Citation
Tommaso Turchi, Alessio Malizia, Fabio Paternò, Simone Borsci, and Alan Chamberlain. 2024. Adaptive XAI: Towards Intelligent Interfaces for Tailored AI Explanations. In Companion Proceedings of the 29th International Conference on Intelligent User Interfaces (IUI '24 Companion). Association for Computing Machinery, New York, NY, USA, 119–121. https://doi.org/10.1145/3640544.3645253

Adaptive XAI: Towards Intelligent Interfaces for Tailored AI Explanations

Tommaso Turchi
Alessio Malizia
tommaso.turchi@unipi.it
alessio.malizia@unipi.it
Department of Computer Science, University of Pisa Pisa, Italy

Fabio Paternò
CNR-ISTI, HIIS Laboratory
Pisa, Italy
larst@affiliation.org

Simone Borsci
Cognition, Data and Education Group, University of Twente
Twente, Netherlands

Alan Chamberlain
Mixed Reality Lab, University of Nottingham
Nottingham, United Kingdom

ABSTRACT

As the integration of Artificial Intelligence into daily decisionmaking processes intensifies, the need for clear communication between humans and AI systems becomes crucial. The Adaptive XAI (AXAI) workshop focuses on the design and development of intelligent interfaces that can adaptively explain AI's decision-making processes and our engagement with those processes. In line with the human-centric principles of the Future Artificial Intelligence Research (FAIR) project[1], this workshop seeks to explore, understand and develop interfaces that dynamically adapt, thereby creating explanations of AI-based systems that both relate to and resonate with a range of users with different explanation-based requirements. As AI's role in our lives becomes ever more embedded, the ways in which such systems explain elements about the system need to be malleable and responsive to the ever-evolving individual's cognitive state, relating to contextual needs/focus and to the social setting. For instance, easy to use and effective interaction modalities like Visual Languages can provide users with intuitive mechanisms to interact with, adjust, and reshape AI narratives. This ensures that a richer, more tailored understanding can be provided, allowing explanations to emerge in line with the users' demands and the ever-shifting contexts they find themselves in, both as individuals and as part of a group. The Adaptive XAI workshop extends an invitation to scholars, designers, and tech-nologists to collaboratively shape the future of human-XAI interplay.

CCS CONCEPTS

• Human-centered computing → *Human computer interaction (HCI)*; Interactive systems and tools; • Computing methodologies → *Artificial intelligence*.

[1] https://future-ai-research.it/spoke1/

KEYWORDS

Explainable AI, Artificial Intelligence, Human-Centered AI

1 DESCRIPTION OF WORKSHOP TOPIC

In an era where AI-driven decisions deeply influence many human activities, the importance of understanding the rationale behind these decisions has been emphasized by numerous studies [8, 9].

The Adaptive XAI workshop emerges as a pivotal avenue to address this need. Situated at the intersection of algorithmic complexity and human-centric design, a space that has seen considerable interest in recent years [4, 5, 16], the workshop aims to conceptualize adaptive interfaces that explain AI's decision-making processes. The focus extends beyond mere explanations, placing emphasis on their adaptability to people preferences and styles, as well as their cognitive needs of understanding and of situational awareness, a concept highlighted in previous HCI research [12].

This workshop's theme dovetails with the foundational principles of the ACM IUI 2024. The very essence of IUI, as underlined in past conferences and discussions [1], is the seamless integration of AI's computational capabilities with the imperatives of HCI. As AI's role in user-centric applications intensifies, the challenge is not just about harnessing its intelligence, but ensuring this intelligence is made palpable and actionable for users with diverse needs. Through this lens, the Adaptive XAI workshop stands poised to make significant contributions to the evolving discourse at the heart of IUI. The convergence of AI and HCI, a topic of continued interest and exploration, embodies the spirit of the IUI conference.

The Adaptive XAI workshop, with its focus on intelligent interfaces for tailored AI explanations, provides a contemporary take on this intersection [11].

