

# Digital Twins for the Built Environment

## How to utilize Digital Twins in daily operations of Smart Cities?

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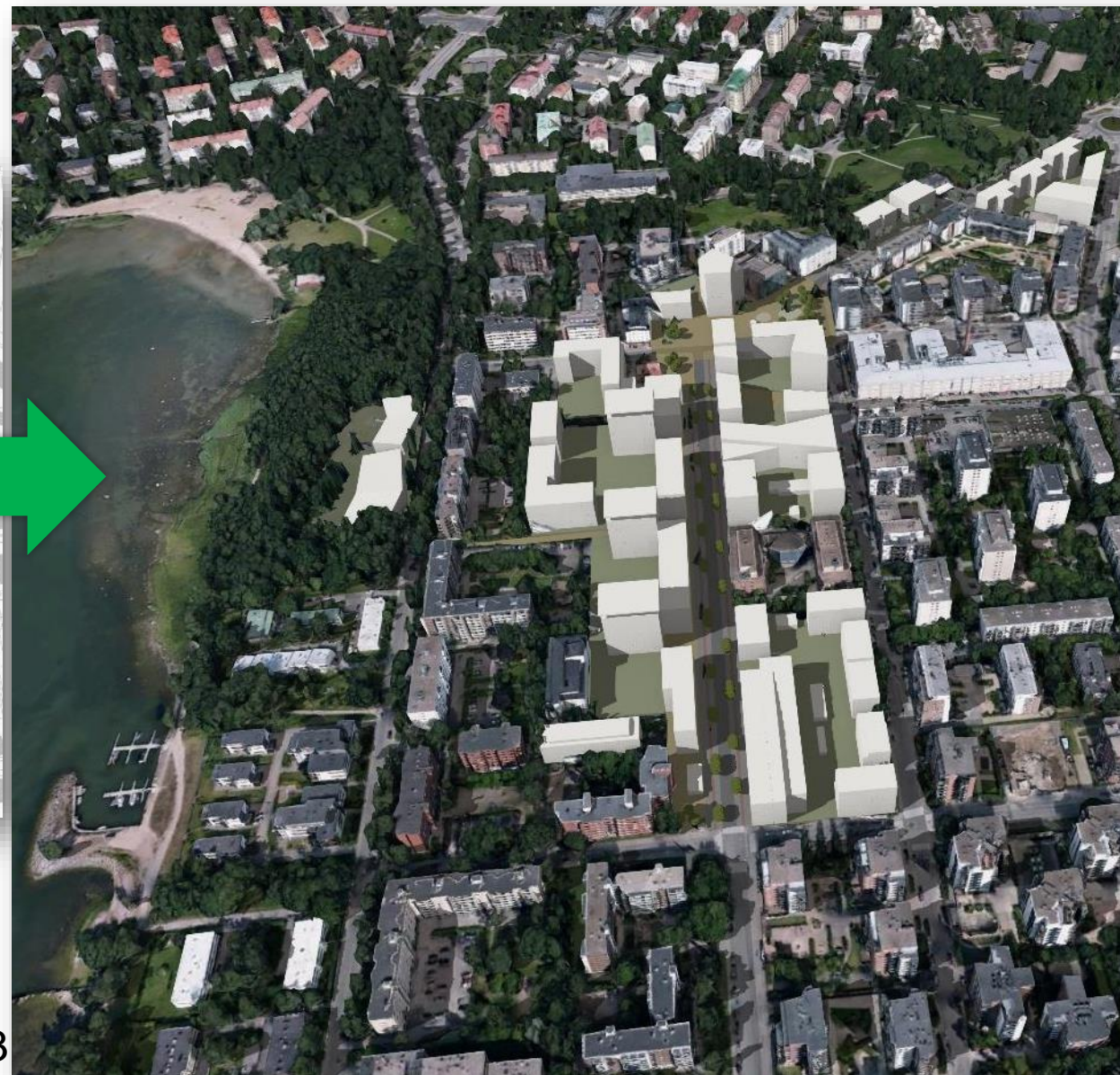
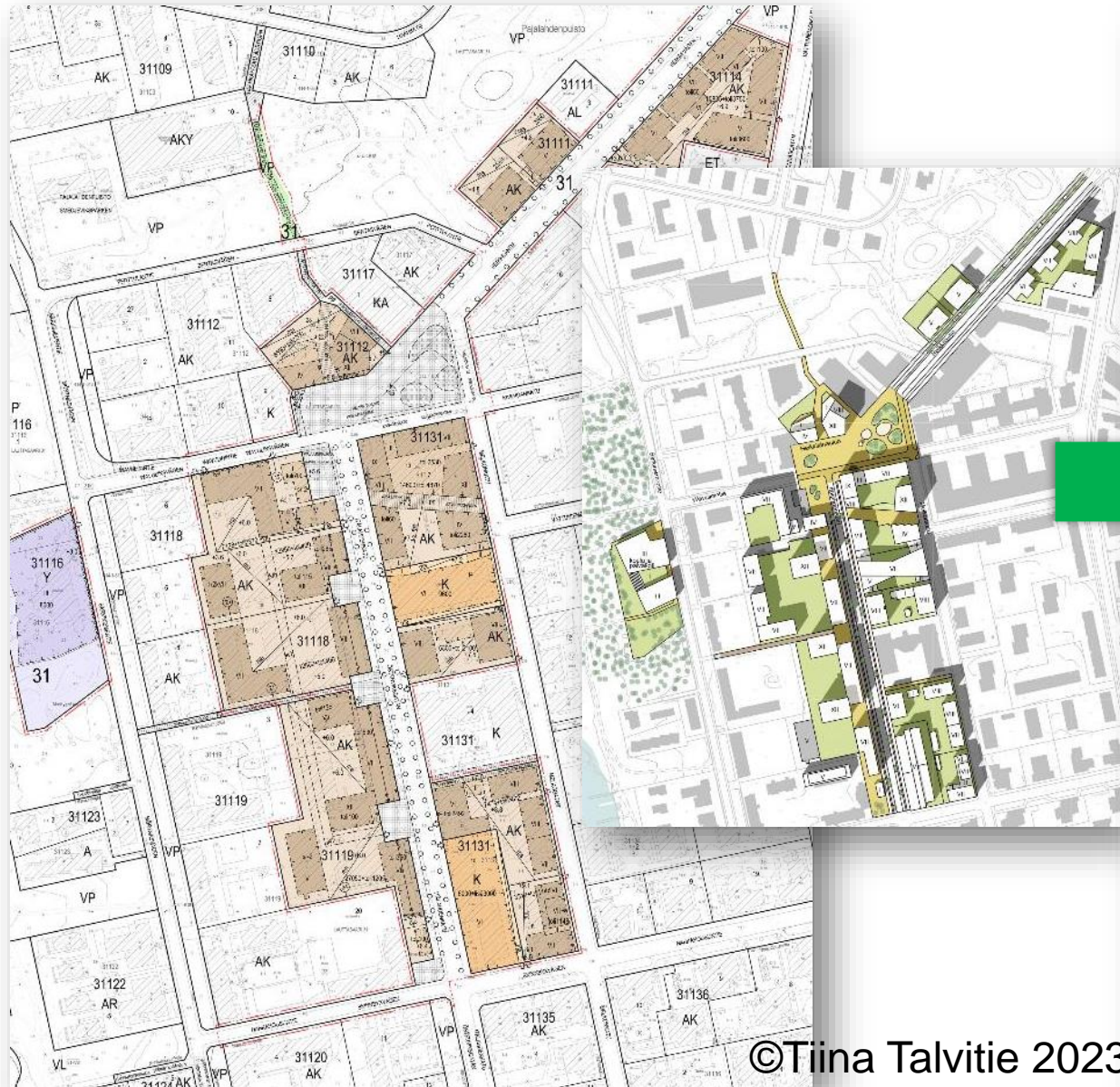
# DESIGN YOUR ULTIMATE DRIVING MACHINE.™



