

30 Years at the University of Maryland's Human-Computer Interaction Lab (HCIL)

Founded in 1983, the Human-Computer Interaction Lab (HCIL; www.cs.umd.edu/hcil) has followed the arc of human-computer interaction from its inception to its current influential role in computing. At a time when emergent personal computers and office technologies were broadening the base of who used computers, it seemed essential to address design issues, the transformation of jobs, and effects on society. The first CHI conference in Gaithersburg, Maryland had just been held the previous year. The opportunity for positive influence was large, but developing the community while doing the work of reshaping technologies to accommodate human skills and needs was a substantial challenge.

Like all research groups, the HCIL has had its share of publications, prototypes, commercialization successes, and alumni who have gone on to inspire others. Our record is strong (see Key Contributions section), but perhaps equally interesting, our approach has had a distinctive flavor with a remarkable level of consistency over the decades. We are devoted to working on socially relevant problems driven by the needs of external stakeholders. We address their needs by developing freshly designed technologies, conducting rigorous evaluations, and proposing broadly applicable theories.

Our approach also consistently combines research and communication. We have long felt a responsibility for communicating our research results to our colleagues and the broader community of practitioners and students. From 1988 to 1997, HCIL offered an annual television broadcast series for professional education. And we have produced two of the most widely used HCI textbooks for academic teaching and industrial training. Deeply woven into our identity is the importance of running the annual HCIL Symposium, which celebrated its 30th anniversary in May 2013 (described in more detail in Catherine Plaisant's essay).

While our products are visible, we feel that HCIL's enduring legacy is the teamwork that inspires excellence through interdisciplinary collaborations. Over these decades, some things have remained constant, such as our continued design and development of prototypes, while other things have changed. For example, our analytical style has shifted from an early focus on controlled, quantitative experiments to a growing use of qualitative analysis to our current inclusion of case studies, grounded theory, and more. In addition, with time we have become substantially more reflective and collaborative about our design processes. HCIL members are also devoted to helping each other achieve high-quality results as well as celebrating the success of individuals. Each semester is a chance to do better by taking on new topics, serving government and industry, connecting with academic colleagues, and striving to make a better world. There is always room for improvement, but we're proud of our first 30 years.

This series of short essays describes the creation of the HCIL and how successive directors shaped the lab with their visions tied to contemporary challenges.

HCIL's Key Contributions

Our early projects developed advanced menu strategies and novel touchscreen designs for home controls, museum kiosks, and electronic card catalogs deployed at the Library of Congress. The experience from these and other implementation projects gave rise to more effective user input with menus, better predictive theories, and diverse evaluation strategies that have been broadly influential. The concept of *direct manipulation* recorded and refined what a few advanced designers were practicing in 1982, thereby making it easier for many others to innovate more rapidly and reliably. That term is still widely used to describe the design of modern graphical user interfaces.

As the ideas of hypertext were spreading, we used our experience with museum-oriented encyclopedias to develop a commercial product called HyperTIES, which included highlighted selectable text that we called embedded menus. We then applied HyperTIES to produce the world's first electronic journal (*Communications of the ACM*, July 1988) and first electronic book (*Hypertext Hands-On*, 1989). Tim Berners-Lee's 1989 manifesto for the Web cited our work as the source for his implementation of links.

In another area, we led the development of zoomable user interface (ZUI) technologies based on a clear understanding of how and when they could be effective. By building toolkits and applications for managing photos, presentations, and Web browser histories, we slowly but surely built that understanding—leading in part to the broad usage of ZUIs in products today, ranging from smartphones to maps.

