

WOSC 2014: reflexions and personal account

Our self-organising world: from disruption to reparation.

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

Professor Raul Espejo
Director General World Organisation of Systems and Cybernetics
November, 2014

WOSC's 16th Congress in Colombia, WOSC 2014, is now over. These notes are my reflexions of the plenary sessions first seen them together and then as individual presentations. Indeed these are my notes and do not intend to be an accurate account of the speakers' views.

Overview

Culture, history, self-organisation, communication, information, complexity, organisation, learning, technology, change and transformation were some of the key ideas of these plenaries. In a world driven by technology, it is increasingly necessary to consider the braiding of people, organisations and technology in transformation processes. To what extent are we controlling these processes in a largely self-organising world? The idea of guided self-organisation is particularly relevant in a highly complex world in which blue prints to produce desirable emergence do not exist. I see this guiding focused on the coordination of actions of multiple agents and on the alignment of independent resources sharing common purposes or policies. Multiple agents may coordinate their actions through simple rules of association, like keeping distances among birds to produce an ordered flock to gauging, with the support of technology, traffic and distances to facilitate their flow in a city (Gershenson). Multiple resources -people, institutions, technological systems and others- may learn overtime effective forms to relate to each other to pursue shared purposes (Espejo). Overtime they may produce a viable organisational system, however relying only in self-organisation may take too long. This makes it necessary enabling increasingly effective communications among them. Coordination of actions, through shared ethos and culture, can be a major attenuator of individual and social complexity that increases the chances of aligned processes (Mulgan).

Mulgan asked in his presentation why 'wicked problems remain wicked'. Situations as frequent as that of an old lady with health problems living in isolation in a crowded neighbourhood often prove difficult to manage. Fragmented institutions, rather than a whole organisational system, make intractable the problem of this lady. Help may come from speeding up the emergence of an organisational system focused on loneliness. Unfortunately, however much a holistic approach may be acknowledged as a solution, incompatible ethos and cultures make difficult institutional communications. Rodriguez discussion of social autopoiesis offered an explanation for these difficulties; continuing with our above example, particular social functions such as neighbourhood policing, social services for the elderly, local health provision and so forth develop over time their

own cultural codes producing self-referential and operationally closed meanings. Breaking these codes and integrating several functionally specialised systems into one organisational system, focused on services to the elderly, is a tall order. Guided self-organisation may help processes towards building this organisational system.

Particularly in the context of wicked problems or as Leonard names them disruptions, she contributed to our appreciation of Stafford Beer's work. His Viable System Model is a powerful model to guide self-organisation. This is a model that clarifies requirements for coordinated actions at several structurally recursive levels and units and therefore helps developing ethos and culture for the functionally differentiated structural systems producing the desirable organisational system. The relations of recursive organisational system with functionally differentiated meaning producing social systems appear as a valuable future research programme.

Beer's work was also present in Medina's discussion of big data and the internet of things. It is apparent that today's digital technology allows for huge data collection and that not always those using them are aware of their social, individual, and organisational implications. Aspects such, abuses of privacy and power, infringements of autonomy, hierarchical management and others are instances of poor algorithmic regulation. Medina extracted from the Project Cybersyn in Chile and the Viable System Model a number of lessons to make algorithmic regulation today more respectful and effective. Cybersyn was an application, albeit restricted by the political situation, of good cybernetics to government and regulation which applies today as much as it did in the past.

An important topic of the Congress was policy-processes from the perspective of second order cybernetics. Wene's contribution was focused on energy technology learning and climate change. He argued for and illustrated empirically an alternative to the non-reflexive approach of economics to energy technology learning. Economics uses feedback of features, events and processes to project learning curves but does not consider the reflexive interactions between an organisational system and its environment. It is through this reflexivity that double closure is achieved; firstly through environmental feedback and secondly through the organisational system self-reference produced by its actors' two way communications with environmental agents. It is in these communications that the agents' appreciation of the situation evolves within the organisational system. Double closure assumes the closure of the organisational system, and this is a topic for further research. Reflexivity was also developed by Espejo as a necessary aspect to manage and make more transparent the complexity of communications.

A final aspect I want to highlight in these notes is the reflections about knowing and action offered by Flores, Maturana and Davila. They offered platforms to connect systems and cybernetic thinking to the world we operate in and in particular to transformation processes. It can be argued that changing from the cybernetics of the observer, which distinguishes closed external systems, to the cybernetics of observing systems, which put the emphasis in self-reference, can have profound social and organisational implications. Absorbing this transformation would have profound implications for social relationships, increasing the chances for balances of power and mutual respect. This projection of applied epistemology in society was illustrated by Maturana's and Davila's discussion of Cybernetics of Zero-time. Flores's presentation acknowledged Maturana's influence in his thinking; implicitly he acknowledged the structural determination emerging in our personal histories and the structural couplings of drifting in a complex and mysterious world. Indeed control is

an illusion. Communications and coordination of actions in uncertain situations makes possible surfing successfully in the world. This is the world of entrepreneurship rather than of theories and models.

