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*IFIP is the global non-profit federation of societies of ICT professionals that aims at achieving a worldwide professional and socially responsible development and application of information and communication technologies.*

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The working conferences are structured differently. They are usually run by a working group and attendance is generally smaller and occasionally by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is also rigorous and papers are subjected to extensive group discussion.

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Luis M. Camarinha-Matos ·  
Angel Ortiz · Xavier Boucher ·  
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# Collaborative Networks in Digitalization and Society 5.0

23rd IFIP WG 5.5 Working Conference on  
Virtual Enterprises, PRO-VE 2022  
Lisbon, Portugal, September 19–21, 2022  
Proceedings

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# Preface

The widespread digital transformation in industry and services is strongly enabled by the results achieved through more than two decades of research and development in the inter-disciplinary collaborative networks (CNs) area. The paradigm of Society 5.0, recently established, is rapidly gaining importance and awareness as a disruptive concept for most economic sectors. This 5.0 paradigm is having a direct impact on organizations, affecting their journey towards digital transformation, innovative working environments, and new organizational modes.

The term “digitalization” still represents a major ongoing transformation in industry and services. The adoption and integration of a large variety of novel information and communication technologies leads to more efficient, flexible, agile, and sustainable systems. Digitalization became one of the key aspects of Industry 4.0. Current trends towards Industry 5.0 introduce a complementary view, targeting a sustainable, human-centric, and resilient industry. Of course, the notion of resilience, notably based on agile capabilities of processes, organizational structures, and business models has seen increasing growth over the three last years due the strong disruptive crisis the world has faced. However, even for the industrial sector, increasing the resilience capacity of our modern societies cannot be addressed solely with an economy-centered vision. Social and human factors are strongly questioning the capacity to maintain the right level of skills and competencies required for a global industrial resilience; most industrial sectors are being affected by unforeseen factors of an ecological, political, or energy- or climate-related nature. The nature of Industry 5.0 is necessarily multi-dimensional, with the need to collaborate at a large scale, and goes beyond the potential contradiction between resilience, human factors, and sustainability. Current crises have highlighted the need for collaboration as a crucial success factor at all granularity levels (country, ecosystem, company, human actor, and even human-machine cooperation levels).

Beyond Industry 5.0, this multi-dimensional complexity affects many other activity sectors. In all these fields, the integration of resilience, human factors, and sustainability represents the key challenge, leading to the development of Health 5.0, Agriculture 5.0, Cities 5.0, Logistics 5.0, Education 5.0, or even Tourism 5.0. The notion of Society 5.0 represents a comprehensive strategy on science, technology, and innovation aiming at a people-centric super-smart society. With an eye on these diverse application fields, PRO-VE 2022 provided a forum for sharing experiences, discussing trends, and identifying new opportunities together with innovative solutions to cope with challenges ahead towards a collaborative Society 5.0. The conference contributions came from both the engineering/computer science and the managerial/socio-human communities, including industrial and electrical engineering, computer science, manufacturing, organization science, logistics, managerial, and social sciences. These multiple points of view fuel both the interdisciplinary nature of the research and development of

collaborative networks, as well as the multidisciplinary networking spirit of the PRO-VE working conferences.

PRO-VE 2022, the 23rd IFIP Working Conference on Virtual Enterprises, was held in Lisbon, Portugal, during September 19–21, 2022. The event was the latest in the series of successful conferences which began in 1999 and have been held at various locations throughout Europe and in Brazil.

These proceedings include selected papers from the PRO-VE 2022 conference submissions. They provide a comprehensive overview of major challenges of the Society 5.0 transition journey, covering the following topics:

- AI and digital transformation for collaborative systems
- Distributed cognition in collaborative systems
- Collaborative, resilient, and sustainable business models and production systems
- Collaborative business ecosystems
- Cyber-physical systems and their applications in CNs
- Value creation and impact of CNs
- Smart collaborative logistics and transportation networks
- Human-machine collaboration
- Hybridization of collaboration – organizations, people, machines, systems
- Agility, resilience, and sustainability of networked organizations
- Human-centric and resilient collaborative systems
- Industry 5.0, Agriculture 5.0, Healthcare 5.0, and Society 5.0
- Ethics, security, and trust
- Collaborative digital innovation hubs
- Applications and case studies in multiple fields

A total of 55 papers were accepted from 119 papers submitted for peer review, which is an acceptance rate of 46.2%. The review process was double blind, with 3.5 average reviews per submission and 4 papers on average per reviewer.

We would like to express our thanks to all authors for their contributions, originating in academia, research institutions, and industry. Continuing with the tradition of the PRO-VE conferences, we hope this collection of papers will represent both a valuable tool for those interested in research advances and emerging applications in collaborative networks, and in identifying future open challenges for research and development in this area. Finally, we would also like to show our extreme appreciation for the time, efforts, and dedication shared by the members of the PRO-VE International Program Committee, who provided their support in the selection of articles for this conference and provided valuable and constructive comments to help authors to improve the quality of their papers.

July 2022

Luis M. Camarinha-Matos  
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