Knowledge base for 3D rendering styles

(a system to apply cartographic practices on 3D renderings)

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Motivation

To adapt 3D renderings to urban projects

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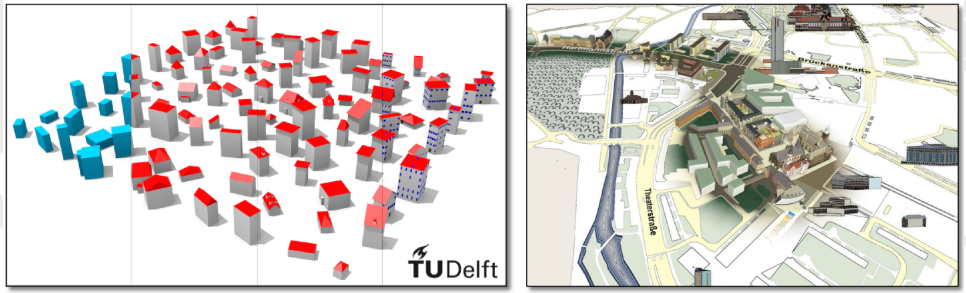
To adapt 3D renderings to urban projects

- → to control 3D styles
- → to smoothly navigate between 3D styles

Motivation

Mixing and navigating between 3D styles for building representation

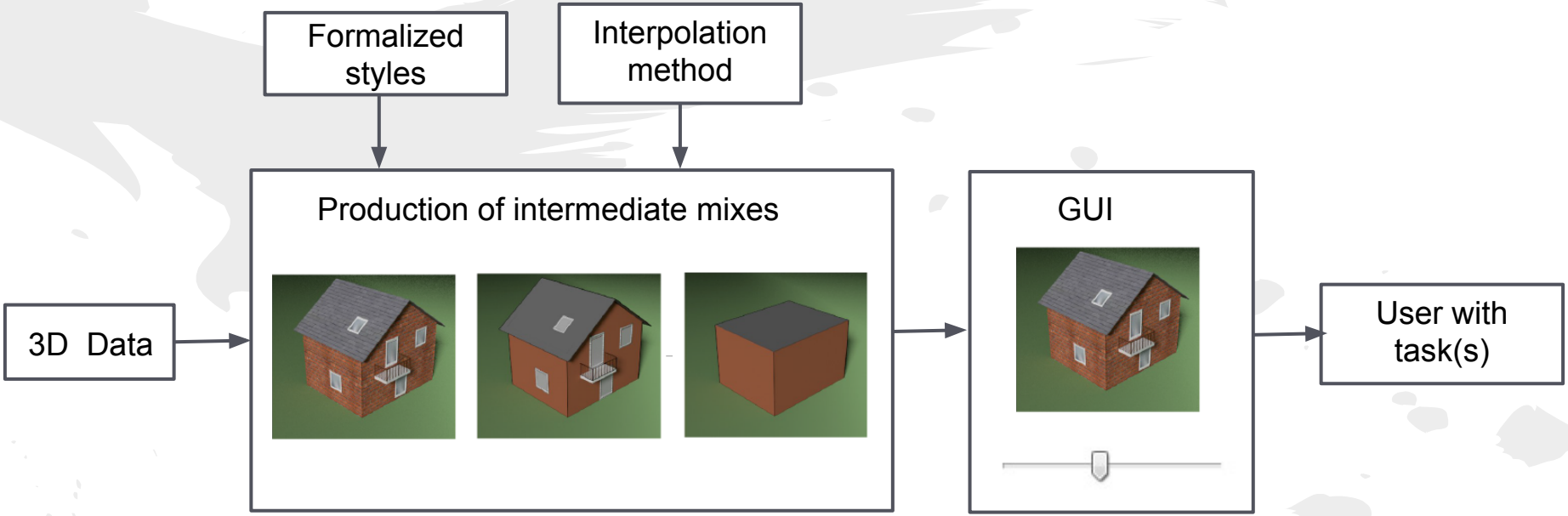


(Biljecki 2014; Semmo et al. 2013)

