



**ESPOO
ESBO**

Espoo City Information Model in Urban Planning

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23.3.2021**

Themes for the lecture

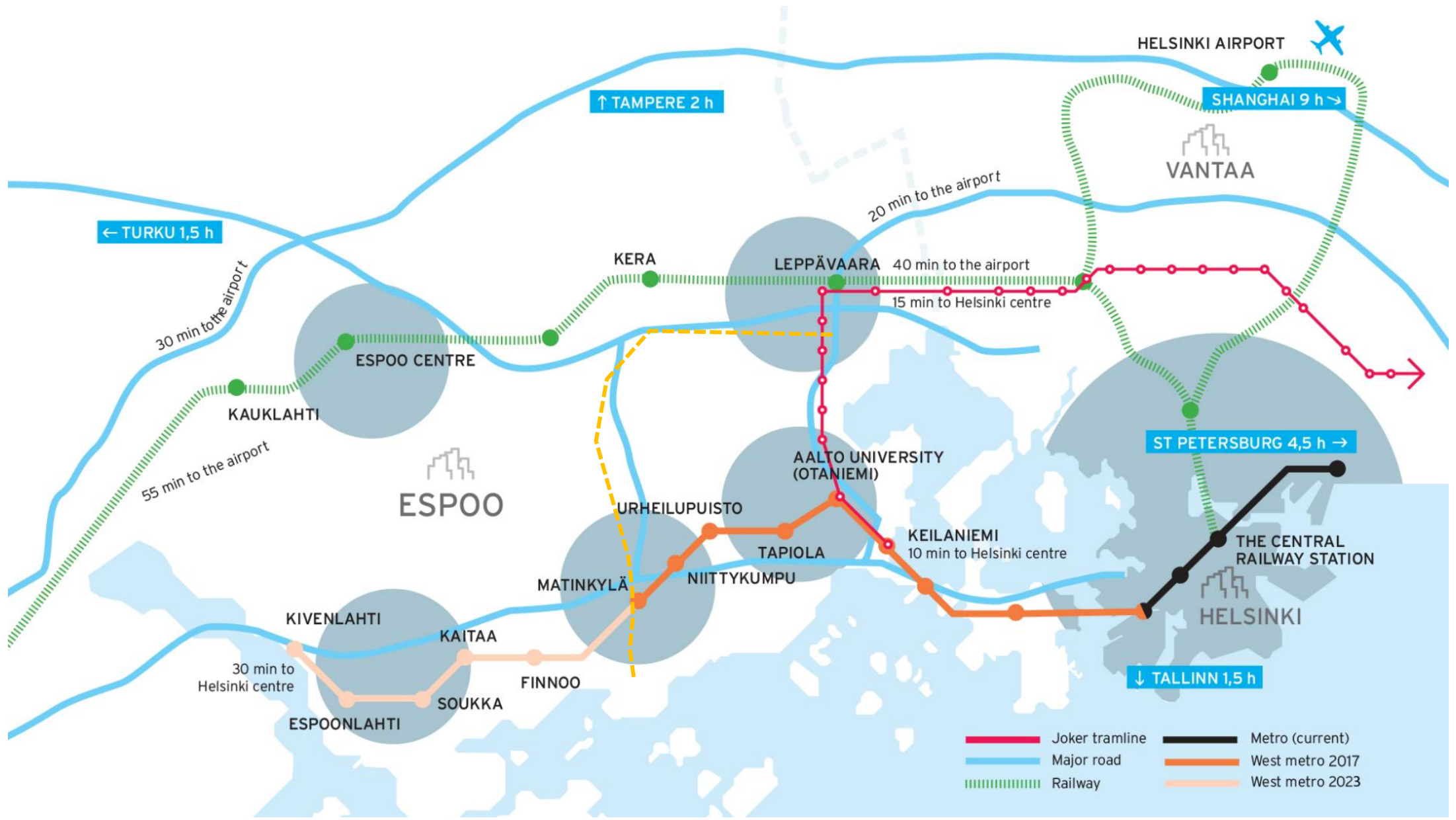
1. Planning the growth of Espoo
2. City Information Model (CIM) in urban planning, examples

