

## A Sweep-Plane Algorithm for the Simplification of 3D Building Models in the Application of Wind Simulation

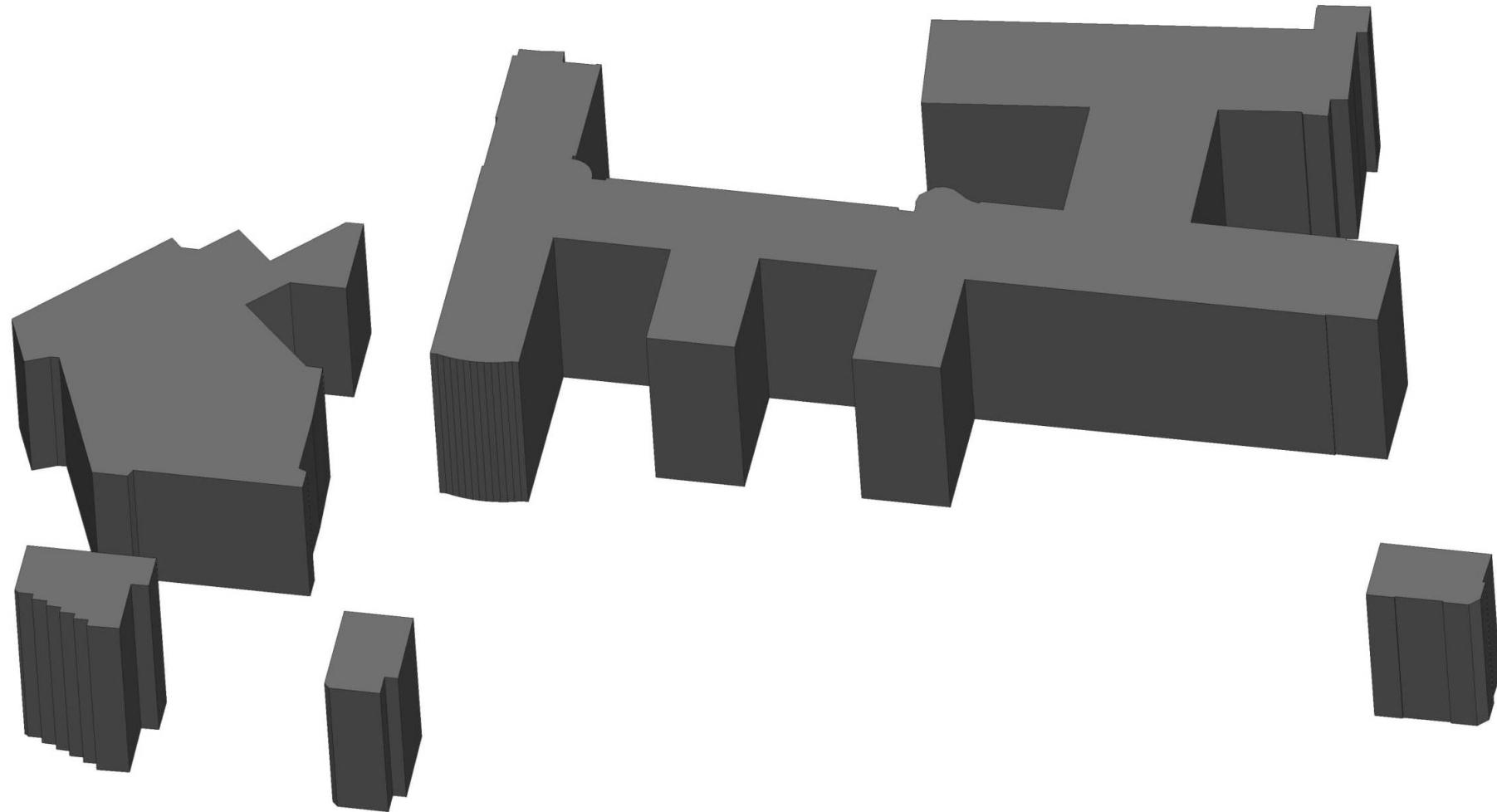
**3D GeoInfo Conference 2018**

**02.10.2018**

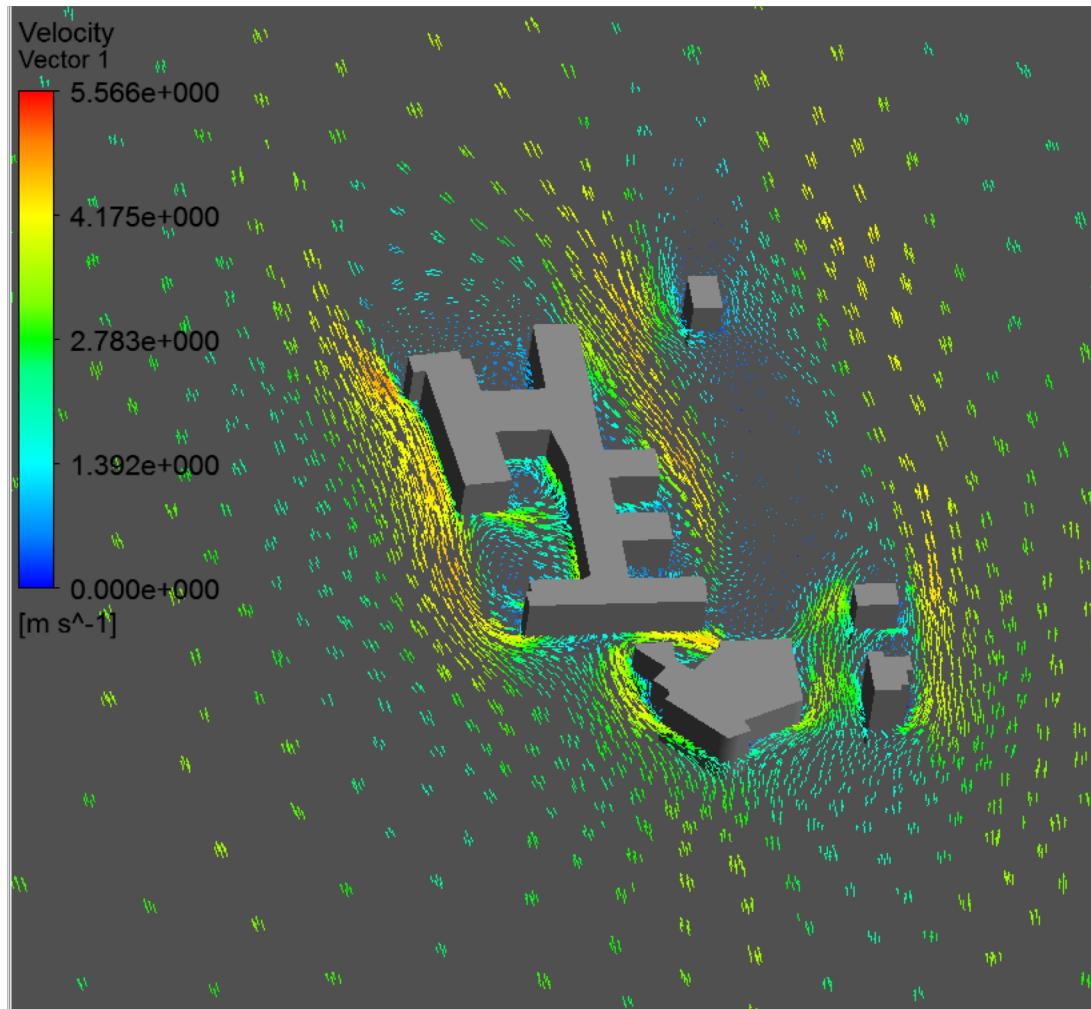
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Dr. Martina Deininger (HFT Stuttgart),  
Prof. Dr.-Ing. Martin Kada (TU Berlin),  
