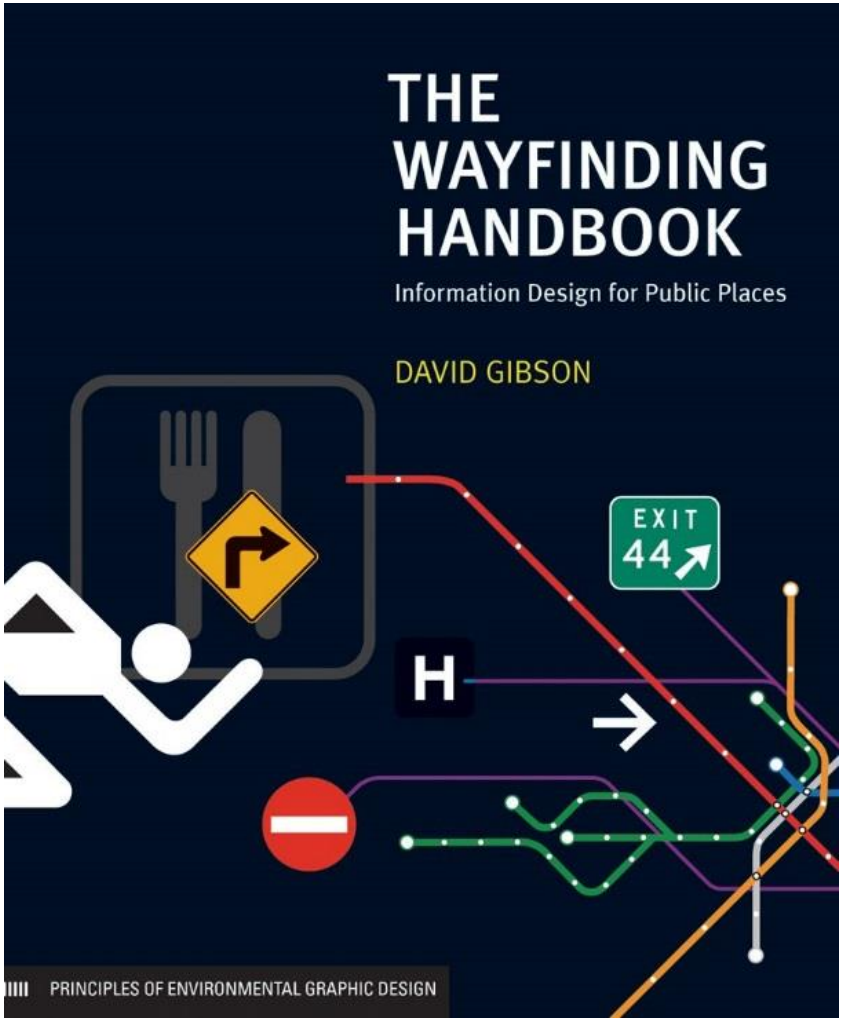
LBS 2014
11th Symposium on Location-Based Services
Vienna, 26–28 November 2014

Indoor Signposting and Wayfinding through an Adaptation of the Dutch Cyclist Junction Network System

Antigoni Makri
Edward Verbree

26 November 2014

Wayfinding … there are many ways



13:45–14:55 – 10 and 15 minutes slots (Chair: Karl Rehrl, Salzburg Research)

Wayfinding and Navigation II

Anita Graser, Markus Straub, Melitta Dragaschnig – 15 minutes
Is OSM Good Enough for Vehicle Routing? A Study Comparing Street Networks in Vienna

Carolin von Groote-Bidlingmaier, David Jonietz and Sabine Timpf – 15 minutes
Calculating Route Probability from Uncertain Origins to a Destination

Jukka Krisp, Andreas Keler and Nicole Karrais – 10 minutes
Personalized Routing for Car Navigation Systems

Lucia Tyrallová, Carolin Kucharczyk, Lasse Scheele and Hartmut Asche – 10 minutes
Towards a Dedicated Data Model for Seamless Pedestrian Navigation

Antigoni Makri and Edward Verbree – 10 minutes
Indoor Signposting and Wayfinding through an Adaptation of the Dutch Cyclist Junction Network System

Nimalika Fernando, David A. McMeekin and Iain Murray – 10 minutes
Context-aware Navigation Model Supporting Way-finding for Vision Impaired People in Indoor Environments

