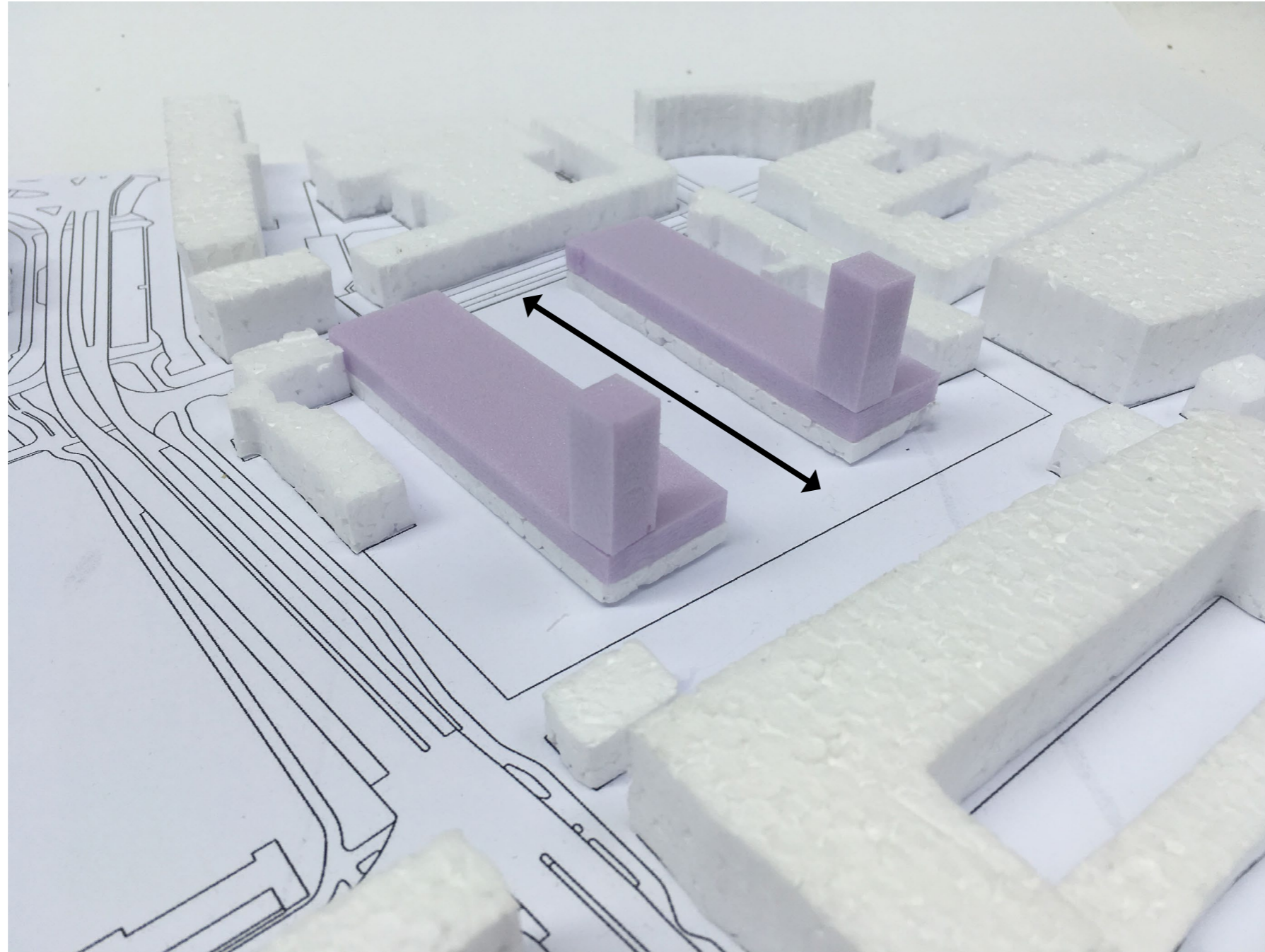
# MASS 3



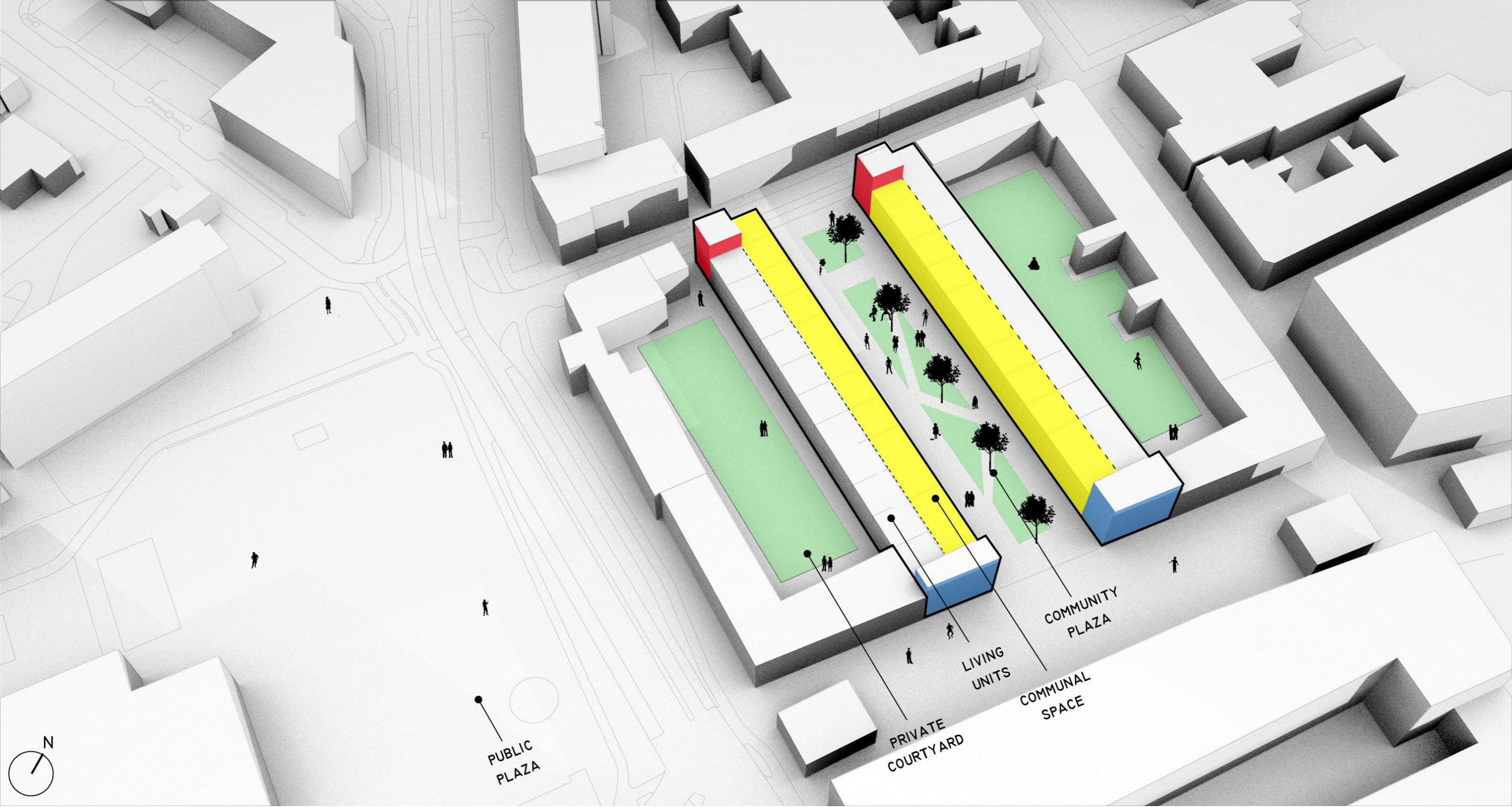
# MASS 4



