Smart Space Subdivision of Polyhedral Models for Indoor Navigation (SIMs3D)

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TU Delft

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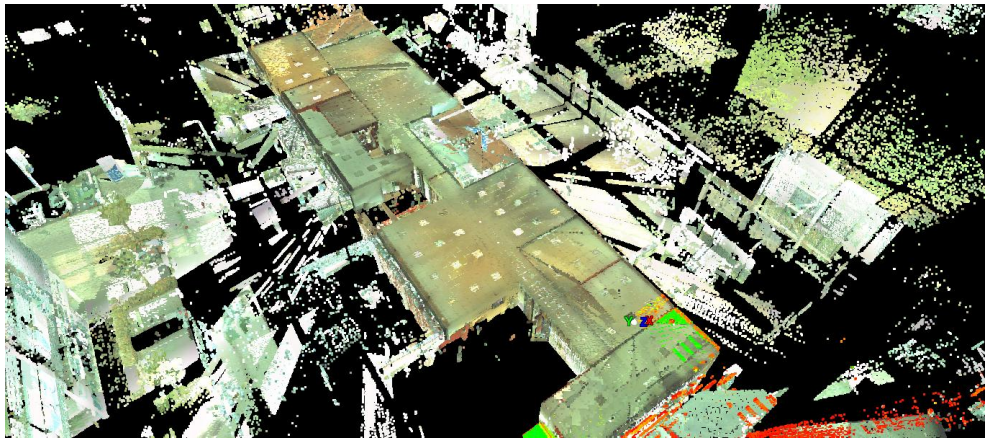
Completed Work

- Data acquisition
  - Scanning of fire brigade and Maassilo buildings with Leica.

Source: SIMs3D.net



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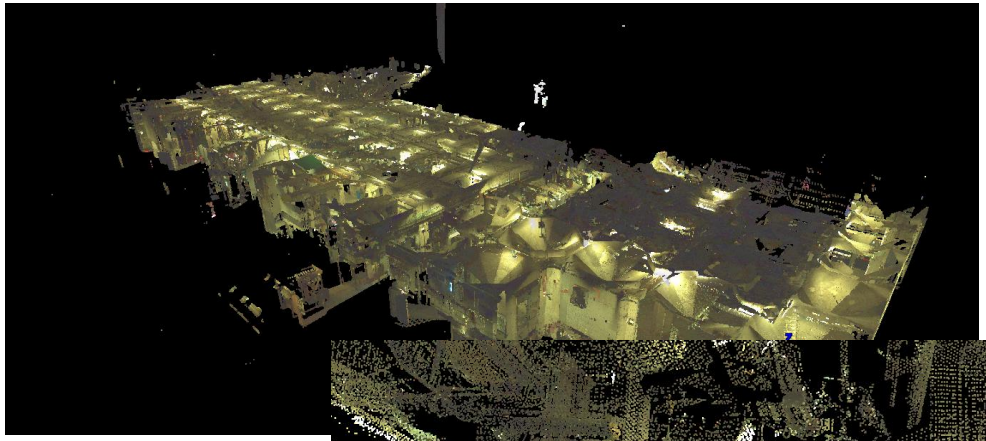

