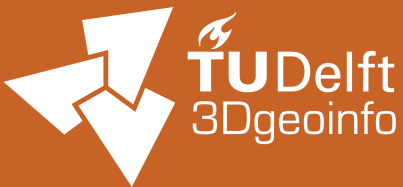


How can you use the 3DBAG?

Balazs Dukai, Ravi Peters, Gina Stavropoulou,
Jantien Stoter

Geonovum Open Geodag
7-11-2024, Amersfoort



Contents

1. What is the 3DBAG? (Ravi Peters)
2. How to get the 3DBAG data? (Gina Stavropoulou)
3. How is 3DBAG used?
 - a. ESRI (Joris Bak)
 - b. NL3D (Arjan Koelewijn)
4. The next version of 3DBAG (Balázs Dukai)
5. 3DBAG organisation (Balázs Dukai)

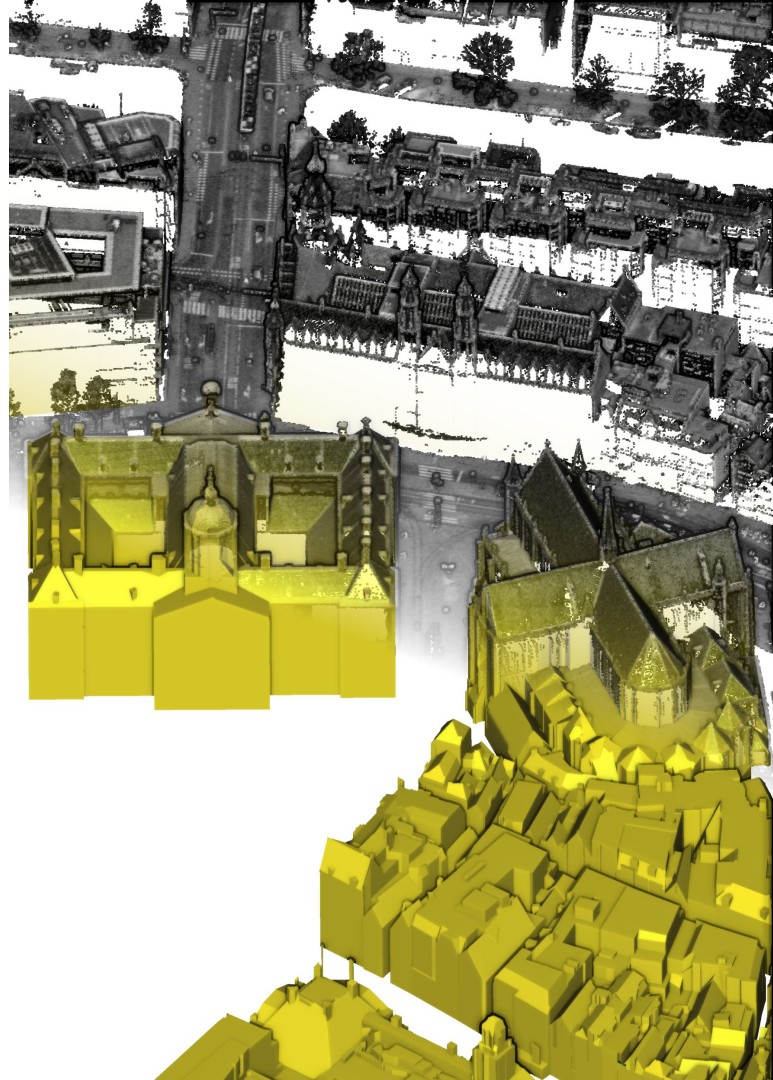


What is the 3DBAG?

What is the 3DBAG?

A dataset with **detailed 3D models** for **all buildings** in the Netherlands

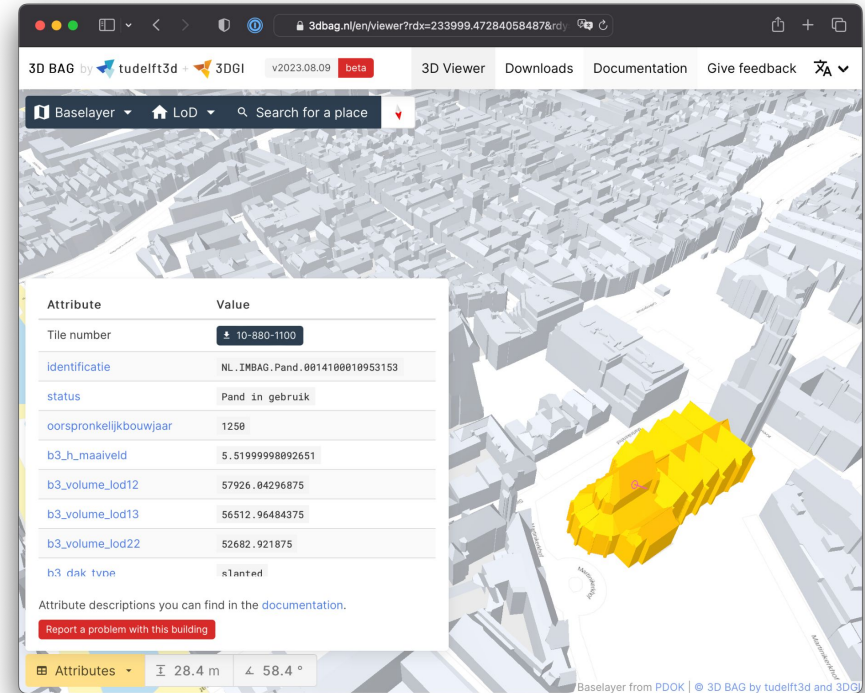
- ~10 million buildings
 - Detailed roof structure
 - Based on open government data
 - Available as open data
 - Built and maintained by a small team (3-5 persons)
- @TU Delft 3D geoinformation & 3DGI



What is the 3DBAG?

Downloadplatform 3dbag.nl

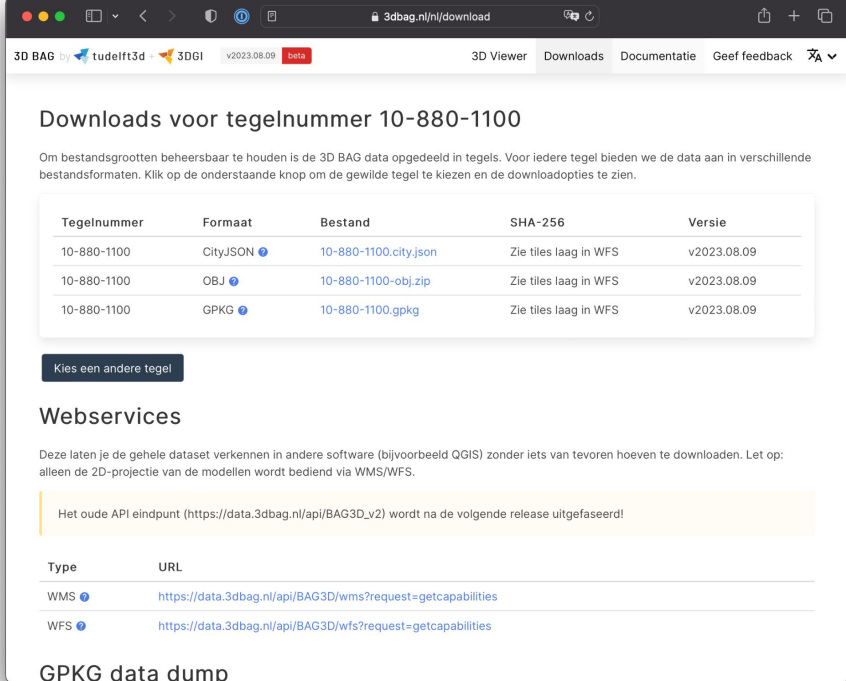
- 3D viewer
 - Directly view and inspect data
 - Also works on mobile



What is the 3DBAG?

Downloadplatform 3dbag.nl

- 3D viewer
 - Directly view and inspect data
 - Also works on mobile
- Data available in common GIS/3D formats



The screenshot shows the 3DBAG website interface. At the top, there's a navigation bar with links for '3D Viewer', 'Downloads', 'Documentatie', and 'Geef feedback'. The main heading is 'Downloads voor tegelnummer 10-880-1100'. Below this, a paragraph explains that data is divided into tiles and can be downloaded in different formats. A table lists three download options for the tile 10-880-1100: CityJSON, OBJ, and GPKG. Each row includes the format name, a download link, the SHA-256 hash, and the version. A button 'Kies een andere tegel' is located below the table. The 'Webservices' section mentions that the dataset can be explored in other software like QGIS and provides the API endpoint. A note indicates that the old API endpoint will be phased out. A table lists the WMS and WFS endpoints. The 'GPKG data dump' section is partially visible at the bottom.

