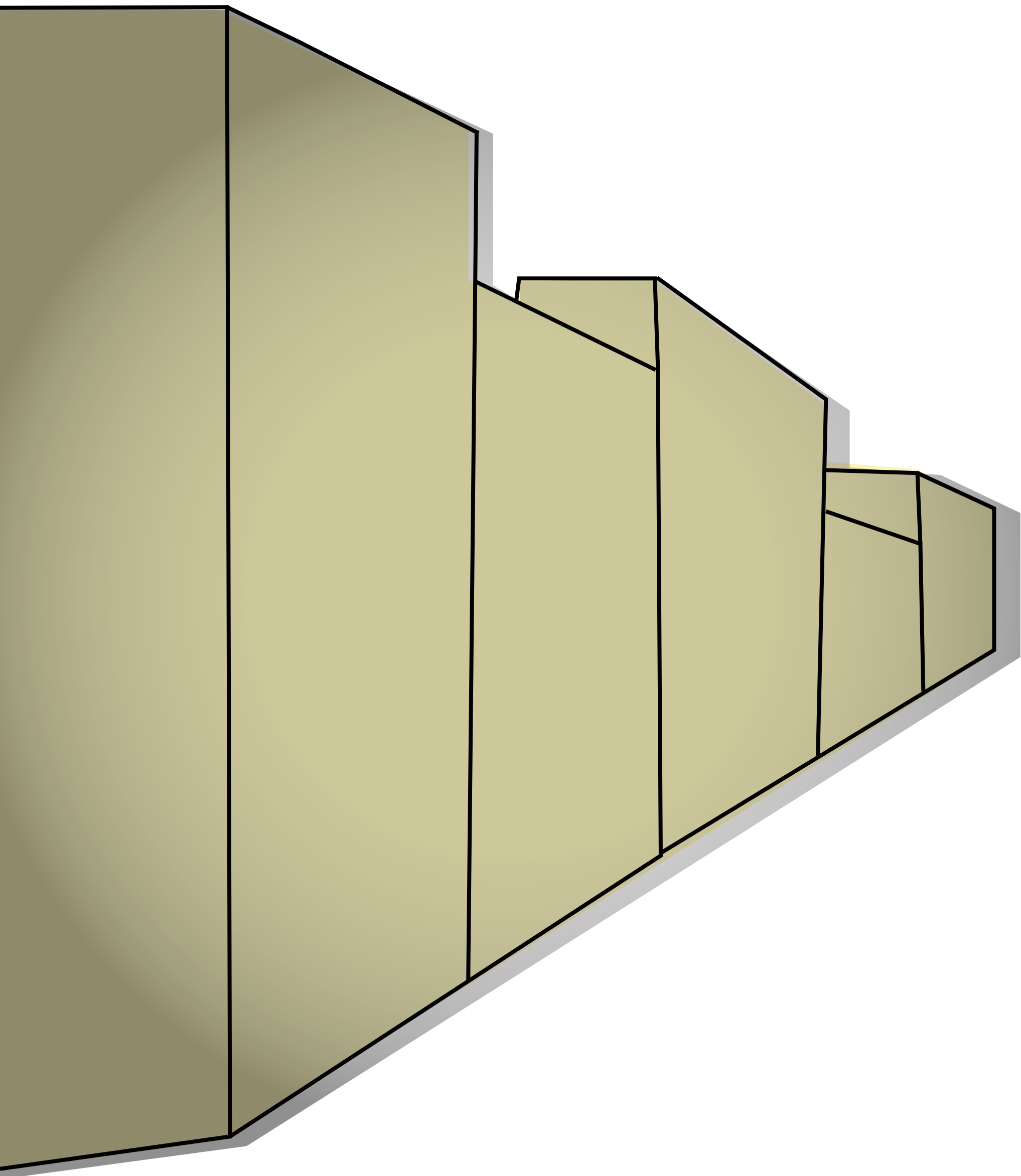


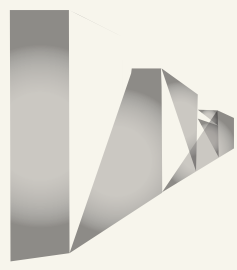
DEVELOPMENT OF AN URBAN PARAMETRIC SIMULATION TOOL TO CREATE SUSTAINABLE DAYLIGHTING MASTER PLANS

Diakite A., Knoop M., Völker S.

