Kanishk Chaturvedi
02.04.2015

Minutes of Meeting
CityGML 3.0 WP06 Eighth Meeting

Participants

- Thomas H. Kolbe, TU Munich
- Gilles Gesquière, LIRIS
- Steve Smyth, OpenSitePlan
- Tatjana Kutzner, TU Munich
- Kanishk Chaturvedi, TU Munich

Agenda of the meeting

- Discussion/feedback on the paper on the versioning concept.
- Presentation by Kanishk on the approach for a dynamic data schema and related use cases.
- Presentation by Steve on the standard WaterML 2.0 (especially about the part which is going to be renamed to TimeSeriesML in the future) and its relevance for our work package.
- Finalization of dates for the next meeting.

Paper on the versioning concept

- The paper on the versioning concept titled "Managing versions and history within semantically enriched 3D city models" has been finalized and submitted for publication in the Second International ACM Workshop on Managing and Mining Enriched Geo-Spatial Data 2015 (GeoRich'15) (http://www.dbs.ifi.lmu.de/georich15/).

Presentation by Kanishk

- Kanishk presented an approach of a dynamic schema for supporting dynamic/time-varying attributes within CityGML.
- The approach has close relation to the GML Coverage schema which contains three components: Domain Set, Range Set and Coverage Function. Spatial values in the Domain Set are mapped to specific values in the Range Set by a rule defined in the Coverage Function.
- Likewise, in the proposed approach, the Coverage functionality is extended by creating the new domain set type Temporal Domain Set. It allows all GML Time objects (Time Instants or Time periods) to be included in the domain set and hence, will allow to map values in the range set to the specific time values in the domain set.

- Further, these values can be referenced by city objects via the XPath mechanism. The existing GML application schema for Coverages also allows Sensor Web Enablement (SWE) Data Records to be integrated in the Coverages. Using the same approach, sensor data from various sources can also be included in the data records and be mapped with time values.
- Two use cases (energy demand variations and texture temporalization) were presented which can handle dynamic attributes using a similar approach.

Discussions:

- Slide 3: The proposed approach only uses one modifier to override dynamic attributes in all city objects. However, we will need one separate modifier for each attribute. Furthermore, also grouping should be allowed, so that one modifier can refer to a group of attributes and can override them simultaneously.
- Slide 9: Can we create an association from Modifier to an attribute of a CityGML class?
- Slide 10: In this example the building is extended by dynamisation. However, the building should not be aware of dynamisation. The dynamisation should be imposed onto the building from the modifier feature which results roughly in the following structure:

  <modifierFeature>
     <Modifier>
        <Coverage + LinkToBuilding>

- Slide 14: The file should be referenced by the modifier feature.
- Slide 15, question 2: Can patterns be repeated?
- Slide 15, question 3: Geometries of movement could perhaps be represented within a coverage.
- There should also be a kind of parameterization of the modifier. There may be different sources and specializations of parameters. Instead of fixed values, we can supply parameterized functions for the time values. The parameterization will also allow dynamic attributes to be modified, e.g., with the help of tables or a URL.
- Can we introduce a specific selector to select the correct dynamic instance? Currently, the only selector is time. Can we use some other property, e.g. spatial positions, as selector? Can time/domain set be replaced by other domain sets/states/values? Can we also define a selector at initial level for selecting either versioning or dynamic data schema?
- Can this temporal coverage approach be used for expressing time patterns by extending GML Coverage, and in particular TimeDomain, by patterns?
- Should we allow superposition of different coverage functions which can be used to determine a final result? An example would be the multiplication of two coverages (e.g. multiplying a trend with a regular function)
- This approach also requires further investigation on
  - How can we reference an OGC Web Sensor Observation Service?
  - How can we add periodic/cyclic patterns in the coverage domain set?
  - Should we use existing GML coverages or create separate coverage features within CityGML?
- Our versioning schema and the dynamic data schema should be combinable. → The modifier feature has to be made subject to versioning.
  - Clear advice should be given when to use the versioning schema and when to use the dynamic data schema.

Presentation by Steve

- Steve presented on the approach of supporting time series in the standard WaterML. The standard supports time in the form of (i) time-value pairs and (ii) Domain-Range lists.
- The time series can include discrete time values of the properties. An interesting feature, in relation to WP06, is that this approach supports blank values. It allows to connect multiple time series.
- This approach also supports cumulative time series allowing accumulation or successive addition of time values.
- The three terms have been used for expressing time values in this standard: phenomenonTime (when it happened in the world), resultTime (when sensed or computed measurement value is available) and validTime (when the observation should be used).

Discussion:

- This approach supports only discrete values. However, there should be a support for allowing:
    - Continuous values
    - Interpolation
        - Step functions
        - Linear functions
        - Instantaneous observations (no interpolation)
    - Disjoint functions
    - We also need to represent blanks in between observations
- In relation to WP06, we are currently using the term validTime for expressing the value valid at a certain point in time. This corresponds to the term phenomenonTime used in WaterML. The term validTime in WaterML rather corresponds to a predicted time, e.g. the temperature of tomorrow.
- This approach seems to be an extension of GML coverages, in supporting domain and range sets. Kanishk will have further look into it.
- Would it be possible to support spatial properties within TimeSeriesML? Kanishk will have further look into it.

Next steps

- Kanishk will prepare a presentation about modified approach using temporal extension of GML coverages. Kanishk will also investigate about open questions in relation to TimeSeriesML discussed in the meeting.
- Tatjana will prepare a presentation on the OGC Moving Features standard and its relevance with moving objects within WP06.

Next meeting

- The next teleconference will take place on April 20, 2015 (5pm-7pm CET).