

HAIC 2025 - Preface to the First Workshop on Human-AI Collaborative Systems

Michele Braccini¹, Allegra De Filippo¹, Michela Milano¹, Alessandro Saffiotti² and Mauro Vallati³

¹Department of Computer Science and Engineering, University of Bologna, Italy

²University of Örebro, Sweden

³University of Huddersfield, United Kingdom

Abstract

In recent years, Human-AI Collaborative Systems (HAIC) has emerged as a key research frontier, with the aim of leveraging the complementary strengths of humans and artificial intelligence. Research in this area has demonstrated the potential of HAIC systems in a variety of fields, including healthcare, creative arts, finance, manufacturing, and education. These systems not only improve problem-solving and performance, but also enable novel forms of human-machine co-creation and decision-making. The HAIC workshop provides an interdisciplinary forum to explore these challenges and opportunities, fostering dialogue between communities towards a general framework for the design, evaluation and implementation of next-generation human-AI collaborative systems.

1. Background and Motivations

Human-machine collaboration leverages the complementary strengths of humans (such as reasoning, creativity, and social understanding) and AI (high computing power and big data processing capabilities) to improve problem-solving and performance of both humans and machines. The field of Human-AI Collaborative (HAIC) Systems is currently characterized by domain-specific solutions that address particular challenges. Successful applications combining humans and AI exist in healthcare, creative arts, and finance, to name a few. However, these works reveal the growing need for a systemic and generic approach to manage the complexity and heterogeneity of these systems. Indeed, effective collaboration between humans and AI requires systems that merge human and AI capabilities, adapt to each other's needs, and integrate qualitative and quantitative metrics. Furthermore, to ensure the usability and real-world applicability of these systems, trained people working at the human-machine interface and users trained to use them are essential. At the same time, AI tools must be designed to adapt to the peculiarities, knowledge and emotional spheres of their users. This is only possible if an iterative refinement cycle is triggered, in which AI continuously learns from real-time interactions and vice versa. The development of truly adaptive collaborative systems therefore requires a redefinition of fundamental principles such as adaptability, security, trust, and explainability, while also taking into account the psychological and ethical impact on users.

The aim of the first international workshop on Human-AI Collaborative (HAIC) Systems is twofold. On the one hand, we want to provide a space for researchers and practitioners to further stimulate the expansion and deepening of each of the research directions within the HAIC field, fostering at the same time the dialogue and collaboration between the different communities. On the other hand, we want to promote a broader discussion that aims towards the definition of a general framework, capable of synthesizing common principles and driving a paradigm shift in the development of HAIC systems,

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✉ m.braccini@unibo.it (M. Braccini); allegra.defilippo@unibo.it (A. De Filippo); michela.milano@unibo.it (M. Milano); asaffio@aass.oru.se (A. Saffiotti); m.vallati@hud.ac.uk (M. Vallati)

🌐 <https://www.unibo.it/sitoweb/m.braccini> (M. Braccini); <https://www.unibo.it/sitoweb/allegra.defilippo> (A. De Filippo); <https://www.unibo.it/sitoweb/michela.milano> (M. Milano); https://www.oru.se/english/employee/alessandro_saffiotti (A. Saffiotti); <https://www.mvallati.net/> (M. Vallati)



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thus providing a common basis for future interdisciplinary and multimodal developments.

