Complexity-NET

‘Interdisciplinary Challenges for Complexity Science’ Brokerage event 28-29th May 2009

Radisson Blu Royal Hotel
Brussels

Delegate brochure

Coordination of National Complexity Research and Training Activities

Complexity-NET is a group of European science and technology funding agencies, research councils and ministries all working together to create an environment that enables the coordination of national activities in Complexity Science and Complex Systems.

Funded by the European Commission Framework 6 Programme, **Complexity-NET** is aimed at integrating and strengthening the European Research Area through multinational coordination and cooperation of research programmes.

ERA-NET funding is restricted to the costs for networking and coordination of research activities and programmes: the networks align national research policies and activities in terms of objectives, expertise and resources.

Complexity-NET activities to date

We have:

(1) Gathered information on:

- National complexity research landscapes
- The European complexity research landscape
- The need for complexity research in industry and business

(2) 'Engaging with Social Science' workshop

(3) Launch of pilot call on 8th May 2009

Future Complexity-NET activities

We will:

(1) Continued engagement with non-partner countries and encourage involvement in the Joint Complexity Programme

(2) Continued engagement with other Complexity related activities across Europe

(3) Development of strategies for future collaboration

Belgium

Fonds National de la Recherche Scientifique

Belgium Science and Policy Office

Fonds Wetenschappelijk Onderzoek

Title & Name:	Prof Carletti Timoteo
E-mail address:	Timoteo.carletti@fundp.ac.be
Country:	Belgium
Research organisation:	Dep Mathematics FUNDP
Departments involved in complexity	Department of Mathematics
Main strengths of your research organisation in complexity science	Dynamical systems theory, tools and methods; Numerical methods; Networks analysis;
Real-world application areas	Transport; Social sciences : emergence of complex social networks, opinion dynamics; Economics;
Three research areas	Social dynamics and opinion dynamics; Evolving networks;
Relevant existing International collaborations	*None listed*

Title & Name:	Prof. Dr. Annick Castiaux
E-mail address:	annick.castiaux@fundp.ac.be
Country:	Belgium
Research organisation:	University of Namur
Departments involved in complexity	Business administration departement, mathematics department, philosophy department, computer science faculty
Main strengths of your research organisation in complexity science	Our university favours cross-disciplinary research. This allows us to consider complex issues with the complementary views. In business administration in particular, we use models coming from science (physics, biology) to enlighten emergent phenomena in innovation management, in collaboration between firms, in networks, etc.
Real-world application areas	In business administration, we use complexity science to understand systemic behaviours in organizations; to enlighten emergent phenomena at the level of the individual, the firm and networks of firms; to predict the influence of new technologies on the evolution of our economies, etc.
Three research areas	Study of social networks Management in uncertain environment Emergence and business
Relevant existing International collaborations	System Dynamics Society

Title & Name:	Prof. Pierre Colinet
E-mail address:	pcolinet@ulb.ac.be
Country:	Belgium
Research organisation:	Université Libre de Bruxelles (ULB)

Departments involved in complexity	CENOLI (Center for Nonlinear Phenomena and Complex Systems), formed by several research groups among which the laboratory TIPs (Transfers, Interfaces and Processes) - Fluid Physics Unit (director : P. Colinet)
Main strengths of your research organisation in complexity science	The Brussels School has played a major role in the development of Complex Science, following the works of I. Prigogine, G. Nicolis, and co-workers. Along these lines, our team focuses on theoretical and experimental studies of nonlinear dynamics of multiphase fluid systems. Interfaces between phases, with or without phase transition, are subject to a wide variety of thermodynamic and hydrodynamic instabilities, leading to very rich pattern and wave formation dynamics, front propagation, transitions to chaos ... In addition to analyzing fundamental and generic aspects of such phenomena, our group is also active in studying their applications in collaboration with industries.
Real-world application areas	Self-organization at interfaces is nowadays a very promising field for applications, in many technological fields, either classical (chemical engineering, heat transfer), or emerging (micro-fluidics and nanotechnologies). The application areas we are interested in include (but are not limited to) : - Process intensification by interfacial instabilities - Nonlinear dynamics of thin films deposited on or flowing along solid substrates, control of wetting - Development of intelligent micro-fluidic devices - Reaction-diffusion processes and hydrodynamic instabilities during CO_2 absorption in solutions - Boiling heat transfer and evaporative cooling - Micro- and nano-scale pattern formation phenomena in microfluidics and nanotechnology
Three research areas	1) Groups involved in theoretical and experimental study of condensed matter at micro-scale, starting from molecular properties and interaction potentials (bottom-up approaches), including the development of micro-macro hybrid models coupling continuous with discrete approaches 2) Groups involved in microfluidics and/or nanotechnologies, including the characterization of solid surfaces, especially regarding their roughness and wetting properties, interfacial energies, and the handling and/or manufacturing of nano-particles 3) Other groups involved in the field of pattern formation in fluids, emergence of collective behaviours, transition to turbulence ...
Relevant existing International collaborations	MULTIFLOW FP7-ITN network on "Multiscale Complex Fluid Flows and Interfacial Phenomena", homepage http://www.multiflow-itn.eu/

Title & Name:	prof. J. Danckaert
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Country:	Belgium
Research organisation:	Vrije Universiteit Brussel (VUB)
Departments involved in complexity	Dept of Applied Physics and Photonics Dept. of Physics
Main strengths of your research organisation in complexity science	Photonics, laser dynamics Systems with delay Coupled systems Dissipative structure formation
Real-world application areas	Photonic systems Neuronal dynamics Reservoir computing
Three research areas	Laser dynamics Delay-coupled systems Neuronal dynamics
Relevant existing International collaborations	- Optique Nonlinéaire théorique – ULB – Brussels, Belgium - Inst. For Interdisciplinary Physics and study of Complex Systems (IFISC), Palma de Mallorca, Spain.

Title & Name:	Prof. Pierre C. DAUBY
E-mail address:	PC.Dauby@ulg.ac.be
Country:	Belgium
Research organisation:	University of Liège, Belgium
Departments involved in complexity	Faculty of Sciences, Faculty of Applied Sciences
Main strengths of your research organisation in complexity science	*None listed*
Real-world application areas	- cardiac electrophysiology, cardiac arrhythmias
Three research areas	- nonlinear propagation in electrophysiology - electromechanical couplings in the heart - heat and mass transfers in fluid systems
Relevant existing International collaborations	*None listed*

Title & Name:	Professor Paul De Grauwe
E-mail address:	paul.degrauwe@econ.kuleuven.be
Country:	Belgium
Research organisation:	University of Leuven
Departments involved in complexity	Physics, Statistics, Mathematics, Chemistry, Biology, Economics
Main strengths of your research organisation in complexity science	The University of Leuven is a large and prestigious institution with a vast number of researchers from all over the world. Complexity is a very active field of research in Leuven and our researchers have a strong publication profile. Additionally, part of the success of our university has been the active cooperation between different faculties and departments. Currently we are developing an interdisciplinary research project in complexity between the departments of Economics and Physics with renowned researchers from both departments.
Real-world application areas	Most of the applications of the suggested cooperation between the two departments would be of both theoretical and practical importance. From a theoretical viewpoint, complexity is relatively new in economics and has therefore a large potential for scientific innovations. From a practical point of view, interesting real world applications can be obtained. These range from policy recommendations to forecasting of economic variables for both government and non-government institutions as well as for financial corporations.
Three research areas	Since the last two decades there has been a growing interest by economists to use complex systems as a modelling approach. Important contributions have been already made through the cooperation between economists, physicists and mathematicians. Moreover, because of its relative infancy in economics, complexity offers a large potential for new applications. Cooperation and exchange between researchers of all these fields is highly valuable and offers always new insights and perspective
Relevant existing International collaborations	*None listed*

Title & Name:	Prof. Anne De Wit
E-mail address:	adewit@ulb.ac.be
Country:	Belgium
Research organisation:	Université Libre de Bruxelles
Departments involved in complexity	Science Faculty Engineering Science Faculty
Main strengths of your research organisation in complexity science	Interdisciplinary Center for Nonlinear Phenomena and Complex Systems
Real-world application areas	CO2 sequestration Environmental issues Self-organization phenomena
Three research areas	Nonlinear chemistry Pattern formation and self-organization Chemo-hydrodynamic patterns and instabilities
Relevant existing International collaborations	ESA Topical Team on “Chemo-hydrodynamic pattern formation at interfaces”

Title & Name:	Dr. Stéphane Dorbolo
E-mail address:	s.dorbolo@ulg.ac.be
Country:	BELGIUM
Research organisation:	FNRS
Departments involved in complexity	Physics departement, GRASP (Group for Research and Application in Statistical Physics)
Main strengths of your research organisation in complexity science	We do experiments based on image analysis. Equipments: fast cameras, electromagnetic shakers, IR camera. The group has two main research areas: granular materials (powders, compaction, flow, fish!…) and complex fluids (foams, antibubbles, droplets,…). The collective motion and the spontaneous organization are explored.
Real-world application areas	Applications are found in foam science, pharmacology, space, concrete, zoology
Three research areas	Granular materials Bouncing and self-propelled particles Droplets
Relevant existing International collaborations	COST P21: Physics of droplets

Title & Name:	Dr. Marco Dorigo
E-mail address:	mdorigo@ulb.ac.be
Country:	Belgium
Research organisation:	Université Libre de Bruxelles & F.R.S–FNRS
Departments involved in complexity	IRIDIA – Artificial Intelligence research laboratory – Applied Sciences Faculty
Main strengths of your research organisation in complexity science	I direct a group of approximately 20 researchers working on various aspects of swarm intelligence. In particular: (i) ant colony optimization: we initiated the work on the use of artificial ants for the solution of NP-hard problems; (ii) swarm robotics: we have developed new types of robots capable of autonomous self-assembly and we have developed many distributed, self-organized algorithms for their control; (iii) data analysis: we have developed self-organized algorithms inspired by social insect behaviour for the solution of clustering and topographic mapping problems.
Real-world application areas	The area we are interested in are a direct consequence of our three main strengths listed above: (i) applications of ant colony optimization to difficult real-world discrete optimization problems in logistics, bioinformatics, science, etc.; (ii) applications of swarm robotics to challenging problems such as search and rescue; (iii) applications of ant algorithms to data mining problems.
Three research areas	- Theoretical biology: for cooperation in the development of a theory of swarm intelligence - Robotics: for collaboration in the study of the behaviour of swarms of robots - Operations research: for cooperation in the solution of dynamic, stochastic, and multi-objective discrete optimization problems
Relevant existing International collaborations	- Swarmanoid project: a FET project in swarm robotics funded by the EU; IRIDIA coordinates, EPFL (CH), IDSIA (CH), and CNR (I) are partners

Title & Name:	Prof. Pierre Gaspard
E-mail address:	gaspard@ulb.ac.be
Country:	Belgium
Research organisation:	Université Libre de Bruxelles
Departments involved in complexity	The Center for Nonlinear Phenomena and Complex Systems is an interdisciplinary research center attached to the Departments of Physics, Chemistry and Biology of the Faculty of Sciences, to the Faculty of Applied Sciences, and to the Faculty of Medecine.
Main strengths of your research organisation in complexity science	Our main activities concern the connections between dynamics at the microscopic and mesoscopic levels and complexity at the macroscopic level. The topics involved are interlinked by the use of probabilistic concepts. One of our topics pertains to the role of dynamical chaos in classical transport phenomena and in the structure of non-equilibrium states. The conditions for a clearcut separation between macroscopic behaviour, as described e.g. by the equations of fluid dynamics or chemical kinetics, and dynamical processes at the microscopic level are also analysed. In parallel, numerical simulation methods especially designed for the study of non-equilibrium systems are being developed.
Real-world application areas	Kinetic and thermodynamics of multi-step processes such as nucleation; nano-scale phenomena such as self-assembly and self-organisation in biological macro-molecules (protein aggregates, protein motors, etc.); transport and fluid advection problems; nonlinear analysis of complex bio-medical data, in particular in the context of information theory.
Three research areas	Complex matter, fluid dynamics and transport. Dynamics and stochasticity in multi-agent systems, emergence of collective behaviour. Information based, nonlinear time-series analysis in the context of bio-medical applications.
Relevant existing International collaborations	*None listed*

Title & Name:	Christian Maes
E-mail address:	Christian.Maes@fys.kuleuven.be
Country:	Belgium
Research organisation:	K.U.Leuven, Instituut voor Theoretische Fysica
Departments involved in complexity	Physics, Engineering, Economy
Main strengths of your research organisation in complexity science	Link with mathematical and theoretical physics
Real-world application areas	Nonequilibrium statistical mechanics, discrete spatial probability and study of dynamical systems
Three research areas	Chemistry and Biology
Relevant existing International collaborations	*None listed*

Title & Name:	Dr. Vyacheslav R. Misko
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Country:	Belgium
Research organisation:	University of Antwerp (UA), Belgium
Departments involved in complexity	Faculty of Science UA-NANO Centre of Excellence

Main strengths of your research organisation in complexity science	Computer modelling of complex dynamics of interacting systems, self-assembly and self-organisation
Real-world application areas	- Applied superconductivity: enhancement of the superconducting critical parameters. - Fluxonics: manipulating single flux quanta, elaborating new principles and concepts of micro- and nano-device for information technology. - Biological applications: e.g., ion-channel transport in cell membranes, drug release, etc.
Three research areas	- The dynamics of flux quanta in nano-structured superconductors. - The dynamics and self-assembly of colloids. - Rectification mechanisms.
Relevant existing International collaborations	Centre for the Study of Complex Systems, Univ. Michigan (US), RKIEN (Japan), Univ. Manchester (UK), Univ. Loughborough (UK), Univ. of Tuebingen (Germany), Centre of Nanoelectronic Systems for Information Technology, FZ Juelich (Germany), Univ. Camerino (Italy), Univ. of Syracuse (US), KU Leuven (Belgium)

Title & Name:	Prof. Catherine Rouvas-Nicolis
E-mail address:	cnicolis@oma.be
Country:	Belgium
Research organisation:	Royal Meteorological Institute of Belgium
Departments involved in complexity	Research Department
Main strengths of your research organisation in complexity science	- Access to extensive data sets on environment related variables (temperature, humidity, precipitation, floods and other extreme events). - Long standing research activity devoted to the analysis of weather and climate related problems from the standpoint of complexity science.
Real-world application areas	- Quantitative characterization of weather and climate variability. - Predictability of atmospheric and climatic fields, dynamical and statistical analysis of the growth of small initial prediction errors, sensitivity to the parameters. - Dynamical and statistical properties of extremes.
Three research areas	Dynamics and (un)predictability, risk, extreme events.
Relevant existing International collaborations	- Network of European National Meteorological Institutes

Title & Name:	Prof. Jan Ryckebusch
E-mail address:	Jan.Ryckebusch@UGent.be
Country:	Belgium
Research organisation:	Ghent University
Departments involved in complexity	Department of Physics and Astronomy
Main strengths of your research organisation in complexity science	The Department has developed research activities in many-body and statistical physics. There is a substantial amount of expertise in advanced computer modelling of (quantum) systems of many interacting units.
Real-world application areas	The group has developed some research activities in econophysics. The current line of active research is in the use out-of-equilibrium molecular dynamics techniques to simulate the time evolution of dynamical systems (including financial markets). The use of the molecular dynamics technique allows us to study the systems over both long and short time scales.
Three research areas	- econophysics - statistical physics of systems operating out of equilibrium (with applications in socio-economic systems)
Relevant existing International collaborations	*None listed*

Title & Name:	Prof.dr. Jacques Tempere
E-mail address:	jacques.tempere@ua.ac.be
Country:	Belgium
Research organisation:	University of Antwerpen
Departments involved in complexity	Department of Physics Department of Mathematics
Main strengths of your research organisation in complexity science	Expertise in use and development of path-integral techniques (i.a. to solve stochastic differential equations), stochastic calculus, and various other many-body techniques and approximations to obtain analytic results.
Real-world application areas	Pricing of financial products (derivatives). Description, characterisation and modeling of time-series, in (1) financial series and (2) atmospheric pollution. Phase transitions in (scale-free) networks.
Three research areas	Pricing of financial derivatives, developing and studying models leading to power-law distributions, mapping of finanicial models onto physical many-body systems, description and modeling of time-series (using eg. superstatistics and nonlinear stat. mech.); application of many-body techniques to scale-free networks.
Relevant existing International collaborations	This is a relatively new area for us, no pre-existing international collaborations on this topic.

