

H-STAR Two-Year Report

September 1, 2012 – August 31, 2014

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1. Overview and Mission

What: H-STAR is a Stanford interdisciplinary research institute reporting to the Dean of the Graduate School of Education.

Focus: H-STAR focuses on advancing the human sciences, often in the context of their application to the design and uses of information technology and their influences on people, with a particular emphasis on education and learning. H-STAR programs conduct research at the intersection of human sciences and information technology in the areas of learning, mobility, collaboration, entertainment and commerce.

Breadth: H-STAR is the only organizational unit on campus focusing on the multi-disciplinary core of theory, research, and methods that are needed for world-class work on the central topics in K-12 learning sciences and technology design.

Sponsored research: During the two-year period of this report, H-STAR provided all administrative and financial management and support for 34 sponsored research projects (28 of them in the Graduate School of Education), with a total budget of \$27,032,298. (Section 4.)

Core AC faculty: Ten Academic Council faculty carry out research supported in a substantial way by H-STAR, seven of them in the School of Education. (See list in Section 5a.)



Affiliated Academic Council faculty: An additional 41 Academic Council faculty have research projects within H-STAR, or participate actively in one or more H-STAR programs. (Listed in Section 5b.)

Other researchers (not Academic Council): A further 25 Stanford and Stanford-associated faculty and researchers without Academic Council status have a significant affiliation with H-STAR, and many have received funding through H-STAR (often through our mediaX Industry Affiliates Program). (Section 5c.)

Campus need met: Most of the faculty supported by H-STAR (listed in Section 5) are based in social science and humanities-affiliated departments (rather than engineering and research-equipment intensive disciplines such as physics). Those disciplines typically do not have the extensive infrastructure needed to support the large scale interdisciplinary research projects they wish to pursue. As a result, H-STAR meets an important campus need that would otherwise go unfilled.

U/G education: While the primary mission of H-STAR is university research, H-STAR affiliated faculty members are among campus leaders in undergraduate education.

H-STAR membership criteria: Having a broad scope of interest that has commonalities with every School, H-STAR is defined by research mission rather than permanent faculty affiliation; we facilitate, fund, and support research within our mission anywhere on the campus. All Stanford faculty are potentially H-STAR researchers. To date, over 80 Stanford researchers from all five schools have carried out H-STAR supported research or hosted a visiting H-STAR researcher from another university. (See lists in sections 5 and 7 for current affiliated faculty.) In addition, over 90 Stanford faculty have received over \$3.5M in research support through H-STAR's mediaX Industry Partners Program. (See Section 8.)

Activities: We pursue our mission in a number of ways: we organize and service interdisciplinary grants, contacts, and other funding opportunities; we bring together faculty to work collaboratively on projects — both across the campus and in collaboration with faculty at other universities around the world; and we organize events such as lectures, small seminars, workshops and conferences, sometimes through our mediaX program.

Support of faculty collaboration: We provide full service support (visa procurement, travel, logistics, housing, schools for children, space, etc.) to Stanford faculty who want to invite a collaborator from an overseas university. During the period 2012-14, we arranged visits of 20 foreign researchers who came to Stanford to work with Stanford faculty, 7 in the School of Education, 7 in the Communication Department. (Itemized in Section 7.)

Staff: H-STAR employs 5 regular staff (academic and non-academic), performing shared administrative support functions, such as research administration, financial, human resources, and building management in Cordura Hall. We also currently have 25 casual and temporary employees. Between September 2012 and August 2014, under academic staff, we supported 30 graduate students.

Budget (research): The total volume for federal and non-federal sponsored research funding awarded to H-STAR in FY13 was \$4.8M, of which \$1.5M was F&A (indirect cost charges). For FY14, the figure was \$5.1M with \$1.6M F&A. See Section 4 for a complete listing of all sponsored projects.

Budget (administration): The FY13 total administrative costs for H-STAR were approximately \$475K. This number includes a \$200K base allocation. The FY14 total administrative costs for H-STAR were approximately \$400K, including a \$200K base allocation.

Funding sources: The primary source of funding for H-STAR research is the normal system of federal and foundation grants. The infrastructure costs (primarily support-staff salaries) required to support the institute's research and outreach activities and to ensure compliance is approximately \$500K, of which roughly a half is covered by our current allocation from the University. The institute develops the remaining half of the budget from external sources.

2. How H-STAR works

Faculty support: H-STAR provides affiliated faculty (and their students and research assistants) and visiting researchers with limited-term office space, physical and "virtual" meeting rooms (via IP videoconferencing), lecture rooms, lab space, seminars and lectures, printing and copying facilities, secretarial services, the services of administrative, financial and technical support personnel, assistance with identifying and securing funding for research, and, through the mediaX program, contacts with industries relevant to their research pursuits.

Regular research funding: The primary means for funding H-STAR research is external grants, secured by the faculty and researchers. The administrative and financial support staff of H-STAR provides help and support for faculty in proposal preparation and grant management. During the period covered by this report, H-STAR we managed 30 sponsored faculty projects, totaling \$10,510,025. These are itemized in Section 4.

Major research projects: H-STAR also works with faculty to secure large-scale, institute-level, sponsored research funding for multi-year projects involving many faculty members. We helped initiate and then managed four such projects during the period covered by this report, totaling \$16,522,273 in funding:

- National Science Foundation, \$4,783,231: The LIFE Center – Learning in Informal and Formal Environments (2/1/10 – 1/31/15), PI Roy Pea (Education)
- US Dept of Energy, \$5,006,011: Large-scale Energy Reductions through Sensors, Feedback, and Information Technology I (1/14/10 – 11/30/13), PI Byron Reeves (Communication)
- US Dept of Energy, \$3,185,367: Large-Scale Energy Reductions through Sensors, Feedback, and Information Technology II (12/1/13 – 2/29/16), PI James Sweeney (MS&E)
- USAID, \$3,547,664: Resilience Africa Network (RAN) (11/8/12 – 9/30/17), PI James Fishkin (Communication)

While the Energy Project and the RAN project are continuing, funding for the LIFE Center project ended in January 2015, although final reporting is ongoing in a No-Cost-Extension period.

Space: H-STAR has administrative offices and research space in Cordura Hall, which comprises four administrative offices and four rooms devoted to international research projects.

