Facilitating Longitudinal Research in HCI

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ABSTRACT

HCI researchers develop tools to address HCI challenges, typically evaluating them within a single session. But is this enough? The complexities associated with long-term deployment and evaluation have hindered researchers from exploring the longitudinal interaction between users and tools. Our workshopseeks to address these challenges, explore opportunities, and prepare researchers for conducting longitudinal studies. The workshop includes lightning talks, keynote, panel discussions, and interactive breakout groups for discussion and hands-on protocol and tool design sessions. These activities aim to foster collaboration and build a community in longitudinal HCI research.

CCS CONCEPTS

• **Human-centered computing → Empirical studies in HCI**; *HCI theory, concepts and models*; *User studies*; *User models*; *Usability testing*; *Heuristic evaluations*; *Walkthrough evaluations*; *Laboratory experiments*; *Field studies.*

KEYWORDS

longitudinal, HCI tools, novelty effect, learning curve, familiarization, customization, personalization, appropriation, (non)use

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WORKSHOP WEBSITE

https://longitudinal-workshop.github.io/

1 MOTIVATION

Longitudinal research can offer various insights that complement traditional HCI in-lab user studies [20].

Currently, most CHI papers focus on isolated user studies for system testing, which are effective in single sessions but often overlook real-world implications and interactions with these tools [28]. These traditional user studies, usually constrained to sessions lasting between 15 and 60 minutes, may only capture initial reactions of satisfaction or dissatisfaction [14, 51]. Additionally, since the study process is strictly observed by experimenters, the pressure and unnatural setup of the study can lead to biases, masking potential learning phases and user-initiated customization [17, 18]. As a result, these studies often fail to capture the nuances of users' behaviors and experiences over the long term [5].

In comparison, longitudinal studies allow the researchers to better understand users' evolving interactions with these tools throughout time [28, 37, 57]. For example, here are a few aspects that we can analyze further using this study design:

- Novelty and placebo effects: Many emerging technologies, such as generative AI, often exhibit strong novelty effects that can initially skew users' perceptions, making the tools seem more effective or appealing than they truly are [8, 21, 24, 45, 46]. Over time, as the novelty wears off, users' interest may decline [37, 47, 49, 56]. Besides, placebo effects may occur in studies, where users perceive benefits simply because they believe AI is effective, even if the tool's actual performance is limited or unchanged [22].
- Learning phases: Users go through a dedicated learning phase to explore and familiarize with the system's affordances and specific features [8, 42]. Even for tech-proficient users, this phase may still last for sessions [28]. Before familiarization, users are more likely to experiment with the system and try to understand its affordances [2, 16, 32]. Over time, they develop a better mental model, confidence, and comfort in using it — eventually settling into a preferred way of interacting with the tool [3].

- Customization and personalization: Subsequently, users engage in customization and personalization, shaping the technology to align more closely with their unique needs and experiences [33]. If the system workflow (the underlying framework) is editable, it can incentivize users to make iterative customization, making the technology more useful and personally tailored [25, 28]. Also, if the system takes into account users' data and behaviors, it can enhance personalization by automatically adapting features and content to fit individual preferences [33, 54, 60].
- Appropriation: Beyond customization, users sometimes repurpose the tool for other tasks [9]. They may discover the tool's adaptability and appropriate it to solve problems that differ from its original setup or their customized version [10, 23, 34]. This allow researchers to identify unexpected tool applications [6, 28].
- Shift in usage: As users adopt the tool, their usage patterns evolve [3, 15, 35, 40, 55]. Different use cases may emerge (see appropriation), and the targeted user base can shift, transforming a single-user tool into a multiple-user or even a community-focused tool [2, 16, 26, 32, 58]. Users may also engage in social learning by sharing their tips and tricks for using the system with other [27]. This sharing not only fosters collaboration among users but also reduces the likelihood of having hidden features within the system for users [27, 36, 52].
- Shift in perception: As users become more familiar with the task and the system, they also develop their new *perceptions of the task* (mental demand, frustration, performance, etc) [11, 29, 39], new *perceptions of the system* (perceived usefulness, perceived control, creativity support index, trust, etc) [12, 13, 19, 38, 43, 61], and new *mental models of the system* (as a tool, as a collaborator, as a colleague, etc) [16, 20, 41, 44].
- (Un)sustained use (adoption vs abandonment, using full or only parts of the tool, further integration of the tool into users' workflow): Alongside shifts in usage and perceptions, some users may find themselves dependent on the tool, adopting it for the entire process and struggling to work on the task independently [4, 28]. However, others may realize that they prefer to use the tool only for specific aspects of the task, or they may stop using it [27, 47, 49, 56]. Over time, some users might integrate the tool into their daily workflows beyond the tool-supporting task [28, 59].