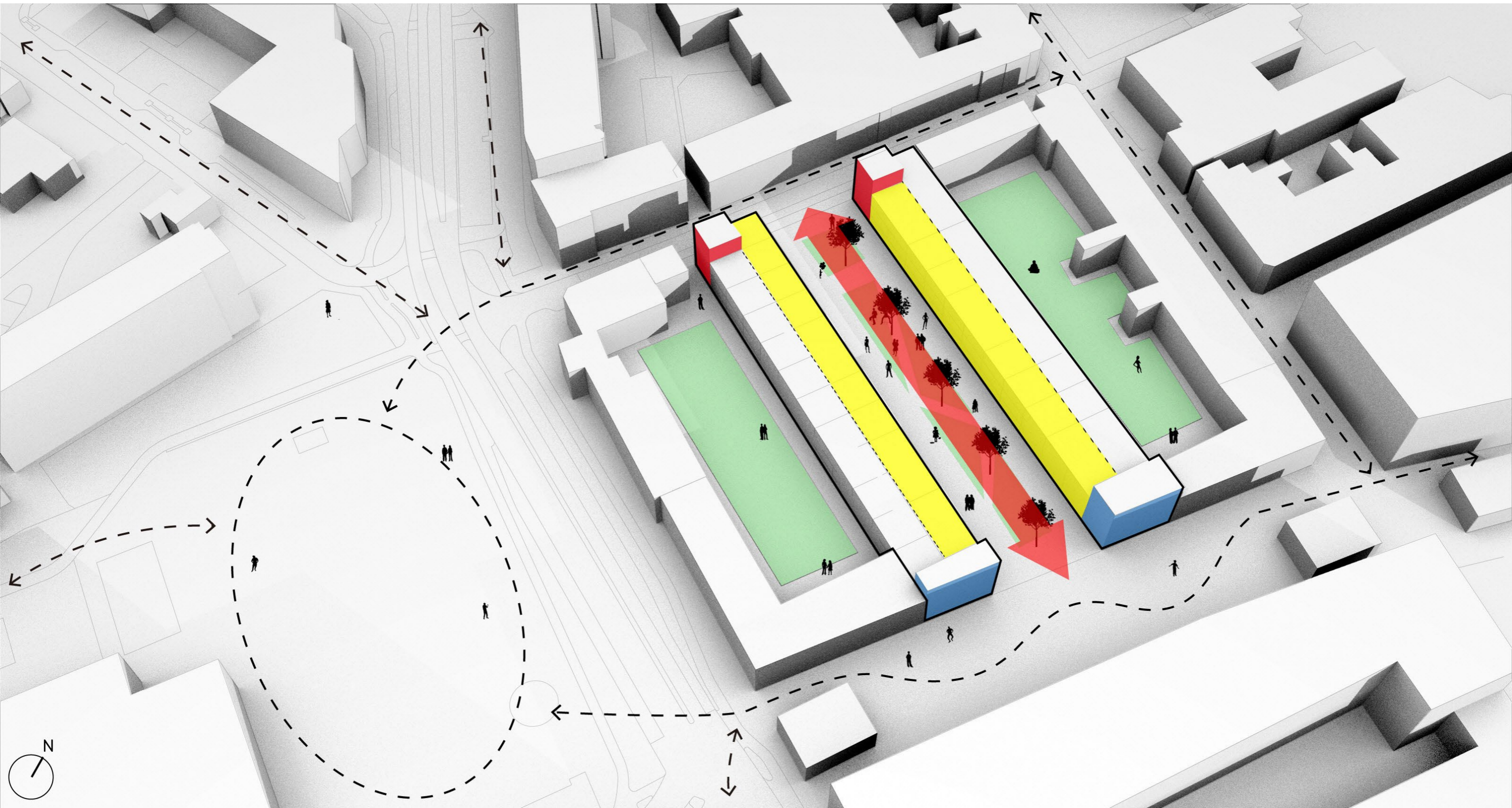
# MASS 5



# SPATIAL HIERARCHIES

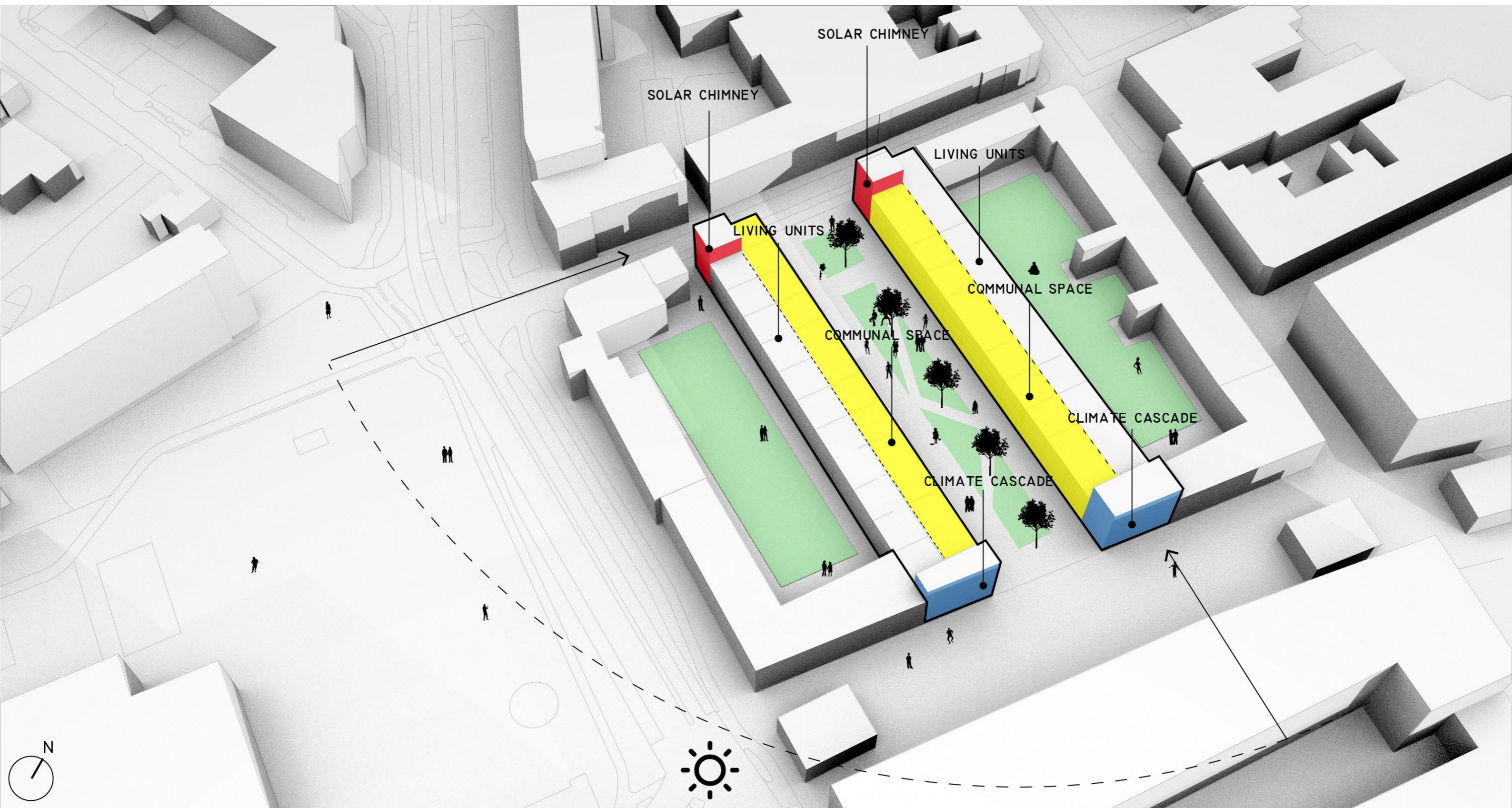