Title & Name:	Dr. Paul VALCKENAERS
E-mail address:	Paul.Valckenaers@mech.kuleuven.be
Country:	BELGIUM
Research organisation:	K.U.Leuven
Departments involved in complexity	Faculty of Engineering, Mechanical Engineering Department - Centre for Industrial Management / Traffic and Infrastructure - Multi-Agent Coordination and Control Research Group
Main strengths of your research organisation in complexity science	Beyond analysis: our research investigates the **synthesis** of systems/artefacts that account for complexity science. It goes beyond identifying and modelling of complexity and complex behaviour. We develop systems that possess attractive properties and offer valuable services in a complex environment. Their design is a complex system to cope with such a challenging environment. Existing design methodologies and design validation methods are challenged here. Key issues in complex systems are handled through design and not simply accepted as 'a fact of life'.
Real-world application areas	On-line coordination and control of resource-centric applications, characterized by activities that need certain rights over resources to achieve their goals. These activities are constrained concerning the manner in which they need these resources. Real-world applications within this scope are: - Logistic execution systems - Manufacturing execution systems - Supply network/chain management - Intelligent traffic - Intelligent transport - Warehousing systems - Cross-docking systems - Smart power grids - Hospital logistics and operations management
Three research areas	1) Design of complex systems, artefacts, systems of systems and holonic systems addressing the above application areas. 2) Applying (and developing new) complexity theory in which our coordination and control systems are the focus of the analysis and modelling. 3) Coordination and control (in the above-listed applications) with missing, stale, incomplete, unreliable and incorrect information links to the real world.
Relevant existing International collaborations	IMS – Intelligent Manufacturing Systems

Title & Name:	Professor Christian Van den Broeck
E-mail address:	christian.vandenbroeck@uhasselt.be
Country:	Belgium
Research organisation:	Hasselt University
Departments involved in complexity	Science Department
Main strengths of your research organisation in complexity science	We have tackled various fields of research, such as neural networks, nanotechnology and Brownian motors, using tools and concepts coming from nonequilibrium statistical mechanics, thermodynamics and dynamical systems theory.
Real-world application areas	At this moment, we are specifically involved in applications in nanotechnology.
Three research areas	Connection between dynamical system theory and statistical mechanics. Applications of complexity concepts in nanotechnology.
Relevant existing International collaborations	I am chair of the European Network: "Exploring the Physics of Small Devices" funded by the European Science Foundation (2009-2014).

Estonia

Eesti Teaduste Akadeemia

Title & Name:	Dr. Heiko Herrmann 
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Country:	Estonia
Research organisation:	Centre for Nonlinear Studies, Institute of Cybernetics, Tallinn University of Technology
Departments involved in complexity	All the research groups of the Centre for Nonlinear Studies are involved (at least in some extent) in the complexity studies
Main strengths of your research organisation in complexity science	Our main strength is that our compact research team at CENS includes good specialists in a wide spectrum of different research fields: mathematics (proactive systems), theoretical physics (nonlinear waves, mixing, nonlinear dynamical systems), marine sciences (wave engineering), biophysics (regulation of intracellular processes), biomedical engineering (EEG and ECG analysis), and econophysics. This allows us to use an efficient interdisciplinary collaboration (which is almost always necessary for successful complexity studies).
Real-world application areas	- Complexity in nonlinear wave motion: solitonics and coherent wave fields, phase transformation fronts, stress analysis, thermo-dynamical constraints, anomalies of water waves including extreme waves; - Complexity in biophysics: in silico modelling of cardiac contraction and cell energetics, internal variables; - Fractality in nature: statistical topography, multifractality, turbulent diffusion, econophysics; - Complexity in software-intensive systems - emergent behaviour in proactive embedded systems, situation-aware interaction centred models of computation, time-counting systems with multiple metric times, holistic self-organizing systems; - Nonlinear control theory - novel algebraic formalisms, catering for multiple time scales.
Three research areas	We are interested in making contacts in all the above listed real-world application areas. Outside the context of particular application areas, we would like to make contacts in the following topics: - scale-invariance and intermittency in the dynamics of complex systems, together with the relevant risk estimation techniques; - geometrical complexity and statistical topography of complex systems; - evolution of coherent structures (solitons, shock waves, phase transition fronts, vortices, etc) in various media.
Relevant existing International collaborations	We have formal collaboration agreements with the Department of Mathematics, University of Turin; Department of Mathematics of City University, Hong Kong; HAS-TUB Research Group for Continuum Mechanics; Hungarian Academy of Sciences; d'Alembert Institute, University Pierre and Marie Curie, Paris; Department of Mathematics, University of Messina; Akhiezer Institute for Theoretical Physics. National Science Center, Kharkov Institute of Physics and Technology; Institute of Thermomechanics, Czech Academy of Sciences, Prague, Czech Republic; Department of Mathematics, University of Patras, Patras, Greece.

Title & Name:	Dr. Jaan Kalda
E-mail address:	kalda@ioc.ee
Country:	Estonia

Research organisation:	Centre for Nonlinear Studies, Institute of Cybernetics, Tallinn University of Technology
Departments involved in complexity	All the research groups of the Centre for Nonlinear Studies are involved (at least in some extent) in the complexity studies.
Main strengths of your research organisation in complexity science	Our main strength is that our compact research team at CENS includes good specialists in a wide spectrum of different research fields: mathematics (proactive systems), theoretical physics (nonlinear waves, mixing, nonlinear dynamical systems), marine sciences (wave engineering), biophysics (regulation of intracellular processes), biomedical engineering (EEG and ECG analysis), and econophysics. This allows us to use an efficient interdisciplinary collaboration (which is almost always unavoidable for successful complexity studies).
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Relevant existing International collaborations	We have formal collaboration agreements with the Department of Mathematics, University of Turin; Department of Mathematics of City University, Hong Kong; HAS-TUB Research Group for Continuum Mechanics; Hungarian Academy of Sciences; d'Alembert Institute, University Pierre and Marie Curie, Paris; Department of Mathematics, University of Messina; Akhiezer Institute for Theoretical Physics. National Science Center, Kharkov Institute of Physics and Technology; Institute of Thermomechanics, Czech Academy of Sciences, Prague, Czech Republic; Department of Mathematics, University of Patras, Patras, Greece.

Title & Name:	Dr. Ülle Kotta 
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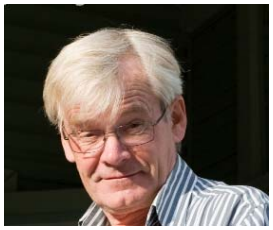
Country:	Estonia
Research organisation:	Institute of Cybernetics at Tallinn University of Technology
Departments involved in complexity	• Control Systems Department • Mechanics and Applied Mathematics Department • Laboratory of Photoelasticity • Laboratory of Systems Biology • Laboratory of Wave Engineering
Main strengths of your research organisation in complexity science	• Complexity in nonlinear wave motion: solitonics and coherent wave fields, phase transformation fronts, stress analysis, thermo-dynamical constraints, anomalies of water waves including extreme waves; • Complexity in biophysics: in silico modelling of cardiac contraction and cell energetics, internal variables; • Fractality in nature: statistical topography, multifractality, turbulent diffusion. • Complexity in software-intensive systems - emergent behaviour in proactive embedded systems, situation-aware interaction centred models of computation, time-counting systems with multiple metric times, holistic self-organizing systems; • Nonlinear control theory - novel algebraic formalisms, catering for multiple time scales. • Human gesture modeling and recognition
Real-world application areas	• Human-adaptive mechatronics and especially human-machine interaction-intensive assistive robotics (companion robots, nursing robots, scouting robots, extra sceletal robots, etc). A domain, related to "ageing society" oriented applications, for example, after-injury rehabilitation training of elderly people. • Another application area is the electrical power systems. With the increasing pressure from environmental policies and the expansion of the electricity market, the penetration of distributed renewable generation is continuously growing. This leads to an increased complexity of power systems and necessitates the study of the behaviour of such systems with suitable mathematical and systems analysis tools.
Three research areas	• Unsupervised and collective learning in self-organizing Human-Machine systems; human gesture modelling and recognition; analysis of self-organizing and -stabilizing systems; adaptive control and behavior planning in the presence of dynamic context information as well as partial and distorted sensory information • We are looking for experience in recreational medicine and human body cinematics, self learning systems, and human-machine and machine-machine interaction. • Addressing fluctuation intermittency, especially in wind turbines, and energy efficient power generation control • We would like to apply the theory of dynamic control systems on time scales in different application areas • We are looking for data analysis experts from computer science (pattern recognition, data driven modelling and optimization, identification).
Relevant existing International collaborations	• Prof Zbigniew Bartosiewicz, Institute of Mathematics and Physics, Bialystok Technical University (joint research on the topic of control systems on time scales) • Prof. Fujio Miyawaki, Miyawaki Laboratory at Tokyo Denki University, Japan (joint research on the medical assisting robots) • Prof. Juha Röning, Department of Computer Science at Oulu University, Finland • Prof. Giorgio Cannata, University of Genova, Italy Dr. Jihong Wang, School of Electronic, Electrical and Computer Engineering, University of Birmingham, UK. Dr Wang is the Head of Power and Control Systems Research Group and the Deputy Director of Midlands Energy Graduate School. Her research group has attained over £ 1.5 m research grants duringthe past 2 years for conducting research in electrical power systems, renewable energy and energy efficient systems. The group is associated with Institute for Energy Research and policy of Birmingham University, bringing together more than 50 academics (from engineering, mathematics, economy, environmental and computer science, and sociology) under interdisciplinary umbrella.

Title & Name:	Prof. Merik Meriste 
E-mail address:	merik.meriste@ut.ee
Country:	Estonia
Research organisation:	Tallinn University of Technology(TUT) and University of Tartu (TU)
Departments involved in complexity	Centre for Nonlinear Studies (CENS) based at Institute of Cybernetics including Research Laboratory for Proactive Technologies, Department of Computer Control at TUT; Institute of Technology at UT
Main strengths of your research organisation in complexity science	The laboratory (http://www.proactivity-lab.ee) focuses on theoretical and practical study of networked systems built from stationary and/or mobile software-intensive (proactive) components. Typical components are pervasive computing systems. The research is partitioned into three threads - modelling and verification of situation-aware interaction-centred computation, methods and technologies for acquiring situational information, and methods for interpretation of situational information for (proactive) decision making. The long-term goal of the laboratory is the ability to detect and partially control the emergent behaviour in pervasive computing systems. The laboratory is a member of CENS (Estonian Centre for Nonlinear Studies, http://cens.ioc.ee/cens).
Real-world application areas	Complexity in networked pervasive computing systems and in software-intensive devices – holistic self-organizing systems, situation aware networked agents. The essence of emergent behaviour in those systems, interaction-centred model of computation, formal behaviour verification of integrated systems. Introducing mediated interactions to enable early detection and partial control of emergent behaviour in those systems.
Three research areas	1. Forecasting and (partially) controlling (emergent) behaviour of networked (proactive) agents 2. Analysis methods and capabilities in ad hoc mobile networks 3. Providing situation-awareness to nodes and subnets of ad hoc mobile network
Relevant existing International collaborations	**NATO RTO Task Groups**: o ***SCI-TG-181*** "Design Considerations and Technologies for Air Defence Systems", o ***SCI-ET-206*** "System Design Considerations and Technologies for Safe High-Tempo Operations in Degraded Visual Environments" **The Palaemon Project** (Artemis-2009-1, 21 partners, 6 countries, 7 LE, 7 SME, 7 PRO, 3 years, 1510 PM, coordinator Microsoft EMIC, Aachen,pending application). focuses on software methodology for building practical systems that combine the physical environment with cloud computing. It attempts to gather information about both the physical and the computer aspects of the target system and generate informed plans that optimize resource use in the combined target system, and then automatically triggers actions to implement the plan. The project strives to demonstrate actual efficiency gains in two distinct pilot deployments, a flexible factory and a smart office building, while using common methodology and software for both. **COST ICT actions:** o **IC0603** – Antenna Systems and Sensors for Information Society Technologies (ASSIST), o **IC0801** – Agreement Technologies. **Innovative Manufacturing Engineering Systems Competence Centre (IMECC)** (2009-2015, 16 industrial partners, 4 scientific partners, application pending). IMECC activities cover three strategic development areas: o Integration of business and manufacturing planning based on e-manufacturing and Product Lifecycle Management Systems, o Development cost and time-efficient solutions for SMEs for process automation and innovative emerging manufacturing technologies, o Self-organizing systems with on-line monitoring and diagnostics **Cooperation with other universities** o **University of Luebeck** (supported by DAAD), on formal models of situation -aware interactive computations, o **University of Brown**, on foundations of interactive computing

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Country:	Estonia
Research organisation:	Centre for Nonlinear Studies (CENS), Institute of Cybernetics, Tallinn University of Technology
Departments involved in complexity	The whole CENS is involved in the complexity studies.
Main strengths of your research organisation in complexity science	Broad range of different research areas allows a tight interdisciplinary collaboration. The research in: mathematics (proactive systems), theoretical physics (nonlinear waves, mixing, nonlinear dynamical systems), marine sciences (wave engineering), biophysics (regulation of intracellular processes), biomedical engineering (EEG and ECG analysis), and econophysics.
Real-world application areas	- Complexity in nonlinear wave motion: solitonics and coherent wave fields, phase transformation fronts, stress analysis, thermo-dynamical constraints, anomalies of water waves including extreme waves; - Complexity in biophysics: in silico modelling of cardiac contraction and cell energetics, internal variables; - Fractality in nature: statistical topography, multifractality, turbulent diffusion, econophysics; - Complexity in software-intensive systems - emergent behaviour in proactive embedded systems, situation-aware interaction centred models of computation, time-counting systems with multiple metric times, holistic self-organizing systems; - Nonlinear control theory - novel algebraic formalisms, catering for multiple time scales.
Three research areas	We are interested in making contacts in all the above listed real-world application areas. Outside the context of particular application areas, we would like to make contacts in topic of scale-invariance and intermittency in the dynamics of complex systems, together with the relevant risk estimation techniques;
Relevant existing International collaborations	We have formal collaboration agreements with the Department of Mathematics, University of Turin; Department of Mathematics of City University, Hong Kong; HAS-TUB Research Group for Continuum Mechanics; Hungarian Academy of Sciences; d'Alembert Institute, University Pierre and Marie Curie, Paris; Department of Mathematics, University of Messina; Akhiezer Institute for Theoretical Physics. National Science Center, Kharkov Institute of Physics and Technology; Institute of Thermomechanics, Czech Academy of Sciences, Prague, Czech Republic; Department of Mathematics, University of Patras, Patras, Greece.