Tegelnummer	Formaat	Bestand	SHA-256	Versie
10-880-1100	CityJSON	10-880-1100.city.json	Zie tiles laag in WFS	v2023.08.09
10-880-1100	OBJ	10-880-1100-obj.zip	Zie tiles laag in WFS	v2023.08.09
10-880-1100	GPKG	10-880-1100.gpkg	Zie tiles laag in WFS	v2023.08.09

Webservices

Deze laten je de gehele dataset verkennen in andere software (bijvoorbeeld QGIS) zonder iets van tevoren hoeven te downloaden. Let op: alleen de 2D-projectie van de modellen wordt bediend via WMS/WFS.

Het oude API eindpunt (https://data.3dbag.nl/api/BAG3D_v2) wordt na de volgende release uitgefaseerd!

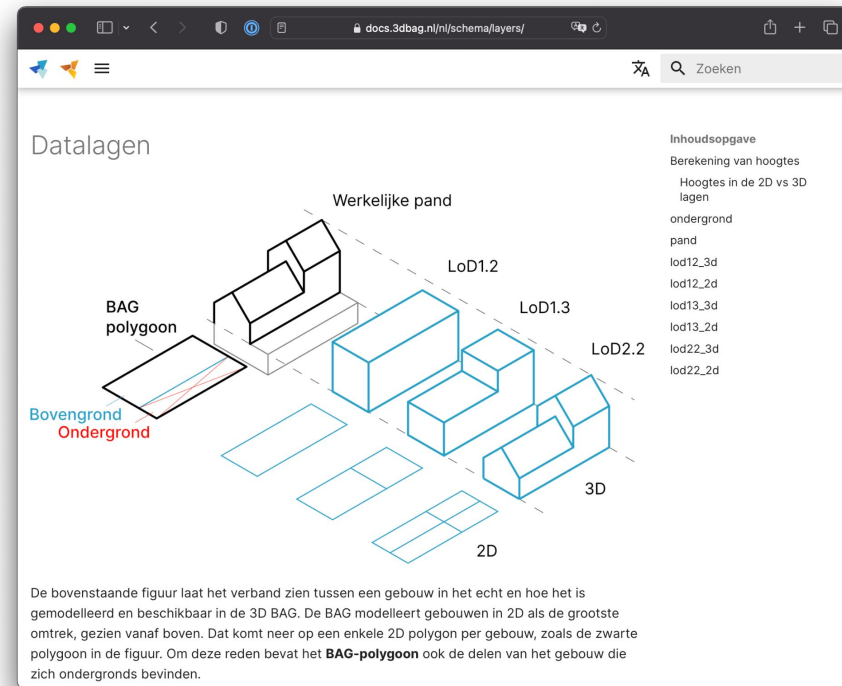
Type	URL
WMS	https://data.3dbag.nl/api/BAG3D/wms?request=getcapabilities
WFS	https://data.3dbag.nl/api/BAG3D/wfs?request=getcapabilities

GPKG data dump

What is the 3DBAG?

Downloadplatform 3dbag.nl

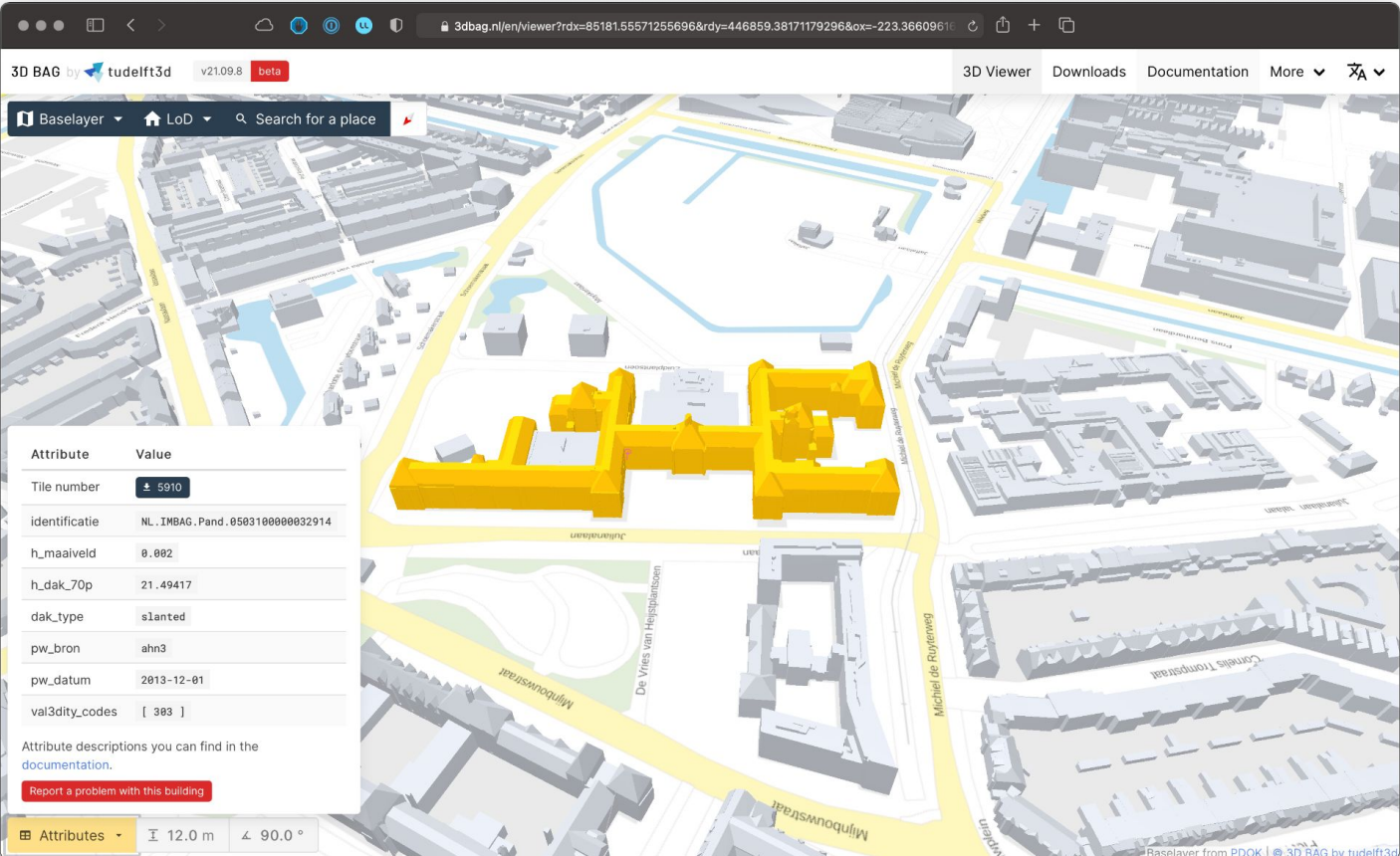
- 3D viewer
 - Directly view and inspect data
 - Also works on mobile
- Data available in common GIS/3D formats
- Documentation
 - Describing the dataset and how to use it



The 3D BAG

3dbag.nl

Data:  



3D BAG by tudelft3d v21.09.8 beta

Baselayer LoD Search for a place

3D Viewer Downloads Documentation More

Attribute	Value
Tile number	± 5910
identificatie	NL_IMBAG_Pand.0503100000032914
h_maaiveld	0.002
h_dak_70p	21.49417
dak_type	slanted
pw_bron	ahn3
pw_datum	2013-12-01
val3dity_codes	[383]

