

Meeting Minutes: 2024-07-24

ASAM OpenDRIVE Open Area Concept Ideation Workshop

Location	MS Teams
Date	2024/07/24
Time	09:00 – 13:00 CET
Note taker	Ahmed Sadek (ASAM e.V)

Antitrust reminder

Every participant acknowledges that they know the content of the antitrust reminder:

[ASAM Antitrust Reminder](#)

Agenda/Goals

Item	Topic
1	Introduction Welcome Problem statement Basic Idea
2	Current State ASAM OpenDrive CityGML
3	Use Cases / Stakeholder
4	Presentation of the proposal idea Timeline Work packages
5	Discussion Ask for feedback Ask for expectations of the audience (wish list)

Meeting Minutes

9:00 Introduction (30 mins)

Welcome, Yash
ASAM introduction

Problem Statement, Andreas

- As vehicles attain greater autonomy (SAE Level 3 and above), the complexity increases, necessitating an expansion of testing within virtual environments to enhance the efficacy of these simulations.
- Introducing real-world data into simulations is becoming essential to address current challenges. The intricate designs of road layouts require more than the basic modelling provided by ASAM OpenDRIVE's reference line concept.
- Additionally, there is a growing need for comprehensive details regarding environmental elements such as street infrastructure, surface types, and buildings, as well as various materials, to improve sensor simulation accuracy.

Basic Idea (Concept), Michael

- Separate road logics from Visualization properties.
- Link ASAM OpenDRIVE logic with CityGML semantic environment.
- Goal is to reduce complexity, increase interoperability, facilitate exchange between overlapping domains and still support synthetic and geo-specific scenarios
- Scaling OpenDRIVE on its current state to model entire cities could become easier if synergize with CityGML

9:30 Current State

9:30 Presentation ODR 1.x (30 min), Esther

An Introduction to OpenDRIVE 1.8.0 was given by Esther:
OpenDRIVE's methodology relies on establishing a reference line within the X-Y plane, upon which road elements such as lanes and objects are positioned using the S-T coordinate system along the reference line. While this approach is suitable for synthetic roads, it proves inadequate for accurately representing real-world roads.

Addressing the intricacies of geo-specific roads presents another layer of complexity. Junctions in OpenDRIVE are conceptualized as intersections of reference lines, a simplification that falls short of capturing the nuances found in actual road maps.

Furthermore, OpenDRIVE faces limitations in accurately modelling road elevations. Aligning elements and pedestrian zones with the reference lines becomes a significant challenge, underscoring the need for a more robust modelling framework.

10:00 Presentation CityGML (45 min + 15 min questions), Christof

An introduction about CityGML and semantic 3D City modelling by Christof from TUM: CityGML articulates a structured decomposition of urban environments into smaller, semantically rich entities. It prescribes a uniform framework for modelling urban elements and their hierarchies, facilitating applications in energy modelling, noise analysis, and city-based automated driving.

Encompassing various thematic domains, CityGML offers a comprehensive data model and exchange formats for urban datasets. Numerous city databases conform to this standard, which is accessible through the OGC organization. The most recent iteration, CityGML 3.0, is available via OGC, complete with sample datasets.

The standard encompasses multiple themes to encapsulate diverse facets of urban landscapes, with a particular emphasis on infrastructure. Road networks are delineated into sections and junctions, featuring TrafficSpaces that are geometrically defined. The standard also details the modeling of road geometry and topology.

Additionally, CityGML includes classifications for roadway elements such as road markings, traffic furniture (e.g., signs, trash bins, benches, bus stops), public squares, and green spaces. It allows for the specification of appearances, detailing colours and materials. The introduction of the 'Dynamizer' in version 3.0 facilitates the representation of dynamic data for urban object attributes and the integration of sensors within the 3D city model.