Discussion and break

- Case area introduction of Suurpelto

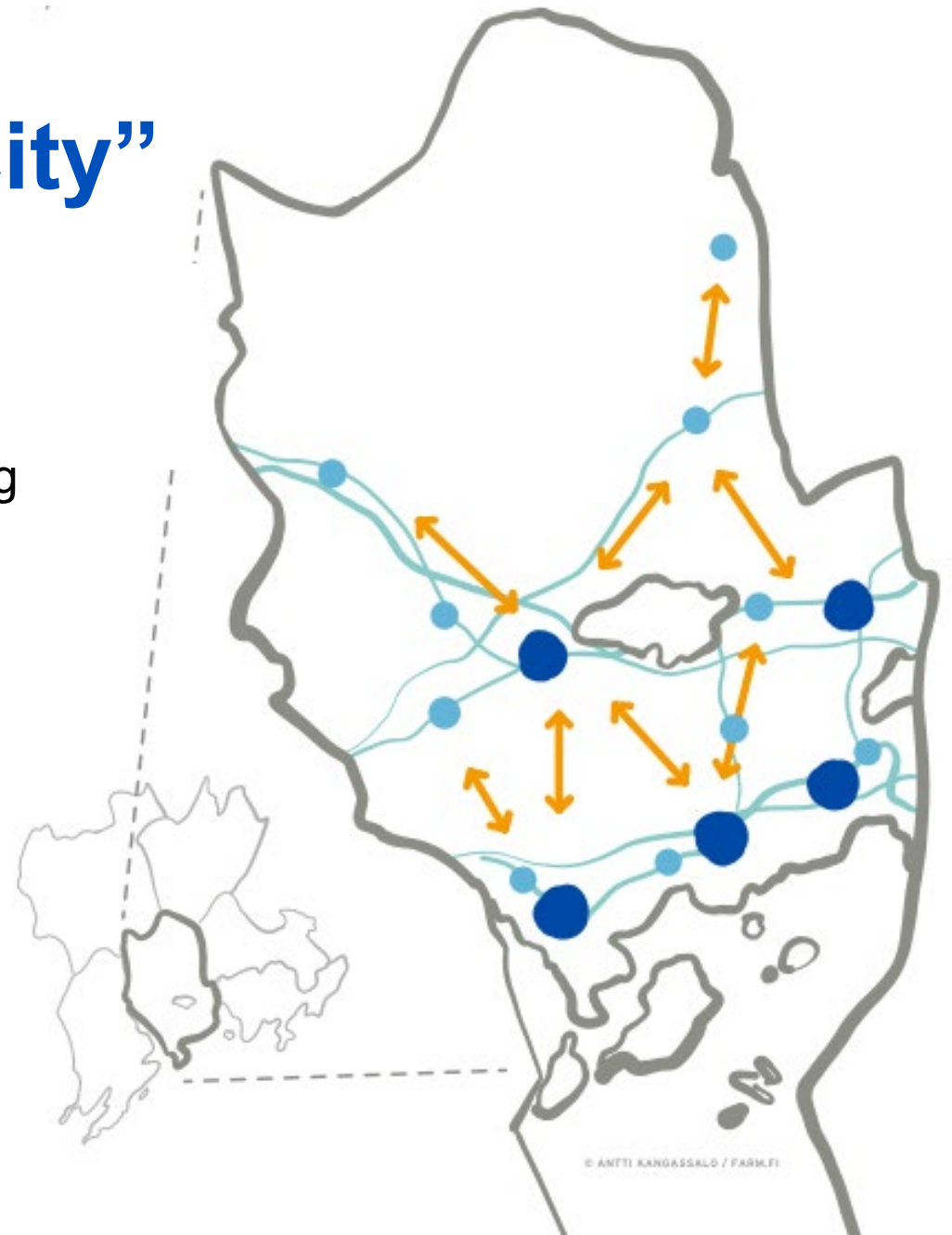
jussi.partanen@espoo.fi

Planning the growth of Espoo



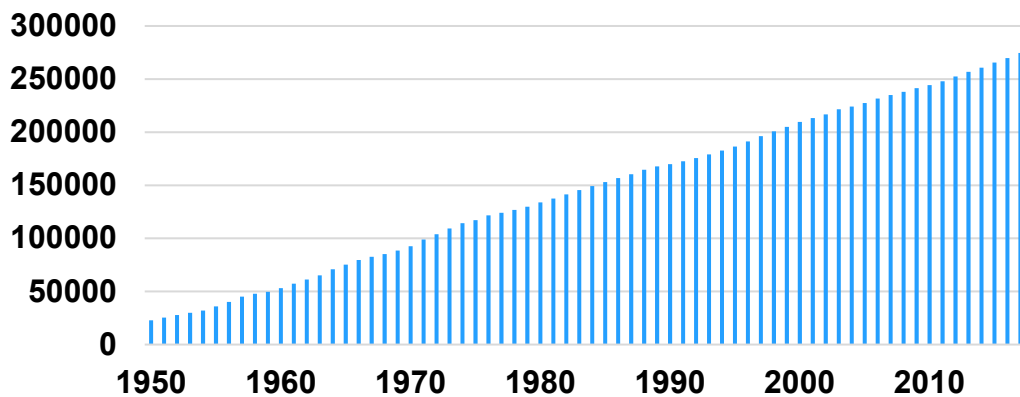
Espoo is a "networked city"

- **Espoo has five city centres**
(and some local centres)
- This design initiates from the Espoo city planning of 1960's: in 1968, the city decided the networked structure of the five centres and that Espoon keskus would house the city official functions
 - "Independence from Helsinki" – not to focus all functions and jobs east
 - "Fluent traffic" (via private cars and buses)

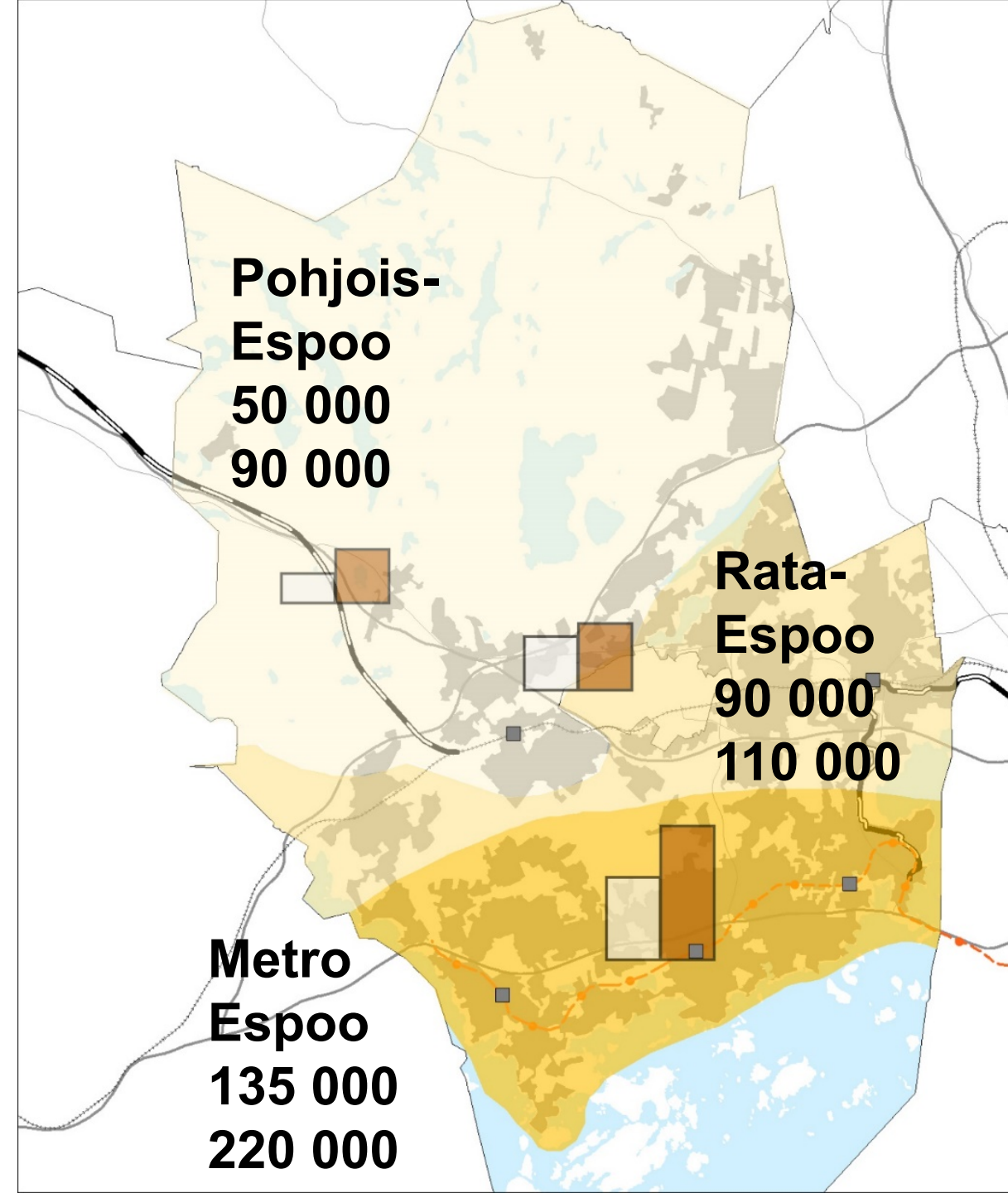


Espoo is growing

- Currently 293 000 inhabitants (31.12.2020)
- Projections for 2059:
429 000 – 466 700 inhabitants.
- Approx. +50% growth, +4600 inhabitants/year
- How do we conserve the local identities and liveability of the city centres and subcentres?



24.3.2021



The Espoo Story

- https://www.espoo.fi/en-US/City_of_Espoo/Decisionmaking/The_Espoo_Story

- **Espoo - the most sustainable city in Europe**

Espoo's objective is to be permanently the most sustainable city in Europe.

In a study conducted last year, Espoo was found to be the most economically, socioculturally and ecologically sustainable city in Europe. According to a recent follow-up study, Espoo has maintained its position as the top city in Europe in terms of sustainability.

The Espoo Story

The city of Espoo in Finland scored high in a sustainability assessment of over 140 European cities with a population of more than 100 000.

The study of sustainability challenges was prepared for the Dutch Presidency of the EU in the first half of 2016, and it was carried out by Telos, an academic centre for local and regional sustainability studies at the Tilburg University, in Netherlands.

The study analyses cities' sustainable development by including ecological, social and economic characteristics.