Airport

Arrivals / Departures

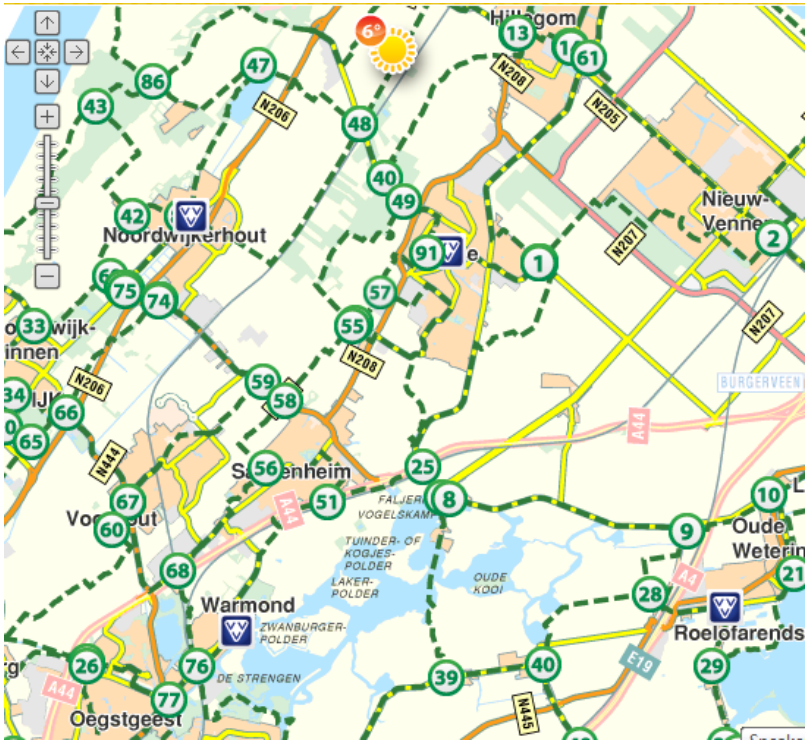
- Schiphol Amsterdam
  - Mijksenaar
- Vienna
  - Ruedi Baur

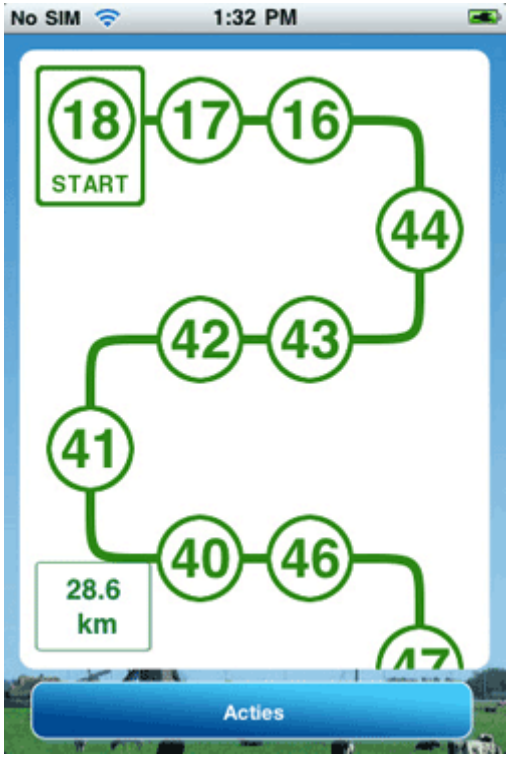
Indoor Signposting and Wayfinding Adaptation

- Problem:
  - The existing indoor wayfinding systems do not consider the presence of salient objects in order to enhance wayfinding efficiency
- Objective:
  - To propose a wayfinding system for indoor settings in order to direct to a user-specified destination by incorporating the concept landmark-signs
- Method:
  - Using as a reference an already existing outdoor system and adapting it to the case of indoor navigation