Greece

General Secretariat for Research and Technology

Title & Name:	Professor Tassos Bountis
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Country:	Greece

Research organisation:	Centre of Research and Applications of Nonlinear Systems, University of Patras (CRANS) www.math.upatras.gr/~crans
Departments involved in complexity	Departments of Mathematics, Physics, Biology, Computer Science, Electrical Engineering, Chemical Engineering and also Department of Medicine and Department of Business Administration
Main strengths of your research organisation in complexity science	We have organized 22 Summer Schools and 4 International Conferences on "Nonlinear Science and Complexity" and have participated in numerous national and European research projects on complexity related themes. Many Ph.D. theses and Master's theses on complexity related topics have been supervised by faculty members of CRANS. We also run weekly seminars on nonlinear and complex systems, given by Patras researchers and visitors from other universities.
Real-world application areas	We are interested and currently involved in applications to energy transport phenomena in Solid State Physics, Physics of complex matter (fluid and granular), interacting populations in Biology, brain dynamics and cardiovascular diseases, as well as Evolutionary Algorithms and Optimization and the dynamics of competing markets in Economics.
Three research areas	➢ Brain dynamics: Analysis of EEG signals and images, brain – computer interfacing ➢ Complex biological networks: Protein networks and gene dynamics in Systems Biology ➢ Physics of plasmas and crystals: Complex matter exhibiting transitions between solid, fluid, granular and gaseous states
Relevant existing International collaborations	➢ Max Planck Institute for Complex Systems, Dresden, Germany ➢ Nonlinear Dynamics group, University of Potsdam, Germany ➢ The CENOLI Group, Université Libre de Bruxelles (ULB) ➢ Physics of Fluids Group, University of Twente, Netherlands ➢ National Technical University of Athens, Greece, Department of Electrical Engineering ➢ Department of Physics, University of Crete, Greece ➢ National Research Center "Democritos", Athens, Greece ➢ Institute of Complexity, Florence, Italy

Title & Name:	Dr. Vassilios Constantoudis
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Country:	Greece

Research organisation:	National Centre for Scientific Research "Demokritos"
Departments involved in complexity	Institute of Microelectronics, Institute of Physical Chemistry, Institute of Biology
Main strengths of your research organisation in complexity science	Complexity in microelectronics: Impact of fractal dimension on transistor performance Complexity in nanotechnology: Self-organization of treated surface nanotopography and roughness evolution of thin films Complexity in biology: Genome organization, pattern formation
Real-world application areas	1. Control of nano-topography structure of film surfaces and its possible applications to cell or protein adhesion, proliferation and other properties. 2. (New activity in collaboration with the Institute of Language and Speech Processing) Regularities and trends in social dynamics by using topic detection and tracking techniques as well opinion dynamics methods on real data (sequences of texts extracted by news and blogs sites and analyzed by complexity methods)
Three research areas	1. Topic/opinion dynamics and social dynamics 2. Modelling of complex systems and the relationship between atomistic (Monte Carlo) and continuum approaches in traditional computational physics. 3. Applications of ordered nano-topographies on treated surfaces in biology, photonics, optoelectronics.
Relevant existing International collaborations	*None listed*

Title & Name:	Professor Kyriakos HIZANIDIS 
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Country:	GREECE
Research organisation:	National Technical of Athens School of Electrical and Computer Engineering Laboratory of Plasmas, Electron Beams and Nonlinear Optics
Departments involved in complexity	Laboratory of Plasmas, Electron Beams and Nonlinear Optics
Main strengths of your research organisation in complexity science	The Laboratory of Plasmas, Electron Beams and Nonlinear Optics incorporates 15 Researchers (5 on Thermonuclear Fusion and Gyrotron Development and 10 on Nonlinear Optics and Plasma Nonlinear Physics) very active in associated areas (40 publications in the last 3 years of the members involved in Nonlinear Optics and Plasma Nonlinear Physics). Two clusters (one with 17 nodes and one with 65 nodes) and numerous state-of-the-art computers are utilized for intense parallel computing.
Real-world application areas	Nano-photonics Liquid Crystals Nonlinear Control Plasma Confinement Laser and Plasma Accelerators
Three research areas	• Nonlinear Optics, Disordered Lattices and Partial Coherence, Nano-photonics, Liquid Crystals, Optical Vortices, Intermitted and/or Intrlaced Linear-Nonlinear Dynamical Systems, Solitons and Breathers • Bose-Einstein Condensates, Shock Waves • Plasma Turbulence, Anomalous Transport in Plasmas, Generalized Fokker-Planck Models, Intense Laser – Matter Interaction
Relevant existing International collaborations	• CREOL/University of Central Florida • PSFC/Massachusetts Institute of Technology • Tel Aviv University, Department of Interdisciplinary Studies

Title & Name:	Dr. Michael Maragakis
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Country:	Greece
Research organisation:	Aristotle University of Thessaloniki
Departments involved in complexity	1) Department of Physics 2) Department of Informatics 3) Department of Biology 4) Department of Geology 5) Department of Chemical Engineering 6) Department of Chemistry
Main strengths of your research organisation in complexity science	Experience in management of complex systems projects. Access and knowledge on use of advanced computational resources (Grid computing, mpi) Advanced facilities: we have our own parallel cluster of 96 computers and we are involved in the administrating team of the Grid computing facility in our University.
Real-world application areas	Studies of: 1) Structure and dynamics, resilience and immunization 2) Self organization and evolution of complex networks 3) Predictability and unpredictability of complex systems 4) Critical Phenomena 5) Trapping and information propagation Applied on problems related to: 1) Social sciences 2) Econophysics 3) Informatics
Three research areas	1) Dynamics and (un)predictability, risk and extreme events 2) Emergence and self-organisation, individual to collective behaviour, micro to macro 3) Resilience, sustainability, management and control of complex systems
Relevant existing International collaborations	1) S. Havlin, Bar Ilan University 2) R. Mantegna, Palermo University 3) J. Mendez, Universidade de Aveiro, Portugal 4) A. Bunde, University of Giessen, Germany 5) F. Liljeros, Stockholm University, Sweden

Title & Name:	Dr. Research Director Gerasimos A. PAPADOPOULOS 
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Country:	Greece
Research organisation:	Institute of Geodynamics, National Observatory of Athens, Athens, Greece
Departments involved in complexity	Institute of Geodynamics
Main strengths of your research organisation in complexity science	Studies on the non-linear behaviour of the earthquake activity and consequences for modeling: - space zonation of seismicity, - time clustering of earthquakes, - non-linearity of the magnitude - size relation for earthquakes, - near-field (static) and distant (dynamic) interactions between earthquakes.
Real-world application areas	The main real-world application we are interested for is the development of pattern recognition tools for the near-real time recognition of anomalous earthquake activity as precursor of strong earthquakes (mainshocks). This is of great social importance given that such tools could be used to forecast earthquakes and develop models of time-dependent earthquake hazard. One of the most promising areas, which is already under investigation by us, is the foreshock activity preceding mainshocks in the time range of minutes to months. The lesson learned by the last, disastrous earthquake of 6 April 2009 in Central Italy is quite characteristic.
Three research areas	- Pattern recognition development. - Non-linear dynamic systems. - Fractal applications.
Relevant existing International collaborations	We are in close contact with CSEP (Collaborative Studies on Earthquake Predictability) which is a US initiative already incorporating institutes and research teams from Europe, Japan, New Zealand and elsewhere, with the aim to approach the problem of earthquake predictability on a global scale of collaboration and on a multidisciplinary basis.

Title & Name:	Prof.George P.Papavassilopoulos
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Country:	Greece
Research organisation:	Dept.EE/CS,Nat.Techn.Univ.of Athens,Greece
Departments involved in complexity	EE/CS,Appl.Math.
Main strengths of your research organisation in complexity science	Control,Game Theory,Graphs,Networks
Real-world application areas	Networks of agents involved in dynamic games with local interactions as they appear in computer,economic and social networks.Study of critical behaviour,impact of policy decisions,graph dynamics.
Three research areas	Game Theory,Networks,Phase Transitions.
Relevant existing International collaborations	1)Prof.F.Udwadia,Dept.Mech.&Aerosp.Eng.,USC,Los Angeles,USA 2)Prof.M.Mesbahi,Dept Mech.Eng.,Washington Univ.,Washington,USA 3)Prof.John Baras,Dept EE,Univ. of Maryland,Md,USA

Title & Name:	Associate Professor, Pavlos Georgios
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Country:	Greece
Research organisation:	Democritus University Of Thrace Department of Electrical and Computing Engineering Lab of Electromagnetic Theory
Departments involved in complexity	The department of Electrical and Computing Engineering and specifically the Lab of Electromagnetic Theory has a multiplane experience in complexity science at different scientific areas.
Main strengths of your research organisation in complexity science	The last 20 years the associate professor mr. Pavlos Georgios and the Lab of Electromagnetic Theory deepen in complexity science. The main research strengths of this team are the following: ✓ Non linear analysis of signals ✓ Analysis, modelling and prediction of timeseries from geophysical, space, solar, health and economical systems.
Real-world application areas	The real – world application areas are: ✓ Analysis, monitoring and prediction of seismic events, solar activity and correlation of these. ✓ Analysis, monitoring and prediction of illness data ✓ Non linear analysis of crisis management ✓ Monitoring and prediction of climate change data
Three research areas	The three research areas are the following: ✓ Geophysical – Space systems in complexity ✓ Health systems in complexity ✓ Crisis management in complexity
Relevant existing International collaborations	✓ A. A. Tsonis Department of Geosciences, University of Wisconsin-Milwaukee ✓ Epilepsy Center of the University Hospital of Freiburg, Germany

Title & Name:	Dr. Astero Provata
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Country:	Greece
Research organisation:	National Center for Scientific Research "Demokritos"
Departments involved in complexity	Institute of Physical Chemistry, Institute of Biology, Institute of Materials Science,Institute of Microelectronics, Institute of Nuclear Physics, Institute of Nuclear Technology
Main strengths of your research organisation in complexity science	The main strength of the complexity researh performed in the above Institutes are: – Stochastic Processes – Synchronization in nonlinear stochastic networks – Fractals and Applications in Chemical and Biological Systems – Surface Reactions & Reaction-Diffusion Systems – Monte Carlo Simulations (Reaction Diffusion Systems) – Chaotic and Intermittent Oscillations – Ecological Modelling – Bioinformatics & Genome Organization – Stochastic Modelling of DNA – Nonlinear Dynamics and Statistical Mechanics – Long Range Correlations – Thermodynamics – Entropic Forms – Magnetic Behaviour of Nanoparticles – Magnetic Behaviour of Assemblies – Magnetic Ferrofluids – Diluted Magnetic Semicondor Nanostructures – Chaotic Dynamics of Lasers – Surface Roughness at the Nanoscale – Percolation & Transport Phenomena – Nonlinear Waves – Topological and Nontopological Solitons – Quantum Computing
Real-world application areas	Membranes and Porous Media, Disordered Media, Magnetic Properties of Nanoparticles and Nanoparticle Assemblies, Quantum Computing and Cryptography, Lithography, Structure of DNA (primary and 3-D), Fractal Scaling in MRI Images, Heterogeneous Catalytic Reactions
Three research areas	– Synchronization in Nonlinear Stochastic Networks – Magnetic Properties of Nanoparticles and Nanoparticle Assemblies – Complexity of Biological Molecules (DNA, proteins)
Relevant existing International collaborations	– Prof. Hideki Takayasu, Tokyo Institute of Technology and Sony INC, Japan – Prof. Lutz Schimansky-Geier, Humbolt University, Germany – Prof. Vadim Anischenko, Saratov State University, Russia – Prof. Florence Baras, Universite de Bourgogne, France

Title & Name:	Dr Kalliopi Trohidou
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Country:	Greece
Research organisation:	NCSR "Demokritos"
Departments involved in complexity	Institutes of :Physical Chemistry, Biology, Materials Science, Microelectronics, Nuclear Physics and Nuclear Technology
Main strengths of your research organisation in complexity science	The main strength of the complexity research performed in the above Institutes are: – Stochastic Processes – Synchronization in nonlinear stochastic networks – Fractals and Applications in Physical, Chemical and Biological Systems – Surface Reactions & Reaction-Diffusion Systems – Chaotic and Intermittent Oscillations – Ecological Modelling – Bioinformatics & Genome Organization – Stochastic Modelling of DNA – Nonlinear Dynamics and Statistical Mechanics – Ferrofluids for bio-medical applications – Chaotic Dynamics of Lasers – Study of Magnetic Materials at the Nanoscale – Percolation & Transport Phenomena – Nonlinear Waves – Topological and Nontopological Solitons
Real-world application areas	Ferrofluids for bio-medical applications, growth process and magnetisation dynamics of magnetic nanostructures, structural evolution of deposited magnetic-nonmagnetic films and the dynamics of the phase separation for magnetic recording applications, fractal aggregates of magnetic nanoparticles for magnetic and magnet-optical applications.
Three research areas	Growth process of magnetic nanostructures. Self organisation of magnetic nanoclusters. Ferrofluids.
Relevant existing International collaborations	Prof. J.A. Blackman , Reading University and Lecester University, UK Dr. R. Botet, Orsay, France Dr. Marek Godlewski, Polish Academy of Science, Warsaw, Poland

