

Potentials of Complexity Science for Business, Government and Media

Budapest, Hungary, 3 - 5 August 2006

Concept and Organization

As originally planned, the workshop on *Potentials of Complexity Science for Business, Government and Media* was a 3 day event. It immediately followed the international workshop on *Complexity and Social Sciences* from July 30 to August 1, 2006, to allow people to participate in both events and minimize travel costs.

Our workshop was announced on the GIACS webpage and on various Internet Forums. Colleagues working in the field of complex systems were informed by e-mail, and a poster listing the keynote speakers was printed and distributed to the community by regular mail. It called for papers and poster contributions and announced the *Prize for Applied Complexity Science*. Professor Helbing saw this poster displayed in several international institutions. Moreover, STREP project leaders within NEST were asked to inform and nominate potential speakers.

Our workshop took place from August 3 to 5, 2006. That is, the workshop lasted from Thursday to Saturday in order to minimize travel costs (most return flight tickets are cheaper when returning on Saturdays or Sundays). The calendar week was chosen according to the availability of the most busy keynote speakers, while the others were flexible enough to adjust. In this way, and thanks to the possibility to offer speakers from industry attractive conditions (including a moderate honorary), and by choosing an attractive meeting place in the most beautiful area of Budapest, we reached an extremely high-quality list of keynote speakers, which attracted internationally well-known participants and very good contributed talks and posters.

It was possible to gain most of the keynote speakers we had originally in mind. Six of them (Eric Bonabeau, Vince Darley, Peter Hofmann, Bernardo Huberman, Karl Kempf, and Dick Sanders) were representatives from an industrial or business environment (including consultants), with a particular focus on applications of methods from the theory of complex systems. Eight of the keynote speakers (Laszlo Barabasi, Armando Bazzani, Stefan Bornholdt, Jean-Louis Deneubourg, Dario Floreano, Neil Johnson, Kai Nagel, and Oliver Rose) were academic researchers developing complex systems approaches with relevance for real-world applications. In this way, the meeting was designed to stimulate a fruitful interaction and a transfer of novel methods from complexity science to applications, while industrial and business representatives generated awareness for interesting real-world problems to be solved in the future.

For maximum cross fertilization, the number of participants was intended to be around 60 people. However, in order to allow for the participation of more representatives from business, industry and the media (who could often attend only at short notice), we have finally accepted a maximum of 80 participants. This turned out to be a good strategy, as the average number of participants attending each talk varied around the ideal number of 60 people. The participants originated from many different countries, namely Germany, Hungary, United Kingdom, Poland, Switzerland, Italy, USA, France, Spain, Belgium, Serbia, Slovakia, Russia, Israel, Japan, and Columbia.

Although our policy was to admit as many participants as the capacity of the meeting place allowed, the quality of contributions was enormous. The reason for this

was the particular concept applied: Our interdisciplinary selection of excellent keynote speakers attracted an incredible number of 9 applications by professors, and 19 applications by postdocs. They were given slots for contributed talks and turned out to be of high quality because these participants are subject to quality control all the time. The young scientists (PhD students) had been offered poster contributions, with the incentive to possibly win the *Prize for Applied Research in Complexity Science*. This prize motivated high standards also of the posters.

The first workshop day started with a short self-introduction of the keynote speakers, including the fields represented by them and the grand challenges seen by them. This was to maximize interactions between and with the keynote speakers from the very beginning. For similar reasons, parallel sessions were avoided, while the poster session gave PhD students the opportunity to present additional subjects, in order to cover the maximum possible width of the field. Altogether the workshop offered 32 talks and 16 poster contributions. Each keynote talk was scheduled to last 45 minutes in order to allow for sufficient information transfer and discussion, while the contributed talks were limited to 25 minutes. Sufficient breaks and a workshop dinner on the first day served for personal discussions and establishing relationships between business and academic people, between young and established complexity scientists, and between business or government representatives and PhD students.

Most areas were well represented by the participants:

- Industry and business were well represented by 19 participants from Aitia International, ComInnex Zrt., DaimlerChrysler, Delta Elektronik Kft., Eurobios, Hewlett Packard, Icosystem Corp., INTEL, Mathematical-Economical Consultancy, Nokia Hungary Kft. (4), OD Partner, OTP Bank NYRT, SCA Packaging (2), Thales Nanotechnology Inc., and Unilever.
- Critical infrastructures were represented by Alex K. S. Ng and Janet Efstathious, Paul Ormerod and R. Colbaugh, plus Limor Issacharoff and Prof. Sandro Bologna from ENEA.
- Traffic and transportation systems were covered by Prof. Armando Bazzani, Prof. Hani Mahmassani, Martin Schönhof, Stefan Lämmer, and Atsushi Tero. Prof. Oliver Rose, Dr. Karsten Peters and Dr. Stefano Battiston addressed the complexity of logistic and production systems.
- Three contributions addressed the media (Prof. Bernardo Huberman, Prof. Maciej A. Nowak, and Zoran Mihailovic).
- The subjects of administration and governance were covered by Prof. Laszlo Barabasi and Bertrand de la Chapelle from the French Ministry of Foreign Affairs.

