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Results template for Task 3

Support for CityGML within GIS (and other) tools

Section 1 - Participant information

This information has already been captured in the "Registration of interest in participation" form, here we only ask you your name and e-mail, to connect the two parts for our final analysis.
In the case something has changed, please communicate it through e-mail at f.noardo@tudelft.nl

Your Name and Surname	Philipp Willkomm – Dr. Nina Krüger
Your e-mail address	pwillkomm@moss.de - nkrueger@moss.de

Section 2 - Tested Software/tool

Software Name	novaFACTORY + WEGA-3D
Software house / vendor / developer	M.O.S.S. Computer Grafik Systeme GmbH
Proprietary / open source	☒proprietary ☐open source software
Version	8.1.1.1
Kind of software (CAD/BIM/GIS/3DViewer/other)	☐BIM ☒GIS ☒3D Viewer ☐CAD ☐3D Analyser ☐Facility Management software ☒Extract/Transformation Load ☒Other (specify): 3D Data Management
What kind of CityGML management is possible? (multiple answers allowed)	☒import ☒export ☒view ☒query ☒analysis ☐other_____

Important Note: **novaFACTORY** is an advanced Spatial Data Management solution for efficient Geo-data cataloguing, exploitation and dissemination. With novaFACTORY we are leading the way in the full integration of enterprise-wide geospatial data sources which the whole organization can have access to and work from, covering all aspects of:

- Data Import
- Integration
- Date Storage
- Management
- Data Dissemination.

WEGA-3D, is the extended Web-GIS platform WEGA with the integrated use of 3D Geo-data and free plugin in the browser and mobile workstation. This allows locating and visualizing city and landscape models, including the associated factual data, to be available quickly and everywhere for user groups with any size in the Intranet or Internet.

Section 3 - Computer hardware used

Model and year	FUJITSU- 2011
Operating system and version	Windows 7 Professional (6.1)
CPU	Intel® Core(TM) i7-2600 CPU @ 3.40GHz
GPU	NVIDIA Quadro 600
Memory (RAM)	16 GB
Hard drive capacity	666 GB
Hard drive free space	85,6 GB

Section 4 - The Task

⚠ Please, remember to **turn off all the unnecessary processes**, software and tools in the computer during the test, and check the approximated required processing time.

We advise you to have a look at the whole task (described in this results template and in the corresponding one in word format) before beginning to answer. In this way you will be aware of what is asked and will not miss anything, nor lose time in going back and forward.

1) Implementation format of CityGML

1.1) Does the software support CityGML in native format?

i.e. without any conversion, it can read the structured GML file

<table>
<tr><td colspan="2">☒ Yes</td><td></td></tr>
<tr><td rowspan="3">☐ No→</td><td colspan="2">1.1.1) Which one of the following is true?</td></tr>
<tr><td>☐ The CityGML file is read through one of its different implementation possibilities described by OGC (e.g. 3DcityDB) →</td><td>1.1.1.1) Which implementation is used? If a database management system is employed, which one is it?</td></tr>
<tr><td>☐ Some specific translation through specific tool/plugin is necessary, or other kind of formats are used. →</td><td>1.1.1.2) What processing and/or tools/plugins are necessary to import the CityGML file?
Give a description
1.1.1.3) Attach screenshots[1]</td></tr>
</table>

1.2) short comments to the previous question (1) (optional).

The software has the possibility to import the CityGML format directly.

2) Application Domain Extensions (ADEs)

2.1) Does the software support CityGML ADEs?

<table>
<tr><td colspan="2">☐ No</td><td></td></tr>
<tr><td>☒ Yes→</td><td colspan="2">2.1.1) Are they directly managed without any change in the settings / specific tools / plugins?</td></tr>
</table>

[1] Please, give them an understandable title, or put them in a word/pdf file with titles or captions.

	☒ Yes	
	☐ No, some specific settings / tools / plugins are necessary. →	2.1.1.1) Please give a description about how is it necessary to install the needed tool or plugin, or change the software settings, or any other intervention which is necessary to enable the functionality. Give a description 2.1.1.2) Attach screenshots
	2.1.2) How is the ADEs information managed by the software? (multiple answers allowed) ☒ it can be viewed and inspected ☒ it can be queried ☐ it is possible to use the information stored in the ADE to perform analysis in the software	
☐ I don't know		

2.2) short comments to the previous question (2) (optional).

ADEs are mapped via generic attributes during import and can data can be exported into its original data structure. Functionality is restricted to basic level ADEs.

Phase 1 - IMPORT functionality.
Import *RotterdamLOD12.gml* into the software and answer the following questions.

3) Initial performance time evaluation (more details in the web forms).

How long does it take, approximately, to:

Import and visualise the model	☐ it's almost immediate ☐ less than a minute ☒ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Zoom the model to see more detail	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Pan the model	☒ it's almost immediate

	☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Rotate the model	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Query an object	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Inspect the objects linked to the queried one through a relationship	☐ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☒ the software does not allow this

4) Levels of Detail (LoDs) management

4.1) How are the different LoDs read/managed in the software?

i.e. when a CityGML file contains many LoDs, how are they imported/visualised/managed?

☒ They are all read and managed in the software and a consistent multi-LoD view and management is possible by visualising / managing / analysing the objects in the different connected LoDs.

☐ One LoD can be selected and only the objects having the chosen LoD can be imported in the software to be visualised / managed / analysed

☐ They can only be imported and visualised all together, with overlaps in their view / management / analysis

☐ The software gives problems importing a multi-LoD CityGML file and crashes

4.2) Please, give more details and examples

The software can be set to a specific schema (CityGML and Databank Schema). This setting can handle automatically the LoDs information during the import procedure. The data storage is assisted by the open software 3DCityDB (www.3dcityb.org).

4.3) Attach screenshots

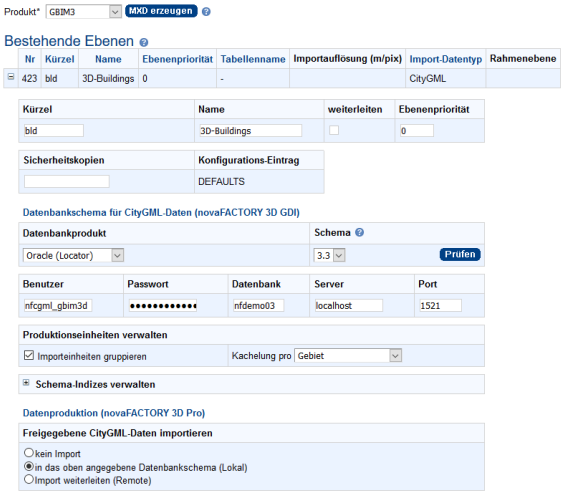

Figure 1, The schema setting to import CityGML with different LoDs.

Figure 2. The databank setting to import CityGML with different LoDs.

4.4) short comments to the previous question (0.3) (optional).

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Task 3 - 2/7
Following the tests with the **RotterdamLOD12.gml** file

Georeferencing

When you import the model into the software, does it lose its georeferencing information? *No*

5) Try to inspect the coordinate reference system: *Amersfoort_RD_New*

5.1) Are you able to determine, by inspecting the data, the world (projected) coordinate reference system of the data as described in the data description?

☒ Yes

☐ No, the software does not have the necessary tools for checking it.

5.2) short comments (optional):

Essentially the software can not directly inspect the coordinate system. The coordinate frame has to be defined in advance in order to import and locate the data with correct coordinates. However, by using the header file it is possible to determine the coordinate system. Then, the relevant coordinate system can be defined in advance to begun the import process.

6) Details about the coordinate reference system of the imported model

6.1) Are the world (projected) coordinates taken into account for locating the model in the software's coordinate reference system?

(and it is not automatically moved closer to the origin when imported)

☒ Yes	
☐ No →	6.1.1) Where is the origin of the model coordinate reference system as imported in the software? Give a description 6.1.2) Attach screenshots 6.1.3) What is the coordinate reference system and projection and what unit of measure is used for the representation? Give a description 6.1.4) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

6.2) short comments to the previous question (6.1) (optional).