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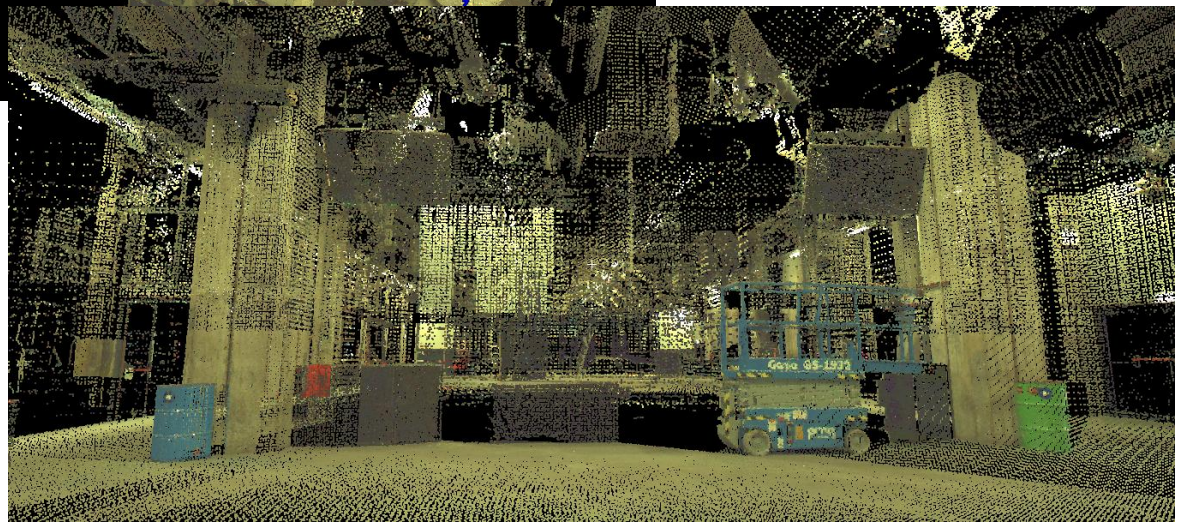
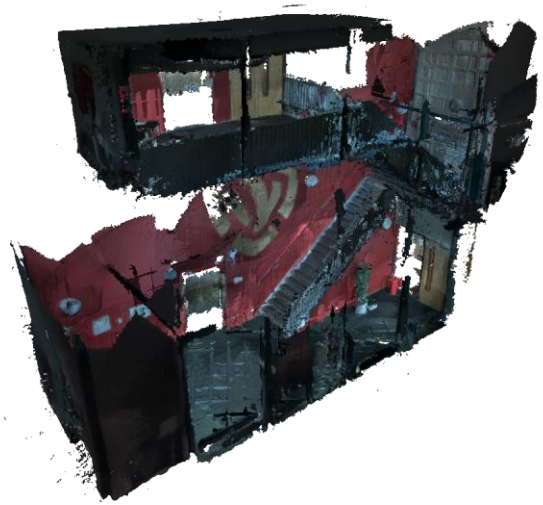
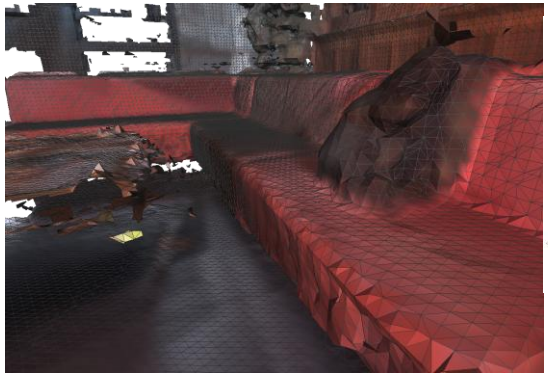


Completed Work

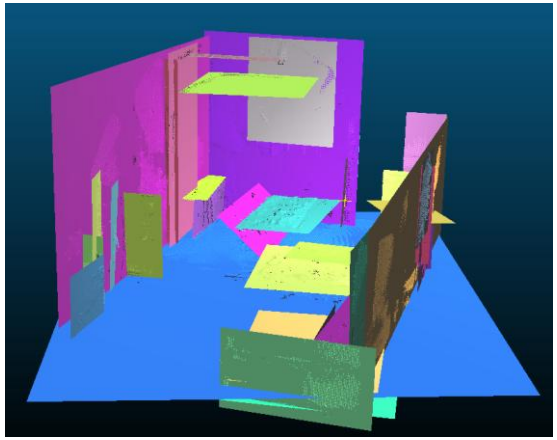
- Google Tango
  - Investigation of the tablet for indoor scanning usage.
  - Tested on different types of scenes.





Completed Work

- Google Tango
  - Study of performance and quality
  - Accepted article at the 13th ISPRS Congress (to be published in July 2016).