Moreover, we could welcome Bernd Finger from the German Embassy as our guest. Many other application-oriented areas of complexity science such as management, social, information, financial or traffic networks, interactions among autonomous robots or in insect societies, and biological or medial systems were represented at this workshop as well, which is documented by the conference materials.

The list of lectures is shown below. Further information, including the recordings of all the lectures can be found at the workshop www site:

<http://vwitme011.vkw.tu-dresden.de/TrafficForum/budapest/index.html>.

As a result of the workshop a book has also been published: D. Helbing (ed.) *Managing Complexity*. Springer, Berlin, 2008.

August 3, Thursday

09:00 - 09:05 **Imre Kondor**

(Collegium Budapest, Institute of Advanced Study, HU)

Welcome Address by the Rector of the Collegiums Budapest

[\[mp3\]](#)

09:05 - 09:25 **Dirk Helbing**

(Dresden University of Technology, Inst. for Transport and Economics, D)

Introduction to the Workshop

[\[mp3\]](#) [\[pdf\]](#)

09:25 - 09:55 **Self-Introduction of the Keynote Speakers and Their Fields**

[\[mp3\]](#)

09:55 - 10:40 **Bernardo A. Huberman**

(Hewlett Packard, USA)

Harvesting Organizational Knowledge

[\[mp3\]](#) [\[pdf\]](#)

10:40 – 11:05 **Group Photograph + Coffee Break**

11:05 - 11:50 **Stefan Bornholdt**

(University of Bremen, Inst. for Theoretical Physics, D)

Physics of Networks: Tools for a Complex World

[\[mp3\]](#)

11:50 - 12:35 **Jean-Louis Deneubourg**

(University of Brussels, B)

Learning from Social Insects and Applications of Ants Algorithms

[\[mp3\]](#)

12:35 – 13:45 **Lunch**

13:45 - 14:30 **Neil F. Johnson**

(University of Oxford, UK)

The Making and Breaking of Partnerships based on Money, Power, Love and War

[\[pdf\]](#)

14:30 - 15:15 **Dick Sanders**

(SCA Packaging, B)

*Why Complexity Science Is So Important To Business Today
And Why It Is So Difficult To Get This Message Across*

[\[mp3\]](#) [\[ppt\]](#)

15:15 – 15:35 **Lunch**

15:35 - 16:20 **Hani Mahmassani**

(Transportation Initiative, University of Maryland, USA)

*Repeated Auction Games and Learning Dynamics in Electronic Logistics
Market-places: Regulation Through Information*

[\[mp3\]](#) [\[ppt\]](#)

16:20 - 17:05 **Oliver Rose**

(Dresden University of Technology, Inst. for Applied Computer Science)

*Simple Models and Grand Challenges in Modeling and Simulation of
Complex Manufacturing Systems*

[\[mp3\]](#) [\[ppt\]](#)

17:05 – 19:05 **Poster Session**

The Keynote Speakers Form the Committee to Determine the 3 Best Posters

19:15 – 22:00 **Social Dinner**

August 4, Friday [Top](#)

09:00 - 09:45 **Albert-László Barabási**

(Notre Dame, USA)

Complex Networks, and Applications

[\[mp3\]](#)

09:45 - 10:30 **Karl Kempf**

(INTEL, USA)

Complexity and Evolution in Semiconductor Supply Chains

[\[mp3\]](#) [\[ppt\]](#)

10:30 – 10:50 **Coffee Break**

10:50 - 11:35 **Vince Darley**

(Eurobios, UK)

From Theory to Practice: Obstacles and Solutions to the Application of Complexity Science to Business Problems

[\[mp3\]](#) [\[ppt\]](#)

11:35 - 12:20 **Armando Bazzani**

(Bologna, I)

A Complex Systems Approach to Urban Mobility Governance

[\[mp3\]](#)

12:20 – 13:30 **Lunch**

13:30 - 14:15 **Eric Bonabeau**

(Icosystems, USA)

Business Life is a Miracle

[\[mp3\]](#)