This approach of combining practice and theory continues in how we work with children as design partners. Since 1998, a team of co-designers we call KidsTeam has worked on numerous projects. The longest-running resulting initiative has been the International Children's Digital Library (www.childrenslibrary.org), which offers nearly 5,000 of the world's best children's books in more than 60 languages. This freely available resource has not only produced numerous papers and dissertations, but has also been used by more than 8 million readers worldwide and was the basis of fruitful collaborations such as a World Bank-funded literacy initiative in Mongolia. A related project is a freely available iOS app called StoryKit that supports children in writing simple but rich multimedia stories. The app has attracted broad usage among schoolteachers and was used for 100,000 hours in the past month alone, largely by children writing stories.

A longstanding strength of the lab has been its development of interactive information visualization tools and applications. InfoVis very nicely fits our approach of developing new technologies that support a theoretical model and solve real problems. Early efforts led to treemaps that provided screen-filling overviews of complex datasets. These treemaps with zooming and filtering capabilities have been applied broadly over the years to various domains, such as the stock market, finance, sports, and even hard-drive space. It's estimated that more than 100 million people have used treemaps.

Our application of direct manipulation principles to InfoVis resulted in "dynamic query" interfaces that used sliders, buttons, and other selectors to filter databases. These ideas led to the creation of the company Spotfire in 1997 that grew to a 200-person company acquired by TIBCO in 2007—a wonderful outcome for a university-inspired research innovation. Similarly, our work on ZUIs applied to mobile user interfaces in collaboration with Microsoft led to the creation of Zumobi, a Seattle-based company that continues independently today with more than 40 employees. More recently, we have applied InfoVis techniques to numerical time-series data and temporal-event sequences, such as in electronic health records, Web logs, and sports events. A still greater challenge was exploring network data that enables users to study online communities, social media applications, citation networks, and the like.

As the lab has expanded in recent years, we have branched out, extending our work into areas that integrate technology, design, and methodology to produce results with impacts in many areas. In our work with people with disabilities, we have derived guidelines for designing more accessible touchscreen interactions, created new methods for conducting large-scale accessibility research, and designed new technologies to improve both the access to information and the accessibility of the physical world. With the rise of small, powerful embedded sensing and computation, we have also explored how human activity can be finely measured and visualized to support reflection and help individuals achieve their fitness and environmental sustainability goals (e.g., via eco-feedback and "quantified self" systems). Finally, our work on analyzing social media has opened up new lines of inquiry about the personal data people reveal, how they communicate, and how information propagates through social networks.

Launching an Interdisciplinary Lab



Ben Shneiderman,
HCIL Founding Director
1983–2000

Marshall McLuhan predicted the all-at-once electronic world would create a global village in which narrow specialization would give way to interdisciplinary thinking. His intricate language of hot and cool

media that augmented human senses resonated in my undergraduate mind as I struggled to find a balance between computing, psychology, and photography. Since life is about making choices, I steered my graduate studies to database theory at a time when Ted Codd was promoting the relational model, but I also explored programming languages and software engineering while keeping photography as a hobby.

One attraction of the University of Maryland was its strong psy-

chology department. My computing colleagues were intrigued by my early attempts to use empirical techniques to study programmers as they wrote, modified, or debugged programs. These cross-over ideas caught the attention of Azriel Rosenfeld (1931–2004), a world leader in computer vision, who was forming an interdisciplinary Center for Automation Research (CfAR). He led the Computer Vision Lab and invited me to form a Human-Computer



Interaction Lab when he launched CfAR in 1983. In a campus reorganization, HCIL became a unit in the Institute for Advanced Computer Studies and eventually became jointly managed with the iSchool.

Rosenfeld's invitation advanced my efforts by at least five years, giving credibility to the "marriage of computer science and psychology," which I described in my 1980 book, *Software Psychology*. Gaining credibility was important, as this was still a time when many computer scientists were unsure about the value of psychological studies of programmers and database systems' users, and even the growing field of interactive computer systems. The term *human-computer interaction* (HCI) was still novel, but I insisted on putting the human first, as opposed to the ACM's choice of *computer-human interaction* to make a more pronounceable name, "CHI."