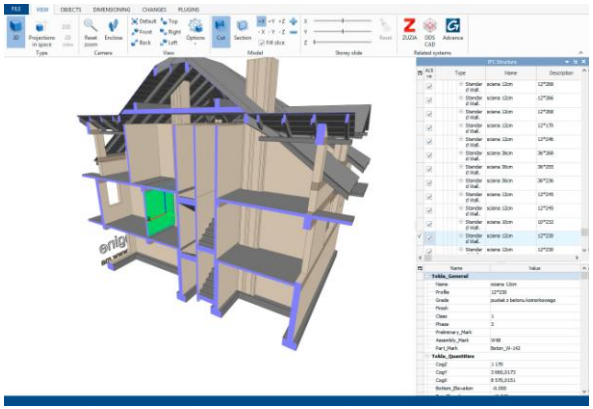


Completed Work

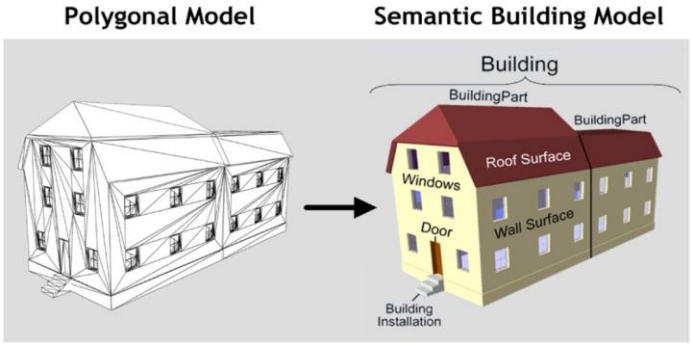
- Website
  - www.sims3d.net
- Communication
  - Twitter account: @SIMs3DProject
- Data sharing
  - Private server / access on demand

Ongoing Research

- Investigation of different representations
  - Octree
  - Voxel
  - Vector models (Polyhedral, IFC, CityGML LoD4)

