



## II Conference

September 26<sup>th</sup>-27<sup>th</sup>, 2011

Aula Magna – Vincenzo Li donni  
Università di Palermo  
Facoltà di Economia  
viale delle Scienze ed. 13  
Palermo, Italy

### **COMPLEXITY SYSTEMIC SCIENCES AND THE GLOBAL ENERGY AGENDA**

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**The aim of the conference is to focus on the epistemological theoretical, methodological, technical and practical contributions of the systemic approach throughout each disciplinary or interdisciplinary perspective rooted in the systemic approach (sociology, management, engineering,**

biology, economics, mathematics, etc.) to shape a scientific and policy agenda to face the energy challenges of our times on a global scale.

The conference schedule will include also panels with studies and research about any field of complexity science. All panelists must be members of WCSA.



## Tuesday 27<sup>th</sup>

### 9:30 a.m. – 1:00 p.m. **III Panel: Systemic approaches in Business Management**

Panel Chair Rosario Faraci, *University of Catania, Italy*

#### **Panelists**

Enzo Scannella, *University of Palermo, Italy*

Polese F., Carrubbo L., *University of Cassino, Italy*

Michele Infante, *Jhon Cabot University, Rome, Italy*

Barile S., Calabrese M., Iandolo F., *University of Rome La Sapienza, Italy*

Di Nauta P., Polese F., Saviano M., *Univ. of Foggia, Cassino, Salerno, Italy*

Sergio Barile, *University of Rome La Sapienza, Italy*

Marco Ghisi, *Selex – Elsag Datamat- Finmeccanica, Italy*

### 1:00 p.m. – 2:00 p.m. **Lunch break**

### 2:00 p.m. – 3:00 p.m. **WCSA Systemic Research Medal Award**

*Winner Speech:* Klaus Krippendorff, *University of Pennsylvania*

*Ceremony Chair:* Demetrio Errigo, *WCSA President*

### 3:00 p.m. – 6:30 p.m. **IV Panel: Systemic Science in the Knowledge Based Society**

Panel Chair Gandolfo Dominici, *University of Palermo, Italy*

#### **Panelists**

Simone D'Alessandro, *G. D'Annunzio University, Italy*

Athor Subroto, *University of Indonesia, Indonesia*

Ruzzenenti F., Picciolo F., Basosi R., *University of Siena, Italy*

Vespasiano F., Martini E., *University of Sannio, Italy*

Gianpaolo Basile, *University of Salerno, Italy*

Levanti G., Palumbo F., *University of Palermo, Italy*

Borrelli D., Gavrilu M., *Univ. del Salento, Univ. La Sapienza, Italy*

### 6:30 p.m.

#### **Conference Ending Speech**

Demetrio Errigo, *WCSA President*

Andrea Pitasi, *WCSA Scientific Director*

Gandolfo Dominici, *Conference Program Chair*

# List of Abstracts

## panel 1

### 1) **A HEURISTIC MODEL FOR ASSESSING NATIONAL ENERGY SECURITY**

(Christopher Cooper, *Vermont Law School, USA*)

Contemporary energy policy analysts have tended to rely on restrictive definitions of energy security in an attempt to delineate security indicators and compare national energy strategies between nations and across expansive geographical areas and geopolitical spheres. This insular approach to comparing national energy security policies is unnecessary to expedient policy analysis and may actually impede prudent decision-making by inducing a form of bounded awareness that overlooks salient issues that affect energy systems as a whole. Three cases studies (nuclear reactor cooling in the United States, electricity theft in the Mumbai slums of India, and hydrocarbon drilling in Cambodia's Tonle Sap) are examined as evidence that a cognitive heuristic model of energy security that applies experiential knowledge to energy systems provides a more practical way to conceptualize energy security and results in more prudent national and international energy policy.

### 2) **The global energy key players: forced to be Systems (complexity) Integrators**

(Massimo Paoli, *University of Perugia, Italy*)

You cannot be a key player in the new global energy arena if you are not a "Systems Integrator" (wherever you are positioned along the energy systems chains). The objective of this work is to leave some new theoretical considerations on knowledge and consequently about why and how the control of systems integration at your chain level can really be maintained and also innovatively directed. The basic idea is to support redundancy of knowledge basis, therefore of agents as profiles of adequate professional bearers of such knowledge, but also of organizational contexts, conceived as "containers", predisposed to allow men and their knowledge basis to be integrated in order to construct the fundamental business axis of System Integration. This fundamental axis resides in the capability of complex vision-construction of change and its marching direction (a change that is used as a strategic competitive "club").

### 3) **GREEN ENERGY: PLACEMENT STRATEGIES AND BOUNDARIES**

(Massimiliano Ruzzeddu *UNISU, Rome, Italy*)

#### THE PROBLEM:

In the current time, the diffusion of renewable energy is becoming more and more crucial both for economic and environmental reasons.

Of course, rebuilding a social-industrial system that only relies on "green energy" would imply costs almost unbearable for no matter what society; though, the impression is strong that even a process of gradual change is far to begin; or at least, in many areas this process faces boundaries, that make it slower.

We can assess that there are three kinds of boundaries. First: oil companies lobbies, that defend the use of the fossil sources of energy, and impose limits to the use of other sources. Second, the continuous innovation in the field of green energy can make it too risky for entrepreneurs to invest in any given system of production, if research is likely to yield new systems of production. Last but not least, the public opinion, i.e., the sum of energy users, is often uninformed and sceptical about the effectiveness of green sources of energy, that do not show eager to drop fossil fuels.

#### THE HYPOTHESIS:

The main idea of this paper is that, in order for the energetic innovations to spread around, the effectiveness of those innovations in terms of pollution and/or cost reduction could not be enough to ensure successful innovation.

According to the Triple helix model (Etzkowitz H., Viale R. Third academic revolution: polyvalent knowledge; the DNA of the triple helix, Triple Helix 5 Convention., Turin, 10-21 May 2005.), there are three more categories of variable to take into consideration: economic issues imply not only pollution and/or energy cost reduction, but also the possible financial loss, if the technology used to provide clean energy, turns quickly obsolete. Political issues imply the decisions, that political or local authorities make about energetic issues; these decisions will shape an environment, that can be favorable or not favorable to energetic innovation. Cultural issues consist of the representations, that social actors have built, about the effectiveness of the innovations. This is the most crucial issue, because the opinion about green energy depends not only on its effectiveness, but principally on the visions of the worlds, that affects the context of diffusion. A cultural context, that has a linear vision of time and value of human action to improve life, will be more likely to accept technological- and energetic- innovation.

In other words, diffusion of green energy is a complex issue; as a consequence, complex categories will be necessary in the analysis or related phenomena.

Namely, systemic will make easier to take into account the activity of companies, that are active in the field of green energy. In fact, by considering companies as systems, it will possible to consider at the same time the sources of knowledge for creating products - inputs - and the way the market and the audience - environment- will react to this innovation - output. The systemic vision will also provide the theoretical framework, to assess the main hypothesis of this work. In fact, one of the main issues of the systemic, is the system's swap of energy, material and information with its environment; of course, in this case the meaning of "environment" is not related to the nature: the words refers to the social, cultural and economic conditions, in which the organization operates.

Within this framework, by considering the organizations and companies as systems, Mintzberg (Mintzberg, H Structure in Five. Englewood Cliff, Prentice-Hall, 1983) states a correlation between the internal structure of an organization and the complexity of the system, expressed in terms of hostility, frequency of change and knowledge necessary to cope with it.

So that, the hypothesis is that the environment for "green companies" is complex as it implies continuous changes, not only economic, but also cultural and legal, as well production know-how's.

Furthermore, according to Mintzberg's vocabulary, the environment for green companies is hostile, for it consists of several obstacles to the adoption of renewable sources of energy; not only political and financial, but principally cultural. In other words, the main obstacle for green energy production is the resistance to the innovation, that characterizes the current, national, culture.

#### RESEARCH PLAN AND METHODOLOGY:

The empirical data for assessing those issues will come from one or more case studies, among small and large enterprises, that trade production and delivery of totally green energy (solar, sea grass, wind etc.).

Namely, I will assess how the actors involved in the production, perceive and define their environment. I will investigate on the following issues:

The source/s of theoretical and technical companies' knowledge acquisition;

Their target and, generally speaking, their environment;

The relationship with authorities, both local national and supranational;

The companies' internal structure;

The problems tat they have faced at spreading their products.

The methodology will consist mainly of depth interviews to be administered to the company/ies staff; use of observation and document analysis will be used if required.