Initial funding from Control Data Corporation put us to work on "Human Factors Research in Editor Interfaces" and then "Human-Computer Interaction Research," followed by IBM's substantial support for "Multiple Coordinated Windows for Programmer Workstations." Kent Norman was a close partner in those days. Hiring Catherine Plaisant as a research scientist and having a lab manager helped us develop as a well-organized research community.

Our close connections with government agencies gave us support for work on online documents and electronic encyclopedias that led to the Interactive Encyclopedia System (TIES). The successor system,

HyperTIES, introduced the hyperlink as a highlighted clickable text string or image region that enabled users to easily jump to related documents and back while generating a history stack of followed links.

Our attraction to museum and library kiosks led to touchscreen card catalogs for the Library of Congress, traveling exhibits for the Smithsonian Institution, and eventually home-control touchscreens. We took the early touchscreen hardware and tuned it to support our hypertext systems, as well as tiny three-inch-wide keyboards, home-control schedulers, and art tools. NASA's growing engagement with interactive systems led it to become a major sponsor of our research, including touchscreens designed for weightless astronauts who could not use a mouse. Our success with making early hypertext journals (CACM, July 1988) and the world's first commercial electronic book (*Hypertext Hands-On*) generated strong enough interest that we began to hold annual HyperTIES User Group meetings (HUGs), which eventually expanded into the HCIL's annual Symposium.

The mix of government and corporate funding enabled the HCIL to grow and attract attention. It was time to find more faculty who would expand our resources and take on new directions. I had met Allison Druin at NYU and followed her innovative Media Lab work, so when I found that she and her computer-scientist husband Ben Bederson were looking for jobs, I was eager to get them to come to the University

of Maryland. Their presence opened up many possibilities and boosted HCIL so that it became a larger community of researchers across multiple disciplines.

HCIL: The Cognitive Side of the Interface



Kent Norman,
Founding Member
1983–present

When the HCIL began in 1983, there were two founding members from the Department of Psychology, Nancy S. Anderson (1930–2007) and myself. The year before, we had formed an alliance with Ben Shneiderman in the Department of Computer Science to submit a grant proposal to NSF to fund research in human-computer interaction. It was not funded, but it initiated our involvement in the HCIL.

From the psychological perspective, HCI is about the human cognitive system sensing and perceiving, learning and remembering, thinking and problem solving, and making decisions about what is going on at the interface and how to act to make things happen. Consequently, our graduate students have been involved in the design of early menu-selection systems, decision-support systems, command-and-control systems, and electronic educational environments. We helped to settle the early debate in hierarchical menus by showing that breadth is superior to depth in terms of user performance and



preference. Today, we see this in Web pages with scores of options organized in groups on a home page rather than page after page of selections drilling down to the desired option. This line of research resulted in my book *The Psychology of Menu Selection: Designing Cognitive Control at the Human/Computer Interface*.

In addition, we developed techniques for user testing and evaluation and psychometric tests for user assessment of the interface. In 1986, we developed the Questionnaire for User Interaction Satisfaction (QUIS), the first standardized instrument for user evaluation of the interface. Currently, it includes one section for overall reactions and nine sections for subcomponents of the system, such as the screen, terminology used, feedback given, and learnability. Now in its seventh edition with translations into six languages, it continues to be widely applied in usability labs around the world.

Around 1990, Ben Shneiderman and I became involved in the multidisciplinary design and evaluation of electronic classrooms through a generous grant from AT&T. During this time, several “teaching theaters” were built with computer workstations for both faculty and students, as well as network and multimedia facilities. We explored the ideas of co-discovery, collaborative learning, and active individual learning. This work is summarized in the online book *Teaching in the Switched On Classroom: An Introduction to Electronic Education and HyperCourseware*. To this day, Ben and I continue to use these classrooms and teaching techniques.

