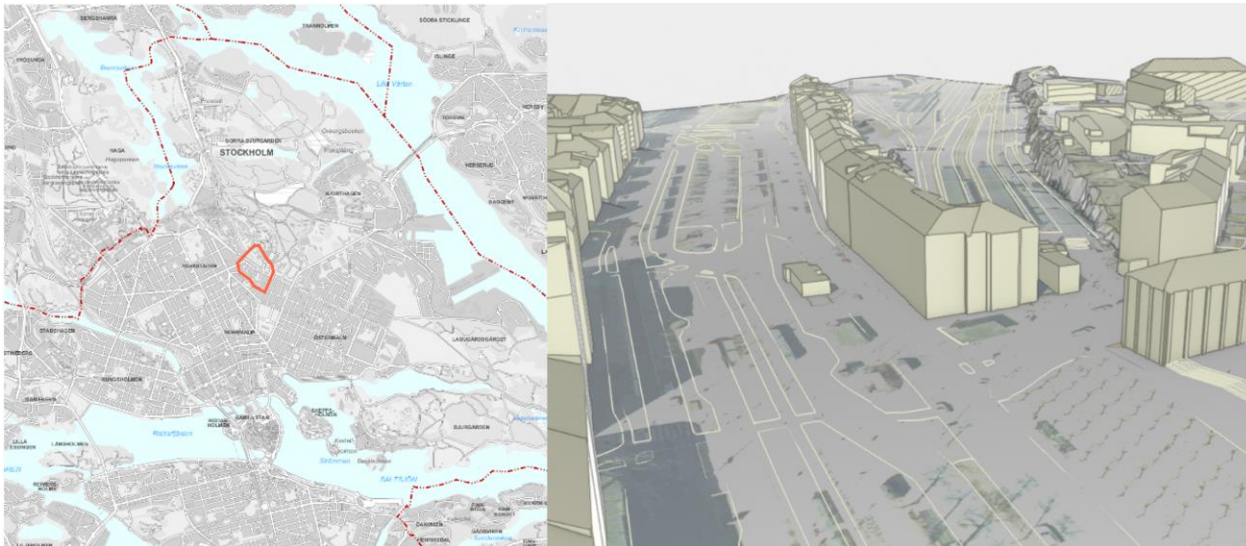


Standards for digital twins



Per-Ola Olsson, Lund University



Source: Stockholm, Stadsbyggnadskontoret



Source: Gothenburg, Stadsbyggnadskontoret



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Standards for digital twins

- What should they include?

