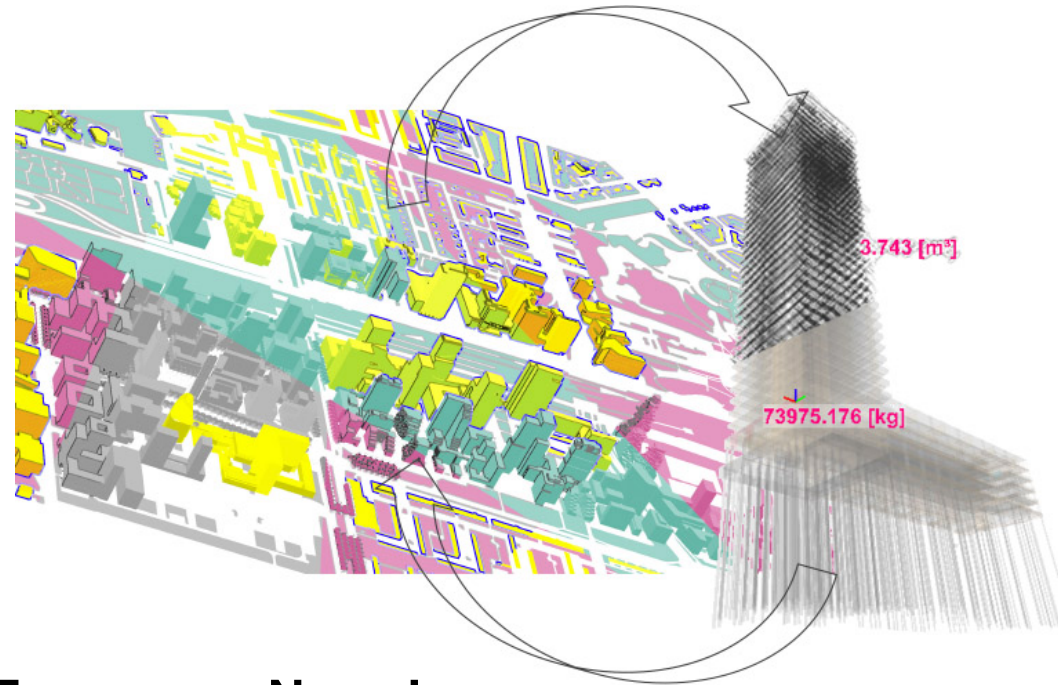




24th September 2019

# GeoBIM integration in practice: from design to automatic building permission issuing





# Overview

- 1) Introduction: 3D city models vs BIM and GeoBIM
  - General issues
  - Related open standards: CityGML and Industry Foundation Classes
  - Non technical issues
- 2) Working towards GeoBIM for the building permission use case  
the EuroSDR GeoBIM project
- 3) Investigating the interoperability technical issues  
the ISPRS-EuroSDR GeoBIM benchmark
- 4) Conclusion and final remarks



## 3D city models vs BIM and GeoBIM

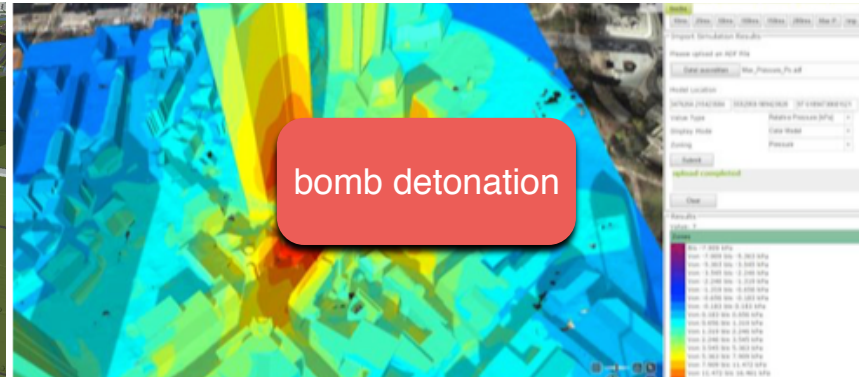
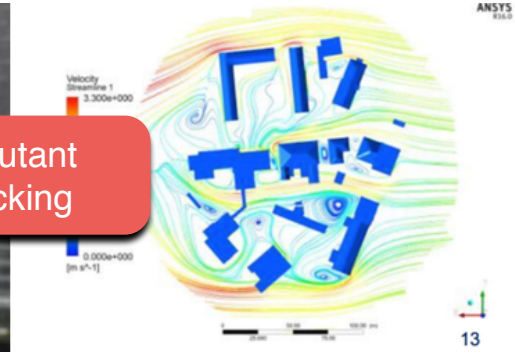
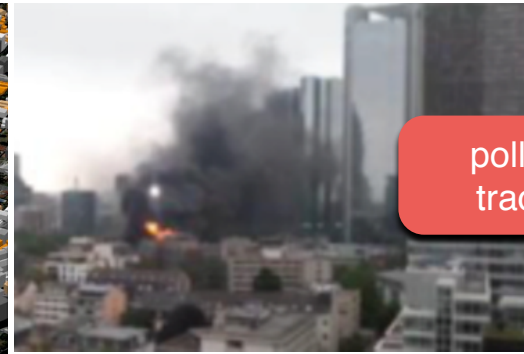
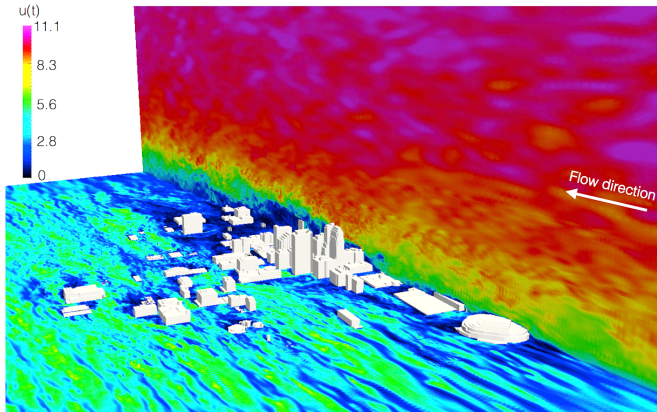
GeoBIM for the building permits:  
EuroSDR  
GeoBIM project

Interoperability technical issues:  
ISPRS-EuroSDR  
GeoBIM benchmark  
Conclusions

## GeoBIM



3D geoinformation:  
3D city models



Navigation

Flood simulations

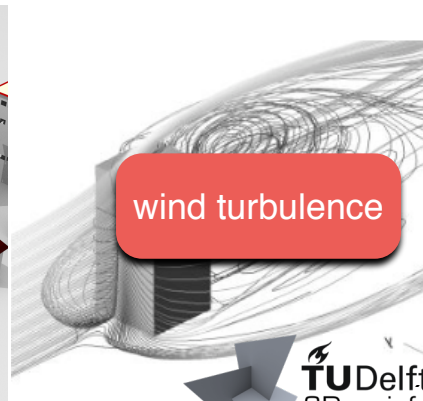
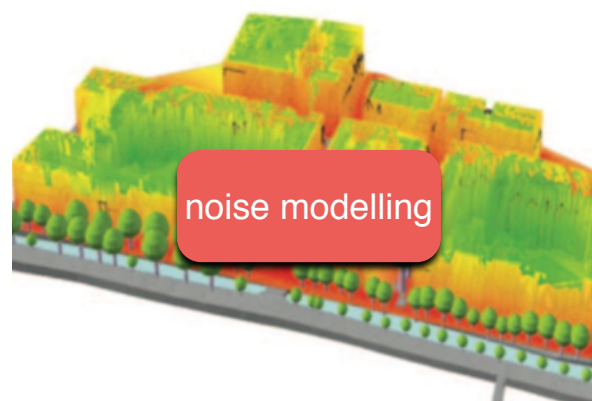
Multivariate analysis

3D cadastre

3D archive

Multitemporal analysis

Risk assessment...





## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits:  
EuroSDR  
GeoBIM project

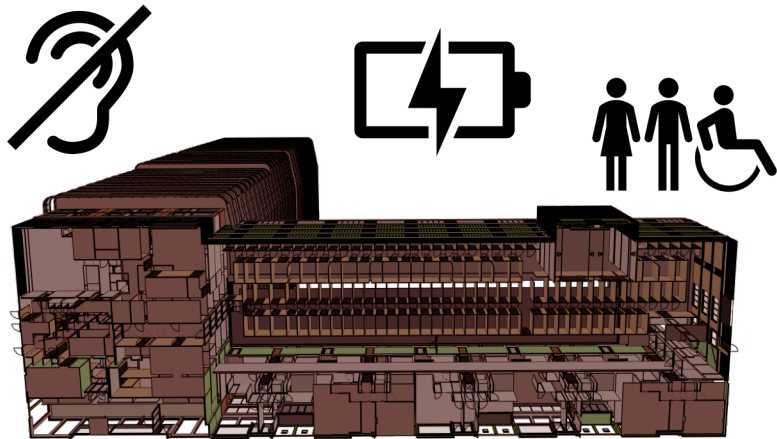
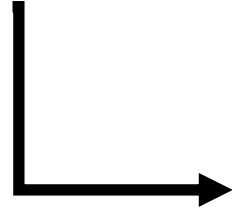
Interoperability technical issues:  
ISPRS-  
EuroSDR  
GeoBIM benchmark

Conclusions

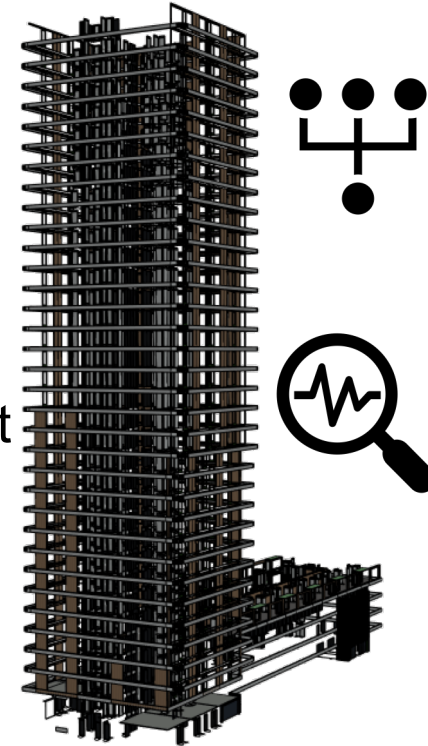
## GeoBIM



Building Information Models



- **design** options assessment;
- **quantities** and **cost** estimation;
- construction simulation;
- **energy** modelling;
- **project management support** (efficient collaboration, multi-disciplinary project team);
- **facilities and asset management**;
- better **design and construction coordination**;
- **reduced construction costs** (less delays on-site, rework...)
- **reduced operational costs** (seamless information delivery for facilities management at handover).





## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits: EuroSDR GeoBIM project

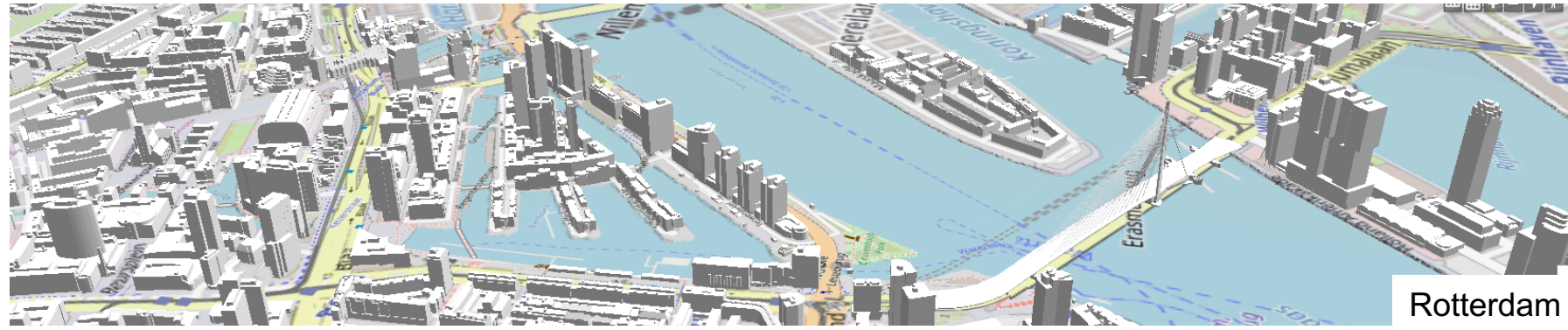
Interoperability technical issues: ISPRS-EuroSDR GeoBIM benchmark

Conclusions

## GeoBIM



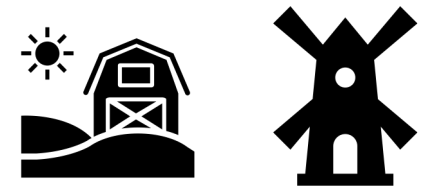
3D geoinformation:  
**3D city models**



Difficult **to update** (new building, building changes...)



Missing **detailed building information** (materials, energy related information...)



Difficulties in modelling large numbers of **high level of detail** buildings





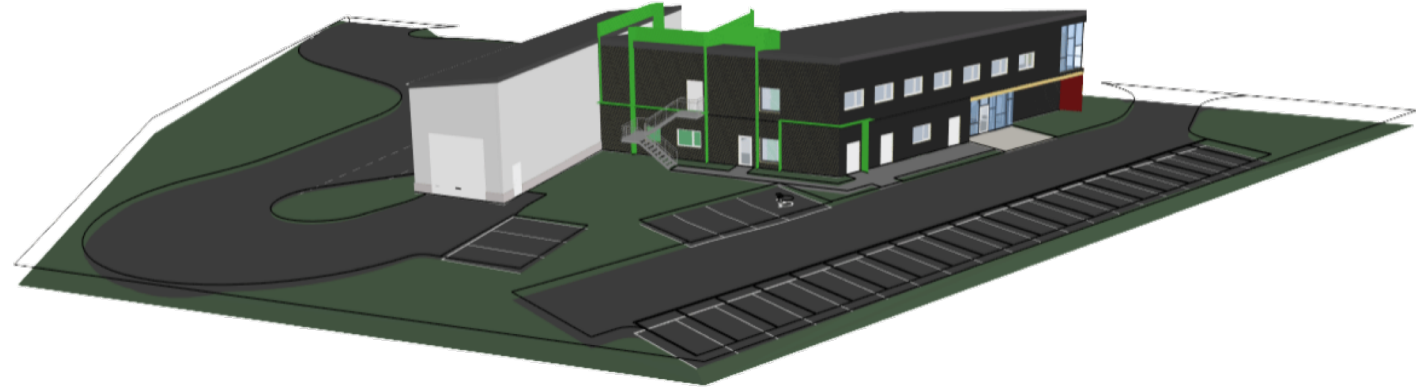
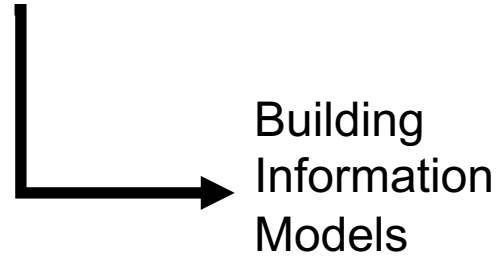
## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits: EuroSDR GeoBIM project

Interoperability technical issues: ISPRS-EuroSDR GeoBIM benchmark

Conclusions

## GeoBIM



**No context** (transport networks, environmental features, urban values, infrastructure connections...)



**Somewhere in the world** (only generic location information, with very low accuracy...)



**Discrepancy** between the **precision** of what is modelled in the BIM and the context where it is supposed to be built (possible need to fix them on site, during construction)





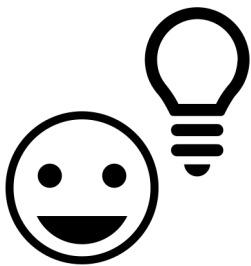
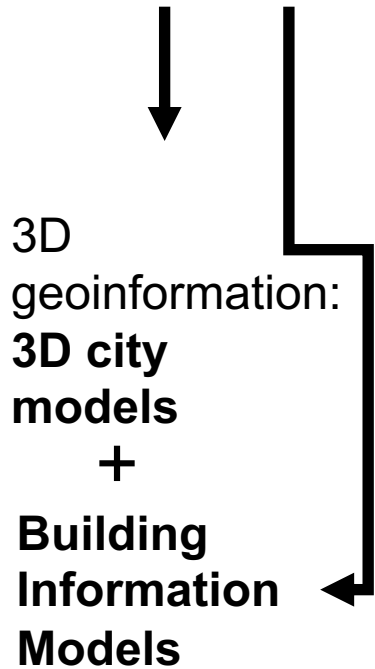
## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits:  
EuroSDR  
GeoBIM project

Interoperability technical issues:  
ISPRS-  
EuroSDR  
GeoBIM benchmark

Conclusions

**GeoBIM** = integration of geoinformation with BIMs



**GEO world point of view**

- High **level of detail** 3D cadaster
- No tasks duplication** (3D data collection)
- Efficient databases **updates** without additional costs
- Effective **data exchange** with **professionals** (architects, engineers, environmental scientists, etc.)
- Stronger information for **lifecycle asset management & city analysis**

**Context** for design reference

Improved **test of building properties**: designed building into its context

Test of the **impact of the building** on the city or landscape.

**Multiscale** vision (from construction elements to whole territories)



**BIM world point of view**



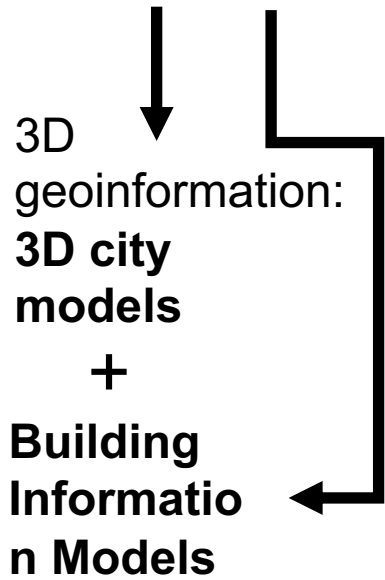
## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits:  
EuroSDR  
GeoBIM project

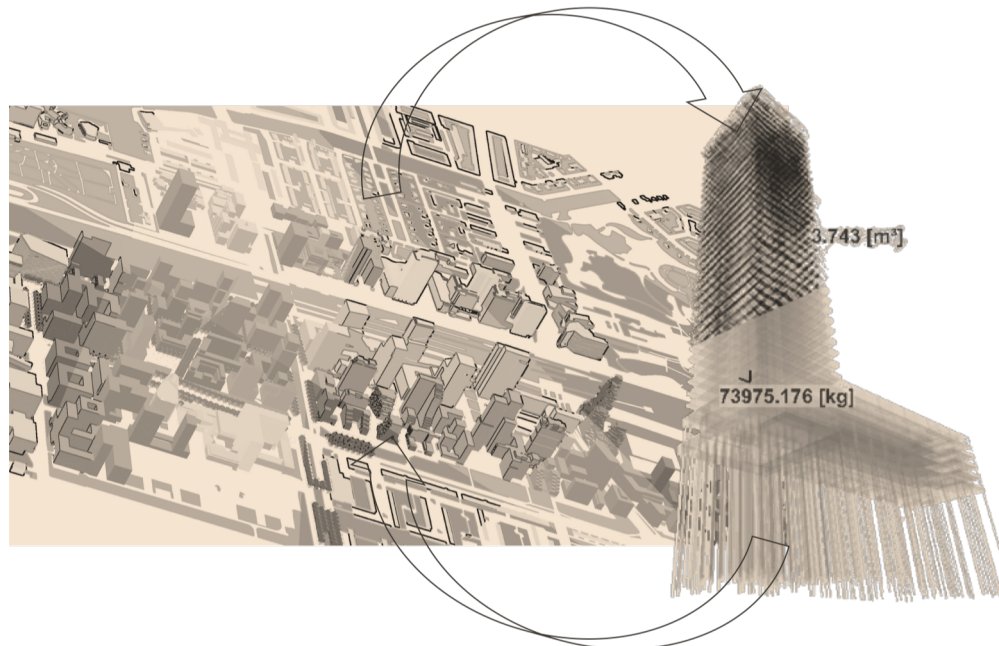
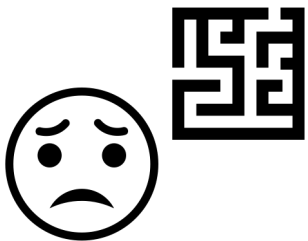
Interoperability technical issues:  
ISPRS-  
EuroSDR  
GeoBIM benchmark

Conclusions

**GeoBIM** = integration of geoinformation with BIMs



1. Integration of **data** (common characteristics, they fit together)
2. Data **interoperability**
3. Integration of **procedures** (BIM and GIS tools)







## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits:  
EuroSDR  
GeoBIM project

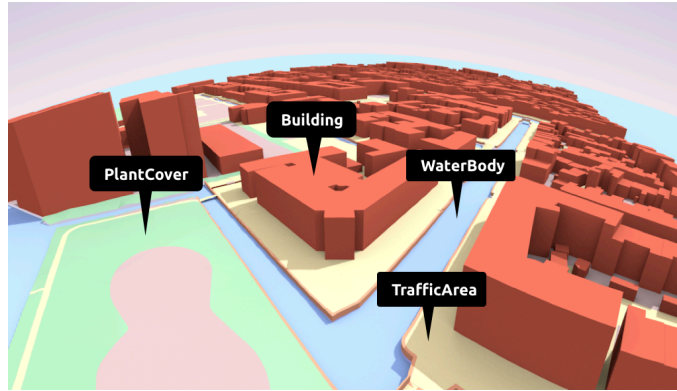
Interoperability technical issues:  
ISPRS-EuroSDR  
GeoBIM benchmark

Conclusions

## GeoBIM



3D geoinformation:  
**3D city models**



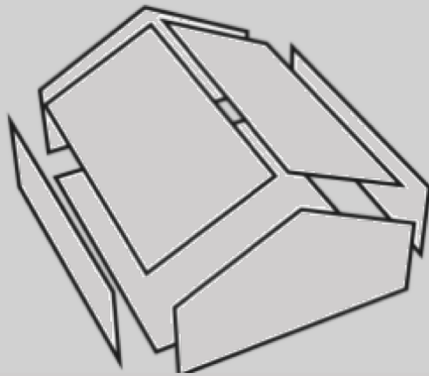
Evolution of **GIS**;

In **cartographic** field and **city management** (not pushed by industry!);

Medium levels of detail objects (e.g. **~20 cm** accuracy);

1. Integration of data

### Geometry



Boundary representation

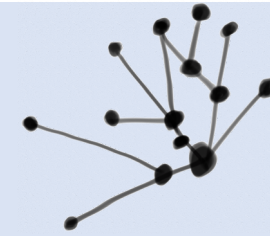
Storage of all the coordinates composing a surface (explicit representation)

### Georeferencing



### Semantics

City representation and management aims



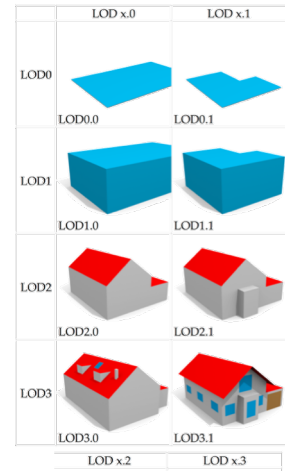
City

Buildings

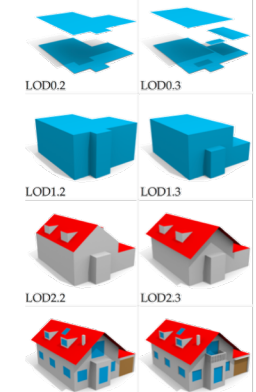
Vegetation

Water

Roads



Levels of Detail



(Biljecki, 2016)



