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GEOSPATIAL WORLD FORUM

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Connected Urban Twins - Digital Twins for Integrated Urban Development

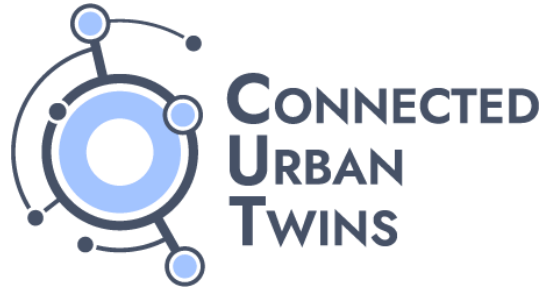# Foundation for Urban Digital Twins:

Michael Fischer

The CUT project at a glance

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Connected Urban Twins

The Partner Cities:

Hamburg · Stadt Leipzig · Landeshauptstadt München

Funded by:

Bundesministerium für Wohnen, Stadtentwicklung und Bauwesen · KFW

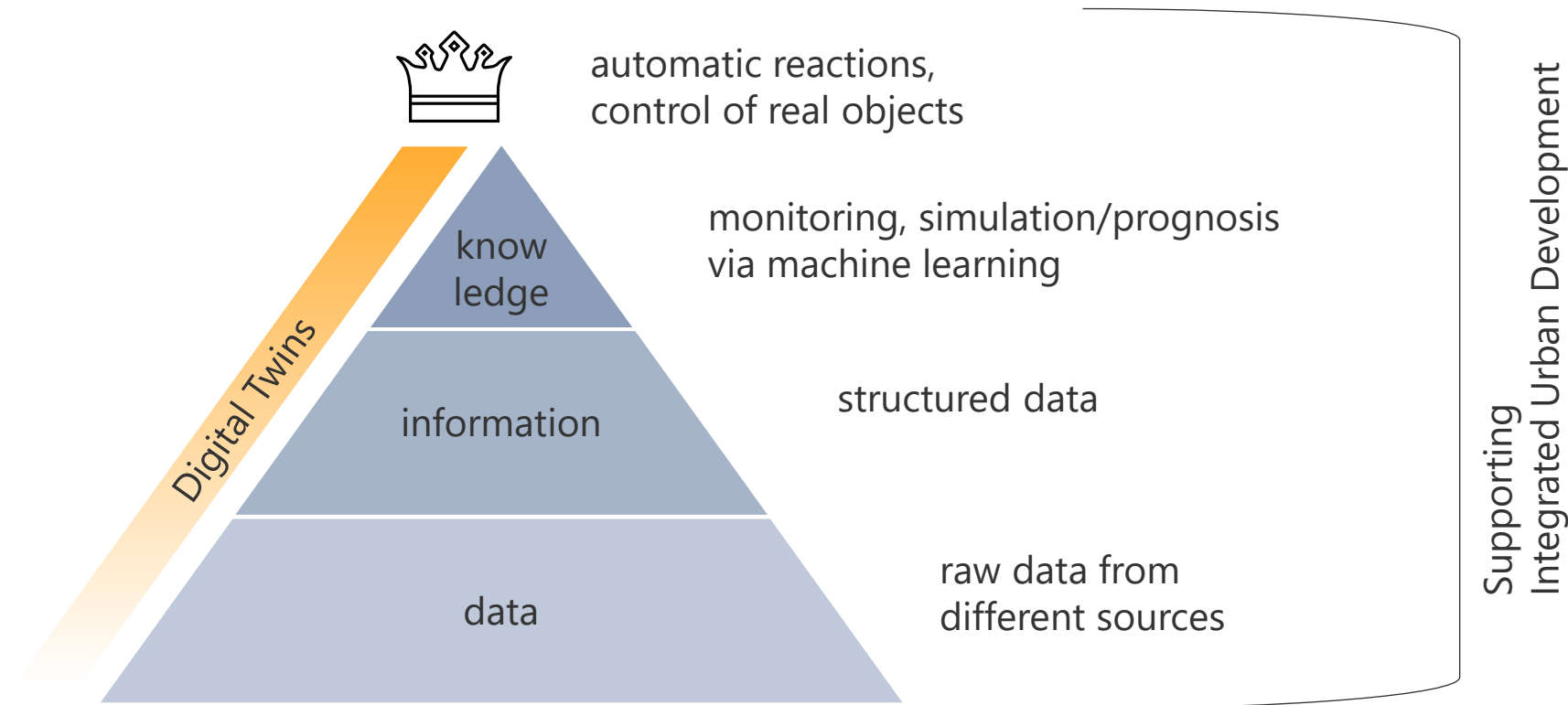|		
3 **partner cities** Hamburg, Leipzig and Munich	**70** **specialists** in our project team	**73** **Model projects smart cities (MPSC)** in our network
5 **years project duration** from January 2021 to December 2025	**32,4** **million euros** project volume	**BMWSB** **Funding:** Federal Ministry for Housing, Urban Development and Building

