

DIGITALA TVILLINGAR AV STÄDER AI SOM STÖD I PLANERING, STYRNING OCH FÖRVALTNING

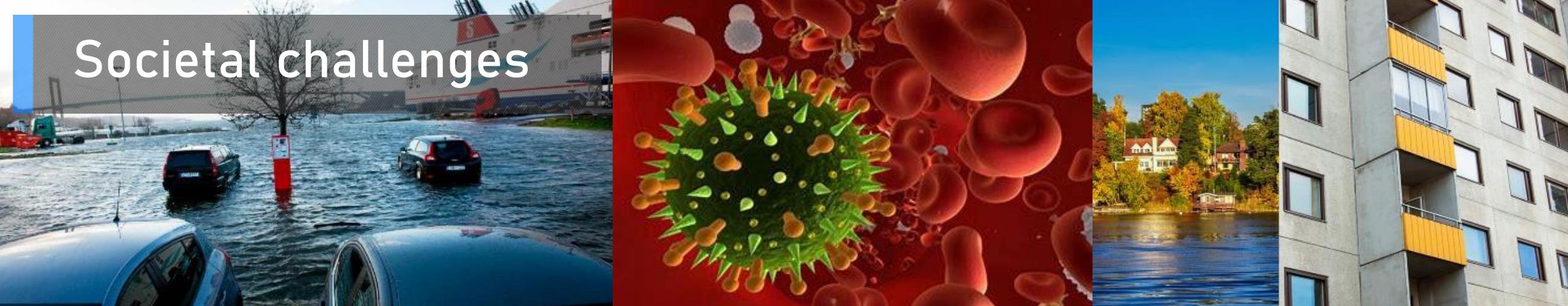
STORA BIM-DAGEN 2023-04-26

ERIC JEANSSON

GEODATASTRATEG, PROJEKTLEDARE VIRTUELLA GÖTEBORG



Societal challenges



7 RENEWABLE ENERGY



8 GOOD JOBS AND ECONOMIC GROWTH



9 INNOVATION AND INFRASTRUCTURE



10 REDUCED INEQUALITIES



11 SUSTAINABLE CITIES AND COMMUNITIES

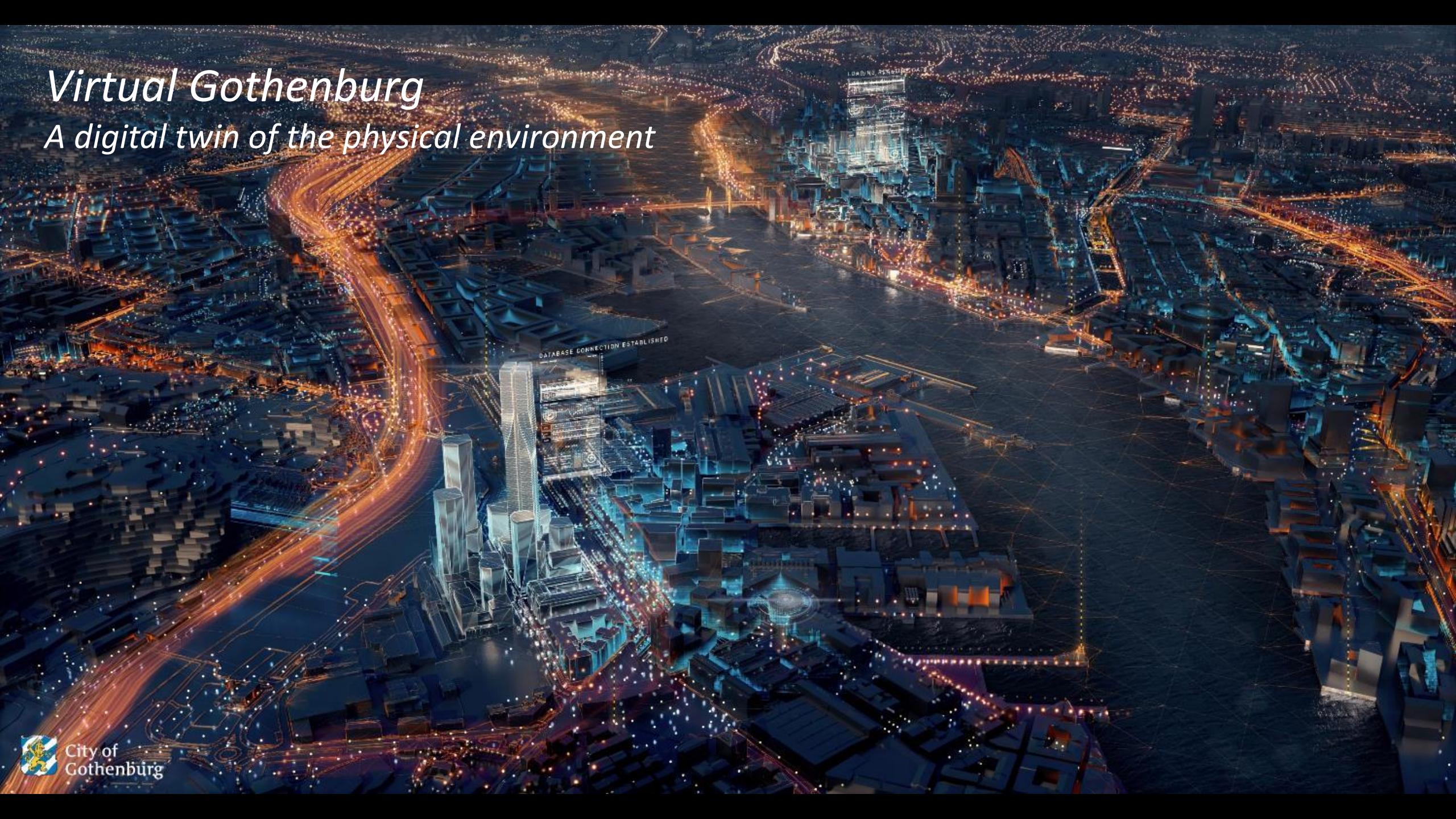


12 RESPONSIBLE CONSUMPTION



Virtual Gothenburg

A digital twin of the physical environment



The background of the slide is a blurred aerial photograph of a city at night, showing a dense network of illuminated streets and buildings.

*The goal of the project is to contribute to a smarter and more efficient **planning, control, management** and **experience** of the city. This is done by developing a digital twin, which enables modeling, analysis and visualization of the city's physical environment and the information linked to it*

*With the digital twin as a model, we can **understand** our challenges, create **consensus** on problems and solutions, and make the necessary **decisions** required for us to be able to build a sustainable and even better city*

