Our self-organising world: from disruption to reparation

Systems and cybernetics applied to technology, design, governance and power

Keynote Abstracts and Congress Schedule

Dear All,

WOSC 2014 will offer both strong foci on systemic thinking and on structures for effective policy processes. It is more than 40 years since Fernando Flores invited Stafford Beer to work with the Chilean Government in the implementation of a democratic socialist economy. Beer created Project Cybersyn in the context of Allende's Chile. In addition to introducing his work to a young generation of local scientists and professionals he made of Norbert Weiner and Ross Ashby familiar names. In parallel to Beer's work Humberto Maturana was working from the Universidad de Chile, in collaboration with Francisco Varela, the theory of autopoiesis. Heinz von Foerster, father of second order cybernetics, joined them during part of this period. These are all names shaping the contributions to WOSC 2014. Beer's vision of the early 1970s, particularly his vision of an economy in real-time, has grown in maturity, not only through the extraordinary technological developments of the past four decades but also through the increasing relevance of cybernetics as an applied epistemology to governance. Together with the extraordinary potentials of digital technology in real-time, the epistemologies of systemic embodiment, ecological networks, organisational closure, self-organisation offer new insights and avenues to deal with the driving topic of this Congress: "Our Self-organising World: from disruption to reparation". This narrative is offered by the following contributions of our keynote speakers.

Abstracts for Plenaries

1. Fernando Flores

An Encounter with Cybernetics in the Chile of the 1970's: A personal story

In the Chile of the early 1970's I had the opportunity to work with **Stafford Beer** in the Cybersyn project. This was also the encounter with two Chilean scientists, Humberto Maturana and Francisco Varela, and the start of a friendship with Heinz von Foerster. Later, during my time at Stanford and UC Berkley I came in contact with other traditions, such as Hermeneutics and the theory of Speech Acts. With my colleague, Terry Winograd, we wrote a first synthesis of these works in the book *Understanding Computers and Cognition.* In this intervention I will tell my story of how these different influences blended together to shape the present we live in now, as well as the reach and implications I see for them in our future.

2. Eden Medina

Rethinking Algorithmic Regulation: Lessons from Project Cybersyn

Recent discussions of big data have motivated a push to rethink the relationship of computers, algorithms, and governance. Pundits such as Tim O'Reilly, for example, have argued that law should follow the same regulatory approach as an algorithm – it should be outcome driven, regularly tested using data to see if it is meeting the desired outcome, and adjusted as needed. On the surface, such observations are reminiscent of cybernetics. This is especially true of work in areas such as management cybernetics, including Stafford Beer's work on Project Cybersyn in Chile. Yet current discussions of algorithmic regulation miss central insights from the Cybersyn experience. In this keynote, Medina will draw from her extensive research on the history of Project Cybersyn to build an argument for how cybernetic history can enrich current discussions on algorithmic regulation and the use of big data for governance.

3. Allenna Leonard

Seeing Around Corners - Stafford Beer's Continuing Legacy

Like Norbert Wiener, Ross Ashby and Heinz von Foerster, Stafford belonged to a tradition of public intellectuals who had been profoundly influenced by World War II and determined that science and technology be used in the service of

humanity. In that war, under the rubric of operational research, many disciplines worked together for their common defence. Later, in British Steel, Stafford continued that tradition, bringing a multi-disciplinary perspective to innovation in industry. This approach resulted in his invitation to work on the Cybersyn project. He applied knowledge from neurophysiology, sociology, mathematics, psychology, philosophy, operational research and the arts to assist the government of Salvador Allende to manage the state run economy. Central to that work were the recursive Viable System Model, the real-time monitoring of key indices in the operations room and early designs that eventually led to the Team Syntegrity process. A key feature was to be able to perceive the weak signals that presaged incipient instability – what we might now refer to as 'emergence' and to deflect them before they began to cause trouble. These tools for 'seeing around corners' are as important now as they were forty years ago.

In the present time, his dictum "the purpose of a system is what it does" is even more relevant. There is better instrumentation available now to measure and assess weak – and not so weak – signals but perhaps even more incentive for vested interests to ignore the big picture and the foreseeable unintended consequences of their actions.

