AI for LiDAR Processing at National Scale: Digital Twin Germany

Blaž Vidmar @ Flai

Geospatial World Forum, Amsterdam, 2026.04.30

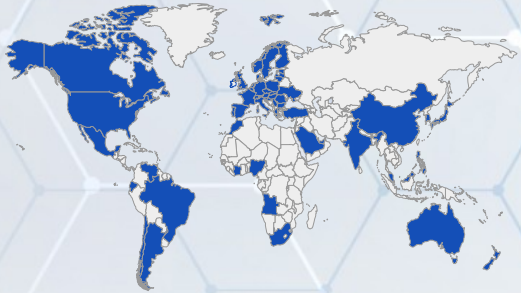
About Flai

AI software company building advanced software tools and solutions for the geospatial industry.

Deep expertise in **AI, LiDAR, point clouds, and geoinformatics.**

Supporting **governments, defence, and enterprises worldwide.**

Delivering **secure, scalable, and accurate geospatial intelligence.**



17
satisfied clients

6
Pretrained AI models

50 - 99%
time savings

Built for Real-World Data

LiDAR sensor agnostic

HEXAGON

RIEGL®

TELEDYNE

…and others

Location-Independent AI

AI Models built from global training data for:

> 60 countries

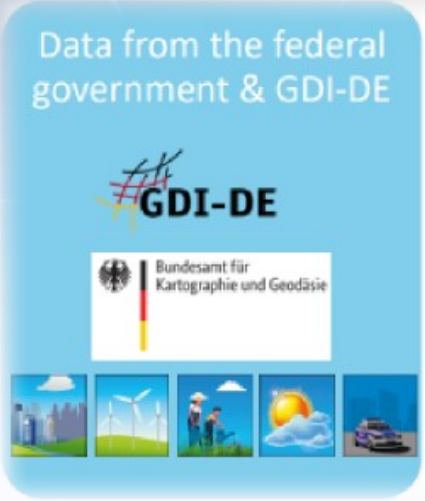
> 60 classes

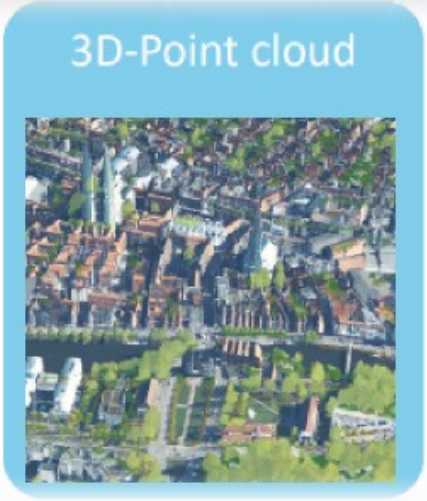
LiDAR platform agnostic

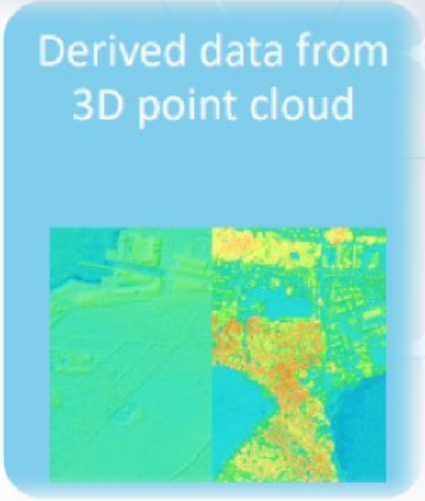
DIGITAL TWIN GERMANY

About Digital Twin Germany

- **National initiative led by BKG**
- **Builds a 3D digital replica of Germany**
- **Supports planning, crisis management, sustainability**







von Dömming, A., & Knöfel, P. (2025, January 23). Digital Twin Germany [Presentation slides]. EuroSDR Workshop *State-of-the-art 3D Mapping at National and Regional Mapping Agencies*, Paris. Slide 7.