- Urban planning
- Simulations
- Park maintenance
- Traffic control
-
-
-

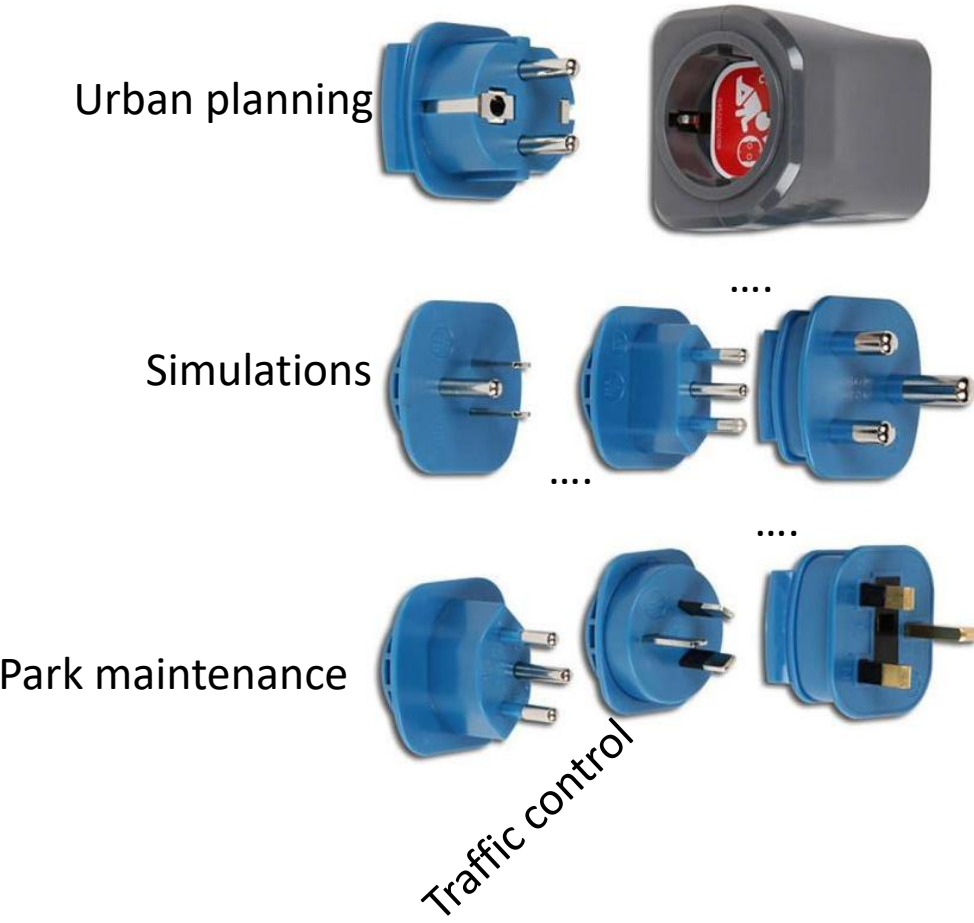


Ladda in Lorensborg

Source: Malmö (3CIM testdata)

Standards for digital twins

- What should they include?



Source: Malmö (3CIM testdata)

3CIM – Swedish specification for 3D city models

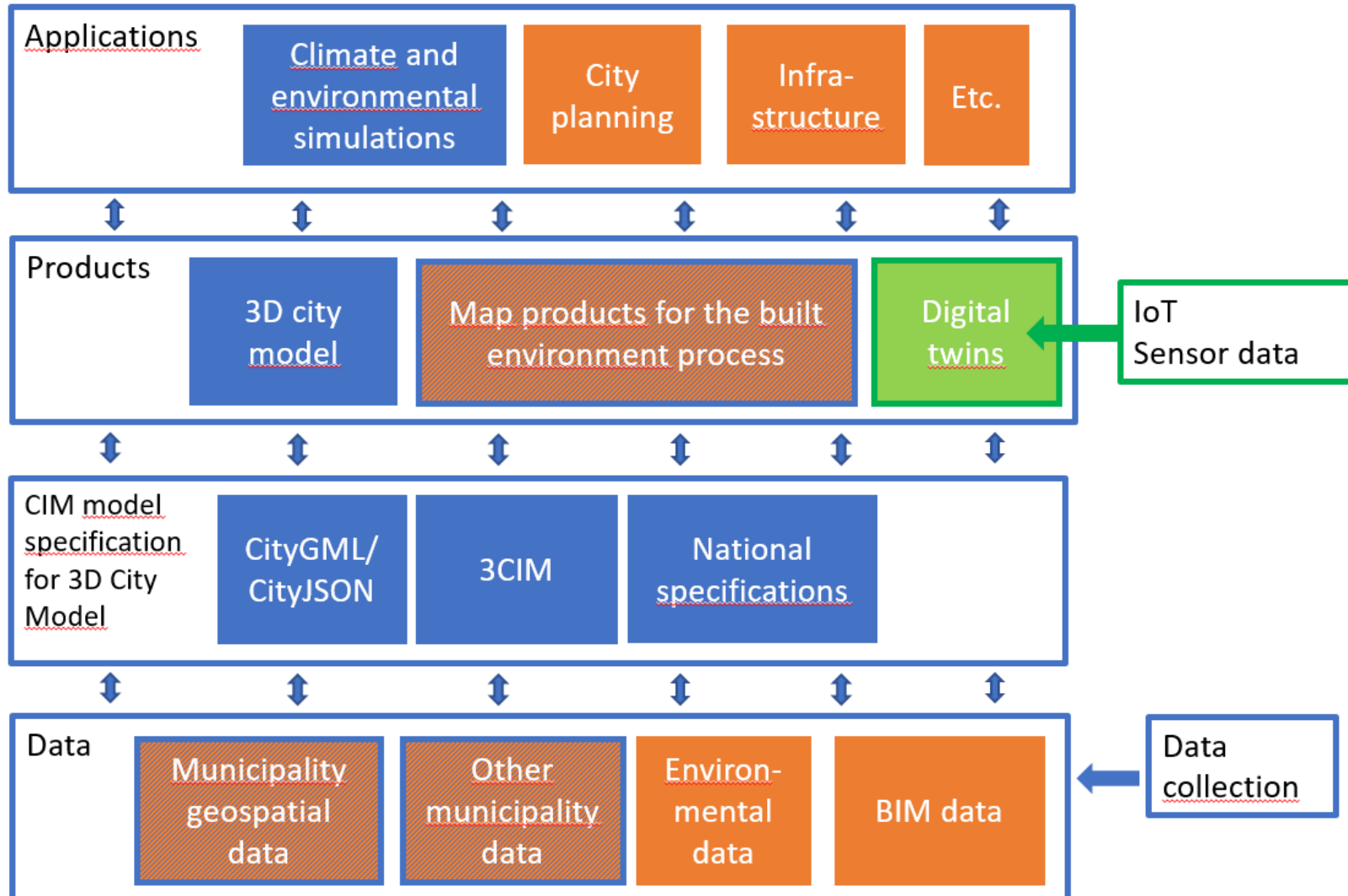
- Project including the three largest cities (Stockholm, Gothenburg, Malmö) and Lund University.