Title & Name:	Dr. Nikolaos Tsarouchas
E-mail address:	nick_tsarouchas@yahoo.com
Country:	Greece
Research organisation:	University of Patras (UPAT), Faculty of Medicine, Dept. of Medical Physics, Biosignal Processing Laboratory(BIOLAB)
Departments involved in complexity	1) UPAT, Faculty of Natural Sciences, Dept. of Mathematics (Prof. Tassos Bountis) 2) UPAT, Faculty of Medicine, Dept. of Medical Physics (Prof. Tassos Bezerianos) 3) UPAT, Faculty of Medicine, Dept. of Physiology (Prof. George Kostopoulos)
Main strengths of your research organisation in complexity science	1) Biological systems & neural networks modelling 2) Biomedical signal processing methods/techniques 3) Applied biomedical engineering (Neuroengineering, Biomechanics and Bioinformatics)
Real-world application areas	1) Modelling of biological and neuronal networks 2) Study of nonlinear & nonstationary dynamics in biological time-series data 2) Strength & directionality of nonlinear phase dynamics among weakly coupled neuronal oscillators 3) Handling complexity of electrophysiological data by entropy and information measures 4) Biomedical applications of complexity in brain-computer interfaces and genomic-proteomic networks
Three research areas	1) Multiscale integration of neuronal activity and emergence of nonlinear dynamics in the visual system 2) Applications of complexity in motoric, sensory and hybrid integrated sensorimotor brain-computer interfaces 3) Applications of EEG information measures as monitoring, diagnostic and prognostic indices used to guide therapeutic interventions in critical care medicine
Relevant existing International collaborations	1) University of Szeged, Faculty of Medicine, Dept. of Physiology, Vision Laboratory (Prof. G. Benedek) 2) John Hopkins University, Dept. of Biomedical Engineering, Neuroengineering & Biomedical Instrumentation Lab (Prof. N. Thakor)

Title & Name:	Prof. George P. Tsironis 
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Country:	Greece
Research organisation:	University of Crete and FORTH
Departments involved in complexity	Department of Physics, University of Crete Institute of Electronic Structure and Laser, FORTH
Main strengths of your research organisation in complexity science	Our group in Crete has been working on problems of nonlinear science and complexity for over twenty years. We have been engaged in research in the following areas: (a) Nonlinear localization in the form of discrete breathers in extended discrete nonlinear lattices. (b) Energy and charge transfer in biological macromolecules, polaron formation and dynamics. (c) Nonlinear modes in metamaterials, electromagnetic propagation in left handed metamaterials. (d) Statistical mechanics of nonlinear processes, extreme events in extended nonlinear systems.
Real-world application areas	1. Biological complexity: Heat and energy transfer studies provide a microscopic tool for investigating the complex dynamics of proteins and DNA. Extreme events take place that may affect the behavior of the system. An interesting example is that of bubble appearance in DNA. Investigation of statistical and dynamical processes in these systems provides a key for undesrstanding and control. 2. Optical and lattice complexity. Appearance of extreme optical events in optics is connected to design and construction of optical as well as optical lattice devices. 3. Nano-metamaterials. These man-made materials have exotic properties that lead to entirely new applications. The presence of nonlinearity turns these systems into complex objects with unconventional properties.
Three research areas	1. Biological complexity: Dynamical and statistical properties of biomolecules with special attention to extreme dynamical events that may produce new behaviour. Noise may induce extreme collective behaviour that will be investigated. 2. Optical complexity: Extreme events in the form of optical rogue waves appear in nonlinear optical systems. We would like to investigate their statistical properties and make predications for their control. 3. Nano-metamaterials: They have individual building blocks that are quite complex and through geometrical arrangement and interactions form a type of adoptive matter with externally tunable properties. We would like to focus on geometry, dynamics and statistics and propose material structures with desirable and controllable features.
Relevant existing International collaborations	*None listed*

Hungary

Nemzeti Kutatási és Technológiai Hivatal

Title & Name:	Dr Antal Berényi MD PhD 
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Country:	Hungary
Research organisation:	Department of Physiology, University of Szeged, Hungary
Departments involved in complexity	Laboratory of Visual Research, Dept. of Physiology Laboratory of Psychopharmacology, Dept. of Physiology
Main strengths of your research organisation in complexity science	1. 25 years of experience in studying the complexity of parallel processing of sensory information in the CNS. 2. Ability to acquire high quality *in-vivo* data - from animals (mice, rats, cats, ferrets, monkeys) and humans - in both anesthetized and awake behaving experiments - using invasive (extracellular electrodes) and non invasive techniques - on a multiscale level (Single-unit activity, Local field potentials, EEG, Evoked potentials) - from both cortical and subcortical structures 3. Ability to reveal neuronal connectivity *in-vitro* by using advanced neuroanatomical methods (both LM and EM) 4. Well trained, high capacity HR (mostly medical doctors, biologists) 5. Animal breeding station for non-primate species
Real-world application areas	- Coding and processing of sensory (mostly visual) information along neuronal circuits - Translation of sensory inputs into adequate motor responses (adjustment of somato- and oculomotor behaviour) - The usability of closed-loop biosensor-driven feedback systems of artificial limbs in BMI and BCI development. - Interfering with sensory systems by feeding artificially translated sensory information in different levels of processing. (Sensory neuroimplantation)
Three research areas	- Applied invasive and non-invasive BCI/BMI development, invasive neurointerfaces - Optical imaging, optical interfacing (ChR2,HALO) - Computational modelling of neuronal circuitry to predict complex system behaviour
Relevant existing International collaborations	1. Andrzej Wróbel and Wioletta Waleszczyk, Department of Neurophysiology, Nencki Institute, Warsaw, Poland 2. Anastasios Bezerianos, Biosignal Processing Group, Dept. of Medical Physics, University of Patras, Patras, Greece 3. Masao Norita, 2nd Department of Anatomy, Niigata University, Niigata, Japan 4. Onur Güntürkün, Ruhr University of Bochum Dept. of Biopsychology, Bochum, Germany 5. Klaus-Peter Hoffmann, Ruhr University of Bochum, Dept. of Zoology and Neurobiology, Bochum, Germany

Title & Name:	Prof. Peter Csermely 
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Country:	Hungary
Research organisation:	Semmelweis University, Department of Medical Chemistry, LINK-Group (www.linkgroup.hu)
Departments involved in complexity	We are representing a highly multi- and transdisciplinary research group recruited from multiple Hungarian, EU and USA institutions including our own university, groups and colleagues at the Biological Research Centre in Szeged, the University of Cambridge and the NIH.
Main strengths of your research organisation in complexity science	➢ Fast visualization and analysis of the topology, dynamics and evolution of large, real world networks o low intensity weak links (our Springer book: www.weaklink.sote.hu/weakbook.html), o overlapping modular structure (own powerful, novel method, called ModuLand) o trend-setting, evolution regulating, creative elements (we defined the term, and gave evidence for its existence using the evolution of yeast cells) o attack-prone, target-points (comparison of genetic algorithms and the death-pathways of programmed cell death, called apoptosis). ➢ Trans-disciplinary analogies using our wide-spread expertise in molecular and cellular networks to offer novel approaches to social and economical networks as well as ecosystems.
Real-world application areas	➢ Offering novel solutions to study the crisis and recovery of complex systems o changes of modular, hierarchical network structure during crisis and recovery (using the example of cellular stress for social and economical networks) o identification and role of trend-setting creative elements promoting faster, more efficient crisis-recovery. ➢ Study the ageing of complex systems with the possibility of identifying "aged", danger-prone complex systems other than cells or organisms, and offering methods for their re-juvenilation. ➢ Identification of novel types of attack-prone, key target-points of complex systems (for anti-terrorist measures, and for ecosystem protection testing the target strategy of programmed cell death).
Three research areas	We seek open-minded research groups, which can be our partners for trans-disciplinary, network-based analysis of complex systems from the fields of 1. social networks (network-based identification of creative and vulnerable members – firm safety –, identification of "aged" social networks and firms, crisis prediction and management), 2. economics, econo-physics (collaboration, trade and cross-ownership networks: network-based identification of creative and vulnerable firms – bank safety and regulation – and "aged" economies, crisis prediction and management) and 3. ecosystems (environmental protection by identification of "aged" ecosystems and their attack-prone, key target points for special protection, and their crisis-recovering, creative elements for special promotion).
Relevant existing International collaborations	Our group has a wide-spread, world-wide scientific collaboration network in the fields of stress (i.e. biological crisis) and ageing research. We are part of the ongoing EU program PROTEOMAGE. We would like to offer this background for the trans-disciplinary studies above serving as a mediator (broker) between these biological science areas and other areas of complexity science.

Title & Name:	Dr. Imre M. Janosi
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Country:	Hungary
Research organisation:	Loránd Eötvös University, Budapest
Departments involved in complexity	Department of Physics of Complex Systems, Department of Biological Physics
Main strengths of your research organisation in complexity science	Astrophysical and geophysical data mining, experimental analysis and modelling of complex network.
Real-world application areas	Internet architecture and traffic, vulnerability of manmade networks, green energy production over integrated networks, coupling of atmospheric processes.
Three research areas	Nonlinear time series analysis Identification of couplings between atmospheric parameters Information aggregation from huge data banks
Relevant existing International collaborations	*None listed*

Title & Name:	Dr Attila Nagy MSc PhD
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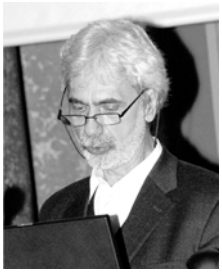
Country:	Hungary
Research organisation:	Department of Physiology, University of Szeged, Hungary
Departments involved in complexity	Laboratory of Visual Research, Dept. of Physiology Laboratory of Psychopharmacology, Dept. of Physiology
Main strengths of your research organisation in complexity science	6. 25 years of experience in studying the complexity of parallel processing of sensory information in the CNS. 7. Ability to acquire high quality *in-vivo* data - from animals (mice, rats, cats, ferrets, monkeys) and humans - in both anesthetized and awake behaving experiments - using invasive (extracellular electrodes) and non invasive techniques - on a multiscale level (Single-unit activity, Local field potentials, EEG, Evoked potentials) - from both cortical and subcortical structures 8. Ability to reveal neuronal connectivity *in-vitro* by using advanced neuroanatomical methods (both LM and EM) 9. Well trained, high capacity HR (mostly medical doctors, biologists) 10. Animal breeding station for non-primate species
Real-world application areas	- Coding and processing of sensory (mostly visual) information along neuronal circuits - Translation of sensory inputs into adequate motor responses (adjustment of somato- and oculomotor behaviour) - The usability of closed-loop biosensor-driven feedback systems of artificial limbs in BMI and BCI development. - Interfering with sensory systems by feeding artificially translated sensory information in different levels of processing. (Sensory neuroimplantation)
Three research areas	- Applied invasive and non-invasive BCI/BMI development, invasive neurointerfaces - Optical imaging, optical interfacing (ChR2,HALO) - Computational modelling of neuronal circuitry to predict complex system behaviour
Relevant existing International collaborations	6. Andrzej Wróbel and Wioletta Waleszczyk, Department of Neurophysiology, Nencki Institute, Warsaw, Poland 7. Anastasios Bezerianos, Biosignal Processing Group, Dept. of Medical Physics, University of Patras, Patras, Greece 8. Masao Norita, 2nd Department of Anatomy, Niigata University, Niigata, Japan 9. Onur Güntürkün, Ruhr University of Bochum Dept. Biopsychology, Bochum, Germany 10. Klaus-Peter Hoffmann, Ruhr University of Bochum, Dept Zoology and Neurobiology, Bochum, Germany



Title & Name:	Fokasz Nikosz (Nikos Fokas) Professor of Sociology
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Country:	Hungary
Research organisation:	Lóránd Eötvös University, Budapest
Departments involved in complexity	Department of Social Relations, Department of Sociology, Faculty of Social Sciences,
Main strengths of your research organisation in complexity science	-Fractals and chaotic dynamics in social sciences. -Fractals and political clientelism. -Fractal-like Properties of National and Regional Railroad. -Networks in Europe. -Complex social networks. -Hurst analysis, phase space reconstruction of capital market. -Growth Functions, Social Diffusion and Social Change. -Dissemination Processes in the Media. -Logistic curve, diffusion, public discussion.
Real-world application areas	We are most interested in tackling that the effective causality of long-term macroeconomic rhythms, most commonly referred to as exponential trends or long waves. The model based on the theory of long-term economic growth invented first by Ferenc Jánossy end developed later by Agnus Maddison. We extend this model to the phenomena of growth fluctuation in Schumpeterian growth model. Mathematically, the model is equivalent to a large dimensional Volterra-Lotka system perturbed by stochastic flow of innovations. Our study is also related to the temporal dynamics of articles in connection with "crises" which appeared in international dailies during bigest economic world crises. We targeted to reveal how the press reacted to rises of economic crises. We intend to reveal a typology of media dynamics based on our previous results of investigating the same dailies and certain analytical procedures, which arise from the literature about of diffusion of innovations.
Three research areas	1. Nonlinear dynamics in society and economy. Determinants of long-wave behaviour in socioeconomic growth and development. 2. The origins and similarities of big economic crises. Financial Time Series and Their Characteristics 3. Dissemination Processes in the Media reacted to the three World Crises.
Relevant existing International collaborations	*None listed*

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Country:	HUNGARY
Research organisation:	Loránd Eötvös University of Budapest (ELTE)
Departments involved in complexity	Dept. Plant Taxonomy and Ecology, Biological Institute - including the Theoretical Biology Research Group of the Hungarian Academy of Sciences
Main strengths of your research organisation in complexity science	1) Mathematical models and computer simulations on various ecological and evolutionary systems. Main areas of research: ▪ spatially explicit models of populations (dynamics of spreading, spatial interactions), ▪ self-organisation in ecosystems (emergent patterns, stability, predictability), ▪ evolutionary game theory and adaptive dynamics, ▪ cooperation and competition between agents, collective problem-solving (e.g. sharing resources and information in heterogeneous environments). 2) Collaborations between theoretical and applied scientists are traditional at our department. Besides modelling, we have research capacity for ecological fieldwork, too.
Real-world application areas	1) Providing theory-based guidelines ▪ for the spatial design of nature reserves, ▪ for the protection of species in fragmented habitats, and ▪ for the management of ecosystems on complex, heterogeneous landscapes.) Suggesting some novel methods for monitoring and predicting ▪ changes in the distributions of species, and ▪ shifts in the the boundaries between ecosystems due to climate change.
Three research areas	1) Application of the theory of phase transitions in ecological systems (e.g. studying critical thresholds in invasions and extinctions). 2) Studying landscape patterns in the view of percolation theory. (Computer simulations of population dynamics on habitat maps obtained by remote sensing.) 3) Studying the evolution of resource acquisition, sharing, and allocation between agents in a heterogeneous (patchy and changing) environment.
Relevant existing International collaborations	*None listed*

