

Science Fund of the Republic of Serbia

Program: PRISMA

Future Heritage of Spa Settlements: Digital Platform for Advancing Knowledge and Innovation in Urban Morphology Approach for Environmentally-Sensitive Development in Serbia

Project Reference: 7408



Conference Presentation

The 31st Conference of the International Seminar on Urban Form

Prompting Urban Morphology: Testing the Application of Artificial Intelligence in Decoding Urban Patterns of Spa Settlements

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Disclaimer:

This document is realized with the financial support of Science Fund of the Republic of Serbia.



RESEARCH CONTEXT

SPATTERN Project

FUTURE HERITAGE OF SPA SETTLEMENTS

Digital Platform for Advancing Knowledge and Innovation in Urban Morphology Approach for Environmentally-Sensitive Development in Serbia

Funded by Science Fund of the Republic of Serbia
2023-2026

Indicators

38

Spa Settlements

11

Researchers

3

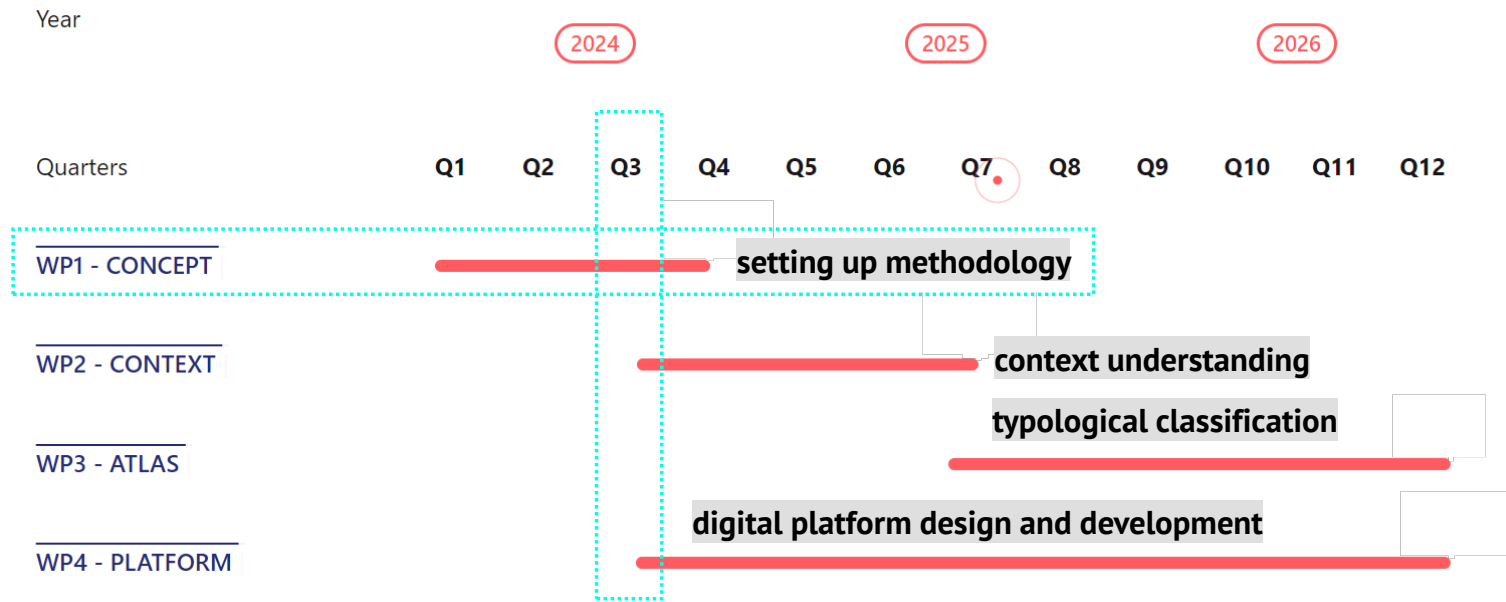
SROs

6

Work Packages

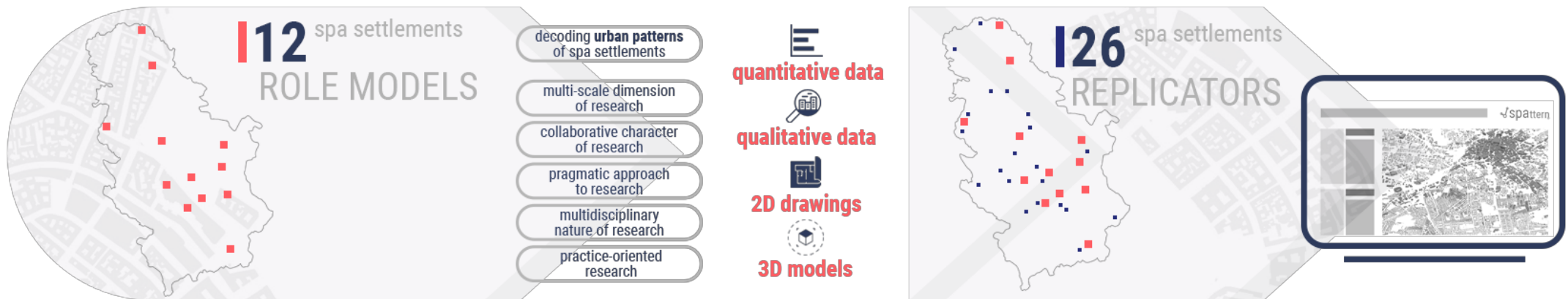
18+

Deliverables



RESEARCH STRATEGY

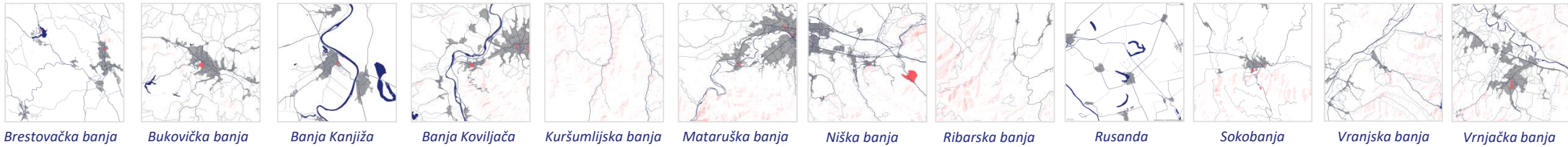
SPATTERN Project



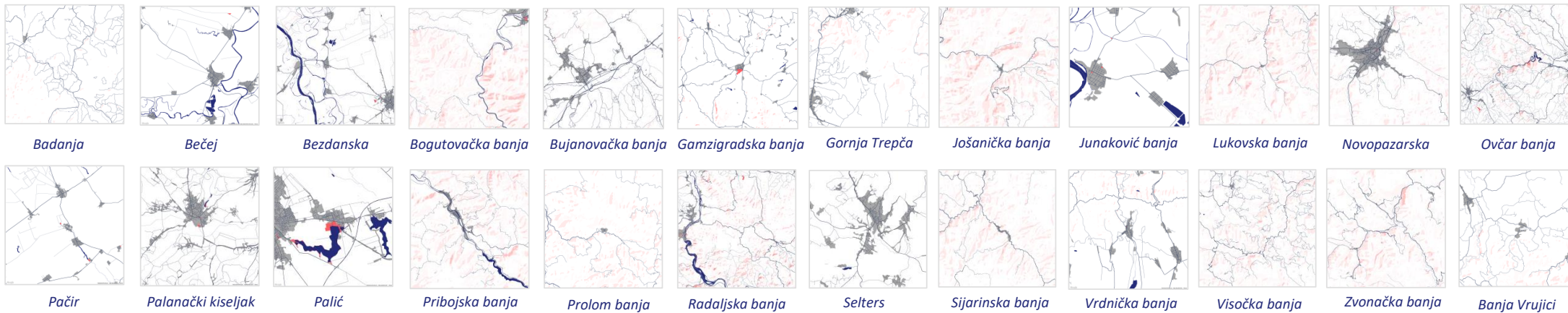
OBSERVATORY FRAMEWORK

38 spa settlements in Serbia

Role Models

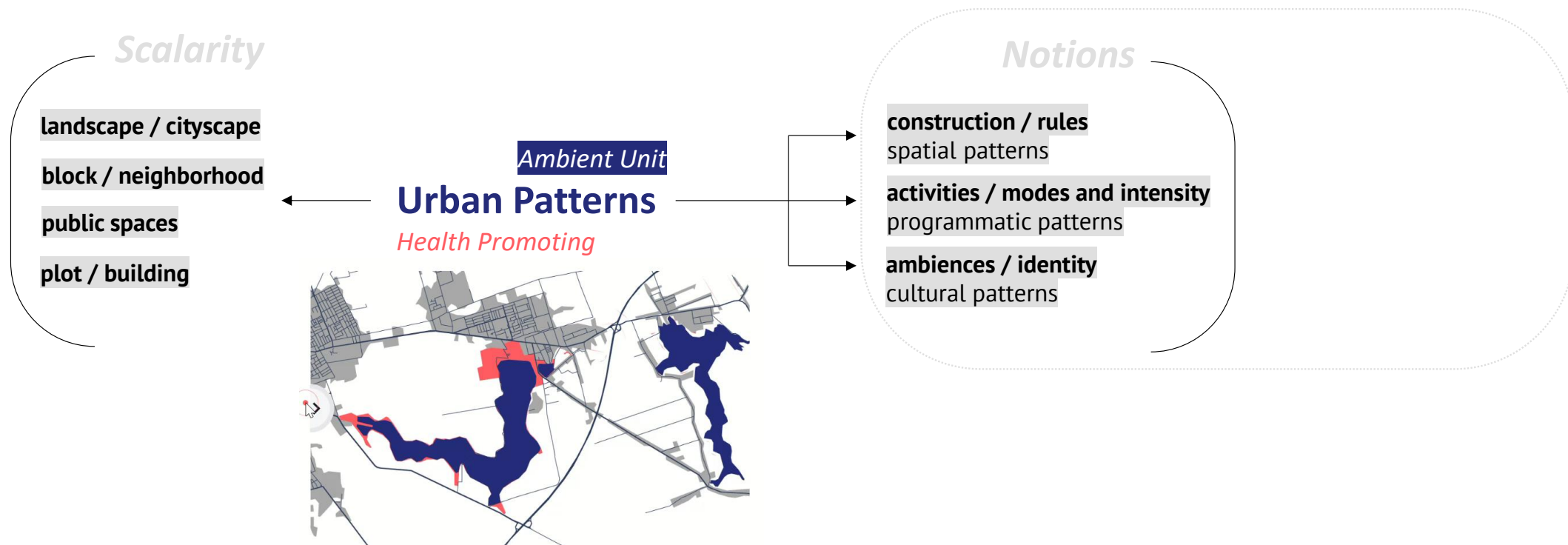


Replicators



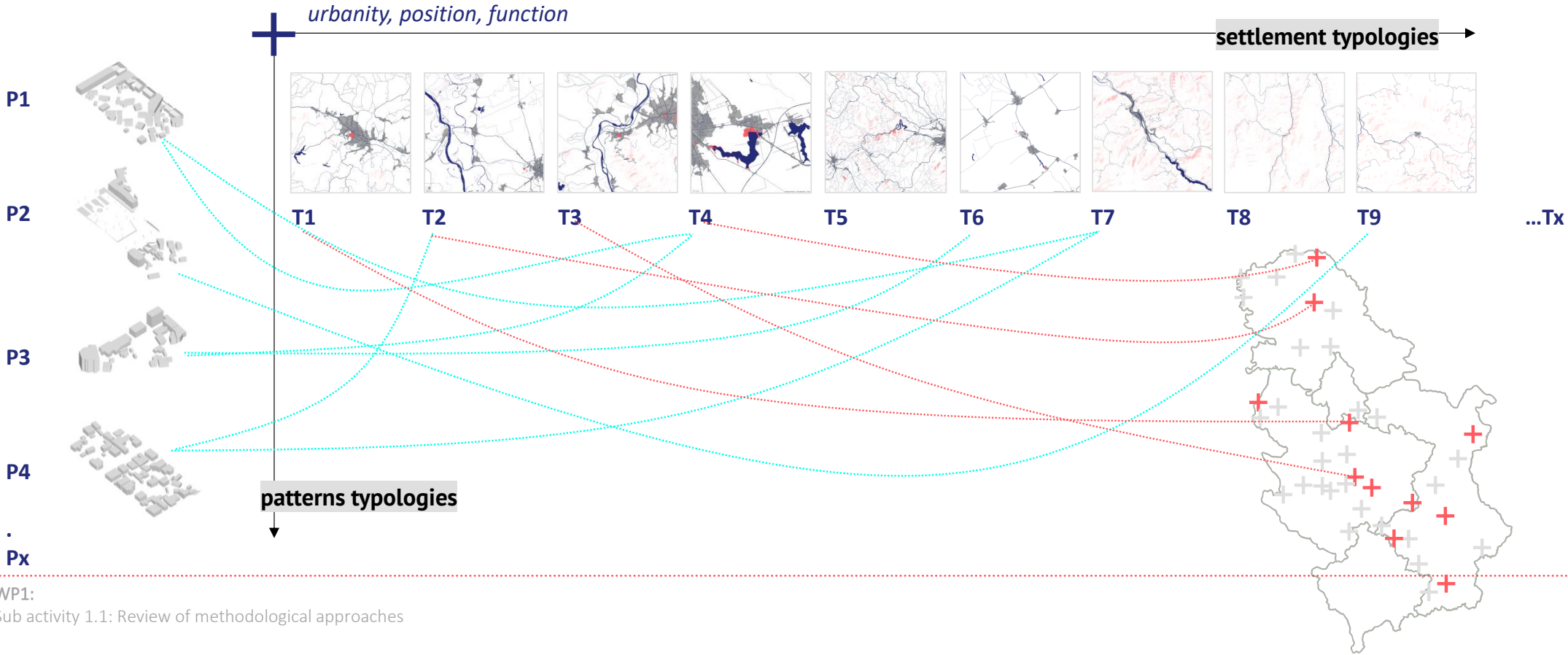
