Digital Twin Germany

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EuroSDR Workshop State-of-the-art 3D Mapping at national and regional mapping agencies,

Paris, 23.01.2025

Development project “Digital Twin Germany”

“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:

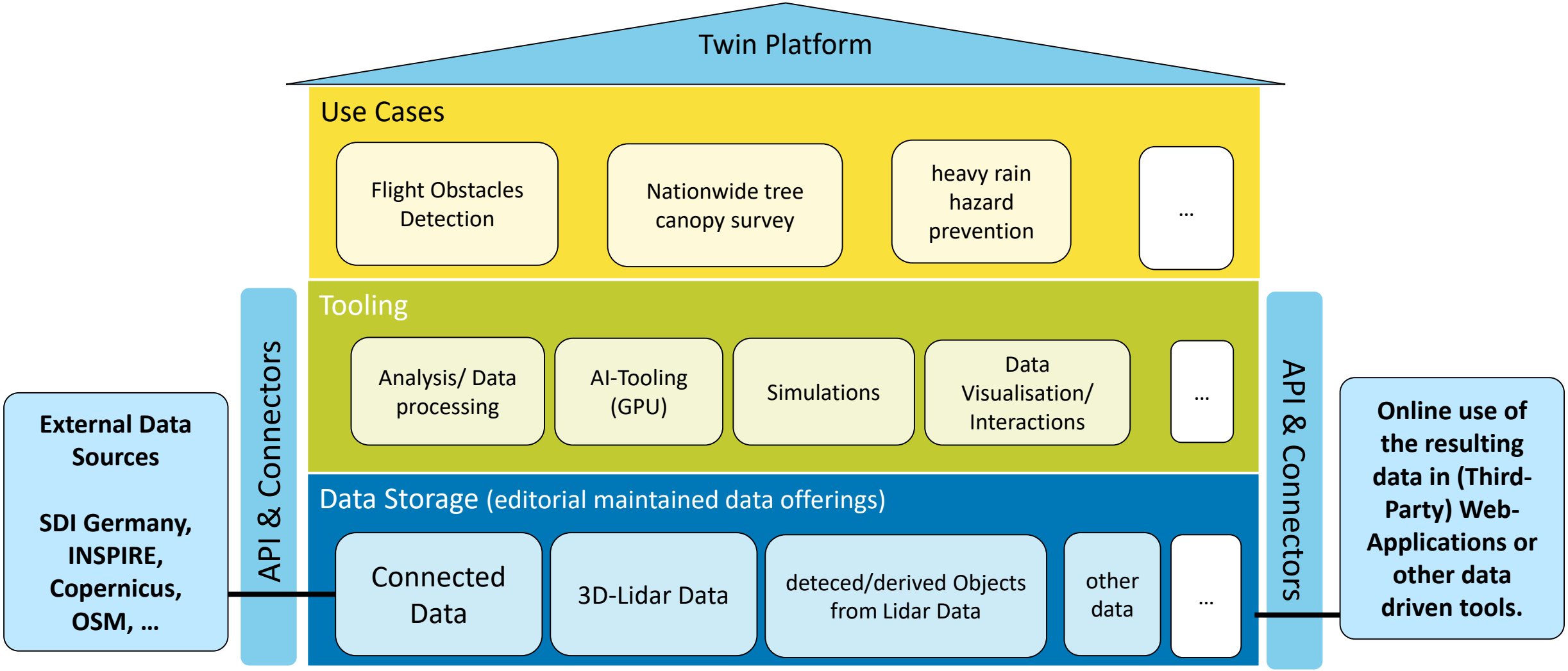
- Setup/Development Project: 8/2022 - 12/2026
- Production planned from 01/2027

Essential components:

