
Guest editorial: CyberSystemic implications on the future of societies

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2901

1. Introduction

Important world institutions, such as the United Nations (UN), the World Health Organisation (WHO) and the Organisation for Economic Co-operation and Development (OECD) are publicly recognising the highly interconnected nature of our world and, therefore, the relevance of systemic thinking and cybernetics as leading knowledge foundations to deal with the complexity of economic, social and environmental issues. This recognition by major international agencies of the CyberSystemic nature of global problems makes it apparent that in the context of the World Organisation of Systems and Cybernetics, more than ever, we need to debate and develop current ontological, epistemological and methodological approaches to understanding the future of humanity.

Cybernetic and systems scientists from all around the globe have made important contributions to key issues of human society over the decades. They have contributed to resolving epistemological and methodological issues relevant to social organisations, communities and digital technology, as well as to research in space exploration, the fight against terrorism, self-organisation for strategic projects and many more.

During the preparation and holding of the congress, its participants actively discussed the problems of increasing challenges and threats to humanity associated with the introduction of digital technologies and artificial intelligence (AI). By focussing on the safe development of a wide range of social systems, individuals, communities and organisations, countries and civilisations can join their efforts on all levels.

We aim in joining CyberSystemic scientists, particularly young researchers, with senior managers and practitioners to debate pressing economic, social and ecological problems of humanity at all levels, from local communities to global societies.

For this purpose, the discussions are set on four themes: first, philosophical and methodological foundations for the development of the systems approach and cybernetics; second, the cybernetics of society, ecology and governance; third, subject, digital technologies and physical realities merging into a hybrid reality, and fourth, the transdisciplinarity of systems sciences and cybernetics applied to the further developing of knowledge areas, such as education, medicine, economics and arts.

In the editorial, each special issue paper is highlighted, and in the conclusions, the synthesis of their interdisciplinary contents provides a CyberSystemic transdisciplinary perspective of the Hybrid reality.

2. The special issue contributions

2.1 *Co-evolutionary hybrid intelligence is a key concept for the world intellectualisation* (Krinkin et al., 2023)

The study aims to show the inconsistency of the approach to developing AI as an independent tool (just one more tool humans have developed). It describes the logic and the concepts of intelligence development regardless of its substrate – a human or a machine – and evidences that the co-evolutionary hybridisation of the machine and human intelligence will



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make it possible to solve the problems inaccessible to humanity so far (global climate monitoring and control, pandemics, etc.).

The development process of intelligence (as mutual development (co-development) of human and AI) should correspond to the property of increasing cognitive interoperability. The degree of cognitive interoperability is arranged in the same way as the method of measuring the strength of intelligence. It is stronger if knowledge can be transferred between different domains on a higher level of abstraction.

The key factors behind the development of hybrid intelligence are interoperability: the ability to create a common ontology in the context of the problem being solved, plan and carry out joint activities and co-evolution: ensuring the growth of aggregate intellectual ability without the loss of subjectness by each of the substrates (human and machine). The rate of co-evolution depends on the rate of knowledge interchange and the manufacturability of this process.

The intelligence development should take place within the framework of integrating the following four domains: global challenges and tasks, concepts (general hybrid intelligence), technologies and products (specific applications that satisfy the market's needs).

2.2 Transferring artificial intelligence practices between collaborative robotics and autonomous driving (Zorman et al., 2023)

For technologies like collaborative robotics and autonomous driving, which focus on closing the gap between humans and machines, human individuals' physical, psychological and emotional needs are becoming increasingly important to ensure effective and safe human-machine interaction. The authors try to conceptualise ways to combine experience from both fields and transfer AI knowledge from one to another. By identifying transferable meta-knowledge, the authors will increase the quality of AI applications and raise safety and contextual awareness for users and the environment in both fields.

Autonomous driving and collaborative robotics' connection to AI are examined. The authors expect that autonomous driving and collaborative robotics will start moving closer in the following years and even merging in some areas like driverless and human-less transport and logistics.

The research proposal focusses on the aspects that should positively impact safety, complement and optimisation; augment human capabilities and increase productivity in line with social expectations.

2.3 On the dynamic neural network toolbox design for identification, estimation and control (Chairez et al., 2022)

The study elaborates on a version of the dynamic neural network (DNN) toolbox that can identify the black box's dynamics and restore the system's underlying laws using known inputs and outputs. Depending on the completeness of the information, the toolbox allows users to change the DNN structure to suit specific tasks.

