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Editorial

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With this third issue of "**systems: connecting matter, life, culture and technology**", we complete volume 1 of our new journal. We look back with gratitude for the strong support we have received from the Systems Movement, and look forward with optimism and anticipation to our ongoing contribution to the advancement of Systems Science, Thinking and Practice (SSTP). The past 18 months has been a stimulating experience for the journal's executive team, and based on this we have been reflecting on how we can best serve the systems community with the new journal. In this light we have developed a more focused statement of our editorial vision, and while staying within the boundaries of our founding philosophy of publishing original high quality papers that advance and promote systems science, we will in future provide a more focused guidance to authors and reviewers about the specific article topics and perspectives that we think will be most valuable for advancing the competence and relevance of SSTP. An announcement about these new developments will be published on the journal website in January 2014, and we look forward to both your feedback on it and your participation in the more focused endeavor.

With the present issue of "**systems**" we are pleased to present a further group of valuable papers from the EMCSR 2012.

We lead with a survey of expert opinions on the challenges and opportunities facing Cybernetics and Systems Research. It reports views presented during a round table discussion at the EMCSR 2012 by computer scientist and complexity researcher **Dr Carlos Gershenson** (National Autonomous University of Mexico), biochemist and network scientist **Prof Péter Csermely** (Semmelweis University, Budapest), computational neuroscientist **Prof Péter Érdi** (Hungarian Academy of Sciences), philosopher of science **Prof Helena Knyazeva** (National Research University, Moscow), and systemic sustainability and organizational renewal expert **Prof Alexander Laszlo** (Syntony Quest, USA, and Bainbridge Graduate Institute, Washington). The discussants were united in the view that Cybernetics and Systems Research (CSR) will be essential for addressing 21st century challenges such as rapid urbanization, instability, overpopulation, and climate change. While confident of the power and potential of CSR they also point out its present limitations. Firstly, the major transitions in nature (e.g. the emergence of vitality, sentience and sapience) are still not understood. Secondly, although CSR is now finding application in

both the sciences and the humanities it does not yet provide a bridge between them. The authors however suggest that CSR can provide a common language and a common vision for addressing these challenges.

We are pleased to present in this issue a landmark paper by three researchers from the Russian Academy of Sciences, physicist and mathematician **Dr Boris Kulik**, information technologist **Prof Alexander Fridman**, and open systems modeling specialist **Dr Alexander Zuenko**. Their paper presents new advances on work originally presented at the EMCSR 2010 [1]. It is about a new algebra (N-tuple Algebra (NTA)) they developed initially for solving certain problems in artificial intelligence, such as simulating logical systems and reducing the complexity of algorithms of logical inference [2]. Such theories are essential for modelling systems of all kinds, because the logical integrity of abstract systems map the causal integrity of concrete systems. However, gaining an understanding of concrete systems via modelling is hampered by the fact that we do not yet have a general theory of relationships [3, p. 1297], and hence of an essential ingredient of systemicity. This is particularly problematic in cases where the assumptions/boundary conditions are uncertain, changing or evolving, and/or where the relationships are only partially known or subject to variation. In this issue of **Systems** Dr Kulik and his colleagues present a major development of NTA, showing how it can be used to model cases involving such uncertainties and probabilities. While this is not yet a completely general theory of relationships it is a major contribution towards establishing such a theory, and enables forms of analysis not previously possible.

In the next contribution we present a different approach to modelling conceptually complex phenomena. In his paper systems scientist and complexity researcher **Prof Manfred Füllsack** (University of Graz) explores the possibility of using agent-based models to represent the meaningfulness of communications in social systems. The question of how meaning can arise on evolutionary grounds from antecedent systems for which meaning is not a category, is a central puzzle in systemic analysis. Prof Füllsack's work is at the forefront of computational approaches to this problem, and in his present paper he argues that Niklas Luhmann's constructivist theories, long considered beyond empirical quantification, in fact does have an empirical analogy, namely in the communication models that evolve in computer-based multi-agent simulations and in mathematical game theory.

A concern for similar questions is evident in the contribution by cyber-artist and media researcher **Prof William Seaman** (Duke University). He surveys the historical development of ideas from cybernetics, robotics and AI concerning the notions of 'soft' human qualities such as benevolence, insight, creativity and sentience in relation to embodied processes, and reflects on the challenge and possibility of designing and building systems that display such qualities. As he makes clear, it may be that it is only through the effort to develop the conceptual and theoretical apparatus needed to design and build such systems that we will only come to truly understand the nature of these qualities in ourselves.

Staying with the theme of meaning and communication, philosopher **Prof Iryna Predborska** (National Pedagogical Dragomanov University, Ukraine) considers the role of education in the light of Edgar Morin's complexity theory. Granted the modern insight of the complexity of the world we live in, she sees education not only as a possibility arising from complexity but more importantly she advocates for our duty to use education to prepare new generations of persons to function adequately in a complex world. .

In closing this issue we present a paper on the use of simulation models using cellular automata in epidemiology studies, by computer scientists **Prof Jones Albuquerque** and **Prof Silvana Bocanegra** (both from the Federal Rural University of Pernambuco, Brazil), physicists **Dr Jordi Ferrer-Savall** and **Prof Daniel López-Codina** (both from the Universitat

Politécnica de Catalunya, Barcelona), biologist **Prof Marco Antonio de Souza** (Universidade Federal do Espirito Santo, Brazil), and public health scientists **Dr Reinaldo Souza-Santos** and **Dr Constança Barbosa** (both from the Fundação Oswaldo Cruz, Brasil). In their study, they show that a cellular automata simulator can be effective in predicting many important epidemiological parameters, including predicting where and when lack of intervention can lead to infections becoming endemic. As they also show the computational cost of a cellular automata simulator is low, and therefore such simulators can be valuable tools for assisting in the monitoring, diagnosis and containment of infectious diseases that occur over extensive domains.

Finally, as this is the last issue for 2013 I would like to thank all the people who worked so diligently behind the scenes to make volume 1 possible, especially the Production Editor **Mag. Robert Bichler** (University of Salzburg) for his tireless work in doing the copy-editing and layout, and also the many members of the **Editorial Board** who have given so selflessly of their time to act as peer-reviewers. On behalf of myself and the authors whose work has appeared in **Systems**, *thank you* for helping us all to connect matter, life, culture and technology in the interests of creating a better world.

References

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