All the metrics above demonstrate how longitudinal studies can provide valuable and more comprehensive insights into emerging technologies and complement traditional HCI user studies.

Despite the potential benefits, researchers often face significant challenges in implementing longitudinal studies [30]. The complexities associated with long-term tool deployment and evaluation - such as recruitment, retention, compensation, and the ability to study interactions without constant observation - have hindered a deeper exploration of the longitudinal interaction between users and tools [1, 30, 48, 50, 53]. There is an emerging literature related to longitudinal studies in HCI, but there is not a cohesive community to define and create a design space for longitudinal study research (only 106 longitudinal study papers identified from CHI 1989 to CHI 2019 [20]). As HCI system developers, we have already crafted many single-use case tools to address various problems; however, before creating new ones, it is crucial to pause and consider how we might enhance existing tools and conduct further studies to truly understand their impact [7]. By focusing on longitudinal investigations, we can gain deeper insights and enrich our understanding of user-tool interactions over time, ultimately advancing the field.

2 THE GOAL OF THE WORKSHOP

Therefore, our workshop aims to foster discussion that facilitates longitudinal research in HCI, with three specific goals:

(1) **Identify existing challenges in conducting longitudinal research and propose solutions.** Researchers face various complexities and uncertainties in designing and planning longitudinal studies, which make them challenging to conduct. These complexities include: (1a) designing effective longitudinal protocols, (1b) developing robust systems, (1c) mapping use cases and contributions, (1d) understanding the differences between academic and industry settings, and (1e) recognizing new opportunities for longitudinal studies in the era of AI. After conference, the participants and organizers will compile a workshop summary and post it on the website.

(2) **Offer participants a chance to gain hands-on experience in designing longitudinal protocols and prototyping longitudinal systems.** These hands-on activities allow organizers to contribute their experiences and help participants overcome mental barriers, preparing for future longitudinal studies.

(3) **Foster a community network of researchers dedicated to longitudinal research**, and raise awareness about this field by facilitating networking among various subgroups both inside and outside HCI.

Specifically for (1), we hope our discussion can clarify the complexities or help develop guidelines, thus facilitating future longitudinal studies. Thus, we will foster discussion around the following questions as point of interests:

- (1a) "How to design longitudinal protocols?" An effective and flexible protocol will allow researchers to maximize the utility of collected data and insights generated from the participant-researcher check-ins. Thus, the discussion on this topic will facilitate developing longitudinal methodologies. Specific questions include how frequently and how should we check in with users? Also, what formats (surveys, interviews, diaries) should we utilize to collect information during each check-in to maximize richness and relevance? What questions should we ask? What data should we collect? During these check-ins, how can we minimize disruptions to participants' routines while collecting data? How to make sure the experience is "in the wild" enough? What ethical considerations must we address when collecting sensitive data? Like, to what extent can archival trace data stand in for or complement study-specific data? Finally, what constitutes a sufficient time frame for longitudinal studies? In medicine, "longitudinal" typically spans years, but what about in HCI? For different systems and interactions, might the definition of "longitudinal" vary? etc.
- (1b) "How to develop longitudinal systems?" With longitudinal study, tool deployment and maintenance becomes a real troublesome job. Thus, the discussion will contribute to a list of design considerations that facilitate building longitudinal study systems.