## **4) A STATE-BASED HOLONIC FORMALISM FOR CONTROLLING COMPLEXITY OF DEPENDABLE ENERGY-PRODUCTION SYSTEMS**

(Luca Pazzi, *University of Modena & Reggio Emilia, Italy*)

Energy production is nowadays facing depletion of traditional, non renewable, energy sources. This in turn leads to having to make more use of safety-critical processes, for example fossil fuel extraction through marine mining and an increasing recourse to nuclear plants. Such processes exhibit distinctive features which require to analyze safety issues from a different point of view. The first feature is for example that they are not "fail safe", that is they do not reach a safe state after an accident. Fail safeness is an intrinsic properties of the system, that is it does not depends on the control we exercise upon it. For example, a car may pull over after a tyre blows out, hence it is fail safe, while a plane cannot land safely after engines stop, hence it is not fail safe. It can be easily observed that both extraction of marine oil and nuclear-based energy production are not fail safe either. Moreover, both cases call for further safety-related classification. If a failure in a system which is not fail safe typically ends with a single point in time catastrophe, a failure within such systems end typically with a never-ending, possibly accelerating, catastrophe. Such a distinctive ontological feature of such plants requires therefore to further investigate whether safety can be "totally" achieved. If, on one hand, it is common wisdom to believe that safety increases at the same pace of technological advances, a deeper analysis shows instead that system sciences may help in seeing the quest for safety in safety-critical and dependable system far from being won. Surprisingly, technological advances do not help, taken alone, in taming safety-related complexity; rather they tend at exacerbating it. The paper claims therefore that a more comprehensive systemic view is needed. In the first part we review limitations of traditional accident models and show that they are not adequate for complex systems. In the second part we show how Systems Theory may help in understanding accidents as well as modeling and implementing safety in systems design. The third part deals with the specific notion of computer-based control, showing that state of the art state-based control may lead to never ending cycles or deadlocks which may interrupt dependable-systems control. Moreover, a sound notion of state semantics is still missing, meaning that both the current state of a computer controlled complex system and its evolution are not knowledgeable. A novel formalism for structuring subsystems as holonic subcomponents of reduced complexity is finally presented.

## **5) The Paradigm Shift in Energy Systems: the Evolving and Evolutive Role of Energy Service Companies (ESCO) in Italy**

(Luca Proietti, *University of Rome La Sapienza, Italy*)

**The Overview** – This paper analyses the complexity of energy issues and focuses on the Energy Service Companies, a particular kind of firm specialized into energetic efficiency and renewable energy production. ESCOs are quite innovative institutions in the European energy systems, especially in the Italian one. EU regulation of the ESCOs tends to promote the ESCOs as a relevant actor into the paradigmatic shift of national energy systems.

Thus, ESCOs can play a significant role in the transition from the traditional idea of the energy as a certainty/commodity to a more complex system, based on demand and supply co-evolution, distributed poly-generation, smart grids, multi-tier supply chains and networks, a gradual replacement of traditional energy sources with a mix of alternative energies, the development of new types of actors (like ESCOs). Moving from the current centralized and hierarchical global and national energy systems to new architectures more rooted on coordination among actors, both synergies and conflicts among actors are possible. The confidence in the individual capacity to quantify benefits of energy choices will be decisive, thus social processes at the community level will play a central role in the transition towards a more sustainable future and actors like ESCOs could affect them in order to improve change, innovation and awareness both in energy production and in energy consumption processes.

**Purpose** – The fundamental aims of the work are the following ones:

- 1) Are some very recent theoretical systems-based views (especially Viable Systems Approach or VSA, Service Dominant Logic or SDL and Service Science Manufacturing, Management and Engineering or SSME) useful frameworks for understanding both the complexity of energy issues and the role of ESCOs in this transition age?
- 2) Why and how general needs about energy services and ESCO's entrepreneurial purposes can coexist and synergically interact?
- 3) Which are the possibilities and criticalities of the distributed energy systems on energy efficiency, renewable energies and ESCOs services?
- 4) Which are the main features and strategic directions of the Italian ESCOs at the moment? Methodology/approach – A mix of deductive and inductive methods is used, as the paper includes:
  - a) a literature review regarding structural features and evolutionary patterns of energy production/- consumption and the systems-based theoretical perspectives mentioned above;
  - b) empirical data derived from an on field research about the Italian ESCOs.

**Findings** – The study shows some significant scientific and managerial findings: the importance of an integrated view based on SD-Logic, SSMED and VSA in supporting the evolving and evolutionary role of the Italian ESCOs; possibilities and problems in the transition to new energy scenarios; lights and shadows of the current situation of Italian ESCOs Research implications – On a scientific level, this work demonstrates that micro-economic and managerial studies, if well rooted on systems-based frameworks, offer a relevant contribution to description and explanation of the transition from the energy as a commodity to the energy as a complex and differentiated service. The paper also underlines relevant aspects about the new approaches to energy and about the ESCOs which may be more carefully considered by systems-based and managerial studies.

**Practical implications** – From a managerial point of view, an updated overview of the Italian ESCOs is outlined. The search for an adequate mix of technical/engineering and economic/managerial capabilities into the ESCO business is another important outcome of the study.

**Originality/value** – The most original aspect of the study are its topic (ESCOs and the paradigmatic shift of national energy systems) and the application of SD-Logic, SSMED and VSA, in an integrated way, to the energy industry and its radical transformation. So, this paper has not a marginal value under both a theoretical and an empirical perspective.

## **6) International Nuclear Energy Regulation: Facing the Challenge of Environment Protection**

(Mariarosalba Angrisani, *University of Naples Federico II, Italy*)

Nuclear power has inevitably created risks for the international community of States, as the recent Fukushima reactors accident have tragically shown to the world.

Every States - and obviously their environment - can be potentially affected by the event of a radioactive contamination as well as by long term health deceases due to radiation exposure.

Thus, the issue at stake nowadays is whether States should keep implementing their nuclear power policy, or alternatively shift their financial and scientific resources to develop safer ways to produce energy which may be “environment friendly”.

International Law is entitled to face these serious risks by assuring a stronger and detailed regulation and a more effective faceted oversight. An IL policy enhancing adequate provision for liability and compensation in cases of trans-boundary damages may however entail a policy of freedom limitations. Such a policy would then affect the sovereignty of States in

their own choices aiming at conducting research or hazardous activities on their own territory. Even though States themselves have been reluctant to endorse such activities, that can represent the only effective option to handle power control and self-standing production.

The study will then inquire into IL provisions and dynamics, in order to envisage a possible global, socio-legal framework for the international community to comply with to finally achieve an efficient balance between energy exploitation and environment protection.

# List of Abstracts

## panel 2

### **7) Philosophy and the emergence of an energetic education**

(Fausto Fraaisopi, *Albert Ludwigs University, Freiburg, Germany*)

In Energy is evidently not a philosophical problem. Nobody, in continental and analytical Philosophy means that such a fundamental argument have rights to be admitted in the Field of philosophical enquiries. Energetic problems determine our life, our ways of communication, our possibility of production and the ways of human developments but are not worthy enough to find place in philosophical discussion? This “nowhere” of philosophy show the limits of a non-interdisciplinary approach. In opposition to the classical and contemporary limitative approaches to energetic problems, a philosophical systemic point of view can integrate these problems to the fundamental discussion in Philosophy: epistemology, political philosophy, philosophy of history and philosophy of education. My paper gives a first approach from the point of view of philosophy (and complexity theory) to energetic problems and a first topography of the places that these problems can find in philosophical field. Energy is everywhere, and thought must fix its “manifestation” by a new system of thinking.

### **8) Universality and Emergence in Complex Systems**

(Licata I., Giuliani A., Modonesi C.M., Crosignani P., *ISEM, ISS, Univ. Parma, INT, Italy* )

The feeling of the reaching of a crucial turning point is shared by the whole spectrum of sciences. The main features of this turning point are basically identical across different disciplines and can be interpreted as a re-location of the most relevant level of explanation (and consequently intervention for more applicative fields) from the microscopic to the so called mesoscopic level. That is to say that the interest is shifted from the nature of the basic elements constituting the system into their mutual interactions. This allows for the foundation of a ‘general science’ no more constrained into strict disciplinary barriers.

In the year 2000, in their paper entitled ‘The Middle way’, appeared on the proceedings of the American academy of science, the Nobel laureate for physics Robert Laughlin and other eminent scientists set the scientific agenda for the XXI century. After three centuries in which the definitive (or at least the most complete) explanation of a natural phenomenon was identified by the construction of a causative model at the most microscopic level, scientists discovered that the place where the ‘most interesting’ things happen were not the ‘basic bricks’ but the level where the correlations between the fundamental structure and the global behaviour take place. Using an architectural metaphor, the authors tell us that we cannot discriminate between a Romanesque and a gothic cathedral neither at the level of the bricks composition (microscopic level) nor at the level of the general plan (macroscopic level), but we can efficiently perform this task taking into consideration the shape of arches, being the arch the mesoscopic level linking the microscopic (bricks) and macroscopic (plan) layers.

Far from being a purely philosophical and theoretical proposal, the article reports an impressive list of ‘mesoscopic approaches’ to different facts of nature demonstrating the impossibility to tackle these problems from a classical ‘back to the fundamentals’ approach.

The physicists were used to consider differential equations as the privileged form of expression for the scientific explanations: these dates back to the dawn of modern science in which each phenomenon was considered in terms of ‘motion’. Biologists, especially in these last four decades, are used to look at the world as a place where some microscopic agents (proteins, metabolites, hormones) interact by a ‘mutual recognition’ at specific molecular sites. These mutual recognitions, linearly arranged in subsequent steps give rise to ‘pathways’ that end up with a macroscopic (organism level) consequence. The above approaches are usually called as ‘reductionist’.