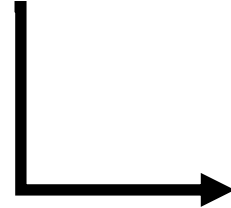
## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits:  
EuroSDR  
GeoBIM project

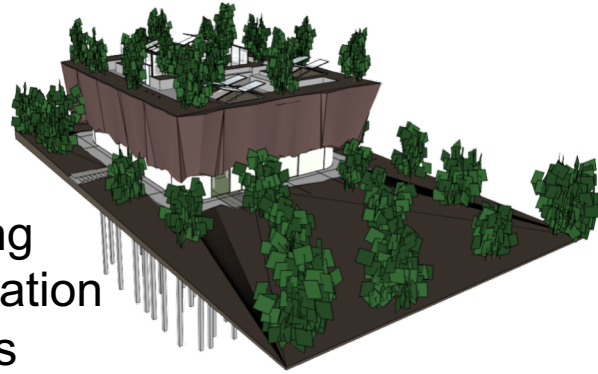
Interoperability technical issues:  
ISPRS-  
EuroSDR  
GeoBIM benchmark

Conclusions

## GeoBIM



Building Information Models



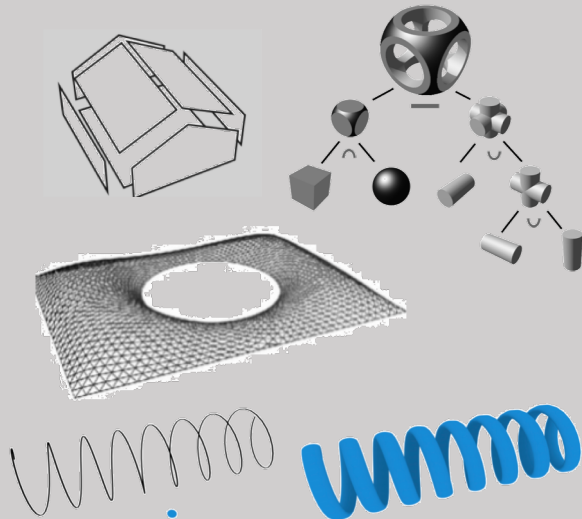
Evolution of **CAD**;

1. Integration of data

In **Architecture Engineering and Construction** field (pushed by industry!);

Very high detail objects (e.g. ~1 mm accuracy);

### Geometry



Many possibilities  
(explicit, Construction Solid Geom., extrusion...)

### Georeferencing



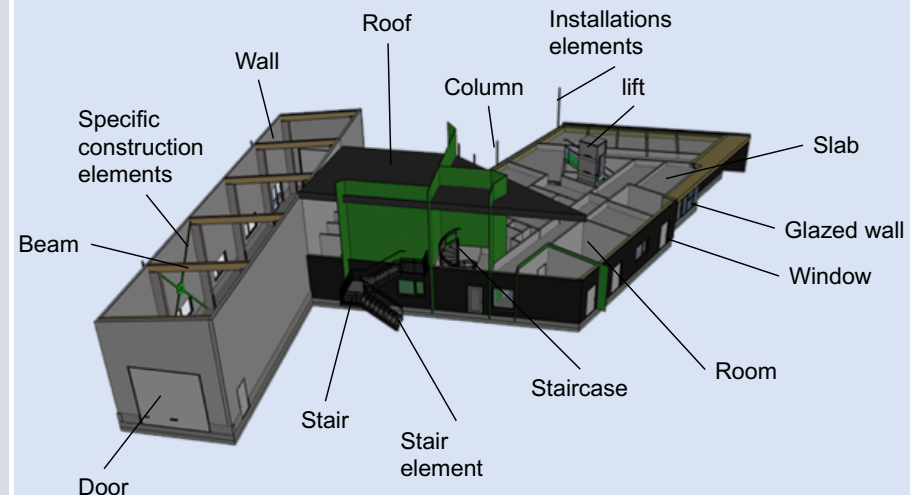
### Semantics



Detailed building **components**.

+

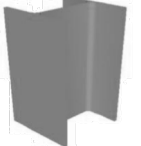
**Building management:** energy information, cost, installations...



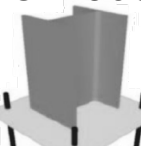
LOD 100



LOD 200



LOD 300



LOD 400



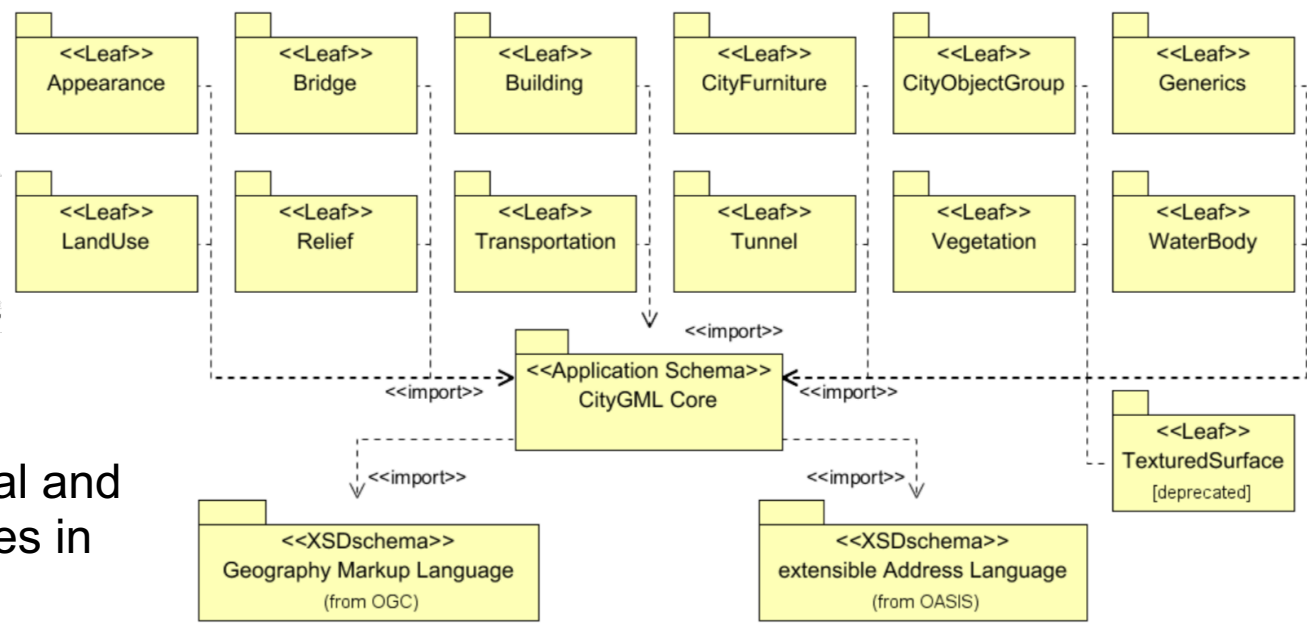
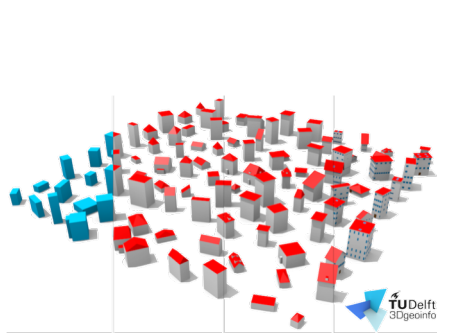
Levels of Development



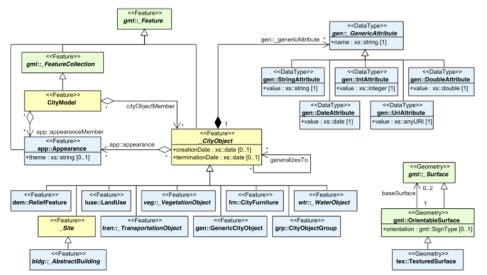
# GeoBIM CityGML – open standard for 3D city models

by Open Geospatial Consortium (OGC)

## 2. Data interoperability



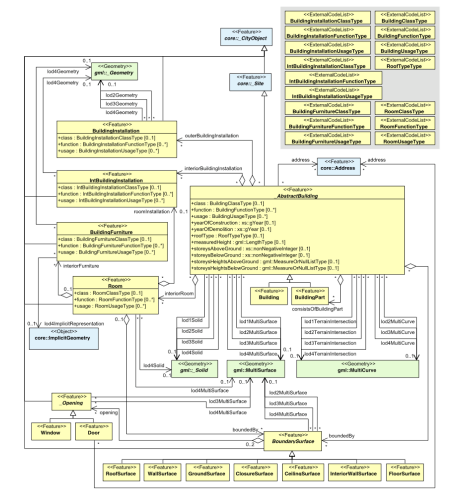
**Core model:** central and most general classes in the data model.



Possibility to **extend** the model with application-related classes and attributes:

## CityGML Application Domain Extensions (ADEs)

**Modules:** data model specification for each category of city objects (Buildings, Vegetation, Transport network, Water...).





## 2. Data interoperability

### GeoBIM



We can love CityGML because:

Intended to **cover** the most basic **3D city information** with meaningful **“object-oriented”** representation.



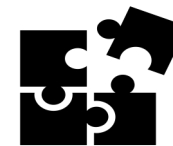
**Multiscale** representation!

**Standardised** mechanism to **extend the model** following the needs of **specific domains**:



Application Domain Extensions (ADEs)

→ Customised information can be modelled, through a known procedure.



Intended as **open format + human-readable**  
→ information won't be lost even when losing backwards-compatibility.





## GeoBIM



CityGML can potentially disappoint because:

If you are a **software developer**:

**Development process** of the model not always very transparent and open (although recent changes in working methods)

**Geography Markup Language (GML) to store geometry**: many issues.

E.g. a polygon can be stored in 25 ways (implementation must support all of them!)

**Complex data model and weird possible connections** to internal/external information can give implementation problems:

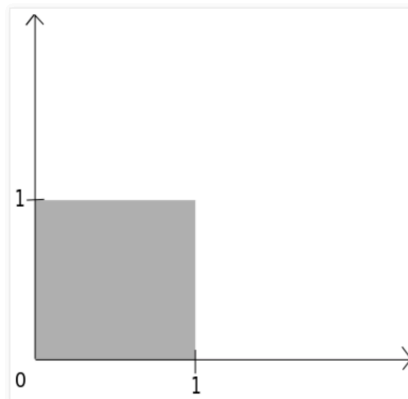
**LESS IS MORE**

dimanche 6 avril 2014

GML madness

I am convinced that most people wonder "how many ways are there to encode a polygon in GML?" If you have never considered that before, you might be interested in reading the following lines.

To start gently, let us consider the following grey shape :



<http://erouault.blogspot.com/2014/04/gml-madness.html>

## 2. Data interoperability



1. READ DIRECTIONS ON BOX



2. THROW BOX AWAY



3. PULL BOX OUT OF TRASH 15 SECONDS LATER



4. REPEAT



Image by talin401  
imgur.com 17/1/2018



## GeoBIM



CityGML can potentially disappoint because:

**RESULT: If you are a user:**

**Very few software** support the correct and complete import, view, edit and analysis..  
The **richness is lost** + no **user-friendly tools** to manage data.



