The FuturIcT Knowledge Accelerator -

Unleashing the Power of Information for a Sustainable Future

Dirk Helbing, with the support of >200 scientists from all over Europe

We have explored the microcosmos and the universe, and have sent men to the moon. It turns out, however, that our knowledge of society is too limited to efficiently tackle the global challenges of humanity in the 21st century. Thus, it is timely to create an ICT Flagship to explore social life on Earth and everything it relates to.

The greatest bottleneck of ICT systems today is the difficulty in making sense and efficiently use the large amounts of data we generate.

Challenges Humanity is Facing in the 21st Century

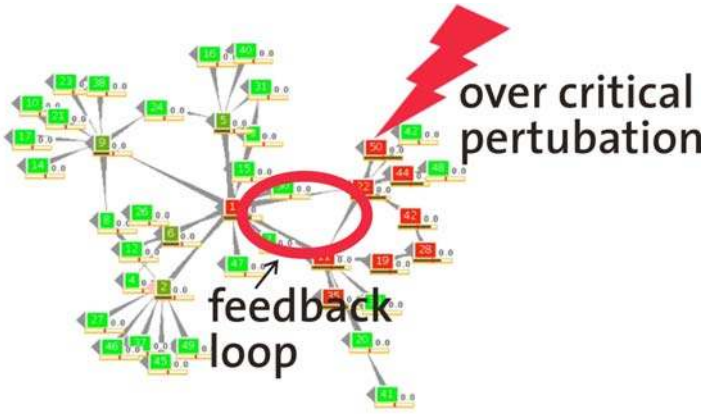
Lee C. Bollinger, president of Columbia University, formulated the issue as follows: "The forces affecting societies around the world ... are powerful and novel. The spread of global market systems ... are ... reshaping our world ..., raising profound questions. These questions call for the kinds of analyses and understandings that academic institutions are uniquely capable of providing. Too many policy failures are fundamentally failures of knowledge."

1. Financial and economic crisis
2. Debts and inflation
3. Stability of the European Union
4. Corruption
5. Organized crime, hooliganism
6. Extremism, terrorism, war
7. Epidemics (SARS, H1N1 pandemic)
8. Security and cyber risks
9. Migration and integration
10. Environmental change

The Top 10 Socio-Economic Problems and their Reasons

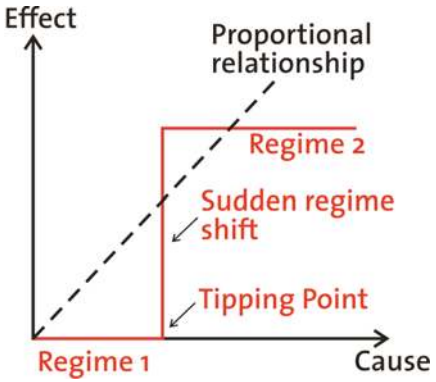
Problems:

1. Demographic change
2. Financial and economic stability
3. Social, economic and political inclusion
4. Public health
5. Balance of power and conflict
6. Corruption and crime
7. Collective social behavior
8. Institutional design
9. Sustainable use of resources
10. Reliability of critical infrastructures



Reasons:

1. Interdependency, interconnectivity
2. Socio-economic, ecological, and technological complexity
3. Self-organization, emergence, chaos
4. Limits of predictability and control



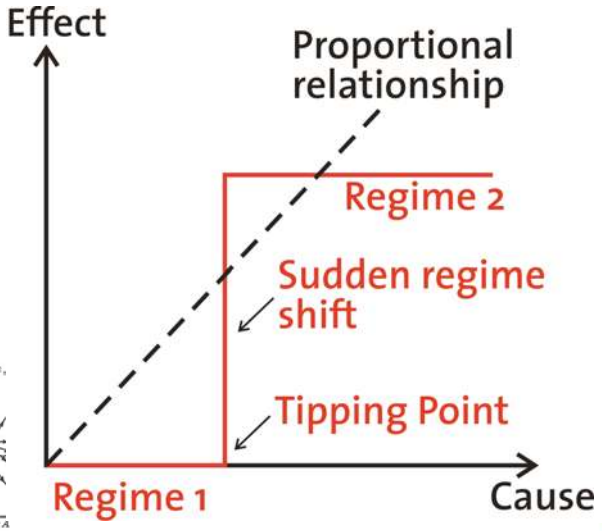
Cascade failures/ avalanche effects:
Epidemic spreading, congestion spreading, failure of interbank market, breakdown of former GDR

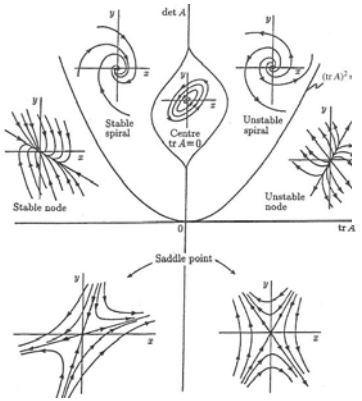
5. Lack of quantitative models
6. (Due to) Lack of data
7. Lack of computational power
8. Lack of systemic predictions
9. Lack of tested alternatives
10. Systemic risks

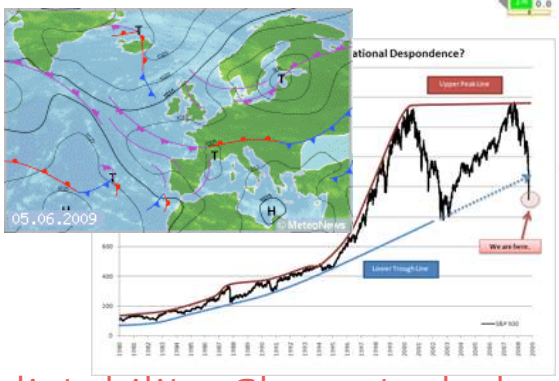
This is about to change!

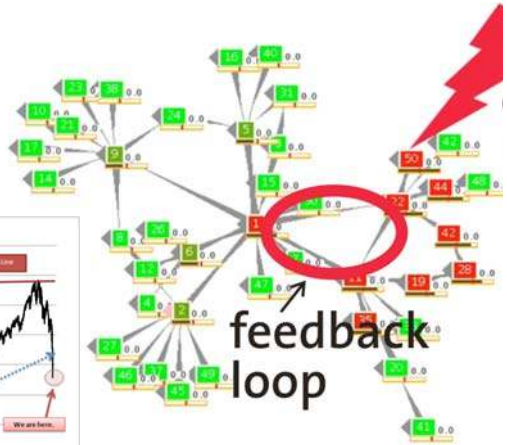
Techno-Social-Economic-Environmental Systems Are Complex

- Elements mutually adapt to each other
- They are influenced by their environment, but at the same time, they influence their environment
- Causes and effects not proportional to each other
- Unresponsive system or regime shifts
- Example: Sudden public opinion changes (collapse of GDR; pro vs. anti-war mood; public smoking ban; swiss banking secrecy; car sales)
- Network interactions are ubiquitous
  - Feedback loops, circuli vitiosi
  - Cascade spreading
  - Unwanted side effects





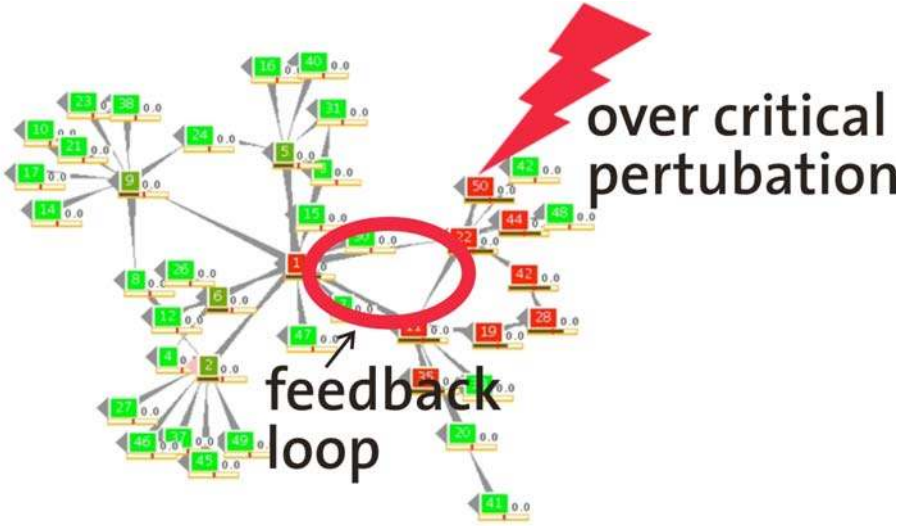




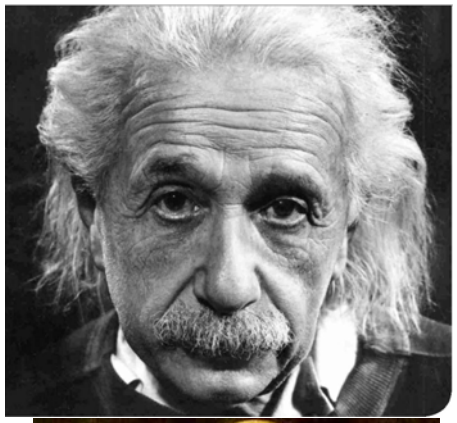
Limits of predictability: Chaos, turbulence, "butterfly effect"

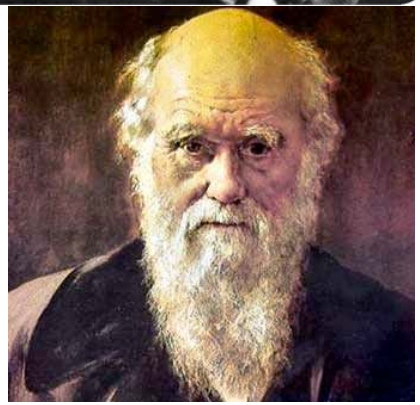
Cascade Spreading and Systemic Crises

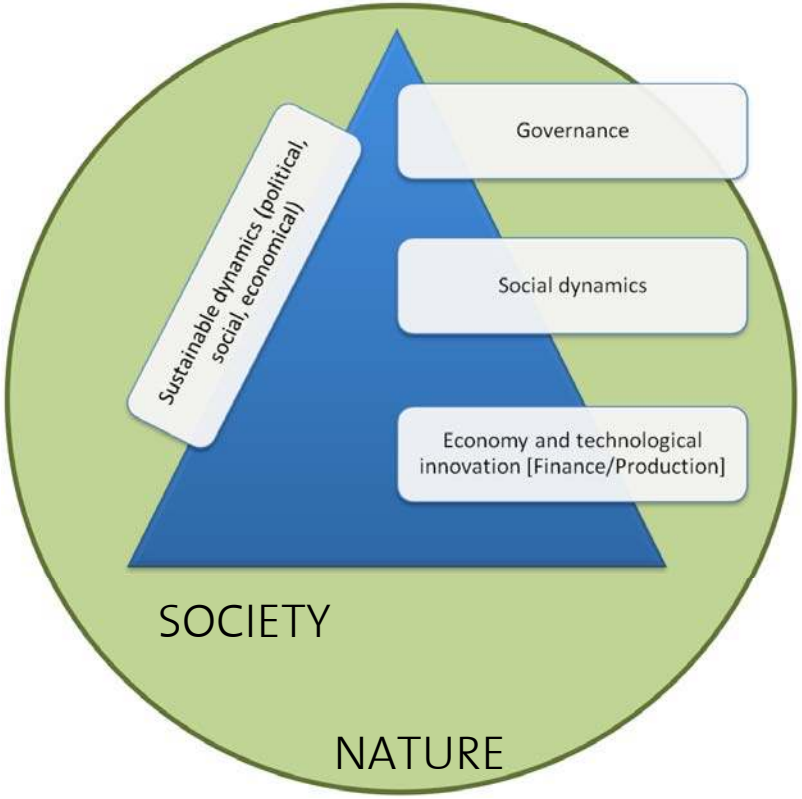
- Network interactions are ubiquitous
  - Feedback loops, circuli vitiosi
  - Unwanted side effects
- Systemic malfunctions, whenever the system state changes beyond a critical threshold („tipping point“)
- Often caused by massive cascading effects („domino effects“, „avalanche effects“)
- Triggered by overcritical perturbation or coincidence of failures
- Examples: Epidemic spreading, failure of interbank market, congestion spreading, blackout of electrical power system