3. Major research programs within H-STAR during 2012-14

3a. LIFE Center: Launched in 2004, the LIFE Center (Learning in Informal and Formal Environments) was, over its ten-plus year span, our largest ever project. The LIFE Center was established as one of the first three national Science of Learning Centers (SLCs) in partnership with the University of Washington and SRI International. The NSF funded the Center for the maximum ten-year period for a total of approximately \$47M. This Center supported faculty and students across education, communication, and psychology, and has served as a tremendous interdisciplinary training ground for building capacity in the university for fundamental learning sciences research across schools and departments.

3b. Energy Project. This \$8.2M, six-year project (funded in two successive parts), which commenced in January 2010, focuses on the development of technologies that encourages people to be more energy efficient at home. The funding came from the U.S. Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E) supplemented by matching grants from Stanford and the California Energy Commission.

3c. USAID RAN Project. The Resilient Africa Network (RAN), funded by USAID, is a partnership of 20 African universities in 16 countries. RAN seeks to strengthen the resilience of communities by nurturing and scaling innovations from the different universities. The RAN Project, funded at \$3,547,664 over five years, applies science and technology to strengthen the resilience of African communities against natural and man-made stresses. It is led by Makerere University with Tulane University's Disaster Resilience Leadership Academy, Stanford University's H-STAR Institute, and the Center for Strategic and International Studies (CSIS) as partners. RAN is one of seven development labs under the Higher Education Solutions Network (HESN) in the office of Science and Technology (OST), USAID. H-STAR is developing online democracy tools and a form of online education (involving MOOC-like elements) to support the RAN initiative.

3d. mediaX. H-STAR's primary industry partnership program, mediaX, is a self-funded program that seeds campus-wide research and coordinates industry interest. The program currently includes 14 industry partners. The program supports and funds research initiatives on domains involving people and technology, rather than by discipline. Since the program began in 2001, mediaX has supported more than \$3.5M of Stanford research, spread across over 90 Stanford faculty PIs, receiving over 200 proposals, representing faculty from all seven schools, and involving over 100 graduate students.

Research funding from mediaX has been in the form of seed grants to support early investigation of promising ideas that show likelihood of leading to larger projects. mediaX research funds are open to all researchers in the Stanford community, and preference is given to novel interdisciplinary collaborations. Many of these "seed" funded projects leverage large federal and foundation grants (bringing faculty and student work closer to societal impact through commercial diffusion.) A significant number have led to new interdisciplinary proposals for federal and foundation grants that build on the mediaX seed projects. (See Section 8 for more details about mediaX.)

3e. ChangeLabs This is a relatively new program in H-STAR, directed by Banny Bannerjee. Working with the d.School, Stanford ChangeLabs aims to pioneer world-class thinking on large-scale, sustainable transformation and creating our world's future systems. To fulfill this vision, ChangeLabs seeks to define and advance the field of Transformation Innovation, to create a strong trans-disciplinary global community, and to generate new large-

scale, sustainable transformation models along with the mechanisms to diffuse them rapidly in practice. ChangeLabs is playing a leading role in the USAID-funded Resilient Africa Network project (RAN). The lab organized the following events during the period of the report:

DATE	MEETING NAME/TOPIC	PARTNER	LOCATION
2/10/14-2/13/14	Scaled Innovation for Small-scale Fisheries	Rockefeller Foundation	Bellagio, Italy
2/25/14-2/28/14	RAN Training on Design Thinking	USAID	Kampala, Uganda
3/10-3/14	Behavior Design for Energy Efficiency	People Power	Hawaii, US
5/5/14-5/10/14	RAN Partners Meeting	USAID	Kampala, Uganda
6/2/14-6/5/14	Intervention Strategy Workshop	USAID/RAN	Stanford
6/22-6/23/14	Scale Amplification Workshop	Rockefeller Foundation	NYC
8/27/14-8/30/14	Approaches to Innovation Workshop	Danish Innovation Center	Copenhagen

4. H-STAR managed funded research projects

The total funding amount for projects active in the period July 2012 – July 2014 is \$27,032,298.

4a. Projects that have a budget over \$1M

Four projects, total funding amount \$16,522,273.

1. Byron Reeves: US Dept of Energy (1/14/10 – 11/30/13) \$5,006,011. Large-scale Energy Reductions through Sensors, Feedback, and Information Technology I
2. James Sweeney: US Dept of Energy (12/1/13 – 2/29/16) \$3,185,367. Large-Scale Energy Reductions through Sensors, Feedback, and Information Technology II
3. Roy Pea: National Science Foundation (2/1/10 – 1/31/15) \$4,783,231. The LIFE Center – Learning in Informal and Formal Environments
4. James Fishkin: USAID (11/8/12 – 9/30/17) \$3,547,664. African Resilience Initiative

4b. Project with a budget of \$1M or less

Thirty projects, total funding amount \$10,510,025.

1. Brigid Barron: NSF (09/01/10–8/31/14) \$549,201. EXP: Developing Citizen Scientists Through Face-to-Face and Networked Learning Opportunities
2. Brigid Barron: NSF (01/01/11–2/31/15) \$49,982. CAP: Collaborative Research: Building a Network to Advance Collaborative Research on Young Children's Learning through Public Media Assets
3. Brigid Barron: SU/mediaX (09/24/11–10/31/13) \$30,000. Contests as a Catalyst for Content Creation
4. Kenji Hakuta: S. H. Cowell Foundation (07/01/10–6/30/16) \$390,000. The Stanford ELL Leadership Network: Improving Instructional programs, Practices and Policies for Secondary English Language Learners
5. Kenji Hakuta: Central Valley Foundation (05/13/10–5/12/17) \$80,500. Data Dialogues: Augmentation to the Stanford ELL Leadership Network
6. Kenji Hakuta: US Dept of Ed/Educational Testing Service (03/01/10–2/28/13) \$192,420. A Technology-Rich Teacher Professional Development Intervention that Supports Content-Based Curriculum Development for English Language Learners