Summary of Plenaries

For *Fernando Flores* we are historical beings; our traditions and experiences make us who we are. His personal development as an entrepreneur was a vivid expression of history making. He did not offer theories; his present being the articulation of encounters with cybernetics -Stafford Beer, Humberto Maturana, Francisco Varela, Heinz von Foerster and others in the context of the Cybersyn Project in Chile; with artificial intelligence - Terry Winograd and their co-authorship of the book *Understanding Computers and Cognition* in Stanford; with the hermeneutic tradition -John Searle and Hubert Dreyfus in Berkeley and his work in language and coordination of actions and indeed with other encounters. This ontology, related to particular historical traditions is at the root of the entrepreneur he is today. He gave short shrift to a focus on epistemology as platform for change. In agreement with other speakers he dismissed our drive to control things. We do not fully understand ourselves. This is part of our human condition; we need to accept the mystery of life and of being, and relinquish our will to control in favor of developing communicative competencies. Drifting is part of our adventure as human beings.

Eden Medina' paper "Rethinking Algorithmic Regulation: Lessons from Project Cybersyn" was a timely reflection about the lack of cybernetic insights in current developments of huge data collection and processing capabilities offered by digital technology. To do this she refers back to the design criteria underpinning the Cybersyn Project. She argues for not dismissing the state as inefficient and bureaucratic. Government with good cybernetics, supported by technology, has the potential to protect the rights of the vulnerable from abuses of power. Cybersyn was an instance of using old technologies to great effect. Not only less technology may help preserving resources but good design of data collection and processing can avoid overloading users with irrelevant data. Cybersyn enabled at the same time autonomy and improved management capabilities. This organizational design helped to worked out "what data do we need", something that today can help creating technologies to protect privacy and individual freedom in an increasingly algorithmic world. She argues that the cybernetics of Project Cybersyn gives us heuristics to make the operation of digital technology increasingly transparent and participative and that this is not simply a technical decision, but also a way to promote democracy. Finally, Cybersyn is instructive in keeping real people in decisions loops and avoiding the damaging dominance of machines.

With the support of Stafford Beer's Viable System Model and Team Syntegrity *Allenna Leonard* focused on the Congress theme 'from disruption to reparation'. Beer was a deep systems thinker and found most frustrating the limited practice of interdisciplinarity in day to day problem solving. Project Cybersyn gave him the opportunity for this systemic practice. A major aspect of that project was performance measurement. Technological measurement capabilities have increased orders of magnitude since the 1970's. Today, computers, 'smart' materials and the internet of things record data in vastly larger scales. Real time measures have become easy to install and are commonplace. However, some of the purposes for which they are used have become controversial. Traffic light synchronization is generally accepted as a good thing while the customer load measures that facilitate just-in-time staffing and zero hour contracts are problematic, especially where fatigue and safety conflict. Unlike the Cybersyn design, in general these measures are not situated within a

holistic model, making difficult to detect incipient instability. For problematic situations Team Syntegrity addresses the questions of repairing disruptions by enabling multi-viewpoints structuring and understanding people's perspectives. It gives us a tool to look around corners for unintended consequences.

For *Geoff Mulgan* 'wicked problems remain wicked' and he asks 'has the craft and science of transforming whole systems moved forward, and how could we do better?' Consistent with several other speakers he argued that the fragmentation of services and institutions makes it extremely difficult to see a person in need as a person and not as an object of weakly related services. Through his work in NESTA UK he is involved in numerous pilot projects aimed at bringing organisational innovation to the provision of services, particularly finding approaches to relate the local with the global using among other networks enabled by digital technologies. After the Congress he wrote a blog about WOSC 2014 in Ibague <http://www.nesta.org.uk/blog/systems-and-common-sense>. In this blog he highlights that "*I'm convinced that the ability to think and act systemically is the greatest intellectual and practical challenge of this century*" and states that "*The event was in some respects a reminder of the intellectual thinness of much discussion of the digital world*". These are powerful statements that summarize and align his presentation with Flores's ontological position.

Carlos Gershenson's "Requisite Variety, Autopoiesis and Self-organisation" was a challenging contribution. His arguments were driven by Shannon's seminal work on information and Ashby's work as a regulatory paradigm. In addition to requisite variety, autopoiesis and self-organisation this presentation discussed and related the concepts of emergence, entropy, organization and complexity. He argued that self-organization can be seen as the inverse of entropy, and thus of information and emergence. Self-organization will be high when emergence is low and vice versa. A maximum self-organization occurs with minimum information, *i.e.* maximum predictability, while minimum self-organization occurs with maximum information, *i.e.* minimum predictability. He offered a novel definition of autopoiesis as the ratio between the complexity of a system and the complexity of its environment. An example where these ideas have been applied is in the coordination of traffic lights. Comparing a self-organizing method with a traditional non-adaptive method, he showed through a computer simulation that the self-organizing method is close to a theoretical optimal performance for all traffic densities. This is achieved because the controller (traffic lights) manages to adjust its complexity to the complexity of its environment (vehicles), leading to an autopoiesis greater than one for almost all densities. The densities where autopoiesis is less than one is precisely where the performance is farther from the optimum. Finally he argued for guiding agents' mutual coordination of actions or self-organisation.