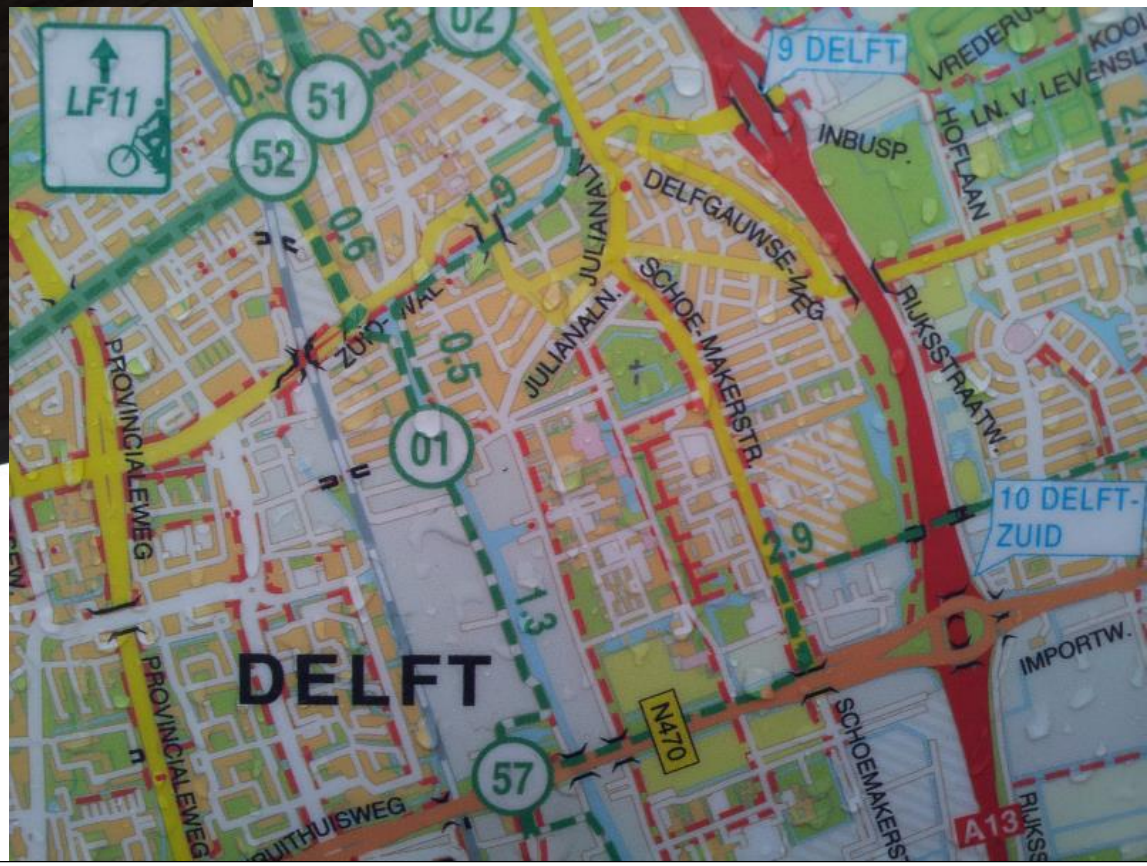
Cyclist Junction Network System

Available, accepted, and proven





Nootdorp 8
Pijnacker 7
Zweth 5
Rotterdam 13
Den Haag 12
Naaldwijk 16
Schipluiden 5
Delft-Zuid
(oostzijde)
Delft-Centrum 2
57
knooppunt
1
5
HAAGLANDEN
57
knooppunt
58
1
HAAGLANDEN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JULIANALN.
SCHOE-MAKERSTR.
RIJKSSTRAATW.
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KANOCENTRUM
ARJAN BLOEM
KAJAK.NL
Poelweg 1b - 1531 MD Wormer - Tel. 075-6218805
VAN 1 APRIL TOT 1 OKTOBER: 7 DAGEN PER WEEK GEOPEND
Kanoverhuur
maandag t/m vrijdag
10.00 - 18.00 uur
€ 5,- p. persoon 'onbeperkt'
mer en Jisperveld
Kano-boten verhuur
Knooppunt met infopaneel tevens overstapplaats
Horeca gelegenheid
Bezoekerscentrum Poelboerderij
Botanische locatie Kneppelsoord
Picknickplaats
Knooppunt met kaart
Jisp
Wormer
Neck
Het kano-route-netwerk
U bepaalt zelf uw route en het aantal meters dat u wilt varen, vrijheid & flexibiliteit staanvoorop!
U kunt in twee richtingen varen, van knooppunt naar knooppunt via genummerde borden.
Onthoud het nummer van de startplaats waar u uw vaartocht begint, zodat u indien gewenst op het beginpunt ook weer kunt eindigen. Op de plattegrond ziet u een aantal nummers, dit zijn de zogenaamde "knooppunten". U volgt de genummerde borden in de richting van de pijl van knooppunt naar knooppunt. Op elk knooppunt kunt u een keuze maken in welke richting u uw vaarroute wenst te vervolgen.
Op iedere knooppuntspaal staat een plattegrond.
Regels
• Huurder is aansprakelijk voor schade, vermissing en schade aan derden.
• Geef voorrang aan beroepsvaart en aan motor- en zeilboten.
• Hinder geen vissers.
• Spaar de natuur zoals rietoevers en verstoor geen vogels.
• Ga alleen aan land op daarvoor bestemde uitstap plaatsen.
• Honden mogen nergens aan land.
• Neem afval mee naar huis.
• Bij slecht weer geen verhuur
• Reservering mogelijk met vermelding tijdsduur
• Verhuurperiode: 1 april - 1 oktober
• Bijzondere Feestdagen gesloten. Koningsdag, 1e Paasdag, Hemelvaartsdag en 1e Pinksterdag.
Gruto
Schaal in meters
0 200 400 600 800 1000
info@kajak.nl www.kajak.nl

