Differentiating and Deepening the Concept of End User in the Digital Age (CoPDA 2024)

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ABSTRACT

Recent developments in Artificial Intelligence and meta-design challenge the understanding of the concept of "end user". The 8th edition of a workshop in the series "Cultures of Participation in the Digital Age" (CoPDA 2024) aims to critically differentiate, dissect, and deepen the roles, experiences, and demands of end users considering contributions from different perspectives.

CCS CONCEPTS

• **Human-centered computing** → **HCI theory, concepts and models**; **Interaction design theory, concepts and paradigms**.

KEYWORDS

Cultures of participation, Meta-design, End-User Development, Human-centered Artificial Intelligence, Design trade-offs, Large Language Models, Quality of Life

ACM Reference Format:
Barbara Rita Barricelli, Gerhard Fischer, Daniela Fogli, Anders Mørch, Antonio Piccinno, and Stefano Valtolina. 2024. Differentiating and Deepening the Concept of End User in the Digital Age (CoPDA 2024). In *International Conference on Advanced Visual Interfaces 2024 (AVI 2024), June 03–07, 2024, Arenzano, Genoa, Italy*. ACM, New York, NY, USA, 4 pages. https://doi.org/10.1145/3656650.3660533

1 INTRODUCTION

This workshop is the 8th edition of CoPDA (Cultures of Participation in the Digital Age). All the previous editions have identified specific themes and challenges of the digital age by exploring conceptual frameworks and socio-technical environments:

- 2013: Empowering End Users to Improve their Quality of Life [7][8]
- 2014: Social Computing for Working, Learning, and Living [6]
- 2015: Coping with Information, Participation, and Collaboration Overload [5]
- 2016: From "Have to" to "Want to" Participate [1]
- 2018: Design Trade-offs for an Inclusive Society [2][9]
- 2022: AI for humans or humans for AI? [3]
- 2023: Artificial and/or human intelligence: nurturing computational fluency in the digital age [4]

All information about the editions of the CoPDA workshop series are available here: https://copda.unibs.it.

This edition of the CoPDA workshop seeks to critically differentiate, dissect, and deepen the roles, experiences, and demands of end users by inviting contributions from researchers and practitioners from various backgrounds and communities, such as designers and users of socio-technical environments, learning scientists, and educators. The concept of "end user" has conventionally been understood as the final consumer or user of a digital product, service, or system. However, recent developments in Artificial Intelligence (AI), meta-design, and cultures of participation challenge this simplistic understanding, revealing that end users are not just passive recipients but can also become co-creators, critics, and distributors of innovative ideas and artifacts.

2 WORKSHOP THEME

The theme of the workshop proposed in 2024 is grounded and related to some of the findings of previous workshops and will bring together a community of researchers to discuss their findings and explore challenges for the future. While the value of contributions made by end users can be significant in terms of the outcomes they generate (e.g., innovative software, user-centered solutions, accessible knowledge), the effort required by end users to facilitate and sustain these approaches should not be underestimated. Balancing the potential value with the necessary effort is crucial to ensure that end users will be motivated to contribute over long periods of time.

In the design, development, use, and evolution of complex socio-technical environments, the "end user" concept is limited and insufficient to capture the full range of stakeholders involved. Here are some alternative concepts that can better reflect the diverse roles and perspectives within this context:

- *Stakeholders*: This term is a broad and inclusive concept encompassing all individuals and groups with an interest or

