

# Co[nn]Action

Improve the liveability in the Zaatari Camp by  
creating accessible & inclusive infrastructure

EARTHY 4.0 FINAL PRESENTATION

CHRISTOPHER BIERACH, EREN GOZDE ANIL, FELIPE LOPEZ, JUN WEN LOO, ROY UIJTENDAAL

# OVERVIEW

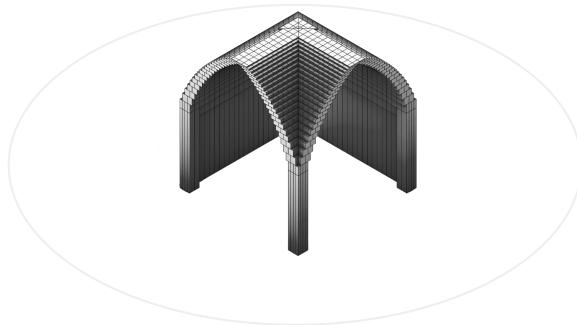
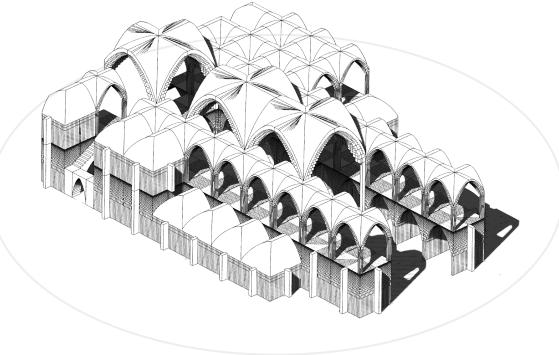
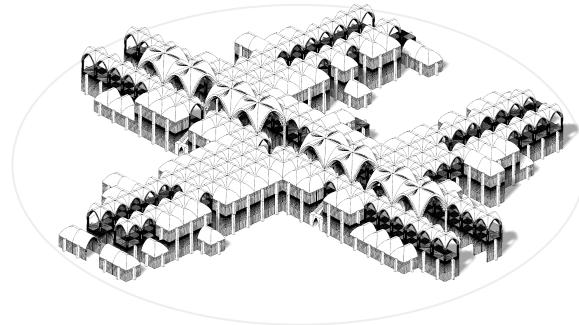
CONFIGURING TO STRUCTURING

OVERVIEW > FORMING > CONFIGURING > STRUCTURING | 2

CONFIGURING

FORMING

STRUCTURING



# **1.0 ZAATARI REFUGEE CAMP**

PROBLEM STATEMENT & VISIONS

### 01\_URBAN\_STRUCTURE

The infrastructure is inadequate in terms of accessibility, safety, and connectivity.

### 02\_CULTURE

Cultural aspects within the camp does not meet the requirements in sense of identity, sense of belonging & ownership

### 03\_ACTIVITY

The range of activities and diverse spaces in the camp is insufficient to meet the demand of being occupied.

# DESIGN PROBLEMS

## SPATIAL STRATEGIES

FORMING [DESIGN PROBLEMS] > CONFIGURING > STRUCTURING | 5

### 01\_URBAN\_STRUCTURE

Provide urban growth guidelines

Create landmarks and sense of wayfinding

Provide clear urban hierarchy

### 02\_CULTURE

Provide safe and inclusive routes

Encourage independency

### 03\_ACTIVITY

Provide space for occupation

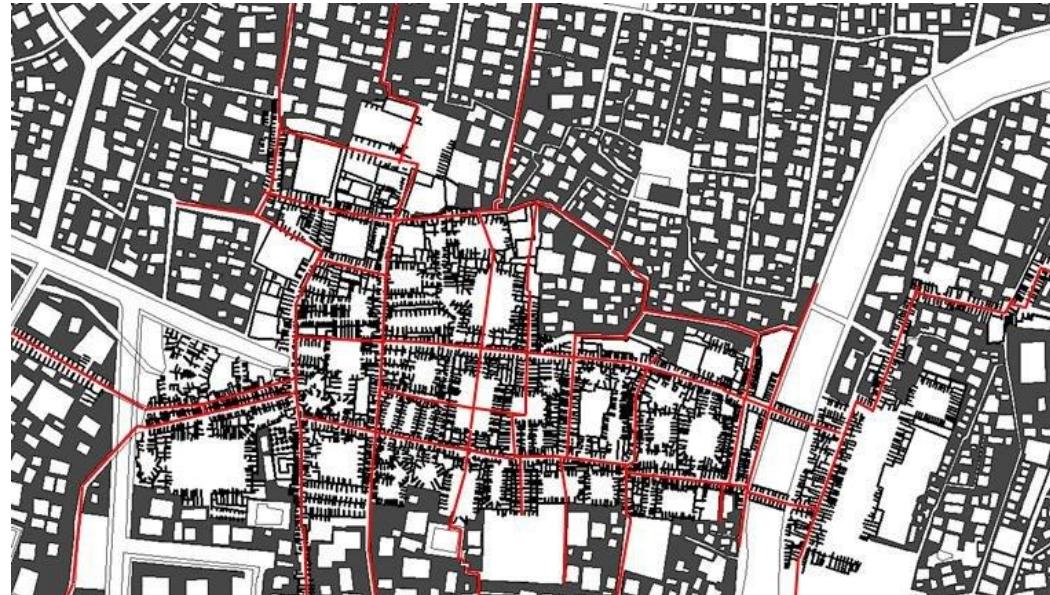
Provide spaces for development

Encourage freedom to move

# DESIGN INSPIRATION

## BAZAAR TYPOLOGIES

FORMING [DESIGN PROBLEMS] > CONFIGURING > STRUCTURING | 6



Taghizadehvehed, Niloufar. (2018). A Comparative Study Of Covered Shopping Spaces: Covered Bazaars, Arcades, Shopping Malls.

01 - Provide a **system** that could help configure the **urban development**.

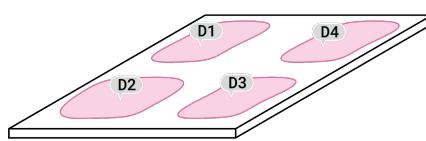
02 - Encourage **independence** by providing **safe** and **inclusive routes**.

03 - Provide a place for **activity** and **skills development** to flourish.

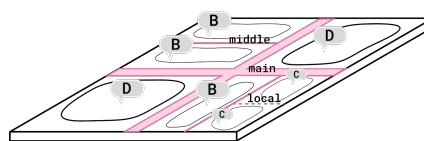
# URBAN STRATEGIES

RECAP

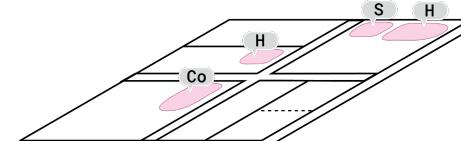
FORMING [DESIGN PROBLEMS] > CONFIGURING > STRUCTURING | 8



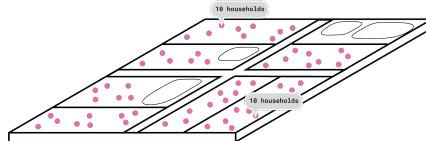
1. Define Districts



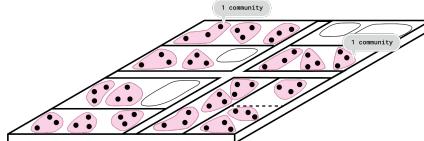
2. Main, Middle & Local Streets



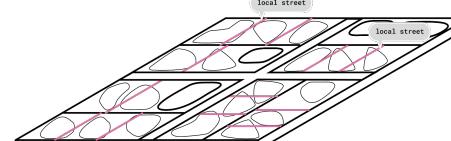
3. Identify Hubs



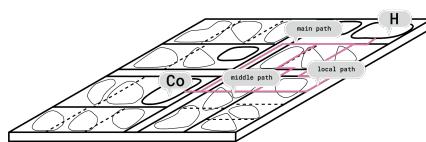
4. Household Density



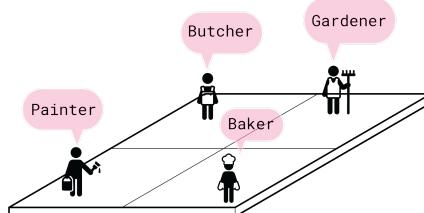
5. Create Communities



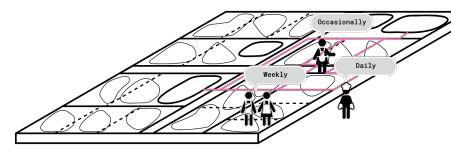
6. Create Local Streets



7. Create Routes



8. Collect Requests

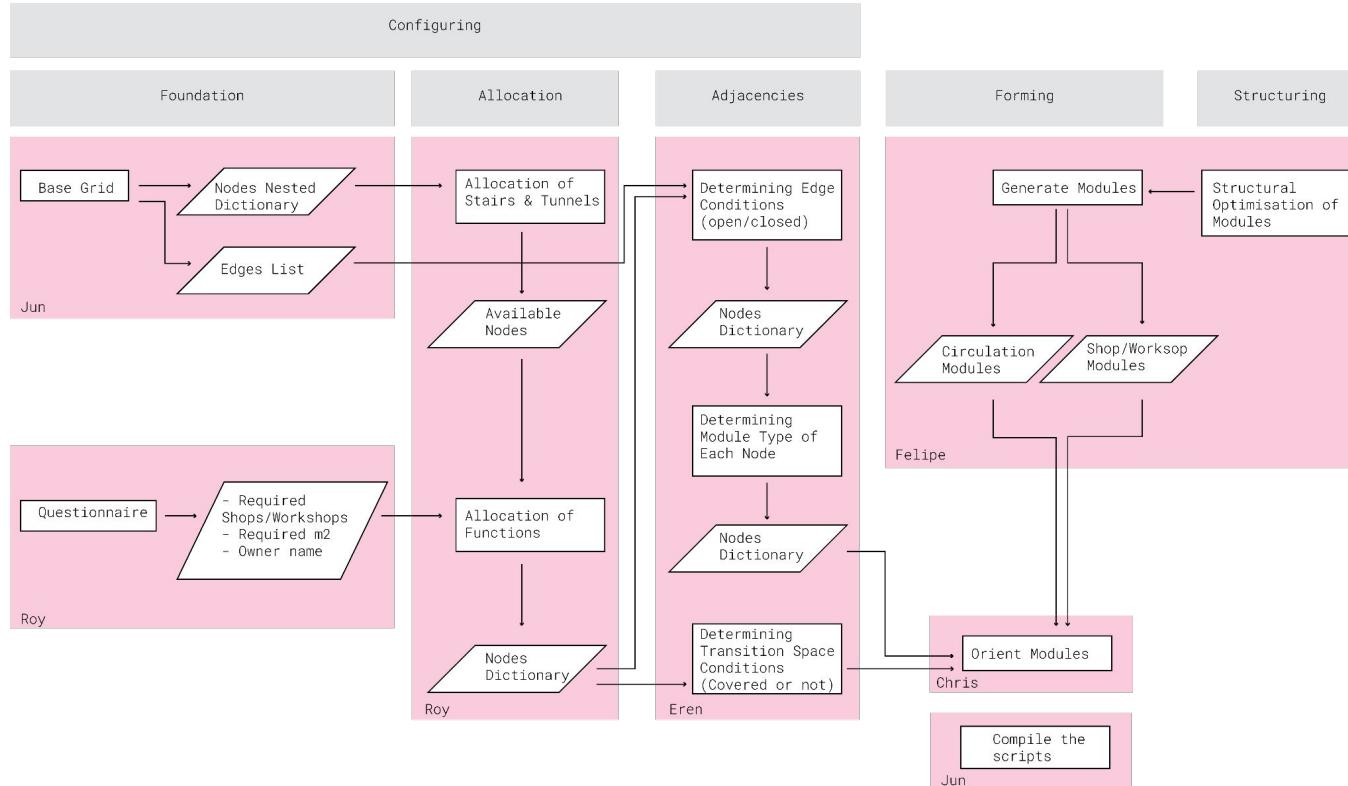


9. Allocate Programs

# WORKFLOW

## OVERVIEW

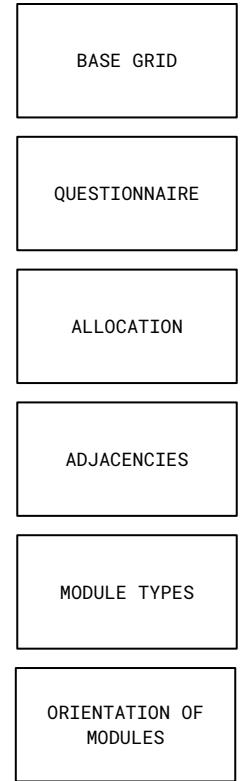
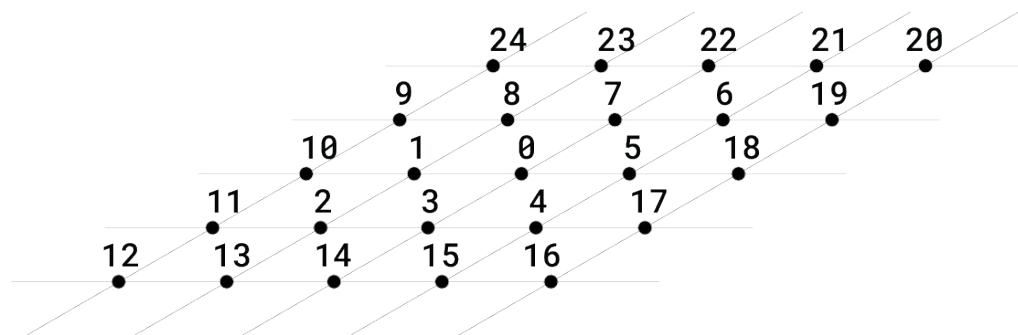
CONFIGURING > FORMING > STRUCTURING | 9



# WORKFLOW

## OVERVIEW

CONFIGURING > FORMING > STRUCTURING | 10



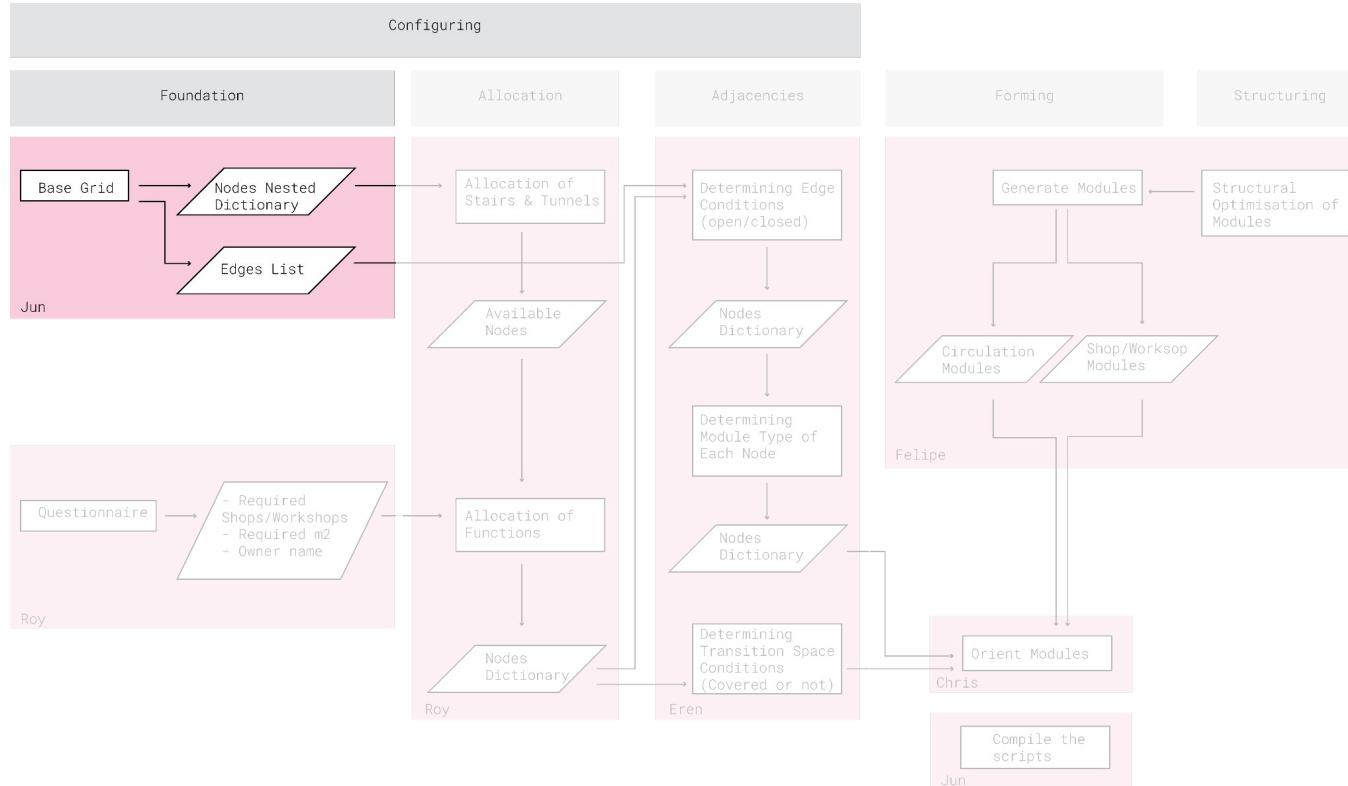
## **1.1 STREET & COMMUNITY**

URBAN FORMING

# WORKFLOW

## BASE GRID

CONFIGURING > FORMING > STRUCTURING | 12

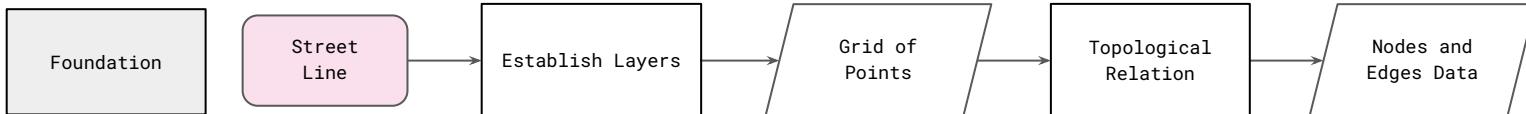


MIDDLE STREET

LOCAL STREET

LOCAL STREET

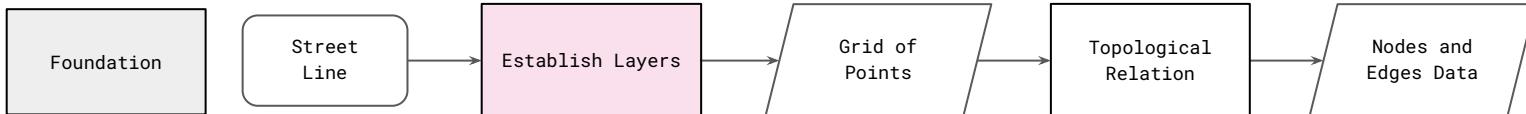
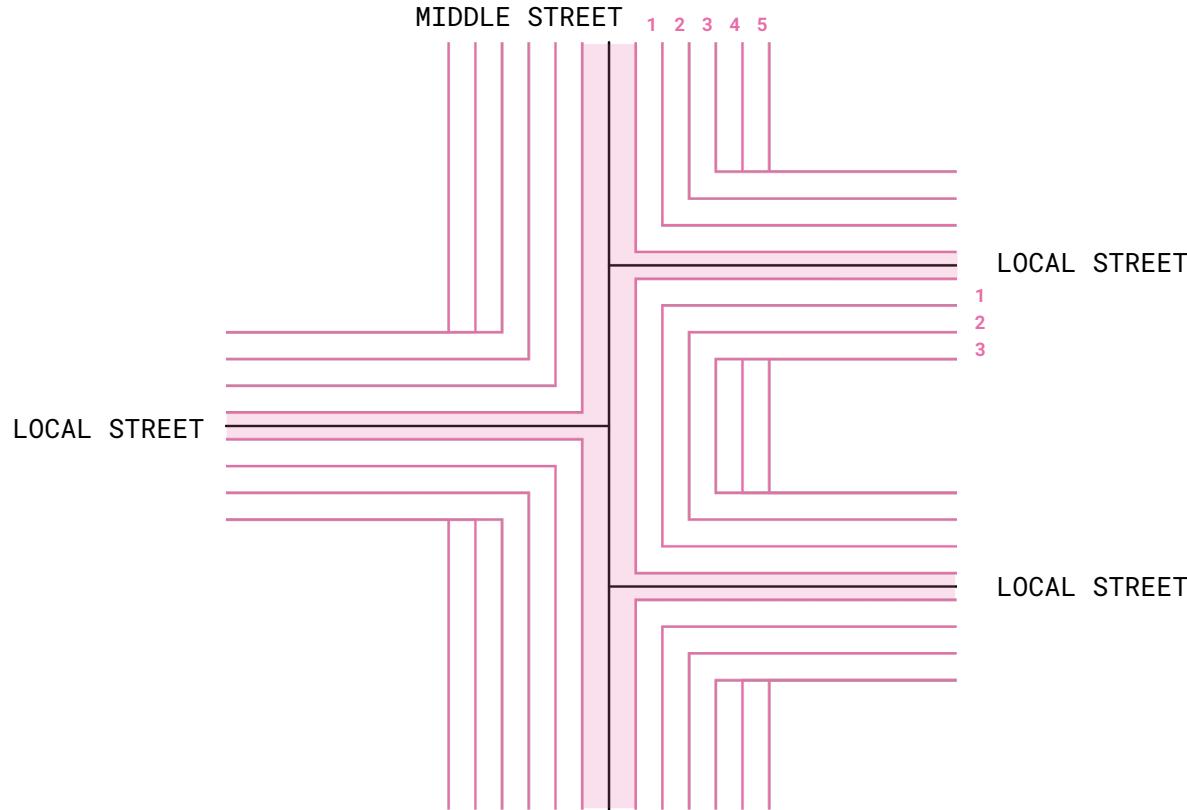
LOCAL STREET

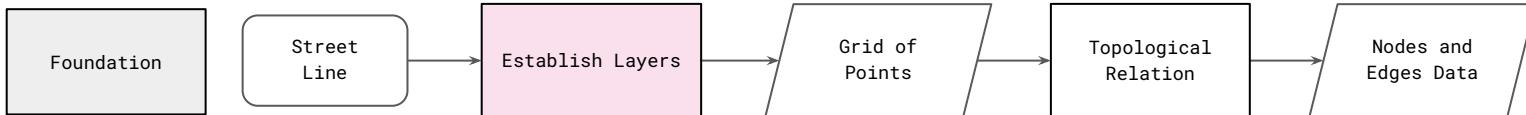
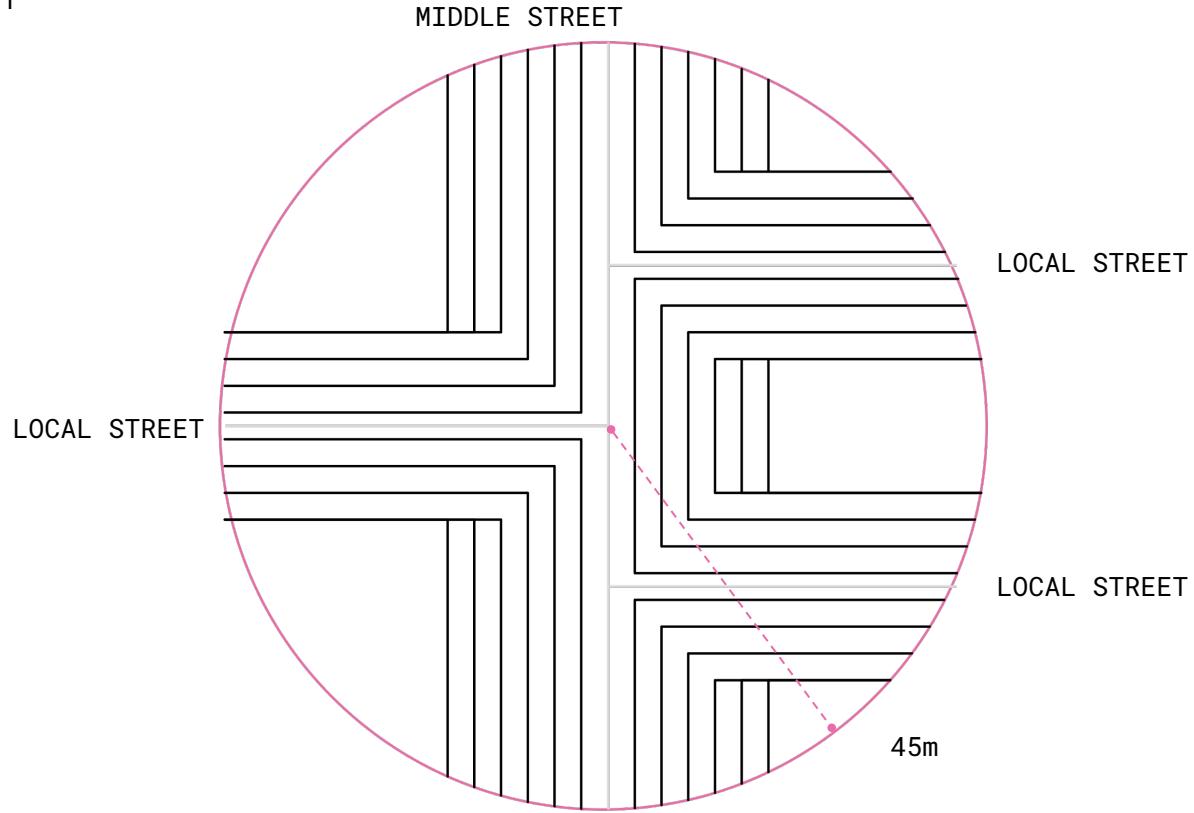


