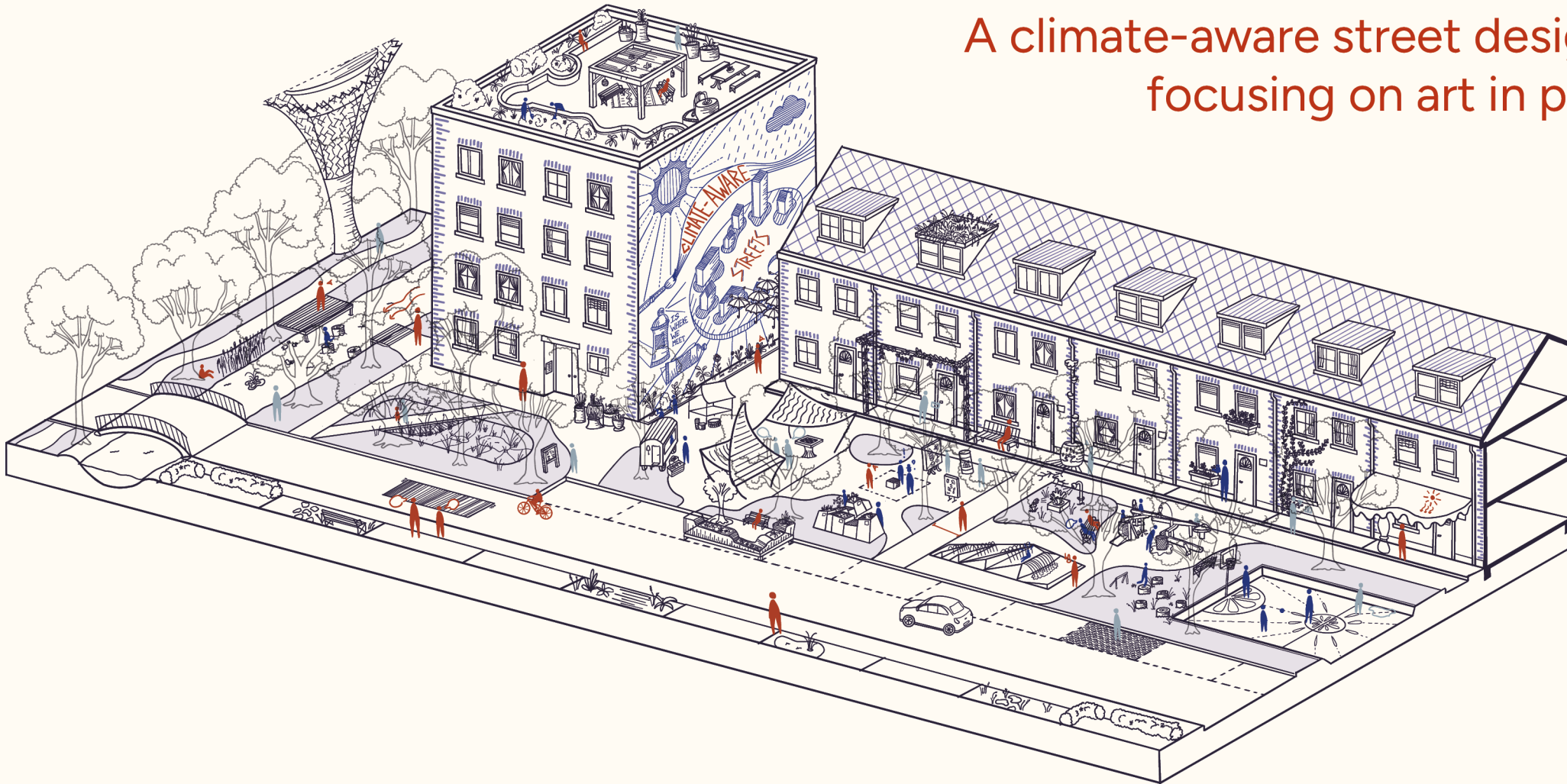


# THE ART OF RESILIENCE

A climate-aware street design concept  
focusing on art in public space



CITIES HAVE BECOME...



# TWO DEGREES WARMER

SINCE 1906 (KNMI, 2023)

# 20% INCREASE IN AMOUNT OF PRECIPITATION

SINCE 1906 (KNMI,2023)



# THE HEATWAVES HAS DOUBLED

SINCE 1906 (KNMI,2023)

AND IN THE FUTURE?



WHAT IF... WE WERE TO  
REDESIGN THE PUBLIC SPACE  
OF STREETS WITH ART



AND THIS ART ADDRESSES  
CLIMATE CHALLENGES AND  
SOLUTIONS



AND PEOPLE WOULD START  
TO ENGAGE AND PARTICIPATE  
IN CREATING ART



# HOW WILL CITIES LOOK LIKE?





# WOULD IT BE REAL?



**WOULD IT BE  
ATTRACTIVE?**

# WILL IT CREATE CLIMATE AWARENESS?



**WILL IT SHOW THE  
IMPACT?**

# OR WILL IT REDUCE CLIMATE PRESSURE TOO?



# WILL IT BRING PEOPLE TOGETHER?



# AND WILL WE UNDERSTAND IT?

PIUS FLORIS  
BOOMKULTOER

TREETAG  
**Ik ben een Gewone beuk.**

- Ik heb een stamomtrek van 503
- Ik heb een hoogte van 32
- Ik heb een bladoppervlak van 4.652
- Milddstam & takken bestaan uit 7.500 kg hout

**IK BEN BELANGRIJK, WANT ELK JAAR:**

LEVER IK VOOR 35 dagen <b>ZUURSTOF</b> VOOR 1 PERSOON		HOU IK 16.100 liter REGENWATER VAST OM WATEROVERLAST TEGEN TE GAAN	
ZUIVER IK DE LUCHT 7.055 gram LUCHTVERVUILING AF TE VANGEN		VANG IK 29,73 gram CO <sub>2</sub> AF, DAT IS IS GELIJK AAN 1,273 auto's	

EN NOG VEEL MEER!

MAAK EEN FOTO EN TAG MI OP INSTAGRAM  
**#EUTreeTag**

Scan deze QR code voor meer informatie



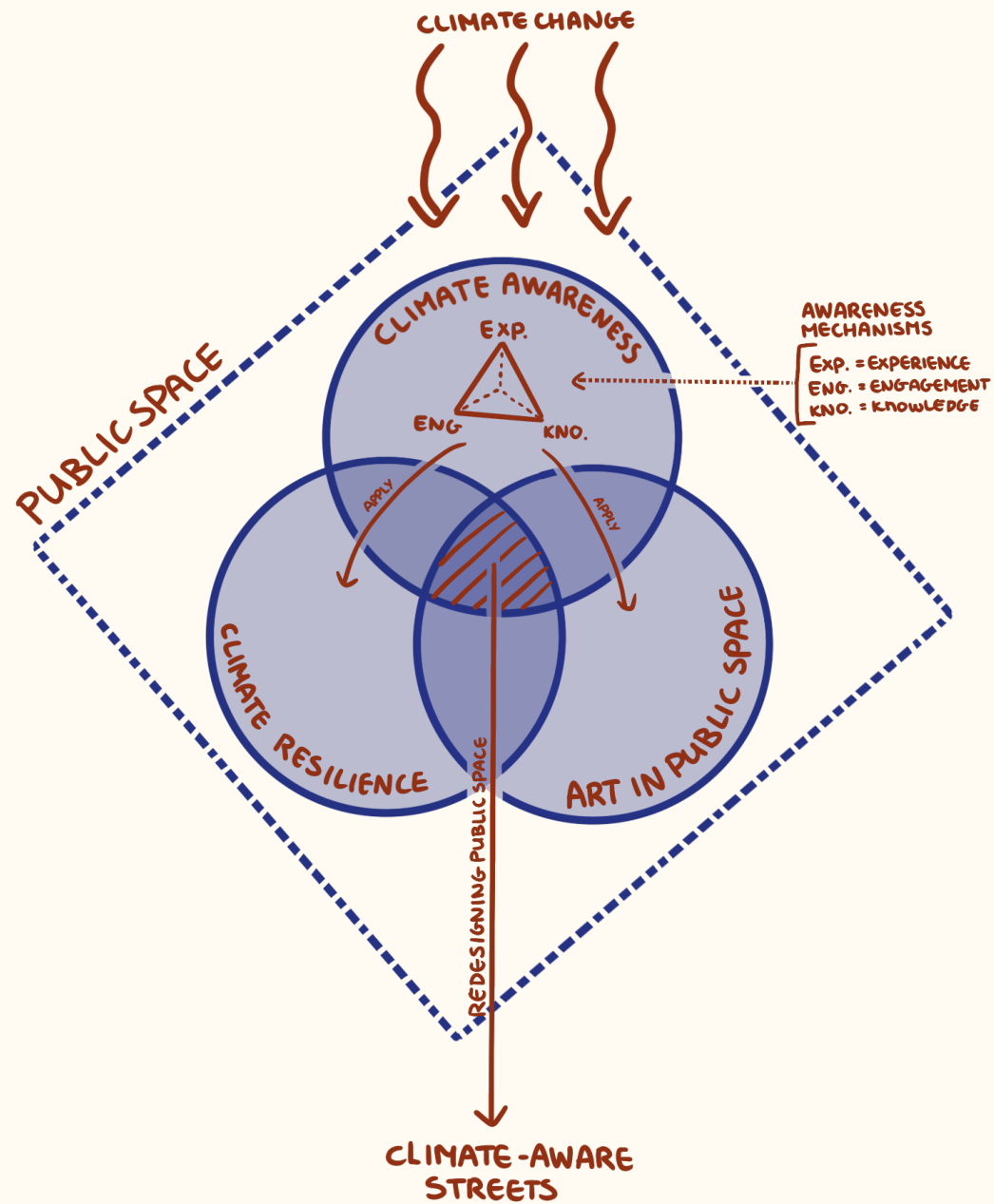


**AND HOW DOES  
IT ALL CONNECT?**

# WE NEED CLIMATE-AWARE STREETS?



# WHAT ARE CLIMATE-AWARE STREETS?



# WHY DO WE NEED CLIMATE-AWARE STREETS?

# CITIES HAVE TO DEAL WITH...



Warmer temperatures



Wetter winters



Drier summers

# CLIMATE RESILIENT NETHERLANDS

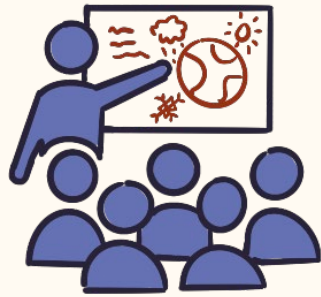
# 2050



Citizen engagement



Six out of ten Dutch citizens believe they should live in a more climate aware manner (CBS, 2023)



Education

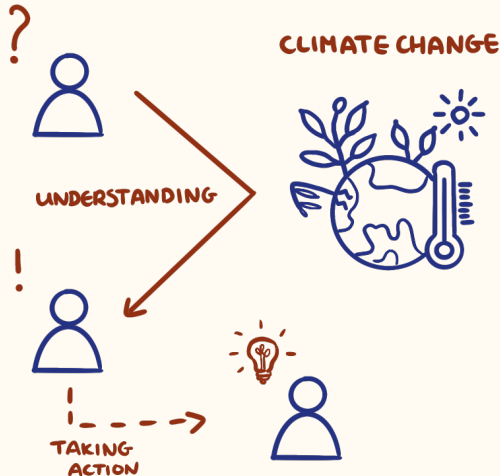


# WHY NOT USE STREETS CLIMATE AWARENESS?

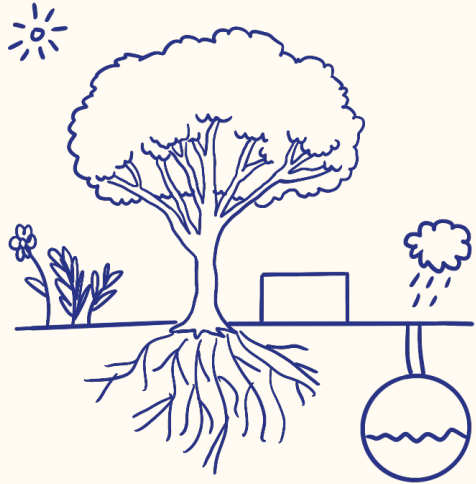


# THE GAP...

Lack of understanding



Interventions are invisible



(Willems, 2017; Lenzholzer et al., 2020)