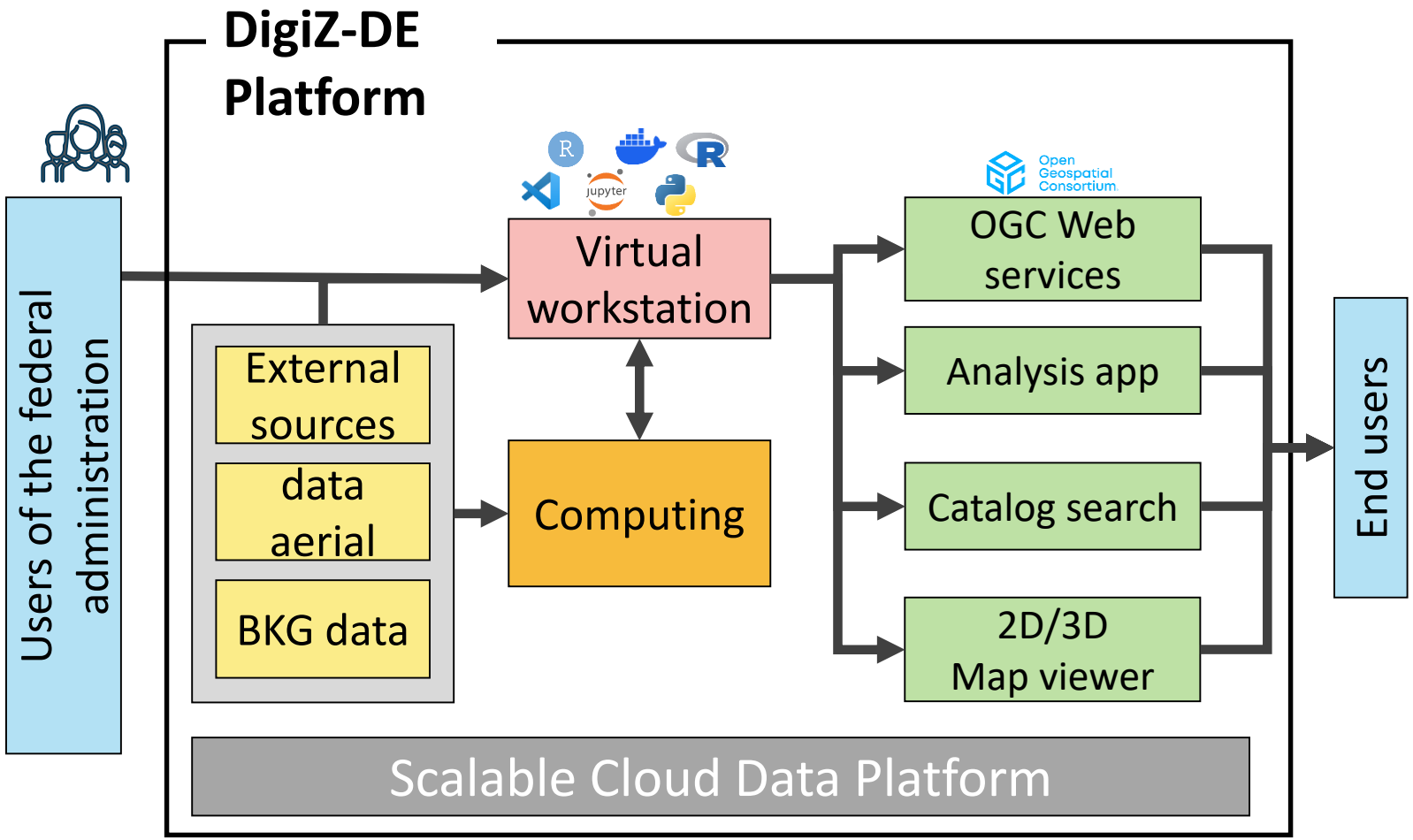
- Development of a technical platform
- Development of the data offering
- Implementation of use cases

What should the technical platform for our digital twin look like?

Digital twin data platform



Web Data IDE: creating an environment where a data scientist feels comfortable



What data basis is being established?

The data basis of the digital twin

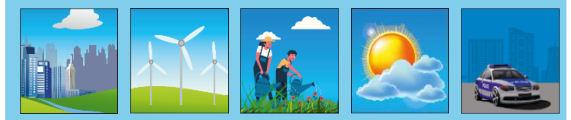
Data Basis

Digital twin Germany

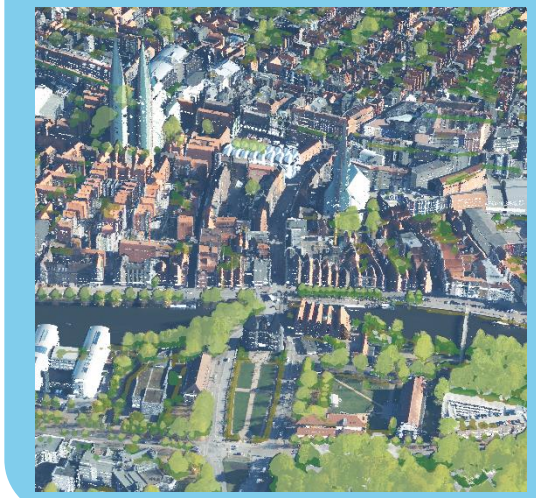
Data from the federal government & GDI-DE