BACKAPLAN

VIABLE CITIES

PRIVATE SECTOR

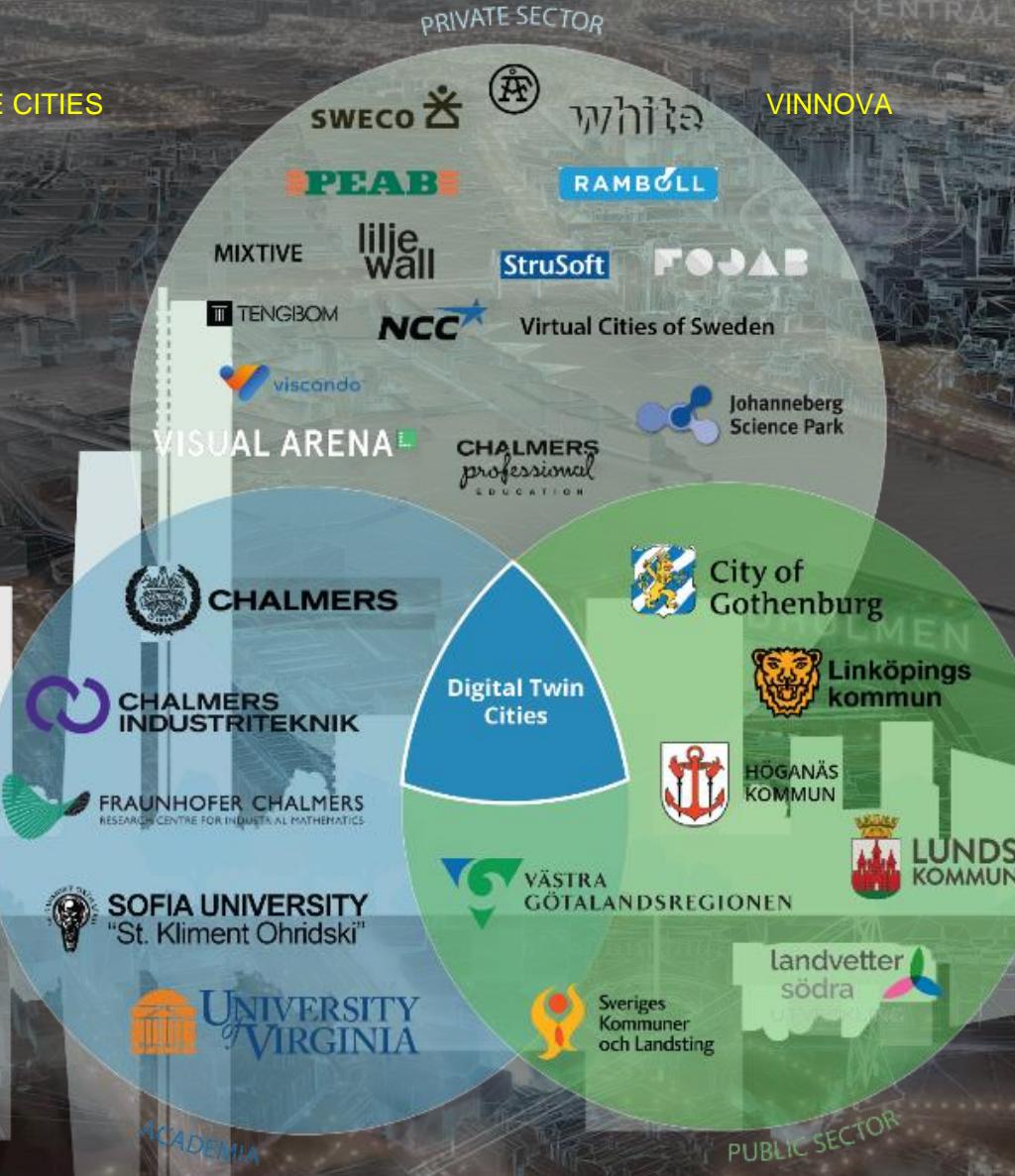
CENTRALENDOMRÅDET

Climate Neutral
Gothenburg
2030

VINNOVA

VINNOVA
VGR

Virtual
Gothenburg Lab



Investments of about 10 miljon euro in research and development of city digital twin technology in West Sweden

Key benefits of a digital twin in a sustainable city



Climate



Resilience



Planning



Maintenance



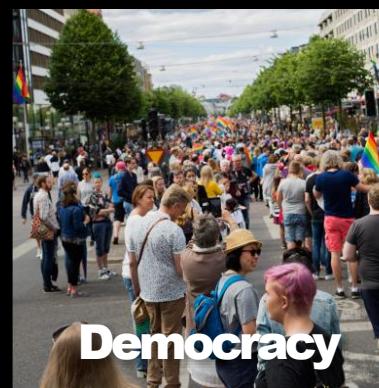
Tourism



Innovation



Learning

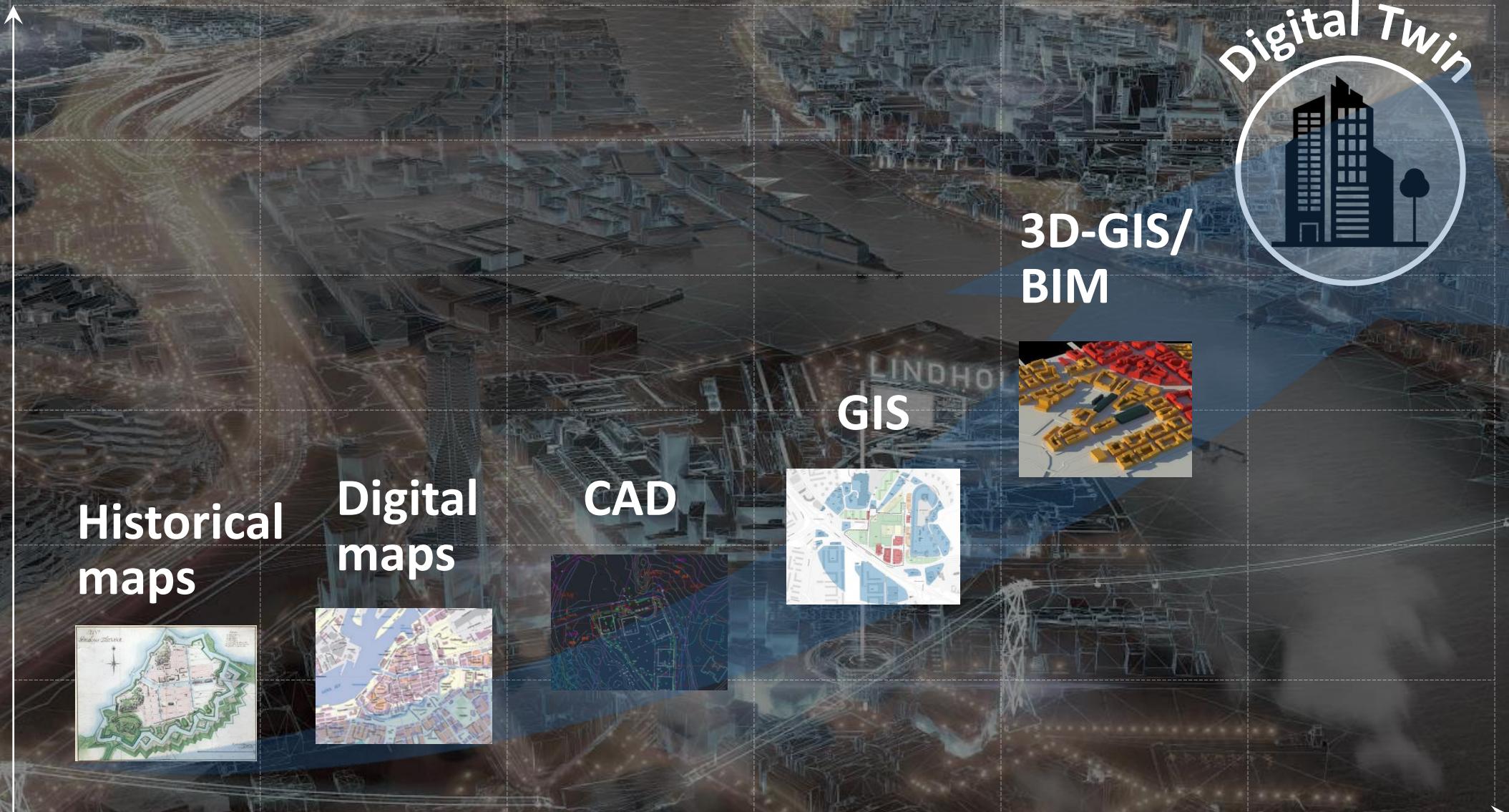


Democracy



Branding

COMPLEXITY



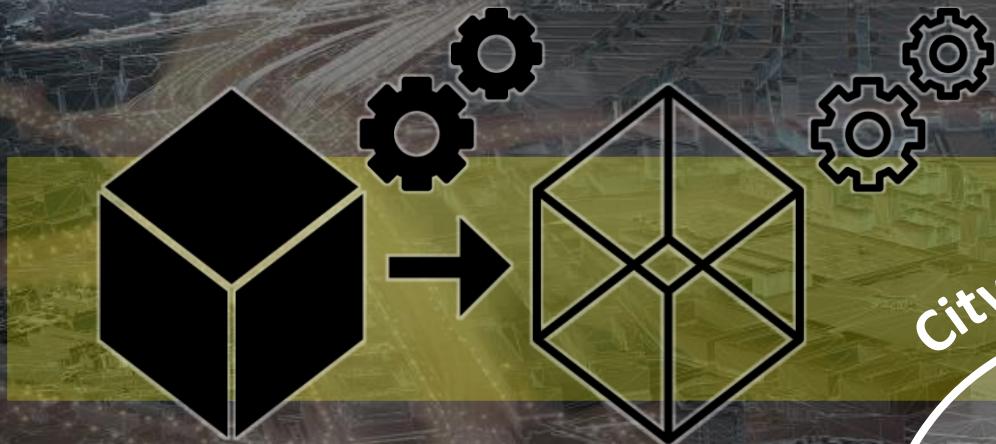
GENERATION

BACKAPLAN

CENTRALENDOMRÅDET

Visual (and/or functional) representation

Connected information
(could also be a twin by itself)