7. Kenji Hakuta: S. H. Cowell Foundation (01/01/10–3/31/14) \$586,520. The Stanford ELL Leadership Network: A Collaboration of Seven California School Districts in Support of English Language Learners
8. Larry Leifer: Tokyo Gas Company Limited (03/01/10–2/28/15) \$220,000. Special Instruction with Collaborative Research to Design and Measure Engagement and Retention Strategies for High Priority Market Segments in a Monopolistic Market Now
9. Roy Pea: John D. and Catherine T. MacArthur Foundation (06/01/10–7/31/14) \$275,000. Building a Field: Learning Analytics and Educational Data-Mining
10. Roy Pea: Bill & Melinda Gates Foundation (07/01/10–7/31/14) \$274,999. Building a Field: Learning Analytics and Educational Data-Mining
11. Roy Pea: NSF (10/01/10–9/30/15) \$252,656. Foundations for Advancing Computational Thinking (FACT): Learning and Assessment through an Online Middle School Curriculum
12. Roy Pea: NSF/Univ of Washington (01/01/11–2/31/14) \$286,500. Expanding STEM Learning and teaching with Mobile Video Inquiries and communities
13. Roy Pea: SU/WGLN (09/01/10–12/31/13) \$500,042. LETSGO: Learning Ecology with Technology from Science for Global Outcome
14. Roy Pea: SU/mediaX (06/01/10–8/31/13) \$160,000. The Utility of Calming Technologies in Improving Productivity
15. Roy Pea: SU/mediaX (09/24/11–2/31/14) \$38,000. Recasting the Textbook as an On-Demand, Collaborative Collection of Historical Narratives Through Primary documents and Interactive, Touch-based Devices
16. Roy Pea: SU/Precourt (10/01/11–2/31/14) \$140,000. Intelligent Crowd-sourcing for Indicators of Change in Assumptions for Improved Decision Making in Energy Reduction Initiatives
17. Byron Reeves: SU/Precourt (08/01/10–3/31/13) \$140,000. Serious Games and Energy Use Behavior
18. Byron Reeves: California Energy Commission (09/09/10–10/30/13) \$500,000. Large-scale Energy Reductions through Sensors, Feedback, & Information Technology
19. Daniel Schwartz: NSF (09/01/10–8/31/13) \$998,985. Cognitive and Cortical Restructuring in the Acquisition of Negative Number Concepts
20. Daniel Schwartz: NSF/Vanderbilt Univ (08/01/10–1/31/13) \$691,476. HCC: Medium: Collaborative Research: Formal Analysis of Choice-Adaptive Intelligent Learning Environments (FACILE) that Support Future Learning
21. Daniel Schwartz: NSF/Univ of Colorado (09/01/10–8/31/15) \$582,045. Expanding PhET Interactive Simulations to Grades 4-8: A Research-based Approach
22. Daniel Schwartz: John D. and Catherine T. MacArthur Foundation (07/01/10–6/30/13) \$600,000. Digital Assessment for Informal and Formal Learning Pursuits
23. Daniel Schwartz: Gordon and Betty Moore Foundation (04/19/10–3/18/13) \$365,825. Measurement Foundations for Rejoining Motivation and Cognition in Learning
24. Daniel Schwartz: The William and Flora Hewlett Foundation (11/14/11–1/14/14) \$450,000 PhET Interactive Simulations
25. Daniel Schwartz: NSF (10/01/10–9/30/15) \$799,999. Nimble Assessments: Tools for the Design and Analysis of Interactive Assessments
26. Daniel Schwartz: US Dept of Ed (07/01/10–6/30/17) \$442,987. Designing Contrasting Cases for Inductive Learning
27. Daniel Schwartz: Gordon and Betty Moore Foundation (07/18/10–7/31/15) \$398,000. Experimentally Validating Assessments of Student Choices that Prepare Them to Learn Science

28. Daniel Schwartz: Gordon and Betty Moore Foundation (09/20/10–9/01/15) \$195,000. Pioneering Next-Generation Assessments of STEM Learning
29. Daniel Schwartz: SU/WGLN (09/01/10–2/28/13) \$269,888. Talking and Seeing Math in Games
30. Daniel Schwartz: SU/BioX (10/01/10–5/31/13) \$50,000. Founding the BioX Game Center for Educating and Large Scale Science

5. Faculty and researchers supported by H-STAR

5a. Faculty supported substantially by H-STAR

The following 10 Academic Council faculty carry out research supported in a substantial way by H-STAR:

1. Bailenson, Jeremy, (Department of Communication)
2. Barron, Brigid (School of Education)
3. Blikstein, Paulo (School of Education; courtesy, Computer Science)
4. Fishkin, James (Department of Communication)
5. Goldman, Shelley (School of Education)
6. Hakuta, Kenji (School of Education)
7. Pea, Roy (School of Education; courtesy, Computer Science)
8. Reeves, Byron (Department of Communication)
9. Schwartz, Daniel (School of Education)
10. Valdés, Guadalupe (School of Education)

5b. Affiliated Stanford Faculty

The following additional 41 Academic Council faculty have some research projects within H-STAR, or participate actively in one or more H-STAR programs. Those that have received research funding from H-STAR are marked with an asterisk.

1. Altman, Russ (School of Medicine)*
2. Bailey, Diana (Department of Management Science and Engineering)*
3. Berman, Russell (Department of Comparative Literature)
4. Boaler, Jo (School of Education)
5. Chafe, Chris (CCMRA)*
6. Chu, Larry (School of Medicine)*
7. Clark, Herbert (Department of Psychology)
8. Cook, Karen (Department of Sociology)
9. Cutkosky, Mark (Department of Mechanical Engineering)*
10. Diaconis, Persi (Mathematics)*
11. El Gamal, Abbas (Department of Electrical Engineering)*
12. Genesereth, Michael (Department of Computer Science)
13. Guibas, Leonidas (Department of Computer Science)*
14. Hamilton, Jay (Department of Communication)*
15. Hanrahan, Pat (Department of Computer Science)*
16. Heer, Jeffrey (Computer Science)
17. Heller, Craig (Department of Biology)
18. Hinds, Pamela (Management Science and Engineering)*
19. Iyengar, Shanto (Department of Communication)*
20. Klemmer, Scott (Department of Computer Science – no longer at Stanford)
21. Koltun, Vladen (Department of Computer Science)*
22. Krawinkler, Helmut (School of Engineering)*
23. Law, Kincho H. (Dept of Civil and Environmental Engineering)*
24. Leifer, Larry (Department of Mechanical Engineering)*
25. Levis, Philip (Department of Computer Science)*
26. Levoy, Marc (Department of Computer Science)*