Experimental methods, user testing, and psychological theory remain at the center of HCI from our perspective. If the “medium is the message,” according to Marshall McLuhan, then psychology is central to our understanding of HCI. Consequently, in my recent book, *Cyberpsychology: An Introduction to Human-Computer Interaction*, I focus on the cognitive side of the interface.

A Research Scientist Perspective



Catherine Plaisant,
HCIL 1987–present;
Associate Director
2006–present

With the privilege of having been in the lab for 26 of its 30 years, I bring the perspective of a long-term research scientist. Not interested in being lab director, I have enjoyed being an active researcher and lab member while also helping to shape the lab in my own way.

I’ll focus here on the annual HCIL Symposium. It was here that I first met Ben Shneiderman in 1987, fresh from France and looking for a job for what I thought would be only a few years. Ben had his first large contract (from NASA, to expand early work on hypertext), and he invited me to work on it (even though I could not speak much English; but I had a good video demo to show off my previous work and lots of experience interacting with users!). In the early years, the lab had fewer than 10 students, and the projects were in

collaboration with Kent Norman in Psychology or Gary Marchionini in the College of Information Studies.

Our annual event—called the Open House at the time—was smaller and free, but it already attracted about 100 attendees for talks in the morning and demos in the afternoon. Attendance grew every year, to about 200 in 1993, the year we decided to charge admission for the now renamed Symposium, so we could run a nicer event and still give free (or almost free) admission to students. Attendees received paper copies of all technical reports for the year. In 1991 we started to produce a video with all the demos. We hired the campus’s professional videographer, who taught us how to write scripts and who filmed the demos starting with author introductions. Those early videos were offered for sale (there was no Internet), and were used extensively in HCI classes, along with the CHI videos.

While the event has changed over time and the characteristics have fluctuated (e.g., attendees, speakers, topics, and format), the basic benefits of running the Symposium have remained constant. It is a time when everyone in the lab polishes their demos, records videos, completes a paper explaining their work, rehearses talks, and comes together to collectively present our public image. We often panic in January trying to guess what work will be ready, but the pressure of the event challenges everyone to produce their best. Students early in their careers get an opportunity to participate, with everyone producing posters

► The four directors of HCIL: Jen Golbeck (current director), Ben Shneiderman, Allison Druin, and Ben Bederson, with HCIL birthday cake.



(imagine running an event larger than many professional conferences). Large events can also be a burden, and without the superb organizational and technical skills of faculty research assistant Anne Rose, and the help of a succession of long-term lab coordinators such as Kiki Schneider and Charley Lewittes to work out every detail and rouse an army of student helpers, we might have given up a long time ago. Aside from giving the lab the power to organize large events, research faculty and staff provide a reliable daily presence, lab memory, and the glue that make the lab run smoothly and grow a friendly and supportive environment. As Ben Shneiderman and I realized when hiring Anne Rose, it's best to hire people you will enjoy having lunch with every day.

To thrive, the lab needed a core set of faculty and staff who saw themselves as responsible for the health of the lab and for its future and who thought of HCIL as their first affiliation. We have experienced different director styles, and they work just fine as long as the core set of faculty are available and enthusiastic about helping when needed. A recurring challenge has been the need to keep or grow the number of HCI faculty. Several important HCIL faculty have had to leave for various reasons (e.g., Gary Marchionini and François Guimbretière). I think the most tense days have been the ones where job offers to new faculty were turned down, and the best days in the lab have been the ones where new blood was coming (we were thrilled when we heard that Leah Findlater and Jon Froehlich were coming to Maryland in 2012). A rich set of campus partners, who become temporary HCIL members, ensured the needed diversity of HCIL as well. Grants and partnerships defined

connections that grew and moved on in a pulsating manner. Over the years we have reached nearly every department of the university, and the dramatic growth of the iSchool under the leadership of Jenny Preece has given us many excellent collaborators. Finally, sponsors sometimes become friends after they bring us the challenges of their users.