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Country:	Hungary
Research organisation:	Eötvös University
Departments involved in complexity	Institute for Physics, eScience Knowledge Center
Main strengths of your research organisation in complexity science	Simulation of complex systems, analytical solutions, data-mining technologies, virtual observatory
Real-world application areas	Internet studies, future internet; market regulation systems; wind-power prediction; energy systems; DNA analysis for drug development
Three research areas	Complex system analysis; market regulation; energy systems
Relevant existing International collaborations	EU FP7 MANMADE project (http://www.manmadenet.eu/index.html)

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Country:	Hungary
Research organisation:	Eötvös Loránd University
Departments involved in complexity	ELTE-UNESCO Department of Minority Studies Department of Biophysics Department of Plant Taxonomy and Ecology
Main strengths of your research organisation in complexity science	• Social/ethnic identity and relations • Non-linear interactions in group behaviour • Modelling of population dynamics
Real-world application areas	• Communication patterns in self-organizing network structures • The role of gossip in strong and weak connectivity of social groups/networks • Spreading of news and forming of opinions
Three research areas	• Data mining and processing of communication databases (based on textual and/or contact information) • Language specific semantic analysis of social/group interactions
Relevant existing International collaborations	*None listed*

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Country:	Hungary
Research organisation:	Research Group for Communication Studies of the Hungarian Academy of Sciences at Eotvos Lorand University
Departments involved in complexity	The research group above is a small institution, but in touch with several schools, departments from this and other universities, institutes of the Academy and in the field of public opinion research as well (such as in the frames of the current project with other participants of the Brussels workshop on the role of media in dynamic processes, or, to mention another one, on participation and representation under the aegis of the Hungarian Election Studies Program).
Main strengths of your research organisation in complexity science	Our research group covers a large area from general issues of communication, media and public opinion in a comprehensive way, embracing theoretical and empirical approaches as well (such as with the study of cultural-interactional stratification). Such an integrated approach of macro- and micro-level phenomena, laying special emphasis on their social network aspects and the related methodological SNA-apparatus also stands for the further projects, research programs mentioned before.
Real-world application areas	In the general frames touched above the group composed of my colleagues under the aegis of the project of ELTE, Budapest Social Science Faculty on dynamic processes, we plan to focus on timely developments related to crisis phenomena of world economy, tackling thereby economy, media and public thought as complex systems by themselves and with regard to their interdependencies as well, following a line of research started some time ago.
Three research areas	Social network analysis, approaching the interplay of macro- and micro-level phenomena, social capital. Studies of media, communication, cultural-interactional milieu. Economic crisis, the evolution of various types of bubble phenomena, the interplay of economic and symbolic aspects with special regard to the role of anticipations.
Relevant existing International collaborations	Participation in volumes recently published on social capital (edited by Lin and Erickson, Oxford 2008, respectively Hsung, Lin and Breiger, Routledge 2009). A leading role in the above project on participation and representation, partly sponsored by the Norwegian Fund, with the collaboration of colleagues from Bergen and Oslo.

Title & Name:	Balazs Vedres
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Country:	Hungary

Research organisation:	Central European University
Departments involved in complexity	Center for Network Science
Main strengths of your research organisation in complexity science	The CEU Center for Network Science is an emerging interdisciplinary group, gathering faculty and students from sociology, anthropology, environmental science, political science, history, economics. The goal of this emerging group is to discuss the potential of non-linear thinking in terms of complex emergent dynamics, the impact of connectedness in network structures especially along the following lines: global civic networks, ecological webs, business-political interconnections and corruption, blog networks and online communities, multinational business networks, migration, academic flows, terrorist networks, semantic webs.
Real-world application areas	We work on the following application areas currently: the impact of political connections on the business networks between firms, the impact of EU regional developmental projects on the emergence of new civic project networks, energy security in the European natural gas pipelines, and the fragmentation of European network science.
Three research areas	We are interested in the following research areas: 1. Ecological cascades and human impact on speciaes extinction, 2. Energy security in energy distribution neworks (terrorism, political opportunism, and robust engineering), 3. Teamwork and creativity (business workteams, regional developmental project teams, academic workgroups).
Relevant existing International collaborations	Center for Organizational Innovation, Columbia University

Ireland

Irish Research Council for Science, Engineering & Technology

Title & Name:	Dr. John Burns
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Country:	Ireland
Research organisation:	IT Tallaght / Department of Computing
Departments involved in complexity	Department of Computing
Main strengths of your research organisation in complexity science	We have specialization in the field of visualization of complex systems, with a particular emphasis on the visualization of agent-based biological complexity models.
Real-world application areas	The process of biological cellular self-organisation.
Three research areas	1. Visualization 2. Biological cellular self-organisation 3. Agent-based models of economic markets
Relevant existing International collaborations	*None listed*

Title & Name:	Dr Ian Clancy
E-mail address:	Ian.clancy@ul.ie
Country:	Ireland
Research organisation:	University of Limerick
Departments involved in complexity	Department of Physics Department of Mathematics and Statistics
Main strengths of your research organisation in complexity science	Our group is doing research in the broad area of higher order phase transitions in dynamic systems. Specifically our research includes investigating criticality in the Burridge-Knopoff model of an earthquake fault, force chains in a model of a sheared granular medium and abrupt resistance changes due to electromigration in thin films far from failure.
Real-world application areas	We are most interested in investigating dynamics on evolving complex networks, including but not limited to dynamic phases and transitions in seismic and financial data.
Three research areas	We are interested in making contacts in the areas of dynamics on complex networks, non-extensive entropy and econophysics.
Relevant existing International collaborations	Alberto Petri, Fergal Dalton Institute of Complex Systems Research, CNR, Rome

Title & Name:	Roisin Duignan
E-mail address:	roisin.duignan@ucd.ie
Country:	Ireland
Research organisation:	UCD Dublin.
Departments involved in complexity	The Circuits and Systems Group part of the School of Electrical, Electronic & Mechanical Engineering that I am a member of. Within UCD the Complex and Adaptive Systems Laboratory (CASL) also does extensive research in the area.
Main strengths of your research organisation in complexity science	Our research groups broad knowledge in the area's of non linear dynamics and the control and stability of non linear systems can be used to identify and model complexity and complex behaviour as well as the controllability of such complex systems.
Real-world application areas	• Complex Biosystem Modelling • Transmission Control Protocol (TCP) Modelling • Electronic Engineering Applications using complexity theory.
Three research areas	• Control of Complex systems • Modelling of Complex systems • Nonlinear dynamical systems
Relevant existing International collaborations	*None listed*

Title & Name:	Dr. Bryan Kelleher
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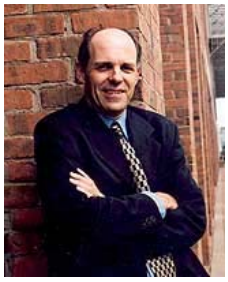
Country:	Ireland

Research organisation:	Tyndall National Institute & Cork Institute of Technology
Departments involved in complexity	The photonics centre in Tyndall is comprised of a number of both theoretical and experimental groups involved in complexity science and particularly complexity in photonics and electronics.
Main strengths of your research organisation in complexity science	Tyndall National Institute has over 350 researchers bringing together complementary activities in photonics, electronics and networking. The strengths of the institute at the present time lie in the areas of photonics, electronics, materials and nanotechnologies and their applications for life sciences, communications, power electronics and other industries. Research programmes range from theoretical modelling and design to novel materials, nanotechnology, device processing and fabrication, packaging and integration and novel systems incorporating these new devices.
Real-world application areas	We are interested in complexity for photonics applications and also conversely, in using photonics to advance complexity problems. For example, we are interested in building systems composed of several lasers to generate ultra-short pulses or to couple various lasers in a dynamical network. We are also interested in using experiments involving lasers to analyse processes common to other areas such as in the life-sciences and chemistry.
Three research areas	• Synchronisation • Delayed dynamical systems • Coupled systems
Relevant existing International collaborations	We have various international collaborations with groups working on synchronisation and non-linear dynamics.

Title & Name:	Prof. Barry McMullin
E-mail address:	barry.mcmullin@dcu.ie
Country:	Ireland
Research organisation:	Dublin City University
Departments involved in complexity	School of Computing; School of Electronic Engineering.
Main strengths of your research organisation in complexity science	Established profile in bioinformatics, computational physics, socioecomic systems, artificial life, evolutionary computation, evolution of complexity.
Real-world application areas	Application of evolutionary techniques to spontaneous growth of agent complexity in virtual worlds, including game and animation platforms.
Three research areas	– Major transitions in evolution. – Origin of life. – Artificial Chemistries.
Relevant existing International collaborations	DCU ALife Lab is a member of the European Centre for Living Technology (ECLT), Venice. Previous relevant EU FP6 projects include Programmable Artificial Cell Evolution (PACE) and Evoling Cell Signalling Networks in silico (ESIGNET).



Title & Name:	Dr. Sergey Melnik
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Country:	Ireland
Research organisation:	University of Limerick

Departments involved in complexity	• Stochastic Dynamics and Complex Systems Group, Department of Mathematics and Statistics (SDCS, www.ul.ie/sdcs) • Mathematics Applications Consortium for Science and Industry (MACSI, www.macsi.ul.ie) • Department of Physics (www.ul.ie/~physics/) • Stokes Institute (www.stokes.ie)
Main strengths of your research organisation in complexity science	• Analysis of dynamics on complex networks • Agent-based modelling in finance
Real-world application areas	• Financial applications • Analysis of real-world network structure and dynamics
Three research areas	• Network science • Agent-based modelling • Financial applications
Relevant existing International collaborations	• Mason A. Porter, Oxford • Peter J. Mucha, University of North Carolina • J. M. Sancho, University of Barcelona and UC San Diego • K. Lindenberg, UC San Diego

Title & Name:	Dr. Dimitri Perrin
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Country:	Ireland
Research organisation:	Dublin City University (Centre for Scientific Computing and Complex Systems Modelling, SCI-SYM)
Departments involved in complexity	SCI-SYM is a University-Designated Research Centre (UDRC), and involves researchers from several schools: Computing, Electronic Engineering, Mechanical Engineering, Biotechnology, and Mathematical Sciences.
Main strengths of your research organisation in complexity science	Even prior to the establishment of SCI-SYM as an UDRC, Complexity Science was an important research area in DCU, as highlighted by work ranging from immune response models to astrophysical simulations. SCI-SYM aggregates this experience and enhances multi-disciplinary collaborations. The centre also has a strong expertise on high-performance computing, provides access to cluster facilities and supports multidisciplinary research projects to national, ICHEC capability, level.
Real-world application areas	- Bioinformatics and Microscopic Biosystems - Social, Economical and Environmental Systems - Complexity and Computation in Physics - Theoretical Approaches and Methodologies in Complexity
Three research areas	- Bioinformatics and Microscopic Biosystems - Social, Economical and Environmental Systems - High-Performance Computing
Relevant existing International collaborations	- Human Genome Centre, Tokyo, Japan. - National Cancer Centre, Tokyo, Japan - Laboratoire d'Informatique, de Modélisation et d'Optimisation des Systèmes, Aubière, France.

Title & Name:	Prof. Gregory Provan
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Country:	Ireland
Research organisation:	IRCSET
Departments involved in complexity	Computer Science
Main strengths of your research organisation in complexity science	• Topological analysis of complex systems; • Use/application of random-graph generators; • Automated generation of complex systems models using random-graph generators and functional component libraries; • Functional analysis of complex systems; • Control, diagnosis and reconfiguration of complex systems;
Real-world application areas	• molecular biology: Flux-balance metabolic models; • evolution of structure of the genome; • sustainable energy (control and model-generation)
Three research areas	• Functional modelling of metabolic models; • Dynamical modelling of bio-systems; • Modelling of energy systems for intelligent buildings.
Relevant existing International collaborations	*None listed*

Title & Name:	Professor Heather J. Ruskin
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Country:	Ireland

Research organisation:	Director, SCI-SYM, Centre for Scientific Computing & Complex Systems Modelling, Dublin City University
Departments involved in complexity	SCI-SYM is a University-Designated Research Centre: researcher disciplines include Computing, Mathematics, Physics, Biotechnology, Electronic Eng., Mechanical Eng.
Main strengths of your research organisation in complexity science	SCI-SYM, through core groups, such as ModSci. (Modelling and Scientific Computing), has a long track record in multi-disciplinary Complexity Science. Key research areas include: Computational modelling, high-dimensional data handling and analysis, complex networks, parallel computing, statistical and mathematical models and methods. Simulation techniques: micro-level, include agent-based, MC, CA; at macro, include DE models, approximate methods. Applications range from micro-level Biosystems through socio/finance to macro: Physical and Engineering systems. The centre also has considerable expertise in High Performance Computing, provides access to cluster facilities and supports inter- and multi-disciplinary projects to national level, through ICHEC, (the national high-end computing centre).
Real-world application areas	Biocomputation: Biosystem modelling and Informatics, Socioeconomic Modelling: inc. Economics and Finance Environment and Energy: inc. urban impact/traffic Complexity and Computation in Physics Theoretical approaches and methodologies in Complexity
Three research areas	*Biocomputation: Bioinformatics, Microscopic models of Biosystems, (several application interests including Epigenetic networks, Immune response models, infectious disease spread) * Social Systems, particularly Financial modelling : HF and mixed information criteria, trader cooperation and conflict in building financial networks. * High-dimensional data handling : algorithm development, (HEC methods) and analysis, (e.g. ANN, GA for microarrays, building GRNs)
Relevant existing International collaborations	Dept. of Physics, USM, U.S.A. Hospital for Special Surgery, NY, U.S.A. National Cancer Centre, Tokyo, Japan Human Genome Centre, Tokyo, Japan Laboratoire d'Informatique, de Modélisation et d'Optimisation des Systèmes, Aubière, France DKFZ/EMBL, Heidelberg, Germany Centro de Matematica/Dept. de Matematica Aplicada da Universidade do Porto

Italy

Instituto dei Sistemi Complessi - Consiglio Nazionale delle Ricerce

Title & Name:	Dr. Valentina Alfi 
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Country:	Italy
Research organisation:	Istituto dei Sistemi Complessi, CNR, via dei Taurini 19, 00185, Rome, Italy and Centro Studi e Ricerche "E. Fermi", Compendio del Viminale, 00184, Rome, Italy
Departments involved in complexity	Department of Physics, University of Rome "La Sapienza" and Institute of Complex Systems of CNR
Main strengths of your research organisation in complexity science	In my organisation there are several groups which works in many areas of complexity. The main topics are complexity in socio-economic systems, complex networks, linguistic applications and complex structure in astrophysics.
Real-world application areas	We are mostly interested in the applications of complexity to analyse socio-economic systems. In particular we want to develop novel methods and tools to study financial systems.
Three research areas	Interdisciplinary application of complexity complexity in socio-economic systems complex networks
Relevant existing International collaborations	M. Gallegati, D. Farmer, M. Egidi, M. Takayasu

Title & Name:	Dr. Andrea Baldassarri
E-mail address:	Andrea.baldassarri@roma1.infn.it
Country:	Italy
Research organisation:	Sapienza University of Rome
Departments involved in complexity	Physics
Main strengths of your research organisation in complexity science	In my departement work many excellent statistical physicists, with strong theoretical skills and driven by vivid curiosity for new problems in complex science.
Real-world application areas	Internet and ICT systems: social annotation, on-line and mobile social community, urban sensing. Non equilibrium dynamics of complex material: friction in granular matter, slow dynamics in glasses and disordered systems. Irregular geometries in nature: coastal erosion, planetary geomorphology.
Three research areas	Network theory, statistical physics of non equilibrium dynamics, fractal and percolation in natural systems.
Relevant existing International collaborations	I'm involved in the TAGORA project (www.tagora-project.eu) in collaboration with Sony CSL (Luc Steels), Koblenz Landau University (Steffen Staab), Kassel University (Gerd Stumme) and Soton University in Southempton (Harith Alani). I have ongoing collaboration with ISI Foundation in Turin (www.isi.it).