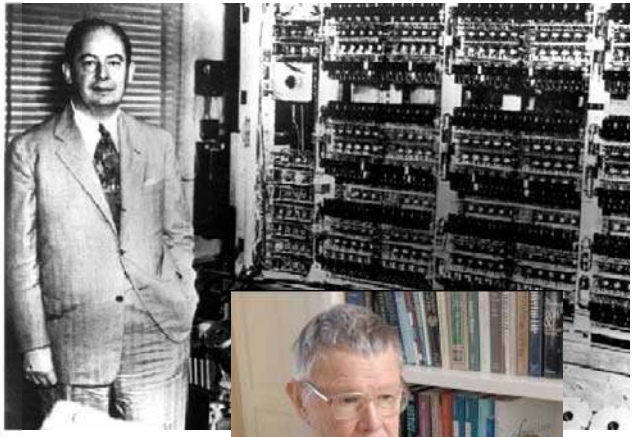


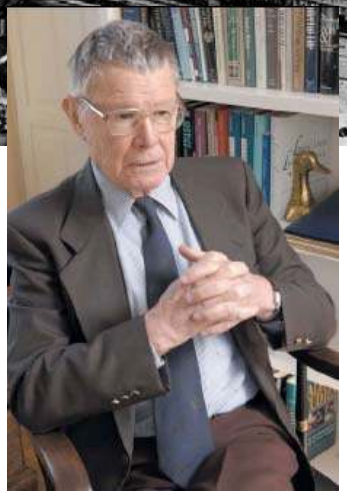
The Need of A Knowledge Accelerator





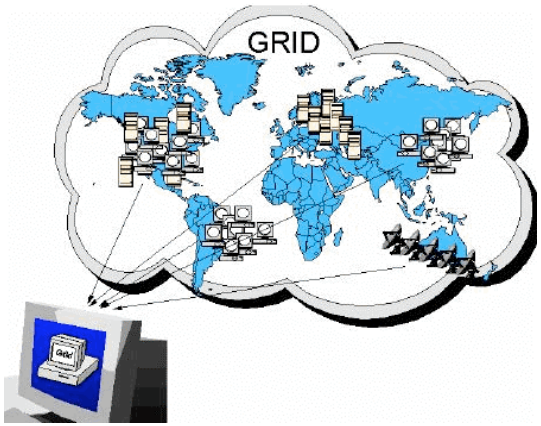






We need to create a techno-socio-economic-ecological knowledge accelerator - a kind of multi-disciplinary Apollo project that uses current and future ICT developments to address the challenges of humanity, involving natural scientists and engineers

Ambitions of FuturIcT



Living Earth Visualator

to simulate life on Earth and everything it relates to

Requires to solve difficult

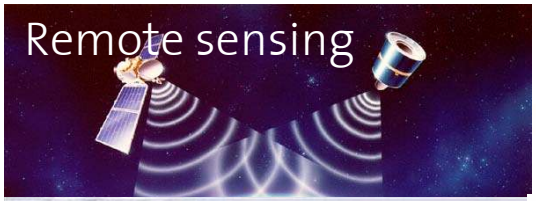
Fundamental ICT Challenges

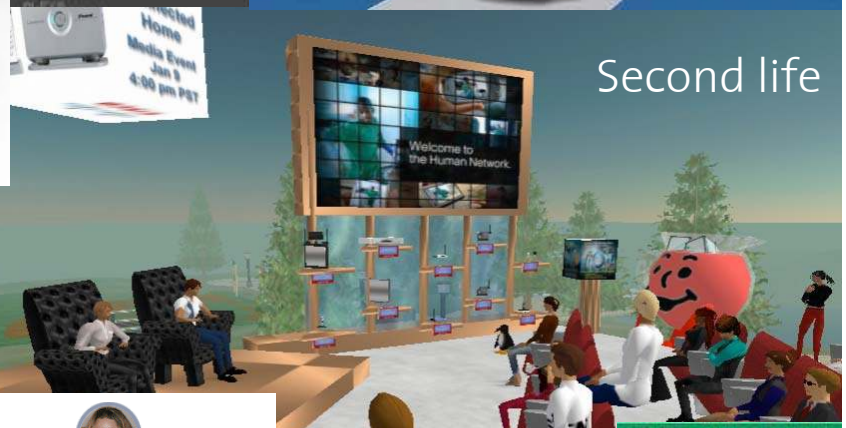
- Exascale Computing
- Highly Decentralized and Peer-to-Peer Systems
- Zero-Delay Reality Mining
- Swarm Computing
- Social Computing
- Social Information Theory

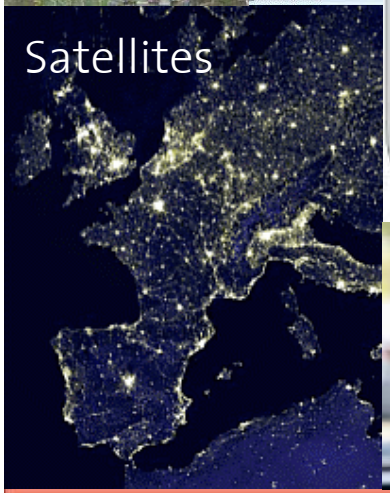
Applied ICT Challenges

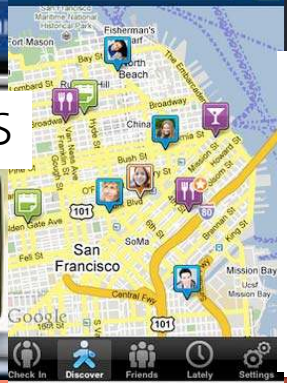
- User-Oriented ICT Systems
- Data Collectors
- ICT-Empowered Systems Modeling
- Evaluating ICT Systems
- Reasoning ICT Systems
- Creative ICT Systems