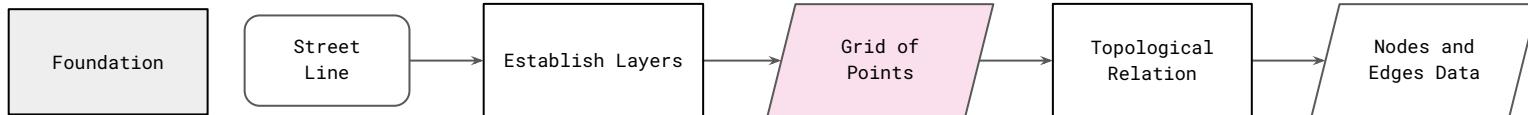
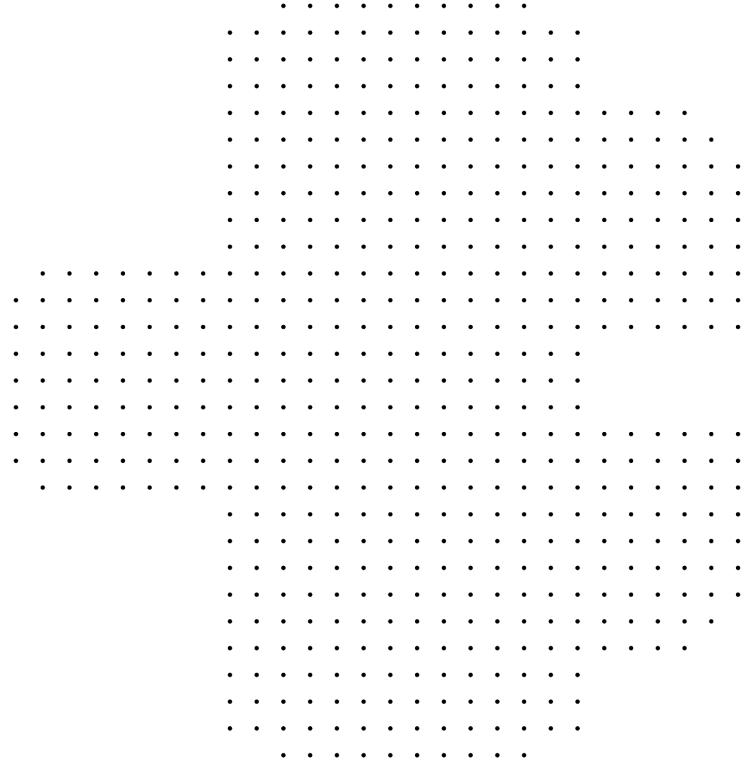
# FOUNDATION

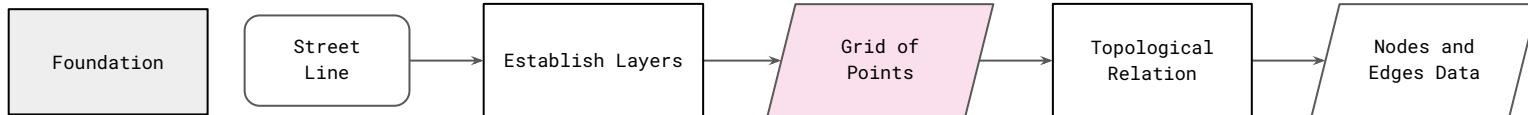
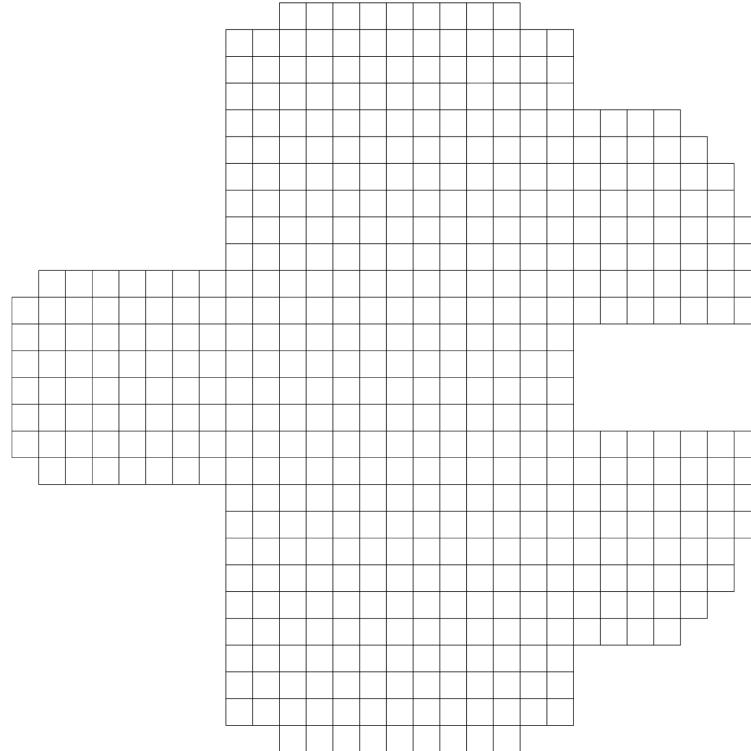
## LAYERS

CONFIGURING > FORMING > STRUCTURING | 14





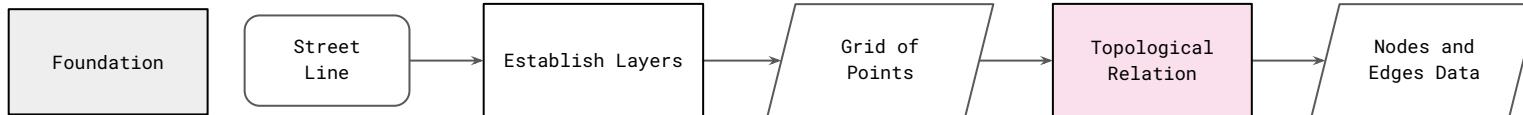
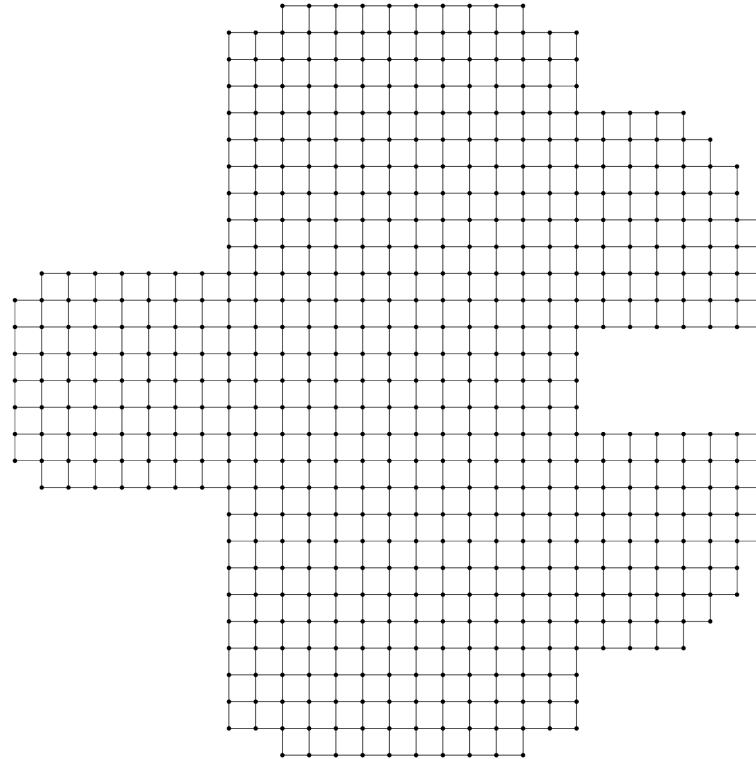




# FOUNDATION

## TOPOLOGICAL RELATIONS

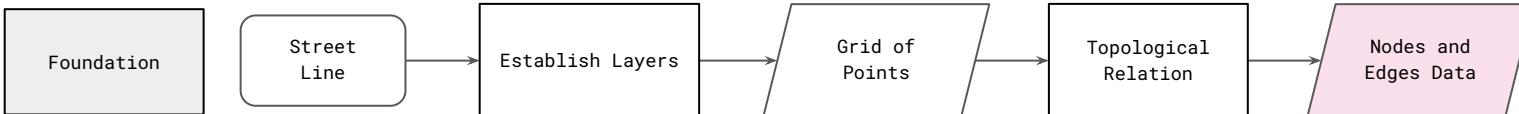
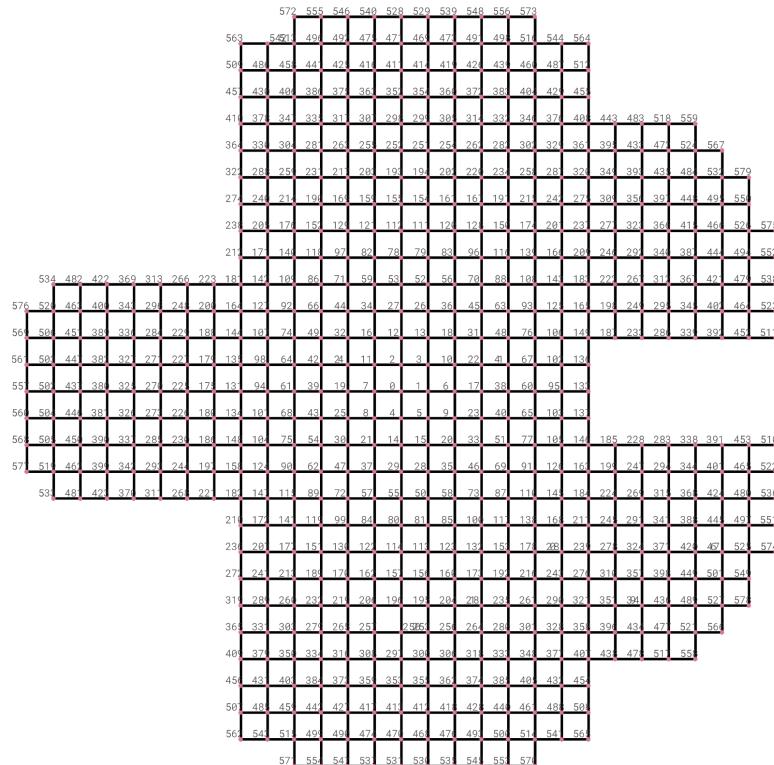
CONFIGURING > FORMING > STRUCTURING | 18



# FOUNDATION

## TOPOLOGICAL RELATIONS

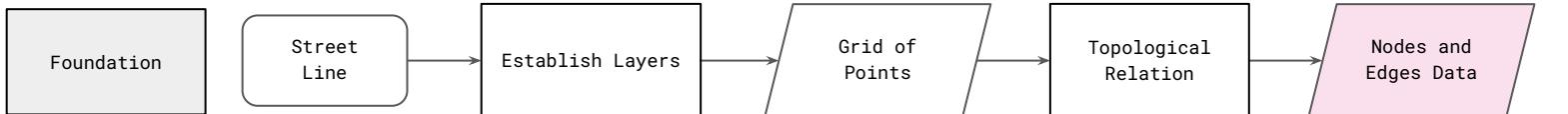
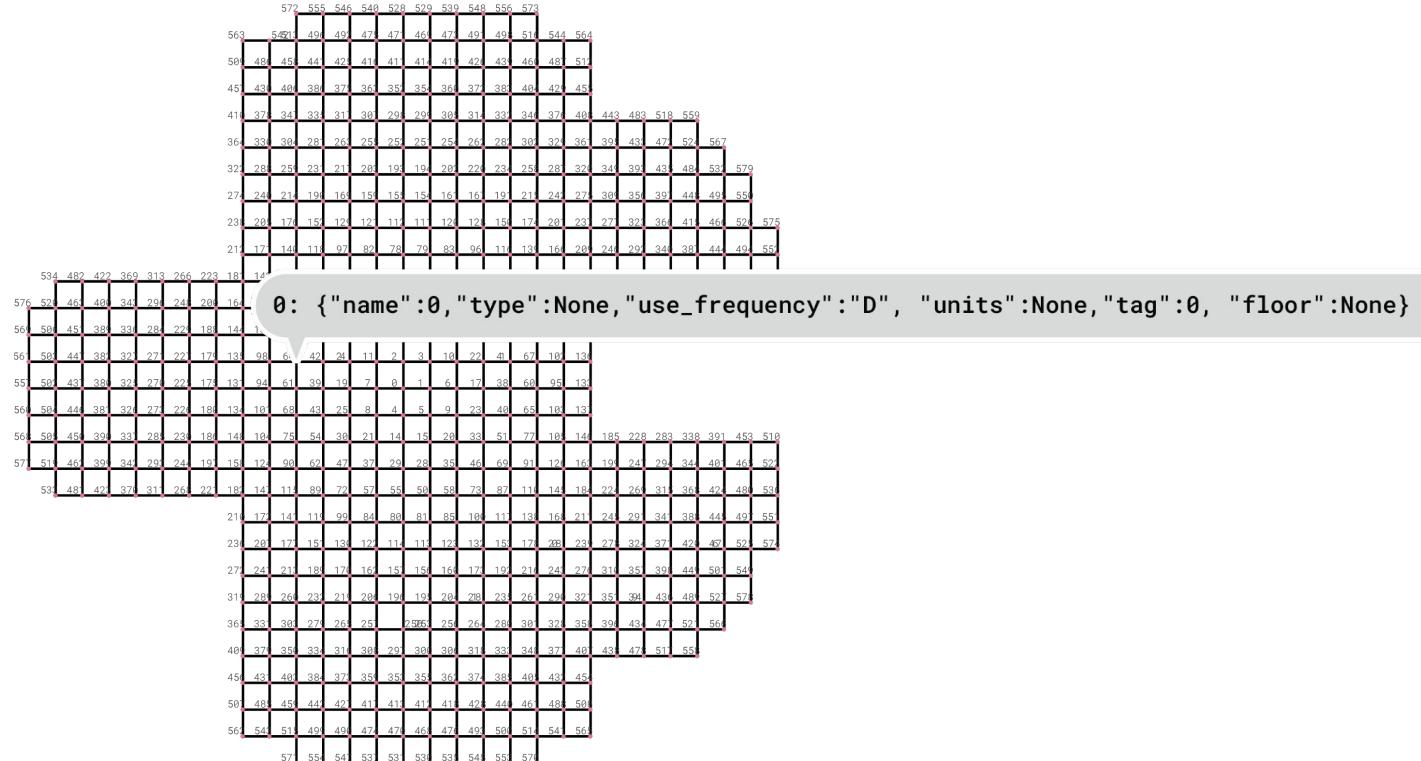
CONFIGURING > FORMING > STRUCTURING | 19



# FOUNDATION

## TOPOLOGICAL RELATIONS

CONFIGURING > FORMING > STRUCTURING | 20



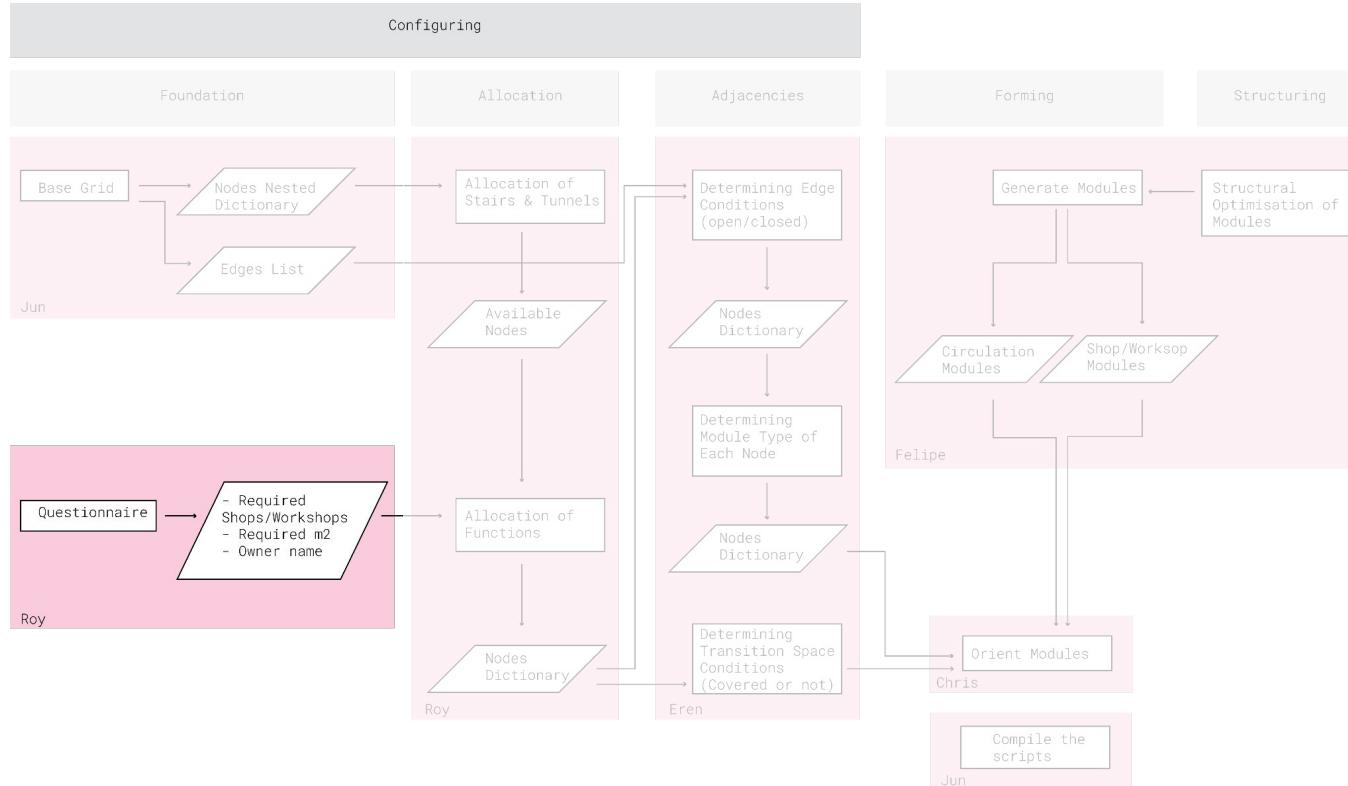
## **1.1 GATHERING REQUIREMENTS**

URBAN CONFIGURING

# WORKFLOW

## QUESTIONNAIRE

CONFIGURING > FORMING > STRUCTURING | 22



# FOUNDATION

## QUESTIONNAIRE BUILDING REQUESTS

Earthy ConnAction

Let's create your ideal occupation!

\* Vervielst

1. What district are you from? \*

1  
 2  
 3  
 4  
 5  
 6  
 7  
 8  
 9  
 10  
 11  
 12

3. How many m<sup>2</sup> do you need? \*

9  
 18  
 27  
 36  
 45  
 54

4. What is the user frequency? \*

Daily  
 Monthly  
 Occasionally

5. Type in your name \*

2. What type of building do you need? \*

Shop  
 Workshop  
 Both shop and workshop

**Verzenden**

Geef nooit uw wachtwoord - [Misbruik melden](#)



# FOUNDATION

## QUESTIONNAIRE BUILDING REQUESTS

CONFIGURING > FORMING > STRUCTURING | 24

Earthy ConnAction

Let's create your ideal occupation!

\* Vervolg

1. What district are you from? \*

1  
 2  
 3  
 4  
 5  
 6  
 7  
 8  
 9  
 10  
 11  
 12

3. How many m<sup>2</sup> do you need? \*

9  
 18  
 27  
 36  
 45  
 54

4. What is the user frequency? \*

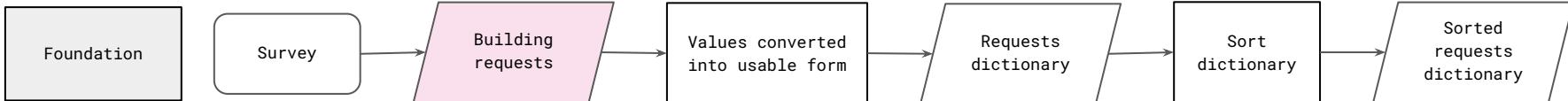
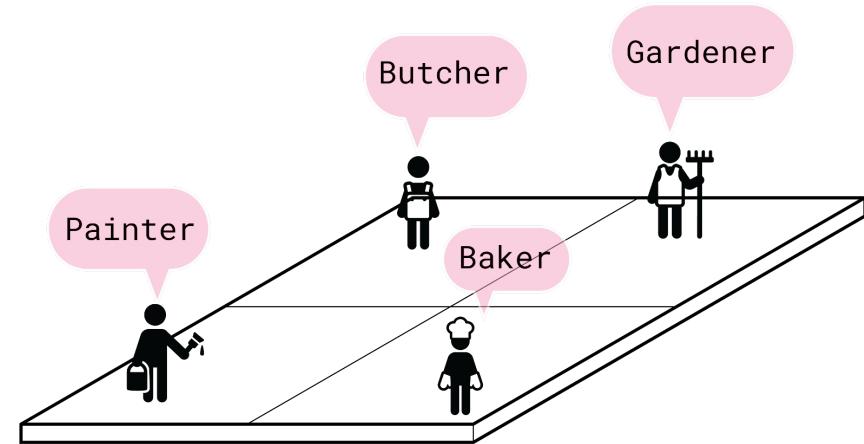
Daily  
 Monthly  
 Occasionally

5. Type in your name \*

2. What type of building do you need? \*

Shop  
 Workshop  
 Both shop and workshop

Geef nooit uw wachtwoord - Misbruik melden



# FOUNDATION

## QUESTIONNAIRE BUILDING REQUESTS

CONFIGURING > FORMING > STRUCTURING | 25

### Earthy ConnAction

Let's create your ideal occupation!

