# Space Modeler User Guide Space modeling workflow

May 3, 2023



## 1. Select project

#### Project selection criteria

Project sources

Check 'Map' web app

Check 'Project selection' sheet

- 2. Collect project meta data
- 3. Document project
- 4. Interpret floor plan
- 5. Prepare input layout

- 6. Generate space model
- 7. Analyze space model

#### Multi-unit apartment building

#### Not a duplicate

- Models of the project are not included in the Space Patterns database (<u>http://spacepatterns.com/sp/map/html/viewer.html</u>)
- Selected for modeling but not yet in the database (see next pages)

#### Meta data

- Location
  - Geocoordinates (mandatory)
  - Any continent/region (increasing location diversity in the database is desirable)
- Architect(s)
  - Known or anonymous
- Year of design or construction
  - Contemporary or historical
  - Exact year or estimate

## Project selection criteria

## **Floor plans**

- Known scale (mandatory)
- Vector drawings (optional)
- Single floor
  - Regular floor preferred over ground or roof floor
- Multiple floors of the same building may be modeled

#### **Apartment units**

- Standard or non-standard
  - Do not need to be geometrically complex
  - Do not need to have exceptional features
- No multi-level units
  - No split-level units
  - No multi-storey (maisonette) units

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## Project sources

#### Accessible from TU Wien network

**Detail Inspiration** 

https://inspiration.detail.de/



## **Project sources**

#### Accessible from TU Wien network

#### **Building Types Online**

#### http://www.degruyter.com/view/db/bdt



(Deutsch)

Accessible from TU Wien network

O. Heckmann, F. Schneider, E. Zapel, "Grundrissatlas Wohnungsbau", Walter De Gruyter, Basel/Berlin/Boston, 2018

https://catalogplus.tuwien.at/permalink/f/8j3js/UTW\_alma2159207540003336

F. Schneider, O. Heckmann, "Grundrissatlas Wohnungsbau", Birkhäuser, Basel, 2011 https://catalogplus.tuwien.at/permalink/f/8j3js/UTW\_alma5169913310003336

D. Mehlhorn, "Grundrissatlas Wohnungsbau Spezial: Lösungen und Projektbeispiele für schwierige Grundstücke, besondere Lagen; Erweiterung, Umnutzung, Aufstockung", Bauwerk, Berlin, 2009

https://permalink.catalogplus.tuwien.at/AC06842277

V. Hernandez, "Collective Housing Atlas" (online) https://collectivehousingatlas.net

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# Check 'Map' web app ( http://spacepatterns.com/sp/map/html/viewer.html )



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# 'Project selection' sheet

https://docs.google.com/spreadsheets/d/1GYVvuVEu8iiZFJpCRt538gJv78Mmb3urCo2jRMGXG4o/edit

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## Check OpenStreetMap link



**1.** Select project

#### 2. Collect project meta data

- 1. Architect, Year, Location/Country
- 2. OpenStreetMap link
- 3. Document project
- 4. Interpret floor plan
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- 6. Generate space model

#### 7. Analyze space model

## Architect, Year, Location/Country

## Useful to

- find floor plans
- find project description
- access project documentation (if available)

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## Architect

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## Year

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404		PS18	Philippe	Samyn	Kortrijk	20.8 Belgium	50.83	3.27	https://www.openstreetmap.org/w	ay/737584589			
405		AN18		ANA	Amsterdam	20.8 Netherlands	52.35	4.84	https://www.openstreetmap.org/w	ay/534901350			0
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411		NI16		NIU	Palma de Mallor	20 6 Spain	39.59	2.65	https://www.openstreetmap.org/w	av/91864756			+
412		BC17		Barclav+Crousse	Miraflores	20.7 Peru	-12.11	-77.05	https://www.openstreetmap.org/w	av/290776855#ma	p=16/-12.1074	/-77.043	1
413		3LH18a		3LHD	Zagreb	20.8 Croatia	45.81	16.00	https://www.openstreetmap.org/w	ay/616926370			
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416		GSP20a		GSP	Munich	2020 Germany	48.16	11.63	https://www.openstreetmap.org/w	ay/685222775			
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**1.** Select project