For the purpose of visualization based on the coordinate system, the WEGA-3D is called. In the case of importing, the model will be located with respect to the coordinate system defined in the novaFACTORY in advance.

Figure 3, The coordinate system is defined to geo-reference and import the data.

7) Details about the height reference system of the imported model

7.1) Are the "real-world" elevation values (heights) considered when locating the model in the software (z)?

(i.e. it is not automatically moved to height 0 when imported)

☒ Yes	
☐ No →	7.1.1) What is the elevation value of the origin of the model coordinate reference system as imported in the software? Give a description 7.1.2) Attach screenshots 7.1.3) What is the height reference system? Give a description 7.1.4) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

7.2) short comments to the previous question (7.1) (optional).

8) Details about the imported model orientation

8.1) Is the model oriented correctly with respect to the true North?

(i.e. it is not automatically rotated to align with the system axes when imported)

☒ Yes	
☐ No →	8.1.1) How is the model oriented, with respect to the reference direction? Give a description 8.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

8.2) short comments to the previous question (8.1) (optional).

9) CRS Settings

9.1) When you import the data, Is it necessary to set the correct CRS manually?

☐ No	
☒ Yes→	9.1.1) What are the tools needed to set the correct CRS, or where is it possible to set it in the software? The software requires defining the coordinate system in advance. Then, the data can be imported in the right coordinate system. 9.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

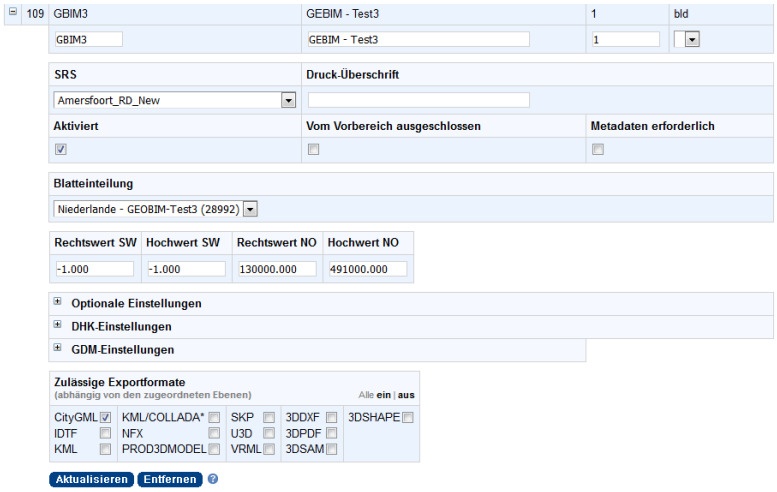


Figure 4, the coordinate system definition.

9.2) short comments to the previous question (9.1) (optional).

This mechanism is designed in order to preserve the quality of the data. Therefore the CRS of the import file is checked and approved.

Semantics

How are the semantics translated into the software's internal library / vocabulary?

10) Details about the classification

Is the CityGML classification retained? Yes

10.1) Is the eventual translation consistent with the CityGML definitions?

(are the walls still walls, are the doors still doors and so on)

☒ Yes	
☐ No →	10.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 10.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	

10.2) short comments to the previous question (10.1) (optional).

As it is presented in the Fig.5 the imported model represents 3D buildings in WEGA-3D. Additionally, the appearances in this CityGML data will be attached to the model and can be exported and visualized in a 3D PDF format (Fig.6).

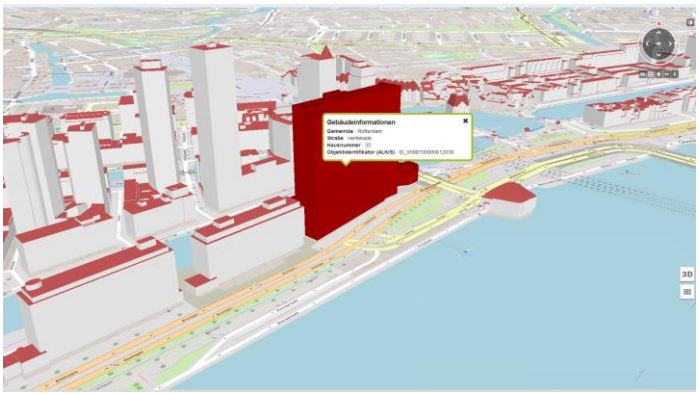
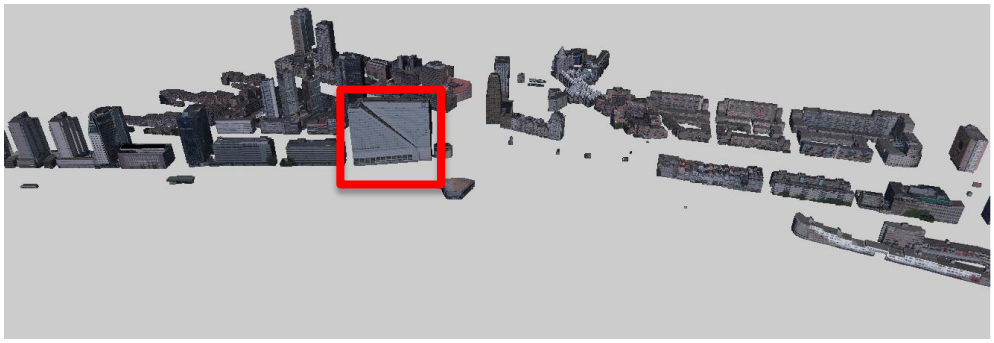
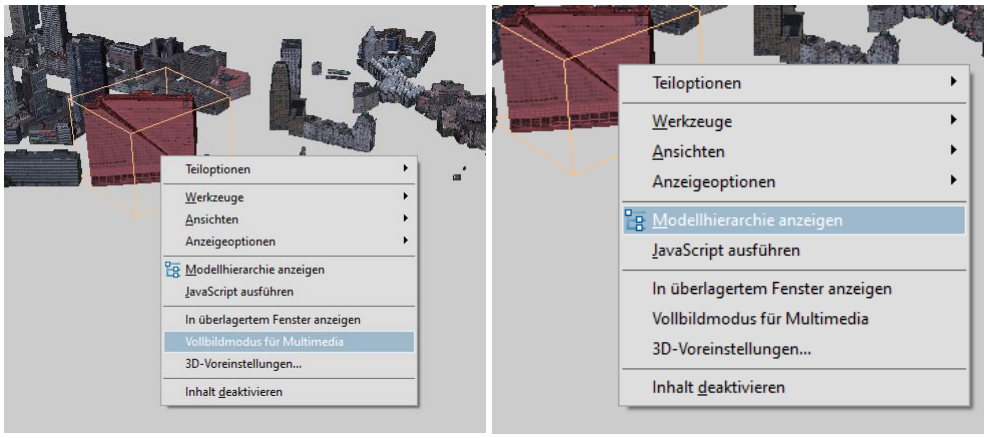


Figure 5, 3D model visualization in WEGA-3D





Object selection and attributes table and hierarchy presentation (all information stored in the data format)

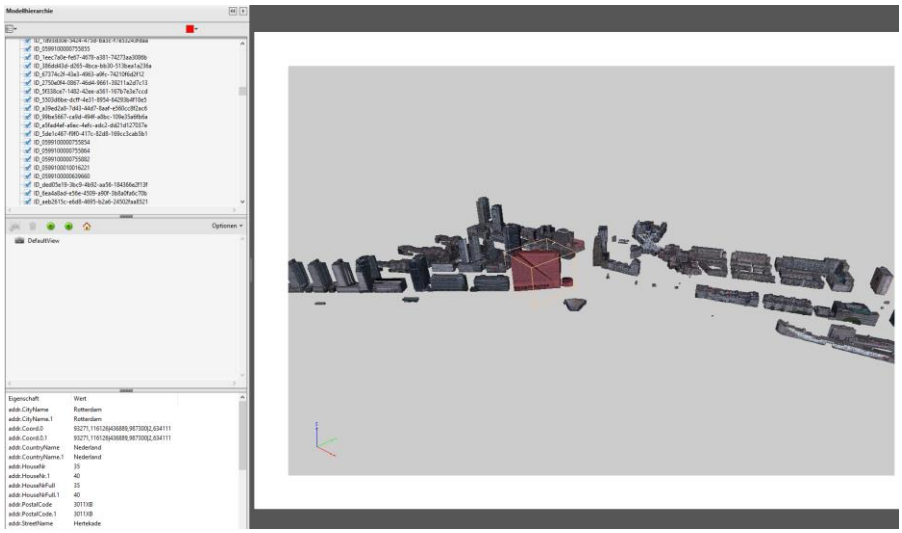


Figure 6, 3D PDF of the Rotterdam CityGML (RotterdamLOD12.gml) data as a visualization example.