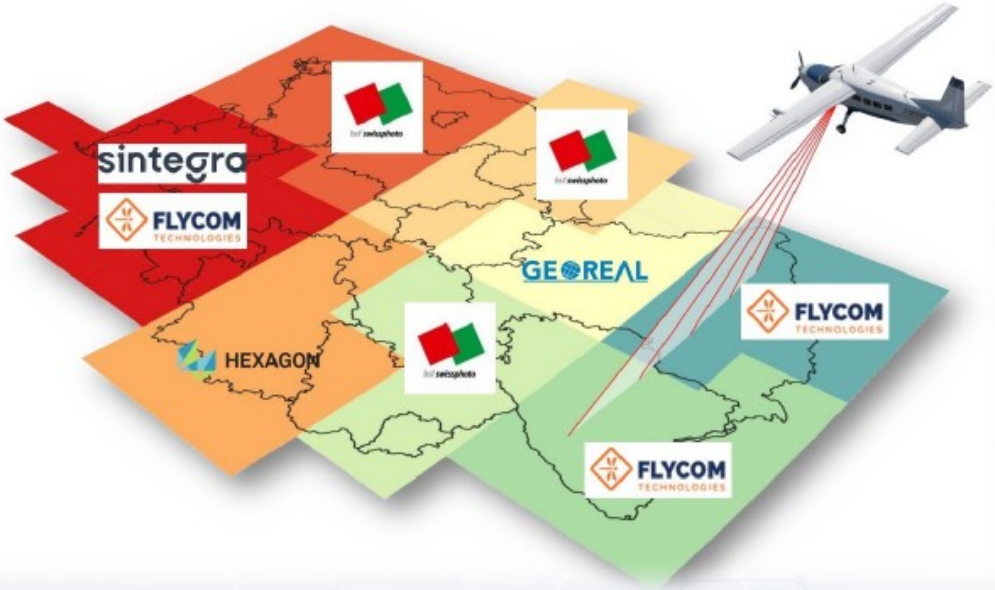
Project specifications

- **Total area 356 ,794 km²**
- **Acquisition 2024 – 25 (March–November)**
- **Leaf-on survey → tree analysis**
- **≥ 40 points / m² density**

Von Dömming, A. (2025, June 18). Der Digitale Zwilling Deutschland – Exemplarischer Impuls Bund [Presentation slides]. Bundesamt für Kartographie und Geodäsie. Slide 2

Flycom Technologies Role

- **Responsible for ~ 100,000 km²**
- **Pilatus aircrafts**
- **RIEGL 1560 II-S sensor**
- **Experience from Slovenia, Croatia, Slovakia nationwide projects**



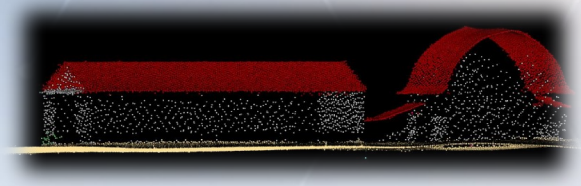
Von Dömming, A. (2025, June 18). Der Digitale Zwilling Deutschland – Exemplarischer Impuls Bund [Presentation slides]. Bundesamt für Kartographie und Geodäsie. Slide 5

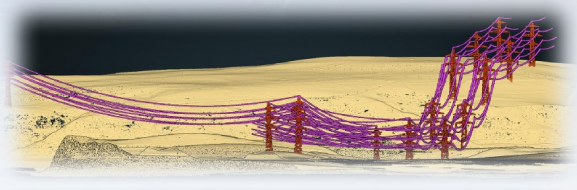
Processing Strategy

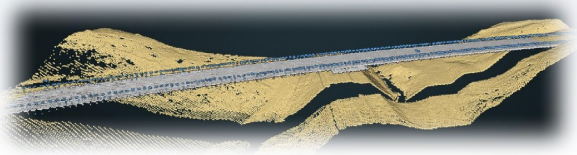
- **Automation is essential**
- **Mix of traditional solutions + AI methods**
- **Ground → traditional**
- **Above-ground → AI (pretrained FlaiNET models + new categories)**

- **Examples of AI support:**
  - **Noise classification on strip level**
  - **Powerline classification**
  - **Wind turbine detection**
  - **Bridge boundary optimization**

