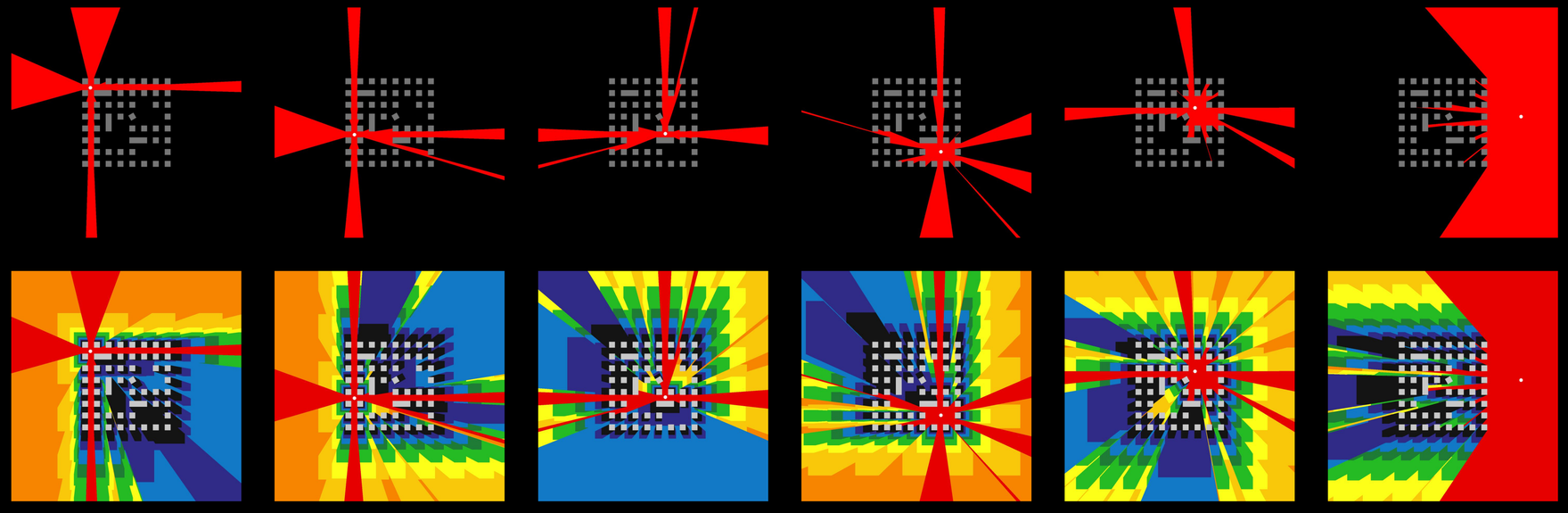
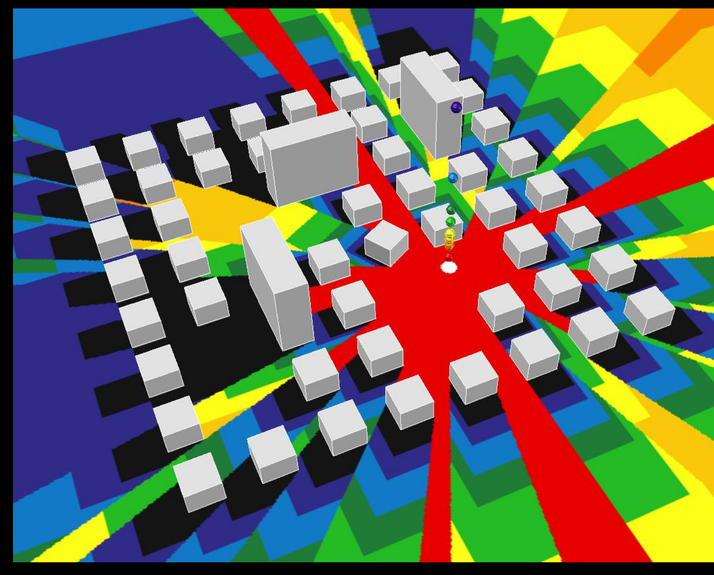
Application of 3d Isovists
in Visual Impact Simulations of Tall Buildings