This point is central in shifting of both epistemological and methodological perspectives. The case of biological sciences is particularly eloquent because the approaches focused on processes rather than on structures changed the way we look at natural ‘objects’. For example, the relationship between genotype (G) and phenotype (P) based on the linear  $G \rightarrow P$  map must be considered misleading as well as the old-fashioned metaphor of genetic material as the ‘blueprint’ of living beings. As the new conception of the genotype-phenotype relationship suggested by the stochastic model of biological development has spread out in last decades, the idea of a biological system ‘caused’ by its molecular units (e.g. the genes) has lost any significance. A current effect of this transition is a radical reform of the neo-Darwinist theories in evolutionary biology and ecology.

An innovative conceptual framework has emerged from another way of giving birth to our questions, and consequently another way of shaping and checking our hypotheses about nature. Theoretical issues, fundamental research and applied strategies can talk each other bridging gaps between different ways of conceiving natural phenomena: a strong evidence that

it is not just a matter of the 'speculative' dimension of reality but of the 'material' dimension too. By focusing on what binds - in statistical terms - genes to populations, to ecosystems, to landscapes, even to human impact on planetary dynamics, we have the possibility to delineate a rational and non-deterministic nexus to understand the importance of Universality and Emergence in natural world.

In the mesoscopic approach both these old attitudes of physicists and biologists are replaced by a 'phase space' geometrical approach in which the system at hand is placed into a multidimensional space correspondent to its relevant features where it 'finds its way' by the minimization of some general 'energy' function. This space is far from being smooth and continuous, it can be equated to a mountain territory where peaks (correspondent to energy maxima) go hand in hand with deep valleys (energy minima) as a matter of fact these representations are named 'rugged landscapes' by scientists. Probably the most studied of such landscapes are those correspondent to the folding dynamics of proteins: the axes spanning these landscapes are suitable structural descriptors (distances between landmark aminoacid residues, contact matrix descriptors..) and the valleys correspond to stable configurations of the protein molecule. Other 'landscapes' are now emerging as for cell differentiation and development so allowing for a sort of biological 'statistical mechanics' to be envisaged.

As often is the case in the history of science this kind of representations are not totally new: thermodynamics made use of very similar diagrams since decades, anyone knows the so called 'triple point': that specific combination of pressure, volume, temperature (the axes of the phase space) in which water can simultaneously exist in the three liquid, gas and solid aggregation phases. An efficient phase space description of a given system depends heavily upon the choice of meaningful 'collective state descriptors' (such pressure, temperature and volume for thermodynamics) that could allow us to focus on the relevant emerging properties of the system at hand without being lost in a myriad of tiny (and globally not relevant) details.

In the case of ideal gases, in which the interactions between different particles can be considered as negligible, such collective descriptors arise as simple statistics over myriads of particles, in the case of biological entities, where the correlation between the constituent parts are far from being negligible, we need something different.

The description of phase spaces of complex systems needs to put emphasis on their correlation structure so pointing to multidimensional statistics as the main repository of both methods and explanatory concepts (cluster analysis, principal component analysis, multidimensional scaling).

In this realm Universality and Emergence becomes the two basic pillars of modelling efforts. The universal character of the explanations stems directly from the purely syntactical nature of multidimensional statistics, e.g. the increasing in mutual correlation between the variables defining a system is a general (universal) property of any system when subjected to a stress acting as order parameter, being it a pine forest exposed to a pollution source or a fibrillating heart [9]. Emergence in turn is directly connected to the 'data driven' character of multidimensional data analysis in which mathematics comes 'after' (and not before as in classical differential equation style of modelling) data collection.

Networks in which the nodes are the basic elements of the system and the edges their mutual (experimentally computed) correlation are the most common way in which systems are represented in the mesoscopic approach. This allows for the simultaneous generation of descriptors at different scale levels by means of graph theory so we will have global network descriptors as clustering coefficient, degree distribution, assortativity, modularity, as well as, single node, single edge descriptors as the 'hubness' or 'connectiveness' character of each single network element.

Even if the consideration of correlated systems will need some non trivial theoretical efforts in terms of probabilization (small world nets and power laws as efficacious "devices" to manage both robustness and flexibility), we must admit (with a great joy) that here we are dealing with very intuitive and formally simple mathematical methods that, for the first time after more than one century, hold the promise to be manageable by scientists trained in different disciplines so holding promise for a recovery of integration of science after very sad decades of extreme specialization.

All in all complex systems ask for simple mathematics. They are just universality and emergence which act as protection laws on the details of a system and make possible such new kind of simplicity.

## **9) Beyond the age of coal and oil? Accumulation Treadmill, Urban Dynamics and Roadmaps for Development**

(Alfredo Augustoni, *University D'Annunzio, Italy*)

Walter Benjamin describes with extreme subtlety and sociological imagination the "XIX Century Capital Town", i.e. the capital town of a century where industrial production and capitalist economy are emerging within a world feeding itself by coal: Paris can actually be considered, from a cultural and political point of view, the capital town of this century, such as, on the other side, Manchester, vanguard of "classical" industrial capitalism, such as of all connected ideologies. In the late XIX century, as Anselm Strauss and Marco d'Eramo perceive by their completely different analysis, Chicago appear to be the capital town of the forthcoming century: that means of a century characterized by the coming of an organizational capitalism, by the development of great corporations, often with a multinational organization, from the growth of mass consumptions and an increasing permeation of economy and politics, with several utopic and critical ideological

elaborations accompanying these phenomena (this brings a keen observer of her time, Hannah Arendt, to foresee a parallel and complementary process of accumulation of the economic capital and of political power). As Manchester anticipates the model of the classic industrial town, Chicago anticipates several patterns of XX century (urban sprawl ...). Then, we consider the rise and fall of post war capitalism, with particular attention to relations between space, society, technology, environmental and energetic resources, also towards a critical analysis of concerning scientific production.

## 10) GREEN ECONOMY AND GREEN SOCIETY

(Giorgio Carlo Cappello, *University of Catania, Italy*)

A green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities - United Nations Environment Programme (UNEP) (2010). A green economy is a economy or economic development model based on sustainable development and a knowledge of ecological economics. Its most distinguishing feature from prior economic regimes is direct valuation of natural capital and nature's services as having economics value (see TEEB and Bank of Natural Capital) and a full cost accounting regime in which costs externalized onto society via ecosystems are reliably traced back to, and accounted for as liabilities of, the entity that does the harm or neglects an asset. A green economics loosely defined is any theory of economics by which an economy is considered to be component of the ecosystem in which it resides (after Lynn Margulis). A holistic approach to the subject is typical, such that economic ideas are commingled with any number of other subjects, depending on the particular theorist. Proponents of feminism, postmodernism, the ecology movement, peace movement, Green politics, green anarchism and anti-globalization movement have used the term to describe very different ideas, all external to some equally ill-defined "mainstream" economics. The use of the term is further ambiguated by the political distinction of Green parties which are formally organized and claim the capital-G "Green" term as a unique and distinguishing mark. It is thus preferable to refer to a loose school of "green economists" who generally advocate shifts towards a green economy, biomimicry and a fuller accounting for biodiversity. (see TEEB especially for current authoritative international work towards these goals and Bank of Natural Capital for a layman's presentation of these.) Some economists view green economics as a branch or subfield of more established schools. For instance, as classical economics where the traditional land is generalized to natural capital and has some attributes in common with labor (providing nature's services to man) and physical capital (since natural capital assets like rivers directly substitute for man-made ones such as canals). Or, as Marxist economics with nature represented as a form of lumpenproletariat, an exploited base of non-human workers providing surplus value to the human economy. Or as a branch of neoclassical economics in which the price of life for developing vs. developed nations is held steady at a ratio reflecting a balance of power and that of non-human life is very low. An increasing consensus around the ideas of nature's services, natural capital, full cost accounting and interspecies ethics could blur distinctions between the schools and redefine them all as variations of green economics. As of 2010 the Bretton Woods institutions (notably the World Bank and IMF (via its Green Fund initiative) responsible for global monetary policy have stated a clear intention to move towards biodiversity valuation and a more official and universal biodiversity finance. Taking these into account targeting not less but radically zero emission and waste is what is promoted by the Zero Emissions Research and Initiatives.

Karl Burkart defines a green economy as based on six main sector:

- Renewable energy (solar, wind, geothermal, marine including wave, biogas, and fuel cell)
- Green buildings (green retrofits for energy and water efficiency, residential and commercial assessment; green products and materials, and LEED construction)
- Clean transportation (alternative fuels, public transit, hybrid and electric vehicles, carsharing and carpooling programs)
- Water management (Water reclamation, greywater and rainwater systems, low-water landscaping, water purification, stormwater management)
- Waste management (recycling, municipal solid waste salvage, brownfield land remediation, Superfund cleanup, sustainable packaging)
- Land management (organic agriculture, habitat conservation and restoration; urban forestry and parks, reforestation and afforestation and soil stabilization)

Three circles enclosed within one another showing how both economy and society are subsets of our planetary ecological system. This view is useful for correcting the misconception, sometimes drawn from the previous "three pillars" diagram that portions of social and economic systems can exist independently from the environment.