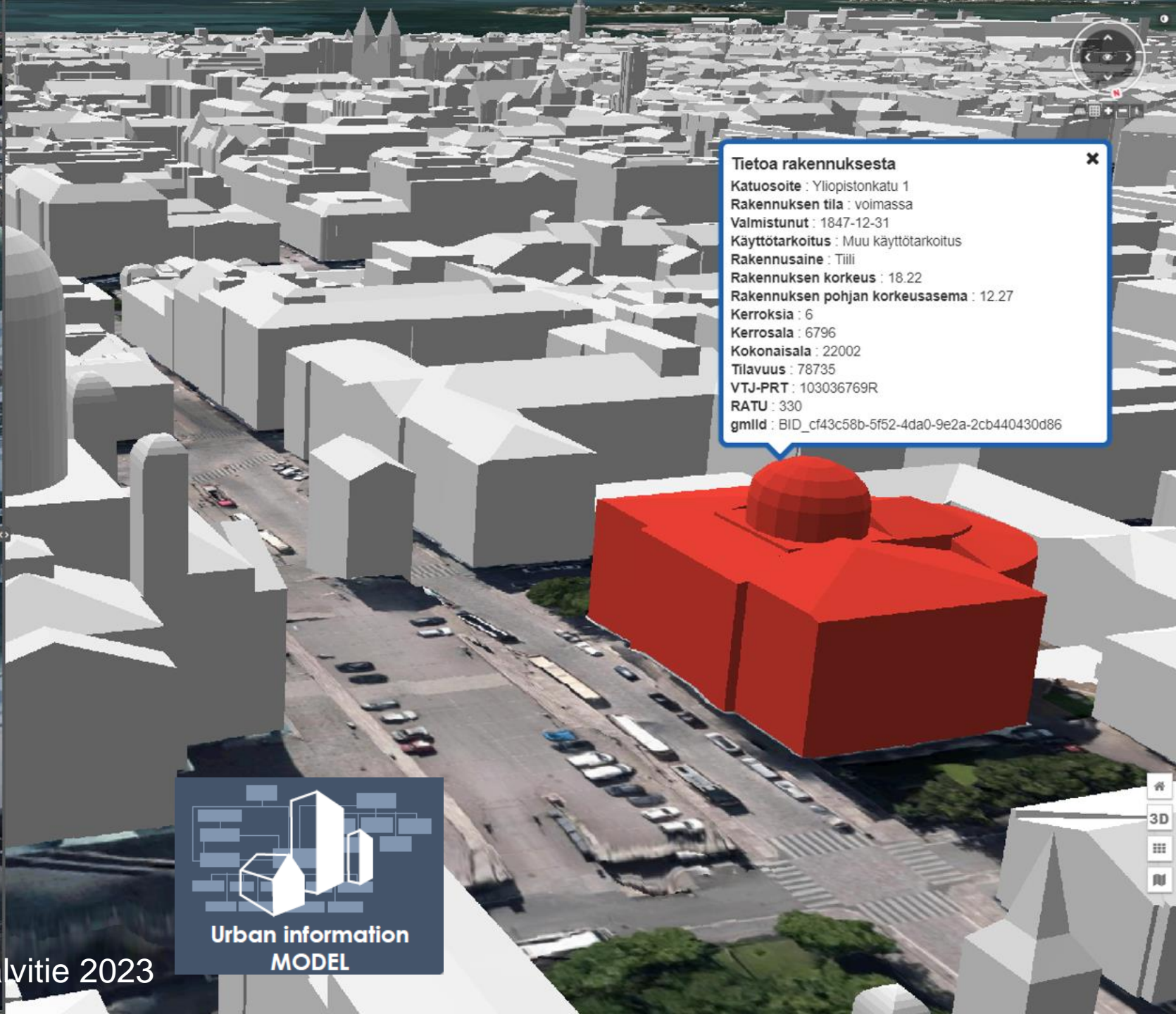


# How do we Design our Cities?

## Digital Twin as a City Design Studio







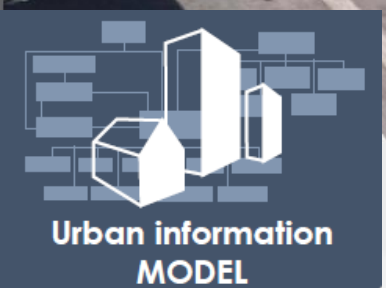
**Tietoa rakennuksesta** ✕

Katuosoite : Yliopistonkatu 1  
Rakennuksen tila : voimassa  
Valmistunut : 1847-12-31  
Käyttötarkoitus : Muu käyttötarkoitus  
Rakennusaine : Tiili  
Rakennuksen korkeus : 18.22  
Rakennuksen pohjan korkeusasema : 12.27  
Kerrosala : 6796  
Kokonaisala : 22002  
Tilavuus : 78735  
VTJ-PRT : 103036769R  
RATU : 330  
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# Helsinki Energy and Climate Atlas