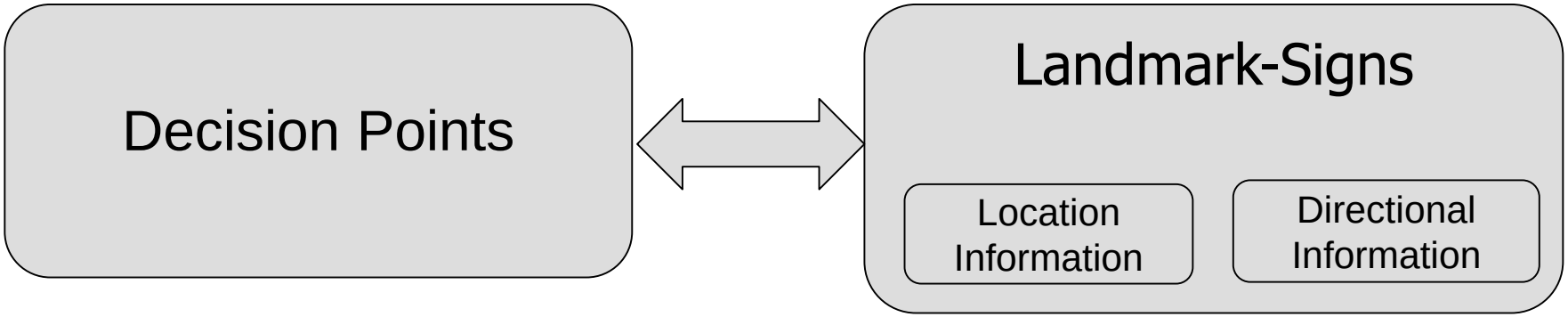
Junction Network System for Indoor Settings

- Original System:
  - A user-specified route is determined by sequence of numbers indicated by special landmark-signs on selected ('best') roads.
- Adapted Concept:
  - Creation of a **complete network** of locations, equipped with a special type of sign, so that **any possible route** in an indoor setting can be mapped out.
- Design Requirements:
  - What information should be presented?
  - Where will the information be provided?
  - In what form?

Assistance is provided
where to take a decision on how to go on

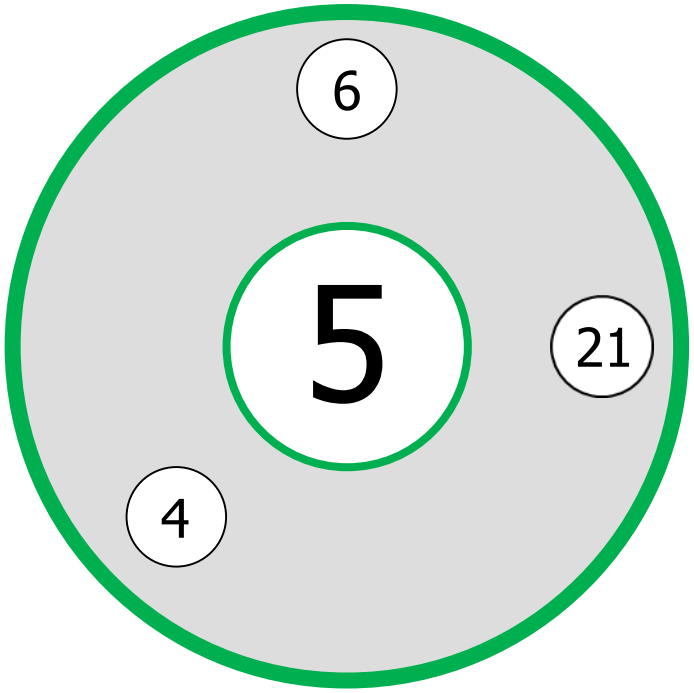
- Based on an already existing and recognized system
- A unique identifier playing many roles
  - Decision point
  - Destination
    - Place, Room (in between two decision points)
- Spatial reference supported
  - Topographic / Schematic map / guide
- No need for use of special equipment by the wayfinder
- Suitable for wayfinders not familiar with electronic devices
- Applicable to various types of buildings