Great, powerful use of such data is **prevented**

The data are **computationally very heavy**



Use of such data is **prevented**

**Metadata** are not systematically associated to data



Reuse of such data is **prevented**

No **clear coded rules** about how to store information (e.g. Levels of Details)



Reuse of such data is **prevented**

**Different ADEs** can exist for the same domain, and can have **differences**



Reuse of such data is **prevented**

## 2. Data interoperability



Anyway, we trust it is **possible to work towards the good side of CityGML!**





3D city models vs BIM and GeoBIM

GeoBIM for the building permits: EuroSDR GeoBIM project

Interoperability technical issues: ISPRS-EuroSDR GeoBIM benchmark

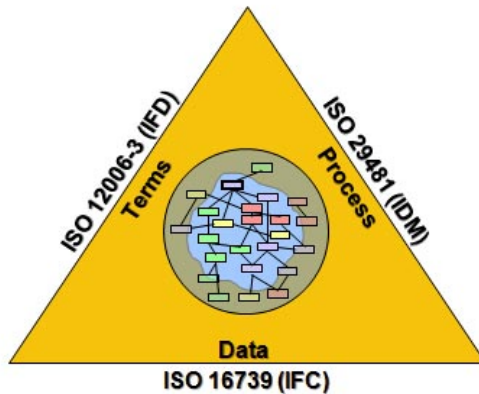
Conclusions

## GeoBIM

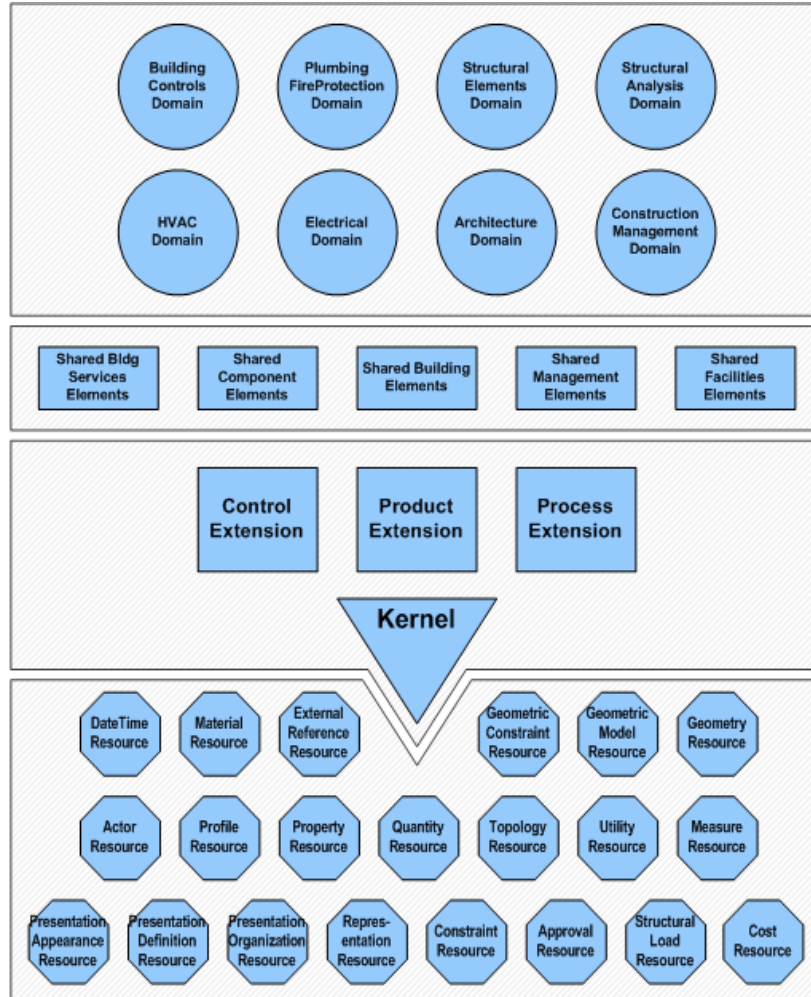


by buildingSMART ([ISO 16739](#)).

Part of complex standard about processes, technical requirements and coordination.



## Industry Foundation Classes (IFC) – open standard for BIM



**Domain layer:** even more specific information, specifying classes in the interoperability layer + in the product extension directly.

**Interoperability layer:** specializes the classes in the *IfcProductExtension* schema, increasing the level of detail of the represented information.

**Core layer:** central and most general classes in the data model.

**Resource layer:** entities to further describe the objects in the other levels (Materials, Geometry, Cost...).



## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits:  
EuroSDR  
GeoBIM project

Interoperability technical issues:  
ISPRS-EuroSDR  
GeoBIM benchmark

Conclusions

## GeoBIM



We can love IFC because:

**Inclusive full domain data model:**  
interoperable information for any building use case  
**\*one common language\***

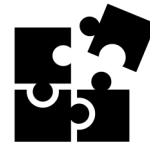
**Standardised mechanism to extract application data models to structure use-case specific information:**



Information Delivery Manual (IDM)

+

Model View Definition (MVD)



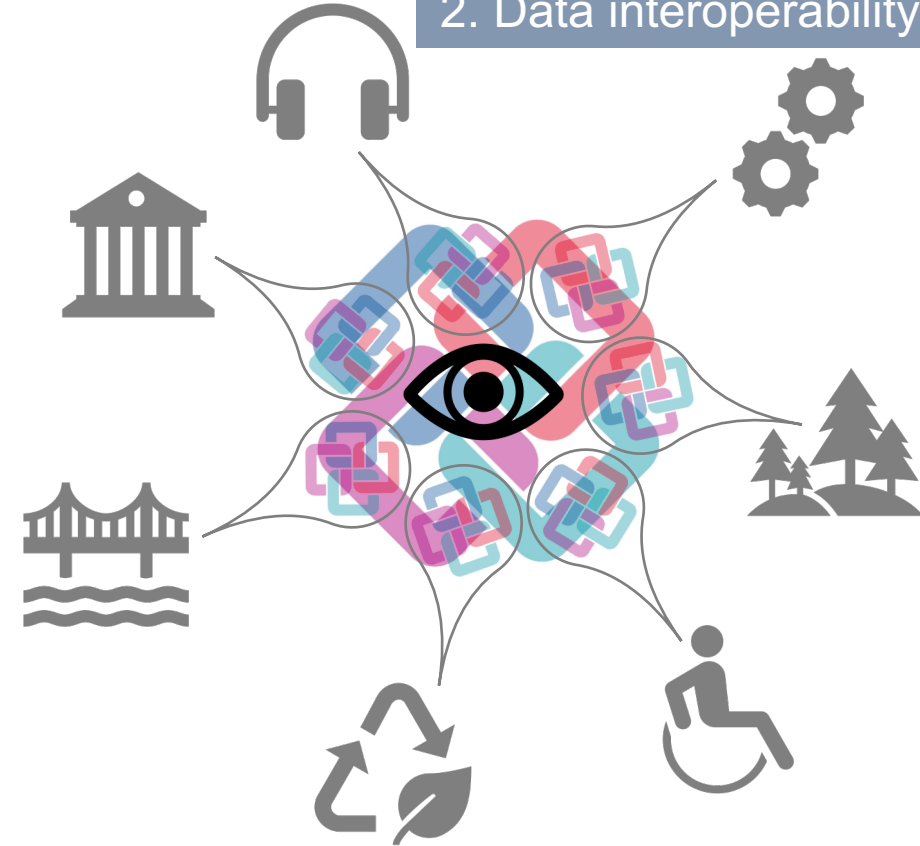
→ Only needed information used, and effectively.



Intended as **open format + human-readable**  
→ information won't be lost even when losing backwards-compatibility.



## 2. Data interoperability



Even **very different information is interoperable:**  
refer to the **same domain description.**





## GeoBIM



IFC can potentially disappoint because:

Its **'openness'** sometimes is hampered:

- to find simple **explanations about the model**, (how is it conceived, structured and used) can be **tricky**;
- the **work-in-progress** for schemas and MVDs **cannot be accessed** (e.g. draft of "Energy Analysis View" cannot be seen);
- **certification** procedure and criteria are **not openly accessible** (only general information, no reference data nor access to the procedure)
- Maybe too affected by **'company approach'**: great efficiency and adoption, but high **certification costs**, **dense new-release schedule**
- **ISO** standard: has to be bought





## GeoBIM



IFC can potentially disappoint because:

**Only** export to **Model View Definitions (MVDs)** (no fully inclusive IFC model generated by software)

**Customised MVDs** are **seldom supported** by software → **only official MVDs** can be used.

**RESULT: proprietary formats** used as **inclusive 'domain ontology'**, and **export formats** (e.g. IFC MVDs, gbXML for energy, etc.) are the used **subsets** of the model information.

→ **IFC not used as inclusive domain data model** supporting interoperability; MVDs used as 'operational' formats;

→ However, **IFC MVDs are not often fully supported as operational formats** in many tools (YET)

## 2. Data interoperability



Anyway, we trust it is **possible to work towards the good side of IFC!**





## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits:  
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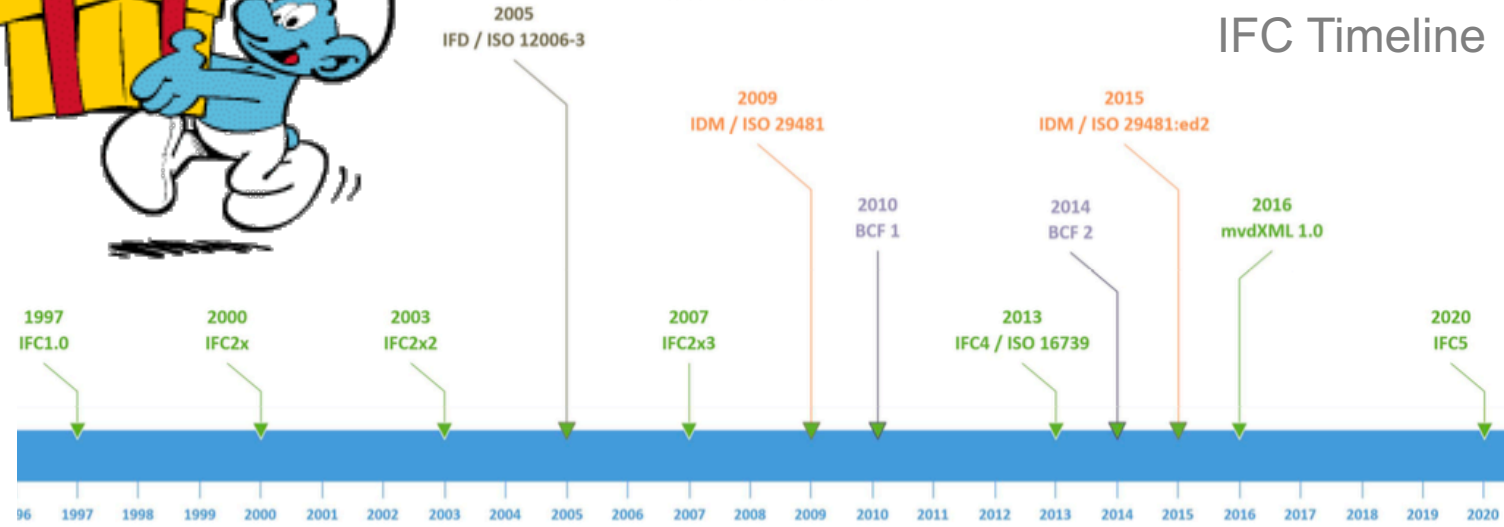
Conclusions

## 2. Data interoperability

### GeoBIM



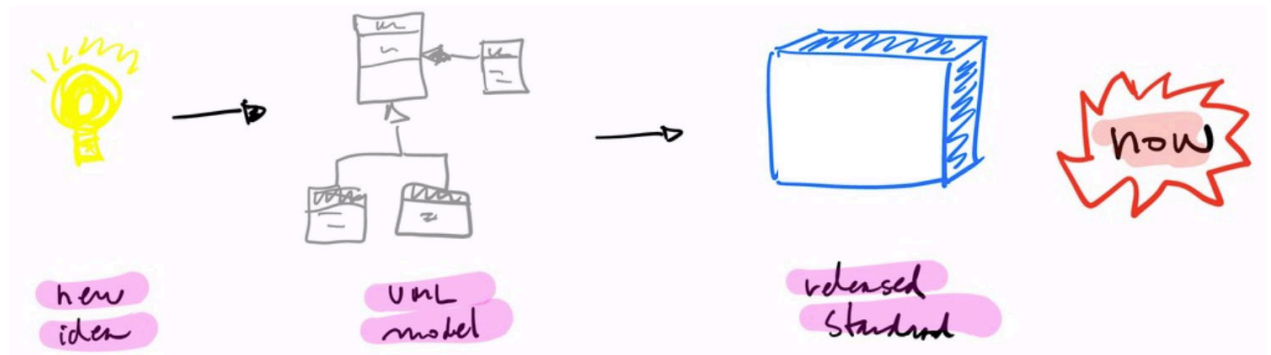
Version	Published	Status
4.2.0.0	2019	Candidate standard
4.1.0.0	2018	Official
4.0.0.0 (IFC4)	2013	Retired
2.3.0.1	2007	Official
2.3.0.0 IFC2x3	2005	Retired



Every 1-5 years a new version is released!



