Understanding the Brain through Modelling based on Rigorous Experimentation - from Ion Channels to Behaviour

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One overarching goal of HBP is to understand the integrative function of the brain based on the detailed, although often fragmentary knowledge of the building-blocks of the brain, extending from subcellular processes to behavior. The dynamic interaction between different processes within a neuron like subtypes of ion channels is difficult to comprehend fully without modeling, even more so the cellular interaction in a network dedicated to a certain function. Even more so at a next level with the collective network interaction resulting in overt behavior needs to be understood. I will discuss this challenge from the perspective of our HBP experiments and simulation, but also draw upon experiments regarding forebrain – brainstem - spinal cord control of movement.