The Global Citizens Center, led by Kevin Danaher, defines green economy in terms of a "triple bottom line," an economy concerned with being:

1. Environmentally sustainable, based on the belief that our biosphere is a closed system with finite resources and a limited capacity for self-regulation and self-renewal. We depend on the earth's natural resources, and therefore we must create an economic system that respects the integrity of ecosystems and ensures the resilience of life supporting systems.

2. Socially just, based on the belief that culture and human dignity are precious resources that, like our natural resources, require responsible stewardship to avoid their depletion. We must create a vibrant economic system that ensures all people have access to a decent standard of living and full opportunities for personal and social development.

3. Locally rooted, based on the belief that an authentic connection to place is the essential pre-condition to sustainability and justice. The Green Economy is a global aggregate of individual communities meeting the needs of its citizens through the responsible, local production and exchange of goods and services.

This one aim of this paper to investigate more and more about new perspective for a green society and any green job. That's all right now.

## **11) A Systemic Methodology to Improve Workplace Performance for Disabled Peoples: a Taxonomy Progressive Systemic Skills**

(Magno M., Attainese E., Duca G., *Univ. Federico II, GnoSys, Italy*)

Many aspects involved in this analysis, are methodologically related to: psychology, ergonomics, theory of the control, equipment, juridical, economic and risk in a disability workplace. It has been possible to take into account those aspects, even if sometimes they are complex, in the determination of the space of the decisions by the Systemic. This discipline studies the systems and focus on the model rather than on the objective and analytic aspects. This one could make less impervia the understanding of multidimensional and multidisciplinary phenomena spotting on the finality and meta-finality. Under these assumptions, subjective feelings of human beings have started to be processed by a multidimensional objective projective geometrical approach. In this frame, nearly all must be done. As far as we know, subjective descriptions have not yet been before correlated with objective ones in order to link both subjective and objective descriptions of physical systems related to the disability workplace. On the basis of ergonomic approach, the definition of a multidimensional space in its apparent aspects taking into account the changes in characteristic due to the observers' positions and the objectives constrains. In other terms, this research aims at reducing the apparent incoherence which seems sometimes to exist between objective and subjective vision of human skills, consequently providing an empowering tool for any kind of personal characteristic.

Interdisciplinary and multidisciplinary aspect

Merging different discipline: Geometry, Logic, Statistics, Decision Theory, Multi Utility Theory Decision, physiology, Systemic, Science of the Communication. Working in risk areas considered up to now as being excluded from the objective area: in this frame research would aim to built a bridge between objective and subjective sciences, between Statistic-Mathematic and Systemic, and would open the way of quantifying aspects which could just be assessed qualitatively up to now on one hand and create systemic model on quantified problem on the other hand.

Benefits for employers and employees cover a wide range of human resources related aspects, such as:

- The company discover its useful positions • The company through this diagnostic is aware of the technological gap to be achieved by the integration and the facilitation statute.
- Taxonomy Progressive Systemic Skills
- Cataloguing skills for positive characteristics
- Integration of systemic complex synergies in order to finalize the job
- Clarity of the technical parameters of an addition to the disability as a function of its task and complexity
- Clear exposure of factors complementing the training and professional integration of unskillful

## **12) Where to look at when health system is talking about an invisible disease?**

### **Knowledge arrangements of life experience and women body in chronic pain. A psychosocial systemic response to biomedical reflection**

(Pujal Llombart M., Mora Malo E., Maestres Useche C. B., *UAB, Spain*)

Featuring preliminary conclusions of a survey concerning the relationship between knowledge arrangements of social life experience and the contemporary women suffering of chronic pain, our aim in this paper is to contest the biomedical fibromyalgia diagnostic, drawing a psychosocial hypothesis based on Luhmann's approaches on "sense living". Understanding societies based on knowledge as the "building a reflected sense of social life", individual human life experience or "sense living" must be understood in correspondence, as a structural coupling engagement in which, "the self, is the psychological dimension of this relationship. Therefore, "the fatal psycho social triangle embedding women in chronic pain" (non stopping routinized working bodies, genderized souls and a strict ruled self or an absence of an "all encompassing self entity"), can be understood as the structured mirror glances correspondences of social structures. That is to say, as the individual side of the structural coupling relationship between psychic and social systems. In this sense, chronic pain may be hypothesized in terms of a functional equivalent of the self, in processing and integrating social

differentiation, so to speak, complexity. Seen in terms of semantics, knowledge arrangements of social sense, for instances, mechanization, bureaucratization, genderization, marketization, medicalization, transforms simultaneity of experience into a temporality one, a redundant and/or a loss of sense is the matter to be processed either by the self or perhaps the matter that is been processed by pain in women bodies. Thus, a closer look to the 40 woman life experience we are currently analyzing, led us in this paper to focus on those semantic or knowledge arrangements of life experience implicated in generating the specific problematic they are dealing with, when managing incompatible and incommensurable temporalities. For example, temps of equality, gender tradition and inequality, health care protocols and so on.

Our conclusions in this paper constitute a guide about where to look at when we are talking about women body in chronic pain? Biomedical knowledge stopped looking for answers to this question, paradoxically, when the "fibromialgia" term was coined just to describe something that cannot be seen, either by its episteme or by its visual technologies and diagnostic techniques.

### **13) Dynamic cyclic structures, spatial-temporal differentiation and cooperative reciprocity in the biological and economic systems.**

(Hana Zemanova, *University of West Bohemia Pilsen, Czech Republic*)

Any sustainable system works much like a biological organism. How these factors are automatically reflected in the organization of biological systems and economic systems? What laws should copy the model of a sustainable economic system of biological systems? After much research, physicists have discovered that a functioning living organisms carry out work. The Living systems are extremely complex compared to the organic material, which consists of the rest of the universe. The Living systems are energy converters that use the information.

1. work performance
2. converting one form to another job
3. The transfer of energy information.

Human economic systems collapse, as power is transferred to the wrong information. Economists' world revolve money. The circulation of money can be well compared to the flow of energy in living systems. In biochemistry textbook even for universal carrier ATP adenosine triphosphate) using modern parable "energy currency". Money, however, are not equivalent energy.

Given that the economic system must be connected to the ecosystem ...and the ecosystem input-dependent parameters reflect the deterioration in the entropy of the ecosystem, there are feedback in the economic system.

Misery can be considered as absolute. There is a finite optimum speed, which can be used to transform and resources. Poverty is a threat to the survival of the system as a whole. Money is a source of energy and entropy. Vote for real wealth of nations is unreliable (mobilized energy sources), the gross national product, by the amount of expenditure on goods and services by different sectors of the economy...

Efficient energy converters, such as the steam engine, or a cell carrying out photosynthesis, are structurally organized to maximize the output of useful work - "W" power - output "Q". Structural organization "I" provides an information input, which modulates the information output. The work "W" which results in the reduction of entropy, "useful" work W must be a function of the information "I" input.

Neoclassical economic theory all derived from non-physical parameters / priorities, technology, income distribution / physical limitations quietly ignored ...Given that the economic system must be connected to the ecosystem ...and the ecosystem input-dependent parameters reflect the deterioration in the entropy of the ecosystem, there are feedbacks in the economic system.

# List of Abstracts

## panel 3

### **14) Project Finance in Energy Industry: an Integrated Approach to Credit Risk Assessment**

(Enzo Scannella, *University of Palermo, Italy*)

Project finance has emerged as a leading way to finance large projects in energy industry.

The basic characteristic of project finance is that lenders loan money for the development of a project solely based on the specific project's risks and future cash flows. This highlights a key feature of project finance due to the capacity to generate cash flows to ensure the repayment of loans and adequate returns on equity capital. A revenue stream from the project large enough is a prerequisite for project financing.

The paper aims to assess the drivers of credit risk in project finance. Credit risk is one of the risks to which the project lenders are exposed. In particular, the proposed paper aims to analyse some critical issues related to credit risk assessment by lending banks. It is particularly complex to evaluate credit risk because of large infrastructure projects in energy industry, large sums of capital required to finance energy projects, new technologies involved, complex project agreements, legal and contractual structures, state-level regulation and tax treatment.

The creditworthiness of the project is a fundamental structural component that characterizes any project finance transaction. It has a huge impact not only on borrowing costs, lending contracts, capital raising, and project feasibility, but also on project marketability, contractual commitments, structures of investments, guarantees, and private-public partnerships.

The credit risk assessment of project finance will determine whether lenders view the project as financeable. Energy projects usually require a long time period to execute and obtain a return on investment. This critical aspect requires the identification of appropriate investors and adequate financial structures of energy projects..

### **15) Systems theory's support for designing a viable energy agenda – The contributes deriving from the Viable Systems Approach**

(Polese F., Carrubbo L., *University of Cassino, Italy*)

Purpose – Energy is a complex issue to deal with, and the paper's purpose is to decline a systems theory reflections capable of interpreting complex phenomena in order to better design and manage future energy agendas. Achieving an efficient matching of energy demand and supply needs introducing a market mechanism for the allocation and pricing of energy resources that especially takes the specific requirements of energy producers and consumers into account. Moreover, many other actors ought to be taken into considerations; among these for certain all world population and future generations. It seems that energy is a socio-economic topic that needs to be approached with network and complexity theories due to the number of interested parties and the numerous perspectives with which it can be viewed and analyzed. Furthermore, Smart Energy Grid requires continuous improvement in the interactions among network elements in order to optimizing resource allocation, collaborative advantages and cooperative strategies (Castells, 1996; Gulati, 1998; Capra, 2002), indeed for the systemic equilibrium within the complex service systems related the energy services provision.