Citation
Tommaso Turchi, Alessio Malizia, Fabio Paternò, Simone Borsci, and Alan Chamberlain. 2024. Adaptive XAI: Towards Intelligent Interfaces for Tailored AI Explanations. In Companion Proceedings of the 29th International Conference on Intelligent User Interfaces (IUI '24 Companion). Association for Computing Machinery, New York, NY, USA, 119–121. https://doi.org/10.1145/3640544.3645253

1.1 Target Audience

The workshop's audience targets a wide range of expertise, promising insights for:

- HCI Practitioners and Researchers: As they aim at making AI explanations more intuitive and dynamic, a challenge recognized in many HCI research studies.
- AI Scholars: Tasked with making complex algorithms transparent, a challenge highlighted in recent literature.
- UI/UX Designers: Eager to explore adaptive techniques that have been highlighted in prior HCI designs.
- Technology Enthusiasts: Keen on discovering future trajectories of human-AI collaborations, an area of huge interest. In sum, the Adaptive XAI workshop, while complementing existing discourses, is poised to further the conversations at the IUI 2024, presenting an interdisciplinary exploration at the crux of AI and HCI.

2 PREVIOUS HISTORY

While no direct workshops on this specific topic have been held by our team, related workshops have touched upon AI explainability and human-centric AI interfaces at venues such as:

- Workshop on Adaptive and Personalized Explainable User Interfaces (APEx-UI) [14] @ ACM IUI 2022
- Workshop on Human-Centered Explainable AI (HCXAI) [7] @ ACM CHI 2023
- Workshop on Explainable AI for the Arts: XAIxArts [3] @ ACM C&C 2023
- Workshop on Visualization for AI Explainability [2] @ IEEE VIS 2023
- Workshop on Interaction Design for Explainable AI [10] @ ACM OzCHI 2018

3 ORGANISERS

- Tommaso Turchi (*primary contact*) is an Assistant Professor at the University of Pisa (Italy), tommaso.turchi@unipi.it. His research focuses on Human-Centered AI and End-User Development. He has worked on various research projects related to the interaction with AI systems and is currently investigating the use of Design Fiction for AI-as-a-service applications in the medical field. His most recent work includes the development of a co-design toolkit to identify and address bias in ML-based collaborative decision-making domains.
- Alessio Malizia is an Associate Professor at the University of Pisa (Italy), alessio.malizia@unipi.it. His research explores the convergence of physical and digital realms, aiming to enhance interactive system design. Previously organised workshops: [6]
- Fabio Paternò is Research Director at CNR-ISTI in Pisa (Italy), fabio.paterno@isti.cnr.it. His research activity has mainly been carried out in the HCI field, with the goal to introduce computational support to improve usability, accessibility, and user experience for all in the various possible contexts of use by proposing relevant languages, models, design spaces, tools, and applications. Previously organised workshops: [13, 15]
- Simone Borsci is an Associate Professor of Human Factors and Cognitive Ergonomics at the University of Twente (Netherlands), s.borsci@utwente.nl. His research spans across Human factors and ergonomics, interaction with technology and artefacts, usability and accessibility studies, and user experience analysis in ubiquitous computing contexts. • Alan Chamberlain is a Senior Research Fellow at the University of Nottingham (United Kingdom), alan.chamberlain@nottingham.ac.uk. His research is based on Human-Computer Interaction, Ethnography, Action Research, Participatory Design, and User Engagement in order to develop networks of people who are able to involve themselves in the practices of innovation and design. Previously organised workshops: [3]

4 WORKSHOP PROGRAM COMMITTEE

- Alan Dix, University of Swansea (United Kingdom)
- Silvio Carta, University of Greenwich (United Kingdom)
- Riccardo Guidotti, University of Pisa (Italy)
- Matt Roach, University of Swansea (United Kingdom)
- Marlene Weber, Harness Inc. (United States)
- Federico Mazzoni, University of Pisa (Italy)
- Serena Versino, University of Pisa (Italy)
- Glenn McGarry, University of Nottingham (United Kingdom) • Anna-Maria Piskopani, University of Nottingham (United Kingdom) • Favour Borokini, University of Nottingham (United Kingdom)

5 WORKSHOP ACTIVITIES

The workshop will balance knowledge dissemination with interactive discussions:

- Paper Presentations: A dedicated session will feature paper presentations. This session will cluster papers based on emerging topics, ensuring focused discussions and coherence in the narrative.
- RoundtableDiscussion: The day will culminate in a roundtable, offering a platform for reflective discussions on the presented papers and envisioning future directions in Adaptive XAI.