Overall, Northern European cities scored highest on sustainability. Espoo, Stockholm and Munich form the top three.

Espoo, the neighbouring city of Helsinki, scored high in safety, education, social and economic participation as well as economic knowledge. Altogether 35 per cent of Espoo's land area is covered with forest, and the city was also recognised as a green city.

The sustainability scores for cities were found to vary widely. Population size, demographic dynamics, geographical region, typology and competitiveness, for example labor productivity, were found to be important determinants of urban sustainability performance.

Cities with a population of 100 000–250 000 inhabitants excel in social and ecological capital, whereas considerably larger cities outperform all other cities in their score on economic capital.



1932

HELSINKI YMPÄRISTÖNEEN

— maantie, — tekeillä oleva tie.

Brief history of Espoo

- **Espoo has been a city since 1972.** However, the region has been inhabited already for some 8000 years. Archaeologists have discovered plenty of evidence of Stone Age settlements in Espoo, for example in Nuuksio and Perinki.
- Medieval Espoo consisted of numerous villages. The locals built a stone church in about 1490. Gustav Vasa, king Gustav I of Sweden, ordered a royal demesne (a king's manor) to be founded in Espoo in 1556. The construction of the Suomenlinna fortress from the mid-1700s onwards also brought people and businesses to Espoo. Espoo also benefited when Helsinki became the capital city of what was then the Grand Duchy of Finland. Several public officials working in the new capital city purchased manors in Espoo. As the city grew, new opportunities emerged for people and companies.
- **When Finland gained its independence, Espoo was still a rural parish, but its population started to increase rapidly in the late 1940s, after the war, and this trend still continues. Today, Espoo is the second-largest city in Finland.**

Brief history of Espoo

- When Finland became independent, Espoo was a rather small rural parish. Hardly anyone moved to Espoo in the 1920s. The densely populated Grankulla community in Espoo became an independent market town in 1920. When the economy started to pick up again after the Great Depression of the 1930s and the number of jobs increased in Helsinki, more people started to migrate to Espoo.
- In the 1920s and 1930s, agriculture was still the most important livelihood, but Espoo also had some small-scale industry. In the 1920s, a glass factory was founded in Kauklahti. Its operations continued until 1952. Its main products were decorative, domestic and pharmaceutical glass.
- The Lindholm sawmill was located on the plot of the current Espoontori shopping centre. Leppävaara had a flag factory and quarries. Many companies were located along the railway, as the Jorvaksentie road that precedes the current Länsiväylä motorway was only completed in 1937.
- The population began to grow rapidly in the late 1940s after the war. Large numbers of people migrated to Espoo. Some of them were internally displaced persons from Karelia and Porkkala which Finland leased to the Soviet Union. Population growth changed the percentages of speakers of different languages. In 1950, Finnish became the majority language. Espoo had 25,000 inhabitants at that time.
- Many people were moving to Espoo, and the construction of homes picked up speed. Inspired by international examples, the construction of the Tapiola garden city began in 1953, led by Heikki von Hertzen. Tapiola provided new solutions to the prevailing housing shortage: many dreamed of living in a garden city in close vicinity of services.
- The Otaniemi campus emerged next to Tapiola. In 1963, Espoo had 65,000 inhabitants and became a market city.

Brief history of Espoo

- In 1972, Espoo became a city. The districts of Suvela, Olari, Matinkylä and Kivenlahti were built in the 1970s. The first office tower in Keilaniemi, the headquarters of Neste Oy, was completed in 1976.
- Traffic routes have been an essential part of neighbourhood construction projects as Espoo has grown. Finland's very first motorway called Tarvontie or Turunväylä through Espoo was completed in 1962. The Kehä I ring route was built in the 1960s, and traffic on Kehä II began in 2000. The construction of the West Metro from Helsinki to Southern Espoo began in 2010.

Current urban planning themes

- See Aila Vallden's introduction to Suurpelto, chapter 3 for an overview

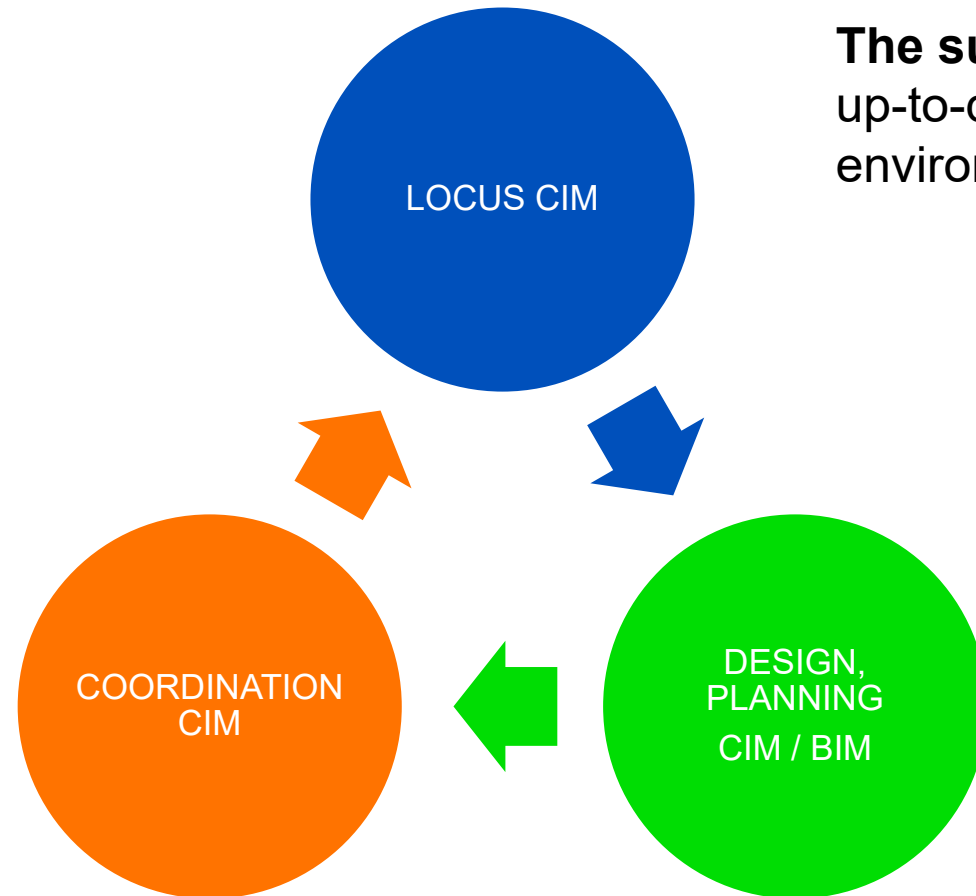
City Information Model in urban planning

CIM workflow in Espoo

The coordination model is updated by the **urban planning centre**.

As a project makes progress towards legal status the model is elevated into more fixed status in the coordination model.