27. Lewenstein, Marion (Emeritus, Department of Communication)
28. Luhrman, Tanya (Anthropology)*
29. Lunsford, Andrea (Department of English)
30. Musen, Mark (School of Medicine)
31. Ng, Andrew (Computer Science)*
32. Perry, John (Department of Philosophy)*
33. Salisbury, Kenneth (Departments of Computer Science and Surgery)*
34. Schnapp, Jeffrey T. (Stanford Humanities Laboratory)*
35. Sheppard, Sheri (Engineering)*
36. Turner, Fred (Department of Communication)*
37. Wagner, Anthony (Department of Psychology)
38. Wandell, Brian (Department of Psychology)
39. Wheeler, Christian (Graduate Business)*
40. Willinsky, John (School of Education)*
41. Winograd, Terry (Department of Computer Science)

5c. Stanford researchers in H-STAR

The following 25 Stanford and Stanford associated researchers (the majority of whom are senior scholars with doctoral degrees) have a significant affiliation with H-STAR (an asterisk indicates that the researcher has received funding from H-STAR, mostly through mediaX):

1. Bannerjee, Banny (H-STAR)
2. Barbagli, Federico (Computer Science)*
3. Bennetsen, Henrick (Stanford Humanities Lab)*
4. Chen, Helen (H-STAR)
5. Chin, Doris (H-STAR)
6. Devlin, Keith (H-STAR, CSLI)
7. Fern, Veronica (H-STAR)
8. Flora, June (H-STAR)
9. Fogg, B.J. (H-STAR)
10. Frampton, Matthew (H-STAR)
11. Fruchter, Renate (Engineering)*
12. Go, Janet (H-STAR)*
13. Grossman, David (Center for Design Research)*
14. Huang, Camillan (H-STAR, no longer at Stanford)
15. Kunz, John (Civil and Environmental Engineering)*
16. Kwong, Henry (H-STAR)
17. Levitt, Raymond (Civil and Environmental Engineering)*
18. Martin, Caitlin (H-STAR)*
19. Rosen, Joseph (H-STAR)*
20. Rosenberg, Duska (Royal Holloway University, London)
21. Martha Russell (mediaX)
22. Van der Loos, H.F. Machiel (CDR)*
23. Varma, Sashank (H-STAR)*
24. Verplank, William (Computer Science and CCRMA)*
25. Vogl, Roland (Law School)

Much of the research carried out at H-STAR is conducted under faculty guidance by doctoral level researchers, postdocs, graduate students, and academic and industrial visitors who are based in Cordura Hall.

6. International research collaborations

H-STAR has several international collaborations with universities and industries throughout Europe and Asia. The most active during the period 2012–14 are listed below:

6a. Finland H-STAR has had close ties with Finnish universities for several years, focused on research on education and the human-centered design of technology, both areas where both Finland and Stanford have international reputations. For many years, the Finnish government technology agencies (TEKES) funded Stanford's infrastructure costs in supporting research collaborations on the Stanford campus between university scholars from Finnish universities, working on projects with Stanford faculty PIs.

Of particular note, in January 2012, in conjunction with the Finnish Consul General in Los Angeles, and assisted by Stanford's SCOPE center, H-STAR organized a high level, two day conference titled "Empowerment through Learning in a Global World," to which senior staff from the NSF were invited. This led directly to the creation of a new NSF program – SAVI (Science Across Virtual Institutes) – which was initially designed for US and Finnish faculty to collaborate on learning technology projects. Further planning took place at the Finnish Embassy in Washington DC in June 2012, leading to Stanford and Finnish faculty collaborative projects being funded in Fall 2012.

During the two-year period of this report H-STAR hosted a number of visits by Finnish university researchers. These are listed in Section 7.

6b. Denmark Paralleling the H-STAR partnership with the Finnish university system, we had a similar, ongoing research collaboration with the Danish university system, funded by the Danish Agency for Science, Technology, and Innovation (DASTI). As with the TEKES-funded partnership with Finland, DASTI funded Stanford's infrastructure costs in supporting research collaborations on the Stanford campus between university scholars from Danish universities, working on projects with Stanford faculty PIs.

During the two-year period of this report H-STAR hosted a number of visits by Danish university researchers. These are listed in Section 7.

6d. Estonia H-STAR has a research partnership with Tallinn University of Technology. During the two-year period of this report H-STAR hosted a number of visits by TUT researchers. These are listed in Section 7.

7. International visiting faculty

In addition to H-STAR's formally established international collaborations, we act on behalf of Stanford faculty to organize and support visiting faculty collaborators. During the period of this report, we organized and supported 12 visiting faculty from overseas in 2012–13 and 8 visiting faculty from overseas in 2013–14. The departments of the hosting Stanford faculty were the Graduate School of Education (7 visitors), Dept of Communication (7), School of Medicine (2), Dept of Mechanical Engineering (1), Dept of Mathematics (1), School of Law (1), Graduate School of Business (1). The visitors are listed next to their Stanford faculty host.

2012–13

1. Roy Pea: Heli Ruokamo, Centre for Media Pedagogy, Univ. of Lapland, Rovaniemi, Finland (June 2012-June 2013)
2. Jeremy Bailenson: Jari Takatalo, CICERO Learning, Univ.of Helsinki, Finland (August 2012-July 2013)
3. Byron Reeves: Kaarina Nikunen, Swedish School of Social Sciences, University of Helsinki, Helsinki, Finland (January 2012-December 2012).
4. Paulo Blikstein: Anna Siewiorek, CICERO Learning, Univ. of Helsinki, Finland (September 2012-March 2013).
5. Jeremy Bailenson: Ulla Konnerup, e-Learning Lab - Center for User Driven Innovation, Learning and Design, Dept of Communication & Psychology, Aalborg University, Denmark (September-December 2012).

6. Fred Turner: Jun Liu, Department of Media, Cognition and Communication, University of Copenhagen, Denmark (September-December 2012).
7. Roy Pea: Jakob Eg Larsen, Dept of Informatics and Mathematical Modelling, Technical University of Denmark (DTU) (September-December 2012)
8. Barbara van Schewick: Katrin Nyman-Metcalf, Law School, Tallinn University of Technology (November 2012).
9. Byron Reeves: Kristian Kiili, Advanced Multimedia Center, Tampere University of Technology, Pori, Finland (February-April 2013).
10. Larry Leifer: Morten Petersen, Dept of Learning and Philosophy, Aalborg University, Copenhagen, Denmark (March-July 2013).
11. Roy Pea: Hannele Niemi, Faculty of Behavioral Sciences, Univ of Helsinki, Finland (March-April 2013).
12. Larry Chu: Peeter Ross, Institute of Clinical Medicine, Tallinn Univeristy of Technology, Estonia (May-June 2013).