MAPPING URBAN PATTERNS

Multiscale Approach



DEVELOPMENT STRATEGY

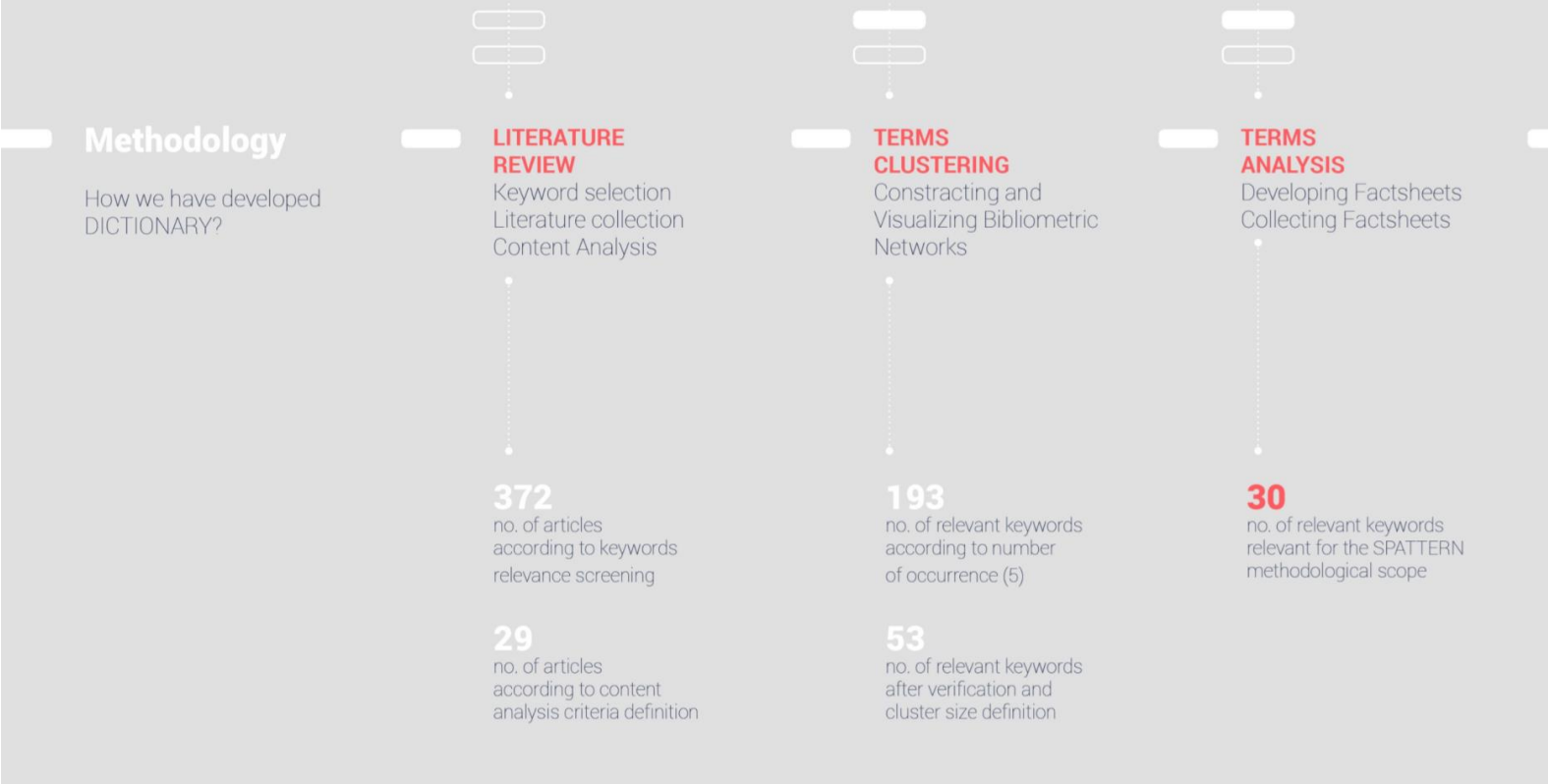
Platform Scope



PAPER CHALLENGE AND MOTIVATION

Derived from SPATTERN Project

D1.1: Review of Methodological Approaches



PAPER CHALLENGE AND MOTIVATION

Derived from SPATTERN Project

D1.1: Review of Methodological Approaches



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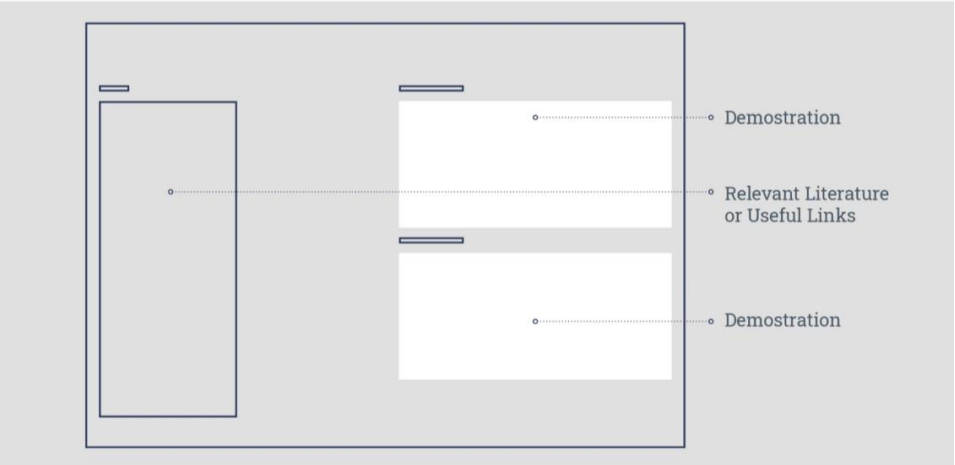
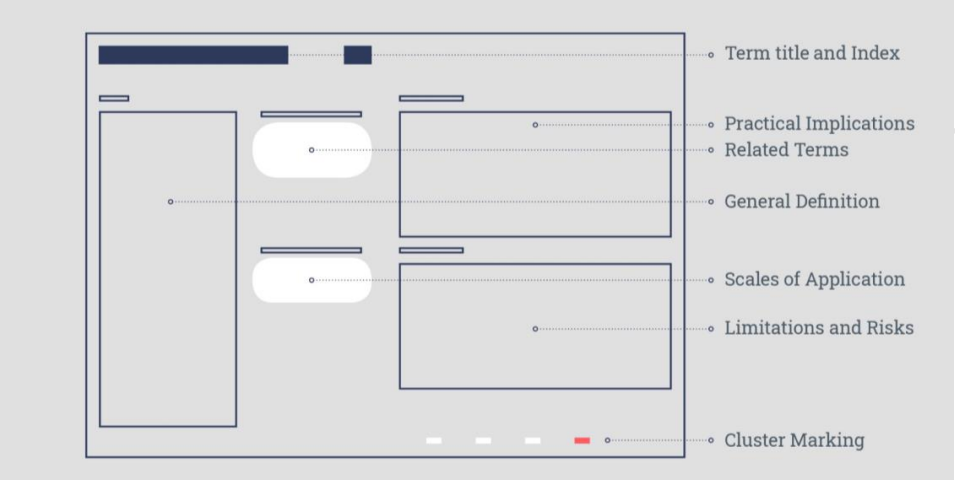
Prompting Urban Morphology: Testing the Application of Artificial Intelligence in Decoding Urban Patterns of Spa Settlements

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PAPER CHALLENGE AND MOTIVATION

