**Minutes: workshop CityGML WP9 – Other constructions**

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Setup of the workshop

* Part 1: discussing process related business: what are our deliverables, who does what (UML editing, text writing), future meetings, planning etc.
* Part 2: everyone presents their input on constructions with room for discussion and feedback (approx. 1 hour per participant).
* Part 3: further discussion on important topics that were already identified beforehand, or were identified during the presentations.

Participants

Present:

* Linda van den Brink
* Dimitri Sarafinof
* Joachim Benner
* Heinrich Geerling
* Gerhard Gröger
* Volker Kraut: attended part of the meeting via GoToMeeting

Absent:

* Debbie Wilson
* Marc-O. Löwner

Agenda

Day 1

10:30 – 10:45 Welcome, short intro – Linda van den Brink

10:45 – 11:30 Work process

11:30 – 12:30 Presentation Geonovum

12:30 – 13:15 Lunch

13:15 – 14:15 Presentation Dimitri Sarafinof

14:15 – 15:15 Presentation Joachim Benner

15:15 – 15:30 Break

15:30 – 16:30 Presentation Heinrich Geerling

Day 2

09:00 – 10:00 Presentation Debbie Wilson (skipped due to her cancellation)

10:00 – 11:30 Discussion on definitions of Building, Construction, Wall, etc.

11:30 – 12:30 Discussion on geometry representations for constructions. Which levels of detail; are implicit representations also wanted?

12:30 – 13:15 Lunch

13:15 – 14:15 Slot for other discussions based on presented input (with room for extending this another hour)

14:15 – 14:30 Break

14:30 – 15:30 Conclusions, wrap up, next steps

Between 15:30 – 16:30 End of workshop

Minutes

Part 1 - process

The workshop started an hour later than anticipated due to a train strike. Linda van den Brink as leader opened the workshop. It was agreed that the following are the deliverables for WP9:

* Text for chapter in CityGML standard documentation (consisting at least of an explanation of the model and conformance requirements)
* UML model for Other Constructions module
* Codelists, either normative or informative
* Examples

The timeline (reach consensus on main points by end of 2014; draft module by March 2015; module integrated with work by other WPs by June 2015): was viewed as ambitious, especially the integration phase which is supposed to start in March 2015. It would briefly be rediscussed at the end of the workshop.

Part 2 - presentations

Proposal by Linda van den Brink

Linda van den Brink presented her input based on previous presentations about the Other Constructions change request in the CityGML SWG, prepared together with IGN. The presentation focused on the definitions for the classes of Building and OtherConstruction and contained a proposal for modeling the new class.

Comments and discussion:

* There was some discussion on renaming the class AbstractSite and giving it more explicit semantics e.g. ‘artificial environment’ or ‘man-made’. Discussion was deferred to Joachim Benners presentation slot as it contained a proposal regarding this.
* The proposed definition mentions OtherCOnstructions being immovable, but some could be movable (in a limited way), such as harbor cranes and floating houses.
* As better term for ‘free-standing’ is suggested: ‘independent’.
* The three subclasses of OtherConstruction that are present in IMGeo, ‘OtherBuiltObject’, ‘CivicEngineeringStructure’ and ‘Separation’ will not be adopted in the CityGML OtherConstruction proposal. They are specific to the Dutch regulations.
* Three aspects of Levels of detail were deferred for discussion at length in part 3 of the meeting: explicit geometric representations, implicit geometries, and interior.
* Whether or not to add further structure, e.g. construction parts, to OtherConstruction class, was deferred for discussion in part 3 of the meeting.
* There is a possible relationship with the Utility Networks module (WP10)
* Action to check the details of the Walls CR. Is there a detailed proposal for Walls including specific semantics etc.?

Proposal by Dimitri Sarafinof

Dimitri Sarafinof presented a full list of objects for which it is difficult to find a good class in the current CityGML standard. For all objects he presented examples (photos).

Possible attributes for OtherConstruction:

* Information about manufacturing.
* Material – relationship with WP7.
* Barrier top type (specific to security use case)
* Controlling authority: a general attribute for all classes, not currently in CityGML
* Physical condition: not currently in CityGML, but is in INSPIRE BU theme.