The paper suggests that the Viable Systems Approach (VSA), a methodological key based on system theory and relationships, useful for the interpretation of complex phenomena, might be promising to support world community discussion upon energy.

VSA, in fact, focuses on the analysis of relationships among socio-economic actors in search of viable interacting conditions (Golinelli, 2000, 2005; Golinelli et al., 2001; Barile, 2000), and this may support the valorisation of all interested parties expectations, giving voice to all the actors interested in the energy topic.

Methodology/approach – This papers is a conceptual analysis of the Viable Systems Approach, trying to direct it to the analysis of the global energy agenda.

Findings – In 2011 we can easily assume that energy management and sustainable development are two of the most challenging and important issues we are about to face in the new millennium. Issues that may affect the length and quality of human life in the world. Despite their relevance, and the fact that many actors (participants involved in energy system processes enhancement) are struggling to find shared politics and strategies to deal with energy production/consumption, as well as with a sustainable development of human socio-economic activities, more efforts need to be placed. Researchers, politicians and opinion leaders, in fact, cannot easily find a solution to such complex phenomena. Energy is a complex issue due to the multiple actors involved in its production, transportation, consumption, management. It is complex for the related

continuous technical innovation, for the balance that needs to be reached among renewable energy sources, for the shortage of traditional energy sources such as gas and petroleum. To carry out an efficient plan of activities we have to reach the elements for a better Energy Agenda. We need a long-term goal to shape a scientific and policy agenda aimed at smart, sustainable and inclusive growth. The priority goals in the agenda have to be oriented to rationalize consumption, diversify the energy portfolio, reduce emissions of greenhouse gases and increase energy efficiency. Future EU measures will be implemented through appropriate legislative instruments, including a legislative proposal encompassing revision of the existing Energy Services and Combined Heat and Power Directives, focusing on the establishment and functioning of the internal market, securing

EU energy supplies, energy efficiency and renewable, reticular interconnection energy networks. The renewable generations in the grid could be reachable with the distributed energy storages and advanced communication network. Accommodating renewable power needs managing the increased volatility of electricity supply achievable, by implementing Demand-Side-Management (DSM). DSM seeks to reduce electricity demand or shift it to times that better suit supply. Consumers can be provided with the necessary information to better manage their use. Reaching an active and flexible management requires devices able to communicate in real time, as smart meters and electronic box, using intelligent two-way communication between intelligent agents located on the grid. In order to design and manage future energy agendas the VSA can be analyzed in order to decline opportunities and constraints expressed by the involved actors, looking for wise decision making and sustainable (viable) behavior of producers, consumers, politicians, researchers and so on. This may be accomplished since the VSA, based upon ten fundamental concepts (FCs) (Barile and Polese, 2010) introduces the issues such as: systems; systems hierarchy; reductionism and holism; systems' boundaries; autopoiesis, homeostasis, and self-regulation; structures and systems; Consonance and resonance; system viability; adaptation; complexity and decision-making. All these seems to fit with energy and able to support the related system critical deepening.

Research implications – VSA supports energy research and to support energy decision makers, policy makers and opinion leaders since the scientific proposal is able to analyze and manage complexity and the role of many actors (also including ending users), naturally involved in co creation exchanges characterizing energy production and consumption. The VSA, being it a scientific proposal based on systems theory and synthesizing several interdisciplinary contributes, with its 10 Fundamental Concepts represents interesting insights for this purpose.

Practical implications – The paper helps practitioners to better plan an energy agenda and business strategy aimed to align energy theory and practice with real sustainable world characterizing our future generations.

Originality/value – The paper suggests that increasing complexity of modern energy system can be analyzed from a managerial perspective for the creation of value within and among service systems, for a business as a network of relational service activities.

## **16) Financial Risk Management: a systemic approach to the global economic relations. Why complexity makes periodical financial crisis unavoidable and produces permanent social risk**

*(Michele Infante, Jhon Cabot University, Rome, Italy)*

The relation within financial system between policymakers, international institutions and banks are nothing fundamentally new. The recent financial crisis has strikingly illustrated the interconnectedness that characterizes the global financial system and the market as a network of financial agents. However, the financial institutions over the last 20 years and financial innovations have made the system much more interconnected, complex and opaque than it was in the past. If George Simmel stated «money is the spider that spins society's web» (The Philosophy of Money, 1986), we can investigate the money as an immaterial social resource in a systemic approach. Simmel pointed to the network aspect of money, how financial innovation can transform the economy and society; and the transformation process as changes in the complexity, size and nature of economic and societal networks. In this paper, I want to present the recent advances in modeling systemic risk using network analysis, and try to apply the analysis of systemic risk to the financial sectors. While the systemic stability is a public good, the impact of systemic risk depends very much on the collective behavior of financial institutions and their interconnectedness. In some extend, the systemic risk is, generally, outside the control of each individual institution (banks). In conclusion, I would provide a framework for strengthening financial stability, strategies and decisions patterns for the policy-makers. My goal is not only refining the regulatory and institutional set-up, but also looking for new analytical tools that help to better identify, monitor and address sources of systemic risk.

## 17) Time factor in decision making between tendencies and ambitions

(Barile S., Calabrese M., Iandolo F., *University of Rome La Sapienza, Italy*)

### PREMISE AND PURPOSE

The function of managers is to make decisions, while his role is to supervise the correct declination of the choices in his specific context. By analogy, you can think of the hands, whose function is to grasp and only subsequently carry out specific roles: writing, drawing, ironing, etc. In order to adequately perform the function of decision making, the decision makers must have an appropriate information variety (Barile, 2009). Well-established literature includes several patterns and techniques that only concern routine, structured, quantitative and deliberate decisions; scientists have shown little concern for unstructured decisions, the intuitive and abductive ones. This paper aims to study these two kinds of decisions: in the first part we will consider the literature of rational, deductive and inductive processes, while, in the second one we will analyze non-rational, intuitive, and abductive decisions. The term rational is used with reference to those management activities that are essentially based on the experience and behavior implemented in the past, whilst irrationality and non-rationality don't concern the complex government decisions, that are based on the absence of well-known procedures to follow. On the base of these assertions and, above all, starting from the self-evident conception that the past has an influence on the decision-making process, in what follows we propose to consider the possibility that future could affect the modus operandi of the individuals. You could say that our task is to discover the rationality of what does not respond to rationality (Simon, 1987).

### METHODOLOGICAL APPROACH

In order to achieve the ambitious aims of the work, while remaining strongly anchored to managerial studies, we have to tap into several disciplines that compose the human knowledge: philosophy (Aristotle, Cross, Eccles, Hofstadter, Kuhn, Korzybsky, Masullo, Peirce, Popper) physics (Feynman, Beauregard, Bohm, Wheeler, Wigner), mathematics (Fantappiè, King, Poincare), cybernetics (Ashby, Wiener) psychology (Bateson, Damasio, Erickson, Maslow, Mynsky), management (Barile, Barnard, Beer, Bodganov, Drucker, Golinelli, Fazzi, Kahneman, Saraceno). The contribution starts from a brief discussion of Chester Barnard's theory that, in his book "Functions of the Executive", distinguishes between logical processes (the conscious thought that would be expressed in words or other symbols, ie, reasoning) and non-logical processes (which cannot be expressed in words or by reasoning that simply express an opinion, a decision. This may be due either to the fact that processes are unconscious or because they are so complex and so rapid, often almost instantaneous, that they could not be analyzed by the person in whose brains they are made). Later, in Italy, two Maestri linger over this theme, distinguishing between "government" and "administration" (Fazzi) and between "strategic decisions" and "operative decisions" (Saraceno). Recent studies, in viable-system perspective, following the identification of an area of government and one of administration, permit to better explain the notions of decision making and problem solving. Then we will analyze how the notions of supercausality, retrocausality and syntropy could help to theorize and, therefore, to rationalize interesting new perspectives, allowing the emergence of a new paradigm on managerial decisions.

### EXPECTED RESULTS

It is generally believed that management requires a high degree of analytical reasoning, and that great managers are usually professionals who have dedicated many years to acquire their skills and their interpretation schemes. However, when a manager is asked on how he can easily untangle the complex contexts, the answer is that winning decisions are based on intuition and on the ability to envision a future, potential scenario. If we accept that there can be the ability to strategically anticipate an action, generating an abduction, we are dealing with syntropic phenomena that, in managerial sciences, represent the embodiment of desire. As an example, think of the will to launch a new product; before the marketing idea becomes a reasoning, a strategy, a written plan, it is necessary that this desire is embedded in the mind of the decision-maker. The fact that the governing body had planned in some way to launch a new product is due to its ability to imagine the potential effects related to the introduction of the new product. Therefore, emphasis is put on the decision-maker's ability to prefigure the existence of the firm seen as a viable system through desire and planning (principle of free will). Prefiguring future, that certainly becomes difficult at the micro level, at a macro level has always characterized human action even though it has never been emphasized in social studies. The will to include new products in a commercial offer, generates an anticipate causation through all the actions that are implemented, so that the desire can become a reality; in other words, you create the basis so that what is desired doesn't remain an abstract utopia. The work is intended to provide, after detailing the notions of supercausality, cyclicity (aiòn), syntropy and non-linearity (krònos) of time, a procedure that can overcome firm criticalities, through a response that looks at the past and future. At the past in order to make a diagnosis of the actions that led to the existing situation; at the future in order to find a path that allows you to overcome it. Besides, "we all have our time machines: those that call us back, called memories, and those that drive us forward, called dreams" (Jeremy Irons, *The Time Machine*).