**THEREFORE WE USE**  
**ART**



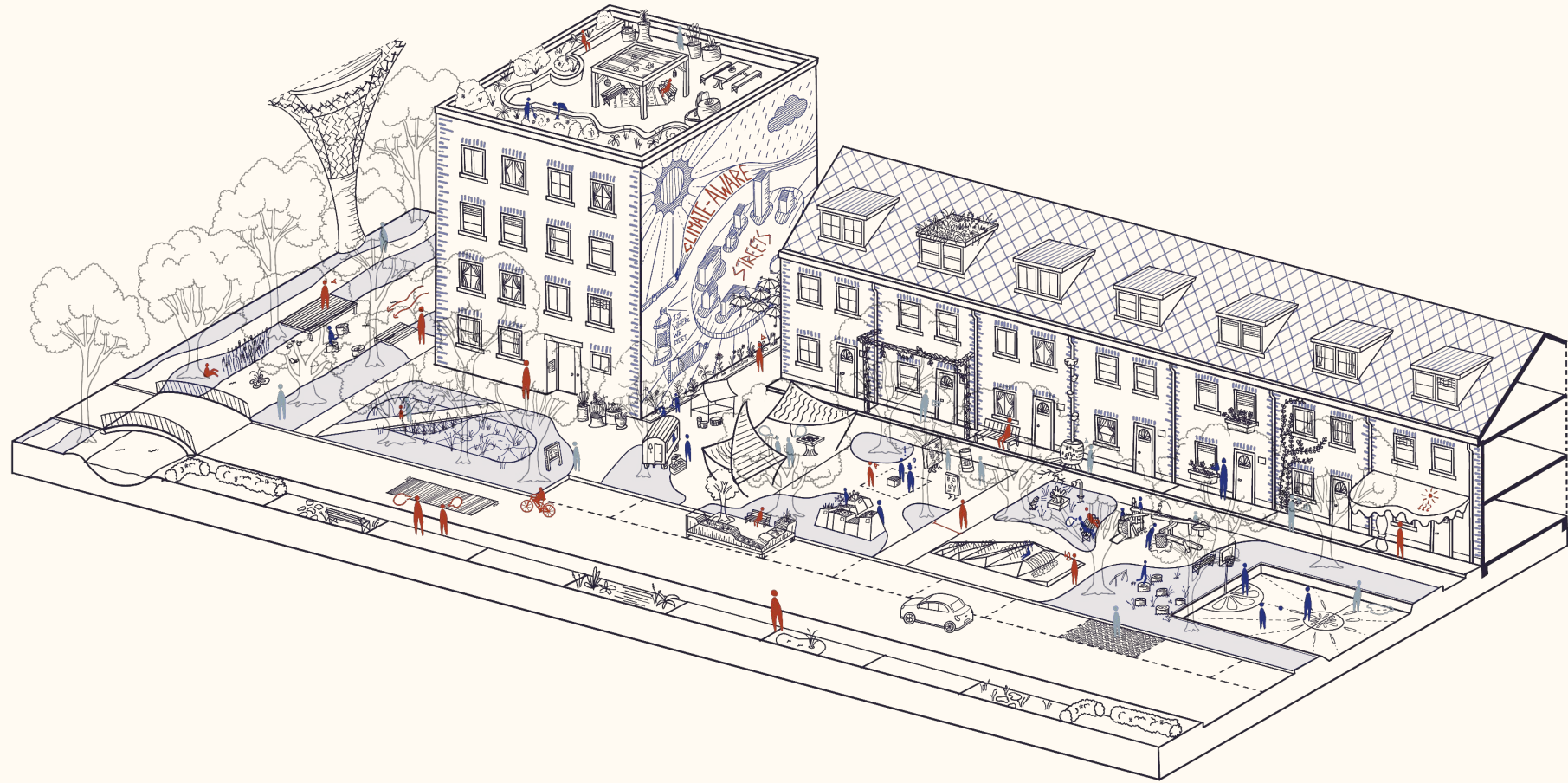


Art translates technical  
knowledge in tangible  
experiences

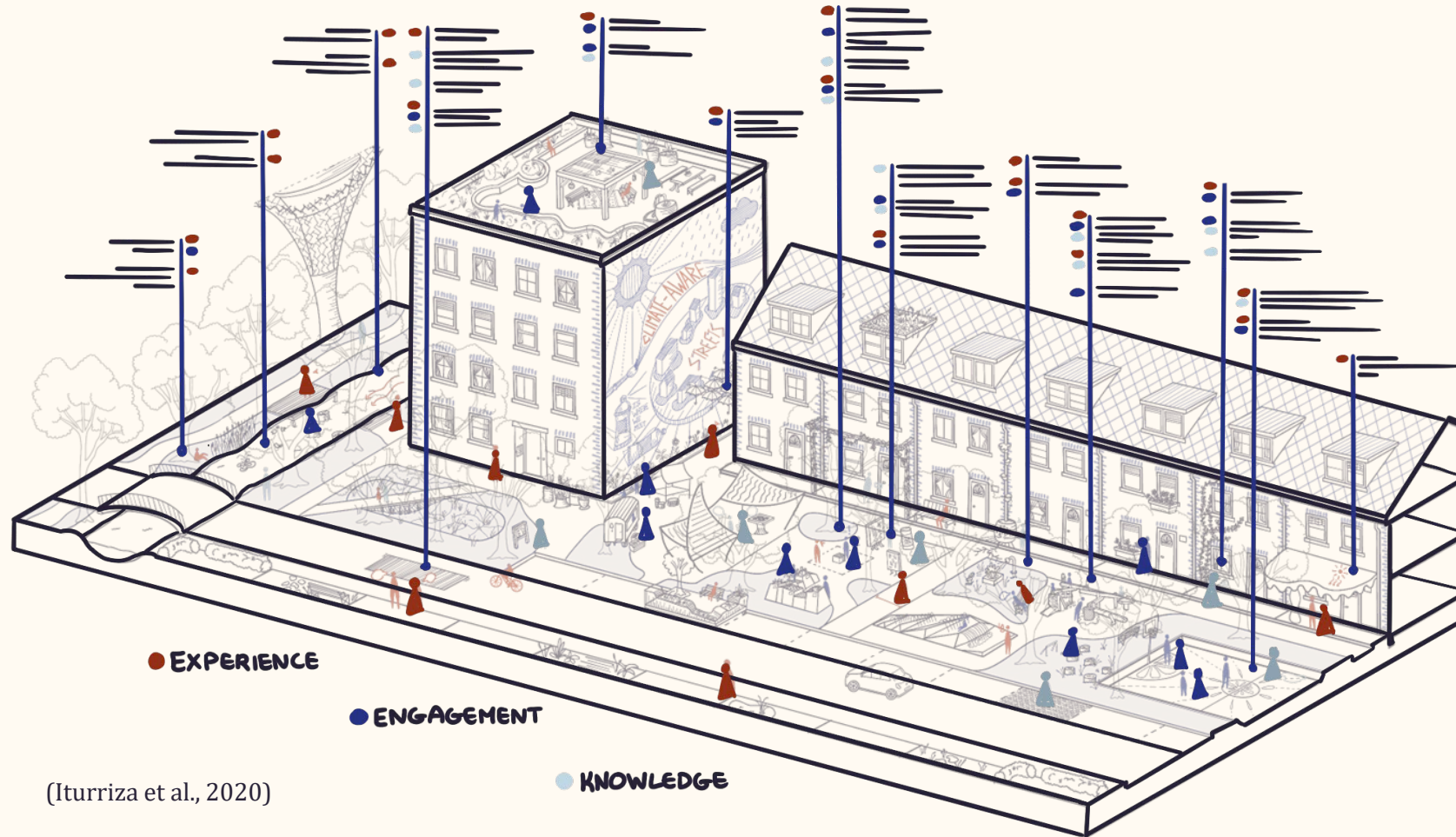


Art serves as a medium to  
engage people

# WHAT DO CLIMATE-AWARE STREETS LOOK LIKE?

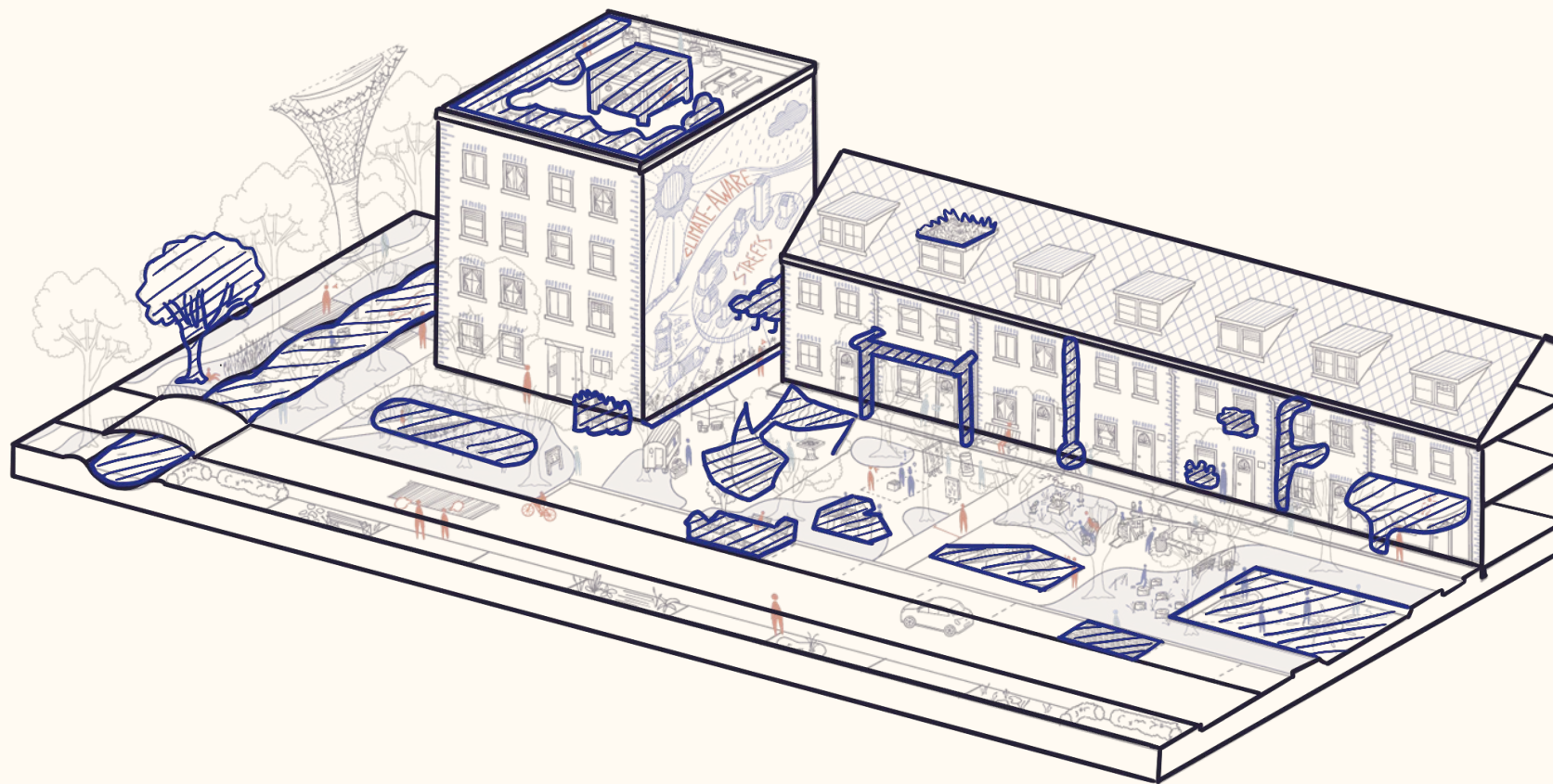


# CLIMATE AWARENESS

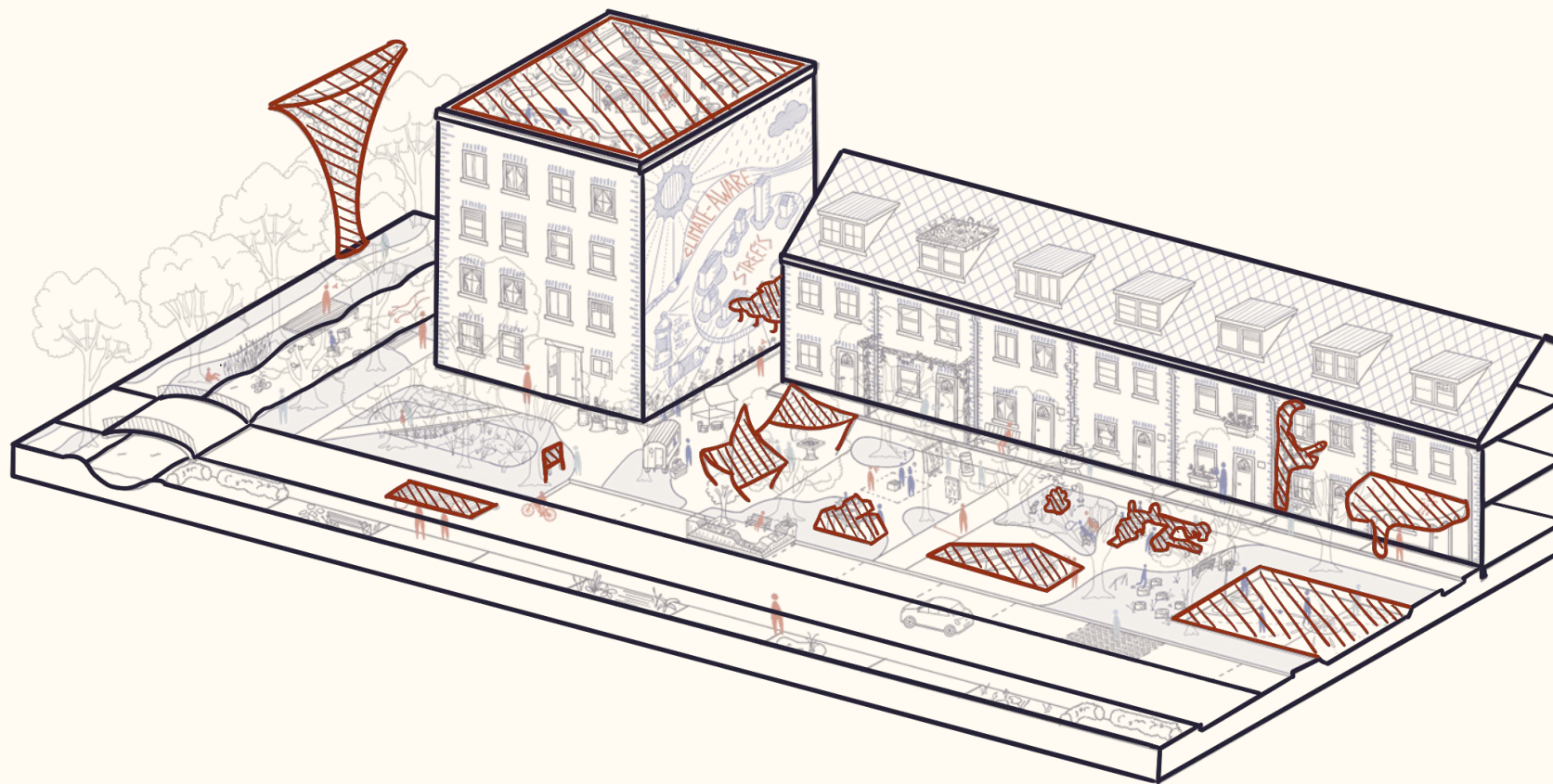


(Iturriza et al., 2020)

# CLIMATE RESILIENCE

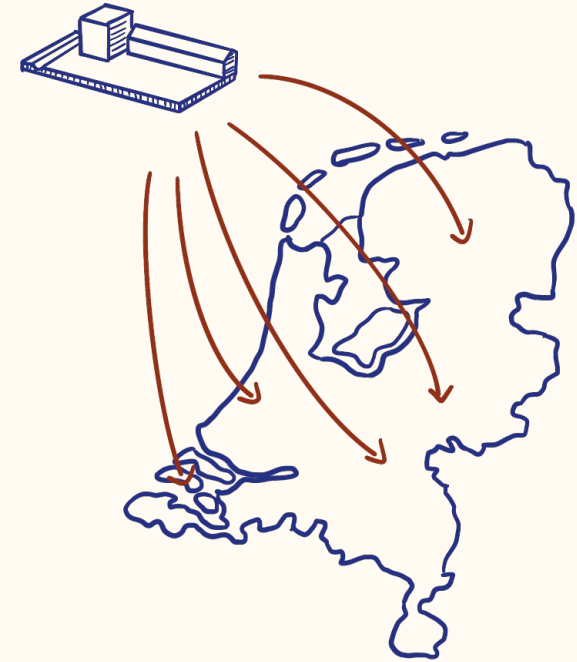


# ART IN PUBLIC SPACE

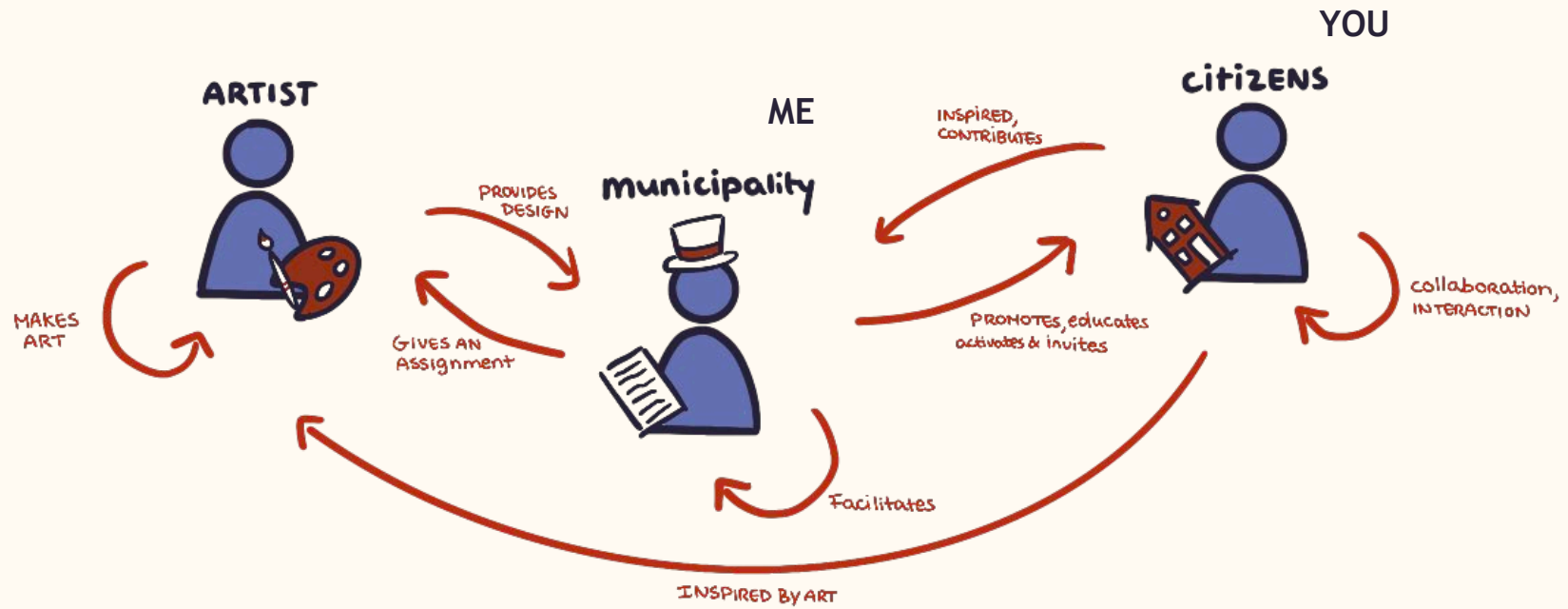


**IS THIS HOW ALL STREETS SHOULD  
LOOK LIKE?**

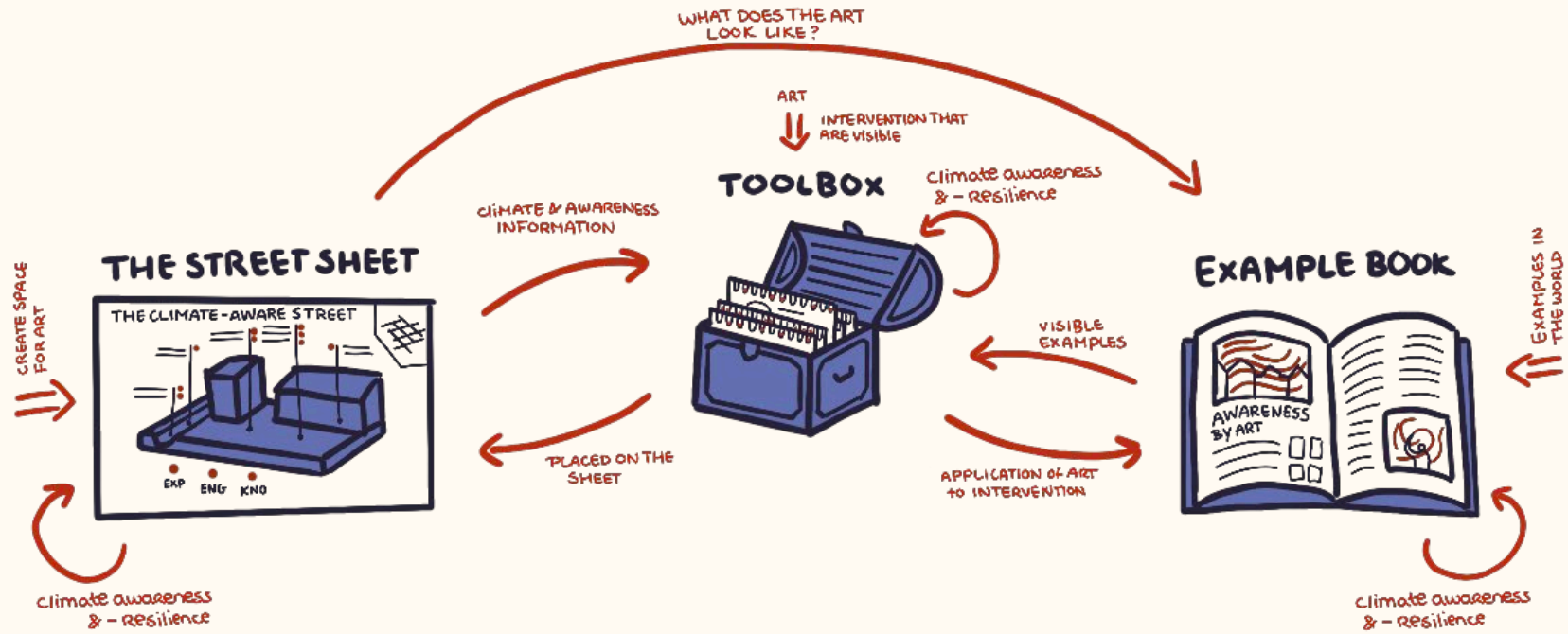
NO, THIS CONCEPT IS INTENDED TO BE TRANSFERABLE ACROSS MULTIPLE URBAN CONTEXTS.

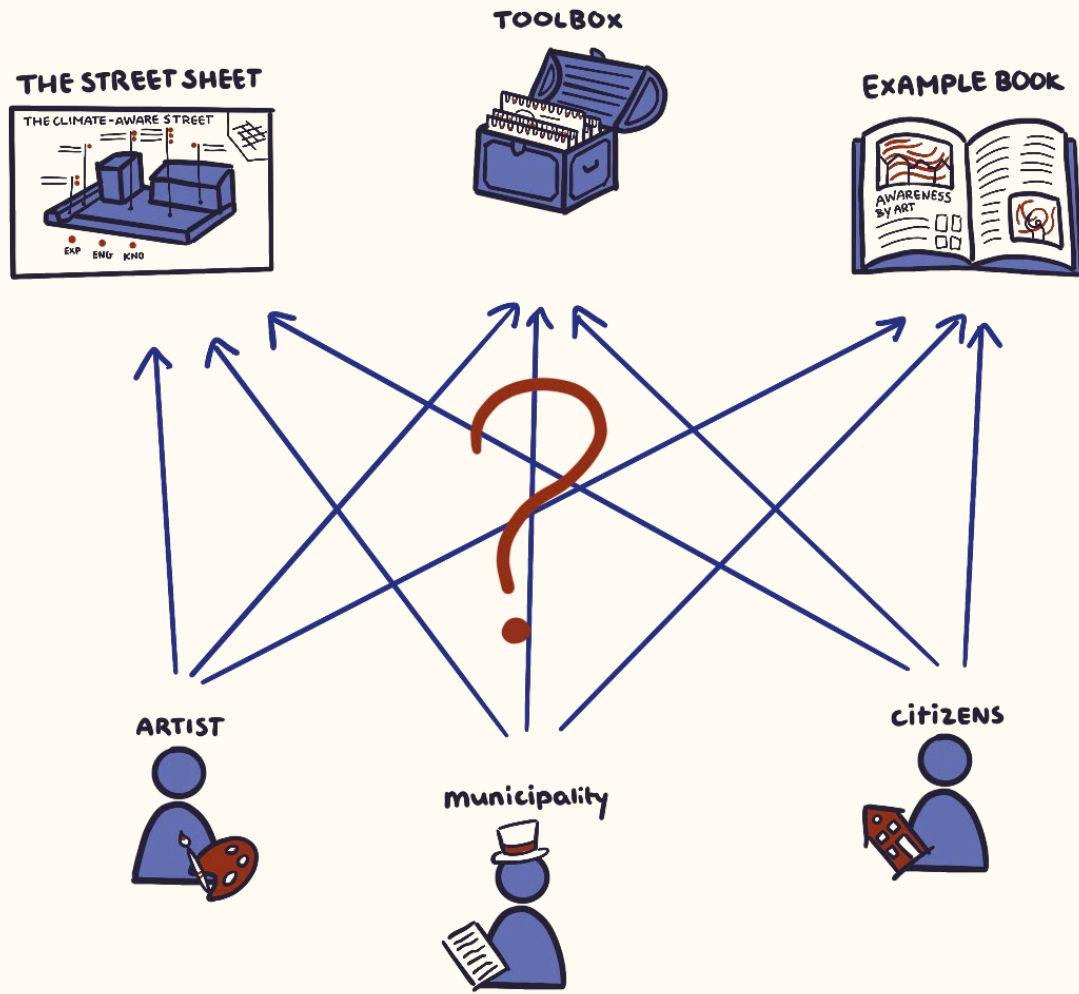


**WHO WILL USE IT?**



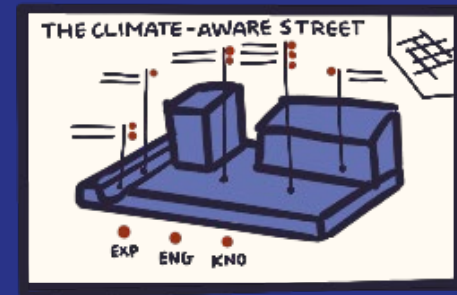
# HOW TO DESIGN CLIMATE-AWARE STREETS?