Our vision

- Use Urban Digital Twins to gain a better understanding of complex urban development contexts, make more informed decisions.

- Innovative digital tools and formats help facilitate democratic participation.

- Set standards for the concept of Urban Digital Twins and data governance.

- Providing standardized technical building blocks, facilitate the subsequent use and independent further development in other cities

Photo: Angela Pfeiffer

What are Urban Digital Twins?

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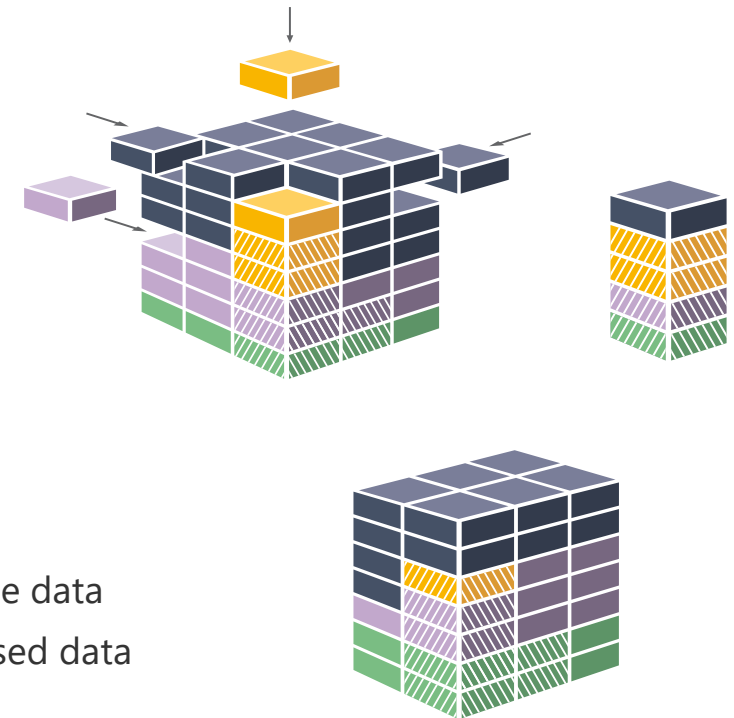## From data to information and knowledge to control

Pyramid diagram (labeled "Digital Twins" on the left edge) with three levels and a crown at the top:

- (crown) automatic reactions, control of real objects
- **know ledge** — monitoring, simulation/prognosis via machine learning
- **information** — structured data
- **data** — raw data from different sources

Supporting Integrated Urban Development

Conceptual approach Urban Digital Twin

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Digital resources of a city

Urban Digital Twins

Concept for the organization and utilization of urban data, its physical components and logical structures as well as the actors involved and their processes

– i.e. all digital resources of a city

Consideration of technical, organizational and legal aspects

- Geo base data
- Specialised data
- Analysis
- Applications
- Geo base twin

Geo Base Twin

- **Essential basis** of Urban Digital Twins of a data-sovereign city: Urban geographic base data

