**Summary**

This research project focuses on the development of simulation-based methods for evaluating the heat stress in interiors of buildings in densely populated urban areas. Two essential questions will be studied in the core:

1. How can detailed statements are made with a manageable computational effort on the heat stress in inner spaces, which are subject to the influence of realistic boundary conditions of a fluctuating outside and inside climate?
2. How simulation models must be designed for a heat stress analysis in interiors, so that boundary conditions of the building design and of air conditioning technologies can be easily integrated?

Until now, Computational Fluid Dynamics (CFD) models of the indoor air, segmented thermal models of the human body and a voting models for the thermal sensation are coupled for the evaluation of the thermal comfort of the interior. Because of the fine spatial resolution of the room models in several million balance elements, at present only steady states or transient states for a few hours real time can be calculated with this approach.

For this reason, a more simplified and therefore faster thermal room model with a much smaller number of balance elements will be developed, based on the modelling language Modelica. Both the simplified room model and a more complex CFD-room model will be integrated with a thermal comfort and heat stress model of humans to obtain two differently detailed **I**ndoor **C**limate **S**ystem **M**odels (ICSM_coarse and ICSM_fine). The fast ICSM_coarse will allow the calculation of unsteady heat stress scenarios, even over several days. Because of the modular properties of Modelica, the ICSM_coarse can be easily adapted to different room situations and can be connected with the models for building air conditioning. The ICSM_fine will be used for in-depth analysis of heat stress scenarios.