Topics of interests include but are not limited to:

- Design and Development of HAIC Systems
 - Frameworks and methodologies for designing human-AI collaborative systems.
 - Designing principles for developing smart human-machine interfaces.
 - Principles for adaptive systems that evolve with user interactions.
 - Knowledge engineering for HAIC Systems.
 - Metrics for evaluating the quality and effectiveness of collaborations.
 - Novel approaches for the integration of human feedback into HAIC systems, in real-time.
- Applications and Case Studies HAIC systems in assistive robotics scenarios.
 - HAIC solutions for industrial challenges.
 - HAIC systems for precision agriculture.
 - Context-aware cobots for collaborative manufacturing.
 - Human-AI co-creation in creative arts, including but not limited to music, visual art, and poetry.
 - Collaborative decision-making systems.
 - HAIC educational systems that prioritize learner control.
 - Healthcare and precision medicine through collaborative intelligence.
- Future Directions and Emerging Trends
 - Approaches for controlling emergent dynamics in HAIC.
 - Visionary HAIC applications in collective robotics, such as swarm robotics.
 - Applications for co-creative processes human and AI.
 - Definition of ethical guidelines for future HAIC research and developments.
 - Psychological and societal implications of HAIC technologies.

2. Accepted Papers

The program provides a good overview among the different topics related to the area of Human-AI collaborative systems.

In total, 11 contributions were accepted at HAIC 2025 (all included in the proceedings):

1. Paolo Baldini, Michele Braccini and Andrea Roli. *Impact of LLM-Assisted Coding in Creativity and Robustness of Robot Controllers*
2. Roberto Casadei, Giovanni Delnevo and Silvia Mirri. *Human-Under-Test and Continual Bidirectional Assessment for Co-development of Human-AI Systems*
3. Chiara Ceccarini, Ami Liçaj, Elisa Matteucci and Giovanni Delnevo. *From Data to Narrative: Visualizing Complex Phenomena through Human-AI Co-Creation*
4. Justus Flerlage, Alexander Acker and Odej Kao. *Comparative Analysis of Large Language Models for the Machine-Assisted Resolution of User Intentions*
5. Silvia Garzarella, Lorenzo Stacchio, Pasquale Cascarano, Allegra De Filippo, Elena Cervellati and Gustavo Marfia. *A Large Reconstruction Model Driven Approach to Support Humans in Digitization of Dance Visual Material into 3D environments*
6. Silvia Torsi, Stefano Bonelli, Anna Giulia Vicario, Alfonso Levantesi, Hossein Mapar. *Cognitive Resilience and Human-AI Teaming in Air Traffic Control: Toward a New Systemic Paradigm*
7. Kiran M. Sabu, Jennifer Renoux, Hermine J. Grosinger and Alessandro Saffiotti. *First the action has to be perceived for communication to take place*

8. Sanyam Jain, Khuram Naveed, Illia Oleksienko, Alexandros Iosifidis and Ruben Pauwels. *InjectedD: Analyzing Trajectories and Drift Dynamics in Denoising Diffusion Probabilistic Models for 2D Point Cloud Generation*
9. Alessia Papale, Gloria Lopiano, Andrea Campagner and Federico Cabitza. *Process Over Skill: Validating Kasparov's Law Through Human-AI Collaboration in Clinical Diagnosis*
10. Alina Vozna, Andrea Monaldini, Stefania Costantini and Valentina Pitoni. *Scalable and Explainable Diet Recommendations via Answer Set Programming*
11. Jayalakshmi Baskar, Kaan Kilic, Vera C. Kaelin and Helena Lindgren. *Towards collaborative planning for health promotion through person-tailored storytelling and argumentation*

3. Program Committee

As a final remark, the program co-chairs would like to thank all the members of the Program Committee (listed below), as well as the organizers of the ECAI 2025 - 28TH European Conference on Artificial Intelligence¹.

- Luís Espírito Santo (University of Coimbra, Vrije Universiteit Brussel)
- Matteo Magnini (University of Bologna)
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- Cataldo Musto (University of Bari)
- Joseph Giovanelli (University of Bologna)
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- Antonio Pietro Ugo Fleres (University of Messina)
- Sara Montagna (Università degli Studi di Urbino Carlo Bo)
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- Lorenzo Stacchio (Università degli studi di Macerata)
- Sanyam Jain (Aarhus University)
- Ilaria Tiddi (Vrije Universiteit Amsterdam)

¹<https://ecai2025.org/>