Prof. Dr. Margitta Pries (Beuth Hochschule Berlin),  
Prof. Dr. Ursula Voß (HFT Stuttgart)**



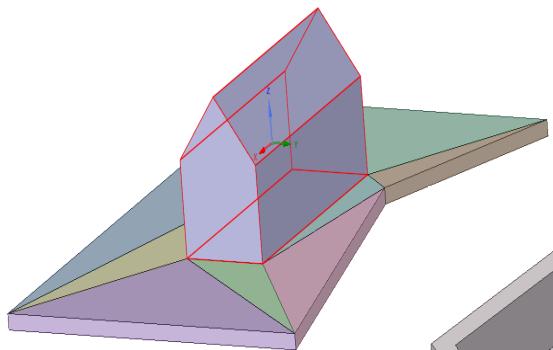
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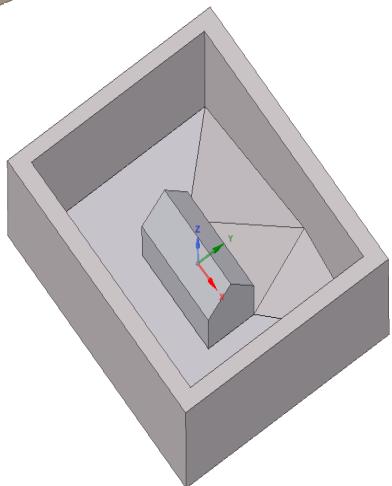
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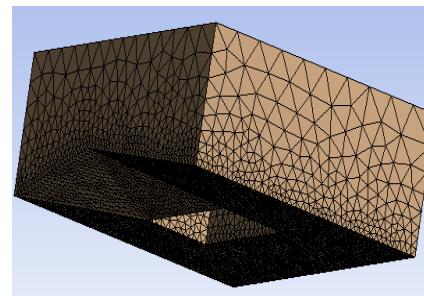
## Creating the computational domain for CFD