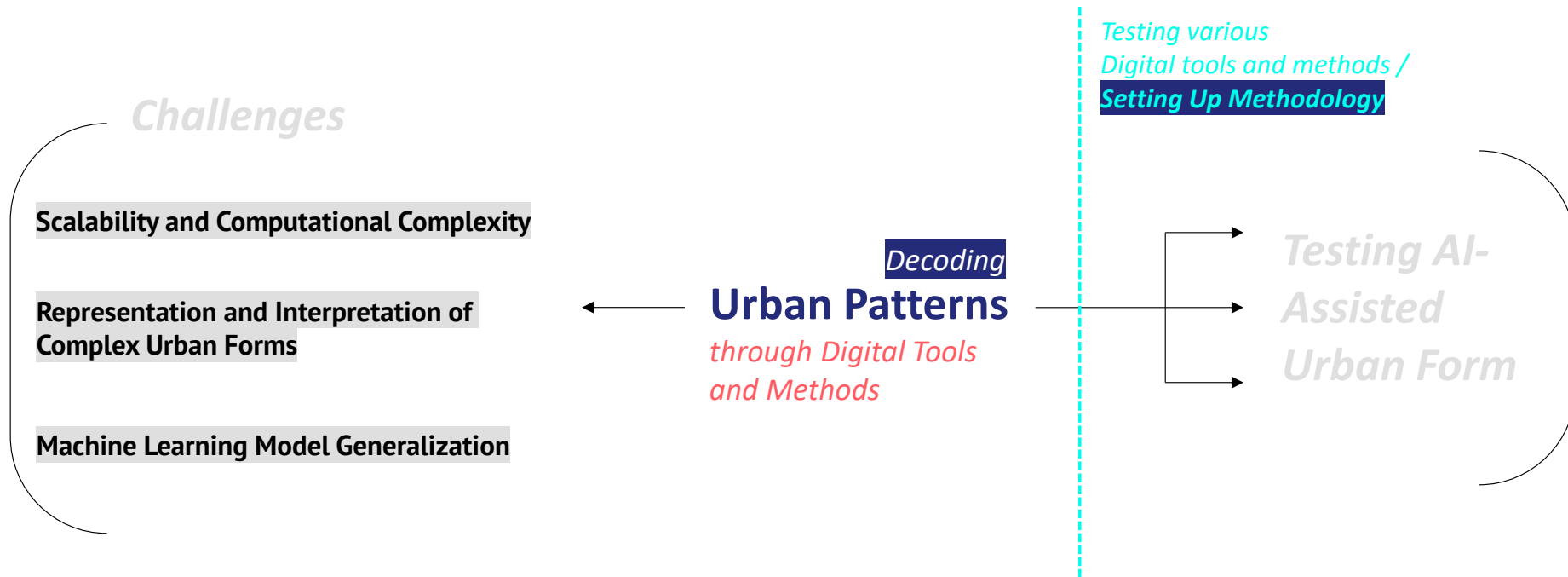
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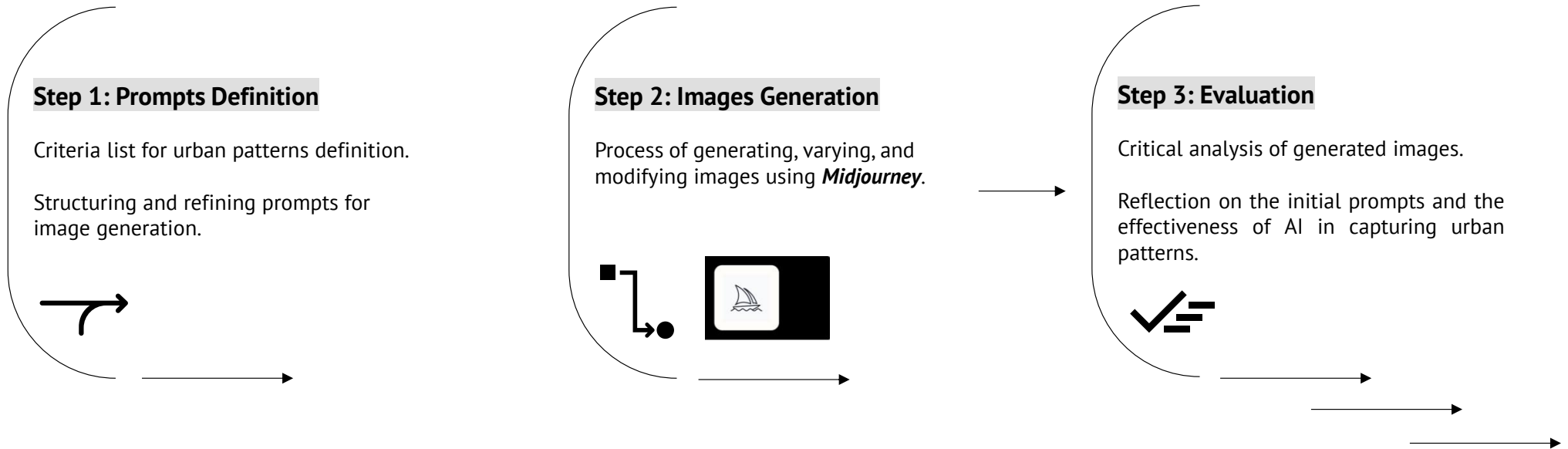
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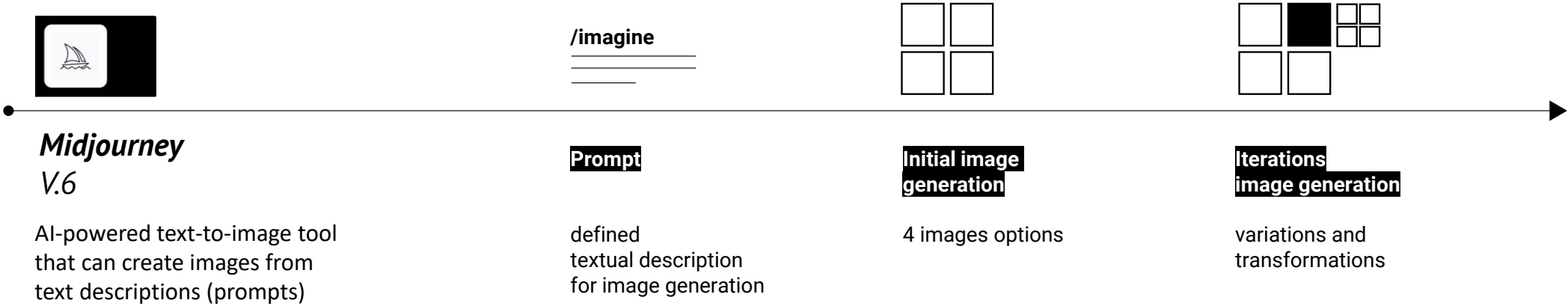
PAPER DESIGN

Testing Steps



PAPER DESIGN

Testing Steps



PAPER DESIGN

Testing Steps

Step 1: Prompts Definition

Criteria list for urban patterns definition.

Structuring and refining prompts for image generation.



PROMPT GENERAL STRUCTURE

General Morphological Characteristics

Position / Shape / Size / Function / Cultural Identity

Typologies

Building Type / Street Type / Settlement Type

Pattern Definition (Relations)

Growing Pattern / Transformation Pattern

Visualization

Drawing Type (Representation) / Scope (Framework)

Spa Features

Spa Settlement (fixed term) / Health Promoting features

PAPER DESIGN

Testing Steps

Step 1: Prompts Definition

Criteria list for urban patterns definition.

Structuring and refining prompts for image generation.



CRITERIA LIST

Screening **ISUF Glossary** and classifying of the terms within prompt general definition structure + general morphological features derived from **Đokić, V. (2004). *Urban morphology: City and city square*. University of Belgrade – Faculty of Architecture.**

GENERAL MORPHOLOGICAL CHARACTERISTICS

Position

Position of the city in relation to a water area or a river

city by the river, city by the bay, peninsula city, island city, city surrounded by canals

Position of the city in relation to the topography of the terrain

bay city, linear ridge city, hilltop city, hillside city, **plain city**

Shape

compact, linear, orthogonal, radial, annular, axial, circular

Size

elaboration

Function

ecclesiastical city, city-state, naval power, imperial city, ideal city, residential city, capital city, commercial city, industrial city, spa city, university city, garden city, colonial city, holy city

Cultural Identity

Absolutist period, Anglo-Scandinavian, Art Deco, Art Nouveau, Baroque, Classical, Edwardian, Georgian, Gothic, Historicism, International style, Jugendstil, Mannerist, Mivve, Modern, Neo-Classical, Neo-Georgian, Neo-Gothic, Neo-Tudor, Post-Modern, Prairie, Regency, Tudor, Vernacular, Victorian,

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TYOLOGIES

Building Type

Arcade, Apartment block, Atrium, Back-to-back, Basic type, Blind-back, Block housing, Bungalow, Burgage, Brgerhaus, Castle, Central business district (CBD), Court housing, Department store, Detached house, Flatted terrace, Klosterhfe, Mall, Mansard roof, Mietshuser, Motte and bailey, Ornamental villa, Residenz, Semi-detached house, Skyscraper, Sozialwohnungen, Steel-frame building, Superstore, Tenement, Terrace, Timber-framed building, Town house, Tunnel-back dwellings, Villa,

Street Type

Avenue, Back lane/access, Boulevard, Break-through street, Consequent streets, Cul-de-sac, High street, Main street, Major traffic street, Mall, Occupation road, Residential street, Ringstrasse, Ring road,

Settlement Type

Burgh, Burh, Colonial town, Company suburb town, Doppelstadt, Exultantenstdte, Garden city, Market town, Metroland, New town, Neustadt, Proto-urban – proto-town, Rechstadt, Residenzstadt, Roman town, Suburbia, Villae mercatoriae, Vorstadt

PAPER DESIGN

Testing Steps

CRITERIA LIST

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Step 1: Prompts Definition

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PATTERN DEFINITION (REALTIONS)

Growing Pattern

Accretion, Additive processes, Agricultural residual, Dispersed urban development, Fringe belt, Green belt, Integument, Plat, Residential accretion, Ribbon development, Suburb/suburban, Urban-rural fringe,