\* Vervolg

1. What district are you from? \*

1  
 2  
 3  
 4  
 5  
 6  
 7  
 8  
 9  
 10  
 11  
 12

3. How many m<sup>2</sup> do you need? \*

9  
 18  
 27  
 36  
 45  
 54

4. What is the user frequency? \*

Daily  
 Monthly  
 Occasionally

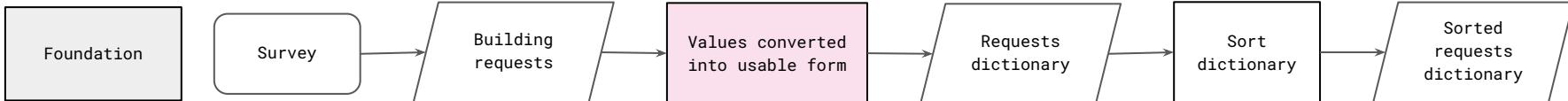
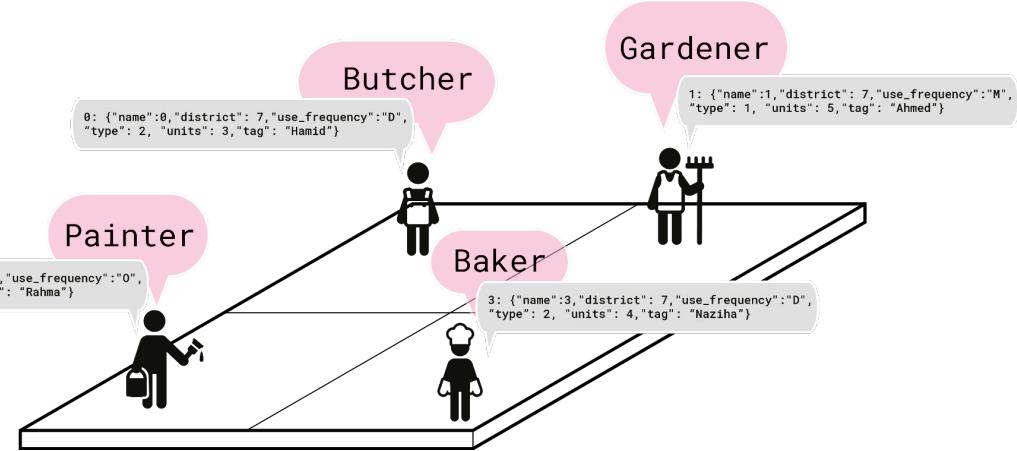
  

5. Type in your name \*

Voor uw antwoord in

Geef nooit uw wachtwoord - Misbruik melden

**Verzenden**



# FOUNDATION

## QUESTIONNAIRE BUILDING REQUESTS

CONFIGURING > FORMING > STRUCTURING | 26

**EARTHY CONNACTION**

Let's create your ideal occupation!

\* Vervolg

1. What district are you from? \*

1  
 2  
 3  
 4  
 5  
 6  
 7  
 8  
 9  
 10  
 11  
 12

3. How many m<sup>2</sup> do you need? \*

9  
 18  
 27  
 36  
 45  
 54

4. What is the user frequency? \*

Daily  
 Monthly  
 Occasionally

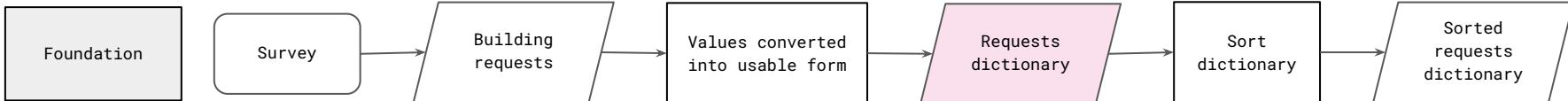
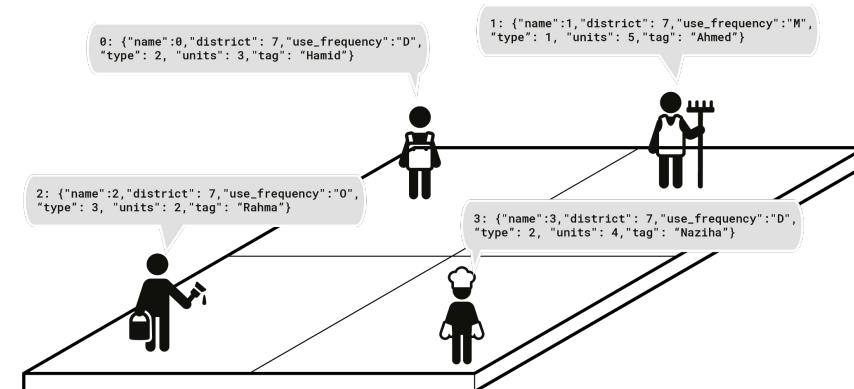
5. Type in your name \*  
Voer uw antwoord in

2. What type of building do you need? \*

Shop  
 Workshop  
 Both shop and workshop

Verzenden

Geef nooit uw wachtwoord - Misbruik melden



# FOUNDATION

## QUESTIONNAIRE BUILDING REQUESTS

**Earthy ConnAction**

Let's create your ideal occupation!

\* Vervolg

1. What district are you from? \*

- 1
- 2
- 3
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- 9
- 10
- 11
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3. How many m<sup>2</sup> do you need? \*

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- 27
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4. What is the user frequency? \*

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- Monthly
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5. Type in your name \*

Geef nooit uw wachtwoord - Misbruik melden

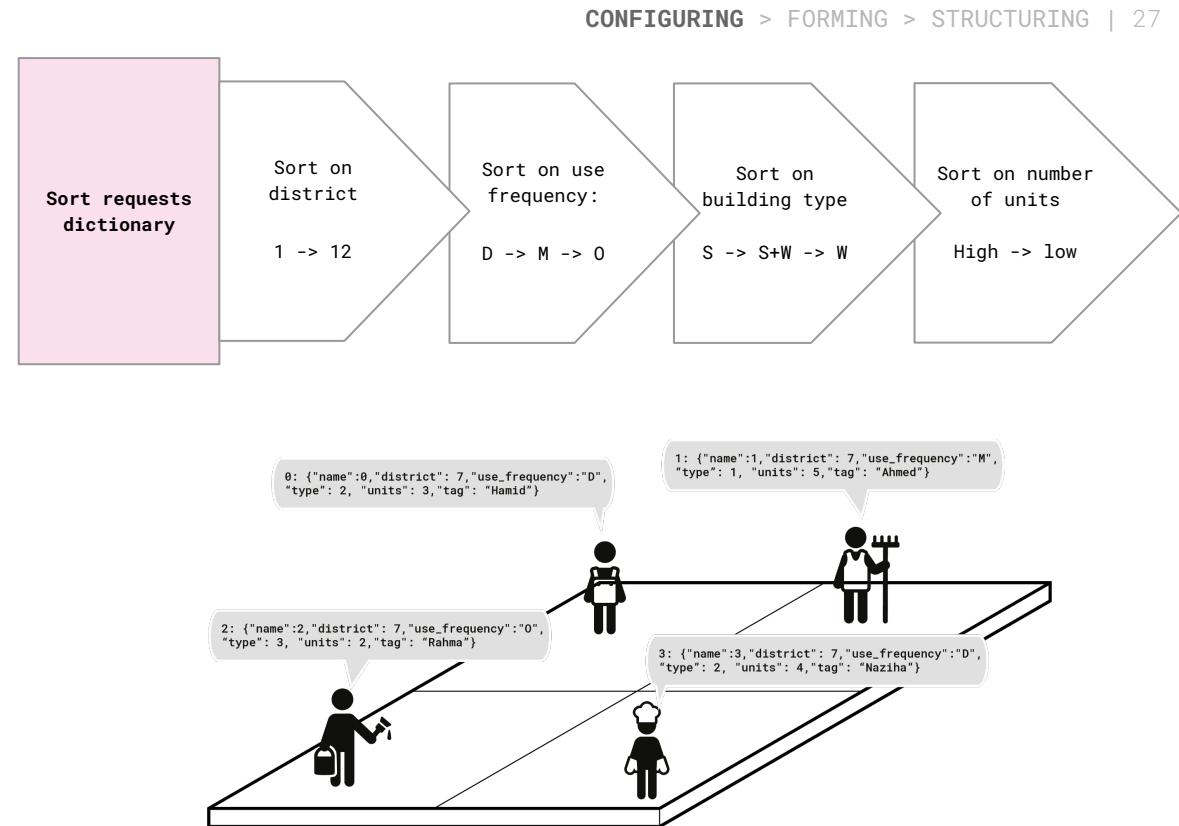
**Earthy ConnAction**

Let's create your ideal occupation!

2. What type of building do you need? \*

- Shop
- Workshop
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Verzenden



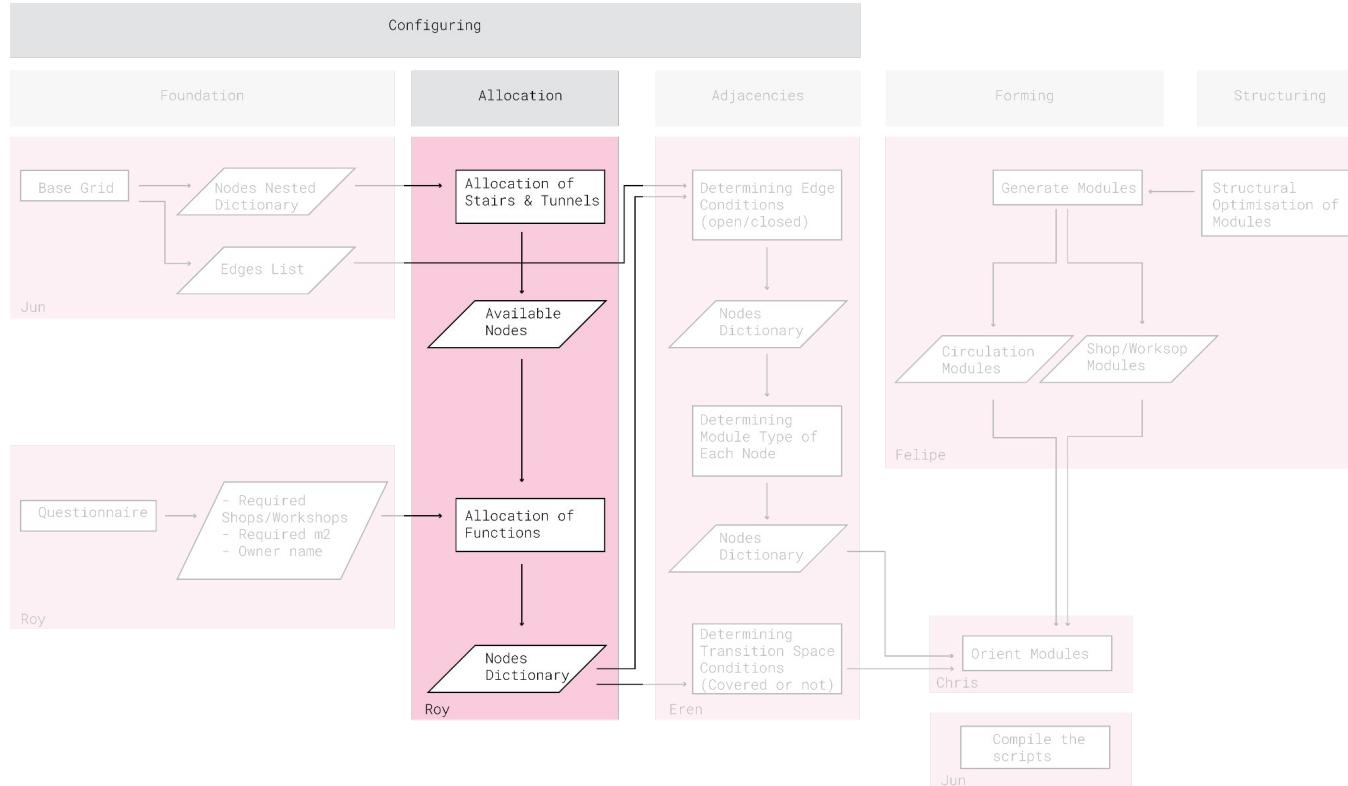
## **1.2 ALLOCATION OF REQUIREMENTS**

URBAN CONFIGURING

# WORKFLOW

## ALLOCATION

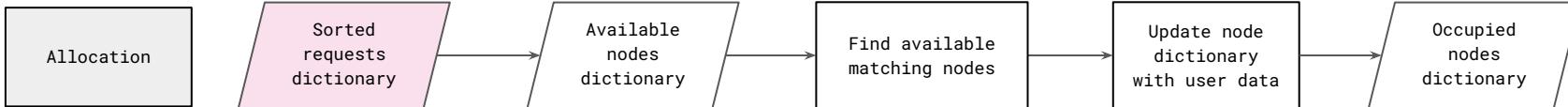
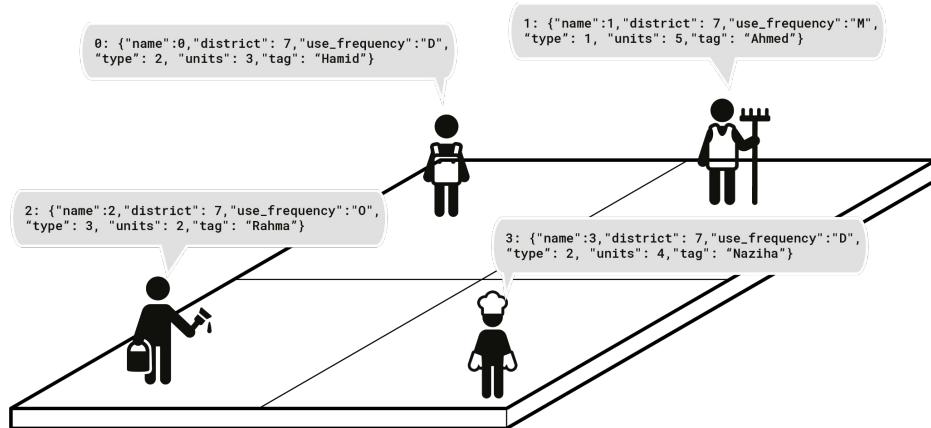
CONFIGURING > FORMING > STRUCTURING | 29



# ALLOCATION

## QUESTIONNAIRE BUILDING REQUESTS

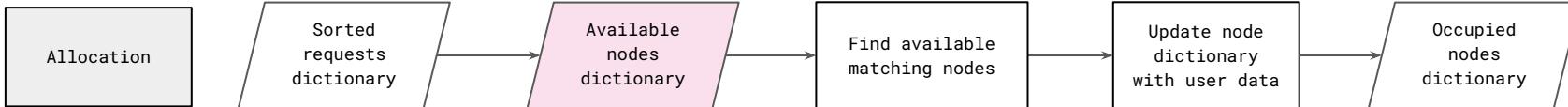
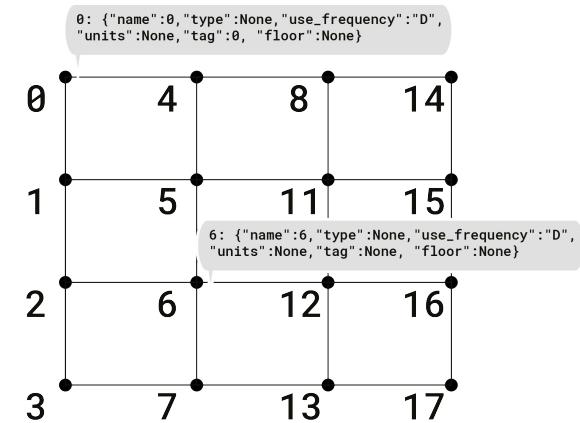
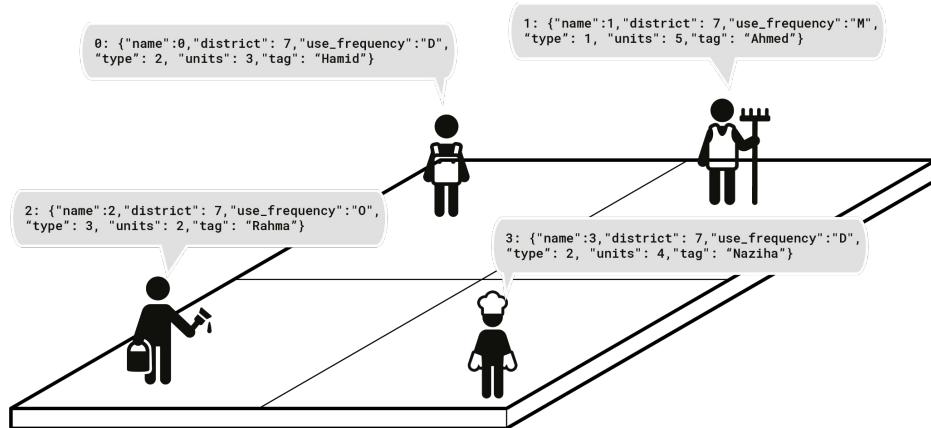
CONFIGURING > FORMING > STRUCTURING | 30



# ALLOCATION

## QUESTIONNAIRE BUILDING REQUESTS

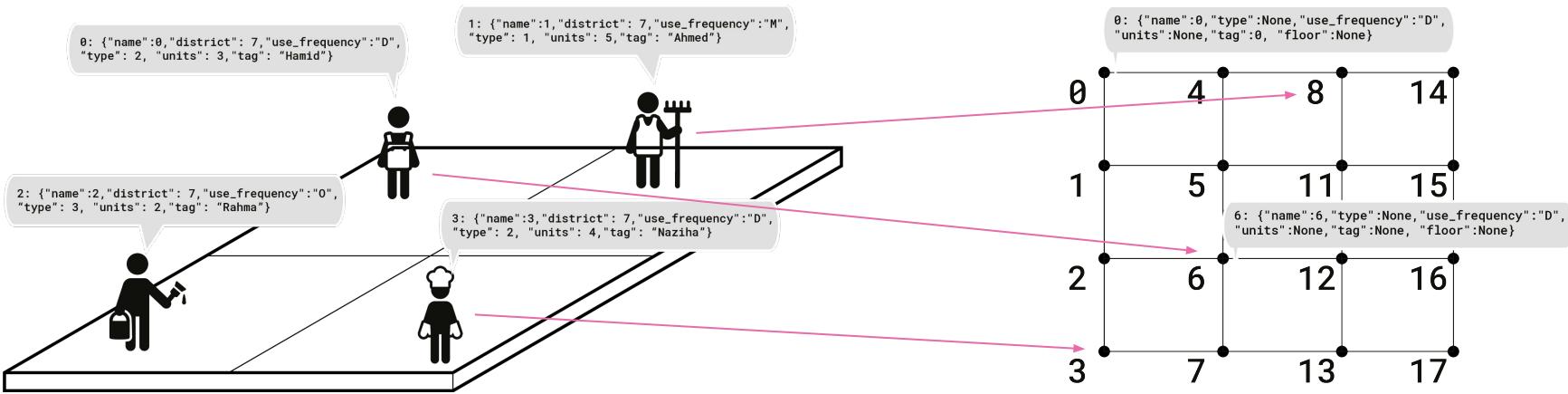
CONFIGURING > FORMING > STRUCTURING | 31



# ALLOCATION

## QUESTIONNAIRE BUILDING REQUESTS

CONFIGURING > FORMING > STRUCTURING | 32



Allocation

Sorted  
requests  
dictionary

Available  
nodes  
dictionary

Find available  
matching nodes

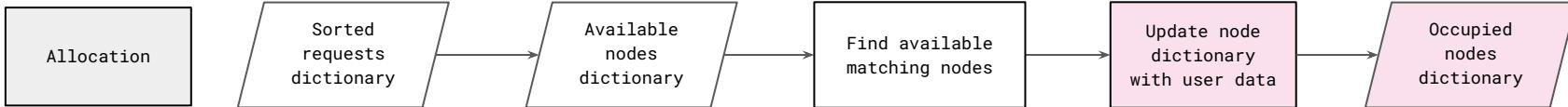
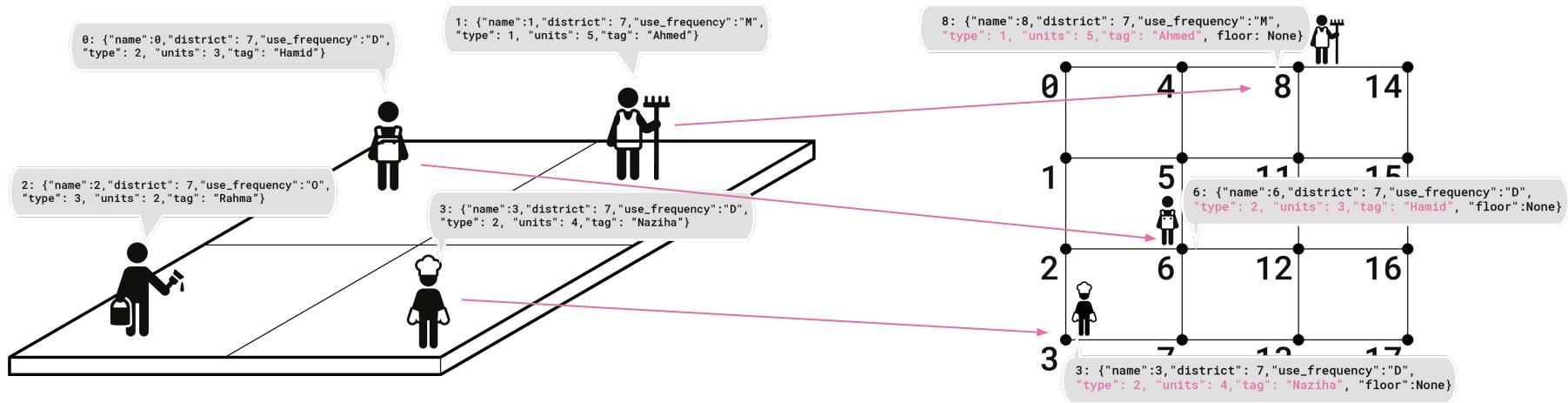
Update node  
dictionary  
with user data

Occupied  
nodes  
dictionary

# ALLOCATION

## QUESTIONNAIRE BUILDING REQUESTS

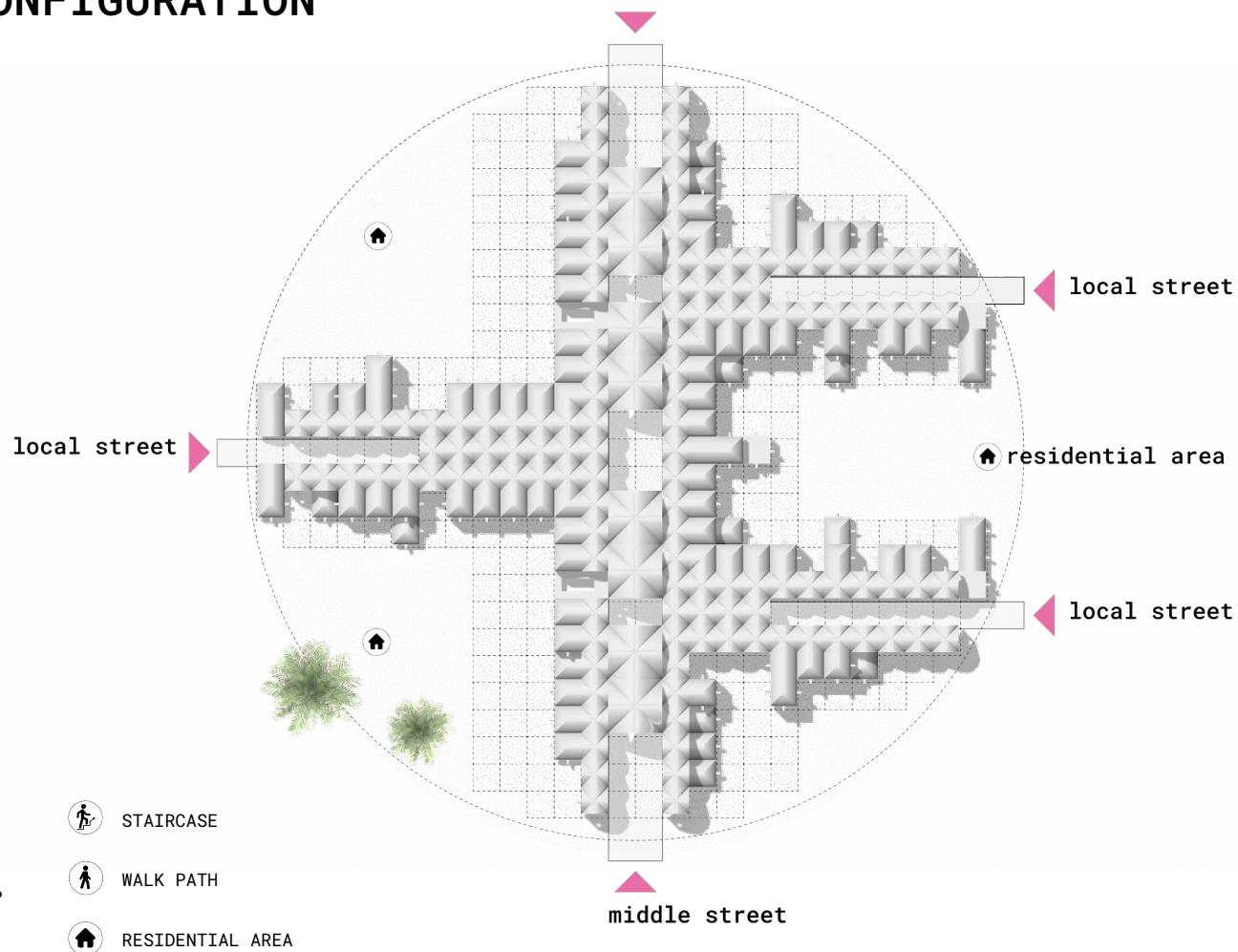
CONFIGURING > FORMING > STRUCTURING | 33



