NEWSLETTER Special number

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Complex Systems Society

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Complexity and Public Policy

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Although complexity thinking has been around for a while, recent changes in organizations and society at large and the tremendous progress in ICTs are making its potential even more apparent for policy activities. Engaging complexity science in public policy is one of the main goals of the ASSYST co-ordination action.

In the last months, ASSYST has promoted a number of events to discuss the issues: the BIG-STEP (Business, Industry and Government – Science and new Technologies for Enhancing Policy) conference in Brussels (April 2010), the Towards a Science of Social Intelligence meeting in London (August 2010), the Policy Making in Complex Adaptive Environment satellite meeting at the Lisbon Conference (September 2010), the ICT for Green Knowledge Economy venue in Florence (May 2011). Other initiatives are being organized for the remains of the year and will be advertised in the Newsletter and on the CSS website

With this Newsletter, we invite the CSS members to join the efforts and help creating an *open* but *reliable* community where scientists, decision-makers, business, and the general public can make sense of how complexity science can be fruitfully leveraged in the *making* of policy activities.

To prompt the discussion, this Newsletter mentions a few themes which, although by no means exhaustive, can help in focusing the discussion.

Special number guest editors,

Sylvie Occelli and Ferdinando Semboloni

Challenging complexity for public policy

by Sylvie Occelli and Ferdinando Semboloni

Over the last 30 years, a variety of complexity oriented approaches and modeling styles (non linear dynamics models, MAS, cellular automata, GIS systems, social computing, planning support systems etc.) have become increasingly popular in the public policy field as a result of the greater data availability, spread of computing power and the communication possibilities provided by the Internet.

To date a burgeoning research stream exists and is continuously expanding to accommodate the new requirements stemming from institutional transformation, new demands from citizens for participation in public life, technological progress and epistemological changes (see Dennard, Richardson and Morçöl eds., 2008).

Not unexpectedly, several perspectives have been proposed to leverage complexity thinking in both policy analysis and public management. When accounting for the role of the observer, in particular, two main perspectives can be distinguished. A so-called external perspective typically oriented at understanding the dynamic and co-evolutionary features of the policy landscape. And a so-called internal one dealing with the ways of being and knowing in the policy environment, which thus entail participation and engagement by the different stakeholders to enable social evolution.

According to the former, complexity based methodologies provide a tailored tool kit facilitating the main steps of the policy cycle (problem identification, alternative formulation, implementation, monitoring and evaluation) although, so far, their use in everyday practices is still modest.

For the latter, the applications of the paradigm of complexity thinking, and namely those related to self-organization, emergence and modeling, call for a transformation of the overall policy production process. In several practical cases, in fact, they often entail re-aligning public organizations, sharing information among different institutional departments, promoting wider societal participation and involving a variety of scientific expertise, while being confronted with unforeseen ethical issues.

Whereas a number of approaches focus on the improvement of policy effectiveness, others are more concerned with the creation of the socio-technical conditions for making policy actions more institutionally, socially and environmentally viable. While for some applications, methodologies and techniques are the foremost ingredients for tackling the ambiguities and uncertainties which afflict policy making, for others, nurturing the human and organizational-based knowledge underlying most policy actions is the core issue. As adaptation and emerging patterns are looked at, increasingly, questions are raised about their value-laden features and the many determinants which generate them in the particular contexts.

Although not antagonist, and forming a whole continuum of positions a tension exists between the two perspectives. Indeed, such a tension is not a flaw but a distinctive feature of a generative science such as complexity science purports to be. It defies both the *hard* and *soft* parts of the CSS scientific community, as, more and more, it is realized that the connections between external and internal perspectives have to be tackled for successfully engagement in the policy field .

Complexity thinking and public policy: overcoming fragmentation

To take up the Europe 2020 challenges for smart, sustainable and inclusive growth, the forces of fragmentation we observe in the policy domain across most European countries should be contrasted.

Insofar as we acknowledge people's intrinsic willingness to cooperate and the unique infrastructural capability provided by ICTs, complexity science has a pivotal role in supporting the fight against those forces. Empowering the stakeholders in building a shared understanding of the societal questions to be addressed, developing ways to harness the problems at hand, and contributing to a cultural shift from a risk-averse towards a collective learning culture, are some praised features already accredited to complexity thinking.

Complexity approaches can help in integrating the disparate domain knowledge, such as economics, geography, sociology, physics, management, laws, computing- which are involved in the set of interdependent activities policy has to array through time,- policy formulation, implementation, and assessment–. But this is only one of the potentials.

