GIACS

General Integration of the Applications of Complexity in Science

NEST Coordination Action
(http://www.giacs.org/)

Diana Mangalagiu
Reims Management School, France & Institute for Scientific Interchange, Italy
(diana@isi.it, diana.mangalagiu@reims-ms.fr)

GIACS | MORE IS DIFFERENT

General Integration of the Applications of Complexity in Science

INSTITUTE FOR SCIENTIFIC INTERCHANGE FOUNDATION

OBJECTIVES

- Coordinate activities of the Complexity Pathfinder in NEST
- Support recruiting and rising of the young researchers
- Discover, connect and transfer complexity information
- Find, catalogue, rank and present relevant activity
- Initiate and coordinate new complexity research

Biophysics Biochemistry and Informatics

Collaborative Complexity – Collaborations as Complex Systems COLL-PLEXITY (Gunther Schuh, Aachen)
Production Industry. Failure Rate. Control networks system analysis. Individual companies as individuals in a network .From Generic Network models to problem-to-system match. Dynamical adaptive collaborations networks

Complexity and evolution of photonic nanostructures in bio-organisms: templates for material sciences. BIOPHOT (Jean Pol Vigneron).
Physical explanation for biological complexity.
Use of light scattering by living organisms

Brain, respiration and cardiac causalities in anaesthesia: BRACCIA
Aneta Stefanovska
Experimental measurement, time series analysis and mathematical modeling of anaesthesia.

Emergent organisation in complex biomolecular systems EMBIO
Robert Glen
Assimilate molecular data from sources world-wide. Linking and analysing data - extract knowledge - predict properties.

Extreme Events:
Causes and Consequences: E2-C2 (Michael Ghil)
Extract the distribution of these events from existing data sets. Reproduce the data-derived distribution of events. Predict the likelihood of extreme events in prescribed time intervals.

Interacting Agents and Markets

Complexity: Agents, Volatility, Evidence and Scale: CAVES
Scott Moss
Modelling procedures for the formation of social policy in conditions of uncertainty.

Financial Markets and Complexity: Uncertainty, Heterogeneous Micro Agents and Aggregate Outcomes :ComplexMarkets
Mark Salmon
risk , welfare and stability, growth, efficient resources and information transfer. Financial phenomena: volatility excess, crashes, speculative bubbles, departures from equilibrium

Common Complex Collective Phenomena in Statistical Mechanics, Society , Economics, and Biology: Co3
Sorin Solomon
Adaptation of autocatalytic fluctuations to noise.
Localized objects with complex adaptive properties not explained by PDE distinction between the typical and the average behavior; rare events

Starlings in flight: understanding patterns of animal group movements: StarFlag
Giorgio Parisi
Large number of heterogeneous agents that interact exchanging information-> pattern formation

Networks and Social Self-organization

Critical Events in Evolving Networks CREEN
Janusz Holyst
scientific community and its epidemic-like behaviour (scientific avalanches).
Spreading of information in scientific and public communication networks.

Human behaviour Through Dynamics of Complex Social Networks : and Interdisciplinary Approach: DYSONET Panos Argyrakis
Statistical Physics concepts -> panic, search, traffic, human relationship,epidemics, Economics and Finance, and Environment
Optimization principle?

Measuring and Modelling Complex Networks Across Domains: MMCOMNET
Felix Reed-Tsochas
Unified and cross-disciplinary understanding of the behaviour and functional properties of complex networks: Biological Supply chains, High-tech innovation,

Unifying Networks for Science & Society: UniNet (Markus Kirkilionis)
Links among entities on different scales.
Reinterpretation of transferred theories in the context of different applications. Math.
“unification of theory feedback cycle”

DESCRIPTION:

INPUT OF YOUNG RESEARCHERS

WP4 New EU member states
WP5 Female Scientists
WP11 Connecting research and PhD programs

CONNECTION TO THE "OUTER WORLD"

WP1 Politicians, Media, Business leaders
WP2 Economic Policy
WP3 Industry

MEETING INSTRUMENTS

WP6 Think Tanks
WP7 Schools/ Courses
WP8 Conferences

COORDINATION AND SELF-ORGANIZATION

WP9 Coordination of Databases
WP10 Electronic Coordination
WP12 European Complexity Society
WP13 Experts' Report

WP14 Management
WP15 Assessment and Evaluation

WHAT WORKED

- Organization of European Complexity PhD Schools

  - Agent-Based Studies of Social, Economic and Industrial Systems (April 2007)

  (http://www.complexity-research.org)

  - Stochastic Effects in Differential Nonlinear Models - From Neutrality in Evolution to Efficiency in Markets: How to bridge theoretical predictions to empirical data? (November 2007)

  (http://www.isi.it/progetti/giacs-school/index.html)

  - 20 senior researchers, 40-50 students (PhD, Master level)

  - Students exposure to different research paradigms

  - Bridge between microeconomics and macroeconomics through complexity

  - Small research projects were initiated

  - PhD schemes (one student, two senior researchers) followed

WHAT WORKED (cont'd)

- Supporting the European complexity conferences
- Integrating Scientists from new and candidate EU states
- Summer schools, advanced courses
- Complexity reports, position papers

WHAT NEEDS TO BE IMPROVED

- Connection to policy makers, stakeholders, business and media leaders
- Links between PhD students in STREP projects and industry (access to data)
- Data coordination and sharing
- Support to Female Advancement in Complexity Application Areas
- Knowledge transfer between Complexity Application Fields

WHAT'S NEXT?

- How complexity relates to converging technologies (nano-bio-info-cogno)?
- Recent years have shown an increasing emphasis on bridging the natural sciences with the social sciences
- The next frontier is a dialog with humanities