5.1 Materials and Resources

- Proceedings: Workshop Proceedings will be linked on the workshop website.
- Slides: All presentations' slides will be shared for attendees' reference.

Citation
Tommaso Turchi, Alessio Malizia, Fabio Paternò, Simone Borsci, and Alan Chamberlain. 2024. Adaptive XAI: Towards Intelligent Interfaces for Tailored AI Explanations. In Companion Proceedings of the 29th International Conference on Intelligent User Interfaces (IUI '24 Companion). Association for Computing Machinery, New York, NY, USA, 119–121. https://doi.org/10.1145/3640544.3645253

Overall, the workshop is designed to be a concise yet comprehensive dive into Adaptive XAI's evolving landscape.

6 WORKSHOP PROGRAM

The program for our workshop was organized as a half-day miniconference that consisted of paper presentations and a roundtable discussion. In total, we accepted 3 papers spanning different subareas of Adaptive XAI. We also organized each paper presentation to include a follow-up question-and-answer and discussion session, in order to encourage attendees to have deeper understanding of each others' work.

6.1 Accepted Papers

- Fabio Paternò, Andrea Mattioli, and Sara Maenza. *A Design Space for Adaptive Explainable Daily Automations*.
- Yan-Ming Chiou, Bob Price, Suibi Che-Chuan Weng, and Charles Ortiz. *Intelligent Augmented Reality System for Multi-Tasking Guidance and Support with Seamless AI-HCI Integration*.
- Kaisa Väänänen, Ashley Colley, and Jonna Häkkilä. *Towards Adaptive AI Explanations with Tangible User Interfaces*.

7 PLANNED OUTCOMES OF THE WORKSHOP

We aspire to foster a rich interdisciplinary dialogue that delves deep into the nuances of Adaptive Interfaces for XAI. Our primary objective is to not only stimulate cutting-edge discussions but also to cultivate tangible outcomes that propel the research field forward. To this end, we are already in advanced discussions to establish a Special Issue in the Springer journal "Personal and Ubiquitous Computing", which will feature the best-selected papers from those accepted for the workshop. The curated collection of papers will showcase the rigorous research and innovative ideas presented during our sessions.

Furthermore, we aim to assess the potential and interest in establishing this ongoing conversation by bringing together various perspectives and insights on the topic. Our vision is to possibly evolve the "Adaptive XAI" workshop into a recurring series, thereby creating a dedicated platform for continued exploration and innovation at the intersection of XAI and HCI.

ACKNOWLEDGMENTS

We thank IUI's workshop chairs Alex Soto and Eva Zangerle for their support in organizing the workshop at IUI'24. This Workshop is partly sponsored by PNRR - M4C2 - Investimento 1.3, Partenariato Esteso PE00000013 - "FAIR - Future Artificial Intelligence Research" - Spoke 1 "Human-centered AI", funded by the European Commission under the NextGeneration EU programme. This work was also supported by the European Union's NextGenerationEU National Recovery and Resilience Plan, Mission 4, Component 2, Investment 1.5, Tuscany Health Ecosystem (THE) (ECS00000017; CUP B83C22003920001), and by the Engineering and Physical Sciences Research Council [grant number EP/V00784X/1] UKRI Trustworthy Autonomous Systems Hub (The TAS RRI II project), [grant number EP/G065802/1] and [grant number EP/Y009800/1] AI UK: Creating an International Ecosystem for Responsible AI Research and Innovation (RAI UK), (RAKE Responsible Innovation Advantage in Knowledge Exchange). We acknowledge the involvement of the STAHR Collective.

REFERENCES

[1] 2023. *IUI '23: Proceedings of the 28th International Conference on Intelligent User Interfaces* (Sydney, NSW, Australia). Association for Computing Machinery, New York, NY, USA.

[2] 2023. Workshop on Visualization for AI Explainability. https://visxai.io/. Accessed: 2024-02-08.

