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FACULTY OF  
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## Contact

E-mail: [ceciis@foi.unizg.hr](mailto:ceciis@foi.unizg.hr)  
Phone: +385 42 390 890  
Fax: +385 42 213 413  
Web: [ceciis.foi.hr](http://ceciis.foi.hr)  
Fb: [facebook.com/ceciis.foi](https://facebook.com/ceciis.foi)

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## Preface

We are pleased to present to you the Proceedings of the Central European Conference on Information and Intelligent Systems 2023. We trust that this compilation will prove to be both valuable and inspiring to you.

Contained within these Proceedings are the full text conference papers from the Central European Conference on Information and Intelligent Systems (CECIIS), an annual international event. This conference is organized by the Faculty of Organization and Informatics Varaždin, Croatia, and hosted by the University of Dubrovnik in Dubrovnik. The event took place from September 20<sup>th</sup> to 22<sup>nd</sup>, 2023. CECIIS has successfully convened for over three decades, with the aim to be the interface between scholars and professionals within the field of information and intelligent systems and related domains and the official language of the Conference is English.

Under the thematic focus of "Digital Human," CECIIS 2023 was designed to facilitate scholarly exploration and discourse on the transformative opportunities and challenges of digital technologies. The term digital human is included in a wide area of topics related to interaction of human beings in an evolving digital environment. Society is changing due to digital technologies while we, as humans, live part of our lives on social networks, metaverse and interact with artificial intelligence. ChatGPT is an important milestone in the development of AI but also in the evolution of digital humans. We can expect more advanced modalities of human augmentation and further immersion in the digital environment. At the most advanced level, we will have a digital human as a computer-generated representation of a human being. This can take many forms, from a simple avatar used in a video game to a highly realistic, photorealistic rendering used in films or virtual reality. The technology will create more advanced digital representations that are going to be increasingly indistinguishable from real humans. One of the key advantages of digital humans is that they can be created and customized quickly and easily. This allows a wide range of applications, from entertainment and gaming to training simulations and even medical and psychological research. However, the use of digital humans also raises some ethical questions. Further, the new digital dimension redefines our personal and social interactions impacting on our understanding of ourselves as humans, and on the relations with others and with the milieu. We are still unsure about the impact of these advanced technologies on education, labour market, economy, human rights and many other areas. In search of answers, we have to act within large-scale interdisciplinary collaborations and try to find the best approach to understand the future that has already started.

It is also pertinent to emphasize that the convergence of Program and Organizing Committee members, academics, and experts from diverse fields allows us to create a cross-disciplinary approach of the conference. This format propels discussions towards topics poised to emerge prominently in the near future, while concurrently facilitating valuable networking among individuals with varied domains of expertise, their collective insights contribute substantial value to the fabric of CECIIS.

The Proceedings of CECIIS 2023 encompass 59 meticulously reviewed scientific papers. These papers were subject to rigorous peer review by no fewer than two independent evaluators and subsequently endorsed by the international Program Committee. The papers span an array of categories including Computer Games, Data and Knowledge Bases, Digital Human, Digital Transformation and Corporate Culture, Education and Learning Analytics, ICT Entrepreneurship and Innovation, Intelligent Energy, Intelligent Systems, Quality in ICT, Strategic Planning and Decision Making, Systems for Smart Mobility, and Trends in Software Engineering. The selection of these papers hinged upon their relevance, innovativeness, applicability to the information and intelligent systems domain, and overall scholarly merit.

The review process itself has been conducted with the dedication of 104 reviewers, of which 48 were from Croatia and 56 from abroad. Collectively, they conducted 148 reviews, culminating in the acceptance of 59 papers. Authored by 161 individuals representing 16 nations, these papers were subsequently presented at the conference. Following the conference, a subset of chosen papers will undergo further review, potentially leading to extended publication within the Journal of Organizational and Information Sciences (JIOS), the international scientific publication published by the Faculty of Organization and Informatics.

A pivotal hallmark of this year's conference lies in the distinguished invited keynote speakers, individuals whose intellectual contributions have shaped their respective spheres of scientific and professional inquiry. CECIIS 2023 was honoured to host the following keynote speakers:

Professor Lode Lauwaert, Ph.D., who addressed the topic of "Ethics of risk in the context of AI". Professor Lauwaert is professor of technology at KU Leuven (Belgium), where he also holds the Chair Ethics and AI. His current research is on AI from the perspective of both environmental ethics and cross-cultural ethics.

Damir Bogdan, CEO of uptownBasel Infinity presented the topic "How Technologies of tomorrow will impact our Industries today - an overview about Quantum Computing". Damir Bogdan is heading a Center of Excellence for Quantum-computing and AI, QuantumBasel. He is also CEO of Actvide AG, a consulting company specialized on transformation within the digital age, leading C-Levels into the new future. He is engaged at Plug and Play, Silicon Valley's largest innovation platform. Damir Bogdan is multiple Board-Member within the Health Care, High-Tech and Industry sector. He is Senior Advisor at IWI University of St. Gallen and member of several Swiss startup committees and juries. He is a well-booked keynote speaker and panellist on digital transformation, cultural change, disruption, and startups.

In tandem with the scholarly sessions, the conference showcased two sections dedicated to poster presentations. Notably, this encompassed 6 scientific research posters and 20 student-generated posters. A collaborative effort involving 50 authors, these posters contributed to the intellectual tapestry of the conference.

A particularly insightful component of the program was the panel discussion titled "Science and AI", aptly moderated by Professor Neven Vrček, Ph.D., from the Faculty of Organization and Informatics University of Zagreb, Croatia. Esteemed panellists converged to share their perspectives on application of artificial intelligence in scientific context. Topics encompassed novel AI-driven technologies, associated opportunities, benefits, challenges, and their applications in scientific context.

We extend our sincere thanks to all contributors who enriched the Conference program and these Proceedings. This encompasses our esteemed keynote speakers, authors, reviewers, session chairs, as well as the Program and Organizing Committee members whose dedication was instrumental. The formidable support rendered by the Faculty of Organization and Informatics underpins the unequivocal success of the conference.

Lastly, profound appreciation is extended to our esteemed academic and industrial partners and sponsors whose unwavering support made CECIIS 2023 a resounding achievement. Collaboration with the Faculty of Transport and Traffic Sciences of the University of Zagreb, Faculty of Electrical Engineering and Computing of the University of Zagreb, Faculty of Electrical Engineering, Computer Science and Information Technology Osijek, and the University of Dubrovnik was central to the conference's realization. Financial support from sponsors including InfoDom d.o.o., SICK Mobilisis d.o.o., Oracle d.o.o., Factory X d.o.o. and Automobil Lončar was invaluable.

In conclusion, it is our sincerest hope that the participants of CECIIS 2023 found their experience enriching and productive, and that they find relevant and interesting papers in the following pages. The enduring connections forged with participants over the years reinforce our commitment to continuous improvement. Anticipation is already building for the forthcoming Central European Conference on Information and Intelligent Systems slated for the autumn of 2024.

September, 2023

On the behalf of the Program and Organizing Committees

Neven Vrček, Luis de Marcos Ortega and Petra Grd  
Editors



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