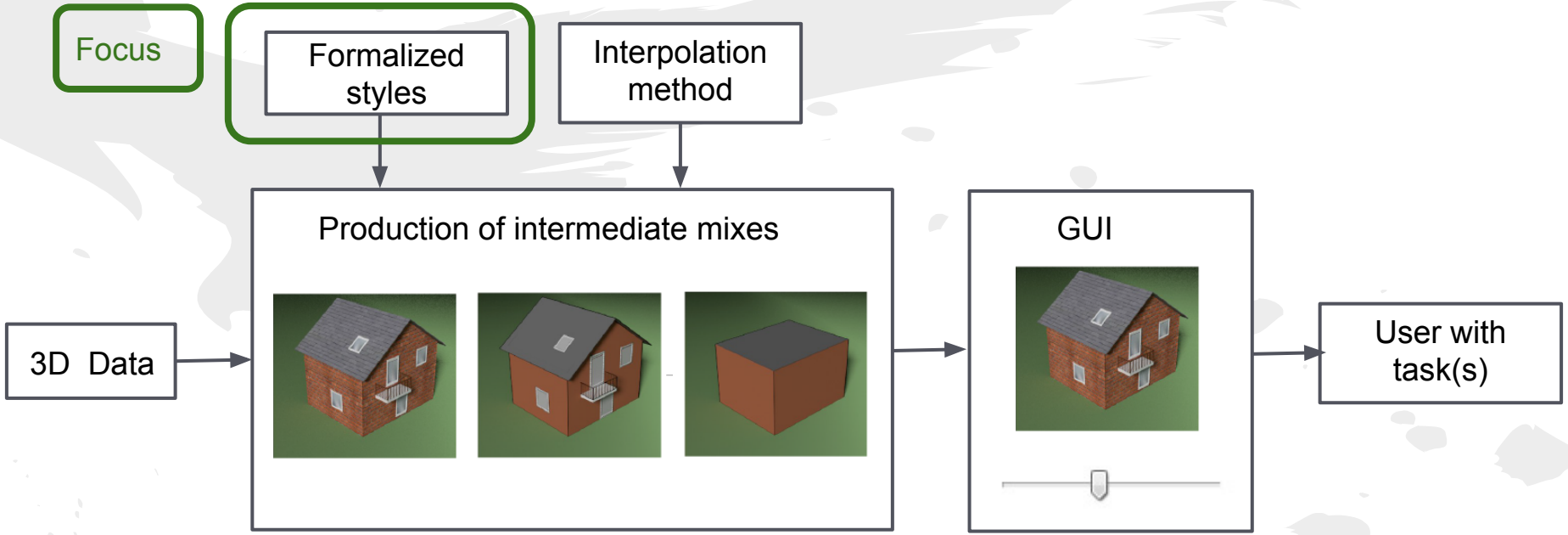
(Semmo & Döllner 2014)

(Hoarau 2015)