The metaphorical arguments recounted in Herbert Simon's parable of the two watchmakers (Simon, 1962) more than 50 years ago are still a source of inspiration today. They remind us that a core issue is the management over time of the relationships between policy stages, - the watch production process in the story, the set of policy interdependent activities arrayed through time - and the types of knowledge necessary to cross those stages, - how to conceive and organize that process, which, by the way , are neglected in the original story- (Occelli, 2010).

In fact, applications of complexity science can help in addressing that. They provide insights into how the different knowledge contributions can be related to each other in searching for a solution to a policy problem. They also expose how the results of their inter-linking may be leveraged by the various stake-holders, and help to tackle those wicked problems which are responsible of the fragmentation observed in many policy situations.

In this sense, a complexity science approach can be viewed as a problem design strategy capable of resolving tension between what is needed (or what ought be done to address a certain policy issue) and what can be done, given the available resources and the existing environmental constraints (Conklin, 2006). In other words, it is a strategy which makes it possible to continuously move back and forth between the recognition of needs and the solutions which can be put in place to meet those needs (Johnson, 2009).

In the process, both understanding and engagement by the stakeholders are entailed (see the above mentioned linking between the external and internal perspectives), which allow a sharing of the design process. As stakeholders' learning is improved and knowledge spillover likely to be generated in the policy context, opportunities can be created for overcoming fragmentation and establishing more effective policy organizational patterns. For the socio technical system as a whole, this would mean to be capable to more timely and effectively appropriate of the ICT progress, as the gaps between social needs (what communities want) and technical performance (what technology does) would be progressively closed (Whitworth, 2009).

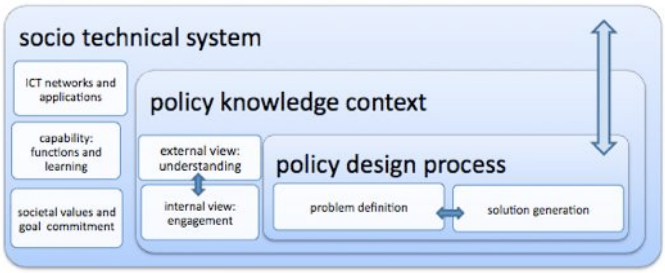

Figure 1 Leveraging complexity policy activity: connecting design process, knowledge context and the socio technical system

Modeling and models: empowering policy activities

Modeling is at the core of complexity science. In complex environments, models as cognitive mediation artifacts are essential tools for making the problems intelligible.

In the policy domain, and this holds for the set of all the interdependent activities, such tools have three main components: a) a syntactic one, related to the method of analysis adopted for yielding explanations of the policy problems; b) a semantic component, associated with the meanings explanations have for the model users (the analyst and stakeholders); and c) a knowledge project component, depending on the purpose of the model development (i.e. aims, resources and competences necessary for the model implementation, expected results, governmental departments involved, etc.).

Recent progress in ICT based applications such as cloud computing applications, visualization and social computing, offers unprecedented potentials to the cognitive mediation role of models as they positively affect both the syntactic component (more targeted computing power, and easier access to the model methodological underpinnings) and the semantic one (better communication and higher inclusiveness among the model users).

These improvements are expected to greatly benefit the co-evolution between problem definition and solution generation, shortening the deployment time of the policy design strategy and enhancing more participatory policy practices.

But it is the knowledge component which deserves deeper attention, as it is responsible for the relationships between policy design process, policy context and socio technical systems (see Fig.1). It sees to the management of the two crucial phases of the modeling activity: a) encoding, and namely providing legitimization to the issues to be modeled, and b) decoding, making those societal bodies having policy responsibility more appreciative of the modeling activity as a main source of innovation in the whole policy organizational process (better alignment between governmental departments, raising ICT education levels among civil servants, developing model-based service portfolios, etc.).

Developing an open model platform, allowing access to the many model approaches already existing in the scientific community and showing the benefits (likely to be) accrued from their applications, as well as the financial, human and time resources necessary to the projects, is an activity the CSS community should engage in.