10th International
Space Syntax Symposium
13-17 July 2015, London
SSS10

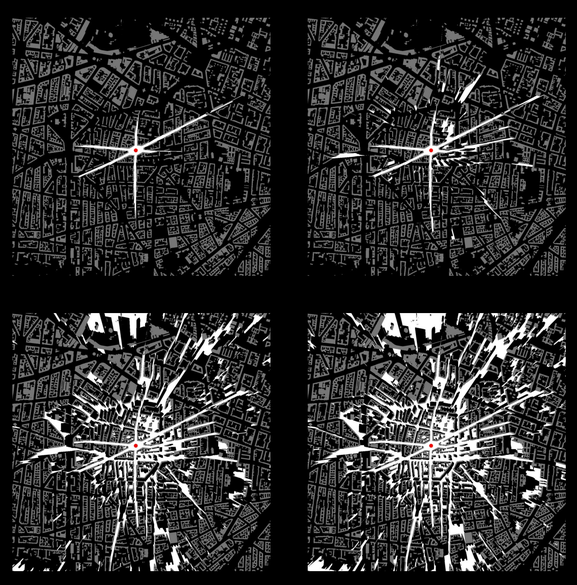
POSTER #350

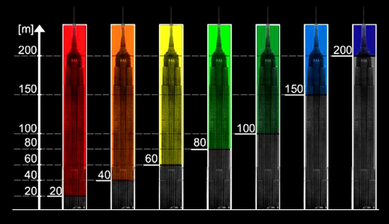
Tall Buildings: The planned height of buildings is subject of discussions, conflicts and controversies, especially for historically composed cities in Europe. This trend is growing worldwide. Most of tall buildings in Europe were built in this century. In many instances the negative impact of tall buildings on the cityscape is the result of mistakes in the planning process, disregarding of important views in analyses, etc. To bring the discussion to the level of objective and measureable arguments it is necessary to develop tools that enable analyzing the phenomenon at its geometrical level.

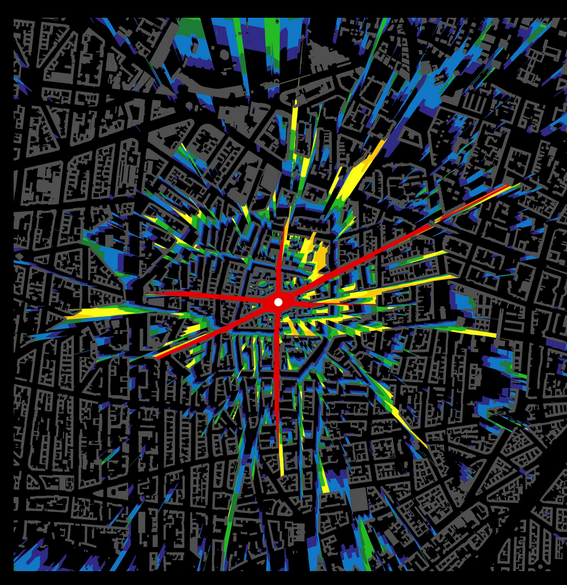




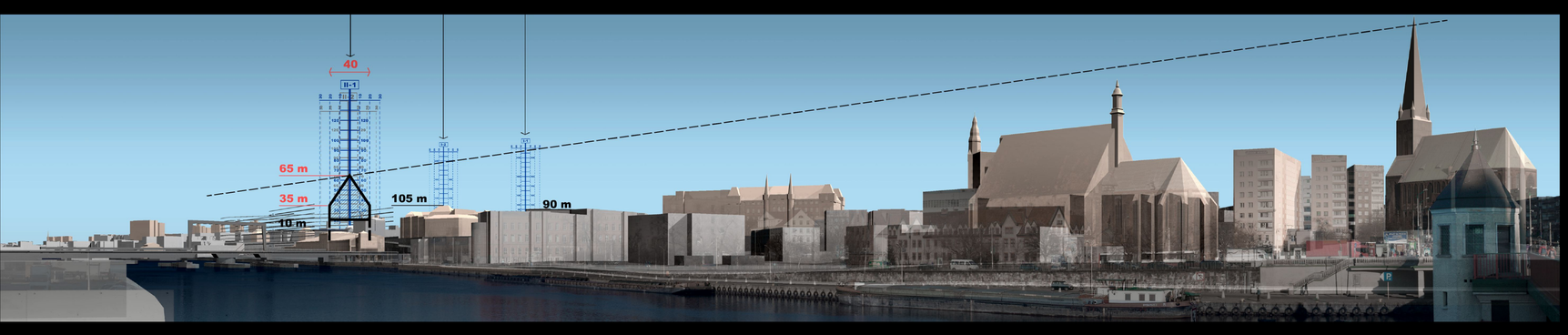
Visual Impact Size (VIS): The method provides urban analyses based on 3d Isovists, focused on impact simulations of tall buildings on cityscape. It allows: (a) to identify all locations in the city from which the planned tall building can be seen (depending on it's height); (b) to show not only visual range but also imaging of the impact power of the building. The figure above presents 2d Isovists and VIS-simulations for eight thresholds of the building height: 20, 40, 50, 60, 80, 100, 150 and 250m, and different locations in a test model.