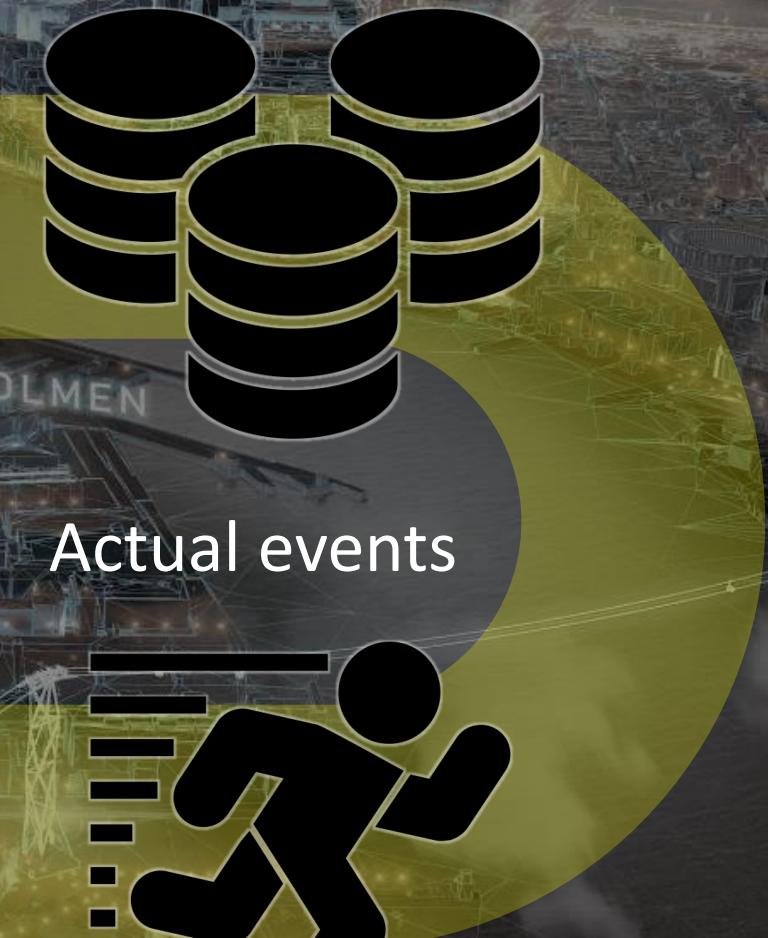
Actions (AI)



