



# EUROPEAN CONFERENCE ON QUALITY IN OFFICIAL STATISTICS 2024 ESTORIL - PORTUGAL





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QUALITY IN OFFICIAL STATISTICS  
2024 ESTORIL - PORTUGAL

# Earth Observation Data and AI for Construction Statistics

Maren Köhlmann

Federal Statistical Office of Germany

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# Overview

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# Background and motivation



## Political endeavour

- » Build new, affordable and climate-appropriate housing
- » Monitor building and housing statistics more frequently



## Statistical needs

- » Intra-year information on construction work
- » Transform the largely paper-based building-activity statistics in regard to digital advances



## Idea:

Develop a method to  
quality assure building  
activity statistics using  
EO data



# Background and motivation



## Exemplary availability of remote sensing data for Germany, as of July 2022

Type of remote sensing data	Availability / temporal frequency	Spatial resolution
Satellite imagery	Daily up to every 16 days	0.3m up to 30m
Aerial photo / Digital Orthophoto	Every 2 to 4 years (rolling updates)	0.1m up to 0.4m





# Objectives and requirements

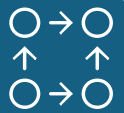


Developing a method to quality assure the construction activity statistics using remote sensing data and artificial intelligence

- Developing models to detect buildings and construction sites and possibly define construction starts as well as works completions
- Contrive a methodology to compare these results of the change detection analysis with data from official statistics



# Objectives



Use of a permissive open license  
segmentation model

→ SAM by © Meta AI

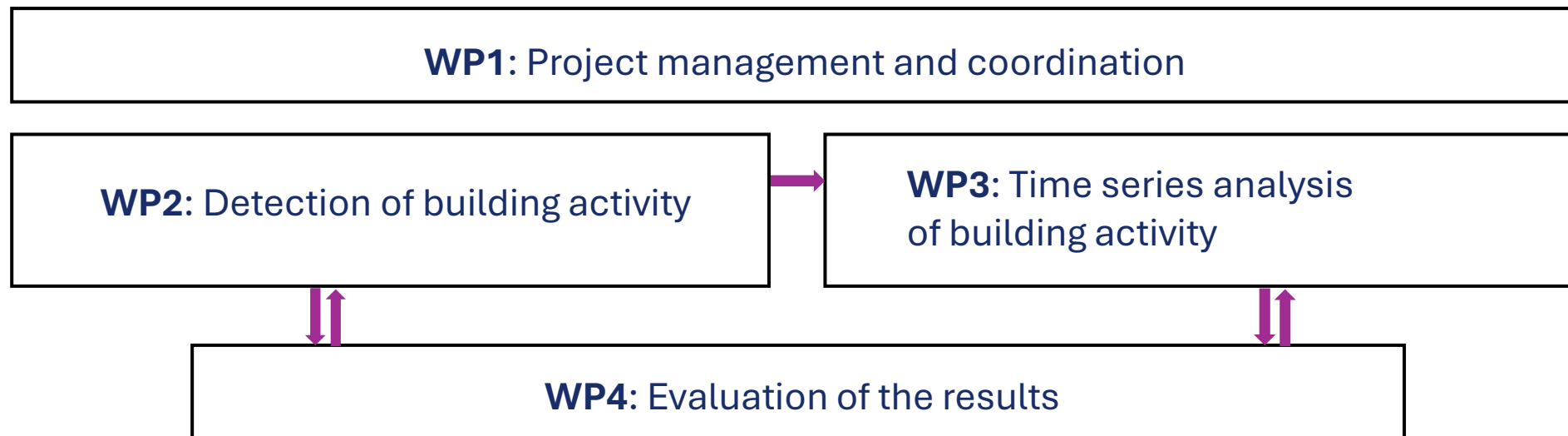
→ Foundation model

1. Putting a grid on the image
2. Selecting certain points of interest within the image
3. Masking the selected points according to the identified class





# Work packages and method







# Method



- House perimeter data
- OSM: landuse „construction“
- Property portals



Labeled training data



Segment Anything Model

Segmented construction sites and buildings

Building footprints of the house perimeter data

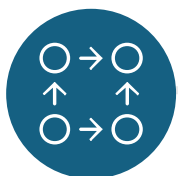
Data Mining for sensitive spectral indices (Conditional Random Forest)

Threshold-analysis of time series in building footprints/from segmentation

Further construction sites and construction phases



# Method



Differences of yearly house  
perimeter data

- Supports analysis of DOPs
- Detection of large building areas



2022

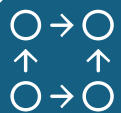
2023

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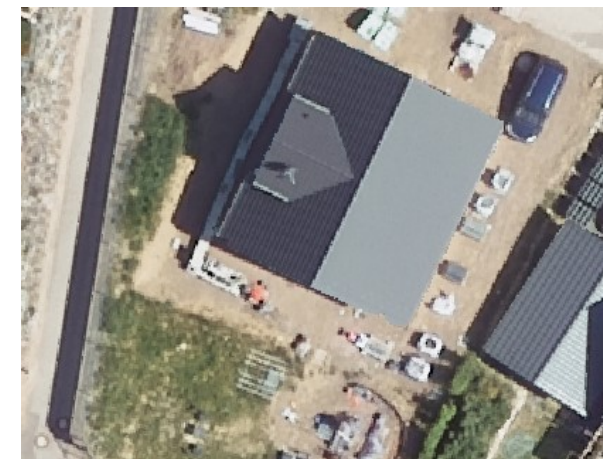




# Method

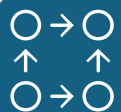


Different building phases  
Can the model identify these  
phases?