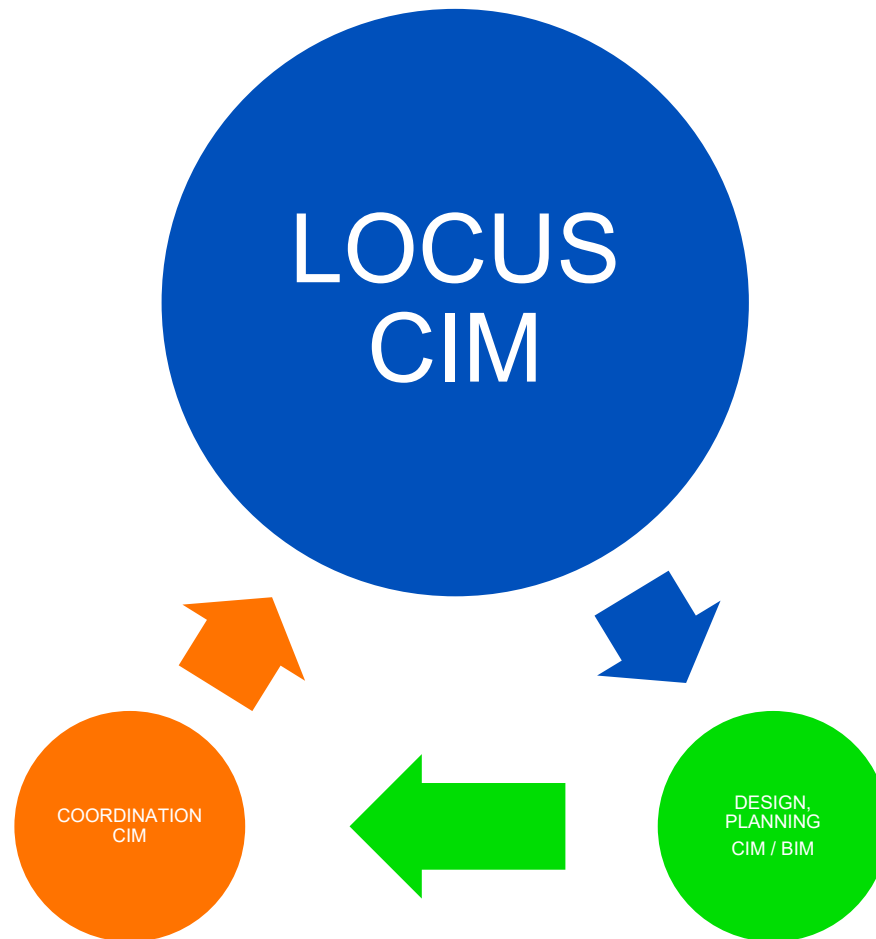
This way everyone can keep up with the big picture.



The **survey department** keeps an up-to-date CIM model of built environment in Trimble Locus.

Individual project models are handled either by the planner, or more often by the **client and their consultant**.

CIM workflow in Espoo



The survey department keeps up an up-to-date CIM model of built environment in Trimble Locus. It can be exported to various formats (DWG, SKP, CityGML).

~64 000 buildings, bridges, streets, city furniture...

- kartat.espoo.fi/3d/

LOCUS CIM

- The Locus model contains only information on the actual built environment.
- The task of keeping up the information is on the city survey department.

Video:

- <https://kartat.espoo.fi/3d/citymodel.html>



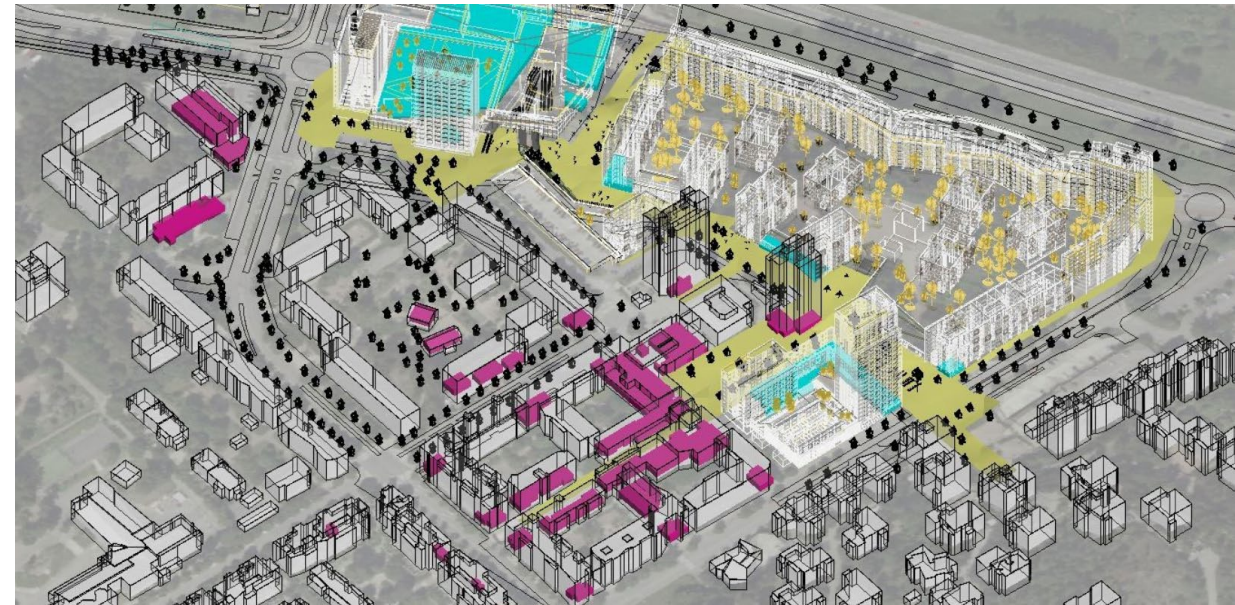
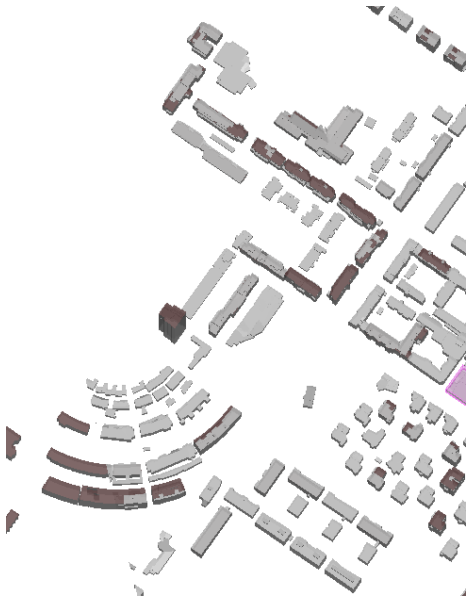
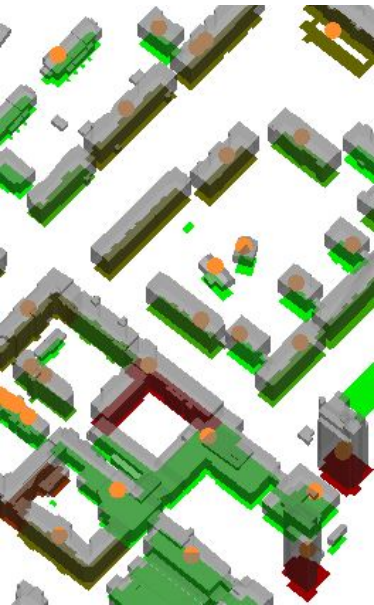
Information model



