AHRQ Grant Final Progress Report

Title of Project: Workshop on Interactive Systems in Healthcare (WISH) 2012

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Organization: University of Washington

Inclusive Dates of Project: September 1, 2012 – August 31, 2013

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Workshop on Interactive Systems in Healthcare (WISH) 2012

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STRUCTURED ABSTRACT

Purpose: The Workshop on Interactive Systems in Healthcare (WISH) 2012 addresses design limitations and other issues that stymie the development and adoption of health IT. WISH provides a forum for sharing research, experiences, and perspectives that enable progress in the design and development of health IT; spurs communication and interdisciplinary dialog on health IT and interactive systems in health care; and promotes ideas and innovation by convening health IT research communities from a variety of disciplines, including biomedical informatics, human-computer interaction, computer science, sociology, and medical anthropology.

Scope: The scope of the workshop was healthcare information technologies and improving the communication between researchers in different disciplines.

Methods: The format of the workshop included keynote speakers; panel discussions; technical presentations on topics such as design, methodology, evaluation, and technology; informal breakout sessions; and poster sessions. Additionally, the workshop included a mentorship program to pair promising junior researchers and students with prominent senior researchers in a related field.

Results: The workshop drew more than 75 attendees and advanced ongoing development of research agendas for interactive systems in healthcare; advanced ongoing consensus-building around research methodological and technical issues in regards to design and evaluation of interactive systems in healthcare; established a new channel for dissemination and implementation of research on interactive systems in healthcare; provided a forum for partnership development among researchers and stakeholder organizations; and established a mentorship program for junior researchers in the field.

Key Words: Health Information Technologies, Interdisciplinary Research, Interactive Systems, Workshop

PURPOSE

The Workshop on Interactive Systems in Healthcare (WISH) was initiated in 2010 to address design limitations and other issues that stymie the development and adoption of health IT. WISH provides a forum for sharing research, experiences, and perspectives that enable progress in the design and development of health IT; spurs communication and interdisciplinary dialog on health IT and interactive systems in health care; and promotes ideas and innovation by convening health IT research communities from a variety of disciplines, including biomedical informatics, human-computer interaction, computer science, sociology, and medical anthropology.

WISH 2012 was held on November 3-4 in Chicago, IL as a day-and-a-half interdisciplinary research symposium in conjunction with the AMIA Annual Symposium. About 75 people from a variety of disciplines attended. Another WISH was planned to be held in conjunction with AMIA again in 2013.

WISH 2012 was organized and led by co-chairs Drs. Wanda Pratt, Katie Siek, and assisted by Dr. Andrea Hartzler. A steering committee comprised of biomedical informatics, public health, policy, and human-computer interaction professionals helped the co-chairs plan the workshop. The steering committee identified and recruited potential speakers, helped choose topic areas for presentations, and reviewed and selected submissions for presentation at the workshop. The format of the workshop included keynote speakers; panel discussions; technical presentations on topics such as design, methodology, evaluation, and technology; informal breakout sessions; and poster sessions. Additionally, the workshop included a mentorship program to pair promising junior researchers and students with prominent senior researchers in a related field.

Specific Aims:
- Develop research agendas for interactive systems in healthcare and identify strategies and mechanisms for studying them.
- Discuss and develop consensus around research methodological and technical issues in regards to design and evaluation of interactive systems in healthcare.
- Establish a new channel for dissemination and implementation of research on interactive systems in healthcare.
- Provide a forum for developing new partnerships among researchers and stakeholder organizations and building their capacity to participate in research activities and using the results of research on interactive systems in healthcare.
- Establish a mentorship program for junior researchers in the field and provide them with the opportunity to meet with leading researchers in the areas related to interactive systems in healthcare.

SCOPE

Efforts to expand adoption and use of health information technology (IT) rely in part on the alignment of health IT design and clinical practice, including the extent to which health IT supports health care providers and patients. The misalignment between health IT and its ability to fully and seamlessly support the workflow, systems, and processes of health care providers limits the technology's positive impact on the quality, safety, efficiency, and effectiveness of health care.