New ICT for Socio-Economic-Ecological Reality Mining + Simulation

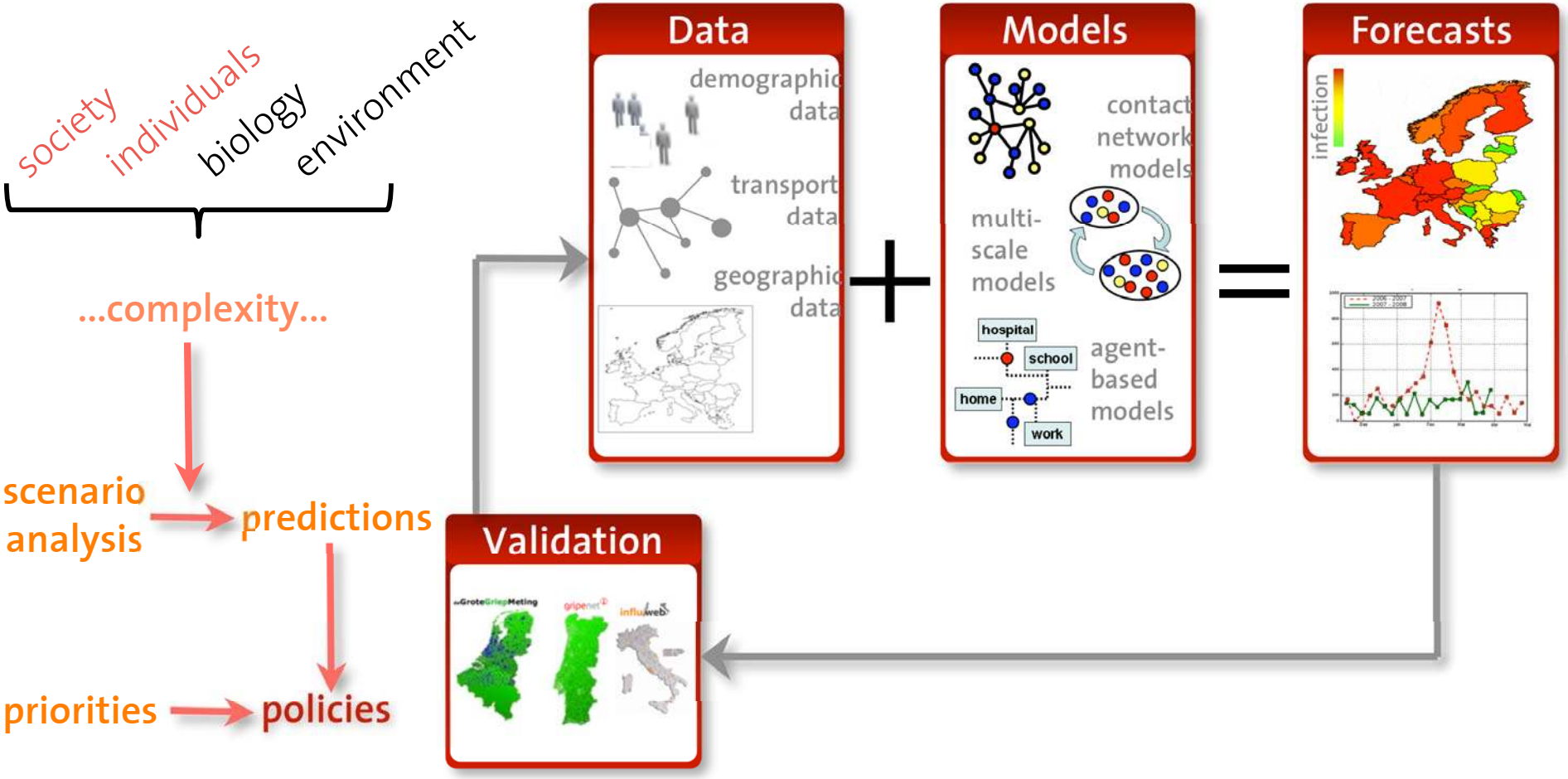








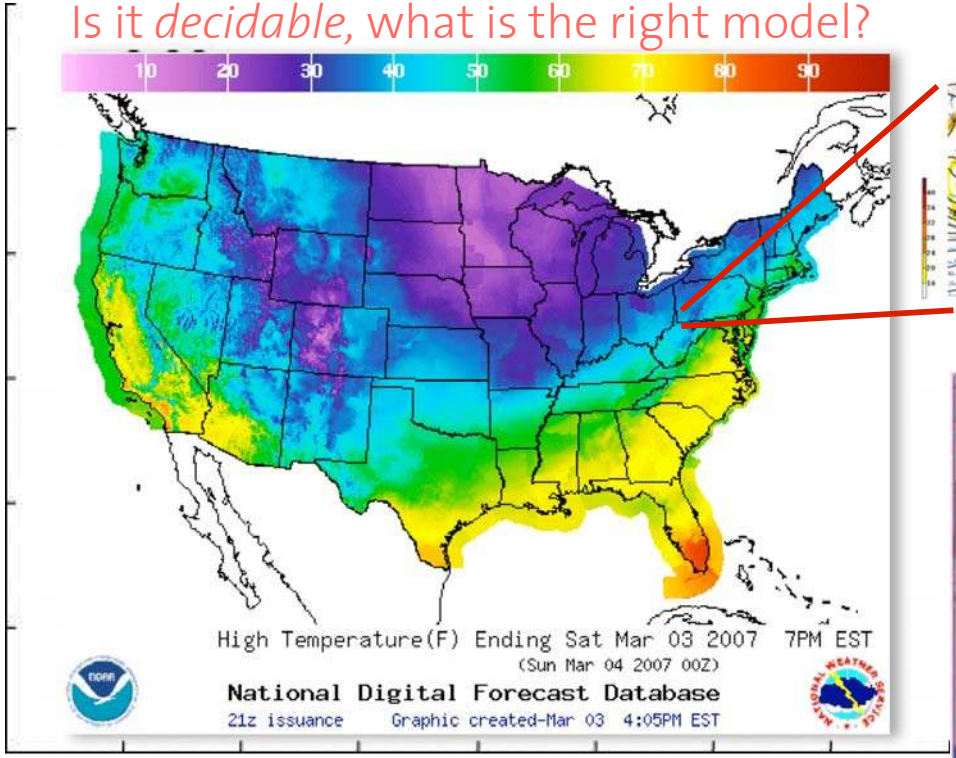
Global-Scale Simulation of Socio-Economic-Environmental Systems

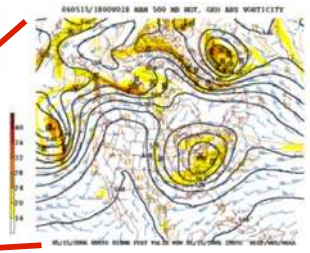


(thanks to Alex Vespignani)

What's the Right Model? Multiple World Views and Parallel Worlds

Is it *decidable*, what is the right model?





Examples: Hurricane prediction, climate science, car safety simulation, airplane control

(thanks to Alex Vespignani)

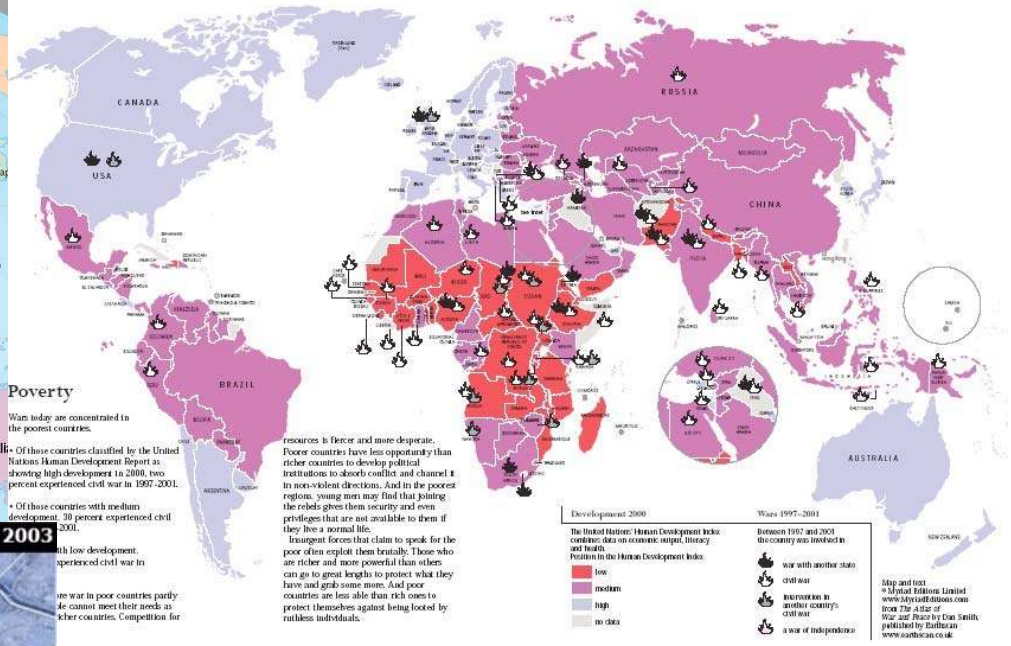
Social systems are so "noisy" that it is usually not possible to verify a unique model. What constitutes the best model or theory often appears to be a matter of belief. A superposition of inconsistent models may give the best results!

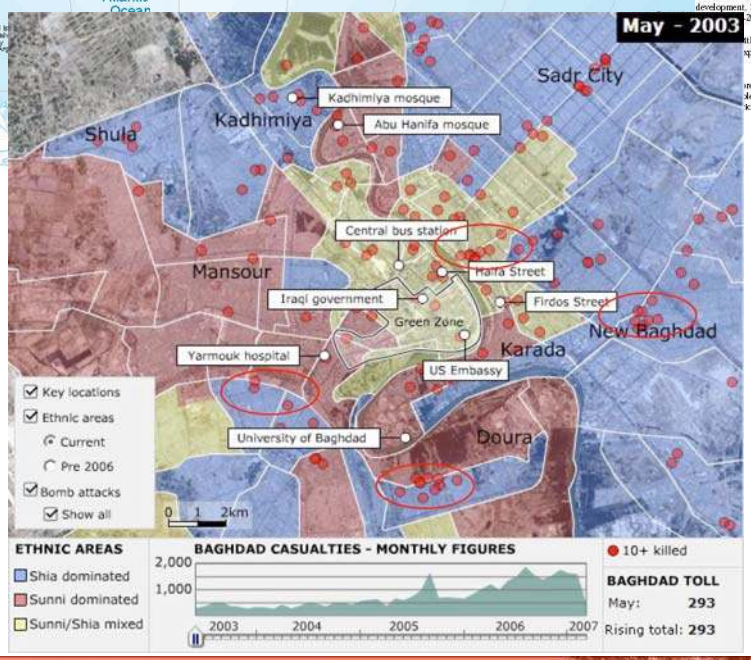
Second Life for Policy Testing?