- **Geo base data...**
  - ... define the spatial reference
  - ... enable consistent, cross-disciplinary information linkage
  - ... form a unified interpretive space

- **Geo Base Twin** as an essential basis for digital twins of a city/municipality

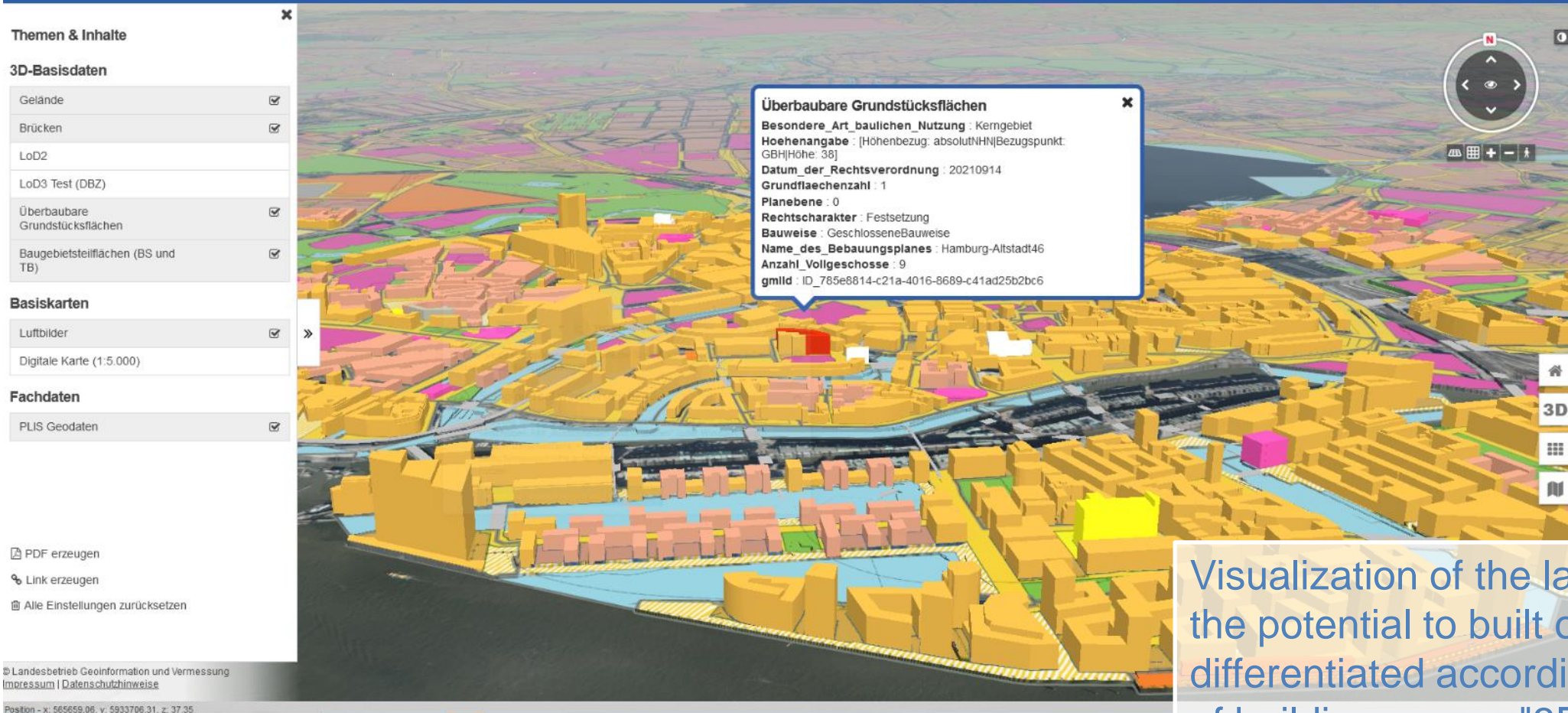Composition of fundamental components
Geo Base Twin