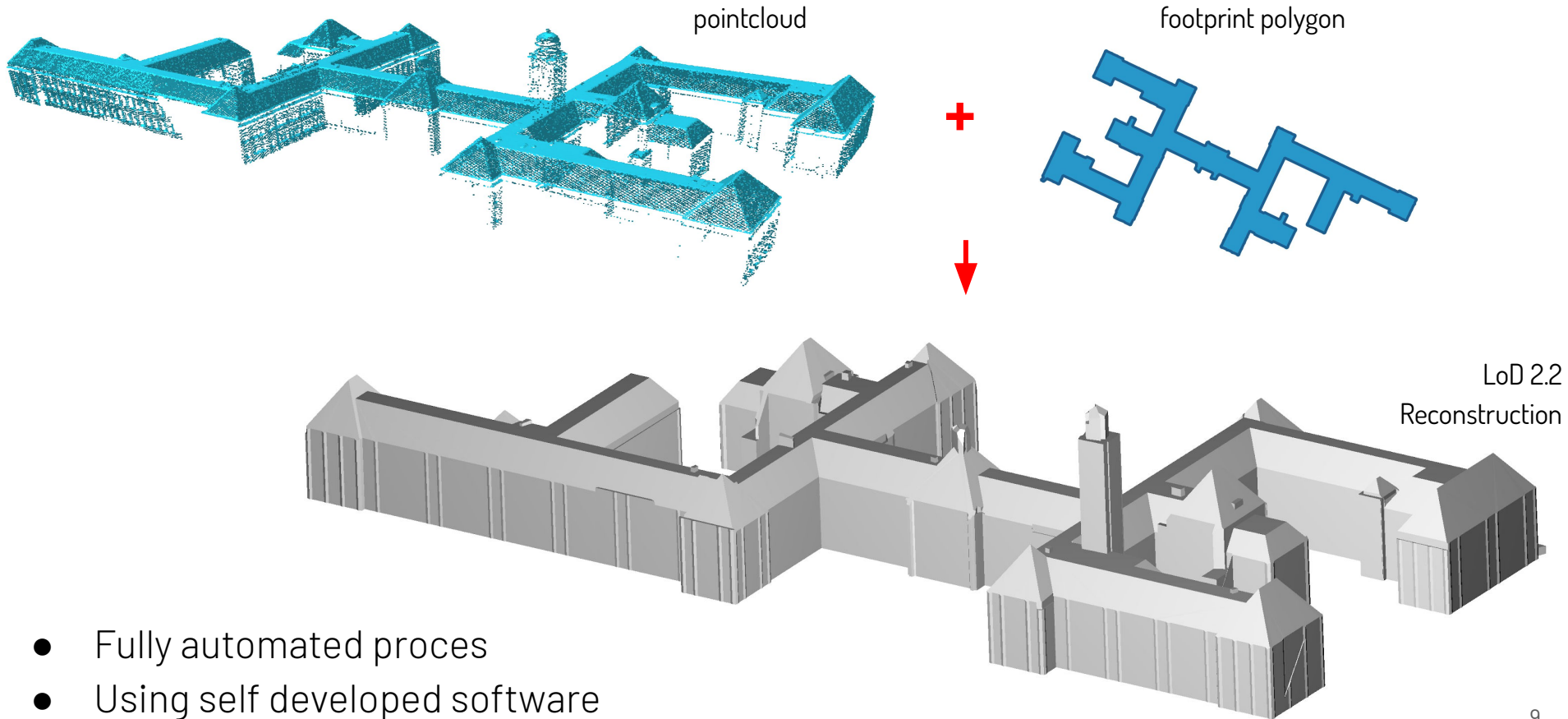
Attribute descriptions you can find in the [documentation](#).

[Report a problem with this building](#)

Attributes 12.0 m 90.0 °

Baselayer from PDOK | 3D BAG by tudelft3d

How is 3DBAG made?



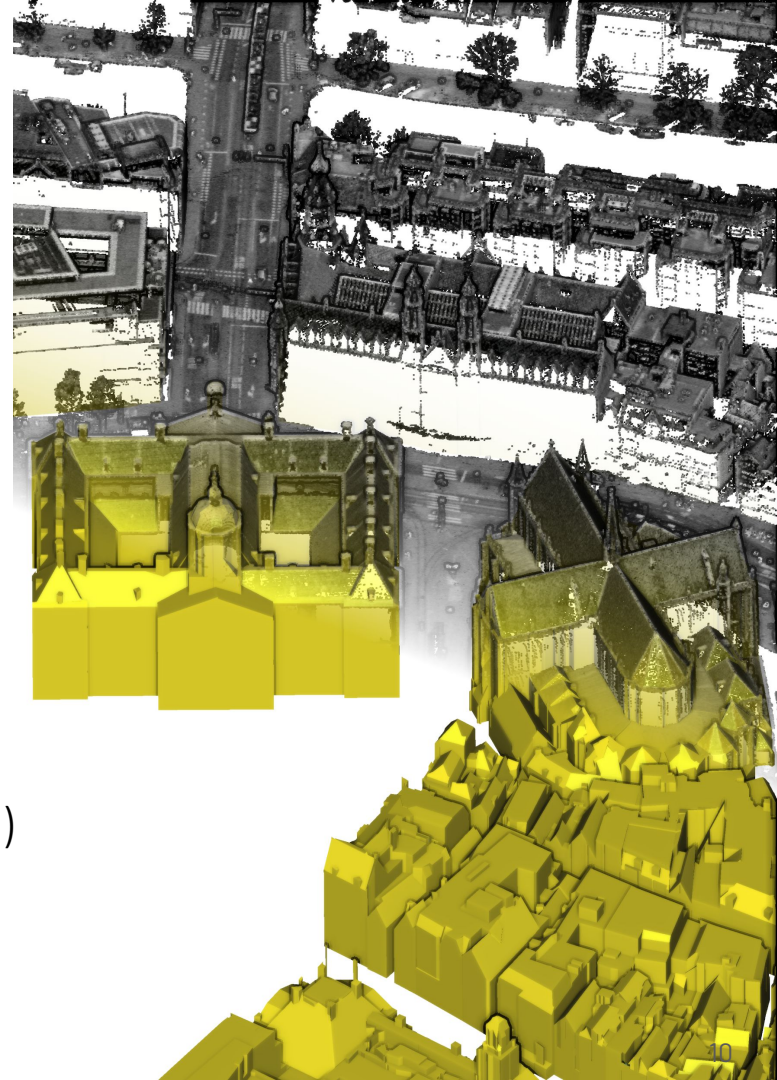
Built from Dutch open data

BAG <https://www.kadaster.nl/bag>

up-to-date building polygons + attributes
largest extent → roofprint + underground
positional accuracy 30cm

AHN <https://ahn.nl>

classified point cloud
positional accuracy ~23cm (height and planimetric)
8-15 pts/m² for buildings
occlusion and other no-data areas



How to get the 3DBAG data?