Aim of the talk



Aim of the talk



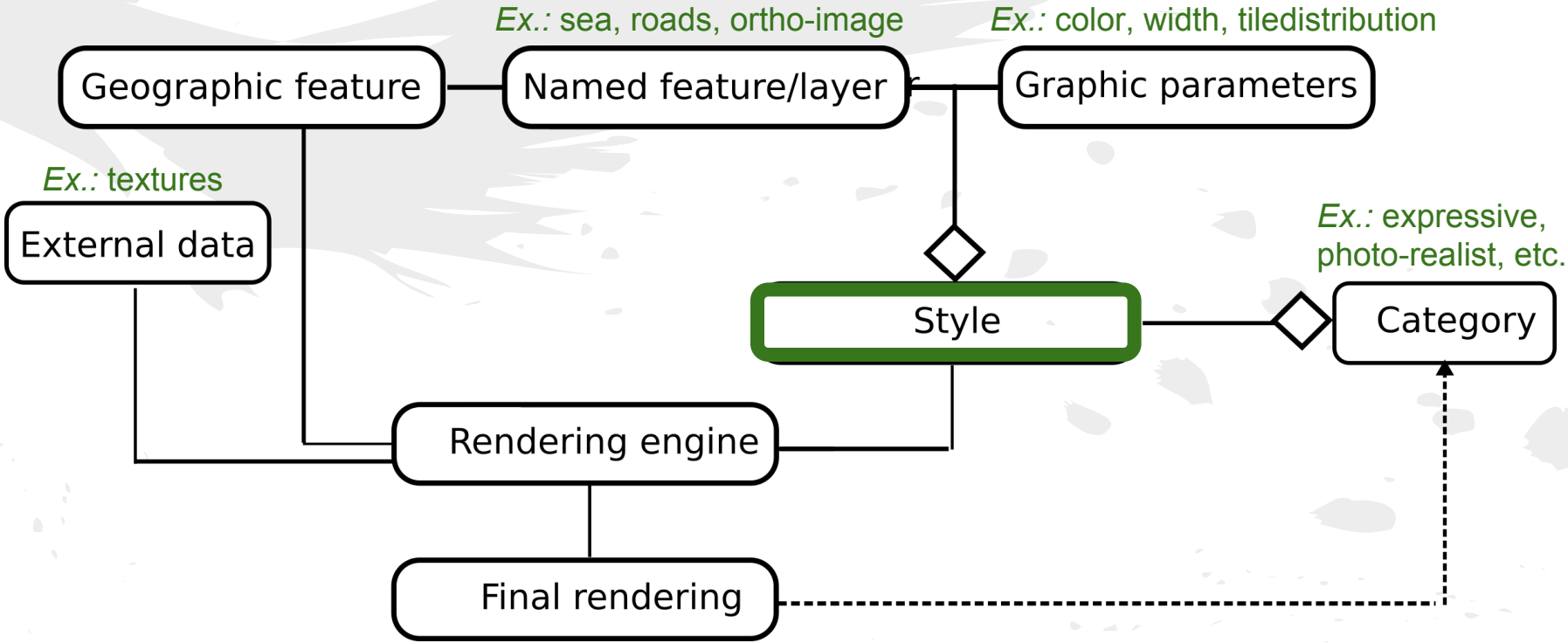
Approach

1. Style Formalization: 2D style model to 3D style model?
2. Analysis and annotation of 3D renderings
3. 3D Knowledge base production

Style formalization

Style formalization

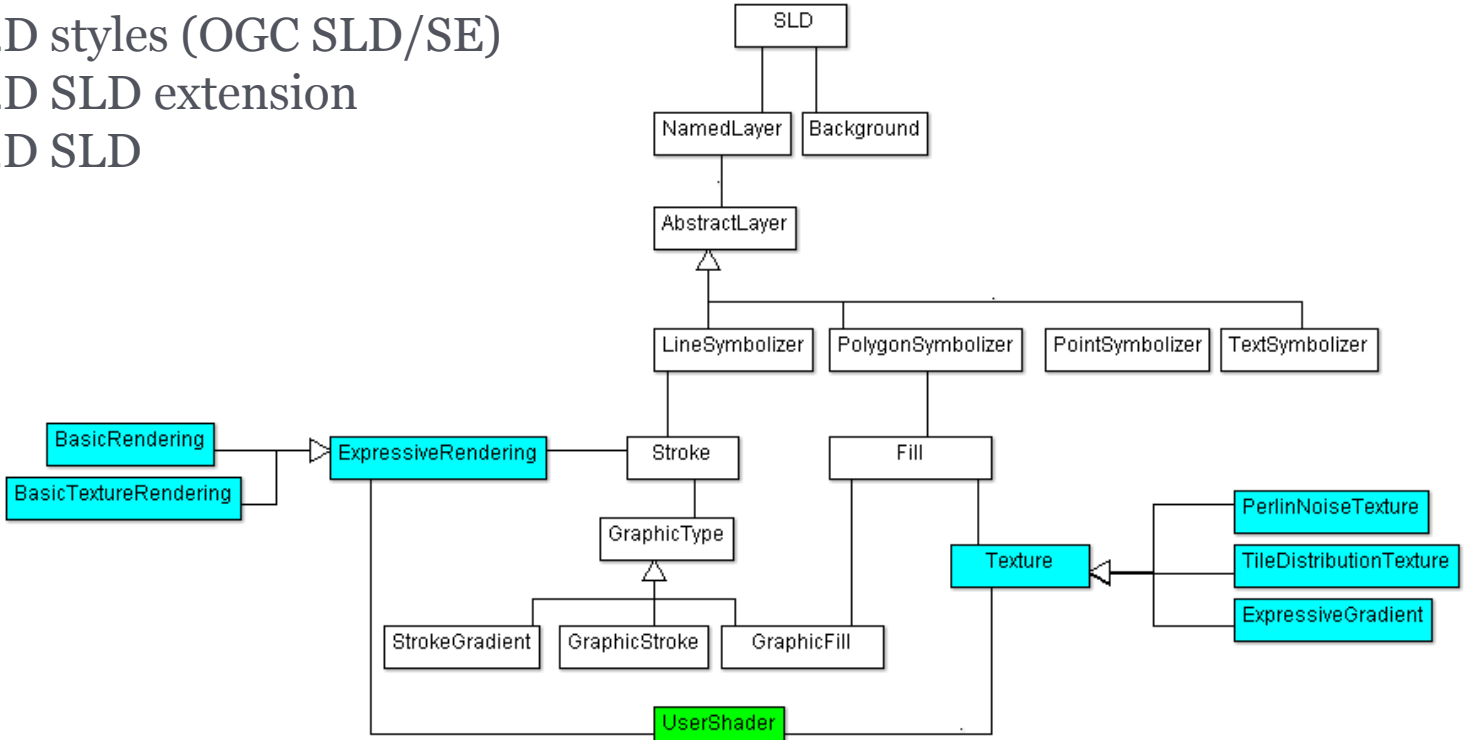
Rendering process driven by style description