Comparison of OpenDRIVE and CityGML

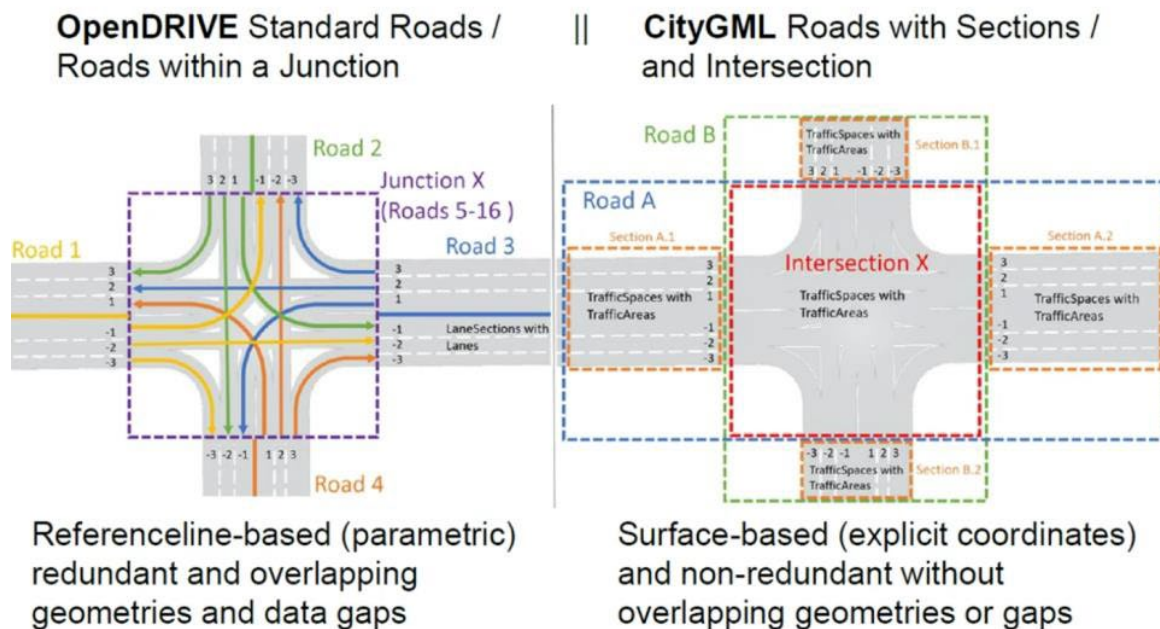


Figure 1 Comparison of road representation in OpenDRIVE and CityGML

Q: Is parking garage modelling considered in the scope of this project?

A: This topic should be covered as it will also be a good use case to show how driving logics and traffic area definitions are linked together. CityGML already addresses this use case. It is also possible in OpenDRIVE 1.8.0, but the difference between logical and visual is huge.

Q: Is tiling and streaming of a citygml map possible, is there any know solution implementing this?

A: 3DCityDB allows a tiled export of CityGML data. Also, the mentioned formats like 3DTiles or i3S are visualization formats, that can be derived from CityGML and are explicitly created for streaming large amounts of data.

11:00 Use Cases / Stakeholder

11:00 Presentation (10 min) Michael

- 1) Urban Digital Twins for simulation
- 2) Microscopic Traffic simulation
- 3) Autonomous driving development
- 4) Urban Planning and Operation

11:10 Stakeholder identification survey (5 min)

[Survey on Experience and Stakeholder Roles \(office.com\)](https://office.com)

11:15 Presentation of proposal idea (30 min), Roland

Scope: Establish a data model for a comprehensive, standardized and easily understandable

description of drivable area street space and its environment:

- Reduce ASAM OpenDRIVE's role to defining the minimal viable driving area
- Outsource further semantic and visual information to CityGML
- Link information in a standardized manner

Key Considerations in linkage between ASAM OpenDRIVE and CityGML

- Robust referencing system for accurate data representation across formats
- Bidirectional or unidirectional interface to optimize data flow between the two standards
- Utilizing CityGML Global Identifiers
- Incorporating CityGML global identifiers into ASAM OpenDRIVE to establish direct references

