

An aerial photograph of a city, likely London, showing a dense urban landscape with numerous buildings, streets, and green spaces. A river, possibly the River Thames, flows through the lower portion of the image. The text is overlaid on a semi-transparent white rectangular area in the center.

Digital Twin Germany

Sonja Werhahn

EuroSDR Workshop “The way forward for 3D mapping at national and regional mapping agencies”

London, 21./22.01.2026

Development project “Digital Twin Germany”

Digital Twin of Germany



Simulation & Analysis Platform

“Provision of an simulation and analysis platform for the federal administration by the end of 2026 in order to create relevant added value for a variety of social issues.”

Timeline:

- Setup/Development Project: 8/2022 - 12/2026
- Production planned from 01/2027

Essential components:

- Development of a technical platform
- Development of the data offering
- Implementation of use cases

An aerial photograph of a city, likely Copenhagen, showing a dense urban area with many buildings and green spaces. A large stadium is visible in the lower left, and a river flows through the city. A semi-transparent white box is overlaid on the center of the image, containing the text.

Update on platform, data and use cases

Digital twin data platform - Architecture and DestinE

Development environment



 Cloud, Big Data, Development and Build-Tools, Container, AI-Modelltraining and Analysis

 Data transformation, Application development

 BKG / Public Cloud (AWS / ROSA)

 07/26 Demonstrator | In 2027 operational

User platform

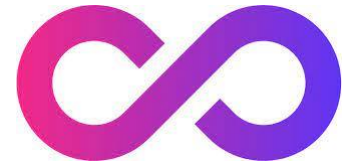


 Catalog, Map viewer, Applications

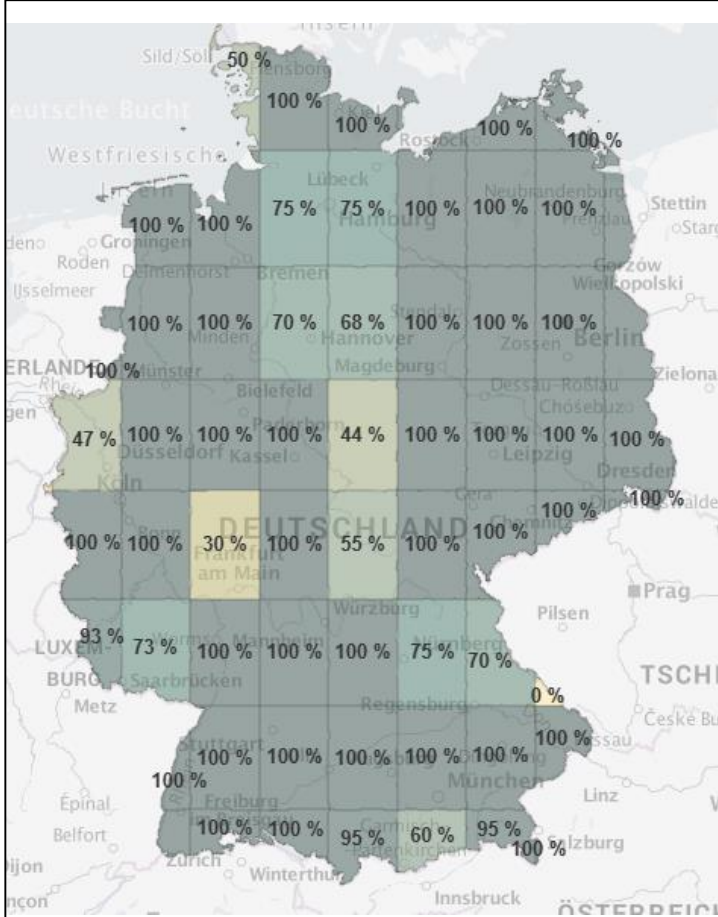
 Data exchange, provision of results and applications, access for authorities and other users