Building Blocks



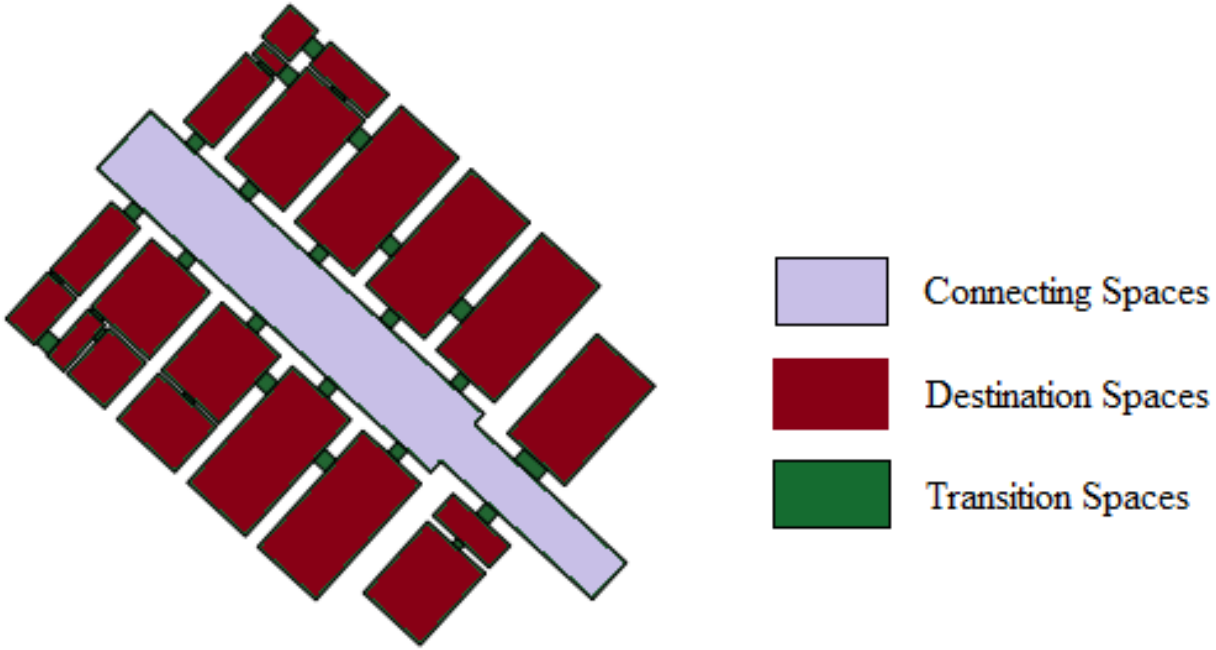
Physical presence of landmark-signs throughout the entire space

Design of the landmark-signs:
Floor-mounted (open space)

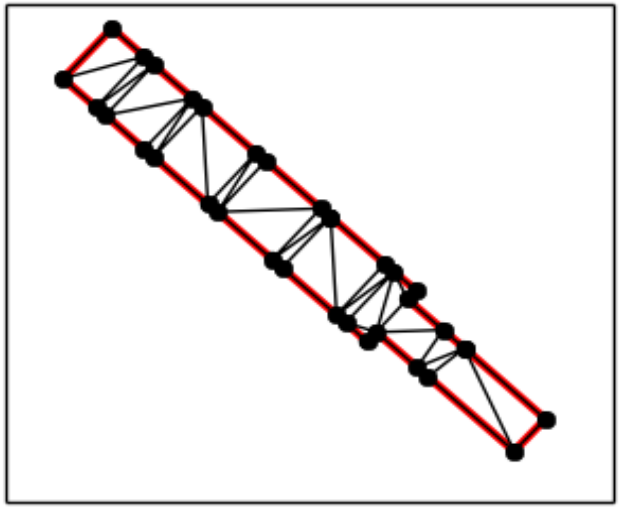


Environment Representation

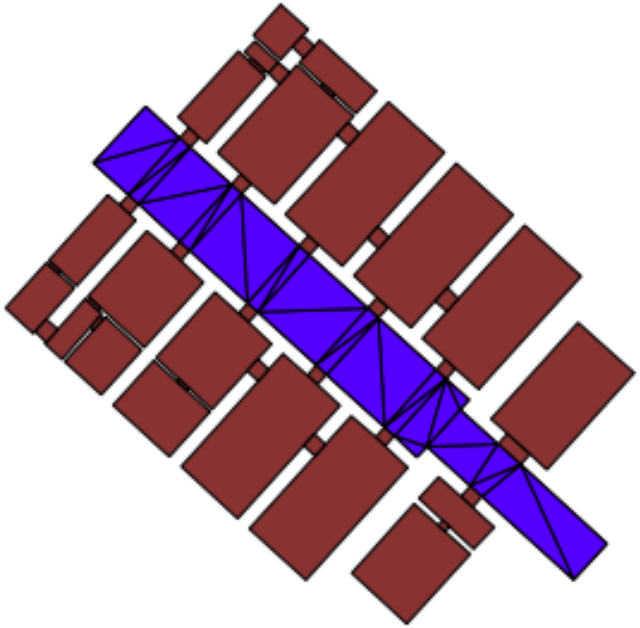
- Navigable space: Connecting spaces between destination points
- Graph model to represent the structure of the building
  - Decision points are mapped as nodes of the graph
  - Links between the nodes are the edges of the graph