# CONNECTION TO THE CITY

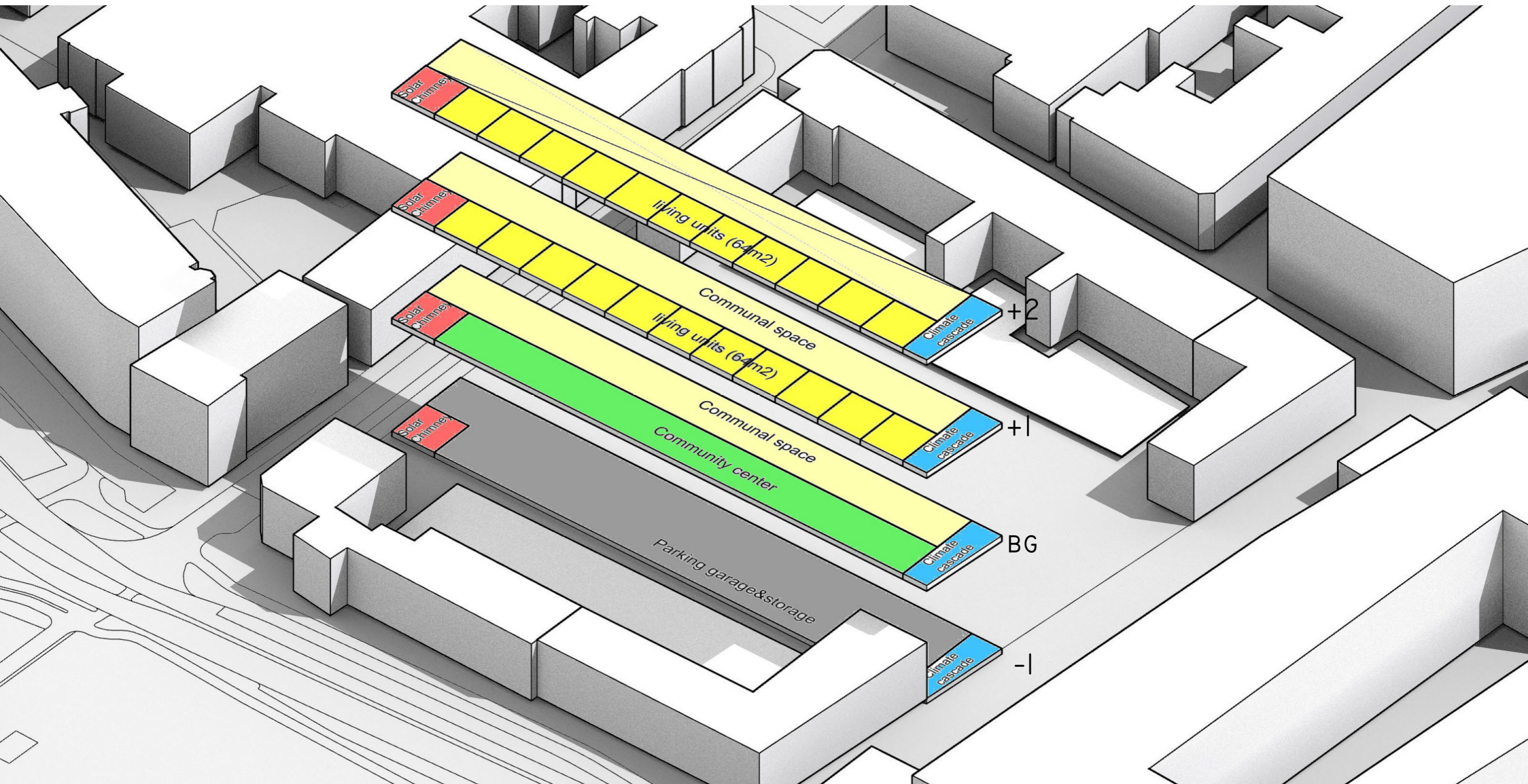




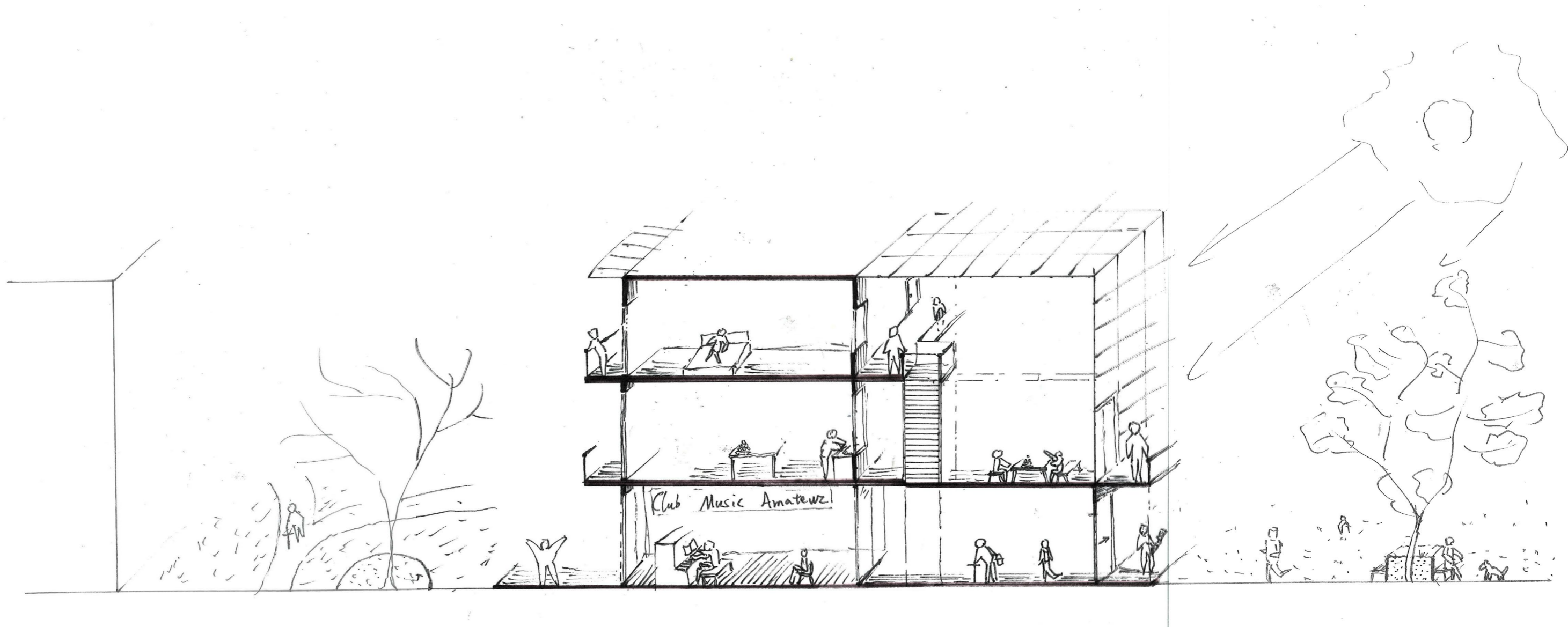