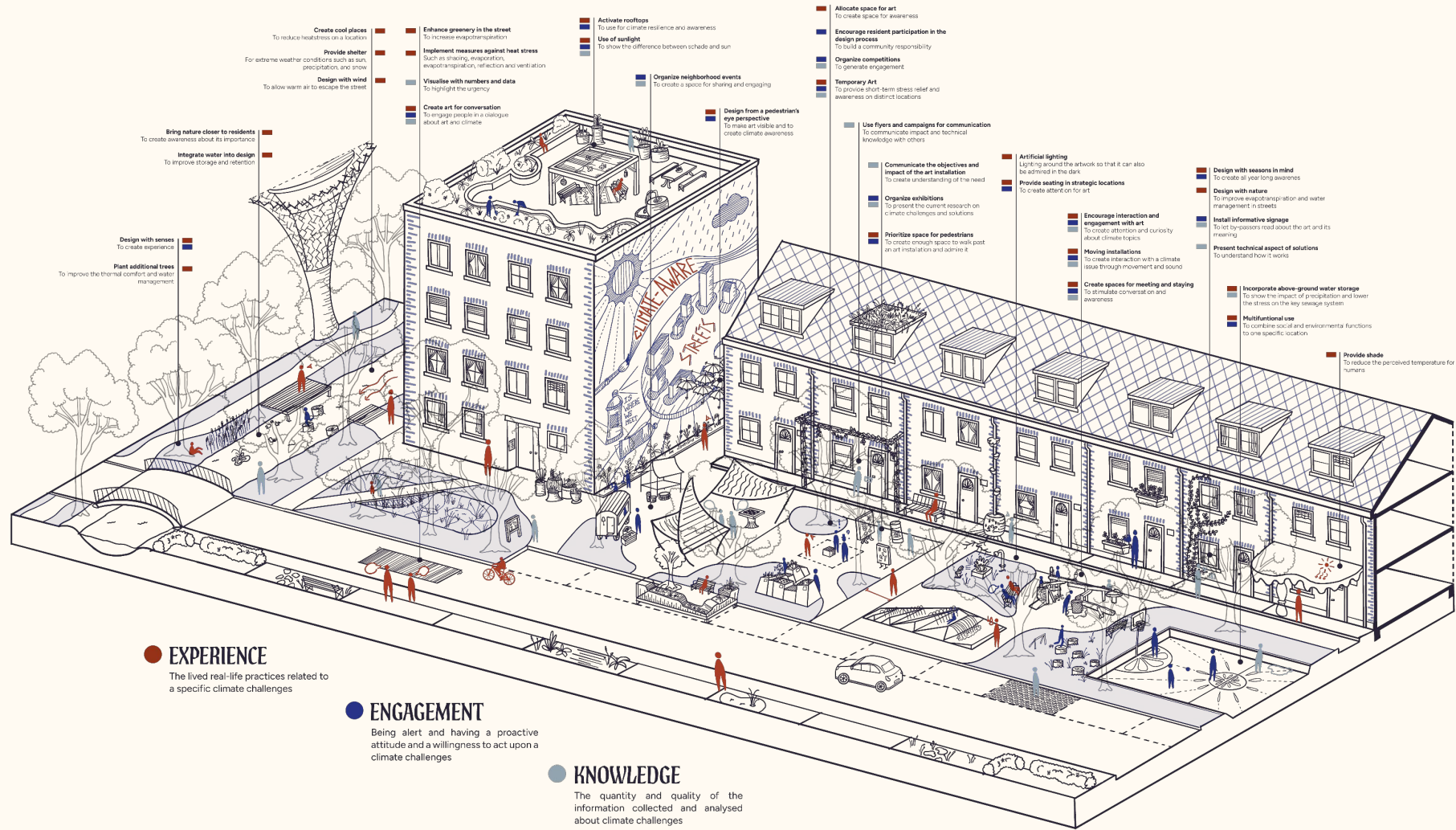


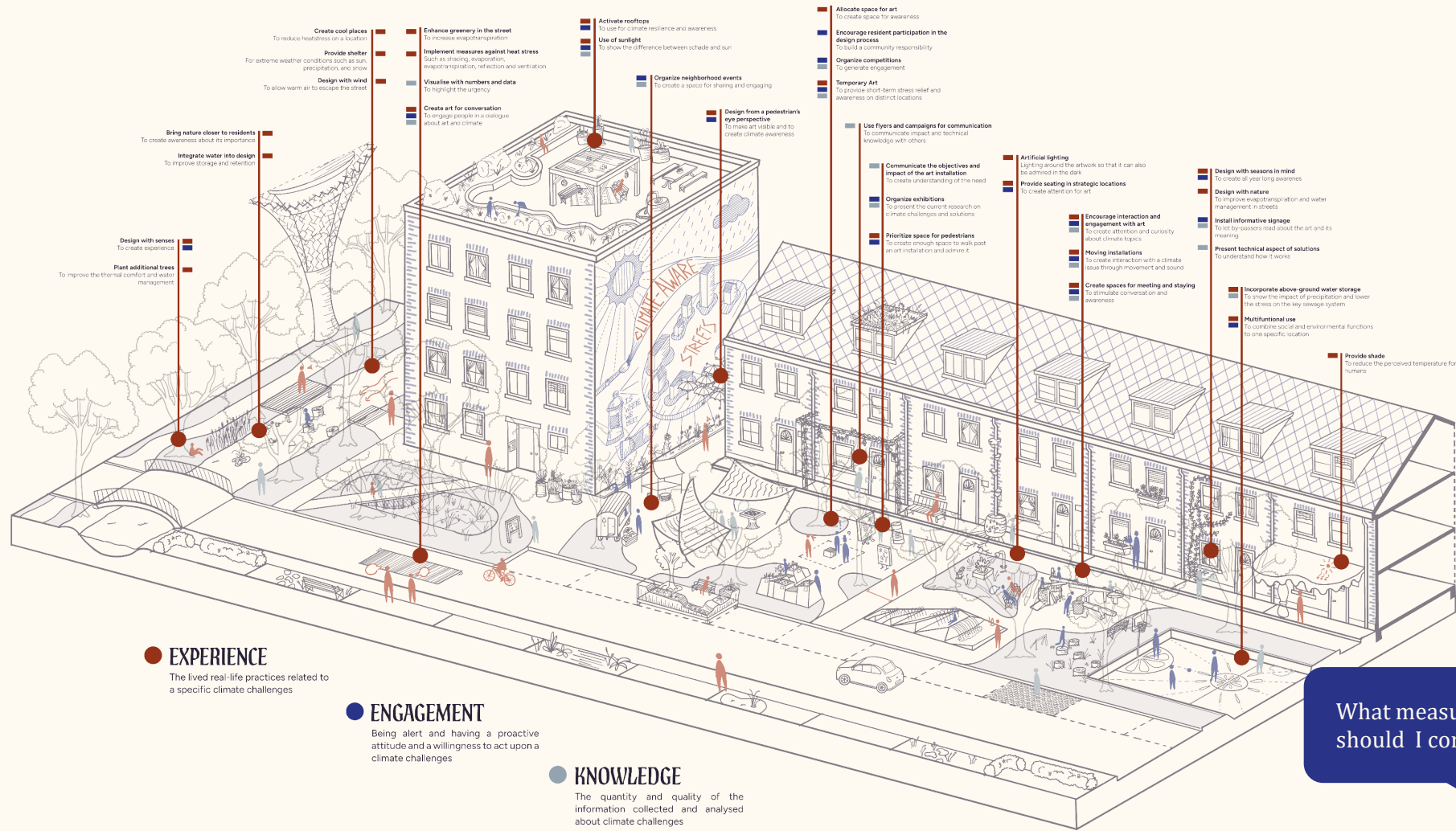


# HOW TO CREATE CLIMATE AWARENESS IN PUBLIC SPACE?

Street sheet







What measures should I consider?

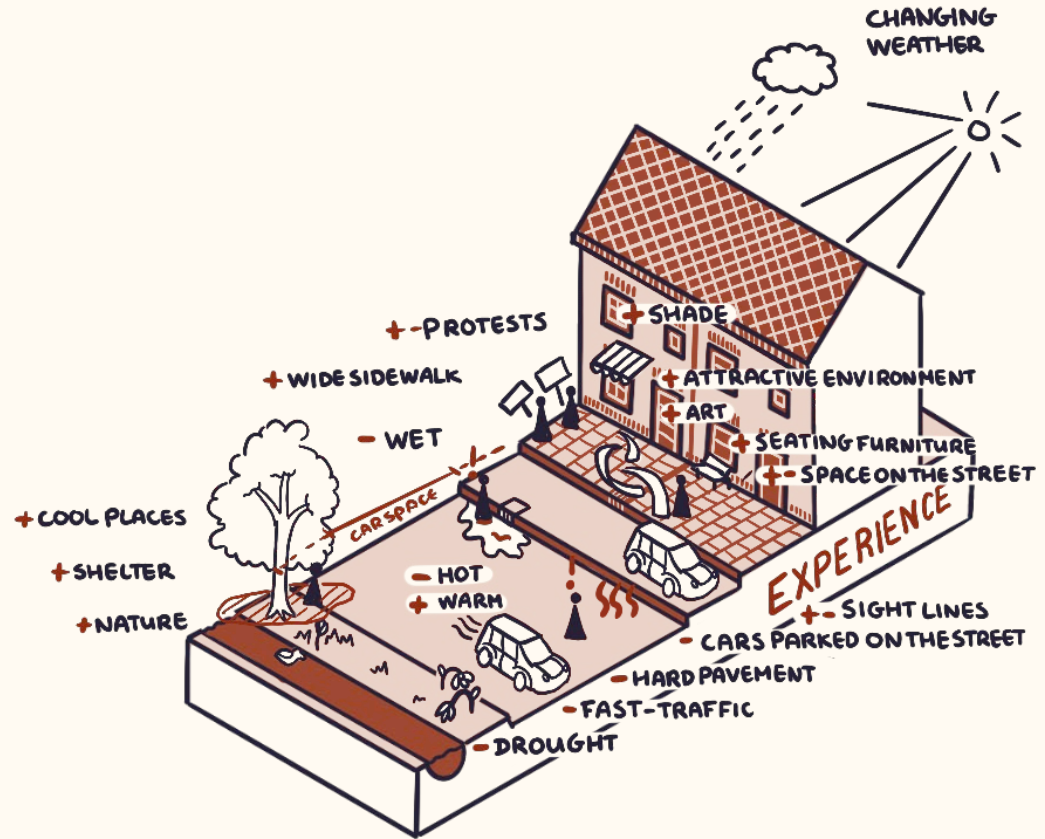
municipality





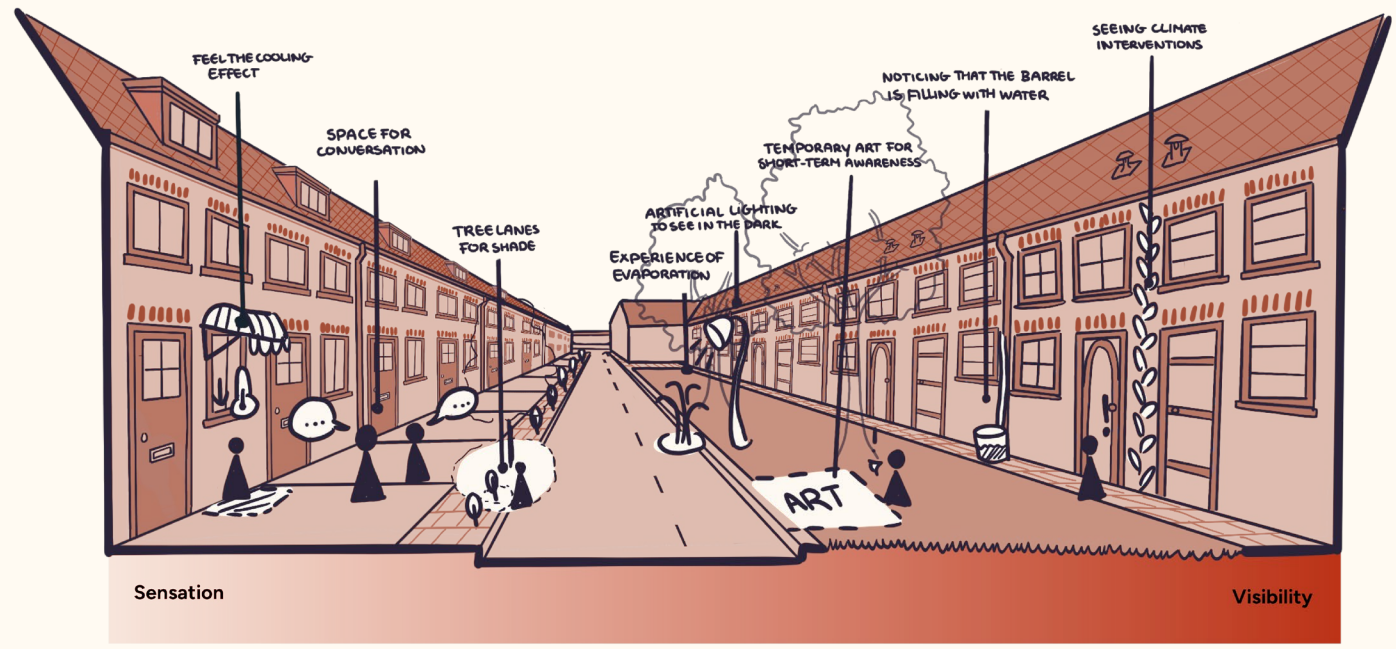
👁 Experience

## Create space for art



Influences of public space on climate awareness

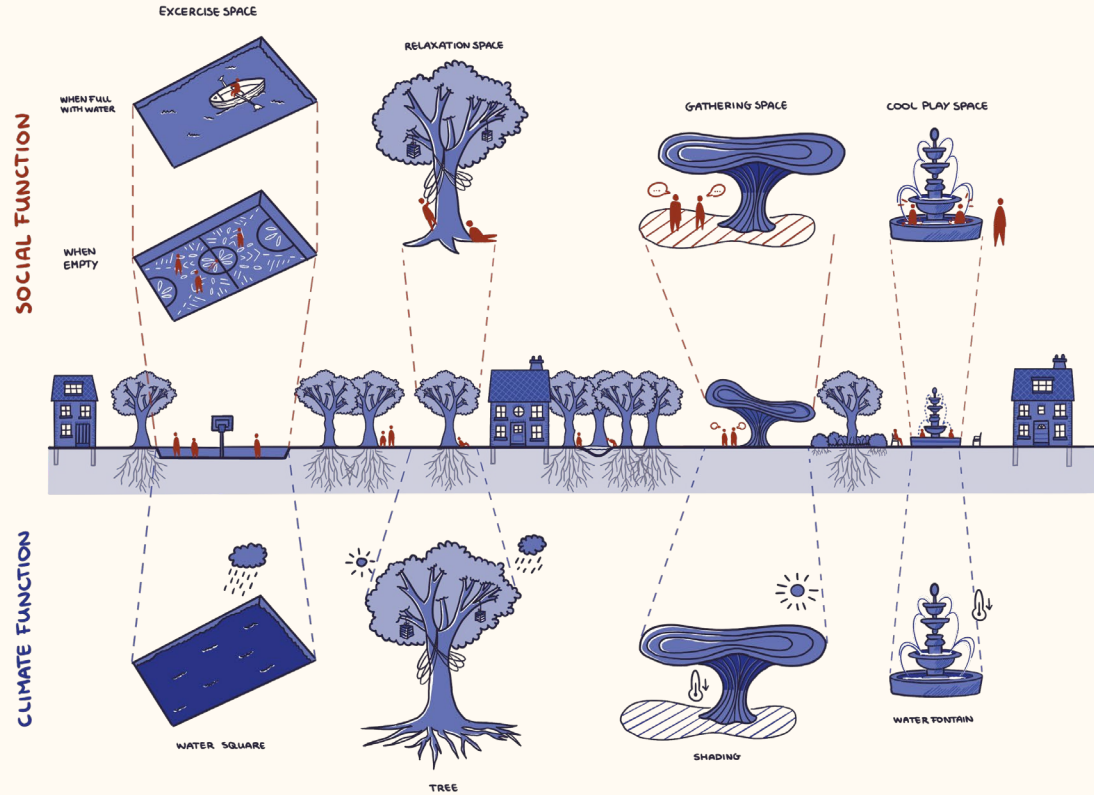
# Install artificial lighting





 Experience

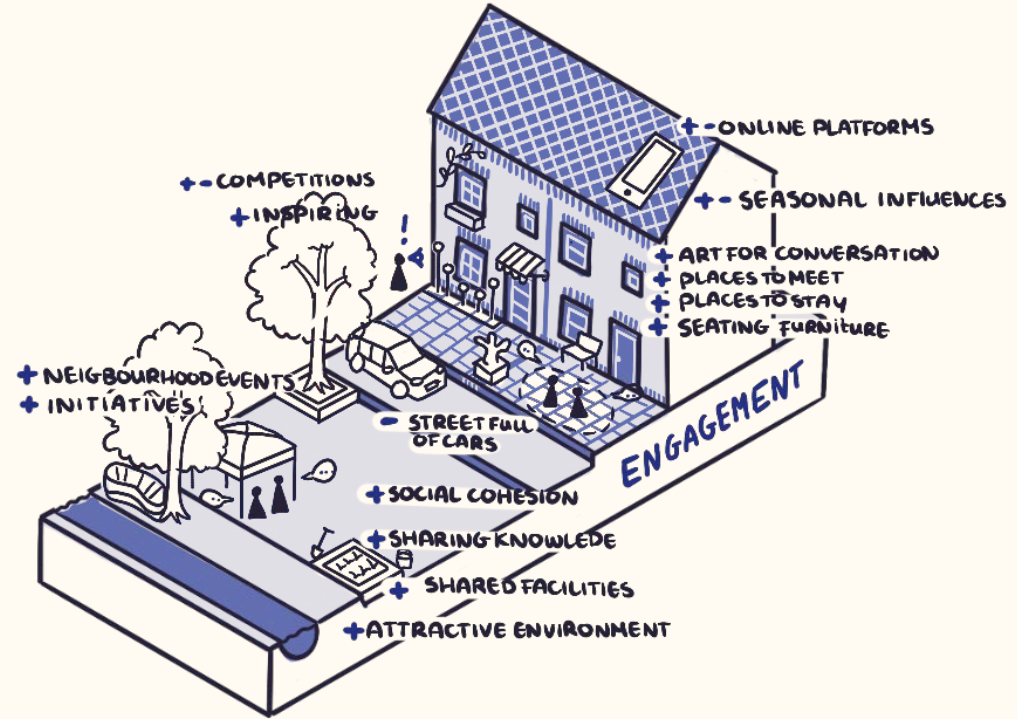
# Design multifunctional spaces





 Engagement

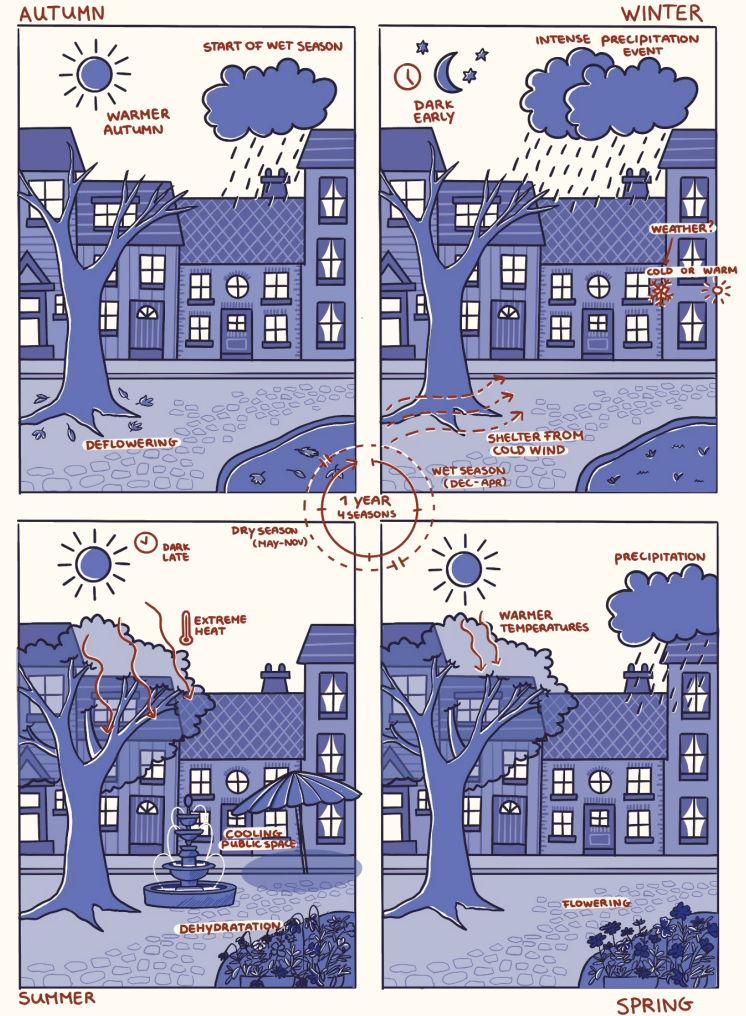
# Enhance interaction and conversation through art