Building with terrain



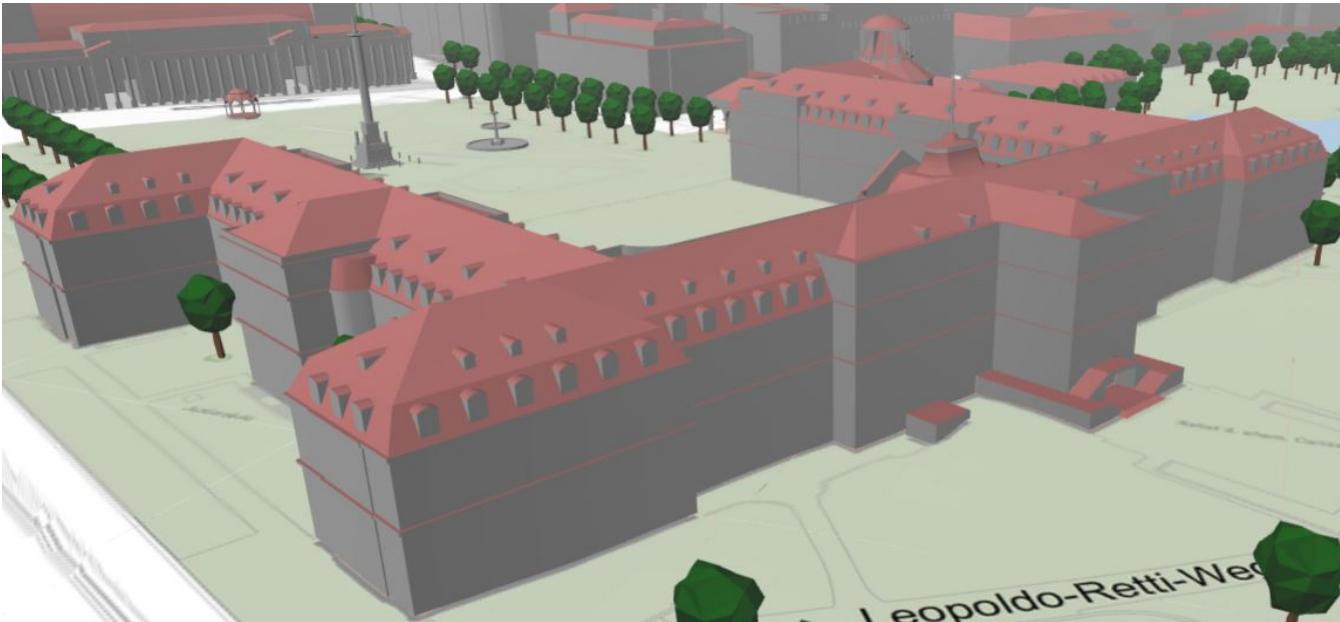
Create a box around  
the building(s)