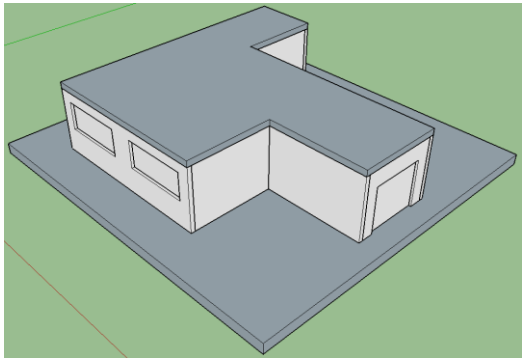


Source: BimVision



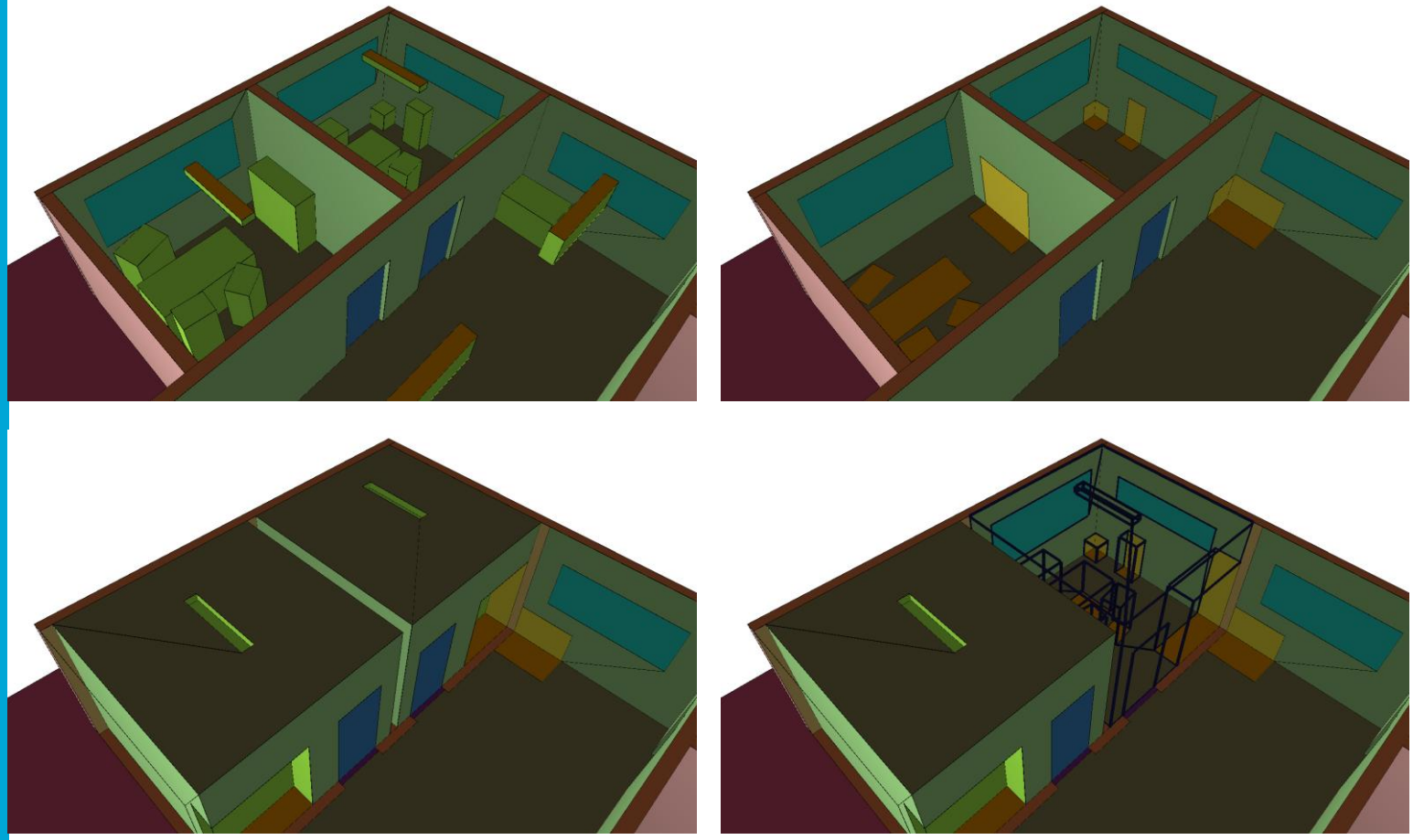
Source: Nagel et al. 2009

Production of test models



Ongoing Research

- Extraction of free space from vector models



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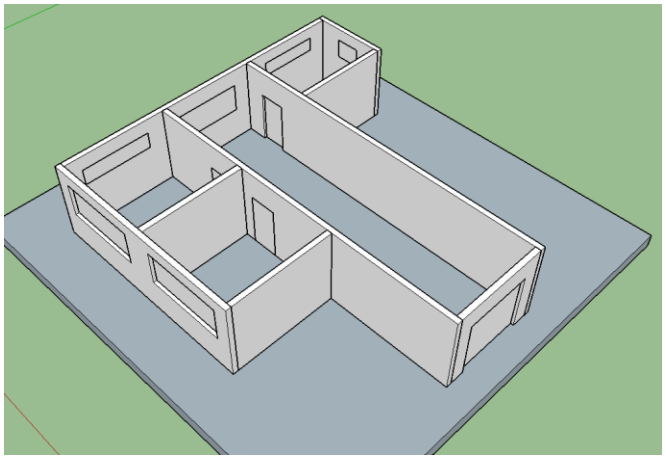