## **18) COMPLEXITY AND DECISION MAKING. IMPLICATIONS FOR MARKETING**

(Di Nauta P., Polese F. Saviano M., *Univ. of Foggia, Cassino, Salerno, Italy*)

**Purpose** – The purpose of the paper is to analyze how marketing approach is changing and should change as a consequence of the conditions of growing complexity that characterize decision making contexts. In particular, focus is on the shift from a traditional dominant logic structure to emerging -dominant logic systems.

**Methodology** – Conceptual analysis based on complexity theory and decision making, attempting to relate these scientific proposals with new developments in emerging Service paradigm sciences – Service Dominant Logic, Service Science Management and Engineering –network and systems theories – Many-to-Many Logic and Viable Systems Approach.

**Findings** – There are many areas of knowledge that the research community on Complexity should consider to better understand social systems in complex contexts, government and management of relationships and interactions, and marketing processes.

A model of synthesis is devised to represent the emerging marketing paradigm as a result of a change in perspective from a structure to a systems approach. On the basis of the ‘big picture’ for the understanding of social systems behavior in complex contexts, an innovative viable systems marketing framework is proposed for an effective management of relationships and interaction governance approach in complex decision making contexts.

**Expected Results** – Many contributions have focused on the service sciences paradigm, network and systems theories, highlighting the significant integration among these scientific proposals. This paper is written with the intention to give a further contribution, closely analyzing complexity and decision making. One of the main expected results is to draw the attention of both business scholars and operators on the necessity to change perspective in the marketing approach. Such, based on the adoption of the systems interpretation scheme as a general reference framework for the emerging service and network paradigms, highlighting the relevant implications of an innovative interpretation of decision making in complexity contexts.

The paper also suggests the integration of the research efforts of different communities on the basis of common roots in systems thinking.

## **19) Supercausality, consciousness and managerial decisions**

(Sergio Barile, *University of Rome La Sapienza, Italy*)

**Introduction and aim**

The fact that past events influence our choices is accepted and shared in the current epistemological paradigm. But is it correct to assume that future events may affect the choices we make today?

In the research track of exact sciences, this matter has been debated for a long time. Physicists John Wheeler and Richard Feynman, with their “theory of the receiver”, describe a radioactive process as a “transaction”, in which the emitter and the recipient of the radiation exchange waves: the emitter sends a wave called “delayed” to the receiver, and simultaneously the receiver returns a wave called “anticipated” that, traveling in a negative time direction (that is to say from future to past), reaches the emitter.

Some philosophers believe that reverse causality (the assumption that the future can influence the present), is a reasonable opinion provided that our preconceived ideas of causality are removed. Huw Price, an Australian philosopher, believes that the current conception of causality, asymmetric with respect to time, follows from the fact that it is strongly conditioned by a ‘popular’ knowledge of causality influenced by established theories of physics, which in turn are built starting from a universally accepted framework which states that time travels in one direction only and, therefore, the future cannot influence the past.

In managerial subjects, and more generally in social sciences, the problem does not exist. The established paradigm not only admits anticipated causality, but basically, with the concept of ‘strategy’, it formalizes the possibility that, within an organization, the decision maker may be prejudging future scenarios on which to proceed to make government choices. It is obvious that any foreshadowing, or more correctly, any strategic framework is to be implemented on the basis of considerations related to the context in which the planning is to be developed, and then, to the historicized events and relevant factors assessed at that time. However, it is indisputable that the actions taken by management are strongly influenced by the foreshadowing of the assumptions made. The human decision maker anticipates in his own mind the future context, and acts according to it. In particular, no theory of the firm could exist if undocked from the forecast logic. On the basis of the above mentioned, it becomes meaningful and important to assess whether there is a possibility, using the studies and research related to the concept of “supercausality”, to address the managerial actions through a methodology of analysis, identification, and implementation of scenarios that may have greater success potential.

**Methodology**

The purpose of the work necessarily relate to interdisciplinary conceptualizations. First, it is necessary to retrieve, albeit in the form of discourse, the debate in physics (Feynman, Beauregard, Bohm, Wheeler, Wigner), as in mathematics (Fantappiè, King, Poincare), that refers to the problems of supercausality, delayed causation, anticipated potentials,

syntropy, time reversal, and so on. Then, it will be necessary to consider the problems of complex decision making, and therefore, issues related to the subjective nature of the decision (Viable Systems Approach - VSA), to the impossibility to act on established patterns (conditions of non-linearity), and to the different importance given to rational and emotional inferences on the basis of problem-solving issues instead of decision making (Bateson, Damasio, Erickson). It is also essential to address all the matters to the decision making methodologies in management science. The consolidated managerial guidance identifies, in the availability of appropriate information systems, one of the key success factors. The ability to clearly understand the context (defined as the environment [structure] filtered by the decision maker) allows to improve the quality of the decision that can be made by constructing a model able to envisage the evolutionary dynamics of the context in which the organization operates, in order to allow the transposition of the intended goals, in behaviors aiming at their achievement. The set of analyzed positions and conceptual references allow to formulate innovative hypotheses for the approach to managerial decisions, introducing further elements, so far neglected, that should be taken into account.

Expected results

The objective of this contribution is to possibly redefine the approach of environment analysis, also in a subjective perspective, as already argued in the Viable Systems Approach, the introduction of the constraint conditions, and the causation factors of elements comparable to “anticipated potentials”. Following more detailed concepts of back-causation, supercausality and syntropy, and having briefly examined the canonical structure of a business information system, resulting in a descriptive and predictive modeling process useful to the managerial decision, a reconfiguration of the complete decision making process will be achieved. The work aims at developing, through a logical deduction criterion, the hypothesis of an operating procedure, capable of including the “anticipated potentials” resulting from a perspective purpose, useful to support the decision maker in complex contexts. Though, ultimate hypotheses have not been provided, management theorists have noticed the inadequacy of consolidated procedures for quite some time.

## **20) Solutions, ICT platforms, services and go-to-market model for technology operators in the energy sector**

(Marco Ghisi, *Selex – Elsig Datamat- Finmeccanica, Italy*)

Recognizing that global trends are creating flux in traditional Energy markets, Selex Elsig has launched its own study (developed in collaboration with the University of Genoa) of macro influences on its future business base and of ways in which it might respond via the resources at its disposal.

The macro-external trends to keep in mind include: demographic growth, an increasingly intensive global carbon economy, urbanization, mobility, security, information and scarcity of energy, water and natural resources.

The key question is how these emerging requirements are driving technology operators in the implementation of innovative solutions for the customers by making available new technologies and programs that will reduce energy consumption and improve electrical system performance

From the technology side, this work addresses the need of achieving higher energy efficiency and consumption reduction through innovative approach partially based on embedded systems.

The main goal is:

- To enable efficient utilization of energy granting a good level of perceived comfort and operations by means of embedded intelligence and integration technologies.
- To Cooperate to optimize energy distribution, minimum of flow transfer and enhance network secure operations

Application relevance focuses on two market sectors: 1. residential and non-residential buildings and 2. domestic electronics and appliances, by providing seamless interoperation and exchange of information among these appliances and an interface to connect the building as a Cell in the urban network. Therefore it is possible to provide energy management and optimization beyond “device level efficiency” and it is realistic to help the energy distribution provider to maintain secure operation without exploiting more generation reserve at far sites.

The concept is to achieve the best economical benefits to End User by efficiently usage of energy and by interacting with the market both to get as primary scope cost-effective supplies and optimally trade energy . The secondary scope is the have the capability to interact with smart grids scenario and be a smart actor as a generation/load point of the grid.

By Addressing the business aspects and starting from the consideration that energy is an important asset on which is possible to save money, the study try to identify different scenarios to offer End User economic advantages, for example using "flexible" contract; this contract defines the ability to reduce or increase the consumption for a certain amount and for a certain period of time and at a certain price (on the basis of available information - contracts, estimates of the cost of energy - typical profile of users).

# List of Abstracts

## panel 4

### **21) Normative ambiguity and social and economic development: the case of China**

(Simone D'Alessandro, *G. D'Annunzio University, Italy*)

Is China a mature capitalist country or a “primitive commercial society” in which industries of excellence live side by side with archaic systems, where competition is unbridled and rights are absent? This essay uses both a systemic (Luhmann, 1984) and relational (Donati, 1991) approach and reaches the conclusion that the “dragon’s” great leap arose from:

- a transitional political and economic phase that was supported by a “dual-track” economy;
- a political control of the economy which saw rule by law rather than the rule of law;
- a normative ambiguity/flexibility/tolerance that was in some cases officially premeditated and at other times was the result of a community-based and relational reaction of defense against the system; on yet other occasions it may be considered an “inevitable effect” of the excessive pace imposed by the economic development.