AVI 2024, June 03–07, 2024, Arenzano, Genoa, Italy

ACM ISBN 979-8-4007-1764-2/24/06
https://doi.org/10.1145/3656650.3660533

stake in the design, use, and assessment of socio-technical environments. It recognizes that diverse perspectives, motivations, and needs must be considered and integrated into the development and evolution process. It acknowledges that these individuals play different roles and contribute to the software ecosystem in various ways.
- *Co-Designers*: This concept emphasizes the active involvement of users and other stakeholders as collaborators in the design process. It recognizes their contributions to shaping the software environment and promotes a more inclusive and participatory approach to development.
- *Contributors*: This term highlights the idea that users and other stakeholders are not just passive consumers of the software but can actively contribute to its improvement and evolution. It encompasses activities such as providing feedback, reporting bugs, suggesting new features, and sharing knowledge and resources.
- *Domain Experts*: In certain software environments, there may be individuals with specialized knowledge and expertise in a specific domain relevant to the software. Referring to them as domain experts, one recognizes their valuable insights and contributions to the development and use of the software.
- *Prosumers*: In numerous environments, the roles of producers and consumers are merging, with consumers taking on more active, participatory roles in design and development processes, thereby breaking down traditional divisions existing in the earlier software environment [14].
- *Professional Amateurs*: "Professional Amateurs" (Pro-Ams) refer to individuals who pursue a hobby or activity with the enthusiasm and dedication typically characteristic of professionals but without the primary intention of financial gain. Pro-ams pursue problems that are personally meaningful to them, and they often engage deeply in their chosen pursuits, thereby acquiring significant skills and knowledge and contributing to the advancement of the field, albeit without making it their primary profession [10].
- *Power Users*: In communities and research groups, power users are the local designers who create extensions and modifications of tools for all members of the community [12].
- *Curators*: In cultures of participation (e.g., Wikipedia, Open Source communities, Scratch, and software reuse libraries), curators play a crucial role in managing, organizing, and enhancing shared resources and knowledge. They serve as mediators and facilitators, ensuring the quality, accuracy, and accessibility of resources within these participative environments.
- *Participants*: In cases where the software environment has a strong community aspect, such as open source projects or online platforms, referring to users as community members acknowledges their participation in a shared ecosystem. It emphasizes the sense of belonging, collaboration, and collective responsibility within the community.

These roles are not static, and in socio-technical environments supporting rich ecologies of participation, end users may migrate between these roles over time [11][13].

3 WORKSHOP OBJECTIVES

The workshop organizers invited contributions to explore the following fundamental issues:

- Re-conceptualizing the multi-faceted roles that end users can play.
- Investigating how end users are evolving into active participants in the design and development through frameworks (such as meta-design) that encourage collaborative creation, modification, and evolution in individual and group activities.
- Understanding the skills and literacies (e.g., computational fluency) that end users need to acquire to be successful contributors (e.g., education, after-school clubs, etc.)
- Envisioning future scenarios and possibilities for end user roles and experiences in the context of emerging technologies and cultural changes.
- Understanding the design trade-offs associated with balancing the potential value of end-user contributions with the necessary effort to ensure that end users will be motivated to contribute over long periods of time.

The workshop also aims to investigate how Large Language Models (LLMs) in general, and ChatGPT in particular, can both empower and potentially diminish the role of end users, depending on the context in which they are applied.

The following sources of empowerment of end users by ChatGPT can be critically examined. Can ChatGPT:

- Provide access to relevant information (e.g., reducing information overload)?
- Serve as a digital assistant (e.g., drafting initial responses), increasing the backtalk of situations with critiquing systems?
- Enhance learning by providing explanations and generating examples?
- Integrate adaptive features (generated by ChatGPT) with adaptable components (contributed by humans)?

ChatGPT can diminish the role of end users, and concerns about these developments can be elaborated by exploring the following hypotheses. Will ChatGPT:

- Create an overreliance on technology?
- Suppress critical thinking skills needed to analyze bias and misinformation?
- Reduce the autonomy of end users by imposing its view and value system of the information generated?
- Replace workers in tasks that the workers can do better and would like to do themselves?
- Represent mostly "black boxes" for end users due to the complexity and opacity of their internal workings (e.g., end users often have limited capability to influence or customize the model's behavior)?

Therefore, topics of discussion include (but are not limited to):

- Analysis of the use and historical development of the concept of end user
- Can meta-design frameworks facilitate and empower end users in becoming designers, shaping, and adapting systems to their needs?

- What are the major responsibilities for end users in "end-user development" and/versus "end-user software engineering"?
- If computational fluency is widely achieved by humans in the digital age — how will this change the concept of "end user" and "learning with digital tools"?
- How can the division between professional developers and end users be designed and supported as collaborative interactions rather than as rigid separation?
- How do we scale up user participation from individuals to groups to communities?
- In which contexts are end users the drivers of the innovation?
- Which other frameworks and environments in AI exist, in addition to LLMs, to support end users?
- How does the role of end users change in the era of LLMs?
- Which additional learning demands occur that empower end users to assess LLM possibilities and limits?
- Success stories and failures (e.g., empirical studies) involving or analyzing end users as active participants in socio-technical systems in different domains (education, workplace, at home, leisure, etc.).