Classification



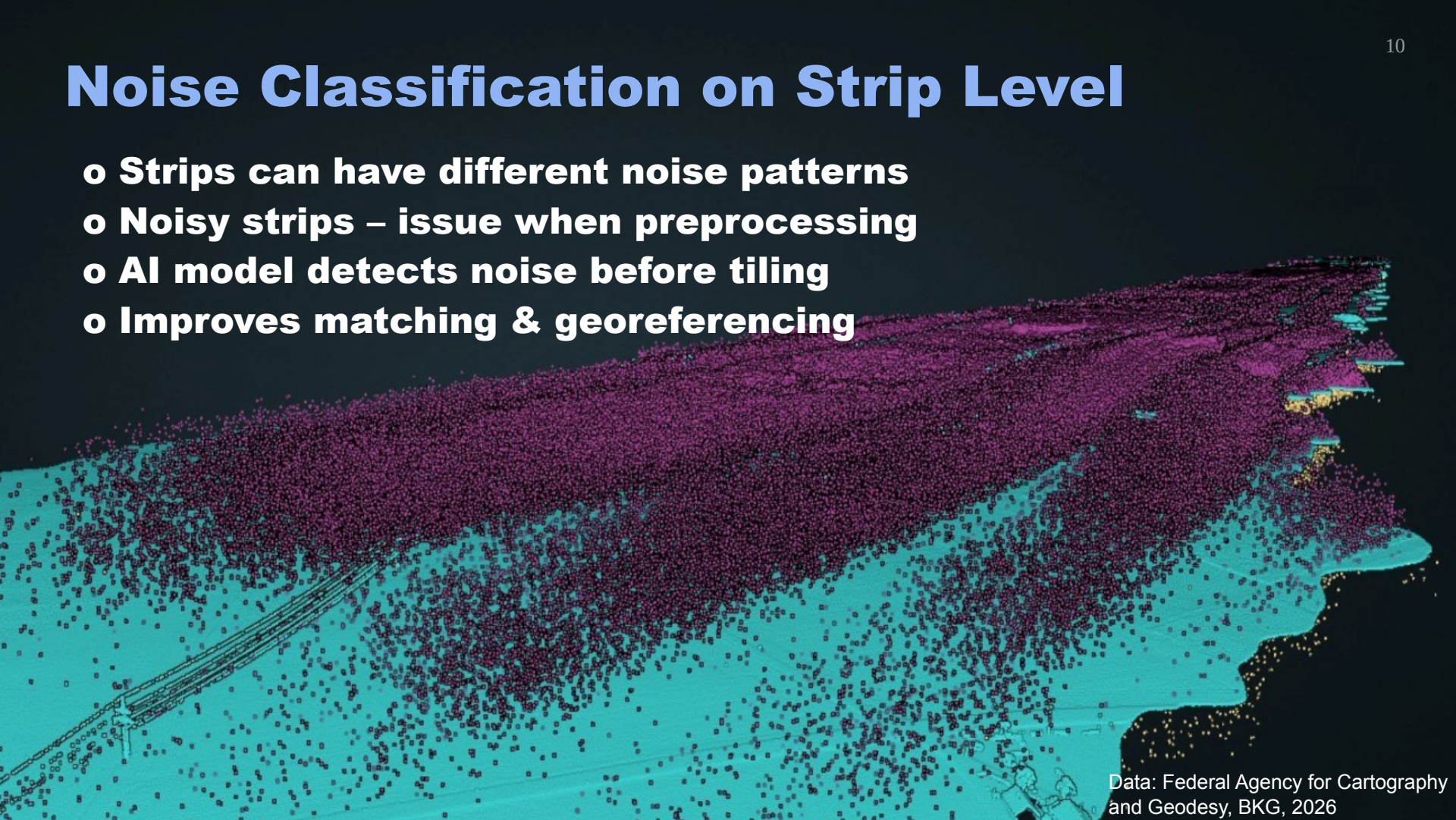




Pretrained Flai AI model	Digital Twin Germany
1 – Other	**1 – Unclassified**
2 – Ground	**2 – Ground**
3 – Vegetation	**3,4,5 – Low, Mid, High vegetation**
6 – Buildings (roof)	**6 – Buildings**
7 – Low Noise	**7 – Low noise**
9 – Water	**9 – Water**
17 – Bridge decks	**17 – Bridge decks**
18 – High noise	**18 – High noise**
20 – Roof Objects	
21 – Vehicles	
22 – Facade	
23 – Points below ground	
24 – Low voltage Wires	