2013–14

1. Homero Rivas: Katarzyna Wac, Institute of Services Science, Univ of Geneva, Switzerland (August 2013-October 2013).
2. Roy Pea: Jari Multisilta, CICERO Learning, Univ. of Helsinki, Finland (July-November 2013)
3. Fred Turner: Maja Sonne Damkjaer, Dept. of Aesthetics and Communication, Aarhus University, Denmark (September-December 2013).
4. Persi Diaconis: Bjarne Toft, Dept of Mathematics & Computer Science, University of Southern Denmark, Denmark (September-December 2013).
5. Jay Hamilton: Naja Nielsen, Head of TV and Executive Editor, Danish Broadcasting News, Copenhagen, Denmark (February-June 2014).
6. Paolo Blikstein: Tiina Korhonen, Department of Teacher Education, University of Helsinki, Finland (February-April 2014).
7. Christian Wheeler: Essi Pöyry, Department of Marketing, Aalto Univ School of Business, Helsinki, Finland (February-April 2014).
8. Roy Pea: Jari Multisilta, CICERO Learning, Univ. of Helsinki, Finland (June-July 2014).

8. mediaX Industry Partners Program

mediaX membership September 2012 to August 2013

Strategic Partner Level

Konica Minolta

Associate Membership Level

CNI and its Industry Partners

Orange at Venables Bell Partners

Philips

Sábia Experience

Samsung

University of Hong Kong

Affiliate Membership Level

Accel Partners

Savantas Policy Institute

mediaX membership September 2013 to August 2014

Strategic Partner Level

BigBonsai

Konica Minolta

Orange at Venables Bell Partners

Associate Membership Level

Hong Kong University of Science and Technology

IBE
ITRI
Japanese Innovation Network
Nissan
Omron
Philips
Sábia Experience
Samsung
SESI-Santa Catarina
Tampere University of Technology
THNK

Affiliate Membership Level

BitTubes
Good.co
Savantas Policy Institute
Sense Health
Sprockit
Wisetech Foundation

mediaX Research Themes

September 2012 to August 2013

mediaX Research Themes enable researchers from member companies to collaborate with Stanford researchers on leading-edge questions, which have a time horizon of three to seven years and often revolve around complex issues that are not yet well defined. Results of mediaX research projects are disseminated openly. In many cases, results validate a new question or method. They can also lead to significant research funding from public or private resources.

THE FUTURE OF CONTENT – CREATION, CONSUMPTION AND CURATION

The goal of this research theme spans the creation, consumption and curation of media content in K-12 contexts, across the wide range of organizations, people and technologies involved and spanning formal and informal learning environments, as well as in-school and out-of-school contexts that include teachers, administrators, students and families.

Physical Media as Active Social Learning Agents

This team explored how the social behaviors of mechatronic media affect a creative K-12 mechatronics learning experience. By conducting tests with high school students assigned to one of four conditions, the team measured learning performance, enjoyment of a task, and retention of learning content. The study developed theory and principles necessary to design new physical media that enable highly motivating K-12 learning experiences.

Team members:

Clifford Nass, Professor, Department of Communication.
Malte F. Jung, Postdoctoral Scholar, Mechanical Engineering.
Nik Martelaro, Graduate Student, Management Science and Engineering Dept.

The Stanford Clinical Anatomy Scans (SCANs) Library

To understand requirements, this team tested a prototype for an online library of educational CT scans for use by high school students. The project sought to help K-12 students explore the scans using software – similar to the one used by professional clinicians – that builds a patient's

personal history and the anatomy related to the case. They collaborated with Vizua, a Seattle-based company that maintains high-end servers that store CT scans. The project connected students to the Vizua server from a computer or an iPad, so they can access the library of Stanford-provided scans. The scans were accompanied by a clinical synopsis authored by the team, containing relevant diagnostic details.

Team members:

Sakti Srivastava, Stanford University Medical Center.

Alan Detton, PhD, Lecturer of Surgery-Anatomy.

W. Paul Brown, DDS, FACS, FICS, Consulting Associate Professor of Surgery-Anatomy.

Patricia Youngblood, PhD, Consulting Associate Professor of Surgery-Anatomy.

Matt Hasel, Production Manager, Division of Clinical Anatomy.

Robert Cheng, Research and Development Engineer, Division of Clinical Anatomy.

Matthew Stephens, Research Assistant, Division of Clinical Anatomy.

Contests as a Catalyst for Content Creation: Contrasting Cases to Advance Theory and Practice

This team carried out an experimental study that contrasted ways to foster the creation of content by students. The study was conducted using an Internet community and living lab called Vital Signs (<http://vitalsignsme.org>) to generate insights about amplifying the potential of cyber-learning for all students. The project provided insights that are relevant to all academic learning hubs that use networked tools to build community, collect data, and advance knowledge. The team plans to leverage existing research conducted previously, and to build on substantial ethnographic and web analytic data.

Team members:

Brigid Barron, Associate Professor, Graduate School of Education.

Caitlin K. Martin, MA, Project Manager and Lead Researcher, Learning Ecologies Group at Stanford.

A New Generation of Hybrid Tangible Interfaces for STEM Learning in K-12 Environments

This team sought to understand requirements, develop, and test a scalable and cost-effective online experimentation platform for science and engineering education. They measured learning outcomes using cutting-edge learning analytics techniques. The project developed an HTML5 framework for remote and local experimentation, and bifocal modeling; develop and pilot a cost-effective experimentation platform and design; and run a set of two bifocal modeling units in biology and chemistry subjects for high-school students.

Team members:

Paulo Blikstein, Graduate School of Education and Computer Science Department.

Ingmar Riedel-Kruse, PhD, Assistant Professor of Bioengineering Department, Stanford School of Engineering and Medicine.

PUBLISH ON DEMAND

Six Stanford projects explored new insights to optimize user experiences and business infrastructures in the publish-on-demand mediascape of the future. Each project built on prior research and served as a foundation for future research. The projects included in the Publish on Demand Research Theme spanned elementary and secondary education to higher education, including both scholarly work and consumer content.

