
The Disappearing Tabletop: Social and Technical Challenges for Cross-Surface Collaboration

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Abstract

After 20 years of research, it is unclear what role the tabletop should play in the home or workplace. Progress has been made towards hardware and software interfaces, connectivity with nearby devices, and understanding human behaviour on and around the table – yet, in practice tabletops see limited use. This workshop seeks to explore the development and use of tabletops from historical, technical, and social perspectives. Workshop goals include synthesizing opinion and experience from new and established researchers on future directions of tabletop research, and an open discussion of questions such as to what applications are tabletops best suited? and how can tabletops be better integrated into larger workflows and digital ecosystems?

Author Keywords

tabletop; cross-surface; collaboration; historical perspective

ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]:
Miscellaneous

Introduction

Over the past two decades tabletop research has flourished, and tabletops have been successfully deployed to ‘wild’ settings such as museums [6], classrooms [11], and science centres [4]. This success developed in parallel to

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ISS '17, October 17–20, 2017, Brighton, United Kingdom
© 2017 Copyright is held by the owner/author(s).
ACM ISBN 978-1-4503-4691-7/17/10.
<https://doi.org/10.1145/3132272.3135085>

the formation of the ACM Conference on Interactive Surfaces and Spaces, the release of mainstream products such as the SMART Table, Microsoft Surface, Ideum, and hundreds of academic publications.

During this period, a number of strengths of tabletop displays were identified and characterized. For example, they have been shown to support collaborative processes more fluidly than vertical displays [12]. In group decision-making tasks, tabletops have also been shown to result in more in-depth discussion and participants taking on a more diverse set of roles. In response to these strengths, and many others, effort was invested in the development of interaction techniques (e.g., [1, 5, 9, 14]) and design guidelines (e.g., [8, 13]) to promote the adoption of tabletops in practice.

As new devices such as smartphones, tablets, and videowalls have emerged, the ISS community has moved to explore interaction and collaboration across multiple surfaces and spaces [2, 3, 7, 10] – often including tabletops as one component of a ‘device ecology’. As these devices have gained widespread adoption, they have often displaced the tabletop as the central focus of collaborative activities. Today, groups collaborate on individual smartphones, gather around a shared set of tablets, or a nearby wall display in favour of a tabletop. These practices bring into question the role of the tabletop moving forward.

This workshop aims to foster a discussion on the role of the tabletop in modern, multi-surface ecologies between interested researchers. Submissions should describe experience in developing cross-surface or tabletop systems that support collaborative activities, perspectives on the evolving (or disappearing) role of tabletops, opportunities for the use of tabletops in supporting collaboration, and identify key barriers that prevent tabletops from advancing into broader societal use, beyond research labs and niche applications.

Relevance to ISS Community

This conference began in 2006 as the IEEE International Workshop on Horizontal Interactive Human-Computer Systems. Over the next 10 years, the scope of the conference evolved, first to IEEE TABLETOP, then to the ACM Conference on Interactive Tabletops and Surfaces, and most recently to the ACM Conference on Interactive Surfaces and Spaces. These changes mark a notable departure from its origins in tabletop interaction. Our workshop will provide the community an opportunity to reflect on successes in tabletop interaction, changes in the technologies explored at the conference, and to discuss future research directions.

Topics of Workshop

Our workshop aims to support discussion amongst tabletop researchers and practitioners on questions such as:

- What has held back tabletops from commercial success?
- Are there fundamental problems faced by tabletops? (conceptual and/or technical)
- For what tasks, user populations, etc. are tabletops best suited?
- What alternative devices are useful in supporting similar scenarios? e.g., Have smartphones, tablets, or vertical displays displaced tabletops?
- Where has ISS been most successful in fostering the development of tabletops?
- What opportunities exist for new researchers interested in tabletop research?

Participants are encouraged to address these questions directly in their workshop submissions.

Organizing Committee

The organizing committee consists of:

James R. Wallace is an Assistant Professor in the School of Public Health and Health Systems at the University of Waterloo, Canada. His research interests include decision-making, cross-surface interaction, and analysis on and around large displays.

Steven Houben is an Assistant Professor (Lecturer in UK) in Interactive Systems within the School of Computing and Communication at Lancaster University. His research interests include human-computer interaction, ubiquitous multi-device systems, physical and tangible computing, and sensor-based systems.

Craig Anslow is an Assistant Professor (Lecturer in NZ) in Software Engineering within the School of Engineering and Computer Science at Victoria University of Wellington. His research interests include human-computer interaction, multi-surface environments, visual analytics, and software visualization.