# FINAL CONFIGURATION

## SITE PLAN

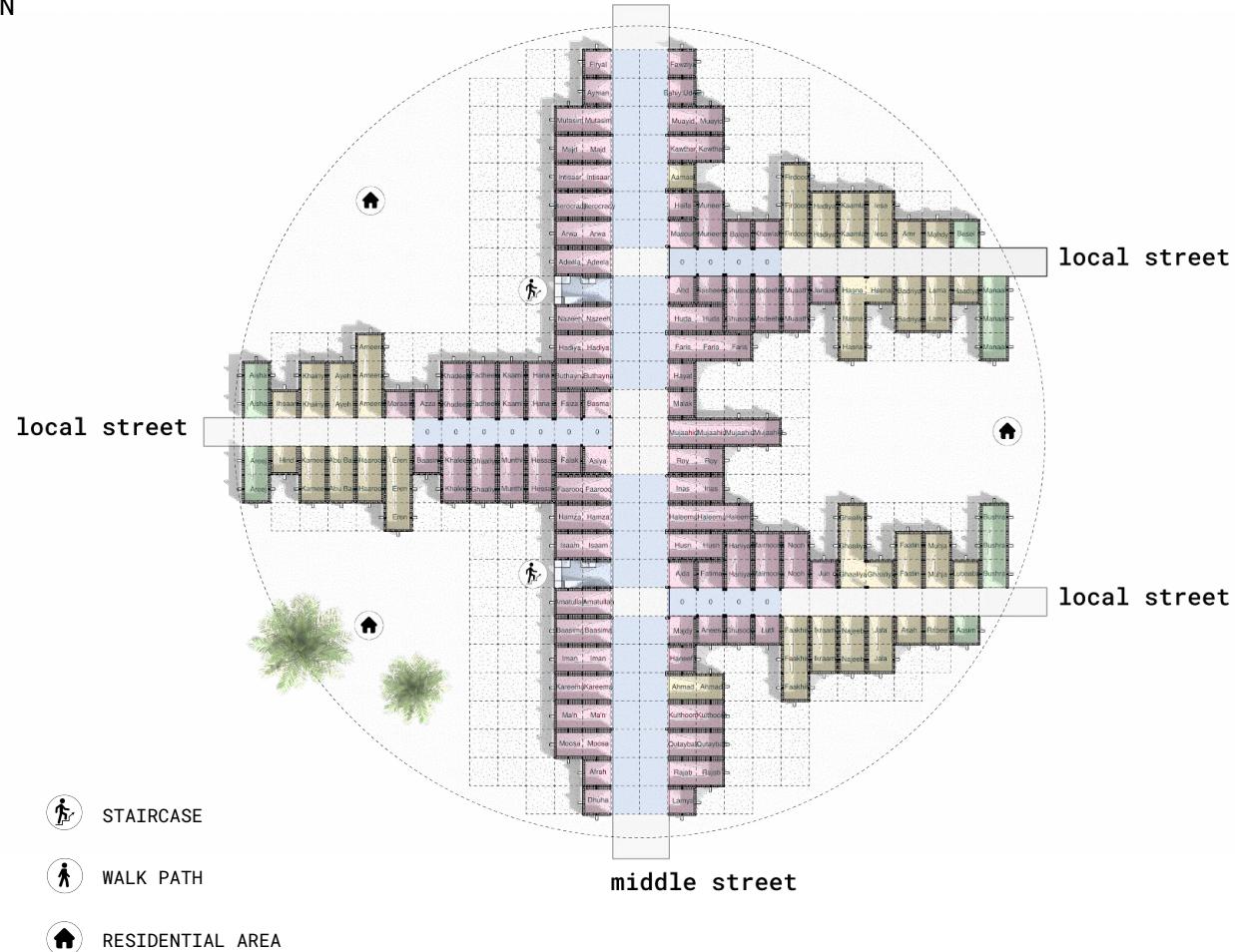
CONFIGURING > FORMING > STRUCTURING | 34



# FINAL CONFIGURATION

CONFIGURING > FORMING > STRUCTURING | 35

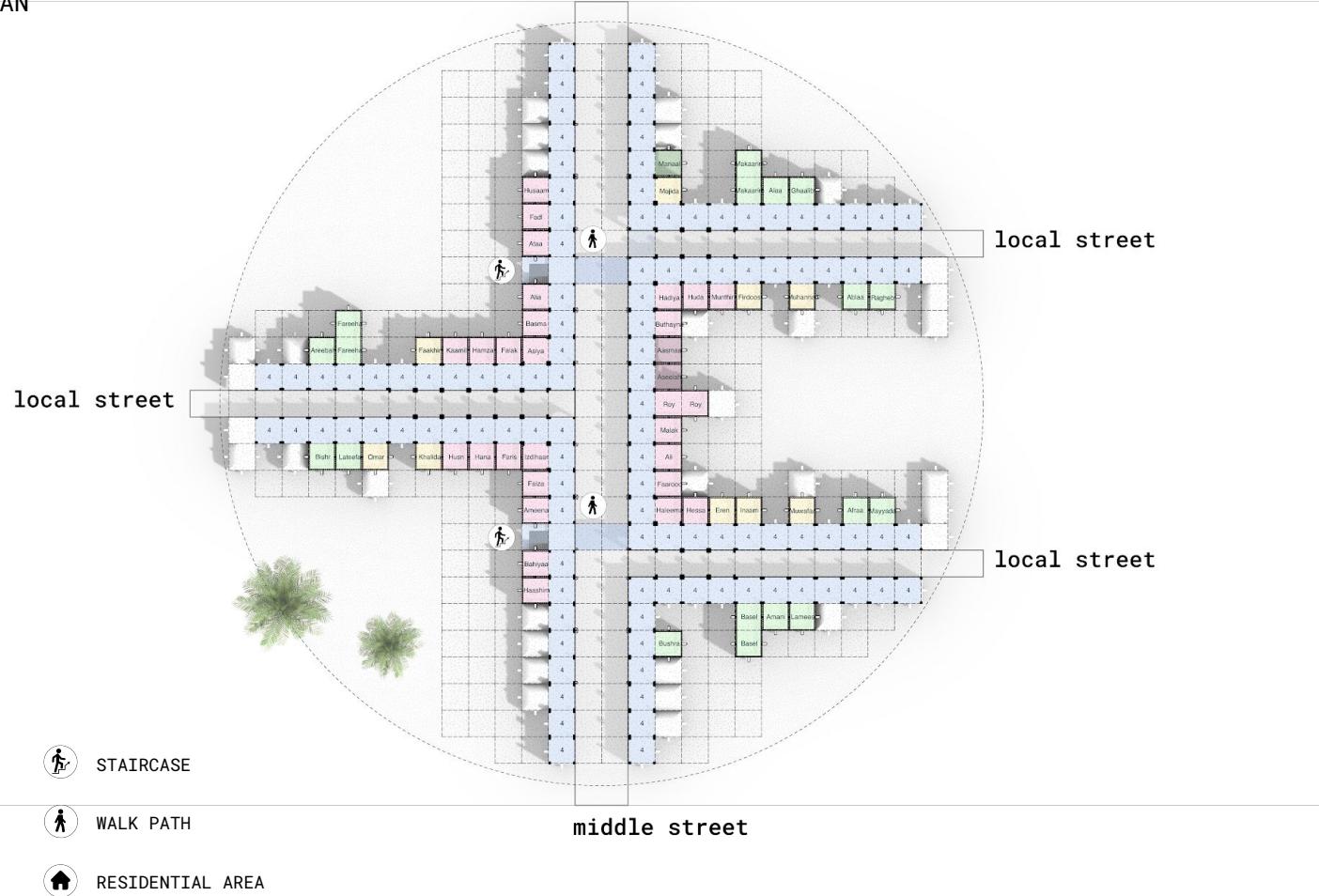
## FIRST FLOOR PLAN



# FINAL CONFIGURATION

## SECOND FLOOR PLAN

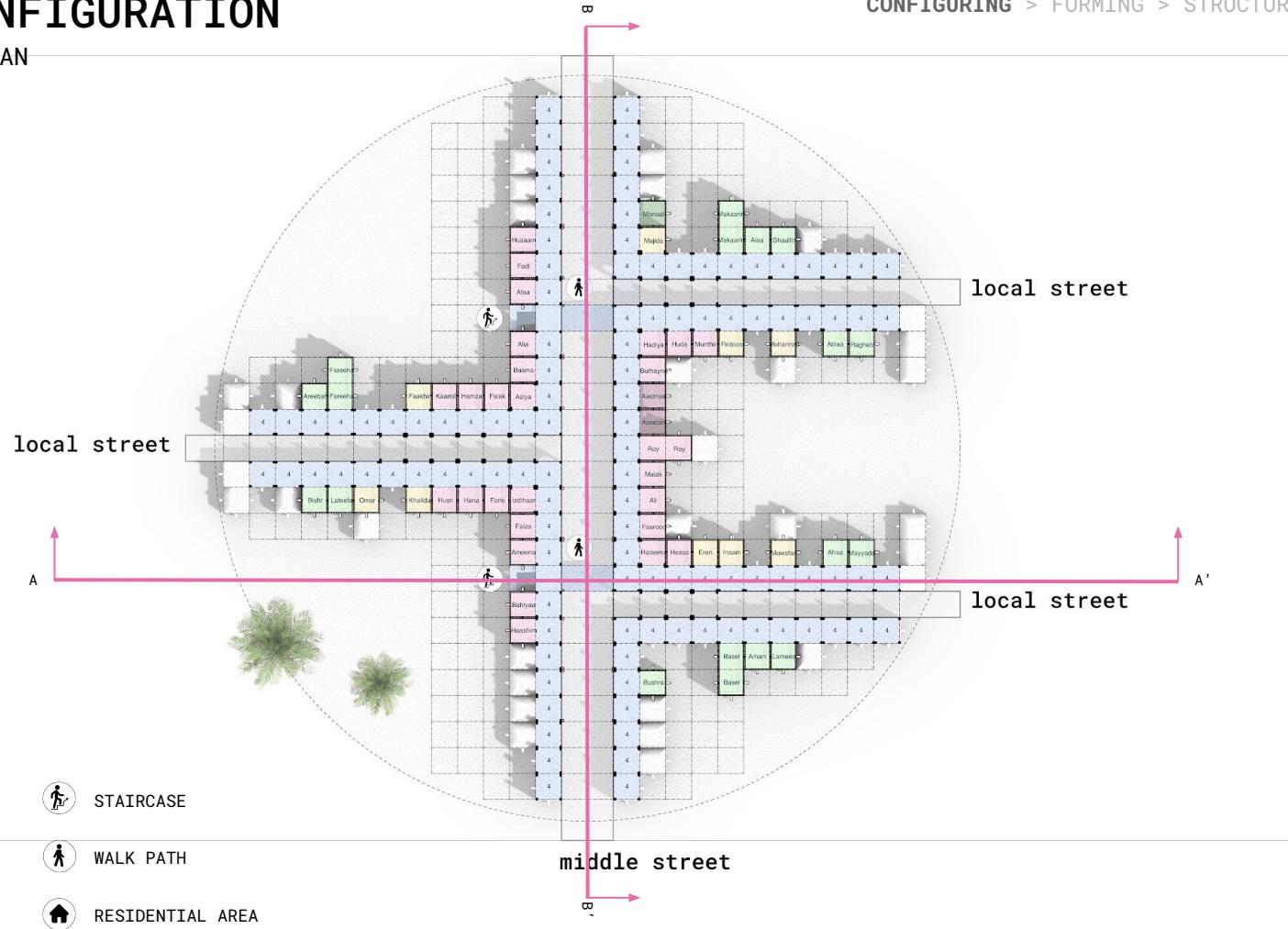
CONFIGURING > FORMING > STRUCTURING | 36



# FINAL CONFIGURATION

## SECOND FLOOR PLAN

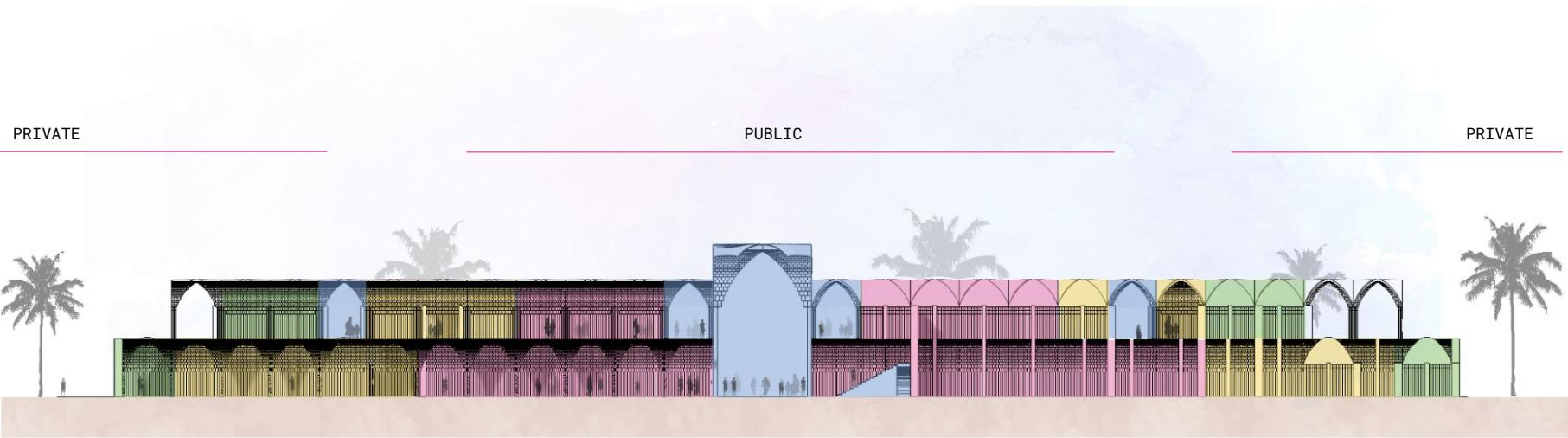
CONFIGURING > FORMING > STRUCTURING | 37



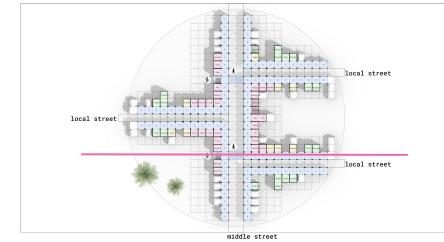
# FINAL CONFIGURATION

SECTION AA'

CONFIGURING > FORMING > STRUCTURING | 38



- SHOPS
- CIRCULATION
- SHOP + WORKSHOP
- WORKSHOPS



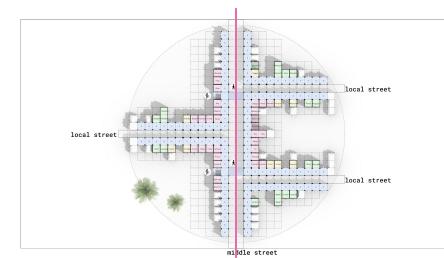
# FINAL CONFIGURATION

SECTION BB'

CONFIGURING > FORMING > STRUCTURING | 39



- SHOPS
- CIRCULATION
- SHOP + WORKSHOP
- WORKSHOPS



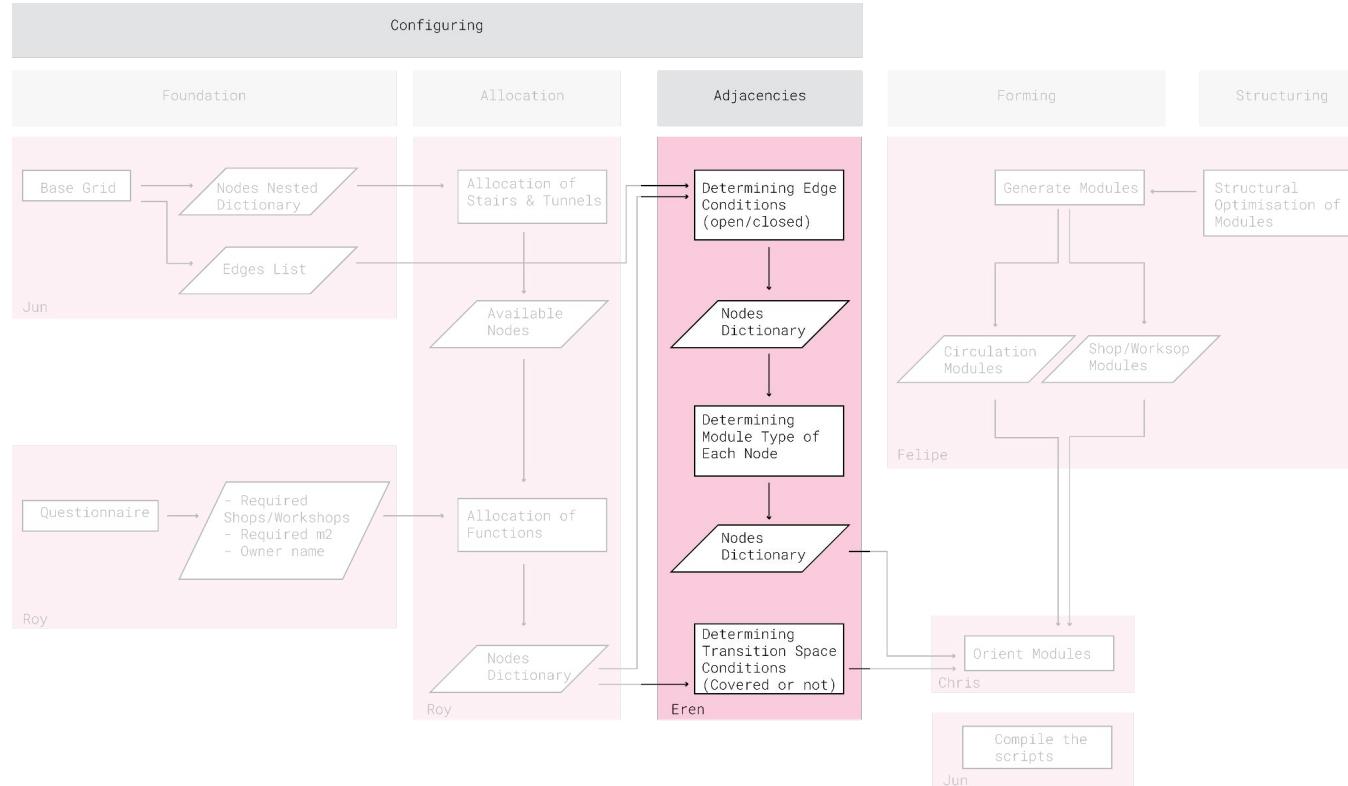
## **1.3 ADJACENCIES & MODULE TYPES**

TOPOLOGICAL OPERATIONS

# WORKFLOW

## ADJACENCIES

CONFIGURING > FORMING > STRUCTURING | 41

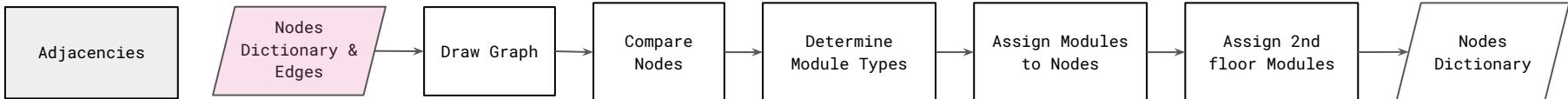
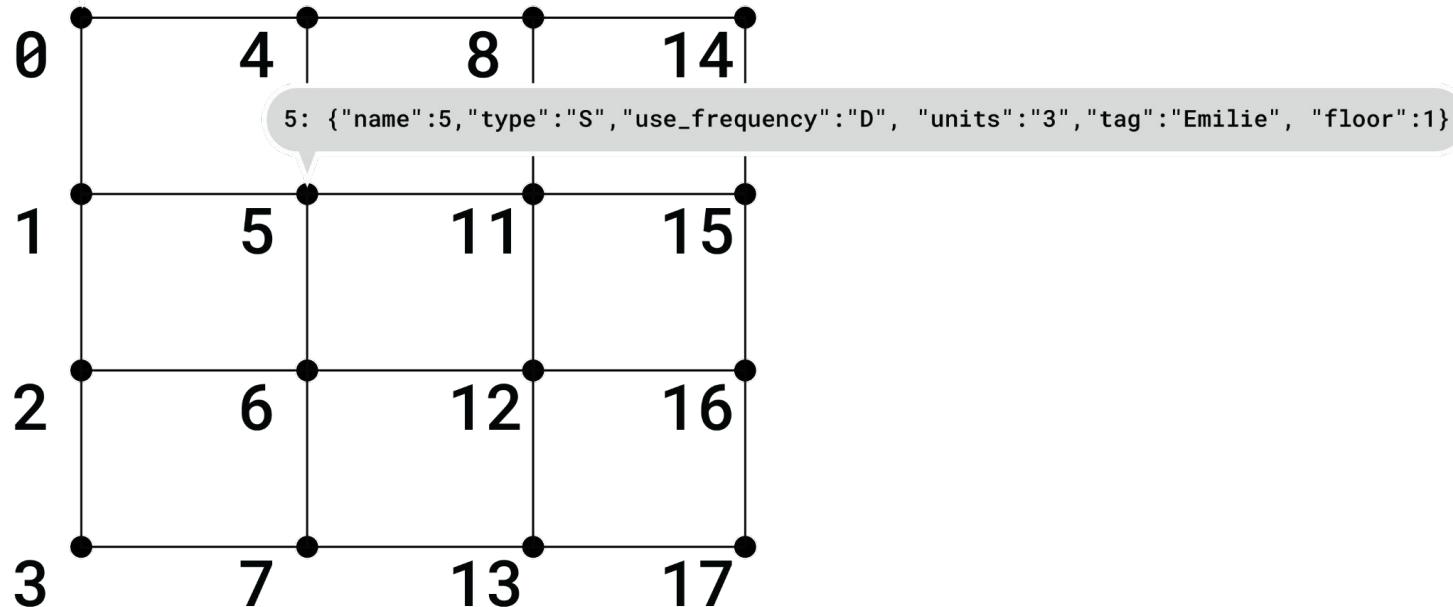


# ADJACENCIES & MODULE DATA

CONFIGURING > FORMING > STRUCTURING | 42

## CONNECTION ATTRIBUTES

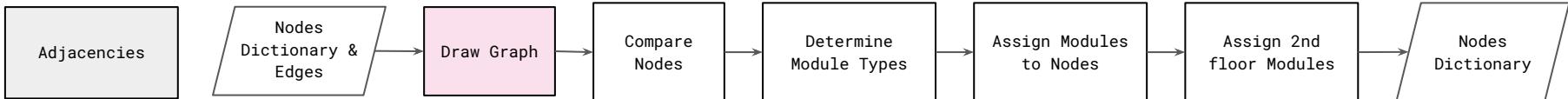
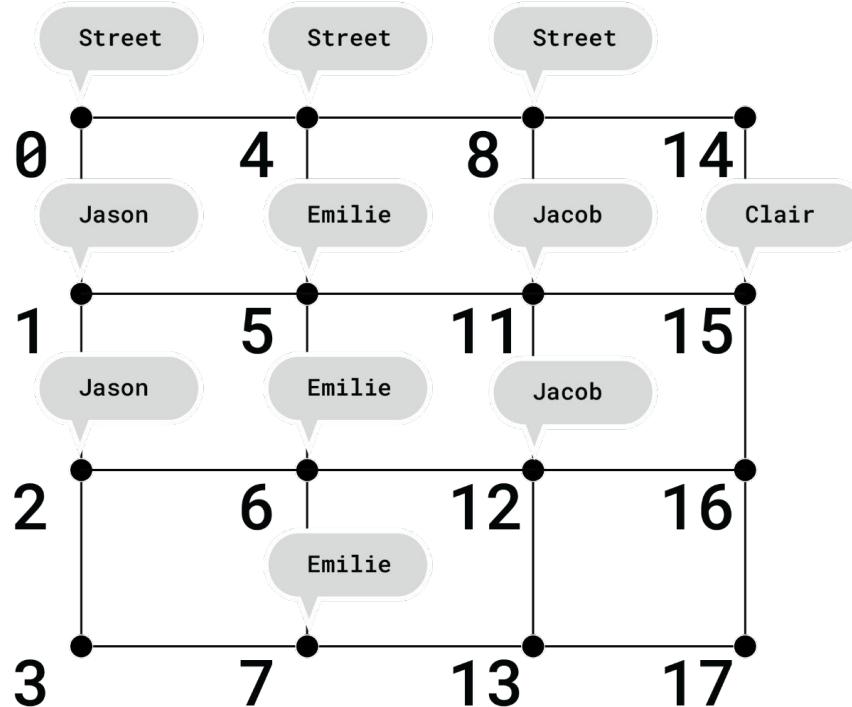
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# ADJACENCIES & MODULE DATA

