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Editorial

Futures of Society: the interactions revolution

The special issue "Futures of Society: The Interactions Revolution" reflects upon the increased fluidity required for self-organising processes in today's world. Digital technologies are transforming our social systems through their deep mutual braiding. New relationships and forms of communication are emerging between systems and their environments and among their constitutive actors. Today organizations and social systems demand an increased fluidity and agility to respond to environmental, social, and economic pressures. In this Special Issue, fluidity and agility are requirements focused on the future. It investigates challenges for organizational and social systems that are shaping today with a view to the future. The interactions revolution offers space for digital technologies and transdisciplinary conceptual frameworks, such as Stafford Beer´s Viable System Model, to disclose self-organised structural forms that are more likely to respond quicker to environmental, social, and economic changes. This interactions revolution is enabled by the contributions of large numbers of distributed actors, crowdsourcing innovative transformations, such as Wikipedia, Open Source Software, Blockchain and others. The challenge we address here is more than bottom-up self-organisation but also, and most significantly, guided self-organisation to speed up learning processes. The related problem solving requires of both. Which interaction strategies can increase response capacity and help making sense of an often overwhelmingly complex surrounding? These are aspects related to Ross Ashby´s requisite variety, which is a thread relating most of the contributions to this issue. Which interactive strategies can help organisations to achieve desirable outcomes and maintain dynamic stability with their environments? What will their futures look like?

The term variety is used extensively in this special issue. Ashby proposed it as the number of possible states of a situation. We know that for even simple situations such as a black box with eight inputs and 1 output, each with only two possible states (0,1), the number of possible states of this black box is 2^{256}, a huge number. Proliferation of possible states is what is behind the digital revolution; binary numbers are behind the scope of digitalization. The challenge is regulating the possible states of our social situations to keep them within a set of desirable states. What is behind this proliferation is the possible interactions among the relatively small number of constituent parts of a situation over time. We have to learn to manage these interactions to keep them under control; this is at the core of the INTERACTIONS REVOLUTION. Ashby's law of requisite variety tells us that this is only possible if the regulator can generate 'directly' or 'indirectly' at least the same number of possible states as the situation generates. Since individually we have a very limited capacity to generate variety, it is necessary to find ways to amplify it, perhaps with technology enabled interactions, and also at the same time to attenuate it. Often we do this by restricting people's capacity to generate variety, which is at the core of the hierarchical forms of regulation that are discussed in this special issue. Directly or indirectly all the contributions to this issue share this construct; they offer instances of variety management. Current technological developments allow proliferation of data, in ways which were unthinkable until recently. The challenge now is containing this variety through variety containing strategies managing interactions. This is the challenge of the interactions revolution for the future.

The authors' contributions, driven by the above considerations, are offered in what follows, clustered in four themes: society, technology and interactions; human aspects of interactions; nature and social organisation; and the future.

1. Society, technology and interactions

1.1. Alexandre Perez Casares. The brain of the future and the viability of democratic governance: the role of artificial intelligence, cognitive machines, and viable systems

Perez Cazares's contribution makes apparent the increasing influence of big data, algorithms and artificial intelligence (AI) in societies and organisations today. It helps to increase our appreciation of the role of cognitive machines in today's world. The author argues for the need to improve organisation structures to harness complexity and avoid decision makers being overwhelmed by data. The future is in the emergence of a collective brain for public governance: a distributed brain of the social system. He argues that if

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the organization structures underpinning social systems are inadequate, decision makers may find themselves abrogating their responsibilities and applying artificial intelligence algorithms to control the proliferating data, but if the effectiveness of these structures is better, it might be possible for decision-makers to move in the direction of complementing human decisions with AI systems.

1.2. Alexander Raikov. Accelerating technology for self-organising networked democracy

Raikov's contribution is focused on improving decision-making processes and strategic conversations in a networked democracy. Big data, artificial intelligence, algorithms and other information and communication technologies, as introduced in the above contribution, are overloading decisions makers and reducing their capacity to respond effectively to an ever increasing rate of change. He argues that traditional approaches to group decision making support are not effective in a networked society. The author offers what he calls a 'convergent technology' to help structuring information to accelerate networked group decision-making processes. The approach is offered to support the self-organisation of social networks and for creating effective strategies for government, non-government, regional, national, municipal, and other bodies. As such, it is a proposal to make democracy more effective.

1.3. Diego Gonzalez-Rodriguez & Rodolfo Hernandez-Carrion: Self-organized linguistic systems: from traditional AI to bottom-up generative processes

This contribution enhances our understanding of self-organized linguistic systems (SOLS). It argues for reducing our orientation to standard definitions, and accepts that usually language emerges among interacting agents within a social context to achieve collectively self-constructed goals. SOLS are constructed languages that rely on the theoretical framework of Complex Adaptive Systems (CAS), in conjunction with the development of computational tools and simulations such as agent-based models. These self-organised linguistic systems emerge both from CAS and -from the perspective of the interactions revolution- from variety balances between self-organising agents that through the construction of a shared language find means to coordinate their contributions to the shared goals. In peer to peer interactions (P2P) language offers an evolving mutual learning process for these agents to correct through self-organisation imbalances of variety as they perform their shared tasks. These agents learn to work-out variety imbalances through significant cues, such as the vagueness, imprecision or lack of capacity of some of them to perform these task. As they contribute to these interactions, language evolves as a variety balancing tool.

1.4. Rita Aquino, Sergio Barile, Antonio Grasso, Marialuisa Saviano: Envisioning smart and sustainable healthcare: 3D-printing technologies for personalized medication

The focus of the authors is 3D-printing personalised medication (PM); which they argue is a powerful emerging technology with significant implications for the future. This technology challenges interactions between medical staff and patients. It offers the transition between standardised medication and individual medication. In the light of the new technology, the challenge is making the interactions between medical staff and patients more robust. Some of the key issues for the future of 3D PM are safety, trust, auditing and regulation. The authors use the ideas of variety and variety amplification and attenuation. 3D printing technology inserts a 'variety balancing' element between the massive product standardization of traditional medications' manufacturing, and also of the standardized healthcare delivery service, and the crucial differentiation of patients' needs, potentially revolutionizing the functioning of the entire system. In this context the authors offer the clarification of organisational ethical and cultural issues; "how requisite 'unique' medicines for individual patients can be manufactured on a routine basis." Also they address "How soon can we expect personalized medicine?"

1.5. Alberto Ferraris, Gabriele Santoro, Armando Papa: The cities of the future: hybrid alliances for open innovation projects

The emphasis of this paper is in smart city projects, which are grounded in local agents' interactions and their variety balances. Its aim is learning about innovation in environments where people and their enterprises can go beyond the traditional internal, self-centred, innovation into collaborative, open, innovation. Through significant studies the authors offer experiences of smart cities in different countries. They explore two important dimensions, one is the openness of enterprises to other enterprises and the other the extent to which these cities foster either explorative or exploitative, or both, environments for smart city projects. Are enterprises open to the risks of giving away their inner knowledge and organisational strengths to support an overall innovation beyond their closed boundaries? And, do governments offer opportunities for innovative public-private partnerships? Cities, through their interrelated people, offer opportunities for smart services in environments that are systemic by nature.

2. Human aspects of interactions

2.1. Solveig Beyza Narli Evenstad. The virtuous circle of ephemeralization and the vicious circle of stress: a systemic perspective on ICT worker burnout

This contribution highlights a problem experienced today by workers in many enterprises, particularly by those experiencing technological and processual changes in highly dynamic environments, such as enterprises in the information and communications technologies (ICTs). The speed of change of these technologies requires important organizational adaptation. They overload workers