Attributes

b3_azimut

b3_bag_bag_overlap

b3_bouwlagen

b3_dak_type

b3_dd_id

b3_h_dak_50p

b3_h_dak_70p

b3_h_dak_max

b3_h_dak_min

b3_h_maaiveld

b3_hellingshoek

b3_kas_warenhuis

b3_kwaliteitsindicator

b3_mutatie_ahn3_ahn4

b3_nodata_fractie_ahn3

b3_nodata_fractie_ahn4

b3_nodata_radius_ahn3

b3_nodata_radius_ahn4

b3_opp_buitenmuur

b3_opp_dak_plat

b3_opp_dak_schuin

b3_opp_grond

b3_opp_scheidingsmuur

b3_pand_deel_id

b3_punt dichtheid_ahn3

b3_punt dichtheid_ahn4

b3_pw_bron

b3_pw_datum

b3_pw_selectie_reden

b3_reconstructie_onvolledig

b3_rmse_lod12

b3_rmse_lod13

b3_rmse_lod22

b3_val3dity_lod12

b3_val3dity_lod22

b3_volume_lod12

b3_volume_lod13

b3_volume_lod22

begin geldigheid

documentdatum

documentnummer

eind geldigheid

eindregistratie

geconstateerd

identificatie

labels

oorspronkelijk bouwjaar

status

tijdstipeindregistratie lv

tijdstip inactief

tijdstip inactief lv

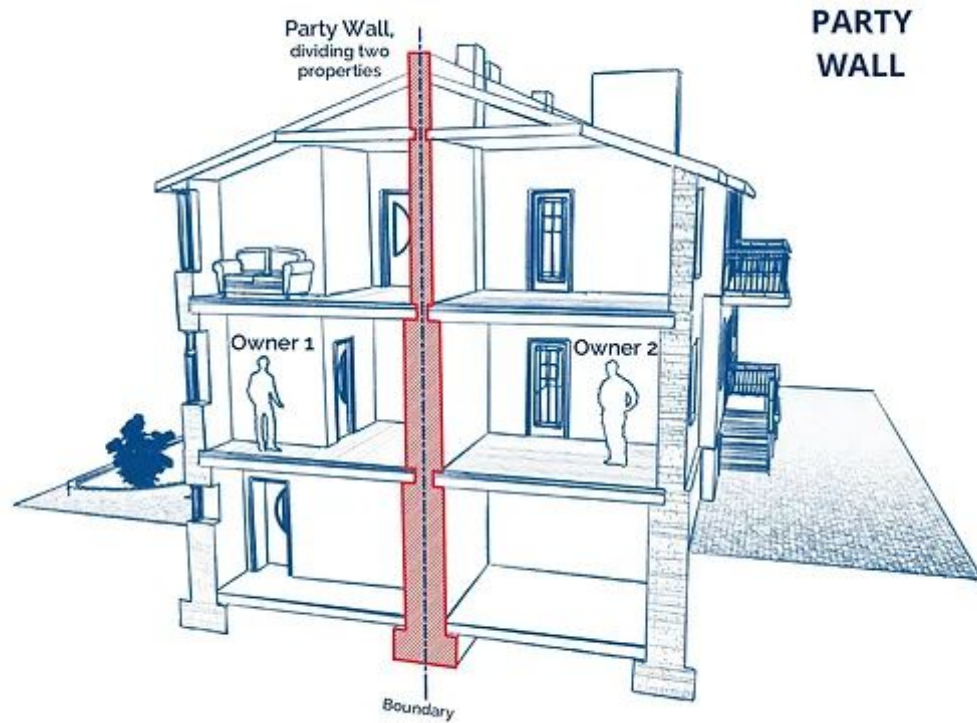
tijdstip niet bag lv

tijdstip registratie

tijdstip registratie lv

voorkomen identificatie

Party walls



File formats & Services

Individual tile formats

GPKG

OBJ

CityJSON

Full dataset

GPKG

Web Services

WFS

WMS

API

File formats & Services

Individual tile formats

GPKG

OBJ

CityJSON

Full dataset

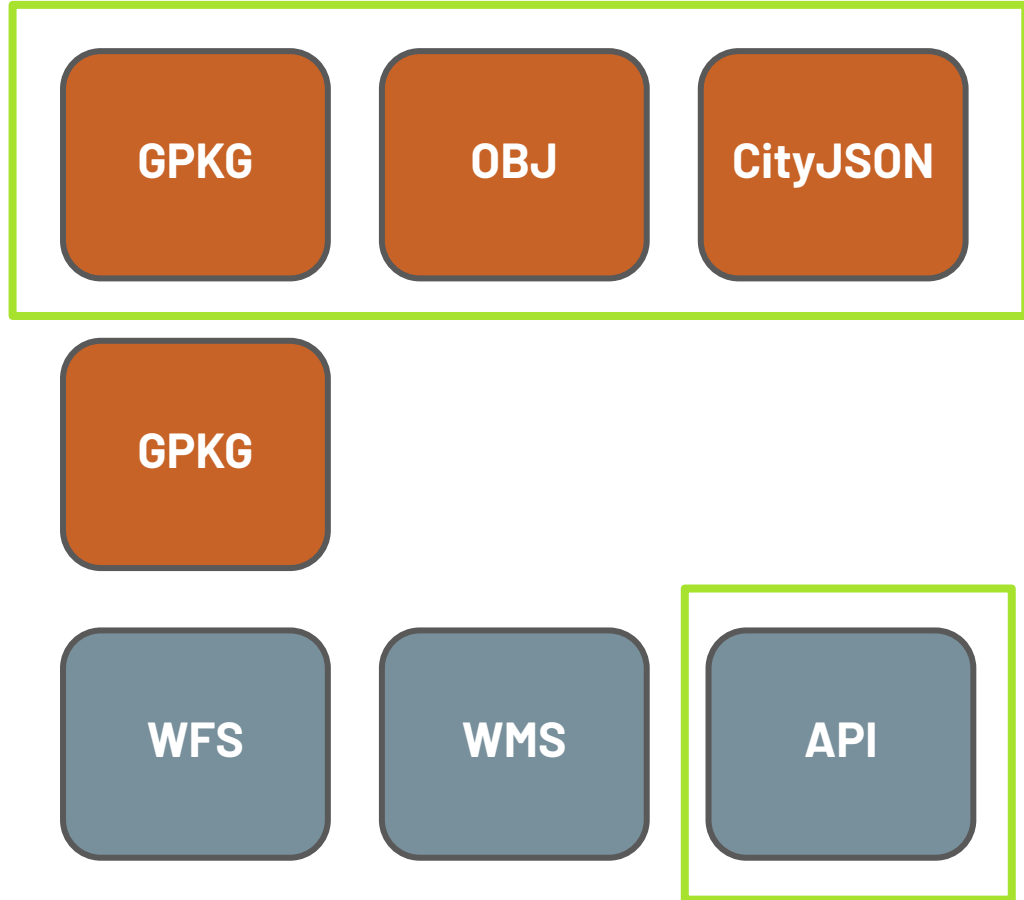
GPKG

Web Services

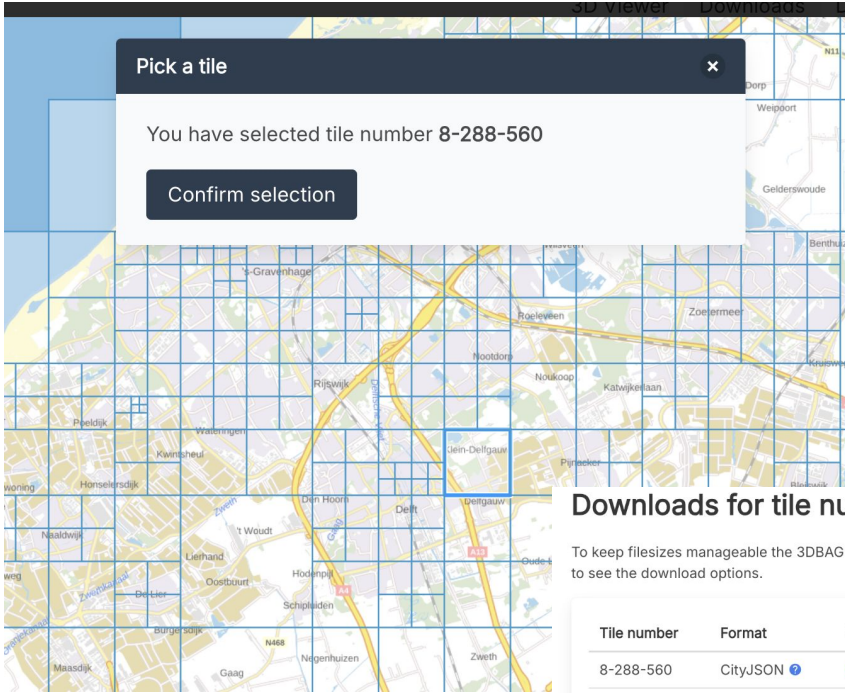
WFS

WMS

API



How-To: Downloading 3DBAG tiles



Downloads for tile number 8-288-560

To keep file sizes manageable the 3DBAG dataset is subdivided in tiles. For each tile we offer the data in a number of different file formats. Use the button below to select the tile of interest to see the download options.

Tile number	Format	File	SHA-256	Version
8-288-560	CityJSON ?	8-288-560.city.json	163affe58ed35f4a86d79d524cf5d03e43e01c70f938663ab52964be5fb2aa8b	v2024.04.20
8-288-560	OBJ ?	8-288-560-obj.zip	fa3e331c0301a8ff41985d1a386ddd3d9dfabfdd233e88c265f45771217917ec	v2024.04.20
8-288-560	GPkg ?	8-288-560.gpkg	0fd6fe5d00ddce18774909218bf8eb5f7e4dd1c54d58a1d3f6b1c3c38143e1c0	v2024.04.20

How-To: Downloading 3DBAG tiles

All tiles within a bbox: Use the complete tile index (FlatGeoBuf)

```
{
  'tile_id': '6/288/672',
  'cj_sha256': 'b932ca1a5d10cca49f37d053fba6116c7ac33b18afc006f64cabcf20aee77d6d',
  'gpkg_sha256': '3e31da3d82100fbc9bf867756ec056fd238b23d432e1bd1ba93ea8a564cf0e0',
  'obj_sha256': '90e58b5ea58463a3d0a12980bb7cd1a238dcfd3406ce13fb1472811a2aa5704c',
  'cj_download': 'https://data.3dbag.nl/v20240420/tiles/6/288/672/6-288-672.city.json.gz',
  'gpkg_download': 'https://data.3dbag.nl/v20240420/tiles/6/288/672/6-288-672.gpkg.gz',
  'obj_download': 'https://data.3dbag.nl/v20240420/tiles/6/288/672/6-288-672-obj.zip'
}
```

