

INTEGRATION OF BUILDING INFORMATION MODELS INTO VIRTUAL CITY MODELS

International Seminar on UN-GGIM – 17 May 2022

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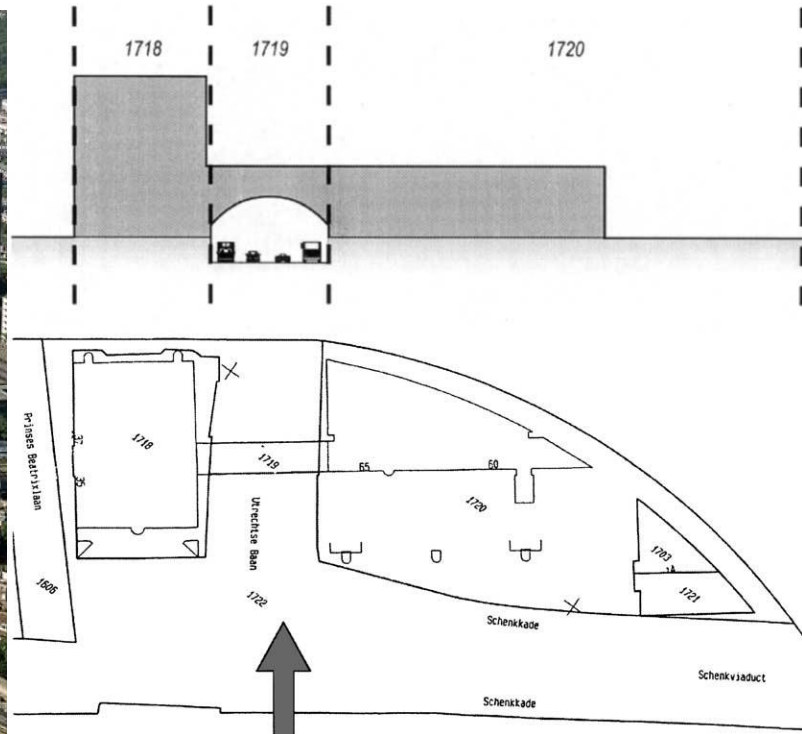
AIR RIGHTS



Artist impression – JTC Corporation

3D CADASTRE

- Jantien Stoter and Martin Salzmann, Towards a 3D cadastre: where do cadastral needs and technical possibilities meet? *Computers, Environment and Urban Systems* 27 (2003) 395–410



BUILDING INFORMATION MODELS

- BIM submission in Singapore not yet obligatory in IFC-compatible form
- nevertheless, BIM models are becoming more widespread

compliance checking –and– development



IFC2CITYGML

“Strict and automatic mapping of IFC-BIM models into semantically enriched 3D CityGML building models (exterior & interior)”

- National University of Singapore
- Ordnance Survey (UK)
- Housing & Development Board (SG)
- Building and Construction Authority (SG)
- Graphisoft SE
- Bentley Systems Inc
- Trimble Solutions SEA PL

