

## Guest Editorial: Management of Digital EcoSystems – Recent Trends, and Open Issues

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Nowadays modern, technically, and technologically highly progressed society and the rapid development of numerous ICT disciplines bring new smart, intelligent, interconnected socio-technological components and services in everyday life. One of the new concepts and challenging paradigms is digital ecosystem. It represents a group of interconnected information technology resources within a functional unit. Digital ecosystems consist of a wide range of participants and components like suppliers, customers, but also applications, third-party data service providers and all numerous supportive respective technologies. The ecosystem's success is highly dependent on interoperability.

Digital ecosystems are frequently supported by market share leaders and they are quickly influencing changes in various industries, cyber-physical systems, business processes, healthcare and other domains. Some characteristic technical, legal, and business-related difficulties found in digital ecosystems as well as service orchestration, customer engagement, and data management are significant research and practical challenges.

In today's ICT supported world numerous entities are engaged in all forms of interactions mimicking the social world of humans. It influences different producers of data (the Web, Internet of Things, Sensors, etc.), consumers of data (end users, applications, systems, etc.), networking capabilities to ensure data transfer and sharing, data-enabled services, processes (including AI and big data), deployment infrastructures (e.g., cloud computing), processing capabilities, visualization, and reporting facilities. Services underpinning such ecosystems also must satisfy non-functional requirements such as performance, security, and data privacy.

This special section contains revised and extended versions of papers presented at the 14th International Conference on Management of Digital EcoSystems (MEDES 2022), which was held in Venice, Italy during the period October 20th to 21st. The conference aim was to explore the manifold challenges and issues related to web technologies and resource management of Digital Ecosystems, and how current approaches and technologies can be evolved and adapted to this end. Ten papers have been selected for the present section, whereas after standard reviewing procedure of ComSIS Journal four papers have been accepted to be published in this section.

The aim of this special section is to share the experiences in some of recently interesting and challenging trends and issues of digital ecosystems but also to help stakeholders and researchers in academia and industries to gain insights into digital ecosystems potential in practice.

The first paper entitled “DG\_Summ: A schema-driven approach for personalized summarizing heterogeneous data graphs” by Amal Beldi et al. contributes to the area of modelling data graphs. The focus is on summarizing data from multiple sources using a schema-driven approach and visualizing the summary graph adjusted to the needs of users. Authors pointed out challenges and importance of identifying trends in the processing of vast amounts of data in different domains and considered graph summarization as an effective framework aiming to facilitate the identification of structure and meaning in modelling data graphs in medical domain. The problem of graph summarization has been recently intensively studied and many approaches for static contexts are proposed to summarize the graph. However, these approaches are computationally prohibitive and do not scale to large graphs in terms of both structure and content. An additional problem is that there is no proposed framework which provide summarization of mixed sources with the goal of creating a dynamic, syntactic, and semantic data summary. The innovative approach proposed by authors is promising and can be useful for researchers in other domains as well.

The second paper entitled “A faceted discovery model architecture for cyber-physical systems in the web of things” by Juan Alberto Llopis et al. presents a discovery model architecture for cyber-physical systems based on the web of things. The approach is based on proactive discovery, recommendation, federation, and query expansion. As a consequence of intensive research efforts in this area, more complex cyber-physical systems are being developed and integrated with web technologies, supporting smart city scenarios with thousands of devices available to be discovered online. For successful realization some capabilities related to locating, registering, and consulting devices must be provided to adapt to the continuous changes in cyber-physical systems. Authors considered an example scenario where the proposed architecture has been implemented with different topologies using edge computing facilities. The obtained results show that the capabilities of the discovery model architecture facilitate the discovery of cyber-physical systems in different smart environments.

The third paper entitled “Systematic exploitation of parallel task execution in business processes” by Konstantinos Varvoutas et al. is focused on business process re-engineering/optimization as a core element of business process management (BPM). Authors proposed a novel approach which considers resource allocation and model modifications in a combined manner, where an initially suboptimal resource allocation can lead to better overall process executions. The main contributions are: (1) a variant of the representation of processes as Refined Process Structure Trees with a view to enabling novel resource allocation-driven task re-ordering and parallelization, and (2) to introduce a resource allocation paradigm that assigns tasks to resources taking into account the re-sequencing opportunities. The presented results, based on experimental cases, show significant improvements, and decrease in cycle time.

The last paper entitled “Ownership protection system for partial areas on image data using Ethereum blockchain” by Natsuki Fujiwara and Shohei Yokoyama proposes a novel method that utilizes blockchain to protect the ownership of specific regions within image data. They considered various values that are assigned to each region of image based on its importance. Particular regions are individually encrypted protecting their privacy. Non-fungible tokens (NFTs) are used to protect the key image and to manage the ownership of each object on the image data. The ownership NFT and the key NFT are verified to

match by the judgment function. Adopted method allows different values to be assigned to different parts of an image, facilitating the transfer and sharing of ownership.

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Finally, we hope that readers will enjoy the content of this special section, and that it will inspire them for high quality research in this modern and attractive area.