How-To: Downloading 3DBAG tiles

All tiles within a bbox: Use the complete tile index (FlatGeoBuf)

Python snippet:

```
from pathlib import Path
from urllib.request import urlretrieve
import flatgeobuf as fgb

outdir = Path("gpkg_tiles"); outdir.mkdir(exist_ok=True)
tile_ids = fgb.HTTPReader('https://data.3dbag.nl/v20240420/tile_index.fgb',
bbox=(84000, 477000, 86000, 478000))
for tile_id in tile_ids:
    url = tile_id.properties['gpkg_download']
    urlretrieve(url, outdir / url.split('/')[-1])
```

How-To: Downloading 3DBAG tiles

All tiles within a bbox: Use the complete tile index (FlatGeoBuf)

Python snippet:

```
from pathlib import Path
from urllib.request import urlretrieve
import flatgeobuf as fgb

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bbox=(84000, 477000, 86000, 478000))
for tile_id in tile_ids:
    url = tile_id.properties['gpkg_download']
    urlretrieve(url, outdir / url.split('/')[-1])
```

Script in:

github.com/3DBAG/3dbag-scripts

How-To: 3DBAG-API

- Programmatic access to the 3DBAG data
- Returns cityJSONSeq
- Allows the retrieval of specific buildings and bbox operations
- Not yet OGC-compliant
- Only supported CRS: Amersfoort / RD New + NAP height (EPSG:7415)

<https://api.3dbag.nl/>

How-To: 3DBAG-API

Request Single Building:

<https://api.3dbag.nl/collections/pand/items/NL.IMBAG.Pand.0503100000032914>

Request All Buildings in a BBox:

<https://api.3dbag.nl/collections/pand/items?bbox=85000.00,446700.034,85300.011,447000.0>

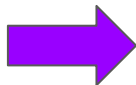
Instructions in:

api.3dbag.nl/api.html

How-To: 3DBAG-API

Request Single Building:

<https://api.3dbag.nl/collections/pand/items/NL.IMBAG.Pand.0503100000032914>



CityJSONSeq

```
{
  "feature": {
    "CityObjects": {
      "NL.IMBAG.Pand.0503100000032914": {
        "attributes": {
          "b3_bag_bag_overlap": 23.3554954528809,
          "b3_bouwlagen": null,
          "b3_dak_type": "slanted",
          "b3_h_dak_50p": 20.1499996185303,
          "b3_h_dak_70p": 21.5,
          "b3_h_dak_max": 52.8300018310547,
          "b3_h_dak_min": 0.939999997615814,
          "b3_h_maaiveld": 0.0020000000949949,
          "b3_kas_warenhuis": false,
          "b3_mutatie_ahn3_ahn4": false,
          "b3_nodata_fractie_ahn3": 0.000949908164329826,
          "b3_nodata_fractie_ahn4": 0.271673738956451,
          "b3_nodata_radius_ahn3": 0.76659369468689,
          "b3_nodata_radius_ahn4": 3.12317109107971,
          "b3_opp_buitenmuur": 19287.86,
          "b3_opp_dak_plat": 2240.14,
          "b3_opp_dak_schuin": 9948.24,
          "b3_opp_grond": 7894.57,
          "b3_opp_scheidingsmuur": 1406.73,
          "b3_punt dichtheid_ahn3": 18.9032707214355,
          "b3_punt dichtheid_ahn4": 27.572732925415,
          "b3_pw_bron": "AHN3",
          "b3_pw_datum": 2014,
          "b3_pw_selectie_reden": "_HIGHEST_YET_INSUFFICIENT_COVERAGE",
          "b3_reconstructie_onvolledig": false,
          "b3_rmse_lod12": 3.58611083030701,
          "b3_rmse_lod13": 2.86251378059387,
          "b3_rmse_lod22": 0.478037446737289,
          "b3_val3dity_lod12": "[]",
          "b3_val3dity_lod13": "[]",
          "b3_val3dity_lod22": "[303]",
          "b3_volume_lod12": 169719.15625,
          "b3_volume_lod13": 169433.0625,

```

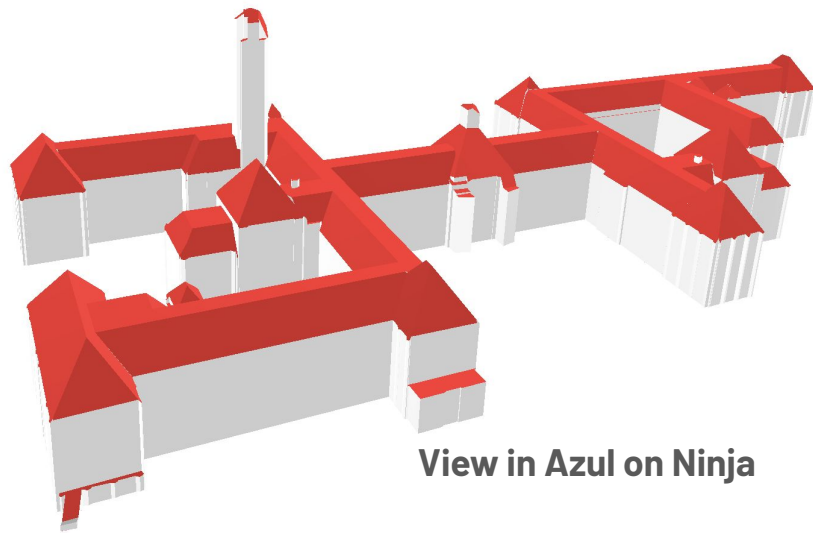
How-To: 3DBAG-API

Request Single Building:

<https://api.3dbag.nl/collections/pand/items/NL.IMBAG.Pand.050310000032914>



```
BUILDING_ID = "NL.IMBAG.Pand.050310000032914"
request = f"https://api.3dbag.nl/collections/pand/items/{BUILDING_ID}"
with urllib.request.urlopen(request) as response:
    j = json.loads(response.read().decode('utf-8'))
    with open(f"{BUILDING_ID}.city.jsonl", "w") as my_file:
        my_file.write(json.dumps(j["metadata"]) + "\n")
        if "feature" in j:
            my_file.write(json.dumps(j["feature"]) + "\n")
        if "features" in j:
            for f in j["features"]:
                my_file.write(json.dumps(f) + "\n")
```



View in Azul on Ninja

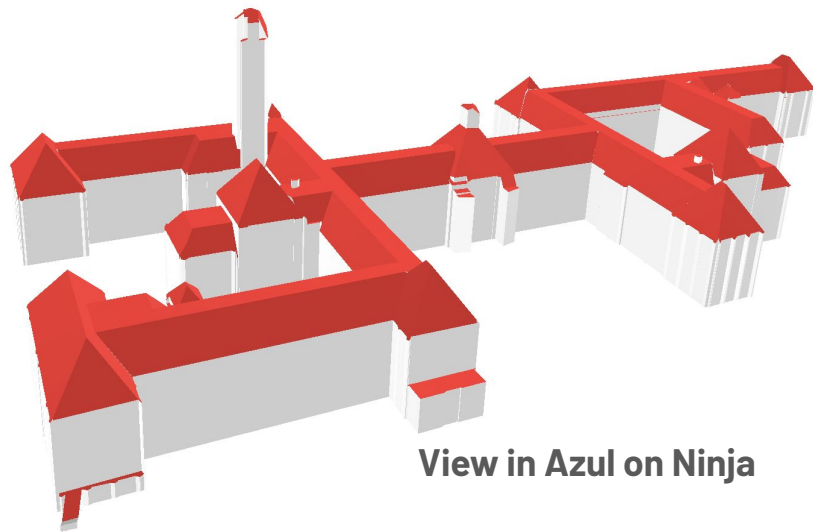
How-To: 3DBAG-API

Request Single Building:

<https://api.3dbag.nl/collections/pand/items/NL.IMBAG.Pand.050310000032914>



```
BUILDING_ID = "NL.IMBAG.Pand.050310000032914"
request = f"https://api.3dbag.nl/collections/pand/items/{BUILDING_ID}"
with urllib.request.urlopen(request) as response:
    j = json.loads(response.read().decode('utf-8'))
    with open(f"{BUILDING_ID}.city.jsonl", "w") as my_file:
        my_file.write(json.dumps(j["metadata"]) + "\n")
        if "feature" in j:
            my_file.write(json.dumps(j["feature"]) + "\n")
        if "features" in j:
            for f in j["features"]:
                my_file.write(json.dumps(f) + "\n")
```