Title & Name:	Dr. Leonardo Bargigli
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Country:	Italy
Research organisation:	Università Politecnica delle Marche
Departments involved in complexity	Dipartimento di economia
Main strengths of your research organisation in complexity science	Interdisciplinarity, i. e. the possibility to make interact the skills and expertise of both macro- and micro- economists with those of natural scientists and particularly of physicists engaged in the study of complex networks
Real-world application areas	These are all the relevant complex networks which emerge in real economies, such as financial networks, supply chains or trade networks. In particular, complex networks' modelling can be applied to networks of bilateral financial exposures (e. g. the interbank loan market), in order to analyse financial distress and bankruptcy propagation following systemic shocks. Further, all kind of economic networks can trigger concatenations of adverse events, such as bankruptcy cascades, which have a bearing on business fluctuations and, together with macro-conditions, on business cycles.
Three research areas	1) financial crisis forecasting 2) agent-based economic modelling 3) (macro)economies as interaction-based networks of heterogeneous agents
Relevant existing International collaborations	1) Joseph E. Stiglitz (Columbia University, NY) 2) Bruce C. N. Greenwald (Columbia Business School, NY)

Title & Name:	Dr. Guido CALDARELLI
E-mail address:	Guido.CaldarellI@roma1.infn.it
Country:	ITALY
Research organisation:	Centre Statistical Mechanics and Complexity CNR-INFM
Departments involved in complexity	This institute in the CNR is devoted to Complexity
Main strengths of your research organisation in complexity science	Network Theory, Econophysics, Socio-Technological Systems, Spin-Glasses, Condensed Matter Theory
Real-world application areas	Urban Delevopment and Supply Networks, Ideally we would like to set up an international observatory for the study of Infrastructural Networks, both for a possible optimization and both in order to assess the requirement of protection of critical infrastructures.
Three research areas	Urban Development, Network Theory, Infrastructural planning.
Relevant existing International collaborations	Yahoo! Research Lab; University of Barcelona, ETH Zuerich, EPF Lausanne, London Institute for Mathematical Science

Title & Name:	Dr. Claudio Castellano
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Country:	Italy
Research organisation:	SMC, INFM-CNR
Departments involved in complexity	Beyond SMC (Center for Statistical Mechanics of Complex Systems) also ISC (Istituto dei Sistemi Complessi) is involved in complexity
Main strengths of your research organisation in complexity science	There is a quite large group of very active statistical physicists interested in many aspects of complexity science, ranging from disordered and quantum systems to interdisciplinary applications (biological phenomena, technological and social problems)
Real-world application areas	Uncovering emergent regularities in large scale social behavior (in particular from data about consumers, internet users, electoral results, scientific production). Interpretation of macroscopic phenomena in terms of microscopic agent-based models. Quantitative validation of microscopic models.
Three research areas	Quantitative social science. Scientometrics Network science.
Relevant existing International collaborations	Romualdo Pastor-Satorras (Universitat Politecnica de Catalunya, Barcelona)

Title & Name:	Prof. Rosario Nunzio Mantegna 
E-mail address:	mantegna@unipa.it rn.mantegna@gmail.com
Country:	Italy
Research organisation:	CNR-INFM SOFT and Palermo University
Departments involved in complexity	PhD school in Applied Physics of Palermo University
Main strengths of your research organisation in complexity science	We are a leading group in the analysis and modelling of price dynamics in financial market. Our research group The Observatory of complex Systems http://ocs.unipa.it has a large and unique collection of high-frequency financial data. Markets like NYSE, NASDAQ, LSE, Tokyo, Euronext and other stock exchanges are covered. These data include the complete information about the order book of the London Stock Exchange for the period 2004-2006. For some markets data also include information about the coded identity of the traders. Specifically we have data with the identity of market members for the Spanish Stock Exchange and the London Stock Exchange.
Real-world application areas	We are interested in developing statistical methods to detect strategies used by single agents in financial markets and/or in well-defined social systems. By using data with a coded identity of the traders active in a real market or of the actors taking action in a specific social system we hope to detect resulting strategies for some of them. These strategies validated empirically will be used to evaluate the robustness of the considered system to a stress test involving some of the strategies. We will also consider building some agent-based models, which will be including the strategies empirically detected in data.
Three research areas	We are interested in: - Modelling of social and economic systems. The modelling should comprise both an empirical investigation of the major determinants of the social dynamics and the building of an explainatory agent-based model able to describe the most relevant stylized facts; - Construction and analysis of social and economic networks; - use of the network paradigm to characterize and model social and economic interactions.
Relevant existing International collaborations	Panos Argyrakis - Department of Physics, University of Thessaloniki, 54124 Thessaloniki Greece. Doyne Farmer – Santa Fe Institute, Santa Fe NM, USA. Giuli Iori - Department of Economics, City University, London, United Kingdom. Janos Kertesz – Institute of Physics, Budapest University of Technology and Economics, Hungary. Fredrik Liljeros – Department of Sociology, Stockholm University, Stockholm, Sweden.

Title & Name:	DR SERGIO NASI
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Country:	ITALY
Research organisation:	CNR, LIFE SCIENCE DEPARTMENT
Departments involved in complexity	Biological complexity is an emerging field to which several research groups within the Institutes belonging to the CNR Life Science Dept. and Sapienza University, in which I work, are interested
Main strengths of your research organisation in complexity science	Networks related to intracellular signalling and gene expression, high-throughput data on gene expression
Real-world application areas	Elucidating the operation of cellular networks of interest to biology and medicine, identification of critical points (hubs) as potential therapeutic targets for human disease
Three research areas	Topology of bio-networks Modelling of bio-networks Data mining
Relevant existing International collaborations	*None listed*

Title & Name:	Dr. Alberto Petri 
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Country:	Italy
Research organisation:	Institute of Complex Systems; Consiglio Nazionale delle Ricerche
Departments involved in complexity	At CNR, the Institute of Complex Systems is mainly involved with complexity natural science. Also in other Institutes can be found groups delaing with complexity in a wide range of field including biology, information technology etc. In particular, in INFM there are several groups concernde with social dynamics, newtork and finance that presumably will joint ISC in the next months.
Main strengths of your research organisation in complexity science	CNR is a very big organization involved in different disciplines covering a very wide range of activities ranging from human sciences, e.g. history, philosopy, archeology, sociology,, diritto, to natural sciences, including biology, chemistry, medicine,mathematics, physics, etc., to technology, e.g. informatics, engineering, electronisc, etc. The main strength threfore probably emerges from the interdisdisciplinarity
Real-world application areas	The application areas in which we are most interested have to do with – materials mechanical properties – automatic control algorithms – electoral systems
Three research areas	**a)** One main interest concerns areas involving fractures and friction, from nanotribology to earthquakes. These topics cover the themes: – Emergence and self-organisation, individual to collective behaviour, micro to macro and – Dynamics and (un)predictability, risk and extreme events **b)** Another area of application concerns the time series and statistical analysis, specifically of acoustic emission signals and financial markets. This covers the theme 3) Resilience, sustainability, management and control of complex systems **c)** Finally we have investigated some features of the Italian electoral system, an activity which in many senses covers all the three themes of the call
Relevant existing International collaborations	Within the countries participating to this call we have collaborations with: D. Corcoran; University of Limerik Ireland M. Ibanez; Universidad Autonoma de Madrid, Spain We also collaborate with: M. Alava, Helsinki University of Technology C. Marone, University of Pennsylvania, USA M.J. de Oliveira, S. Salinas, T. Tome, Universidade de Sao Paulo, Brazil

Title & Name:	Dr. M. Pica Ciamarra 
E-mail address:	picaciam@na.infn.it
Country:	Italy
Research organisation:	Dep. of Physics, University of Naples Federico II
Departments involved in complexity	Faculty of Natural Science Dep. of Physics.
Main strengths of your research organisation in complexity science	Theoretical: statistical mechanics – percolation – phase transitions – disordered systems– SOC - slow dynamics – networks. Simulations: Molecular Dynamics – Monte Carlo
Real-world application areas	Real world implications (earthquakes / avalanches / traffic flow / foams / glasses) of the liquid ☐ disordered solid transition (jamming transition). Setting up models of real world (many interacting agents/particles/field) complex phenomena both in the natural science, as well as in social science. Physical models of biological processes.
Three research areas	1) Jamming transition and implications for earthquakes and avalanches. 2) Statistical analysis of real world data- both from natural sciences (temperature/wind/..) as well as from social science (road networks/information/..). 3) Physical mechanisms of biological processes.
Relevant existing International collaborations	*None listed*

Title & Name:	Prof. Antonio Politi
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Country:	Italy
Research organisation:	CNR - Institute of Complex Systems
Departments involved in complexity	The whole Institute
Main strengths of your research organisation in complexity science	In the Florence section of the Institute, we have a long tradition in developping nonlinear-dynamics techiniques to characterize the behaviour of classes of complex phenomena with the ultimate goal of identifying sufficiently general (universal) phenomena. We have also statistical-mechanics competences and master the techiniques of time-series analysis. More recently we started to work on the characterization of complex networks.
Real-world application areas	Mostly in the biophysics area, in connection with the (mal) functioning of biological networks. In particular we are interested in studying epilepsy and Parkinson disease. Control and optimization of heat conduction in nanodevices
Three research areas	Computational neuroscience (more, in general, information processing by means of oscillator networks) Optical information processing Control and design of biomolecules
Relevant existing International collaborations	*None listed*

Netherlands

Nederlandse Organisatie voor Wetenschappelijk Onderzoek

Title & Name:	dr. Johan L.A. Dubbeldam
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Country:	The Netherlands
Research organisation:	Delft University of Technology
Departments involved in complexity	Applied Mathematics Physics (Multiscale Physics/Fluid Dynamics) Biotechnology
Main strengths of your research organisation in complexity science	The main strengths of TU Delft in complexity science are in the *physics* and the *applied mathematics* departments. In the applied mathematics department we work on *electrical networks* and, in collaboration with biologists, on *biological networks* where we investigate the role of randomness on the network topology and the evolution of dynamical processes occurring on such a network
Real-world application areas	Complexity of (electricity) networks. How should a network for electricity be designed so that in case a certain amount of stations suffer from power failure, the network carrying the electric power still continues to work properly.
Three research areas	Complex networks Complex fluids Complexity in biological systems
Relevant existing International collaborations	P.D Olmsted Leeds University (UK) shear-banding and complex fluids

Title & Name:	Prof. Bernard Geurts
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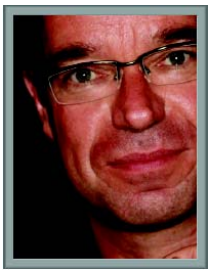
Country:	The Netherlands

Research organisation:	University of Twente/Eindhoven University of Technology
Departments involved in complexity	Applied Mathematics, Applied Physics, Mechanical Engineering, Chemical Engineering, Civil Engineering
Main strengths of your research organisation in complexity science	The field of complexity science is approached from a multi-disciplinary perspective, combining experimental, theoretical and simulation studies. All activities are embedded in the research institute IMPACT at the University of Twente.
Real-world application areas	Applications range from environmental problems, resource efficient energy systems, smart systems and materials, multiphase fluids and flows, and, biomedical applications such as lab-on-a-chip developments and monitoring and patient specific prognosis.
Three research areas	Dispersed multiphase systems, multiscale modelling and simulation, energy systems.
Relevant existing International collaborations	ERCOFTAC, COST Action 'LESAID'



Title & Name:	Dr. Ale Jan Homburg
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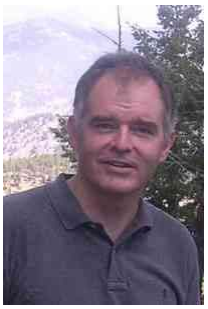
Country:	Netherlands
Research organisation:	KdV Institute for Mathematics, University of Amsterdam
Departments involved in complexity	None listed
Main strengths of your research organisation in complexity science	No details supplied
Real-world application areas	No details supplied
Three research areas	None listed
Relevant existing International collaborations	None listed



Title & Name:	Dr. H.J.J. Jonker
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Country:	Netherlands
Research organisation:	Delft University of Technology
Departments involved in complexity	Faculties: – Applied Sciences – Electrical Engineering, Mathematics, and Computer Science Burgerscentrum: research school for fluid mechanics
Main strengths of your research organisation in complexity science	*None listed*
Real-world application areas	Weather and Climate. Clouds and Precipitation patterns. Extreme weather.
Three research areas	Atmospheric dynamics, Clouds (multi-scale physics aspects: micro to macro) Extreme weather events: dynamics and underlying universal principles. Statistical mechanics, Self Organized Criticality
Relevant existing International collaborations	National Center for Atmospheric Research EU Cloud Intercomparison, Process Study & Evaluation Project (NL,DE,UK,FR,GR,SE,CH,PL,USA)

Title & Name:	Dr. Jaap A. Kaandorp
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Country:	Netherlands
Research organisation:	University of Amsterdam, Section Computational Science
Departments involved in complexity	Section Computational Science
Main strengths of your research organisation in complexity science	Modelling and simulation, scientific computing, computational biology
Real-world application areas	Morphogenesis in metazoans (animals), gene regulation of development
Three research areas	Morphogenesis in biology Gene regulation in developmental biology Modelling cells and tissues
Relevant existing International collaborations	Collaborations through ``Morphogenesis and gene regulatory networks in plants and animals: a complex systems modelling approach (MORPHEX)'' project funded by the New and Emerging Science and Technology (NEST) programme of FP6