For example, should we limit the feature for ease, or incorporate more features for exploration? What data should we log and should we allow users to see them? Will there be a trade-off between privacy and utility? Also, what if there are bugs? How to streamline the maintenance process? For system builders, what are some good practices that we can share with the broader community to make their system more care-free and thus more feasible to deploy long-term. Besides, for the system learning and familiarization, what training or how long the onboarding session will users need to utilize the system effectively? Regarding customization, what flexibility should we design into the system and given to the users? Should we make it transparent for users to see the backend logic of the tool, such as opening up the prompt boxes for LLM-powered tools? How to design for unexpected usage? How to design to allow customization, personalization, and appropriation? How to account for changes in the system? For example, the AI programming tool Cursor recently added o1-preview to its set of available models: is this change seen as a normal evolution or as a structural break? etc.

- (1c) "What are the potential longitudinal contributions to CHI?" Longitudinal studies require significant effort, and their open-ended nature often leads to various discussions. Thus, having a discussion on this can help determine how to clarify the importance and impact of longitudinal research within the field. So guided questions include: what makes this longitudinal research unique, and what valuable insights can it offer? What claims can we substantiate about the contributions of longitudinal studies in advancing HCI knowledge? What valuable research questions emerge from this approach, and how can we define what constitutes a meaningful longitudinal contribution? etc.
- (1d) "What does longitudinal mean for industry and academia?" Researchers from both academia and industry study longitudinal interactions, but their approaches and objectives often differ. Understanding these differences can shed light on how longitudinal research varies across these contexts. So questions include: how does longitudinal research differ between academic and industry settings in terms of goals, resources, data access, timelines, scale, and ethical considerations? What we can learn from an academic longitudinal study yet impossible from industry settings? How can we establish sustainable collaborations between academia and industry, particularly for data sharing and tool access? etc.
- (1e) "What about human-AI longitudinal studies?" AI-powered tools, particularly those based on large language models (LLMs), open up new possibilities for long-term interaction due to their ease of use and customization through natural language. However, the complexities around running such studies remain and more questions arise, such as: does the rapid pace of change in AI systems make it more challenging to sustain longitudinal studies over time? How can we examine not only how users learn but also how the AI learns, and how these processes affect system evolution [31]? Additionally, will the use of AI lead to greater novelty or merely placebo effects? How will customization work in practice? In agent-based systems, how should we design the long-term deployment of these agents? Should AI agents be treated as users or as part of the system? How can we conduct such longitudinal studies with agents? etc.

3 ORGANIZERS

Tao Long (Columbia University) is a PhD student at Columbia University. His current work focuses on human-AI experiences, aiming to make AI-powered tools more usable, useful, and well-integrated into our everyday workflows. He has led multiple long-term deployment studies of multimodal AI tools for creative professionals, which deepens the understanding of how users interact with and integrate AI in the context of workspaces.

Sitong Wang (Columbia University) is a PhD student at Columbia University. Her current work focuses on developing AI-powered systems to enhance human creativity and productivity. She is also interested in studying how to integrate these tools into existing workflows and examining their long-term impact on everyday life and the workplace.

Julien Porquet (University of Cambridge) is an illustrator and a PhD candidate in Social Anthropology at the University of Cambridge. Based on a year-long ethnographic fieldwork with commercial artists in New York City, his research examines how human and machine ways of seeing interact and compete in shaping the value of creative labor.

Yue Jiang (Aalto University) is a PhD student supervised by Prof. Antti Oulasvirta at Aalto University and the Finnish Center for AI in Finland. Her research focuses on computational user interface understanding, with specific interests in generating adaptive UIs for different users and contexts, AI-assisted design, and modeling human behavior.

Jason Wu (Apple) is a Research Scientist at Apple in the Human-Centered Machine Intelligence group. Previously, he received a PhD in HCI from Carnegie Mellon. In his research, Jason builds data-driven and computational systems that understand, manipulate, and synthesize user interfaces to maximize the usability and accessibility of computers. Jason's work has received awards at academic conferences and has been by a Fast Company Innovation by Design Student Finalist Award, press coverage in major outlets such as TechCrunch and AppleInsider, and by the FCC Chair Awards for Advancements in Accessibility.