- Geo base data
- Specialised data
- Analysis
- Applications
- **Geo Base Twin**
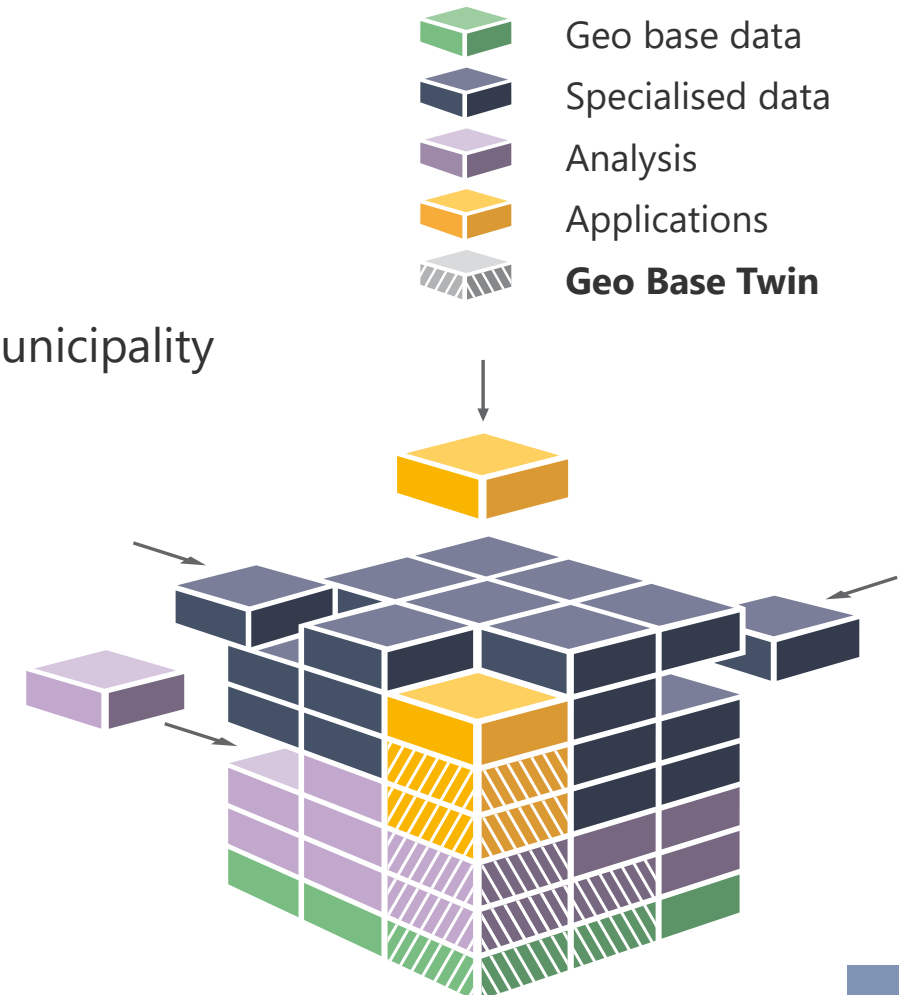
Examples

Interaction of Urban Digital Twins

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Example

„Geo Base Twin" (GBT)

Other Twins

tbc...

Execution shadow simulation

Trees from GBT

Shadow analysis   Shadow analysis

Update Shadow analysis

updated buildings   Updated buildings

As-built Modell   **Incorporation of a new building**

Wind simulation   Update Wind simulation

tbc...

Geo base date (e.g. Buildings)

„ Building Project Twin" (BIM)

„Planning Twin"

- Geo base data
- Specialised data
- Analysis
- Applications
- Geo Base Twin

Digital twin of the planned city

Visualization of the land areas with the potential to built over, differentiated according to the type of building use as "3D Planning law framework".