11) Details about the hierarchy

11.1) Are the hierarchical relationships consistent with the CityGML hierarchy?

(are the class-subclass relationships maintained)

☒ Yes	
☐ No →	11.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 11.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	

11.2) short comments to the previous question (11.1) (optional).

12) Details about the attributes

12.1) Are the attributes present in the CityGML entities retained and consistent?

(can they all be read in connection to the related entities and have the correct meaning)

☒ Yes	
☐ No →	12.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 12.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	

12.2) short comments to the previous question (12.1) (optional).

13) Details about the relationships

13.1) Are the relationships between the objects retained?

(intended as different from hierarchical relationships)

☒ Yes	
☐ No →	13.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 13.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	

13.2) short comments to the previous question (13.1) (optional).

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Task 3 – 3/7
Following the test with the **RotterdamLOD12.gml** file

Geometry

How are the geometries managed?

14) Details about the kind of geometries

14.1) Is geometry read correctly?

(solids are solids, surfaces are surfaces, objects are not grouped nor broken)

☒ Yes	
☐ No →	14.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 14.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

14.2) short comments to the previous question (14.1) (optional).

15) Details about the normals

15.1) Are normals not changed?

possibly, you can at least visually check this, through the way the objects are visualised (e.g. different colours for different faces directions)

☒ Yes	
☐ No →	15.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 15.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

15.2) short comments to the previous question (15.1) (optional).

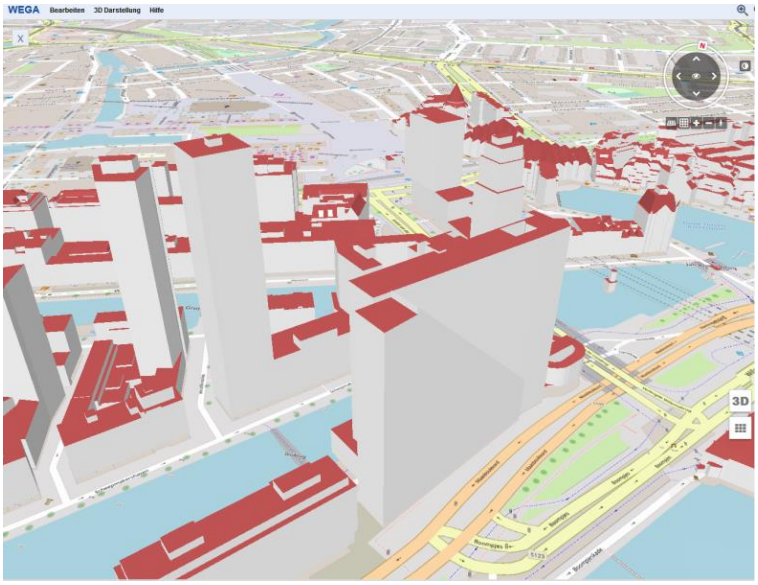


Figure 7, The visualization in order to check the normals on the objects.

Model management

16) Visualisation 3D

16.1) Is it possible to view the model in 3D?

☒ Yes

☐ No

16.2) short comments to the previous question (16.1) (optional).

It is possible in the WEGA-3D component to have a 2D and 3D at the same time with the side by side window (Fig.8).

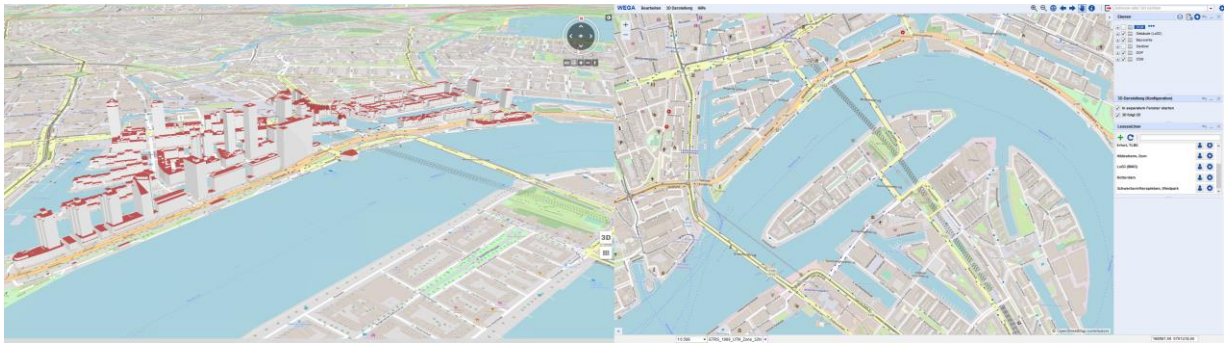


Figure 8, 3D and 2D visualization windows in WEGA-3D.

17) Visualisation 2D

17.1) Is it possible to view the model in 2D?

☐ Yes

☒ No

17.2) short comments to the previous question (17.1) (optional).

18) Editing possibilities

18.1) Is it possible to edit the model (attributes, geometry, other)?

☐ No	
☒ Yes→	18.1.1) What editing is possible (attributes, geometry, georeferencing, please add details)? Through the plug-in software tridicon© Editor as an implemented Module in the novaFACTORY it is possible to edit the buildings and their properties. Additionally by using SketchUp- PlugIn in novaFACTORY as a editing tool, the attributes of buildings can be edited. 18.1.2) Attach screenshots 18.1.3) Needed time to perform the edits (approximately) ⚠ NB: do not save the edits as you will need to re-export the original data later on! ☐ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation

18.2) short comments to the previous question (18.1) (optional).

In the WEGA-3D the main aim is to visualize/analyze the model in 3D next to a 2D window. However, it is possible to edit the details, attributes using a third party plugin software in the novaFACTORY such as tridicon® Editor Module to do the editing on the building objects.

19) Query possibilities

19.1) Is it possible to query the model and the attributes?

☐ No	
☒ Yes→	19.1.1) What kinds of query are possible? It is possible to make a query which is focused on any attributes of the objects such as height attributes, area size and etc. 19.1.2) Attach screenshots

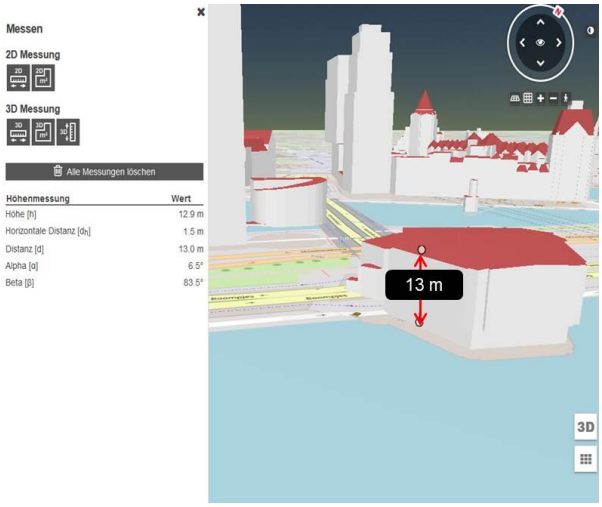


Figure 9, The measurement illustration in 3D and 2D views.

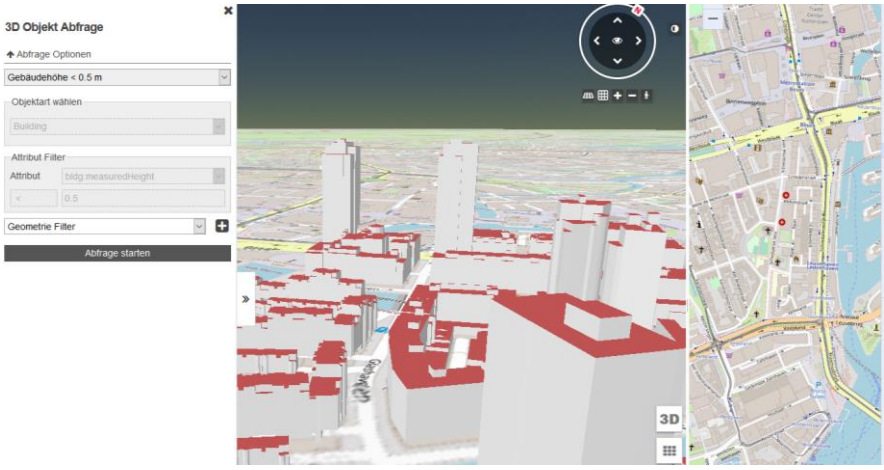


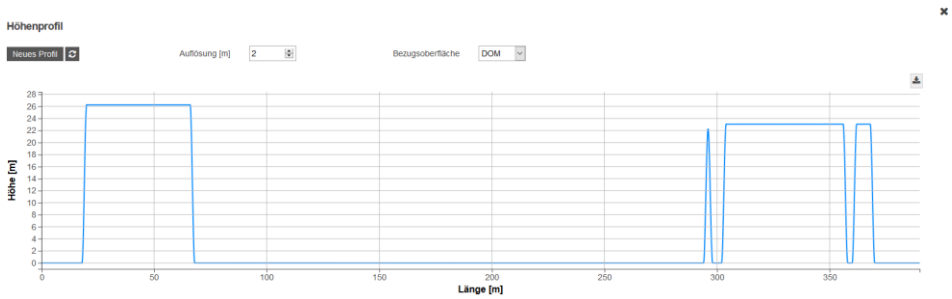
Figure 10, Query from objects.

19.2) short comments to the previous question (19.1) (optional).

20) Analysis possibilities

20.1) Is it possible to analyse the objects and the model?

☐ No	
☒ Yes→	20.1.1) What analysis are possible? Do you know if the results are reliable? Analysis such as height profile, visual axes, object shadows or

	classification/selection of 3D buildings based on a threshold. 20.1.2) Attach screenshots  *Figure 11, An example of a height profile acquisition in WEGA-3D.* 20.1.3) Needed time to perform the analysis (approximately) ☐ it's almost immediate ☒ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation

20.2) short comments to the previous question (20.1) (optional).

You arrived at the end of the Phase 1: "Import and manage the file in the software"

Now choose:

☒ The software has also export abilities

☐ The software cannot export, therefore **skip the phase 2**

Phase 2: EXPORT the data again to CityGML and answer the following questions.

(Only complete this section software tools having export functionality)

You should export the data to the **same CityGML version of the provided data;** optionally, file(s) exported to **different CityGML version(s)** can also be provided in addition, if multiple versions are offered by the software, and it is (/they are) **welcome.**

21) Details about the needed customisation

21.1) Are any pre-processing or setting changes needed in the software to enable a consistent export?

☒ No	
☐ Yes→	21.1.1) Can you add a short description of the steps involved in the pre-processing? 21.1.2) Attach screenshots

21.2) short comments to the previous question (21.1) (optional).

The export phase consists of the following main steps: LoDs details, type of export format, CityGML schema, coordinate reference system and metadata.

Available export formats and setting are:

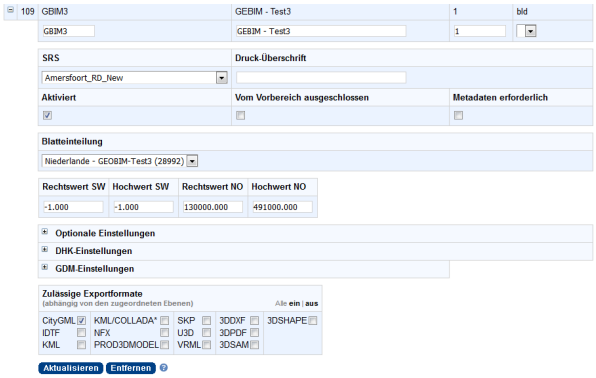


Figure 12, CityGML export.

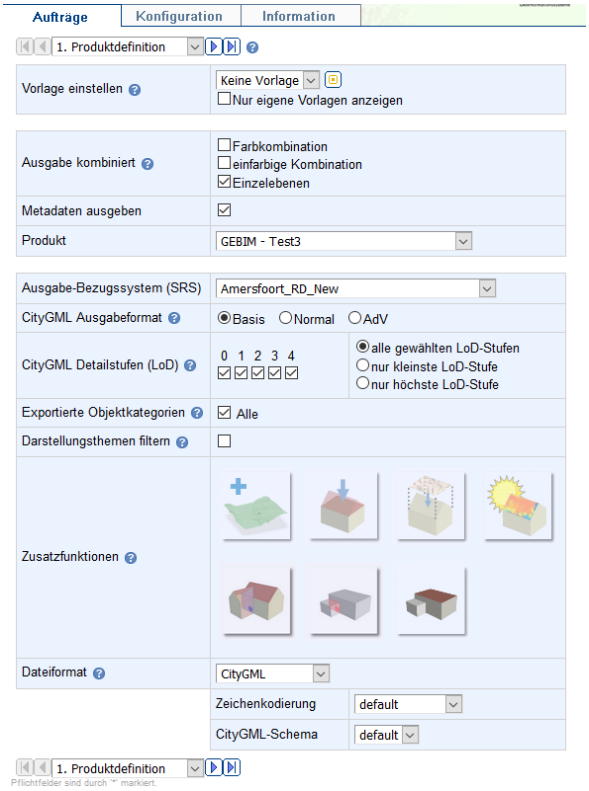


Figure 13, CityGML export setting.

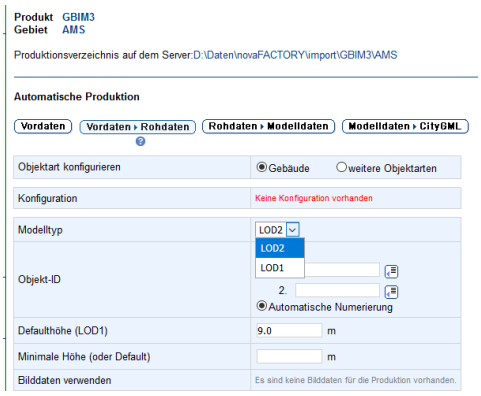


Figure 14, Automatic production of 3D buildings.

As an interesting example Fig.14 shows a 3D PDF export of the Rotterdam.glm model:

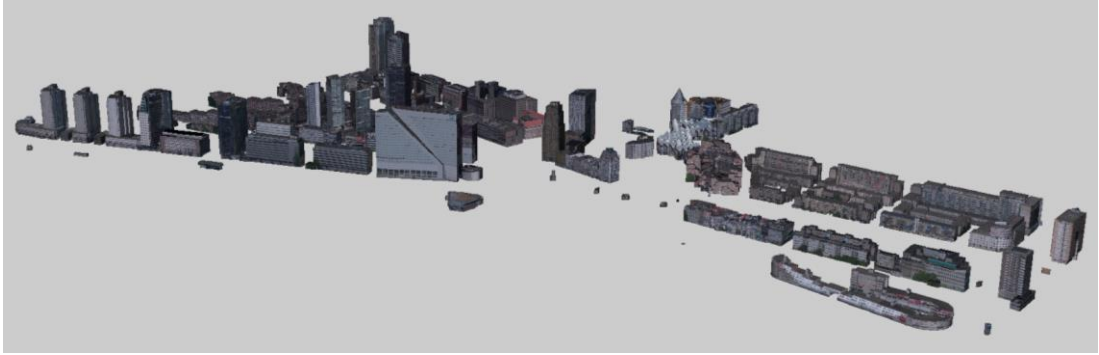


Figure 15, 3D PDF export view from the Rotterdam.gml

22) How long does it take for the data to be exported to CityGML?

(approximately)
☐ it's almost immediate
☐ less than a minute
☒ 1-5 minutes
☐ 5-20 minutes
☐ 20 minutes - 1 hour
☐ more than 1 hour
☐ it crashes without completing the operation

Form 4/7

Task 3 – 4/7
Following Section 4 – The Task
Test with the file BuildingsLOD3.gml

Phase 1 - IMPORT functionality.
Close and reopen the software again.
Import *BuildingsLOD3.gml* into the software and answer the following questions.

23) Initial performance time evaluation (more details in the web forms).
How long does it take, approximately, to:

Import and visualise the model	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Zoom the model to see more detail	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation

	☐ the software does not allow this
Pan the model	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Rotate the model	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Query an object	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Inspect the objects linked to the queried one through a relationship	☐ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☒ the software does not allow this

Georeferencing

24) Details about the imported model dimensions and proportions

24.1) Does the model maintain its correct dimensions and proportions?

(i.e. it is not distorted nor scaled)

☒ Yes	
☐ No →	24.1.1) How do the dimensions change / how is the model distorted? Give a description 24.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	

☐ Other

24.2) short comments to the previous question (24.1) (optional).

Semantics

How are the semantics translated into the software's internal library / vocabulary?

25) Details about the classification

Is the CityGML classification retained?

25.1) Is the eventual translation consistent with the CityGML definitions?

(are the walls still walls, are the doors still doors and so on)

☒ Yes	
☐ No →	25.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 25.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

25.2) short comments to the previous question (25.1) (optional).

26) Details about the hierarchy

26.1) Are the hierarchical relationships consistent with the CityGML hierarchy?

(are the class-subclass relationships maintained)

☒ Yes	
☐ No →	26.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 26.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

26.2) short comments to the previous question (26.1) (optional).

27) Details about the attributes

27.1) Are the attributes present in the CityGML entities retained and consistent?

(can they all be read in connection to the related entities and have the correct meaning)

☒ Yes

☐ No →	27.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 27.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

27.2) short comments to the previous question (27.1) (optional).

28) Details about the relationships

28.1) Are the relationships between the objects retained?

(intended as different from hierarchical relationships)

☒ Yes	
☐ No →	28.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 28.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

28.2) short comments to the previous question (28.1) (optional).

Form 5/7

Task 3 – 5/7
Following the test with the file **BuildingLOD3.gml**

Geometry

How are the geometries managed?

29) Details about the kind of geometries

29.1) Is geometry read correctly?

(solids are solids, surfaces are surfaces, objects are not grouped nor broken)

☒ Yes	
☐ No →	29.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 29.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	

☐ Other

29.2) short comments to the previous question (29.1) (optional).

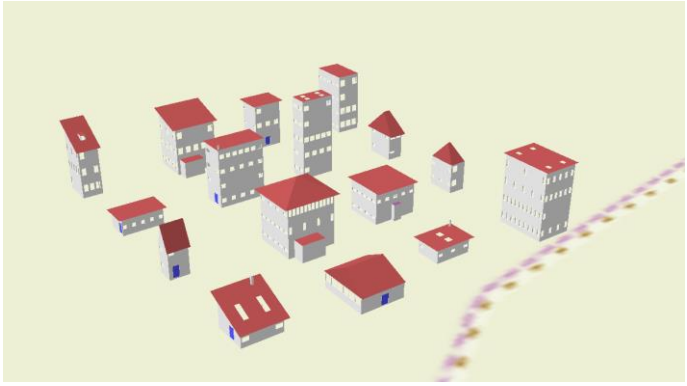


Figure 16, 3D visualization of the BuildingLOD3.gml data.

30) Details about the normals

30.1) Are normals not changed?

possibly, you can at least visually check this, through the way the objects are visualised (e.g. different colours for different faces directions)

☒ Yes	
☐ No →	30.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 30.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

30.2) short comments to the previous question (30.1) (optional).

Model management

31) Visualisation 3D

31.1) Is it possible to view the model in 3D?

☒ Yes

☐ No

31.2) short comments to the previous question (31.1) (optional).

32) Visualisation 2D

32.1) Is it possible to view the model in 2D?

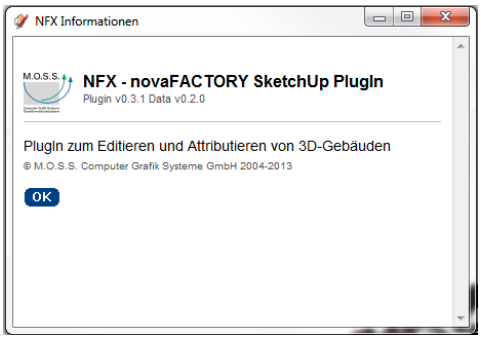
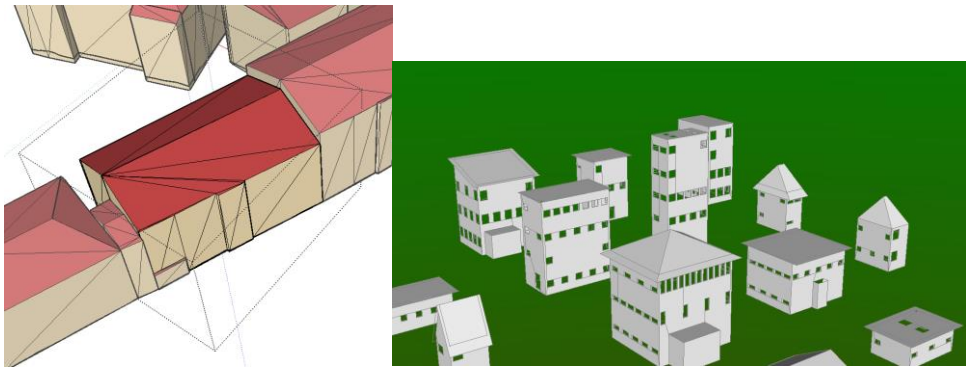
☐ Yes

☒ No

32.2) short comments to the previous question (32.1) (optional).

33) Editing possibilities

33.1) Is it possible to edit the model (attributes, geometry, other)?

☐ No	
☒ Yes→	33.1.1) What editing is possible (attributes, geometry, georeferencing, please add details)? Through the plug-in software tridicon® Editor as an implemented Module in the novaFACTORY it is possible to edit the buildings and their properties. Additionally by using SketchUp- PlugIn in novaFACTORY as a editing tool, the attributes of buildings can be edited. 33.1.2) Attach screenshots   *Figure 17, SketchUp (left) visualization and CityDiscoverer (right).* 33.1.3) Needed time to perform the edits (approximately) ⚠ NB: do not save the edits as you will need to re-export the original data later on! ☐ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation

33.2) short comments to the previous question (33.1) (optional).

34) Query possibilities

34.1) Is it possible to query the model and the attributes?

☐ No	
☒ Yes→	34.1.1) What kinds of query are possible? It is possible to make a query which is focused on any attributes of the objects such as height attributes, area size and etc. 34.1.2) Attach screenshots

34.2) short comments to the previous question (34.1) (optional).

35) Analysis possibilities

35.1) Is it possible to analyse the objects and the model?

☐ No	
☒ Yes→	35.1.1) What analysis are possible? Do you know if the results are reliable? Analysis such as height profile, visual axes, object shadows or classification/selection of 3D buildings based on a threshold. 35.1.2) Attach screenshots 35.1.3) Needed time to perform the analysis (approximately) ☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation

35.2) short comments to the previous question (35.1) (optional).

You arrived at the end of the Phase 1: "Import and manage the file in the software"

Now choose:

☒ The software has also export abilities

☐ The software cannot export, therefore **skip the phase 2**

Phase 2: EXPORT the data again to CityGML and answer the following questions.
(Only complete this section software tools having export functionality)

You should export the data to the **same CityGML version of the provided data;** optionally, file(s) exported to **different CityGML version(s)** can also be provided in addition, if multiple versions are offered by the software, and it is (/they are) **welcome.**

36) Details about the needed customisation

36.1) Are any pre-processing or setting changes needed in the software to enable a consistent export?

☒ No	
☐ Yes→	36.1.1) Can you add a short description of the steps involved in the pre-processing? 36.1.2) Attach screenshots[2]

36.2) short comments to the previous question (36.1) (optional).

The export consists of the following important (main) steps: LoDs details, type of export format, CityGML schema, coordinate reference system and metadata.

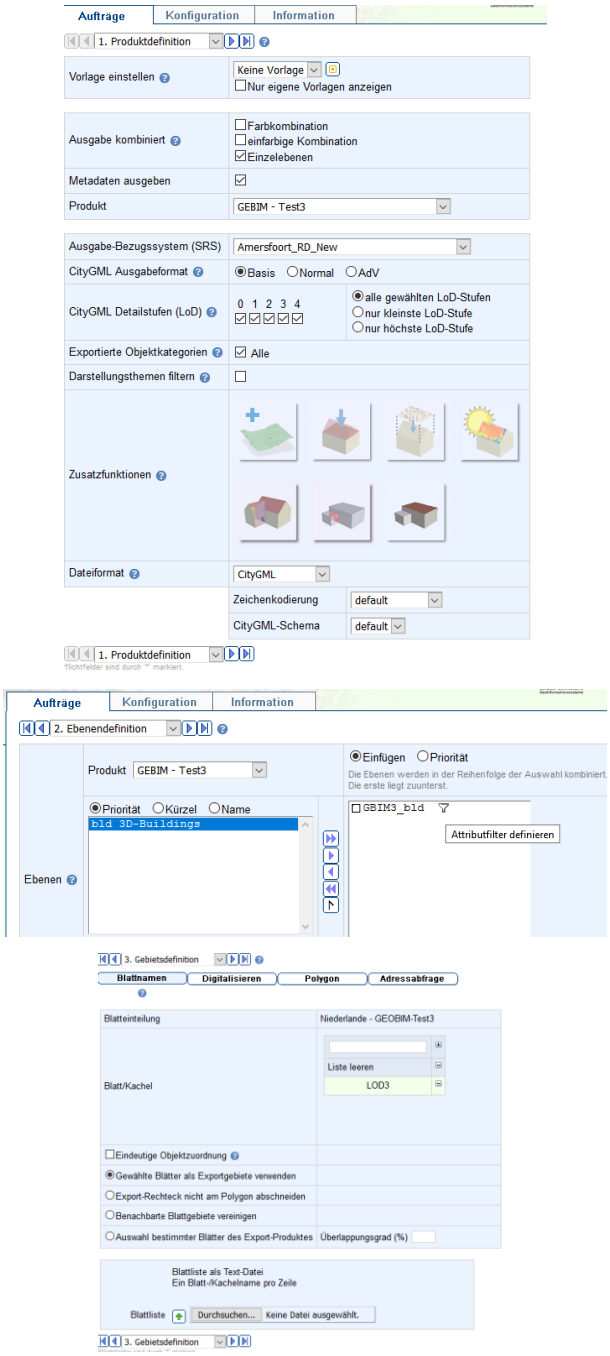


Figure 18, Export Module setting in detail.

[2] Please, give them an understandable title; in this case, a word/pdf file containing the tutorial with screenshots and their captions can be the most effective solution.

37) How long does it take for the data to be exported to CityGML?

(approximately)
☐ it's almost immediate
☒ less than a minute
☐ 1-5 minutes
☐ 5-20 minutes
☐ 20 minutes - 1 hour
☐ more than 1 hour
☐ it crashes without completing the operation

Form 6/7

Task 3 – 6/7
Following Section 4 – The Task

Test with **amsterdam.gml**

Some parts about processes are repeated, even if already filled when testing the RotterdamLOD12.gml file, for the case the software was not able to read RotterdamLOD12.gml

If they were already explained, you can avoid repeating them here, just checking that they work in the same way.

Phase 1 - IMPORT functionality.
Import *amsterdam.gml* into the software and answer the following questions.

38) Initial performance time evaluation (ore details in the web form).

How long does it take, approximately, to:

Import and visualise the model	☐ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☒ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Zoom the model to see more detail	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Pan the model	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes

	☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Rotate the model	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Query an object	☒ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☐ the software does not allow this
Inspect the objects linked to the queried one through a relationship	☐ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation ☒ the software does not allow this

Georeferencing

When you import the model into the software, does it lose its georeferencing information? No

39) Try to inspect the coordinate reference system

39.1) Are you able to determine, by inspecting the data, the world (projected) coordinate reference system of the data as described in the data description?

☒ Yes

☐ No, the software does not have the necessary tools for checking it.

39.2) short comments (optional):

Essentially the software can not directly inspect the coordinate system. The coordinate frame has to be defined in advance in order to import and land data with correct coordinates. By using the header file it is possible to determine the coordinate system. Then, the relevant coordinate system can be defined in advance to begun the import process.

40) Details about the coordinate reference system of the imported model

40.1) Are the world (projected) coordinates taken into account for locating the model in the software's coordinate reference system?

(and it is not automatically moved closer to the origin when imported)

☒ Yes	
☐ No →	40.1.1) Where is the origin of the model coordinate reference system as imported in the software? Give a description 40.1.2) Attach screenshots 40.1.3) What is the coordinate reference system and projection and what unit of measure is used for the representation? Give a description 40.1.4) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

40.2) short comments to the previous question (40.1) (optional).

41) Details about the height reference system of the imported model

41.1) Are the “real-world” elevation values (heights) considered when locating the model in the software (z)?

(i.e. it is not automatically moved to height 0 when imported)

☒ Yes	
☐ No →	41.1.1) What is the elevation value of the origin of the model coordinate reference system as imported in the software? Give a description 41.1.2) Attach screenshots 41.1.3) What is the height reference system? Give a description 41.1.4) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

41.2) short comments to the previous question (41.1) (optional).

42) Details about the imported model orientation

42.1) Is the model oriented correctly with respect to the true North?

(i.e. it is not automatically rotated to align with the system axes when imported)

☒ Yes	
☐ No →	42.1.1) How is the model oriented, with respect to the reference direction?

	Give a description 42.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

42.2) short comments to the previous question (42.1) (optional).

43) Details about the imported model dimensions and proportions

43.1) Does the model maintain its correct dimensions and proportions?

(i.e. it is not distorted nor scaled)

☒ Yes	
☐ No →	43.1.1) How do the dimensions change / how is the model distorted? Give a description 43.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

43.2) short comments to the previous question (43.1) (optional).

44) CRS Settings

44.1) When you import the data, Is it necessary to set the correct CRS manually?

☐ No	
☒ Yes→	44.1.1) What are the tools needed to set the correct CRS, or where is it possible to set it in the software? The software requires defining the coordinate system in advance, then the data can be imported and located in the right coordinate system. 44.1.2) Attach screenshots

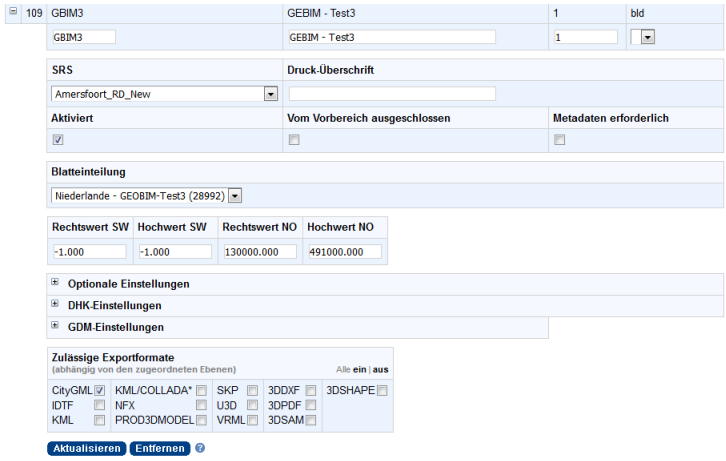


Figure 19, the coordinate system setting phase.

☐ The software does not have the necessary tools to check this information.	
☐ Other	

44.2) short comments to the previous question (44.1) (optional).

Semantics

How are the semantics translated into the software's internal library / vocabulary?

45) Details about the classification

Is the CityGML classification retained?

45.1) Is the eventual translation consistent with the CityGML definitions?

(are the buildings still buildings, are the roads still roads and so on)

☒ Yes	
☐ No →	45.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 45.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	

45.2) short comments to the previous question (45.1) (optional).

46) Details about the hierarchy

46.1) Are the hierarchical relationships consistent with the CityGML hierarchy?

(are the class-subclass relationships maintained)

☒ Yes	
☐ No →	46.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 46.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	

46.2) short comments to the previous question (46.1) (optional).

47) Details about the attributes

47.1) Are the attributes present in the CityGML entities retained and consistent?

(can they all be read in connection to the related entities and have the correct meaning)

☒ Yes	
☐ No →	47.1.1) What changes / inconsistencies / errors / other issues were noted?

	Give a description 47.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	

47.2) short comments to the previous question (47.1) (optional).

48) Details about the relationships

48.1) Are the relationships between the objects retained?

(intended as different from hierarchical relationships)

☒ Yes	
☐ No →	48.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 48.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	

48.2) short comments to the previous question (48.1) (optional).

Form 7/7

Task 3 – 7/7
Following the test with **amsterdam.gml**

Geometry

How are the geometries managed?

49) Details about the kind of geometries

49.1) Is geometry read correctly?

(solids are solids, surfaces are surfaces, objects are not grouped nor broken)

☒ Yes	
☐ No →	49.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 49.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

49.2) short comments to the previous question (49.1) (optional).

50) Details about the normals

50.1) Are normals not changed?

possibly, you can at least visually check this, through the way the objects are visualised (e.g. different colours for different faces directions)

☒ Yes	
☐ No →	50.1.1) What changes / inconsistencies / errors / other issues were noted? Give a description 50.1.2) Attach screenshots
☐ The software does not have the necessary tools to check this information.	
☐ Other	

50.2) short comments to the previous question (50.1) (optional).

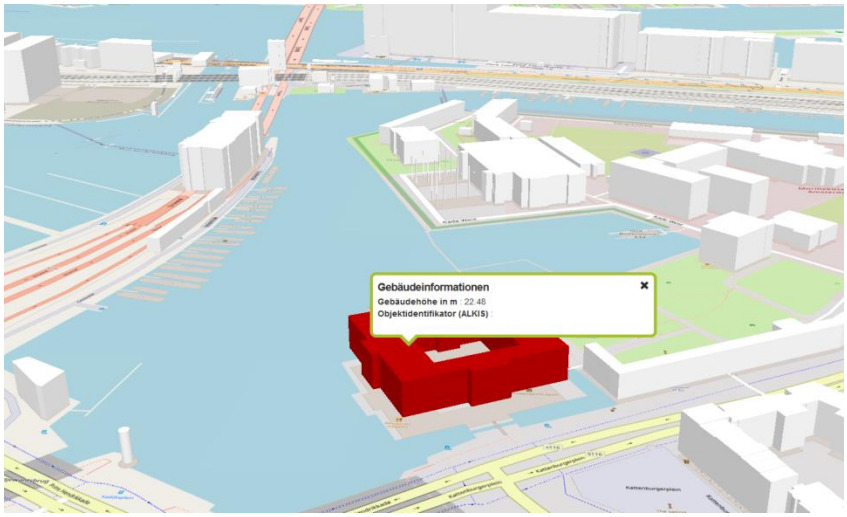


Figure 20, 3D visualization.

Model management

51) Visualisation 3D

51.1) Is it possible to view the model in 3D?

☒ Yes

☐ No

51.2) short comments to the previous question (51.1) (optional).

Figure 21, 3D visualization of Amsterdam.gml

52) Visualisation 2D

52.1) Is it possible to view the model in 2D?

☐ Yes

☒ No

52.2) short comments to the previous question (52.1) (optional).

53) Editing possibilities

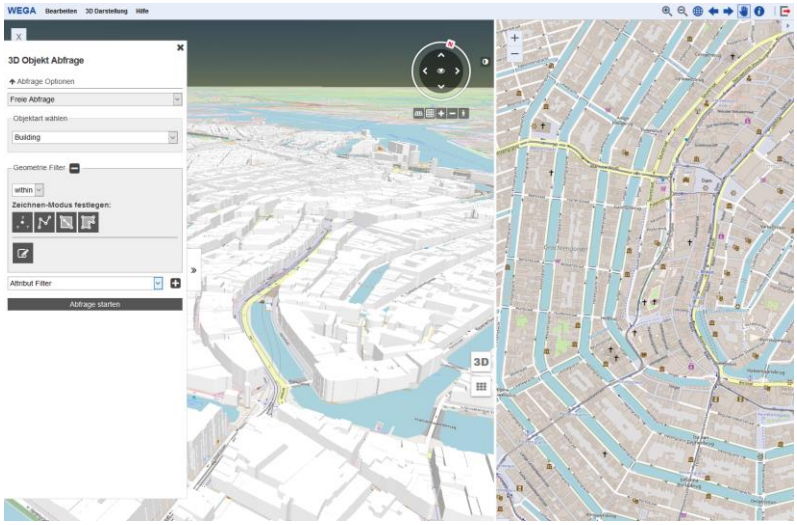
53.1) Is it possible to edit the model (attributes, geometry, other)?

☐ No	
☒ Yes→	53.1.1) What editing is possible (attributes, geometry, georeferencing, please add details)? Through the plug-in software tridicon® Editor as an implemented Module in the novaFACTORY it is possible to edit the buildings and their properties. Additionally by using SketchUp- PlugIn in novaFACTORY as a editing tool, the attributes of buildings can be edited. 53.1.2) Attach screenshots 53.1.3) Needed time to perform the edits (approximately) ⚠ NB: do not save the edits as you will need to re-export the original data later on! ☐ it's almost immediate ☐ less than a minute ☐ 1-5 minutes ☐ 5-20 minutes ☐ 20 minutes - 1 hour ☐ more than 1 hour ☐ it crashes without completing the operation

53.2) short comments to the previous question (53.1) (optional).

54) Query possibilities

54.1) Is it possible to query the model and the attributes?

☐ No	
☒ Yes→	54. 1.1) What kinds of query are possible? It is possible to make a query which is focused on any attributes of the objects such as height attributes, area size and etc. 54.1.2) Attach screenshots  *Figure 22, Quary setup, WEGA-3D.*

54.2) short comments to the previous question (54.1) (optional).

55) Analysis possibilities

55.1) Is it possible to analyse the objects and the model?

☐ No	
☒ Yes→	55.1.1) What analysis are possible? Do you know if the results are reliable? It is possible to do analysis on the 3D model. 55.1.2) Attach screenshots

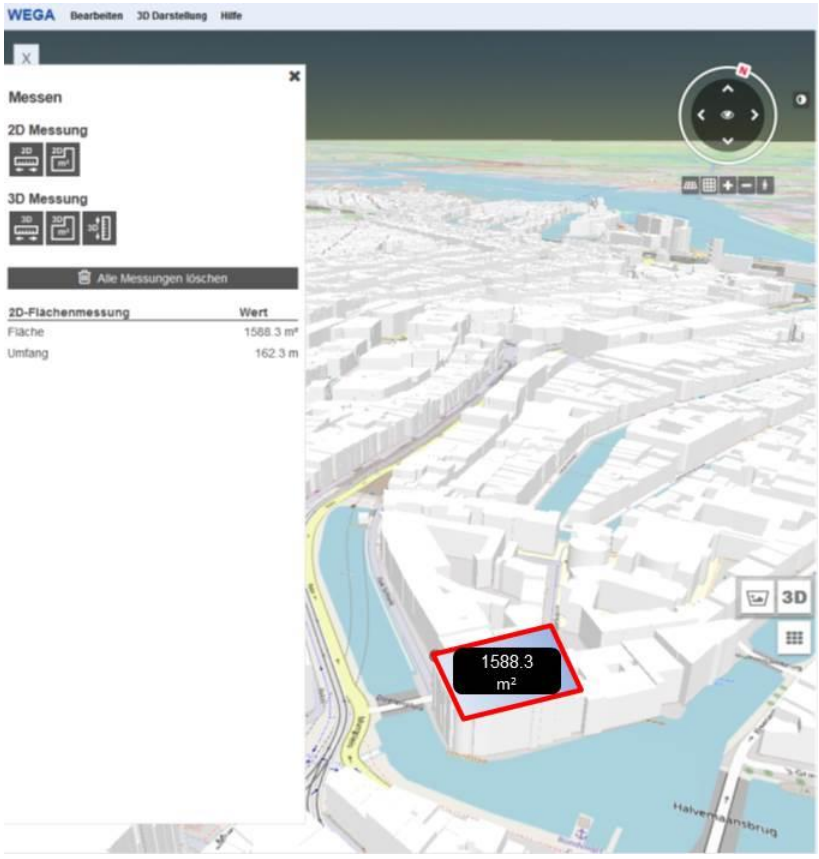


Figure 23, 3D and 2S measurements.

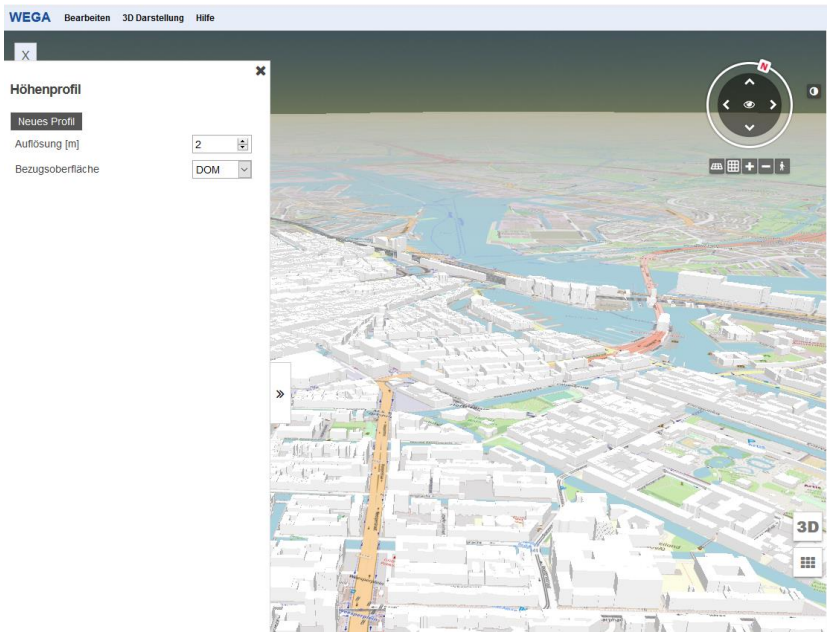


Figure 24, Analysis.

55.1.3) Needed time to perform the analysis

(approximately)
☐ it's almost immediate
☒ less than a minute
☐ 1-5 minutes
☐ 5-20 minutes
☐ 20 minutes - 1 hour
☐ more than 1 hour
☐ it crashes without completing the operation

55.2) short comments to the previous question (55.1) (optional).

You arrived at the end of the Phase 1: "Import and manage the file in the software"

Now choose:

☒ The software has also export abilities

☐ The software cannot export, therefore **skip the phase 2**

Phase 2: EXPORT the data again to CityGML and answer the following questions.

(Only complete this section software tools having export functionality)

You should export the data to the **same CityGML version of the provided data;** optionally, file(s) exported to **different CityGML version(s)** can also be provided in addition, if multiple versions are offered by the software, and it is (/they are) **welcome.**

56) Details about the needed customization.

56.1) Are any pre-processing or setting changes needed in the software to enable a consistent export?

☒ No

☐ Yes→	56.1.1) Can you add a short description of the steps involved in the pre-processing? 56.1.2) Attach screenshots

56.2) short comments to the previous question (56.1) (optional).

The export consists of the following important steps: LoDs details, type of export format, CityGML schema, coordinate reference system and metadata.

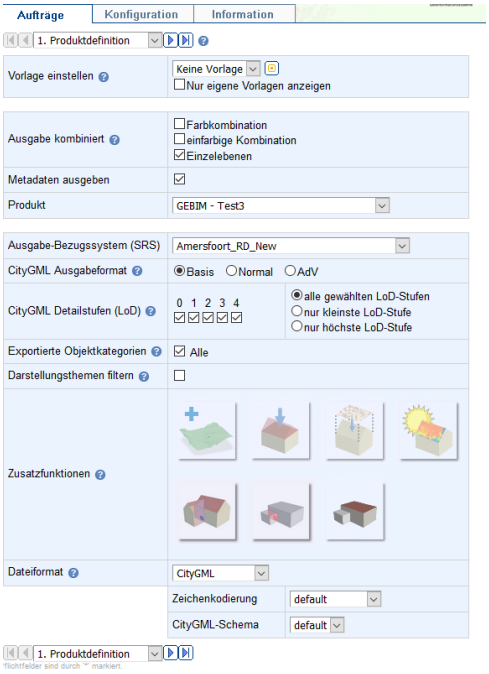


Figure 25, Export setting.

57) How long does it take for the data to be exported to CityGML?

(approximately)
☐ it's almost immediate
☐ less than a minute
☐ 1-5 minutes
☐ 5-20 minutes
☒ 20 minutes - 1 hour
☐ more than 1 hour
☐ it crashes without completing the operation

Section 5 - Finalisation

58) Would you like to share any other comments or observations? (They are all welcome).

59) Attach other screenshots or files that you consider useful. (optional).

60) In addition, attach this filled form in word format. (optional, do it only if you think that some information was not given effectively through the web form).

☒ I hereby declare that all the information provided and the answers given are true, correct and detailed as much as I could provide (mandatory). Moreover, I give my consent to use

these results for the benchmark activities and analysis as described in the website (https://3d.bk.tudelft.nl/projects/geobim-benchmark/) and connected research (mandatory).

☒ I give my consent to publish these results (anonymously) within the benchmark outcomes, as open data (optional but welcome).

☒ I declare that, in the delivered results, no personal information is present that will allow me to be identified (except for personal and contact details).

☒ I agree my name, affiliation, nationality and photo/logo to be added in the benchmark website, in the section listing who participated to the scientific initiative. My personal details will not be linked to the test results I have provided.

☒ I agree to my e-mail address being added to the mailing list of this project in order to follow the project progress and connected activities information.

61) Use this link to upload **the file in the used software (used native format)**

The software uses a relational database for data storage. Oracle, PostGreSQL and MS SQL Server are supported by the software. Oracle was used in the benchmark Task 3 experiment.

https://www.dropbox.com/request/Ozi6hjNRdNHR1QAAaNtP
If the software allows to save the project in its native format, it is **required**.
The files must be **named** like the following:
T3_Name of the used CityGML file_Name of the used software_Your name (initial+surname).native format
e.g. T3_Rotterdam3D_QGIS_FNoardo.qgs

62) Use this link to upload **the exported CityGML file**

https://www.dropbox.com/request/ozO2Qj5RzAF4DTticfxg

In the case the software has export functionalities, it is **required**
If you exported the file in various CityGML versions, please upload them all here.
The files must be named like the following:
T3_Name of the used CityGML file_Name of the used software_CityGML version_Your name (initial+surname).ifc
e.g. T3_Rotterdam3D_QGIS_CityGML2_FNoardo.gml

Thank you very much for your contribution!

Please remember to deliver:

- The file imported in the tested software **(native) format**
- This answered results template (by submitting this **filled online form**)
- The **exported CityGML** file (only if a software with export ability was tested)