Academic Program Review Self-Study

Department of Human Centered Design & Engineering

April 2017

Part A
Self-Study Questions

Section I - Organizational Overview

Questions for the self-study defined by the graduate school are in light grey text. The graduate school guidance suggests that Section I should be approximately +/-4 pages.

Mission & Organizational Structure

Describe the overall mission of the unit. What is the vision, goals, etc.

The faculty reenvisioned and renamed the Department of Human Centered Design & Engineering in 2009 (see Appendix D: Abbreviated Departmental Timeline). As part of that work, the faculty developed a new mission and new vision statement to carry the department into the future. The mission and vision for HCDE are:

> Putting people first, we research, design, and engineer interactions between humans and technology. Join us. Change the world. Human Centered Design & Engineering (HCDE) faculty and students are advancing the research and design of technologies by using innovative techniques to study human activity and develop meaningful information and sociotechnical systems.
>
> HCDE designs the future by:
> - Considering the role of technology in human activity.
> - Prioritizing the needs, desires, and behaviors of people and communities who interact through sociotechnical systems.
> - Addressing the specifics of design by working with interdisciplinary communities of researchers to build the technologies of tomorrow.

List: (1) Undergraduate and graduate degrees offered, program options, majors/minors, fee-based programs within these degrees and (2) certificate programs. Included application, enrollment and progression patterns for each degree.

The department offers three degrees and one certificate program:

- Bachelor of Science in Human Centered Design & Engineering

Like the majority of majors at UW, the BS degree is a two year degree composed of upper division courses in the junior and senior years (3rd & 4th years). Students in the HCDE Bachelor of Science program graduate with an engineering degree and a strong foundation in designing user experiences and interfaces, creating information visualizations, conducting user research, designing for the web, and building web technologies. The BS degree includes two possible degree options: Human Computer Interaction (HCI) and Data Science (DS). Students generally

apply to the degree during their freshman and sophomore years (1st and 2nd) at UW. Students can apply for two potential start times during the academic year; applicants in May start in the subsequent Autumn quarter, applicants in January can start in Spring quarter. Appendix F: Degree Related Data includes a diagram that overviews the BS HCDE degree progression and some historical admissions data.

- Master of Science in Human Centered Design & Engineering

The Master of Science in HCDE prepares its graduates for leadership roles in user experience research and design, interface design, interaction design, product design, and human-computer interaction. The MS degree is a professional degree designed to develop skills and knowledge that will allow individuals to be effective at the practices of human centered design and to be competitive as a potential employee in the broad design and engineering profession. The department has one application cycle per year for the MS degree. Individuals apply for the MS program in January and are notified of their acceptance during Spring quarter to start in the subsequent Autumn quarter. Appendix F: Degree Related Data includes a diagram that provides an overview of the MS HCDE degree progression and some historical data for admissions.

- Certificate in User-Centered Design (UCD)

The UCD certificate program is designed as an introduction to the field. The four-course evening, graduate-level program is for students who want to explore a wide range of issues in user-centered design.This four-course certificate focuses on usability studies, user-centered design theories, visual communication and information visualization, and web design. The program accepts applicants once yearly during summer for an Autumn quarter start. The program receives a little over 100 applications annually. Beginning with the 2017-2018 academic year, the program will admit at most 35 students per year.

- Doctor of Philosophy in Human Centered Design & Engineering

The PhD is a research degree designed to prepare students to take positions in academia, industry research labs, or other professional research settings. This program accepts applications once yearly in December. Students admitted start the following Autumn quarter. The program receives a little over 100 applications per year and the tenure-track faculty select a cohort of 15-20 students to offer admission to, of which, 8-12 students generally enroll.

How is the academic and non-academic staffing within the unit distributed? (add organizational chart to Appendix A)

HCDE has a total of 20 career faculty; 8 professors, 3 associate professors, 4 assistant professors, 4 senior lecturers and 1 lecturer. The non-academic staff consist of the main HCDE operations and staff in two centers. The 13 main department operations staff include an administrator, a

fiscal specialist, an outreach and events manager, a communications manager, a computing manager, an office manager who also handles facilities, a grants manager, a grants coordinator, a student service manager, two senior academic counselors, one scheduling program assistant, and the chair's assistant who also manages most of the academic HR for the department. The two centers have some fiscal staff, a program coordinator, and research scientists. The department is responsible for 8 research scientists, some of whom work with HCDE faculty directly, while others are associated with projects in the centers. In total HCDE has 24 staff. An organizational chart is provided in Appendix A. See also Appendix C: Information About Faculty.

Describe the manner in which shared governance works in the unit along with how the unit solicits the advice of external constituents.

Decision making in the department is overall, highly collaborative. The department has a set of standing committees that develop and refine policy issues which are then presented in full faculty meetings. Three critical committees include the Bachelor's Program Committee, Master's/UCD Program Committee, and the PhD Oversight Committee which have responsibility for the respective degree and certificate programs. Other committees that meet less frequently to handle topically focused policy and program issues include the Awards Committee, Space Committee, Technology Committee, Diversity Committee, and Chair's Executive Committee. The Chair's Executive Committee has been delegated voting authority for the faculty in situations where the full faculty cannot meet. One example of this is during summer when there are no scheduled faculty meetings and when academic appointments for visiting or part-time lecturers must be approved before they can be hired to teach for Autumn quarter.

For day-to-day operations the department Chair has weekly meetings with the department administrator and the student services manager. During those weekly meetings, any open operational or policy issues are reviewed and decisions are made about how best to resolve those issues.