Addressing the complex interplay between human, organizational, and technological systems in healthcare is a significant research area with the potential to impact quality, safety, efficiency, and effectiveness of health care in America. Although new research initiatives aim to better align health information technology (HIT), real clinical practices, and design of technologies informed by the best practices in Human Factors and Human-Computer Interaction, current efforts exist in several disjointed research communities, without established pathways for transfer of knowledge and expertise.

At WISH 2012, researchers and practitioners with an interest in health information technology came together to create deeper and more profound connections among the biomedical, informatics, human-computer interaction, medical sociology and anthropology communities that can lead to the development of new methods, approaches, and techniques to remove the barriers for the adoption of HIT.

METHODS

WISH 2012 employed a variety of approaches to engage workshop participants. Based on feedback received from the previous year's workshop (WISH 2011), we decided how to structure WISH 2012. The primary feedback was that participants felt the need for was more time to interact with each other. We made a number of changes to the workshop program to accommodate that desire. First, we increased the time for the workshop to span a day and a half. This change enabled more time in the program for interaction, but also allowed more time for participants to engage with each other outside the workshop through meals and breaks. Second, we included multiple breakout sessions to allow small groups of people interested in similar topics to engage deeply on topics and then bring them back to the entire workshop to share their thoughts.

We also tried to keep the best parts of the workshop. For example, participants appreciated having keynotes from both a well-known expert in Human-Computer Interaction as well as one from Health Informatics as well as panel presentations and poster sessions for sharing research.

Keynote Presentations
WISH had two exemplary researchers in the areas of Biomedical Informatics and Human-Computer Interaction deliver workshop keynotes.

Dr. Ben Shneiderman, PhD is a Distinguished University Professor in the Department of Computer Science, Founding Director (1983-2000) of the Human-Computer Interaction Laboratory, and a member of the Institute for Advanced Computer Studies at the University of Maryland, College Park. He was elected as a Fellow of the Association for Computing (ACM) in 1997 and a Fellow of the American Association for the Advancement of Science (AAAS) in 2001. He received the ACM SIGCHI Lifetime Achievement Award in 2001. He is a member of the National Academy of Engineering. Dr. Shneiderman is the author of Software Psychology: Human Factors in Computer and Information Systems (1980) and Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th ed., 2010, with C. Plaisant). He co-authored Readings in Information Visualization: Using Vision to Think (1999) with S. Card and J. Mackinlay. His book, Leonardo's Laptop: Human Needs and the New Computing Technologies (MIT Press), won the IEEE Award for Distinguished Literary Contribution in 2004. His most recent book, Analyzing Social Media Networks with NodeXL: Insights from a Connected World (2011), was co-authored with D. Hansen and M. A. Smith.

Dr. Edward H. Shortliffe, MD, PhD is a Scholar in Residence at the New York Academy of Medicine in New York City. He also holds academic positions as an Adjunct Professor of Biomedical Informatics at Columbia University and a Clinical Professor of Biomedical Informatics and Senior Advisor for Health Solutions at Arizona State University. Previously he served as President and Chief Executive Officer of the American Medical Informatics Association (2009-2012). He has also held academic appointments at the University of Texas Health Sciences Center in Houston (2009-2011), the University of Arizona (2007-2009), Columbia University (2000-2007), and Stanford University (1979-2000). Both a computer scientist and a physician, Dr. Shortliffe is an elected member of the Institute of Medicine of the National Academy of Sciences. He has also been elected to fellowship in the American College of Medical Informatics (ACMI) and the American Association for Artificial Intelligence. A Master of the American College of Physicians, he received the ACM's Grace Murray Hopper Award in 1976 and ACMI's Morris F. Collen Award in 2006. Currently Editor-in-Chief of the *Journal of Biomedical Informatics* and of a well-known textbook on Biomedical Informatics, Dr. Shortliffe has authored over 300 articles and books in the fields of biomedical computing and artificial intelligence.