25 – High Voltage Wires	**64 – High-voltage powerlines**
26 – Railroad Wires	
27 – Low Voltage Towers	
28 – High Voltage Towers	
29 – Railroad Towers	
30 – Fences	
+33 - Wind turbines, solar panels	**19 Other; wind, solar, tower >15m, pipeline**

Noise Classification on Strip Level

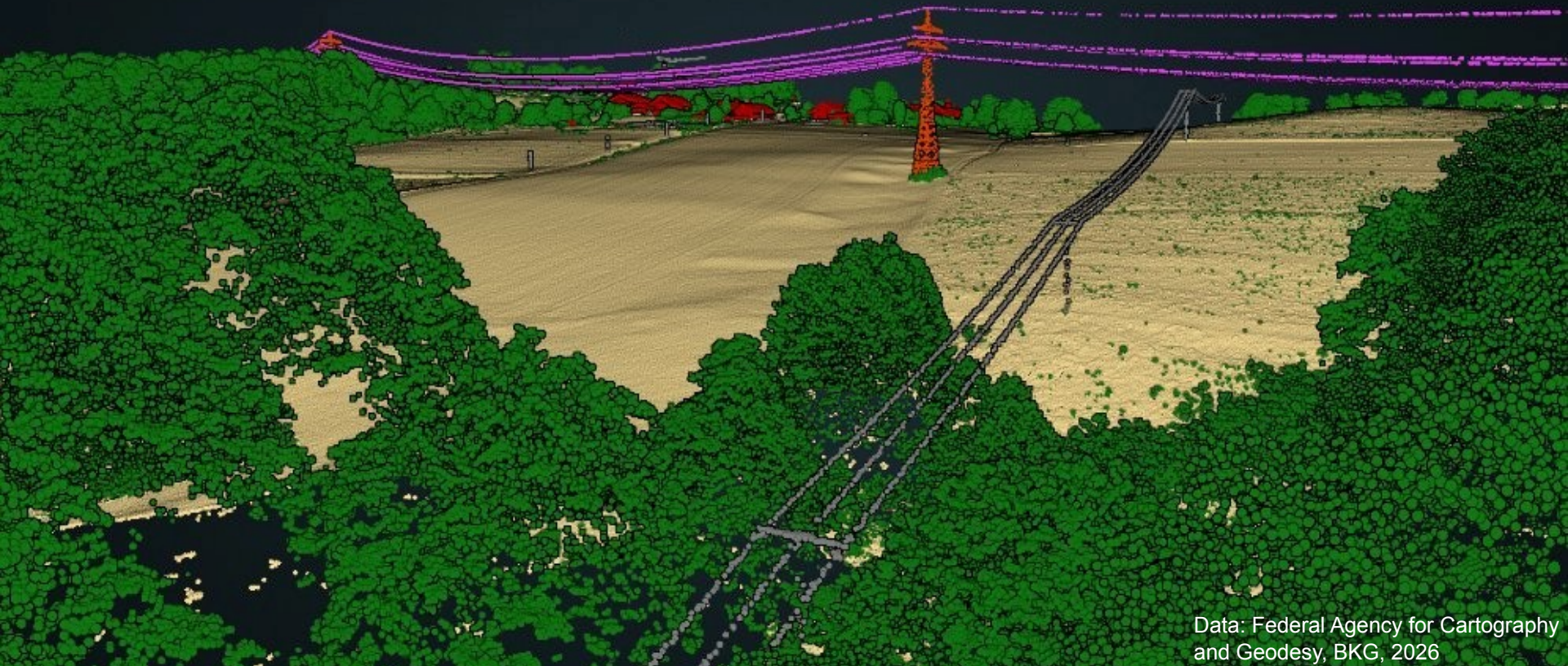
- Strips can have different noise patterns
- Noisy strips – issue when preprocessing
- AI model detects noise before tiling
- Improves matching & georeferencing