GDI-DE

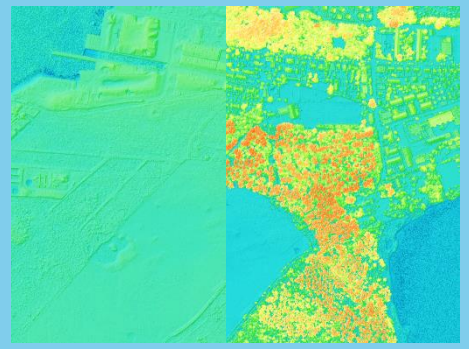
Bundesamt für Kartographie und Geodäsie



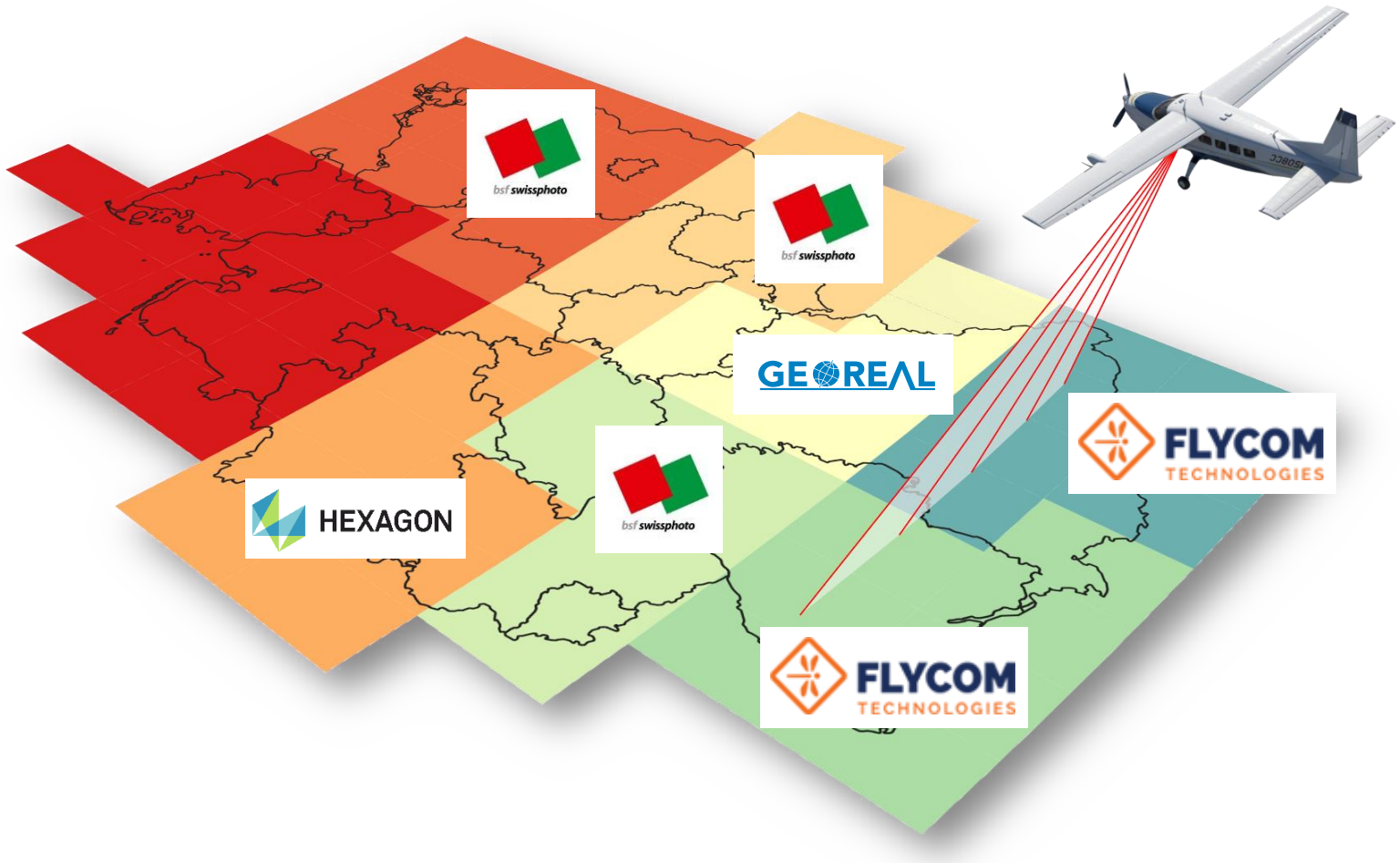
3D-Point cloud



Derived data from 3D point cloud



3D- Point cloud data acquisition



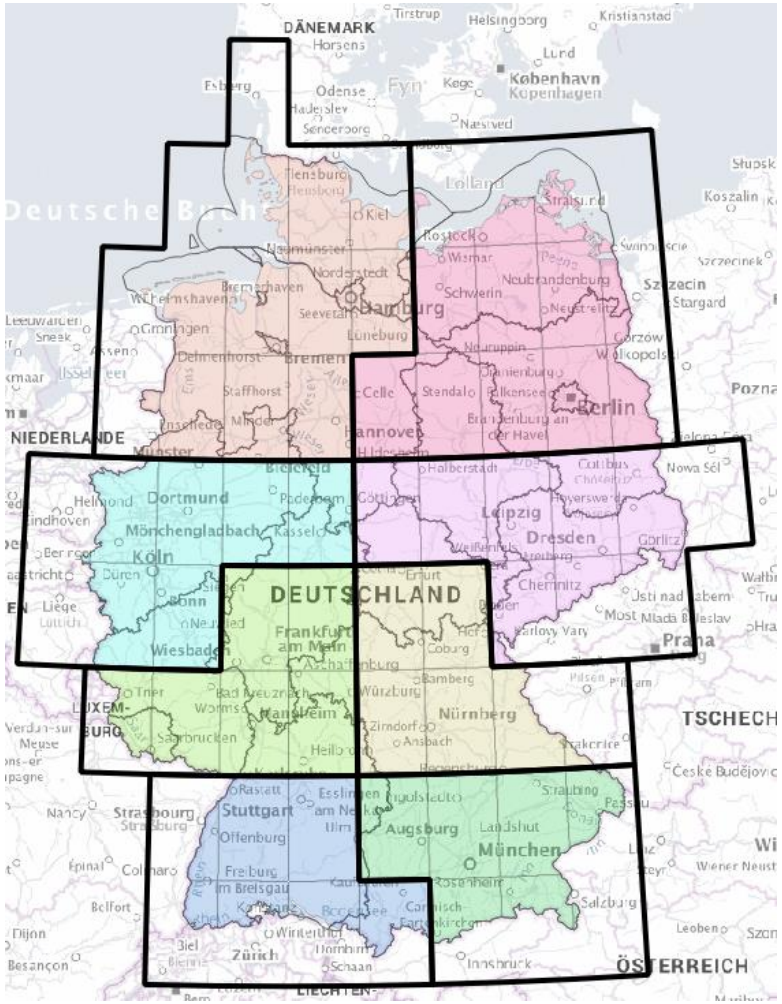
- Nationwide, high-resolution, airborne LiDAR scanning
- Aerial survey with different LiDAR sensors (SPL100, VQ1460, VQ1560 II-S)
- Divided into eight area lots
- Data volume approx. 1.5 PByte