[3] Nick Bryan-Kinns, Corey Ford, Alan Chamberlain, Steven David Benford, Helen Kennedy, Zijin Li, Wu Qiong, Gus G. Xia, and Jeba Rezwana. 2023. Explainable AI for the Arts: XAIxArts. In *Proceedings of the 15th Conference on Creativity and Cognition* (Virtual Event, USA) *(C&C '23)*. Association for Computing Machinery, New York, NY, USA, 1–7. https://doi.org/10.1145/3591196.3593517

[4] Gabriele Carollo. 2023. Interactive or textual explanations?: Evaluation of two explanatory approaches within in-vehicle adaptive systems.

[5] Michael Chromik and Andreas Butz. 2021. Human-XAI interaction: a review and design principles for explanation user interfaces. In *Human-Computer Interaction–INTERACT 2021: 18th IFIP TC 13 International Conference, Bari, Italy, August 30–September 3, 2021, Proceedings, Part II 18*. Springer, 619–640.

[6] Alan Dix, Alessio Malizia, and Silvia Gabrielli. 2016. Hci and the educational technology revolution. In *Proceedings of the International Working Conference on Advanced Visual Interfaces*. 368–371.

[7] Upol Ehsan, Philipp Wintersberger, Elizabeth A Watkins, Carina Manger, Gonzalo Ramos, Justin D. Weisz, Hal Daumé Iii, Andreas Riener, and Mark O Riedl. 2023. Human-Centered Explainable AI (HCXAI): Coming of Age. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) *(CHI EA '23)*. Association for Computing Machinery, New York, NY, USA, Article 353, 7 pages. https://doi.org/10.1145/3544549.3573832

[8] Joana Hois, Dimitra Theofanou-Fuelbier, and Alischa Janine Junk. 2019. How to achieve explainability and transparency in human AI interaction. In *HCI International 2019-Posters: 21st International Conference, HCII 2019, Orlando, FL, USA, July 26–31, 2019, Proceedings, Part II 21*. Springer, 177–183.

[9] Vivian Lai, Chacha Chen, Q Vera Liao, Alison Smith-Renner, and Chenhao Tan. 2021. Towards a science of human-ai decision making: a survey of empirical studies. *arXiv preprint arXiv:2112.11471* (2021).

[10] Prashan Madumal, Ronal Singh, Joshua Newn, and Frank Vetere. 2018. Interaction Design for Explainable AI: Workshop Proposal. 607–608. https://doi.org/10.1145/3292147.3293450

[11] Alessio Malizia and Fabio Paternò. 2023. Why Is the Current XAI Not Meeting the Expectations? *Commun. ACM* 66, 12 (nov 2023), 20–23. https://doi.org/10.1145/3588313

[12] Mohammad Naiseh, Nan Jiang, Jianbing Ma, and Raian Ali. 2020. Personalising explainable recommendations: literature and conceptualisation. In *Trends and*

Citation
Tommaso Turchi, Alessio Malizia, Fabio Paternò, Simone Borsci, and Alan Chamberlain. 2024. Adaptive XAI: Towards Intelligent Interfaces for Tailored AI Explanations. In Companion Proceedings of the 29th International Conference on Intelligent User Interfaces (IUI '24 Companion). Association for Computing Machinery, New York, NY, USA, 119–121. https://doi.org/10.1145/3640544.3645253

Innovations in Information Systems and Technologies: Volume 2 8. Springer, 518– 533. [13] Fabio Paternó. 2012. *Interactive Systems: Design, Specification, and Verification: 1st Eurographics Workshop, Bocca Di Magra, Italy, June 1994*. Springer Science & Business Media.

[14] Erasmo Purificato, Cataldo Musto, Pasquale Lops, and Ernesto William De Luca.
2022. First workshop on adaptive and personalized explainable user interfaces (apex-ui 2022). In *27th International Conference on Intelligent User Interfaces*. 1–3.

[15] Daniel Tetteroo, Panos Markopoulos, Stefano Valtolina, Fabio Paternò, Volkmar Pipek, and Margaret Burnett. 2015. End-user development in the internet of
things era. In *Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems*. 2405–2408.

[16] Tommaso Turchi, Alessio Malizia, and Simone Borsci. 2024. Reflecting on Algorithmic Bias with Design Fiction: the MiniCoDe Workshops. *IEEE Intelligent Systems* (2024), 1–13. https://doi.org/10.1109/MIS.2024.3352977

Received 23 October 2023; accepted 13 November 2023; revised 12 February 2024