Version	Published	Status
3.0	-	Announced
2.0	2012	Official
1.0	2008	Retired?





## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits:  
EuroSDR  
GeoBIM project

Interoperability technical issues:  
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GeoBIM benchmark

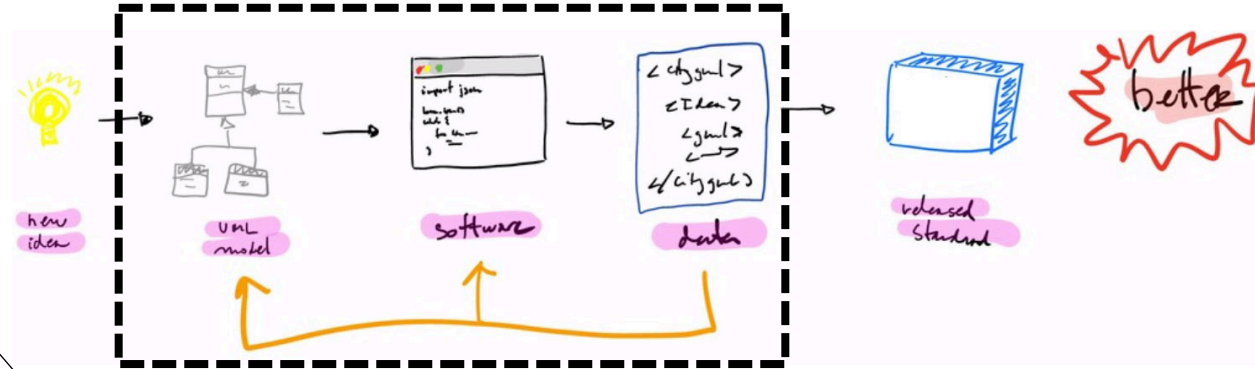
Conclusions

## GeoBIM

### 2. Data interoperability



Version	Published	Status	Available data
4.2.0.0	2019	Candidate standard	No
4.1.0.0	2018	Official	No
4.0.0.0 (IFC4)	2013	<b>Retired</b>	<b>Few</b>
2.3.0.1	2007	Official	<b>Yes, by practice + open repository</b>
2.3.0.0 IFC2x3	<b>2005</b>	<b>Retired</b>	



The implementation phase, at present, needs **≈ 10 years**



Version	Published	Status	Available data
3.0	-	Announced	No
2.0	<b>2012</b>	Current	<b>Yes, mainly by few groups / few tools</b>
1.0	2008	-	Yes

gbXML		
Version	Published	Available data
<b>6.01</b> (current)	2017	No
5.12	2014	No
...	...	No
5.00	2012	No
0.37	<b>2010</b>	<b>Yes, official data samples</b>

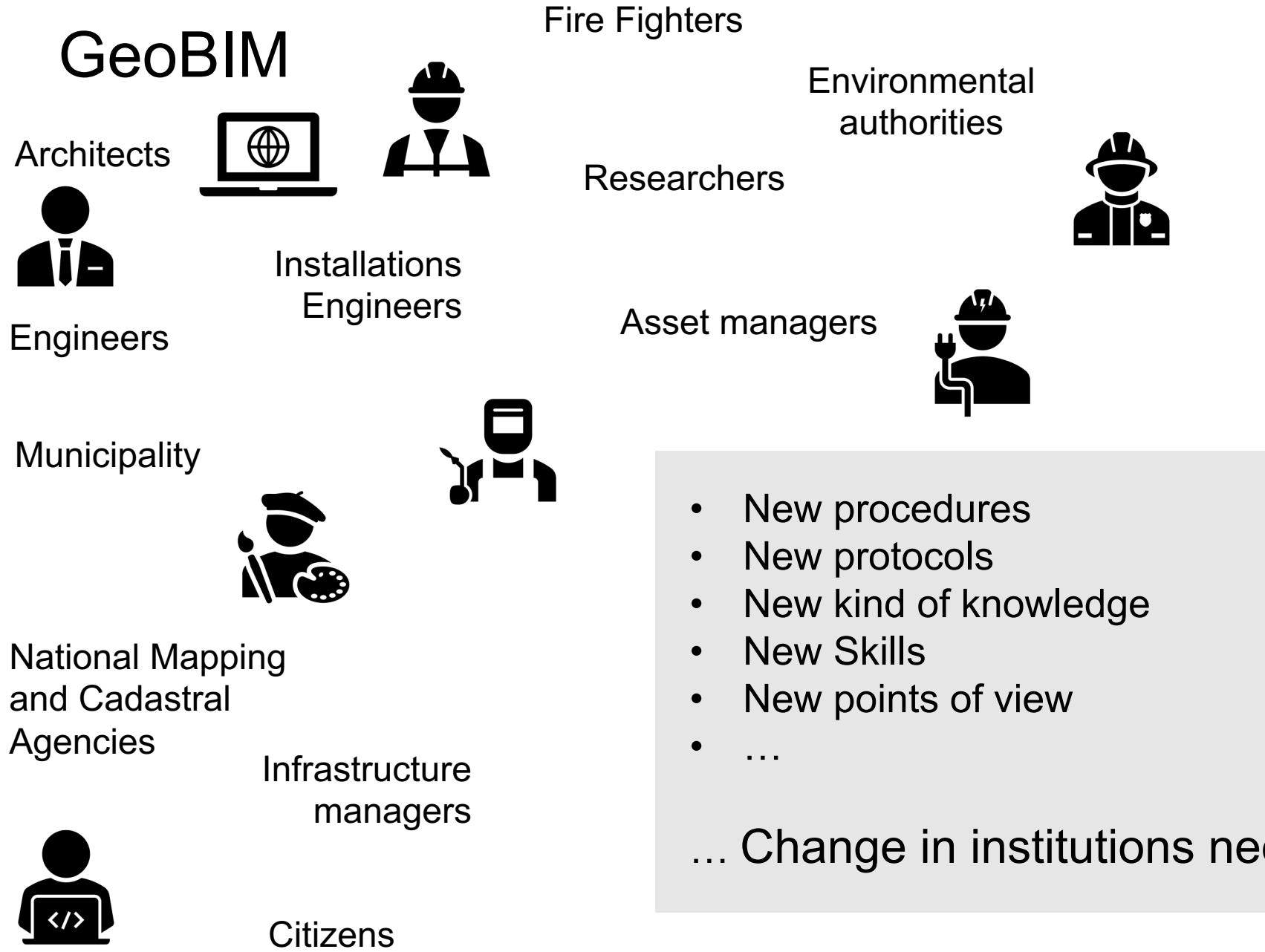


## 3D city models vs BIM and GeoBIM

GeoBIM for the building permits: EuroSDR GeoBIM project

Interoperability technical issues: ISPRS-EuroSDR GeoBIM benchmark

Conclusions



## 3. Integration of procedures



- New procedures
  - New protocols
  - New kind of knowledge
  - New Skills
  - New points of view
  - ...
- ... Change in institutions needed



## 3D city models vs BIM and GeoBIM

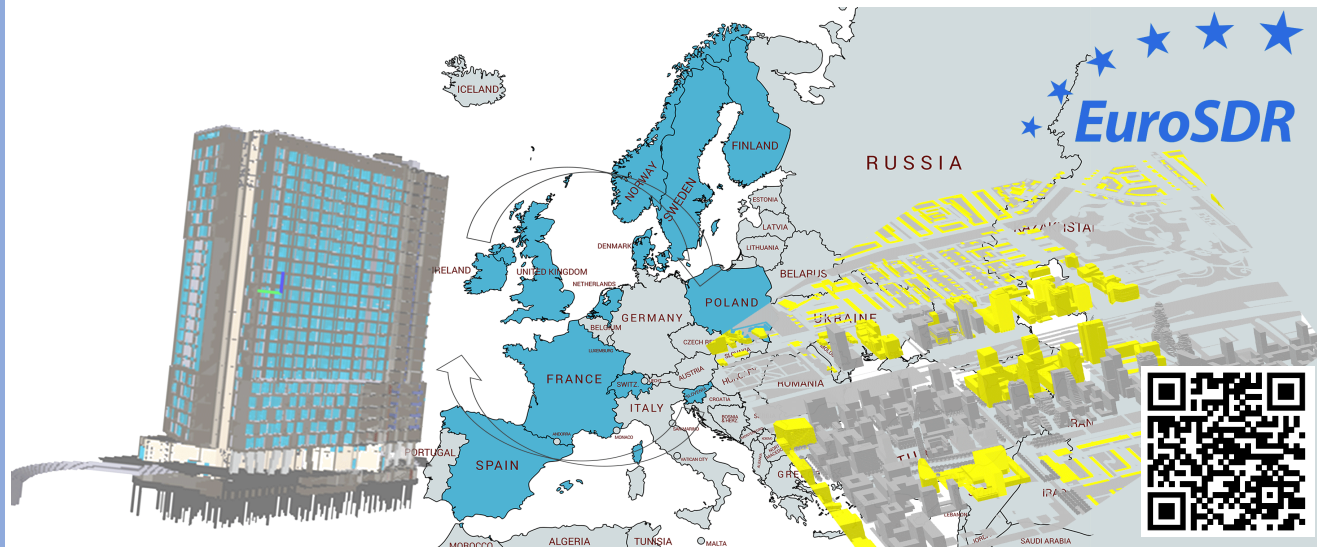
GeoBIM for the building permits:  
EuroSDR  
GeoBIM project

Interoperability technical issues:  
ISPRS-  
EuroSDR  
GeoBIM benchmark

Conclusions

- Need to **harmonise** the different features of 3D city models and BIMs w.r.t. Geometry & Semantics
- Need to provide **georeferencing** for BIMs
- Need to **align open standard development** with **implementation** and use by the community, in terms of use cases support, implementation feasibility, data production, non-expert users needs and requirements (e.g. user-friendliness)
- Need of **institutional changes**, new skills and new agreements





## EuroSDR GeoBIM project

<https://3d.bk.tudelft.nl/projects/eurosd-geobim/>

Addresses:

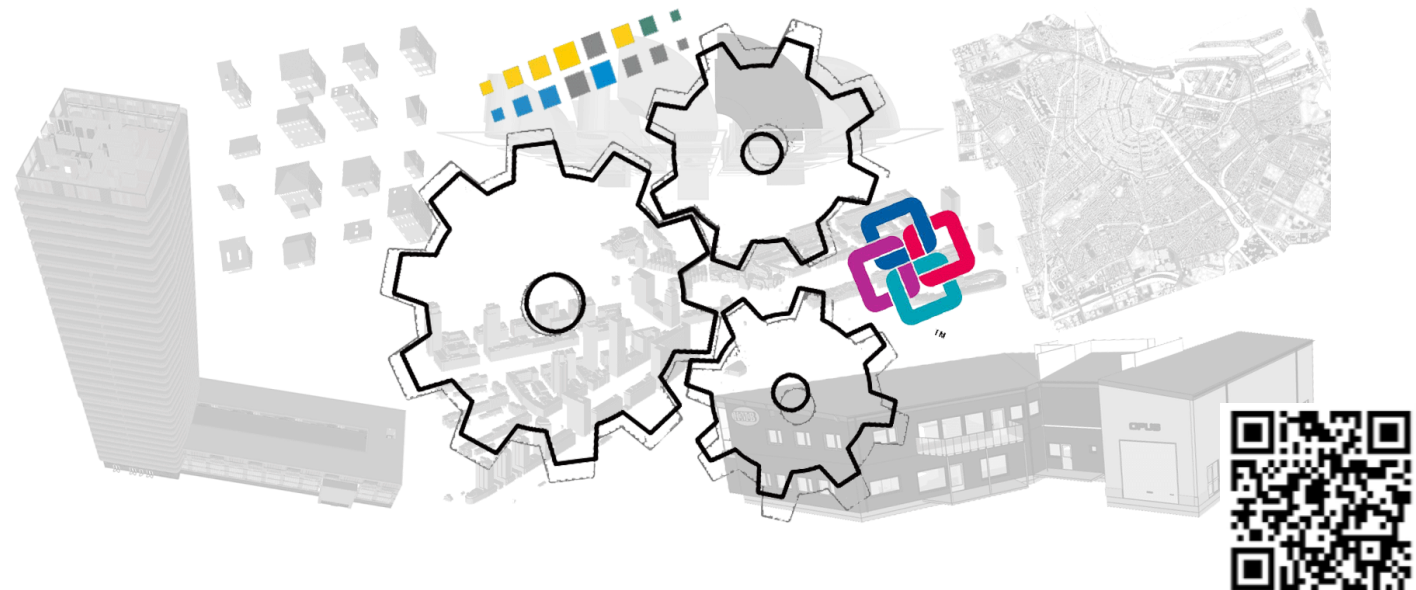
- Integration of **data** (common characteristics, they fit together)
- Integration of **procedures** (BIM and GIS tools)

## ISPRS-EuroSDR GeoBIM benchmark project

<https://3d.bk.tudelft.nl/projects/eurosd-geobim/>

Addresses:

- Data **interoperability**
- Reliable **conversion** procedures



# The EuroSDR GeoBIM project



3D city models vs BIM and GeoBIM

GeoBIM for the building permits: EuroSDR GeoBIM project

Interoperability technical issues: ISPRS-EuroSDR GeoBIM benchmark  
Conclusions

## National Mapping and Cadastral Agencies (NMCAs)



## Universities



*Aims:*

- Coherent approach to GeoBIM integration**
  - consensus between **multiple stakeholders**
  - **international level** (share national experiences)

*Point of view of use cases:*

- Analysis of **current practice**
- How to **improve** current practice w.r.t. automation using a **combined Geo and BIM approach?**
- **Experiments** to show the improvements



2017-2020

*Use cases:*

- 1) Building permission issuing**
- 2) Life cycle asset management**



<https://3d.bk.tudelft.nl/projects/eurosd-geobim/>







3D city  
models vs  
BIM and  
GeoBIM

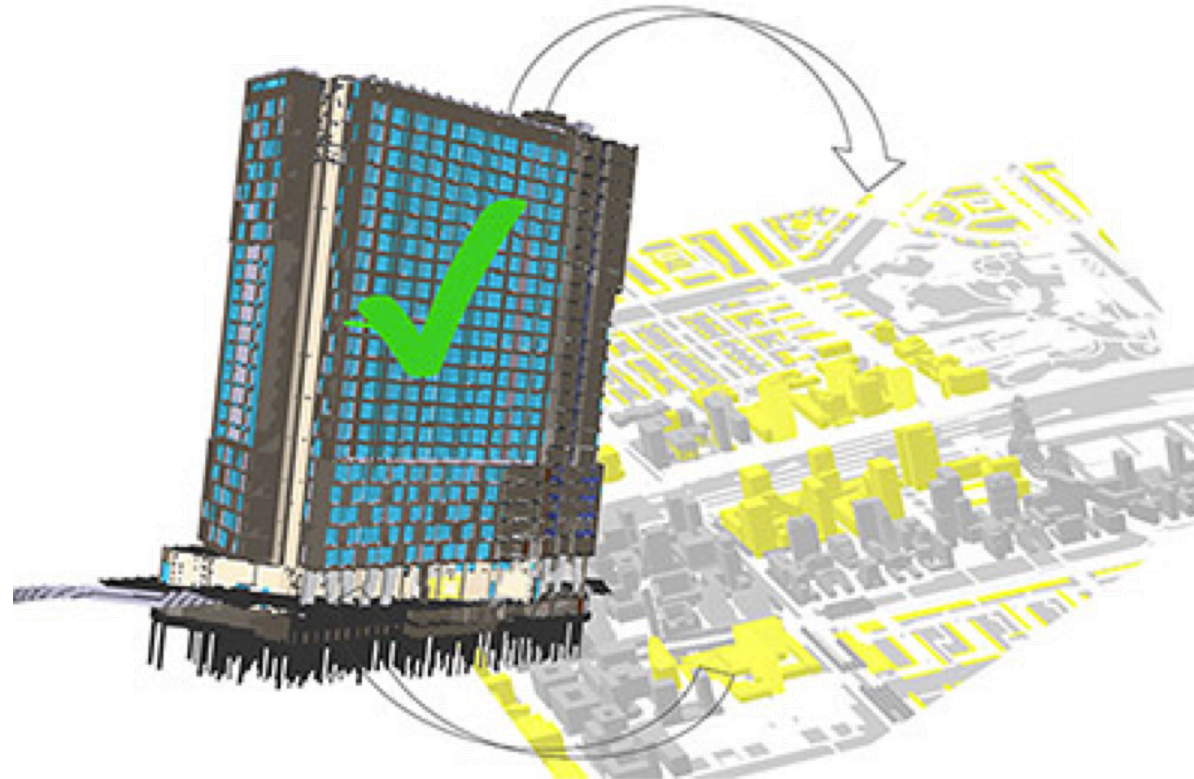
GeoBIM  
for the  
building  
permits:  
EuroSDR  
GeoBIM  
project

Interoperability  
and technical  
issues:  
ISPRS-  
EuroSDR  
GeoBIM  
benchmark

Conclusions

## Use case 1

### From global design to building permission issuing





## Bottom-up approach

They provide us with:

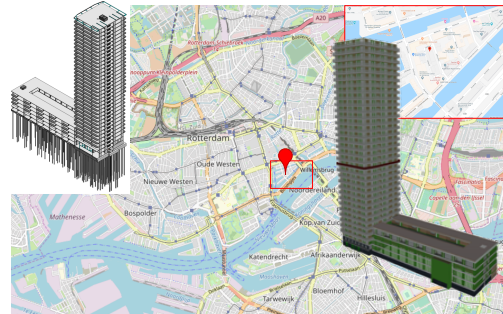


- **Data** (IFC BIM and CityGML 3D city model)
- Nice and enthusiastic **people** to collaborate with



### Case studies:

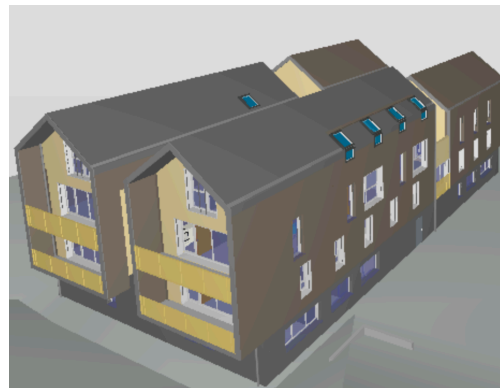
- **The Netherlands** (Rotterdam, Den Haag, Almere, Amsterdam)



*Case study in Rotterdam (NL)*

- **France** (Epone)

- Data
- Regulations
- Practice expertise



*Case study in Epone (F)*

**Sweden / Slovenija**

### Interviews and collaboration



- 1) Workflow + stakeholders
- 2) Regulations



3D city models vs BIM and GeoBIM

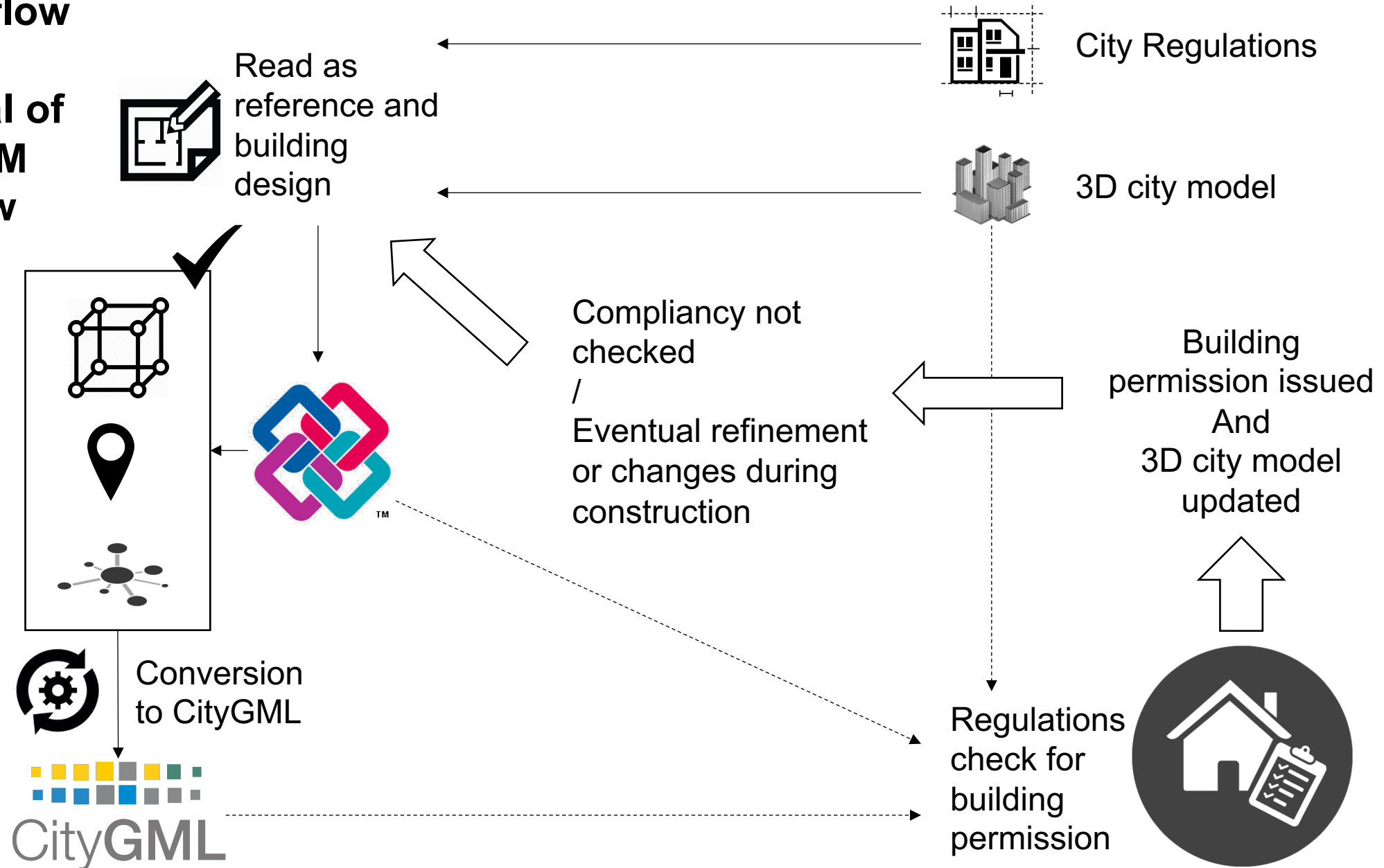
GeoBIM for the building permits: EuroSDR GeoBIM project