Transformation Pattern

Adaptive redevelopment, Architectural incongruence, Augmentative redevelopment, Building adaptation, Building replacement, Complementary building development, Derivative plot, Encroachment, Extension, Infill, Major rebuilding, Mediation, Metamorphic plot pattern, Orthomorphic plot pattern, Plot amalgamation, Replat, Subdivision, Tandem development, Urban conservation,

PAPER DESIGN

Testing Steps

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VISUALIZATION

Drawing Type (Representation)

Figure-Ground Diagrams, Street Network Diagrams, Block and Lot Layouts, Building Typology Maps, Urban Tissue Maps, Land Use Maps, Historical Morphological Evolution Maps, Topographic and Elevation Drawings, Axonometric and Isometric Views, Urban Density Maps, Building Height Diagrams, Transect Drawings, Permeability and Accessibility Maps, Public Space and Green Space Maps, Viewshed and Sightline Analyses

Scope (Framework)

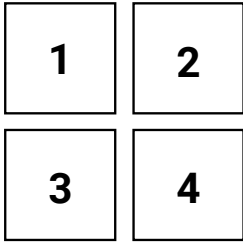
City Center (CBD), District/Neighbourhood Scale, Periphery/Suburban Areas, Urban Block, Street-Level Morphology, Building Typology, Waterfront and Edge Conditions, Historic Core and Heritage Districts, Public Space Networks, Transportation Corridors, Green Infrastructure and Ecological Corridors, Industrial and Commercial Zones, Urban-Rural Interface, Residential Enclaves and Housing Estates, Civic and Cultural Precincts, Transit-Oriented Development (TOD), Growth and Expansion Areas, Axial Maps and Connectivity Networks, Urban Fabric and Street Grid, Civic Nodes and Major Landmarks

PAPER DESIGN

Demonstration – Images Generation

Step 2: Images Generation

Process of generating, varying, and modifying images using *Midjourney*.



U1 U2 U3 U4 ⇔
V1 V2 V3 V4

U – Image selection
V – Image Variation
⇔ – New grid of images with same prompt

TEST PROMPT 01



Spa Features

/Imagine

Spa settlement, central green urban park, thermal springs

General Morphological Characteristics

city by the river, linear ridge city,

Typologies

detached buildings, pedestrian promenade,

Pattern Definition (Relations)

urban-rural fringe, plot amalgamation,

Visualization

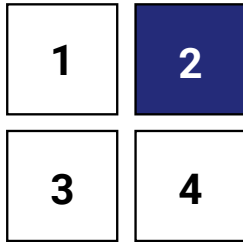
urban tissue map, black and white with contrast, urban fabric and street grid

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General Morphological Characteristics

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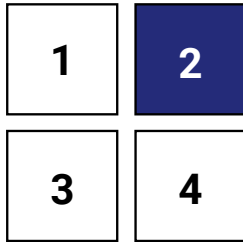
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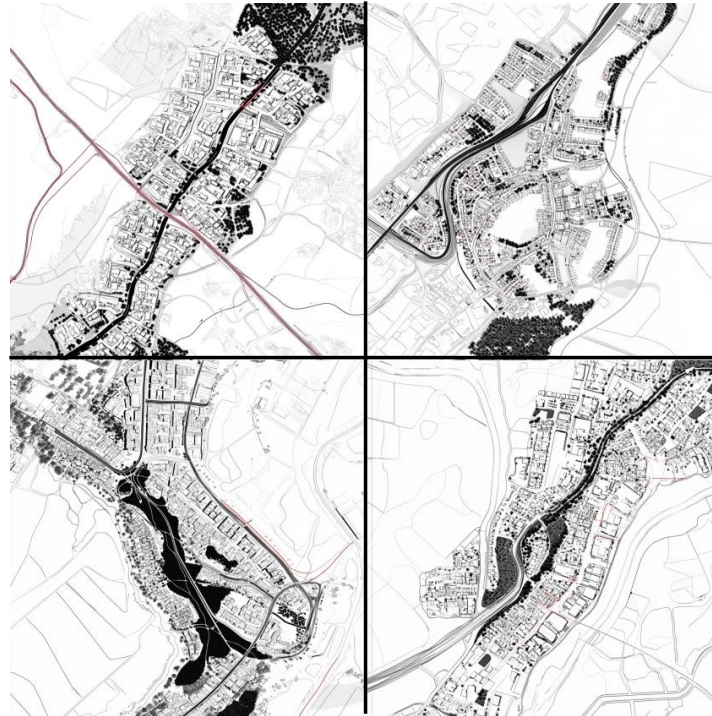
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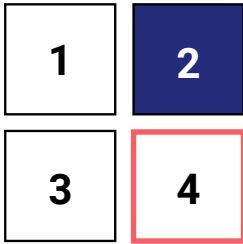
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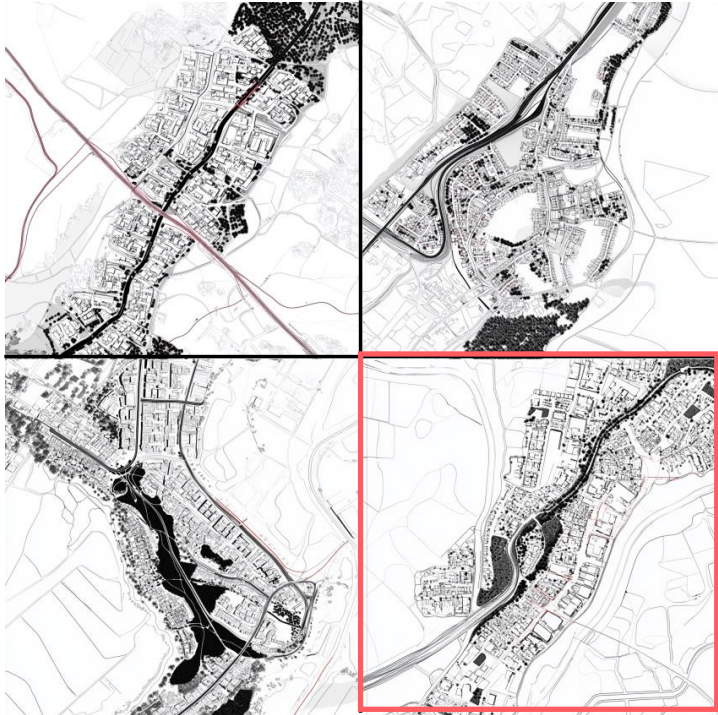
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Spa Features

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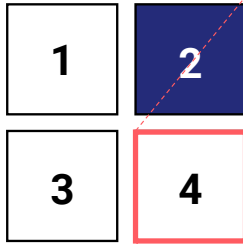
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Visualization

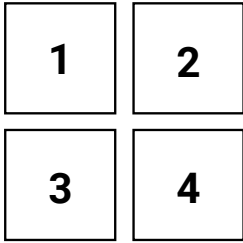
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Demonstration – Images Generation

Step 2: Images Generation

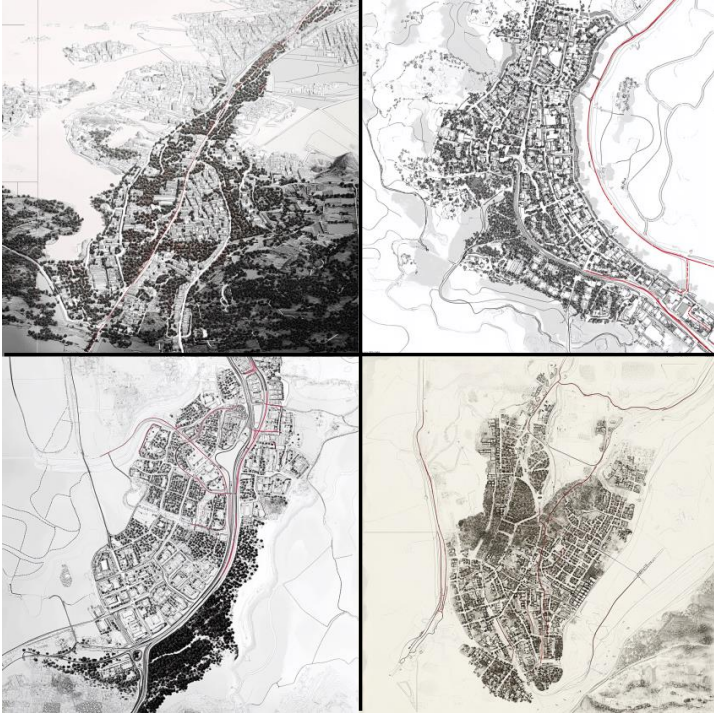
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TEST PROMPT 02