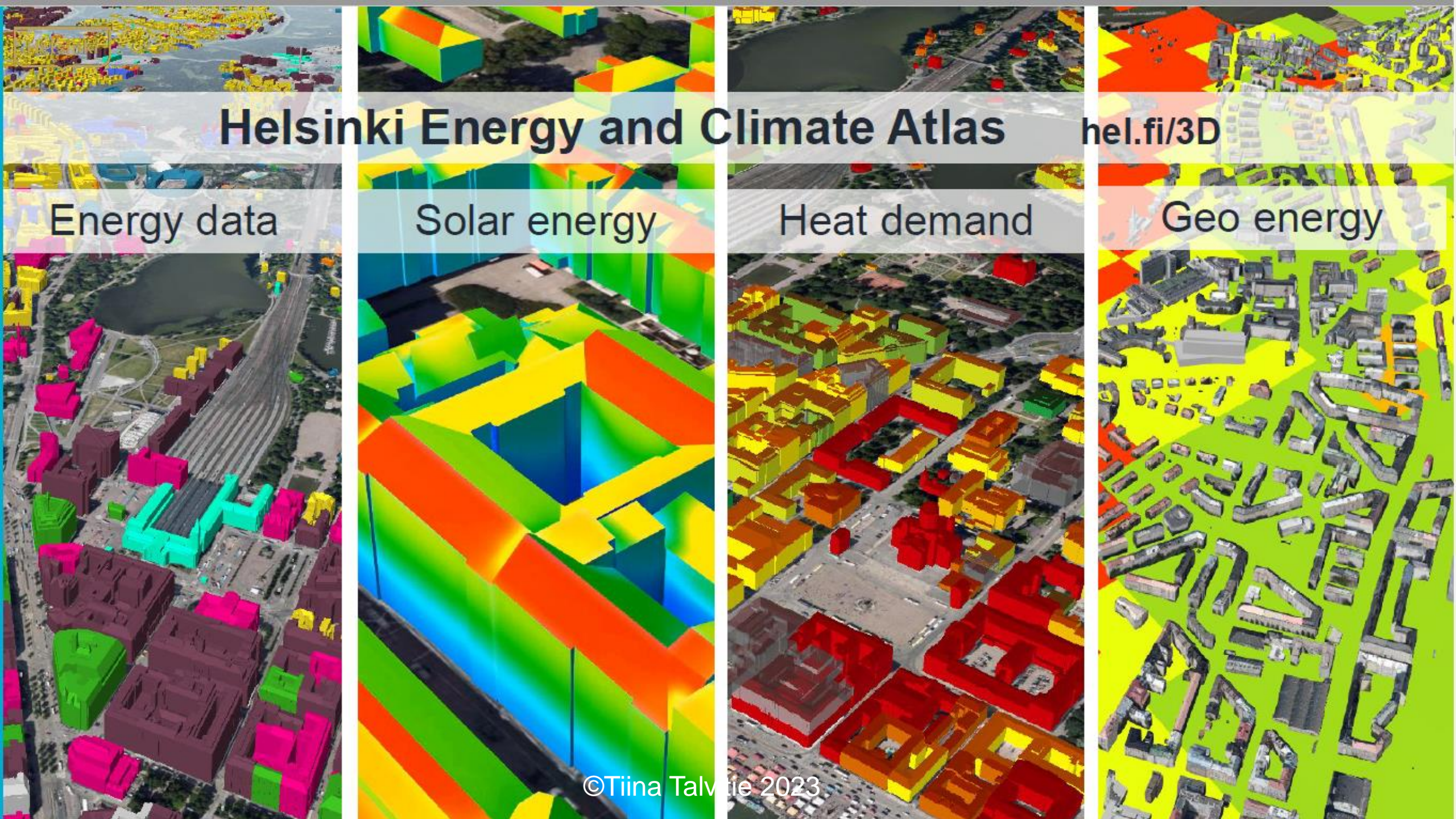
hel.fi/3D

Energy data

Solar energy

Heat demand

Geo energy





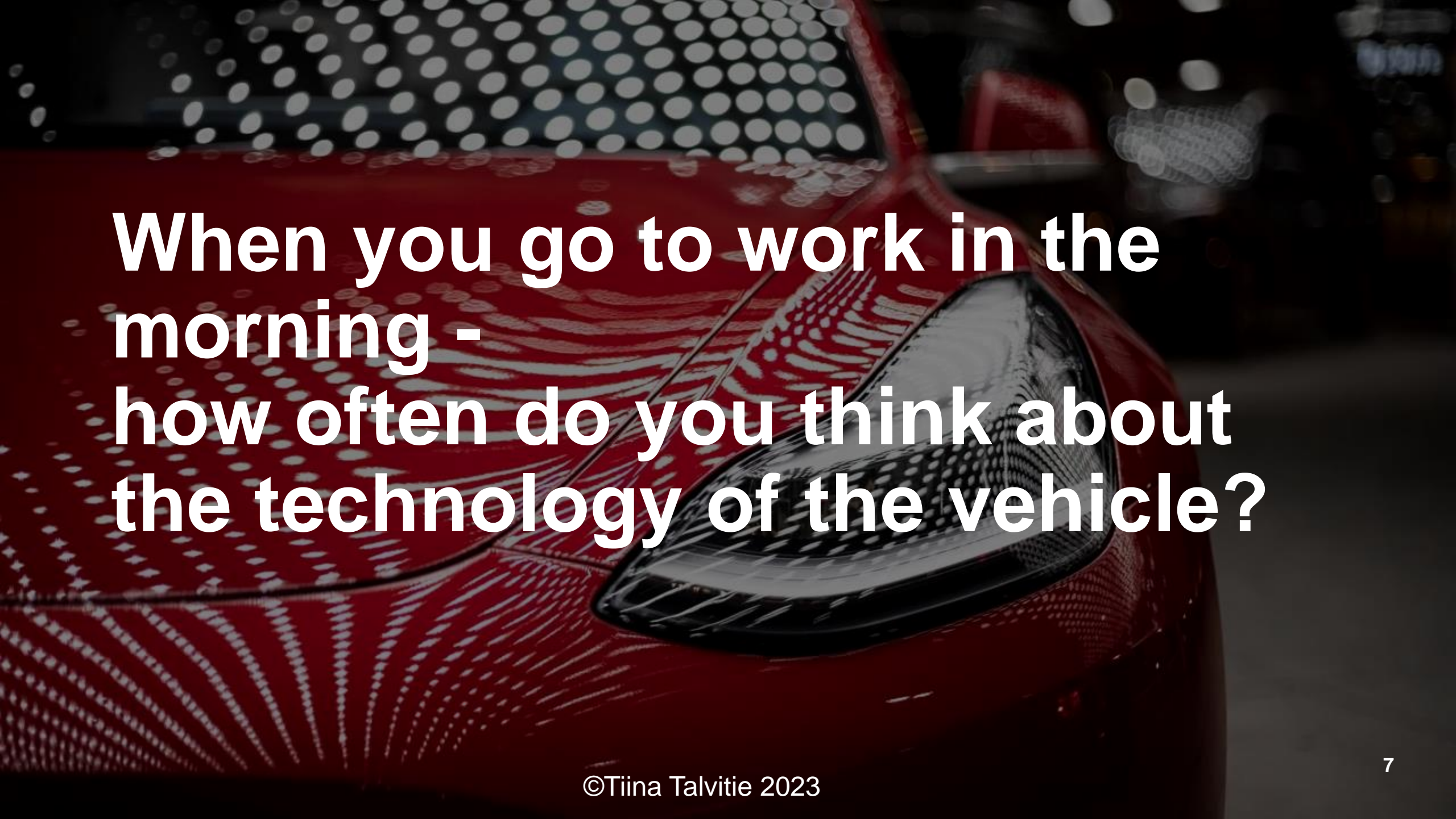
# “The Smart City Maturity”

How capable are we at utilizing Digital Twins in daily operations in our cities?

## Why is deployment struggling?

Technology development is fast  
We also have advanced software available





**When you go to work in the morning - how often do you think about the technology of the vehicle?**



Do we need a cultural  
change in our mindset?

# **Leadership** for promoting digital transformation

**Experimental culture**  
Creating enthusiasm  
by involving the users



# Decision making based on knowledge

## Digital Twins in the center of city operations

Digital Twin as a **dashboard** to information

Data should be **integrated** to the operational customer processes

**Decision making** based on knowledge should support employees' daily work

Need for **data analysis** and dynamically visualized **situational data** over the whole city

**Business and customer needs** should be driving development



# Experimental Culture – Time to pitch

- Focused innovation → use cases
- Concept development
- Pitching user stories and benefits
- **Fail fast** → learnings → new experiments
- Proof-of-concept (PoC) for "winners"
- **9 PoC** projects utilizing Digital Twins at the core of operations in Environment Division's service units  
Own data, own customer processes, own everyday language





Digital Twin PoC videos are published in Helsinki channel

[https://www.helsinkikanava.fi/en\\_US/series](https://www.helsinkikanava.fi/en_US/series)

## [“Digital Twin - experimental development project”](#)

1. Introduction to the “Digital Twin” project
2. Mobile service request @ Digital Twin
3. Mobile Room Reservation @ Digital Twin
4. City planning, case: Landbo
5. City planning, case: Merihaka & Pihlajisto
6. Evaluating planning permission with cityscape review
7. 3D urban tree database
8. Asset management of public areas
9. Infrastructure models
10. Streamlining street work process
11. Home street service
12. Segregation

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## Digital Twin - experimental development project



**Introduction to “Digital Twin” project**  
4 min 4.4.2023

This video reveals the background and goals of the “Digital Twin” experimental development project. L...

Suosittelu  
Kaupunkiympäristö



**Mobile Service Request @ Digital Twin**  
1 min 4.4.2023

The goal of this PoC was to make a mobile application for service requests. The Urban Environment...

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Digital Twin - experimental develop...



**Mobile Room Reservation @ Digital Twin**  
3 min 4.4.2023

The goal of this PoC was to make a mobile application for room reservations. The Urban Environment...