After committing my professional life to the HCIL, it is a still a pleasure to come to work each day and continue the many years of successful collaboration with Ben Shneiderman, work with students who move on to successful careers, and discuss over lunch what the directions of the lab will be.

A Lab in Transition



Benjamin B. Bederson,
HCIL Director
2000-2006

In June of 2000 I had been a computer science faculty and HCIL member at UMD for just over two years, along with my wife, Allison Druin (who was then in the College of Education). At that point, Ben Shneiderman brought Allison and I into a room, closed the door, and said that after 17 years, it was time for him to step down as lab director. He said that each of us was more than capable of running the lab, so he asked us to decide (if we were willing) who should become the next director. Nothing like a big decision to make you evaluate your professional and personal relationships!

This was an interesting point of transition for the HCIL because at that point the lab was still primarily known as being focused around Ben's work. Our challenge was to broaden both the work within the



► Top: Leah Findlater using a prototype of HandSight, a glove instrumented with small cameras and haptic feedback to allow blind users to feel printed surfaces.

that can be displayed in the building and rehearsing together to create the final set of polished talks. Once the Web arrived, the Symposium provided an opportunity to update project pages, upload materials, and polish the lab's overall online presence. With time, attendance to the event grew and we added an extra day for workshops and tutorials. More recently, we switched to parallel tracks to expand the appeal of the event and grow the number of event sponsors. Tweets now supplement the trip reports to raise awareness of the lab.

Every year the event is also a substantial organizational challenge



lab and its reputation—on campus and externally. In the end, Allison and I decided that at that point in time the campus appreciation of HCI still needed to be nurtured and that people could more easily understand technical contributions and focus. So, because I was based in computer science, we decided that I should become the next lab director.

However, there was another key challenge, which was that I was quite untenured at the time. It was clear that taking on a significant administrative duty would require a lot of time and would interfere with my research. At the same time, I speculated that taking on this role would also give me significant visibility in the HCI research community—which would likely provide me with opportunities for collaboration and thus potentially bigger research contributions. At the same time, increased visibility would help me with those all-important reference letters that I would need when it was time to be evaluated for tenure. So, with fairly significant hesitation, I took the job.

In what turned out to be a six-year directorship, my overall goal was to broaden the lab's participation and focus. And at the same time, I aimed to maintain some of my favorite

lab cultures, such as an emphasis on socially relevant problems and working with “real” stakeholders to ensure that we always tried to solve problems that actually matter.

One of the potentially tricky parts was that I was a relatively quiet and definitely young person taking the reins from a well-respected full professor with a powerful personality and strong opinions—and who was still an active lab member. To his credit, Ben Shneiderman always let me make my own decisions. And this is one of the biggest lessons I learned from him. He did not shy away from having or sharing his opinions, but when I disagreed with him, I could tell him head on what I disagreed with and why. We had and continue to have differing perspectives on any number of topics, but in 15 years of working together he has never once taken our differences of opinion personally. Instead, he thoughtfully considers my perspective, we discuss the trade-offs in any approach, and then he lets me make the decision.

And decisions there were. One might not think that a small research group would entail making many decisions, but a huge number of things had to be managed, big and small. I started with the basics, such as redesigning the lab logo and

website. I developed new lab activities, such as the weekly Brown Bag Lunches, which continue to this day. And I worked on the hard problems, including people and space.

Perhaps the biggest conceptual challenge the HCIL has had over the years is how tightly coupled we want our lab to be. We have always had an interdisciplinary approach, and we have never been an independent administrative unit on campus. Rather, we are a “lab,” which is essentially a collection of like-minded faculty on campus. It is up to us to decide how to organize ourselves. The big question in this area when I was director was whether or not we wanted to continue to be a loose confederation of faculty from different departments, each with their own space. Alternatively, we could find a single space where people from different units could come together. This was the core area of disagreement between Ben Shneiderman and me, as he preferred the decoupled confederated approach, while I wanted a more cohesive lab with a single space.