Panel Presentations

The workshop included three panels that examined interdisciplinary issues related to HIT.

Panel 1: *NSF Smart Health and Wellbeing Projects*
Panelists: Kay Connelly (Indiana University – Bloomington , Elizabeth Mynatt (Georgia Institute of Technology), Katie Siek (Indiana University – Bloomington), and Wanda Pratt (University of Washington)
Moderator: Suzanne Bakken (Columbia University)

Panel 2: *Opportunities and Challenges in Designing Interactive Systems for Patient-Provider Communication*
Panelists: Xiaomu Zhou (Rutgers University), Yuan Chen (UC Irvine), Charlotte Tang (University of Michigan – Flint), and Lauren Wilcox (Columbia University)
Moderator: Kai Zheng (University of Michigan)

Panel 3: *Supporting Patients with Chronic Illness*
Panelists: Pedja Klasnja (Univeristy of Michigan), Julie Maitland (University of New Brunswick), Lena Mamykina (Columbia University), and Philip Payne (Ohio State University)
Moderator: Enid Montague (Northwestern University)

Poster Presentations

The workshop included 35 poster presentations. The posters allowed a wide variety of junior and experienced researchers to present their work. The posters were available throughout the workshop and were the focus of an evening reception where food was provided (sponsored by several corporations and universities) and poster authors were instructed to stand near their posters to discuss them with workshop attendees.

1. *Report Format Preferences of Family Physicians for Fracture Risk* Sonya Allin, Sarah Munce, Leslie Carlin, & Susan Jaglal, University of Toronto
2. *Designing a POND: Pattern-Oriented Nutrition Diary* Adrienne Andrew, Gaetano Borriello, & James Fogarty, University of Washington
3. *Resident physicians' interaction with EHRs during primary-care visits* Onur Asan[1] & Enid Montague[2] [1]University of Wisconsin-Madison, & [2]Northwestern University
4. *Designing Reminders and Notifications for Scheduling Research Visits* Solomon Berhe[1], Junfeng Gao[1], Gregory Hruby[1], Adam Wilcox[1], Richard Steinman[2], Carlos Lopez[3], Linda Busacca[4], J Thomas Bigger[2,3], Suzanne Bakken[1,2,5], Chunhua Weng[1,2], [1]Department of Biomedical Informatics, [2]The Irving Institute for Clinical and Translational Research, [3]Department of Medicine, [4]The Clinical Trials Office, & [5]School of Nursing, Columbia University
5. *Online Health Seeking and Social Search* Matthew Bonner & Elizabeth Mynatt, Georgia Institute of Technology
6. *Measurable Gains in Efficiency and Quality in Patient-Provider Communication* Melissa Braxton[1], Keith Butler[1], Mark Haselkorn[1], Chris Esposito[1], Lawrence Lyon[2], Walter Nichol[3], [1]Department of Human Centered Design & Engineering, University Of Washington,[2]VA Puget Sound Healthcare Services, American Lake Division, & [3]Patient Care Services, Veterans Health Administration
7. *#Health@You: An Overview of Text-based Glanceable Displays as a Tool for Socio-technical Interventions* Allison Brown & Katie Siek, University of Colorado Boulder
8. *Temporality in Information Practices of Patients and Clinicians: A Field Study in Bone Marrow Transplant* Ayse Buyuktur & Mark Ackerman, University of Michigan
9. *A Mobile User Interface for Food Portion Size Estimation* Beenish Chaudry & Kay Connelly, Indiana University
10. *Bridging Clinical and Non-clinical Health Practices: A Workshop Report* Yunan Chen[1], Charlotte Tang[2], Karen Cheng[1], Sun Young Park[1], [1]Department of Informatics, University of California Irvine & [2]Department of Computer Science, Engineering and Physics, University of Michigan-Flint

11. *Visual Framing: Nudging Toward Health Behavior Change* Eun Kyoung Choe, University of Washington