Interoperability technical issues: ISPRS-EuroSDR GeoBIM benchmark

Conclusions

## 1) Workflow

### Proposal of a GeoBIM workflow



3D city models vs BIM and GeoBIM

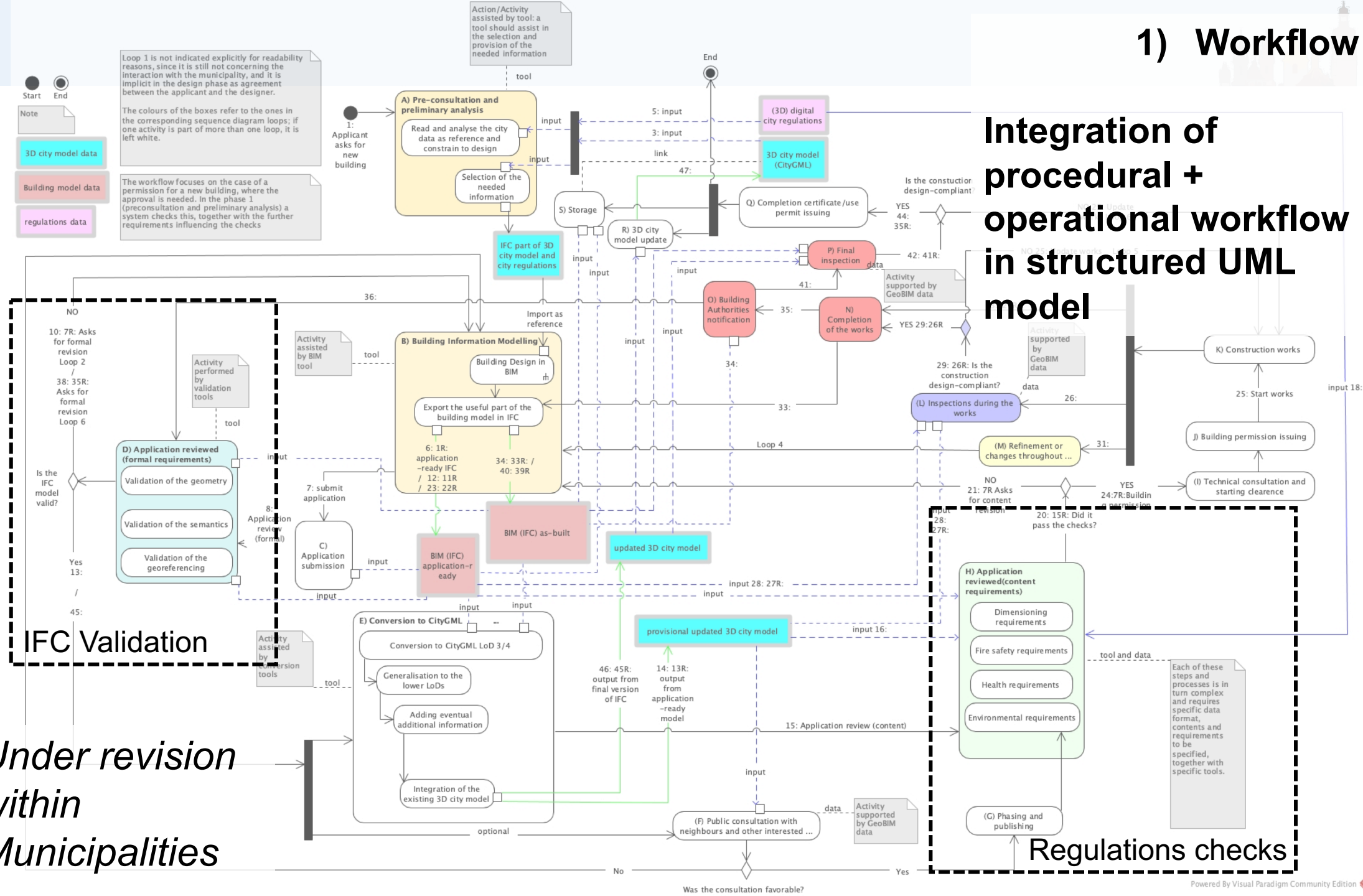
GeoBIM for the building permits: EuroSDR GeoBIM project

Interoperability technical issues: ISPRS-EuroSDR GeoBIM benchmark

Conclusions

*Under revision within Municipalities*

## Integration of procedural + operational workflow in structured UML model



IFC Validation

Regulations checks

Each of these steps and processes is in turn complex and requires specific data format, contents and requirements to be specified, together with specific tools.

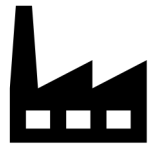


## Regulations most effectively checked through GeoBIM



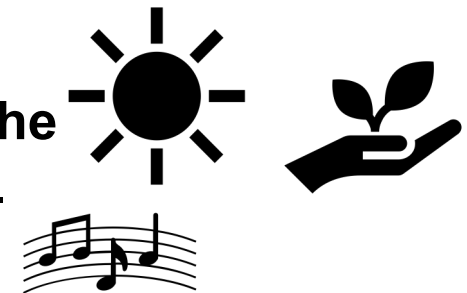
**Zoning and dimensions:** max height, volume, densification, distances (overhanging objects, balconies), pipe heights (restaurants).

**Parking** availability and plans connected to the new buildings



**Function and zoning plan**

**Impact of the building in environment and of environment on the building:** *shadows* analysis, *noise* analysis, *air quality*, *energy*.



**Accessibility** of the buildings in higher detail: disabled accessibility and usability, and *escape routes* planning.



**Structural** safety in specific cases (e.g. Amsterdam cellars)



## Regulations most effectively checked through GeoBIM:

**Interpretation issue** is being tackled with the help by the nice, enthusiastic people in the Municipalities



### 4.2 Building rules

#### 4.2.1 General

The land intended for 'Centrum - 2' may only be built for the functions mentioned there.

#### 4.2.2 Co-destination

In so far as the grounds are also intended for 'Value - Archeology 2', 'Value - Cultural History', the relevant provisions in the aforementioned destination also apply to the building.

#### 4.2.3 Building standards

Construction volume **up to 200 meters high** is permitted within the destination, subject to the following conditions:

- a. as a **basis**, a **building mass** of at least 4 meters and at most 9 meters high must be realized in the building line of the building block;
- b. an additional building volume may be added above the **abovementioned building height of 9 meters**, **22 m<sup>3</sup> per m<sup>2</sup> of building plot surface area**, with a **maximum of 55,000 m<sup>3</sup> per building plot**, on the understanding that land once considered in the granting of an environmental permit, which has been or can be carried out, is not taken into consideration when assessing subsequent construction plans;
- c. along the **Wijnhaven north and south side and the Glashaven**, the above under b. the aforementioned **extra building volume** must first be realized in a **strip in the front façade** line with a height of 20 to 25 meters, **or in accordance with the building height existing at the time of presentation of the design** for this zoning plan; - along the other streets it may be mentioned under b. said additional building volume is realized in a strip in the front façade line with a maximum height of 20 meters, or in accordance with the building height existing at the time of presentation of the design for this zoning plan;
- d. after **deduction of the volume to be realized in accordance with the provisions of c** in this paragraph, the remaining extra building volume in towers can be realized on the understanding that:
  - the **towers** 15 meters behind the building lines of the **Wijnhaven south side** and 10 meters behind the building lines of the **Wijnhaven north side** are placed;
  - the maximum permitted **surface area per floor** of the towers amounts to 50% of the building plot area, with a maximum of 500 m<sup>2</sup> whereby balconies, wholly or partially,

**Francesca Noardo**  
Why only centrum 2?

**Francesca Noardo**  
Otherwise, what is the limit?

**Francesca Noardo**  
Aligned

**Francesca Noardo**  
The basis?

**Francesca Noardo**  
Maximum?

**Francesca Noardo**  
1 building = 1 plot?

**Francesca Noardo**  
If land NOT considered in the granting of an environmental permit BEFOREHAND?

**Francesca Noardo**  
Extra with respect to the ones cited before (in b)? Or this is the additional building volume above the basis (the b)?

**Francesca Noardo**  
Aligned?

**Francesca Noardo**  
If they are lower?

**Francesca Noardo**  
Deduction from the 55,000 m<sup>3</sup>?



## What part of the 3D city model (CityGML) is useful?

Selection of the needed classes

In a useful Level of Detail

Eventually with ADEs

→ Conversion to a proper format, if needed

Depends on the regulation to be checked

Clear metadata are needed!

## What part of the BIM is useful?

Selection of the needed classes

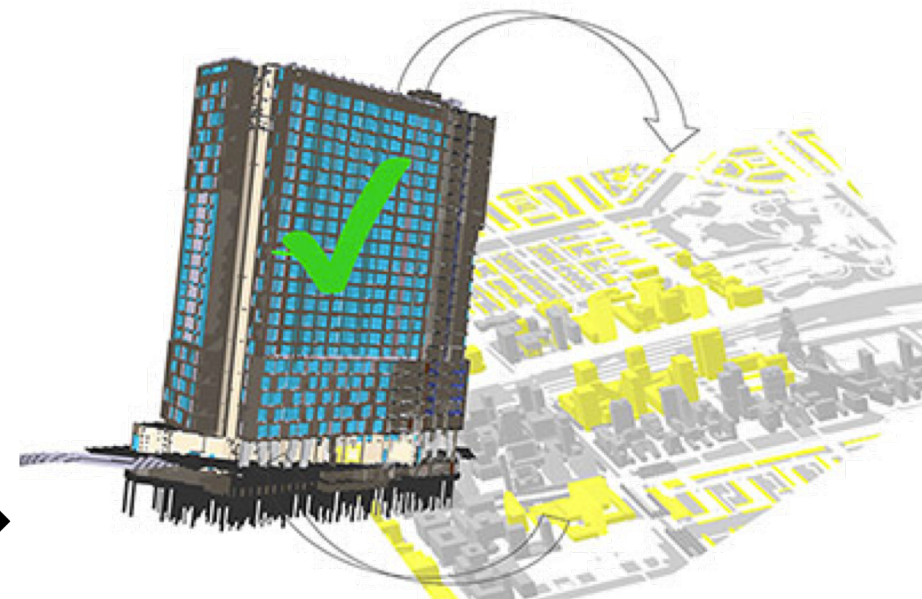
In the useful Level Of Development

Export to a proper IFC Model View Definition

→ Conversion to a proper format, if needed

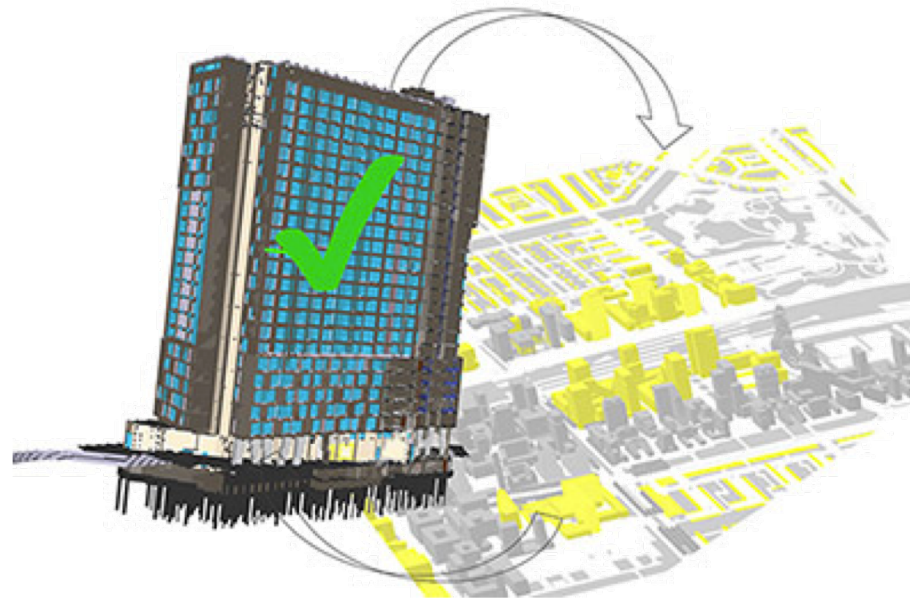


Make the checks

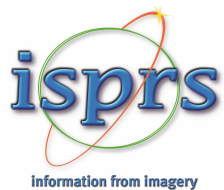




- Not straightforward process (data issue, regulation issue, technical issue...)
- Specific development are needed in a complex workflow;
- Consensus by Municipalities on the proposed workflow

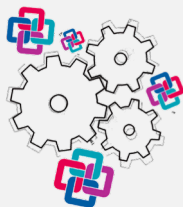






**Aim:** Investigation of the available **technical solutions to support** the open standards IFC (by buildingSMART) and CityGML (by OGC).