3CIM testdata Malmö

Ugla, M.; Olsson, P.; Abdi, B.; Axelsson, B.; Calvert, M.; Christensen, U.; Gardevärn, D.; Hirsch, G.; Jeansson, E.; Kadric, Z.; Lord, J.; Loreman, A.; Persson, A.; Setterby, O.; Sjöberger, M.; Stewart, P.; Rudenå, A.; Ahlström, A.; Bauner, M.; Hartman, K.; Pantazatou, K.; Liu, W.; Fan, H.; Kong, G.; Li, H.; Harrie, L. Future Swedish 3D City Models—Specifications, Test Data, and Evaluation. *ISPRS Int. J. Geo-Inf.* **2023**, *12*, 47. <https://doi.org/10.3390/ijgi12020047>

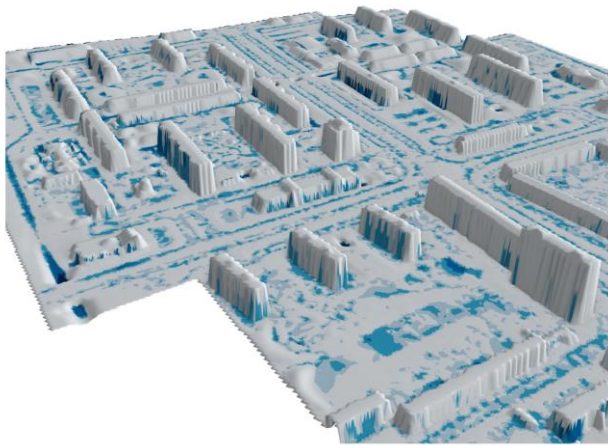
3CIM – Swedish specification for 3D city models



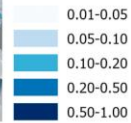
3CIM – Swedish specification for 3D city models

- Developed in an iterative process:
Workshops to design the model – tests – updates of 3CIM model - ...

Flood simulations



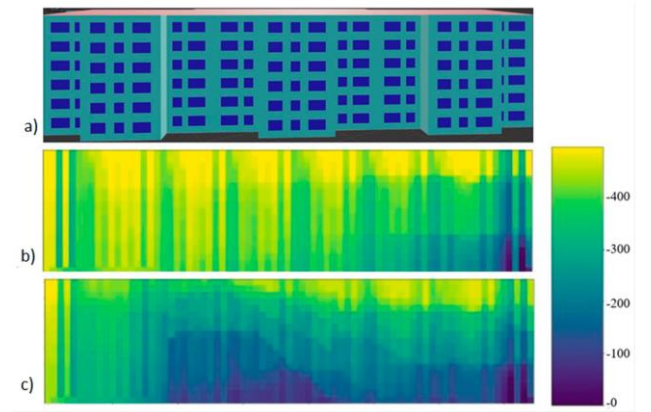
Water depths (m)