The situation is not one of strategically governed Legal Tolerance used to encourage development, but rather a situation of “De-regulation” that is managed only on occasion and is accompanied by a revving up of the economy that led to social and environmental imbalances. China’s normative ambiguity formed the back-drop to a political and economic system that made the nation’s rebirth possible. In addition to this ambiguity, there is a view of the world whereby it is the family and community that acts and where the relationship between the public and private spheres is reversed compared to western concepts. This *weltanschauung* accelerated the country’s economic development by permitting the socialist and the business economies to work together. This contrasts with Marramao’s thesis regarding the Westernization of the world: the facts show that the Chinese model has been exported from the East to the West. There has been a change in the relationship between the public and private spheres that has brought a move towards a hybrid and “analogical” model where the dichotomies between lib/lab, state/market, democracy/state intervention, collaboration/competition or merit/cooptation disappear, or fade into one another to form an “analogical” continuum. In certain areas, the fast-moving changes and violent evolution of a great a number of phenomena lead to massive shifts, both as regards figures and people: it is the pressing on of development that creates voids in the legal system and not the opposite. Legal Tolerance that is both planned and managed according to development needs can only really be present in certain niche sectors, such as biotechnology.

### **22) COMPLEXITY IN CO-ORDINATED PUBLIC POLICY MAKING TO SUPPORT THE SUSTAINABLE GROWTH OF SMALL-MEDIUM ENTERPRISES IN INDONESIA: A SYSTEM DYNAMICS APPROACH**

(Athor Subroto, *University of Indonesia, Indonesia*)

#### Objectives

The current data from the Central Bureau of Statistics of Indonesia (BPS) regarding the number of small, medium enterprises (SMEs) and large enterprises (LEs) in Indonesia from year 1999 until 2008 indeed demonstrated a dynamic behavior is so called ‘overshoot and collapse’. Policies concerned to the development of SMEs in Indonesia are undertaken in parallel by some ministerial department (horizontally) and by different department levels from national to local (vertically). Complexity is rising while the need of the orchestra to play the same music in a harmony is rising. Thus, the paper has objectives to discuss such complexity from the policy cycle point of view in order to generate a coordinated public policy and to raise some point of policy levers in order to avoid such overshoot and collapse behavior and to support a sustainable development of SMEs.

#### Methodology

System dynamics approach is applied to understand the behavior. Some relevant variables included in the simulation model are potential demand, aggregate demand, and quantity of SMEs and LEs. Modular systems excavated from policy cycle were attached to the generic system that has generated overshoot and collapse behavior, in order to explore the complexity of the system and eventually to minimize or even avoid the rapid decreasing number of SMEs in stock.

#### Preliminary findings

Simulation conducted in this paper has been able to show some critical points at which might be useful for the public decision makers to make their decision more robust and minimizing the unintended result and feedback. Some of these points are mass media’s role, boundary spanner’s role and public governance. In particular, from the business technicality, I underlined the use of a production coordination system and a financing mechanism for SMEs in order to keep the number of SMEs to grow instead of “collapse”.

Potential contributions to the literature

This paper re-emphasizes the use of production coordination to support positive growth number of SMEs especially to prevent collapse after experiencing overshoot growth and proposes a financing mechanism to prevent SMEs from the operational failure. This paper also supports the practice roles of the boundary spanners in the free mass media and public governance environment.

### **23) THE REBOUND EFFECT IN THE LIGHT OF NETWORK THEORY**

(Ruzzenenti F., Picciolo F., Basosi R., *University of Siena, Italy*)

The present paper aims at tackling the Rebound Effect under network theory's perspective. RE is a phenomenon that has received an increasing attention in the last decade, as it poses serious threats to the goal of reducing energy consumption and thereby greenhouse's emissions, by increasing energy efficiency. The RE theory, so far, has been widely developed in the field of energy economics and has its theoretical ground in the study of price-elasticities. In the canonical theory, the RE is explained by means of a price mechanism induced by the introduction of a new technology or process. A more efficient technology reduces the relative price of the energy service, whereby its demand raises. Nevertheless, this straightforward explanation has some drawbacks: are elasticities to be considered constant on the long run? This apparently marginal question is fundamental in the theory as it implicitly approach economy as a steady and structurally unchangeable system. We will here advance a different approach, based on network theory, to develop new measures of the RE and therefore a new theoretical framework, upon which explore a different explanation. It will be illustrated two measures based on the concept of euclidean embedding of the network and weighted reciprocity, to stress out the the RE can be interpreted as the result of the a symmetry breaking process. Measures' results will be evaluated in the light of appropriate null-models. The need for a different, broader approach is further suggested by the recognition that energy efficiency and energy growth are strictly and mutually connected in the vast scope of complex systems, spanning from ecosystems to societies. Looking back at evolution there seems to be a sort of thermodynamic law, as was once envisaged by Alfred Lotka, that tends to foster both energy efficiency and energy growth. This recognition would appeal for an altogether different explanation of the RE, based on complex system theories, rather than price mechanism.

### **24) Bodies and emotions: sources of biocapitalism**

(Vespasiano F., Martini E., *University of Sannio, Italy*)

We can call it cognitive capitalism, symbolic economy, flexible accumulation, virtual economy: everywhere the actual capitalism pervades our life and includes our emotions and our leisure inside the mechanism of production of wealth.

Therefore, a point appears to be central: the industry uses raw materials as well as our knowledge, experiences, emotions and aspirations and consequently «the accumulation process is based on and it takes substance by the faculties of individuals through a reticular structure of social cooperation. One can say, in essence, that is the same knowledge to be an expression of the bios» (Fumagalli, 2007: 183).

This paper aims to analyze the new biocapitalism phenomenon as «a transition phase to production of economic value based on the use of human beings as a whole, namely the biological, mental, relational and affective dimensions» (Novelli 2011). In the risk (Beck 2000) and the «anxiety unmasked» (Luhmann 1988: 33) society the functional performance of goods and services lose importance and «open space for new desires and new cognitive experiences of building and sharing of all possible worlds» (Rullani 2004: 159).

This is the last frontier of postmodern capitalism, «a complex system (and ideology) that is able to go beyond the exploitation of workers employed, stable, flexible, or temporary, in the direction of the use of human treated as a laboratory of advanced technology and luxury goods at the same time (plastic surgery); as a biological matter to be patented (genetic engineering); like a vampire use of minds (corporate shareholder); as explained to symbolically re-qualify in order to delectare (entertainment and cultural events industry); as a hinge between sexual objectification and social achievement (the politics of bodies); as sensory involvement of the consumer, achieved through viral marketing and advertising strategies, practices of experiential shopping» (Novelli 2011).

In this scenario, bodies, emotions, ambitions and behavior become valuable to the industry, which increasingly use them to create objects of desire, which can hardly resist. In fact, introducing itself as much more engaging and humanized, the biocapitalism is used by companies as a new business strategy, offering «products and brands as if they were real people, and turning to final consumers by offering them a form of recognition of their identity rather than a good or a service» (Codeluppi 2008: 7).

To the “shop window” strategy (Ibidem 2007) joins a strategy that appeals to all organs of the human body: the biocapitalism produces bio-value not only through the body «in its pure function of employment tool or outside of the body, increasingly shop-windowing, pursuing media and consumerist models, but the body as a whole» (Ibidem 2008: 9) in all its dimensions, i.e. biological, relational and emotional.

## 25) Brand-Individual Relationship: contextual influences and complexity

(Gianpaolo Basile, *University of Salerno, Italy*)

### Methodology/Approach

The present paper, through a conceptual framework, aims at integrating the studies about consumption activities and the relationship between brand and individual/consumer.

Objective of the paper is to show that the relation existing between the firm and the individual/consumer, created by the product/brand, is both the cause/medium and the outcome of influences to and from the respective reference contexts.

Our work tries to fill the literature gaps regarding social consumption and the network approach, and it is based on Giddens's sociological theory of 'Structuration' and Golinelli's managerial Viable System Approach.

### Findings

According to Habermas's, Giddens's and Golinelli's theories the relations between company/brand and individuals are influenced and influence their respective reference contexts.

In particular Giddens, through a duality structural model cycle, says that the social player (individual or firm/brand), as a result of the relation (micro level), changes the interpretative schemes and social practices within his/her/its reference context (for the individual: family, social group, reference brand; for the firm: competitive scenario, financial stakeholders, et al.), creating a different 'signification' with relation to it. The new signification affects the context that, in turn, modifies its influence towards the social player.

Golinelli in his Viable System Approach says that the firm is a system that must interact with the reference contexts in order to survive. These points of view show two isomorphic parts represented by the company/brand and its context, and by the individual and his/her context, mutually linked via a bidirectional relation.

### Practical implications

Communication between social players is mainly aimed at creating relations in order to satisfy their respective needs. Habermas says that such behaviour refers to the interaction between at least two social players capable of language and action who establish a relationship through either verbal or extraverbal means. The players seek an agreement to co-ordinate their action plans and their respective behaviour both within their relations and towards their reference context.