Tuhin Chakrabarty (Salesforce) is a Research Scientist at Salesforce AI Research and an Assistant Professor at Stony Brook University. His research interests are broadly in NLP , Interactivity and Human AI Alignment. He focuses on the design and development of reliable AI systems that can handle implicature, ambiguity, understand human behavior and are aligned with the requirements they have from technology. Tuhin's work on AI and Creativity has been covered by MIT Technology Review, BloomBerg, Washington Post and The Hollywood Reporter

Savvas Petridis (Google DeepMind) is a Research Scientist at Google DeepMind, in the People + AI Research (PAIR) team. He generally researches Human-AI Interaction, with a focus on human controllability and understanding of large generative models. Recently, his work has focused on helping users formulate and communicate their requirements to these large models and is curious how this process might change over longer periods of usage.

David Ledo (Autodesk) is a Venezuelan-Canadian designer, scientist, and communicator working as a Senior Research Scientist within Autodesk Research. David is part of the HCI and Vis Research Group, where he explores novel creativity support tools, authoring

environments, and practitioners' processes to inform the design of future technologies. David received his PhD at the University of Calgary in 2020, for which he received several awards, such as the Killam, NSERC, and Adobe fellowships, Alberta innovates, four teaching excellence awards, among others. During his PhD, David worked at multiple academic and industrial institutions in Canada, the US, and Europe, including the University of Saskatchewan, Autodesk Research, Aarhus University, and Microsoft Research.

Dingzeyu Li (Adobe) is a Senior Research Scientist at Adobe Research. He is interested in building novel creative tools, using the latest advances from vision, graphics, machine learning, and HCI. His past research and engineering has been recognized by two ACM UIST Best Paper Awards (2022, 2017), an Emmy Award for Technology and Engineering (2020), two Adobe MAX Sneaks Demos (2019, 2020), an Adobe Research Fellowship (2017), a NVIDIA PhD Fellowship Finalist (2017), a Shapeways Educational Grant (2016), and an HKUST academic achievement medal (2013).

Tiffany Tseng (Barnard College) is an Assistant Professor of Computer Science at Barnard College and the director of the Design Tools Lab. Her research contributes to design software that enables creative expression and knowledge sharing practices. Before joining Barnard, she was a research scientist at Apple and Project Assistant Professor at the University of Tokyo. She has developed design tools across creative domains including animation, machine learning, electronics prototyping, and 3D design, both through her research and professional work as a product designer at companies such as Autodesk and IDEO. Her work aims to empower a range of users, from young people to professional designers, to realize their creative potential using new technologies.

Jeffrey V. Nickerson (Stevens Institute of Technology) is the Steven Shulman '62 Chair for Business Leadership and Professor of Digital Innovation at Stevens Institute of Technology. His research focuses on how humans and machines work together in creative endeavors such as design. He is currently an investigator in a National Science Foundation funded project called the Future of News Work, which is looking at the effects of generative AI on journalism and related fields.

Lydia B. Chilton (Columbia University) is an Assistant Professor in the Computer Science Department at Columbia University. Her research is in computational design - how computation and AI can help people with design, innovation, and creative problem-solving. Applications include: creating media for journalism, developing technology for public libraries, improving risk communication during hurricanes, helping scientists explain their work, and improving mental health in marginalized communities.

4 PRE-WORKSHOP PLANS

Before the workshop, we will have our workshop website (https://longitudinal-workshop.github.io/) and email address (longitudinal.workshop@gmail.com) ready. The website will contain detailed calls for participation, workshop plans and schedule, organizers information and contacts, and the submission method.

Then, we will distribute a call for participation. With our diverse team of organizers from various countries and disciplines, we plan not only to promote attendance at our workshop in academic areas of ACM SIGCHI, such as IUI, UIST, DIS, and CSCW, but also to encourage colleagues and students in other academic fields, such as sociology, biomedical informatics, management, labor economics, and political science to participate and share their perspectives.