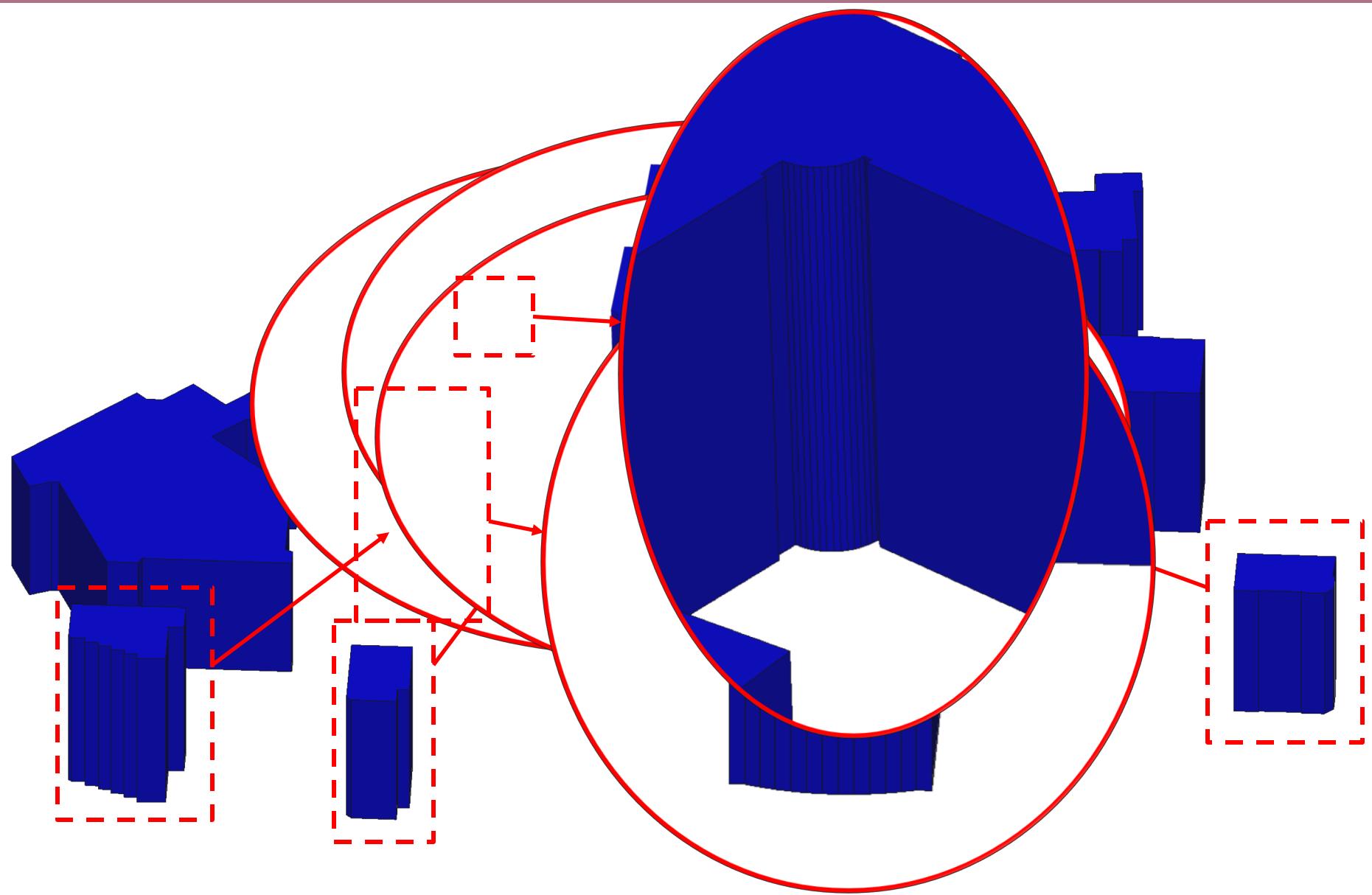
The interior of the box  
represents the air and  
is filled with a spatial  
mesh

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i\_city : Intelligente Stadt

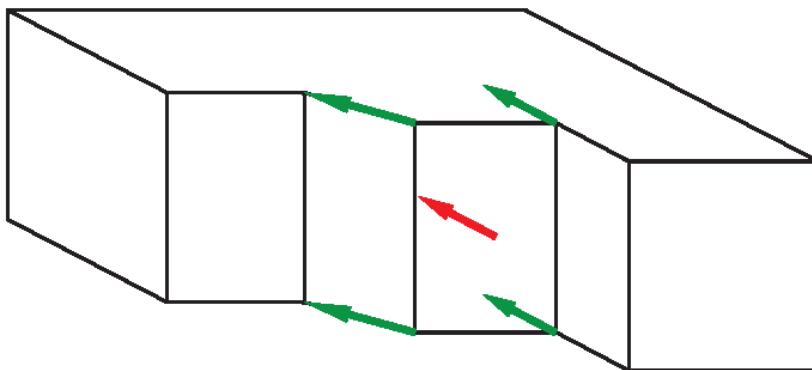


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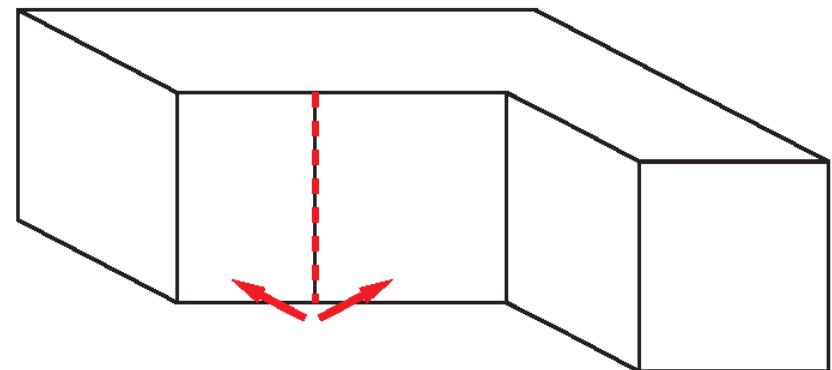