CONFIGURING > FORMING > STRUCTURING | 43

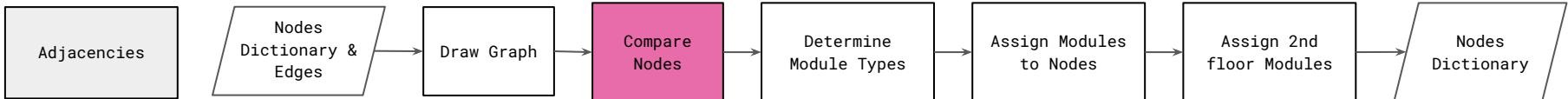
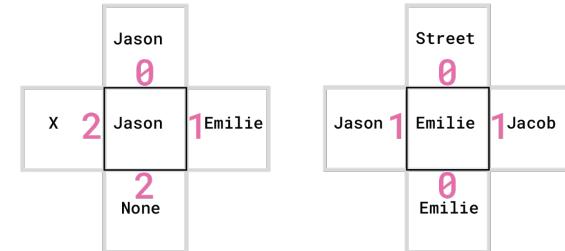
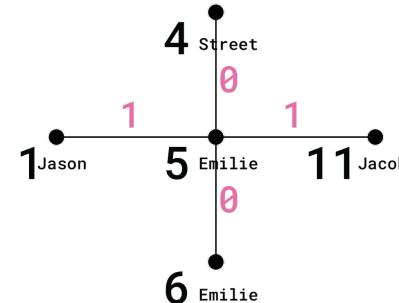
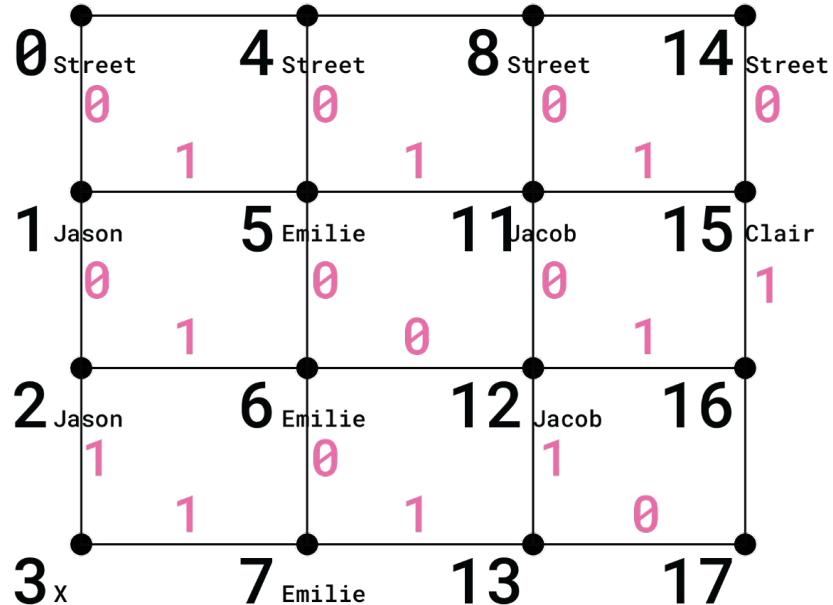
CONNECTION ATTRIBUTES



# ADJACENCIES & MODULE DATA

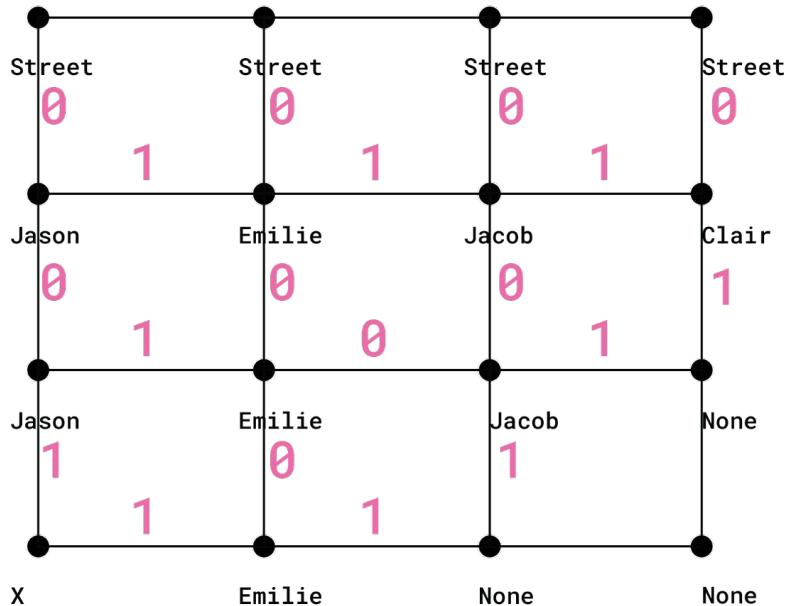
CONFIGURING > FORMING > STRUCTURING | 44

CONNECTION ATTRIBUTES

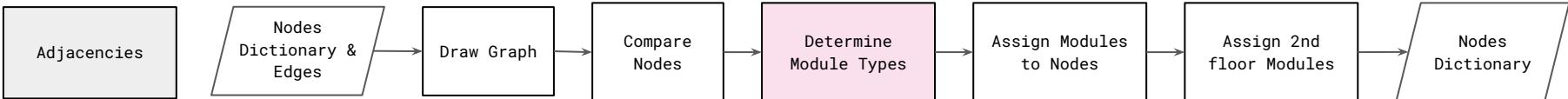
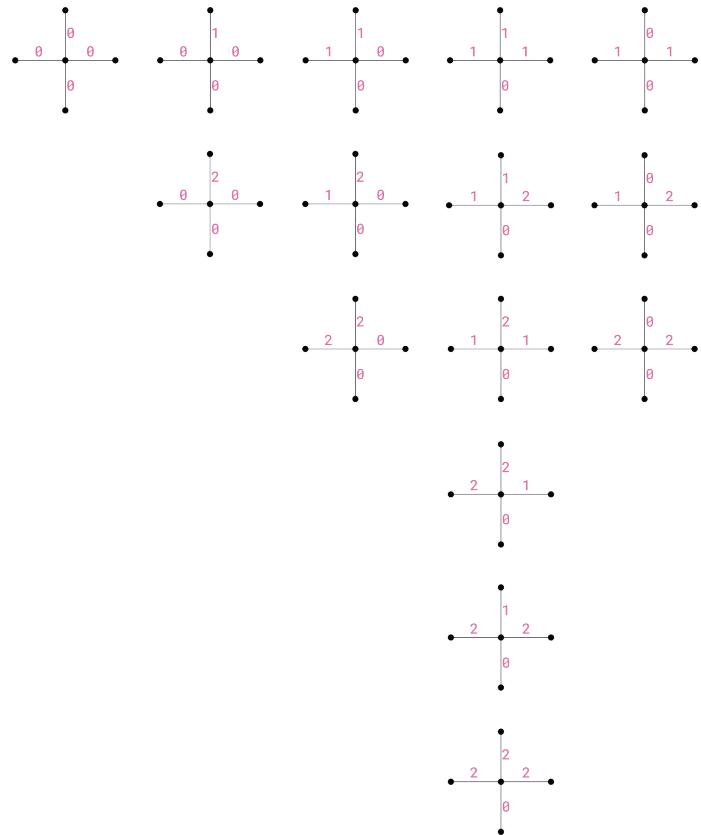


# ADJACENCIES & MODULE DATA

## CONNECTION ATTRIBUTES

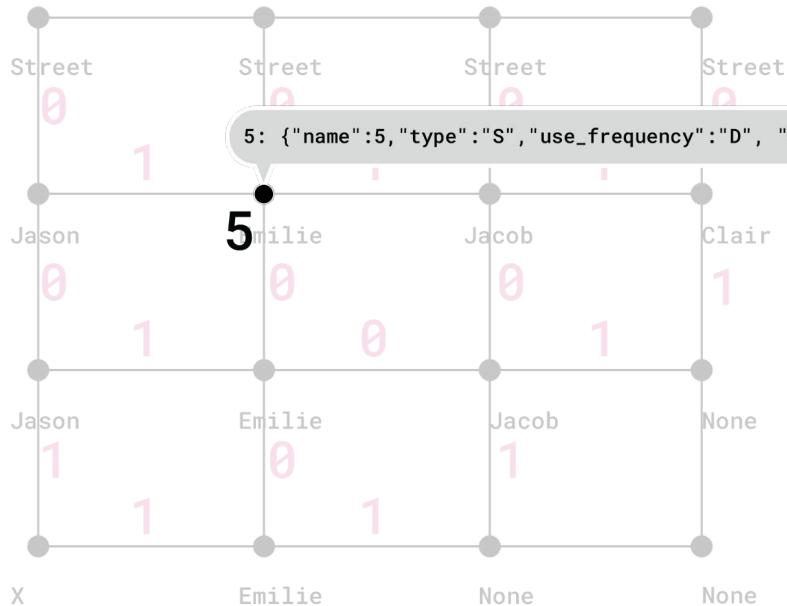


CONFIGURING > FORMING > STRUCTURING | 45

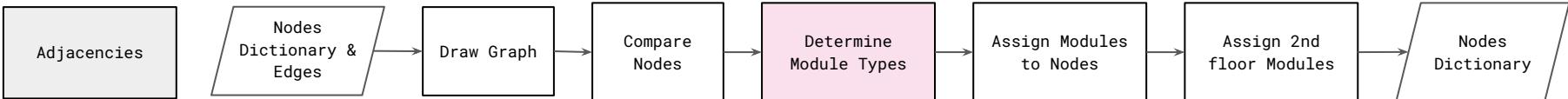
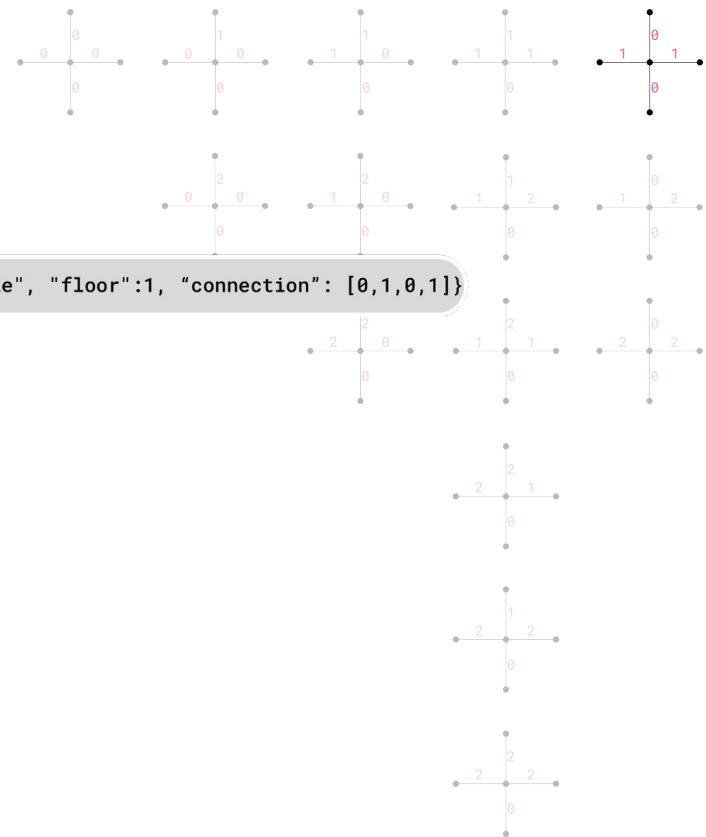


# ADJACENCIES & MODULE DATA

## CONNECTION ATTRIBUTES

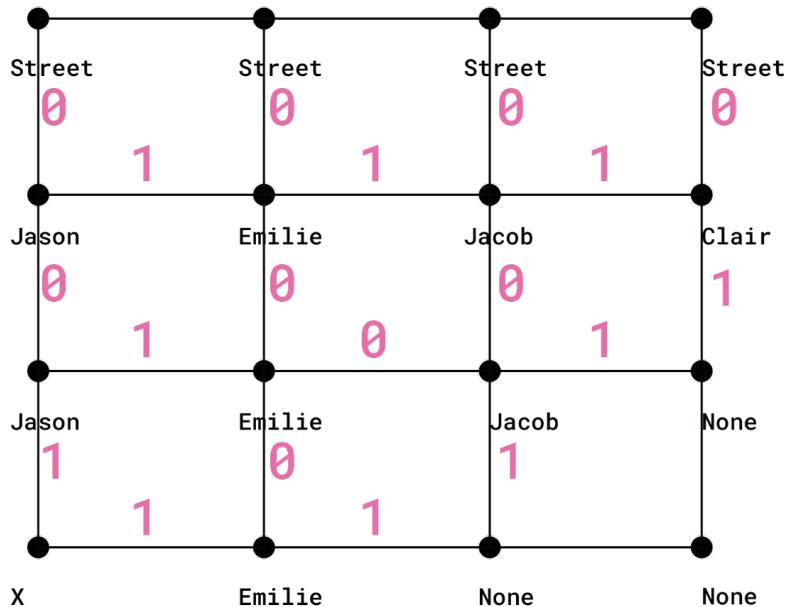


CONFIGURING > FORMING > STRUCTURING | 46

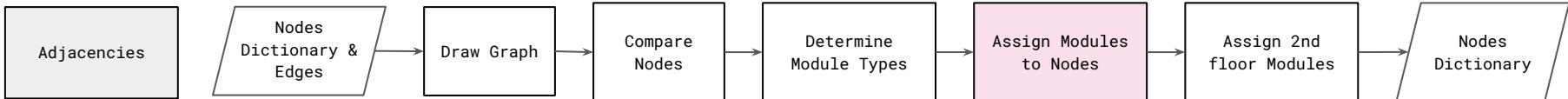
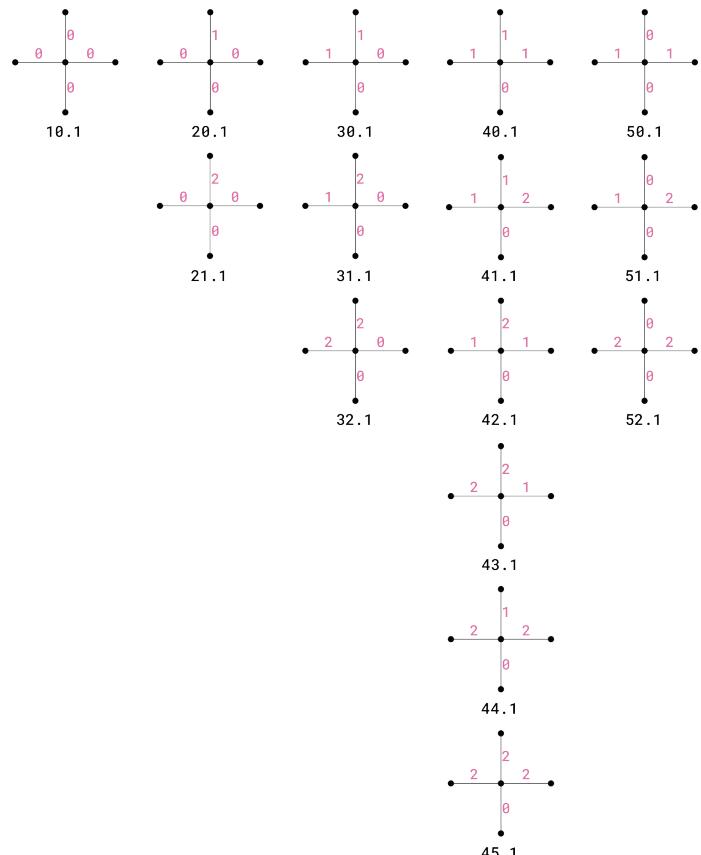


# ADJACENCIES & MODULE DATA

## ASSIGNING MODULES

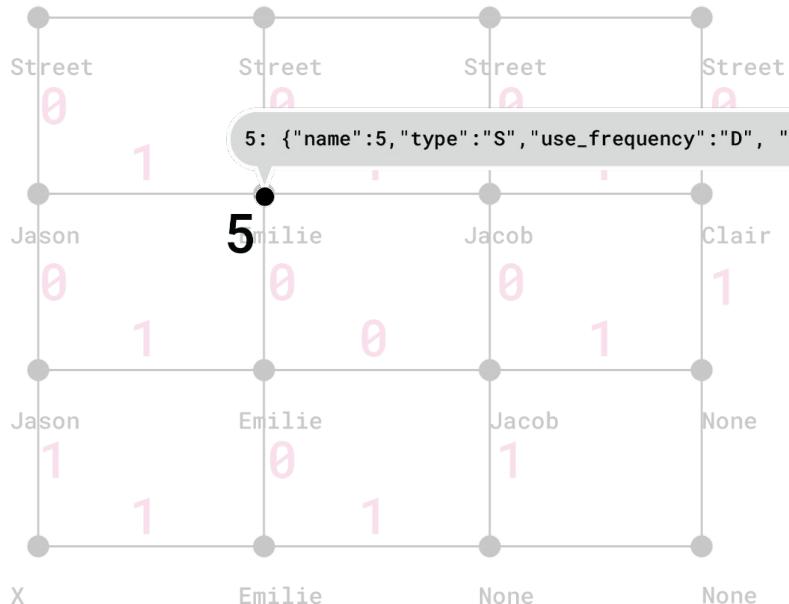


CONFIGURING > FORMING > STRUCTURING | 47

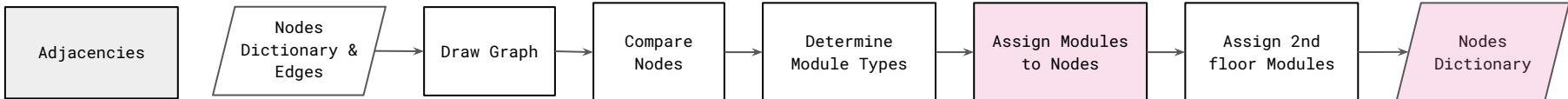
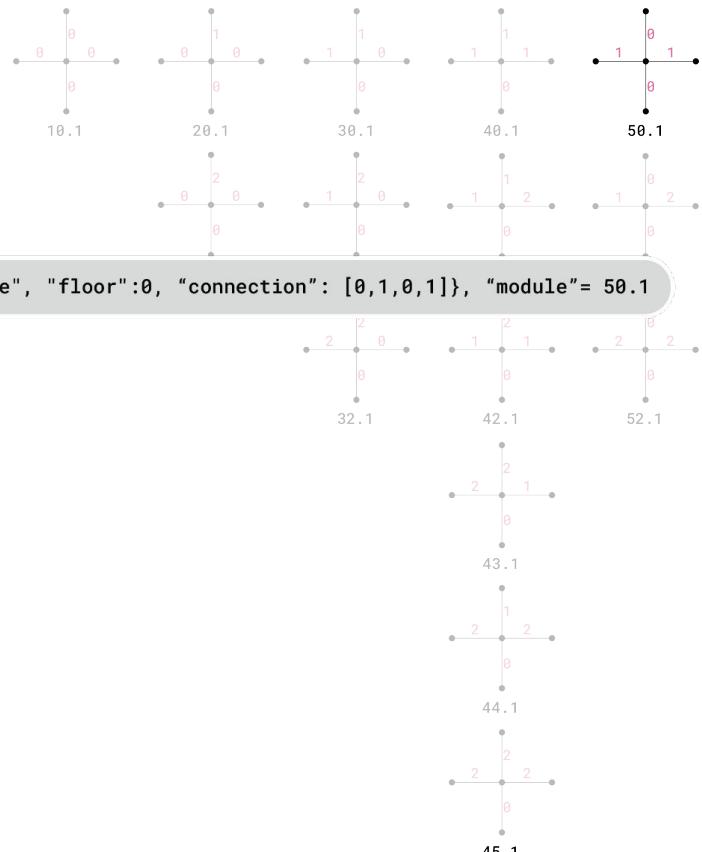


# ADJACENCIES & MODULE DATA

## ASSIGNING MODULES

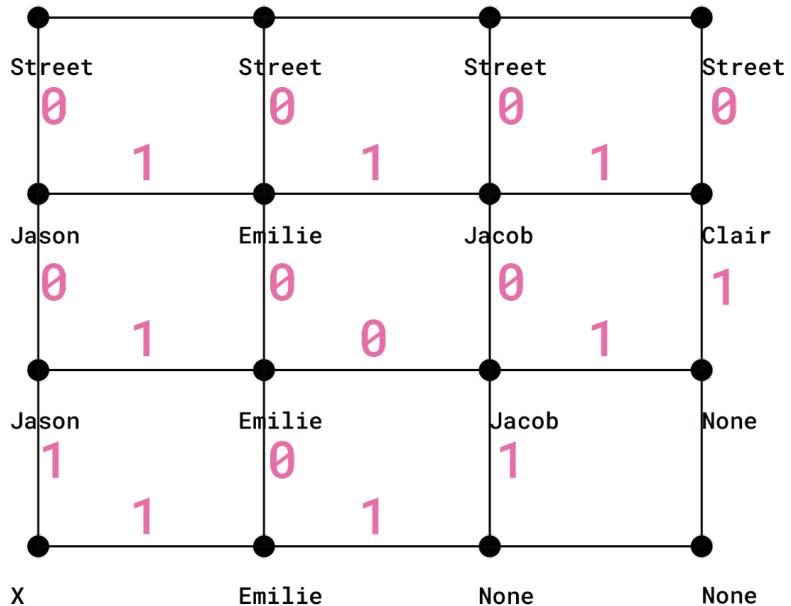


CONFIGURING > FORMING > STRUCTURING | 48

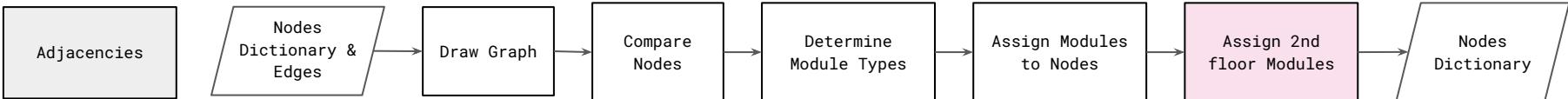
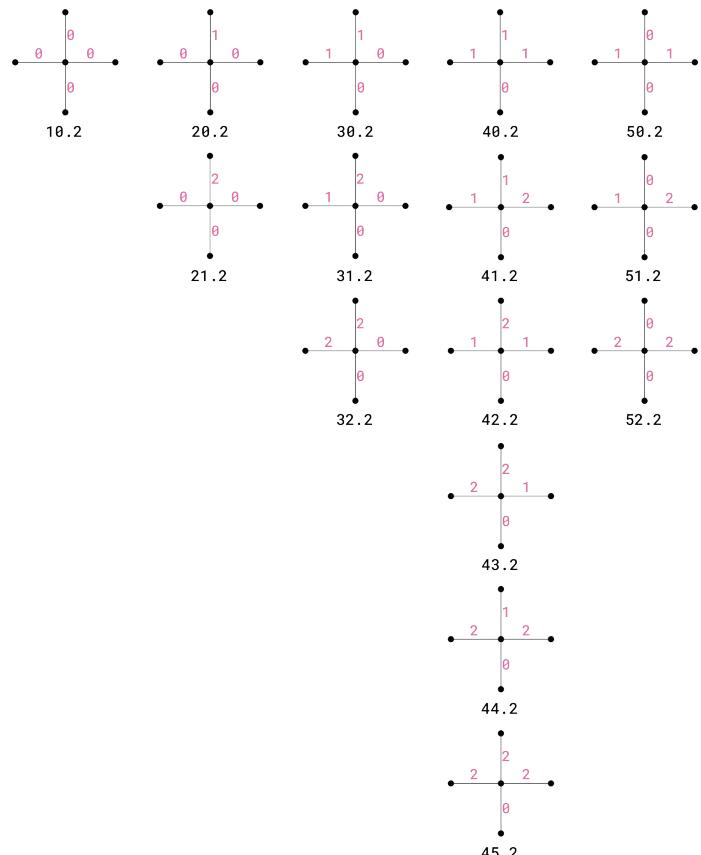