Moreover, with almost half of our workshop organizers working in the industry, we will also reach out and invite industry researchers, product managers, and user experience designers to participate in our workshop. To ensure wide outreach, we will share and promote our call for workshop participation through mailing lists, personal networks, and social media (Facebook, X/Twitter, Discord etc). All participants will be asked to submit a 2-3 page position paper on their plans or insights about longitudinal studies in HCI. Details about the position paper, including the review and publication plans, are in Section 7.

5 WORKSHOP SCHEDULE AND MODE

Schedule. According to our workshop goal, we structure the one-day workshop into three phases (p): (p1) getting to know longitudinal practices, (p2) exploring the challenges of current longitudinal studies, and (p3) gaining hands-on experience in preparing for future longitudinal opportunities.

During phase 1, participants will gain a deeper understanding of longitudinal studies in HCI from the welcome, 2-minute lightning talks from each participant, and the first keynote speaker. The invited keynote speaker, Tesh Goyal, is a leading expert in longitudinal research from the industry, discussing recent Google DeepMind research tools and products that they have been leading or developing for long-term user evaluation. The keynote will be 20 minutes long, followed by a quick Q&A.

During phase 2, participants will dive into the questions list (1a - 1e) mentioned in Section 2 and use that as a framework to review their own position papers. Then, they will discuss the questions and try to find potential solutions or answers (like deciding methodology details). In this table activity 1, they will work with their tablemates in pairs to complete the task, followed by a table presentation. After lunch, we will invite some industry product managers and customer research experts who are also conducting longitudinal research but for entirely different objectives to be on a panel. From this, participants can gain a more comprehensive view about the landscape of longitudinal research.

During phase 3, participants will earn hands-on experiences in designing a new longitudinal protocol as well as prototyping a longitudinal system. For table activity 2, they will work in pairs again to design new study protocols about a system they have built or are interested in running a longitudinal study on. Each table will receive different constraints (e.g., table A will be testing user engagement with social feature for 6 months, while table B will be testing user customization and appropriation with the whole underlying workflow for 10 consecutive days, etc.). After that, they will share their insights, questions, and uncertain decisions they have made, within the table and the whole room. Then, for table activity 3, they will also work on the same problem but draw five different wireframes and design system log information to conduct such studies. They will be provided with a few basic user interface templates on either paper or on Miro board. All these activity materials' preparation will be finished before the position paper deadline.

Phase	Time	Activity
p1	9:00-9:10	**Welcome**: Introduce goals, organizers, and schedule.
p1	9:10-10:30	**Participant Introduction + Lightning Talks**: Participants give 2-min talks on their position papers.
p1	10:30-10:45	*Coffee Break*
p1	10:45-11:15	**Keynote**: Presentation by a leading expert in longitudinal HCI: Tesh Goyal (Google DeepMind).
p2	11:15-11:40	**Table Activity 1**: Reshare their position paper themes with the table and identify potential challenges
p2	11:40-12:00	**Table Presentation and Reflection**
	12:00-13:00	*Lunch Break*
p2	13:00-13:45	**Panel Discussion**: Panel discussion from industry product managers
p3	13:45-14:15	**Table Activity 2**: Designing a longitudinal protocol from scratch
p3	14:15-14:30	**Table Presentation and Reflection**
p3	14:30-14:45	*Coffee Break*
p3	14:45-15:30	**Table Activity 3:** Designing a longitudinal system prototype
p3	15:30-16:00	**Table Presentation and Reflection**
p3	16:00-16:30	**Closing** (Wrap up, photo, discord/mailing list setup, post-workshop plans debrief, thank you)

Hybrid format and asynchronous materials. The one-day workshop will be held in a hybrid format. The workshop will take place in person in Yokohama, Japan, with most of the organizers and participants attending in person. Remote participants will join over Zoom, and the standard equipment provided by the conference center will meet our technical needs. A hybrid workshop broadens participation by reducing concerns over travel costs and visa issues. Specifically, we also aim to attract non-traditional CHI participants, such as product managers from technology companies, non-HCI researchers who have also been using longitudinal methodologies, and others who may be interested in the workshop.