## The Sweep-Plane Algorithm

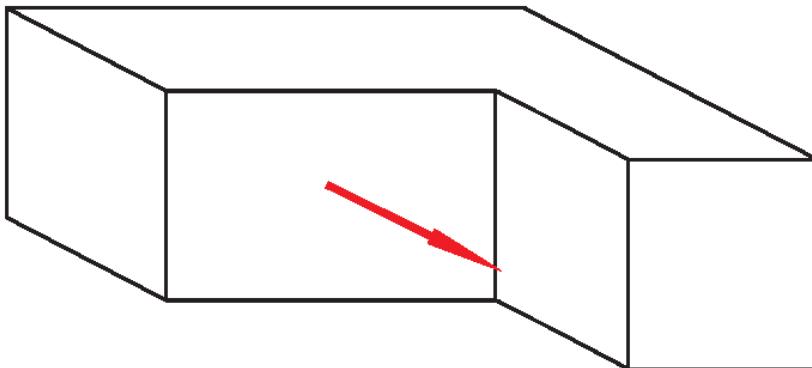
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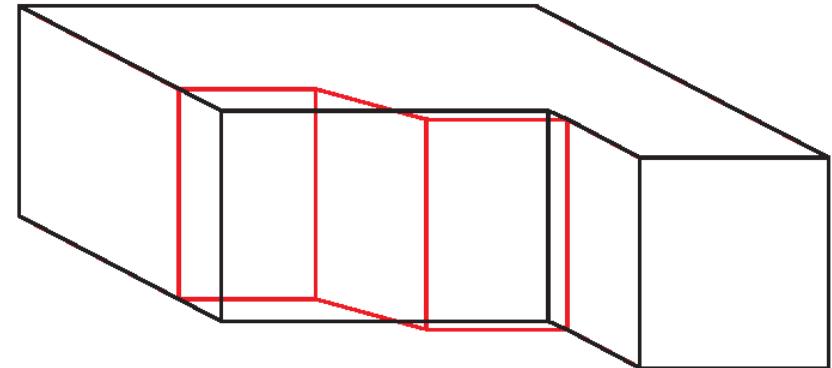
Sweep of a face along its normal (red).  
The Vertices are moved along edges (green).



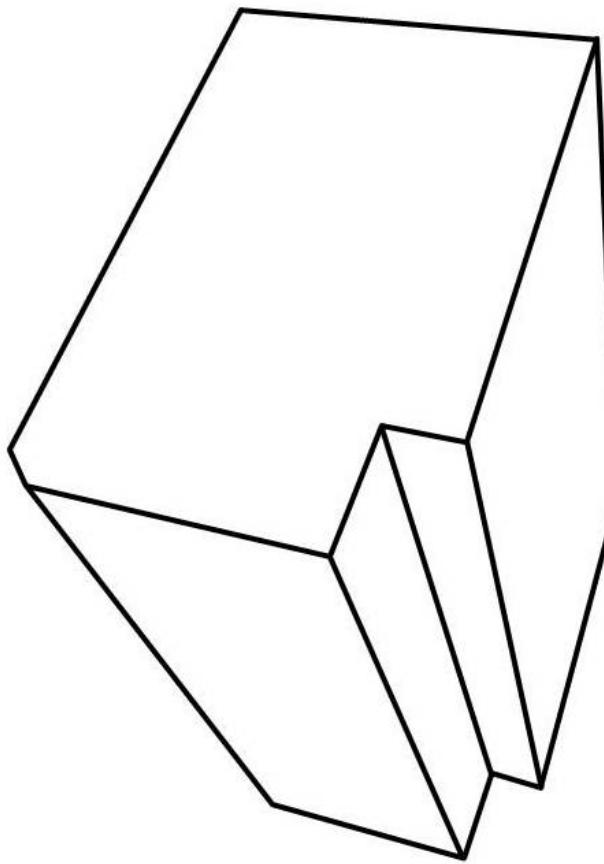
Merging of coplanar faces.



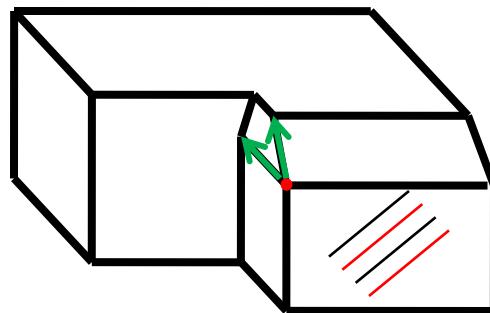
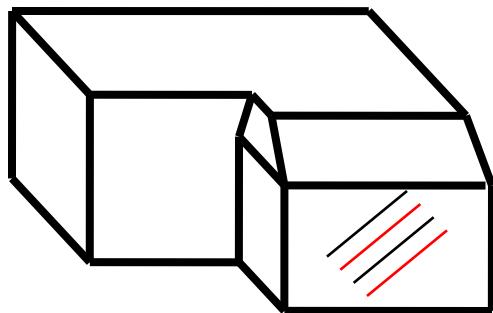
DeSweep of the merged faces.



