Neuronal and microcircuit models are getting more and more popularity as tools for investigating brain functions. In particular, biologically-based models help explaining how ionic conductance generate the excitable response of complex neuronal structures. On one side, modeling can extend at the level of molecular interactions in the membrane and cytoplasm. On the other side, neuronal models can be coupled through synapses extending into the level of microcircuits.

It is now time to make the point on the methodologies and strategies and on the achievements obtained at the different modeling levels.