# ADJACENCIES & MODULE DATA

## ASSIGNING MODULES

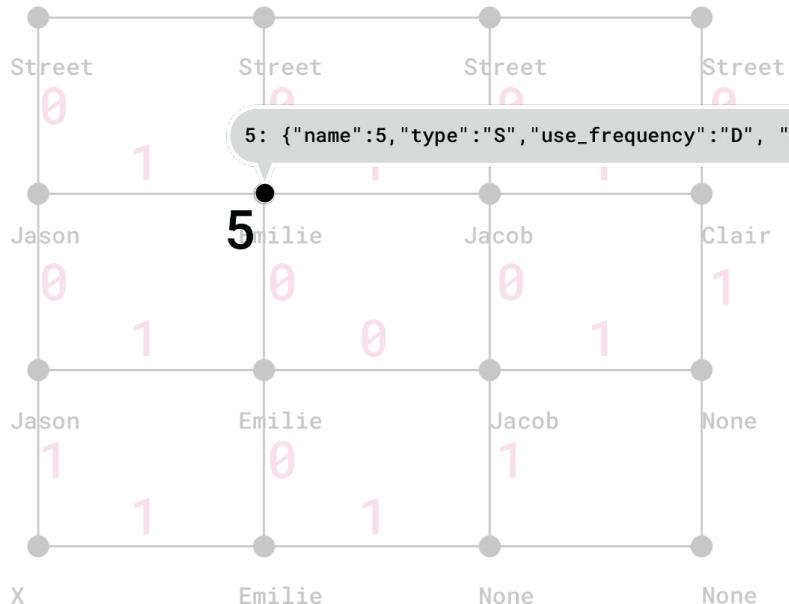


CONFIGURING > FORMING > STRUCTURING | 49

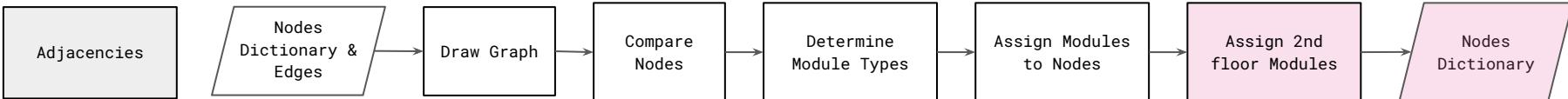
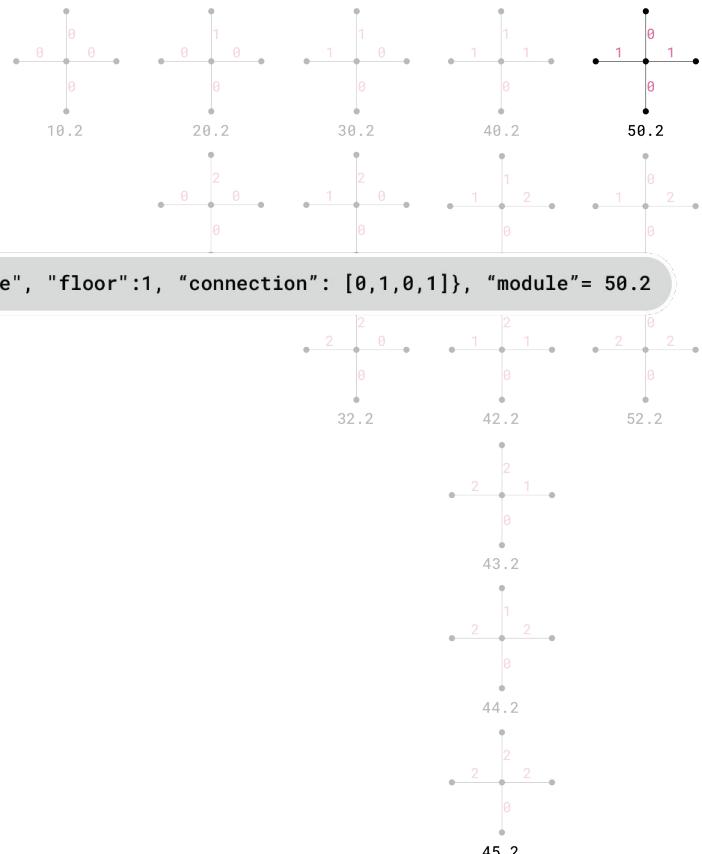


# ADJACENCIES & MODULE DATA

## ASSIGNING MODULES



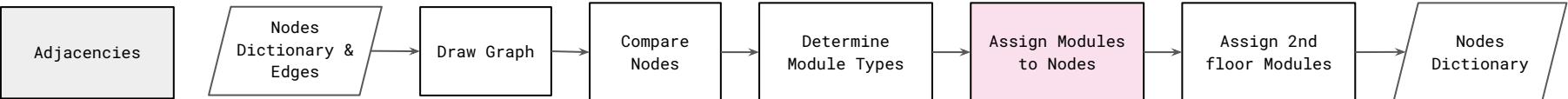
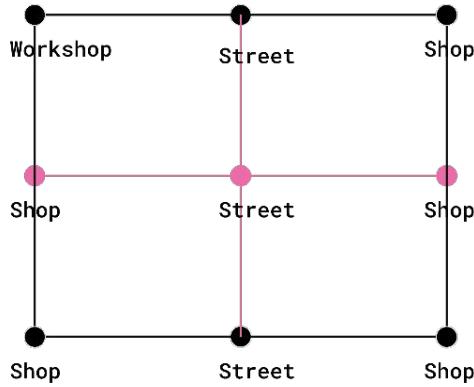
CONFIGURING > FORMING > STRUCTURING | 50



# ADJACENCIES & MODULE DATA

CONFIGURING > FORMING > STRUCTURING | 51

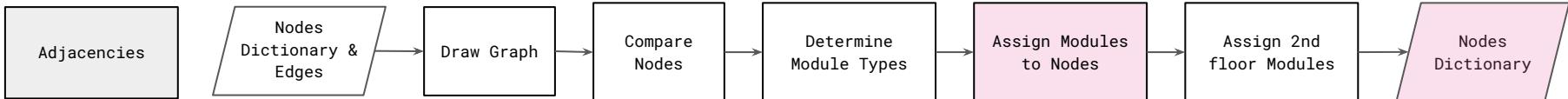
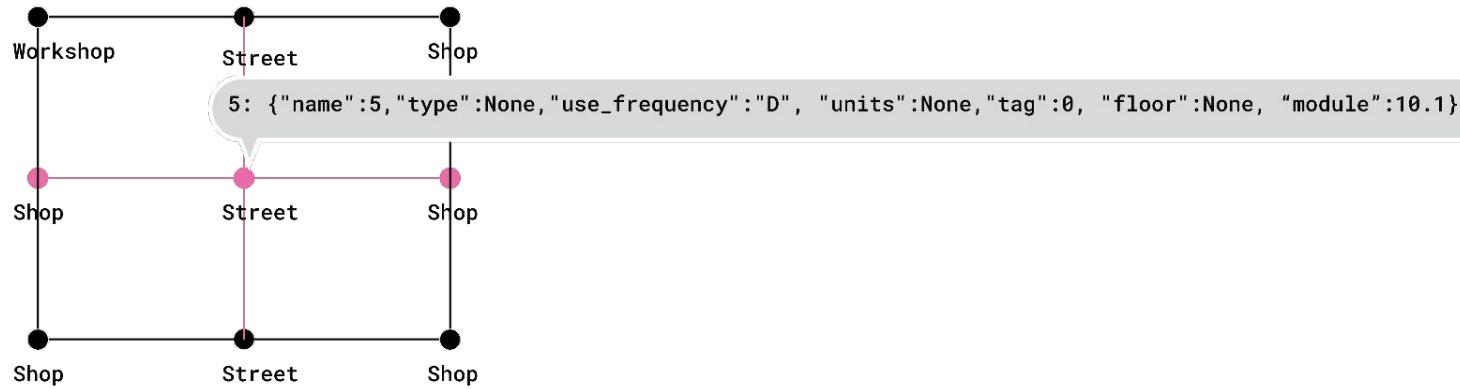
## ASSIGNING MODULES



# ADJACENCIES & MODULE DATA

CONFIGURING > FORMING > STRUCTURING | 52

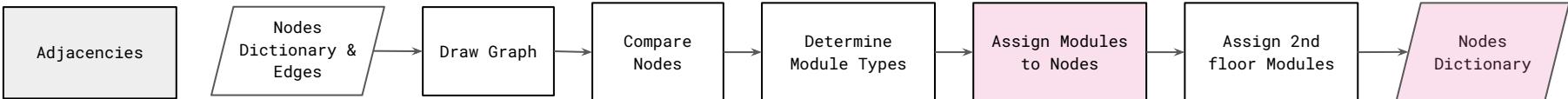
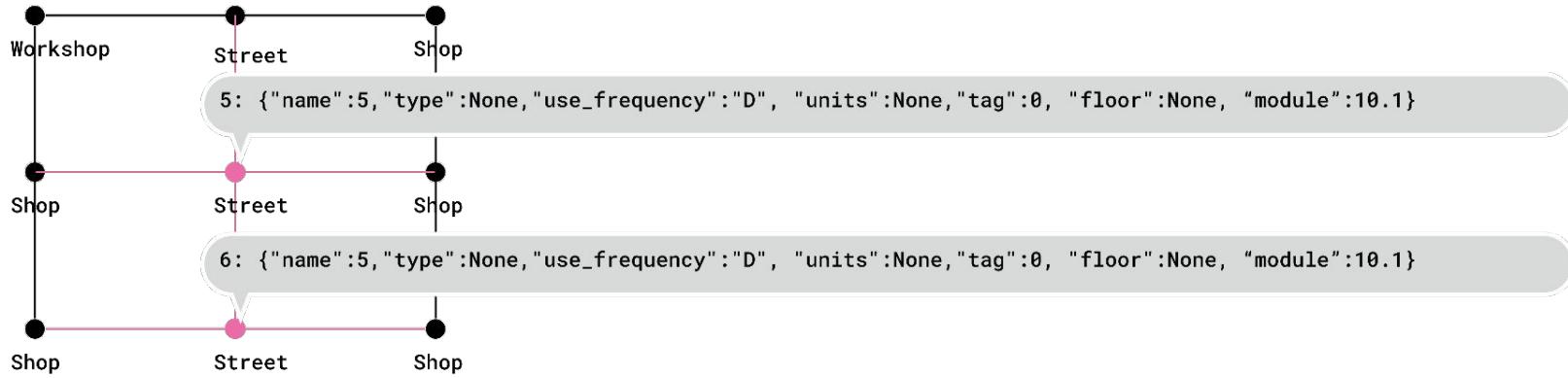
## ASSIGNING MODULES



# ADJACENCIES & MODULE DATA

CONFIGURING > FORMING > STRUCTURING | 53

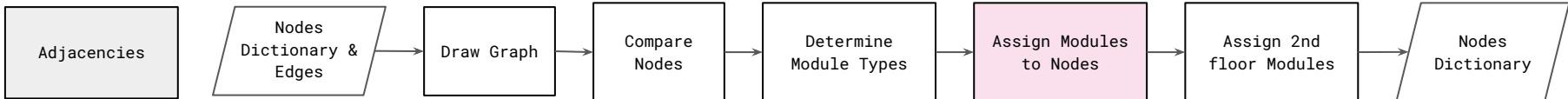
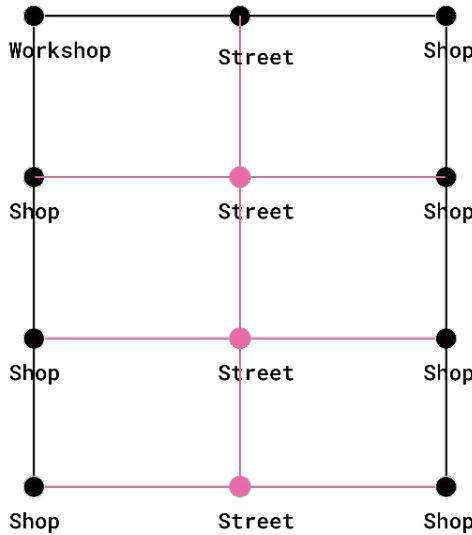
## ASSIGNING MODULES



# ADJACENCIES & MODULE DATA

CONFIGURING > FORMING > STRUCTURING | 54

## ASSIGNING MODULES



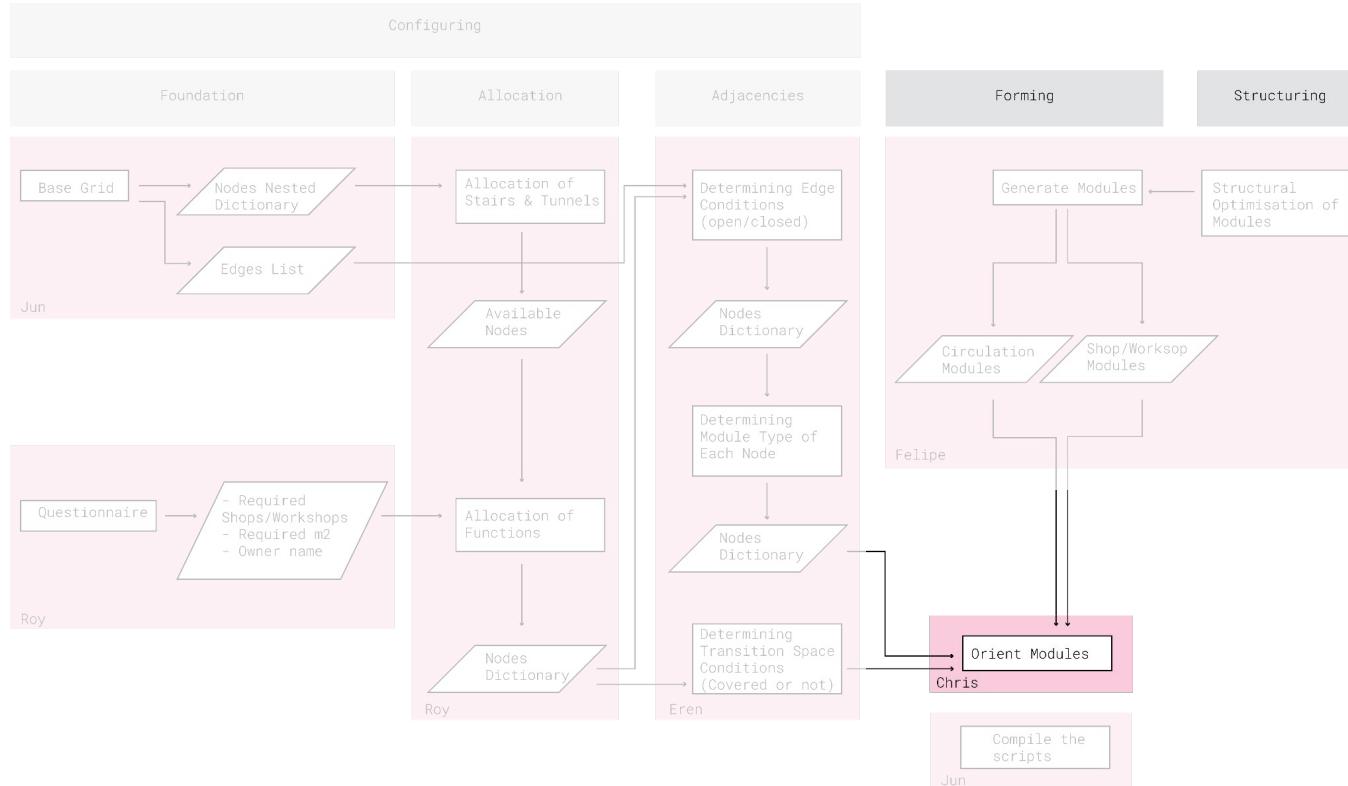
## **2.1 GRAPH TO SITE**

ORIENTING MODULES

# WORKFLOW

## ORIENTING MODULES

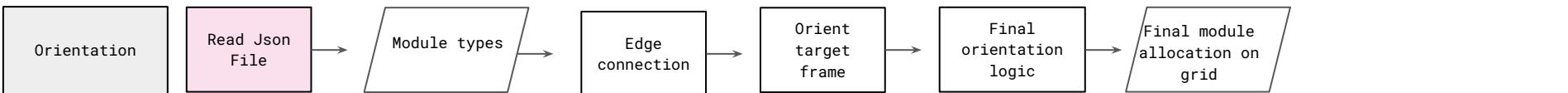
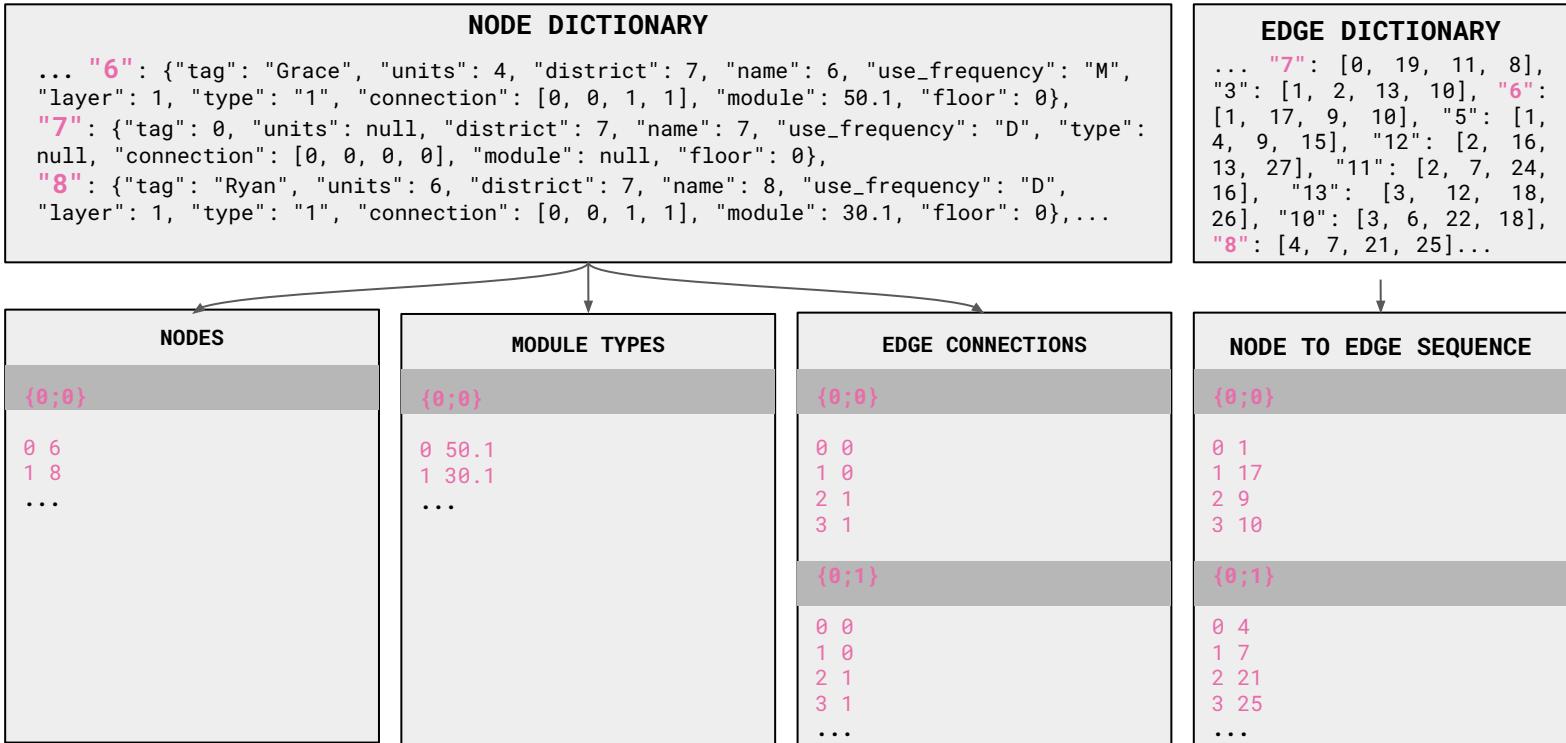
CONFIGURING > FORMING > STRUCTURING | 56



# ORIENTATION OF MODULES

CONFIGURING > FORMING > STRUCTURING | 57

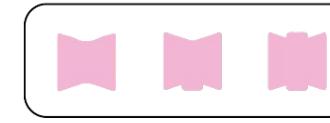
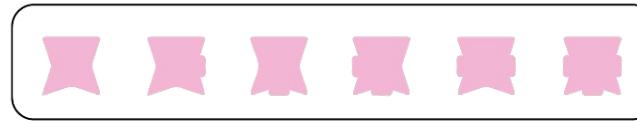
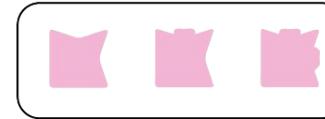
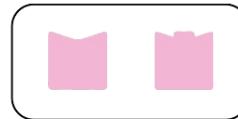
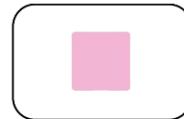
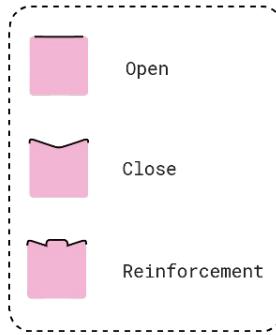
READING JSON FILE



# ORIENTATION OF MODULES

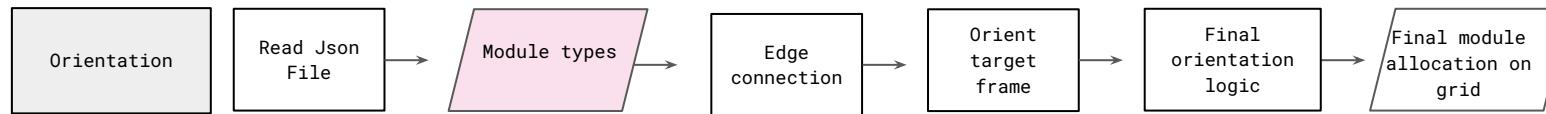
CONFIGURING > FORMING > STRUCTURING | 58

## MODULE TYPES



Type 4

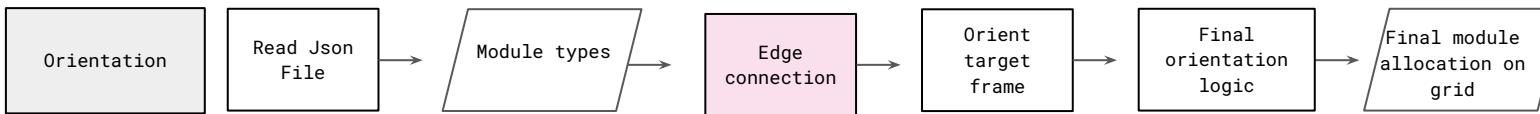
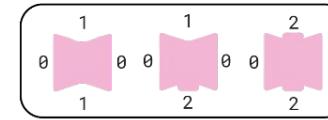
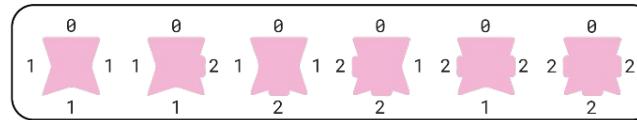
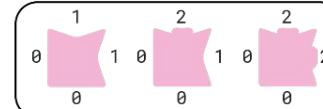
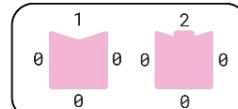
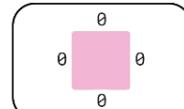
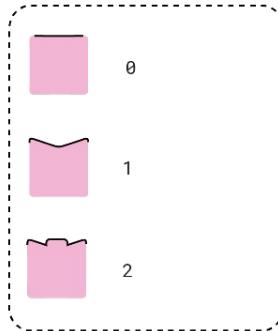
Type 5



