



HUMAD 2024: International Workshop on Human-Centered Modeling and Adaptation for Digital Transformation

Alessandro Sebastian Podda
Dept. of Mathematics and Informatics,
University of Cagliari
Cagliari, IT
sebastianpodda@unica.it

Livio Pompianu
Dept. of Mathematics and Informatics,
University of Cagliari
Cagliari, IT
pompianu.livio@unica.it

Roberto Saia
roberto.saia@unica.it
Dept. of Mathematics and Informatics,
University of Cagliari
Cagliari, IT

Simone Balloccu
balloccu@ufal.mff.cuni.cz
Institute of Formal and Applied
Linguistics (UFAL), Charles
University
Prague, CZ

Angelo Salatino
angelo.salatino@open.ac.uk
Knowledge Media Institute, The Open
University
Milton Keynes, UK

ABSTRACT

While digital transformation brings broad positive impacts, its rapid propagation varies across territories, accentuating disparities not only in the social and organisational contexts but even in industrial sectors. Acknowledging this digital divide, the HUMAD workshop aimed to reshape industrial and digital landscapes for equity and accessibility, specifically emphasising the pivotal role of user modelling and artificial intelligence. Discussions centred on personalised user modelling and holistic, human-centred approaches tailored for an industrial context. The workshop explored applications in critical sectors, including smart cities, tourism, industrial production, healthcare, education, and well-being, focusing on delivering quality digital interactions and services tuned to industrial and human-centric needs. The objective was to elevate the quality of digital interactions and services, ensuring a more uniform and inclusive distribution of the benefits of industrial digital transformation. Beyond immediate concerns, HUMAD delved into user modelling's potential to drive growth in disadvantaged territories. By comprehending the unique challenges these regions face, the aim was to cultivate sustainable solutions within an industrial framework. In the light of the above, we invited contributions that navigate the intricacies of user modelling, proposing innovative strategies to reduce disparities and develop a more equitable, human-centric digital future.

KEYWORDS

digital transformation, human-centred modelling, artificial intelligence, adaptive methods

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1 INTRODUCTION

Advancements in user modelling, artificial intelligence and recommendation systems have transformed the digital landscape, offering unprecedented opportunities for societal progress. However, the benefits of these technologies are not uniformly distributed, creating a digital divide that affects disadvantaged territories and communities [8]. To face this issue, we proposed a workshop aimed at exploiting novel techniques, approaches, methods and applications to bridge such a digital gap, stimulate social and economic growth [7], and enhance processes and services for citizens through digital means. In an era where digital literacy is becoming synonymous with social empowerment, human-centred modelling and adaptation method can represent innovative solutions [13] that not only speed up the digital transformation [6] but actively contribute to the growth of disadvantaged territories [5].

The HUMAD workshop was strategically designed to complement, rather than duplicate, the themes of the main conference. By promoting inclusivity and digital accessibility, our discussions amplified the impact of the main conference topics such as Personalised Recommender Systems, Knowledge Graphs, Semantics, Social and Adaptive Web, Intelligent User Interfaces, and more. In more detail, concerning the main conference topics, the workshop:

- took an in-depth look at user modelling to create adaptive learning environments that meet diverse needs, ensuring education is accessible to all, regardless of digital skills or geographic location [11];
- explored ways to integrate ethical AI practices ensuring that the benefits of AI and recommendation systems are equitably distributed while respecting user privacy [4];
- sought to leverage personalization techniques to promote positive behaviour changes and address societal challenges in disadvantaged regions, aligning with the broader goal of societal improvement [9];

- explored how these technologies can be tailored to be more effective in addressing the challenges faced by disadvantaged communities [1, 2];
- emphasised robust research methodologies [12] to ensure that the proposed solutions are not only innovative but also reproducible and scalable, as to define impactful technologies that can be deployed effectively in diverse contexts, including those with limited resources [3, 10].

Specifically, HUMAD covered topics including, but not limited to:

- Human-centred methods and approaches for digital transformation
- User modelling tools for the transition to smart environments (work, healthcare, cities)
- Digital solutions for disadvantaged areas
- Adaptation methods to foster the Smart Specialisation Strategy (S3)
- Artificial Intelligence (AI) methods and applications for digital transformation
- Digital solutions for socio-economic inclusion
- Adaptive work environments: AI and user modelling for employee well-being
- User-centric design patterns in software applications
- Human-AI collaboration in industrial applications
- Adaptive learning environments and AI-driven educational recommendations
- Digital transformation for industry and small and medium-sized enterprises
- Human-centric metrics and integrated platforms for sustainable development

2 SUMMARY OF CONTRIBUTIONS

Here we summarise the ten contributions that have been accepted for presentation at the workshop.