Title & Name:	Prof. H.J. Kappen
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Country:	Netherlands
Research organisation:	Radboud University
Departments involved in complexity	Dept. of Biophysics Donders' Institute of Neuroscience
Main strengths of your research organisation in complexity science	Stochastic neural networks Stochastic control theory Dynamical system indentification Dynamical system analysis of neural networks
Real-world application areas	Control theory applications/Reinforcement learning Probabilistic expert systems
Three research areas	Stochastic control theory Neural networks
Relevant existing International collaborations	J.Shawe-Taylor, UCL London N. Vlassis, Univ. Crete R. Stoop, ETH Zurich

Title & Name:	Dr Bob W. Kooi 
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Country:	The Netherlands
Research organisation:	Dept. Theoretical Biology, Faculty of Earth and Life Sciences, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam The Netherlands
Departments involved in complexity	Faculty of Earth and Life Sciences, Vrije Universiteit: Department of Integrative Neurophysiology and Molecular Cell Physiology. Faculty of Science, Vrije Universiteit: Dept. of Mathematics, Mathematical Analysis Group
Main strengths of your research organisation in complexity science	In our research, we study the complexity of life at different organization levels, from metabolic networks, organism level, population level, ecosystem, evolution and epidemiology of diseases. We use bifurcation analysis to study the effects of environmental parameter variations on the long-term dynamics of models for food webs. Of special interest are the calculation and analysis of global bifurcations (for equilibria as well as limit cycles) and their connection with chaotic behaviour.
Real-world application areas	Real-world applications are: study the dynamics of marine and river ecosystems (phytoplankton-zooplankton, fish) and eco-toxicology (toxic effects on populations and effects on ecosystem structure and functioning, and bioaccumulation) and the study of glycolitic oscillations in yeast (use of estimated parameter values).
Three research areas	1) Ecosystems dynamics, (predator-prey interactions as well as effects of changing environments) 2) Metabolic organization, (pentose-phosphate cycle, glycolysis, TCA-cycle, respiratory chain) 3) Epidemics (interaction of multiple strains on the infection of the host with cross-immunities). In all disciplines with the emphasis on model analysis: long-term dynamics, periodically forced systems (non-autonomous systems), symmetry (pitchfork bifurcations), synchronization, self-organization and chaotic dynamics.
Relevant existing International collaborations	U. Feudel, Theoretical Physics / Complex Systems, Institute for Chemistry and Biology of the Marine Environment (ICBM), Oldenburg Germany. E. Doedel, Department of Computer Science, Concordia University, Montreal, Quebec, Canada. N. Stollenwerk, Mathematical Biology Group, Centre for Mathematics and Fundamental Applications, Universidade de Lisboa, Portugal. J. L. Snoep, Molecular Cell Physiology, Department of Biochemistry, University of Stellenbosch, South Africa.

Title & Name:	Dr. Roeland Merks
E-mail address:	Roeland.merks@sysbio.nl
Country:	Netherlands
Research organisation:	Netherlands Institute for Systems Biology and CWI
Departments involved in complexity	The whole Netherlands Institute for Systems Biology (collaboration between CWI, AMOLF, UvA and VU)
Main strengths of your research organisation in complexity science	NISB is a close cooperation between biologists, systems-oriented mathematians and biophysicists Systems Biology. We work on several topics, including: - Biomolecular networks (genetic networks, metabolic networks, signal transduction) - Linked force and shape generating systems - Multicellular systems (development, bacterial communities)
Real-world application areas	Systems Biology: - Development - Blood vessel development (angiogenesis) - Metabolism in microbial communities
Three research areas	- Systems Biology - Developmental Biology - Self-organization
Relevant existing International collaborations	*None listed*

Title & Name:	Dr. Vivi Rottschäfer
E-mail address:	vivi@math.leidenuniv.nl
Country:	The Netherlands
Research organisation:	Mathematical Institute, Leiden University
Departments involved in complexity	Mathematical Institute, Leiden Institute of Physics, Institute of Biology Leiden Leiden Observatory, Leiden Institute of Advanced Computer Science
Main strengths of your research organisation in complexity science	There exist several links between the different institutes on research-level as well as in education. Several researchers from different disciplines work, for example, for one day per week at the Mathematical Institute. And, in education, we offer, for example, the possibility to obtain a double bachelor in mathematics and physics (amongst others). Moreover, the departments mentioned are all part of one faculty (with 1 dean).
Real-world application areas	Processes in the natural environment and in living organisms as well as applications in physics. We are especially interested in the formation of patterns. The approach we foresee is to combine experiments with modelling, simulation and mathematical analysis, for example in the dynamics of amoebes.
Three research areas	One interest lies in problems with singularities. When such a singularity occurs this implies that the model breaks down and a different model needs to be used. This has applications in nonlinear optics problems and aggregates of bacteria amongst many others.
	Another interest lies in the interaction between the mathematical theory of dynamical systems and the complex models of life and earth sciences. Specifically, we would like contacts on the subject ofinteraction of bacteria. Moreover, we are interested in pattern formation that arises in, for example, desertification (the creation of deserts) and behaviour of sand dunes.
Relevant existing International collaborations	In the Netherlands there exists the Research Programme *Non-Linear Dynamics of Natural Systems* (NDNS) of which I am a member. This programme is funded by the Dutch Science Organisation (NWO) and it is focused on the interaction between the mathematical theory of dynamical systems and the complex models of life and earth sciences. Moreover, in the Netherlands the Lorentz Center is located. The Lorentz Center is an international center that coordinates and hosts workshops in the sciences, based on the philosophy that science thrives on interaction between creative researchers. Lorentz Center workshops focus on new collaborations and interactions between scientists from different countries and fields, and with varying seniority. Workshops can be proposed and organised by any researcher from any country.

Title & Name:	Prof Holger Waalkens
E-mail address:	h.waalkens@rug.nl
Country:	The Netherlands
Research organisation:	University of Groningen
Departments involved in complexity	Department of Mathematics and Computer Science
Main strengths of your research organisation in complexity science	The research activities of our group Dynamical Systems and Mathematical Physics cover a broad and diverse spectrum of subjects in the fields of fundamental and applied dynamical systems theory, classical, statistical and quantum mechanics and their interfaces in the light of dynamics. Applications to life sciences, meteorology, physics and chemistry play a crucial role.
Real-world application areas	Among other things (like for instance climate models) we are interested in reaction type dynamics in molecules. We in particular would like to extend a geometric approach to reaction dynamics also to macroscopic molecules.
Three research areas	Get in touch with the biomolecule and protein folding communities, and people studying molecular dynamics problems in general.
Relevant existing International collaborations	Member of the EPSRC network 'Mathematical Challenges in Molecular Dynamics'

Portugal

Fundação para a Ciência e a Tecnologia

Title & Name:	Dr. Tanya Araújo
E-mail address:	Tanya@iseg.utl.pt
Country:	Portugal
Research organisation:	Research Unit on Complexity in Economics (UECE) Institute for Complexity Sciences (ICC)
Departments involved in complexity	Department of Economics ISEG Technical University of Lisbon
Main strengths of your research organisation in complexity science	•☐ computational economics, including the study of network dynamics and the analysis and reconstruction of stochastic processes • ☐methodology and complexity in economics, studying alternatives to the prevalence of linear models and static processes, the condition of equilibrium and its micro-economic foundations •☐ multisectoral approaches to growth and complexity, studying concepts and indicators of multisectoral complexity and efficiency. •☐ macroeconometric modelling, including econometric studies on the equilibrium unemployment rate and the asymmetry in the inflation-output relationship
Real-world application areas	Our main project (Financial market as an economic laboratory) uses the available data on stock markets as a source of information on the behavior of economic agents. Our first step was to codify and contract information, through the reconstruction of a stochastic process. The next step was to extract structural information from the previously organized data, through the reconstruction of economic spaces from market data. Finally, using agent based models to compare results with experimental market data, we shall enter in the theoretical interpretation phase. It is where we are most interested in tackling with the tools of complexity science.
Three research areas	Computational Economics and Computational Finance Structure Generation Mechanisms in Complex Systems Opinion Dynamics models (including Innovation models)
Relevant existing International collaborations	*None listed*

Title & Name:	Dr Andreas Bohn
E-mail address:	abohn@itqb.unl.pt
Country:	Portugal
Research organisation:	Instituto de Tecnologia Quimica e Biologica - Universidade Nova de Lisboa (ITQB-UNL)
Departments involved in complexity	Systems Biodynamics Group and experimental partners
Main strengths of your research organisation in complexity science	The SBD group has experience in analyzing organismal *in vivo* datasets and in modelling the growth of microbial biofilms and circadian rhythms in plants. We develop tools to enhance the cyclic flux of knowledge between theory, quantitative models and experimental data.
Real-world application areas	Applications which would benefit from complex-science tools are mostly related to environmental microbiology and include wastewater treatment, bioremediation, biofuels, agri- and aquaculture.
Three research areas	We are interested in contacts in the area of quantitative environmental biosciences and social sciences, specifically dealing with modelling the growth and synchronization of multi-cellular / multi-agent systems; semantic approaches for the integration of data, analysis tools, and models; the integration of tools from artificial intelligence, biostatistics, econometrics, and geosciences for analyzing small (and messy) data sets
Relevant existing International collaborations	*None listed*

Title & Name:	Miguel Castelo-Branco MD PhD
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Country:	Portugal
Research organisation:	Visual Neuroscience Lab, IBILI, Faculty of Medicine, University of Coimbra, Portugal
Departments involved in complexity	Institute of Systems and Robotics, Centre for Neuroscience Department of Biomathematics and Biostatistics IBILI (Institute for Biomedical Investigation of Light and Image)
Main strengths of your research organisation in complexity science	Functional Imaging of Complex Brain Networks Neurophysiological approaches to sensation, perception, attention and decision-making Biophysics of Vision Genotype-Phenotype and Structure-Function correlations in health and disease
Real-world application areas	Analysis of time series (behaviour and brain signals) in order to predict decision Brain computer interfaces Novel data-mining approaches to infer Genotype-Phenotype and Structure-Function correlations in health and disease Novel approaches to understand functional connectivity in the brain
Three research areas	Systems and Computational Neuroscience Understanding Brain Rhythms and other temporal patterns of activity and their correlation with behaviour Novel techniques to infer causality in distributed brain activity patterns in health and disease
Relevant existing International collaborations	Collaboration with the MIT-Portugal Program (Topic: Neuroscience and BioEngineering) Partner of the EviGenoret European Network (Genotype-Phenotype and Structure-Function correlations in health and disease) Collaboration with the Brain Imaging Centre of the University of Maastricht (Novel approaches to understand functional connectivity in the brain)

Title & Name:	Dr. Leonor Cruzeiro
E-mail address:	lhansson@ualg.pt
Country:	Portugal
Research organisation:	CCMAR and FCT, University of Algarve
Departments involved in complexity	Biophysics Group of CCMAR and the Physics Dept of UAlg
Main strengths of your research organisation in complexity science	The research is centred on the self organisation behind protein folding and protein function, using the VES hypothesis, according to which the first step in those processes is the storing of energy in the form of vibrational excited states. Another interest is the possible influence of the quantum nature of motion of its atoms on energy transfer in a protein.
Real-world application areas	One possible application is to probe the shape of the free energy landscape of proteins and test the multi-funnel hypothesis. A second possible application is to calculate variables that can be measured experimentally, such as the absorption spectrum of proteins, in order to estimate parameters in the Davydov/Scott model for energy transfer in proteins. A third possible application is to compare fully quantum simplified models for protein conformational changes with semiclassical approaches.
Three research areas	Biomolecular dynamics (classical and quantum, theoretical or experimental) Nonlinear Physics Condensed Matter Physics
Relevant existing International collaborations	*None listed*

Title & Name:	Prof. Rui Dilão
E-mail address:	rui@sd.ist.utl.pt
Country:	Portugal
Research organisation:	Instituto Superior Técnico, NonLinear Dynamics Group
Departments involved in complexity	As far as I know, in IST, the only group involved in Complexity Science research is the NonLinear Dynamics Group.
Main strengths of your research organisation in complexity science	Modelling and simulation of genetic regulatory networks. Validation and calibration of development models (Drosophila) with multi-objective techniques. Parallel tools. Pareto fronts. General mathematical aspects of Dynamical Systems theory, mathematical physics and modelling. Synchronization. Turbulence.
Real-world application areas	Benchmarking, calibration and validation of models: Real experimental predictions. General mechanisms of synchronization of large ensembles of systems (organisms, cells, ...).
Three research areas	Models of pattern formation in development. Synchronization of dynamical systems. Stochastic processes and diffusion maps in complex systems.
Relevant existing International collaborations	GENNETEC (GENetic NETworks: Emergence and Complexity), FP6-2005-IST-5-FET, STREP, European Comission. FUNCDYN (Functional Dynamics in Complex Chemical and Biological systems), European Science Foundation.