Data: Federal Agency for Cartography and Geodesy, BKG, 2026

Power line classification

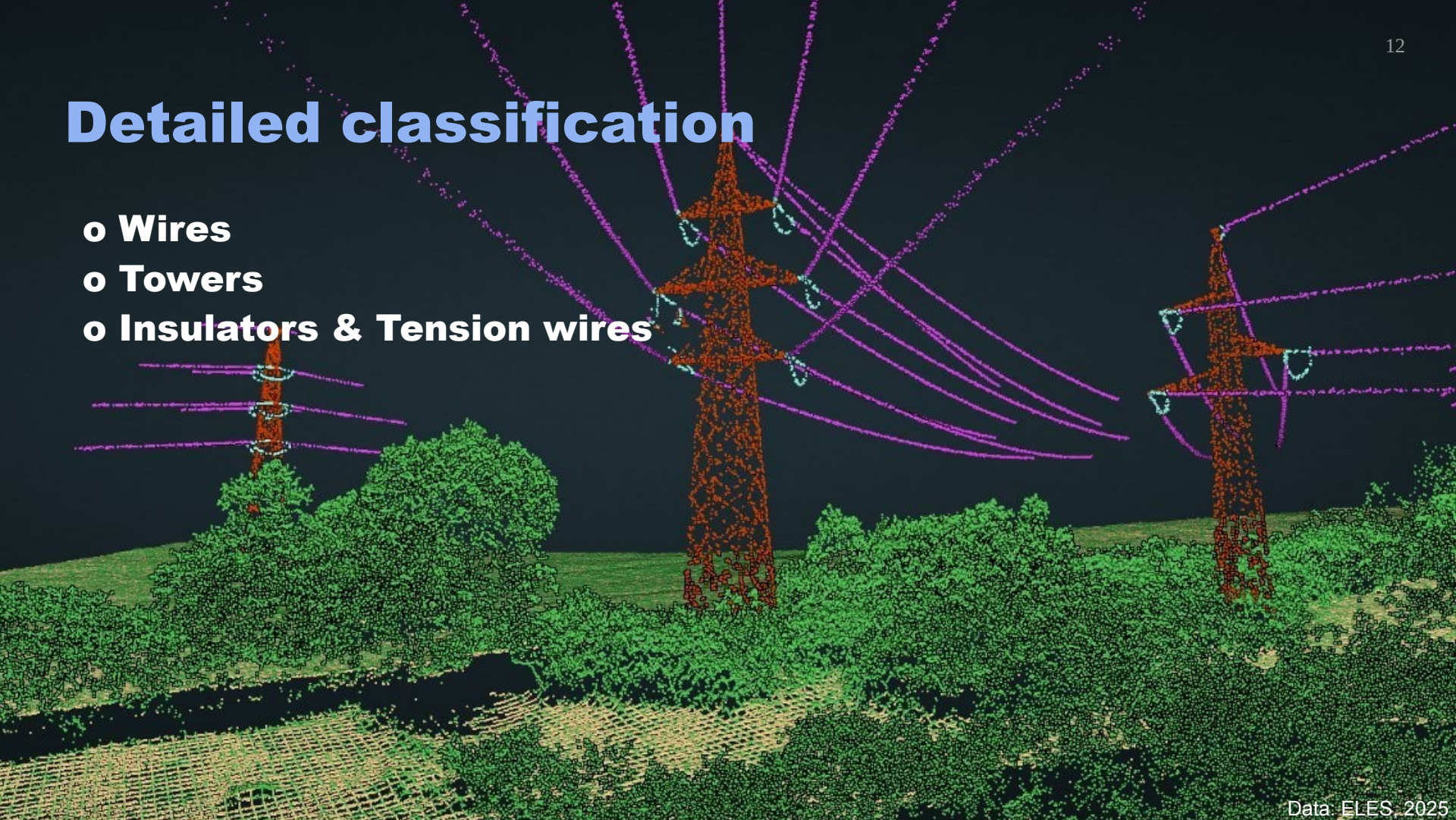
- High and low voltage classes available by default