# PLACING EWF COMPONENTS



# FUNCTIONS

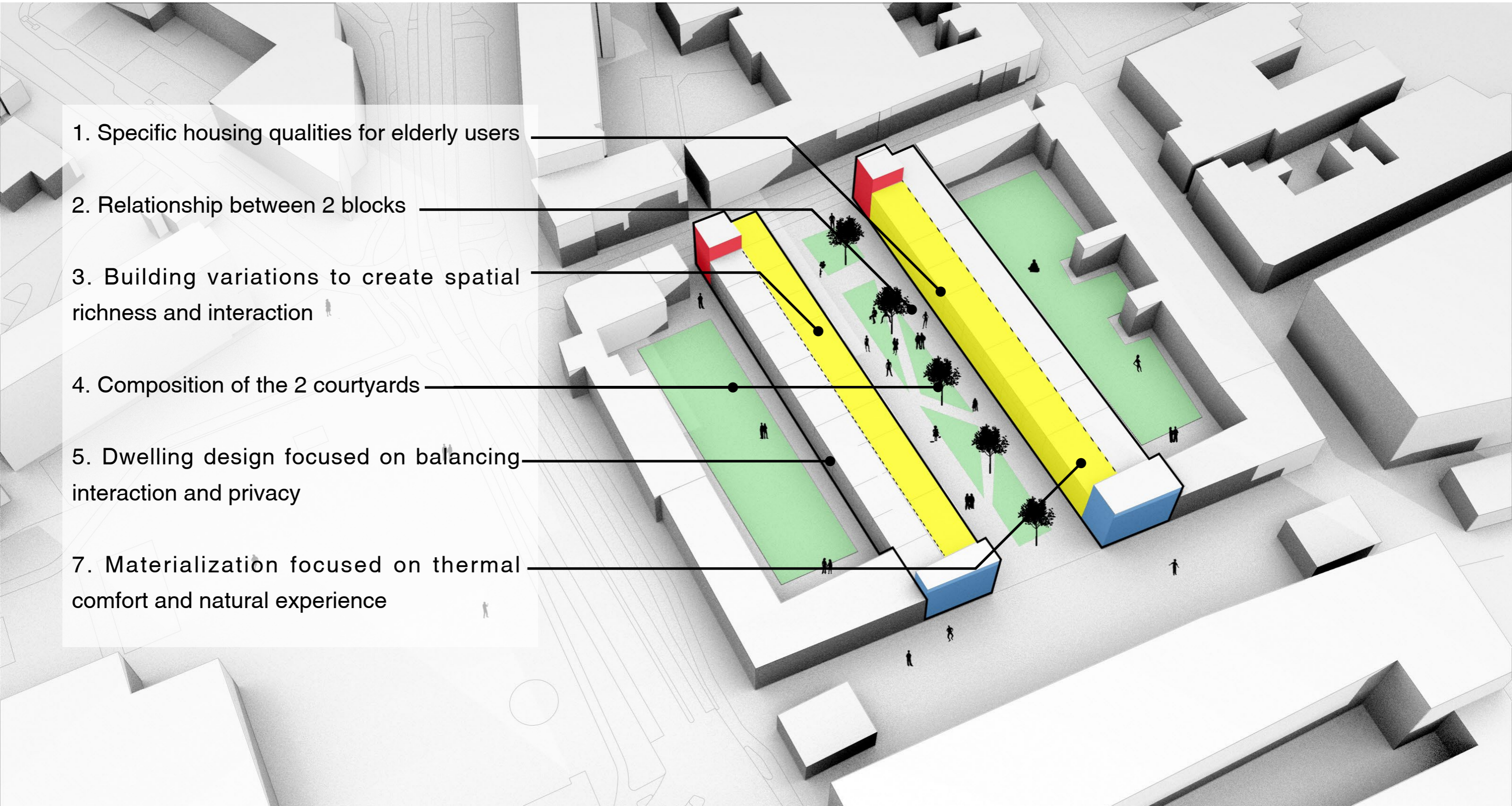


# SPATIAL DIAGRAM



# FURTHER WORK IN P3

1. Specific housing qualities for elderly users
2. Relationship between 2 blocks
3. Building variations to create spatial richness and interaction
4. Composition of the 2 courtyards
5. Dwelling design focused on balancing interaction and privacy
7. Materialization focused on thermal comfort and natural experience



QUESTIONS?

