

Presented at the FIG Working Week 2017,  
May 29 - June 2, 2017 in Helsinki, Finland

BIM USES  
MANAGEMENT  
LEGAL  
INSURANCE  
? SEE LEGAL...

Sustainable land  
management

?

PROCESS CHANGE  
TECHNOLOGY  
REF LEGAL



# Investigating an Interoperability Platform for Sustainable Land Management

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# Structure

1

- Need for Sustainable Land Management (SLM)

2

- BIM and Cadastre as useful tools for SLM

3

- Interoperability platform for SLM

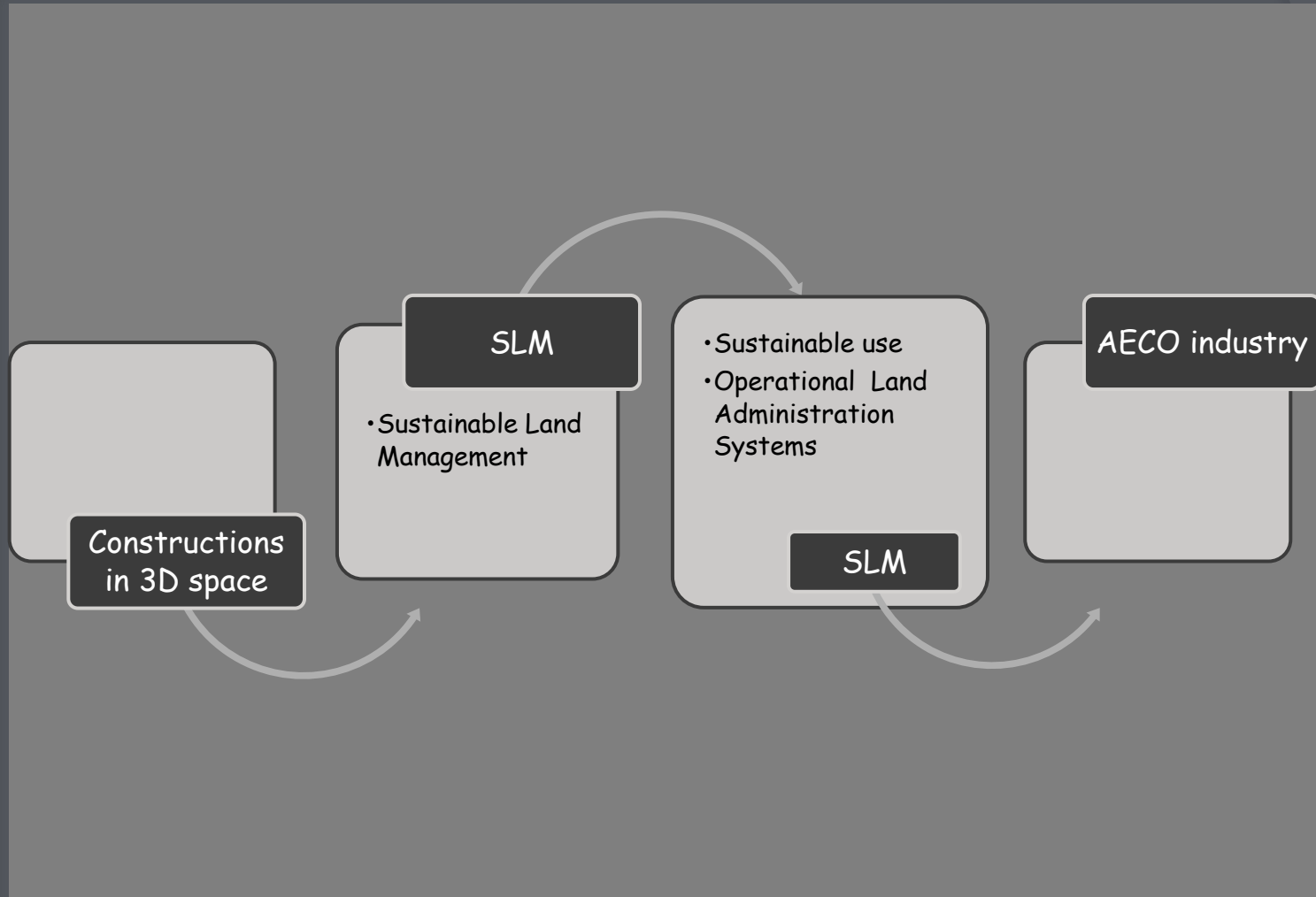
4

- Application on a pilot building

5

- Conclusions and future work

# 1. Need for Sustainable Land Management (SLM)

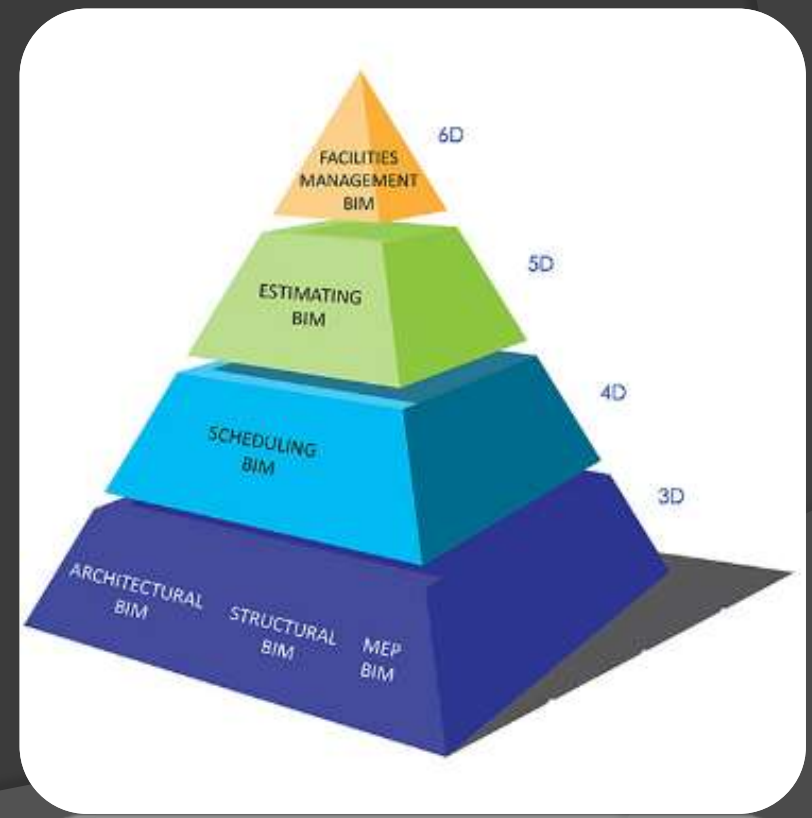


# 2/1 Are Cadastre and BIM Models useful tools for SLM?

## I. BIM

'A Building Information Model serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its lifecycle from inception onward'

BulidingSMART Alliance



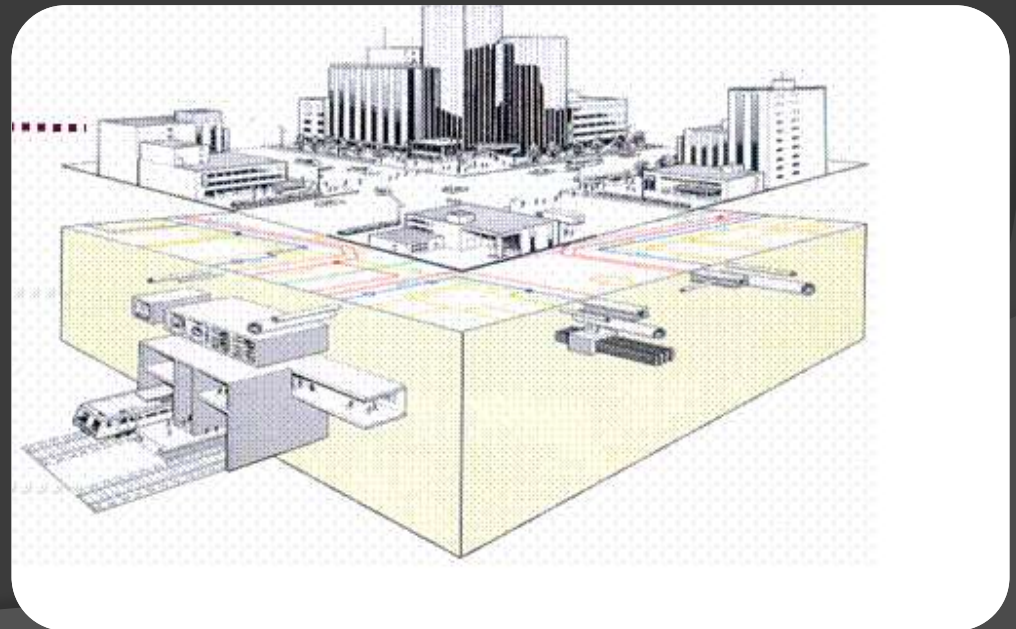
# 2/2 Are Cadastre and BIM Models useful tools for SLM?