It turned out to be somewhat of a moot point, as finding the right space on campus was exceedingly difficult. I spent years looking for the right space, but it was not easy.

► An HCIL Symposium.



I turned down space in the old basketball stadium that was being refurbished. I turned down space in medical offices just outside of campus. And we had to cancel an early effort led by Allison to create an HCI M.S. program because we could not find suitable space.

It was only when Jenny Preece came on as dean of the iSchool with space of her own to manage that we found a beautiful and central space that the broader HCIL finally adopted. But this brought its own challenges, which Allison managed as the lab's next director.

A Lab on the Move



Allison Druin,
HCIL Director
2006–2011

It was August 2006. Ben Bederson and I were just finishing our sabbaticals. We were happy the tenure process was over, and we were wondering how different the world would look through associate-professor-colored glasses. And then everything changed. Ben became chief scientist and a founder of a VC-backed startup company that was to become Zumobi; he could no longer be director of the HCIL. And so it became my turn to step up. I would become the first lab director who wasn't named Ben and wasn't in the computer science department.

My timing was impeccable. I inherited not just a lab, but also a lab move! We had finally found the perfect spot on campus.

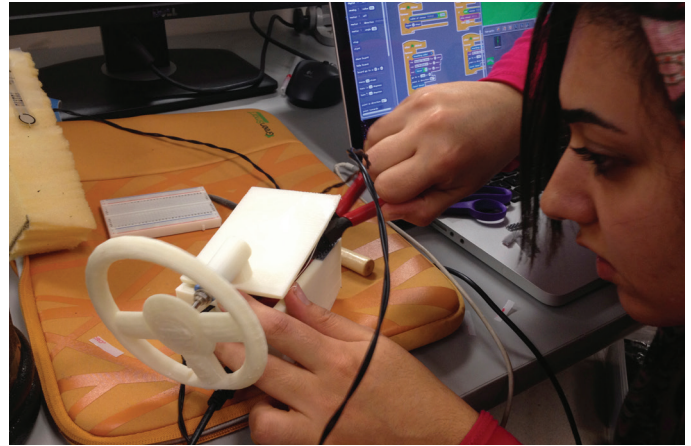
This location would bring us all together and house the considerable research activities and people. Ben had started the negotiations to move the lab out of the building that housed the computer science department and into the building that housed the iSchool. While he did a wonderful job beginning the process, there was still much to plan, communicate among the lab community, and sort out between the different colleges on campus.

I was overwhelmed, so I immediately decided my first act as director needed to be to appoint one associate and four assistant directors. It might have been my best decision. Each director did so much to help scale up and expand the lab's operations. One example of this was Evan Golub, a lecturer in the computer science department who stepped up to be "assistant director of expansion" and ultimately spearheaded the lab's move. He and I did everything, from scouting out and claiming furniture other colleges didn't need, to buying thousands of dollars of IKEA furniture and dragging it all back in to assemble. At one point a good portion of the lab's members were putting together chairs, spread out as far as the eye could see.

Another seemingly simple decision that had a big impact on the lab was to institute two HCIL faculty meetings a year. Before that time, we might have had a meeting once in a while when we needed it, but this formalized a time for communication and brainstorming. This became a useful time to talk about budgetary resources, lab activities, and possible process innovations.

An innovation that I was sure would get a lot of faculty discussion was the expectation that faculty give something to the lab to be in the lab. Before that time, if you wanted to be in the lab, all you needed to do was say so. This was inclusive, but we did not have the resources we needed to pay a lab coordinator, support the Brown Bag Lunches, pay for a retreat, and more. So I asked people to give each year either \$5,000 from their discretionary funds or agree to lead an important activity in the lab (e.g., an HCIL workshop, a Brown Bag Lunch, the annual service day). This was a risky move. Both previous directors (Ben B. and Ben S.) were sure I would lose collaborators and have an even more difficult time finding resources. As it turned out, just the opposite happened. This expectation of collective participation gave lab members a feeling of more ownership, and they became even more active as a community. We also grew in numbers. We became a lab of more than 50 people from eight colleges and two institutes. At the same time, the iSchool was increasing the number of HCI faculty they were hiring. This led to the lab representing a wider expanse of the HCI research blue sky.