 DestinE-Plattform | BKG DestinE-Instance

 01/26 Demonstrator | In 2026 operational

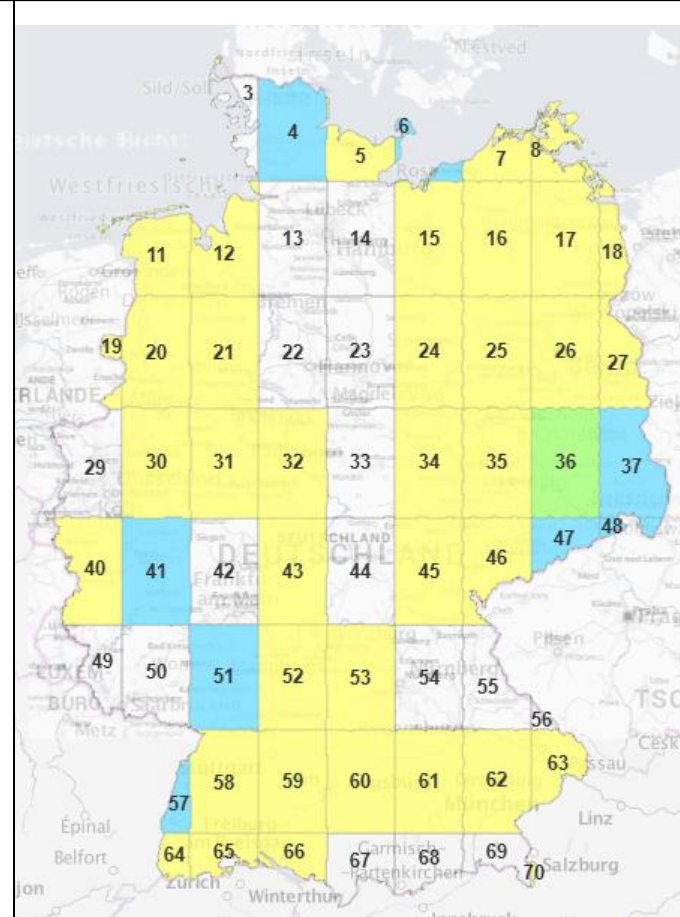


The data base of the digital twin - Aerial LiDAR Scanning



Data acquisition:

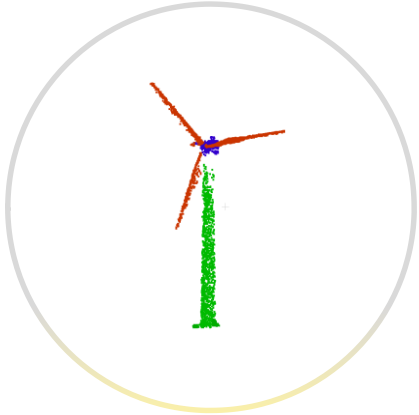
- 93% done
- Missing areas will be scanned in 2026 (03-05/26)
- 7 contractors/ 8 lots
- Started summer 2024
- Season: March-Nov



Data delivery:

- 10/70 blocks delivered
- 1 block accepted
- Final delivery: 30.09.2026

Use Cases: Overview (I)



Identification of plant parameters of wind turbines

UBA, WSV, DFS

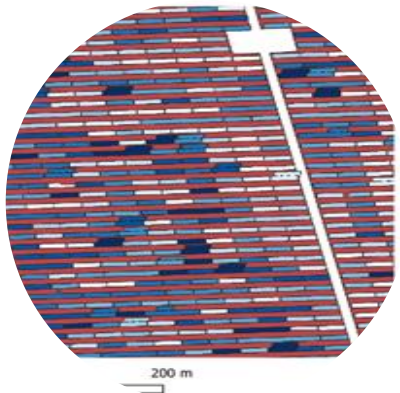
- Instance segmentation, clustering, classification
- Segmentation into different components



Site assessment of meteorological sensors

DWD

- Shading (vertical obstacles)
- Wind shadow (horizontal obstacles)



Identification of system parameters for ground-mounted photovoltaics

UBA

- Identification of modules and segmentation into individual modules
- Derivation of various parameters such as module height and module tilt

