



## Toward a Paradigm Shift from Simulation Science to “Simulationics”

Tetsuya Sato

Graduate School of Simulation Studies, University of Hyogo  
Email: sato@sim.u-hyogo.ac.jp

**Abstract**—The Earth Simulator (2002–2008) in Japan was the last and only real supercomputer that can make a whole simulation of any real macroscopic system such as the global climate change and the automobile collision. The present-day HPC architecture, in contrast, based on a multi-core/multi-processor, may not be so effective for solving a complex nonlinear partial differential equation system because of the latency problem due to too frequent data exchanges among CPUs (nodes). This drastic change of the computer architecture demands us to shift the simulation paradigm from the conventional one (simulation science) to a new paradigm. Considering the characteristic architecture of HPC that numerous independent medium size CPUs (nodes) are connected via cables (network), one recognizes a good similarity to a human society or system including industrial organization and governmental agency. This reminds us that HPC be used more actively to challenging a system involving human activities in which human activities are governed by non-universal rules and communications among individuals and/or organizations. Accordingly, in this talk, I would like to encourage to broaden a new simulation paradigm that can propose a prospective structure of a future social human system by modeling and simulation using HPC. I would like to name this simulation as “simulationics.”