## *II. Cadastre*

...is at the core of any land administration system

...ensure identification of land parcels and proper management of RRRs

The real world development is in 3D, so the 3D Cadastre is the tool in a land administration system



## 2/3 Integration of BIM and Cadastre

The benefits of using BIM models in the geospatial domain have been demonstrated for different applications:

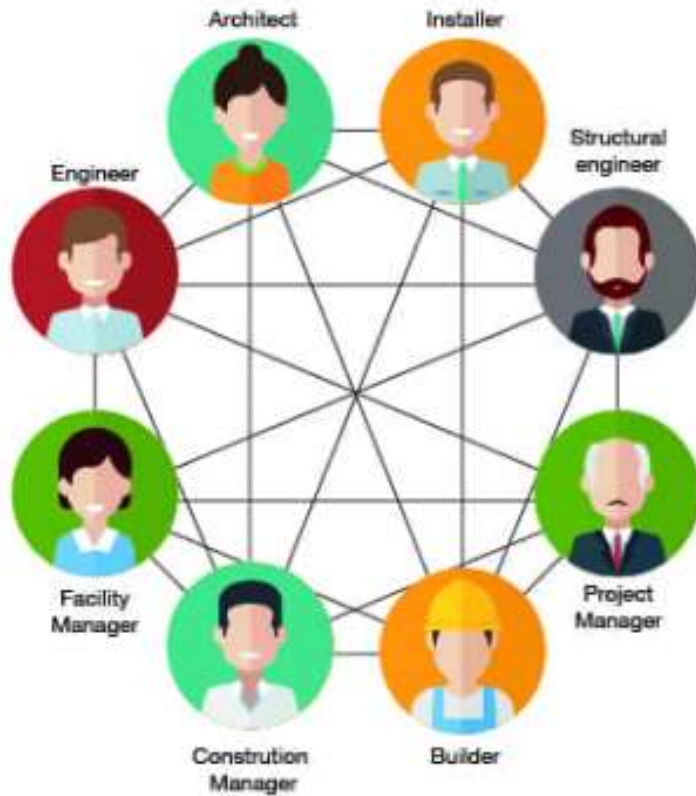
- A. Require indoor and outdoor spatial information
  - Evacuation (*El-Mekawy, 2012*)
  - Fire response management (*Isikdag, 2008*)
- B. 3D RRR data management
  1. via IFC models (*Clemen & Grundig, 2006*)
  2. via Unified Building Models (UBM) (*El-Mekawy & Ostman, 2015*)
  3. via IFC Models (*Atazadeh, 2016*)





