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CONCEIVING DESIGN SCHEMES OF URBAN ARCHITECTURE THROUGH VOLUMETRIC SITE ANALYSIS

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1. Introduction

Information on solar radiation, airflow, and visibility is of key importance to develop sustainable design concepts. The analysis of these features in high and dense urban settings is however a difficult task due to the often intricate morphology of the built environment. A new methodology entitled Volumetric Site Analysis (Leidi and Schlüter, 2013) has been recently developed to address this issue. This poster presents a series of examples that illustrate how the use of this methodology can catalyse the conception of innovative design concepts.

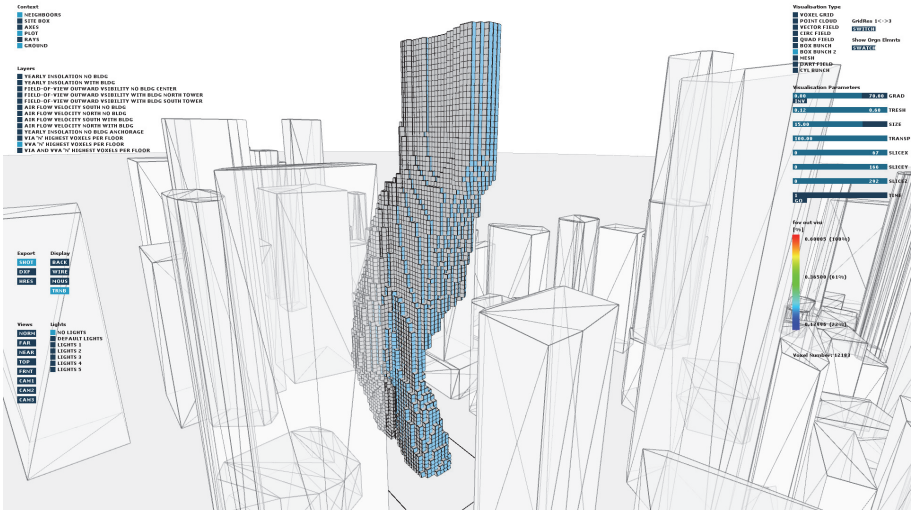

Figure 1. Visualization framework and user interface with an example of design scheme.

2. Methods

Aware that other factors of architectural relevance are neglected, this methodology focuses on the physical perspective related to the environment of an urban site. The process starts with the selection by the designer of the physical proprieties of interest and continues through the phases of analysis, evaluation, and synthesis. The results of the analysis process are made available in a visualization framework with an interactive interface (Figure 1). The joint presence of multiple variables (solar radiation, air velocity, sight) and the possibility to interact with multiple dimensions (quantitative, volumetric, dynamic, directional) allows gaining awareness on how these proprieties are distributed through the site. This consents to recognize volumetric patterns and to investigate multi-variable or multi-dimensional correlations through space and time. Finally this information can be coupled with particular project demands (space, daylight, energy, etc.) allowing the identification of site-specific potentials for the synthesis of innovative design solutions.

3. Conclusion

The design schemes developed through this study reveal a variety of novelties that can emerge using the proposed methodology. Examples are new formal logics (Figure 1), novel configurations of exterior surfaces, or optimal distribution of uses in mixed-use buildings. The inclusion of the environmental information at the beginning of the conceptual process allows to address in a new way a fundamental question of architectural design: the transfer of quantitative information into qualitative design solutions. In early-design simulations (Attia, 2011) or heuristic design processes (Leonardo and Oscar, 2013) an initial design sketch is a necessary and constraining prerequisite. In comparison this new methodology allows to retrieve the initial propositions directly from the environment and to enclose them in novel performance-based design concepts that would not be conceivable otherwise.

Acknowledgements

This research work was supported by the Swiss National Science Foundation (SNSF).

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