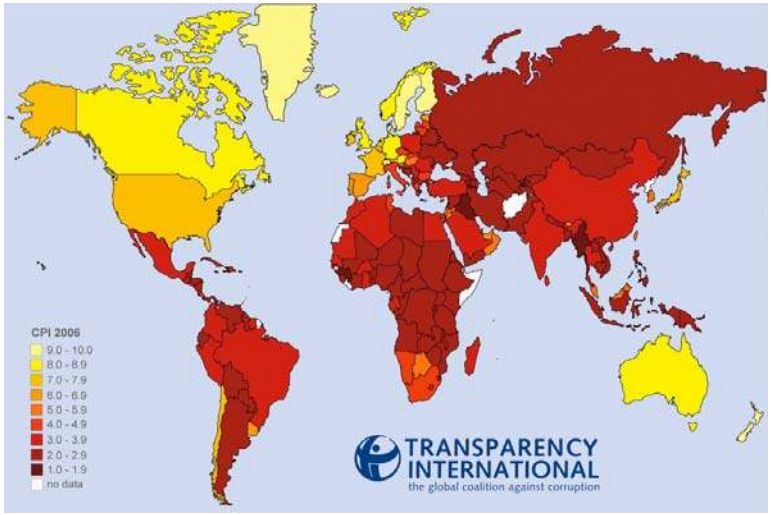
Decision Arenas

Decision Making Considering Priorities and Normative Issues

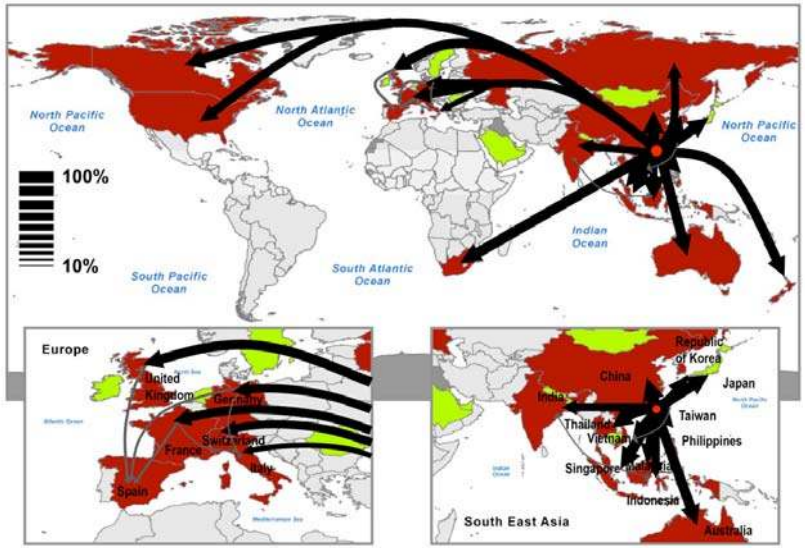
Crisis Observatory for Conflicts

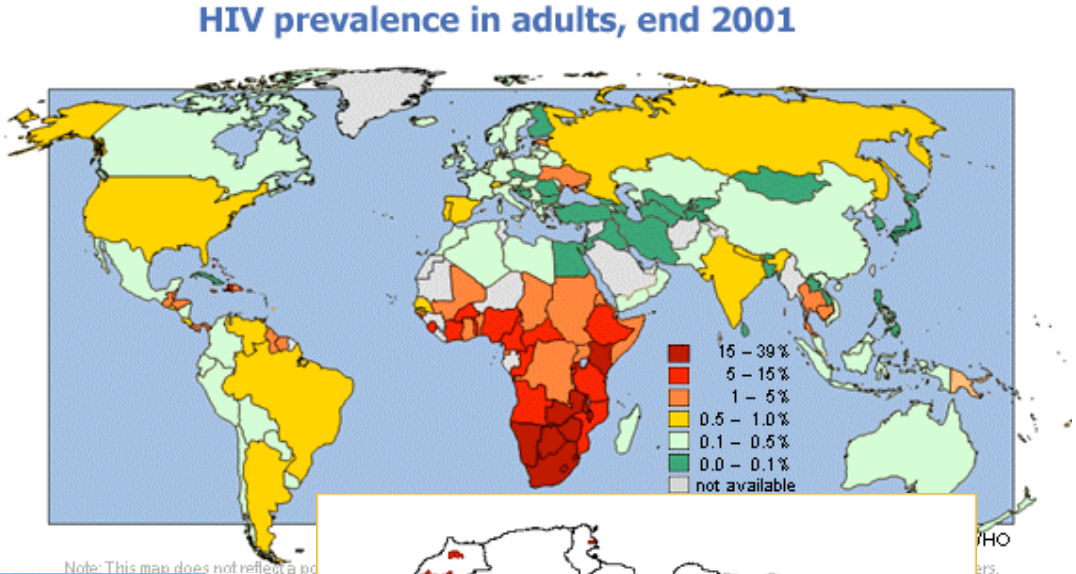


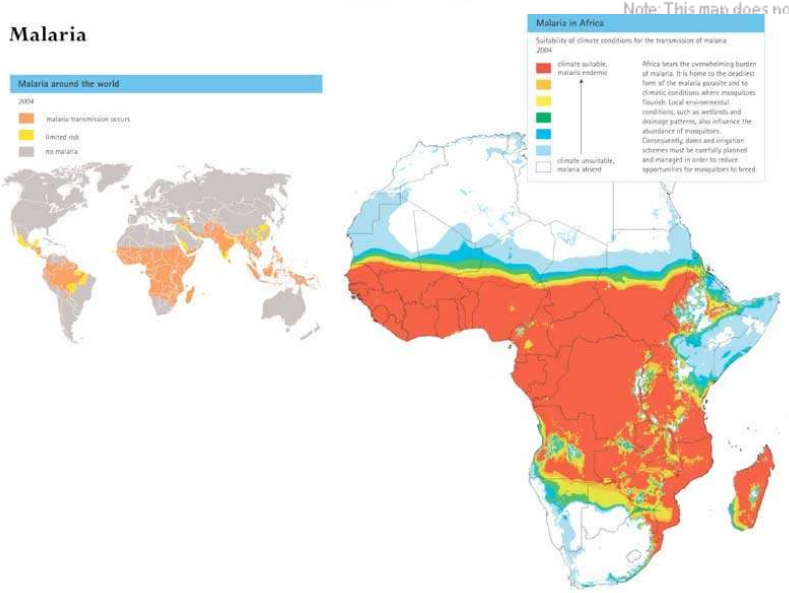


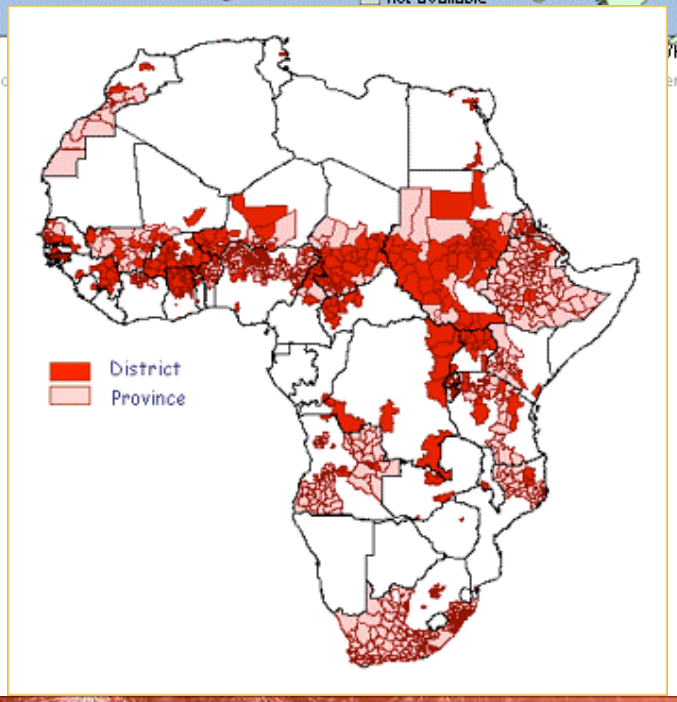


Crisis Observatory for Epidemic Spreading and Health Risks



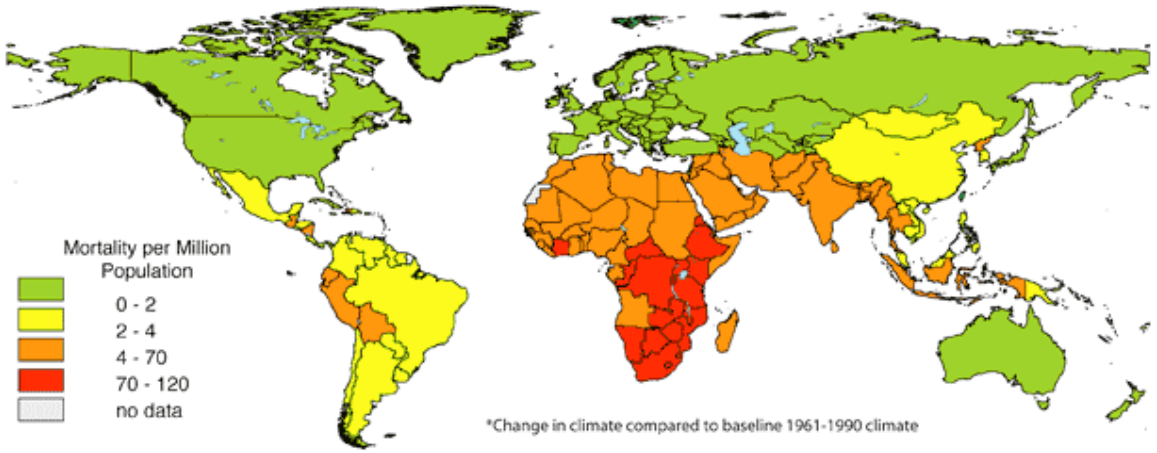






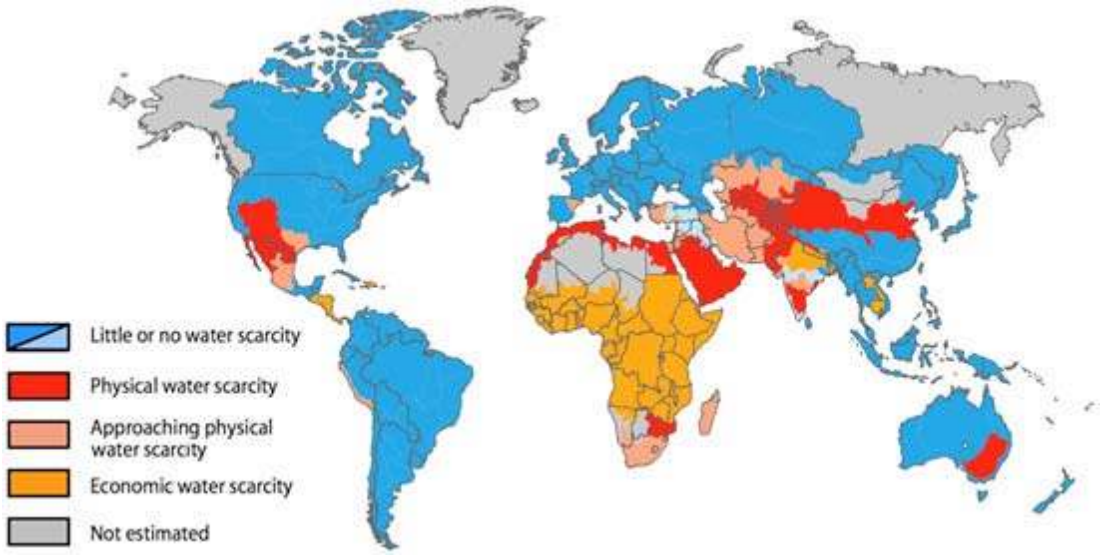
Crisis Observatory for Environmental Change

Estimated Deaths Attributed to Climate Change in the Year 2000, by Subregion*

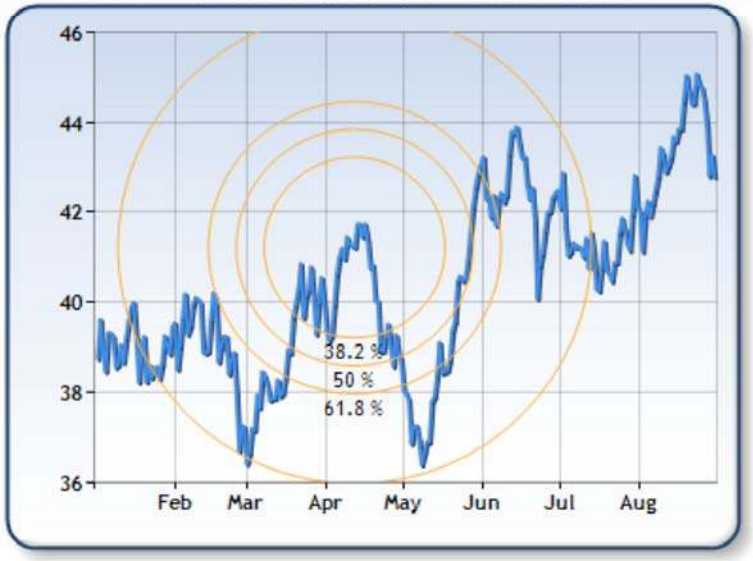


Data Source:
McMichael, JJ, Campbell-Lendrum D, Kovats RS, et al. Global Climate Change. In Comparative Quantification of Health Risks: Global and Regional Burden of Disease due to Selected Major Risk Factors. M. Ezzati, Lopez, AD, Rodgers A., Murray CJL. Geneva, World Health Organization, 2004

Maps produced by the Center for Sustainability and the Global Environment (SAGE)

