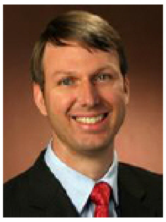

Prof. Dirk Helbing, *Swiss Federal Institute of Technology Zürich (ETH Zürich)*

Since June 1st 2007, Dirk Helbing (born on January 19, 1965) is Professor of Sociology, in particular of Modeling and Simulation at ETH Zurich. Before, he worked as Managing Director of the Institute for Transport & Economics at Dresden University of Technology, where he was appointed full professor in 2000. Having studied Physics and Mathematics in Göttingen, his master thesis dealt with the nonlinear modeling and multi-agent simulation of observed self-organization phenomena in pedestrian crowds. Two years later, he finished his Ph.D. at Stuttgart University on modeling social interaction processes by means of game-theoretical approaches, stochastic methods and complex systems theory, which was awarded two research prizes.

After having completed his habilitation on traffic dynamics and optimization in 1996, he received a Heisenberg scholarship. Both theses were printed by international publishers. Apart from this, Helbing has (co-)organized several international conferences and (co-)edited proceedings or special issues on material flows in networks and cooperative dynamics in socio-economic and traffic systems. He has given 250 talks and published more than 200 papers, including several contributions to journals like Nature, Science or PNAS, which were discussed by the public media (newspapers, radio and TV) more than 200 times. He collaborates closely with international scientists. For example, he worked at the Weizmann Institute in Israel, at Xerox PARC in Silicon Valley, at INRETS in Paris and the Collegium Budapest - Institute for Advanced Study in Hungary, where he is now a member of the external faculty.

Keynote: From emergent crowd behavior to self-organized traffic light control

Crowds and traffic flows have been successfully modeled as driven many-particle systems. Due to the non-linear interactions and delayed adaptions in these systems, one finds a rich spectrum of self-organization phenomena. This includes, for example, various forms of traffic jams, noise-induced breakdowns, freezing-by-heating and slower-is-faster effects, self-organized oscillations, and spontaneous synchronization phenomena. We also discuss instabilities in the motion of dense crowds and the occurrence of turbulence-like phenomena that have been discovered by high-performance video analysis techniques.

Non-linear interactions do not automatically lead to a system optimum. The system may be rather trapped in a local optimum or behave in an unstable way. Therefore, one interesting question is how to modify many-particle interactions in order to avoid this. Future traffic assistance systems will, for example, be able to increase the stability and capacity of traffic flows. Moreover, self-organized traffic light and production scheduling based on decentralized control approaches will allow for better adaptation to variations in capacities and demands. This will lead to a higher quality and performance of traffic and production systems in the future.