12. *Technologies to support aging-in-place among low-SES urban-dwelling older adults* Robyn Evans[1], Ginger White[1], Morgan Soladine[1], Kay Connelly[1], Kelly Caine[2], [1]Indiana University & [2]Clemson University

13. *Designing Individualized Continuous Patient Education (iCOPE) Platform* Joseph Finkelstein, Jeffrey Wood, & Eunme Cha, Johns Hopkins University

14. *Facilitating Intuitive and Interactive Query Composition and Reformulation for Clinical Researchers* Junfeng Gao, Adam Wilcox, Jianhua Li, Feng Liu, Gregory Hruby, Suzanne Bakken, & Chunhua Weng., Department of Biomedical Informatics, Columbia University

15. *Firefly: Designing a Game for Promoting Relaxation Before Sleep* Michael Gilbert[1], Eun Kyoung Choe[2], Michael Lee[2], & Julie Kientz[1], [1]Human Centered Design & Engineering & [2]The Information School, University of Washington

16. *Designing an Interface to Support Shared Decision Making in Oncology* Michael Gonzales & Laurel Riek, University of Notre Dame

17. *Recruiting Participants with Chronic Conditions in Second Life* Saira Haque, Jodi Swicegood, Elizabeth Dean, & Ashley Richards, RTI International

18. *The Doctor is in the House: Examining Health Professionals' Roles in Online Patient Communities* Jina Huh[1], David McDonald[2], Andrea Hartzler[2], Albert Park[1], & Wanda Pratt[1,2], [1]Biomedical Informatics & Medical Education & [2]The Information School, University of Washington

19. *Experiencing Chronic Illness in Flint: A Study of Health Information Behavior* Elizabeth Kaziunas & Mark Ackerman, University of Michigan

20. *Physician Use of Electronic Handoff Tools to Create Patient Mental Models* Logan Kendall[1], Katherine Blondon[1], Justin Iwasaki[1], Jennifer Best[1], Andrew White[1], Predrag Klasnja[2], [1]University of Washington, & [2]University of Michigan

21. *An Interactive Perspective of Health Information Technology Design to Support Collaboration* Craig Kuziemsky[1] & Madhu Reddy[2], [1]University of Ottawa & [2]Penn State University

22. *SunDay: Using Metaphors to Design Visualizations of Sun Exposure* Amanda Lazar[1], Leslie Liu[1], Albert Park[1], Wanda Pratt[1, 2], [1]Biomedical Informatics & Medical Education & [2]The Information School, University of Washington

23. *Understanding Personal Informatics Needs of Individuals with Chronic Health Conditions* Haley Macleod & Anthony Tang, Department of Computer Science, University of Calgary

24. *Expanding the scope of medication adherence measurement to include the measurement of contributing factors* Julie Maitland & John Rutter, Populus Global Solutions Inc.

25. *C-PACE: a Practical Framework for Interactive, Highly-Mobile Accountable-Care Systems* Russell Maulitz[1,2], Wayne Zachary[1], & Janis Cannon-Bowers[1,3], [1]Starship Health Technologies, [2]Drexel University, & [3]University of South Florida

26. *Pushing the Boundaries of Intraoperative Image Use* Helena M. Mentis, Microsoft Research, Cambridge

27. *StepStream: A Social Fitness Intervention for Middle School Students* Andrew Miller, Jessica Pater, & Elizabeth Mynatt., Georgia Institute of Technology

28. *Validity and Utility of an Interactive Multimedia Health Literacy Assessment* Raymond Ownby[1], Drenna Waldrop-Valverde[2], Amarilis Acevedo[1], Robin Jacobs[1], & Joshua Caballero[1], [1]Nova Southeastern University & [2]Emory University

29. *Knowledge, Abilities and Skills as Predictors of Behavior in an Interactive Consumer Health Informatics Intervention* Raymond Ownby[1], Drenna Waldrop-Valverde[2], Robin Jacobs[1], Joshua Caballero[1], [1]Nova Southeastern University & [2]Emory University