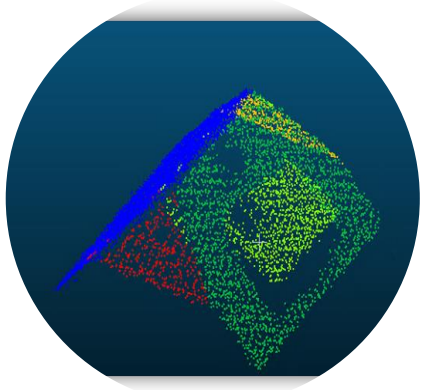


Derivation of potential aviation obstacles

BMV/DFS

- International Regulation
- DGM, DOM, point cloud and raster height model

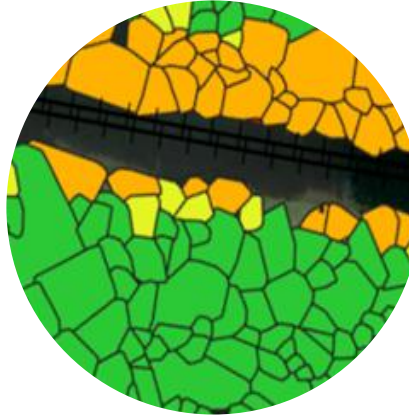
Use Cases: Overview (II)



Roof surface segmentation

BKG

- Instance segmentation of buildings
- Segmentation of roof surfaces and derivation of various parameters such as standard roof shape, pitch, aspect, etc.



Tree Crown Inventory

Thünen-Institut (DZFS, JKI)

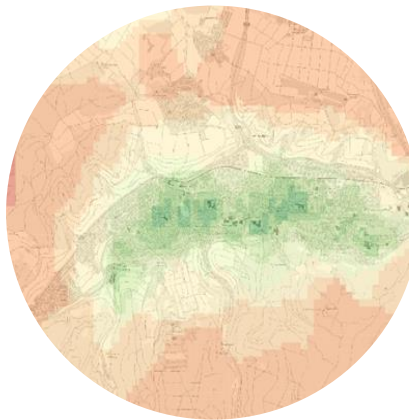
- Segmentation of Trees and Vegetation
- Derivation of 3D features such as tree height, crown area, etc.



Objects on federal waterways

WSV

- Detection of cables and lines
- Determination of their position, elevation and lowest elevation