3D-Point cloud

1. **Aerial survey Hamburg metropolitan region:** Oct 2021 - Feb 2022

2. **Aerial survey:**
   a. Period: 2024 – 2025
   b. Survey: March - Oct (Nov)
   c. Point density: at least 40 points/m²
   d. Height accuracy: 10 cm
   e. Position accuracy: 20 cm
   f. Classification according to 12 classes (like ASPRS)
   g. RGB images
3. **Renewed aerial survey:** (planned)

Result: Germany-wide, high-resolution and classified 3D point cloud



Which use cases are currently under development?

How did we get to the pilot applications?

Idea/ Demand

First contact

Consulting/ demand-orientated workshops

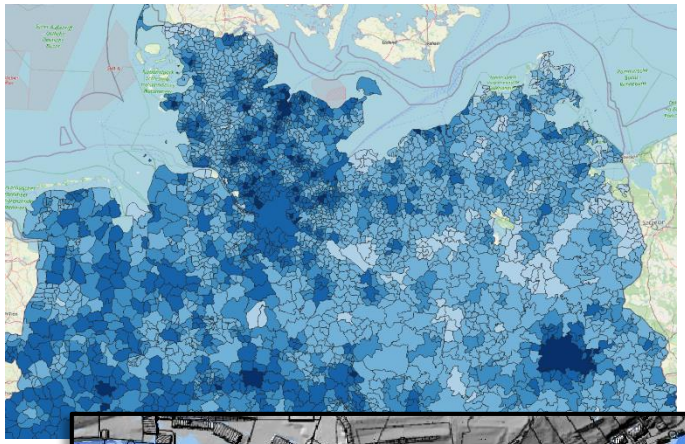
First prototype and results

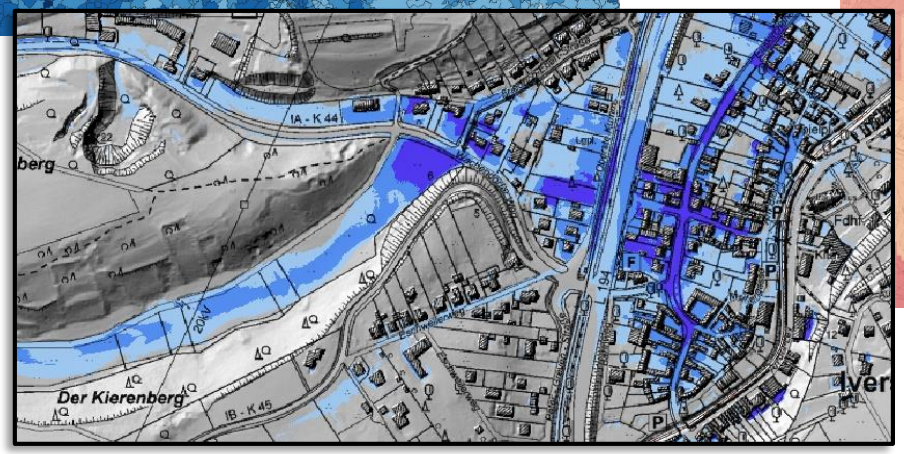
Defining cooperation

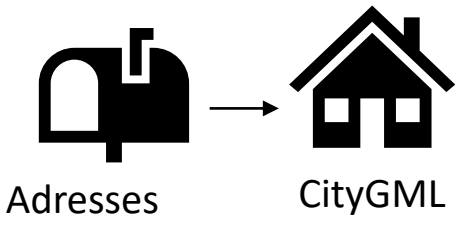
Developing demand together in partnership