Data: Federal Agency for Cartography and Geodesy, BKG, 2026

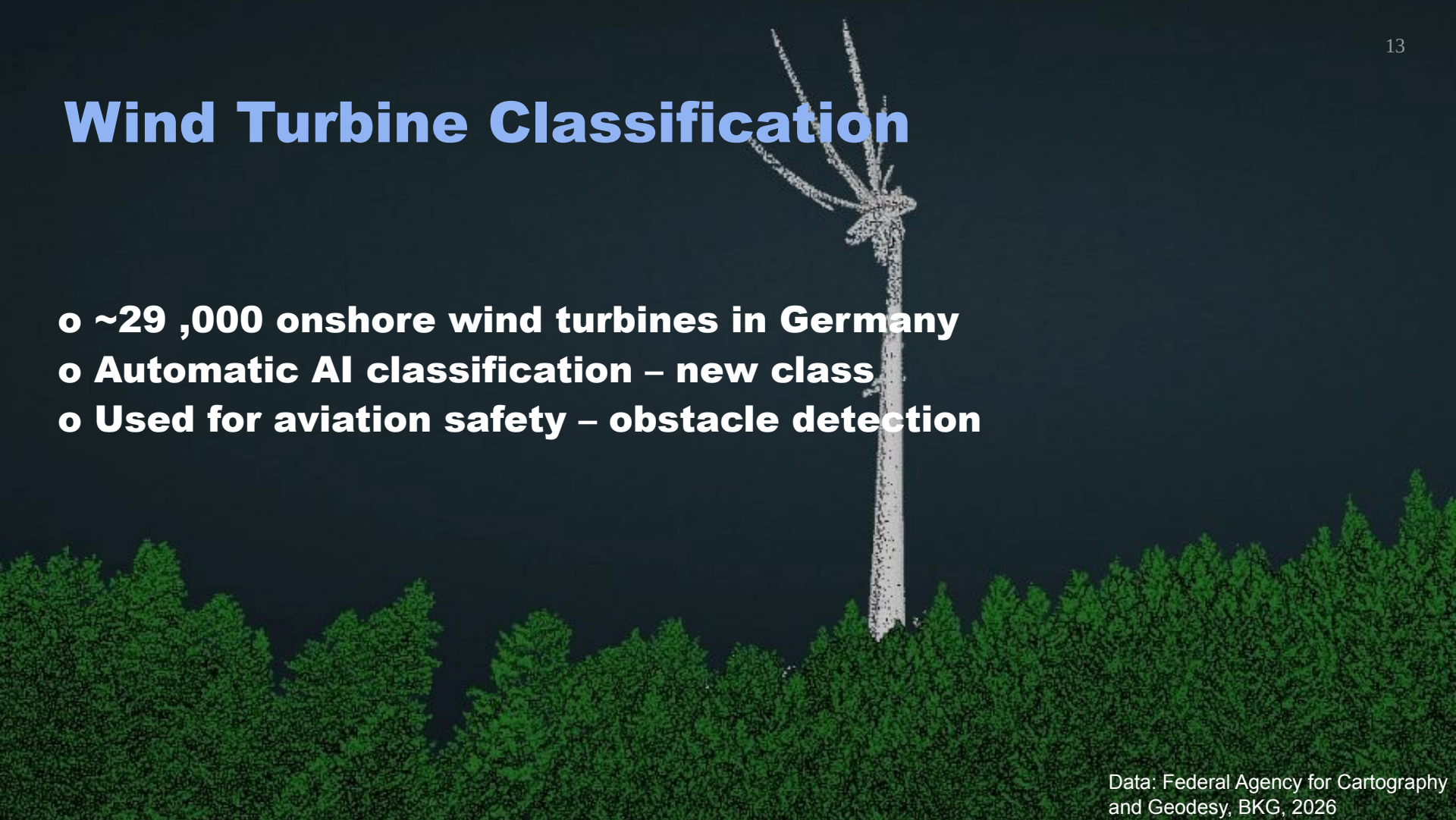
Detailed classification

- Wires
- Towers
- Insulators & Tension wires



Data: ELES, 2025

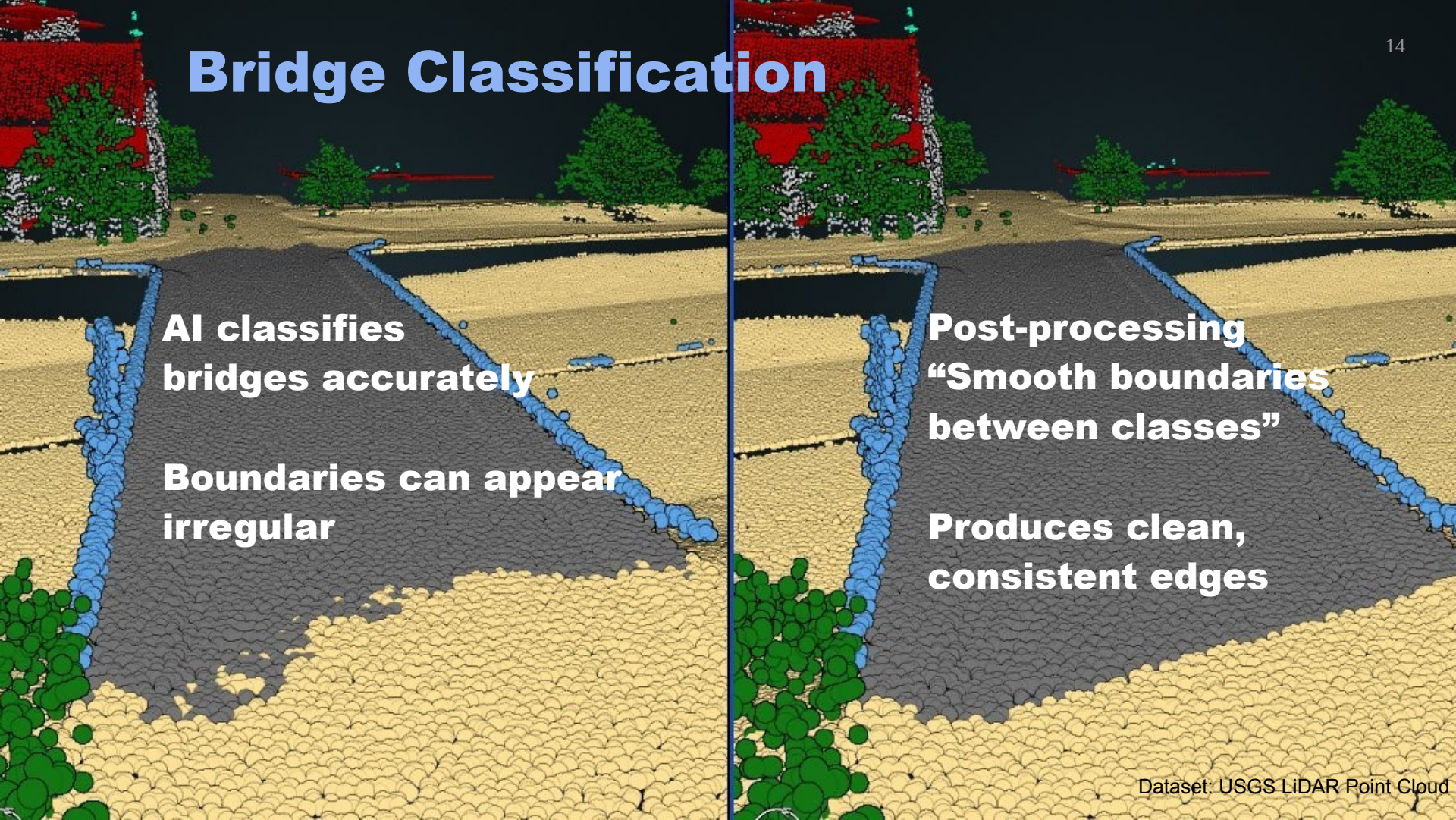
Wind Turbine Classification



- ~29 ,000 onshore wind turbines in Germany
- Automatic AI classification – new class
- Used for aviation safety – obstacle detection

Data: Federal Agency for Cartography and Geodesy, BKG, 2026

Bridge Classification



Dataset: USGS LiDAR Point Cloud

Local vs Cloud Processing

- **Cloud = scalable but data transfer + security issues**
- **Local = fast, secure, cost-efficient**
- **Processing done locally via Flai CLI**

Flai Web App

Simple, intuitive access to Flai AI models — no coding required.