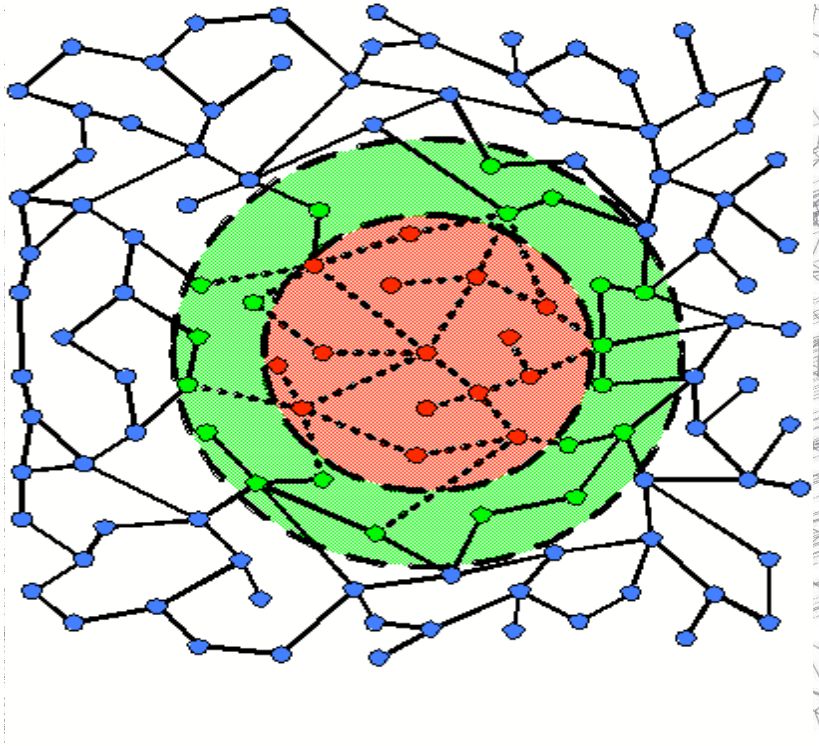


Crisis Observatory for Financial Instabilities

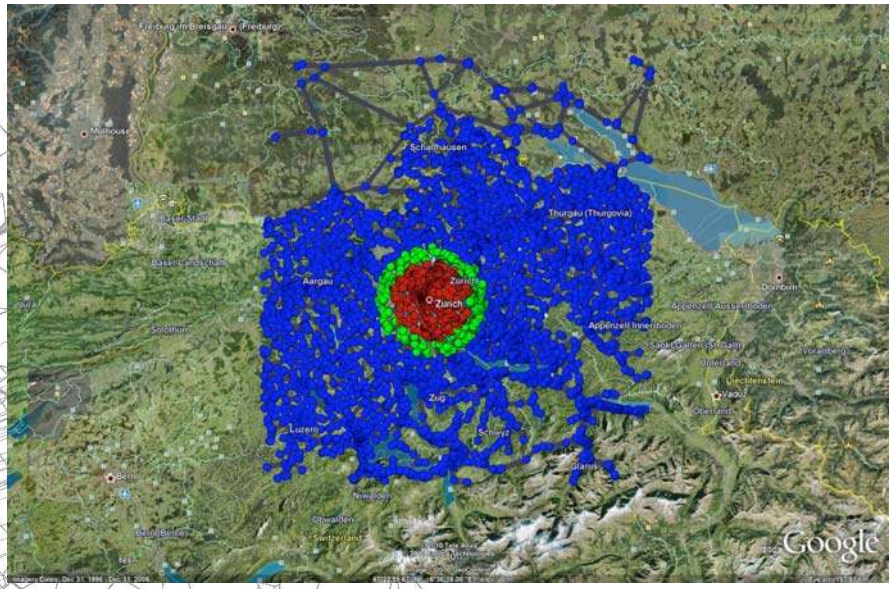


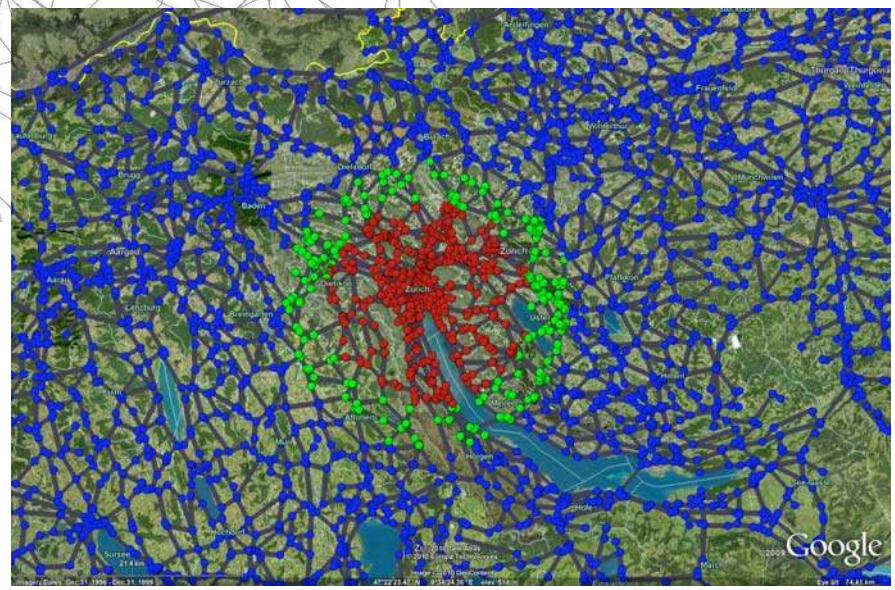
International Herald Tribune, October 27, 1989. Kal, Cartoonists and Writers Syndicate, 1989.

Large-Scale Evacuation and Contingency Plans



Node in the evacuated area
Node in the secure area
Secure node next to the evacuated area
Link that is evacueed

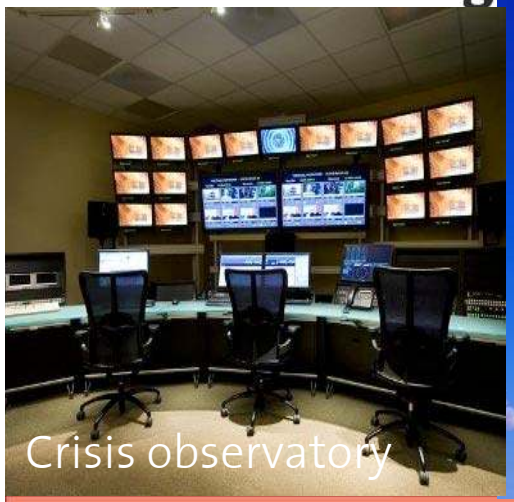




Source: Kay Axhausen, Christoph Dobler

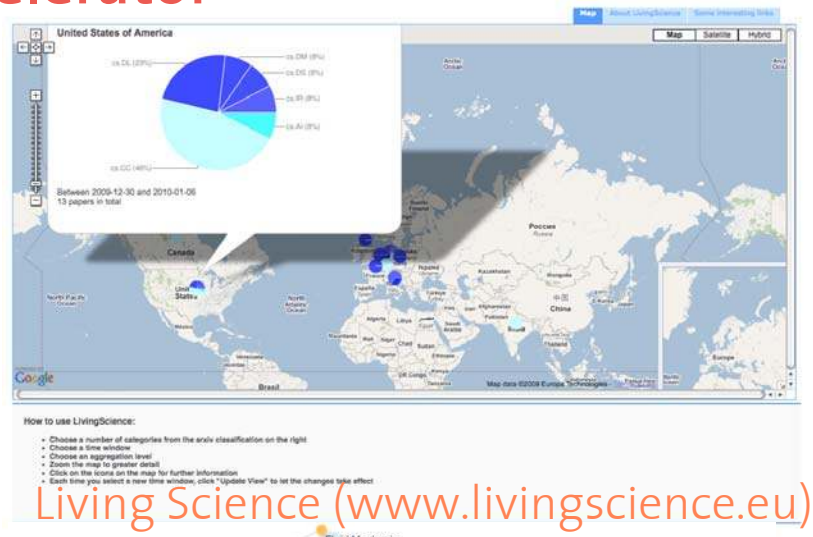
Policy Decision Support through FuturIcT: Case of Financial System

Meltdown modelling

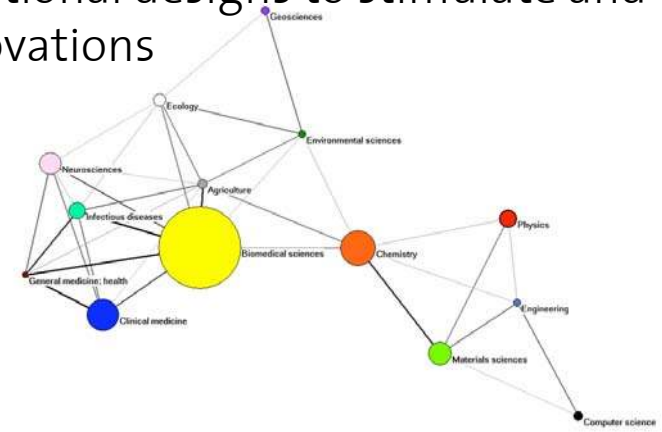


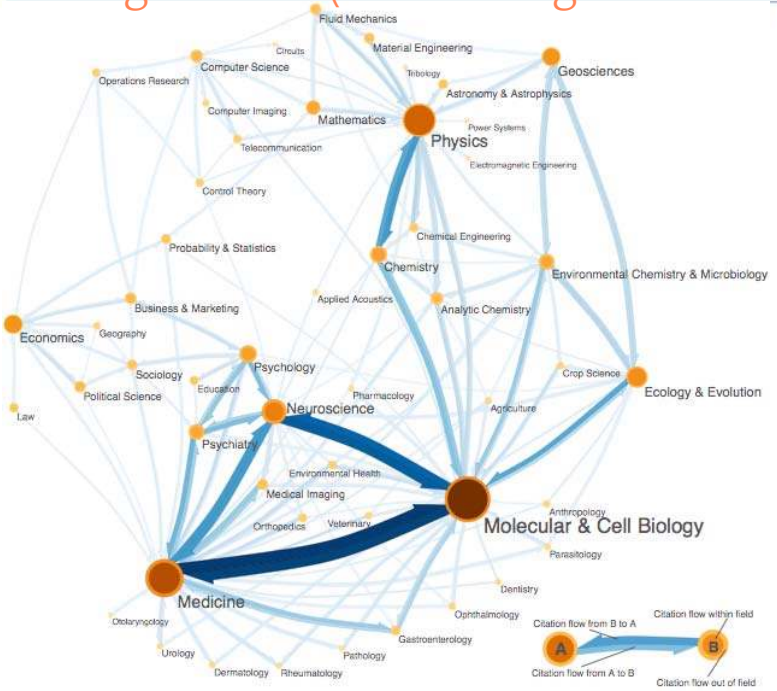
Innovation Accelerator

- Analysis of scientific productivity
- New indices to discover high-quality work
- Identification of innovations and trends early one
- Co-creation tools for large-scale projects
- New science forum and publication platform
- Customized recommender and reputation platforms
- New institutional designs to stimulate and spread innovations

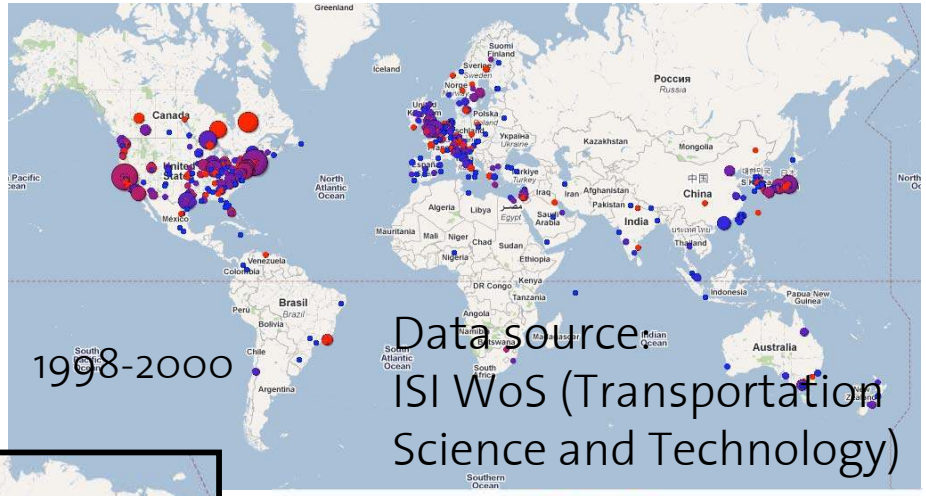


Living Science (www.livingscience.eu)