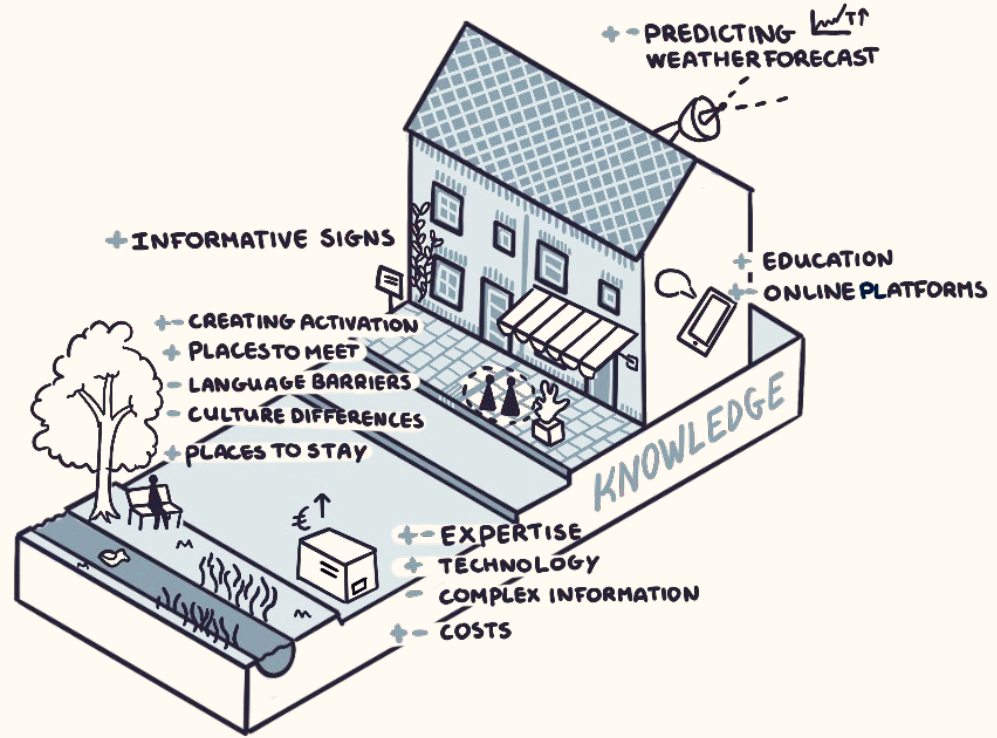
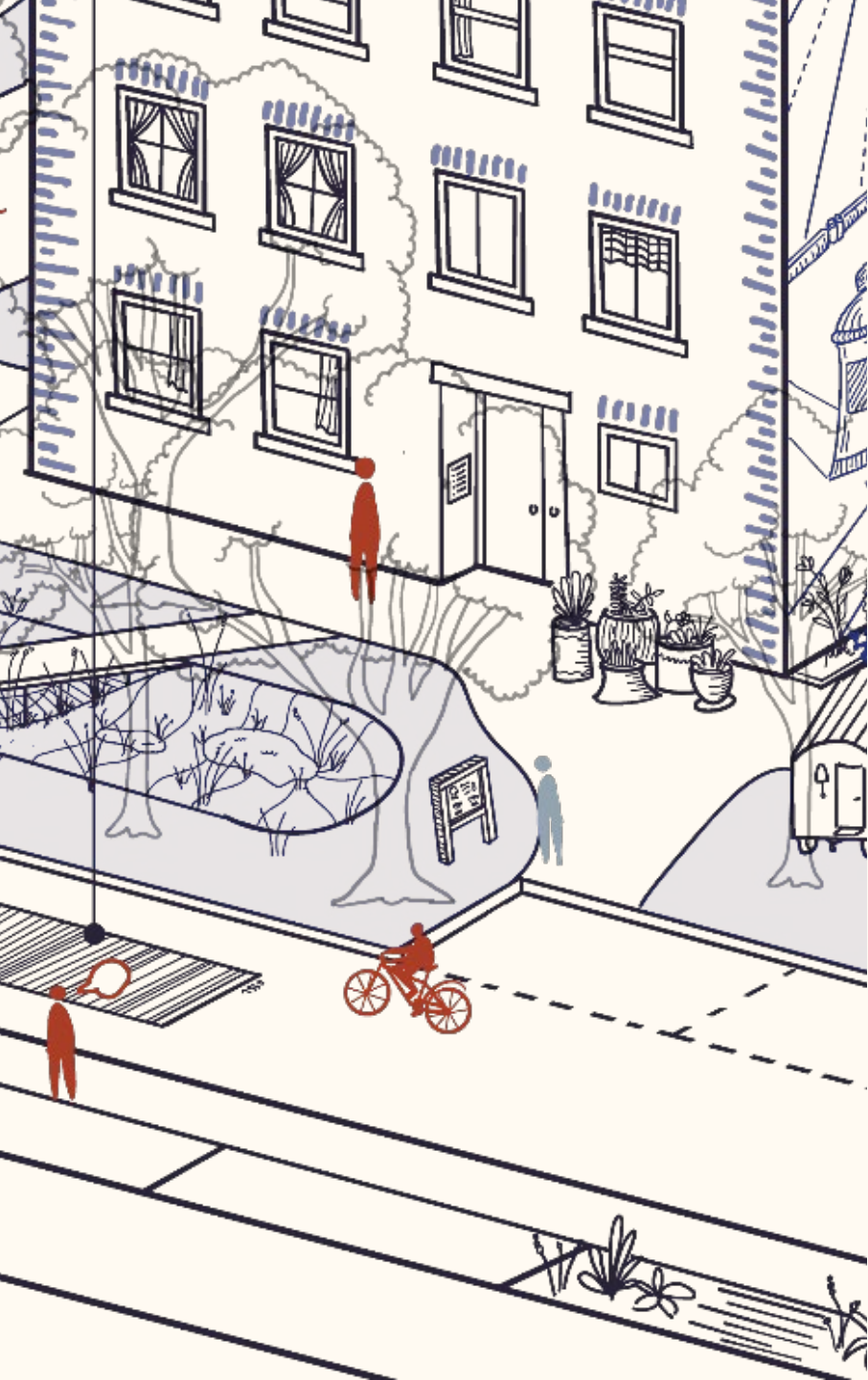
Influences of public space on climate awareness



# Design with all seasons



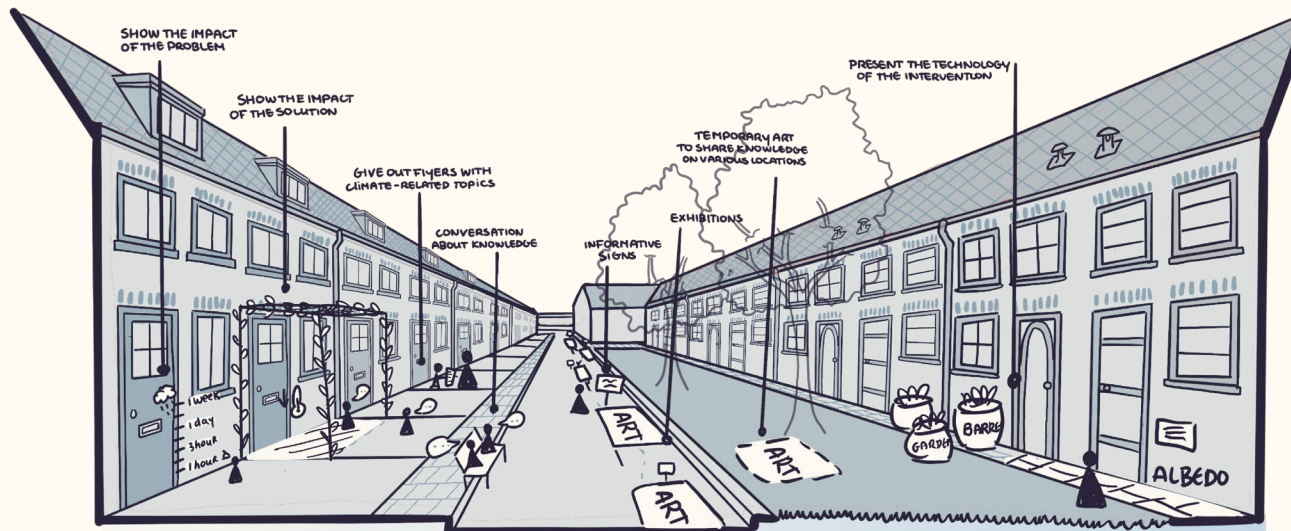
# Place informative signs



Influences of public space on climate awareness

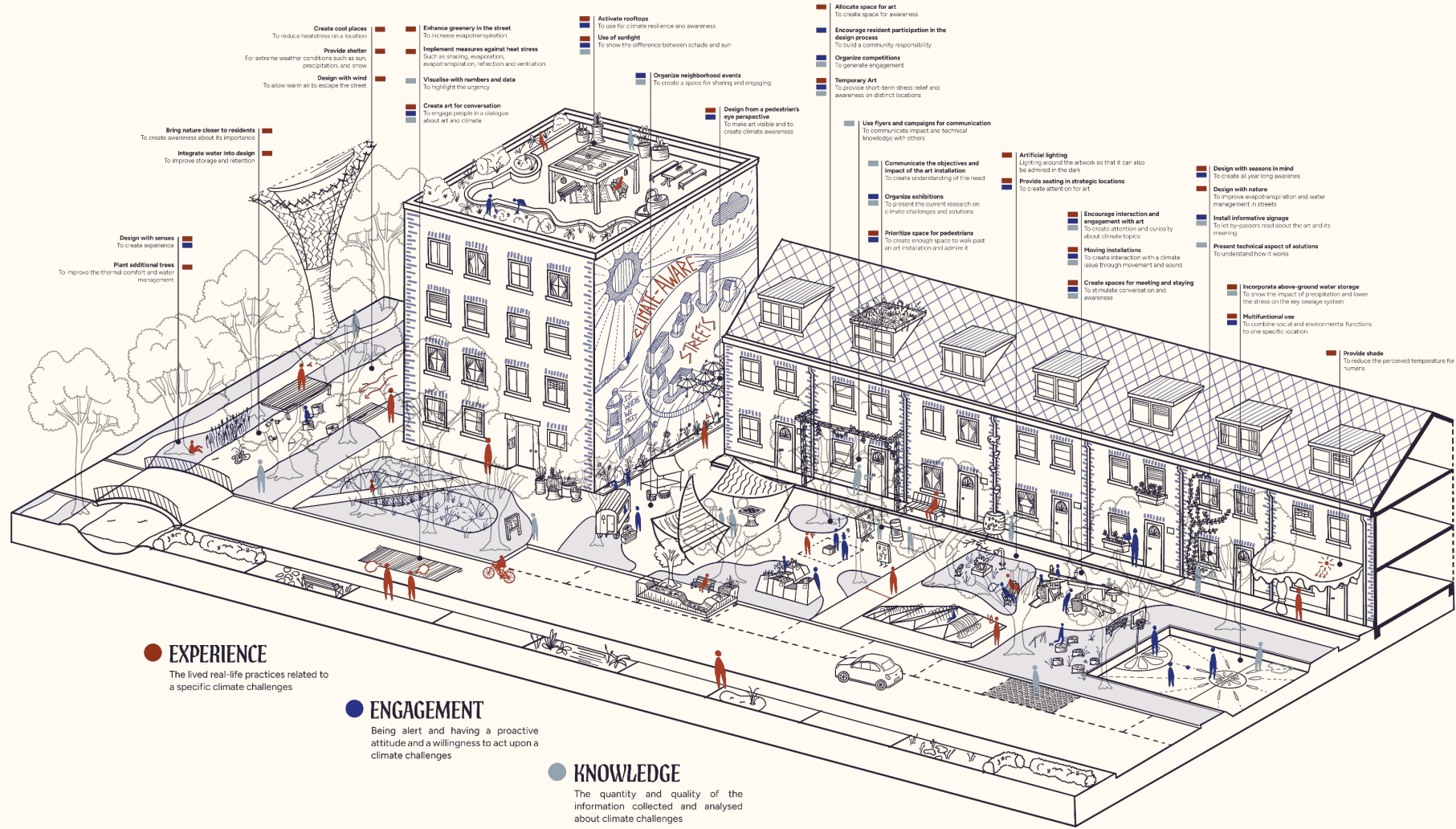


# Make the invisible visible

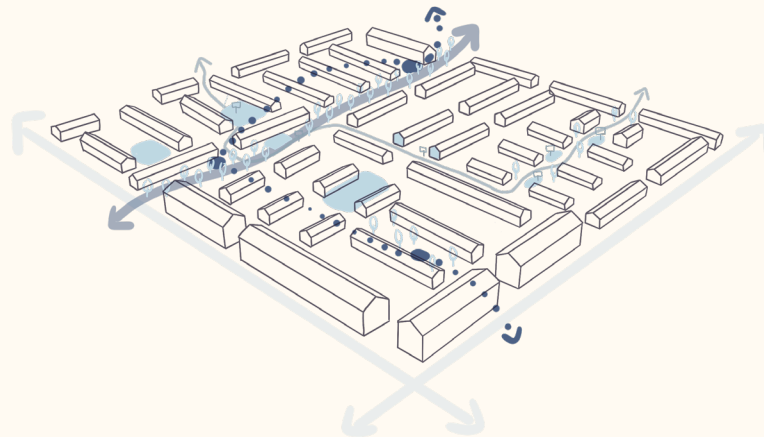
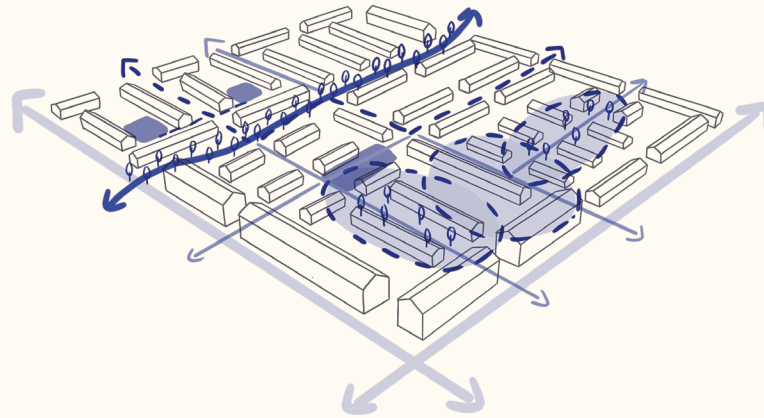
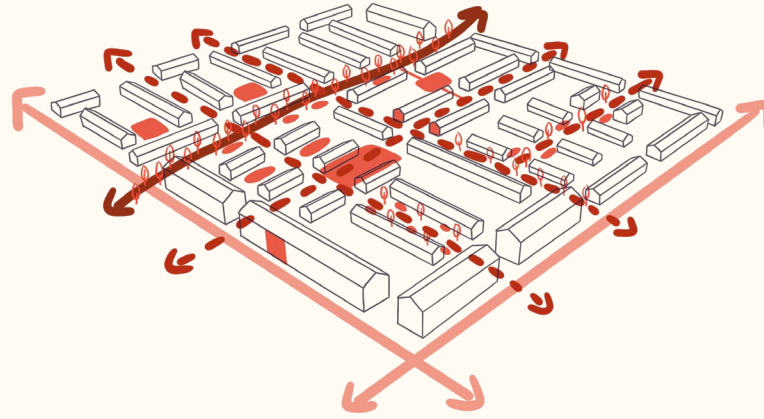


Impact

Technical



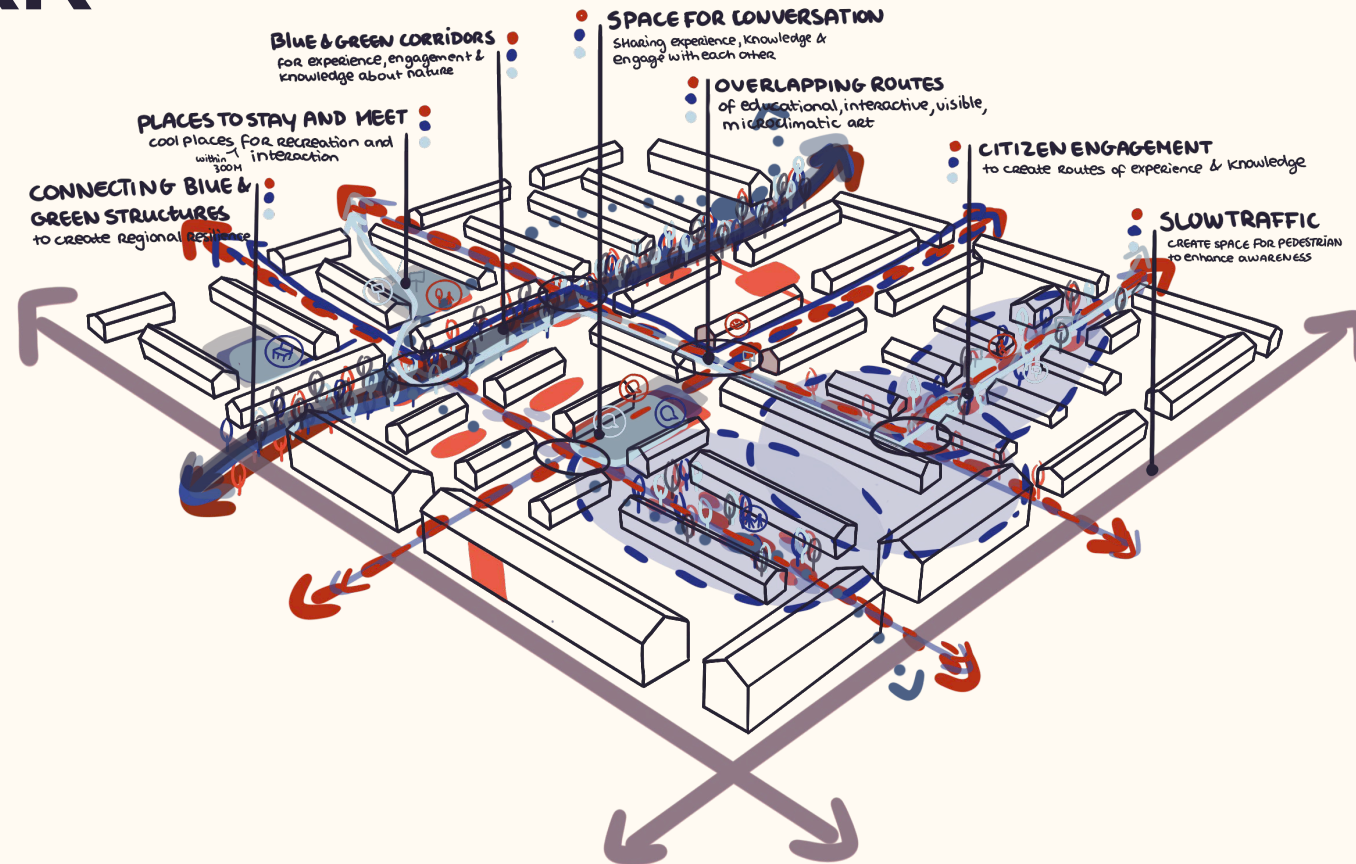
# NETWORK

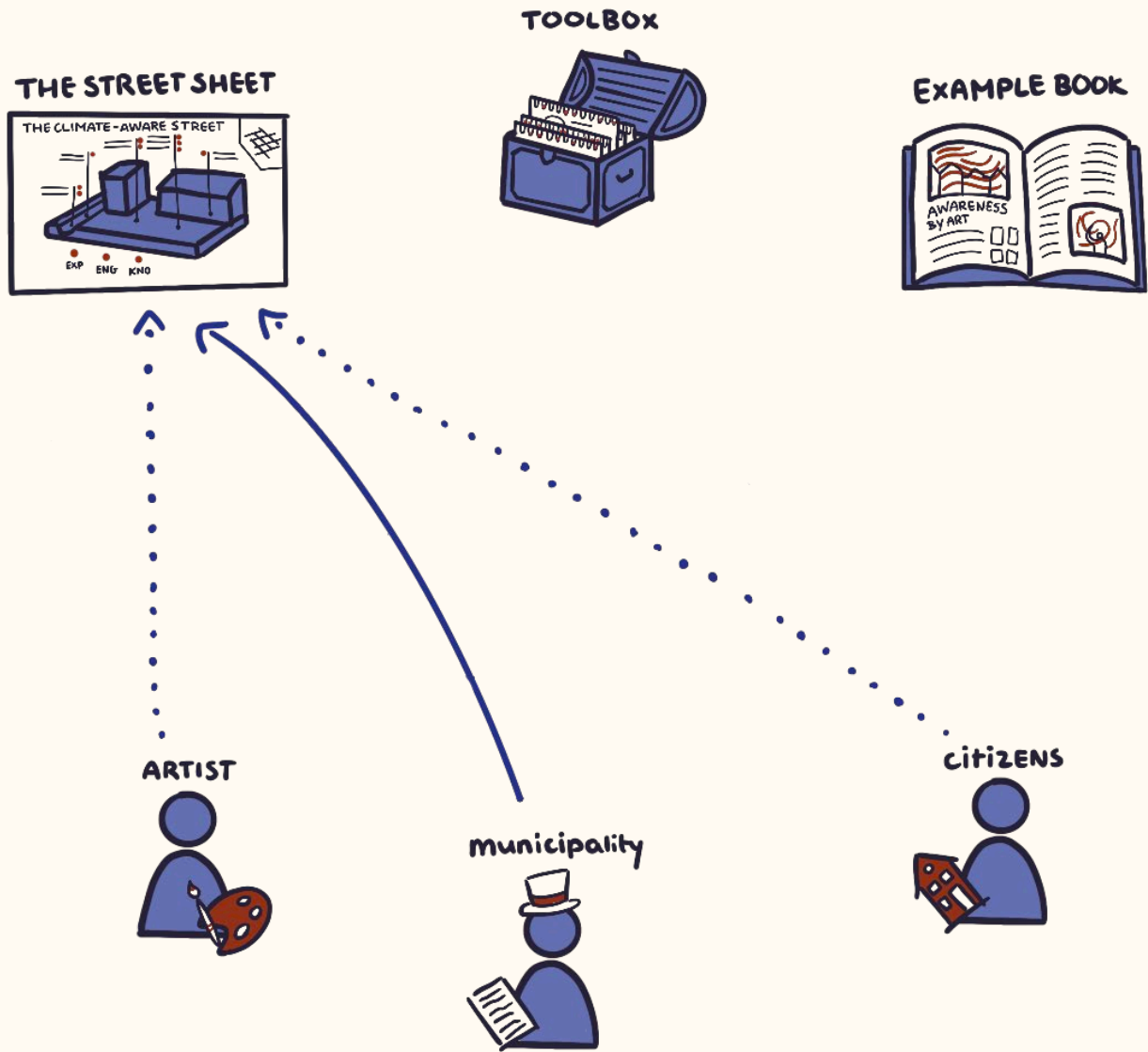


How do the streets connect?