Smarter Scholarly Texts for Cross-platform Publishing, Text-mining, and Indexing

This project has explored requirements for the use of XML (extensible markup language) for digital transformation of text-intensive scholarly work. A Stanford team, in conjunction with collaborators at Simon Fraser University, the University of Heidelberg, the University of Manchester, and the University of Chicago, is prototyping a functional application that will

reduce the time spent on manual editing: a multi-purpose indexing with an assisted automated system for document markup for multiple devices (including print-on-demand). The functionality includes reference checking, a parsing engine, and copy-editing. All of this is being integrated with the Open Journal Systems for multiple audiences.

Team:

John Willinsky, Professor, Graduate School of Education.

Alex Garnett, Data Curator, Simon Fraser University Library.

Juan Pablo Alperin, Researcher and Systems Developer, Public Knowledge Project.

Publish on Demand Decision Products and their Long-term Integrity

This project assessed the human and technical infrastructure required to support the systematic construction of complex group decision products, and the procedures necessary to ensure their long-term integrity. Courses and workshops were conducted to examine two use cases in which the educational, technical, and institutional mechanisms required to ensure the long-term integrity of intellectual work products, including decisions, were explored. Results showed that a principled combination of innovative decision methodology, human incentives engineering, and augmented decision support software and hardware could potentially make a significant difference in decision product quality. The team investigated mechanisms to provide direct linkages to print on demand services to support the digital archives from these courses and workshops. The project team developed protocols to test real world use cases of working groups empowered to improve systematically their decision products, and to ensure a long-term, high integrity archive that documents their work.

Team:

Robert Laughlin, Professor and Nobel Laureate, Physics.

Neil Jacobstein, Distinguished Visiting Scholar, mediaX at Stanford University.

Recasting the Textbook as an On-demand, Collaborative Collection of Historical Narratives Through Primary Documents and Interactive, Touch-based Devices

This team explored the transformation of the textbook as an on-demand, collaborative collection of historical narratives. This digital textbook draws on primary source materials culled by high school students (from national archives, local libraries, and potentially the photo albums and historical records of students and their families). The team also investigated the potential use of near-field communication tags and QR codes for smart phones and mobile devices to allow students to participate and interact with out-of-school resources (such as libraries, museums and social communities).

Team:

Sam Wineburg, Professor, Graduate School of Education & (courtesy) History.

Laura Moorhead, PhD Candidate, Learning Design and Technology, Graduate School of Education.

Molly Bullock, PhD Candidate, Learning Design and Technology, Graduate School of Education.

Paul Franz, PhD Candidate, Learning Design and Technology, Graduate School of Education.

Jeremy Jimenez, PhD Candidate, International and Comparative Education.

Max Alexander, MA Candidate, Learning Design, and Technology, Graduate School of Education.

Content on the Go: The Economics of the Market for Mobile Apps

This project took a combined data-driven and structural analysis approach to study the relationship between pricing decisions and marketplace visibility. The team focused on the role of rankings and recommendations in driving demand. They distinguished between indirect effects, such as “top rank” established through the “wisdom of the crowds,” and direct effects, such as sales rank. Early results using their stylized dynamic model validated the impact of indirect effects and indicate price cycles that induce variation in rank position.

Team:

Ramesh Johari, Associate Professor, Management Science & Engineering.
Bar Ifrach, Postdoctoral Research Fellow, Management Science & Engineering.

Transparent Social Footprints: A New Road to Digital Dollars?

This project examined requirements and developed prototypes for metrics and tools to support media organizations in the shift from print to digital content. Two student teams in an upper level two-quarter computer science course (CS201) worked on a use case involving a mid-sized, regional newspaper.

Team:

Jeff Heer, Assistant Professor, Computer Science.
Ann Grimes, Lorry I. Lokey Professor of the Practice, Department of Communication, Program in Journalism.
Jay Borenstein, Lecturer, Computer Science.
R.B. Brenner, Lecturer, Department of Communication, Graduate Program in Journalism.

Tweakcorps: Retargeting Existing Webpages for Diverse Devices and Users

This project investigated a hybrid machine-learning system to support the adaptation of webpages to users' needs and preferences. Building on earlier research that used an automated process to classify webpage components, the team used expert ratings as input training data for machine-learning. The resulting automated system then leveraged human decision-making to improve classification and adaptation and to optimize the effectiveness of a user interface for editing webpages that automatically adapt for a wide variety of user and device requirements.

Team:

Scott Klemmer, Associate Professor, Computer Science.
Maxine Lim, Graduate Student, Computer Science.

INCREMENTAL AND TRANSFORMATIONAL IMPROVEMENTS IN KNOWLEDGE WORKER PRODUCTIVITY

Advancing knowledge to accelerate the development of tools, processes and metrics to enhance productivity for knowledge work and knowledge workers.

A Journey from Islands of Knowledge to Mutual Understanding in Global Business Meetings

This project identified the most important elements to create mutual understanding among team members in the context of collaborative decisions in creative global business meetings. With two use cases – a globally distributed class and a large organization – the team implemented localizations of the prototype system developed to track and measure these elements. The system allowed team members to build awareness of their individuals' local conditions, and make their local conditions transparent and visible to the rest of the team. The intended outcomes were feedback mechanisms and metrics that indicated the "engagement potential" of each team member and the team as a whole. The system also provided feedback that nudges all towards alignment of expectations and synchronicity of engagement levels.

Team:

Renate Fruchter, Co-founder, Project-Based Learning Laboratory.
Kincho H. Law, Professor, Civil and Environmental Engineering.
Ikuko Kanasawa, mediaX Visiting Scholar, Konica Minolta.
Leonard Medlock, Research Assistant, Learning Design and Technology, Graduate School of Education.

The Utility of Calming Technologies in Improving Productivity

This project devised and evaluated ways to technologically augment human self-regulation to help knowledge workers maintain an optimal psychophysiological state for "sustainable productivity." The team developed a theoretical framework and a breathing sensor. The team

also collected longitudinal respiration data and qualitative data, to gather user feedback on annotation, comprehension and reflection of respiration patterns in work rhythms and productivity waves.