The toolbox consists of three main components: the user layer, network manager and network instance. The user layer provides high-level control and monitoring of system performance. The network manager serves as an intermediary between the user layer and the network instance and allows the user layer to start and stop learning, providing an interface to indirectly access the internal data of the DNN.

Control capability is limited to adjusting a limited number of numerical parameters and selecting functional parameters from a predefined list.

The key feature of the toolbox is the possibility of developing an algorithmic semi-automatic selection of activation function parameters based on optimisation problem solutions.

2.4 Requisite trust requirements for digital society development (Ototsky et al., 2023)

The paper demonstrates the importance of the requisite trust in the digitalisation processes of business, the state and society.

It provides the analysis results of multiple digitalisation projects, and it leads and generates some higher-level principles useful for description, most of them trust, umwelt and complexity.

Based on the analysis of empirical material, the principle of requisite trust is introduced and elaborated by the definition of trust through a “relevant umwelt”. In addition, the article examines many aspects of society’s digitalisation processes using cybernetic concepts. It is shown that:

- (1) In the core of the digitalisation process is the export of the umwelt from the human head to a computer (digital umwelt);
- (2) Models used in the digital platforms are not only a reflection of social processes, but also have a significant impact on them, like the observers of cybernetics of the second order and
- (3) Umwelt concepts are closely related to a social reality concept; meanings are relative and are carried by the communication systems.

The principle of requisite trust and the definition of trust through the relevant umwelt are original. Promoting trust in organisations and digital organisations using such instruments as a social responsibility standard has a high practical value.

The paper summarises practical and theoretical experience in digital projects and introduces the law of requisite trust. In the future, this principle should be studied more formally in quantitative terms.

2.5 Data sharing concepts: a viable system model diagnosis (Perko, 2023)

AI reasoning is fuelled by high-quality, detailed behavioural data. These data can usually be collected from the biometrical sensors embedded in smart devices. In this paper, a new data-sharing concept is proposed, in which data producers execute their data property rights instead of surrendering them to data collectors.

Since data-sharing concept delivers a substantially different alternative, it needs to be thoroughly examined from multiple perspectives: ethical, social and feasibility.

Data sharing could lead to virtuous data science by augmenting data producers’ capacity to govern their data and regulators’ capacity to interact in the process. Truly interdisciplinary research is proposed to follow up on this research.

Data-sharing concepts can provide an alternative approach and help resolve multiple ethical considerations related to the Internet of Things (IoT) data-collecting approach. It will provide numerous new challenges, such as designing distributed data storing, distributed data analysis and intelligent data sharing protocols. Data sharing can significantly change research and development by introducing a data negotiation process where ethical, legislative moral and trust-related issues are addressed at an instance level. The data-negotiation process standardises data sharing and makes the data pool for virtuous research in social sciences generally accessible.

2.6 Social network analysis to understand the dynamics of global supply chains (Meisel et al., 2023)

The paper aims to increase the understanding of collaborative relationships and assess, according to the project size, the influence of the contributory factors in shaping collaboration network structure in projects developed in global supply chains (GSC).

A case study methodology is applied to eight global projects developed by an Austrian company leader in global market intra-logistics solutions and warehouse automation. Two approaches in network analysis are used to examine the cases. First, the visual and descriptive analysis describes the network's structural aspects. Additionally, stochastic network analysis is used to evaluate the influence of contributory factors on the structure of the collaboration network.

The results show that independent of the project size and project manager influence, project team roles (PTRs) with reciprocal communication amongst other PTRs tend to have higher collaboration intensity (CI). Additionally, the results highlight the influence of the project manager in shaping the collaboration network in standard projects (STPs) and small projects (SMPs). According to the project size, the results show that the PTRs that form complete triangles or clusters or who frequently communicate with each other tend to have a high CI, being more evident in these tendencies in large-scale projects than STPs and SMPs.

This research provides a framework to identify the key actors and contributory factors in shaping collaborative relationships in GSC. The findings could support decision-making and formulation strategies for effective collaborative relationship management in GSC.