# NETWORK

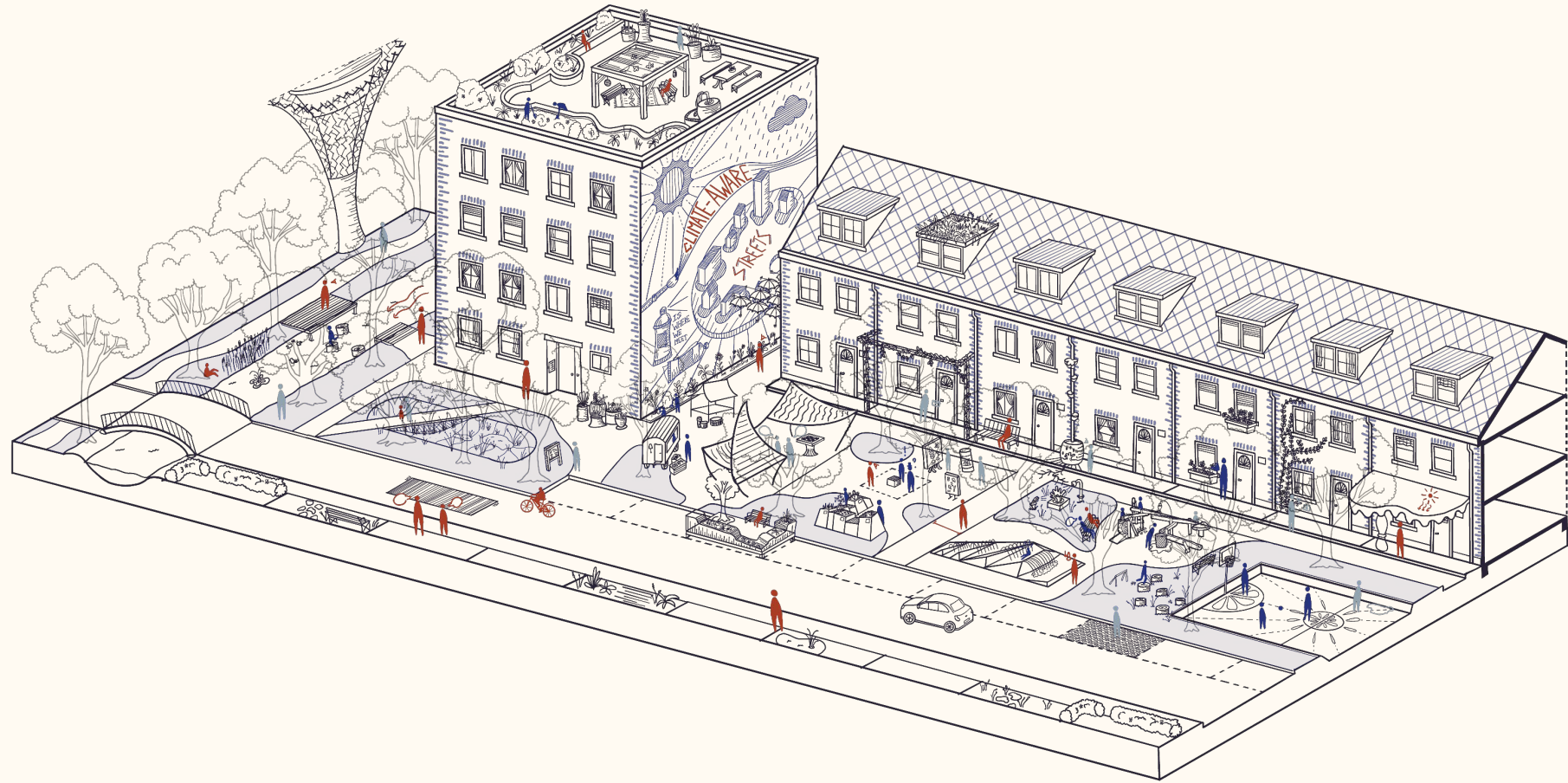




# WHAT SHOULD THEY IMPLEMENT TO ENHANCE CLIMATE RESILIENCE?

Toolbox





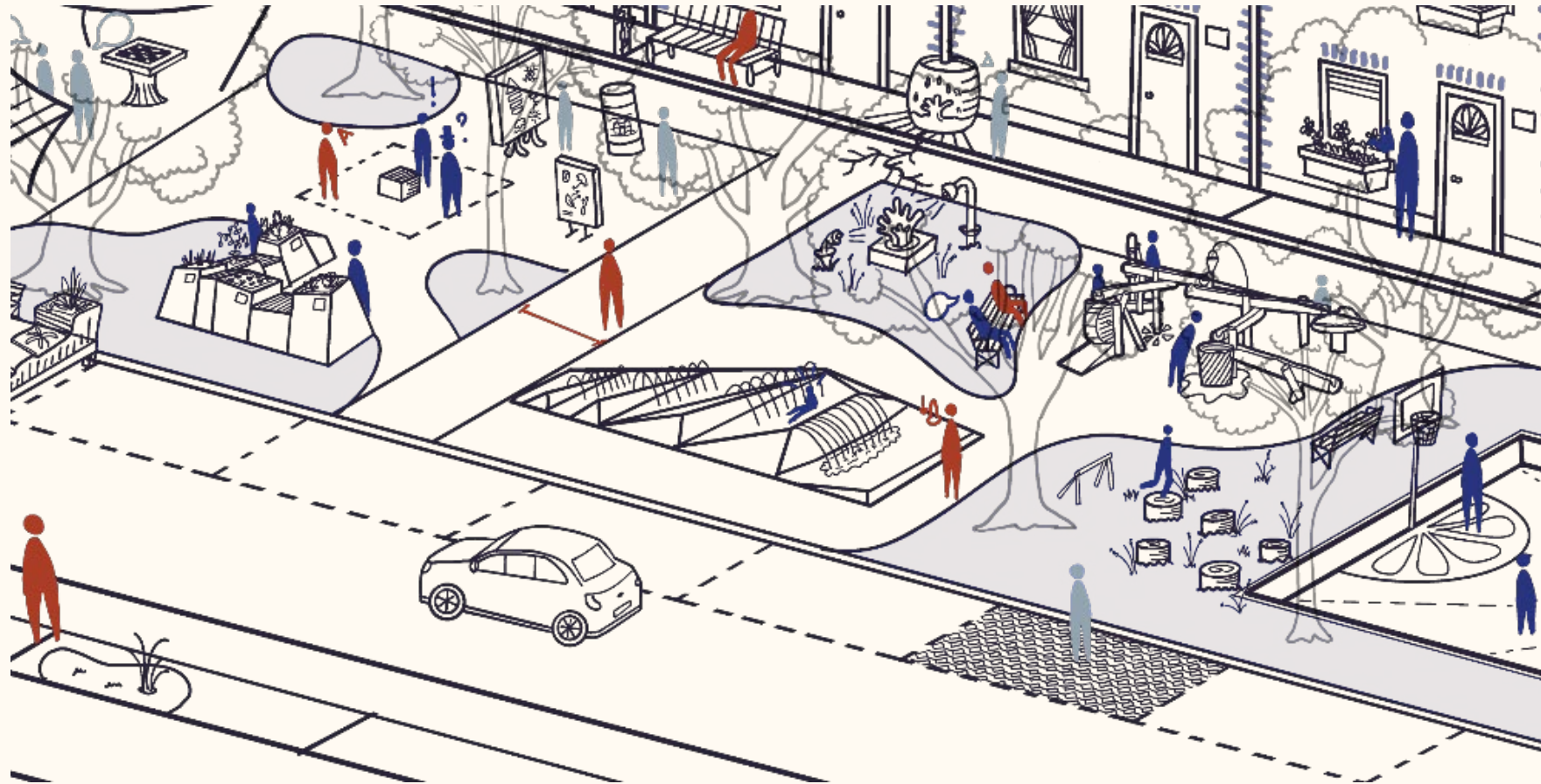


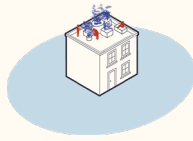
## Horizontal façade garden



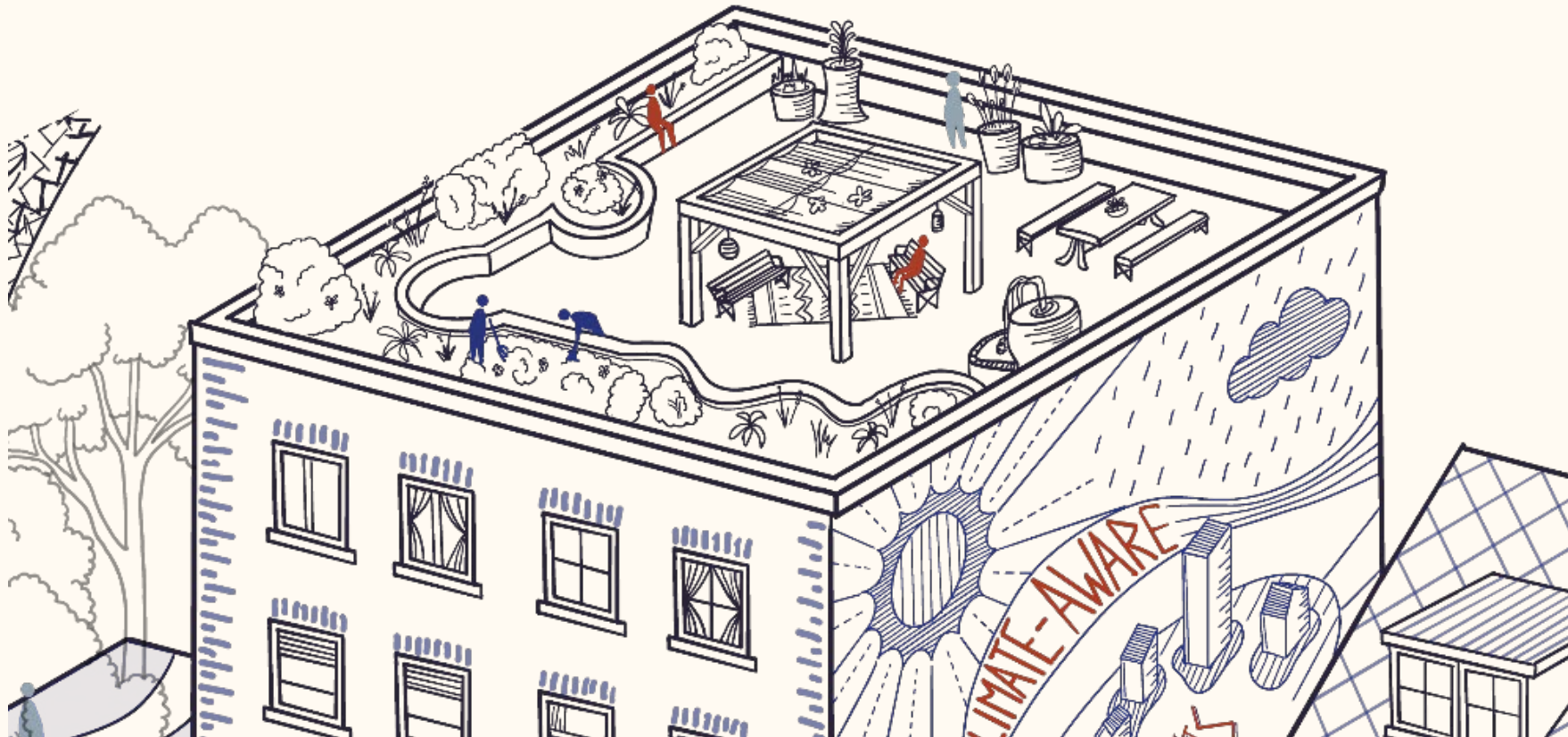


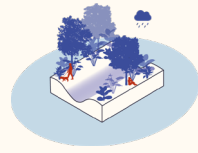
## Water fountain



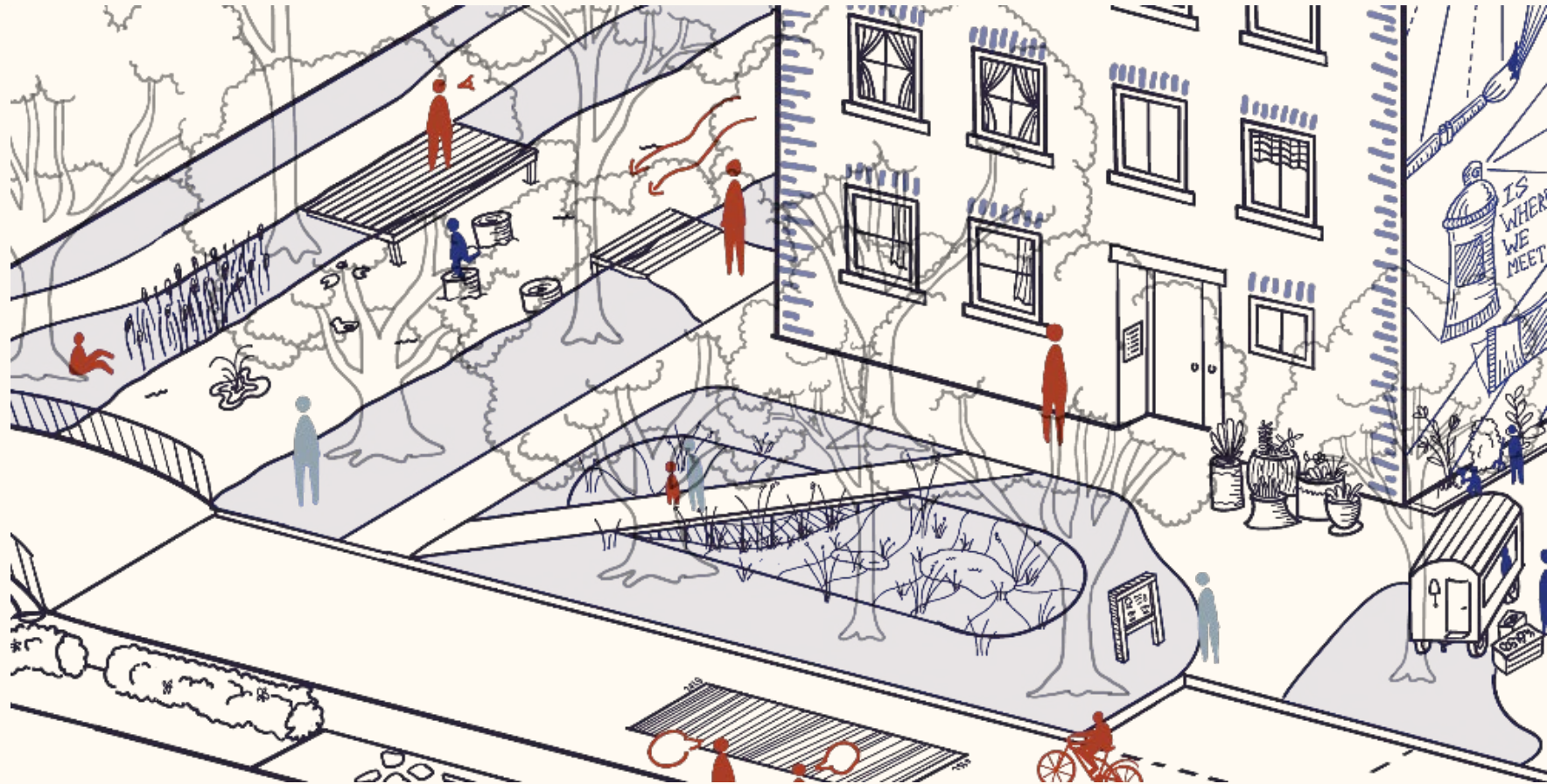


## Roof garden





## Bioswales



# 38 INTERVENTIONS



**Spatial scales**      **Microclimatic process**      **Climate extremes**      **Street typologies**      **Type of awareness**

### INTERVENTION #12: PLANTERS

**Spatial scale**

Planters are micro-scale interventions that consist of containers with soil in which vegetation can grow. The advantage in urban environment is that the roots of the plants are restricted to the dimensions of the planter, preventing interference with underground utilities such as pipelines or cables. Planters contribute to cooling the public space by evapotranspiration. In addition, they store and retain small amounts of precipitation.

**Type of awareness**      **Street typologies**      **Climate extremes**      **Microclimatic process**      **Spatial scales**

**Microclimatic processes**

**Street typologies**

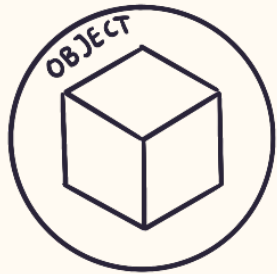
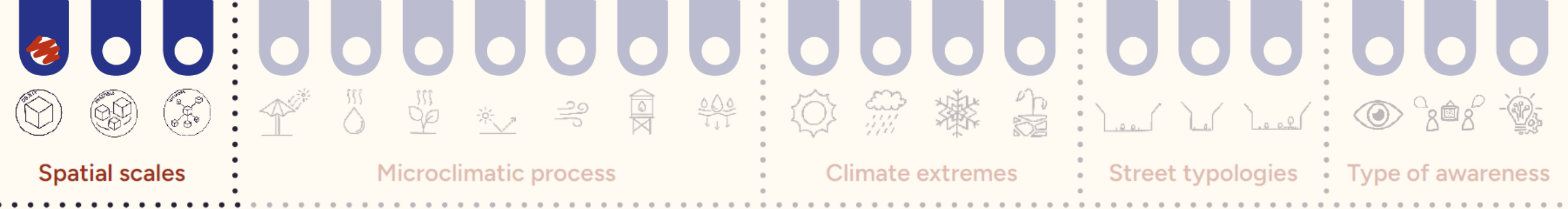
**Climate extremes**

**Triangle of awareness**

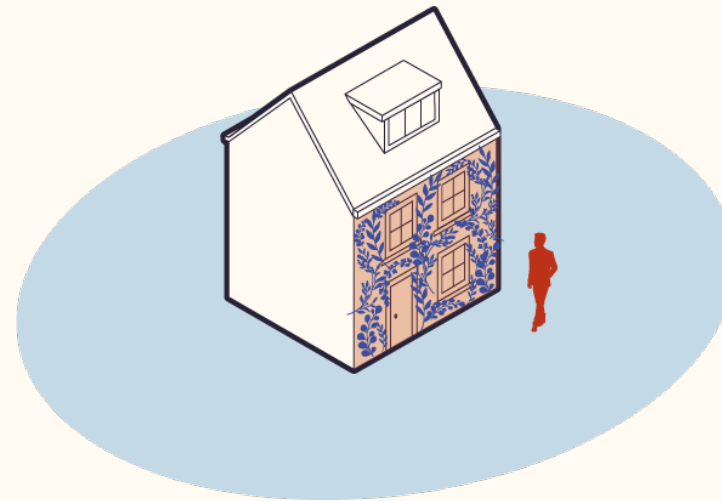
**Gradient of awareness**

How can the most suitable intervention for a specific context be identified?





*Objects function as singular interventions within the urban environment.*



Green façade

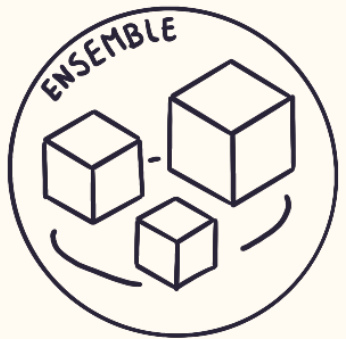
**Spatial scales**

**Microclimatic process**

**Climate extremes**

**Street typologies**

**Type of awareness**



*Ensembles represent interventions which are in a cohesive compositions of multiple interconnected elements.*



**Pocket park**

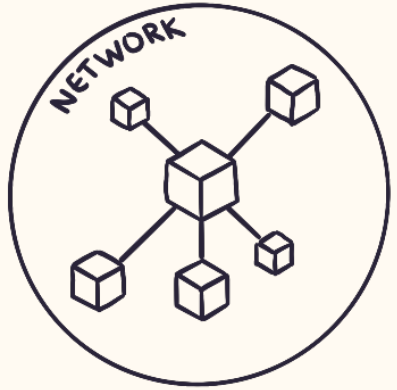
**Spatial scales**

**Microclimatic process**

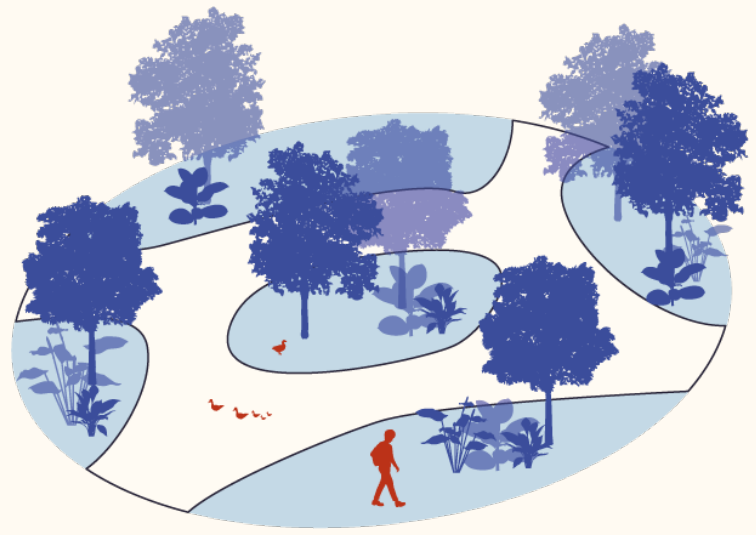
**Climate extremes**

**Street typologies**

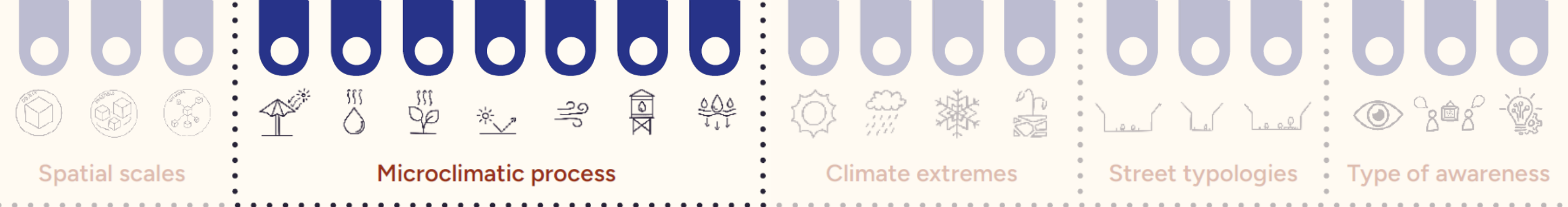
**Type of awareness**



*Networks refer to interventions that are embedded within the urban environment*



**Wetlands**



SHADING



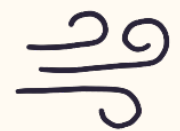
EVAPORATION



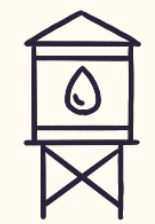
EVAPOTRAN-  
SPIRATION



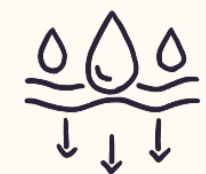
REFLECTION



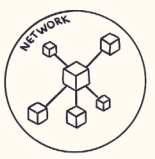
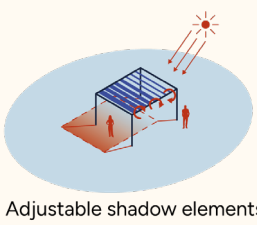
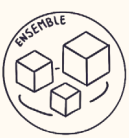
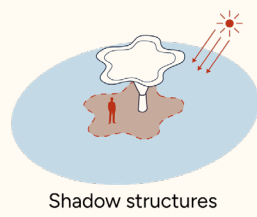
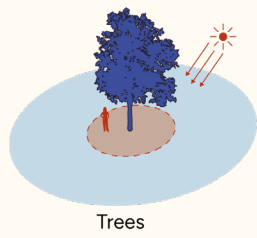
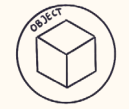
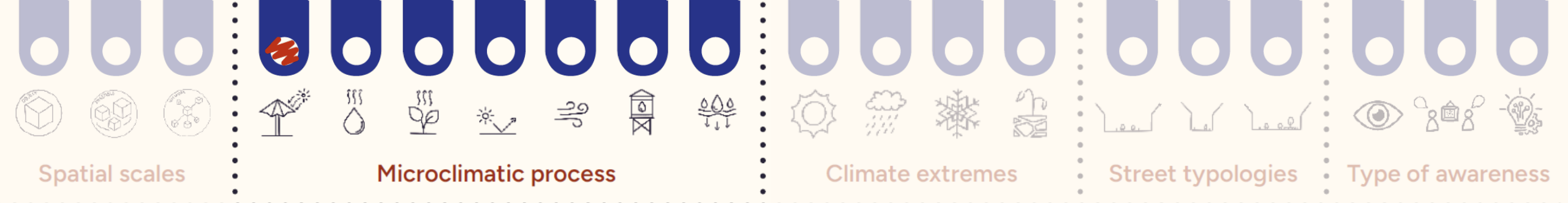
VENTILATION