View in Azul on Ninja

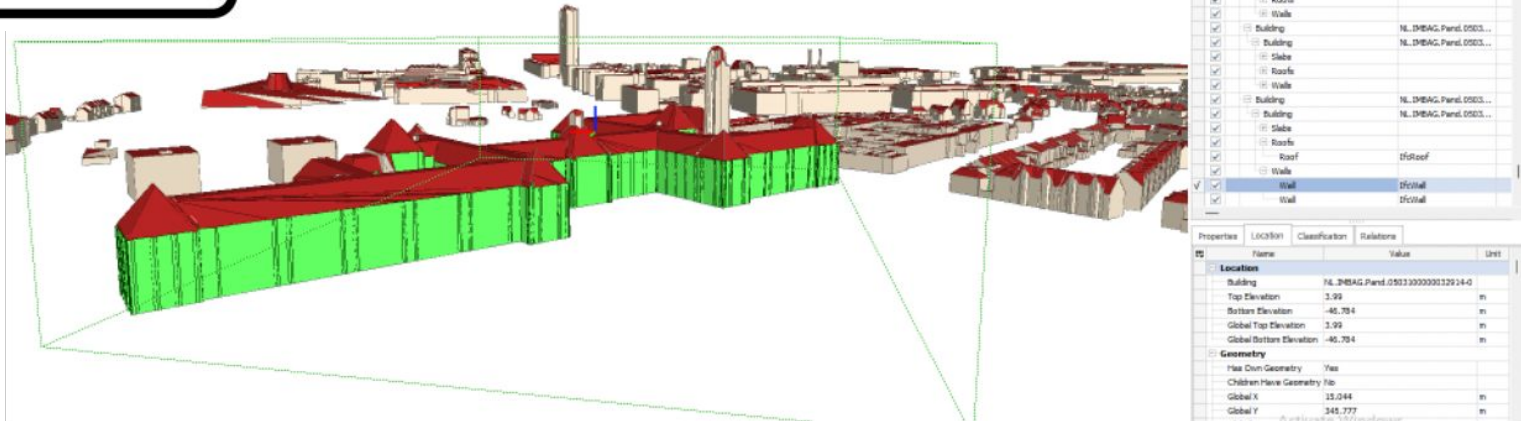
Script in:

github.com/3DBAG/3dbag-scripts

File formats & Services: IFC (soon)



Converter: **cityjson2ifc**



How is 3DBAG used?



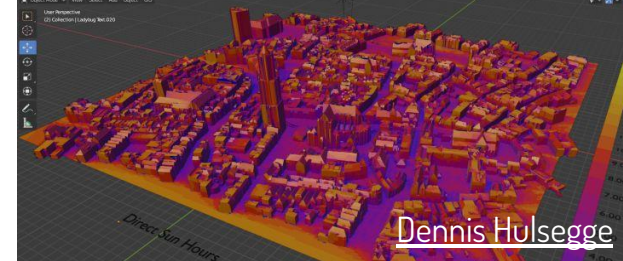
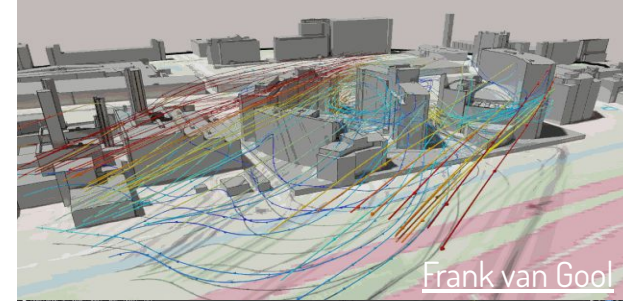
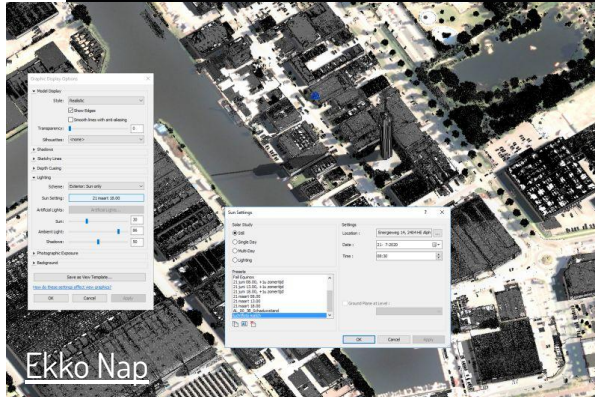
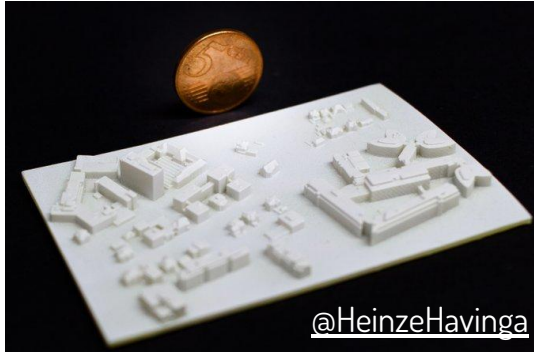
Heating energy demand

Computational Fluid Dynamics

Solar panel potential

3D BAG in practice

<https://docs.3dbag.nl/en/overview/media/>



User presentations

3DBAG organisation and contributors

Organisational status

- Established through research projects
- WaU (Kadaster) financed software refactor (2024)
 - Performed by 3DGI and TU3D
 - => <https://github.com/3DBAG>
- 3DBAG now past research phase. Per month:
 - ~ 100 000 tegel downloads
 - ~ 850 000 webservice queries
- Looking for stable role
 - Financing + Status
 - For example in ZoN Datafundament NGII

The screenshot shows the Datafundament website with a navigation bar at the top containing links for Datafundament, Actueel, Visie, Dataproducten, Projecten, Praktijk, and Doe mee. A search bar is located on the right. Below the navigation bar, the 'Dataproducten' section is highlighted, with a sub-header 'Direct aan de slag'. A paragraph explains that the page lists all products available at the moment and that data for these products comes from geo-basisregistraties. Below this, there are two main sections: 'Viewers Geo-basisregistraties' and 'Dataportalen'. The 'Viewers Geo-basisregistraties' section contains a grid of 12 tiles, each representing a different viewer or product. The 'BAG 3D' tile is circled in red. The 'Dataportalen' section contains a grid of 4 tiles representing different data portals. Below these sections is the 'Andere producten' section, which contains two tiles: '3D Basisvoorziening' and 'API Bestuurlijke grenzen'. Each tile has a small image and a brief description.

Viewers Geo-basisregistraties

- Kaarten van Nederland
- PDOK viewer
- BAGviewer
- BGT viewer
- Topotijdreis
- Ondergrond
- BRT producten
- WOZ-waardeloket
- Ondergrond in 3D
- Cijfers op de kaart
- BAG 3D**
- Kadaster 3D

Dataportalen

- PDOK
- Satelliet-dataportaal
- Klimaat-effectAtlas
- Nationaal Georegister

Andere producten

3D Basisvoorziening

Met het open databestand uit de 3D Basisvoorziening kun je in 1 keer een realistische simulatie van de omgeving inladen en gemakkelijk wijzigen.

API Bestuurlijke grenzen

Binnen het project Bestuurlijke Gebieden is een API opgeleverd. Alle gebruikers die behoefte hebben aan de bestuurlijke grenzen van gemeenten,

3DBAG Innovatieplatform

- Goal:
 - Securing the future of 3DBAG:
 - Maintain software + innovations
 - Data updates
 - Collaboration in future developments
- In coordination with Kadaster 3D Basisvoorziening
 - While maintaining OS software and innovation from academic world
- Activities 2024:
 - Start user community (October 2)
 - Listen to wishes and feedback from users
 - Kick-off developers community (**13 november online**)
 - AHN5 update (for 2/3 NL)
- Exploring long term role/financing



Rijksdienst voor Ondernemend
Nederland



Rijksinstituut voor Volksgezondheid
en Milieu
Ministerie van Volksgezondheid,
Welzijn en Sport

3DBAG on GitHub

<https://github.com/3DBAG>

The screenshot shows the GitHub repository page for 3DBAG. The repository is owned by the 3DBAG organization, which has 26 followers and is located in the Netherlands. The repository is public and has a README file. The README describes the 3DBAG organization's purpose, the main platform for communication (Discussions), and the software available in the organization. The software includes the 3dbag-api, 3dbag-dashboard, 3dbag-docs, 3dbag-pipeline, 3dbag-viewer, CityBuf, geodepot, geodepot-api, and roofer. The repository is pinned to the user's profile, and the pinned items are 3dbag-viewer, roofer, 3dbag-pipeline, and 3dbag-api.