30. *Automatic Profiling of Users' Health Interests from Online Communities* Albert Park[1], Andrea Hartzler[2], Jina Huh[1], David McDonald[2], & Wanda Pratt[1,2], [1]Biomedical Informatics & Medical Education & [2]The Information School, University of Washington

31. ***TalkBack: A Nutrition-Focused Online Forum for Kids*** Andrea Parker, Ian McClendon, Catherine Grevet, & Elizabeth Mynatt, College of Computing, Georgia Institute of Technology
32. ***Exploring clinician empathy using social signal processing technology*** Rupa Patel[1], Mary Czerwinski[4], Anthony Back[2], & Wanda Pratt[1,3], [1]Biomedical Informatics & Medical Education, [2]Division of Oncology & [3]The Information School, University of Washington, & [4]Microsoft Research
33. ***Exploring Visualization Techniques To Identify Opportunities For Error in Interactions with Clinical Informatics Technologies*** Katherine M. Sellen, Andrea Jovanovich, & Mark Chignell, Department of Mechanical and Industrial Engineering, University of Toronto
34. ***Designing a Behavioral Intervention Technology for the Prevention of Depression in Youth*** Colleen Stiles-Shields, Jennifer Duffecy, Joyce Ho, & David Mohr, Center for Behavioral Intervention Technologies, Department of Preventive Medicine, & Feinberg School of Medicine, Northwestern University
35. ***Promoting access to care, patient–provider communication, and adherence in underserved populations*** Tammy Toscos[1,2], Brad Doebbeling[1,3,4], & Paige Dechant[1], [1]Regenstrief Institute, Inc, [2]School of Health & Human Services, IPFW, [3]VA HSR&D Roudebush VAMC, & [4]Department of Medicine, IU School of Medicine

WISH Madness

As in the prior year, authors of accepted posters participated in the "WISH Madness" portion of the program by creating a 30-second presentation with a PowerPoint slide to introduce their poster. This section allowed the entire audience to see the breadth of work being done by the poster authors.

Breakout Sessions

To create more opportunities for participants to interact with each on specific topics of interest, we setup two, phased breakout sessions. Based on the stated interests of participants from the prior WISH workshop, the organizers selected seven topics: mHealth, Clinical encounters, Patient interactions outside of the clinic, EMRs, PHRs, Online Communities/Social Media, and Wellness. At the workshop, participants decided to add an additional topic for Disparities. Participants were provided with the following instructions:

1. Look at the theme of each table and decide where you want to sit
2. Discuss each question related to the theme for 20 minutes. Use the markers, post-it notes, and paper to convey your ideas on the table paper
3. At the end of 20 minutes, select who will stay at your table to be the "tour guide." Then, everyone else moves to a different table. (See step 1)
4. The next 20 minute discussion will begin with the tour guide providing an overview of what was discussed during the previous conversation round

In addition, participants were provided with instructions to help them frame each session. For the first session, participants were asked to answer the following questions:

1. What are the barriers of adoption, acceptance, and appropriation?
2. What strides has the research community done to address each of these barriers?
3. What needs to be done to fully address these barriers?

For the second breakout session, they were asked to answer the following questions:

1. Summarize the barriers of adoption, acceptance, and appropriation for the topic
2. Itemize what needs to be done to fully address these barriers
3. Brainstorm what resources are needed to help the community act
4. Identify the three big research questions for this topic

At the end of the workshop, a representative from each breakout session presented a summary of their breakout group to convey their recommendations to the rest of the workshop participants.