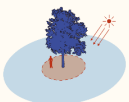

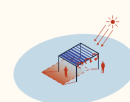












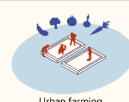




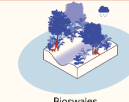





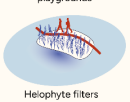







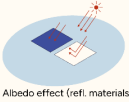
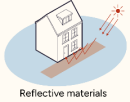





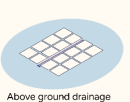


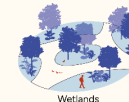
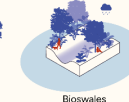


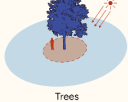
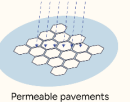






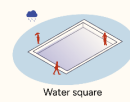
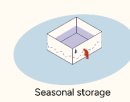

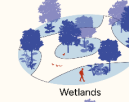
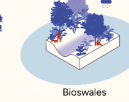
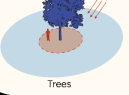




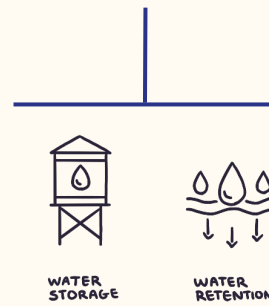
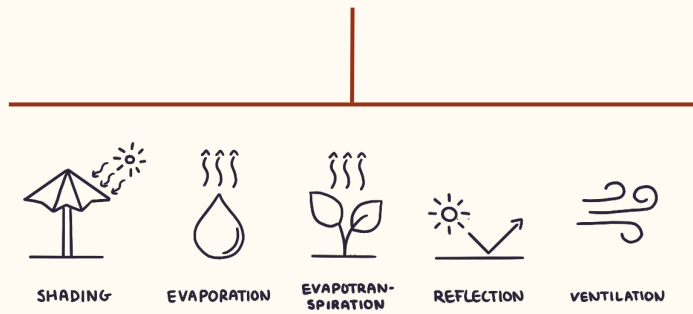
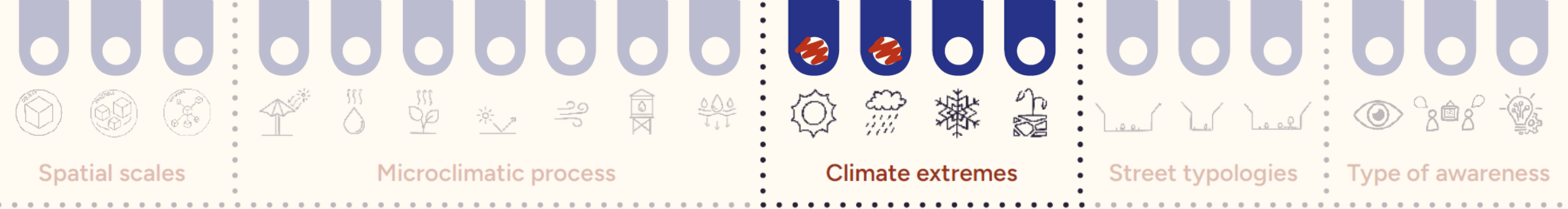
WATER  
STORAGE



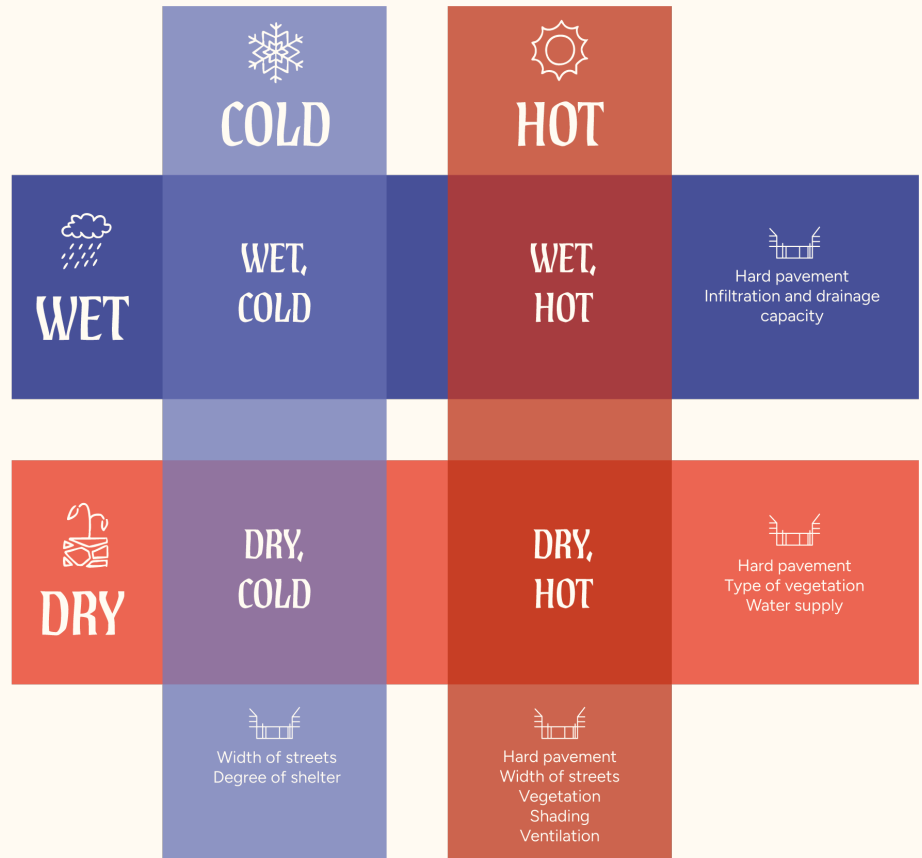
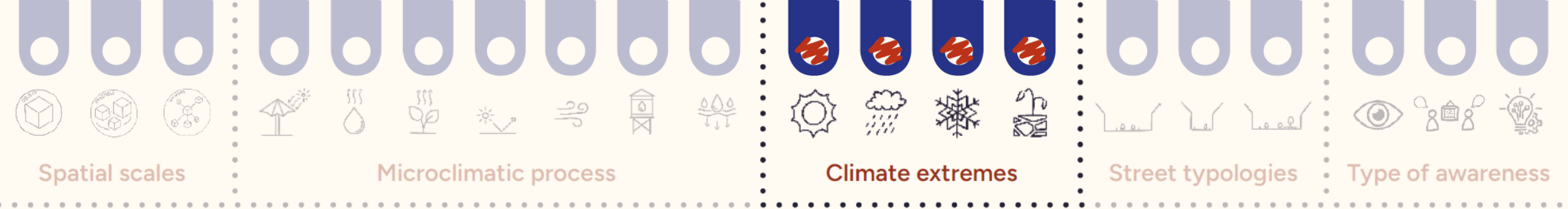
WATER  
RETENTION

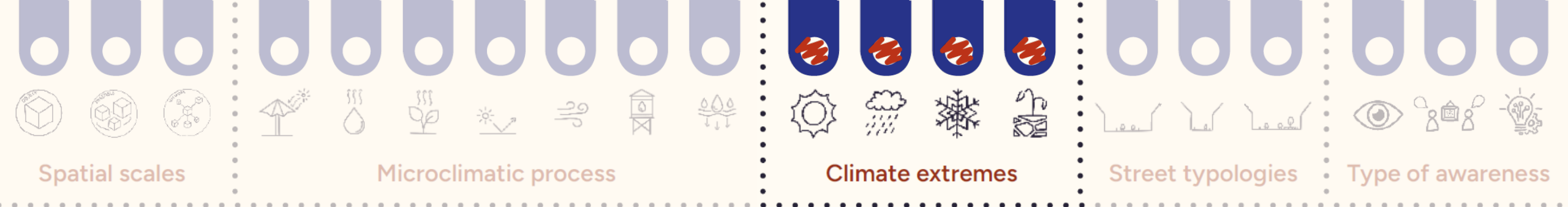


	OBJECT	ENSEMBLE	NETWORK
SHADING	 Trees  Shadow structures	 Adjustable shadow elements	 Shaded streets  Tree lanes  Urban forest
EVAPORATION	 Fountains  Misting systems  Water walls  Blue roof	 Moving water installations	 Ponds
EVAPOTRANSPORTATION	 Planters  Vertical facade garden  Horizontal facade garden  Urban farming	 Green squares and playgrounds  Pocket parks  Greenstrokes	 Wetlands  Bioswales  Urban forest
	 Green parking spaces  Ivy plants  Green facade  Green roof	 Helophyte filters  Unpaving of streets	
	 Roof garden		
VENTILATION	 Show windflow	 Create small pathways	 Create urban pathways  Urban forest  Tree lanes
REFLECTION	 Albedo effect (refl. materials)	 Reflective materials	
WATER RETENTION	 Ivy plants  Green facade  Green roof  Roof garden	 Pocket parks  Above ground drainage (make water visible)  Greenstrokes	 Ponds  Wetlands  Bioswales
	 Planters  Facade garden  Trees	 Permeable pavements  Unpaving the streets	 Urban forest
WATER STORAGE	 Green roof  Planters  Rain barrels  Blue roof	 Water square  Seasonal storage	 Ponds  Wetlands  Bioswales
	 Trees		 Urban forest  Tree lanes



Microclimatic processes





Planters

### Climate extremes

Too hot



Too wet

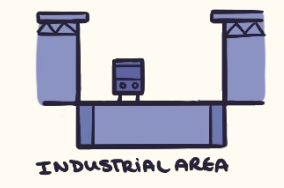
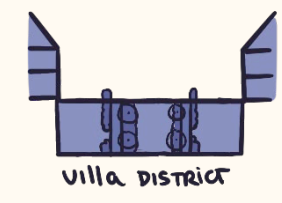
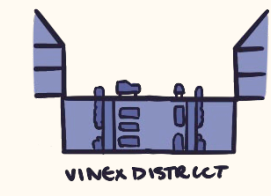
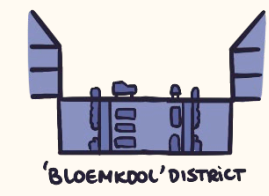
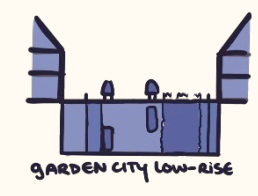
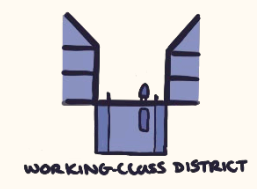
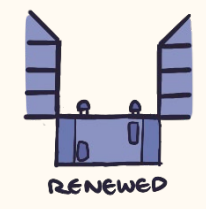
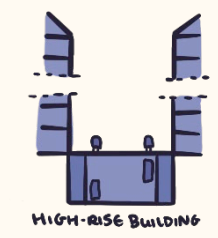
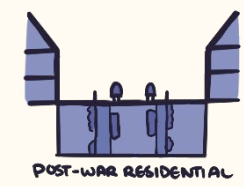
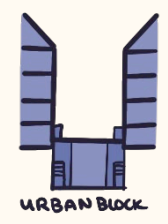
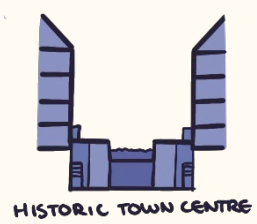


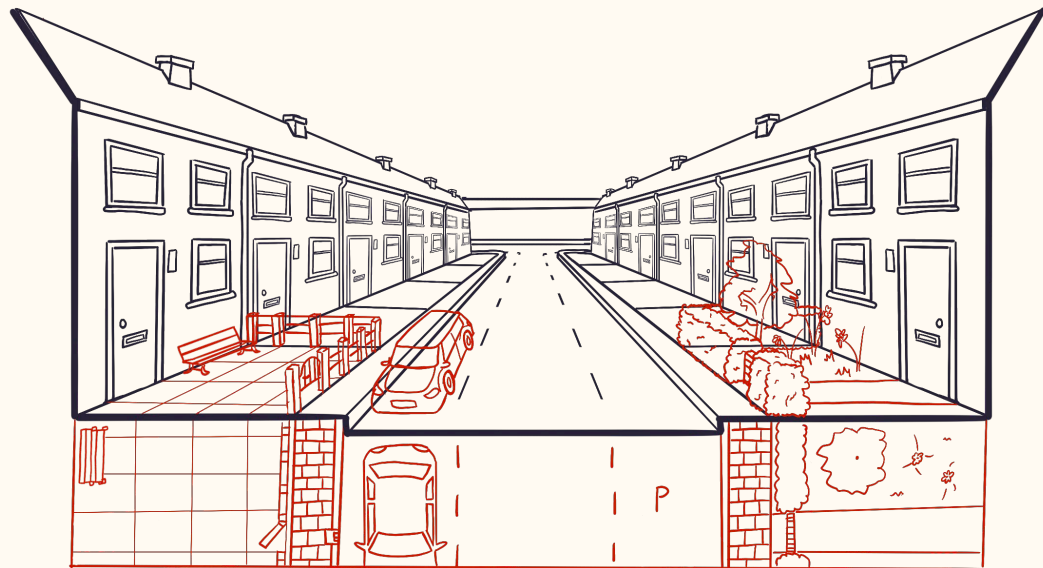
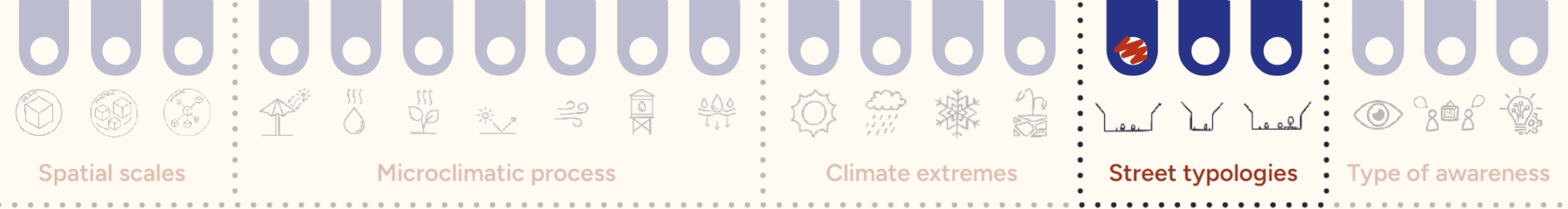
Too cold



Too dry







## Garden village (*tuindorp*)

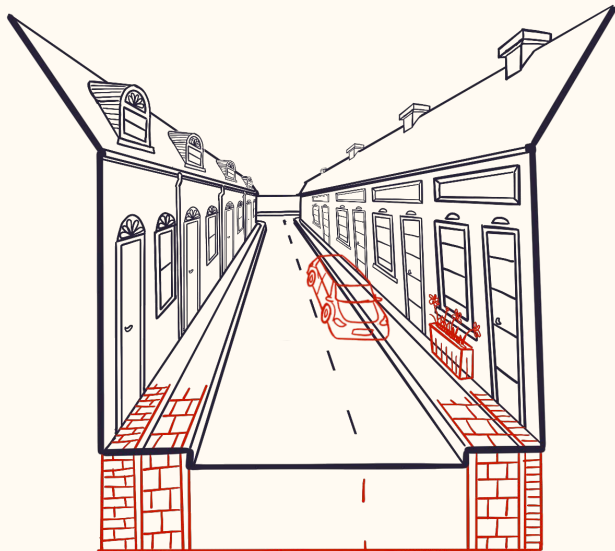
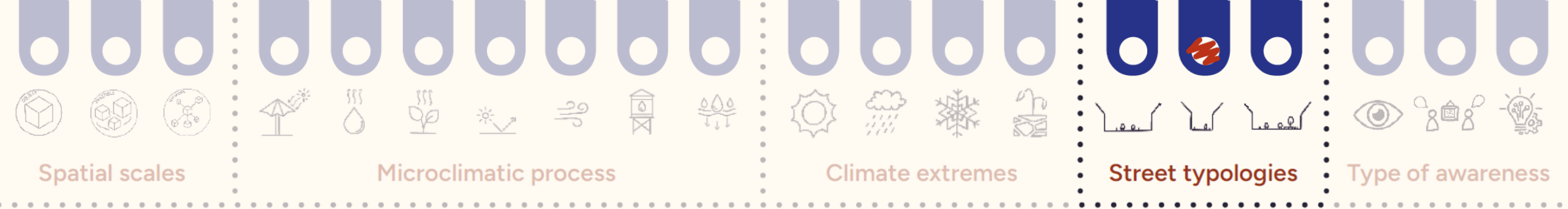
*Spacious front and back garden (private)*