The risks and the opportunities that Stafford foresaw have moved forward in ways that he, along with others, predicted. To name just two, research in neurophysiology has led to both amazing advances, especially in medical science, and fearsome threats to our privacy. The networks of machines, now referred to as the 'internet of things' can be incredibly effective in establishing 'communication and control' but it is much too easy to skip over the setting of initial conditions and the perspectives of engaged, or disengaged, observers. We will honour their commitment and the good will and expertise that characterized the Cybersyn project by remembering not just what was dreamed of and accomplished then but by grasping the opportunities that exist now to put them into action.

4. Geoff Mulgan

The wicked problems remain wicked: has the craft and science of transforming whole systems moved forward, and how could we do better?

Let me start with a familiar problem – an isolated woman in her early 80s living in a fairly prosperous western city. She is suffering multiple health conditions,

and repeated episodes and crises which take her in and out of hospital. She lacks close friends and family. She is high risk and high cost from the perspective of the state. She is not very happy with her situation, interacting with multiple formal systems none of which really understands her. Even when the elements of the system work well – for example, the ambulance comes fast when she calls, the net effects of optimised elements are visibly sub-optimal. Better prevention; better care in her own home; more everyday emotional support; better quick responses to minor crises: all of these would make her life better but are difficult for the system to provide.

Drawing on current practical examples of work on systems change in the UK I will talk about how we should theorise, understand and change the systems that surround someone like this, and what this tells about the praxis of systems.

5. Carlos Gershenson

Requisite Variety, Autopoiesis and Self-organization

Ashby´s law of requisite variety states that a controller must have at least as much variety (complexity) as that of the controlled. Maturana and Varela proposed autopoiesis (self-production) to define living systems. Living systems also require fulfilling the law of requisite variety. A measure of autopoiesis has been proposed as the ratio between the complexity of a system and the complexity of its environment. Self-organization can be used as a concept to guide the design of systems towards higher autopoietic values, with the potential of making technology more “living”, i.e. adaptive and robust.

6. Dario Rodriguez

Niklas Luhmann and autopoiesis

Autopoiesis is a concept coined by the Chilean biologists Humberto Maturana and Francisco Varela to describe living systems as autonomous unities characterized as closed networks of processes of production of components that, through their interactions, compose the network of production of components which produces them, specifying their unity by defining their boundaries. The German sociologist Niklas Luhmann abstracted the concept from living systems, defining autopoiesis as a general form of system building based on self- referential closure. After this abstract formulation, it is possible to distinguish living systems (cells, nervous system, organisms, etc), psychic

systems and social systems (societies, organisations, interactions) as different kinds of autopoietic systems. Autopoietic social systems emerge by producing and connecting their communications. For Luhmann, autopoietic systems generate their own emergence, and social systems do so by producing meaning. Meaning is a product of the operations that use it and not a pre-existing quality of the world. His theory has been used to explain different kinds of social systems, where it has demonstrated its explanatory capacities. Organisations, interactions and World society can be observed through social systems' distinctions, and Law, Health, Economy, Religion, Science, Art, Education, etc. can be conceived as autopoietic functional systems of World society. Current developments in the sociology of law conceive the functional Law as a self-referential autopoietic system structurally coupled to the other functional systems of society in a changing environment where national societies are leaving place to World society, as the other functional systems have already done.

7. Clas-Otto Wene

Future energy system development depends on past learning opportunities

Learning curves measure how cumulative production and use of a technology reduces cost and improves performance. Examples illustrate that learning curves pervade all levels of industry and the economy and also characterised production before the industrial revolution of the 19th century. For energy policy, learning curves suggest deployment programmes to buy down the cost of presently too-expensive environment-friendly technologies. Such programmes have been successfully applied to solar PV and wind technologies. However, the legitimate role of the learning curves in a low-carbon strategy depends on the validity of extrapolations and forecasts of the curves. Understanding the mechanisms behind the curves could support a pro-active, efficient energy technology policy that leads around the present, incessant discussions on CO2-emission reductions and burden sharing. Mainstream economics provides no explanation of the stability and pervasiveness of the learning phenomenon and reduces learning curves to stochastic alignment of well-known features, events and processes (FEPs) such as R&D, economies of scale, spill-over, changing input shares. However, in cybernetics a completely different picture emerges, indicating that the learning curves express