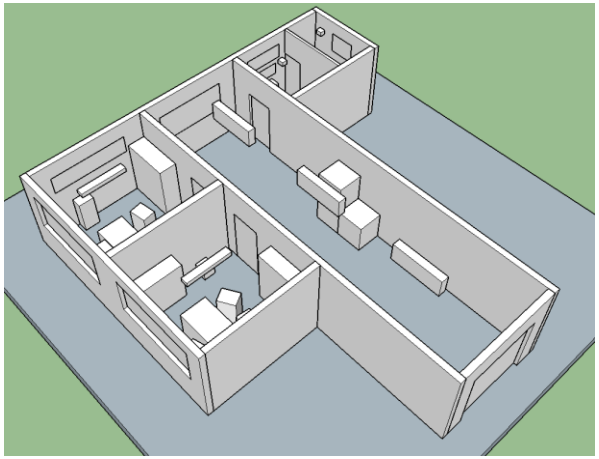

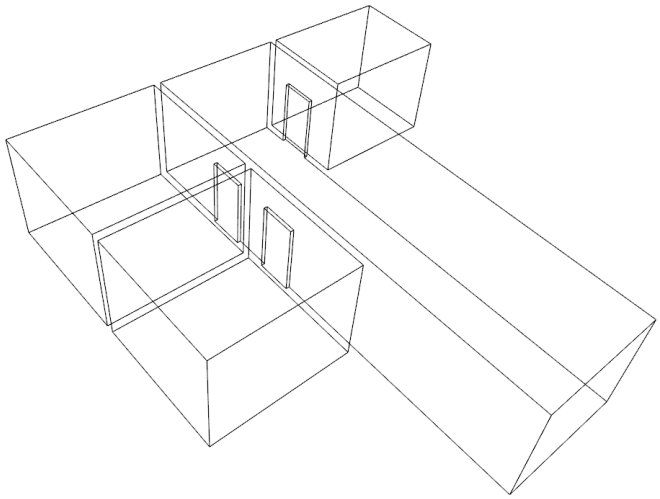

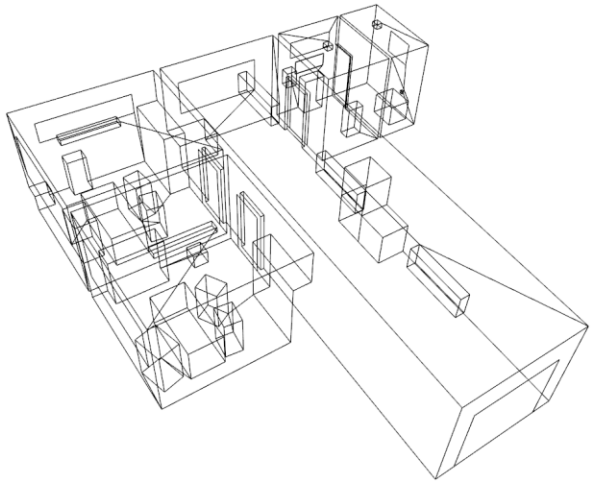

Ongoing Research

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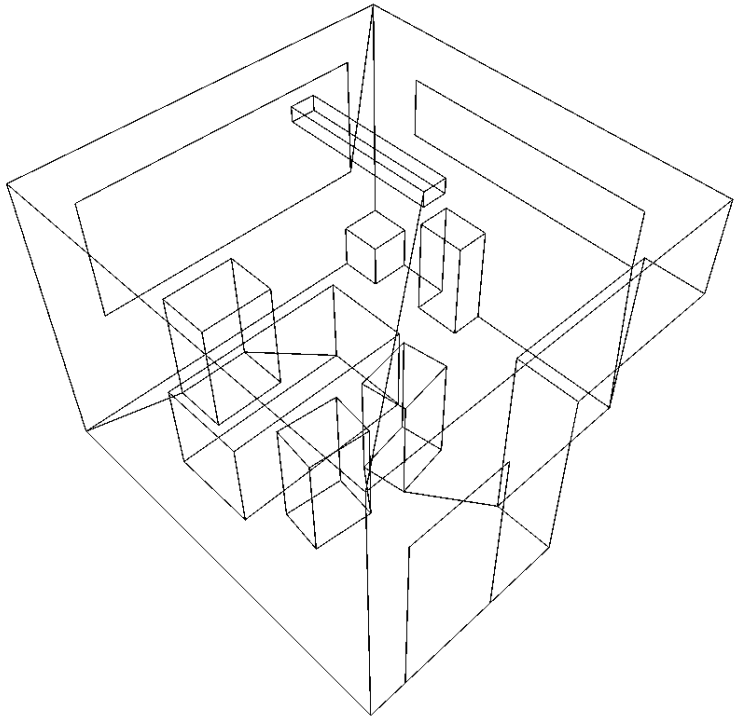
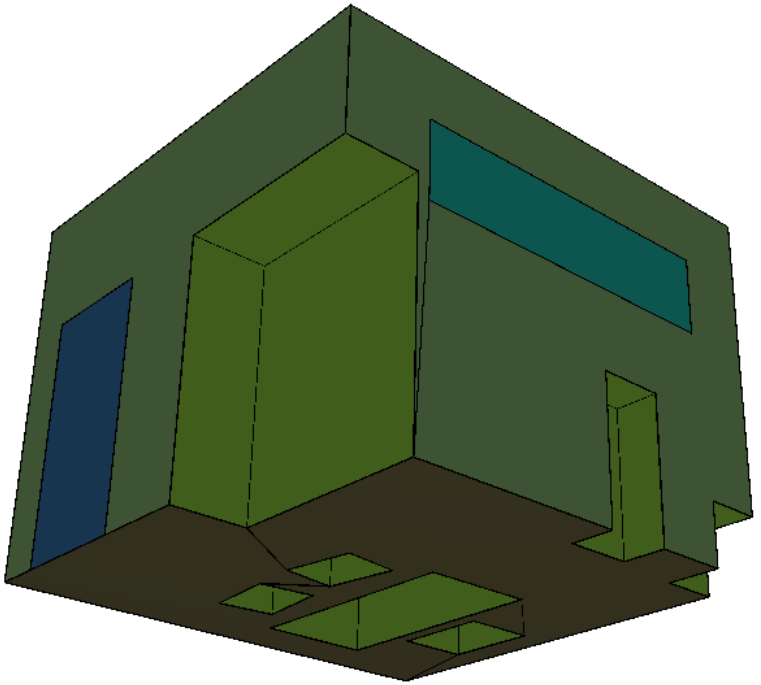