City Digital Twin



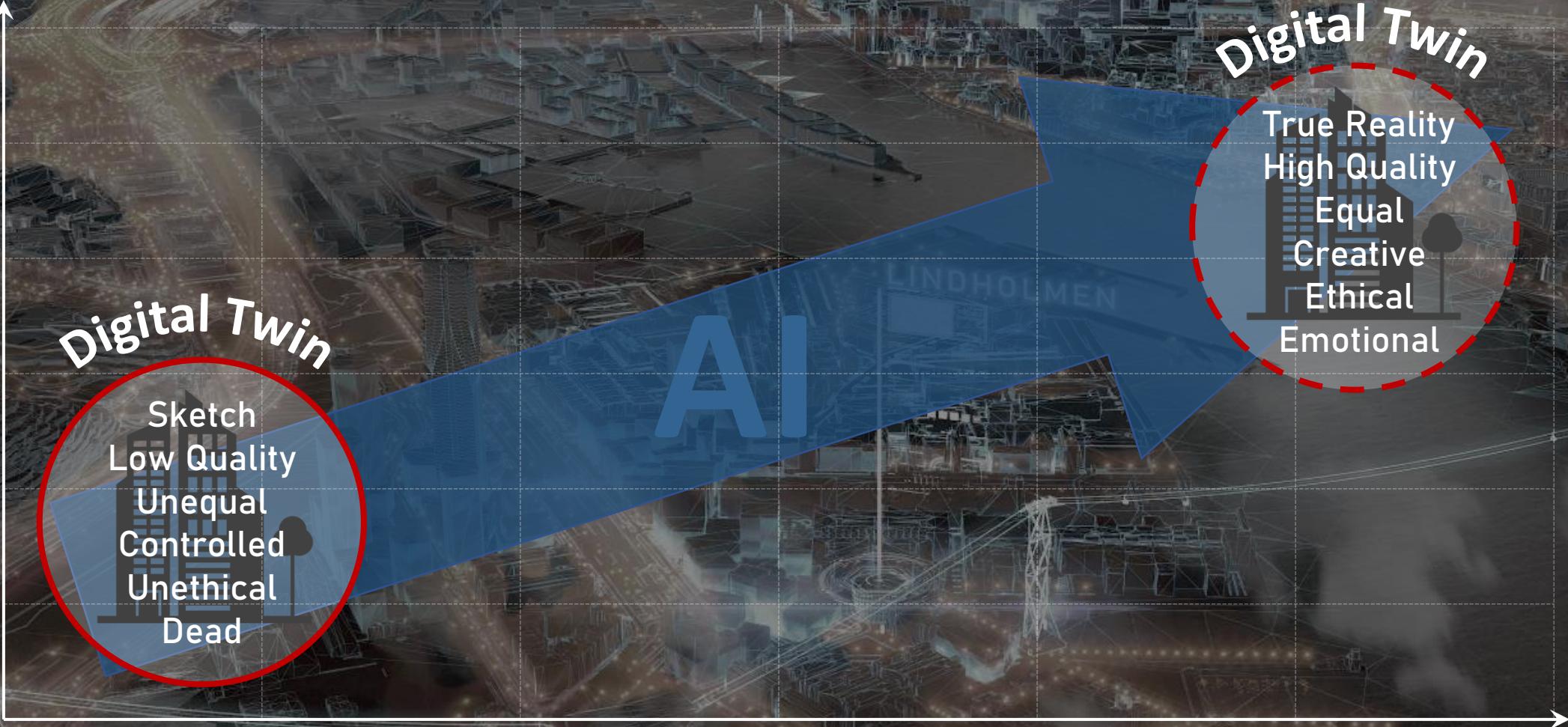
Actual events





"The AI dilemma" of the Digital Twin

DATA QUALITY



HUMAN



AI and Digital Twins for Urban planning and City management



Understanding



Exploring



Consensus



Actions Decisions

AI

Data gathering
Surveying
Crowd sourcing
Data analysis

Scenarios
Modeling
Parametric design

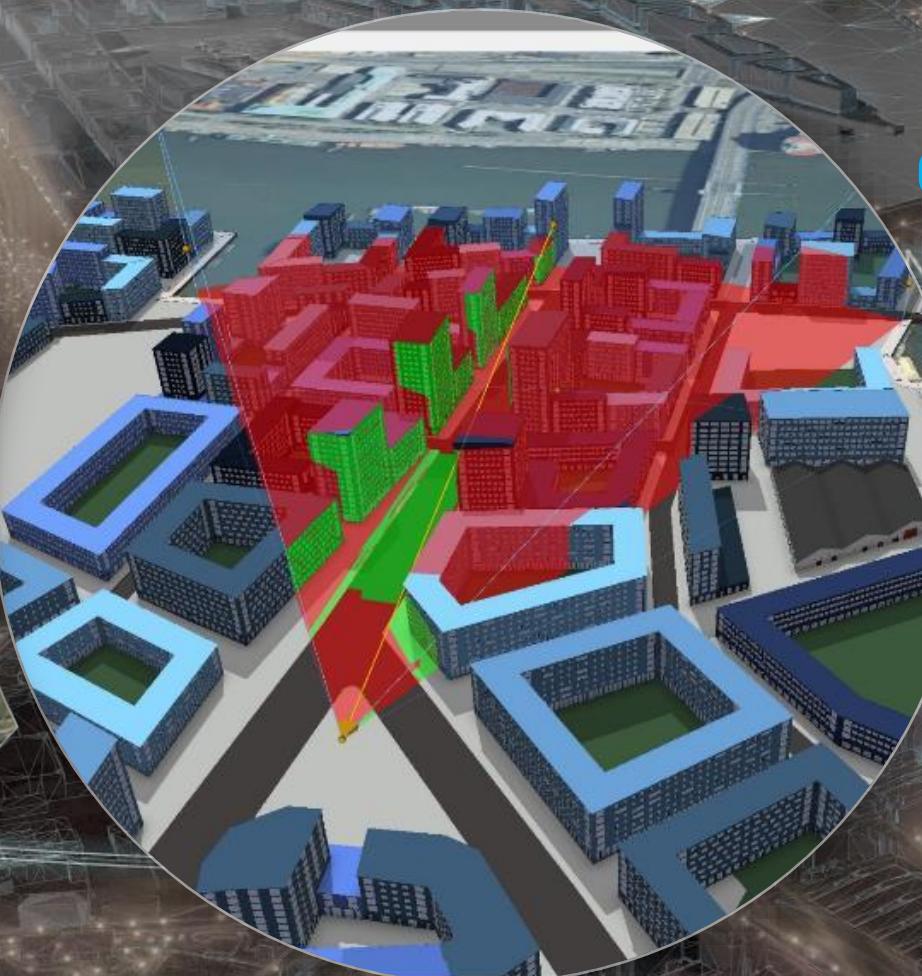
Decision support
Visualization
Metaverse

Time dimensions in a digital twin

Present
Maintenance



Simulated
Planning



Real time
Observe / Control



Timeless
Experience



Virtual Gothenburg can serve all processes in the city with relevant information and act as a platform for planning, monitoring, maintenance, experience, and also, an open testbed for innovation