# 3. Interoperability platform for SLM

2D data exchange



BIM interoperability



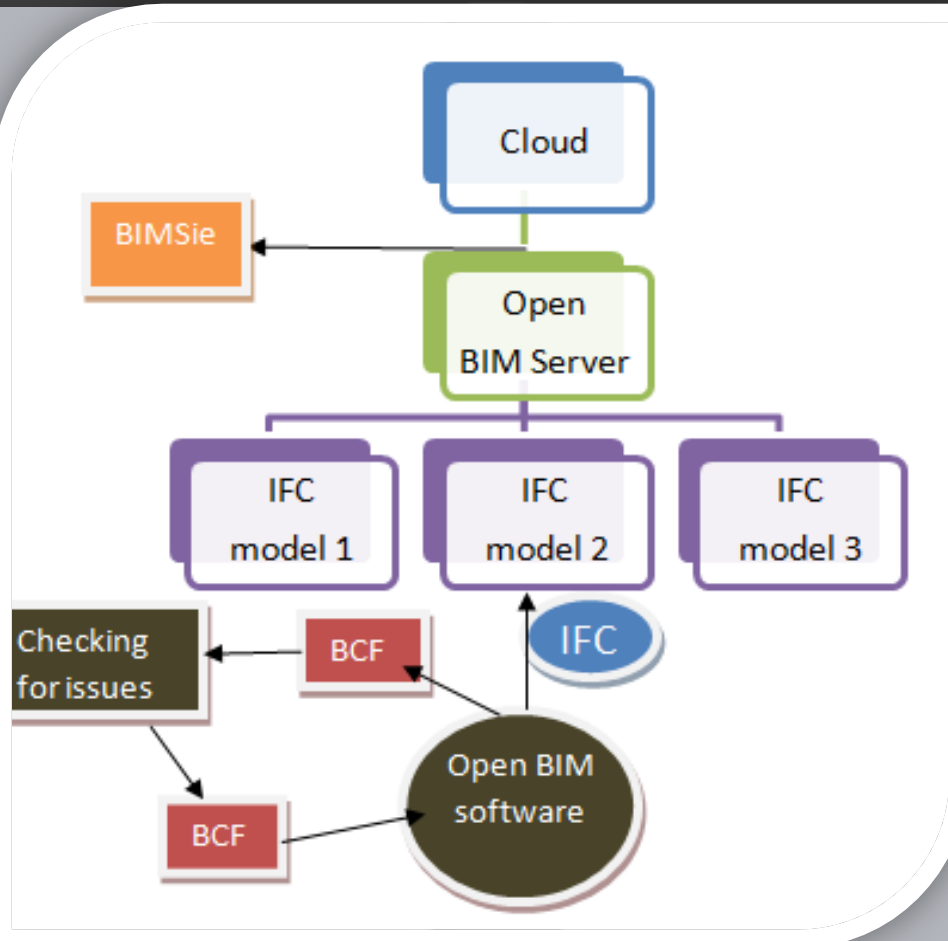
Satisfied Client

ool  
(MA)  
ICE



# Interoperability character of BIMs

Scheduling open standards in interoperability platform is of paramount importance due to:

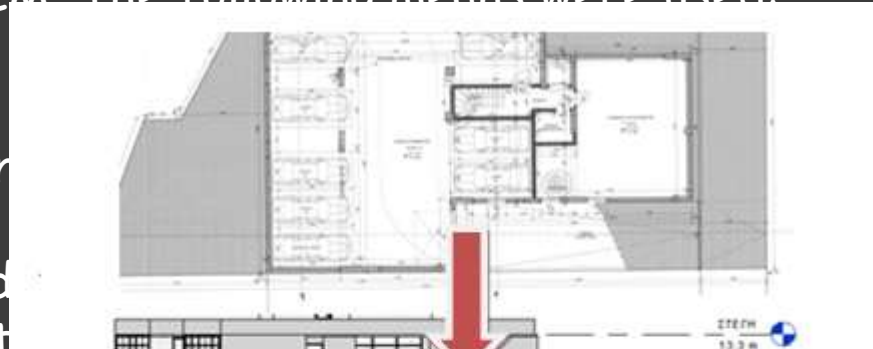




# 4/1 Application on a pilot building

This application aims at accomplishing the goal of an interoperability platform for SLM. The following means were used:

- BIM Software
- 3D Cadastral information formats
- Federated models
- Interoperability



Standard

Revit



# 4/2 Application on a pilot building

The image illustrates the application of a Building Information Modeling (BIM) tool on a pilot building. It features a 3D model of a building structure, labeled as a "Federated Model", with various components and relationships indicated by lines and labels such as "Valid", "IFC", "Cada", and "BCF".

The central focus is a software interface for managing issues. The "Issue Details" window shows the following information:

- Title:** Space\_Properties\_issue
- Description:** This rule checks that spaces have at least one door.
- Coordination:** Status: Open, BCF Status: Error
- Responsibilities:** Add (+)

The "Create Report" dialog box is also visible, showing options for report type (BCF Report (BCF209) v3.0), format (PDF, BCF, Excel), and template (CoordinationReportTemplate.xls).