This growth in our community also enabled us to take on more diverse activities that have grown their own legs. An example of this is when we agreed to help the CHI 2011 conference committee and host the papers review meeting. In the fall of 2010, we used all the HCIL logistics know-how we have (along with all of our students and faculty as volunteers) to host more



than 200 HCI researchers from around the world. Instead of bringing all the associate papers chairs to a conference location, they were brought to a relatively central location on the East Coast that could offer much less expensive spaces. (The year before, Georgia Tech had hosted a similar meeting, but Atlanta was the site of the conference that year.) Our hosting helped save quite a bit of money for the conference, and now it is a model that other CHI conference chairs are being asked to consider. I know this, since in 2016 it will be my turn to be CHI conference chair.

I'm now on my second sabbatical and am using all of the lessons I've learned from my years as HCIL director. The need for inclusive participation, expansive interdisciplinarity, and planned meetings for communications are all key to how I continue to lead campus-wide initiatives. It is now through HCIL-colored glasses that I see the future and look forward to the fun that awaits! I stepped down as lab director when I was given the opportunity to be associate dean for research in the iSchool, and so I passed the baton on to Jen Golbeck.

A Lab with a Degree



Jennifer Golbeck,
HCIL Director
2011–present

I came to the University of Maryland as a computer science Ph.D. student in the fall of 2001.

The first class I took was Ben Bederson's HCI course. I had no idea what HCI was at that point, and the class was a transformative experience for me. I still remember his midterm question: "Ignoring all other factors, design a more usable Start button for Windows." My answer, for which I received full credit, was to draw a giant, full-screen-size Start button.

Six years later, after finishing my Ph.D. and a postdoc, I joined the faculty of the iSchool and the faculty of the HCIL. I had found a great home to pursue my research on social networks and with more collaborators than I had thought possible. When a few years later Allison asked me to direct the lab, I was honored and a bit terrified. Both Ben Bederson and Ben Shneiderman had been on my dissertation committee and Allison had been a mentor and advised me on my job talk. Now I was going to run *their* lab?

I have been director for only a couple of years, but a major change has come to the lab in that time: The iSchool launched a new HCI master's program, now in its second year. This has brought us an influx of new student energy. Our students are bright and enthusiastic, and bring a new diversity of backgrounds and expectations into the lab. Our HCI master's students and graduate students from other programs are now taking classes together across campus. The HCI master's students are also deeply involved in research in the lab, both through their own initiatives and through required internships,

theses, and capstone projects.

My goal is to build an excellent HCI master's program whose close links with the HCIL would benefit both. We have always encouraged faculty and students to publish their work in high-profile venues like CHI, UIST, and CSCW. But now with many more students and more projects, maintaining high quality in conference submissions requires diligence and teamwork so students and faculty can learn from each other. We hold daylong paper clinics, usually two weeks in advance of conference deadlines, enabling authors to get feedback from faculty and students. This intense day builds collaborations on varied topics, while bringing attention to new ideas (even if they are not yet funded).

The new master's program has allowed us to integrate teaching into the fabric of the lab, and we are excited to see how this will bring us new opportunities and help us to move forward as a larger and more connected group.

As Catherine Plaisant mentioned in her essay, we are thrilled to have Leah Findlater and Jon Froehlich join our ranks. They introduce new areas of focus, and Jon has already expanded the lab by building a "hacker space," complete with 3-D printer, soldering guns, oscilloscopes, and more. Other new hires are in the works and more faculty across campus are becoming interested in HCIL.