In the work "*Towards Zero-shot Knowledge Graph building: Automated Schema Inference*", the authors propose a novel approach to automatically generate entity schemas, eliminating the need for manual intervention and improving knowledge representation efficiency.

The authors of the work "*Blockchain Technology for Certifying Waste Management within the digital transformation for industry and SMEs*" present a model capable of improving waste management processes by utilising Blockchain, offering certification, and incentivising sustainable behaviours.

In "*Exploring Mental Well-being Monitoring through Personal Healthcare Devices*", the authors investigate a system to recognise various psychological parameters using data from personal healthcare devices, suggesting promising applications for mental well-being recognition.

The work titled "*Modelling Users for User Modelling: Dynamic Personas for Improved Personalisation in Digital Behaviour Change*" integrates behaviour change theories into user models, enhancing personalisation based on evolving user behaviours and preferences.

The work "*Modelling Patient-Therapist Collaboration for Brain Injury Rehabilitation in Virtual Reality*" explores the use of Virtual Reality (VR) in brain injury rehabilitation, highlighting changes

in patient-therapist interactions and offering insights for human-centred design of VR applications.

The authors of the work "*Charting the Landscape of Digital Health: Towards A Knowledge Graph Approach to News Media Analysis*" present a method for constructing a Knowledge Graph from news articles, offering insights into the evolution of Digital Health and serving as a resource for further research.

The work titled "*Design of an AI-driven Architecture with Arm Robots for Digital Transformation to Enhance Quality Control in the Food Industry*" proposes a novel architecture that leverages Artificial Intelligence (AI) and robotics to optimise cardboard disposal in food production, highlighting the broader impact of digital transformation on operational processes.

In "*Exploring Architectural Choices and Emerging Challenges in Data Management for IoT: A Focus on Digital Innovation and Smart Cities*", the authors investigate architectural choices for IoT data management, offering solutions for challenges in smart city applications and contributing to digital transformation strategies.

The work titled "*Towards Knowledge Graph Refinement: Misdirected Triple Identification*" proposes a classification-based approach to identify misdirected triples within Knowledge Graphs, assisting in graph refinement and improving KG effectiveness.

Finally, in the work "*RoadSense3D: A Framework for Roadside Monocular 3D Object Detection*", the authors introduce a methodology for generating datasets and deep learning models for monocular 3D object detection, addressing challenges in roadside environments and providing benchmark datasets for assessment.

3 ORGANIZING COMMITTEE

Simone Balloccu

Affiliation: Institute of Formal and Applied Linguistics (UFAL), Charles University (Czech Republic)

Email: balloccu@ufal.mff.cuni.cz | Website: <https://uccollab.github.io/>

Simone served as Co-chair for the past two editions of the Workshop on 3rd and 4th Human Evaluation of NLP Systems (HumEval 2023-2024), affiliated with RANLP 2023 and LREC-COLING 2024. He also served as an Organizing Committee Member for the 16th International Natural Language Generation Conference (INLG 2023) and the 24th Annual Meeting of the Special Interest Group on Discourse and Dialogue (SIGDial 2023).

Alessandro Sebastian Podda

Affiliation: Department of Mathematics and Informatics (DMI), University of Cagliari (Italy)

Email: sebastianpodda@unica.it | Website: <https://aibd.unica.it/people/sebastian-podda>

Alessandro served as Co-Chair for the 2021 and 2022 editions of the International Workshop on Artificial Intelligence methods for Smart Cities (AISC), affiliated with the EUSPN conference. He also served as an Organizing Committee Member of the international conference on Computational Intelligence methods for Bioinformatics and Biostatistics (CIBB 2017), as well as a TPC member of dozens of international conferences (including HT 2022, LOD 2021/2022/2023, IEEE HPCC 2022, IEEE CPS-COM 2021, and many others).