*2-3 floors*

*Lots of parallel parking*

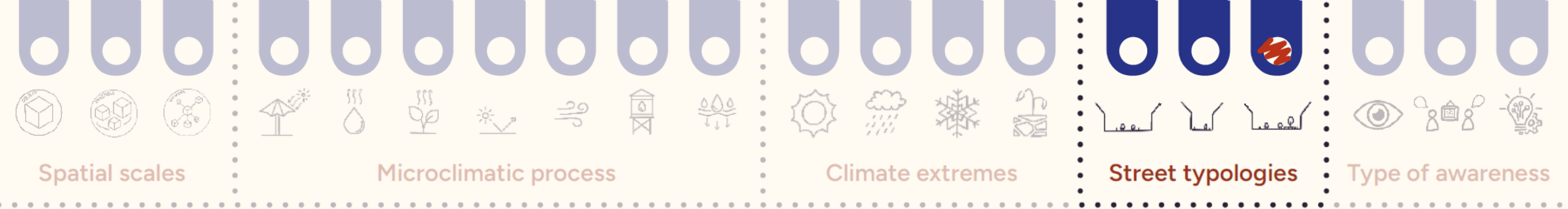
*Limited communal greenery*

*Often no street trees*



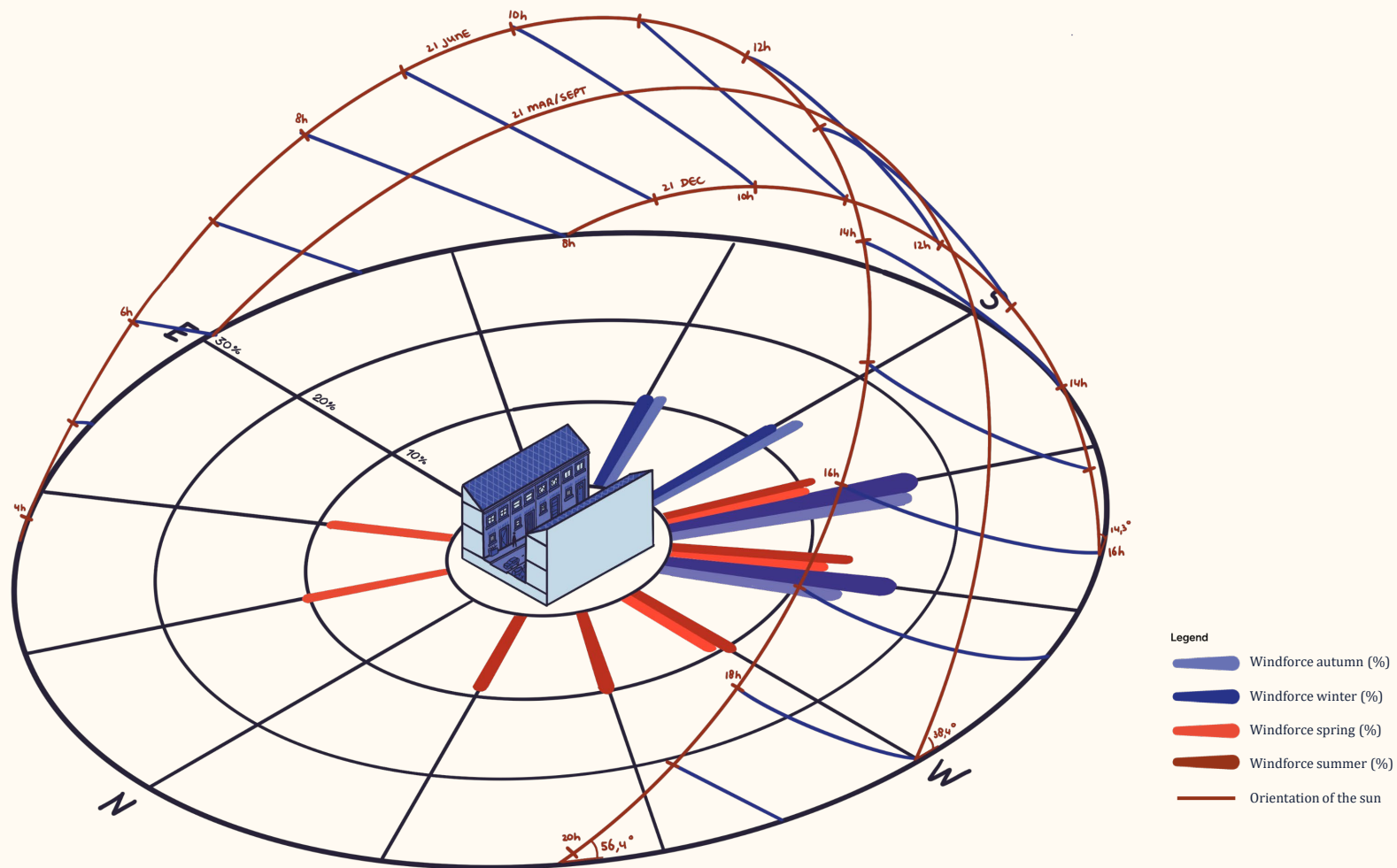
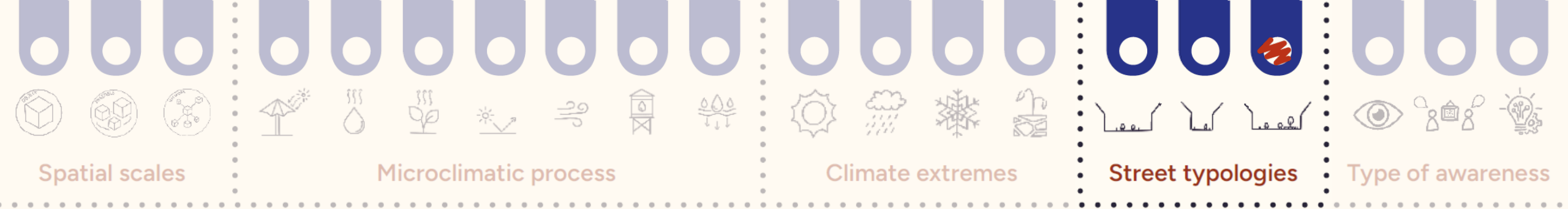
### Working-class district (*volkswijk*)

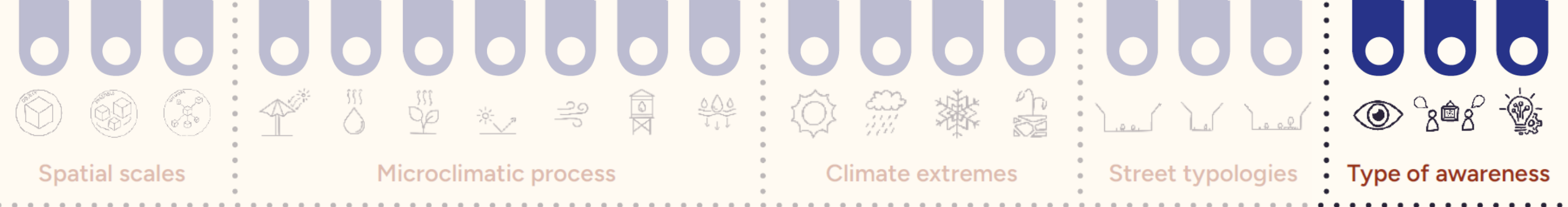
- No front garden*
- 2-3 floors*
- One sided parallel parking*
- Little communal greenery*



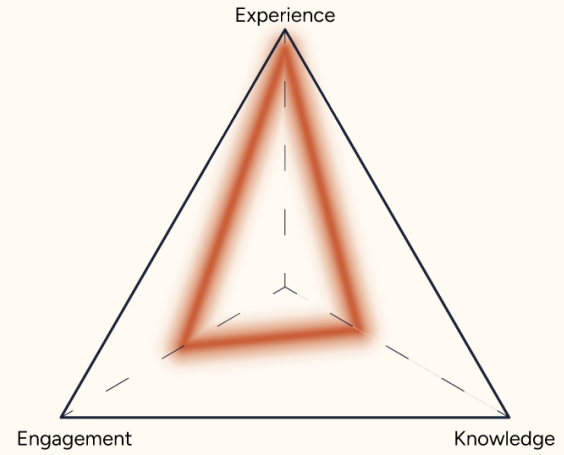
### Garden city low-rise (*tuinstad laagbouw*)

- Open building blocks with front and back gardens*
- 2-3 floors*
- Parallel parking*
- lots of communal greenery*

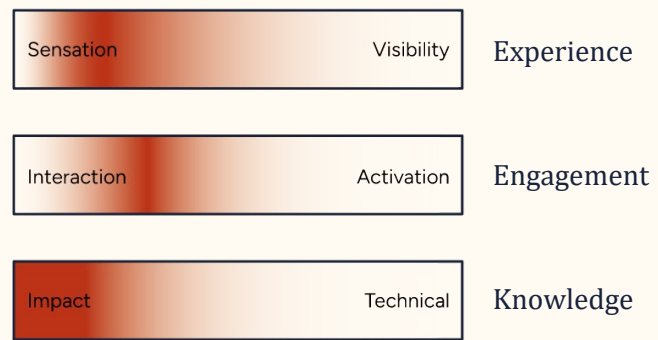


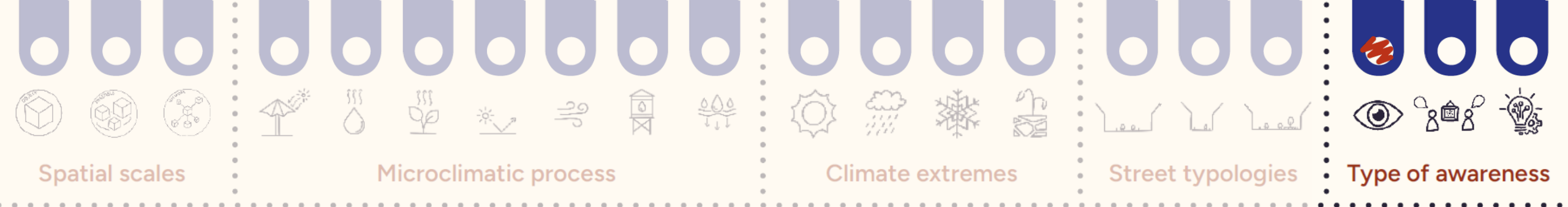


Triangle of awareness

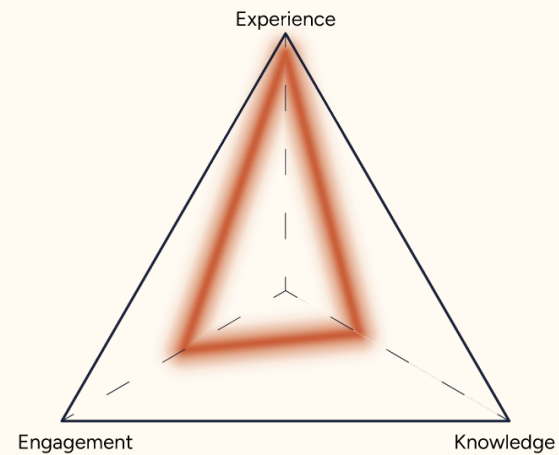


Gradient of awareness





Shaded streets



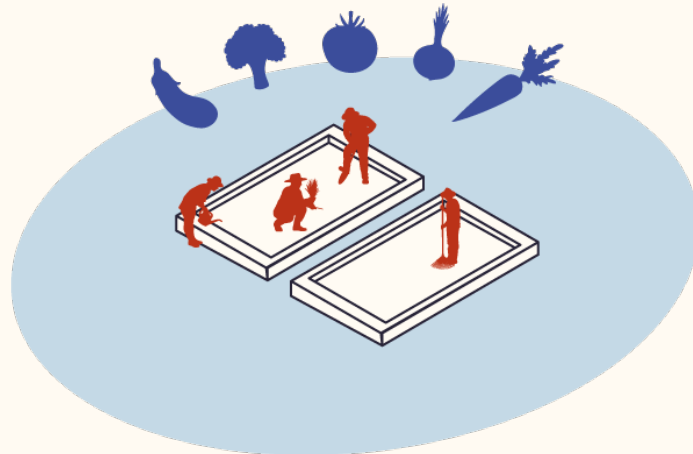
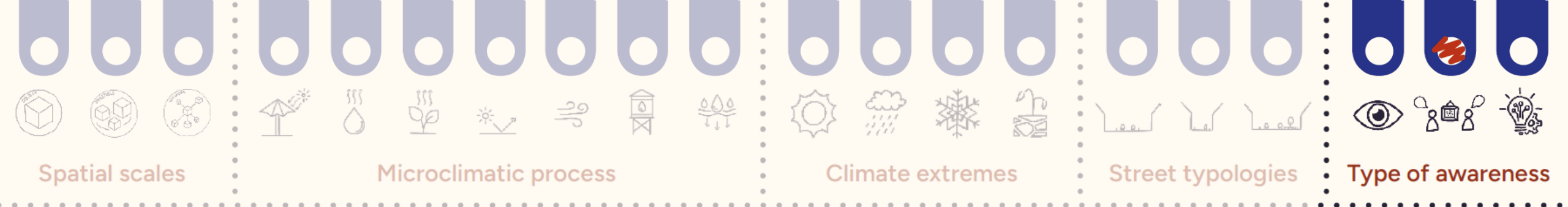
Experience



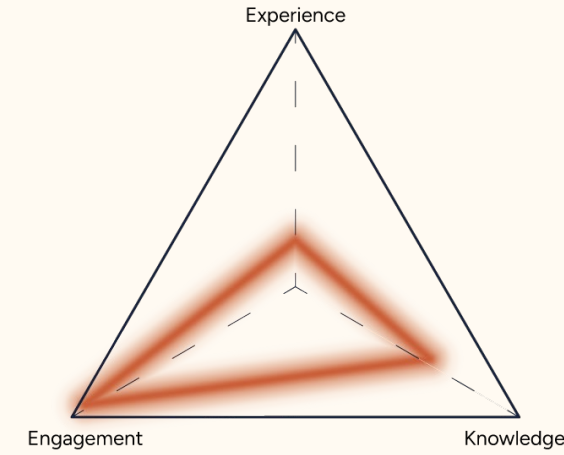
Engagement



Knowledge



Urban farming



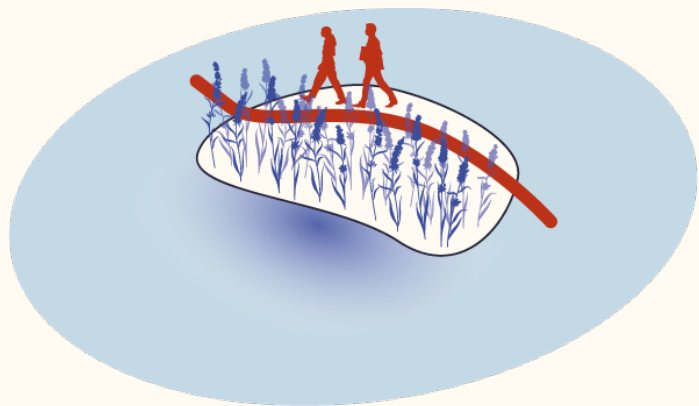
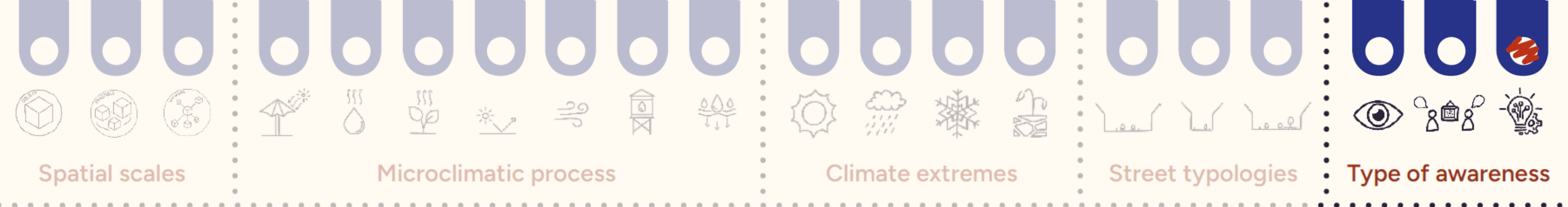
Experience



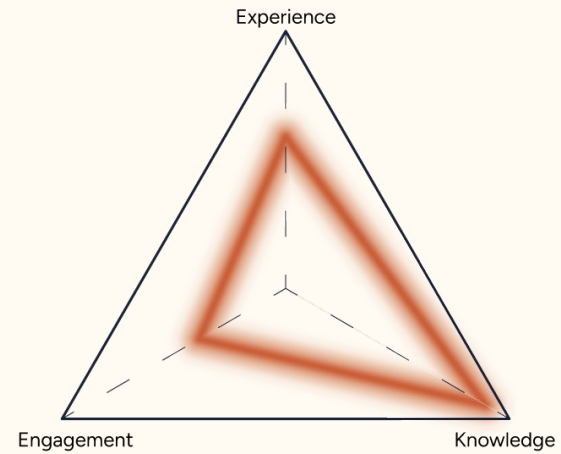
Engagement



Knowledge



Helophyte filters



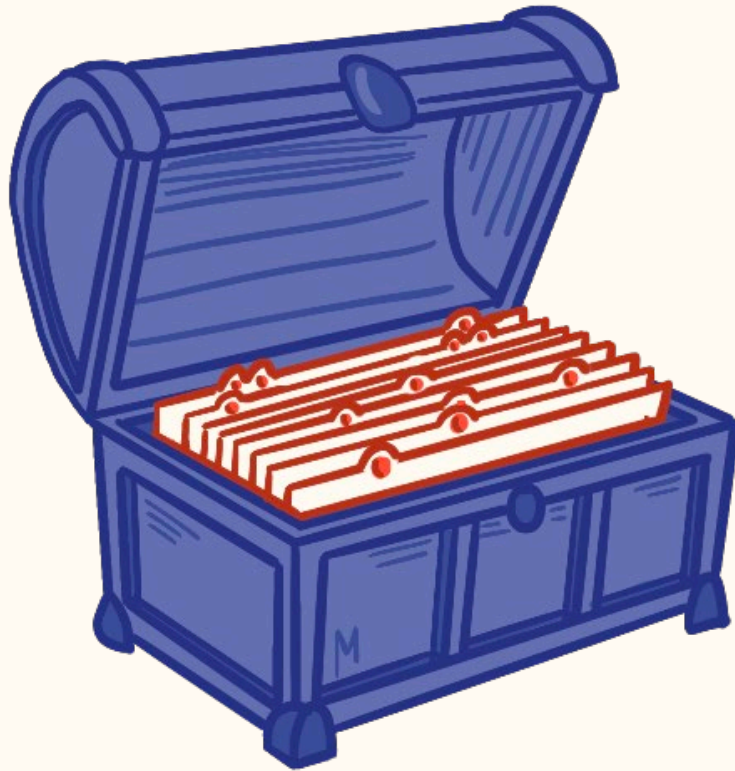
Experience



Engagement



Knowledge



Spatial scales    Microclimatic process    Climate extremes    Street typologies    Type of awareness

### INTERVENTION #12: PLANTERS

**Spatial scale**

Planters are micro-scale interventions that consist of containers with soil in which vegetation can grow. The advantage in urban environment is that the roots of the plants are restricted to the dimensions of the planter, preventing interference with underground utilities such as pipelines or cables. Planters contribute to cooling the public space by evapotranspiration. In addition, they store and retain small amounts of precipitation.

Type of awareness    Street typologies    Climate extremes    Microclimatic process    Spatial scales

**Microclimatic processes**

**Street typologies**

**Climate extremes**

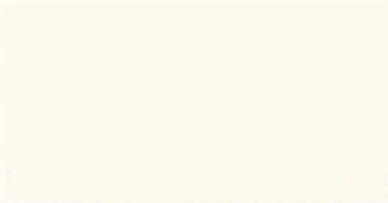
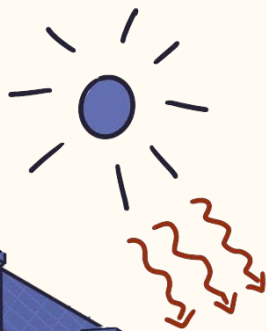
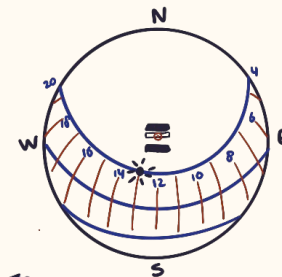
**Triangle of awareness**

**Gradient of awareness**

Sensation	Visual
Interaction	Activation
Impact	Technical

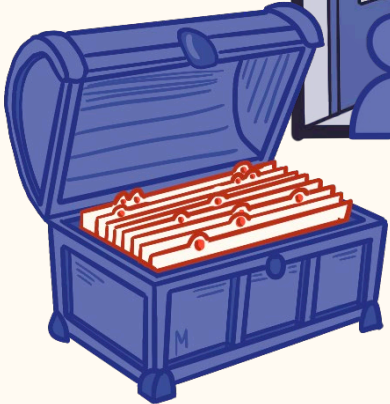
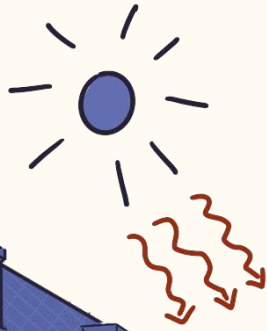
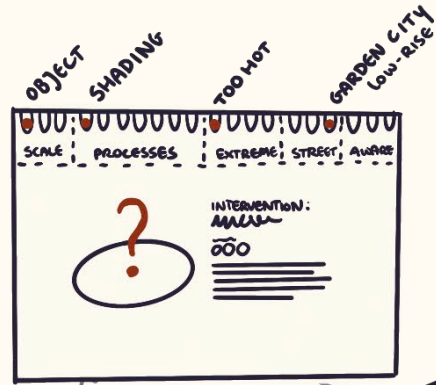
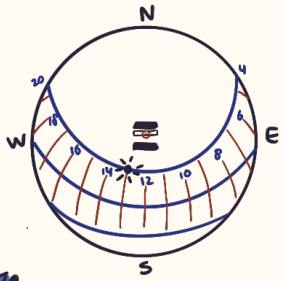
I would like to test it!





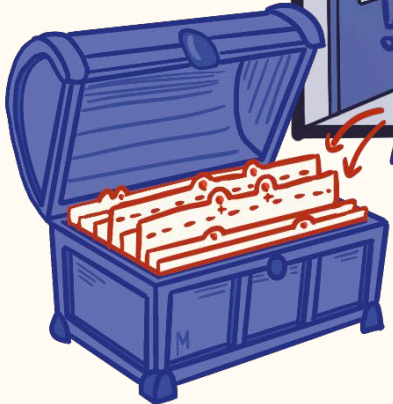
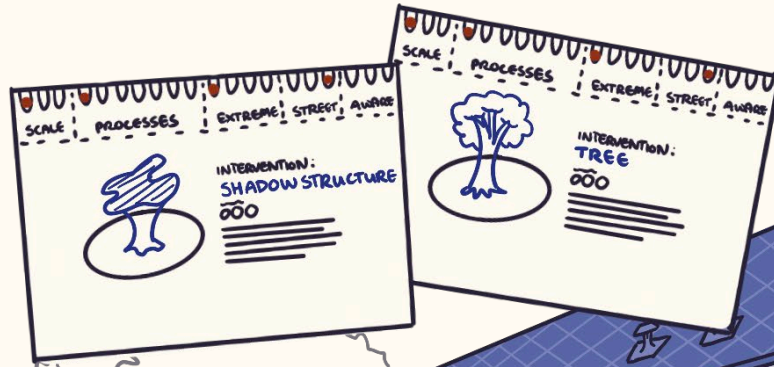
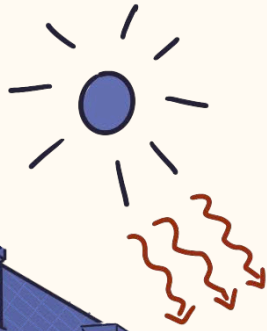
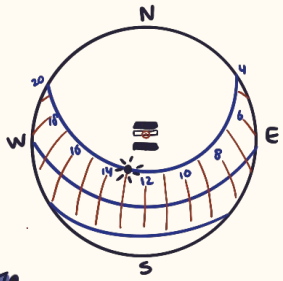
I have a location where I would like to reduce the heat stress!