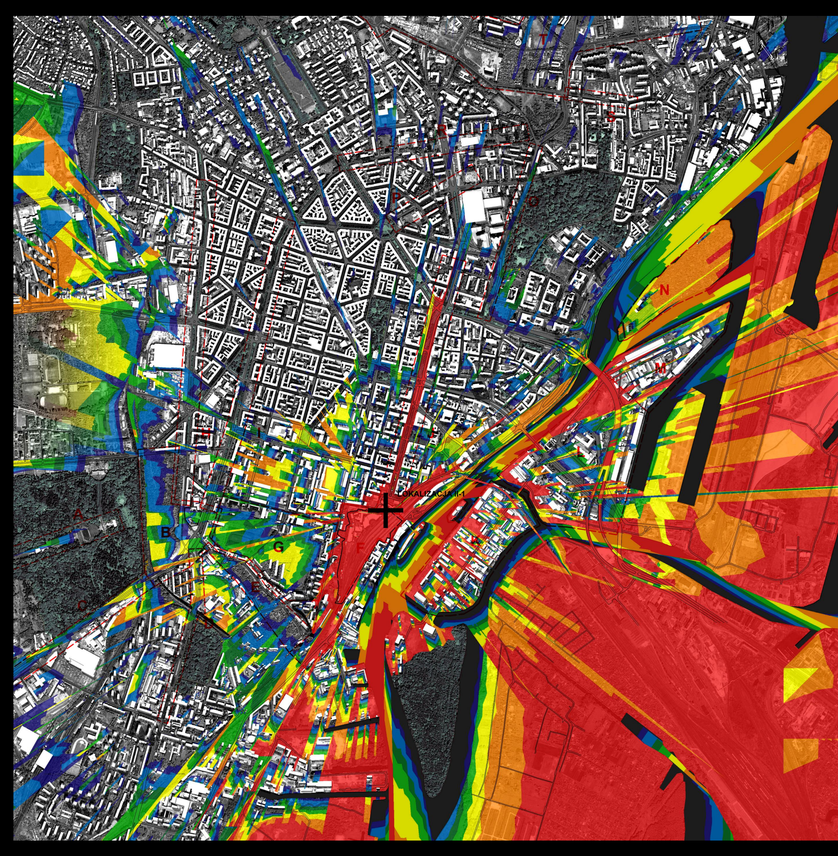




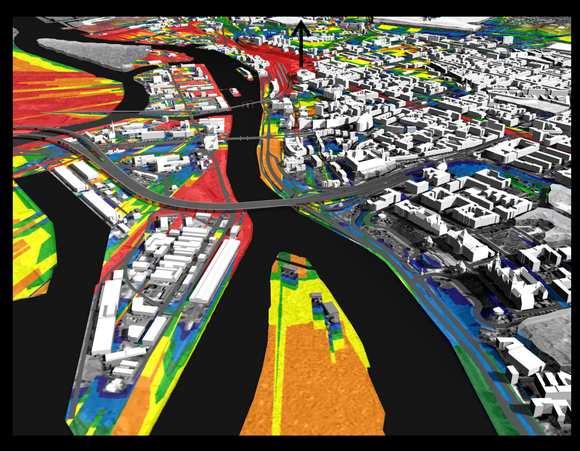


VIS & CtyGML: VIS method uses 3d virtual city models as basis for computation. Simulations shown above were implemented using a computer program developed by the authors (C++), which interprets models of cities in the CityGML format using semantics of the standard to optimize the computation. The figure above presents impact of an hypothetical tall building located in Berlin (Charlottenburg), for a 9,0km2 area. From left: CityGML model LoD2; growth of the visual impact of the building with increasing its height (20, 60, 80, 100, 150, and 200m); in the right: VIS-simulation.





Application in Planning: VIS was used by authors in professional urban praxis for the first time in 2007, to verify potential locations of tall buildings in Szczecin, Poland. The studies were implemented under a contract with the local government (Czyńska et al., 2014, 2007). The studies analyzed in total 10 potential investment projects. The aim was to determine the impact of planned facilities on the city landscape while taking into consideration cultural values and define detailed guidelines concerning their height and form. The figure above presents VIS simulations for one of the analyzed locations of tall building in Szczecin and emulation of city panorama form the river side.



Czyńska, K. (2014), 'Geometrical Aspects of City Skyline – Tall Building Analysis'. In: Schröcker, H.-P. and Husty, M. (eds.), Proceedings of the 16th ICGG, Innsbruck: Faculty of Engineering Science, p. 519–530.

Czyńska, K., Marzęcki, W., Rubinowicz, P. (2007), Analyses of visual impact and definition of spatial guidelines for high buildings in Szczecin, Urban Study commissioned by Department of Spatial Planning, City of Szczecin.

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Berlin Business Location Center
West Pomeranian University of Technology in Szczecin
norway grants
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