ECOLOGICALLY SUSTAINABLE



Culture and
leisure



City development
Environment

ECONOMICALLY SUSTAINABLE



Business and
labour



Health and safety

SOCIALLY SUSTAINABLE

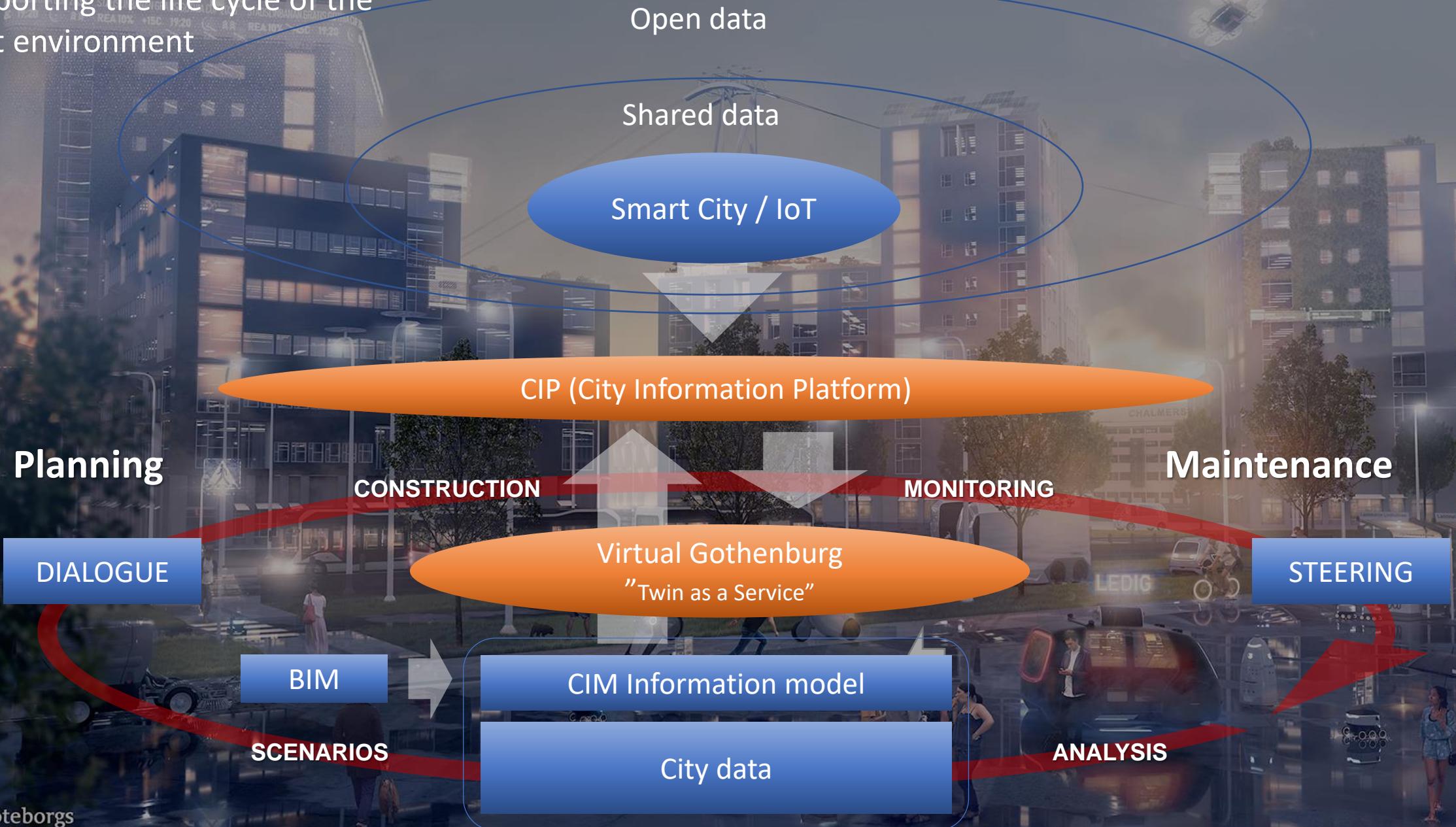


Democracy and
engagement



Education

Supporting the life cycle of the built environment

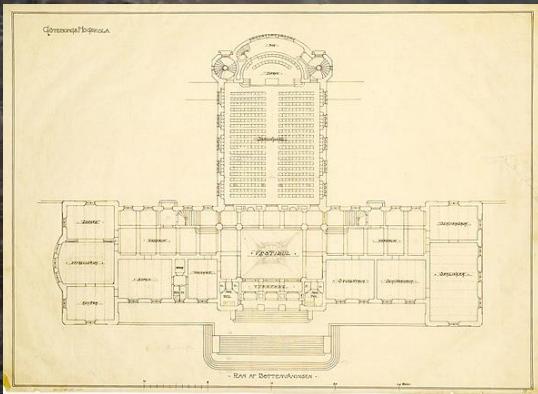


Göteborgs
Stad



BIM-data capture

Analogue drawings,
plans and blue prints



Digital drawings, plans
and blue prints

BIM-models