Information model

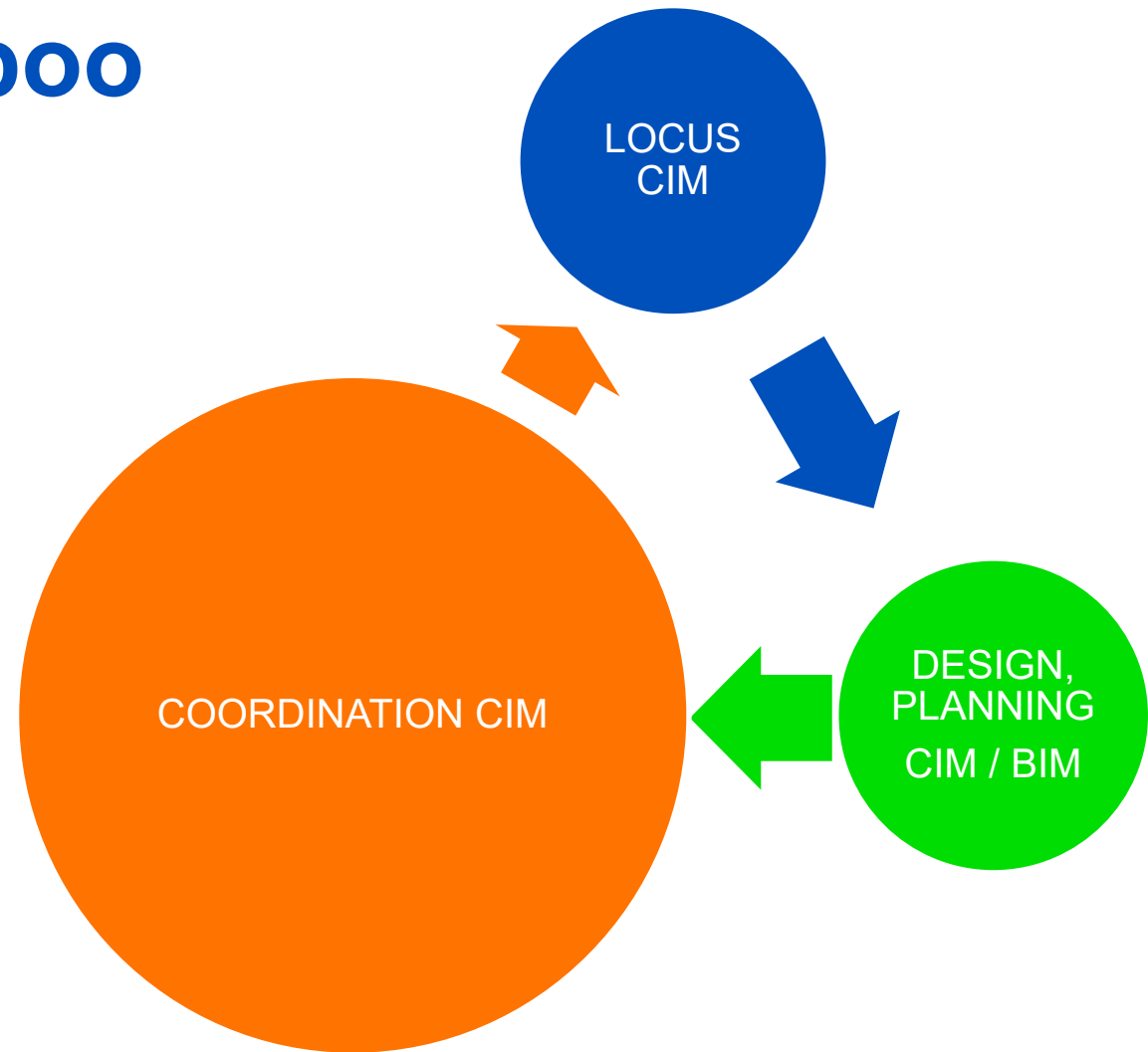
Use examples to the right:

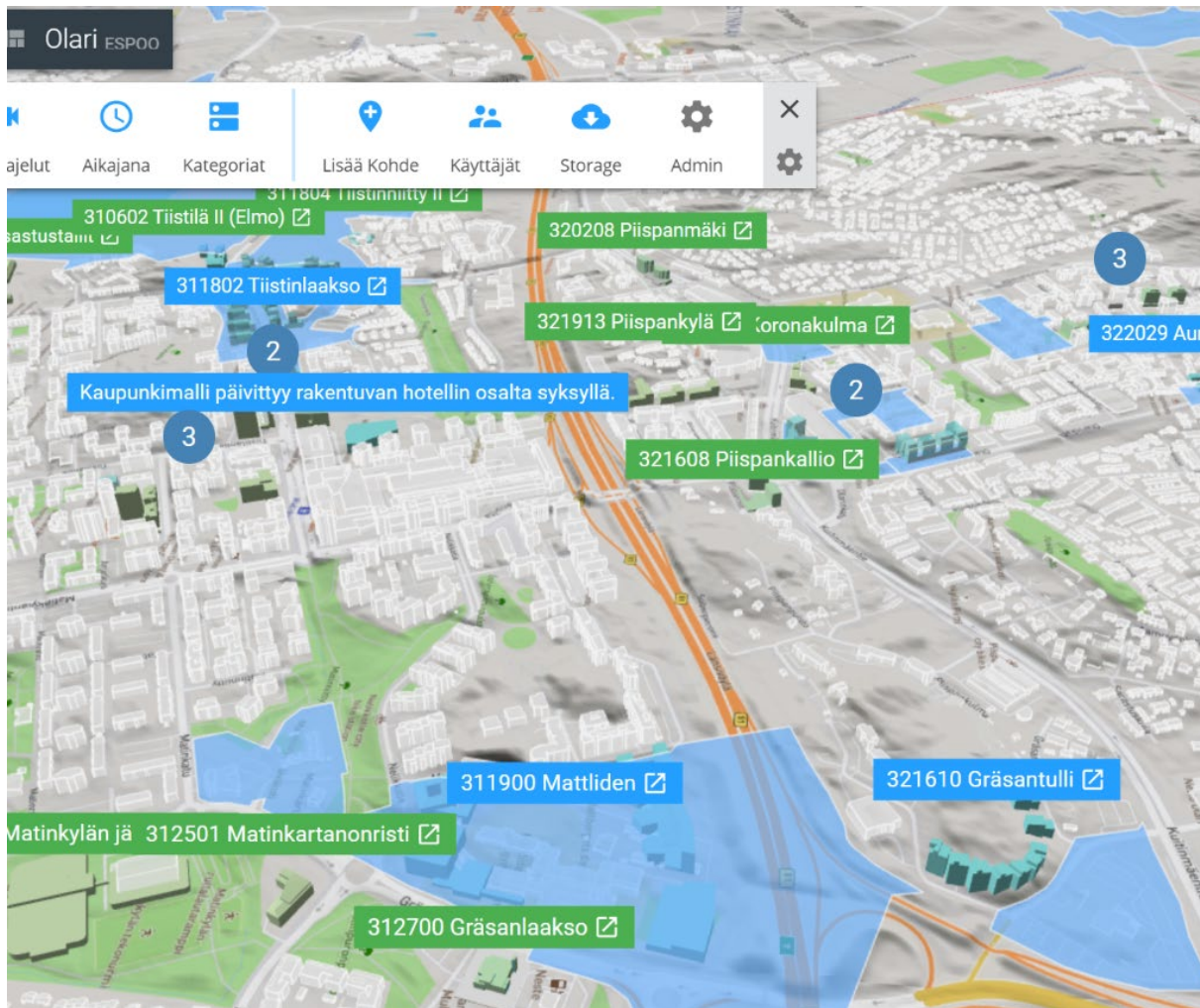
- Building preservation
- Existing vs. Proposed commercial space