Comments and discussion:

* Culvert: could perhaps be a tunnel or a network component in CityGML.
* Some of the examples are objects floating on the water, so not directly connected to earth. This is important for the definition.
* A possible example of a construction with parts: a stadium with grandstands.
* A possible example of a construction where the interior could be relevant: Memorial monument.
* Examples of movable objects: containers; transportation blocks (movable with two states).

Proposal by Joachim Benner

Joachim Benner presented a proposal for a consistent ontology for CityGML feature types. The ontology, which does not necessarily pertain directly to the UML model, contains a division on the top level into natural and man made (‘technical’) objects. Man made objects within the scope of CityGML are constructions: buildings, bridges, tunnels, city furniture and other constructions. The latter is then the category of constructions that do not fit in any of the other construction classes. The reason for adding OtherConstruction to CityGML is to make available a category for man-made things that have no place in the rest of the ontology.

The presentation contains a brief analysis of the existing CityGML classes related to man-made objects.

* The Transportation module: infrastructural objects are missing.
* City furniture: only described by example, no definition or clear description.
* Utility networks (new module): could also define infrastructural objects. Possible overlap with intended OtherConstruction module.
* Adding a class OtherConstruction would make the ontology even less clean. However, there is no CR for changing the complete top level of the CityGML UML model, and this would be difficult with the current way of working in 14 WP’s in parallel.

Proposals in this presentation + discussion:

* Rename AbstractSite to AbstractTechnicalObject. Group agrees on renaming, exact new name to be discussed in part 3.
* Name for ‘other construction’ rest category to be discussed in part 3.
* Move attributes common to all sub classes to this superclass. Group agrees; which attributes is discussed in part 3.
* Remove the Cityfurniture class (merge with new OtherConstruction class):
  + Argument for removing: difficult / impossible to exactly define what is city furniture and what is an ‘other construction’.
  + Argument for not removing: City furniture can be defined by its function: to furnish public space. Also by its size: Small objects as opposed to other constructions: usually larger objects.
  + Argument for not removing: already being used in several datasets.
  + If we keep it, make it a subclass of Site?
  + Consensus mostly toward keeping the class, but discussed in part 3.
* Remove ‘usage’ attribute, because the distinction between ‘function’ and ‘usage’ is not well understood by users and not used. There was no consensus in the group for this.

Proposal by Heinrich Geerling

The presentation of Heinrich Geerling contained an overview of activity complexes in INSPIRE, including construction facilities and agricultural facilities; examples (photos and drawings) of other constructions, and an overview of relevant definitions for constructions in German regulations/law.

Construction-, agricultural- and utility facilities in INSPIRE contain classes for modeling function, not physical form (for this it refers to the Building theme). However they are relevant to our discussion in as far as they provide many examples of constructions that are probably not buildings in the common sense

Examples of other constructions include:

* + industrial complexes, burial mounds, ...
  + Very large construction machines that technically are moving objects, but are not intended to be moved anymore and are used for recreation or as a monument, landmark, or historical feature.
  + Platforms on sea. Sometimes movable, sometimes not.
  + Examples of several objects modeled in different LODs.

German law/regulations on buildings (physical structures) provides a good starting point for definitions, e.g. the definition of when something is regarded as ‘connected to earth’ is usable. gives a useful definition

End of day 1 of the workshop.

Part 3 – discussion

The first step was to create a list with discussion items in a logical order for discussing them, by the whole group. Next, each item would be discussed in order. The agreed list was:

* Definition of OtherConstruction / \_Site classes and, if we keep it, CityFurniture class
* Tunnel and Bridge / parallel or subclass
* Naming of classes (\_Site and OtherConstruction)
* Keep or remove CityFurniture class
* Common attributes at \_Site level
* Specific attributes
* Levels of detail:
  + geometric representations (which kinds?)
  + implicit representations
  + interior?
* Semantic structure, e.g. parts

Definitions

It was decided to propose definitions for all CityGML classes that model man-made objects. This was deemed necessary because other construction is intended to be a rest category.