# ORIENTATION OF MODULES

CONFIGURING > FORMING > STRUCTURING | 59

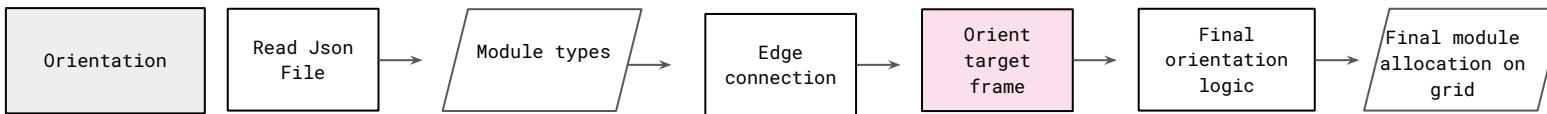
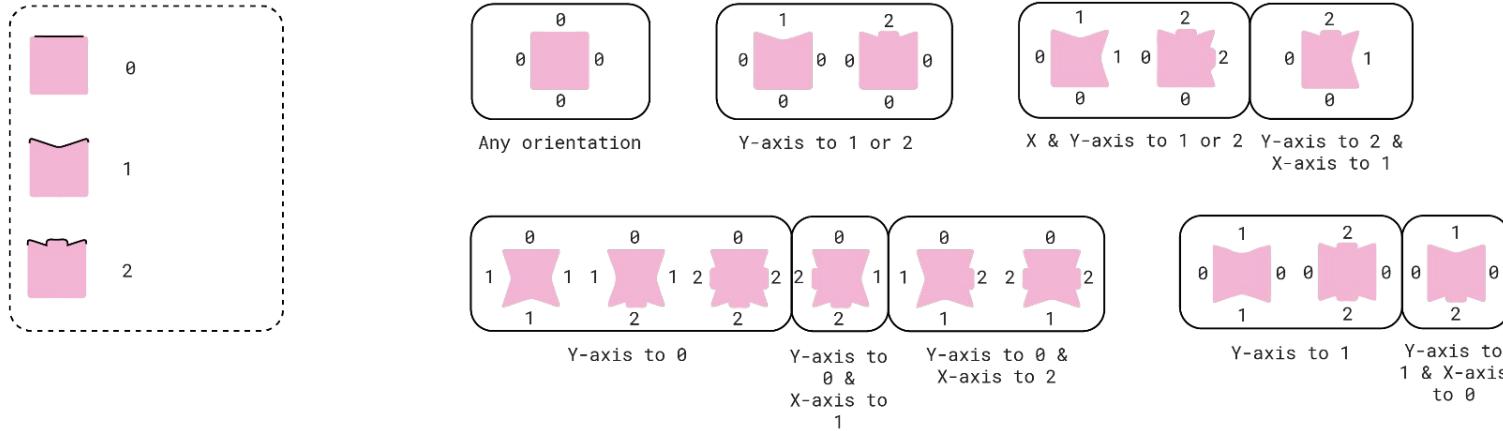
SOURCE FRAME



# ORIENTATION OF MODULES

CONFIGURING > FORMING > STRUCTURING | 60

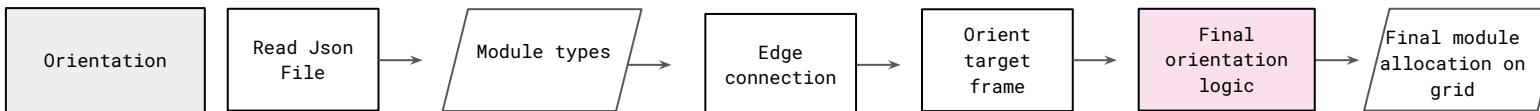
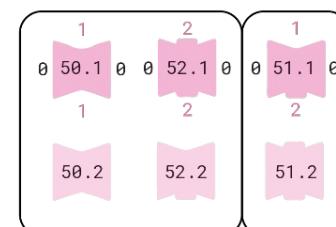
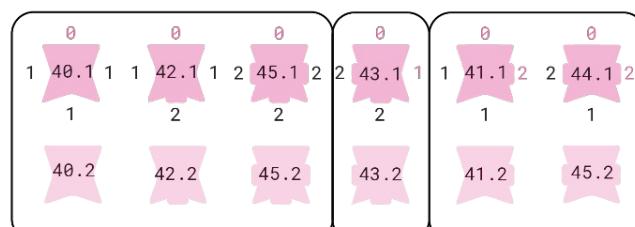
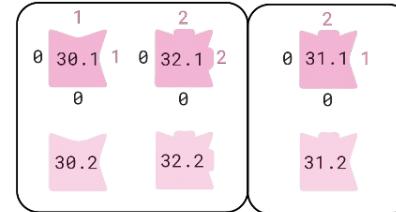
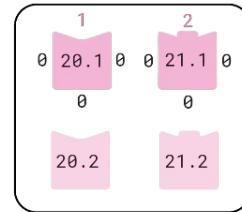
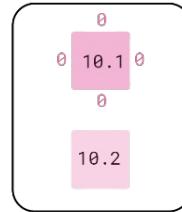
## ORIENT TARGET FRAME



# ORIENTATION OF MODULES

CONFIGURING > FORMING > STRUCTURING | 61

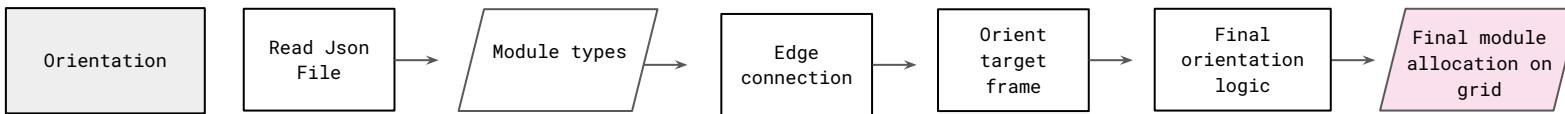
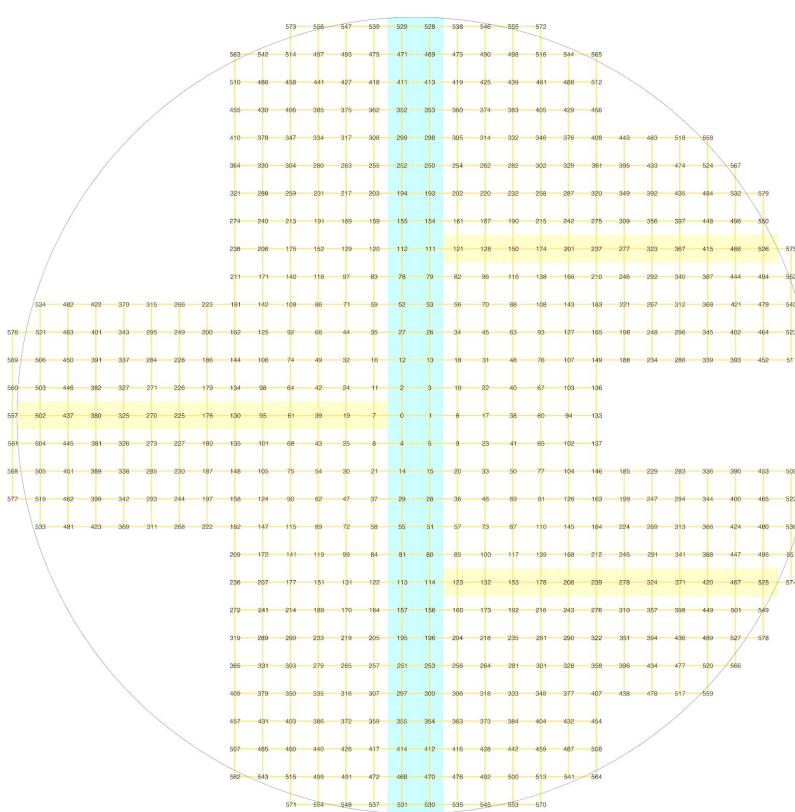
## FINAL ORIENTATION LOGIC



# ORIENTATION OF MODULES

CONFIGURING > FORMING > STRUCTURING | 62

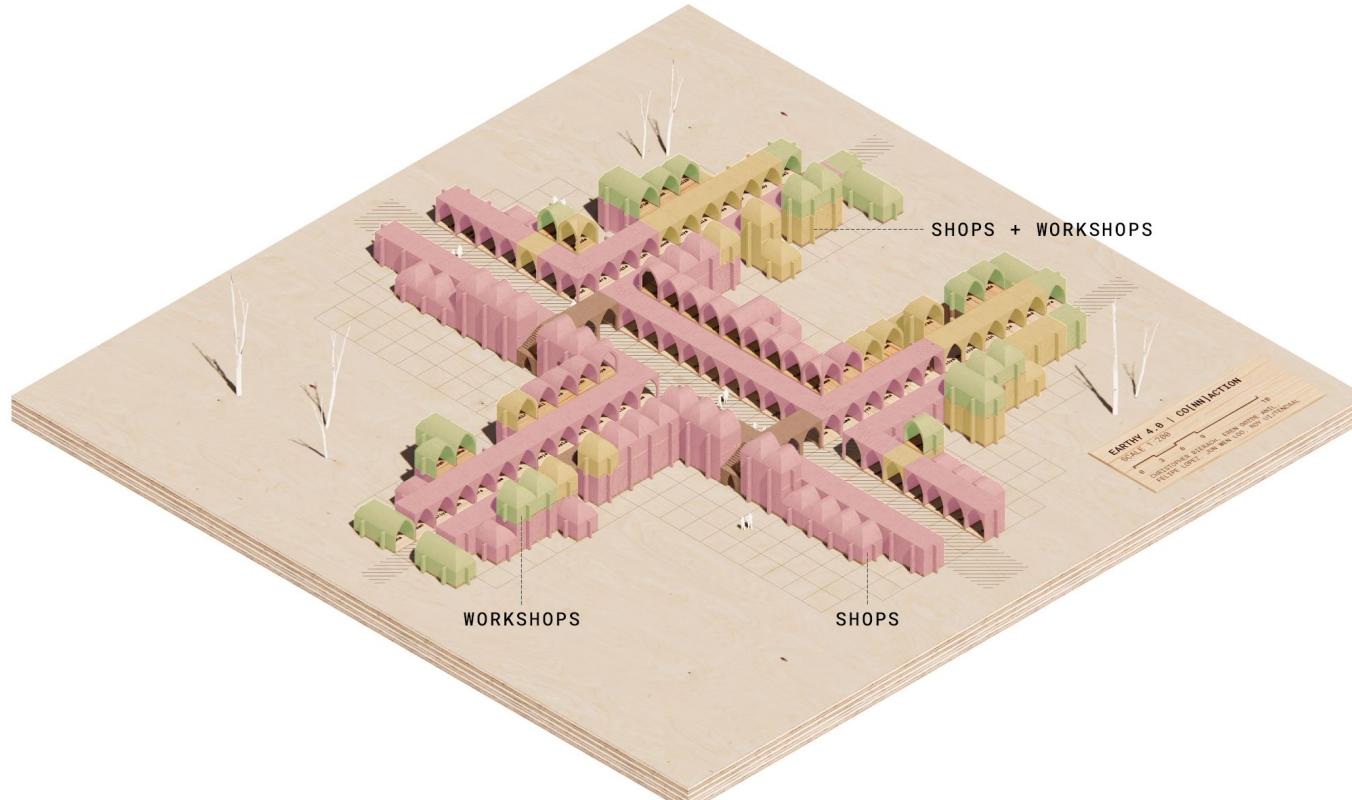
## APPLICATION & RESULTS



# SITE ASSEMBLY

FINAL CONFIGURATION

CONFIGURING > FORMING > STRUCTURING | 63



OVERVIEW



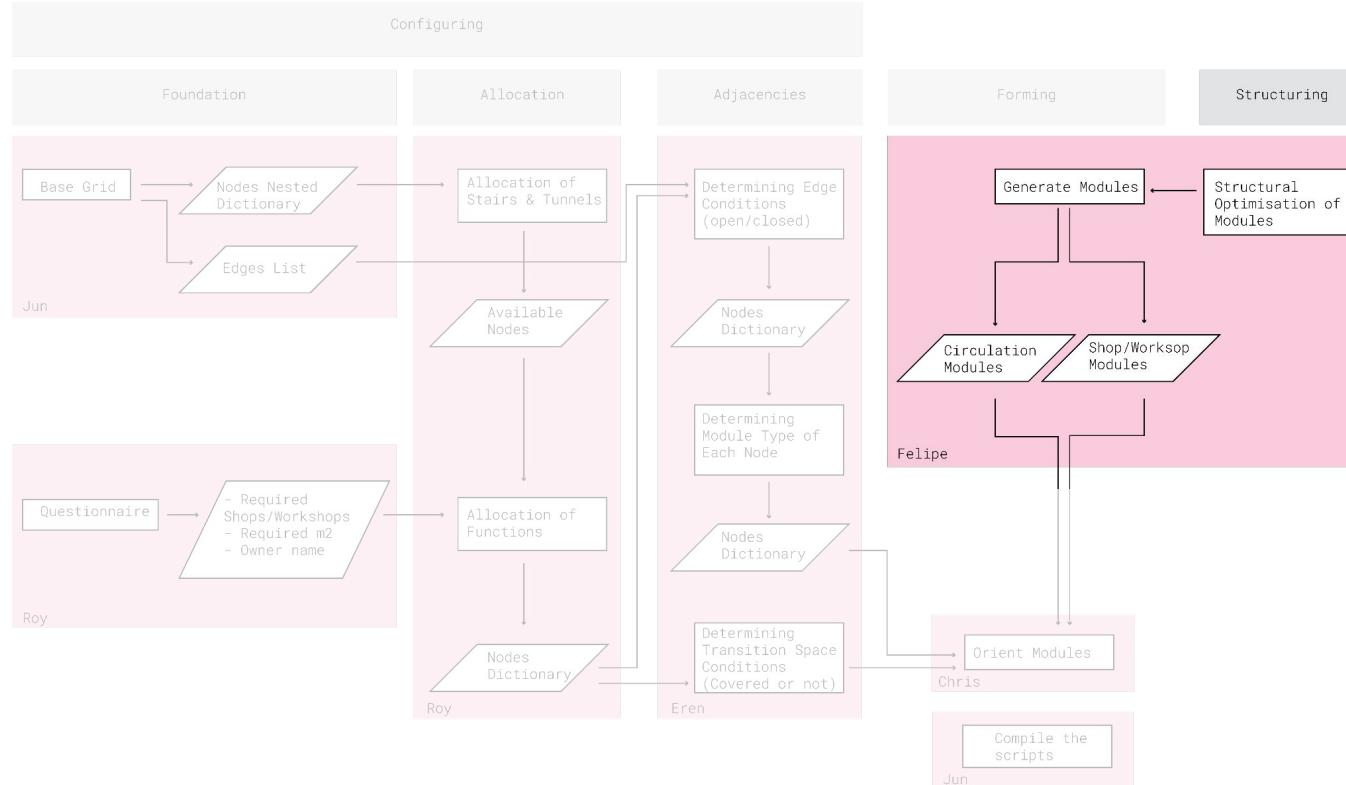
## **2.2 SITE TO BUILDING**

FORMING

# WORKFLOW

## STRUCTURING

CONFIGURING > FORMING > STRUCTURING | 66



# DESIGN INSPIRATION

## SYRIAN CORBEL ROOF

CONFIGURING > **FORMING** > STRUCTURING | 67



Earth Architecture. (2009) Syrian beehive houses. EARTH ARCHITECTURE. from <http://eartharchitecture.org/?p=571>.

# FORM APPROXIMATION

## DEFINING TOPOLOGICAL RELATIONS

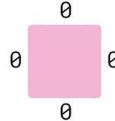
Roof  
Tessellations



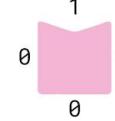
Support  
Conditions



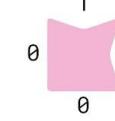
Openings  
Conditions



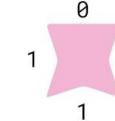
Type 1



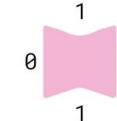
Type 2



Type 3



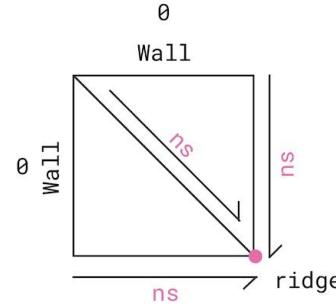
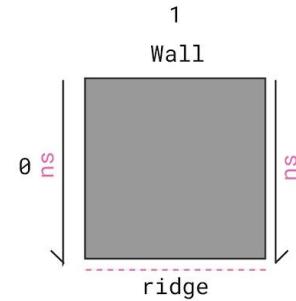
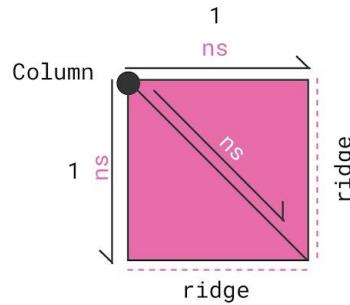
Type 4



Type 5

# FORM APPROXIMATION

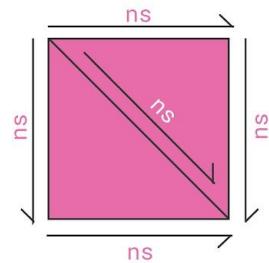
## DEFINING TOPOLOGICAL RELATIONS



ns: N steps

# FORM APPROXIMATION

## DEFINING TOPOLOGICAL RELATIONS

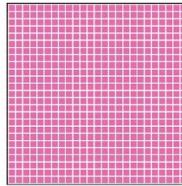


ns: N steps

# FORM APPROXIMATION

## DEFINING TOPOLOGICAL RELATIONS

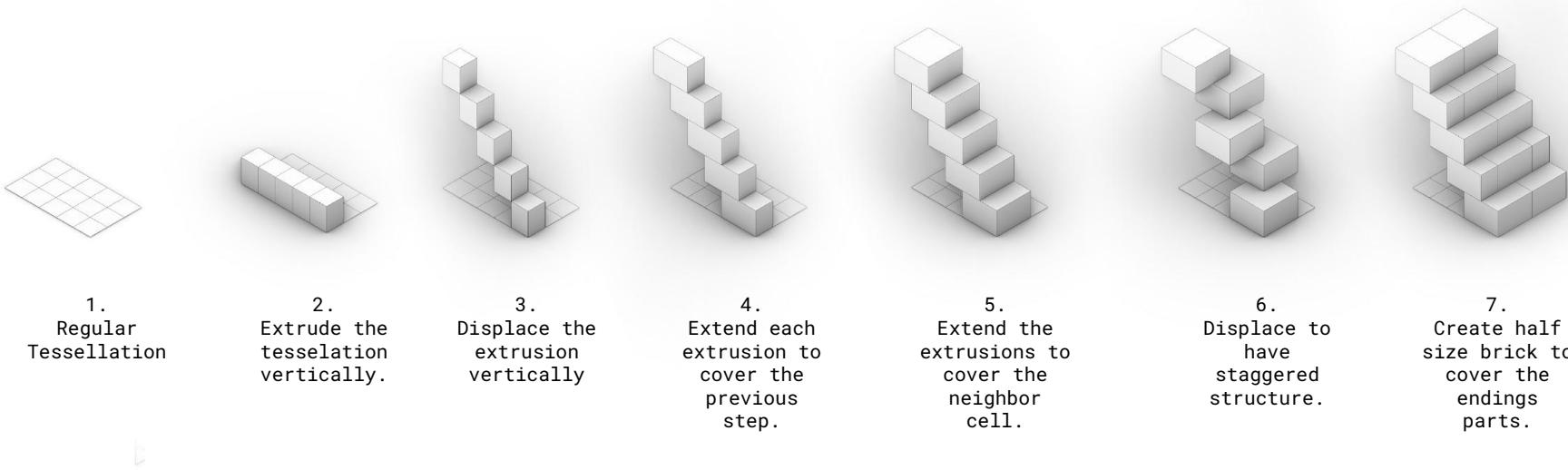
Introduce a regular tessellation that is able to achieve all the conditions



# FORM APPROXIMATION

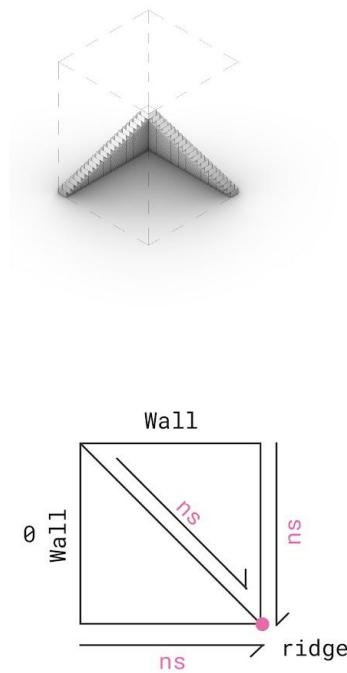
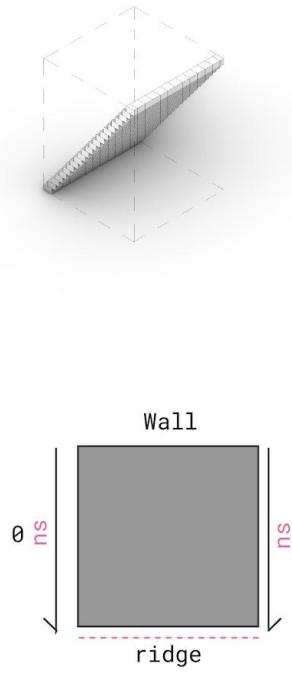
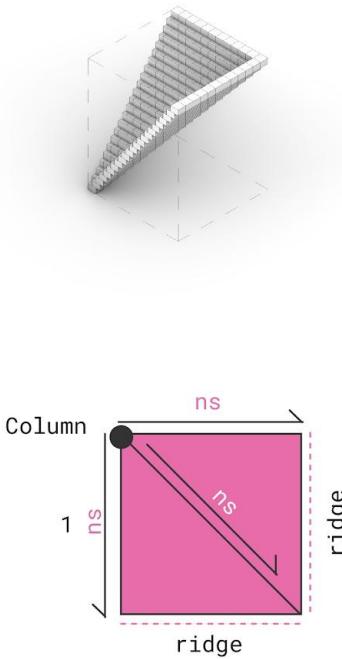
## DEFINING TOPOLOGICAL RELATIONS

CONFIGURING > FORMING > STRUCTURING | 72



# FORM APPROXIMATION

## DEFINING TOPOLOGICAL RELATIONS

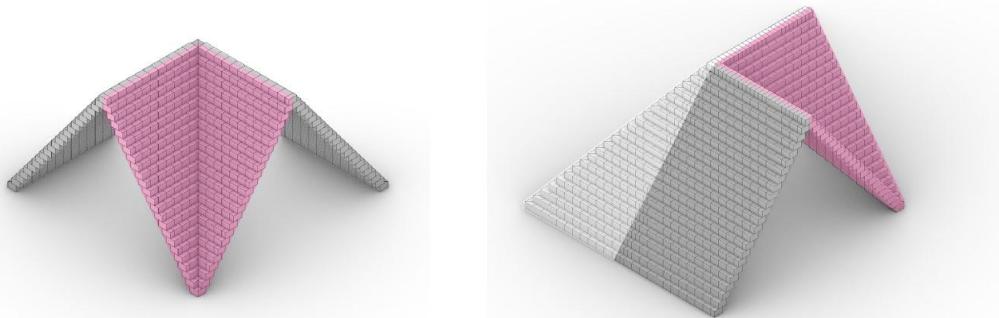


ns: N steps

# FORM APPROXIMATION

DEFINING TOPOLOGICAL RELATIONS

CONFIGURING > **FORMING** > STRUCTURING | 74

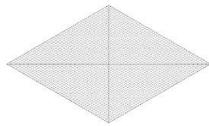


Type 3

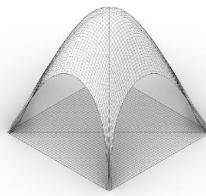
# FORM APPROXIMATION

COMBINING TOPOLOGICAL AND RELAXATION APPROACH

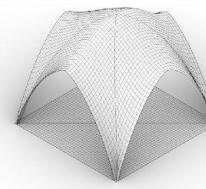
CONFIGURING > FORMING > STRUCTURING | 75



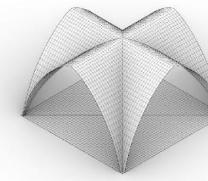
1.  
Base  
Tessellation



2.  
Non  
restricted  
relaxation



3.  
Keeping the  
borders  
vertical

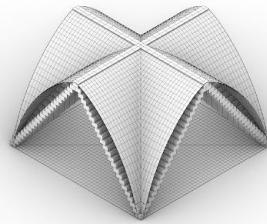


4.  
Adding steps  
coplanarity

# FORM APPROXIMATION

COMBINING TOPOLOGICAL AND RELAXATION APPROACH

CONFIGURING > FORMING > STRUCTURING | 76

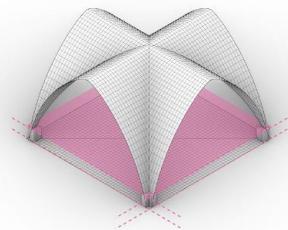


Unacceptable approximation.