Implementation
Connecting Space Subdivision



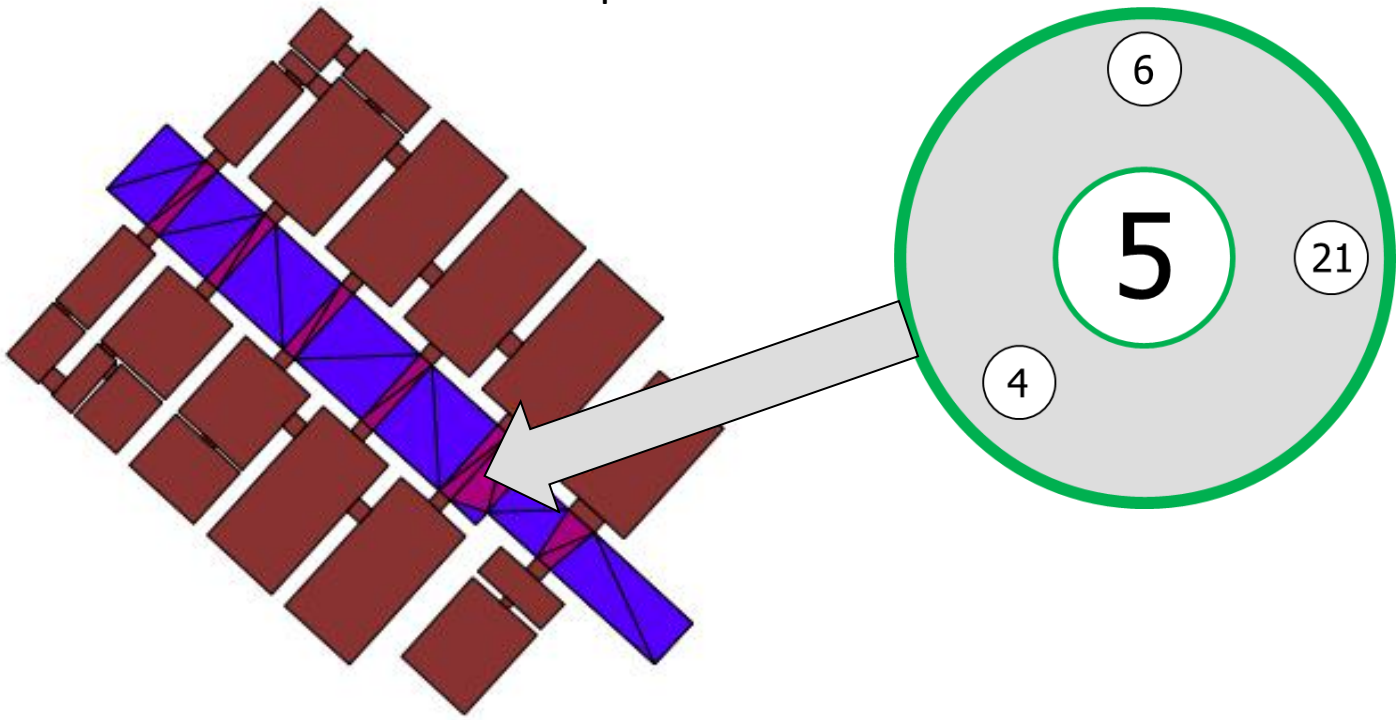
Constrained Delaunay Triangulation



Implementation: Non-constrained triangles Decision Point = Landmark-sign

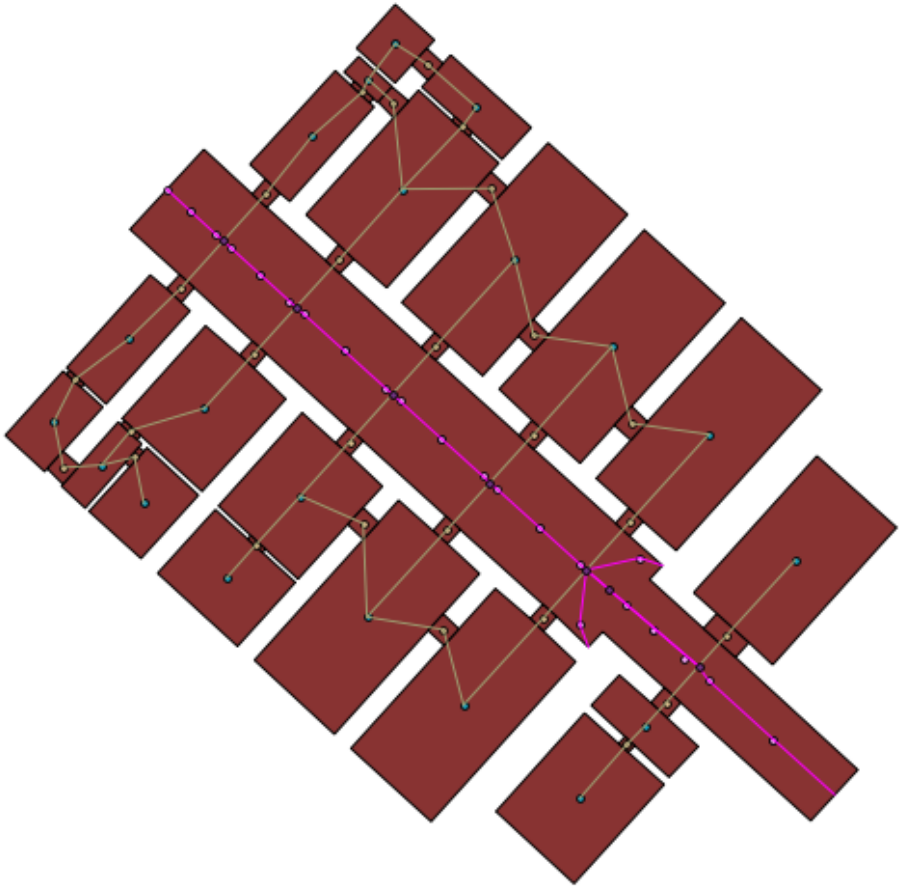
Two Criteria:

- overlap relationship between originating polygon and generated triangular sub-spaces
- semantics of the indoor space



Implementation

Network of Numbered Locations

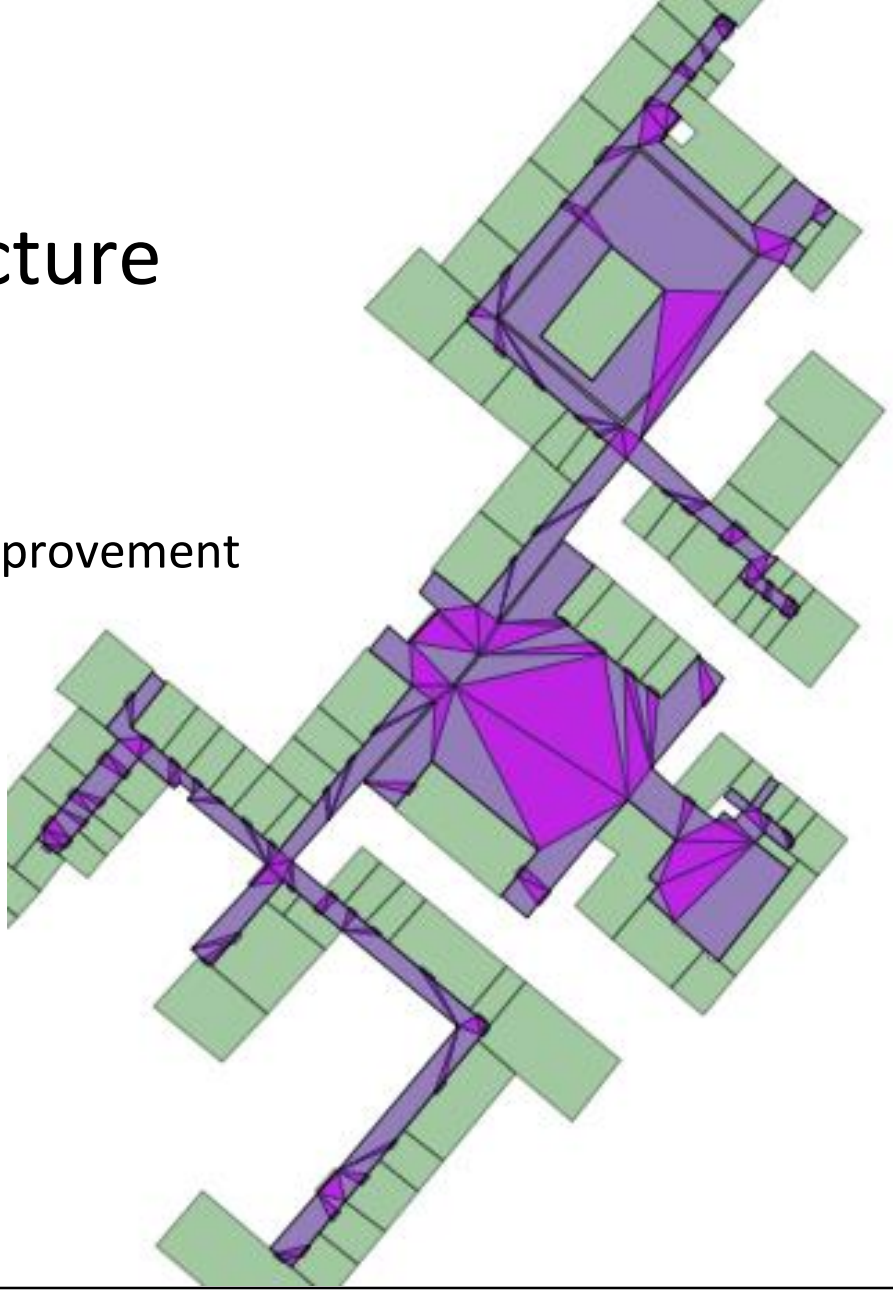


Network Generation:

- more dense for connecting spaces, decision points and middle points of constrained edges
- destination and transition spaces represented by their central points

Other test-site
Faculty of Architecture

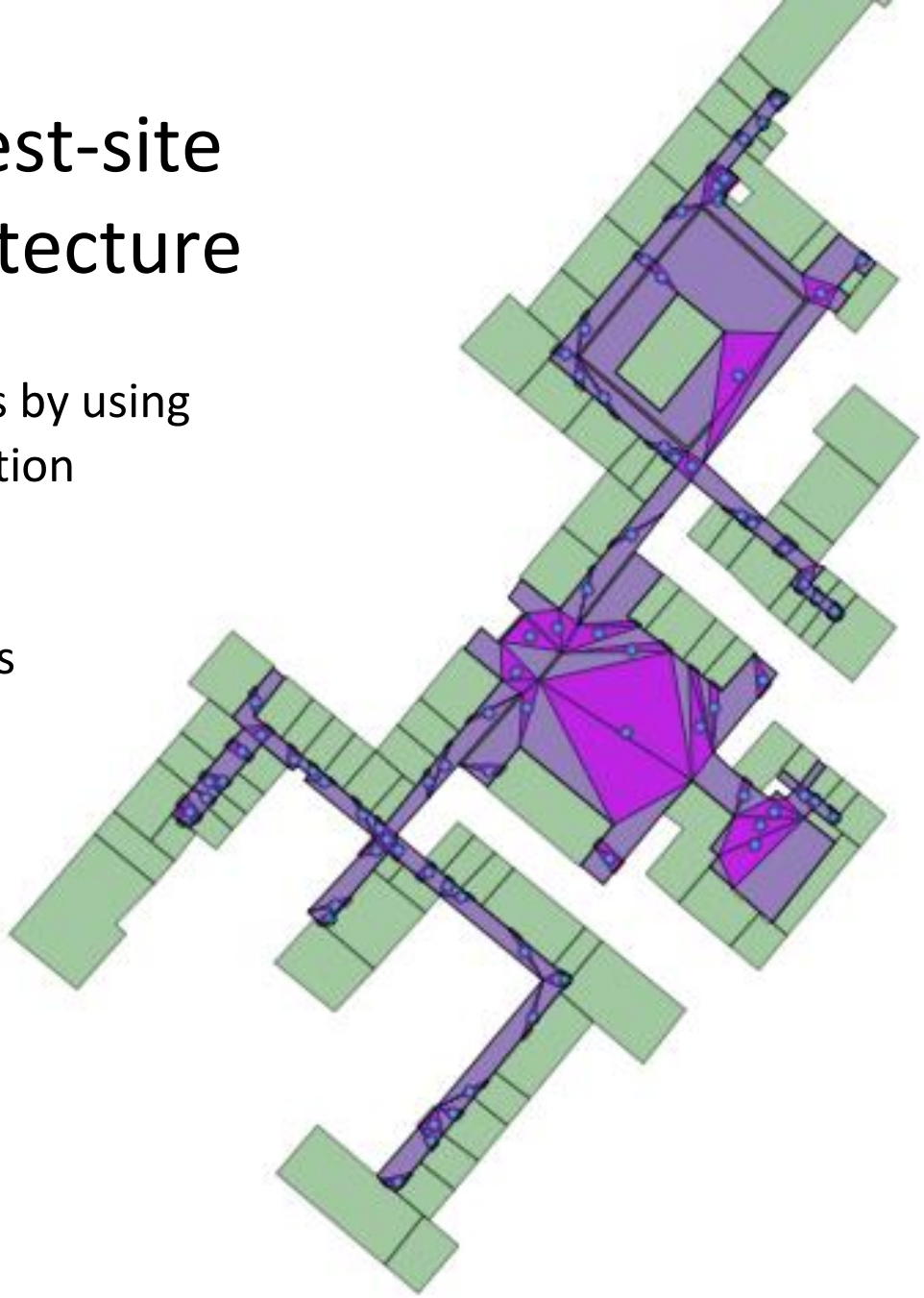
- Complex building
- Contains large open spaces
- Existing wayfinding system needs improvement
- Large number of users



Next Steps – other test-site
Faculty of Architecture

- Improve decision point locations by using Conforming Delaunay Triangulation
- Perform test survey

- Conclusions & recommendations



Thank you very much for your attention!