Team:

Neema Moraveji, Post Doc, Learning Design and Technology, Graduate School of Education & Director, Calming Technologies Lab

Roy Pea, Professor, Graduate School of Education, Director, Learning Design and Technology

Jeff Heer, Assistant Professor, Computer Science

Using Video Game Platforms to Understand Thinking Styles of People Engaged in Collaboration

This project sought to identify data-driven indicators that can detect how well a group is “syncing” on a collaborative project. Using inexpensive commercial videogame platforms to assess non-verbal behavior, then using computational methods to predict collaborative innovation in learning and creative tasks, as well as mind states, the team developed a “thin slice” approach to non-verbal behavior data analysis. They used this to examine face-to-face and online collaboration in dyads in order to help managers predict the future success of creative work teams.

Team:

Andrea Stevenson Won, Graduate Student, Communication.

Le Yu, Graduate Student, Computer Science.

Joris H. Janssen, mediaX Visiting Scholar, Advanced Research, Philips.

Haisong Gu, mediaX Visiting Scholar, Konica Minolta Laboratories, USA.

Jeremy Bailenson, Associate Professor, Communication.

September 2013 to August 2014

PUBLISH ON DEMAND

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INCREMENTAL AND TRANSFORMATIONAL IMPROVEMENTS IN KNOWLEDGE WORKER PRODUCTIVITY

Advancing knowledge to accelerate the development of tools, processes and metrics to enhance productivity for knowledge work and knowledge workers.

A Journey from Islands of Knowledge to Mutual Understanding in Global Business Meetings

Renate Fruchter, Kincho H. Law, and Leonard Medlock

The Utility of Calming Technologies in Improving Productivity

Neema Moraveji, Jeffrey Heer, and Roy Pea

Using Video Game Platforms to Understand Thinking Styles of People Engaged in Collaboration

Andrea Stevenson Won, Le Yu, and Jeremy Bailenson

mediaX Visiting Scholars

September 2012 to August 2013

Joris H. Janssen, Advanced Research, Philips
Haisong Gu, Konica Minolta Laboratories, USA, Inc.
Jaeyoun Cho, Samsung
Ikuko Kanasawa, Konica Minolta
Kishio Tamura, Konica Minolta

September 2013 to August 2014

Tammy Lee, Samsung
Young Yoon Lee, Samsung
Lisa Watanabe, Tokyo Gas Company
Joris H. Janssen, Sense Health
Kaisa Still, VTT

mediaX Theme Days

Theme Days are in-depth brainstorming sessions with Stanford faculty and industry researchers from a member organization.

During the *September 2012 to August 2013 period*, Theme Days were held at Stanford on the following topics:

- What's Next After SIRI?
- Media Innovation at Stanford
- Total Engagement and Just-In-Time Learning for Zero Accidents

During the *September 2013 to August 2014 period*, Theme Days were held on the following topics:

- Security in Multi-Media
- Enhancing Well-Being and Lifestyle with Insights from the Intersection of Human Sciences and Advanced Information Technologies
- Well-Being and Productivity in the Workplace
- Aging and Special Needs in 2025: Lifestyle Trends and Development Opportunities for Innovative Technologies and Applications

Follow-up activities between industry affiliates and the faculty members who attended the intimate, in-depth discussions about issues of common concern during the Theme Days have led to faculty speaking engagements, hiring graduating students, expanded mediaX member relationships, and collaborative submission of proposals.

mediaX Workshops and Conferences

During the period *September 2012 to August 2013*, mediaX held or sponsored eight workshops and conferences to highlight Stanford research interests and explore academic-industry collaboration.

September 15-16, 2012

Quantified Self Conference

January 8, 2013

mediaX 10yr Anniversary Conference

February 19-20, 2013

Beyond the Product: Designing for the Consumer Experience, co-sponsored with Marketing Sciences Institute

February 25, 2013

Persuasive Behavior Masterclass - 3 Tiny Habits Workshop

March 2, 2013

Augmented Decisions Workshop

March 8, 2013

Big Ideas Festival

April 16, 2013

Technology for Education Workshop – Co-sponsored with Pratham

April 29-30, 2013

Delta Conference, Co-sponsored with Accel Partners

June 18-19, 2013

SMPTE Entertainment Technology Conference

July 22-26, 2013

Innovation Ecosystems Workshop

During the period *September 2013 to August 2014*, mediaX held or sponsored nine special workshops to highlight research interests and explore academic-industry collaboration:

October 17-18, 2013

mediaX Workshop Trust, Reliability and Authority in Social Media Communications, with Purdue University

*October 19-22, 2013

Vancouver Wireless Communications and the Smart Grid

October 23, 2013

TSensors Summit/Trillion Sensors Conference

December 2-3, 2013

Chief Digital Officer Forum

February 4-5, 2014

Future of Content in a Publish on Demand World

February 17-20, 2014

Leadership Strategy Workshop, with THNK

April 28-29, 2014

mediaX 2014 Conference

May 21-23, 2014

Designing and Measuring Engagement and Retention Strategies

May 29, 2014

mediaX Games and Learning Conference

June 9-10, 2014

The Next Generation of Media Technology Innovation Workshop, with NAB/Sprockit

mediaX Seminars

The mediaX Seminar Series continued with several seminars given by academic and industry researchers. Video recordings of mediaX seminars are available online for viewing by the public. During the *September 2012 to August 2013* period, public seminars included:

October 23, 2012 Flu Near You

During the period *September 2013 to August 2014*, public seminars offered by mediaX included:

November 6, 2013 Designing Residential Digital Cities for Humans

November 13, 2013 New Quantified Self Practices

November 20, 2013 Designing Energy Systems for Humans

January 13, 2014 Luminous Relationships: Light for Health and Well-being

January 29, 2014 Well-Being/Productivity in a Globally Connected World

During the *September 2013 to August 2014* period, mediaX broadened the distribution of seminar videos to include the mediaX website, YouTube, fora.tv, and Stanford iTunes distribution, resulting in thousands of downloads of presentations by Stanford researchers and livestreaming events, as the industry outreach for the HSTAR Institute.

<http://mediax.stanford.edu/news>

http://library.fora.tv/conference/mediax_2014_conference

mediax at Stanford University's YouTube page:

<https://www.youtube.com/user/mediaxstanford/featured>

mediaX Outreach

mediaX collaborated with a number of industry groups and business-oriented international government-sponsored innovation organizations in offering half-day and one-day programs on communication technology and Innovation for their delegates. Some presentations were given at the home location of the organization (denoted by “*”).