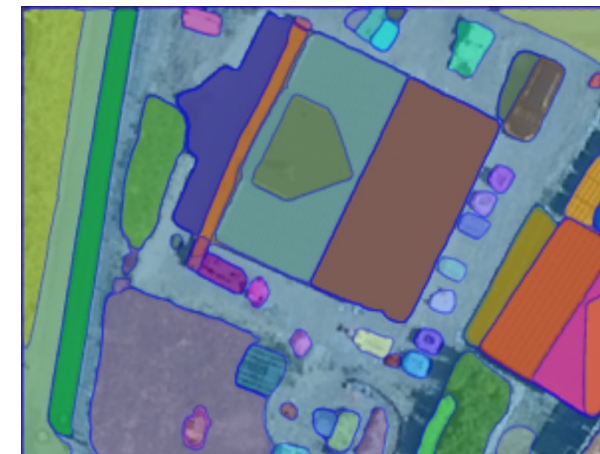
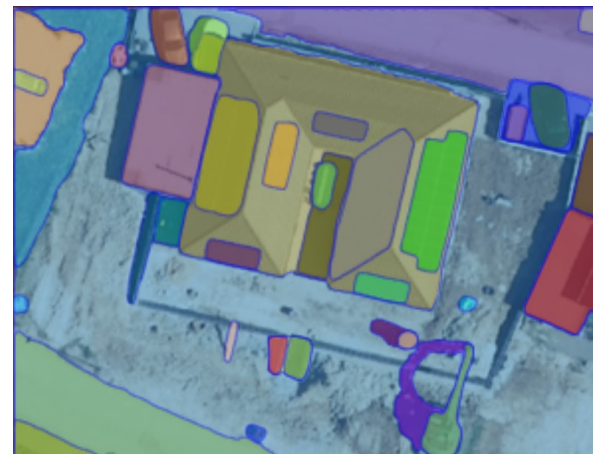


# Method



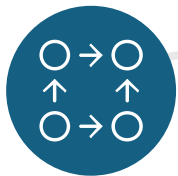
## Labels / ground truth

Surrounding might help to identify  
construction sites correctly  
e.g. construction machinery and  
fences





# Method



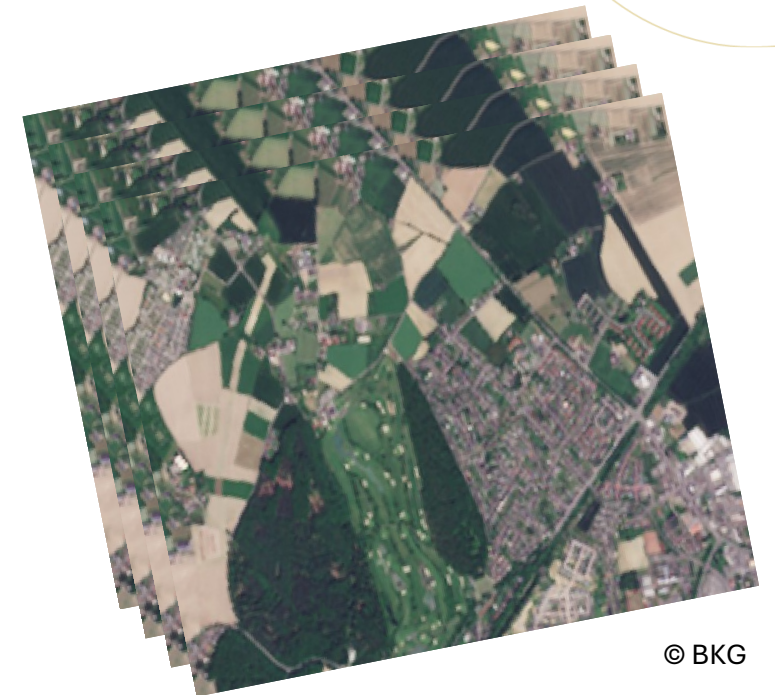
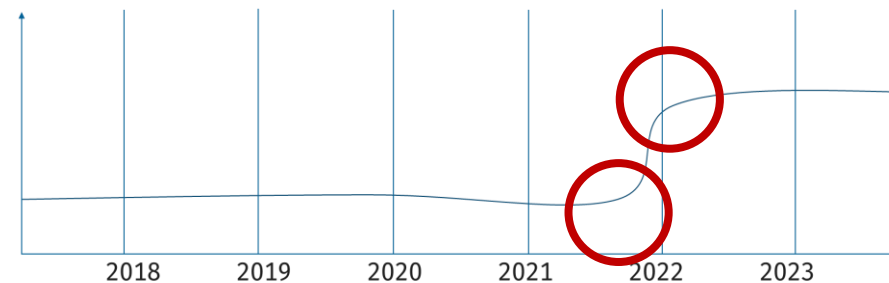
## Calculation of indices for test areas

Build-up Index (NDBI)

NDVI

NDWI

Separate bands



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# Thank You



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## Authors:

Maren Köhlmann - *Statistisches Bundesamt (Destatis)*, Germany

([maren.koehlmann@destatis.de](mailto:maren.koehlmann@destatis.de))

Thorsten Dahms, Carola Stolle – Bundesamt für Kartographie und Geodäsie (BKG), Germany



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