Andrés Lucero is an Associate Professor of Interaction Design at Aalto University. His work focuses on the design and evaluation of novel interaction techniques for mobile devices and interactive surfaces. His research interests include human-computer interaction, design, and play.

Yvonne Rogers is a Professor of Interaction Design, the director of UCLIC and a deputy head of the Computer Science department at UCL. Her research interests are in the areas of ubiquitous computing, interaction design and human-computer interaction.

Stacey D. Scott is an Associate Professor in the School of Computer Science at the University of Guelph,

Canada. Her research focuses on the design of interactive surfaces to support face-to-face collaboration and social activities. She has been researching tabletop and multi-surface systems for over 15 years.

Planned Activities and Format

The workshop comprises morning and afternoon sessions (Table 1). In the morning session we will first welcome attendees to the workshop, provide opening remarks, and each attendee will briefly introduce themselves to the group, followed by an invited talk. After a morning break, attendees will give lightning talks of their accepted workshop papers before a lunch break.

During the afternoon session, attendees will be divided into working groups to each explore a specific challenge that participants and organizers have identified in their position papers as fundamental technical and social challenges facing the uptake and growth of tabletop research and tabletop applications. Each group will be responsible for discussing the root of the identified challenge, and potential solutions to address the challenge. After the afternoon coffee break, groups will be tasked with synthesizing the results of their discussions into the roots of the problem, potential solutions, and opportunities to further advance tabletops beyond their current state of technical capabilities and societal adoption. Each group will then report these results back to the larger group. Finally, the organizers will share closing remarks and attendees will have an opportunity to share feedback and discuss next steps.

Nature of the Workshop

Broadly speaking, we propose a highly dynamic workshop, based on design cases, brainstorming, affinity diagramming, and sharing of results.

Time	Activity
0900–0930	Welcome and introductions
0930–1030	Invited Talk - TBD
1030–1100	<i>Morning Break</i>
1100–1230	Presentation of workshop papers (lightning talks)
1230–1400	<i>Lunch Break</i>
1400–1530	Split into groups based on themes: from the workshop and discuss
1530–1600	<i>Afternoon Break</i>
1600–1730	Group activity Closing remarks from OC
1800	Dinner (Optional)

Table 1. Workshop Activities

Requested Workshop Length

We propose a one-day workshop (8 hours maximum).

Attendees

We invite researchers and designers who have been involved in one or more project(s) involving applications of tabletop displays. Attendees of the workshop must submit a work-in-progress or position paper (2 – 4 pages in ACM SIGCHI Extended Abstract format) and may also submit, if appropriate, a short video.

Given the focus of the workshop, we are particularly interested in perspectives on past work from experienced researchers, reflections on strengths and weaknesses of the tabletop form factor, and opportunities to expand the use of tabletops from new researchers.

Publication

Workshop papers will be published online in the ACM Digital Library. To support discussion during the workshop, accepted papers will also be available on a workshop website.

Room Requirements

Based on past workshops at ISS, we expect up to 20 participants, and therefore require a room capable of accommodating this number. Additionally, we require a data projector that attendees can plug their laptops into, a whiteboard or flip chart with markers, and post-it notes for brainstorming and affinity diagramming.

Submission Timeline

We propose the following timeline for submission of workshop papers and notification of acceptance. The timeline will allow organizing committee members two weeks to review papers and host a virtual PC meeting to discuss acceptance of papers.

- Workshop Paper Submission: 13 August 2017
- Author Notification: 20 August 2017
- ISS Early Registration: 21 August 2017
- Workshop: 17 October 2017

Post-Workshop

By publishing submissions in the ACM Digital Library, our workshop will provide a record of participants' perspectives on tabletop research, synthesize work over its' 20-year history, and identify ongoing opportunities and challenges for those working in the field. Furthermore, the organizers and interested participants will synthesize the results of the "key challenges and potential solutions" explored in workshop into a general article aimed at raising awareness among the broader ISS and ACM SIGCHI communities about the current state and possible future directions of tabletop research and application. This article will be submitted to the ACM Interactions magazine to reach as broad an audience as possible of potentially interested academic and industrial researchers and practitioners.