- Browser-based interface for quick workflows
- Subscription or pay-per-download flexibility
- Ideal for **teams and non-technical users**
- Easily visualize, classify, and download results in QGIS/ArcGIS-ready formats

Flai CLI

Automation and scale for power users and enterprise pipelines

- Command-line interface for scripting & batch processing
- Volume-based licensing tailored for high throughput
- Integrates with existing **cloud or on-prem workflows**
- Perfect for **enterprises, national mapping agencies, and defence clients** who need secure, scalable processing

Flai Engine

The AI core powering all Flai products — built for scalable 3D data intelligence

Private Model Retraining & Fine-Tuning

Maximize Accuracy. Maintain full control.

1

Your Data Your Model 100 % On–Prem

- Full on-premise retraining — no cloud dependency
- Your data never leaves your environment
- Complete control over model, security, and compliance

Enterprise-safe AI

2

Leverage Your Historical Data

- Use years of labeled data to boost performance
- Improve classification accuracy in specific geographies or collection methodology
- Reduce edge-case errors with domain-specific adaptation

Turn historic data into a competitive advantage

3

From Global Model to Project-Specific Precision

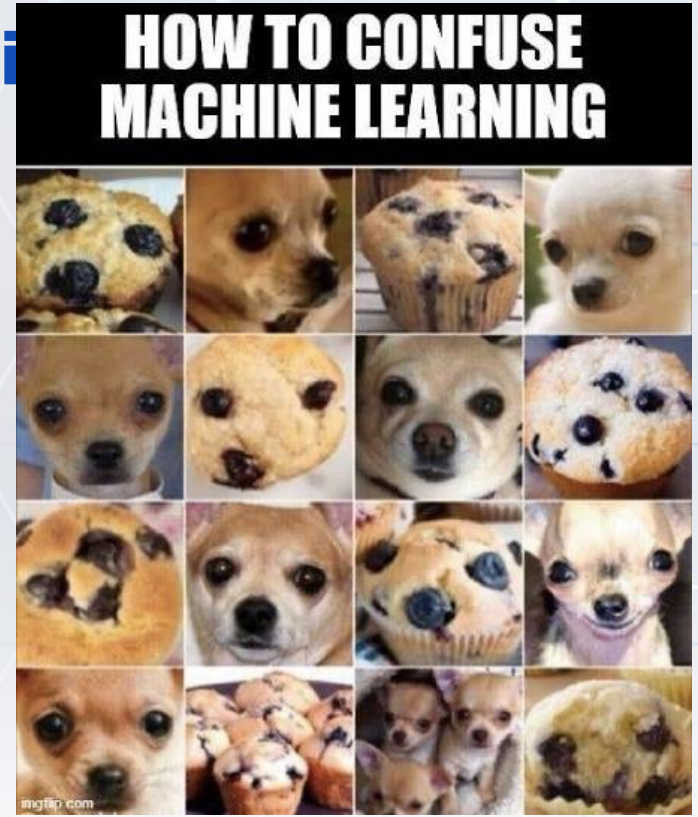
Our pretrained models are built to perform globally, but you can:

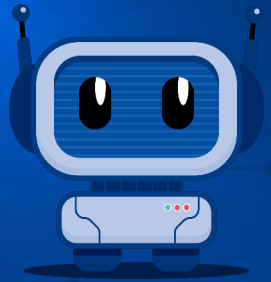
- Fine-tune for specific geographies
- Adapt to client-specific categories
- Improve precision for unique project requirements
- Align outputs with your internal taxonomy

General intelligence → tailored excellence

Benefits of AI Processing i

- It speeds up delivery
- All classes in one automated run
- Especially useful for above ground categories
- Retraining possible for specific categories





flai

Let’s transform your geospatial data into insight.

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