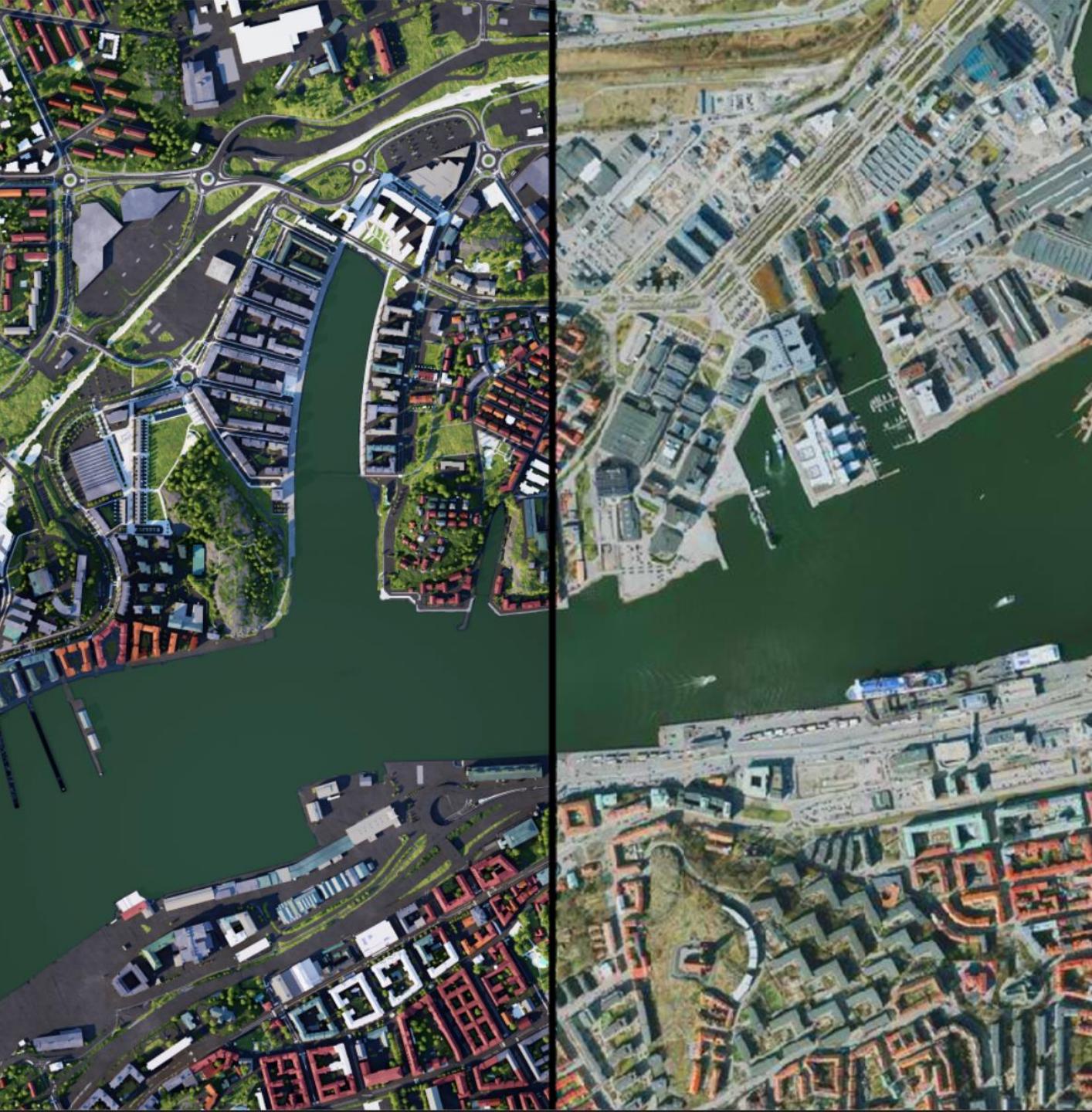
ETL-processes

AI

Intelligent
3D-models



Model



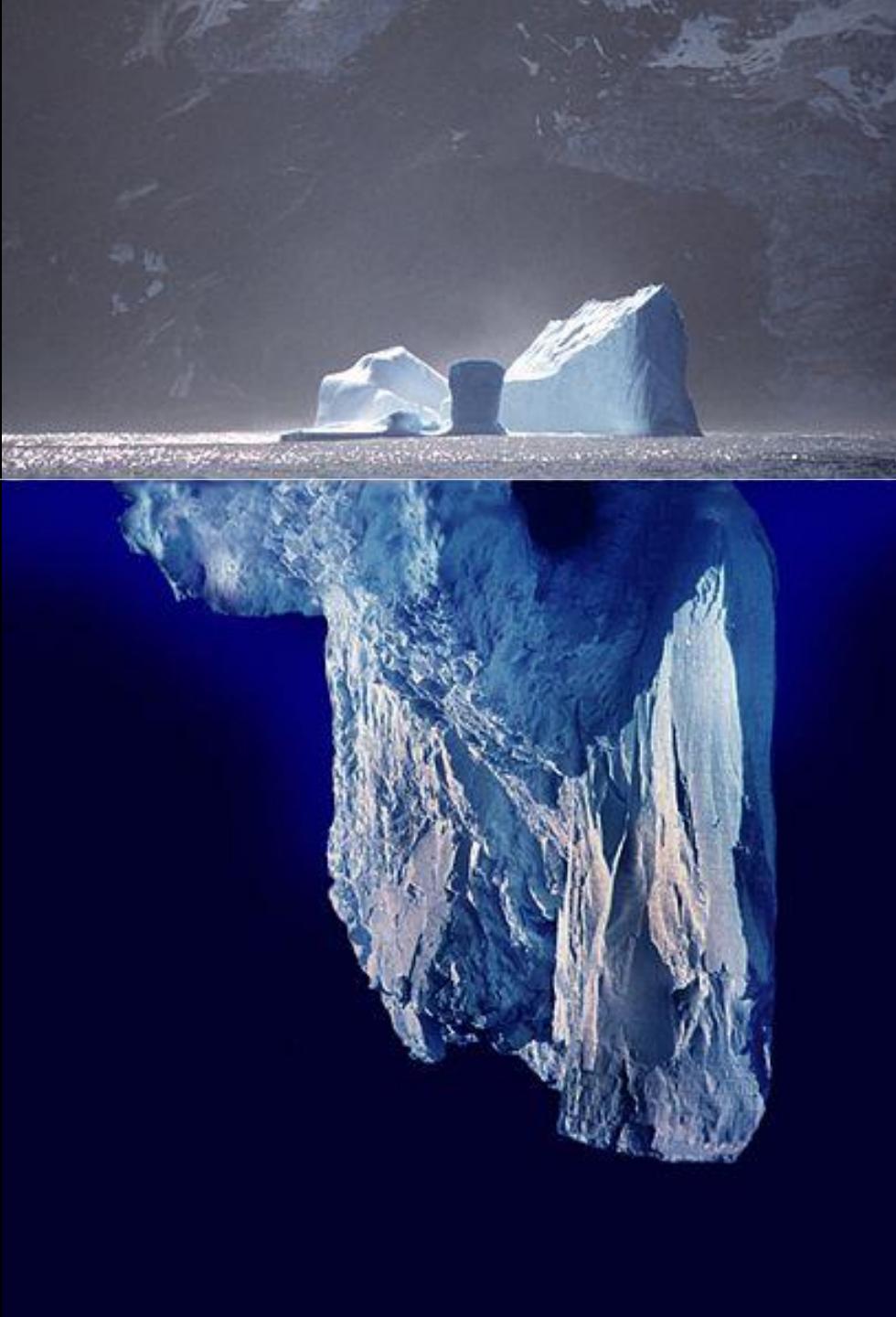
Reality

800 km² digital twin



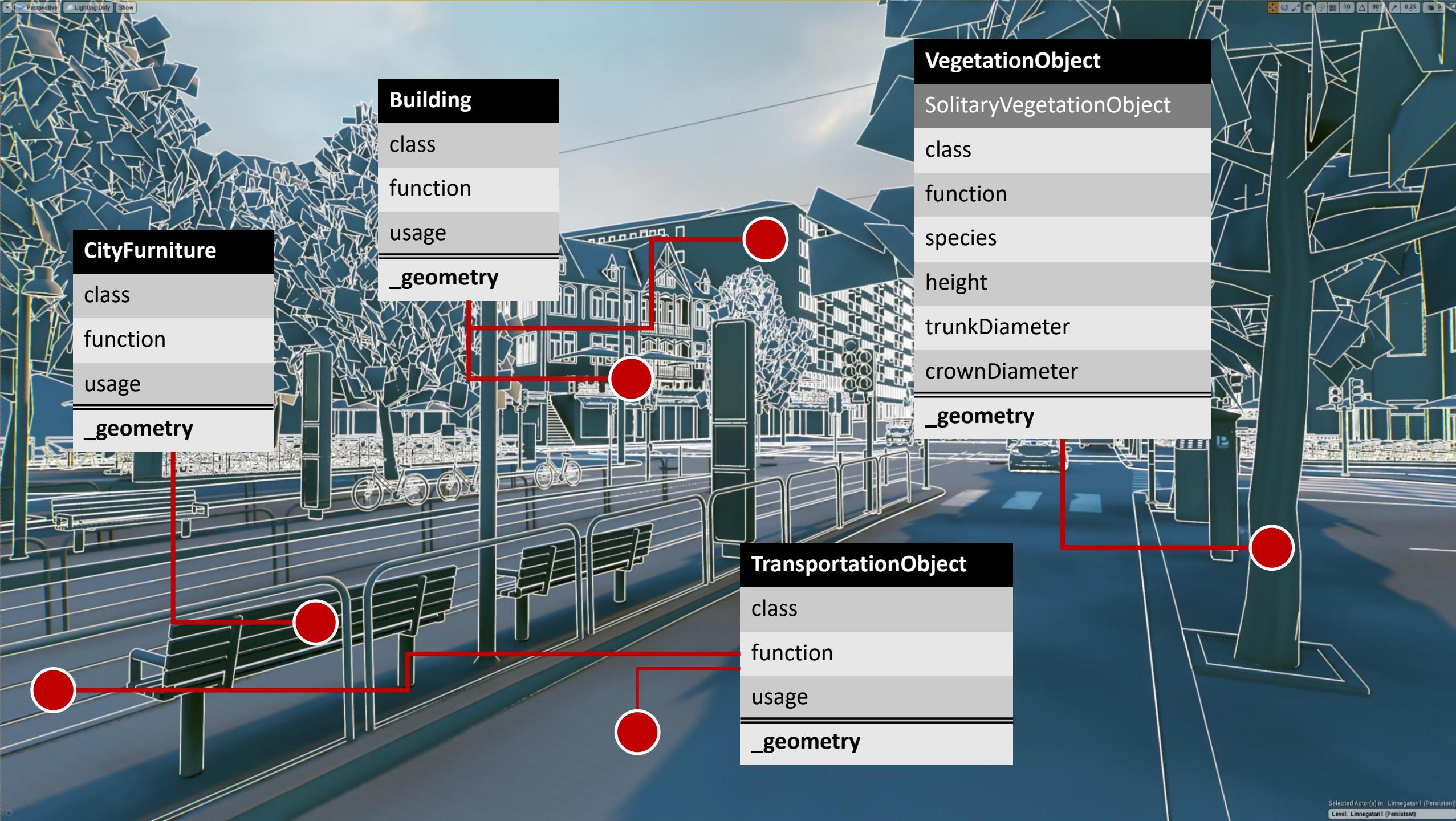






World
representation

Associated data



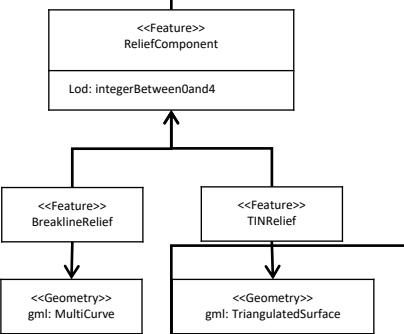
CIM – City Information Model

A ”BIM-model for the built environment”

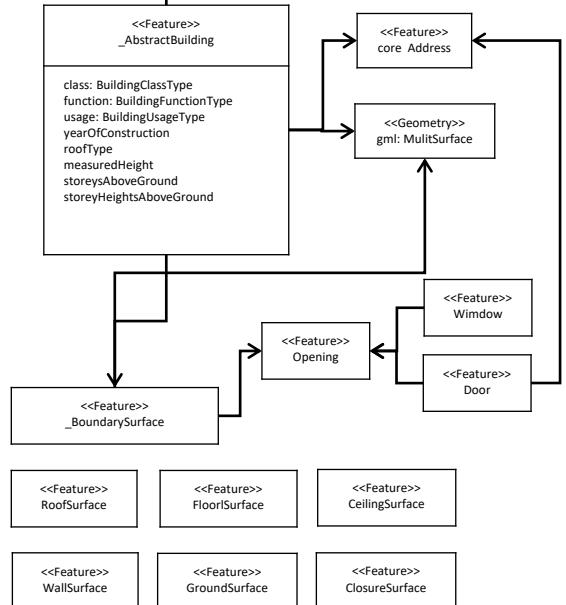
”A common ownership, definition-
and information model describing
the physical built environment”