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Digital Twin - experimental develop...



**City Planning Digital Twins Case: Landbo**  
2 min 4.4.2023

The goal of this PoC was to study Landbo area planning principles and a local detailed plan in a 3D city...

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Digital Twin - experimental develop...



**City Planning, case: Merihaka & Pihlajisto**  
3 min 4.4.2023

We used the 3D city model in the planning principles of two areas in this PoC project: Pihlajisto and...

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**Evaluating Planning Permission with Cityscape Review**  
2 min 4.4.2023

In this PoC project, we wanted to utilize a 3D city model in the cityscape review of the Building...

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**3D Urban Tree Database Digital Twins**  
2 min 4.4.2023

In this PoC project, two-dimensional data on urban tree assets was brought into the 3D city model. The...

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**Asset Management of Public Areas**  
3 min 4.4.2023

The goal of this PoC was to bring the 2D register of public areas, which includes infrastructure assets such...

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**Infrastructure Models**  
2 min 4.4.2023

The goal was to improve the flow of information about infrastructural models and the management of the...

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**Streamlining Streetwork Process**  
4 min 4.4.2023

With this PoC project, we wanted to investigate how to minimize the adverse side effects of constructio...

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Digital Twin - experimental develop...



**Home Street Service**  
2 min 4.4.2023

We used spatial information in this PoC so that residents could find out what services or roadworks were...

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Digital Twin - experimental develop...



**Segregation**  
3 min 4.4.2023

Our aim was to test what added value the 3D city model could bring to discussion and working with...

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Digital Twin - experimental develop...



# Experiments continue with new topics

1. Neighbor hearing in the building control process
2. Visualization of the detailed city plan database information in the 3D city model
3. Green infrastructure in digital twins (tree extraction with laser scanning data)
4. Public areas in digital twins (road damage data)
5. Visualization and simulation of vegetation and lighting in urban planning
6. Common approaches to drone photography and data sharing
7. Mobile app for maintenance and user services
8. Helsinki 3D City Model for authorities
9. Helsinki U-Space