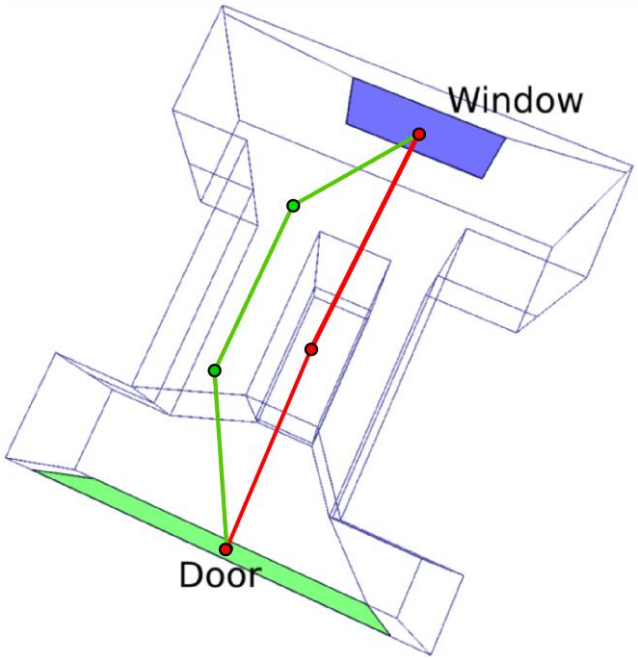
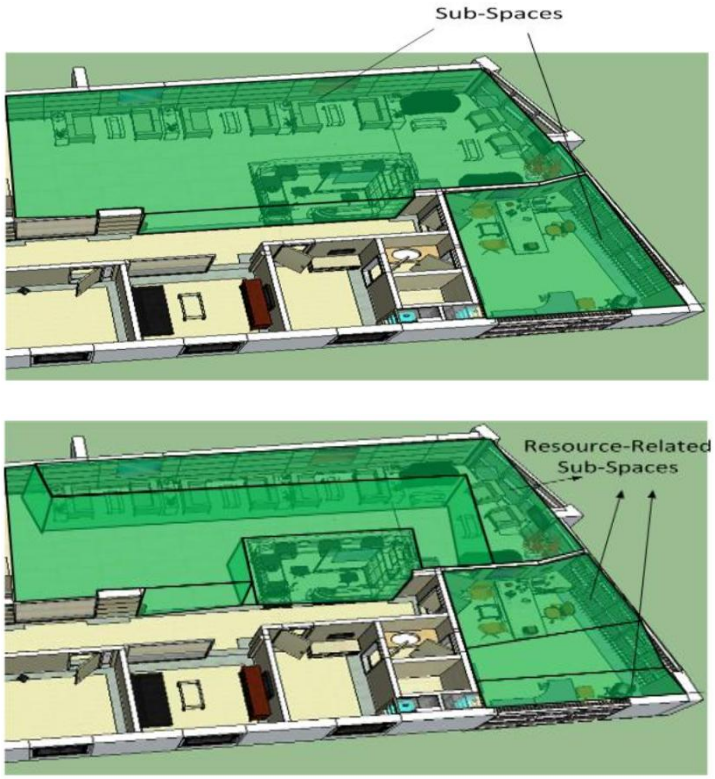




Ongoing Research

- Investigation of different representations
  - What to do with such volumes?
  - How to make them suitable for indoor path generation?