Style formalization

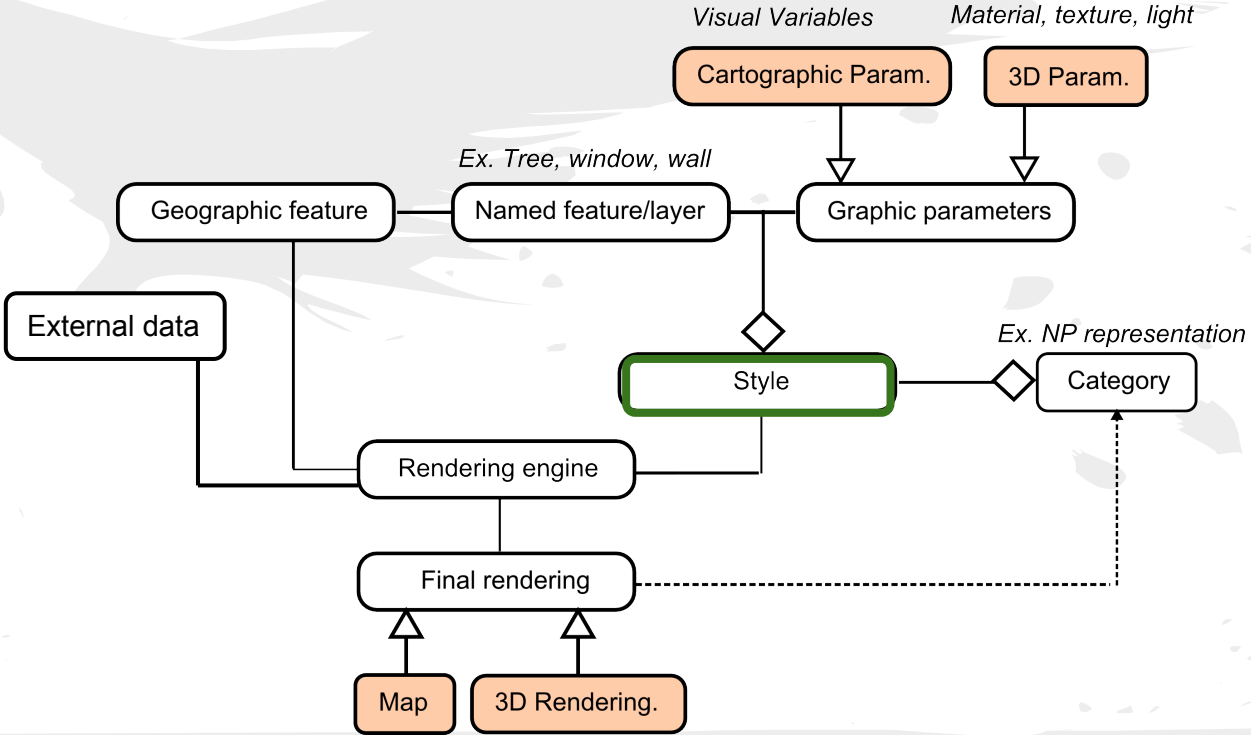
Existing formalisms to describe

- 2D styles (OGC SLD/SE)
- 2D SLD extension
- 3D SLD



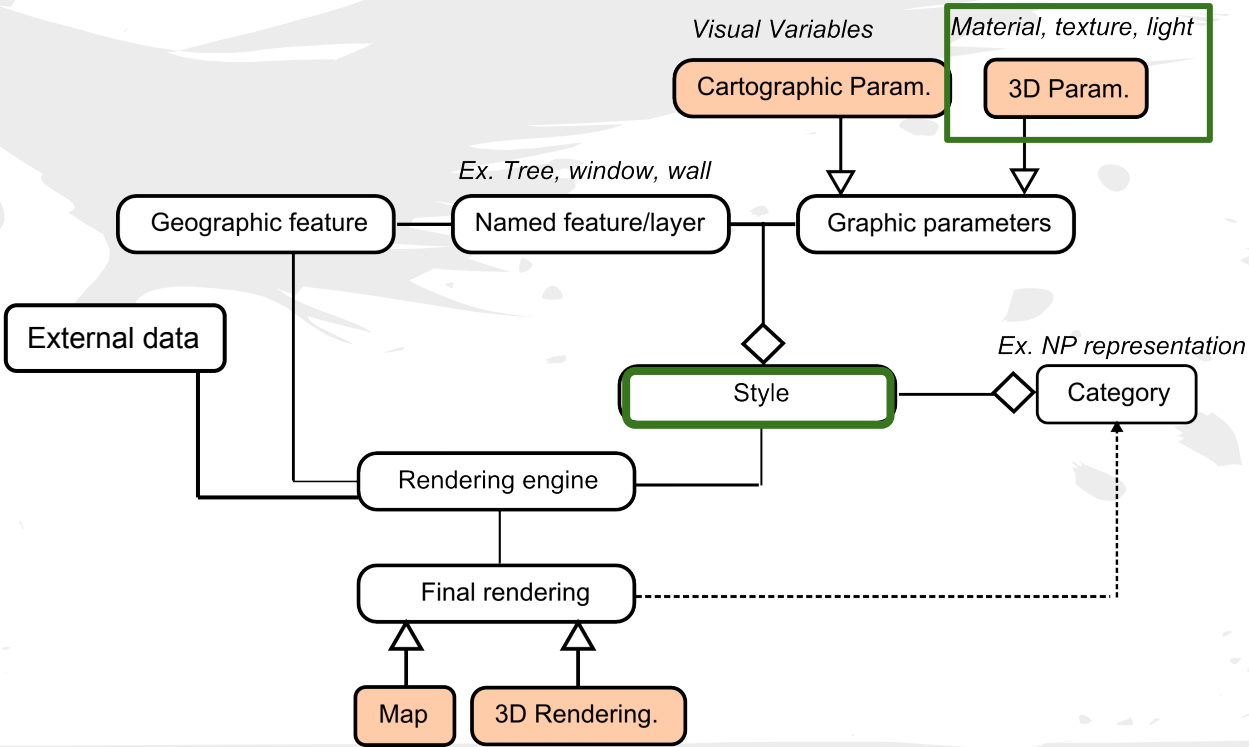
Style formalization

Model design for style formalization based on represented features



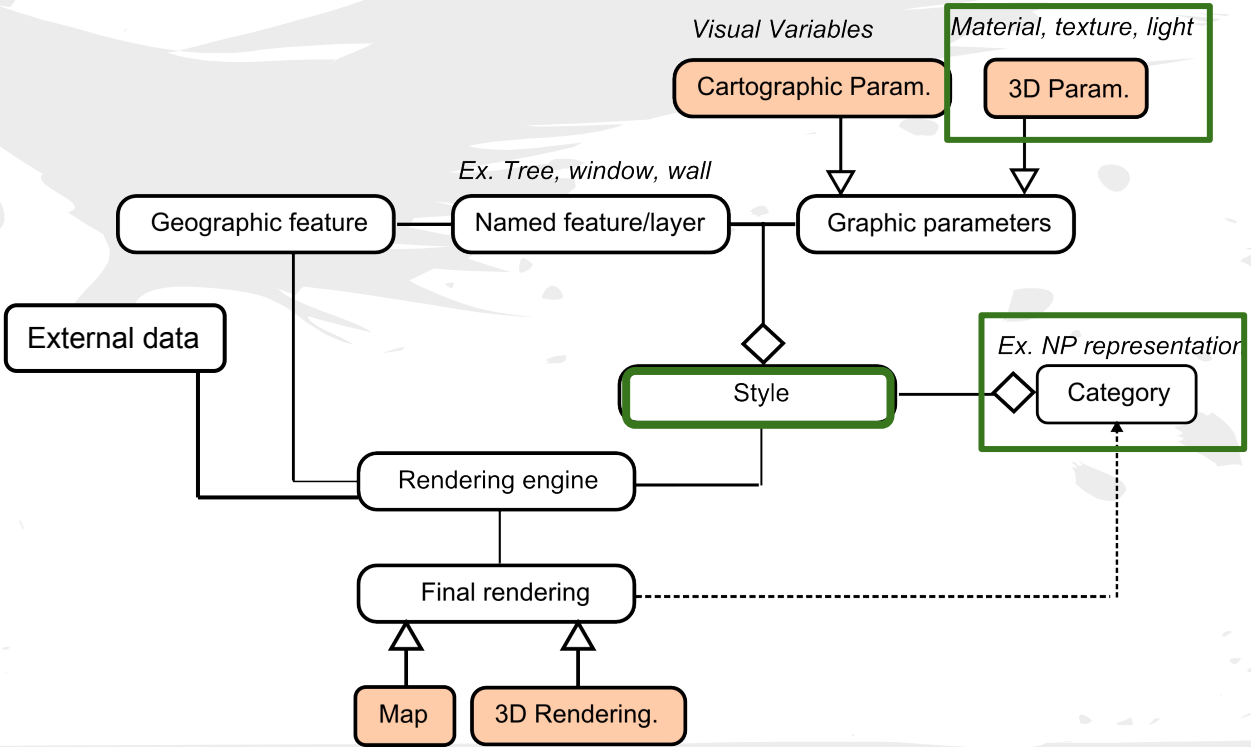
Style formalization

-> To identify controllable 3D graphic parameters



Style formalization

-> To identify representative and recognizable 3D categories of styles



Analysis of 3D renderings