Spa Features

General Morphological Characteristics

Typologies

Pattern Definition (Relations)

Visualization

/Imagine

Spa settlement,
Healing gardens,
manicured parks

city by the lake,
hilltop city,
compact city

detached buildings,
Consequent streets,

green belt,
derivative plot,

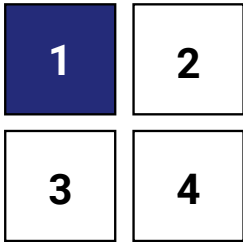
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Demonstration – Images Generation

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TEST PROMPT 02



Spa Features

General Morphological Characteristics

Typologies

Pattern Definition (Relations)

Visualization

/Imagine

Spa settlement, Healing gardens, manicured parks

city by the lake, hilltop city, compact city

detached buildings, Consequent streets,

green belt, derivative plot,

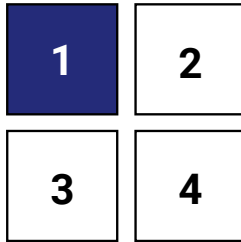
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Demonstration – Images Generation

Step 2: Images Generation

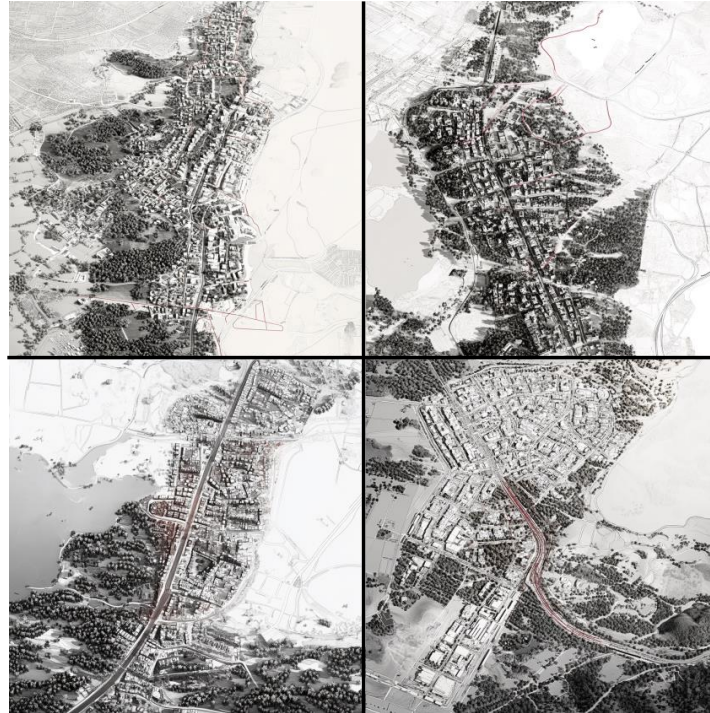
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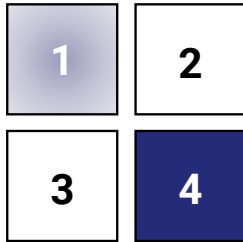
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Demonstration – Images Generation

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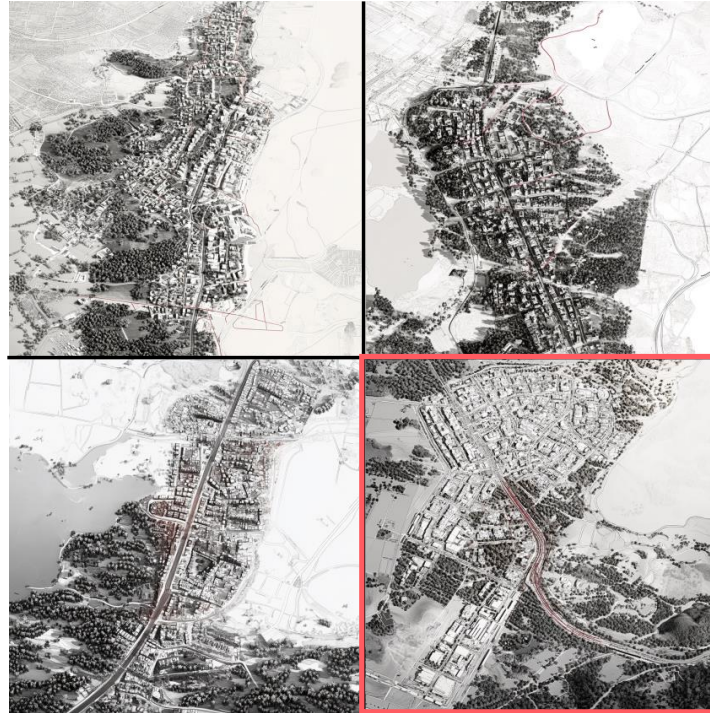
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TEST PROMPT 02



Spa Features

General Morphological Characteristics

Typologies

Pattern Definition (Relations)

Visualization

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manicured parks

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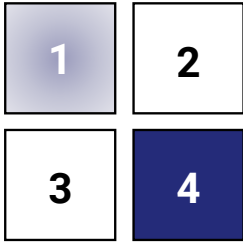
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Demonstration – Images Generation

Step 2: Images Generation

Process of generating, varying, and modifying images using *Midjourney*.



U1 U2 U3 U4 ⇌
 V1 V2 V3 **V4**

U – Image selection
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TEST PROMPT 02



Spa Features

/Imagine

Spa settlement,
 Healing gardens,
 manicured parks

General Morphological Characteristics

city by the lake,
 hilltop city,
 compact city

Typologies

detached buildings,
 Consequent streets,

Pattern Definition (Relations)

green belt,
 derivative plot,

Visualization

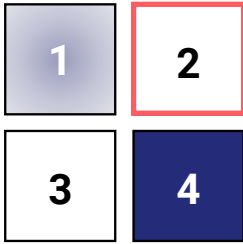
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TEST PROMPT 02



Spa Features

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Spa settlement,
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General Morphological Characteristics

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 Consequent streets,

Pattern Definition (Relations)

green belt,
 derivative plot,

Visualization

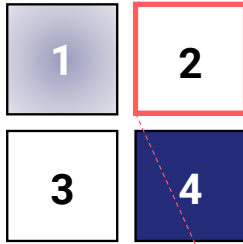
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U1 **U2** U3 U4 ⇌
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Spa Features

/Imagine

Spa settlement,
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 manicured parks

General Morphological Characteristics

city by the lake,
 hilltop city,
 compact city

Typologies

detached buildings,
 Consequent streets,

Pattern Definition (Relations)

green belt,
 derivative plot,

Visualization

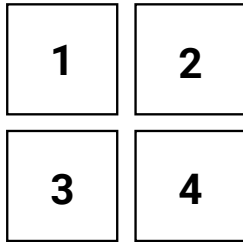
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Demonstration – Images Generation