The company establishes a communicative behaviour aimed at creating a series of relations based on a common language and/or purpose. The communicative dynamic existing between company and individual evolves following a process of mutual interpretation, to be continuously reviewed, based on the definition of situations likely to be agreed upon. In communicative dynamic symbolic features are crucial in creating relations, whose nature should be carefully examined to define the consequent dynamism within the players' reference contexts.

Contexts, according to Giddens's Structuration Theory, are expression of different social players, both at micro and macro level, in which relations are established and reviewed. According to Giddens biunivocal/dyadic relation processes show the dimension of 'the duality of structure' as composed of two levels: micro, where we can see the interaction step between the social players in which they modify their interpretative schemes, giving 'signification' to a different context by displaying different beliefs, behaviour and social practices. The macro level in which, due to different signification, the players contribute to a contextual exchange, receiving new/different influences from the reference context to create/maintain the relations. In management theories contextual influences constantly occur when the management is forced to adapt to the specific stakeholder's needs, at micro level, and to the reference contexts (financial system, consumer system, labor market, et al.), at macro level.

This dynamic, according to Barile, shows that Viable System management constantly operates in a complex domain. Therefore the company, when planning both marketing and communication strategies and tactics, has to take into account the consumer's psycho-social goals at micro level. If a consensus is reached between the parties as a result of such communication activity, we will call that social action. This phenomenon is based on a constant dialogue between company and consumer and it would allow them to share common ground at macro level. The individual would gain distinction and/or social participation, while the company would be able to establish intersystemic relations with all the relevant contexts (competitors' system, financial system, suppliers' system, fiscal system, et al) it has to co-operate with.

On the basis of the above, the firm/brand positioning is affected, apart from company policies, also by the corporate behaviour of other brand competitors. This means that the creation and/or maintenance of micro relations between firm and individuals, involves both the implementation of brand re-positioning policies by the company itself and an "induced" re-positioning response by its competitors. This phenomenon shows an 'instinctive adaptation process' by which firms re-adapt, also without links-network, either in a direct or in an induced way, their competitive condition. Which stresses the importance, for the company, to analyze and respond to the contextual influences caused by other players' behaviour. Using the tools provided by the Structuration Model and the Viable System Approach as a checklist, the framework helps researchers and practitioners to analyse social elements and structural influences. The contextual influence analysis could shape strategic thought and tools with relation to survival in social organizations.

### Originality

The paper presents some useful considerations about the evolution of the relationship between firm/brand and individual and tries to fill some gaps in the network approach and in studies regarding social consumption processes.

## **26) Academic spin off and technological innovation diffusion in less successful areas: a viable system prospective**

(Levanti G., Palumbo F., *University of Palermo, Italy*)

This paper aims to analyze the role that academic spin offs play in enhancing and speeding up the development and transfer of technological innovation, particularly in less successful areas.

In present knowledge-based economy, innovation is a social process (Gibbons et al, 1994; Chesbrough, 2003 and 2011) rooted on the interactions and knowledge inter-exchanges among a variety of actors (such as firms, universities, research organizations, government institutions, and so on). These actors are endowed with idiosyncratic and specialized sets of resources, knowledge and capabilities. As a result, the critical determinants of competitive/innovative advantage rest not only on the innovation capabilities and activities of a single firm, but also on the technological knowledge and capabilities that spread across the environment in which the firm is embedded.

In order to shed light on these (internal and external) determinants, we integrate:

- i) the viable system perspective (Beer, 1972 and 1984; Golinelli, 2010); with
- ii) the national innovation systems theory (Freeman, 1987; Lundvall, 1992; Soete, 2007) and the triple helix model of innovation (Etzkowitz and Leyersdoff, 1999 and 2000).

More in detail, using the holistic approach provided by the viable system perspective, we see the firm as a viable system consisting of a collection of operational elements which are held together by the meta-system. Both meta-system and operations continuously interact with the environment and they are able to be adaptive and proactive with the external stimuli. Accordingly, this approach analyzes the influence on a single firm coming from the overlying systemic entities in the environment (named the supra-systems).

The integration of the viable system perspective with the aforementioned innovation theories allows to scrutinize the relationships that link academic spin offs with other actors involved in the innovation process. By doing so, we underscore the context conditions and institutions that support academic spin offs emergence and development as well as that enhance and speed up the transfer of technological knowledge from university to industry.

The second part of the paper is aimed to apply the theoretical framework elaborated in the first part to examine the case of the business incubator established by the University of Palermo, named "Consorzio Arca", and the academic spin offs it supports. We analyze this case study in order to assess the capacity of the depicted theoretical framework to deliver a satisfactory explanation of the role that academic spin offs play in enhancing and speeding up the development and transfer of technological innovation, particularly in less successful areas.

## **27) The Energy Policy as the Cultural Issue"**

(Borrelli D., Gavrilu M., *Univ. del Salento, Univ. La Sapienza, Italy*)

The debate on energy policy is promoted mainly in the scientific, technological and economic fields. The first aim of this paper is to focus the energy topic by a cultural point of view: we 'll consider each technical option as an expression of specific view of society, as well as a pattern of governance, an ideal of communication and public sphere.

The second aim is to problematize the vexata quaestio of the relation between structure and culture from an issue very unusual in the sociology of the knowledge, that is from narratives of the energy policies.

The nuclear energy technology improves the image of molar, centralized and militarized society, where the source of everything comes from the centre to the periphery, at disposal of the expert knowledge and protected from every external interference. It's the same cultural scheme that gives rise to the pattern of the waste incineration system as well as to the pattern of TV broadcasting, with informational asymmetry between speakers and listeners.

The renewable energy technology, on the contrary, has her frame and metaphor in the image of the net. It's based upon individual participation and civic engagement in a molecular form of society.

## WCSA - World Complexity Science Academy Mission

The World Complexity Science Academy (WCSA) is a social and cultural no-profit organization committed to the diffusion of scientific knowledge inspired to the systemic approach.

The WCSA has also the purpose of promoting the meeting and the co-operation among the scholars. Consistently with this purpose, WCSA organizes periodical national and international Conferences and supervises specific and scientific publications. The WCSA is a meeting place for scholars from very different disciplines inspired by the systemic approach.

The WCSA aims at creating a constellation of research projects and publications to empower a wide horizon and knowledge intensive strategy to let science successfully cope with the key challenges of our times concerning economical development, ecology, radical innovation and biotechnology.

The diffusion of the Systemic Approach is meant both as a peculiar interdisciplinary paradigm and as an applied toolkit. This approach strategically faces the main global challenges of our times described above. WCSA believes the systemic approach is pivotal for intensive and high added value knowledge sharing on a global scale as we all entrepreneurs, professionals, scholars and policymakers can cooperate, as world citizens to facilitate the free circulation of intellectual and strategic capitals.

Within these assumptions, WCSA is committed and supports:

1) the basic and applied interdisciplinary research within the system approach believing that this may represent the most effective meeting place to let different knowledge and disciplines converge towards a strategic common pattern inspired to the neo-renaissance, “third culture” shared with the Edge Foundation ([www.edge.org](http://www.edge.org)) and with the International Budapest club founded and chaired by Ervin Laszlo.

2) The advancement of global (semantic, methodological, technical etc.) platforms for the development of a cosmopolitan cognition that would unify more points of view and would merge basic and applied research in order to cope with problem solving needs in a context of challenges. The needs for problem solving ideas couldn't be fostered with a traditional local and territorial patterns and identities.

3) The divulgation of the systemic-scientific knowledge and the scientific information toward educated, but not specialized, targets (“high divulgation”) assuming the aim to enrich the personal backgrounds of committed scientists (biotechnologists, engineers, physics, sociologists, economists, etc.) about global challenges of our times through appropriate models and systemic- communicational tools and through high concepts for the diffusion and divulgation of the knowledge.

4) The promotion of the dialogue and the synergies among public institutions, business entrepreneurship and social no-profit organizations to let them provide a more user friendly policymaking for the scientific world community reducing the influence of vernacular interests and tactically adopting the motto “think global, act local”.

If you are interested in the WCSA policy, we invite you to suggest your own projects, research projects and publications in progress of which you would be glad to receive patronage for free by the WCSA PROJECTS brand. The patronage of WCSA may be granted both to members and non members provided that they are inventors and/or developers of high quality projects connected to the aims and policy of WCSA.

Wishing that the WCSA constellation be of your interest and that it will be possible to create favourable synergies and collaborations I offer you my warmest regards.

*Prof. Andrea Pitasi*  
*WCSA Scientific Director*

### **HOW TO Join WCSA**

WCSA welcomes professors and scholars from all the Countries of the World and with scientific and/or humanistic field of studies/research/interest etc.

1) **Contact us at [join.wcsa@gmail.com](mailto:join.wcsa@gmail.com).** Please specify your reason for joining WCSA and attach your Curriculum Vitae. Your CV and/or your e-mail should include all your contact information (e-mail, telephone, address).

2) The scientific board will assess your request and return a reply e-mail to you in 2-3 days with further information about the payment of the membership fee (through PayPal or bank transfer).

It will be possible to Join WCSA as a member directly at the membership desk outside the conference room.



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