CIM workflow in Espoo

- The project models are brought into coordination model. The coordination model is updated by the **urban planning centre**.
- <http://cityplanneronline.com/Espoonkaupunki/tehtavaleppavaarassa>
- 3d-matinkyla.mapgets.com





Matinkylä planning 3d review

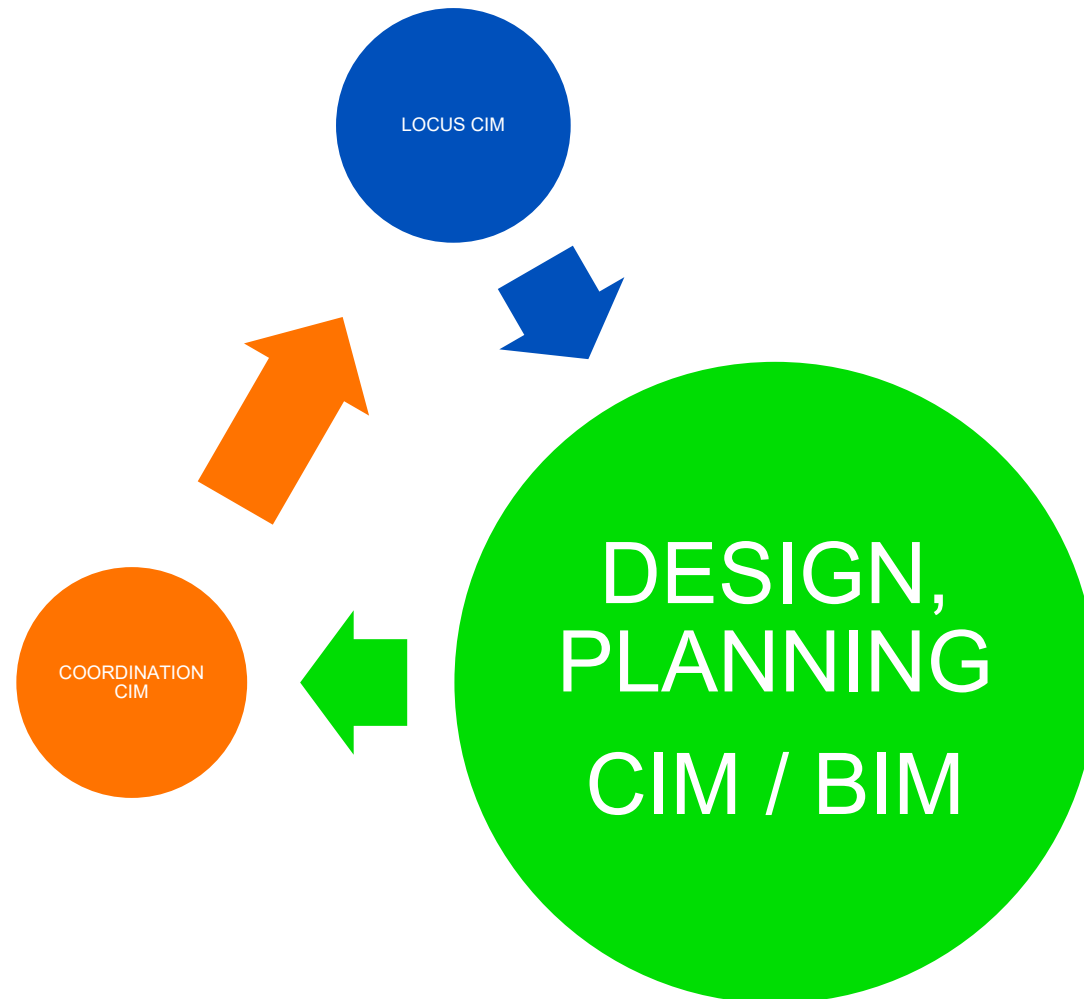
3d-matinkyla.mapgets.com



Tehtävä Leppävaarassa

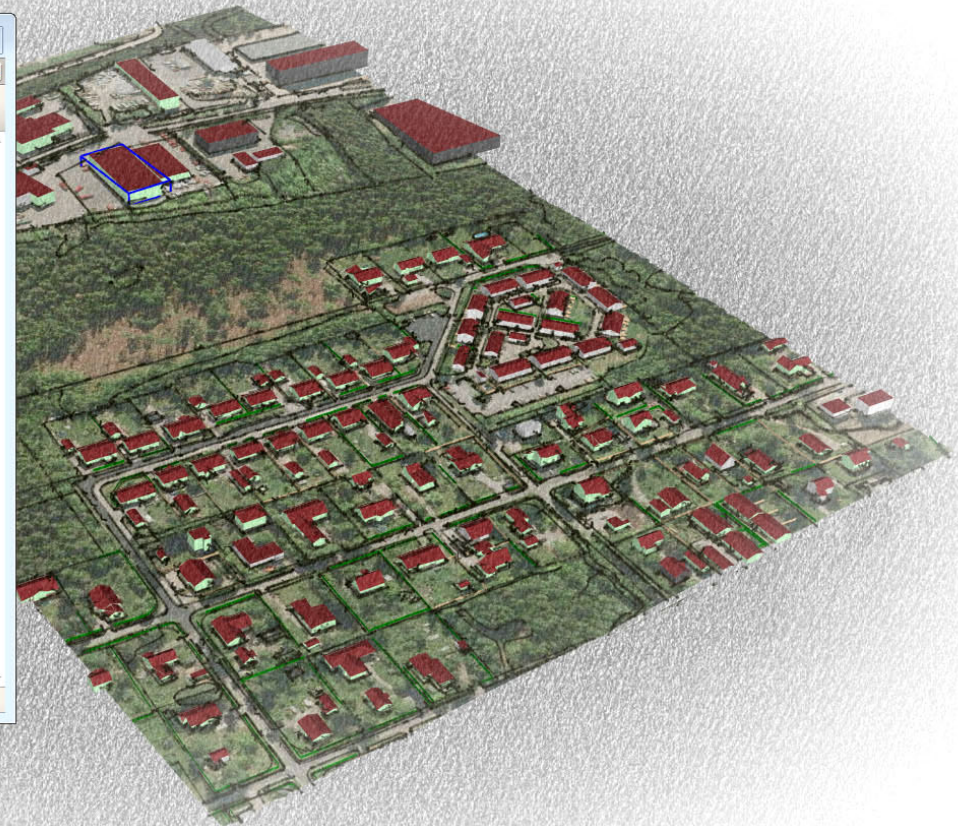
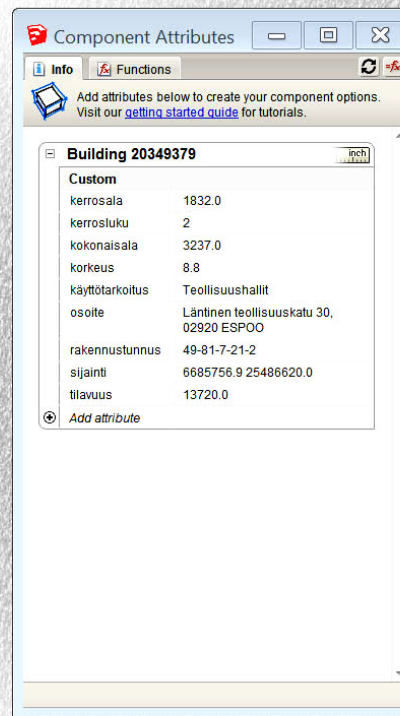
<https://eu.opencitiesplanner.bentley.com/espoonkaupunki/tehtavaaleppavaarassa>