First results

Pilot use cases in 2D





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{
 "ID": "DESHPDHK00031A42",
 "Firma": "Mustermann AG",
 "Adresse": "Hauptstraße 42",
 "PLZ": "12345 Neustadt",
 "Höhe": 11.058,
 "Geschosse": 3,
 "Volumen": 10646.637,
 "Nutzung": "Gewerbe"
}
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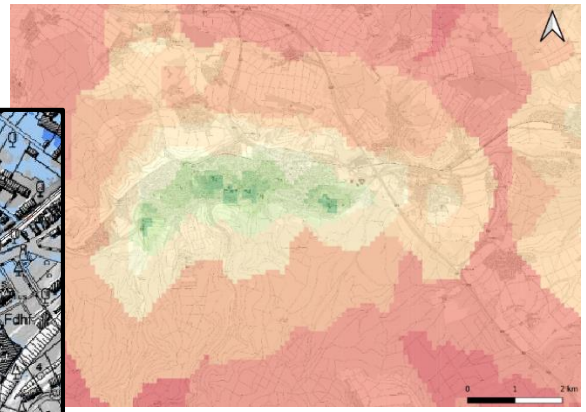
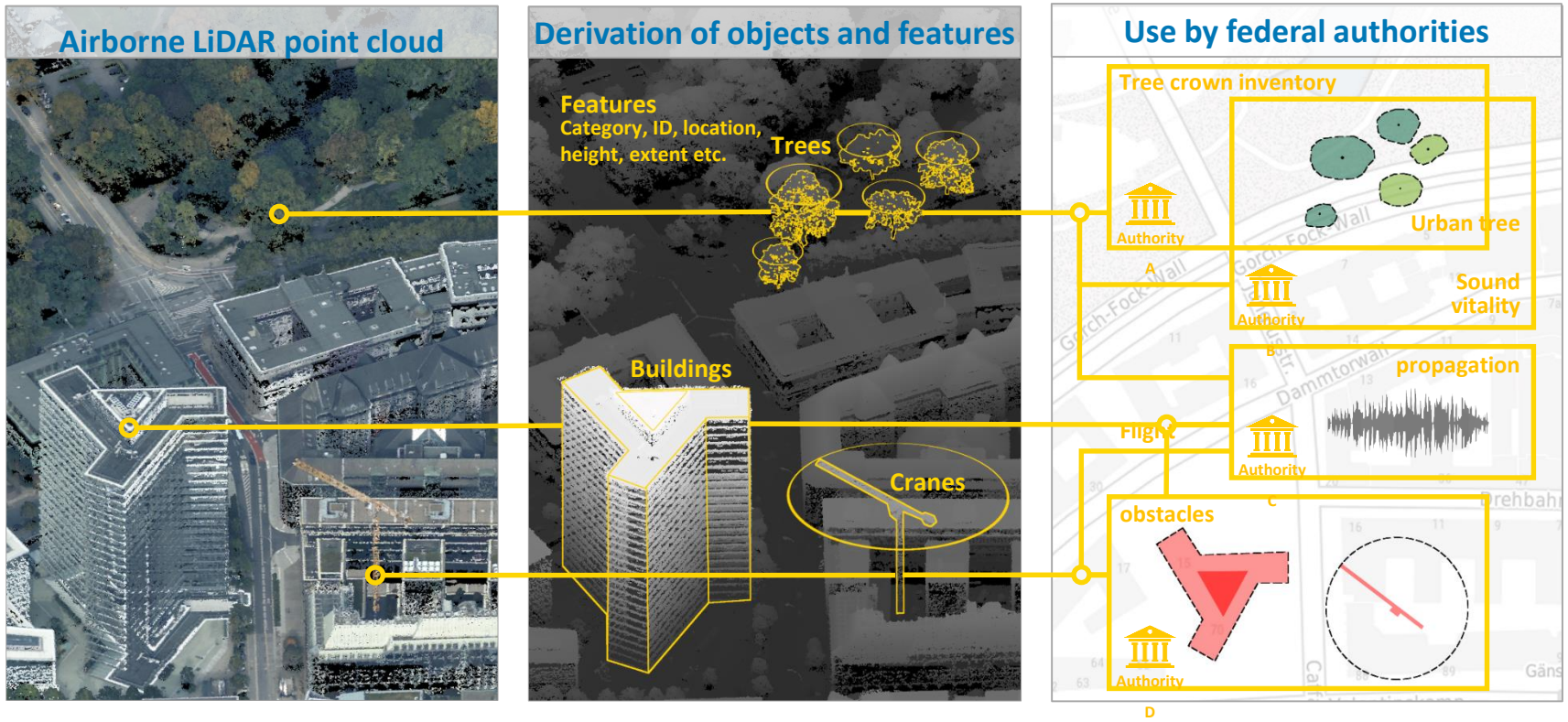


1. Determination of building characteristics on the basis of address data (German Central Bank)
2. Heavy rain hazard information map (BKG application)
3. Accessibility twin (BKG application)

Pilot use cases in 3D

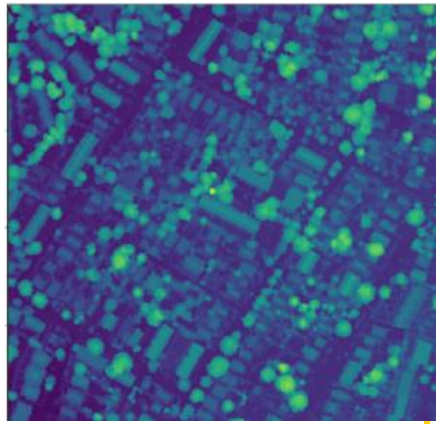


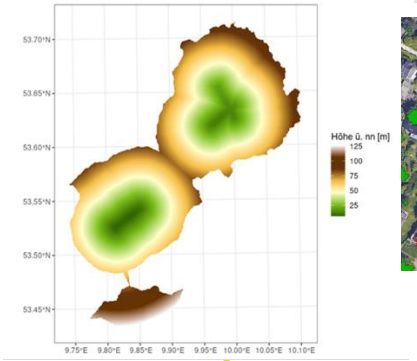
1. Derivation of objects that could represent an flight obstacle
2. Identification of diving platform
3. Single tree detection