Analysis of 3D renderings

15 3D renderings manually annotated:

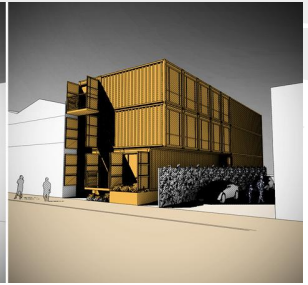
1. Overall categorization into categories
2. Feature extraction
3. Graphic parameters extraction

Analysis of 3D renderings

Level of Detail (+/-) and (Non)Photo-Realism







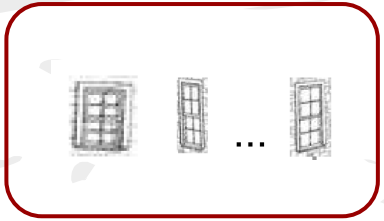




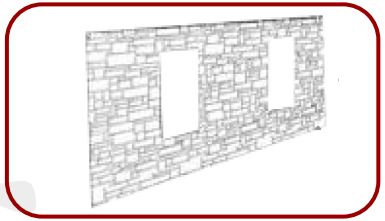
Analysis of 3D renderings

Analysis of 3D renderings

Features



Windows



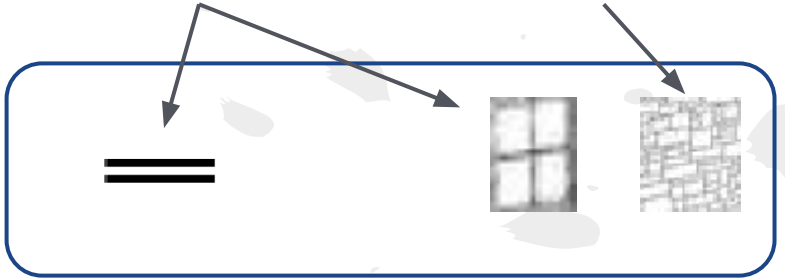
Wall

Category

ex.: non-photorealistic pencil draw style

Style

Graphic parameters



Visual variables

Textures

Analysis of 3D renderings

Features

Windows

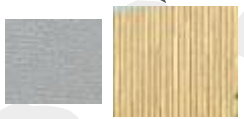
Wall

Graphic parameters

gridtexture (4,2), L=x, l=y

white background, black outline l'

Visual variables



Textures

Category ← Style

ex.: photorealistic

Analysis of 3D renderings

- a set of annotated 3D renderings
  - for each visible feature, a set of graphic parameters
- each 3D rendering into a category