References

Conklin J (2006) Wicked Problems and Social Complexity. In: Conklin J *Dialogue Mapping: Building Shared Understanding of Wicked Problems,* John Wiley & Sons, Chichester, 3-40 (see also http://cognexus.org).
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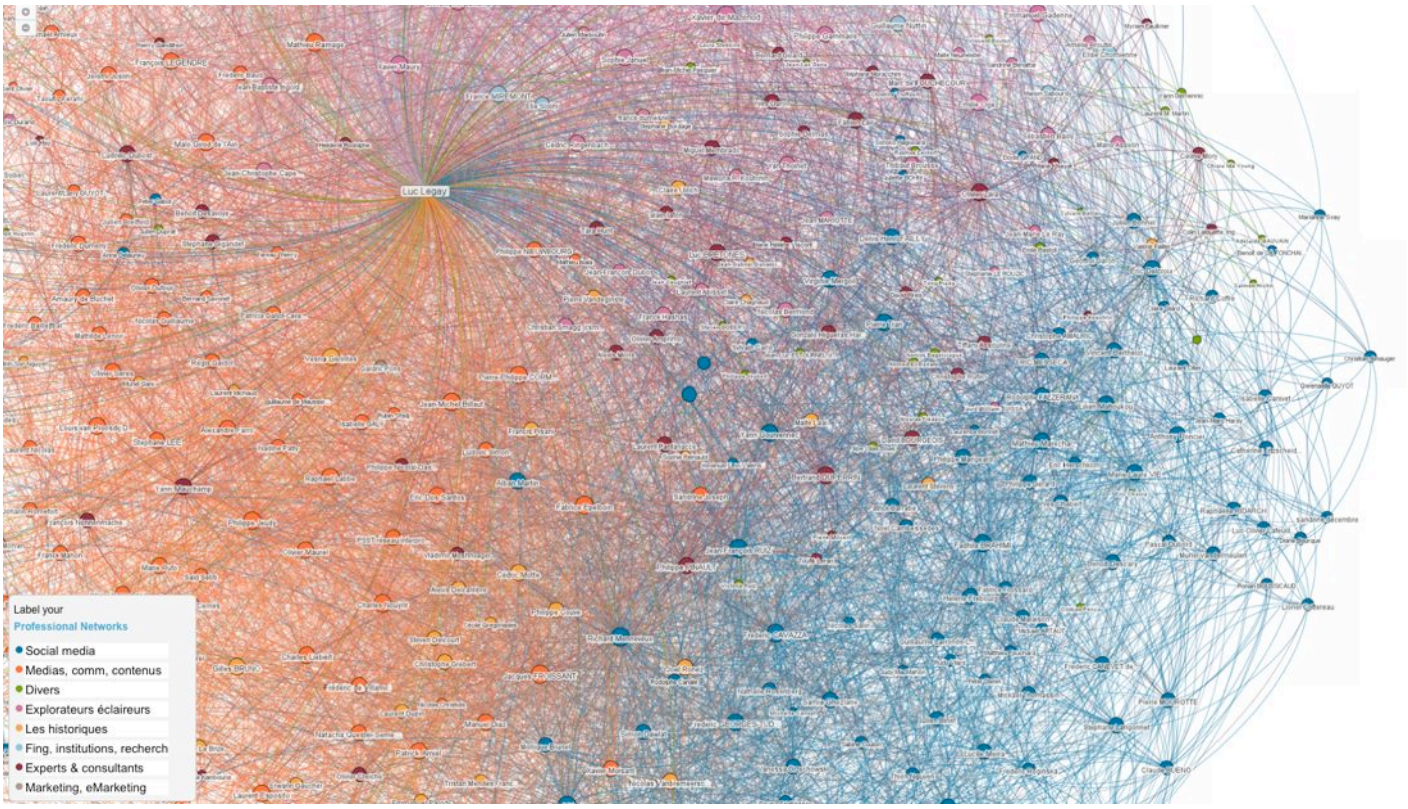
Visualizing Information in Complex Environments

Turin, November 17-18, 2011



The dramatic progress in ICT and Internet-based applications has meant that individuals and organizations are exposed to an ever-increasing stream of data. In such an environment, the burden caused by information overload and processing is largely compensated for by the extraordinary potential which the availability of plentiful distributed data unleash for the management of complex environments.

Information visualization tools provide a creative way to address the issues. They offer a means to deal with a large amount of data and make sense of the emerging information. They also yield new capabilities to amplify cognition. By making it easier to exchange and share information they are artifacts for social affordance, as they enhance in novel ways the environment's properties permitting social action.