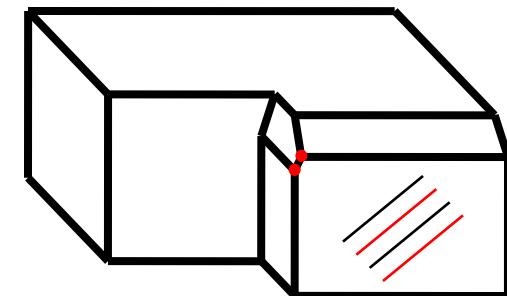
Simplified Building model in comparison to the  
original one.



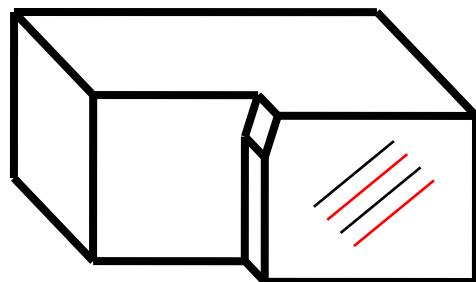
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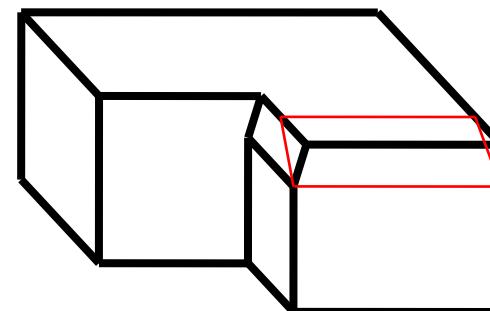
Vertex can be moved along two edges