Digital Twin / CIM data model v 1

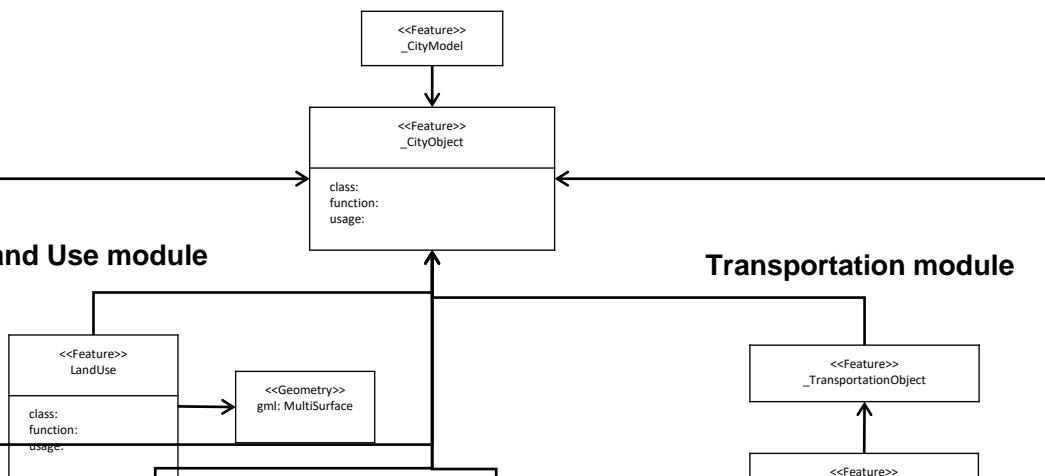
Digital Terrain module



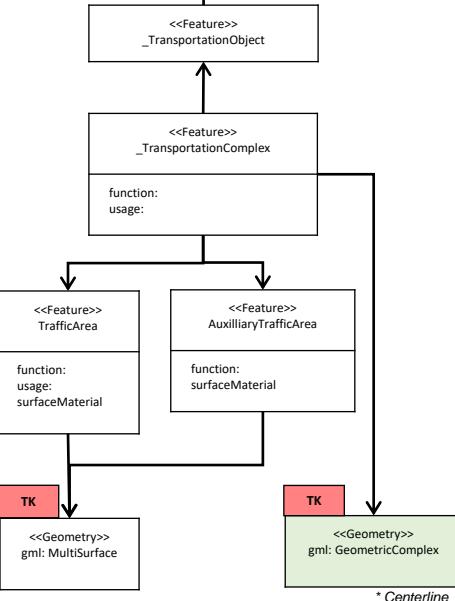
Building module



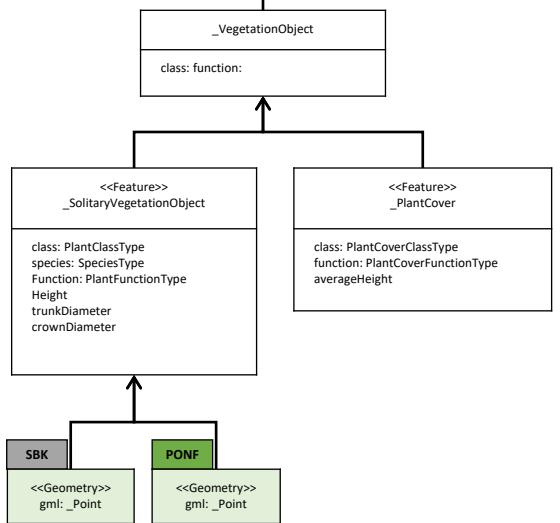
Land Use module



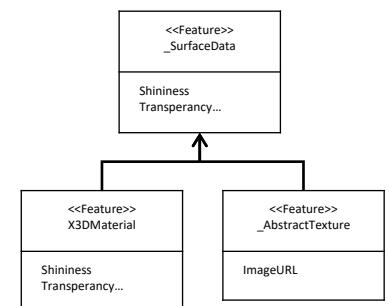
Transportation module



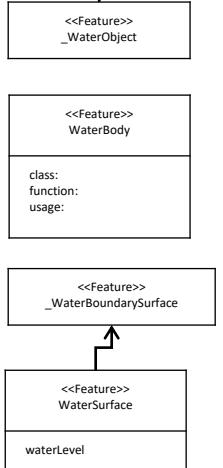
Vegetation module



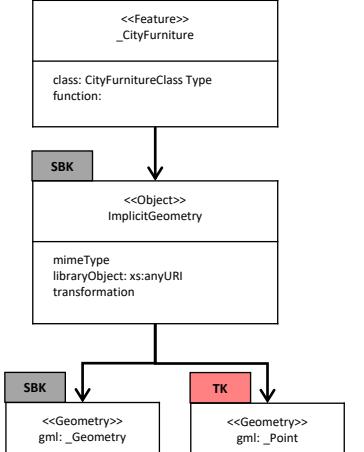
Appearance module



Water module



City Furniture module



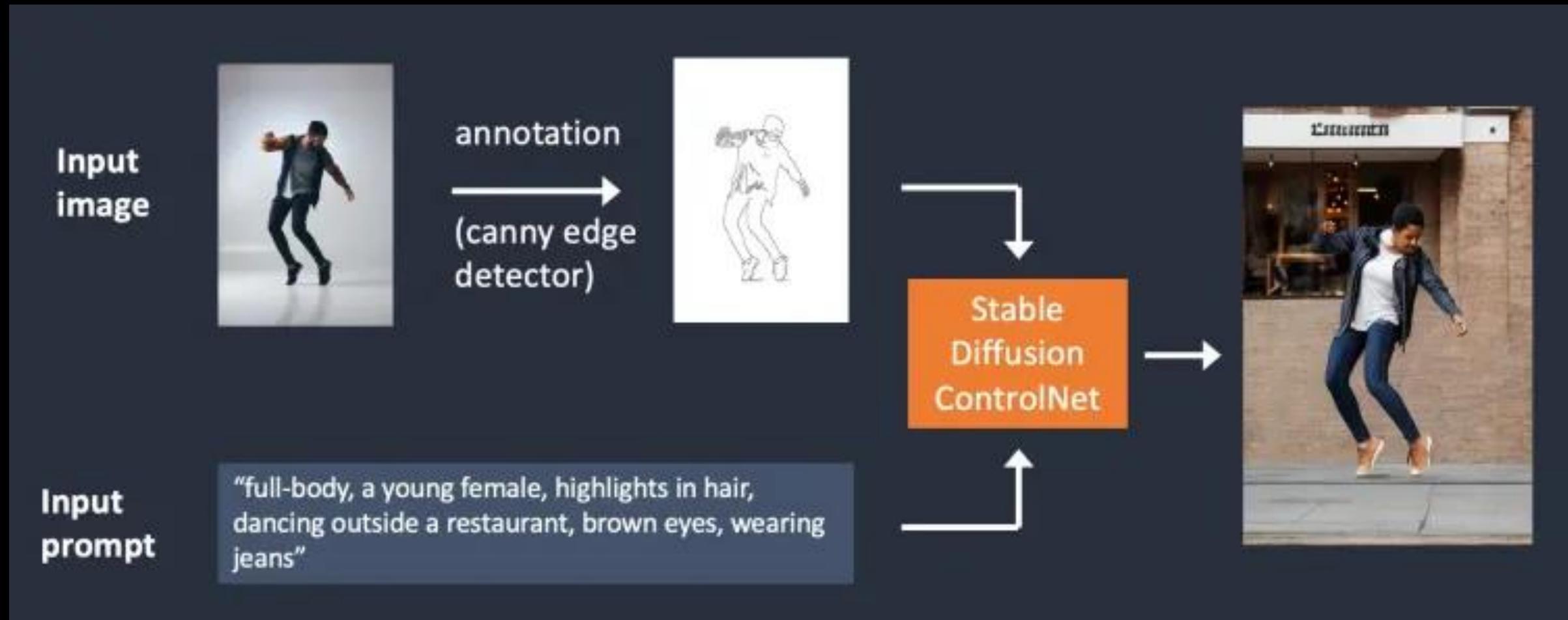
AI in urban planning and management

- Multi Criteria Analysis – for a sustainable city
- Planning and design
- Visualization
- Climate adaption – flow analysis (AI enhanced)
- Pedestrian flow patterns (AI enhanced)
- Road / asset management
- Decision/Document tracking



Image creation by AI / Neural Networks

Stable Diffusion + Control Net



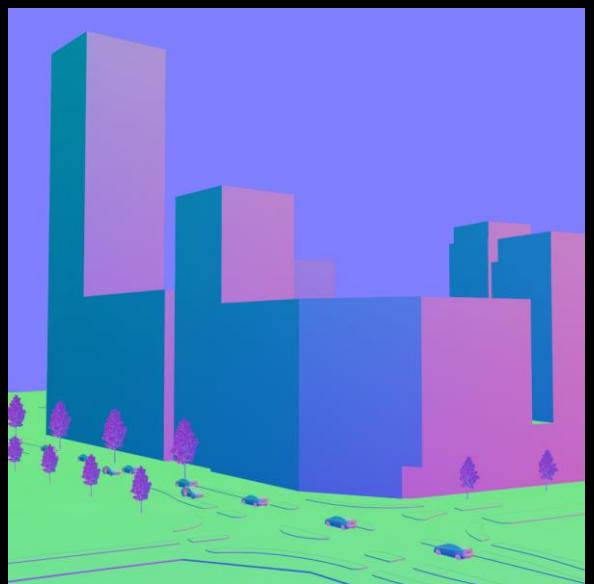




Image Segmentation - Vectorization / Area classification

Orthophoto



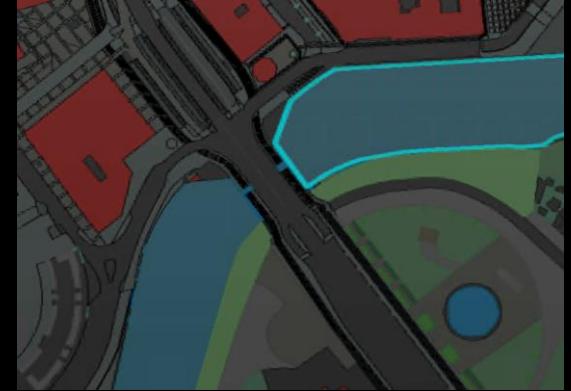
Learning process



Automated process



Land use / Land cover map





Climate change
response and
adaption modeled
and visualized in a
digital twin



An aerial photograph of a modern urban residential complex. The main focus is a large cluster of white, multi-story apartment buildings with a grid-like facade pattern. In the center of this complex is a large, open plaza with a paved walkway and small green spaces. To the right, there are several larger industrial or institutional buildings, one of which has "SKOLA" written on it. The surrounding area includes other city buildings, roads with traffic, and green parks. A blue vertical bar is positioned on the right side of the image.

Urban Planning (Backaplan)

