

Didactic Panel: Interactive Systems in Healthcare

Lena Mamykina, Ph.D¹, Maddhu Reddy, Ph.D², Katie Siek, Ph.D³, Gabriela Marcu, Ph.D⁴, Leslie Liu, Ph.D³.

¹Columbia University, New York, NY, USA; ²Northwestern University, Chicago, IL, USA, ³Indiana University Bloomington, Bloomington, IN, USA, ⁴Drexel University, Philadelphia, PA, USA

Abstract

In this didactic panel, we will review an emerging and growing field of investigation within medical informatics, interactive systems in healthcare. A set of panelists with complementary areas of expertise and substantial experience in biomedical informatics and human-computer interaction will provide an overview of the field, highlight examples of cutting-edge investigations, discuss grand challenges, and outline training and career opportunities. The information presented during the panel will be informed by the Workshop on Interactive Systems in Healthcare (WISH 2016) co-hosted with the SIGCHI conference on Human-Factors in Computing Systems, CHI 2016. Given the growing interest in this area, we expect the panel to be educational and allow for a lively discussion of topics relevant to AMIA members.

Introduction

Health Information Technology (HIT) has the potential to transform healthcare by positively impacting quality, efficiency, and cost-effectiveness. Similarly, new self-monitoring technologies and data science methods open unprecedented opportunities to inform decisions and choices of individuals who must manage their health and chronic diseases at home. However, despite ongoing efforts by many government agencies, HIT continues to experience low levels of adoption¹. Moreover, a growing body of research questions its impact on medical care², for example by highlighting the unintended consequences of HIT³, and medical errors that result from poorly designed computing systems⁴. Researchers have argued that many of these negative consequences result from a mismatch between the reality of conducting clinical work and the structure of computing applications that are meant to support it⁵. Similar concerns are raised in regards to the usefulness and longevity of technologies for health and wellness⁶.

To address these limitations and remove barriers to the successful adoption of HIT, new research initiatives are focusing on a better alignment of HIT and clinical practices, and an approach to system design that is informed by best practices in Human Factors and Human-Computer Interaction (HCI). However, these efforts currently exist in several disjointed research communities, without established pathways for transfer of knowledge and expertise. These communities include but are not limited to Biomedical Informatics, HCI, Computer Science, Social Sciences, and Behavioral Medicine, among others. Each of these fields has its own venues for disseminating research results that rarely overlap. Therefore, researchers and practitioners interested in designing patient and clinician-centric HIT have little opportunity to interact and develop a shared body of knowledge across these communities. As a consequence, there exists a potential to create deeper and more profound connections among the biomedical, informatics, human-computer interaction, medical sociology and anthropology communities that would lead to the development of new methods, approaches, and techniques for removing barriers to the adoption of HIT.

In response to these challenges, the American Medical Informatics Association (AMIA) and the Association of Computing and Machinery (ACM) have co-sponsored a series of Workshops on Interactive Systems in Healthcare (WISH). The overarching goal of these workshops is to establish lasting and meaningful connections between these communities, and bring together students and researchers from various disciplines who are working on creating, implementing, and evaluating innovative health technologies. The first workshop in the series, WISH 2010 was co-hosted with CHI 2010 in Atlanta, GA. The workshop was sponsored by the NSF, ACM, SIGCHI, and Microsoft Research. It attracted close to 150 participants and included both invited panels and peer-reviewed technical program. From 2011-2014, WISH was co-hosted with the Annual Symposium of the American Medical Informatics Association. In 2016, WISH is co-hosted with CHI as a two-day workshop, including an open symposium during the first day, and an invitation-only meeting of the WISH steering committee during the second day.

In this panel, we will outline a broad research agenda for Interactive Systems in Healthcare and provide highlights from WISH 2016.

Panelists and their Qualifications

The panelists are well-known researchers in the fields of Human-Computer Interaction, Computer Science, and Biomedical Informatics who bring their expertise and interdisciplinary perspective to advance the agenda of the workshop. Three of the organizers have served as co-chairs for previous WISH (Drs. Mamykina and Reddy in 2011, Dr. Siek in 2012) that were co-hosted with AMIA. All co-organizers are prominent members of HCI and Biomedical Informatics communities and have served as members of the program committees for CHI and AMIA for multiple years.

Lena Mamykina, PhD, is an Assistant Professor of Biomedical Informatics in the Department of Biomedical Informatics at Columbia University. Her primary research interests reside in the areas of Biomedical Informatics, Human-Computer Interaction, Ubiquitous and Pervasive Computing, and Computer-Supported Collaborative Work. Dr. Mamykina's broad research interests include individual and collective cognition, sensemaking and problem-solving in the context of health, health care, and health management.

Dr. Madhu Reddy, PhD, is a Professor of Health Communication in the Department of Communication Studies and a core faculty member in the Center for Communication and Health at Northwestern University. Previously, he was in the College of Information Sciences and Technology at Penn State University and helped start Penn State's Center for Integrated Healthcare Delivery Systems. Dr. Reddy's primary research interests are at the intersections of Medical Informatics and Computer Supported Cooperative Work (CSCW).