Student-Mentor Meetings
An important part of WISH was to connect students with experienced members of the community. Each mentor was connected with up to two students who they were asked to meet with over lunch. Many of the challenges for students working in this space of interactive systems in health is the sense of isolation that they feel, and we intended this small-group interactions to reduce this isolation and encourage students to continue their work in this important area of work.
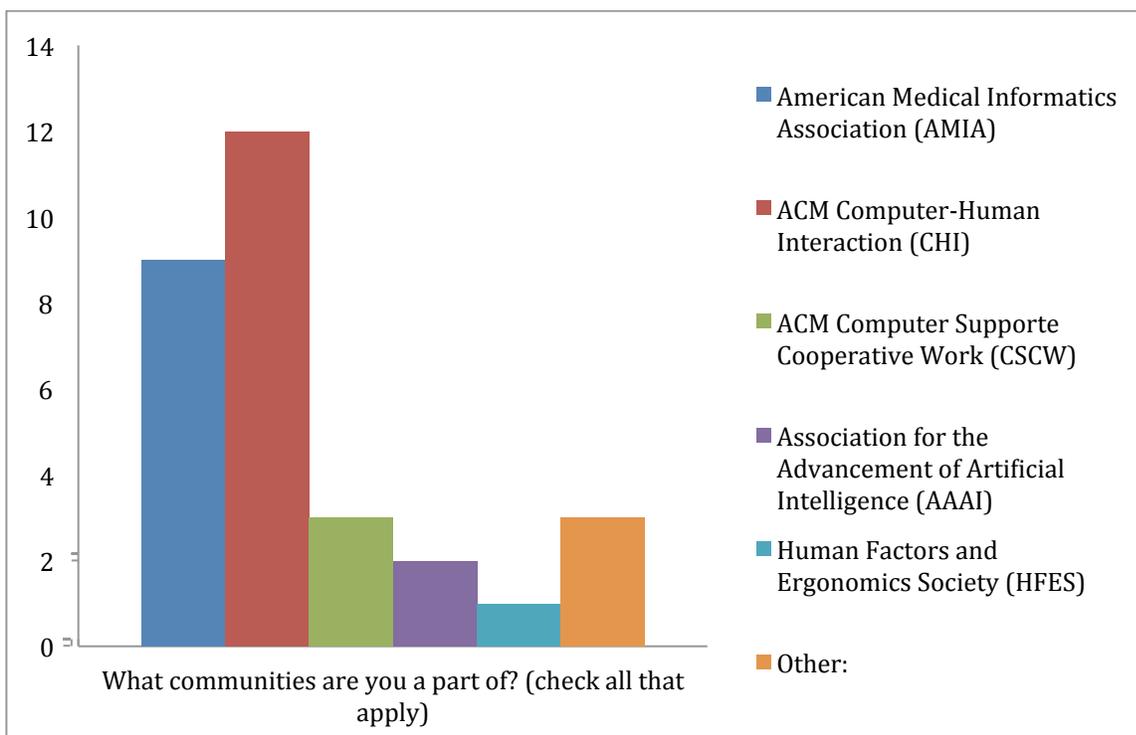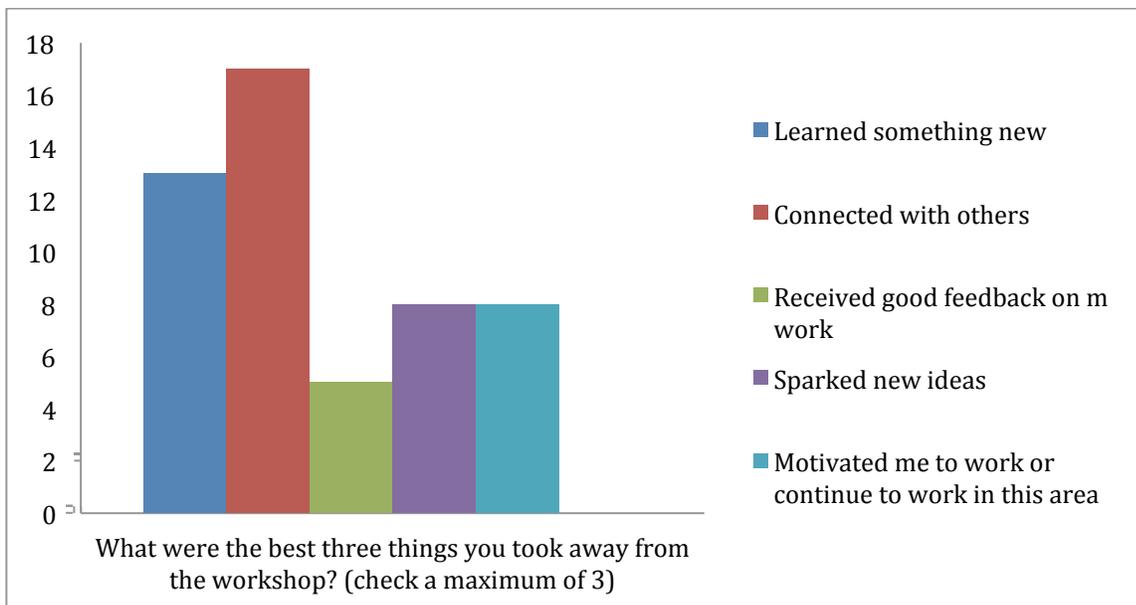
RESULTS