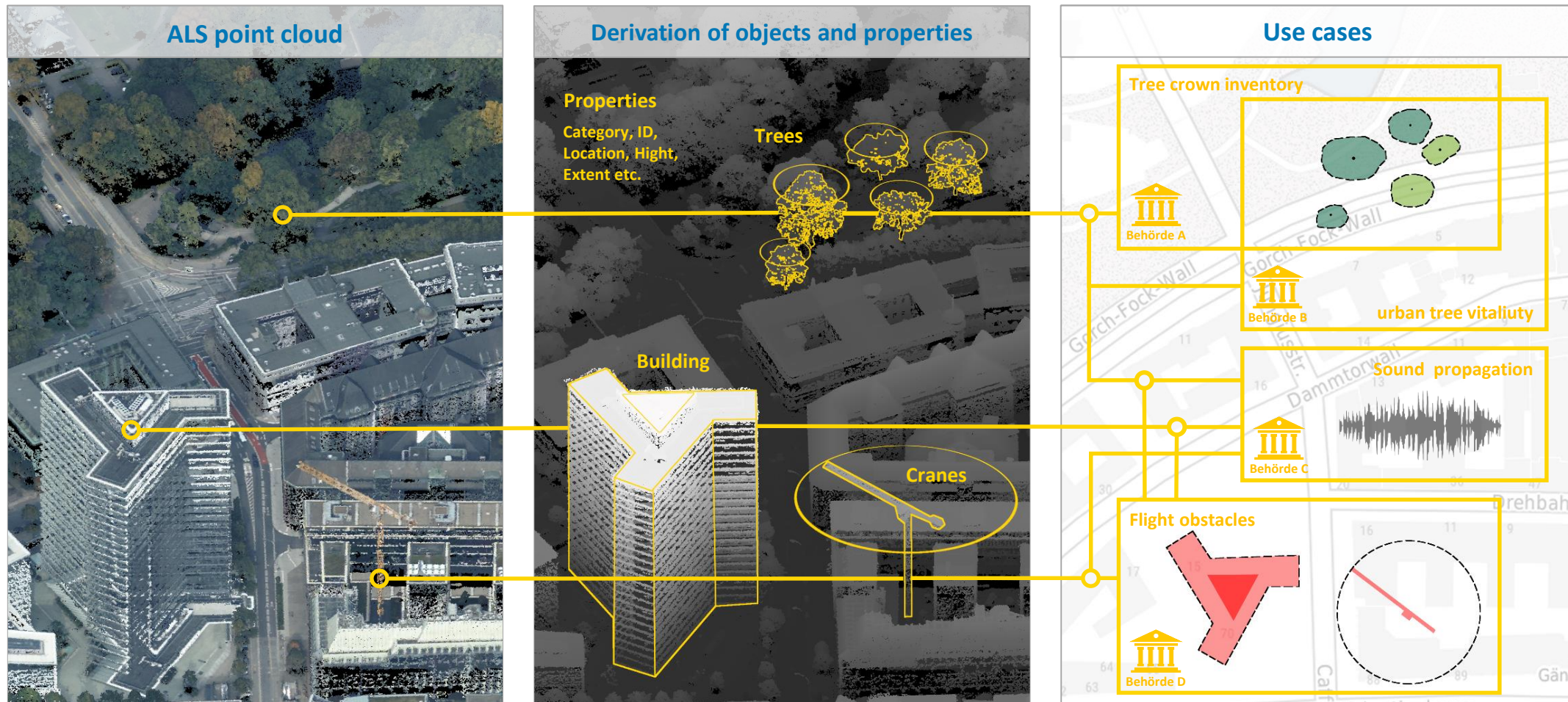


Calculation of child daycare accessibility

BiB

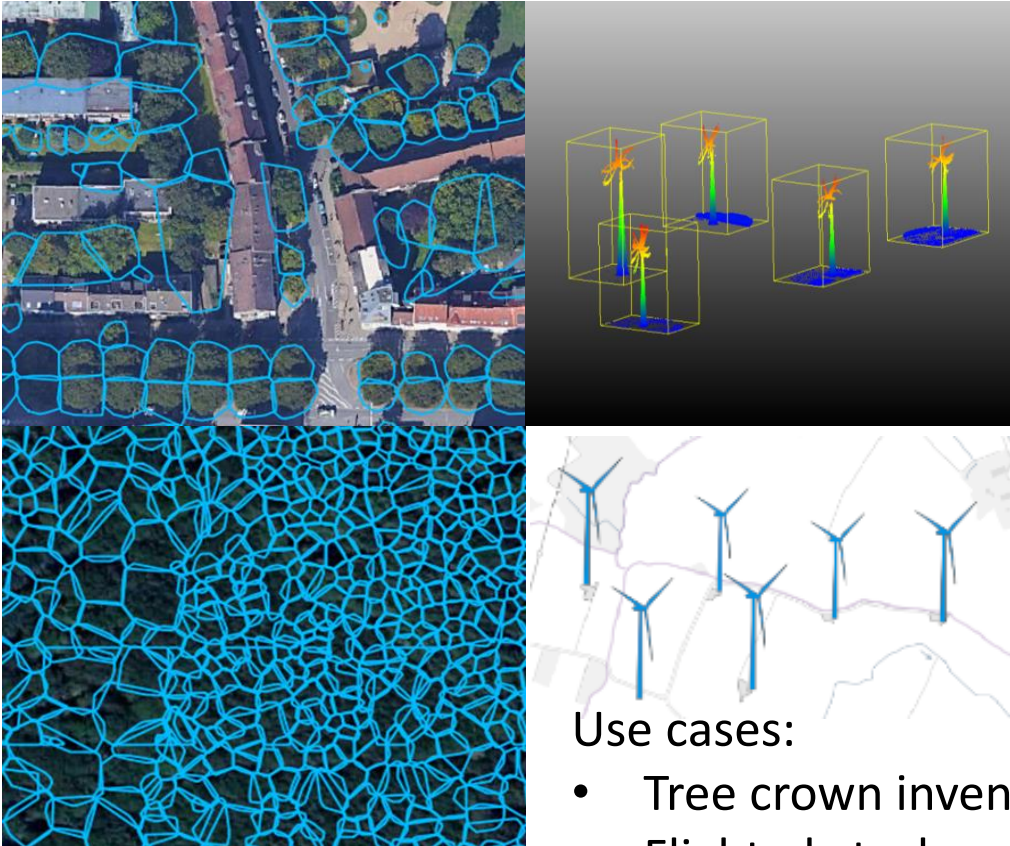
- Linking multiple POIs
- Weighting

From Point Cloud to Use Case



From Use Case to Data Product

Use case = Specific user needs



Use cases:

- Tree crown inventory
- Flight obstacles

Data product = wide range of users

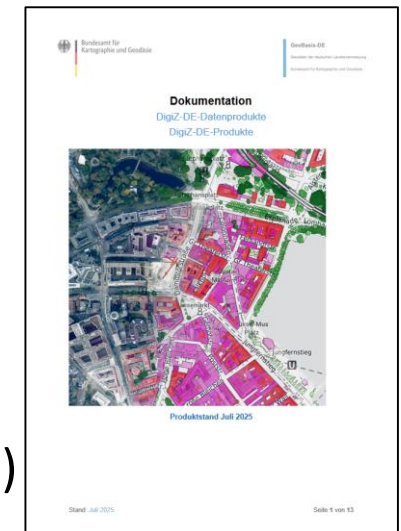


licencing
gpkg
specification
distribution
data
model
metadata

DigiZ-DE vector data product

Themes:

- single trees (Polygon, Point)
- wind turbines (Point)

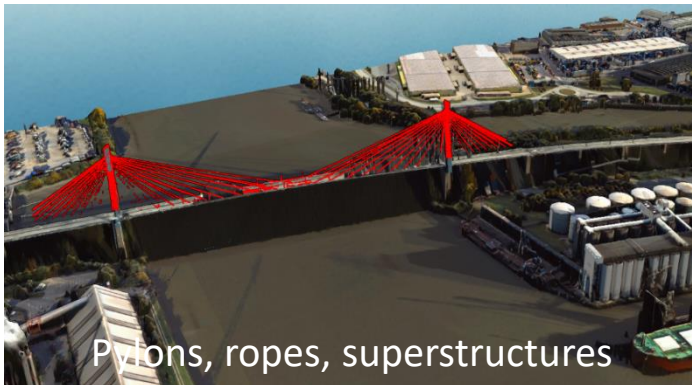


From Use Case to operational services: Aviation obstacles

Based on the results of the proof of concept in the *aviation obstacles* use case the responsible Federal Ministry of Transport and the BKG are preparing an official agreement on:

- Building and centralised maintenance of the database for terrain and obstacle data in accordance with the international ICAO (eTOD) **by BKG using LiDAR-Data from Digital Twin**
- Regular verification of new and existing potential terrain and obstacle data using 3D data.

Goal: Operational Service for Federal Ministry of Transport and German Air Traffic Control, made available via the Aeronautical Information Service (AIS).



Establishment of a Franco-German cooperation project on the spread of forest diseases

Driven by the results of the *canopy inventory* use case
IGN France and BKG are setting up a cooperation project

Cooperation objectives:

- Open geodata ecosystem, cross-border harmonization
- Pan-European digital twin, Franco-German backbone
- Harmonised data, processes, and services
- Application-oriented expertise and methodologies
- Joint benchmarking and technology development
- Advancing forest health monitoring



15. Juli 2025

Memorandum of Understanding on the cross-border use of digital twins

An aerial photograph of a city, likely Copenhagen, showing a dense urban area with many buildings and green spaces. A large stadium is visible in the lower left, and a river flows through the city. The text "Issues and Obstacles" is overlaid in the center.

Issues and Obstacles

Issues and Obstacles – non-technical

National security and geospatial data provision

- Point density / level of detail
- Users (only federal agencies vs Open Data)
- Regulations during flight planning

Standardisation

- Data quality for very big data sets
- Definition of classes in detail

Issues and Obstacles – technical

Size of Data (point cloud only)

- 1 Tile = 1km^2 = $\sim 1\text{GB}$
- 1 Block = $\sim 8000\text{ km}^2$ = 8 TB → can create problems during data processing by contractor
- Germany = $\sim 357.700\text{ km}^2$ = 357 TB → should be ok when platform is available, until then difficult

Division into 8 lots

- Different sensors → how does the sensor influence the classification or object segmentation?
 - BKG virtual research centre [Gauß-Centre](#) project addresses some of the questions
- Do we need to harmonise data between different lots? How?
- Big effort needed to coordinate contractors

Due to size and complexity of the project → everyone involved is still learning



Bundesamt für
Kartographie und Geodäsie



Thank you for your kind attention!

GD6 – Digital twins unit
GD6@bkg.bund.de

Bundesamt für Kartographie und Geodäsie
Richard-Strauss-Allee 11
60598 Frankfurt am Main

www.bkg.bund.de

**Digitaler
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Plattform**