Title & Name:	Prof. José A Feijó 
E-mail address:	jfeijo@fc.ul.pt
Country:	Portugal
Research organisation:	Univ. Lisboa/ Inst. Gulbenkian Ciencia
Departments involved in complexity	Plant Biology, Informatics; epidomology, systems immunology
Main strengths of your research organisation in complexity science	Some interdiscipinarity; access to good biological databases and groups generating high quality biological data and various levels of biological complexityt
Real-world application areas	Establishing collaborations with theoreticists, modellers and groups interested in pairing up to explore complex biological systems at the molecular and cellular levels
Three research areas	Non-linear dynamics, network theory, systems biology
Relevant existing International collaborations	*None listed*

Title & Name:	Jorge Louçã
E-mail address:	Jorge.L@iscte.pt
Country:	Portugal
Research organisation:	LabMAg – Laboratory of Agent Modelling, Lisbon University Institute
Departments involved in complexity	Computer science, Sociology, Psychology, Anthropology
Main strengths of your research organisation in complexity science	We have expertise in artificial agent modelling, network modelling, and social simulation. Our team supervises the research developed by the students at the Master and Doctoral Programs in Complexity Sciences - Lisbon University Institute.
Real-world application areas	We would like to study the notion of *diversity* applied to human populations – cultural, educational and economical diversity. Specifically, we pretend to study the human migration phenomena in Europe. We aim to propose some explanatory model of the general effect of diversity in economic development and social wellbeing of populations.
Three research areas	Social science domains concerning the study of human migration in Europe.
Relevant existing International collaborations	*None listed*

Title & Name:	Professor José F.F. Mendes
E-mail address:	jfmendes@ua.pt
Country:	Portugal
Research organisation:	University of Aveiro
Departments involved in complexity	Physics Department
Main strengths of your research organisation in complexity science	Our research focus on the study of structure and topology of complex networks. WE have interests in the study of real networks (social, tourism, etc) as well as developments in the theory of complex networks.
Real-world application areas	The major applications are on communications networks (www, internet), spreading of deceases and neural networks, tourism networks and other social networks.
Three research areas	Application of our analytical results on real world networks.
Relevant existing International collaborations	Social networks. Neural networks (in vitro)

Title & Name:	Prof. Maria Augusta Santos
E-mail address:	mpsantos@fc.up.pt
Country:	Portugal
Research organisation:	Centro de Física do Porto, Universidade do Porto
Departments involved in complexity	Physics Department/Faculty of Science
Main strengths of your research organisation in complexity science	Theoretical background in Statistical Physics/critical phenomena (analytical techniques and Monte Carlo simulations). Some interdisciplinary applications to economic/social systems, social networks.
Real-world application areas	Propagation of opinions, social influence
Three research areas	Sociology, biology, economy
Relevant existing International collaborations	IFISC - University of Balearic Islands, Palma de Mallorca (ES)

Spain

Ministerio de Ciencia y Innovación

Title & Name:	Dr. Amadeu Delshams
E-mail address:	Amadeu.Delshams@upc.edu
Country:	Spain
Research organisation:	MICINN (Ministry of Science and Innovation) and UPC (Universitat Politècnica de Catalunya)
Departments involved in complexity	The Spanish "Programa Nacional de Matemáticas" is involved with all the departments of Spanish Universities which carry out Research in Mathematics.
Main strengths of your research organisation in complexity science	In Spain, there are several Math networks, like DANCE or GELOCA, which are strong coordinating math groups, but do not interact enough with physics or other science groups.
Real-world application areas	Fluid Dynamics, Transportation Theory, Astrodynamics, Computational Neuroscience, Chemical Reaction Dynamics,..., among others
Three research areas	Partial Differential Equations, Dynamical Systems, Celestial Mechanics and Astronomy,..., among others
Relevant existing International collaborations	*None listed*

United Kingdom

Engineering and Physical Sciences Research Council

Title & Name:	Prof Peter ALLEN
E-mail address:	p.m.allen@cranfield.ac.uk
Country:	UK
Research organisation:	Cranfield University
Departments involved in complexity	There is a cross-Cranfield Complexity community linked by the – Complex Systems Research Centre, involving all Schools: Management; Engineering; Applied Sciences; Defence; Health.
Main strengths of your research organisation in complexity science	Multi-Agent Evolutionary Modelling in organizations, supply chains, urban and regional systems and economic markets. Learning models designed to increase resilience and improve performance for supply, production and distribution systems; Multi-Objective Design simulations with evolutionary methods, and design trade-offs. Virtual reality visualization for trade-off surfaces. Risk analysis for complex systems with impacts of constraints including regulation on design creativity. Developing Intelligent grid simulation. Evolutionary design is being pursued with Nanotechnology innovation and decision cost engineering for complex systems. Generic pattern recognition techniques and the development of mapping for different types of turbulence.
Real-world application areas	Exploring how bottom up systems can avoid collective catastrophes (supply, production, distribution networks) and retain sufficient performance while increasing resilience. Developing simulation tools that can help decision making. Sustainable Living – Distributed, networked learning and innovation in socio-economic systems and the management of natural resources and ecological systems. Entrepreneurial versus Communal Ethical Systems. The development of evolutionary spatial modelling tools for integrated policy and planning tools
Three research areas	Learning networks of agents e.g. Intelligent Grids Modelling supply, production and distribution systems using multi-agent models. The co-evolution of the means of production and delivery of new goods and services with the value systems of society. The development of evolutionary spatial modelling tools for integrated policy and planning tools.
Relevant existing International collaborations	European Complex Systems Society (ECSS) European Research on Innovation Management Association (ERIMA)

Title & Name:	Prof. Christian Beck
E-mail address:	c.beck@qmul.ac.uk
Country:	UK

Research organisation:	Queen Mary, University of London
Departments involved in complexity	Mathematics Physics Computer Science Business Management
Main strengths of your research organisation in complexity science	Statistical mechanics of complex systems Superstatistical time series Technology networks
Real-world application areas	Statistics of turbulent flows and share price dynamics Dynamics of wind velocity fluctuations (wind turbines) Optimization of man-made networks (e.g. electricity) Extreme events (e.g. share price crashes)
Three research areas	Generalized methods of statistical mechanics for complex systems Dynamics of networks Extreme event statistics
Relevant existing International collaborations	Prof. Harry Swinney, Austin, Texas Prof. Eddie Cohen, Rockefeller University, New York Prof. Sumiyoshi Abe, Mie University, Japan

Title & Name:	Prof Chris Budd 
E-mail address:	mascjb@bath.ac.uk
Country:	UK
Research organisation:	Bath Institute for Complex Systems
Departments involved in complexity	Maths/Stats, Physics, Electrical engineering, Mechanical Engineering, Biology, Computer Science, Social Science
Main strengths of your research organisation in complexity science	Expertise in the analysis and computation of complex multi-scale problems and problems on lattices. Expertise in network analysis and the dynamics of networks. Expertise in data assimilation and inverse problems. Strong theoretical understanding of emergence. Applications to problems in geosciences, atmospheric sciences, disease modelling, energy, cancer, protein modelling, materials. Strong interdisciplinary team with an emphasis on knowledge transfer.
Real-world application areas	Physical sciences: oil recovery, meteorology, ionospheric physics, climate, materials modelling, crystals Biological/Social sciences: disease, animal herds, crowd dynamics, educational systems, consumer complexity, Social networks. Engineering/industrial; aerospace, electrical materials, electromagnetic diffraction, retail
Three research areas	1. Problems in the social sciences amenable to a mathematical formulation and analysis 2. Climate and environmental modelling. 3. Complex systems arising in industry.
Relevant existing International collaborations	On the scientific board for MITACS (Canada) and Have close links to MASCOS (Australia)

Title & Name:	Dr. Keith Hopcraft
E-mail address:	Keith.hopcraft@nottingham.ac.uk
Country:	UK
Research organisation:	University of Nottingham
Departments involved in complexity	Mathematics, Physics, Computer Science, Business, Social Science
Main strengths of your research organisation in complexity science	Statistical physics, population and epidemic modelling, extremal events, non-Gaussian stochastic processes
Real-world application areas	Risk management of extremal events: applications to energy micro- and macro- supply and demand. Food supply and demand. Network resilience and susceptibility. Optimal network topologies for ameliorating risk.
Three research areas	Risk management of extremal events Stable random processes & fractal processes Epidemics
Relevant existing International collaborations	*None listed*

Title & Name:	Professor Jeffrey Johnson 
E-mail address:	j.h.johnson@open.ac.uk
Country:	UK
Research organisation:	Complexity-Design Group, The Open University
Departments involved in complexity	Design and Complexity Science Group The OU Energy and Sustainability Initative Faculty of Mathematics, Computing and Technology
Main strengths of your research organisation in complexity science	(1) Complexity Science and Design (2) Mathematics, especially Hypernetworks (3) Policy, e.g. traffic and urban planning dynamics (4) Socio-technical systems, Robotics, AI, Engineering
Real-world application areas	- The use of hypernetworks to analyse complex social structures, e.g. a blog dataset of 44 million posts made between Aug 1st and Oct 1st, 2008; e.g. social networking of 50,000 children in Milton Keynes on an education project; e.g. the structure of the complex systems community
Three research areas	(1) Networks and hypernetwork research (2) Rigorous social science – psychology and sociology (3) Computer simulation and graphical display
Relevant existing International collaborations	(1) ASSYST is a new European Project to support COSI-ICT & Complex Systems http://assystcomplexity.eu/ see also GDS http://www.globalsystemdynamics.eu/ (2) The Complex Systems Society welcomes new members: http://css.csregistry.org/tiki-index.php (3) The European Conference on Complex Systems, ECCS'09 will be in Warwick University 21-25 Sept 2009 Late paper may still be accepted http://www.eccs09.info

Title & Name:	Professor David Lowe
E-mail address:	d.lowe@aston.ac.uk
Country:	UK
Research organisation:	Aston University
Departments involved in complexity	Mathematics, Electronic Engineering, Computer Science, School of Life and Health Science. Business School.
Main strengths of your research organisation in complexity science	Principled statistical physics approaches to many-body complexity problems in the computing, pattern processing and physical sciences.
Real-world application areas	Networks (biological [gene and information pathways] and communications [electrical, internet] and engineering [randomly connected micro- and nano- sensor arrays]). Computing structures (biological and novel artificial computing substrates. Organisational complexity.
Three research areas	1) Dynamics on randomly connected multiscale networks 2) Spatio-temporal patterns of synchronisation in large arrays of coupled dynamical systems. 3) Principled approximative inference methods for complex systems.
Relevant existing International collaborations	*None listed*

Title & Name:	Dr. Jason Noble 
E-mail address:	jn2@ecs.soton.ac.uk
Country:	UK
Research organisation:	University of Southampton
Departments involved in complexity	□ National Oceanography Centre □ School of Biological Sciences □ School of Chemistry □ School of Civil Engineering and the Environment □ School of Engineering Sciences □ School of Electronics and Computer Science □ School of Geography □ School of Mathematics □ School of Medicine □ School of Physics and Astronomy □ Southampton Statistical Sciences Research Institute
Main strengths of your research organisation in complexity science	Breadth of interest in complexity science across the departments listed above, and depth of coverage in specialized groups such as the Science and Engineering of Natural Systems group in ECS. Our new Institute for Complex Systems Simulation (http://www.icss.soton.ac.uk/) brings much-needed doctoral level training to the area and will be central to the University's research strategy in complexity science over coming years.
Real-world application areas	Climate and oceanographic modelling; nanoscale technology; sustainability and resilience, particularly with reference to disaster management; demographic change; ecology and evolution; markets and mechanism design; transport; turbulence; pervasive computing; massive multi-agent systems. See also http://www.icss.soton.ac.uk/research/index.html.
Three research areas	Agent-based models of demographic change and social processes. Disaster management. Ecology and evolution.
Relevant existing International collaborations	The University as a whole has a large number of international collaborations, but in complexity science we could do with more, and my aim at the meeting is to help with this process.

Title & Name:	Gunnar Pruessner
E-mail address:	g.pruesner@imperial.ac.uk
Country:	UK
Research organisation:	Imperial College London
Departments involved in complexity	Maths, Physics, Computing Biological, Chemical, Civil and Electrical Engineering Medical School, National Heart and Lung Institute, Clinical Neuroscience
Main strengths of your research organisation in complexity science	- Statistical mechanics approach to complexity - Access to real world data: FMRI, transport, web infection
Real-world application areas	Data analysis in neural science (FMRI), ecology (evolution and pattern formation) and social science (transport, organisation).
Three research areas	Social Sciences Ecology Neurology
Relevant existing International collaborations	Odense, Denmark (Paolo Sibani) Budapest, Hungary (Beata Oborny) Catania, Italy (Vito Latora)

Title & Name:	Prof Susan Stepney
E-mail address:	susan@cs.york.ac.uk
Country:	UK
Research organisation:	University of York
Departments involved in complexity	Archaeology, Biology, Chemistry, Computer Science, Electronics, Management, Mathematics, Philosophy, Physics, Sociology, ...
Main strengths of your research organisation in complexity science	YCCSA (York Centre for Complex Systems Analysis) provides an interdisciplinary research environment, bringing together groups and individuals with research interests in novel mathematical and computational tools for the analysis of complex systems, establishing a critical mass in the area that would not be possible within a single department. YCCSA supports (in terms of space, personnel and equipment) a wide range of research into complex systems, including novel hardware and software engineering, and modelling of physical and biological complex systems at multiple levels of detail. It provides a platform for a range of multidisciplinary training activities including Masters and PhD training.
Real-world application areas	* the development, maintenance and restoration of robust ecosystems * swarm robotics, particularly robust maintenance of task functionality in the presence of errors and failures * modelling real world complex systems from partial and noisy data * soil as a complex system * archaeological trading patterns * health/diet/lifestyle of populations
Three research areas	* design, engineering and control of emergent complex systems * developing complex systems concepts across application domains, particularly notions of feedback processes and causality loops * what "sustainability" might mean in the context of non-equilibrium open complex systems
Relevant existing International collaborations	* Stockholm Resilience Centre, Sweden * Dr Christof Teuscher, U Portland, USA * Dr Jim Bown, U Abertay * Jose Halloy, Universite Libre de Bruxelles

Title & Name:	Dr Karoline Wiesner
E-mail address:	k.wiesner@bristol.ac.uk
Country:	U.K.
Research organisation:	University of Bristol
Departments involved in complexity	Centre for Complexity Sciences, Faculty of Science (School of Mathematics, School of Chemistry, School of Biological Sciences, School of Geographical Sciences), Faculty of Engineering (Dept of Eng Mathematics, Dept of Computer Science, Dept of Civil Eng, Dept of Electrical Eng), Faculty of Medical and Veterinary Sciences (Department of Biochemistry), Faculty of Arts (Dept of Philosophy)
Main strengths of your research organisation in complexity science	Bristol University is among the leading research universities in the U.K. Its Centre for Complexity Sciences (BCCS) connects scientists from complexity-related research areas across many departments and faculties. BCCS offers an integrative graduate programme, including an MRes in Complexity Sciences. Scientists from many departments supervise the research projects, which leads to an exchange of ideas and knowledge across the departmental boundaries. In particular, all projects combine theory and experiment. This enhances the strengths of the involved individual researchers and generates a whole new generation of graduate students.
Real-world application areas	The Bristol Centre for Complexity Sciences is centred around the application areas of engineering, life sciences, and molecular sciences. Our graduate education and research projects include nano-chemistry, molecular biology, neuroscience, ecology, epidemiology, global climate change, and large-scale computing.
Three research areas	In addition to the above list the centre is interested in exploring connections to the social sciences and economics. From the above list, in particular, the centre is aiming at strengthening the molecular-biology and medical-sciences component, including neuroscience.
Relevant existing International collaborations	*None listed*

Who to contact:

Complexity-NET European Partners Pilot Call:

Belgium - Fonds National de la Recherche Scientifique
Belgium - Belgium Science and Policy Office
Belgium - Fonds Wetenschappelijk Onderzoek

Estonia - Eesti Teaduste Akadeemia

Greece - General Secretariat for Research and Technology

Hungary - Nemzeti Kutatási és Technológiai Hivatal

Ireland - Irish Research Council for Science, Engineering & Technology

Italy - Instituto dei Sistemi Complessi - Consiglio Nazionale delle Ricerce

Netherlands - Nederlandse Organisatie voor Wetenschappelijk Onderzoek

Portugal - Fundação para a Ciência e a Tecnologia

Spain - Ministerio de Ciencia y Innovación

United Kingdom - Engineering and Physical Sciences Research Council

If you want to be kept updated with information about the ERA-NET please contact the Coordination Office who will be pleased to provide you with details of upcoming activities and events, or look on the **Complexity-NET** website: www.complexitynet.eu

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