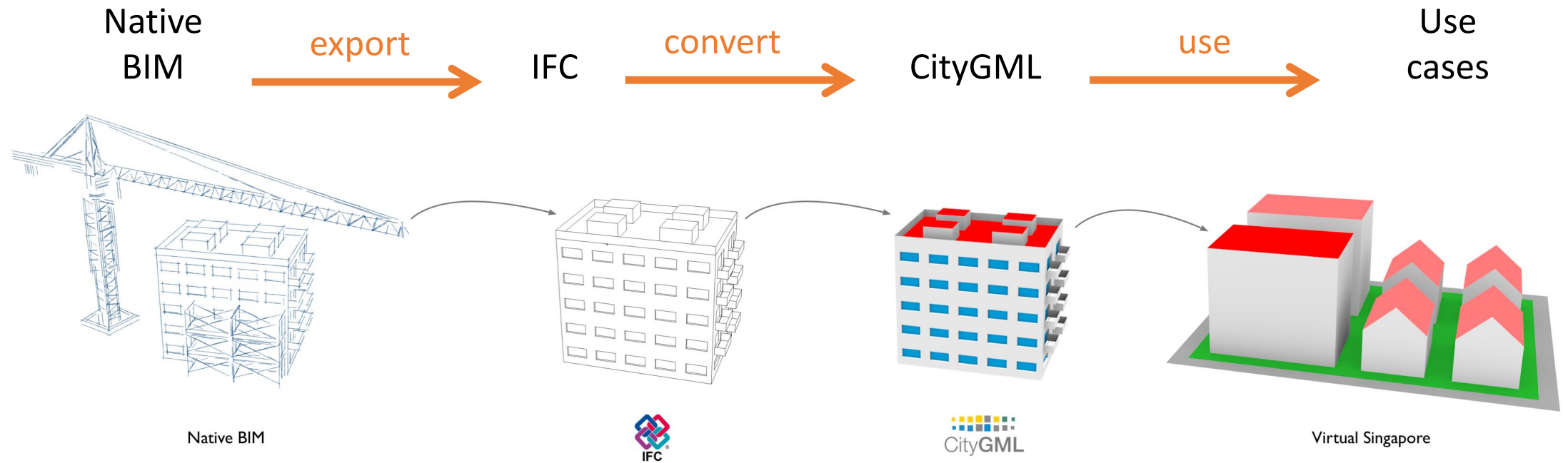


VIRTUAL SINGAPORE

- dynamic 3D city model and collaborative data platform



DATA FLOW