# Helsinki U-space PoC

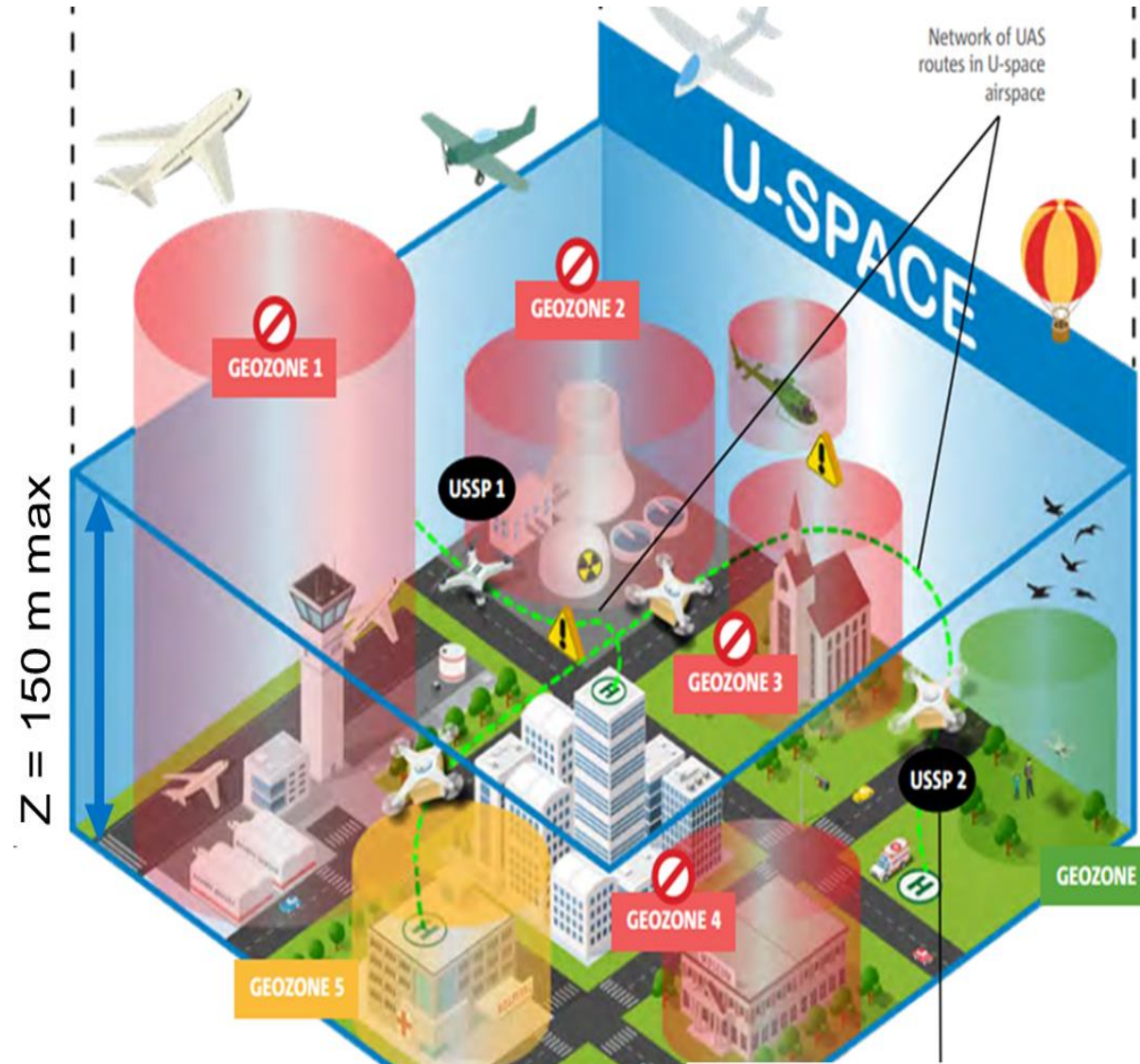


- **Simulations** on a digital twin platform:
  - The prohibited, restricted and allowed **geo-zones** with codes for the complex unmanned, electronic and digitalized aviation with air navigation services (USSP).
  - **Vertiports, flight paths, corridors**
  - **Event information** causing time-limited restrictions
- Showing **possibilities** and **opening discussion** related to
  - **Business** possibilities
  - Proactive **land use planning**
  - **Co-operation** involving the **national aviation authority** and **industry forerunners**

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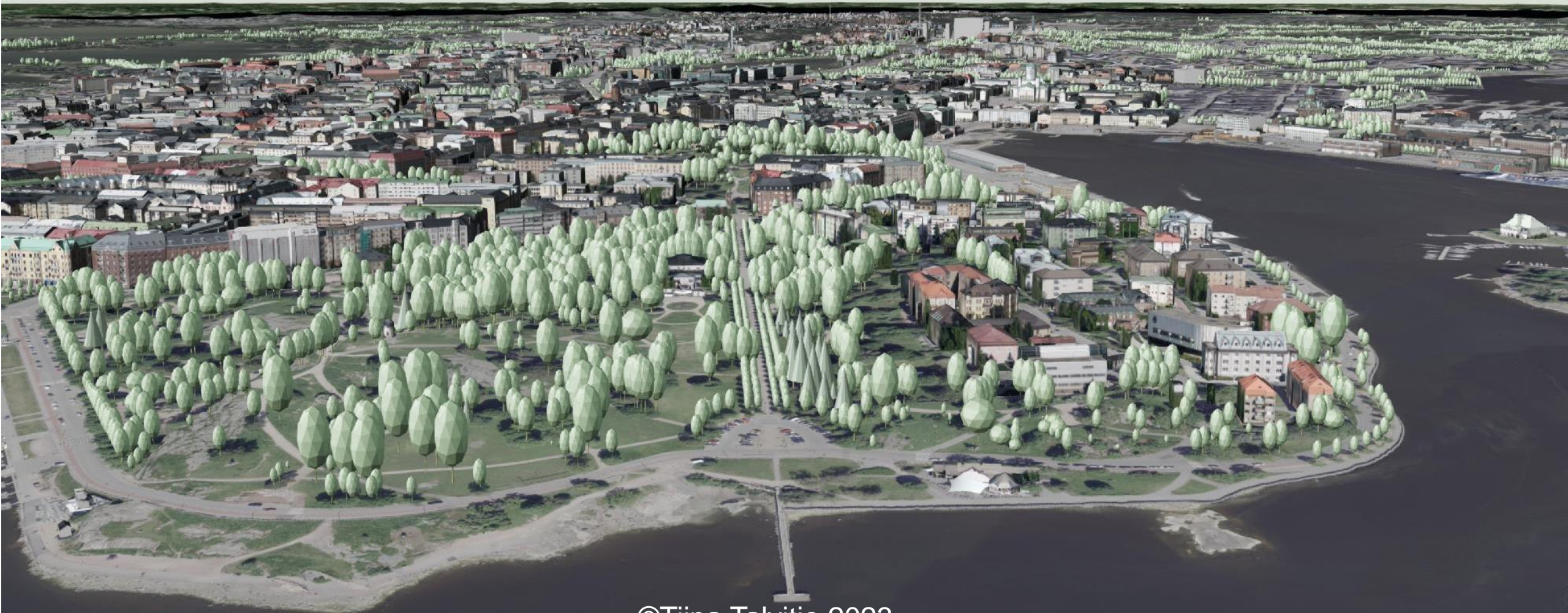
**U-space** is an European framework for **unmanned airspace**, max h=150m. Framework enables simultaneous, dynamic and safe aerial operations **above urban areas**.





