Proposal for defining legal spaces for apartment rights in the Dutch cadastre using the IFC data model

P5 – Public presentation & final assessment

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Presentation Outline

- Introduction
- Motivation
- Methodology
- Developed proof of concept
- Case study
- Conclusions
Introduction

• BIM Legal: Proposal for defining legal spaces for apartment rights in the Dutch cadastre using the IFC Data model
Introduction

- **BIM Legal**: Proposal for defining legal spaces for apartment rights in the Dutch cadastre using the **IFC Data model**
IFC Data Model

- Open data format for BIM
- Most used data model in AEC sector
- BIM mandatory for buildings > €10M
- Rijksvastgoeddiest, BIM Loket
- No legal space in IFC
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Introduction

• Proposal for defining legal spaces for apartment rights in the Dutch cadastre using the IFC Data model
Apartment Rights

- Registered ownership to individual apartment unit
- Registered with a notarial deed
  - Internal Arrangements + 2D Floor plan
Complex buildings

- Hard to depict ownership situation in 2D
- Time consuming, thus expensive (avg €105/h)
- IFC BIM already contains some data about spaces

Figure 3 (Atazadeh et al., 2017)
2D Parcel map
Railway Station Delft

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Proof of concept

1. Enriched BIM Legal creation
2. Automatic extraction of 3D legal space
3. Validation
4. Storage
5. Visualisation
6. (sub-) Splitting
Research Question

*How can the IFC Data Model possibly be extended to extract legal space for apartment rights for registration in the Dutch cadastre?*
Proof of concept

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Proposed Solution

• User Defined Property Sets for IfcSpaces
• IfcSpace one out of 800 entities
• User Defined Property Set: custom set of attributes on entity
Example IFC BIM
Storey sliced out
IfcSpace

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User Defined Property Set

- Based on 2D requirements for map in notarial deed
  - Dutch Civil Code
- Official IFC method
- Fits into current practices
  - RVB BIM Norm (Rijksvastgoeddienst)
  - BIM Loket IDM
Legal Space

• The function of the drawing
• Internal Arrangements: detailed written information
• Map for distinguishing private and shared space according to the “functional arrangement” (Article 5:106 (4) DCC)
Extensibility to other IFC Elements

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6. (sub-) Splitting
Automatic extraction of Legal Space
Automatic extraction of Legal Space

• IFC BIM created according to the proposed solution
• FME workbench
• Legal Space in Database
• Can be visualised on cadastral parcel map
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TU Delft Faculty of Architecture

- Existing building
- Geo-referenced
  - **IfcSite**: RefLatitude, RefLongitude, RefElevation
  - Orientation
    - IfcProject, TruNorth attribute, IfcDirection
- RD + NAP possible
Proof of concept

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Validation

- In IFC with ruleset
- In database (extracted legal space) checks for:
  - Overlap
  - Naming
IfcSpace

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LADM / ISO 19152 mapping

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Web browser-based viewer

- Prototype
- Similar Platform as in (Cemellini et al., 2018)
Web browser-based viewer
Proof of concept

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Case study: Splitting apartment rights
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Conclusions

- IFC BIM can be enriched with legal space by a Cadastral Information User Defined Property set
- Fits the existing legal framework and current practices
- First time 3D geometry in Dutch cadastral database
- Solution is extensible to other juridical systems
Future Work

• Develop system architecture for database transactions via web browser
• Have the *Pset_CadastralInformation* become an IFC common property set (standardized in the data format)
• What to do with source data (IFC file)
• What about ‘as-designed/as-built’ discrepancy
Questions?
References

• Figure 1: Kadaster Logo. Retrieved from https://www.kadaster.nl/
• Figure 2: http://healthcare.wsp-pb.com/building-information-modelling-bim/
• Figure 3: https://offringa-bm.nl/splitsingstekening/
• Figure 5: Stoter et al., 2016. First 3D Cadastral Registration of Multi-level Ownership Rights in the Netherlands. 5th International FIG 3D Cadastre Workshop.
• Symbols Slide 16:
  – Industry symbol: https://www.kisspng.com/png-industry-computer-icons-clip-art-industry-icon-3357635
  – BuildingSmart Logo: https://avatars2.githubusercontent.com/u/5180517?s=200&v=4
  – IDM symbol: https://www.bimloket.nl/upload/images/logos/BIM_BASIS%20ILS_logo.png