The WISH 2012 conference was successful in advancing its stated goals. Attended by over 75 representatives from the fields of HCI and biomedical informatics, WISH 2012 successfully brought together disparate communities to address issues of mutual interest related to the design, implementation, and use of interactive systems in healthcare.

To help participants share their perspectives on the workshop with each other and with others who were not able attend, the organizers encouraged participants to use the Twitter tag #WISH12 to tweet about the workshop. Additionally, the organizers of WISH 2012 created a LinkedIn group called *WISH - Workshop on Interactive Systems in Healthcare* to serve as an online forum to bridge communities, promote conversation, and enable networking among researchers and practitioners across disciplines with an interest in health information technology. This group continues to be used as a way for researchers to connect with each other.

We have received many stories of researchers who connected at WISH 2012 and have established collaborations. For example, at WISH, two doctoral students, Rupa Patel and Lauren Wilcox, decided to form a workshop that would be offered at the CHI conference in 2013. In collaboration with Dr. Wanda Pratt and others, they successfully proposed and ran a workshop called "Patient-Clinician Communication: The Roadmap for Human-Computer Interaction" that also led to a summary paper published in Patient Education and Counseling.

The organizers surveyed participants of the WISH 2012 workshop to determine whether they met their goals and to solicit feedback for future workshops. At the time of this report, 18 attendees had completed the feedback survey. Though this sample is small, responses indicate that attendees were satisfied with the workshop in terms of content quality (16/18), and that it met their expectations along all dimensions queried. In terms of increasing the connections across these two fields, we found that 12/18 respondents attended the AMIA conference because of our workshop and that all of those respondents will consider attending AMIA in the future, even without WISH. We have included a two other example graphs from our results that illustrate the values that participants found in the workshop as well as the diversity of communities represented by the attendees.

Chart: "What were the best three things you took away from the workshop? (check a maximum of 3)"
- Learned something new
- Connected with others
- Received good feedback on m work
- Sparked new ideas
- Motivated me to work or continue to work in this area

Chart: "What communities are you a part of? (check all that apply)"
- American Medical Informatics Association (AMIA)
- ACM Computer-Human Interaction (CHI)
- ACM Computer Supporte Cooperative Work (CSCW)
- Association for the Advancement of Artificial Intelligence (AAAI)
- Human Factors and Ergonomics Society (HFES)
- Other:

More importantly, it is clear that the workshop succeeded in bringing in researchers from the ACM Computer-Human Interaction (CHI) community who would not normally attend the AMIA venue; thus, increasing the possibilities for collaboration between the CHI and AMIA communities in the future. Further WISH workshops have been planned to be co-located with AMIA again.

PUBLICATIONS and PRODUCTS

Proceedings of the 2012 Workshop on Interactive Systems in Healthcare (WISH); 2012 Nov 3-4; Chicago, IL. University of Washington; 2012. Available at:
http://wish2012workshop.files.wordpress.com/2012/06/wishproceedings_draft31.pdf

Slides of panel presentations and keynote speakers are available at:
http://wish2012workshop.wordpress.com/program/