Uncertainty in 3D Reconstruction

Collecting sources

Documentation

Oral reports

Photographs

If the **reconstructed building no longer exists**, its reconstruction relies entirely on sources such as photographs and historical architectural drawings. The beginning of the work is to **collect and sort** them to work further.

Sources evaluation

'bLOD' criterium explanation

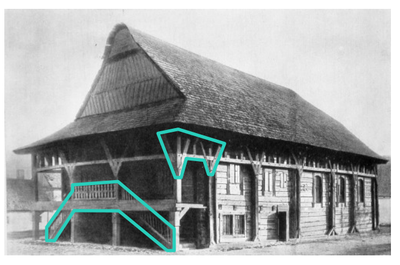
Cubical geometry	1
General shapes	2
Main divisions, characteristic el.	3
High level of details	4
All details	5

'C' criterium explanation

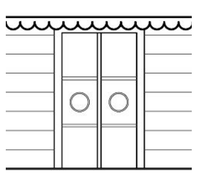
Pure assumption	0
Oral report/external analogy	1
Analogy w. the same building	2
Low quality photos	3
Historical surveys	4
Modern surveys, quality photos	5

The quality of sources varies. Prior to commencing digital reconstruction, it is necessary to estimate the **best possible Level of Details of reconstructed 3D model that can be achieved based on these sources (bLOD)**. Another criterion requiring evaluation is the **Certainty of the source**; for example, a photograph carries greater certainty than a drawing, and an analogy within the same building is more reliable than an external analogy. The source is always evaluated in the context of a specific element, as the same source material may have different bLOD (Level of Detail) and C (Certainty) values for different elements.

For instance, the photograph below provides more information regarding the elements of the half-timbered construction than the partially shaded balustrade of the external staircase.

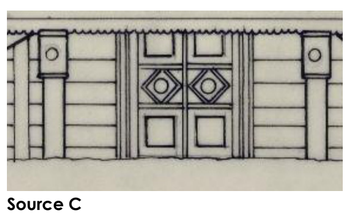


Exemplary source evaluation
Main door

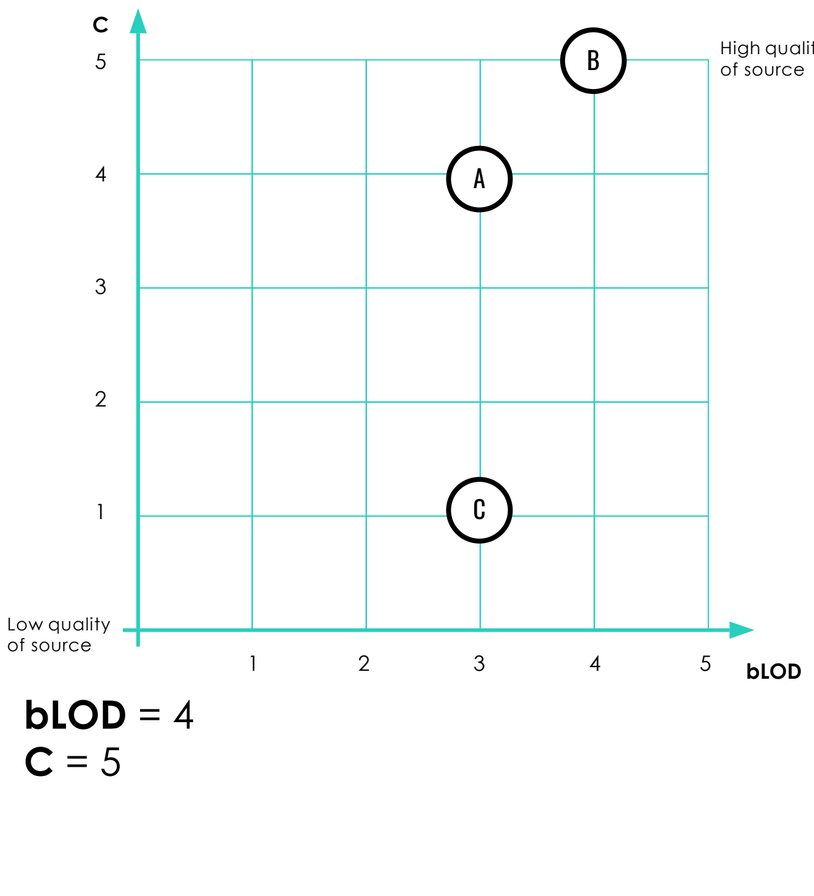


Source A

Source B



Source C



bLOD = 4
C = 5

3D Modeling

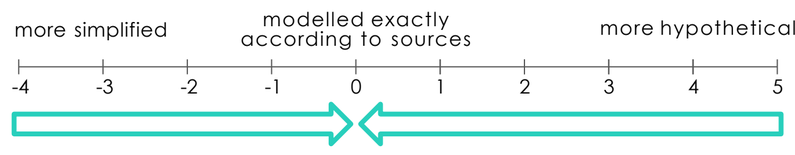
After evaluating the quality of sources, we proceed to the **modeling** stage. At this point, it is necessary to **determine the desired mLOD (modelled Level of Detail)** for each element of the reconstructed building.

Level of Hypothesis Calculation

After modeling we can **determine the LOH (Level of Hypothesis)** of given element of the building.

LOH is calculated in the following manner:

mLOD - bLOD = LOH



Assumption
LOH > 0

We model the element **and add more details than is available from the sources** (for example we resort to a form of analogy as a means of support). mLOD is greater than bLOD.

NOTE:analogy!

bLOD = 2 (little sources and analogies availible)
C = 2 (analogy w. the same building)
mLOD = 3
LOH = 1

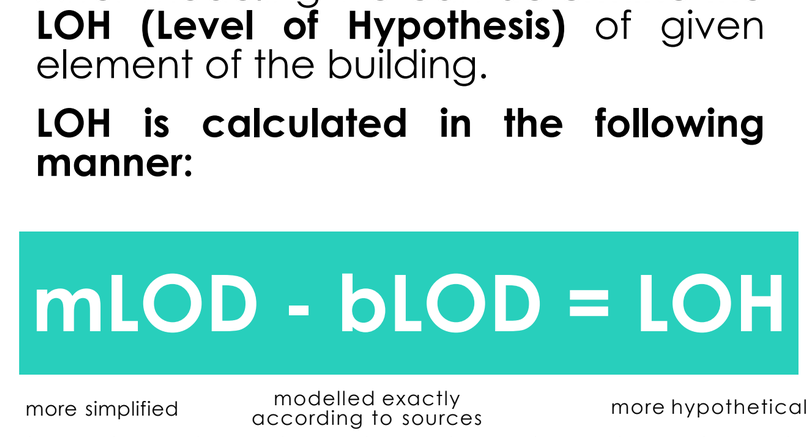
No hypothesis
LOH = 0

We model the element **exactly according to the sources.** If sources are good this is the most desired scenario. mLOD is equal to bLOD.

bLOD = 4
C = 5
mLOD = 4
LOH = 0

Simplification
LOH < 0

We model the element **and downscale the LOD** (for sake of lowering polygon amount in model or adjusting it to 3D print or AR). mLOD is lower than bLOD.



bLOD = 4
C = 5
mLOD = 3
LOH = -1

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