fundamental and stable properties of the learning system and making them reliable policy tools. Based on the work of von Förster, Maturana and Varela, the learning system is analysed as an operationally closed non-trivial machine. The eigenvalues for the learning system explain the distribution of measured learning rates for a very broad spectrum of technologies, including energy technologies. The unperturbed system is in a non-equilibrium steady state. Applying Prigogine's theorem of minimum entropy production to this state and assuming that this production is constant in the eigentime of the system provide the learning curve. The conclusion is that by following basic laws of second order cybernetics and of non-equilibrium thermodynamics the learning system self-organises its learning to follow the optimal path described by the learning curve. The self-organisation includes the use of FEPs as natural elements in the learning loops, but the system learns as a whole. Second order cybernetics does not favour *ceteris paribus* arguments.

8. Raul Espejo

Self-Organisation of Policy Processes: Recursive Structures and Reflexive Communications

Whether we are talking about a country's energy resources, the care of children by a Local Authority, the services to customers by a company or any other policy area, in all these instances multiple social and economic agents engage in purposeful policy collaboration and indeed, sometimes, in painful forms of tacit or explicit aggression.

Evolving policies, whether in enterprises or society at large, are backed, to different degrees, by the political will of stakeholders; the challenge is improving their unfolding, nurturing inclusivity and avoiding abuses of power. Effective policies require ingenuity to visualise them and capabilities to make them happen. In this talk I clarify inclusive and participatory strategies to manage their complexity. This clarification has not only implications for democratic societies but also for open economies with better chances for stakeholders to co-create values with producers, as they interact in cycles of mutual production. How are recursive structures and reflexive communications fostering people´s freedom and wellbeing? The argument is enabling human capabilities in constrained situations. The challenge is transforming coercive

and capricious constraints into increasingly liberating constraints, accepting that they are by and large the outcome of self-organising processes.

However, self-organising processes need catalysts to catch up with environmental changes. Political leadership and survival instincts may bring quicker together agents over time, constituting them actors of organisational systems, with increasing variety absorption capabilities and opportunities for relationships as new technologies are used. On the one hand these technologies are increasing mutual awareness and collaborative opportunities between environmental agents; on the other they are enabling flexible reconfigurations of resources and allowing the evolution of organisations' dynamic capabilities as actors detect and seize challenges and opportunities in their environments. These relationships are offering chances for a deeper reflection and understanding of each other, opening opportunities for more effective ecological networks.

From a policy perspective it is common to have poor appreciation of these relationships, leading to policy failures that go from the small to the large; from marketing failures of small companies, to instances like the painful financial crisis of 2008. This contribution reflects upon changes in relationships and policy processes.

9. Ximena Dávila & Humberto Maturana / Humberto Maturana & Ximena Dávila

Zero-time Cybernetics

In our presentation we will talk from the understanding of what we call in Matríztica the science and art of ontological / epistemological thinking in cultural biology. In this research framework of the biological-cultural nature of being human, and in order to expand our understanding of the relational-operational domain in which our humanity arises –where it is made and preserved daily - we propose changing the perspective of cybernetic processes to what we call Zero-time Cybernetics.

Speaking of zero-time cybernetics, we talk about the happening of recursive systemic processes, which are observed and understood in the continuous

changing of their present. Thus we speak of a cybernetic process when we refer to a recursive dynamic operational conservation of a relational configuration, in a continuously changing system in the realization of its identity.

In Matríztica we are distinguishing the understanding of the changing dynamic architecture of our living in the no-time or zero time, to examine, to see and understand the current operation of the systems without the use or introduction of semantic arguments or notions to explain what is going in and with them, in the flow of their existence.

Moreover, we are particularly interested in understanding how the imaginative past invented (that we generate) as an explanatory notion using the imaginary time dimension, operates at time zero of the continuous changing present in the daily life preserving pains, trivia, joys which were experienced in the past, as if they were valid in the now that is being lived, and therefore leading to suffering and blindness that do not belong to the present that is being lived now.