4 WORKSHOP CONTRIBUTIONS

The workshop received 15 contributions with authors based in Italy, Norway, Germany, The Netherlands, Portugal, Sweden, and United States. A few papers provide conceptual discussions aimed to reflect on the proposed workshop topics, such as how the end user role has changed over the years and may further change in the future. Other contributions focus on case studies developed in various domains, where different design methodologies, such as participatory design, meta-design, and value-based design have been integrated with AI; these papers also explore several issues related to ethics, privacy, inclusivity, and the like.

5 WORKSHOP ORGANIZATION

The one-day workshop is structured as follows: 1) a brief round of presentations by each participant; 2) participants' presentations lasting 15 minutes, followed by 5 minutes for questions and answers; 3) plenary discussion about the new topics, ideas, and challenges that have emerged in pre-workshop activities, as well as those emerging after each presentation; 4) concluding remarks with proposals for future collaboration.

6 PROGRAM COMMITTEE

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7 ORGANIZERS' BIOS

Barbara Rita Barricelli is Associate Professor at the Department of Information Engineering of Università degli Studi di Brescia (Italy). Her research interests are Human-Computer Interaction, Human Work Interaction Design, Socio-technical Design, End-User Development, Usability, and UX. She has been involved in several International and Italian projects in collaboration with universities, research institutes, and private companies. She is Vice-Chair of IFIP TC13.6 Working Group on Human Work Interaction Design.

Gerhard Fischer is a Professor Emeritus of Computer Science, a Fellow of the Institute of Cognitive Science, and the Director of the Center for Lifelong Learning and Design (L3D) at the University of Colorado at Boulder. He is a member of the Computer-Human Interaction Academy (CHI; 2007), and a Fellow of the Association for Computing Machinery (ACM; 2009). His research has focused on new conceptual frameworks and media for learning, working, and collaborating, human-centered computing, and design. His recent work is centered on quality of life in the digital age, social creativity, meta-design, cultures of participation, design trade-offs, and rich landscapes for learning.

Daniela Fogli is Professor at the Department of Information Engineering, University of Brescia, Italy. Her research interests are in the field of Human-Computer Interaction and include meta-design, end-user development, universal design, conversational and multi-modal interfaces. She has performed her research activity in collaboration with several scholars from different universities and research centers. She is chair of the steering committee of the International Symposium on End-User Development.

Anders Mørch is Professor at the Department of Education (IPED), University of Oslo, Norway. He received his Ph.D. in informatics from the University of Oslo and an M.S. in computer science from the University of Colorado, Boulder. He developed Intelligent Tutoring Systems at NYNEX, New York. His research interests are in how tools and artifacts help people learn together (distance education, computer-based scaffolding, end-user tailoring); interfaces supporting learning (critiquing systems; pedagogical agents; learning analytics); domain-oriented design environments for classroom use (maker spaces, virtual worlds); new models of design-based collaborative learning.

Antonio Piccinno is Associate Professor at the Computer Science Department of University of Bari. He is a founding member of the IVU (Interaction, Visualization, Usability & UX) Lab of the University of Bari, where he coordinates research on the interplay between Human-Computer Interaction and Software Engineering through techniques of End-User Development. His research interests focus on Human-Computer Interaction, Software Engineering, End-User Development, the Internet of Things, Smart Environments, and Visual Interactive Systems. He is/has been Full Paper Co-Chair of INTERACT 2021 and 2023 and IS-EUD 2011, doctoral consortium co-chair of ACM CHItaly 2015 and IS-EUD 2017, and poster and demo papers co-chair of ACM AVI 2016.

Stefano Valtolina is Associate Professor at the Computer Science Department of Università degli Studi di Milano. He obtained his Ph.D. in 'Informatics' from University of Milan and an MSc in Computer Science from the same university. His research interests include Human-Computer Interaction (HCI), Creative Design, as

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