USE CASES



CITYGML – IFC4DE



export

IFC

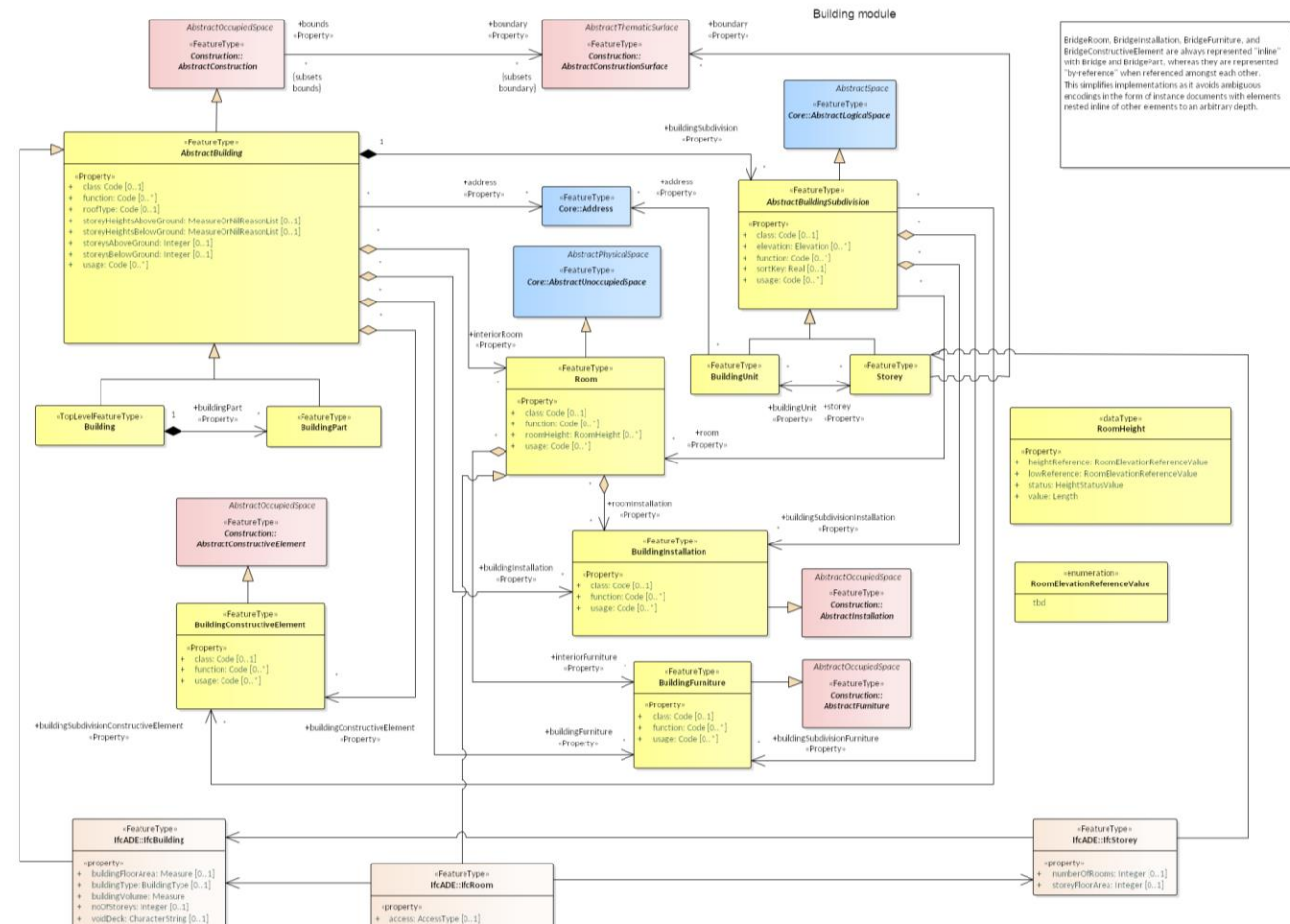
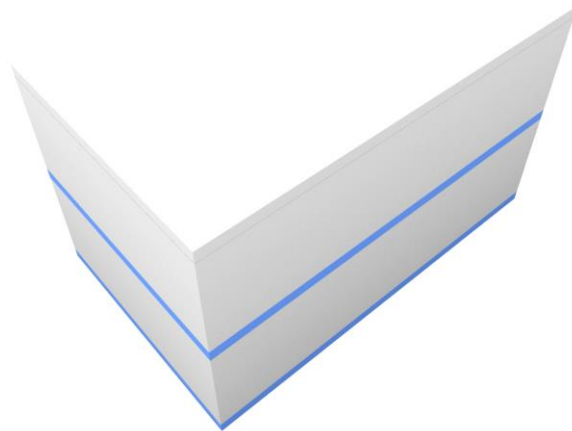
convert