Detection of flight obstacles according to eTOD, Air traffic control

DFS Deutsche Flugsicherung

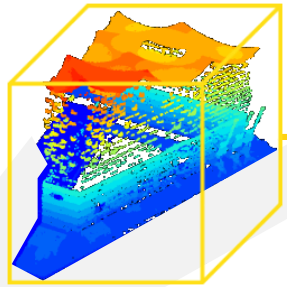
nDSM derived from point cloud



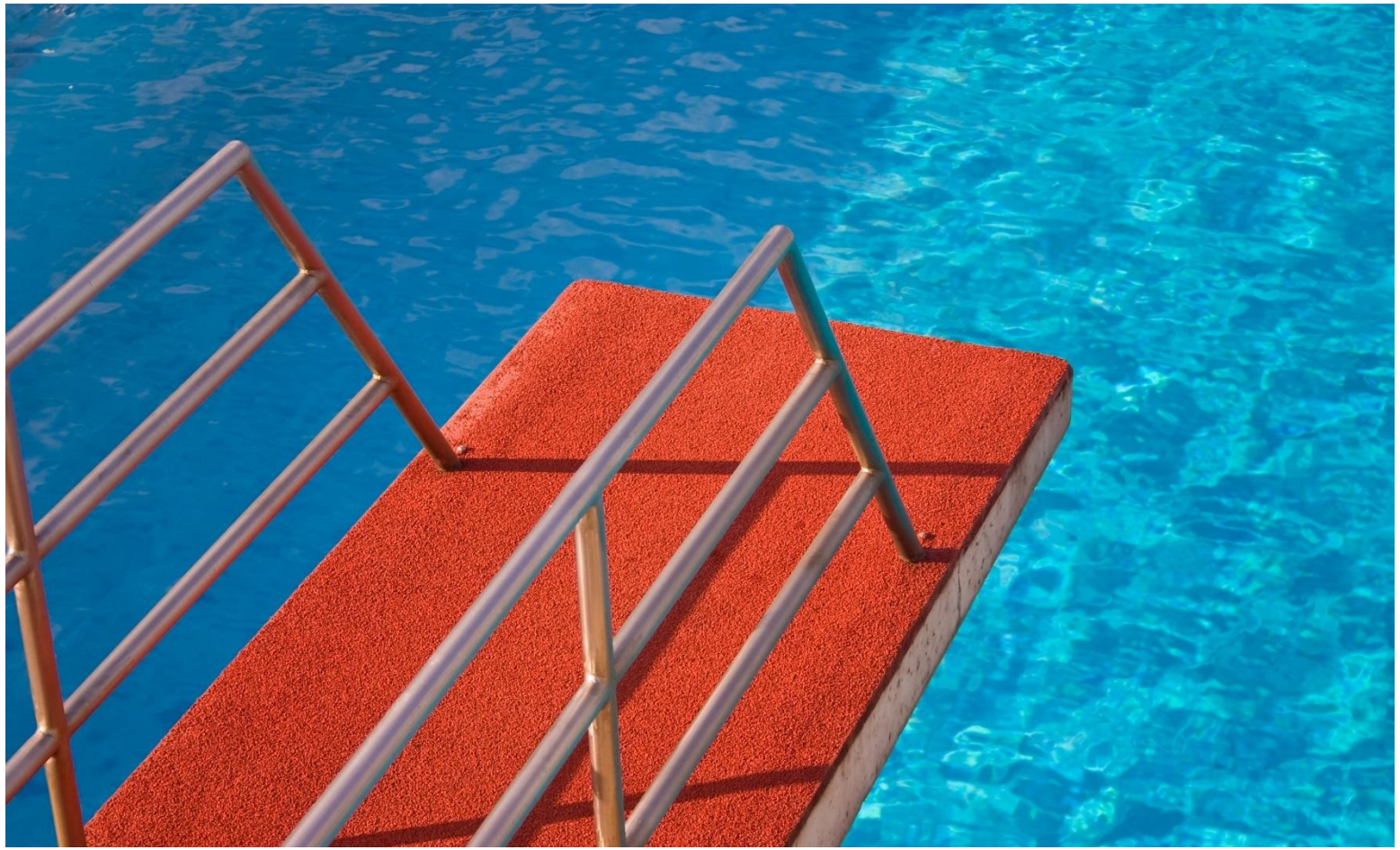


Detection of obstacle candidates

Enrichment with further information



Identification of diving platform

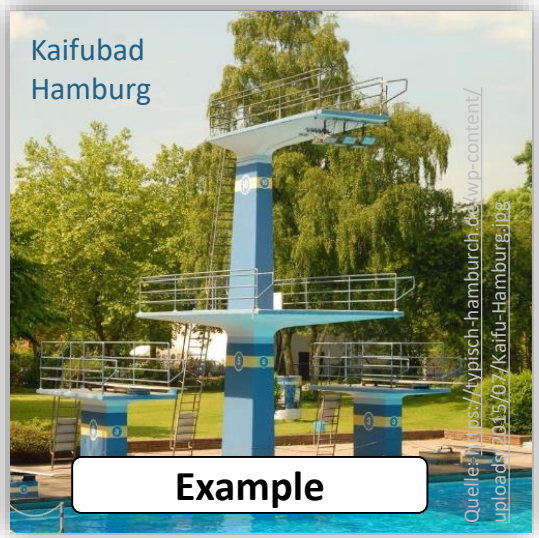


Jens Hertel / stock.adobe.com

- Digital Sports Facility Atlas for Germany (DSD) - Federal Institute of Sport Sciences (BISp)
- Automated recognition of sports facilities from digital orthophotos
- **Objective**: Comprehensive identification of diving platforms and extraction of standardised metrics such as location and height of jumping areas