REFERENCES

1. Dzmityr Aliakseyeu, Andrés Lucero, and Sriram Subramanian. 2007. Interacting with piles of artifacts on digital tables. *Digital Creativity* 18, 3 (2007), 161–174. DOI : <http://dx.doi.org/10.1080/14626260701532033>
2. Craig Anslow, Pedro Campos, and Joaquim Jorge (Eds.). 2016. *Collaboration Meets Interactive Spaces*. Springer.
3. Craig Anslow, Pedro Campos, Andrés Lucero, Laurent Grisoni, Mirjam Augstein, and James Wallace. 2016. Collaboration Meets Interactive Surfaces and Spaces (CMIS): Walls, Tables, Mobiles, and Wearables. In *Proceedings of the 2016 ACM on Interactive Surfaces and Spaces (ISS '16)*. ACM, New York, NY, USA, 505–508. DOI : <http://dx.doi.org/10.1145/2992154.2996359>
4. Lisa Anthony, Kathryn A. Stofer, Annie Luc, and Jacob O. Wobbrock. 2016. Gestures by Children and Adults on Touch Tables and Touch Walls in a Public Science Center. In *Proceedings of the The 15th International Conference on Interaction Design and Children (IDC '16)*. ACM, New York, NY, USA, 344–355. DOI : <http://dx.doi.org/10.1145/2930674.2930682>
5. Mark Hancock, Thomas ten Cate, and Sheelagh Carpendale. 2009. Sticky Tools: Full 6DOF Force-based Interaction for Multi-touch Tables. In *Proceedings of the ACM International Conference on Interactive Tabletops and Surfaces (ITS '09)*. ACM, New York, NY, USA, 133–140. DOI : <http://dx.doi.org/10.1145/1731903.1731930>
6. Eva Hornecker. 2008. “I don’t understand it either, but it is cool!”-visitor interactions with a multi-touch table in a museum. In *Horizontal interactive human computer systems, 2008. TABLETOP 2008. 3rd IEEE International Workshop on*. IEEE, 113–120.
7. Steven Houben, Jo Vermeulen, Clemens Klokmose, Johannes Schöning, Nicolai Marquardt, and Harald Reiterer. 2016. Cross-Surface: Challenges and Opportunities of Spatial and Proxemic Interaction. In *Proceedings of the 2016 ACM on Interactive Surfaces and Spaces (ISS '16)*. ACM, New York, NY, USA, 509–512. DOI : <http://dx.doi.org/10.1145/2992154.2996360>
8. Ahmed Kharrufa, Roberto Martinez-Maldonado, Judy Kay, and Patrick Olivier. 2013. Extending Tabletop Application Design to the Classroom. In *Proceedings of the 2013 ACM International Conference on Interactive Tabletops and Surfaces (ITS '13)*. ACM, New York, NY, USA, 115–124. DOI : <http://dx.doi.org/10.1145/2512349.2512816>
9. Russell Kruger, Sheelagh Carpendale, Stacey D. Scott, and Anthony Tang. 2005. Fluid Integration of Rotation and Translation. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '05)*. ACM, New York, NY, USA, 601–610. DOI : <http://dx.doi.org/10.1145/1054972.1055055>
10. Andrés Lucero, James Clawson, Joel Fischer, and Simon Robinson. 2016. Mobile collocated interactions with wearables: past, present, and future. *mUX: The Journal of Mobile User Experience* 5, 1 (2016), 6. DOI : <http://dx.doi.org/10.1186/s13678-016-0008-x>

11. Roberto Martinez-Maldonado, Andrew Clayphan, and Judy Kay. 2015. Deploying and visualising teacher's scripts of small group activities in a multi-surface classroom ecology: a study in-the-wild. *Computer Supported Cooperative Work (CSCW)* 24, 2-3 (2015), 177–221.
12. Yvonne Rogers and Siân Lindley. 2004. Collaborating around vertical and horizontal large interactive displays: which way is best? *Interacting with Computers* 16, 6 (2004), 1133. DOI : <http://dx.doi.org/10.1016/j.intcom.2004.07.008>
13. Stacey D Scott, Karen D Grant, and Regan L Mandryk. 2003. System guidelines for co-located, collaborative work on a tabletop display. In *ECSCW 2003*. Springer, 159–178.
14. Martin Spindler, Sophie Stellmach, and Raimund Dachsel. 2009. PaperLens: Advanced Magic Lens Interaction Above the Tabletop. In *Proceedings of the ACM International Conference on Interactive Tabletops and Surfaces (ITS '09)*. ACM, New York, NY, USA, 69–76. DOI : <http://dx.doi.org/10.1145/1731903.1731920>