Splitting of the Vertex and a new creating of a new edge



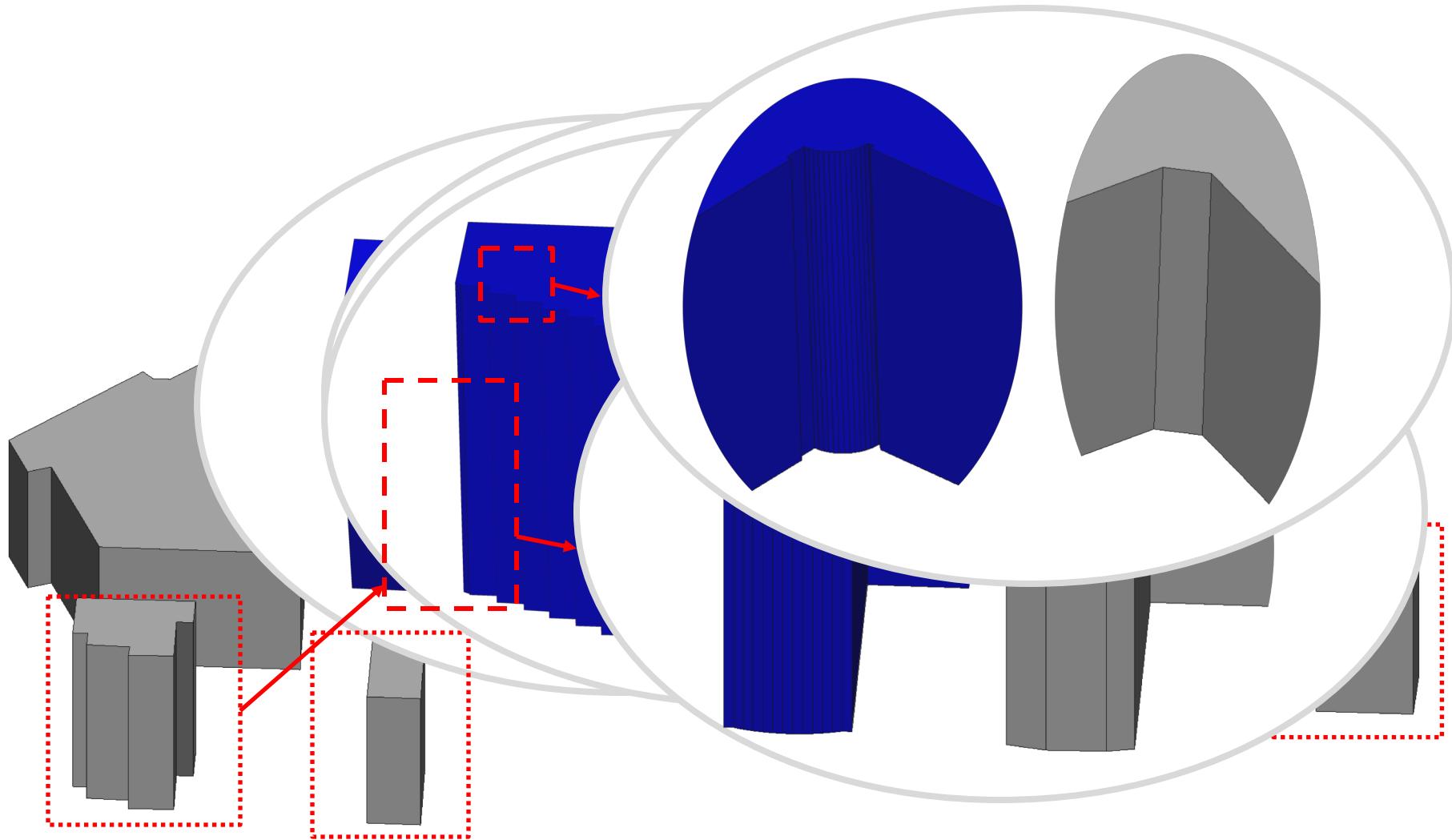
Building model after the sweep



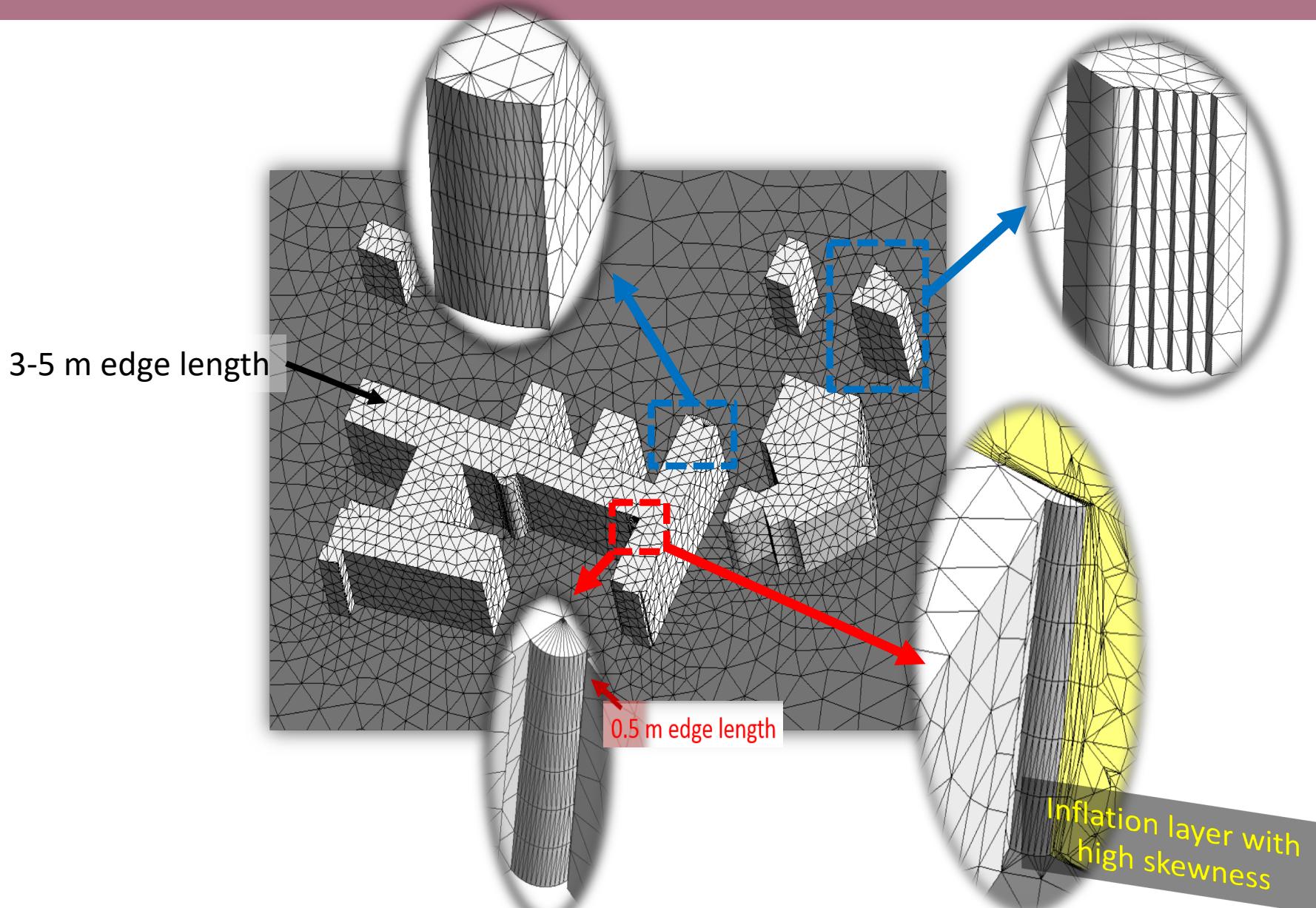
Simplified building model after desweep in comparison to the original one.