CityGML

use

Use cases

- application domain extension



IFC – CITYGML

Native
BIM

export

IFC

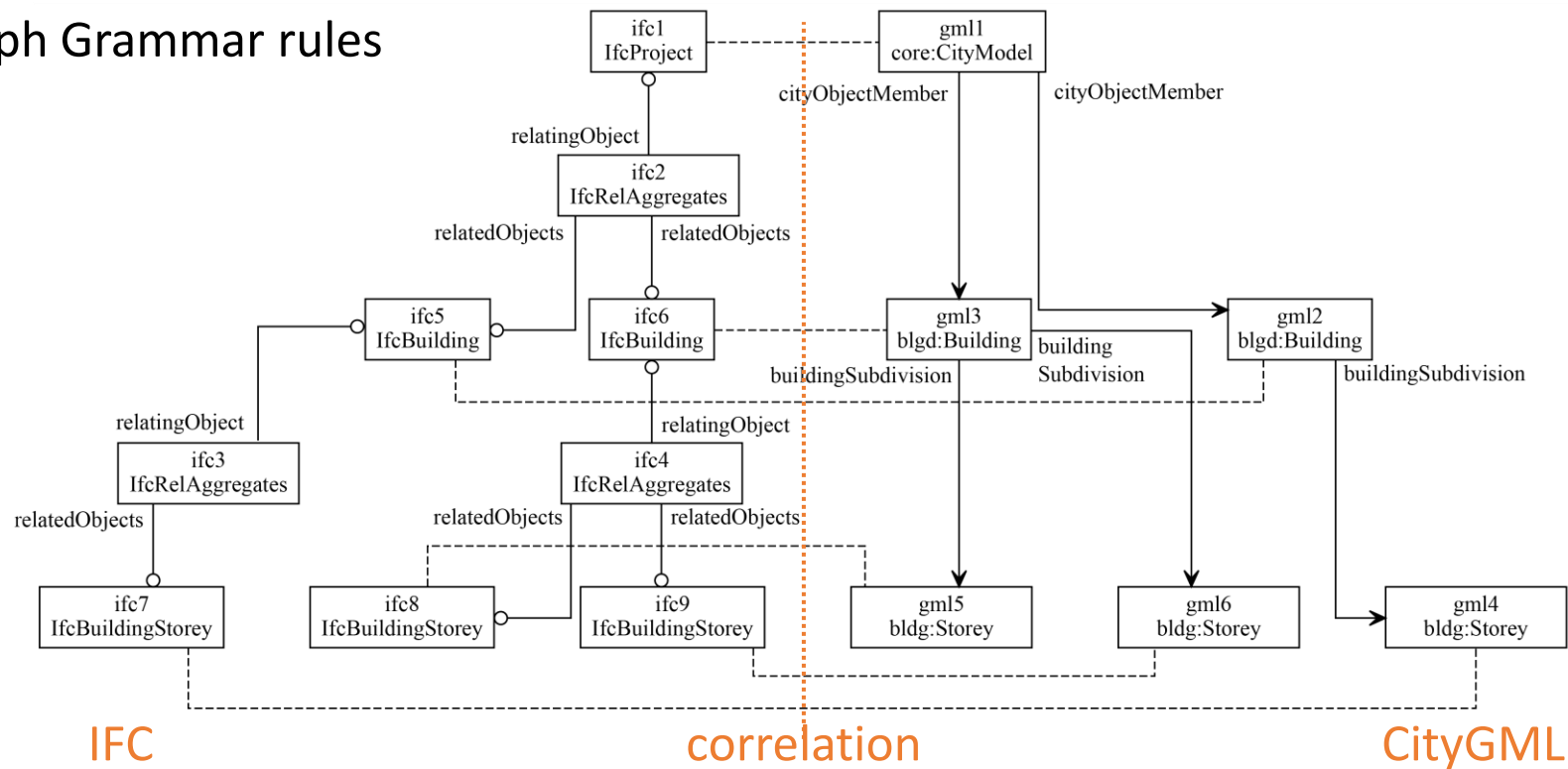
convert

CityGML

use

Use
cases

– Triple Graph Grammar rules



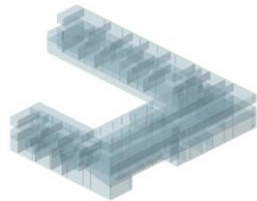
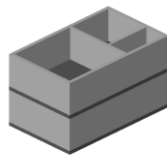
IFC – CITYGML



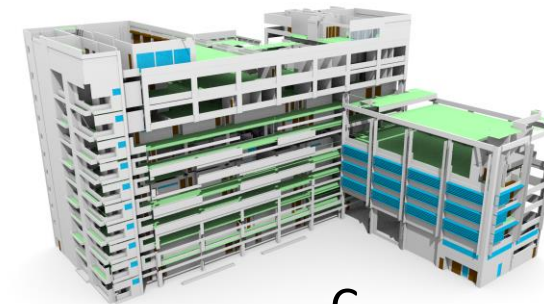
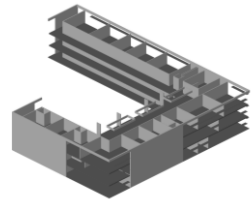
- Triple Graph Grammar rules
 - structural rules (layer 1)
 - creating objects (layer 2)
 - adding geometry (layer 3)