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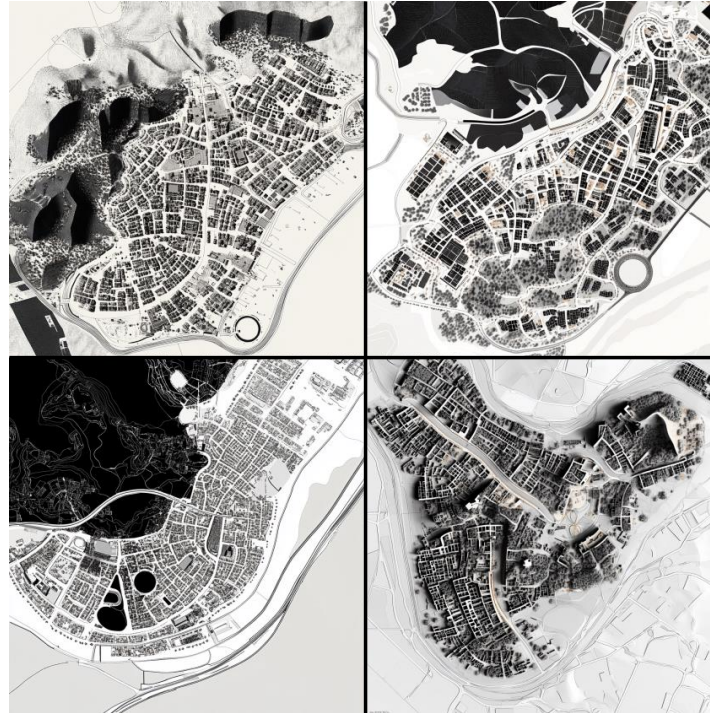
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U1 U2 U3 U4 ⇌
V1 V2 V3 V4

U – Image selection
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TEST PROMPT 03



Spa Features

General Morphological Characteristics

Typologies

Pattern Definition (Relations)

Visualization

/Imagine

Spa settlement,
Historical bathhouses,
Open-air pools,

hillside city,
circular city,
compact city,

detached buildings,
ring road,

green belt,
Metamorphic plot pattern,

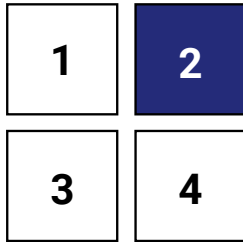
urban tissue map,
black and white with contrast,
urban fabric and street grid

PAPER DESIGN

Demonstration – Images Generation

Step 2: Images Generation

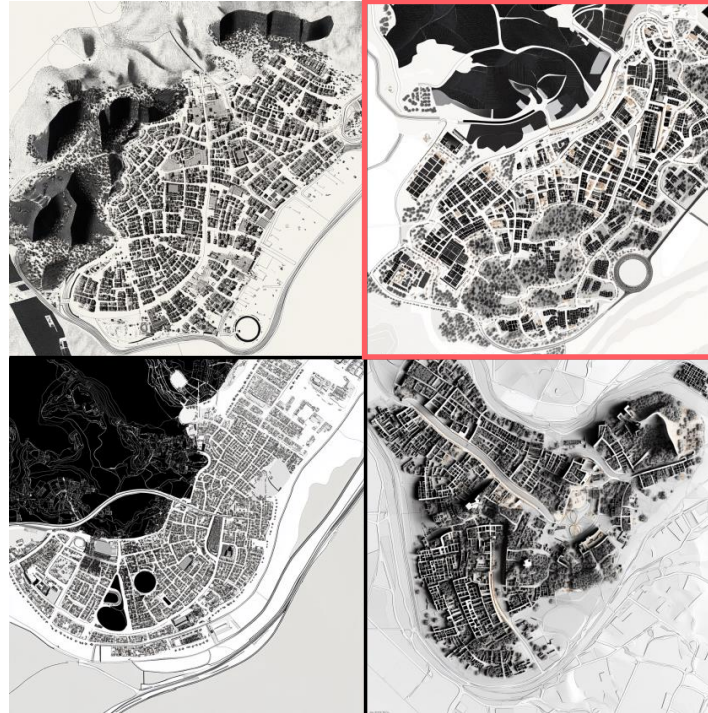
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U1 U2 U3 U4 ⇌
 V1 V2 V3 V4

U – Image selection
 V – Image Variation
 ⇌ – New grid of images with same prompt

TEST PROMPT 03



Spa Features

General Morphological Characteristics

Typologies

Pattern Definition (Relations)

Visualization

/Imagine

Spa settlement,
 Historical bathhouses,
 Open-air pools,

hillside city,
 circular city,
 compact city,

detached buildings,
 ring road,

green belt,
 Metamorphic plot pattern,

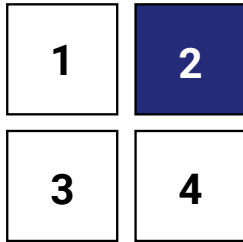
urban tissue map,
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 urban fabric and street grid

PAPER DESIGN

Demonstration – Images Generation

Step 2: Images Generation

Process of generating, varying, and modifying images using *Midjourney*.



U1 U2 U3 U4 ⇌
 V1 V2 V3 V4

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 ⇌ – New grid of images with same prompt

TEST PROMPT 03



Spa Features

/Imagine

Spa settlement,
 Historical bathhouses,
 Open-air pools,

General Morphological Characteristics

hillside city,
 circular city,
 compact city,

Typologies

detached buildings,
 ring road,

Pattern Definition (Relations)

green belt,
 Metamorphic plot pattern,

Visualization

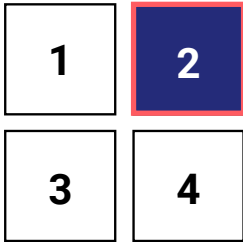
urban tissue map,
 black and white with contrast,
 urban fabric and street grid

PAPER DESIGN

Demonstration – Images Generation

Step 2: Images Generation

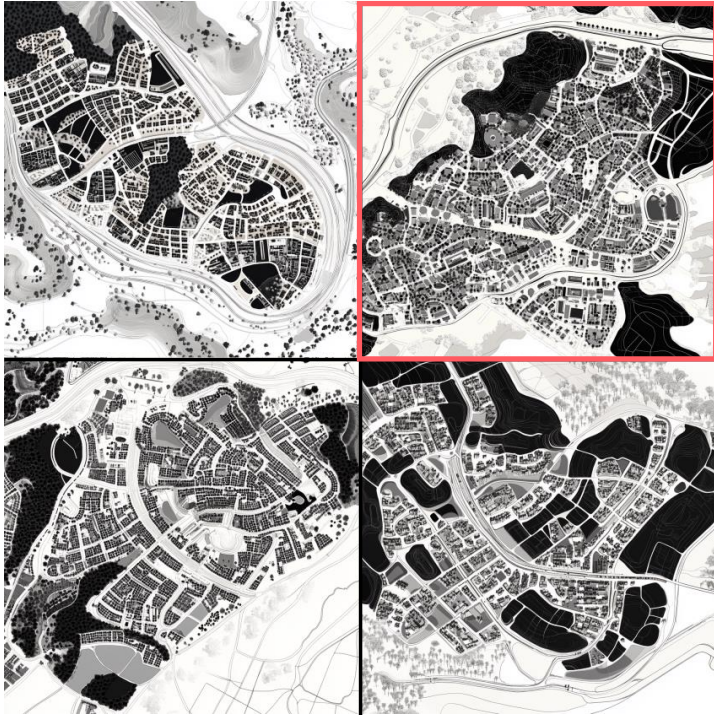
Process of generating, varying, and modifying images using *Midjourney*.