Buildings definition: buildings have ALL these requirements:

* Must be connected to earth. Definition of this aspect can be created using the German definition as a starting point. Under this definition things can have restricted movement.
* Should normally be enclosed. This is not a requirement, because it is too strict to apply to the whole world. E.g. houses in South-east Asia.
* Must be roofed.
* Must be accessible to humans.
* Must have as function: copy from INSPIRE
* Should be intended to be permanent / mostly stationary for a long time. This excludes e.g. temporary buildings during construction work like barracks. Note: normal lifecycle of buildings in Germany is 80 years.

In the text we can use a set theory graphic to illustrate: buildings and other constructions have an intersection. E.g. constructions that have as function to shelter goods, could fall into both categories.

AbstractSite definition

* Old description (CityGM 2.0): superclass for buildings, bridges, tunnels, facilities, etc
* Must be a man made object (e.g. An excavation is also man made)
  + Everything that is covered by other modules e.g. traffic and waterbody is not a Site. E.g. a road or canal is man made, but not a Site.
  + Man made means: manufactured by humans from construction materials. Things constructed by animals, eg. Beaver dam, are excluded. Natural phenomena like caves are also excluded.
* Must be connected to earth
* Should mostly be immovable (location is intended to remain the same for an extended period of time).
* Should be intended to be permanent.

Bridge definition

* Sig3D definition: Civil engineering works that affords passage to pedestrians, animals, vehicles, and service(s) above obstacles or between two points at a height above ground (cf. ISO 6707-1).
* Do piers fall in this category? Argument in favour: they are similar constructions. Against: they are not connecting two points.

Tunnel definition

* Sig3D definition: Horizontal or sloping enclosed passage way of some length, mainly underground or underwater (cf. ISO 6707-1).
* Must be mostly enclosed, but is not totally enclosed:
  + entrance can be open.
  + Should snow or rock shed be included? Argument in favour: they are similar constructions. Argument against: they are less enclosed: open on one side.
  + Some noise barriers are (partly) roofed. Should they be included?
  + No group decision. Action: describe the arguments in full including some illustrations; present to SWG.
* Must be intended as passage way for humans, animals, or goods.
* Must support infrastructure.
* Notes:
  + Mines could be modeled as tunnels (or at least the parts that give passage to the material) but should be in a new ADE if there is a need to model mines in detail.
  + Culvert as well as pipes and ducts for cables are not tunnels but part of utility networks.
  + Wild life tunnels: are tunnels.

City furniture

* We propose to make CityFurniture a subclass of \_Site.
* CityGML description: City furniture objects are immovable objects like lanterns, traffic lights, traffic signs, flower buckets, advertising columns, benches, delimitation stakes, or bus stops (Fig. 67, Fig. 68). City furniture objects can be found in traffic areas, residential areas, on squares or in built-up areas. The modelling of city furniture objects is used for visualisation of, for example city traffic, but also for analysing local structural conditions.
* Must have small size. To explain ‘small’, give list of examples.
* Must have function: to support the general function of the area it is located in. It’s an “accessory”.
* Should usually not be manufactured on site.
* Notes:
  + different from building furniture. These are movable, city furniture are immovable.
  + it is not possible to make a 100% clear mathematical division of what is city furniture and what is other construction. Put choice to the CityGML SWG:
    - EIther replace class of city furniture by other construction, or
    - Keep both, and accept that there is no 100% clear division between both.

Other construction

* Every construction (Site) which is not covered by any of the other subclasses of Site (or by CityFurniture).
* Note: action to check whether noise barriers are included in the Noise ADE.

The use case for other constructions to be modeled in CityGML can be described as making it possible to proof value of a construction object after its primary function. This is important from a planning perspective.

Naming

* AbstractSite:
  + WP9 group proposes to rename this class to “AbstractConstruction”: This is directly in line with INSPIRE. (note: may be name conflict later with materials module)
  + TechnicalObject and ManMadeObject were also considered but rejected because both terms were found too generic.
  + Civil engineering structure: rejected as name for AbstractSite because this term was found too specific.
* “OtherConstruction”: WP9 group proposes this name for the new class. This is directly in line with INSPIRE and makes clear that the class is a rest category.
* Other classes are not renamed.