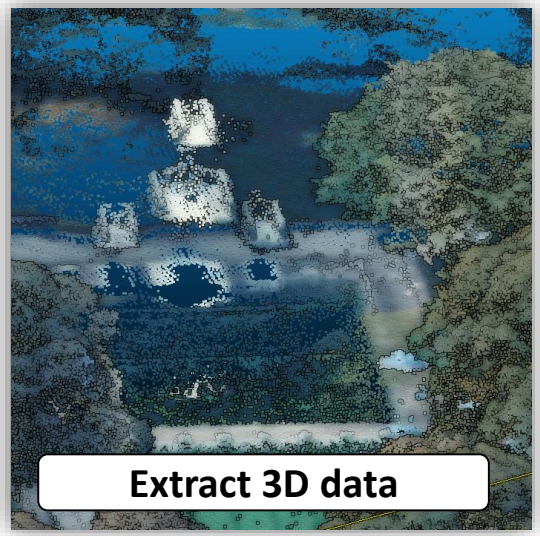
Bundesinstitut für Sportwissenschaft

Identification of diving platform

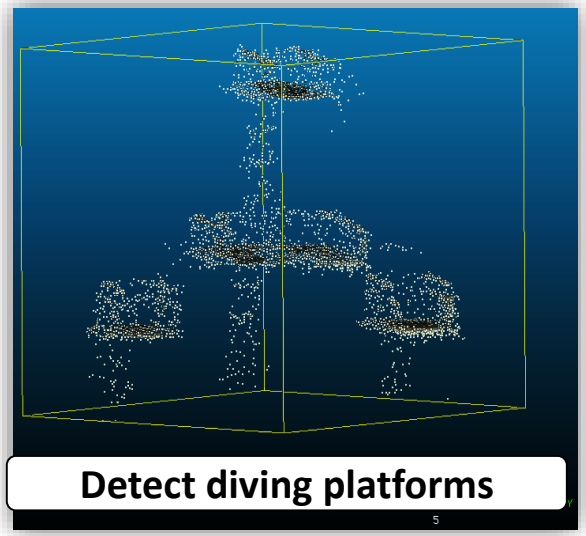


Example

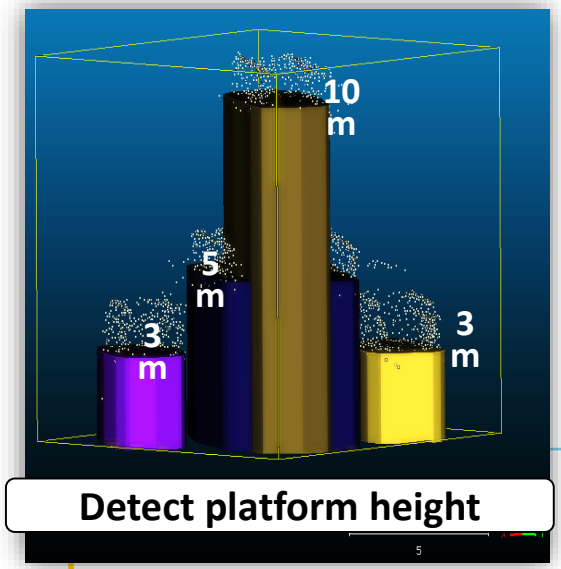
Identify area of interest



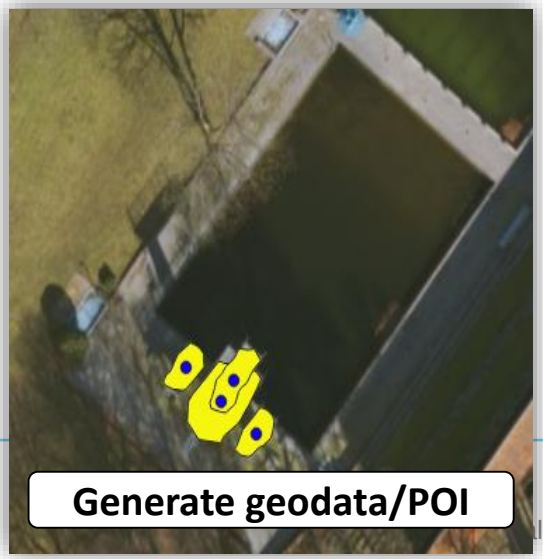
Extract 3D data



Detect diving platforms



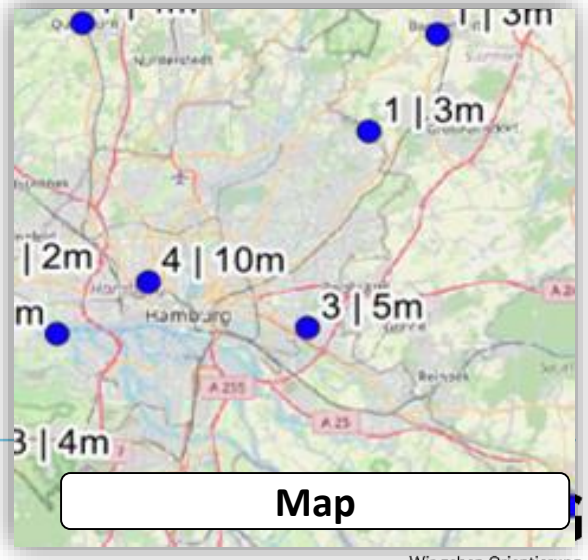
Detect platform height



Generate geodata/POI

Bad_ID	Name	Anzahl	max. Höhe
719	Freizeitbad Billstedt	3	5
727	Kaifu-Bad	4	10
743	Schwimmbad Finkenwerder	1	3
790	Sommerbad Volksdorf	1	3
947	Freizeitbad Geesthacht	2	5
1081	Schwimmzentrum Itzehoe	4	10
1086	Freibad Kellinghusen	2	5
2274	SOLEMIO Erlebnis- und Solebad	3	5
2347	Freibad Krempe	2	5
2543	Waldbad Alt Garge	2	5
4932	Freibad Bargteheide	1	3