U1 U2 U3 U4 ⇌
 V1 V2 V3 V4

U – Image selection
 V – Image Variation
 ⇌ – New grid of images with same prompt

TEST PROMPT 03



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green belt,
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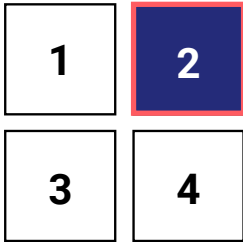
urban tissue map,
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PAPER DESIGN

Demonstration – Images Generation

Step 2: Images Generation

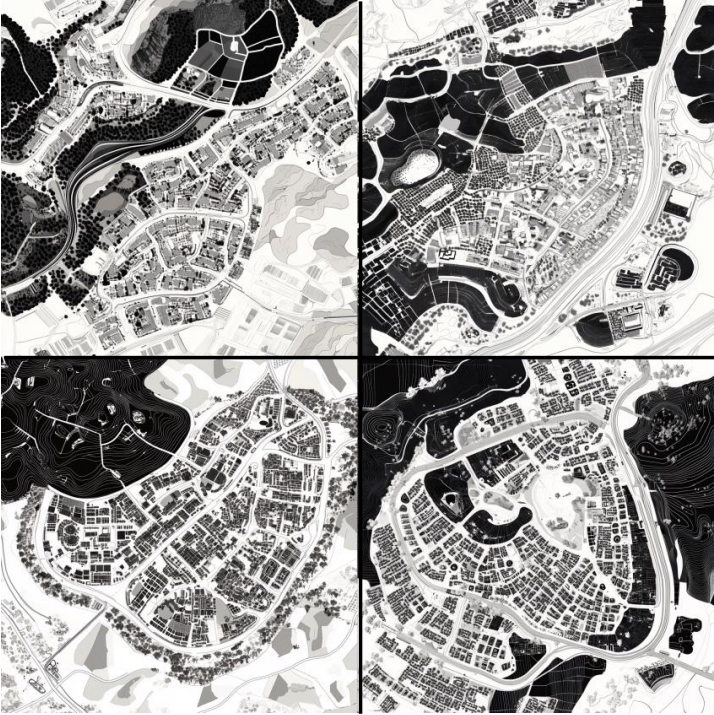
Process of generating, varying, and modifying images using *Midjourney*.



U1 U2 U3 U4 ⇌
 V1 V2 V3 V4

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TEST PROMPT 03



Spa Features

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 circular city,
 compact city,

Typologies

detached buildings,
 ring road,

Pattern Definition (Relations)

green belt,
 Metamorphic plot pattern,

Visualization

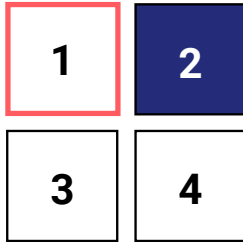
urban tissue map,
 black and white with contrast,
 urban fabric and street grid

PAPER DESIGN

Demonstration – Images Generation

Step 2: Images Generation

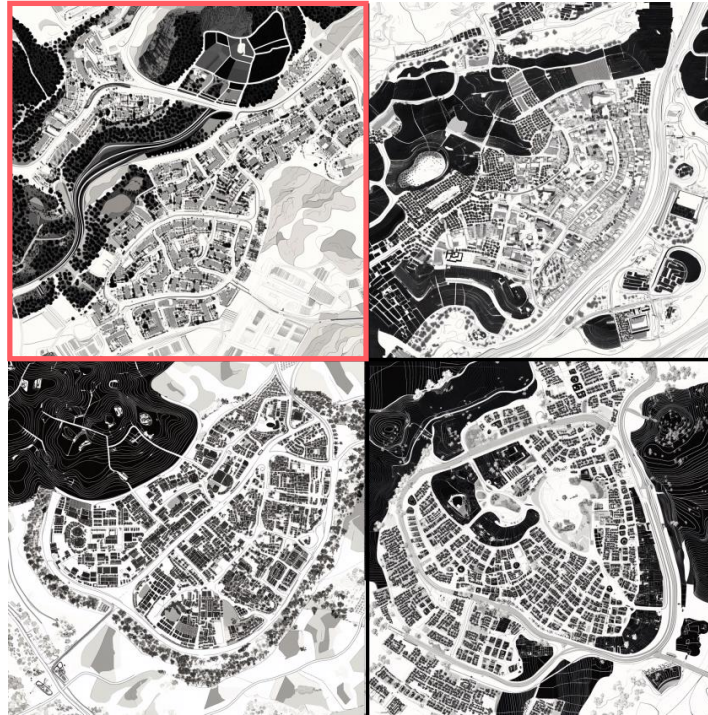
Process of generating, varying, and modifying images using *Midjourney*.



U1 U2 U3 U4 ⇌
V1 V2 V3 V4

U – Image selection
V – Image Variation
⇌ – New grid of images with same prompt

TEST PROMPT 03



Spa Features

/Imagine

Spa settlement,
Historical bathhouses,
Open-air pools,

General Morphological Characteristics

hillside city,
circular city,
compact city,

Typologies

detached buildings,
ring road,

Pattern Definition (Relations)

green belt,
Metamorphic plot pattern,

Visualization

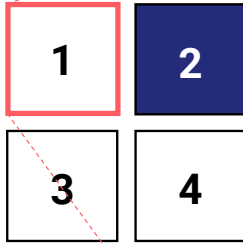
urban tissue map,
black and white with contrast,
urban fabric and street grid

PAPER DESIGN

Demonstration – Images Generation

Step 2: Images Generation

Process of generating, varying, and modifying images using *Midjourney*.



U1 U2 U3 U4 ⇌
 V1 V2 V3 V4

U – Image selection
 V – Image Variation
 ⇌ – New grid of images with same prompt

TEST PROMPT 03



Spa Features

/Imagine

Spa settlement,
Historical bathhouses,
Open-air pools,

General Morphological Characteristics

hillside city,
circular city,
compact city,

Typologies

detached buildings,
ring road,

Pattern Definition (Relations)

green belt,
Metamorphic plot pattern,

Visualization

urban tissue map,
black and white with contrast,
urban fabric and street grid

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Comparison

TEST PROMPT 01

U1 U2 U3 U4 ⇌
V1 V2 V3 V4

U – Image selection
V – Image Variation
⇌ – New grid of images with same prompt

/IMAGINE Spa settlement, central green urban park, thermal springs city by the river, linear ridge city, detached buildings, pedestrian promenade, urban-rural fringe, plot amalgamation, urban tissue map, black and white with contrast, urban fabric and street grid

TEST PROMPT 02

U1 U2 U3 U4 ⇌
V1 V2 V3 V4

U – Image selection
V – Image Variation
⇌ – New grid of images with same prompt

/IMAGINE Spa settlement, Healing gardens, manicured parks, city by the lake, hilltop city, compact city, detached buildings, Consequent streets, green belt, derivative plot, urban tissue map, black and white with contrast, urban fabric and street grid

TEST PROMPT 03

U1 U2 U3 U4 ⇌
V1 V2 V3 V4

U – Image selection
V – Image Variation
⇌ – New grid of images with same prompt

/IMAGINE Spa settlement, Historical bathhouses, Open-air pools, hillside city, circular city, compact city, detached buildings, ring road, green belt, Metamorphic plot pattern, urban tissue map, black and white with contrast, urban fabric and street grid

Science Fund of the Republic of Serbia

Program: PRISMA

Future Heritage of Spa Settlements: Digital Platform for Advancing Knowledge and Innovation in Urban Morphology Approach for Environmentally-Sensitive Development in Serbia

Project Reference: 7408



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Risks and Limitations

Prompting Urban Morphology: Testing the Application of Artificial Intelligence in Decoding Urban Patterns of Spa Settlements

The 31st Conference of the International Seminar on Urban Form

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Possibilities

VISUALIZING URBAN SCENARIOS AND MORPHOLOGICAL CHANGES

- visual representations of different urban morphologies or **future urban scenarios** based on textual descriptions

HISTORICAL URBAN FORM RECONSTRUCTION

- by providing textual descriptions of historical cities or lost urban forms, MidJourney could generate artistic interpretations of how urban spaces might have looked in the past, offering a tool for **understanding historical urban morphologies**

EXPERIMENTING WITH ALTERNATIVE URBAN PATTERNS

- MidJourney's capacity to generate variations from input descriptions can help explore new, unconventional urban patterns, offering potential new perspectives on urban form through an **experimental lens**

EXPLORING URBAN IDENTITY AND CULTURAL EXPRESSIONS IN MORPHOLOGY

- by generating cityscapes based on cultural, historical, and geographical descriptions, MidJourney could help researchers and practitioners **understand how urban morphology reflects local identity and culture**

TESTING AI-ASSISTED URBAN FORM PROTOTYPING

- MidJourney can **assist in the early stages of urban design** by generating multiple visual prototypes of urban forms based on input constraints

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<https://spattern.org/>