CIM workflow in Espoo



Using CIM in SketchUp

- Locus exports a base model for massing in Sketchup.
- This is the main 3d tool for detail planners.
 - Easy to learn and use
 - Does the job
 - Flexible, moddable
 - CIM able:
<https://modelur.eu/>



Examples of CIM based design

S

Quarter design, 5000-50000k-m2

Sketchup, Revit
(Autocad/Microstation)

M

Area design, 50000-100000k-m2 including streets, public areas and quarters

Autocad/Microstation, Infraworks, Cityengine
(Sketchup, Revit)

L

District scale area plan, including street and public area network, less focused in quarters

Autocad/Microstation, Infraworks, Cityengine



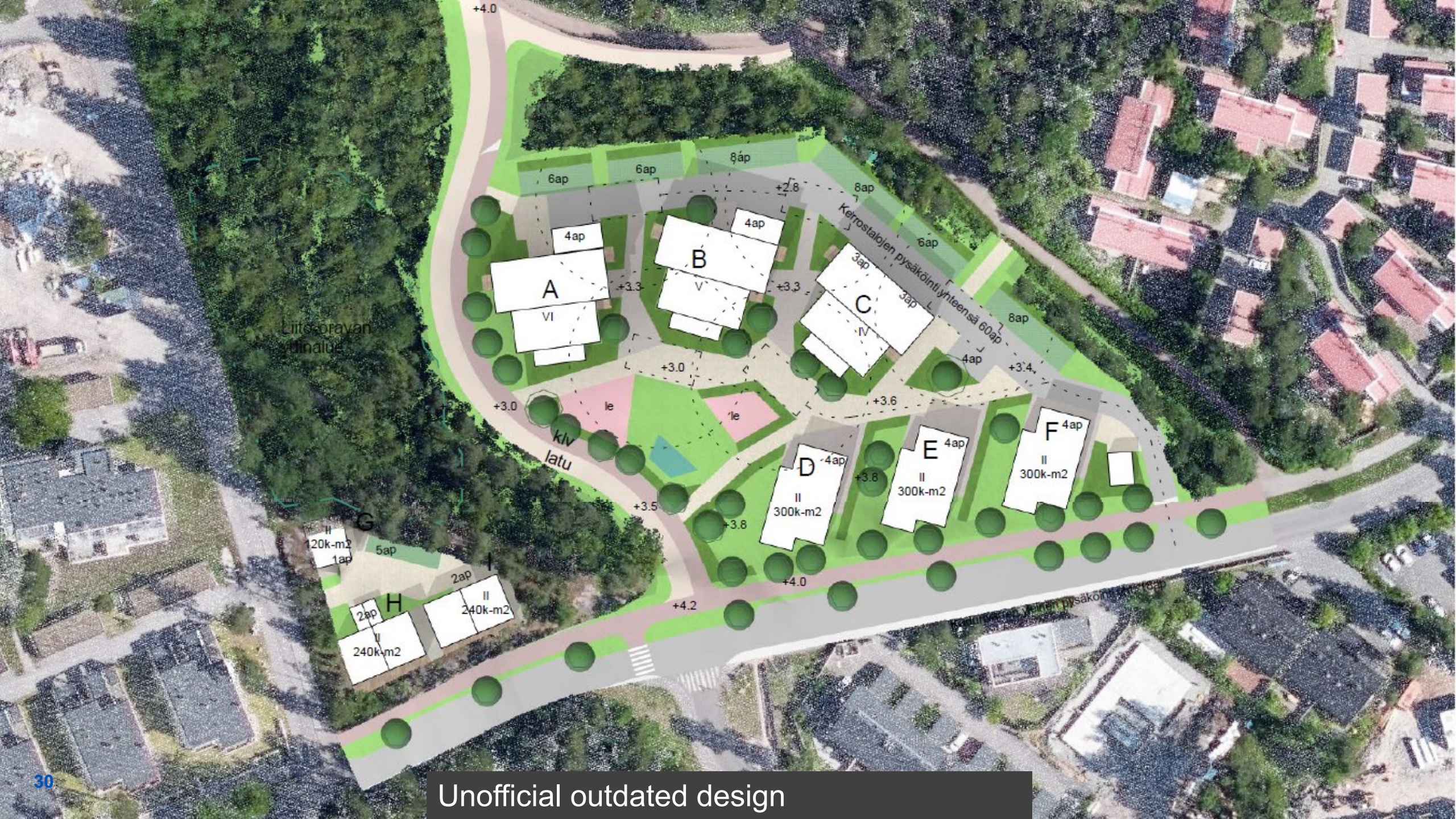
S

Using CIM in BIM tools

- Every detail plan includes a design, e.g. Quarter design which is used to communicate the plan intent and to study design options during the process
- Generally quarter or building scale BIM is not our trade, so we mostly leave it for the clients and their consultants. The job of a detail planner is to guide the design.
- BIM & Game models (Unity) have proved an excellent way to communicate design, as they provide the tools to explore and measure the model in realtime.



Unofficial outdated design

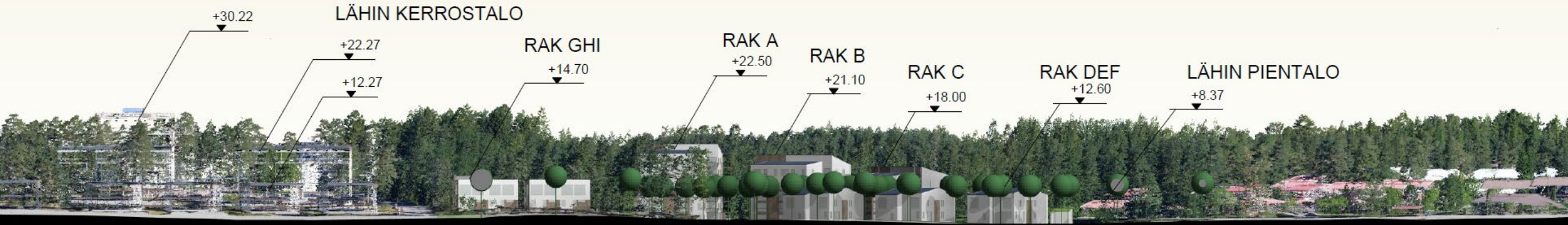


Unofficial outdated design

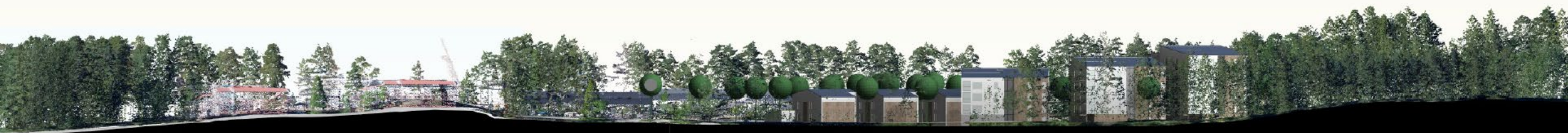




Alueleikkaus Koukkuniementieltä (näköy näköy etelästä)