4935	Schönaubad	2	5
4946	Freibad Lauenburg	1	3
6309	Naturerlebnisbad Boizenburg	1	3
6476	Waldbad Hanstedt	2	4
6479	Freibad Hollenstedt	1	3
6486	Freibad Neu Wulmstorf	3	4
6499	Freibad Salzhausen	2	5
6518	Freibad Tostedt	1	3
7939	Freibad Quickborn	1	4
			3
			5
			3
10037	Freibad Hagen Lüneburg	1	3

Data set



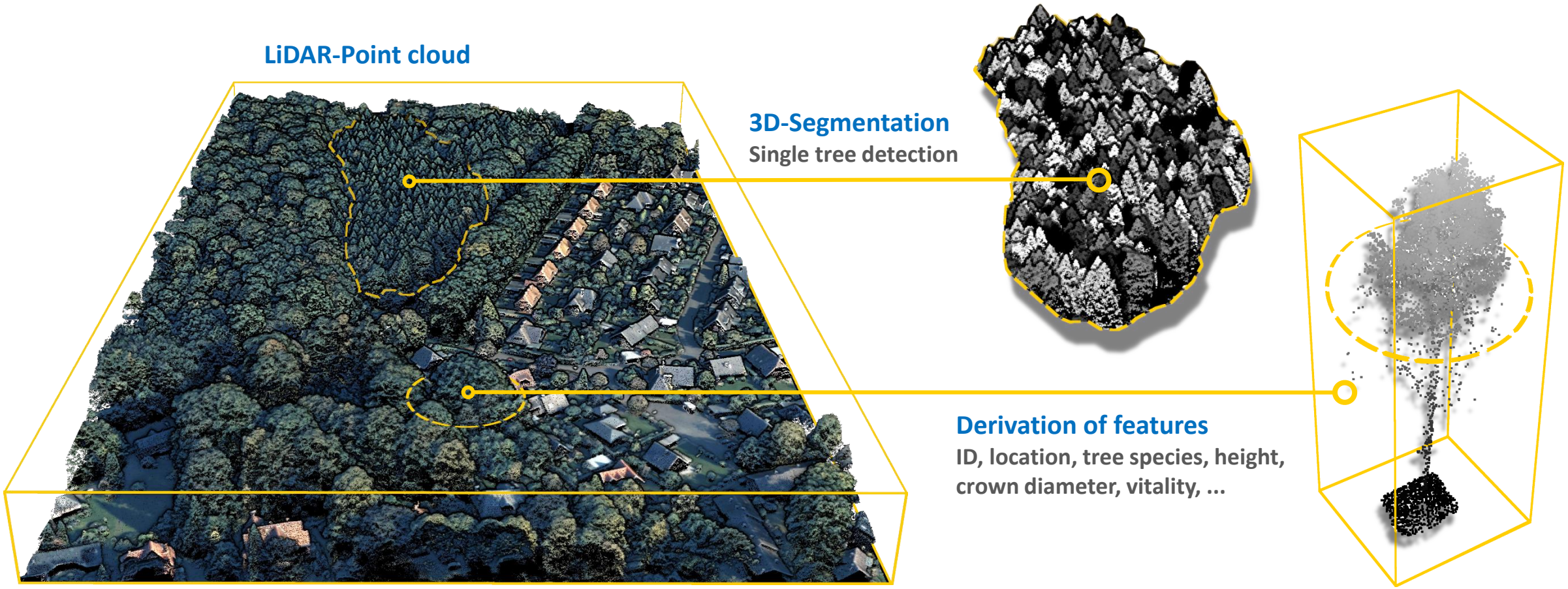
Map

Single tree detection - Canopy inventory

Objective:

Canopy inventory and a forest condition survey → detection of individual trees in forests but also in open spaces & urban areas

Single tree detection



Single tree detection – First results

Bundesamt für Kartographie und Geodäsie

BKG
Wir geben Orientierung.

Thank you for your kind attention!

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