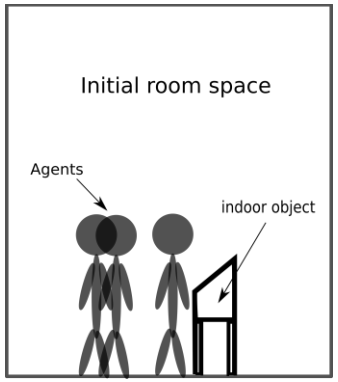


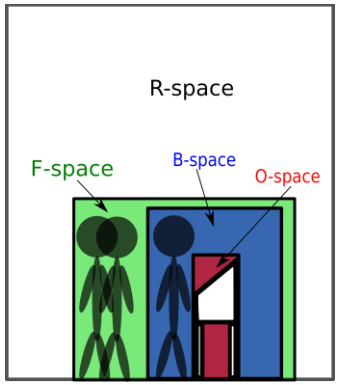


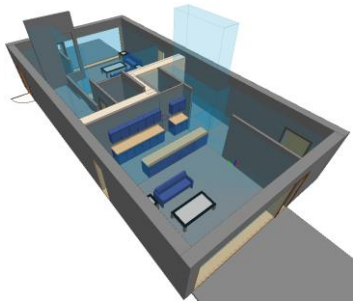
Source: Zlatanova et al. 2013

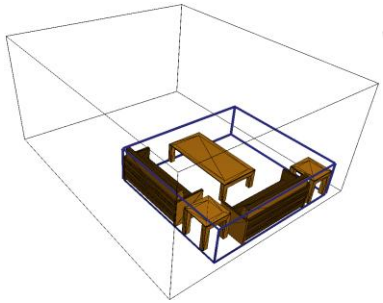
Ongoing Research

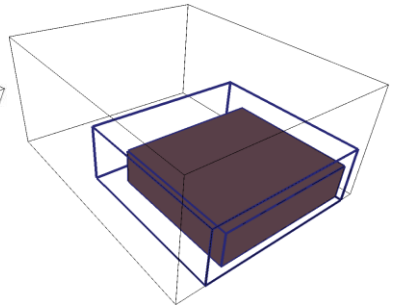
- Study of possible subdivision approaches
  - Subspacing framework