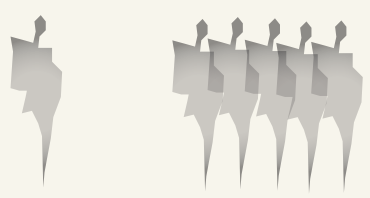


01 RESEARCH MOTIVATION

In line with the UN report "World Urbanization Prospects: The 2011 Revision" more than half of the world's population already lives in cities. Within the next few years the urban population will increase dramatically. According to the United Nation's estimates the number of city dwellers will nearly double in 2050. The rapid demographic change, the fast growing urbanization and the expeditious densification of the cities form new spatial and social framework conditions for urban planning. Therefore there is among other a growing need for research on lighting master planning with daylight.



Up to date, in the consideration of daylighting master planning as a sustainable urban design strategy, energy optimization is typically the only guideline and main purpose. Yet, considering biological, psychological and physiological needs of the citizens, the performance criteria indicate that colorimetric characteristics play an essential role. Hence the need to factor in the spectral information of daylight, next to the illuminance level and the emphasis on the interdependence between the performance criteria, in order to realize healthy and sustainable urban environments.



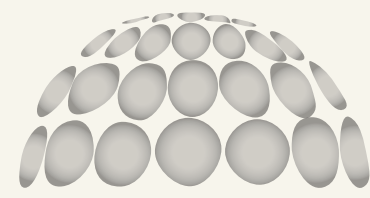
WHY?

02 AIMS

>> Development of spectral sky models

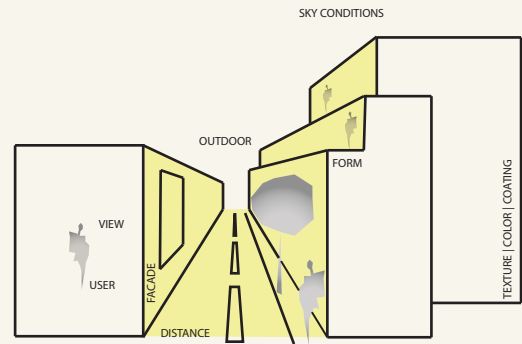
The spatially resolved spectral power distribution measurements of daylight, carried out at the Technical University of Berlin, will be used to create spectral sky models. These distribution models of the colorimetric characteristics enable the implementation of the spectral information in simulations.

>> Determination of the performance criteria and design parameters in the urban planning with daylight



>> Development of a computer-based parametric tool to create sustainable daylighting master plans

This research aims at developing a computer-based parametric tool to optimize the daylight planning in urban structures for multiple buildings based on spectral sky models. The implementation of the colorimetric information supports the inclusion of non-visual aspects in daylighting design.



WHAT?

03 METHODOLOGY

The significant performance criteria and design parameters are determined based on literature survey and case studies. The implemented spectral sky models are based on the spatially resolved spectral power distribution measurements data generated at the Technical University of Berlin. The analysis of the data sets has three goals: to create, to verify and to simplify the spectral sky models. The main emphasis thereby is the practical applicability of the sky models in an urban planning process.

04 CONCLUSIONS

The findings of this study are meant to support the design of sustainable daylighting master plans for cities, by defining the colorimetric characterization of daylight in the urban structures and subsequently assessing the impact of daylight on non-visual aspects in urban settings.

HOW?