## Results

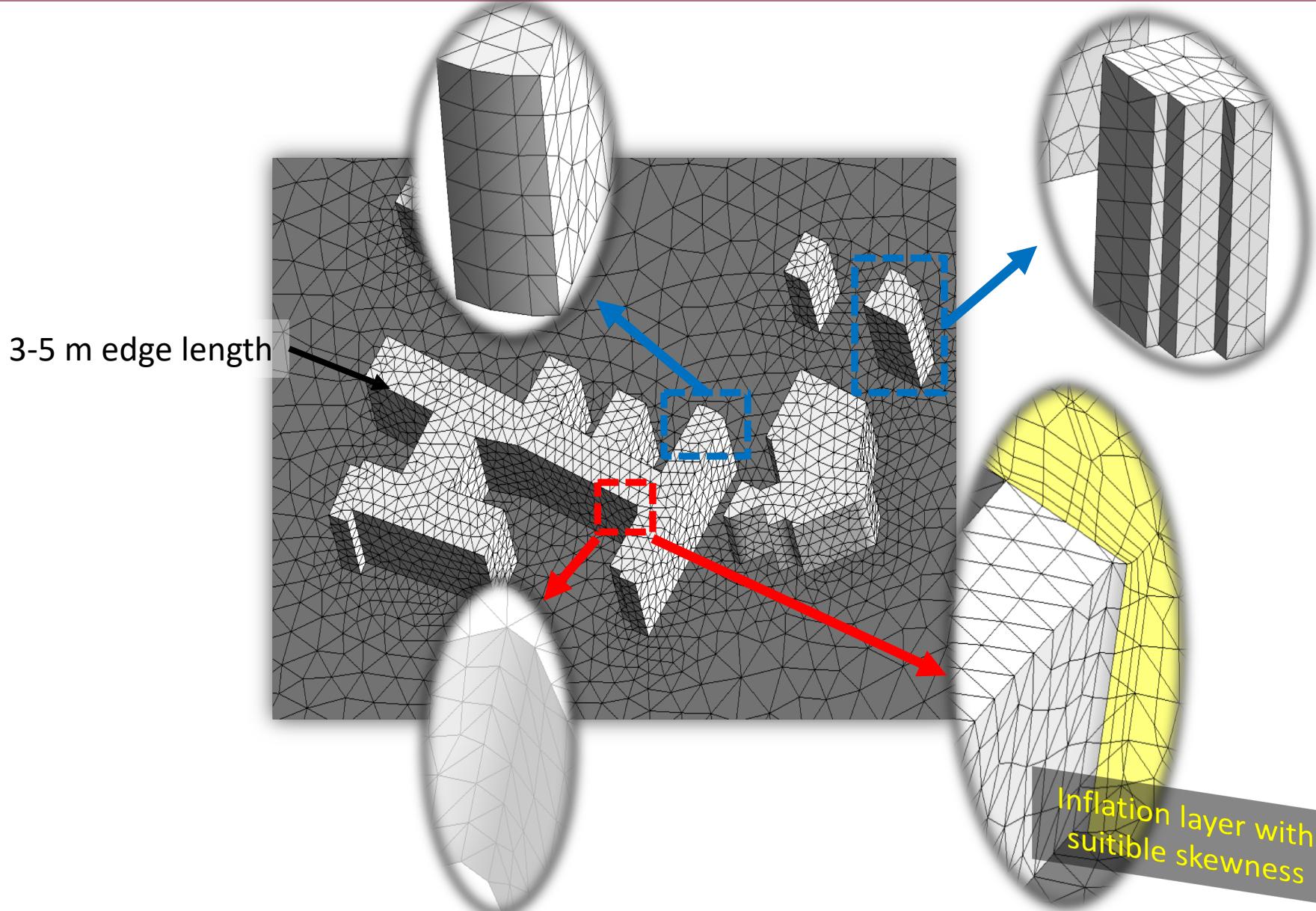
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## Conclusion

- CityGML can be translated into the CAD world, but cityGML models contain too many details for CFD simulations on larger areas. Therefore the models have to be simplified.
- The Sweep-Plane algorithm is a good starting point for the automated processing of 3D city models.
- The presented algorithm alone is not enough to fully process the models for CFD simulations.

**Thank You for Your Attention!**

Contact

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