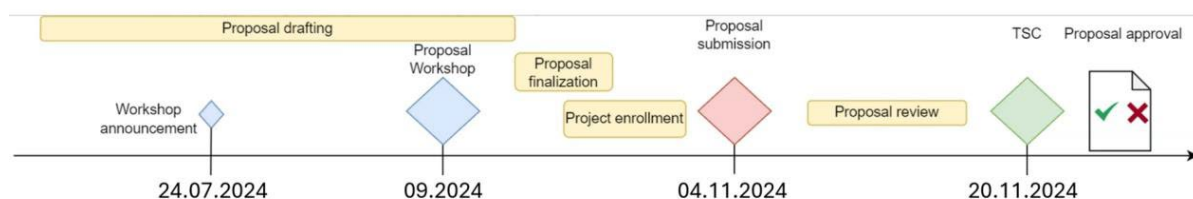
Open Questions

- Defining the exact scope of ASAM OpenDRIVE content
- Identify objects requiring direct reference
- Identify objects that can be linked implicitly
- Consider a more generic approach to link further road specific data such as regulation Data, Fleet drive paths and Environmental impact on road usages. This should make OpenDRIVE much more modular and provide a base to extend OpenDRIVE into new use cases.

Summary of key features to be achieved:

- A slim ASAM OpenDRIVE focusing solely on road network logics
- Non-redundant 3D Street Space Model in CityGML
- Improved interoperability across domains like simulation and urban planning

Timeline is presented:



11:45 Discussion, Yash

Q: With the current work running on OpenMATERIAL, and its relationship with OpenDRIVE, how could that relate to the work proposed in this project?

A: CityGML supports the gtlf format that is adopted in OpenMATERIAL, so CityGML could be seen as a wrapper around it when linking OpenMATERIAL and OpenDRIVE. Another important note that such issues should be included in the discussion when finalizing the proposal for this project.

Miro Board discussion for further ideas:

- Simple road definitions should always be in mind so that simple driving models of traffic participants can be applied, and no need for more sophisticated driving models.
- Offroad use cases with possible additional challenges. Currently the offroad group is investigating use cases for landscapes modelling. Exchange between both projects would be beneficial. CityGML is also handling some aspects of landscapes modelling
- There are potentials to create tools for simplifying the creation of road networks or assist the transition to the new concepts. Migration guideline might also be developed.
- The reference line in OpenDRIVE serves as a base layer, and then additional information such as road furniture, traffic lights can be added as separate layers based on specific use cases. CityGML already provides a layered structure and could be a base for it.
- Layered approach can help in showing temporary changes such as construction sites and temporary diversion of lanes
- Extra consideration of road features such as slippery road or raised zebra crossings
- Guidelines for stakeholders for best practices on how they could create new data formats.
- Harmonization with OpenMATERIAL for CityGML models in case of physics-based sensors simulation
- There is another harmonization potential with OpenCRG in terms of digital elevation model of the road surface. OpenCRG uses a grid space presentation
- Linking infrastructure from driving scenario across multiple driving maps
- Suggestion that Offroad project considers Modelling Sidewalks for AMR (Autonomous Mobile Robots)
- Customizable attributes to enable addition of network members with defined geometry
- Cross-linking road relevant data coming from different domains is a running effort. In the OGC consortium, there is the transportation and mobility domain group which are forming an initiative to address this overlap between domains. So, it might be useful coordinating with such initiatives
- Add a section in the user guide on how to handle large databases and making them interchangeable.

- We need to make sure that we have data providers and tool providers into the project to implement the new data formats and how easy they are convertible to accelerate the usage of new formats

Next Steps

Action	Date
Proposal workshop	TBD.09.2024
Proposal Submission deadline to TSC	04.11.2024
Proposal Approval by TSC	20.11.2024