#### 2. Collect project meta data

- 1. Architect, Year, Location/Country
- 2. OpenStreetMap link
- 3. Document project
- 4. Interpret floor plan
- 5. Prepare input layout
- 6. Generate space model

#### 7. Analyze space model

## OpenStreetMap

#### Main source for location data

- Determine position and orientation of a building from geographic features in OpenStreetMap
- Alternative: use Google Maps if project cannot be accurately located in OpenStreetMap

Location data support floor plan interpretation in

- Google Maps
- Google Street View
- OpenStreetMap



## OpenStreetMap ( www.OpenStreetMap.org )



## Enter street name



## Query features



## Query features



## Select feature



## OpenStreetMap link



# OpenStreetMap link

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## Issue: Building does not have 'way' feature



## Solution: Google Maps ( https://www.google.com/maps )



## Solution: Google Maps ( https://www.google.com/maps )



# Solution: Latitude/Longitude

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## Solution: OpenStreetMap



# Solution: OpenStreetMap

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400		AG09		Aguilera Guerrero	Tarragona	2009	Spain	41.16	1.24	https://www.openstreetmap.org/way/91300449#map=18/41.15769/1.23896				
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- **1.** Select project
- 2. Collect project meta data

## 3. Document project

- 4. Interpret floor plan
- 5. Prepare input layout
- 6. Generate space model
- 7. Analyze space model
## **Project documentation**

### **Included information**

- Building type
  - Housing: public housing, subsidized housing, housing for people with special needs, ...
  - Public: library, hospital, museum, kindergarden, school, university, ...
  - Commercial: office, retail, hospitality, ...
  - Industrial: manufacturing, distribution, data center, ...
  - ...
- Design idea/intent
- Construction methods
- Site/context
- Floor plan
- Sections, elevations (if available)

### Project documentation: Example





### Project documentation: Example

#### Sheltered Public Housing "Torre Julia" for Senior Citizens in Barcelona

architects: Pau Vidal Sergi Pons Ricard Galiana

year: 2011

location: north-east of Barcelona

type: sheltered public housing for seniors

size: 77 units 40–45 m² (1–2 people)

construction method: corrugated and expanded metal elements, two storey glazed corners oft he communal spaces without columns, east and west facades > designed as load-bearing cross-walls with window and door openings

2.10m central corridor

Dwellings are tailored to the needs of senior citizens lives

17-storey building

Roof terrace

for optimum east-west orientation > tower was turned by 45° from the grid

to generate a sense of identity > storeys are divided into three groups (colours)

sections > two-storey communal space and laundry room

Staircases are situated directly next to the facades

Graphic directional system

Outer appearance > communal spaces, staircases, colours of dwelling groups











- **1.** Select project
- 2. Collect project meta data
- 3. Document project

### 4. Interpret floor plan

Space

Internal/external spaces

Living room/Hallway

Living room/Kitchen

Loggia

Balcony

Terrace

Atrium

Space with rooflight

Non-residential space

- 4. Prepare input layout
- 5. Generate space model
- 6. Analyze space model

## Internal/external spaces



Space Modeler User Guide – Space modeling workflow

- **1.** Select project
- 2. Collect project meta data
- 3. Document project

### 4. Interpret floor plan

#### Space

Internal/external spaces

#### Living room/Hallway

Living room/Kitchen

Loggia

Balcony

Terrace

Atrium

Space with rooflight

Non-residential space

- 4. Prepare input layout
- 5. Generate space model
- 6. Analyze space model

# Living room/Hallway: Closed



## Living room/Hallway: Semi-Open



# Living room/Hallway: Semi-Open



# Living room/Hallway: Open



# Living room/Hallway: Open



# Living room/Hallway: Open



- **1.** Select project
- 2. Collect project meta data
- 3. Document project

#### 4. Interpret floor plan

#### Space

Internal/external spaces

Living room/Hallway

#### Living room/Kitchen

Loggia

Balcony

Terrace

Atrium

Space with rooflight

Non-residential space

- 4. Prepare input layout
- 5. Generate space model
- 6. Analyze space model

## Living room/Kitchen: Closed access



## Living room/Kitchen: Semi-open access



## Living room/Kitchen: Semi-open access



# Living room/Kitchen: **Open access**



- **1.** Select project
- 2. Collect project meta data
- 3. Document project

### 4. Interpret floor plan

#### Space

Internal/external spaces

Living room/Hallway

Living room/Kitchen

#### Loggia

Balcony

Terrace

Atrium

Space with rooflight

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- 4. Prepare input layout
- 5. Generate space model
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## Loggia