During the period *September 2012 to August 2013* these included:

Government & NGO:

October 25, 2012	Innovation Policy Institute, France
January 15, 2013	Russian Delegation
February 6, 2013	Ristex, Japan
*April 16, 2013	EIT ICT Labs
May 14, 2013	EIT ICT Labs
May 30, 2013	German Ministerial Delegation
*June 15, 2013	TEKES, Finland
*June 16, 2013	Finnish Forestry Association
August 9, 2013	European Innovation Association

Industry:

September 10, 2012	Pepsi
September 14, 2012	ACERP
September 17, 2012	Sábia Experience
September 17, 2012	Philips
September 24, 2012	Codear.my
September 29, 2012	Konica Minolta
October 8, 2012	WDHD
October 14, 2012	Time Warner
October 18, 2012	Persuasion.API
October 18-19, 2012	Japanese Innovation Network
October 19, 2012	Time Warner Media Camp
October 23, 2012	Statoil
October 30, 2012	Samsung
November 16, 2012	Triple Helix
December 5, 2012	Samsung
*December 10, 2012	Savantas Policy Institute
January 7, 2013	Konica Minolta
January 9, 2013	Sábia Experience
January 9, 2013	ACERP
January 9, 2013	Savantas Policy Institute
January 10, 2013	NTT
January 16, 2013	IBM
January 23, 2013	Lux Capital
January 29, 2013	Philips

January 31, 2013	THNK
February 6, 2013	Siemens
February 8, 2013	Philips
February 19, 2013	Mitsubishi Corporation
February 20, 2013	Tokyo Gas Company
February 21, 2013	VBP
February 22, 2013	State Farm
March 3-4, 2013	Tokyo Gas Company
March 11, 2013	Microsoft
March 21, 2013	Konica Minolta
*April 15, 2013	Persuasion.API
*April 15, 2013	THNK
*April 16, 2013	Shell
April 19, 2013	NTT
April 23, 2013	Tokyo Gas Company
April 29, 2013	Konica Minolta
May 2, 2013	ITRI
May 9, 2013	IBM
May 10, 2013	Noroff
May 13, 2013	Multitouch
May 15, 2013	Wells Fargo
May 15, 2013	Tokyo Gas Company
May 16, 2013	Discern
May 28, 2013	Media24
May 30, 2013	Konica Minolta
June 5, 2013	CapDigital
June 14, 2013	France Telecom Foundation
June 27, 2013	ITRI
*July 28-Aug 4, 2013	Corporation for National Industries
August 9, 2013	Mitsubishi Corporation
August 16, 2013	Konica Minolta

Universities:

September 13, 2012	IMD
*December 10, 2012	University of Hong Kong
*December 11, 2012	Hong Kong University of Science and Technology
*December 13, 2012	University of Tokyo
April 22, 2013	IC2 Institute, University of Texas Austin
August 8, 2013	NY Polytechnic
August 15-17, 2013	University of Hong Kong, eMBA Study
August 20-23, 2013	Hong Kong University of Science and Technology eMBA Study Tour
August 26, 2013	Skolkovo eMBA Study Tour

Professional Societies:

February 13, 2012	EDUCAUSE
October 8, 2013	INFORMS
*October 21, 2013	Wireless World Research Forum
* November 6, 2013	IEEE I of T Standards

During the period *September 2013 to August 2014* these included:

Government & NGO:

September 30, 2013	EIT-ICT Labs
October 4, 2013	EIT-ICT Labs
October 17, 2013	TEKES
December 12, 2013	Taiwan National Science Council
January 17, 2014	Canadian Ministerial Delegation
February 14, 2014	UK Ministerial Delegation

Industry:

September 23, 2013	Pepperidge Farm
September 24, 2013	Big Bonsai, Brazil
October 10, 2013	Japanese Innovation Network
October 29, 2013	MediaMobz
October 30, 2013	Sábia Experience
October 30, 2013	Tokyo Gas Company
November 1, 2013	Sapiens Science Park
November 11, 2013	PARC
November 14, 2013	Bluescape
November 19, 2013	IEL, Rio Grande del Sul
November 20, 2013	Agilent
November 21, 2013	Thomas Drensek-Axel-Springer
*December 2, 2013	Tokyo Gas Company
*December 3, 2013	Japanese Innovation Network
*December 4-5, 2013	Konica Minolta
*December 9, 2013	500.com
*December 10, 2013	Savantas Policy Institute
*December 11, 2013	University of Hong Kong
*December 12, 2013	Hong Kong University of Science & Technology
*December 17, 2013	VBP Orange
January 6, 2014	Konica Minolta
January 7, 2014	PARC
February 5, 2014	Konica Minolta
February 12, 2014	Sing Tao News Corporation
February 21, 2014	SESI/CNI Brazil
April 3-4, 2014	BitTubes
April 9, 2014	Samsung
April 10, 2014	Faurecia
April 22, 2014	NACS
April 28, 2014	ITRI
April 28, 2014	IBE
April 28, 2014	PARC
April 30, 2014	SESI
May 1, 2014	Sense Health
May 4, 2014	BitTubes
*May 8, 2014	Tokyo Gas Company/VBP Orange
May 14, 2014	Polycom
May 16, 2014	Nissan
May 29, 2014	Conrad Foundation
June 12, 2014	Konica Minolta
*June 18-19, 2014	TEKES
*June 30, 2014	Philips

*July 7, 2014	Tokyo Gas Company
*July 8-9, 2014	Konica Minolta
*July 10, 2014	Omron
*July 4-11, 2014	BitTubes, Berlin
*July 11-22, 2014	SESI-Santa Catarina
*July 23, 2014	Sapiens Science Park
*July 24, 2014	Sábia Experience
August 18, 2014	Konica Minolta
August 29, 2014	Japanese Innovation Network

Universities:

March 10-14, 2014	Tampere University of Technology eMBA Study Tour
March 24, 2014	Skolkovo eMBA Study Tour
*June 16, 2014	University of Geneva
*June 24, 2014	Tampere University of Technology
*June 27, 2014	Dauphine University
August 4-9, 2014	Hong Kong University of Science and Technology eMBA Study Tour
August 12, 2014	Tsinghua University

Professional Societies:

April 8, 2014	National Association of Broadcasters
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