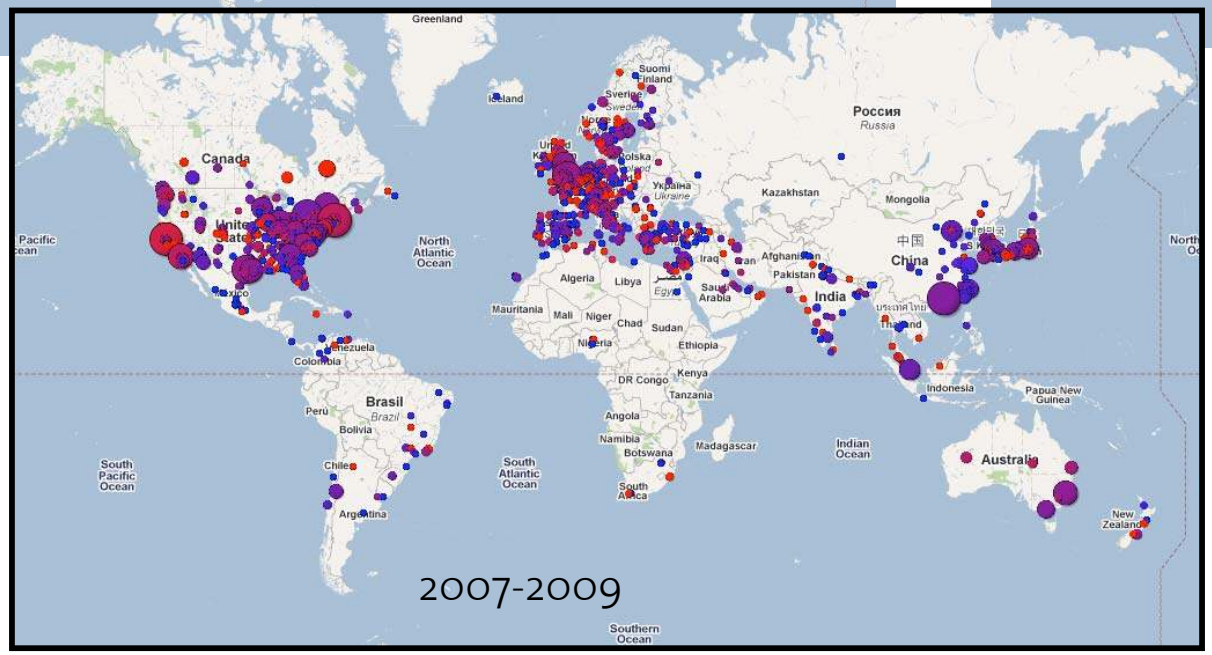


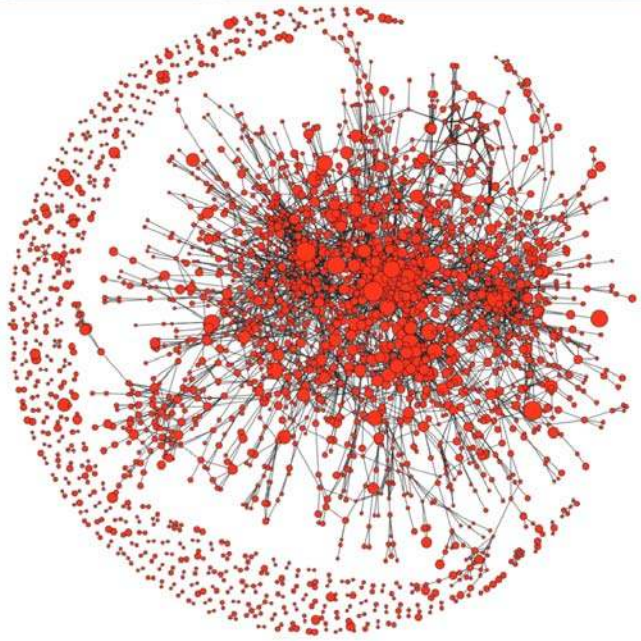


How Knowledge Spreads Geographically

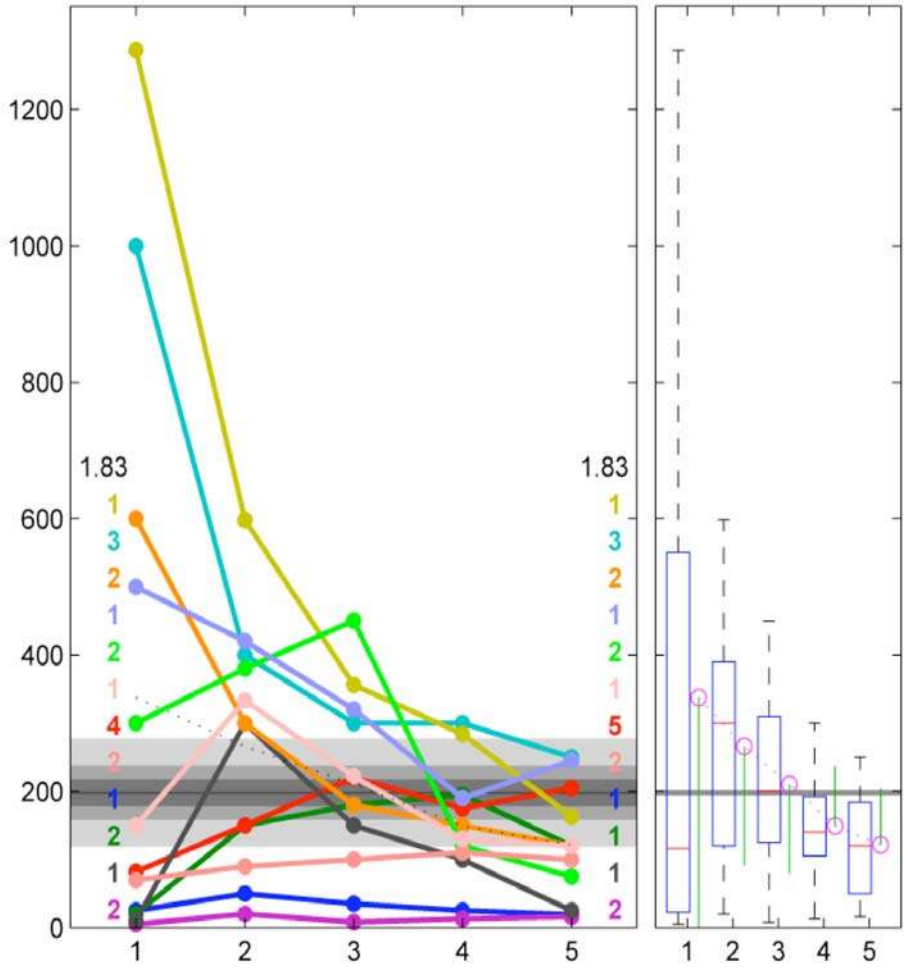


Data source:
ISI WoS (Transportation Science and Technology)

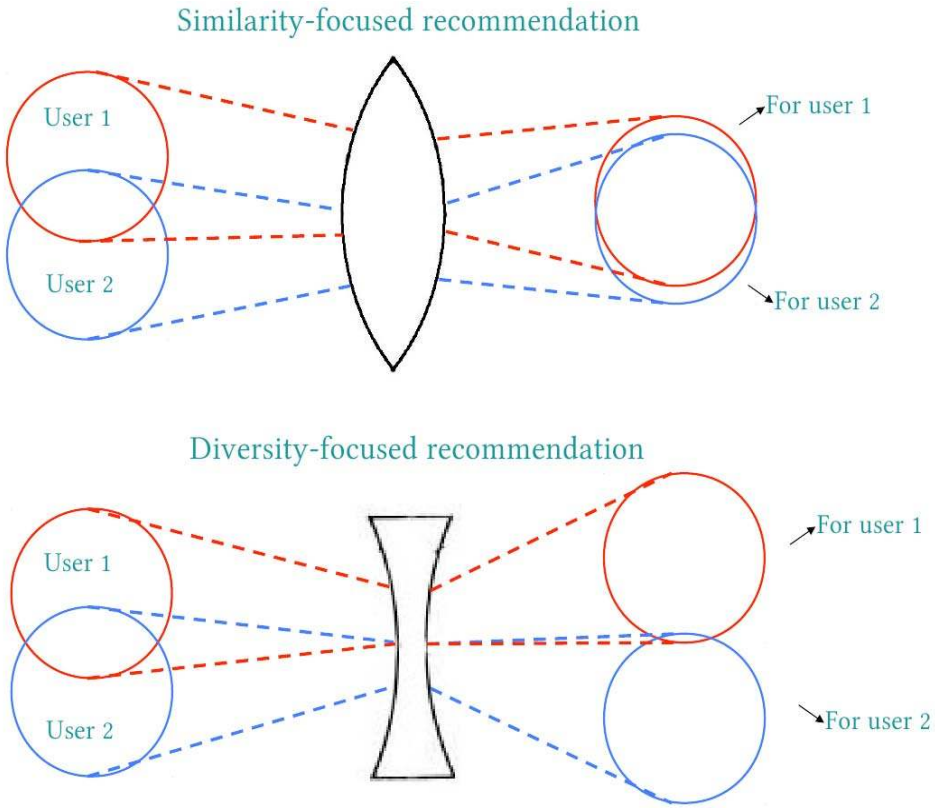




Conformity versus Diversity in Recommender Systems



Collaboration with Jan Lorenz,
Heiko Rauhut, and Frank Schweitzer

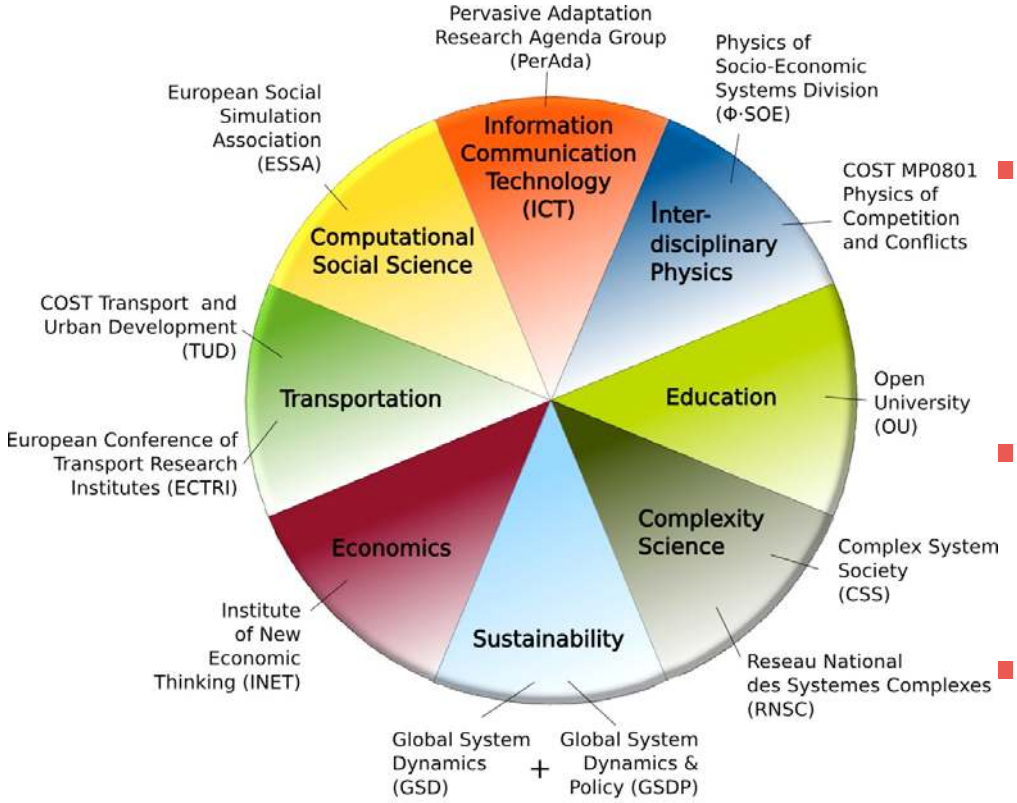


Source: Yi-Cheng Zhang *et al.*

Impact on Science, Industry, Business, Administration, Governance

- Science and Education:
  - Innovation accelerator
  - Personalized education
- Public Sector:
  - Smart, sustainable cities
  - Healthcare (e.g. epidemics)
  - Crisis observatories, risk management
- Business and Industry:
  - Financial sector
  - Managing complexity
  - Transport, traffic, logistics
  - Electrical micro-generation
- Administration and Governance:
  - eGovernance
  - Institutional design
- Consultancy:
  - Customized information services