This meeting is an opportunity to get insights into the possibilities offered by visualization and into the benefits likely to be accrued to the various societal organizations as they use these new tools. Contributions are gathered around three main headings which exemplify some of the roles information visualization can play in this respect:

a) **Visualization and communication**. The focus will be on bringing together expert and lay knowledge and on the co-generation of information in locally based communities. The role of information visualization in providing contexts for general public information and thus adding value to it will be specifically addressed.

b) **Visualization to monitor and supervise spatially distributed systems, such as metropolitan and regional areas.** Attention is paid to how visualization can integrate and make explicit the co-occurrence of different spatially relevant phenomena, such as those concerned with urban security, environmental risks, energy and transport management, thus supporting decision making in complex environments.

c) **Visualization as a means to look into large data-base** and yield an interpretation about data that can expose complex patterns or correlations. This is the realm of visual analytics a new scientific field which is being established at the crossroads between design and computing.

The meeting is organized by ASSYST, a coordination action (Seventh framework program 2008-2011) funded by the FET Proactive initiative Science of Complex Systems for Socially Intelligent ICT (COSI-ICT), in collaboration with IRES, Institute for Economic and Social Research of the Piedmont Region, ISI Foundation, CSI-Piemonte and DUPT, Department of Urban and Regional Planning of the University of Florence, and the University of Warwick.

Further information about the meeting will be given in the autumn Newsletter.

Reading snippets

Elsevier foundation New Scholars Program

The New Scholars Program supports projects to help early-to mid-career women scientists balance family responsibilities with demanding academic careers.

New Scholars seeks to actively address the attrition rate of talented women scientists caused by work-life balance issues. The Foundation provides one, two and three year grants to STEM institutions and organizations actively working towards a more equitable academia by:

Encouraging networking and collaborations among institutions and/or across STEM disciplines in ways that support the challenges of faculty and staff with family responsibilities.

In ASSYST http://assystcomplexity.eu/news.jsp?article=75

ASSYST Bursaries Recipients Biographies

The science of complex systems teaches that variety is necessary for systems to adapt to changing environments. In an attempt to increase variety in the CS community, ASSYST has again this year offered bursaries to support female scientists, minority groups and young researchers in attending ECCS'11. The following 32 people have been offered bursaries.

In ASSYST http://assystcomplexity.eu/news.jsp?article=74

Videos of the 4th Annual French Complex Systems Summer School

The videos and presentations of the 4th Annual French Complex Systems Summer School held in Paris in August 2010 are available online at the ISC-PIF Open Multimedia Library.

In ASSYST http://assystcomplexity.eu/news.jsp?article=72

Paul Ormerod Interview @ ESSA 2011 Summer School

“I think an important point is one of the points that sometimes but quite often made about agent based modeling social simulation, is in some way these are toy models but, their are not. That even apparently quite simple models can nevertheless be found usefull by people who actually have to make decisions.”

In Youtube: http://www.youtube.com/watch?v=kvPzeHte-io

Learning from Insect Swarms: Smart Cancer Targeting

"Smart" anticancer drug systems can use mechanisms similar to **swarm intelligence** to locate sites of disease in the human body. Swarm intelligence arises when swarm behavior, for example bees flying and working together to locate sources of food, is used by the group "to solve a problem collectively, in a way that the individuals cannot"

In Scientific American
http://assystcomplexity.eu/short/?id=128

With space shuttle era over, U.S. robot set for Mars

NASA moved on to a new chapter in space exploration on Friday, a day after the end of its shuttle program, by announcing details of plans to determine if Mars has or ever had the ingredients for life.

In Reuters: http://assystcomplexity.eu/short/?id=130

Structural and Dynamical Patterns on Online Social Networks: the Spanish May 15th Movement as a case study

The number of people using online social networks in their everyday life is continuously growing at a pace never saw before. This new kind of communication has an enormous impact on opinions, cultural trends, information spreading and even in the commercial success of new products. More importantly, social online networks have revealed as a fundamental organizing mechanism in recent country-wide social movements. In this paper, we provide a quantitative analysis of the structural and dynamical patterns emerging from the activity of an online social network around the ongoing May 15th (15M) movement in Spain.