2.7 Dark personality triad and cyber entrepreneurial intentions – mediation of cyber entrepreneurial self-efficacy and moderation of positive thinking (Ishfaq, 2022)

In order to dig down the phenomenon of cyber entrepreneurial intentions (CEIs), this study entails investigation of both direct and indirect effects (through cyber entrepreneurial self-efficacy (CESE) of the dark personality traits (e.g., Machiavellianism, narcissism and psychopathy). It also aims to investigate the moderating role of positive thinking (PT) on the association between CESE and CEIs.

Data are collected, using personally administrated questionnaires, from students enrolled in business and IT programmes in large public sector universities in three waves to tackle common method bias. A total of 641 useful responses were considered for analysis purposes.

The results reveal that not all dark triad dimensions influence CEIs and CESE. Narcissism is the only positive predictor of both the outcome variables (CESE and CEIs). Specifically, psychopathy positively influences CEIs whilst its effects on CESE are negative. Machiavellianism does not predict CESE; however, it negatively influences CEIs. In addition, CESE mediates the association between narcissism and CEIs; however, PT strengthens the relationship between CESE and CEIs.

Research limitations/implications – The study collected data from a country with low entrepreneurs; therefore, results may vary for countries with many entrepreneurs.

The study's findings offer theoretical and practical implications whilst highlighting the role of dark personality traits and their link with the CESE and CEIs.

There is a dearth of literature on CEIs, which this study extends through dark personality traits (Machiavellianism, narcissism and psychopathy). This study also explored the mediating mechanism of CESE and the conditional role of PT between dark personality traits and CEIs.

3. Conclusions

The special issue builds upon the hybrid reality concept by proposing a hybrid intelligence directed towards co-evolutionary human-AI intelligence development (Krinkin *et al.*, 2023). The proposal intends to close the gap between research, work and free time. The authors propose interdisciplinary co-operation to receive transdisciplinary results.

A case of collaboration relations between a driver and an automated vehicle is examined by Zorman *et al.* (2023), where co-evolution and the need for interdisciplinary co-operation are

identified. The authors expect at least a partial merger of research in autonomous driving and collaboration, including driverless and human-less transport and logistics.

Another level of standardisation is proposed by [Chairez et al. \(2023\)](#) in the field of AI modelling. The authors propose a version of the DNN toolbox that can be used to identify the dynamics of the black box and restore the laws underlying the system using known inputs and outputs, featuring the possibility of developing an algorithmic semi-automatic selection of activation function parameters based on optimisation problem solutions.

[Ototsky et al. \(2023\)](#) introduces the concept of requisite trust, which is used in the digitalisation processes and is verifiable. Additionally, it examines multiple aspects of society's digitalisation processes using cybernetic concepts, for instance, exporting human umwelt to the digital environment, the digital modelling of the real world to the real world and the digitally processed social reality concepts. These concepts are related to a requisite level of digitally (un)verifiable trust in digital and real-world perspectives.

[Perko \(2023\)](#) examined the concept of data sharing using VSM. He proposes and verifies a standardised, ethically acceptable data-sharing model based on the importance of personal behavioural data, fuelling AI reasoning. The proposed concept changes the locus of control from data collectors to data producers by providing data producers with data ownership rights.

As a modus operandi, a standardised data negotiation process is proposed, where AI agents of data producers, data collectors and regulators negotiate on data sharing terms. A standardised data-sharing concept would provide a ubiquitous safe environment overcoming several impediments of the currently used data collecting concept.

[Meisel et al. \(2023\)](#) connect the properties of digital social networks with GSC. The authors suggest that, according to the project size, the PTRs form complete triangles or clusters or who frequently communicate with each other in social networks and tend to have high CI, especially in large-scale projects.

Their research provides a framework to identify the key actors and contributory factors in shaping ubiquitous collaborative relationships. The findings could support decision-making and formulation strategies for effective collaborative relationship management in GSC, connecting the private, the business, the digital and the real world.

By examining the dark personality traits related to CEIs, [Ahmed and Islam \(2023\)](#) provides two perspectives: on one side, the actual danger of encountering ill-minded individuals and organisations in cyberspace, and on the other side, the behavioural data analysis capacity in examining personal properties.

The complexity of digital space is exponentially increasing. In this special issue, several CyberSystemic examinations and conceptual proposals, combined with behavioural research results, form a whole unit in which an engaged reader can find crucial parts of a blueprint for designing a safer, supportive and productive digital environment driven by a combined force of ethical principles, individual engagement, organisational resources and AI capacities.

Igor Perko

Faculty of Economics and Business, University of Maribor, Maribor, Slovenia

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