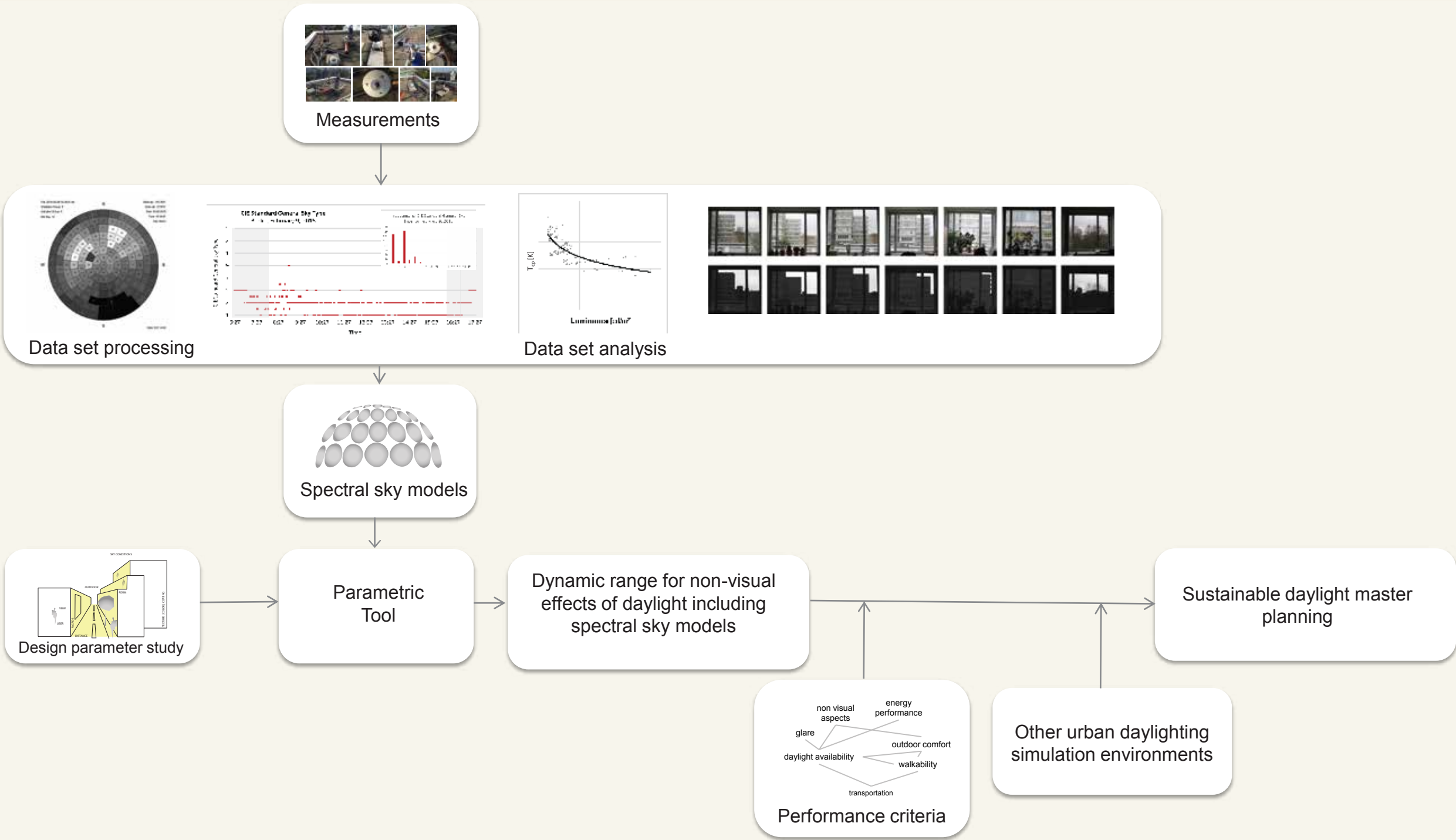


Figure 1: Operationalization diagram for research on daylighting master plans as a new sustainable urban design strategy

BIBLIOGRAPHY

>> United Nations, Department of Economic and Social Affairs Population Division (2011): World Population Prospects: The 2010 Revision and World Urbanization Prospects: The 2011 Revision.

ACKNOWLEDGEMENTS

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POSTER TO GO



WHO?