Plausibility of FuturIcT



The FuturIcT Knowledge Accelerator integrates the best of all relevant knowledge

- Europe has reached leadership in social modeling and simulation, but strong competitors are trying to take over. The project is in the best public interest, meets Europe's Vision 2020.
- Many prepatory Networks of Excellence and Coordination Actions: Exystence, Giacs, Once-CS, ASSYST, PANORAMA/PerAda, ...
- EU projects on techno-social systems: QLectives, Cyberemotions, Epiwork, Socionical
- Various Integrated Projects and STREPS: EURACE, EMIL, PERPLEXUS, PATRES, MMCOMNET, EVERGROW, DELIS, EC-AGENTS, PACE, CREEN, IRRIIS...
- Information Science: HITIME, VIVO, GAPMINDER, GLOBALHUBS, CREEN...

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Department of Humanities and Social Sciences

Chair of Sociology, in particular
of Modeling and Simulation

ETH Zürich
CLU E 1
Clausiusstrasse 50
8092 Zurich
Switzerland

Prof. Dr. rer. nat. Dirk Helbing
Telefon +41 44 632 88 80
Telefax +41 44 632 17 67
dhelbing@ethz.ch

Mr. George Soros

Zürich, 17 March 2010

Dear Mr. Soros,

Many leading scientists from various scientific fields, including Nobel Prize winners, have recently expressed their dissatisfaction with the state of economic theory, and it is obvious that new approaches are needed to address the fundamental and practical challenges of our financial, economic and social system. The criticisms of the pillars of classical economics are substantial and suggest that

- markets are not efficient by nature,
- economics can be driven far from equilibrium (as bubbles and crashes illustrate),
- the system behavior is dominated by interactions between the market participants and stakeholders, and hard to regulate,
- network interactions can change the behavior of markets dramatically, and
- science needs to be driven by empirical data, not just by the logic or beauty of theories.

This situation calls for concerted action and a largely multi-disciplinary approach. It has been proposed, for example, that one can gain valuable insights by comparing financial with eco-systems, in which extreme events can be the result of systemic instabilities. This approach relates to the theory of complex dynamical systems, considering randomness and strong interactions as fundamental features.

The financial crisis has not only created huge financial losses. It has damaged the economic system to an extent that several countries are at the verge of bankruptcy, and social systems have become dangerously vulnerable. The problems we have seen may just be the beginning of a larger crisis. The situation may totally get out of control, endangering social peace and cultural achievements.

It may, therefore, interest you that the European Union is currently creating scientific "Flagships" to address the grand challenges of the future. With a budget of 100 million EUR per year, over a period of ten years, they want to foster unprecedented scientific discoveries and radical innovation by transdisciplinary research. FuturICT, one of the initiatives applying for this program, aims at developing a realistic theory of economic systems and society, at creating computer simulations of global-scale systems, and at designing new concepts for a sustainable world. It will involve scientists from a large range of disciplines. Hundreds of experts in social simulation, economics, physics, sociology, mathematics, psychology, ecology, computer science, etc. would be working together to combine the best of human knowledge.

Herewith, we would like to invite you to be a galleon figure of this Flagship. The FuturICT flagship fits perfectly the goals of your **Institute of New Economic Thinking.** Joining forces could largely accelerate the required paradigm shifts and the development of solutions to the challenges humanity is facing.

Sincerely yours,

Dirk Helbing
Economists: Mauro Gallegati, Domenico Delli Gatti, Cars Hommes, Alan Kirman, Thomas Lux
Econophysicists: Jean-Philippe Bouchaud, Doyne Farmer, Imre Kondor, Matteo Marsili, Yi-Cheng Zhang

GEORGE SOROS

March 30, 2010

To Whom It May Concern,

On behalf of the Institute for New Economic Thinking and Central European University I am writing to express strong interest in this scientific endeavor and in collaborating with the candidate flagship FuturICT and the team Professor Helbing is creating.

The Institute for New Economic Thinking (INET) www.ineteconomics.org has been founded to foster and create new interdisciplinary ways to address social and economic problems. Applications of network theories to system evolution, political-economic interactions and psychologically sophisticated approaches to understanding system dynamics are just a few dimensions of exciting new research that our fellows will be working to develop.

Central European University, INET and a number of leading universities are working to establish a network of campus based joint venture institutes around the world to further invigorate our research agenda. The first of which, in conjunction with the Oxford Universities 21st Century School will begin to operate shortly. This interdisciplinary network will add further strength and depth of scholarship to the pursuit of new and deeper understanding of a myriad of social issues.

The team of scientists that Dr. Helbing has gathered together can, I believe, make a significant contribution to the understanding of the evolution and change in societies as they meet the formidable issues of governance, climate change, sustainable economic balance that we are all faced with in the coming decades. I look forward to CEU and INET joining with FuturICT to address these daunting challenges in the coming years.

Sincerely yours,

George Soros

Lord Robert May of Oxford: "Your letter to Soros puts the case admirably well, and I believe he may well be interested in such an initiative."

UCL DEPARTMENT OF MATHEMATICS

UCL

To: Wolfgang Boch
Head of FET

23 March 2010

Re: **FuturICT - Unleashing the Power of Information for a Sustainable Future**

Dear Wolfgang,

As you know, GSD is very much concerned with identifying new techniques of ICT influenced mathematics that we require in order to assist policy makers with their decision making, particularly in the area of sustainability. GSD Partners have been informed, and indeed are informing, the proposal being put forward by Professor Helbing for his idea of a flagship. Although GSD is approaching its end, new ideas are now being fed into many different projects. It is bizarre that despite all the advanced mathematics available to us we are still not able to successfully model social interactions. It is this inability which lets scientific advisors down in their efforts to provide advice to politicians and others on the best way forward.

As Coordinator of the GSD project I firmly support this notion for a flagship and I know that my colleagues are also supportive. We feel that we have only just beg how modelling and simulation can be brought together to inform an making both for governance and in business. Furthermore we have instigate and collect data that will help form the basis for new actions. much interested in this project.

Furthermore we recognise that the ideas being proposed go eve therefore the FuturICT programme is truly both adventurous and challe

Finally, the goals of FuturICT very neatly match not only my ow many of my colleagues here at UCL.

I am therefore very keen to work with Professor Helbing and wil this important project. I know that this attitude is already mirrored colleagues on our GSD database and I am sure that the others will fc more aware of the particulars.

Yours sincerely

Steven Bishop
Professor of Nonlinear Dynamics

Email : s.bishop@ucl.ac.uk www.ucl.ac.uk

www.globalsystemdynamics.eu

Physics of Socio-Economic Systems Division
of the German Physical Society (DPG)

Φ·SOE

The Wolfgang Boch
Head of FET

Letter of Support for the FuturICT Flagship

Dear Wolfgang Boch,

The European Social Simulation Association

March 19, 2010

To Whom It May Concern

RE: Candidate Flagship on "FuturICT: Unleashing the Power of Information for a Sustainable Future" EU Projects, FET Programme, Complexity Initiative

On behalf of the Management Committee and as President of the European Social Simulation Association (ESSA), I would like to express the strong interest of our community in this scientific initiative.

On one hand, this initiative is a clear evidence of the growing reputation of social simulation and its fertile interconnections with other scientific environments. When the computational social sciences link ICT with the social scientific disciplines, social simulation can bridge the gap with complexity science.

On the other hand, the candidate Flagship shows the strong applicability of social simulation. Nowadays, it would be short sighted to ignore the tools that ICT in general, and computer simulation in particular, can provide to anyone who is interested in understanding the evolution and change of societies. There is no way to investigate the future without the powerful technology provided by ICT, because these gies are a significant factor for change, and a major component of the future. ICT-enabled social on enables us to understand future developments of ICT and its contribution to society..

Taking advantage of a large network of prestigious institutions and highly reputed scientific the Flagship has several merits.

Firstly, it tackles the most crucial issues that strongly affect the future growth and the quality of life rn(ized) societies.

Secondly, it creates a far-reaching interdisciplinary vision, requiring strong synergies among is well as social, cognitive and computational sciences.

Thirdly, if one may use an oxymoron, it represents a solid vision. Highly ambitious in its s, it stands on solid grounds. Implementing complex and evolving virtual societies is a daring task, n the other hand, can count upon a resource of models, theories, techniques and tools. Still in , some basic ingredients (new theories and models, large-scale simulation platforms, databases and ing techniques, etc.) are already available, waiting to be incorporated into a consistent theoretical rk.

Fourthly, it would contribute to European competitiveness by providing novel means to maintain lop its welfare tradition. Moreover, it will add to the merits of the Complexity Programme of the n Union to provide the ways and means of such a competitive endeavour.

Finally, it is innovative, building on the frontiers of ICT and providing stimulating reasons to go ther: using Bertrand Russell's words, it builds on the objective to "see in imagination the society be created".

Best wishes

Rosaria Conte
(President of ESSA
http://www.essa.eu.org/)

TRINITY COLLEGE
UNIVERSITY OF DUBLIN

Professor Peter Richmond
Tel +353 1 896 1676
Fax +353 1 671 1759
Email Richmond@tcd.ie

Department of Physics
Trinity College
Dublin 2
Ireland

31st March 2010

Re: **FuturICT - Unleashing the Power of Information for a Sustainable Future**

To who it might concern,

As you may know, COST is very much concerned with establishing new networks in innovative areas of science and technology. Complex systems science has over the past few years been supported first by COST P10 Physics of Risk and currently by COST MP0801 Physics of conflict and cooperation. The aim of this latest action is to nurture and support researchers interested in applying methods of complex systems to social and economic systems.
These concerted actions have partners from over 24 European member states and many of the partners have been informed, and indeed are informing, the proposal being put forward by Professor Helbing for his idea of a flagship. COST MP0801 will continue for another two years and we expect to help feed many new ideas into the Flagship project. In this way we shall provide a valuable link and input for key projects concerned with the application of new mathematics and physical ideas into the social and economic sciences which are in sore need of new intellectual input.