3DBAG

26 followers · Netherlands · <https://3dbag.nl/en/viewer> · info@3dbag.nl

Unfollow

View as: Public

You are viewing the README and pinned repositories as a public user.

[Get started with tasks](#) that most successful organizations complete.

Top discussions this past month

Discussions are for sharing announcements, creating conversation in your community, answering questions, and more.

[Start a new discussion](#)

People

[Invite someone](#)

Top languages

Python · HTML · Rust · CMake · Jupyter Notebook

Pinned [Customize pins](#)

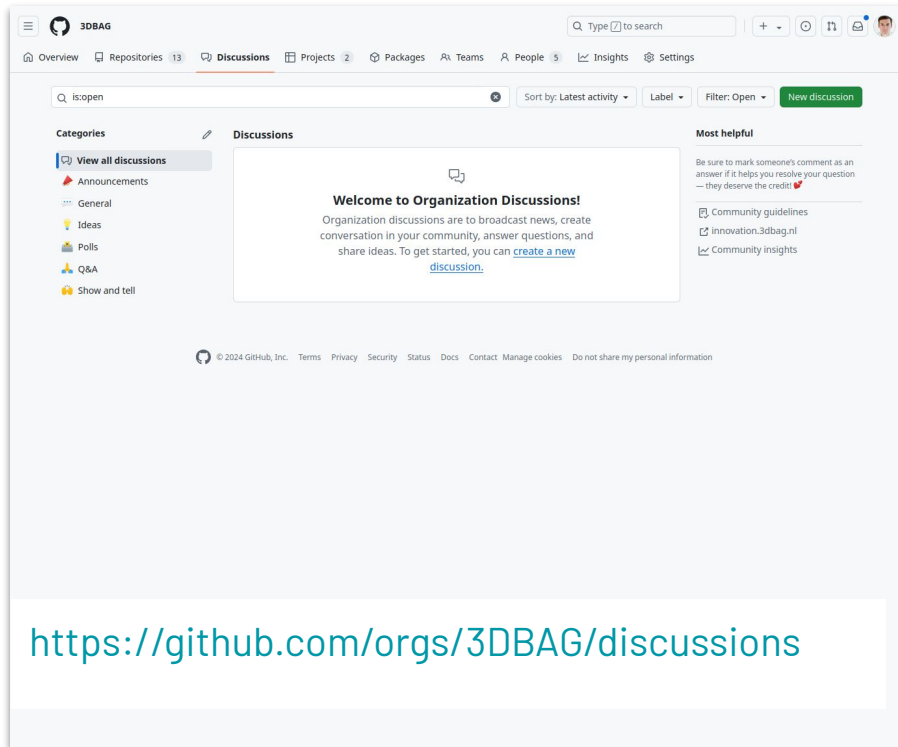
- 3dbag-viewer** (Public) · Vue · 36 stars · 11 forks
- roofer** (Public) · Automatic LoD2.2 building reconstruction · C++ · 14 stars · 3 forks
- 3dbag-pipeline** (Public) · 3DBAG production pipeline · HTML · 2 stars
- 3dbag-api** (Public) · 3D BAG API · Python · 1 star

We are ready for contributors

- all software Open Source
- permissive licenses (MIT, Apache-2.0, GPLv3)
- independent governance and coordination by Geonovum (3DBAG Innovation Platform)
- public communication forum (GitHub, Geoforum)
- contributor guidelines (in progress)
- public roadmap (in progress)
- 3DBAG **Developers' bijeenkomst**
 - 13 November
 - voor 3DBAG software users and developers
 - Roadmap software developments

Question, feedback, bug? Let us know!

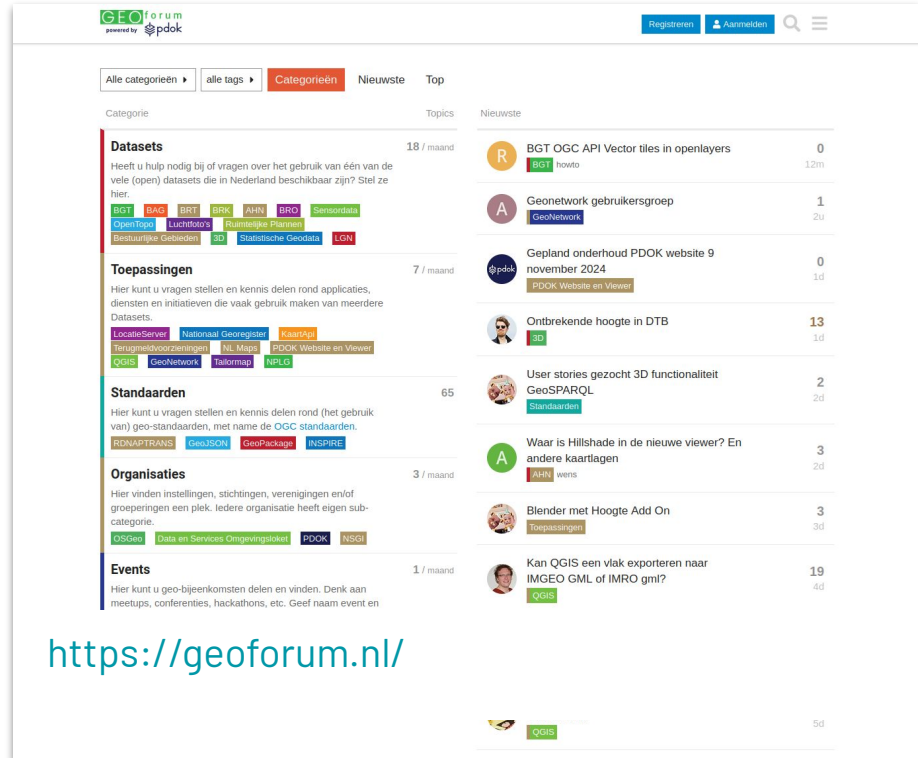
3DBAG software



The screenshot shows the GitHub Discussions page for the 3DBAG organization. The page has a navigation bar with links to Overview, Repositories, Discussions (selected), Projects, Packages, Teams, People, Insights, and Settings. A search bar is present with the text 'Type to search'. Below the navigation bar, there's a section for 'Categories' with links to 'View all discussions', 'Announcements', 'General', 'Ideas', 'Polls', 'Q&A', and 'Show and tell'. The main content area is titled 'Discussions' and features a 'Welcome to Organization Discussions!' message. It explains that organization discussions are for broadcasting news, creating conversations, answering questions, and sharing ideas. A link to 'create a new discussion' is provided. On the right side, there's a 'Most helpful' section with a note about marking comments as helpful. At the bottom, there's a footer with copyright information for 2024 GitHub, Inc. and links to Terms, Privacy, Security, Status, Docs, Contact, and Manage cookies.

<https://github.com/orgs/3DBAG/discussions>

3DBAG data



The screenshot shows the GEOforum.nl website, powered by PDK. The page has a navigation bar with links to 'Registreren' and 'Aanmelden', and a search bar. Below the navigation bar, there's a section for 'Alle categorieën' and 'alle tags'. The main content area is titled 'Topics' and features a list of discussions. The discussions are categorized into 'Datasets', 'Toepassingen', 'Standaarden', 'Organisaties', and 'Events'. Each category has a list of topics with their respective titles, authors, and dates. For example, under 'Datasets', there's a topic 'BGT OGC API Vector tiles in openlayers' by BGT, dated 12m. Under 'Toepassingen', there's a topic 'Gepland onderhoud PDK website 9 november 2024' by PDK, dated 1d. Under 'Standaarden', there's a topic 'Ontbrekende hoogte in DTB' by 3D, dated 1d. Under 'Organisaties', there's a topic 'User stories gezocht 3D functionaliteit GeoSPARQL' by Standaarden, dated 2d. Under 'Events', there's a topic 'Kan QGIS een vlak exporteren naar IMGeo GML of IMRO gml?' by QGIS, dated 19d.