Dario Rodriguez discussed Luhmann's concepts of social and psychic autopoiesis. This was a very tightly constructed presentation which offered deep insights about communications between social systems. Main concepts discussed in this presentation were self-reference, operational closure, structural coupling, recursion and meaning. Social systems are meaning based autopoietic systems. Autopoiesis is a general form of system building based on self-referential closure. An autopoietic communication system is recursively circular. Meaning bonds communications to each other. 'Meaning boundaries' close operationally the social system constituting it as a self-referent circle that can internally operate with the difference between system and environment. Operational closure implies that every component of a social system is a product of the operation of the same social system and cannot be produced anywhere outside it, and imported into it. Structural coupling

is a dynamic structural relationship between an autopoietic system and its environment, in which the system maintains its own identity and its adaptation to its environment. Though this presentation did not discuss organisational systems, it offered a framework to understand organisations as closed decision-making systems produced by functionally differentiated communications. Communications, particular to this organisation, create and produce their own meanings making apparent the challenges to achieve communications between autonomous self-organising organisational systems.

Clas-Otto Wene discussed from the perspective of second order cybernetics the policy issue of climate change and the use of alternative energy sources, such as wind energy and photovoltaic modules. For energy policy, learning curves drive 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 but they still need further development. His argument is that “future energy system development depends on past learning opportunities”. He argues that the traditional economic perspective which explains learning based on aspects such as module efficiency (R&D), key raw materials availability, plant size, and so forth, is blind to an important learning mechanism. From the perspective of second order cybernetics, which views particular technologies such as wind technology or solar PV as operationally closed systems, learning happens from self-reflection as well as from customers’ feedback. This double closure, which implies the reflexivity of *organisational systems*, has a significant potential to improve policy processes as long as they achieve operational closure. He illustrated this potential with reference to the silicon bubble during the first decade of the years 2000s.

Raul Espejo argued that improving policy processes requires more effective processes of value co-creation between organisational systems and customers/stakeholders. Organisational systems’ learning mechanisms require double closure, that is, customers’ feedback and self-reference. This learning assumes organisational closure, that is, self-organisation and autonomy of organisational systems and environmental agents. Closure significantly enhances value co-creation, making among other aspects the market’s invisible hand far more transparent to social, ecological and economic values. All this can be enabled by digital technologies that have the potential of increasing cooperation and coordination. A trend, based on cooperation and trust, may have important structural consequences; capitalist markets controlled by large and powerful enterprises, at the expense of the creativity and innovation of smaller enterprises and the voice of communities and localities, may now be reverted as larger associations or commons allow value co-creation of complex products and services. New enterprise complexity models are possible where *economic* markets play a smaller role to the benefit of sustainability and social values. Four vignettes, one in particular illustrating dysfunctional global financial services, illustrated current shortcoming in policy processes.

Humberto Maturana and Ximena Davila offered an instance of applied epistemology; cybernetics of zero-time is the cybernetics of a continuously changing present, which requires no control. Control and regulation belong to our cultural domain. We are in an on-going drift in an uncertain world. Our ‘here and now’ is what we are and determines the space of what we can do. There is a fundamental inertia in which everything is conserved unless it is interrupted in its natural drift. This conservation is always done from our own selves. The past is a mode of being today the present we are. The future is not future generations but the possibilities of what we are today. As biological being the

present is the only thing we have in our living. We function according to our structure (structural determinism) and the history of structural couplings in our niches (our ontogeny). We are emotionally related to others in mutually modifying niches. From our relations with others emerge the cultural. A recursive dynamic through which we move ahead and conserve what we are (historically) is the dynamic of autonomy and the cybernetics of zero-time. This is cultural biology. It can be argued that in this presentation Ximena Davila and Humberto Maturana have made important contributions to the epistemology of communications, embodiment, real-time, autonomy and operational closure with important implications to the cybernetics of individuals, organisations and societies.

Coda

WOSC 2014 and the Universidad de Ibague gave participants a magnificent opportunity to exchange ideas and develop opportunities for future activities and research. With these notes I want to open the space for more conversations and provide a platform for a stronger World Organisation of Systems and Cybernetics. In the next few months I will be editing in collaboration with Alfonso Reyes and Hernan Lopez-Garay a special double issue of *Kybernetes*; “The Cybernetics of Self-organisation”. We look forward to receiving contributions to this issue and through them furthering our research in systems and cybernetics.