Urban Data Story: Intersection of the twins (planned/built)

View together the twins of the built and planned city to identify non- or underutilized building zoning law. In the example, the height of a building designated by building planning law is not utilized
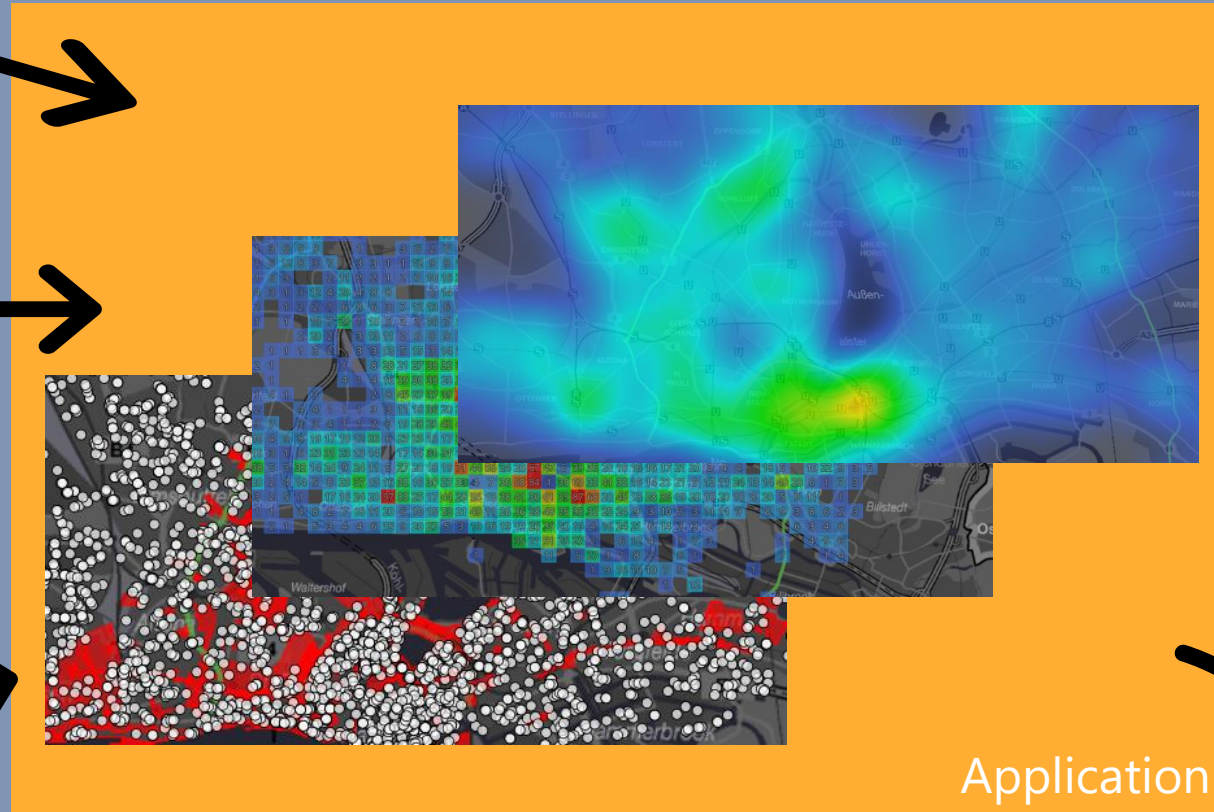
Analysis
- Hotspot
- Aggregation
- ...

Basic spatial information
- Basemaps
- Boundaries
- ...

Data
- Up to date data of positions
- No parking zones
- ...

Sharing Mobility Dashboard as digital twin

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Geo base data
Specialised data
Analysis
Applications
Geo Base Twin

Application

E-Scooter provider
- Provide position data
- Alter their fleet management

Basis for decisions:
- Number of scooters per district
- Use hotspots
- Number of parking violations

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Thank you
for your attention!

CONNECTED
URBAN
TWINS

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Partnerstädte:

Hamburg

Stadt Leipzig

Landeshauptstadt
München

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KFW