<https://geoforum.nl/>

The next version of 3DBAG

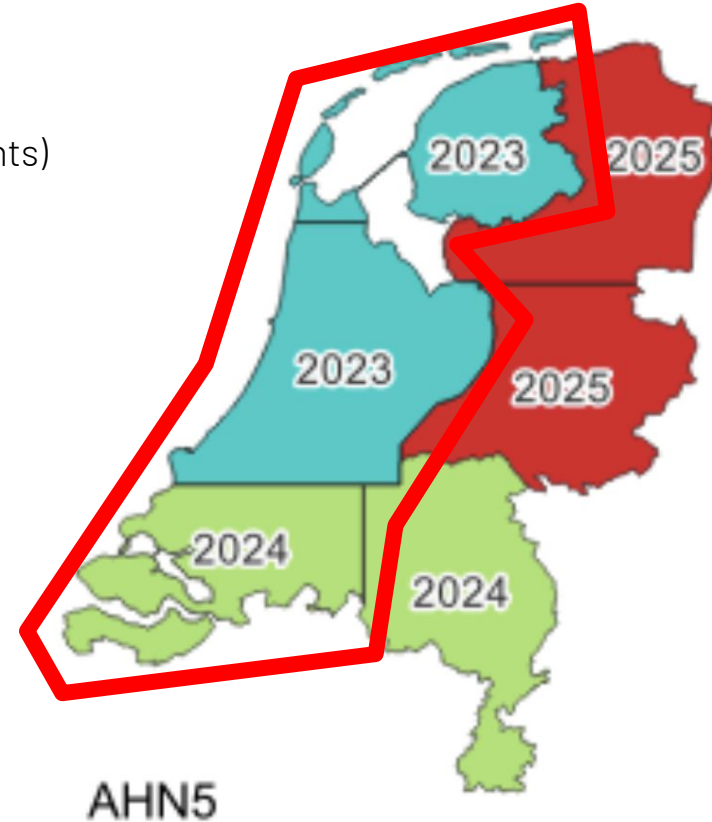
Next steps?

Currently working on a new 3DBAG version:

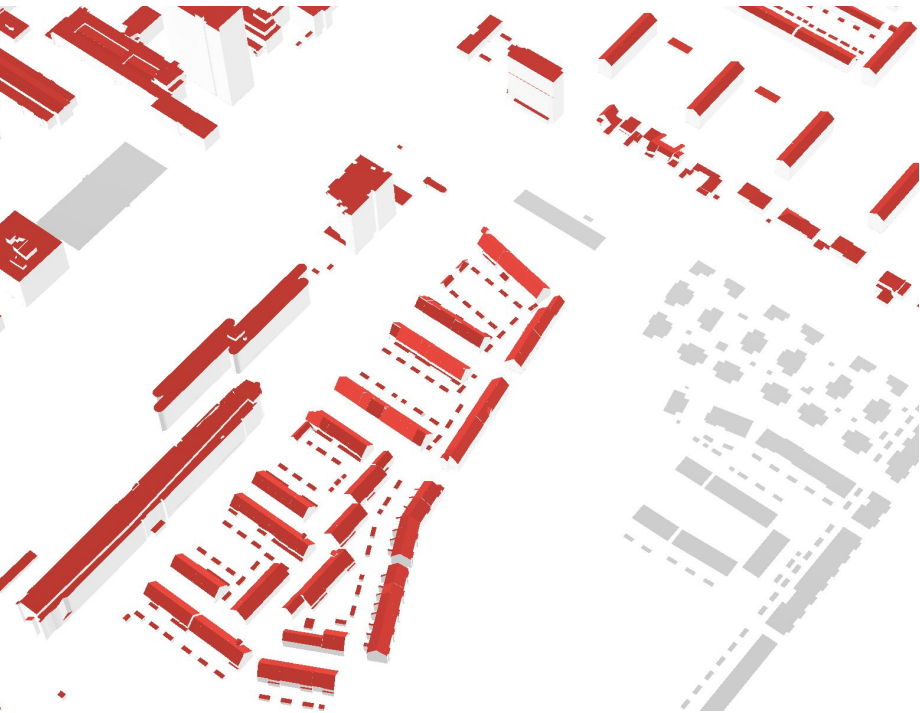
- using our improved software pipeline
 - outputs also object without 3D geometry (eg. due to no points)
 - Improved detection glass roofs
- AHN5 pointcloud Update
 - update buildings west NL

Versions after:

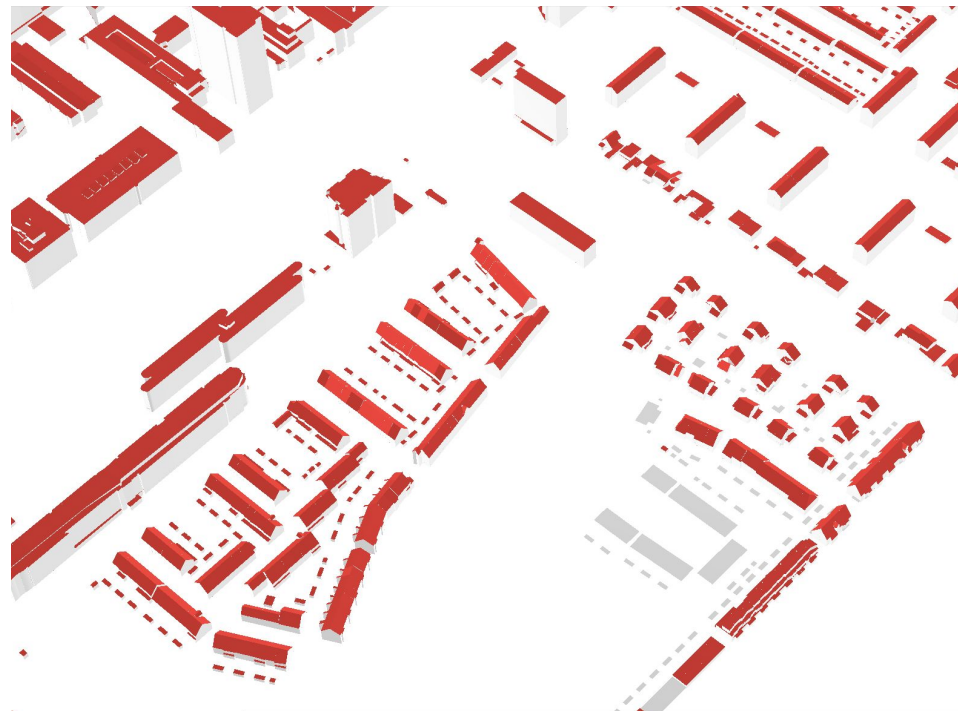
- Add IFC as tile format
- Update 3DBAG webviewer + 3D Tiles
- Improvements reconstruction algorithm
 - Improved plane detection
 - Better geometry regularisation
 - Improved dormer detection
- ...



AHN5 sneak preview



AHN4



AHN5

AHN5 sneak preview

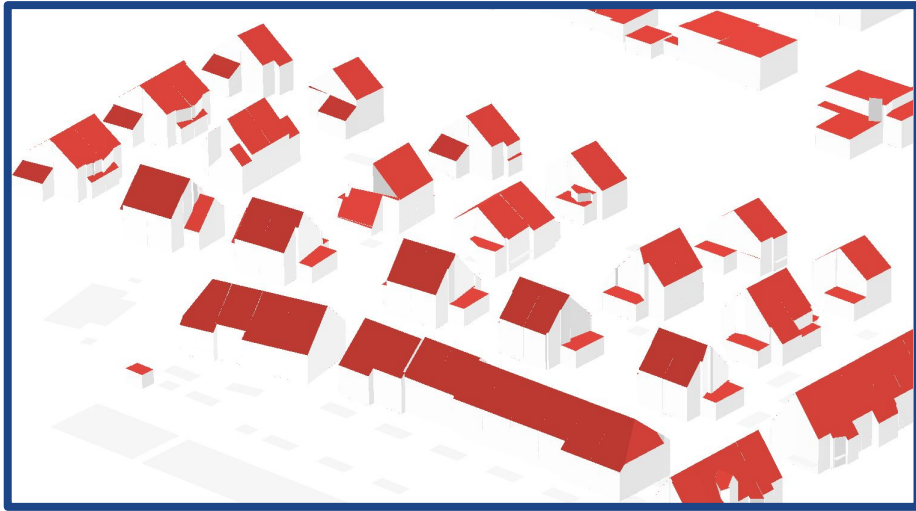


AHN4



AHN5

AHN5 sneak preview



AHN5

Thank you!



Register for 3DBAG
newsletter:

