3D modelling of the built environment (geo1004)

Lesson: Building Information Models (BIM) in practice

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During this lesson, you will learn the main characteristics of Building Information Models (BIM) and their reference open standard format, the Industry Foundation Classes (IFC). An overview of this kind of 3D information system is described in the handout we provide you.

You are supposed to study the handout before the lesson, in order to get confident with the contents.

During the lesson, you will look at the IFC models features in a sample of models within an interactive session.

Plan of the lesson and instructions

Before the lesson

Step 0)   *Individual preparation before the lesson*(Required for the interactive session):*

- Individually, study the general BIM and IFC features using the provided handout, in order to understand and master the key BIM and IFC characteristics.

You will use this achieved knowledge to perform the following inspection tasks. In addition, you will need to answer some questions in a quiz after the interactive lesson.

- **Promise that you will keep them confidential,** and download the sample IFC models from
https://tudelft3d.typeform.com/to/nJI5LurE

- Download and install a 3D viewer supporting IFC. Some suggestions, but also others supporting IFC are admitted:
http://rdf.bg/product-list/ifc-engine/ifc-viewer/ (for Windows); https://openifcviewer.com (for Mac); Blender with https://blenderbim.org is also an option (for the three OS, including Linux), other suggestions at https://thinkmoult.com/how-to-view-bim-ifc-files-linux.html

- Download and install a text editor

- We'll use padlet, so please, try to access this link: https://padlet.com/francesca102/qiakn40yr191n5ef

Prepare these materials and software in your computer in order to enable the interactive session activities. If you want, you can use these materials individually, before the lesson, in order to experience some of the features you will study in the handout.

Interactive session on 24th March 2021 -- h.15.45-16.45

Link to the meeting: https://tudelft.zoom.us/j/94541119206?pwd=ME91SHFXU2F3RmgvenJJSVFodWtWdz09

Step 1)   *Welcome and start of the course with short quiz about the handout contents*

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Start time: 15.45
Duration 5'
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- Join the lesson and will be asked to
- Go to https://www.menti.com add the code communicated in class and answer the three questions (1' per each question) to recap some relevant handout contents (the relevant features about geometry, semantics, georeferencing of BIM/IFC)

Step 2)   *Models inspection in a 3D viewer*

Aim of the activity: experiencing the BIM/IFC features as visible within a 3D viewer that you can find in a model when working with it or whenever you need to use it.

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Start time: 15.50
Duration 20': approximately 5' per each feature to be inspected (padlet columns)
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In small groups of three (made randomly in zoom breakout rooms):

- upload the IFC model in your 3D viewer (each student will use a different model)

- Point out the BIM/IFC features indicated in the online platform (questions A to D in padlet -
https://padlet.com/francesca102/qiakn40yr191n5ef);

- Make a screenshot;

- Show it and possibly discuss within the group (you can also share your screen for discussing with the others)

- Upload the screenshot under the suitable column in the padlet platform: https://padlet.com/francesca102/qiakn40yr191n5ef, together with possible interesting discussion points arisen. If other comments and observation arise from your discussion, you can upload them in column G in padlet as well.

<div align="center">End of activity 1: h. 16.10</div>

Expected outcome: In padlet, a sample of examples and comments on a few BIM/IFC features (which were already described in the handout previously studied)

The results will be the base for final recap of BIM/IFC features and for final discussion of arisen issues and interesting points.

Step 3)   *Models inspection in a text editor*

Aim: experiencing the BIM/IFC features as visible in the text format of the file that you can find in a model when working with it or whenever you need to use it.

<div align="center">Start time: 16.10</div>

<div align="center">Duration 10': approximately 5' per each feature to be inspected (padlet columns)</div>

In small groups of three (made randomly in zoom breakout rooms):
- open the IFC model with your text editor (each student will use a different model);

- Point out the BIM/IFC features indicated in the online platform (questions E to F in padlet - https://padlet.com/francesca102/qiakn40yr191n5ef);

- Make a screenshot;

- Show it and possibly discuss within the group (you can also share your screen for discussing with the others);

- Upload the screenshot under the suitable column in the padlet platform: https://padlet.com/francesca102/qiakn40yr191n5ef, together with possible interesting discussion points arisen. If other comments and observation arise from your discussion, you can upload them in column G in padlet as well.

<div align="center">End of activity 2: h. 16.20</div>

Expected outcome: In padlet, a sample of examples and comments on a few BIM/IFC features (which were already described in the handout previously studied)

The results will be the base for final recap of BIM/IFC features and for final discussion of arisen issues and interesting points.

Step 4)   *Reasoning on the padlet results*

Aim: recall the learnt BIM/IFC features by checking how they are reflected in the reported screenshots and comments from your and other groups.

<div align="center">Start time: 16.20</div>

<div align="center">Duration 3'</div>

Individually, read the padlet results and reason about:
- Featured found and checked;

- Unexpected features;

- Incongruences with what was studied or what was expected

<div align="center">End of activity 2: h. 16.23</div>

Expected outcome: Recalling of studied topics in the handout and ideas about further interesting features of models from practice.

In the next step, someone will be asked to share this with the class.

Step 5)   *Discussing the padlet results*

<div align="center">Start time: 16.23</div>

<div align="center">Duration 15' (ideally, 2/3' per student talking)</div>

In front of the whole class, a few students (randomly selected) are invited to share the main outcomes from the padlet results, by recalling one main BIM/IFC features and making a more general comment about the models.

The others can integrate or discuss

End of activity 2: h. 16.38

Expected outcome: Presentation of the main BIM/IFC features as found in the models, possible discussion about such features as found in models from practice.

At least a part of this outcomes will be object of a final quiz delivered immediately after the lesson and, likely, as part of the final exam.

Step 6)   *Question time*

Start time: 16.38

End of activity and session: h. 16.45

After the lesson

Step 7)   *Final quiz*

Individually, answer the quiz available within the online forms: https://tudelft3d.typeform.com/to/cNGRhdlW

Deadline: 24h after the lesson (Thursday 25th March 2021 h. 17.00)

Please, try to make it in no more than 20-25 minutes.

Aim: Assessment of the level of understanding and identification of BIM/IFC features

Finally, please, I would be grateful if you could fill this questionnaire as well, after the lesson, in order to help us making this lesson of geo1004 about BIM-IFC better for future students, and me to be a better teacher. Thank you very much for your time:

https://tudelft3d.typeform.com/to/Bamwi8Yk

Learning Objective(s) for this lesson:

1. Students are able to exemplify the main BIM and IFC features on a sample dataset both in their graphical visualization within a model viewer and in the text format, within a text editor.

1.1. Students are able to describe the main BIM/IFC features as summarized in the provided study materials.
1.2. Students are able to show specific BIM/IFC features within the IFC model inspected in a 3D viewer
1.3. Students are able to show specific BIM/IFC features within the IFC model inspected in its text version.