Generic attributes at AbstractConstruction level

* Joachim Benners presentation contains a proposal for defining 6 attributes, all originating from INSPIRE at this level. The group adopted this proposal. The exact proposal for INSPIRE harmonization is up to WP12 (i.e. WP9 will follow WP12 in this).
* dateOfRenovation: WP9 group proposes to give this attribute a cardinality of 0-\*. Action to propose this to WP12.

Specific attributes to OtherConstruction:

* Class, function and usage

Levels of detail

* Joachim Benner reported briefly on the progress of WP3. The general LOD concept is still under discussion in WP3. Most probably the outcome will be (for geometric LODs): LOD0 is a 2.5D representation, usually a multisurface or composite surface, LOD1 is usually an extrusion > a solid. LOD2 could be a solid or multisurface or multicurve or a combination of these. LOD3 is the same. Not yet decided if geometry types will be restricted, or formally open and only informally described.
* WP9 group proposal for OtherConstruction LODs:
  + LOD0: 2.5D projection of print on the surface in the form of either a multipoint, or multiline, or multisurface (XOR). (in case of e.g. a fence it is not required to be a horizontal line. In case of buildings the discussion is ongoing in WP3)
  + LOD1: Only horizontal and vertical geometries. Vertical lines, vertical surfaces, or solids.(XOR)
  + LOD2: Solid or multisurface or multicurve or a combination of these.
  + LOD3: Solid or multisurface or multicurve or a combination of these. Representation in LOD3 is more close to reality, while representation in LOD2 is more generalized. It is necessary to provide examples and rules in the standard.
  + The WP9 group is undecided as to the need for interior LODs for OtherConstruction. The majority of the group recommends not to model interior, however the group is small and may not have considered all arguments. Action to present the choice to the CityGML SWG and ask for decision.
    - Arguments pro: a more specific class should be defined when there is a need to model interior (like buildings). In most cases it does not seem to be needed. Also, since OtherConstruction has such a diverse population it is difficult to provide rules for modeling the interior.
    - Argument con: lot of other construction have an inside that may be relevant to some use cases, e.g. control rooms. Consider also e.g. football stadiums. There could be a use case for modeling these.
  + Implicit representation: WP9 group proposes to allow these for OtherConstruction in all LODs. Must be alternative to LOD0-3 explicit representations – not both (conformance requirement).

Semantic parts

* Discussion took place on defining classes to model parts of other constructions, such as OtherConstructionPart and OtherConstructionInstallation. This could be needed e.g. to assign different properties such as functions or materials to parts of a construction. However, deciding this and modeling this is difficult because of the diverse population of OtherConstruction.
* The WP9 group is undecided and will present the choices to the CityGML SWG.

This concluded part 3, Discussion.

Next steps / actions

The following dependencies were identified and need to be followed up / monitored:

* WP10 utility networks
* WP03 level of detail concept
* WP14 Parameterised Constructs and Construction
* WP06 Time Dependent and Alternative Versions
* WP07 Material Properties
* Walls CR
* Relationship with INSPIRE (Building theme and Activity Complex / Production & Industrial Facilities / Agricultural Facilities)

Actions:

* Joachim: produce proposal for model in UML.
* Linda: detailed minutes
* Linda: report to SWG on this meeting at 27th of October telecon
* Linda: make first proposal for contents of OtherConstruction codelist
* Dimitri: make + give presentation at Tokyo meeting
* Next meeting of WP9 group: Telecon 21st of November 10:00-11:00 CET.

Whether or not a next face to face meeting (which would take place in Q1 2015) is needed, was not decided. This will be rediscussed at the next telecon. A face to face meeting is preferred for lengthy discussions, however as we made a lot of decisions about the fundamental issues at this workshop, there is no immediate need for a face to face.

As to the planning of WP9, the group will try to adhere to the time line, but observes that this will be difficult due to the many dependencies between the different WPs both in their topic and the resources involved.

To conclude the meeting, Linda thanked all the participants for the fruitful, enyojable meeting and thanked Gerhard for arranging and providing the meeting facilities in Bonn.