As Coordinator of these COST initiatives I firmly support this proposal for a flagship and I know that colleagues are also very supportive and will be very interested in the project. The ideas being proposed will take our activity forward in new and, at the moment unknown ways and we believe the FuturICT programme is truly both adventurous and challenging. The goals of FuturICT very neatly match the interests of all colleagues within COST.

Many if not most will be keen to work with Professor Helbing and collaborate on this important project and I am sure that the others will follow suit once they

We therefore strongly support this proposal

Yours sincerely

POLITECNICO DI TORINO

To whom it may concern.

As legal representive of the Politecnico di Torino, I hereby confirm our interest and willingness to participate and support the initiative "Candidate Flagship FuturICT", co-ordinated by Prof. Dirk Helbing, ETH Zurich, that will be submitted in response to the next call for proposals of the FET-ICT Programme.

The action areas of the FuturICT Flagship are critically relevant to the main needs of our present and future Society. In the area of the ICT, the focus of research and technology development has moved from the design of monolithic engineered systems to the design, integration, on-the-fly composition of distributed systems and the development of platforms for such systems. Public and private institutions, industries, commercial and public-sector organisations are increasingly aware that their software applications do not stand alone, but are part of a broad interconnected system.

Social interactions change and adapt to the multifaceted and interconnected effect of ambient intelligence. The challenge of this Flagship will be to establish guidelines, design rules and increase awareness to meet the increasing need to face with these new social paradigms.

Hence, we confirm our interest in co-operating actively to the preparation of the project proposal and then in successfully implementing and promoting the Project activities

A cluster of Departments (Physics, Information and Communication Engineering, Transport and Civil Engineering) is jointly involved in the Flagship, collaborating with Professor Helbing and the other partners. The members of our team have long-standing skills in many areas of the ICT as for example Statistical Physics, Image Processing, Distributed Information and Communication Technologies, Information and Algorithmic Complexity, Building and Transport Engineering.

The people involved within our organisation are:

Prof. Anna Carbone (anna.carbone@polito.it) Physics Department - Referent
Prof. Enrico Macii (enrico.macii@polito.it) Computer Engineering Department
Prof. Marco Ajmone Marsan (marco.ajmone@polito.it) Electronic Engineering Department
Prof. Cristina Pronello (cristina.pronello@polito.it)Transport Engineering Department
Prof. Bernardino M. Chiaia (bernardino.chiaia@polito.it) Civil Engineering Department

Name and Position of Legal Representative
Prof. Francesco Profumo
RECTOR
Torino, 12 April 2010

Professor Francesco Profumo
Rector
Politecnico di Torino
Corso Duca degli Abruzzi, 24 – 10129 Torino Italia
rettore@polito.it

ASSYST

Design Complexity Research Group
Faculty of Mathematics, Computing and Technology
Department of Design, Development, Environment and Materials
The Open University
Walton Hall
Milton Keynes
MK7 6AA
United Kingdom
Tel +44 (0) 1908 653655
Fax +44 (0) 1908 652856

Prof Dirk Helbing
ETH Zurich

24th March 2010

Dear Prof Helbing,

FET Flagship: FuturICT

The Open University fully supports the proposed FuturICT Flagship and will do everything it can to make the project a success. The Design Complexity Group at the Open University has an international reputation for its research into the way complexity impinges on design and design embraces complex systems science. We hope to be able to contribute our expertise as the Flagship develops.

Also we will be pleased to contribute our well known expertise in education and distance learning to the project. With over forty years experience of educating millions of students in many countries the Open University will be able to provide programmes of education and support at the level the Flagship will require across many countries and institutions.

As you know the European ASSYST project based in my department is committed to supporting the FuturICT Flagship project , which we see as having the potential to be one of the most important scientific innovations of this century. We congratulate you for developing this exciting and innovative project. The ASSYST community strongly supports it.

The Open University will be also pleased to do whatever it can to help prepare and promote the FuturICT proposal through the efforts of ASSYST and my research group.

We wish you luck, yours sincerely

Jeffrey Johnson
Professor of Complexity Science and Design
Director of the European ASSYST Coordination Action Project

The Open University is incorporated by Royal Charter (RC 000391), an exempt charity in England & Wales and a charity registered in Scotland (SC 038302).

COST

To: **Whom may concern**
Date: **13 April 2010**

Dear Professor Helbing,
as Chair of the COST Transport and Urban Development (TUD) Domain Committee (DC), I hereby express the support and interest of the DC for the "FuturICT" flagship initiative.

The TUD DC aims at fostering international research networking activities of scientists and experts dealing with transport systems and infrastructures, urban land use and development, architecture and design, and civil engineering issues. The focus is on multi- and interdisciplinary approaches and the aim is to cover both basic and applied research activities including technical and technological developments and their changeovers that are relevant to policy and decision making processes. A significant concern is devoted to activities exploring new research needs and developments.
The domain is by definition cross-sectoral and multidisciplinary, encompassing a wide range of scientific expertises within the transport and land use planning, design, and management activities with a special emphasis on the strong interrelationships among the relevant policy fields as well on all aspects related to sustainable development.

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pport y

The Complex Systems Society

Association régie par la loi de 1901
218 rue du Faubourg Saint Martin, 75010, PARIS
http://css.csregistry.org, j.h.johnson@open.ac.uk
Tel: +44 77 966 966 21

Prof Dirk Helbing
ETH Zurich
17th March 2010

Dear Professor Helbing

Complex Systems Society Support for the FuturICT Flagship Project

I write on behalf of the Complex Systems Society to express our commitment to the proposed FuturICT Flagship Project. This proposal has our strongest support.

The Complex Systems Society was created in Europe through the ONCE-CS coordination action of the Future and Emerging Technology (FET) unit of the European Commission . Ten years ago FET had the vision to see that the emerging science of complex system would have a profound impact on every aspect of European Society, providing new ICT-enabled solutions to problems that traditional physical, biological, environmental and social science cannot solve by themselves. Complex systems is a synthesis that integrates the traditional sciences, adding new layers of understanding and enabling new technologies for exploitation in the private and public sectors. Through the support of the European Commission and national funding agencies, Europe has become a world leader in complex systems science. With a membership exceeding two thousand people, the Complex Systems Society is a large and heterogeneous community of scientists, entrepreneurs and policy makers developing and applying the new science.

The complex systems community believes that the FuturICT Flagship will be one the most profound scientific initiatives of the twenty first century, and it will have a great impact in the short and long terms. The major challenges faced by humankind are complex systems problems - from adapting to climate change and its geo-socio-politico-economic consequences, to providing reliable science to underpin global and national finances, to creating a new *in-vivo* biological science on which to base pharmaceutics and medical practice, to creating new methods to study epidemics of viral and socially induced illness, to producing the new theoretical understanding necessary for geopolitical and military stability in the face of the many global challenges that lie ahead. Humankind needs to integrate *all* its knowledge from all domains into new science able to address the new kinds of problem that emerge in our ever more connected world. The FuturICT programme is a unique opportunity for Europe to grasp the scientific initiative and create new science to enable it to survive and even thrive in the turbulent times that lie ahead.

We offer our full support to the FuturICT Flagship and we want to work with you to make this extraordinary vision become a reality. For scientists this a once-in-a-lifetime opportunity to participate in a programme of revolutionary scientific discovery and unprecedented social innovation. The Complex Systems Society and its members are excited by the prospect of making a quantum leap in science and its applications through the visionary FuturICT Flagship project.

Assuring you of our full support, yours sincerely

Professor Jeffrey Johnson
President

ECF

Prof. Dr. Carlo C. Jaeger

European Climate Forum e.V.
Chair
Postbox 600648
D-14406 Potsdam
Germany

Potsdam Institute for Climate Impact Research
Chair of Research Domain IV –
Transdisciplinary Concepts and Methods
Telegraphenberg A 31
D-14473 Potsdam, Germany

fon +49-331-2882601, fax +49-331-2882580, cj@european-climate-forum.net, carlo.jaeger@pik-potsdam.de

Potsdam, 24 March 2010

To Whom It May Concern

RE: Candidate Flagship on "FuturICT"
EU Projects, FET Programme, Complexity Initiative

The GSDP – Global System Dynamics and Policy – network currently includes about 200 researchers interested in developing a research program for the study of global systems. We see great potential in the "FuturICT" initiative from this point of view.

An important example of global systems is given by the world economy. With regard to this system, the global financial crisis has raised the irritating question whether -and if so, why – the

Edinburgh Napier UNIVERSITY

To whom it may concern

March 28, 2010

Support for the FuturICT Flagship Project

Dear Professor Helbing!

On behalf of the PANORAMA (Pervasive Adaptation) Research Agenda Group within the Future and Emerging Technology (FET) unit of the European Commission, we write to express our strong support of the proposed FuturICT Flagship Project.

PerAda is a vibrant consortium of researchers, manifested in the FET FP7 PANORAMA coordination action, involving the leading Pervasive Adaptation research consortia ALLOW, ATTRACO, FRONTS, REFLECT, SOCIALNETS and SYMBRION, all concerned with technologies used in information and communication systems which are capable of autonomously adapting to highly dynamic user contexts. The development of future systems will increasingly require collaborative systems, involving complex interactions between people, intelligent objects and computers. The real challenge will be the constantly changing networked environment that can no longer be centrally controlled, or even completely understood, by the developer or user. To be successful especially in such highly dynamic environments, systems will have to adapt themselves, taking into account the emergent behaviour of the system. More than 650 renowned researchers in this area are coordinated by PANORAMA (see www.perada.eu).

Within PANORAMA, the Research Agenda Group is concerned with the identification of the most challenging frontiers of research in Pervasive Computing and Communications, supporting decision makers, stakeholders and policy makers within the Future and Emerging Technology (FET) unit of the EC, the leading authorities in academia and scientific research worldwide, and future-oriented industrial stakeholders in the ICT area in Europe and across continents.

Many of the grand research challenges identified by PANORAMA are coherent with what FuturICT attempts to establish as the most profound scientific initiative in this century. After almost a whole century of ICT focussed on and centered around the individuals or groups of people, the FuturICT Flagship approach will open a whole new dimension of ICT at the level of societies, and eventually the whole human mankind. It is crucially important for an initiative that reaches out for the ultimate ICT frontiers, to find its underpinning not only in

Completed Steps and On-Going Preparations for FuturIcT

- Build-up of networked multi-disciplinary community
- Identification of Grand Challenges, Hilbert Program for the socio-economic sciences
- Elaboration of suitable institutional settings (Visioneer):
  - Social data-mining and crises forecasting capacities
  - Data security and privacy
  - Innovation accelerator
  - Social simulation capacities
  - Integrative systems design centers
  - Organization and institutional design of large-scale, goal-driven projects (GSDP)

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Coping with Crises in Complex Socio-Economic Systems

Kay Axhausen, Lars-Erik Cederman,

Dirk Helbing, Hans Herrmann,

Frank Schweitzer, Didier Sornette

CCSS
COPING WITH CRISES
IN COMPLEX SOCIO-ECONOMIC SYSTEMS
A Competence Center of ETH Zurich