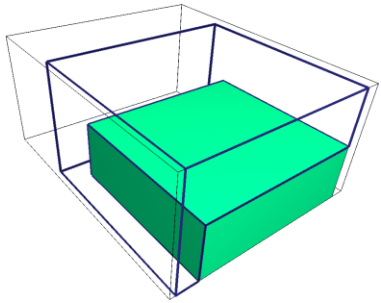






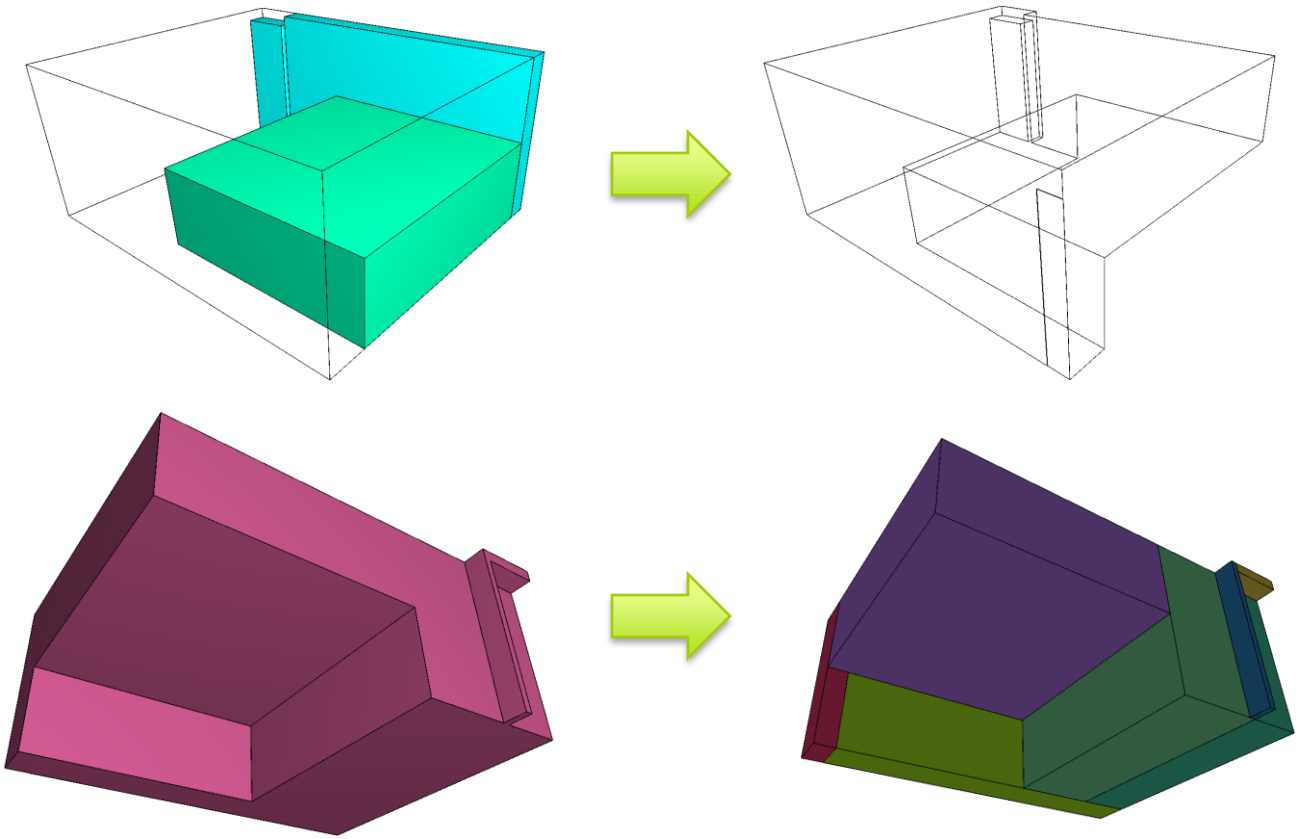






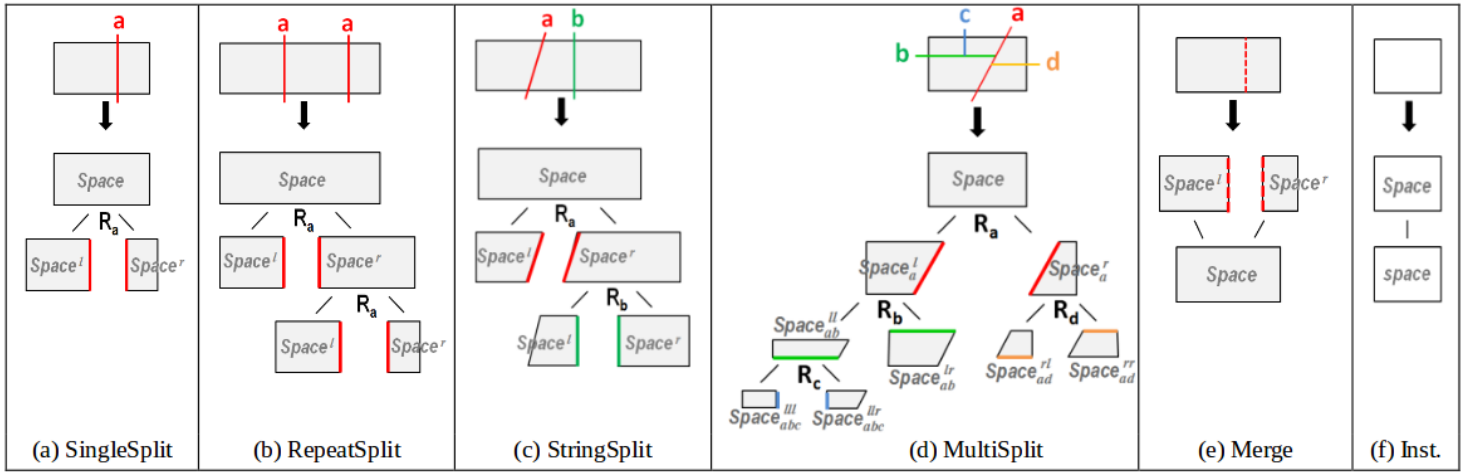
Ongoing Research

- Study of possible subdivision approaches
  - Convex decomposition



Future Plans…

- Grammar based subdivision.
  - Set of rules/operations to generate spaces



Source: Becker et al. 2013

- Consider dynamic changes of spaces.
- Deeper investigation of the Tango tablet possibilities.

References

- Becker, S., Peter, M., Fritsch, D., Philipp, D., Baier, P., & Dibak, C. (2013). Combined grammar for the modeling of building interiors. Proceedings of the ISPRS Acquisition and Modelling of Indoor and Enclosed Environments.

- Nagel, C., Stadler, A., & Kolbe, T. H. (2009). Conceptual requirements for the automatic reconstruction of building information models from uninterpreted 3D models. Proceedings of the International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 46-53.

- Zlatanova, S., Liu, L., & Sithole, G. (2013, November). A conceptual framework of space subdivision for indoor navigation. In Proceedings of the Fifth ACM SIGSPATIAL International Workshop on Indoor Spatial Awareness (pp. 37-41). ACM.