Katie Siek, PhD, is an Associate Professor in Informatics at Indiana University Bloomington. Her primary research interests are in human computer interaction, health informatics, and ubiquitous computing. More specifically, she is interested in how sociotechnical interventions affect personal health and well being. She has actively participated in the CHI community (PC member 2012 and 2013) and AMIA community (PC member 2011 and Vice Chair for the AMIA Annual Symposium 2013) and other conferences and workshops integrating computing and health.

Gabriela Marcu, PhD, is an Assistant Professor of Human-Centered Computing in the College of Computing and Informatics, and a Research Fellow with the A.J. Drexel Autism Institute, at Drexel University. She holds a Ph.D. in Human-Computer Interaction from Carnegie Mellon University, and a B.S. in Informatics from the University of California, Irvine. Dr. Marcu's research seeks to improve coordination and collaborative reflection in health and social services through technology.

Leslie S. Liu, PhD, is a postdoctoral fellow in Informatics at Indiana University Bloomington. Her primary research interests lie within the intersection of human computer interaction, computer supported cooperative work, and health informatics. She both studies and designs technologies for patient populations.

In the proposed panel, Dr. Liu will server as a moderator, and Drs. Mamykina, Reddy, Siek, and Marcu will serve as panelists.

Proposed Topics

We propose the following general topic for discussion during the panel:

1. Overview of the field and main areas of investigation (Dr. Mamykina)

In the first presentation, Dr. Mamykina will review a history of interactive systems in healthcare and how transformations in interactive technologies impacted healthcare practice. In addition, Dr. Mamykina will review recent work on advancing interactive systems in healthcare and outline prominent areas of investigation. These include, but are not limited to, mobile applications for health and wellness self-management, interactive systems for clinicians' communication, interactive information displays for patient care teams, among many others.

2. Representative presentations from WISH 2016 illustrating contemporary work within the field (Dr. Marcu)

To illustrate contemporary research in interactive systems in Healthcare, Dr. Marcu will provide an overview of the five original manuscripts presented during WISH 2016. These manuscripts will be selected based on their scientific merit and also to represent the diversity of investigations.

3. Grand challenges (Dr. Siek)

Dr. Siek will highlight grand challenges for interactive systems in healthcare identified during the meeting of the WISH 2016 steering committee. These challenges will outline opportunities for new research as well suggest

priorities for funding agencies. In addition, Dr. Siek will discuss the vision for future Workshops on Interactive Systems in Healthcare developed during WISH 2016.

4. Training and career opportunities (Dr. Reddy)

In the last presentation, Dr. Reddy will discuss different skills necessary to conduct impactful research in interactive systems in healthcare and opportunities for fostering these skills within academic institutions and industry-oriented training programs.

After the initial presentations, we plan to open the discussion to the audience. We will begin by asking the panelist to comment on the following set of general questions:

1. What unique opportunities and challenges exist in relation to design methods as well as evaluation methods appropriate for health-oriented interactive systems?
2. What opportunities for innovation in interactive systems in healthcare exist within the current landscape of Health IT?
3. What opportunities for funding and publishing work related to interactive systems in healthcare exist within the different research communities?

In addition, we expect new questions from the audience that will explore a variety of topics related to interactive systems in healthcare.

Conclusion

Given the growing interest to interactive systems in healthcare and growing adoption rates of Electronic Health Record systems, we believe this panel will provide a valuable overview of this area to both newcomers to AMIA as well as to members who are conducting active research and develop new interactive tools for improving health and delivery of healthcare.

All panelists agreed to take part in the panel.

References

1. Ash, J. S. & Bates, D. W. Factors and forces affecting EHR system adoption: report of a 2004 ACMI discussion. *J Am Med Inform Assoc* **12**, 8–12 (2005).
2. Chaudhry, B. *et al.* Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care. *Annals of Internal Medicine* **144**, 742–752 (2006).
3. Ash, J. S., Sittig, D. F., Dykstra, R., Campbell, E. & Guappone, K. The Unintended Consequences of Computerized Provider Order Entry: Findings From a Mixed Methods Exploration. *Int J Med Inform* **78**, S69–S76 (2009).
4. Bierstock, S., Kanig, S. P. & Marcus, E. Computerized Physician Order Entry Systems and Medication Errors. *JAMA: The Journal of the American Medical Association* **294**, 178–179 (2005).
5. Stead, W. W. & Lin, H. S. *Computational Technology for Effective Health Care: Immediate Steps and Strategic Directions*. (NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES, 2009).
6. Clawson, J., Pater, J. A., Miller, A. D., Mynatt, E. D. & Mamykina, L. No Longer Wearing: Investigating the Abandonment of Personal Health-tracking Technologies on Craigslist. in *Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing* 647–658 (ACM, 2015). doi:10.1145/2750858.2807554