## Tasks:



1. What is the **support for IFC** within BIM (and other) software?



2. What options for **georeferencing BIM** data are available?



3. What is the **support for CityGML** within GIS (and other) tools?



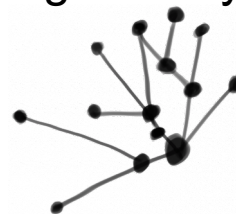
4. What options for **conversion (IFC↔CityGML)** are available?



georeferencing



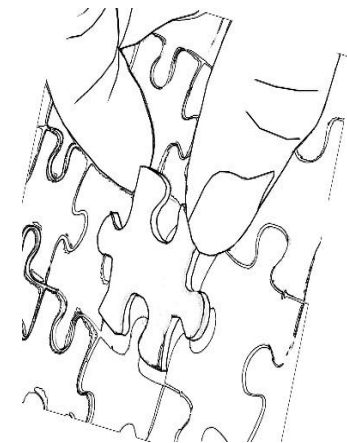
geometry



semantics



Sw functionalities



External **voluntary participants** can perform one or more tasks with the tools they are familiar with, and **deliver their results** in the provided **on-line results template.**



<https://3d.bk.tudelft.nl/projects/geo-bim-benchmark/>



3D city models vs BIM and GeoBIM

GeoBIM for the building permission: EuroSDR GeoBIM project

Interoperability technical issues: ISPRS-EuroSDR GeoBIM benchmark Conclusions

## Large interest has been awarded!




















GeoBIM benchmark background - tasks - data software participants faq



### Participants

The following people are the registered participants to the GeoBIM benchmark, Thank you!

Last update: 18th April 2019

Name	Affiliation	Country
 Doguş Güler	Instambul Technical University	Turkey
 Rudi Stouffs	National University of Singapore	Singapore
 Salman Khalili-Araghi	University of Toronto	Canada
 Diana Moraru	Ordinance Survey	United Kingdom
 Mohsen Kalantari	University of Melbourne	Australia
 Imke Lánský & Celine Jansen	Geomatics MSc students TU Delft	The Netherlands
 Amber Mulder & Kostantinos Mastorakis	B	B
 Felix Dahle & Danny Marx	Geomatics MSc students TU Delft	The Netherlands
 Vasileios Alexandridis & Giulia Ceccarelli	Geomatics MSc students TU Delft	The Netherlands
 Pantelis Kanliouras & Maria Moscholaki	Geomatics MSc students TU Delft	The Netherlands
 Christina Fratzeckou & Chirag Garg & Wessel de Jong	Geomatics MSc students TU Delft	The Netherlands
 Gabriella Wiersma & Karin Staring & Jordi van Lierp	Geomatics MSc students TU Delft	The Netherlands
 Liyao Zhang & Mutian Deng	Geomatics MSc students TU Delft	The Netherlands
 Yifang Zhao & Jinglan Li	Geomatics MSc students TU Delft	The Netherlands
 Maria Pla	ICGC, Head Databases Department	Spain
 Nebras Salheb	TU Delft (MSc Geomatics)	The Netherlands
 Amer Jbelli	Académie Libanaise des beaux-arts (student in Architecture)	Lebanon
 Nichersu Alexandru	EIFER	Germany
 Vinicius Cruvinel Rego		Brazil

### Important dates and next steps

#### March 2019

- Complete materials available
- Start of declaration of interest from participants

#### 5th/8th July 2019

- GeoBIM benchmark meeting with participants and proponents

#### October 31, 2019

- Deadline for data processing and benchmark answer submission

#### December 2019

- ISPRS-EuroSDR GeoBIM winter school

### Team

Francesca Noardo  
Ken Arroyo Ohori  
Jan'ien Stoter  
Filipo Bijecki  
Claire Ellul  
Lars Harrie  
Thomas Krjinen  
Giorgio Agugliaro  
Margarita Kokla

## Intermediate results as expected:

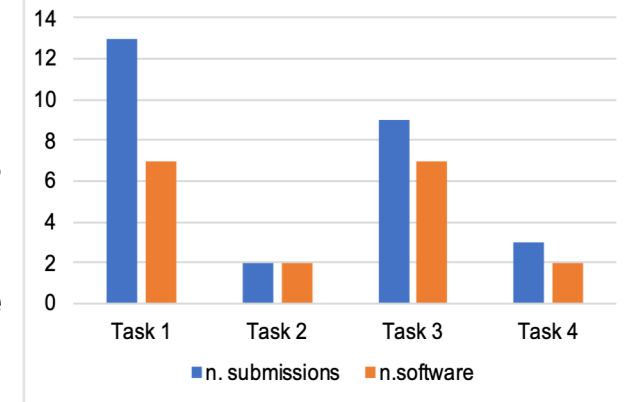
- Problems with **multi-LoDs**.
- Loss of **semantics**
- **Weird geometries...**

Looking forward the complete results!



<https://3d.bk.tudelft.nl/projects/geobim-benchmark/>

## Submitted test results



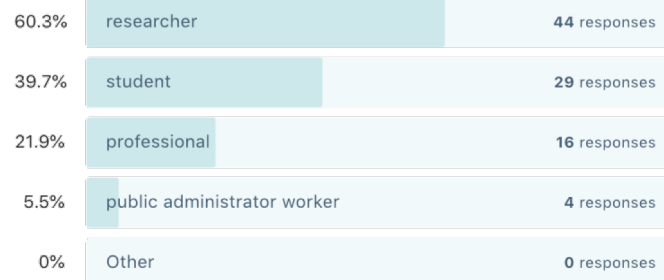
31<sup>st</sup> October



Registered participants from 19 Countries

### I am a:

73 out of 73 people answered this question (with multiple choice)





3D city  
models vs  
BIM and  
GeoBIM

GeoBIM for  
the building  
permission:  
EuroSDR  
GeoBIM  
project

Interoperability  
technical  
issues:  
ISPRS-  
EuroSDR  
GeoBIM  
benchmark

Conclusions

No packed solutions yet, but:

- **Wide interest** from both academy and stakeholders points of view
- The GeoBIM topic has now **clear specific issues** to be addressed
- Continuous **exchange and collaboration** between researchers, stakeholders, software implementers and standardization institutions is essential to overcome those issues



# EuroSDR-AMS GeoBIM benchmark workshop

*December 2nd/3rd 2019*

At the [Amsterdam Institute for Advanced Metropolitan Solutions](http://www.ams.nl), in Amsterdam,

## Insight into GeoBIM benchmark results

Related topics:

- **3D city models,**
- **Building Information Models,**
- **open standards** (CityGML, CityJSON, IFC, and more),
- **GeoBIM use cases** (automatic building permission issuing, asset management, energy simulations).



<https://3d.bk.tudelft.nl/projects/geobim-benchmark/events.html>



## GeoBIM benchmark workshop 2019



2<sup>nd</sup> - 3<sup>rd</sup> December 2019

at the Amsterdam institute for Advanced Metropolitan Solutions (AMS),  
Kattenburgerstraat 5, Building 027W, 1018 JA Amsterdam,  
12-minutes walking from Amsterdam Central



December 2<sup>nd</sup> h.9.30-17.30

Welcome and Introduction on GeoBIM

**3D City models**

[What are 3D city models? How are they powerful to support use cases? How are they modelled? What standards make them interoperable (CityGML, CityJSON...)?]

**Building Information Models (BIM)**

[What are Building Information Models? How do they support the design and management of a construction? How are they modelled? What standards make them interoperable (IFC...)?]

**GeoBIM benchmark results**

The support for CityGML & The support for IFC within software *Workshop* - replicating the benchmark results for software support of CityGML and IFC

The world is not all CityGML and IFC: other Geo/BIM standards

December 3<sup>rd</sup> h.9.00-16.00

**The EuroSDR GeoBIM project**

**GeoBIM use cases**

- GeoBIM for Building permission issuing
- GeoBIM for asset management
- GeoBIM for microclimate simulations

**GeoBIM benchmark results**

Georeferencing IFC & Conversions IFC-CityGML and CityGML-IFC *Workshop* - replicating the benchmark results for Georeferencing IFC & Conversions IFC-CityGML and CityGML-IFC



<https://3d.bk.tudelft.nl/projects/geobim-benchmark/events.html>





an Open Access Journal

## BIM and HBIM: Standardisation and interoperability

### Guest Editors

Prof. Dr. Antonia Spano', Dr. Francesca Noardo, Dr. Margarita Kokla

### Deadline

31 December 2019



International Journal of  
*Geo-Information*



### *Special Issue*

## Integration of BIM and GIS for Built Environment Applications

### *Special Issue Editors:*

Prof. Dr. Lars Harrie: Lund University, Sweden

Dr. Francesca Noardo: Delft University of Technology, the Netherlands

Dr. Claire Ellul: University College London, UK

**(Submission Deadline: 29 February 2020)**

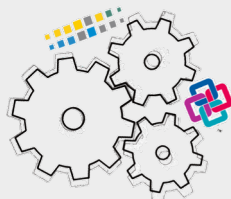
[https://www.mdpi.com/journal/ijgi/special\\_issues/BIM\\_GIS\\_built](https://www.mdpi.com/journal/ijgi/special_issues/BIM_GIS_built)

## GeoBIM benchmark 2019



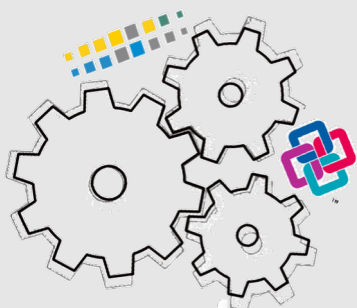
<https://3d.bk.tudelft.nl/projects/geobim-benchmark/>

<https://3d.bk.tudelft.nl/projects/geobim-benchmark/events.html>



## GeoBIM benchmark Workshop 2/3 December 2019, Amsterdam





**GeoBIM  
benchmark  
2019**



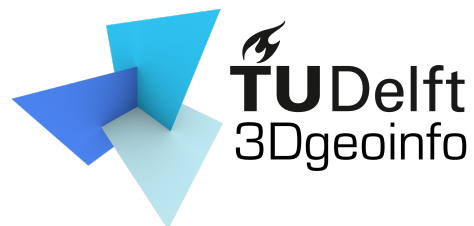
**GeoBIM  
Workshop**

2-3 December 2019,  
Amsterdam

**Thank you for your attention,**

**Enjoy the conference!**

**Francesca Noardo**  
[f.noardo@tudelft.nl](mailto:f.noardo@tudelft.nl)



**Open special  
issues:**

**Integration of BIM  
and GIS for Built  
Environmental  
Applications**

*International Journal  
of Geo-Information*

Deadline: 29/02/2020

**BIM and HBIM.  
Standardisation and  
interoperability**

*Journal of Applied  
Science*

Deadline: 31/12/2019