14:15 - 14:45 **Gabor Vattay**

(Eötvös Loránd University, Budapest, Hungary)

Measuring the Spatial Structure of Traffic Congestion in the Internet

[\[mp3\]](#) [\[ppt\]](#)

14:45 - 15:15 **Markus Kirkilionis**

(University of Warwick, Mathematics Institute, UK)

Modularity in Dynamical Networks

[\[mp3\]](#) [\[pdf\]](#)

15:15 – 15:35 **Coffee Break**

15:35 - 16:20 **Dario Floreano**

(Swiss Federal Institute of Technology Lausanne, CH)

Swarms of Autonomous Robots: Design, Control, and Experimentation

[\[mp3\]](#)

16:20 - 17:05 **3 Selected Poster Contributors**

Sefan Lämmer [\[mp3\]](#) [\[ppt\]](#)

Martin Schönhof [\[mp3\]](#) [\[ppt\]](#)

Jan Lorenz [\[mp3\]](#) [\[pdf\]](#)

Presentations of 3 Best Posters (15 minutes each)

The Keynote Speakers Determine the Winner of the Best Poster Award

(Jan Lorenz)

August 5, Saturday [Top](#)

Contributed Talks

- 09:00 - 09:25 **Janusz Holyst**
(Warsaw University of Technology, Dept. of Physics, PL)
Ferromagnetic Fluid as a Model of Social Impact
[\[mp3\]](#) [\[ppt\]](#)
- 09:25 - 09:50 **Markus Christen**
(ETH Zürich, CH)
From Small World to Hierarchic Business Information Networks by Reorganizations - A Real World Study of a Failure
[\[mp3\]](#) [\[ppt\]](#)
- 09:50 - 10:15 **Jens Christian Claussen**
(University of Kiel, D)
Fluctuations and Finite-Size Effects in Co-Evolutionary Dynamics: Unifying Approaches from Evolutionary Game Theory Lay Further Grounds for Quantitative Modelling of Multi-Agent Systems
[\[pdf\]](#)
- 10:15 - 10:40 **Bertrand de la Chapelle**
(French Ministry of Foreign Affairs, F)
The Emergence of the Notion of Multi-Stakeholder Internet Governance During the WSIS Process
[\[mp3\]](#) [\[ppt\]](#)
- 10:40 – 11:10 **Coffee Break**
- 11:10 - 11:35 **Karsten Peters**
(TU Dresden, Institute for Transport & Economics, D)
Logistic Networks - Coping with Nonlinearity and Complexity
[\[mp3\]](#)
- 11:35 - 12:00 **Konstantin Klemm**
(Leipzig University, Bioinformatics, D)
The Structure of Directory Trees
[\[mp3\]](#) [\[pdf\]](#)
- 12:00 - 12:25 **Alexander Zumdleck**
(Institut Curie, Paris, F)
Self-organization in Substructures of the Cytoskeleton
[\[mp3\]](#)
- 12:25 - 12:50 **Carsten Murawski**
(University of Zurich, Swiss Banking Institute, CH)
Systemic Risk in Financial Markets - A Network Approach
[\[mp3\]](#) [\[pdf\]](#)
- 12:50 – 14:00 **Lunch**
- 14:00 - 14:25 **Maciej A. Nowak**
(M. Kac Center for Complex Systems Res., Jagiellonian Uni., Cracow, PL)
Free Random Variables - Matrix-Valued Probability Theory for Complex Systems
[\[mp3\]](#)[\[ppt\]](#)
- 14:25 - 14:50 **Stefano Battiston**
(ETH Zurich, CH)
Avalanches and Self-Organized Robustness in Evolving Networks
[\[mp3\]](#) [\[pdf\]](#)
- 14:50 - 15:15 **Volker Barth**
(University of Oldenburg, D)
A Model of Opinion Dynamics Among Firms
[\[mp3\]](#) [\[pdf\]](#) [\[ppt\]](#)
- 15:15 - 15:40 **Laszlo Gulyas**
(AITIA Int. Inc./ Eötvös Loránd University, Budapest, Hungary)
Robust Networks From Local Optimization: A Bottom-Up Model To Generate Networks With Skewed Degree Distributions
[\[mp3\]](#) [\[ppt\]](#)
- 15:40 - 16:05 **Atsushi Tero**
(Hokkaido University, Creative Research Initiative, Sapporo, J)
Solving the shortest path problem by Physarum solver - Modeling of the Adaptive Network of True Slime Mold
[\[mp3\]](#) [\[ppt\]](#)
- 16:05 – 16:20 **Best Poster Award Ceremony (3,000 EUR)**
[\[mp3\]](#)