In arXiv http://arxiv.org/abs/1107.1750

Philosophy of Complex Systems. Handbook of the Philosophy of Science Part No. 10

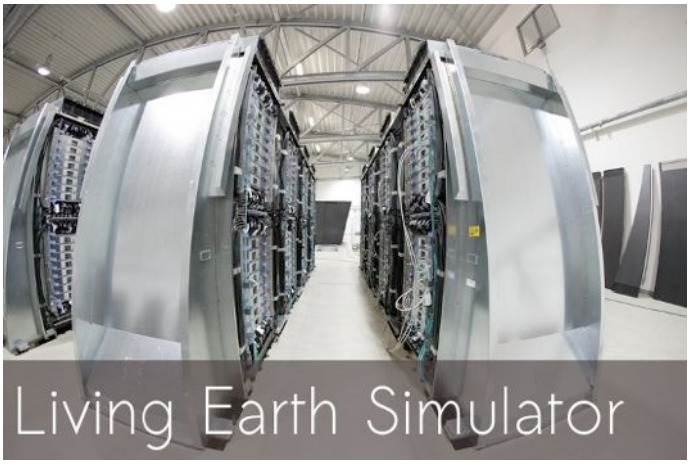
Our intention is to draw together in this volume, we believe for the first time, a comprehensive picture of the manifold philosophically interesting impacts of recent developments in understanding nonlinear systems and the unique aspects of their complexity. The book will focus specifically on the philosophical concepts, principles, judgments and problems distinctly raised by work in the domain of complex nonlinear dynamical systems, especially in recent years.

In Elsevier http://assystcomplexity.eu/short/?id=129

FuturICT and Social Sciences: Big Data, Big Thinking

By Rosaria Conte, Nigel Gilbert, Giulia Bonelli, Steven Bishop, and Dirk Helbing

Imagine storing all the computational information produced in the world in just one year: you would have a pile of DVDs able to reach the Moon and back. How about all the data collected since the beginning of the computer era? The quantity is so huge that traditional units of measurement cannot cope. For this reason a few years ago computer scientists started talking about "Big Data", referring to the gathering, formatting, analysing and manipulating of a massive amount of digital information.



For social scientists, the challenge is now to make sense of all these data in a way that illuminates our social world. This will involve a collaboration between social scientists, who have the concepts, theories and analytical expertise that are needed, and scientists and engineers, especially computer engineers, physicists, and complexity scientists, who are used to handling vast amounts of data.

The European Commission, as part of its Framework 7 Programme, has launched a competition for proposals for "Flagship" research initiatives that will make major advances. Six themes have been accepted for further development; of these only two will be selected and then funded with €1 billion over ten years. Among the themes being considered are research programmes in nanotechnology, robots, personalised medicine, and one on understanding complex social systems, called FuturICT.

Unleashing the power of information for a sustainable future

FuturICT aims at understanding and managing complex social systems, with a focus on sustainability and resilience. Its starting point is Big Data: models of techno-socio-economic systems will be developed, grounded in data from existing and new information technology systems. Computational Social Science will play a crucial role: revealing the processes underlying the emergence and maintenance of societies constitutes a major challenge of the project. FuturICT will help the social sciences take advantage of the computational instruments and the data-driven knowledge required for building and testing social science knowledge.

But is Big Data enough? Social scientists working within FuturICT believe it is not. Just because we have billions of bits of information does not mean we know the intention behind them or their consequences. For this reason, the Social Sciences have a vital role in the project in order that it not only has good data but also good theories.

The greatest difficulty for a project like FuturICT lies in asking good questions. For example, why do financial markets crash again and again? How can we construct resilient institutions? What determines human happiness and well-being, and how are they influenced by personal wealth? How can society change behaviours that destroy our environment and other important public goods? These are just some of the crucial social problems FuturICT will work on. After an analysis of these issues and their consequences, data mining and large-scale computer simulations will step in to provide empirical tests. However, "why" questions cannot be answered through data analysis alone. Therefore, fundamental questions will be discussed during so-called "Hilbert Workshops"—think tanks dedicated to triggering new approaches and ideas. These will naturally lead to the construction of novel theories, developed with the help of an innovative ICT, both responsive and responsible.

So, big questions, big data and big theories: FuturICT goes beyond pure information, and takes the path of big thinking.