A

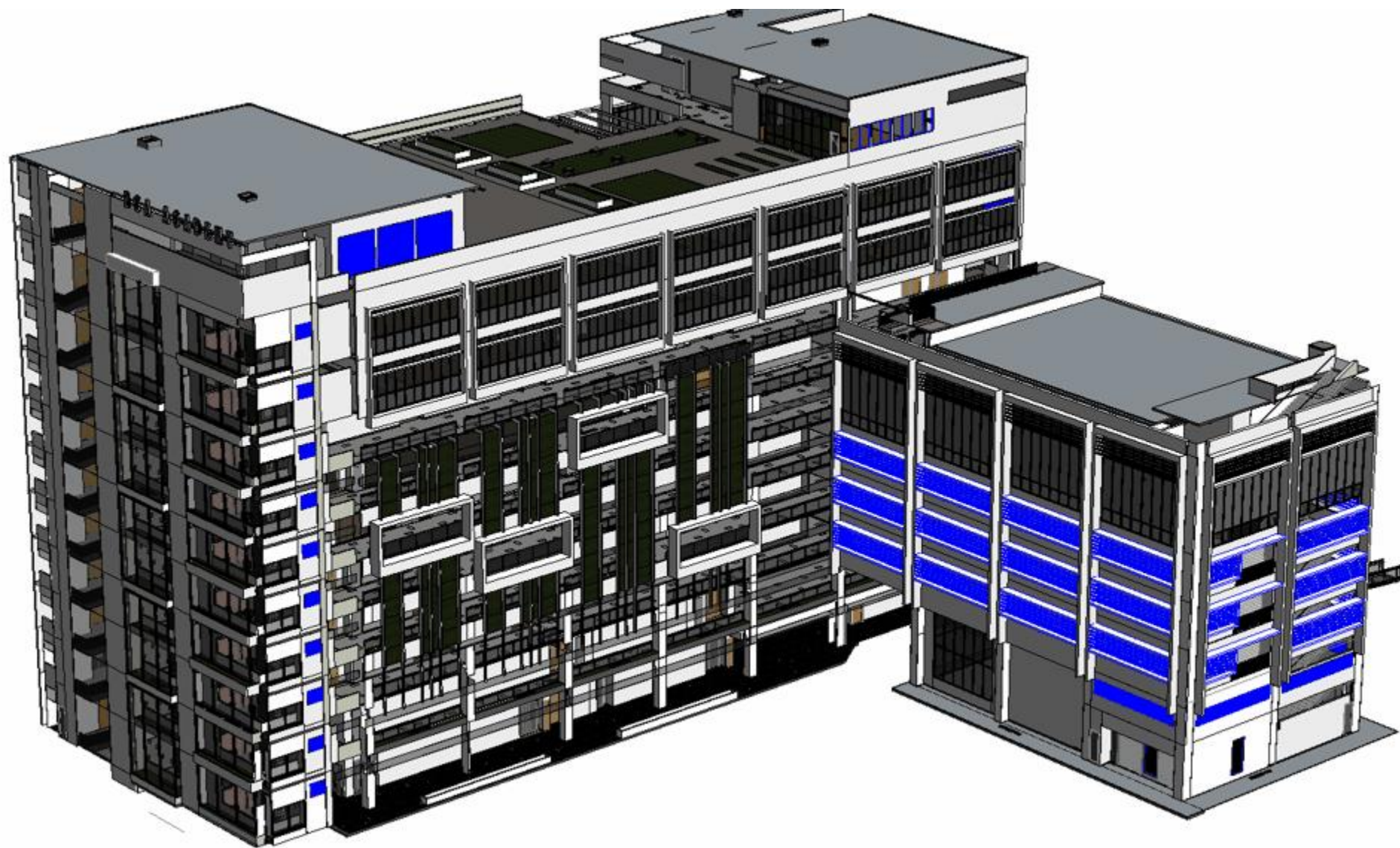


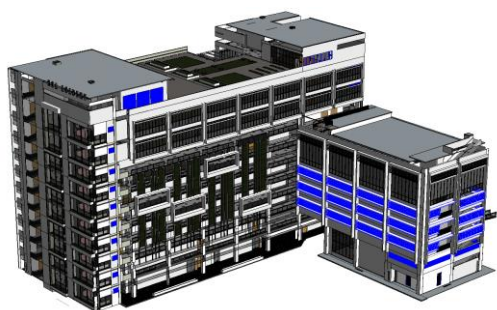
B



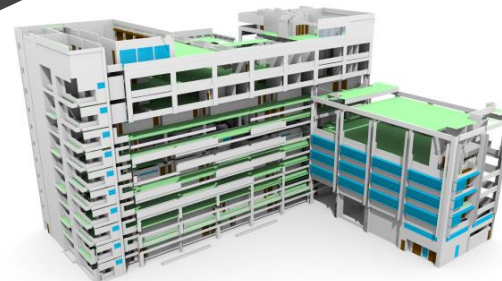
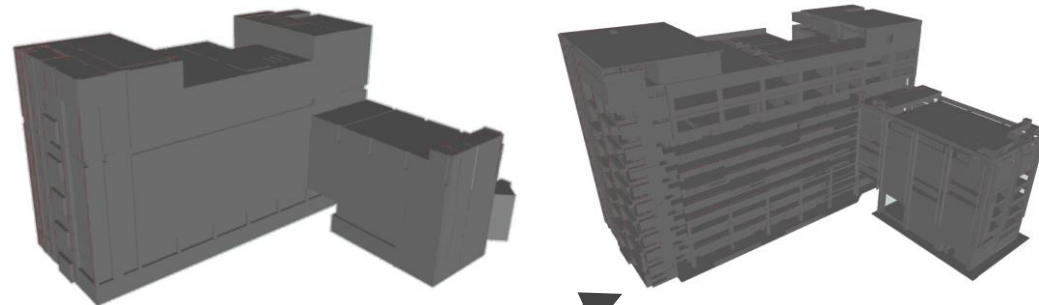
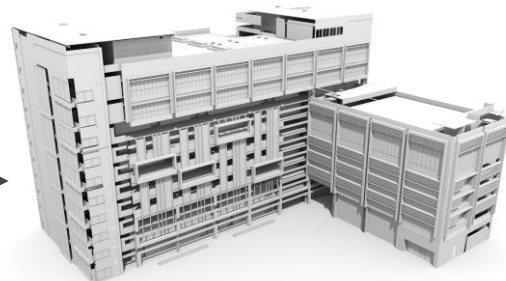
C

	Layer 1				Layer 2								Layer 3												
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	3.10	3.11	3.12	3.13
A	1	0	3	6	15	1	1	1	8	3	9	24	27	24	2	2	1	12	47	27	12	3	6	3	6
B	0	1	5	91	460	0	0	0	0	0	91	509	5411	5355	29	29	6	172	924	5411	172	5	91	0	91
C	0	1	16	709	11634	0	0	0	0	28	1533	6604	21970	21648	1400	1400	11	7555	11596	21970	7555	16	709	0	709