### External space

Located in front of an apartment's internal spaces

Completely or partially cuts into the building

 Balcony: projects from building enclosure

Delimited by lateral walls, a floor, a ceiling

Adapted from MA 25, 2013





- **1.** Select project
- 2. Collect project meta data
- 3. Document project

#### 4. Interpret floor plan

#### Space

- Internal/external spaces
- Living room/Hallway
- Living room/Kitchen

Loggia

#### Balcony

Terrace

Atrium

Space with rooflight

- Non-residential space
- Space Modeler User Guide Space modeling workflow

- 4. Prepare input layout
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## Balcony

## External space element

• Not a space

## Projects from building enclosure



# Balcony









Balcony







- **1.** Select project
- 2. Collect project meta data
- 3. Document project

#### 4. Interpret floor plan

#### Space

- Internal/external spaces
- Living room/Hallway
- Living room/Kitchen

Loggia

Balcony

#### Terrace

Atrium

Space with rooflight

- Non-residential space
- Space Modeler User Guide Space modeling workflow

- 4. Prepare input layout
- 5. Generate space model
- 6. Analyze space model

## Terrace

External space

Open to the sky



## Terrace



- **1.** Select project
- 2. Collect project meta data
- 3. Document project

#### 4. Interpret floor plan

#### Space

- Internal/external spaces
- Living room/Hallway
- Living room/Kitchen

Loggia

Balcony

Terrace

#### Atrium

Space with rooflight

- 4. Prepare input layout
- 5. Generate space model
- 6. Analyze space model

Atrium

Internal central space

## Glazed roof



## Atrium



- **1.** Select project
- 2. Collect project meta data
- 3. Document project

### 4. Interpret floor plan

#### Space

- Internal/external spaces
- Living room/Hallway
- Living room/Kitchen

Loggia

Balcony

Terrace

Atrium

#### Space with rooflight

Non-residential space

- 4. Prepare input layout
- 5. Generate space model
- 6. Analyze space model
# Space with rooflight

## Rooflight

- Window or glazed panel in roof
- Horizontal or sloped

# Examples

- Atrium
- Stairway
- Bathroom on top floor







- **1.** Select project
- 2. Collect project meta data
- 3. Document project

### 4. Interpret floor plan

#### Space

- Internal/external spaces
- Living room/Hallway
- Living room/Kitchen
- Loggia
- Balcony
- Terrace
- Atrium
- Space with rooflight

#### Non-residential space

Space Modeler User Guide – Space modeling workflow

- 4. Prepare input layout
- 5. Generate space model
- 6. Analyze space model

# Non-residential space



# Non-residential space



- **1.** Select project
- 2. Collect project meta data
- 3. Document project

### 4. Interpret floor plan

Space

#### Space element

Door/Opening

Window

Horizontal external element

- 4. Prepare input layout
- 5. Generate space model
- 6. Analyze space model

# Door/Opening



- **1.** Select project
- 2. Collect project meta data
- 3. Document project

### 4. Interpret floor plan

Space

#### Space element

Door/Opening

#### Window

Horizontal external element

- 4. Prepare input layout
- 5. Generate space model
- 6. Analyze space model

# Window





- **1.** Select project
- 2. Collect project meta data
- 3. Document project

### 4. Interpret floor plan

Space

#### Space element

Door/Opening

Window

Horizontal external element

- 4. Prepare input layout
- 5. Generate space model
- 6. Analyze space model





# Floor plan interpretation: Example



- **1.** Select project
- 2. Collect project meta data
- 3. Document project
- 4. Interpret floor plan
- 5. Prepare input layout
- 6. Generate space model
- 7. Analyze space model

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