# FORM APPROXIMATION

COMBINING TOPOLOGICAL AND RELAXATION APPROACH

CONFIGURING > FORMING > STRUCTURING | 77

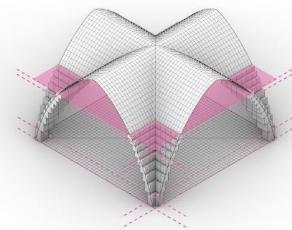


Variable steps height, depending on the  
mesh curvature.

# FORM APPROXIMATION

COMBINING TOPOLOGICAL AND RELAXATION APPROACH

CONFIGURING > FORMING > STRUCTURING | 78

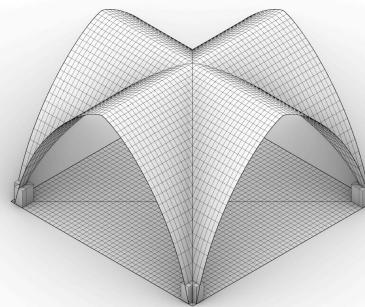


Tops levels are shorter than base ones.

# FORM APPROXIMATION

COMBINING TOPOLOGICAL AND RELAXATION APPROACH

CONFIGURING > FORMING > STRUCTURING | 79

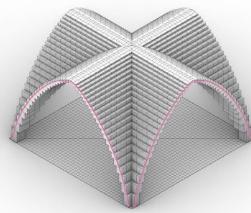


Step by step shape approximation

# FORM APPROXIMATION

COMBINING TOPOLOGICAL AND RELAXATION APPROACH

CONFIGURING > FORMING > STRUCTURING | 80

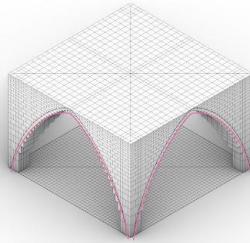


Thrust line keep always inside the  
bricks, but reach the borders.

# FORM APPROXIMATION

COMBINING TOPOLOGICAL AND RELAXATION APPROACH

CONFIGURING > FORMING > STRUCTURING | 81

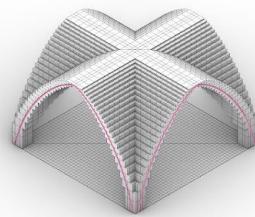


For ground floor modules all the place  
is fill it with bricks, movein thrust  
line even more to the borders.

# FORM APPROXIMATION

COMBINING TOPOLOGICAL AND RELAXATION APPROACH

CONFIGURING > FORMING > STRUCTURING | 82



With a second brick per level the  
thrust line never exceed the middle  
center section.

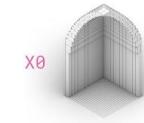
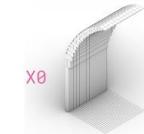
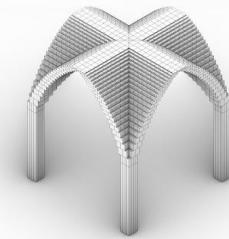
# MODULE LIBRARY

BUILDING FROM A MODULARITY APPROACH

CONFIGURING > FORMING > STRUCTURING | 83



Type 1



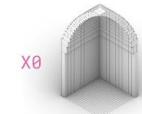
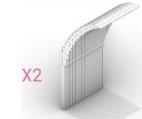
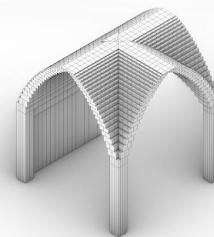
# MODULE LIBRARY

BUILDING FROM A MODULARITY APPROACH

CONFIGURING > FORMING > STRUCTURING | 84



Type 2



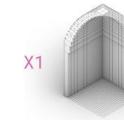
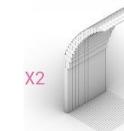
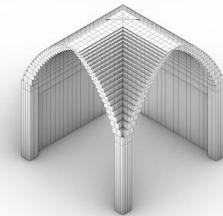
# MODULE LIBRARY

BUILDING FROM A MODULARITY APPROACH

CONFIGURING > FORMING > STRUCTURING | 85



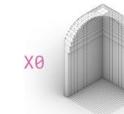
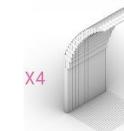
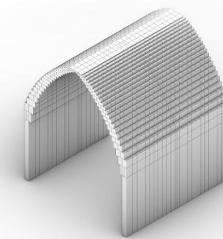
Type 3



# MODULE LIBRARY

BUILDING FROM A MODULARITY APPROACH

CONFIGURING > FORMING > STRUCTURING | 86



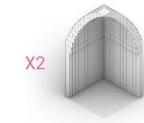
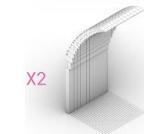
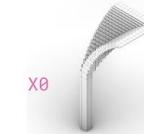
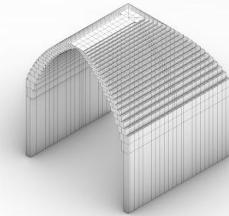
# MODULE LIBRARY

BUILDING FROM A MODULARITY APPROACH

CONFIGURING > FORMING > STRUCTURING | 87



Type 4



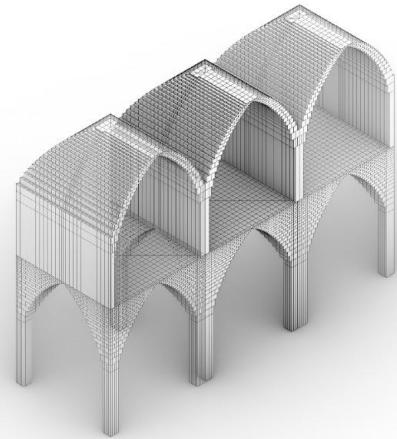
## **2.3 STRUCTURAL APPROXIMATION & CONSTRUCTION**

STRUCTURING

# STRUCTURAL ANALYSIS

## BUILDING THE STUDY CASE

CONFIGURING > FORMING > **STRUCTURING** | 89

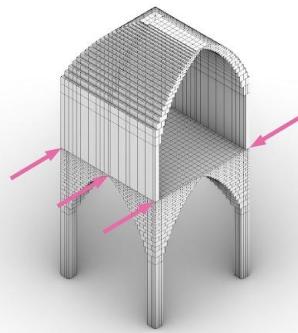


Worst case scenario is when the only column supported module have the full wall module on top.

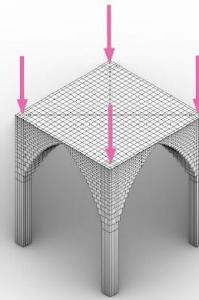
# STRUCTURAL ANALYSIS

## BUILDING THE STUDY CASE

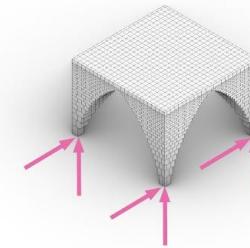
CONFIGURING > FORMING > **STRUCTURING** | 90



1.  
Replace the neighbors modules by horizontal forces.



2.  
Replace the top module with vertical loads.

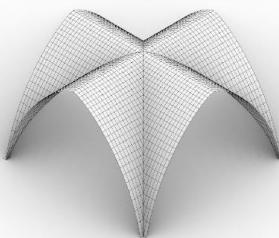


3.  
Replace the columns with supports.

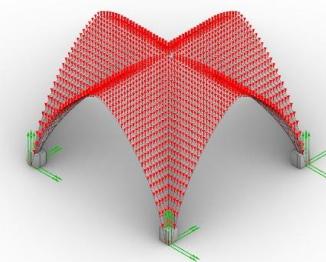
# STRUCTURAL ANALYSIS

## MESH/SHELL APPROACH

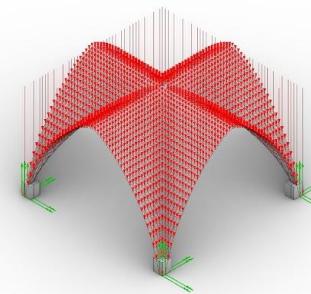
CONFIGURING > FORMING > **STRUCTURING** | 91



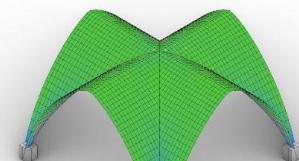
1.  
Relaxed mesh.



2.  
Homogeneous distributed  
loads: self weight,  
second floor, weight and  
living loads.



3.  
Non homogenous  
distributed loads:  
Filling weight



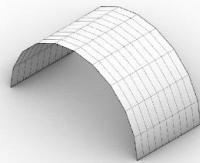
4.  
Final results.

Max. C.S: 0.19 kN/cm<sup>2</sup>  
Max. T.S: 0.02 kN/cm<sup>2</sup>  
Max. D. : 0.01 m

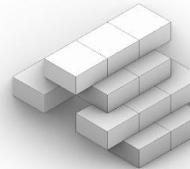
# STRUCTURAL ANALYSIS

BRICK BY BRICK APPROACH

CONFIGURING > FORMING > **STRUCTURING** | 92



1.  
Relaxed mesh.

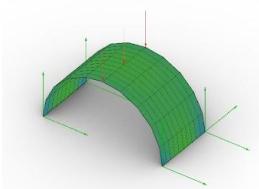
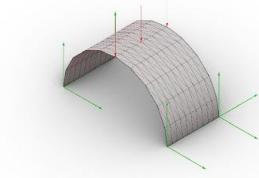


2.  
Bricks reality.

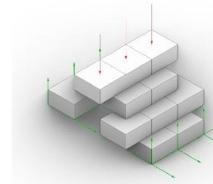
# STRUCTURAL ANALYSIS

BRICK BY BRICK APPROACH

CONFIGURING > FORMING > STRUCTURING | 93



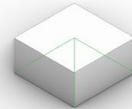
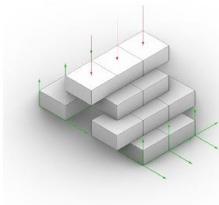
Max. C.S: 1.9 kN/cm<sup>2</sup>  
Max. T.S: 0.03 kN/cm<sup>2</sup>  
Max. D. : 0.0003 m



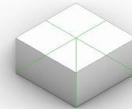
How we approach each brick?

# STRUCTURAL ANALYSIS

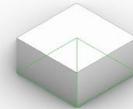
## BRICK BY BRICK APPROACH



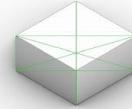
Max. C: 9.70 kN/cm<sup>2</sup>  
Max. T: 7.87 kN/cm<sup>2</sup>  
Max. D: 0.17 m  
C. S. : 8.5 cm.



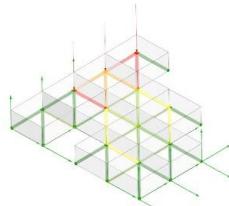
Max. C: 4.88 kN/cm<sup>2</sup>  
Max. T: 3.50 kN/cm<sup>2</sup>  
Max. D: 0.29 m  
C. S. : 6.85 cm.



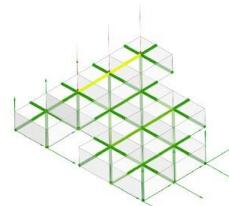
Max. C: 12.37 kN/cm<sup>2</sup>  
Max. T: 11.88 kN/cm<sup>2</sup>  
Max. D: 0.17 m  
C. S. : 6.1 cm.



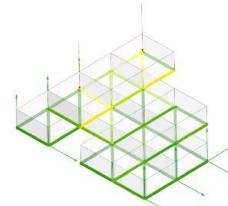
Max. C: 7.32 kN/cm<sup>2</sup>  
Max. T: 6.85 kN/cm<sup>2</sup>  
Max. D: 0.04 m  
C. S. : 4.5 cm.



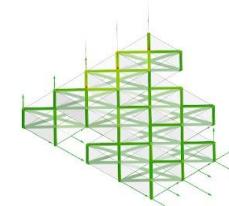
Max. C: 9.70 kN/cm<sup>2</sup>  
Max. T: 7.87 kN/cm<sup>2</sup>  
Max. D: 0.17 m  
C. S. : 8.5 cm.



Max. C: 3.14 kN/cm<sup>2</sup>  
Max. T: 2.24 kN/cm<sup>2</sup>  
Max. D: 0.29 m  
C. S. : 8.5 cm.



Max. C: 4.70 kN/cm<sup>2</sup>  
Max. T: 4.37 kN/cm<sup>2</sup>  
Max. D: 0.17 m  
C. S. : 8.5 cm.



Max. C: 1.65 kN/cm<sup>2</sup>  
Max. T: 1.15 kN/cm<sup>2</sup>  
Max. D: 0.01 m  
C. S. : 8.5 cm.

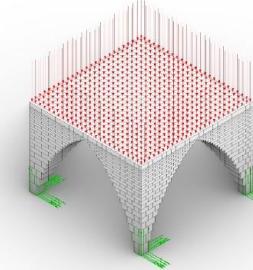
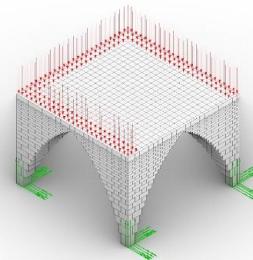
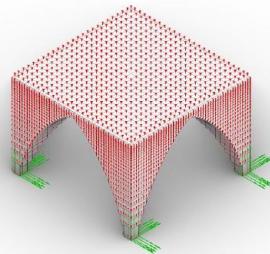
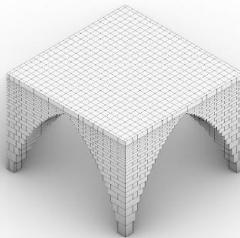
# STRUCTURAL ANALYSIS

## BRICK BY BRICK APPROACH

89 kN  
( $6.08\text{m}^3 \times 14.71 \text{ kN/m}^3$ )

17.09 kN  
( $1.2\text{m}^3 \times 14.71 \text{ kN/m}^3$ )

45 kN  
( $9\text{m}^2 \times 5 \text{ kN/m}^2$ )



1.  
Structure with all the  
bricks recognisable.

2.  
Self weight add to each  
node.

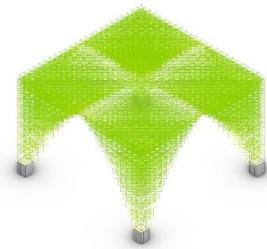
3.  
Second floor loads. Place  
on the node that have  
contact with the walls.

4.  
Live loads. Place in each  
center node of the last  
brick level.

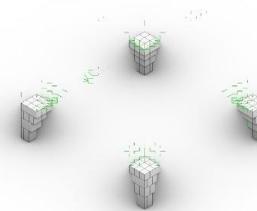
# STRUCTURAL ANALYSIS

## BRICK BY BRICK APPROACH

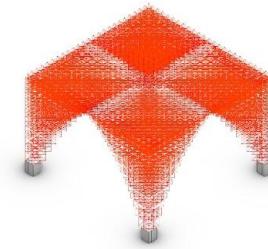
Max. C.S: 0.128 kN/cm<sup>2</sup>  
Max. T.S: 0.095 kN/cm<sup>2</sup>  
Max. D. : 0.03 m



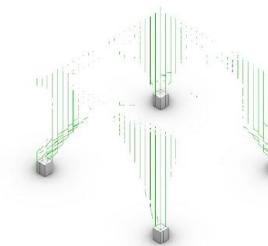
Tension stress per element



Element with tension stresses over 0.015 kN/cm<sup>2</sup>



Compression stress per element



Element with tension stresses over 0.010 kN/cm<sup>2</sup>

# CONSTRUCTION PROCESS

PARTIAL MODEL

CONFIGURING > **FORMING** > STRUCTURING | 97

# CONSTRUCTION PROCESS

PARTIAL MODEL

CONFIGURING > **FORMING** > STRUCTURING | 98



# 3.0 BAZAAR LAYOUT

VISUALISING

# FINAL PRODUCT

3D IMPRESSION | APPROACH TO LOCAL STREET

| 100



# FINAL PRODUCT

3D IMPRESSION | MEDIUM STREET

| 101



# FINAL PRODUCT

3D IMPRESSION - WALK PATH 2ND FLOOR

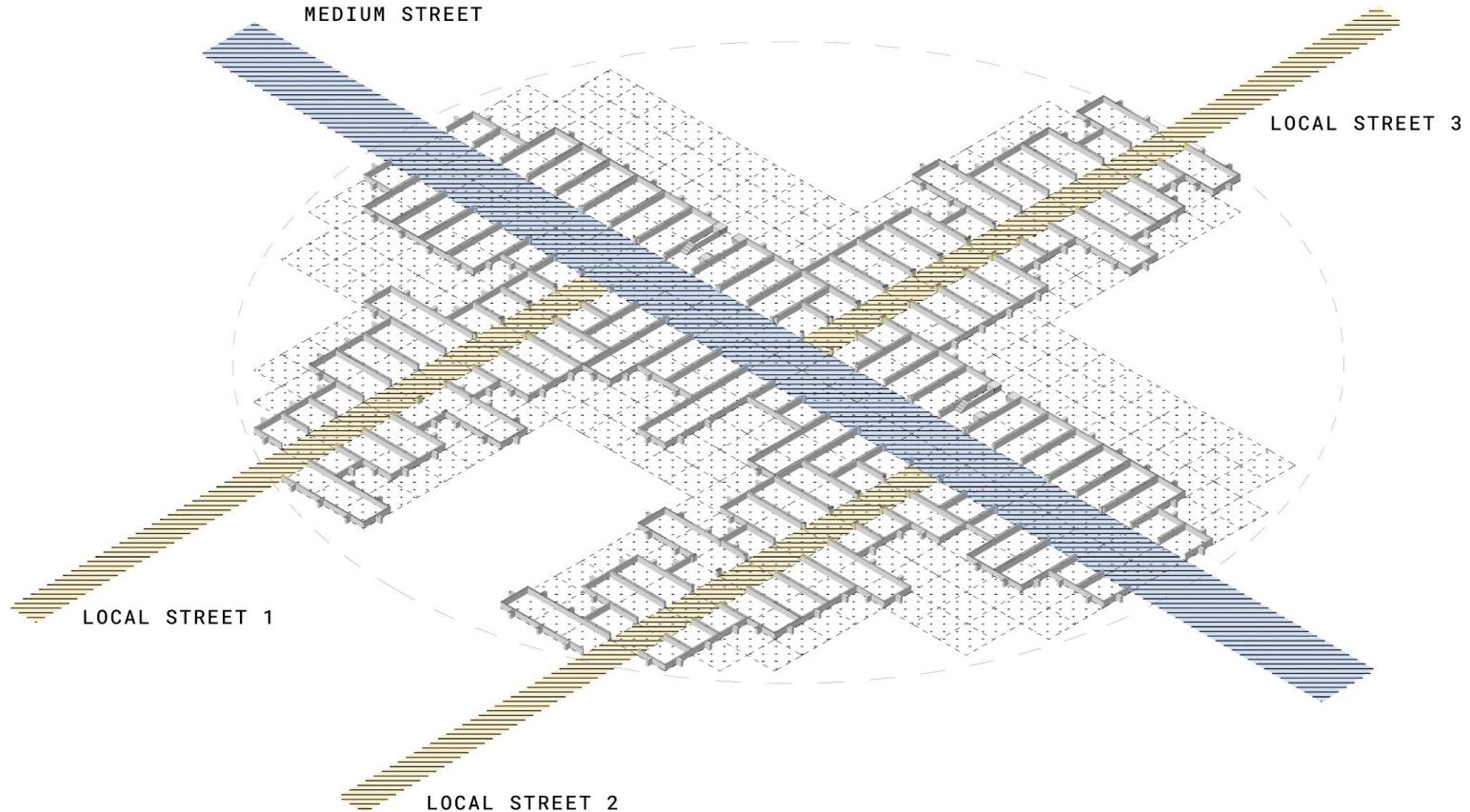
| 102



# BAZAAR LAYOUT

## AXONOMETRIC BREAKDOWN

| 103



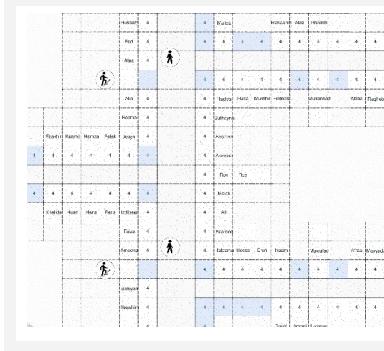
## **4.0 REFLECTING BACK**

TO BE FURTHER ELABORATED

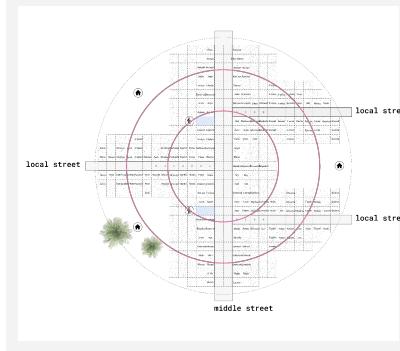
# REFLECTING BACK

TOPICS TO BE FURTHER ELABORATED

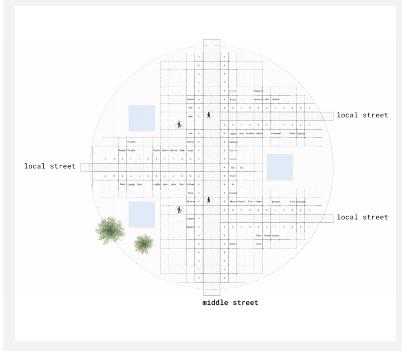
| 105



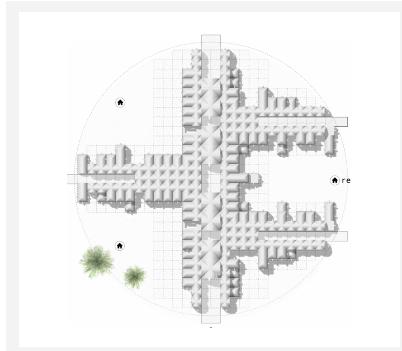
EXCEPTIONS : WALKABLE SHOP MODULES ON THE CORNERS



REPEATING STAIRCASES EVERY #... NODES



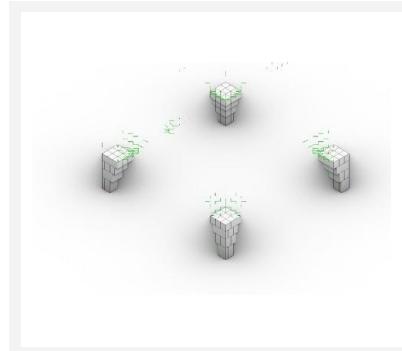
GENERATION OF COURTYARDS OUT OF THE BAZAAR



DIVERSITY IN CONFIGURATION OF SPACES



MORE REALISTIC STUDY ABOUT THE USE OF FRAMEWORKS.



VALIDATE THE BRICK ABSTRACTION AND ELEMENTS CROSS SECTIONS



**THANK YOU FOR YOUR ATTENTION !**

ANY QUESTIONS ?