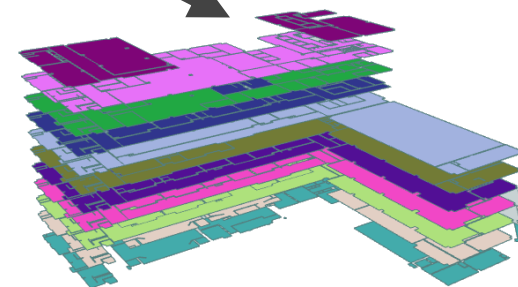




Native BIM

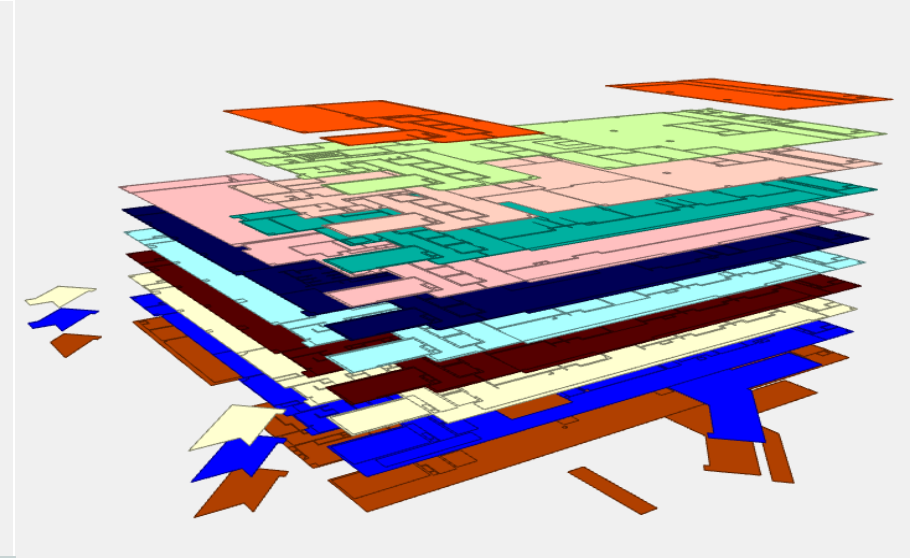
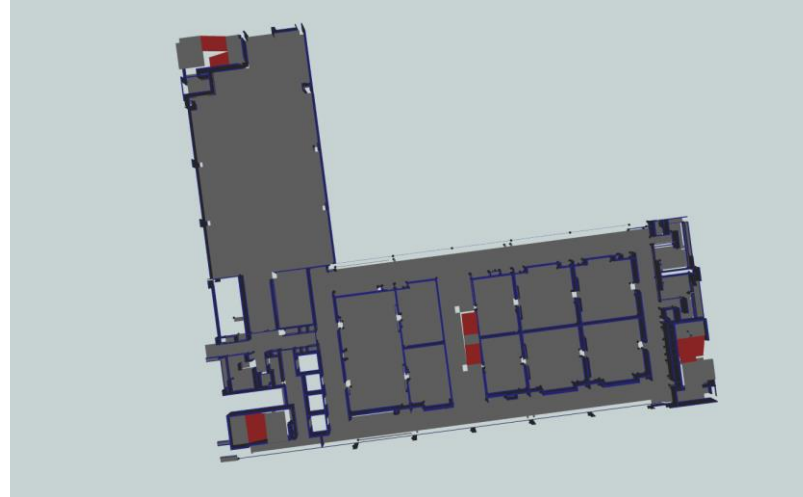
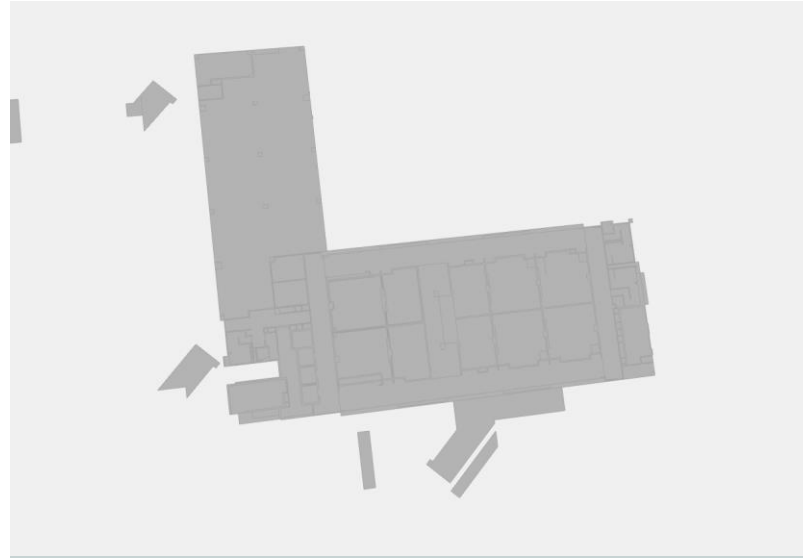