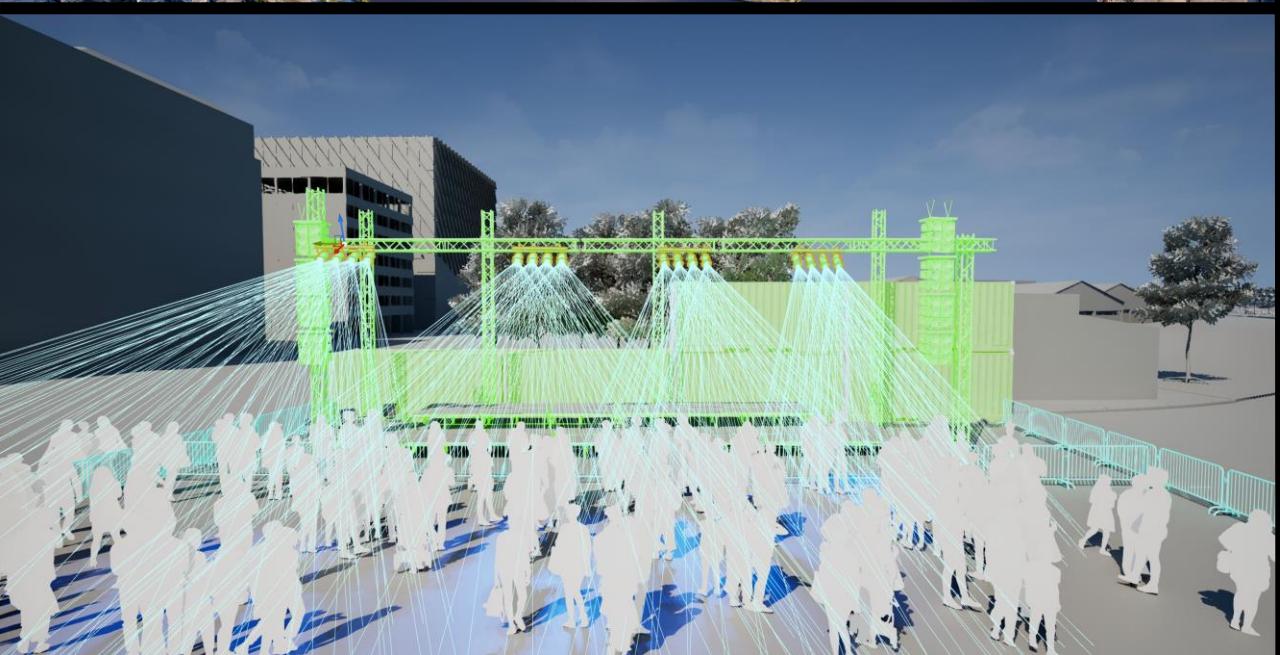
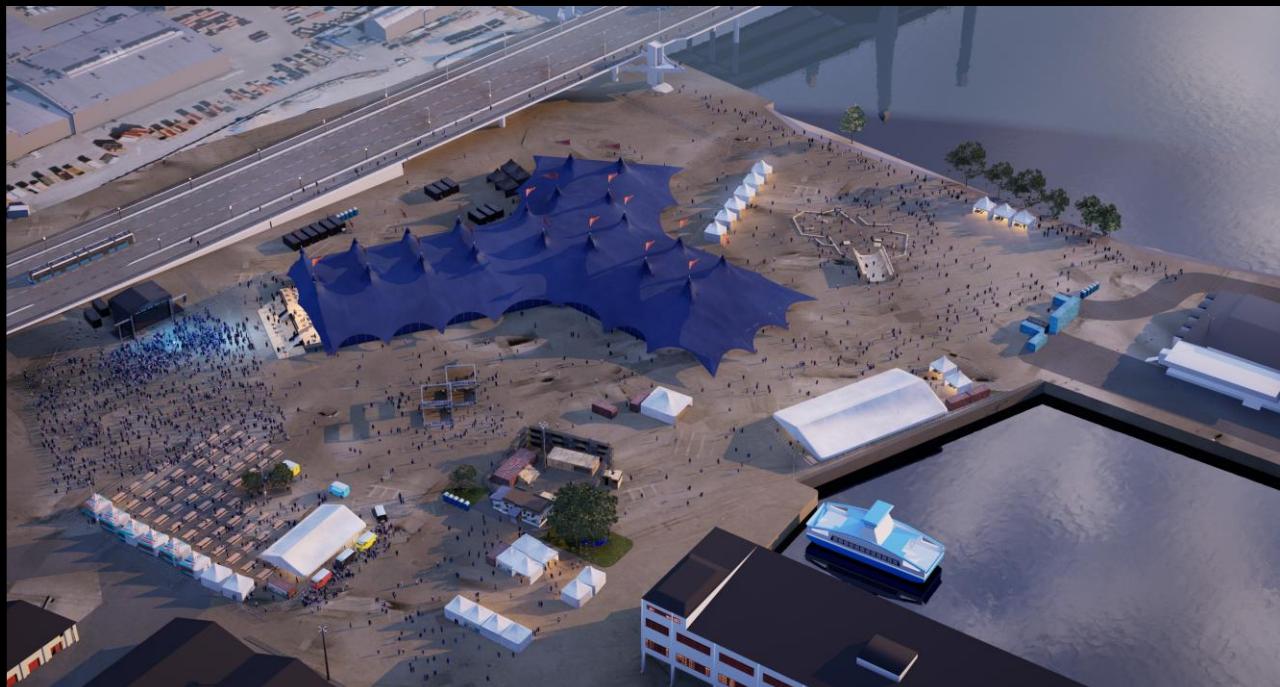


Urban planning, Centralenområdet

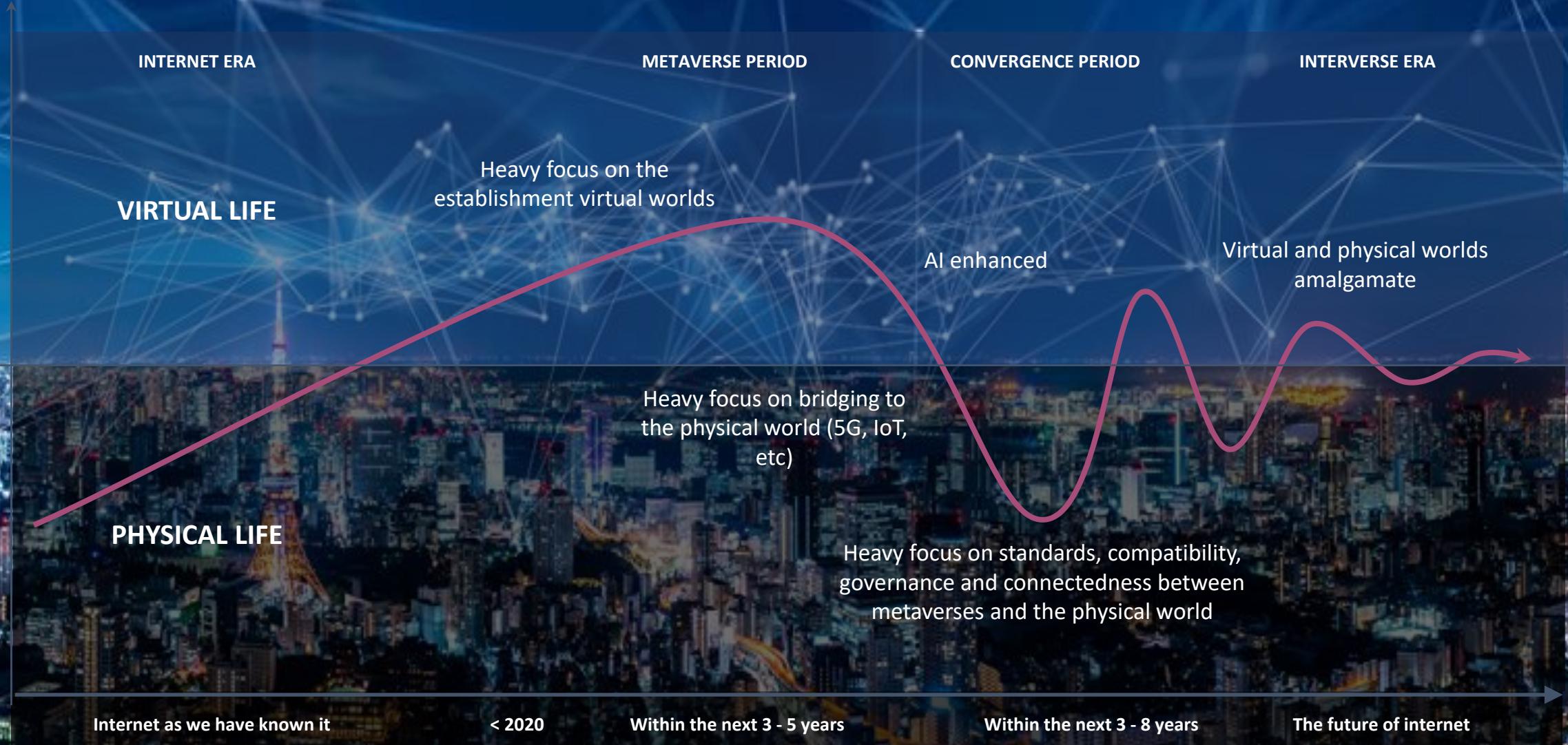
Digital Twin – Gothenburg Prototype / 400 years Anniversary event

Virtual model collaboration and system interoperability in Omniverse (Nvidia)





Metaverse – a new era, and the starting point of the future internet



Gbg&Co - GOTEVERSE

Virtual Gothenburg as a foundation for a versatile
and universal metaverse





"Fake City"





"Fake City"





"Fake City"





"The real city""





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