To better accommodate the remote participants, at least five organizers will be logging into Zoom and facilitating the session. For the three table activities, we will use Zoom breakout rooms and pre-made Miro templates for support. As detailed in Section 6, all workshop materials, with participants' consent, will be available online. If some participants need to attend asynchronously, the first author can host an additional 7-hour Zoom session.

Expected size of attendance. We anticipate 25 to 35 attendees to participate in our workshop at CHI. We believe this is a suitable size for both networking and community building since this is one of the earliest longitudinal HCI workshop, and for active participation and discussion related to our planned interactive workshop concept.

6 POST-WORKSHOP AND PUBLISH PLANS

After the workshop, we will share our outcomes with anyone interested in this area. First, we will feature our collection of accepted papers on our workshop website, subject to authors' consent. Additionally, after the conference, we will compile and submit all accepted papers to arXiv as the official workshop proceedings. The website will also host accepted papers, presentation slides, discussion summaries, videos, and any other releasable materials. Second, as mentioned in point (1) of Section 2, the organizers and interested participants will co-write a blog post summarizing the workshop outcomes, which will be published on the workshop website. This post will highlight insights from the presentations and discussions and outline the proposed future research agenda. Third, the organizers and interested participants will create several living artifacts on GitHub, including an interactive up-to-date collection of SIGCHI longitudinal papers with annotations, a list of guidelines for designing longitudinal protocols or developing systems that facilitate easy longitudinal studies, and a comprehensive survey paper on longitudinal HCI to submit for CHI 2026. The survey paper will be co-authored by all interested participants, focusing on longitudinal research to help further define and advance this area of study. Lastly, to maintain the momentum of our discussions, we will create a Discord channel and a mailing list to engage participants and involve a broader community interested in longitudinal HCI. We will encourage community members to share their research ideas and insights in the channel and organize more networking events, such as future lunches and a second workshop at other conferences, if there is enough interest.

7 CALL FOR PARTICIPATION

Longitudinal studies offer great opportunities for HCI researchers, but the associated complexities have often posed challenges for adoption. Thus, our workshop on "Facilitating Longitudinal Interactions in HCI" at CHI 2025 seeks to address these challenges, explore opportunities, and identify future research direction.

To attend this workshop, we ask participants to submit a 2-3 page position paper in the double-column ACM Extended Abstract Format (excluding references). The deadline for paper submission will be February 13, 2025 (11:59 AoE). Every submitted paper will undergo a peer-review process and be selected based on the criteria of quality and relevance. Upon acceptance, at least one author of each accepted position paper must register and attend the workshop. This workshop will be held in-person in Yokohama, Japan and will also be available on Zoom. Lastly, authors have the option to include their position papers on the workshop website and in the final workshop proceedings.

To submit, participants should follow the instructions on the website: https://longitudinal-workshop.github.io/. Submissions can cover but are not limited to the following topics:

- Running (or planning to run) a longitudinal study: Describe a system you have studied or plan to study longitudinally, and plan out your study protocols and system design.
- Challenges and opportunities about longitudinal studies: Discuss the challenges from conducting long-term interaction

research. Propose future longitudinal research questions that you believe warrant further study.
- Insights about customization, personalization, appropriation, learning curves, or novelty effects: Share a case study or concept that revolves around one of the themes above over time.

Tentative Timeline.

- Call for participation release: December 15, 2024
- Position paper submission deadline: Feburary 13, 2025
- Notification of acceptance: March 11, 2025

8 ACCESSIBILITY

Authors whose position papers are accepted will be highly encouraged to ensure their documents are accessible. As they prepare the camera-ready version, the organizers will provide guidance on enhancing accessibility, such as including alt-text for images and tables. We will be actively working with the accessibility chairs and student volunteers to offer features like subtitles and captioning.

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