Noise simulations



Solar irradiance

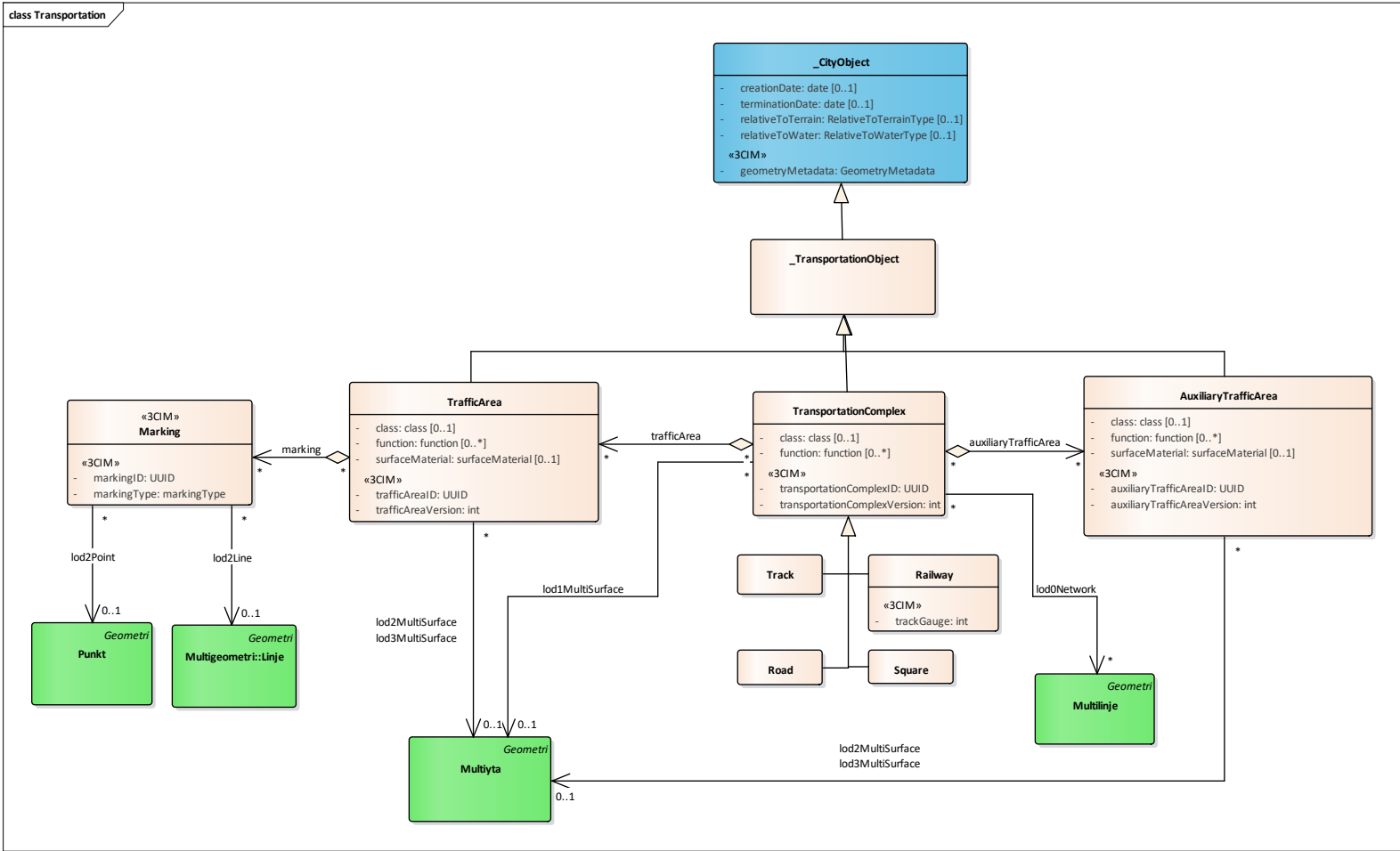


Visualization



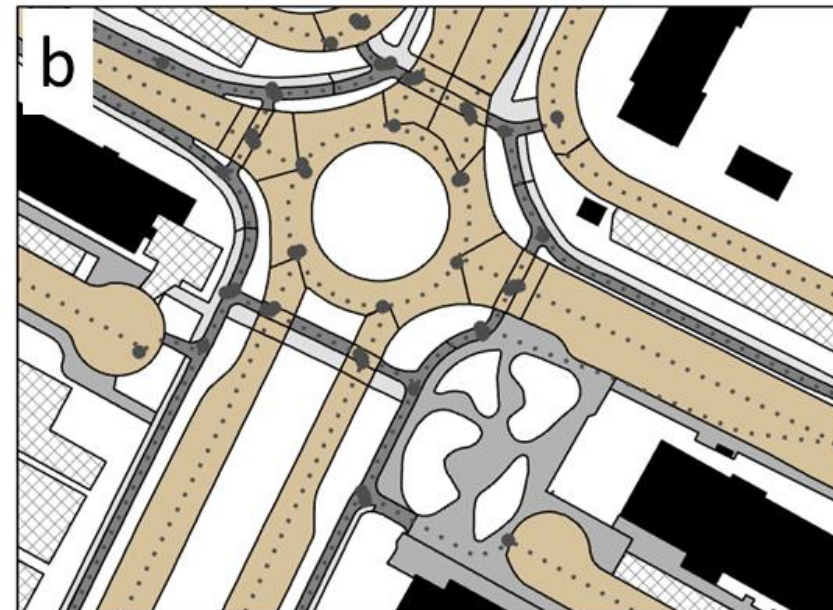
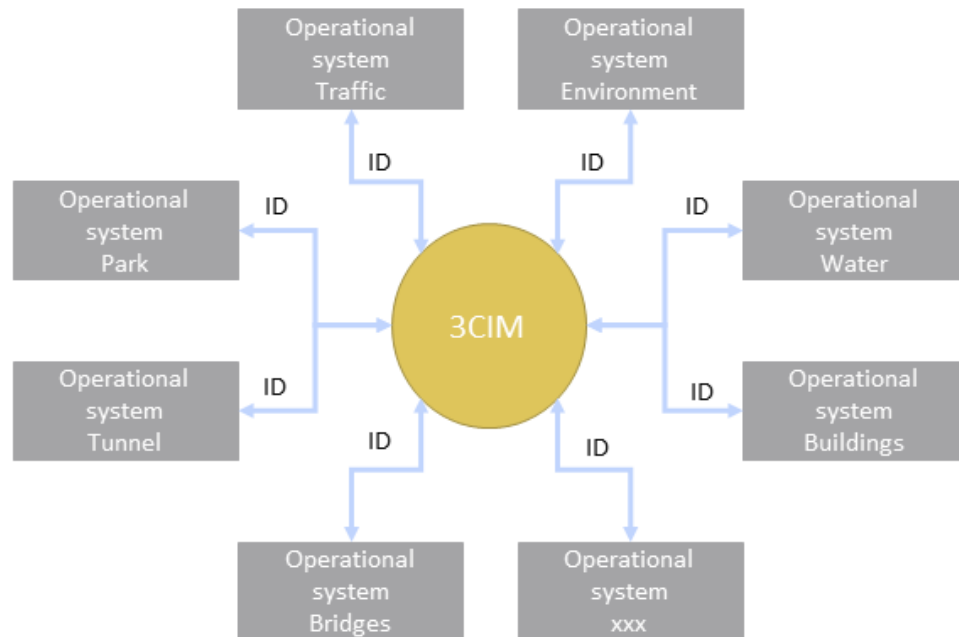
3CIM – Swedish specification for 3D city models

- CityGML 2.0 Application Domain Extension (ADE)



3CIM – Swedish specification for 3D city models

- Semantically thin information model.
 - A digital twin should support several applications. Demanding to maintain an information rich model.
 - Weak software support for ADEs.
- External links to operational systems etc. where data are stored (and maintained)
 - Data stored and maintained at the source.





3CIM test data Malmö visualised in Unreal Engine



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