Alueleikkaus Koukkuniementieltä kevytliikenneväylää pitkin täyttömäelle (näköy idästä)





M



*Scene X 2

3D View X

Progress Inspector X

Search for layers, objects or attributes

- Basemap Imagery3
- Footprints [488 objects]
- Streetnetwork [155 objects]
 - Network
 - Blocks
- New Shapes [0 objects]
- kalajarvi-maasto-cetopo [1 object]
- 1_pikkuaukio [2 objects]
- 1_pihakatu [4 objects]
- 1_hulevesi [5 objects]
- 1_aukio [1 object]
- 1_nurkkapuisto [7 objects]
- 1_viljely [15 objects]

Navigator X

Search for files in workspace All types

- models
- rules
 - Buildings_Advanced_Building
 - Support
 - Building Construction.cga
 - Buildings_Standard
 - Landscape_Design_Greenspace
 - Support
 - Greenspace Construction.cga
 - README.txt
 - Water.cga
 - Landscape_Design_Hardscape
 - Bench.cga
 - BuildingVolume.cga
 - Fountain.cga
 - Pergola.cga
 - TrellisWelded.cga
 - Water.cga



Inspector X















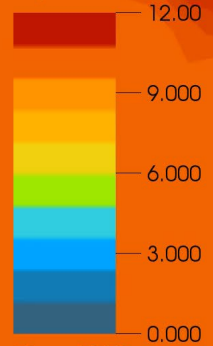




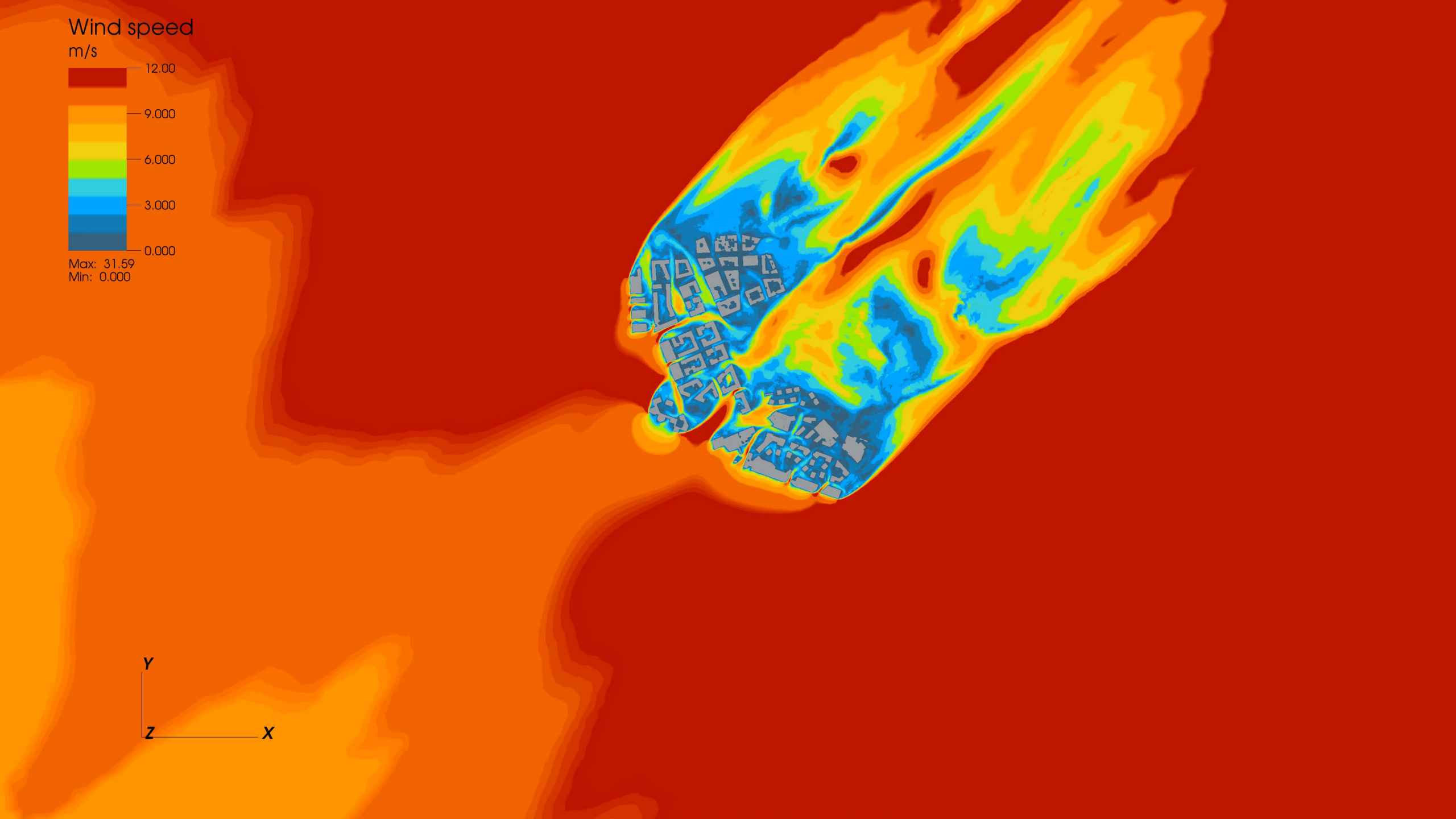
Name	Shape
Shape Parameters	
Rules	
Rule File	/Example_Planning_05_Urbar Assign...
Start Rule	Lot Select...
Building Construction Default Style	
DISPLAY OPTIONS	
Display_Textures	<input checked="" type="checkbox"/> Enabled
Display_Thematics	Thematics Off
Solid_Color	#FFFFFF
Transparency	1
Story_Edge_Display	<input checked="" type="checkbox"/> Disabled
Story_Edge_Size	0.15
Story_Edge_Color	#ffffff
BUILDING HEIGHT	
Floor_Count_Min	6
Floor_Count_Max	6
Variation_Mode	None
Upper_Floor_Height	3
Ground_Floor_Height	4
Foundation_Adjustment	0
Sidewalk_Height_Match	0
BUILDING SETBACKS	
Street_Setback	0
Back_Setback	3
Side_Setback	0
Street_Setback_Mode	None
Street_Setback_Distance	2
FOOTPRINT LAYOUT	
Layout_Shape	Along Street
Layout_Orientation	Open To Back

Wind speed

m/s



Max: 31.59
Min: 0.000



Future

Future predictions 2017

- CityEngine and other parametric design tools
- Machine learning and man-machine partnership in design?
- CityScope, 3d print automatization from Locus environment?

Future predictions 2021

- CityEngine and other parametric design tools
- Machine learning and man-machine partnership in design?
 - Neural networks testing 2019
 - Spacemaker AI (pilot pending) – maybe too computational as an approach
 - Hoping for better iterative design tools – giving guidelines, machine does the detail
- Pilot processes converging towards tools for co-design and citizen interaction
- Increasing focus in data visualization and simulation in CIM, e.g. climate parameters estimation, connectivity and accessibility analyses...
- More everyday use of tools, less dependency on consultants, more design options, better big picture
- Continuous masterplan process
- CityScope, 3d print automatization from Locus environment?

CityScope



A GAN
neural
network
test: it is
possible to
teach an
AI to mimic
human city
planning