Virtual Singapore



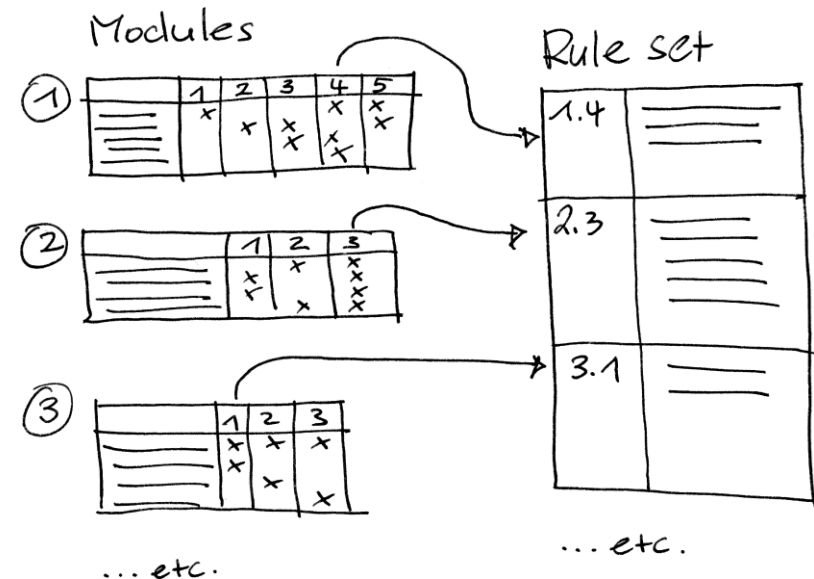
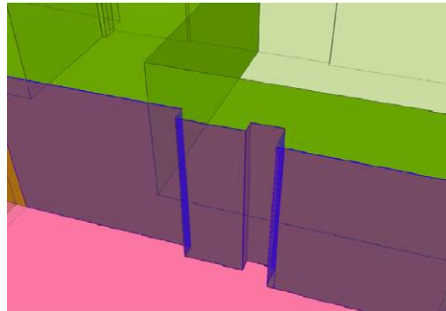
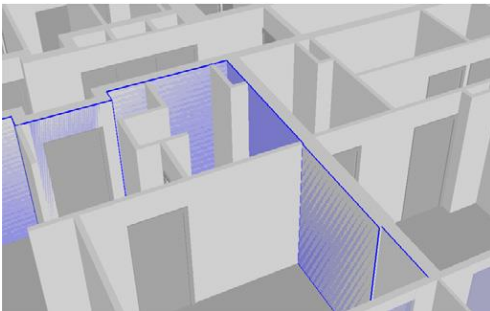
ANALYSES

– indoor navigation and mobility



RULE-BASED APPROACH

- Jacynthe Pouliot, Claire Ellul, Frédéric Hubert, Chen Wang, Abbas Rajabifard, Mohsen Kalantari, Davood Shojaei, Behnam Atazadeh, Peter van Oosterom, Marian de Vries, and Shen Ying, Chapter 5: visualization and new opportunities, in Peter van Oosterom (ed.), Best Practices 3D Cadastres, International Federation of Surveyors (FIG), Copenhagen, 2019



THANK YOU

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