The "BCF Manager" window displays a table of issues:

Nr	Modified	Title	Assigned to	Status	Modified
11	2016	Problem_1	ACER	Active	

Additional windows shown include "Issues found" and "open Standard".

# 4/3 Application on a pilot building

## Interoperability platform



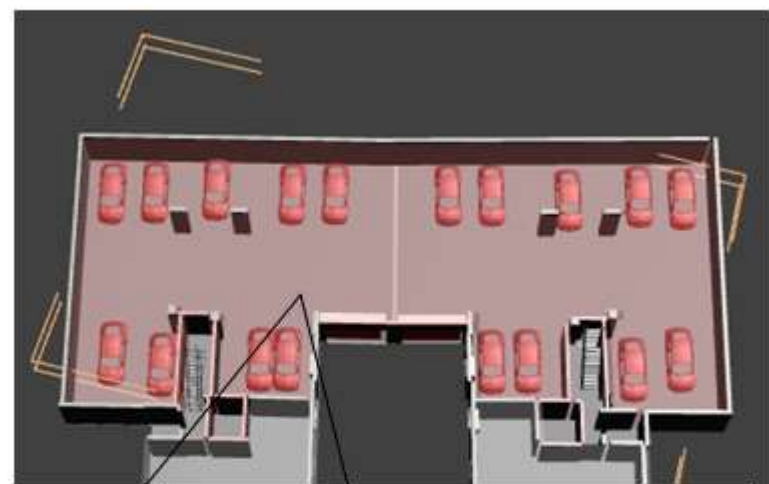
Tree Types Layers Classifications Properties

- Application\_Chairan...
- Project Name
- Surface:598384
- Unknown

Relations:  
Add sub-objects  
Add service

Δέντρο μοντέλου

- node
- node
- ΥΠΟΓΕΙΟ
  - IFCSPACE
  - IFCWALLSTANDARDCASE
  - IFCDOOR
  - IFCWINDOW
  - IFCSLAB
  - IFCSTAIR
- ΙΣΟΓΕΙΟ
- ΠΡΩΤΟΣ ΟΡΟΦΟΣ
- ΔΕΥΤΕΡΟΣ ΟΡΟΦΟΣ
- ΤΡΙΤΟΣ ΟΡΟΦΟΣ
- ΣΤΕΓΗ
- ΔΩΜΑ



Query engine BimQL Engine Load example

Return all rooted ent  
Return all rooted ent  
Return all rooted ent

Identity Data/Name	ΧΩΡΟΣ ΣΤΑΘΜΕΥΣΗΣ	Constraints/Level	Level: ΥΠΟΓΕΩ
Identity Data/Number	28	Constraints/Limit Offset	3.3
Identity Data/ΔΙΕΥΘΥΝΣΗ ΚΤΗΡΙΟΥ	ΝΟΚΗΤΑΡΑ 2 ΚΑΙ 4	Constraints/Upper Limit	Level: ΥΠΟΓΕΩ
IFCSPACE/CompositionType	ELEMENT	Dimensions/Area	532.918
IFCSPACE/GlobaId	3qVAL00KTDxvq2aW_V390w	Dimensions/Computation Height	0
IFCSPACE/InteriorOrExteriorSpace	INTERNAL	Dimensions/Perimeter	143.129
IFCSPACE/Name	28	Dimensions/Unbounded Height	3.3
Other/Category	Rooms	Dimensions/Volume	1678.69

## 5. Conclusion and future work

### *Conclusions*

Revit BIM models can be enriched with cadastral information being the basis for an operational interoperability platform for SLM:

- ✓ Visualization of 3D properties
- ✓ Invaluable tools for managing 3D properties
- ✓ Prevention of data issues and inconsistencies
- ✓ Mitigation of interoperability issues

### *Future work*

- Evaluation of the interoperability platform in three aspects namely, efficiency, usability and reliability
- Automatic algorithms for extracting appropriate building elements from the BIM models
- Further research on IFC format due to specific limitations

Thank you for your attention!!!  
Questions?  
Comments?