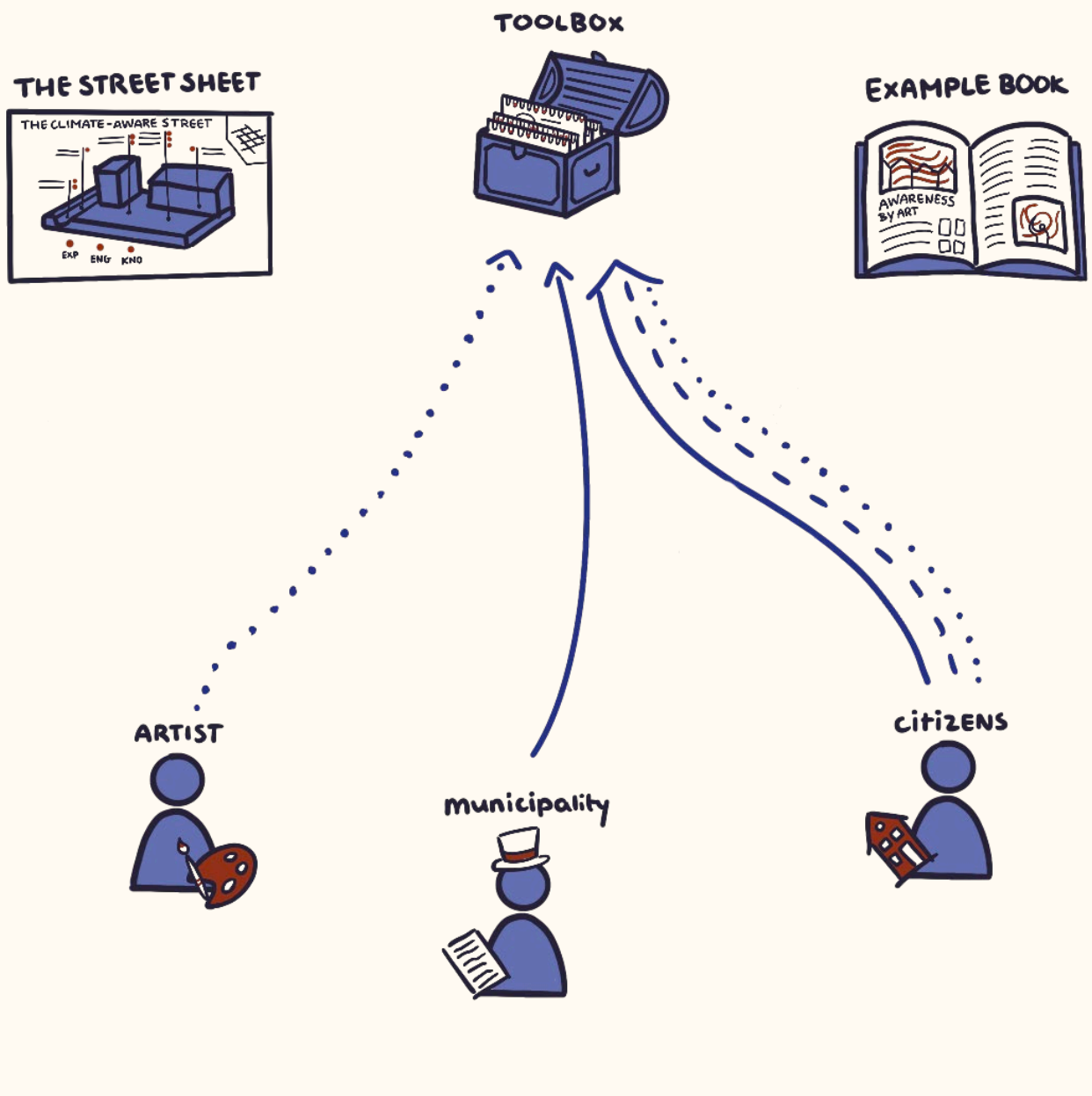
Let me filter the categories





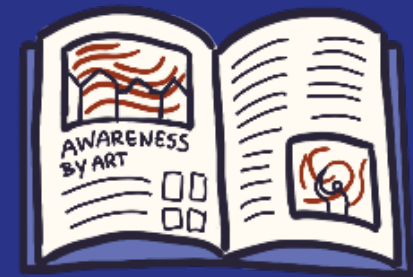
Ohh, and with these interventions I can ask an artist?





# HOW COULD ART BE INTEGRATED IN THESE INTERVENTIONS?

Example booklet

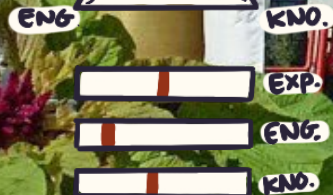


# ROOMBEEK, Enschede

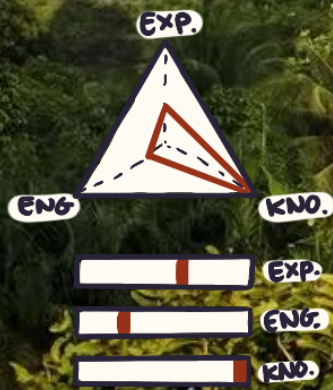




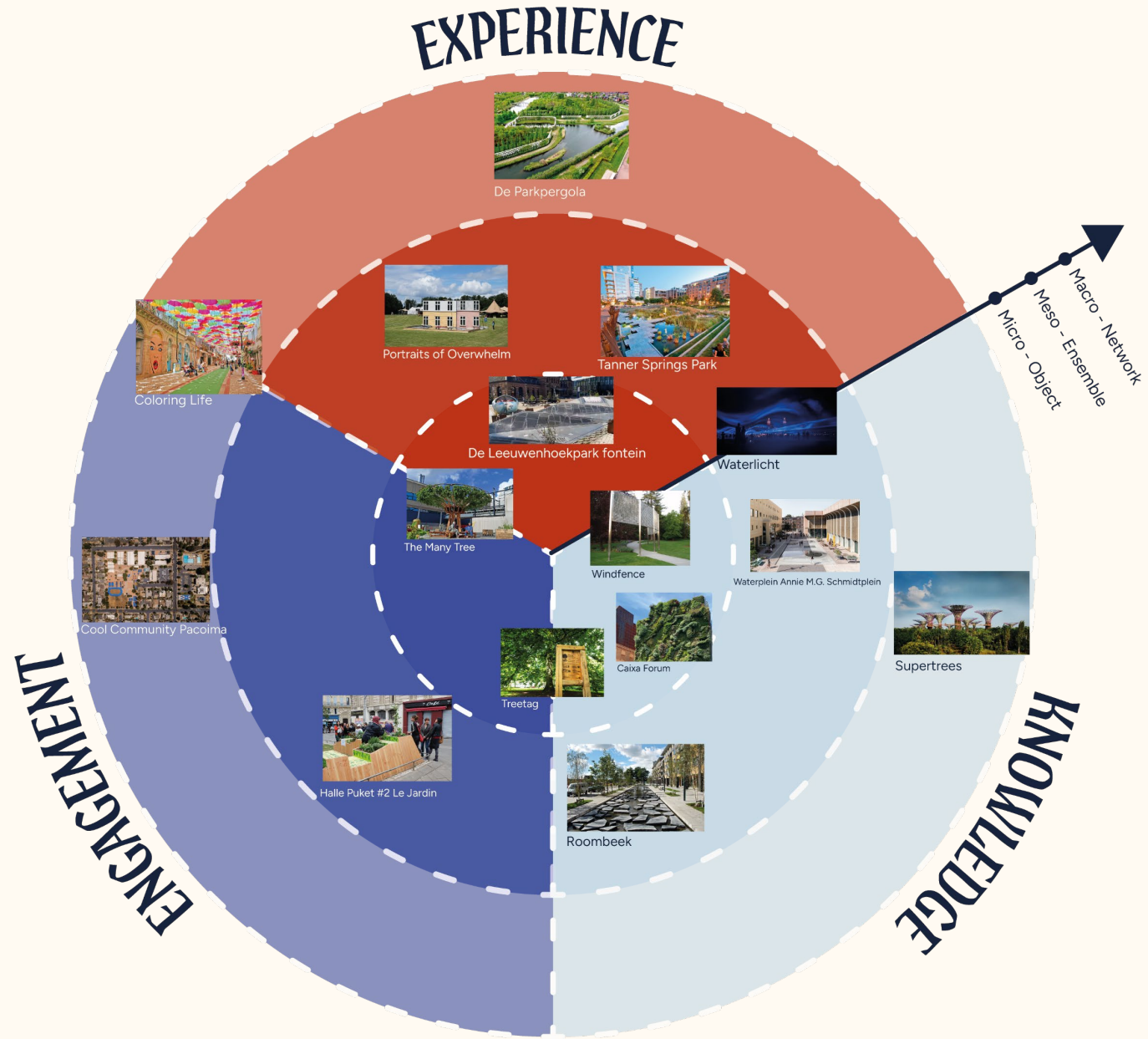
# THE MANY TREE, Eindhoven

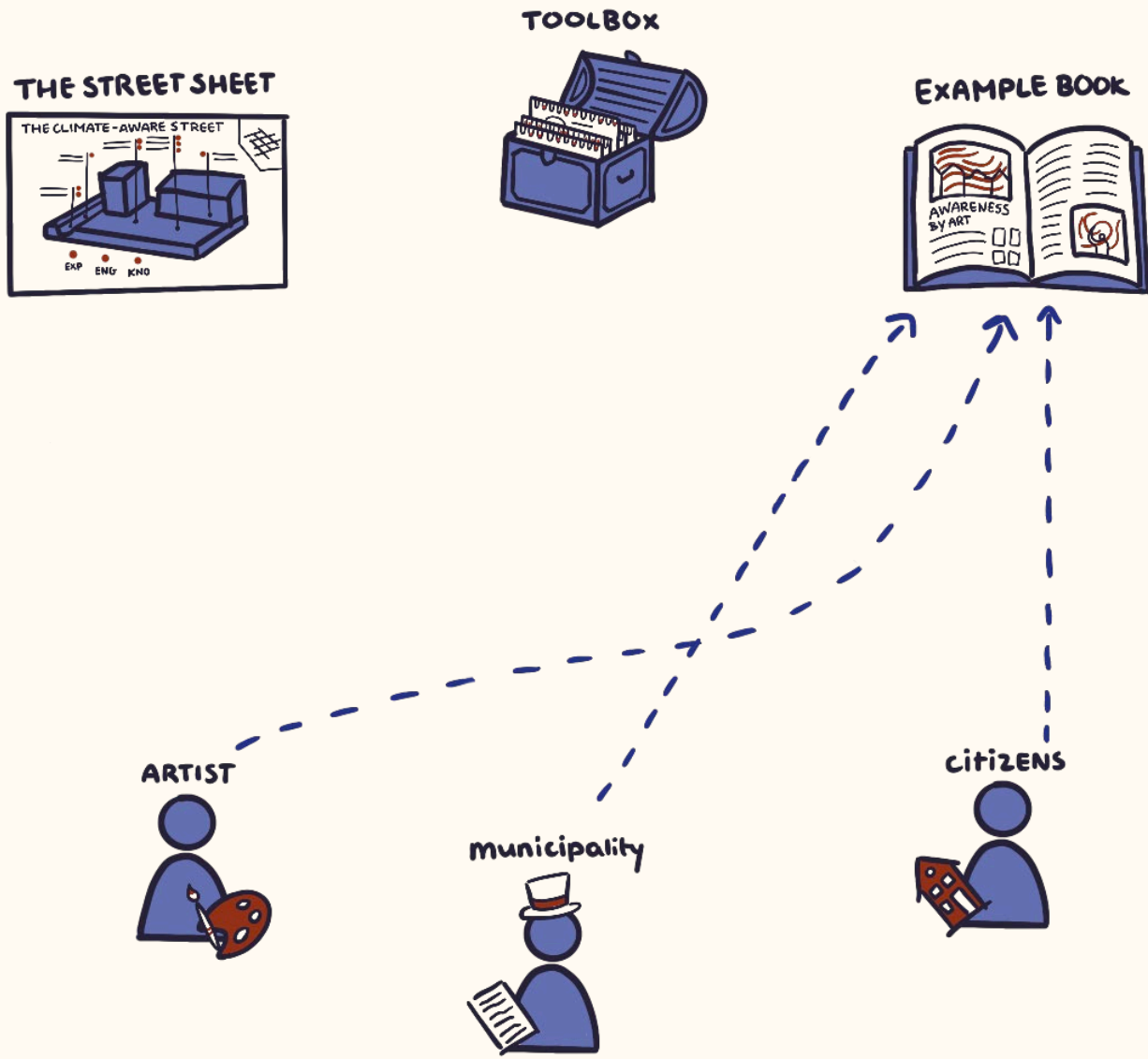


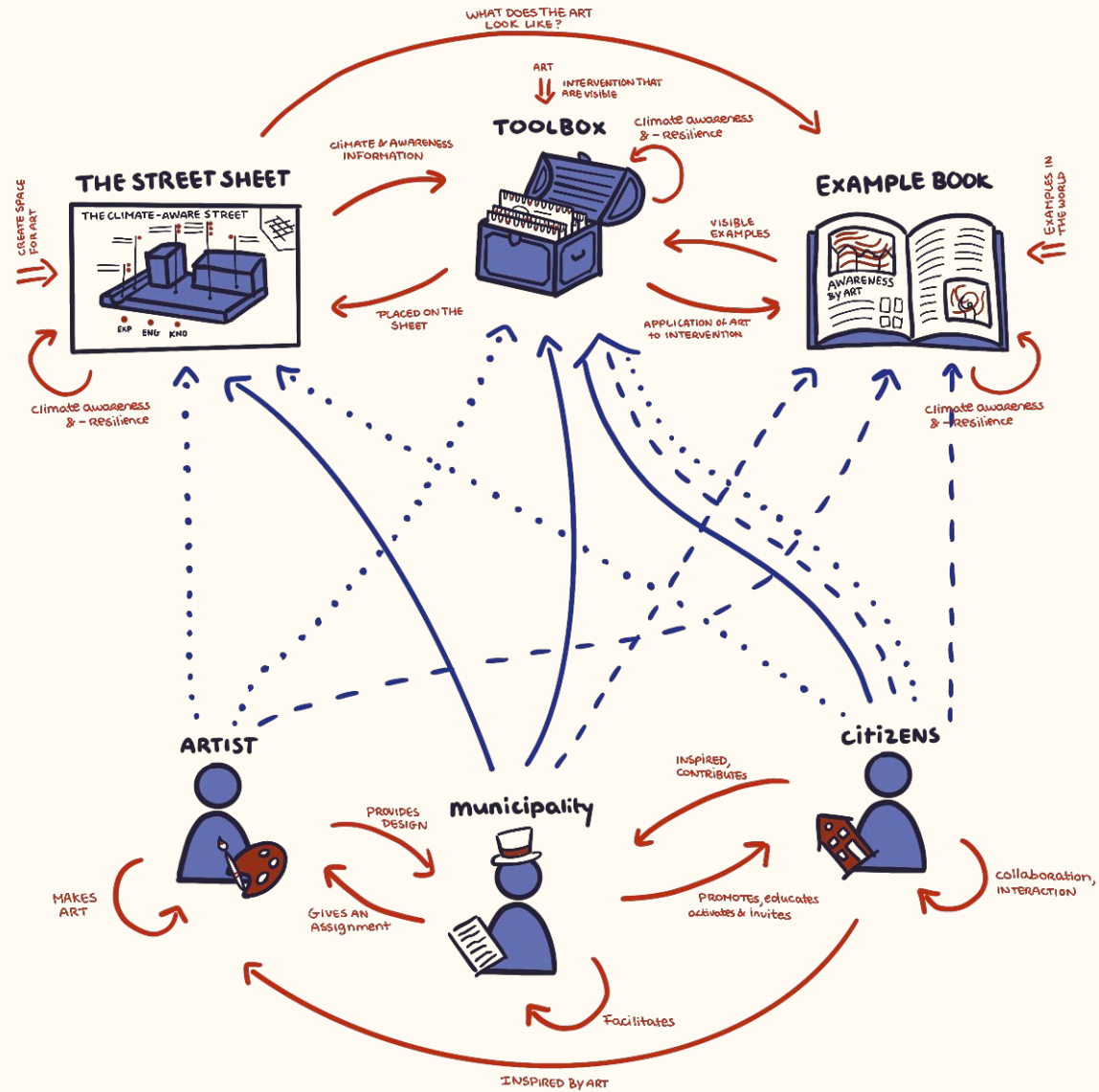
# SUPERTREES, Singapore











**CLIMATE-AWARE STREETS  
CREATE SPACE FOR...**

# COMMUNICATION OF KNOWLEDGE AND EXPERIENCES



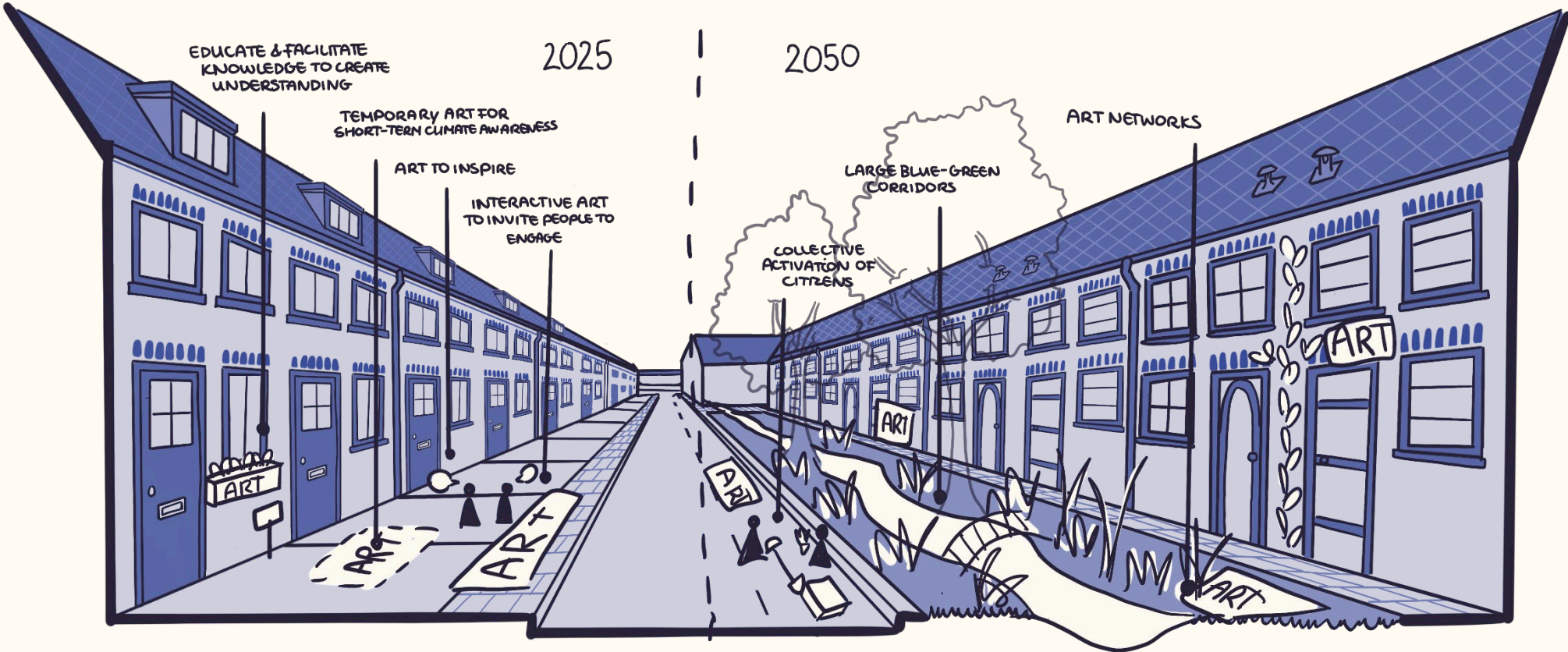
# UNDERSTANDING CLIMATE CHALLENGES AND PROCESSES



# COLLECTIVE ENGAGEMENT AND PARTICIPATION



# CLIMATE RESILIENT NETHERLANDS 2050



The ART OF RESILIENCE begins in the street, where climate, humans and art meet