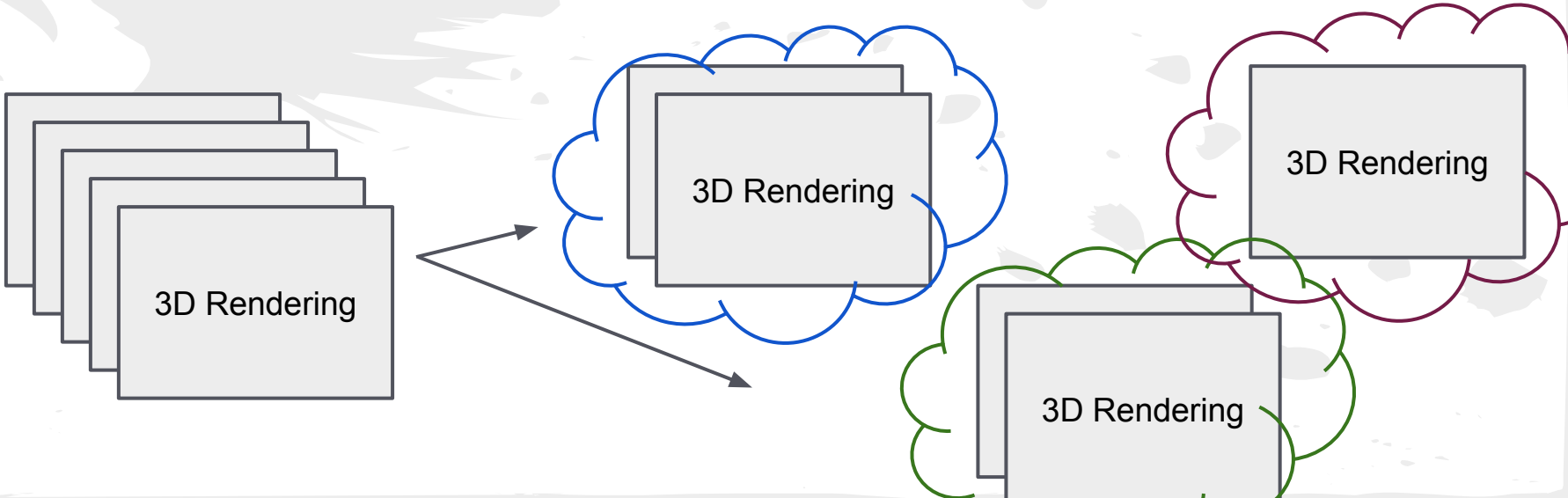
-> to link graphic parameters and 3D categories of style

3D Knowledge Base Production

Knowledge base production

Step 1: manual evaluation of a set of renderings

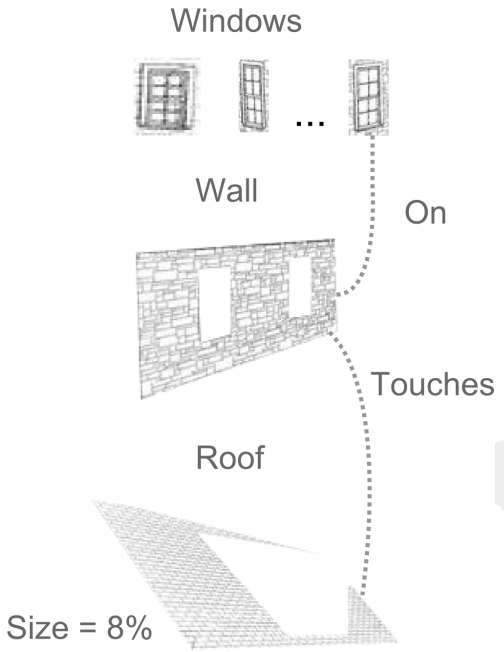
➔ Can be realized by external contributors



Knowledge base production

Step 2: extraction of relevant information

- ➔ Importance of a feature
  (i.e. screen size)
- ➔ Relationship between features
  (i.e. spatial relation to assess saliency)



Knowledge base production

Step 3 : extraction of patterns

➔ Inherent characteristics of graphic parameters

ex.: pencil-like strokes make think about a NPR rendering (level of stylisation)

➔ Relation between a feature and graphic parameters

ex.: unconventional colors used for some features make think about a NPR rendering (level of realism)

➔ Relation between represented features

ex.: same representation for touching features tends to decrease the level of detail of a representation (level of contrasts)

Conclusion & Perspectives

Very first steps towards a 3D style model

- Is 2D knowledge transferable to 3D?

➔ Begin of long term thoughts about 3D semiotics for better practices (to simplify design & implementation tasks)

➔ Interpolation between 3D styles (to simplify users' tasks)

➔ Understanding of 3D styles vs. users vs. tasks?

Thank you for your attention!

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