To find out more about FuturICT, see http://www.futurICT.eu

Conferences and workshops

http://assystcomplexity.eu/conferences.jsp

ATOP2011
Agent Technologies for Business Applications and Enterprise Interoperability
Liverpool, UK
2 Aug 2011 to 2 Aug 2011

ICEC 2011
Workshop on Robustness and Reliability of Electronic Marketplaces
Liverpool, UK
2 Aug 2011 to 2 Aug 2011

WICSOC 2011
The First International Workshop on Issues and Challenges in Social Computing (WICSOC 2011)
Las Vegas USA
2 Aug 2011 to 2 Aug 2011

ECAL11
European Conference on Artificial Life - 20th Anniversary Edition - Back to the Origins of Alife
Paris, France
8 Aug 2011 to 12 Aug 2011

WIIAT2011
The 2011 IEEE / WIC / ACM International Conferences on Web Intelligence and Intelligent Agent Technology
Campus Scientifique de la Doua, Lyon, France
22 Aug 2011 to 27 Aug 2011

IEEE ICDL-EPIROB 2011
IEEE CONFERENCE ON DEVELOPMENT AND LEARNING, AND EPIGENETIC ROBOTICS
Frankfurt, Germany
24 Aug 2011 to 27 Aug 2011

SPSD2011
International Community on Spatial Planning and Sustainable Development
Kanazawa, Japan
29 Aug 2011 to 31 Aug 2011

coins11
Collaborative Innovation Networks Conference
Basel, Switzerland | HyperWerk Institute for Postindustrial Design
8 Sep 2011 to 10 Sep 2011

ECCS11
European Conference on Complex Systems 2011
Vienna, Austria
12 Sep 2011 to 16 Sep 2011

ICMC2011
2nd International Conference on Morphological Computation
ECLT, Venice, Italy
12 Sep 2011 to 14 Sep 2011

OSINT-WM
International Symposium on Open Source Intelligence & Web Mining 2011
Athens, Greece
12 Sep 2011 to 14 Sep 2011

PHDVienna2011
PhD Research in Progress Workshop III
Vienna, Austria
14 Sep 2011 to 14 Sep 2011

ANT2011
2nd International Conference on Ambient Systems, Networks and Technologies
Ontario, Canada
19 Sep 2011 to 21 Sep 2011

ICORE2011
2nd International Conference on Reputation
Montpellier, France
19 Sep 2011 to 19 Sep 2011

MAS&S 2011
5th International Workshop on Multi-Agent Systems and Simulation (MAS&S 2011)
Szczecin, Poland
19 Sep 2011 to 21 Sep 2011

EPIA.2011
15th Portuguese Conference on Artificial Intelligence
Lisbon, Portugal
10 Oct 2011 to 13 Oct 2011

CASON 2011
Third International Conference on Computational Aspects of Social Networks
Salamanca, Spain
19 Oct 2011 to 20 Oct 2011

NICSO 2011
Nature Inspired Cooperative Strategies for Optimization
Cluj Napoca, Romania
20 Oct 2011 to 22 Oct 2011

CAS AAAI 2011
AAAI Fall Symposium - Complex Adaptive Systems: Energy Information and Intelligence
Arlington, VA, USA
4 Nov 2011 to 6 Nov 2011

EUMAS 2011
European Workshop on Multi-agent Systems
Mastricht, Netherlands
14 Nov 2011 to 15 Nov 2011

ICAART 2012
4th International Conference on Agents and Artificial Intelligence
Vilamoura, Algarve, Portugal
6 Feb 2012 to 8 Feb 2012

CI2012
Collective Intelligence 2012
MIT, Cambridge, MA, USA
18 Apr 2012 to 20 Apr 2012

Jobs

http://jobs.cssociety.org

Professor
Tenured Faculty Positions in Computer Science, Mathematical Statistics, Machine Learning, Large Scale Data Mining
IMT Institute for Advanced Studies Lucca, Computer Science and Applications Research Area
Italy, Tue 30 of Aug., 2011

PhD

PhD Scholarships in Computer Science and Engineering
IMT Institute for Advanced Studies, Computer Science and Applications Research Area
Italy, Wed 28 of Sep., 2011

PhD
Estimation of information flows in a sensor network : application to biomedical imaging.
GIPSA-lab, UMR 5216 CNRS, Grenoble and Ecole Normale Superieure de Lyon, Laboratoire de Physique, Equipe "Signaux, Systemes et Physique", CNRS UMR 5672.
France – August 31, 2011

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and Ferdinando **Semboloni**

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http://www.flickr.com/photos/luc/5418037955/

Story submission guidelines:

If you are a Complex System researcher/practitioner and want to share a success story about your work / research please submit it to **newsletter@assystcomplexity.eu.**

The story should approximately 500 words (if you want to submit an extended story please contact us) and should be sent in TXT, ODT, RTF or DOC file formats.

Contacts

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CSS – Complex Systems Society

Web: http://cssociety.org
RSS: http://cssociety.org/tiki-calendars_rss.php
Suggestions: http://cssociety.org/suggestions

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