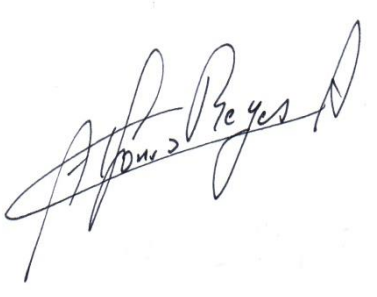
In this drift, and from the confidence that the validity of what we say is in our understanding of the realization of our living as molecular autopoietic systems, we show how it arises and it is possible a liberating conversation, through the understanding of the biology of love, which in its reflective openness enables us to see and understand our living and living from ourselves in our biological-cultural living in languaging, conversing and reflecting, as human beings whose origin and evolutionary conservation is the foundation of their way of life and living together that is primarily loving.

Congress Schedule

The activities from the 15th to 17th October are as follows:

Time	Wednesday (Oct. 15)					Thursday (Oct. 16)					Friday (Oct. 17)				
8:00 - 9:00	**Opening** Governor of Tolima Rector Universidad Ibagué President WOSC														
9:00 -12:00	**Keynote Speakers** 1. Fernando Flores 2. Eden Medina 3. Allenna Leonard					**Keynote Speakers** 4. Geoff Mulgan 5. Carlos Gershenson 6. Dario Rodriguez					**Keynote Speakers** 7. Clas-Otto Wene 8. Raul Espejo 9. Humberto Maturana/Ximena Dávila				
12:00 -1:45		***LUNCH***					***LUNCH***					***LUNCH***			
2:00 - 6:30		**Parallel sessions***					**Parallel sessions***					**Parallel sessions***			
2:00 - 3:45	Posters	**1.1 Digital Society & Business Ecosystems RE&IP**	**2.1 Complexity, Sustainability and Self-Organisation AE**	**3.1 Ecosystems - Renewal for Sustainability MS**	**4.1 Design and Control of Self-organising Systems CG**	Posters	**2.3 Complexity, Sustainability and Self-Organisation AE**	**5.1 Democracy, Citizenship and C.S. Self-org ZM GB**	**6.1 Computer modelling, power and management of complexity HLG**	**7. Networks of influence: systems dynamics JPR**	Posters	**8. Transdisciplinary modelling and decision processes JJ**	**9. Cyber-systemic Governance Autopoiesis and Social Processes SS**	**10. Systemic Project Management & Consulting LK**	
		paper 1	paper 1	paper 1	paper 1		paper 12	paper 1	paper 1	paper 1		paper 1	paper 1	paper 1	
		paper 2	paper2	paper 2	paper 2		paper 13	paper 2	paper 2	paper 2		paper 2	paper 2	paper 2	
		paper 3	paper 3	paper 3	paper 3		paper 14	paper3	paper 3	paper 3		paper 3	paper 3	paper 3	
		paper 4	paper4	paper 4	paper 4		paper 15	paper 4	paper 4	paper 4		paper 4	paper 4	paper 4	
		paper 5	paper 5	paper 5	paper 5		paper 16	paper 5	paper 5	paper 5		paper 5	paper 5	paper 5	
3:45 - 4:00		***Coffe Break***					***Coffe Break***					***Coffe Break***			
4:00 - 6:15		**1.2 Digital Society & Business Ecosystems RE&IP**	**2.2 Complexity, Sustainability and Self-Organisation AE**	**3.2 Ecosystems - Renewal for Sustainability MS**	**4.2 Design and Control of Self-organising Systems CG**		**1.3 Digital Society & Business Ecosystems RE&IP**	**5.2 Democracy, Citizenship and C.S. Self-org ZM GB**	**6.2 Computer modelling, power and management of complexity HLG**		4:00 - 5:00	**Norbert Wiener Memorial Gold Medal**			
		paper 6	paper 6	paper 6	paper 6		paper 12	paper 6	paper 6			WOSC Award of the NWMGM to Prof. Dr. Humberto Maturana			
		paper 7	paper 7	paper 7	paper 7		paper 13	paper 7	paper 7						
		paper 8	paper 8	paper 8	paper 8		paper 14	paper 8	paper 8		5:00 - 5:45	WOSC meeting			
		paper 9	paper 9	paper 9	paper 9		paper 15	paper 9	paper 9						
		paper 10	paper 10	paper 10	paper 10		paper 16	paper 10	paper 10						
		paper 11	paper 11	paper 11	paper 11		paper 17	paper 11	paper 11			**Final event - closure**			
6.30 - 8:30		**Folk event**					**Music Hall concert**								

Kind regards,



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