Livio Pompianu

Affiliation: Department of Mathematics and Informatics (DMI), University of Cagliari (Italy)

Email: pompianu.livio@unica.it | Website: <https://aibd.unica.it/people/livio-pompianu>

Livio served as Co-Chair for the 2022 edition of the International Workshop on Artificial Intelligence methods for Smart Cities (AISC), affiliated with the EUSPN conference. He also served as a web content chair for SEMANTICS 2024, as well as a TPC member of various international conferences (such as ESWC 2024, DAPPS 2024, BioFor 2023, HT 2022).

Roberto Saia

Affiliation: Department of Mathematics and Informatics (DMI), University of Cagliari (Italy)

Email: roberto.saia@unica.it | Website: <https://aibd.unica.it/people/roberto-saia>

Roberto served as Chair at several international conferences, such as Intelligent Systems Conference (INTELLISYS-2023), 19th International Conference on Security and Cryptography (SECRYPT-2022), 12th International Conference on Knowledge Discovery and Information Retrieval (KDIR-2020), 11th International Conference on Knowledge Discovery and Information Retrieval (KDIR-2019), 10th International Conference on Knowledge Discovery and Information Retrieval (KDIR-2018), 11th International Conference on Network and System Security (NSS-2017), 14th International Conference on Security and Cryptography (SECRYPT-2017), 8th International Conference on Knowledge Discovery and Information Retrieval (KDIR-2016), and 6th International Conference on Knowledge Discovery and Information Retrieval (KDIR-2014). He also served as TPC/PC member of numerous international conferences, such as RECSYS-2023, ICCSIT-2023, AISC-2023, AISC-2022, RECSYS-2021, WEBIST-2021, EBIST-2020, MLPRA-2018, EnCHIReS-2017, ICDM-2016, BigData-2015, and others still.

Angelo Salatino

Affiliation: Knowledge Media Institute, The Open University (United Kingdom)

Email: angelo.salatino@open.ac.uk | Website: <https://www.salatino.org/>

Angelo Salatino is a Research Fellow and Associate Lecturer at the Knowledge Media Institute (KMi) of the Open University. He is also an Associate Editor for CEUR-WS. Recently, he organised the 1st Intl Workshop on Scientific Knowledge Graph (SKG2020) held in conjunction with TPD2020, three editions of the Sci-K workshop co-located at The Web Conference (Sci-K 2021, 2022, 2023). In 2022, he was the Chair of the Special Track on “Advanced Representations of Scholarly Knowledge” (ASK) at the 26th International Conference on Science, Technology and Innovation Indicators. In 2024, he is Chair of the Practitioners Track at the Hypertext Conference, and Research Track Chair at SEMANTICS.

4 TECHNICAL PROGRAM COMMITTEE

The Technical Program Committee of the workshop included the following experts:

- Silvio Barra, University of Naples "Federico II", Italy
- Carmen Bisogni, University of Salerno, Italy

- Francisco Bolanos, The Open University, United Kingdom
- Sergio Consoli, European Commission - Joint Research Centre, European Union
- Nicola Elia, University of Bologna, Italy
- David Freire-Obregon, Universidad de Las Palmas de Gran Canaria, Spain
- Marco Grazioso, University of Naples "Federico II", Italy
- Alessandro Giuliani, University of Cagliari, Italy
- Lodovica Marchesi, University of Cagliari, Italy
- Marco Manolo Manca, University of Cagliari, Italy
- Alessia Pisu, University of Cagliari, Italy
- Siddharth Sekhar Singh, Indian School of Business, India
- Luigi Libero Lucio Starace, University of Naples "Federico II", Italy
- Claudio Tomazzoli, University of Verona, Italy
- Cesare Tucci, University of Salerno, Italy
- Samaneh Zolfaghari, Mälardalens University, Sweden

5 FINAL REMARKS

In this first edition, the HUMAD workshop extended the scope of the main conference themes by focusing on the critical intersection of user modelling and artificial intelligence methods, as well as recommendation systems oriented to a human-centred approach to digital transformation and inclusion, with a major emphasis on users and a strong industrial connotation, an aspect that has been – to the best of our knowledge – covered little or nothing by the other planned events. By fostering collaboration, knowledge exchange, and innovative thinking, the participants contributed significantly to the ongoing efforts to reduce the digital divide, stimulate growth in disadvantaged territories, and improve overall processes and services for citizens through digital means.

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