# Digital Twins for the Built Environment help to run a Smart City

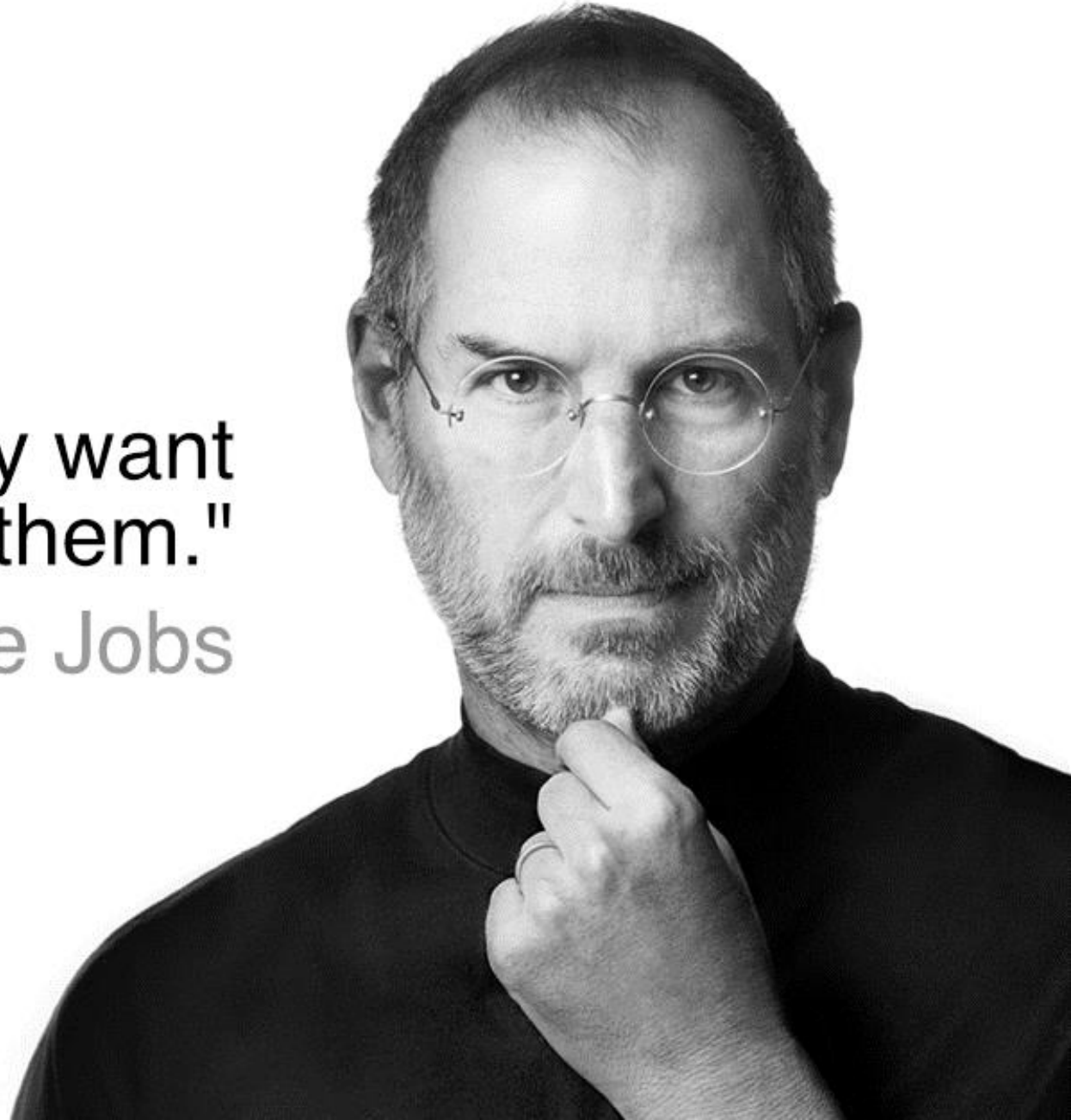
Instead of development in silos, digital twins combine both static and dynamic city objects as well as circumstances and phenomenon, time perspective and life-cycle information





"People don't know what they want  
until you show it to them."

- Steve Jobs





# Thank you!

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