The process of policy revision or development proceeds from committee or the Chair's office. New policy or revisions are often socialized among faculty members through one on one meetings or through an appropriate departmental committee. New or revised policy is then presented to the faculty in a full faculty meeting.

The department solicits advice from external constituents primarily through its External Advisory Board (EAB). The EAB was reconstituted and expanded in 2015 after a 3 year hiatus. The current EAB includes 12 members who serve rotating 3 year terms. The board meets twice yearly for a half day. The EAB consists of practitioners from large and small companies who hire UX researchers and designers. The board also has some members who run consulting firms

or are involved in UX consulting, and some academics who provide perspective on what is happening at other institutions. In general, at each half-day meeting, specific areas are highlighted (i.e., one of the degree programs, or one of our operational areas) and input on opportunities for improvement and use of departmental resources is sought from EAB members. Actionable items are then prioritized.

Budget & Resources

Provide an outline of the unit's budget (budget summary in Appendix B)

Human Centered Design and Engineering (HCDE) has three main funding sources that make up the department budget -State Funds, Fee-Based Programs, and Grant Funding. State funds are issued every two years as part of the state budget and are expected to be spent down by the end of those two years. Funds from the fee based programs are used as they are generated, but the programs also produce a surplus which is turned over to the department every fall. Grant funds are distributed year round as grants are awarded, and the funds have a variety of timelines on which they can be used. HCDE uses state funds exclusively to pay salaries, mostly for faculty, but some staff as well. All other departmental operating costs, including major projects, come from the surplus generated by the fee based programs. A complete budget summary is provided in Appendix B.

How does the unit evaluate whether it is making best use of its current funding and human resources?

On an annual basis, the department Administrator presents to all faculty and staff a budget status report. This report discusses department funding and spending, including the different initiatives faculty have previously voted on. Faculty are able to use that information to determine if they want to continue funding certain initiatives as they are, change them, or cancel them.
In addition, the department Administrator and Chair regularly discuss department funds and human resources. In the past few years, this has led to the creation of 3 new positions within the department (outreach and events manager, grants coordinator, and senior academic counselor for the MS program). There is also a plan in place for cross training staff and making sure back up plans are in place. As mentioned earlier, input is sought twice yearly from the EAB.

Describe any fund raising/development plan or grant/contract-getting strategies used to seek additional funding.

The department engages in both development efforts and grant/contract efforts. In the space of development fundraising, the department works with the development officers in the College of

Engineering (CoE) to reach out to potential alumni donors. Those efforts have resulted in a modest number of endowments for student scholarships and student related activities. The outreach and events manager has also been working to build an “HCDE alumni network” which helps alums maintain a connection with the department and with each other. HCDE has been sponsoring 1-2 events yearly to bring alums together. The goal is for these is to build the community of alums who are then likely to contribute in the future.

The effort around grants and contracts has been focused around helping faculty maintain active research programs which includes supporting proposal writing as they seek extra mural funding. A recent addition of the department grants coordinator was partially to help faculty identify new sources for grants and contracts, and help them apply for those funds.

Academic Unit Diversity

Does the academic unit have a diversity plan? Does the unit have a diversity committee?

The department of Human Centered Design & Engineering (HCDE) at the University of Washington is committed to fostering a supportive environment for diverse students, faculty, and staff. HCDE is committed to admitting and educating diverse students in order to achieve our goal of remaining an elite, internationally recognized leader in human centered design and engineering. Likewise, maintaining a diverse faculty and staff is important to our commitment to meeting students where they are and helping them to achieve success as they move through the program and begin—or continue—in their desired careers We are committed to identifying, recruiting, and retaining diverse faculty, staff, and students with respect to race, ethnicity, gender, age, sexual and gender identity/orientation, disability, religion, culture, socio-economic status, and geography.

An overview of diversity for HCDE is provided in Appendix E: Unit Diversity. The charts and tables present basic descriptive statistics for the department and the degree programs in relation to the Seattle campus as a whole and the College of Engineering (CoE) as a whole.

The department works to maintain a small diversity committee and engages in a specific set of activities that reflect the goals of the diversity plan. In the past few years the diversity committee has (1) developed recruiting plans to increase the URM and geographic diversity of applicants to the degree programs, (2) developed a policy and plan for providing scholarships for diverse students in the HCDE MS program, and (3) committed to supporting the K-12 User Centered Design (UCD) Charette programs managed by Andrew Davidson and run by HCDE undergraduate students.

One effort by the diversity committee is to increase the geographic and URM diversity of the MS and PhD applicant pool. HCDE has begun attending graduate school fairs for diverse universities in northern and southern California. Two schools that were visited in 2016 included UC Santa Cruz and Cal Poly Pomona. Both campuses have been designated as Hispanic Serving Institutions by the US Department of Education, and Cal Poly Pomona was ranked a top 10 most diverse campus nationally by US News & World Report.

Another initiative by the diversity committee is to establish a departmental scholarship to support students in the MS program. Currently, there is no form of scholarship or fellowship for students who are enrolled in the MS program. The faculty have approved the scholarship in principle; however, because the funding for the scholarship is derived from revenue generated by the MS program, the administration of the program needs to meet University and state legislated guidelines for selection and award. The HCDE Student Services manager has been trying to get the UW Office of Minority Affairs & Diversity (OMA&D) to respond to specific questions and they have not.

As well, for the past four years, HCDE has been working on a outreach project that introduces K-12 students to HCDE methods and perspectives. The majority of the activity to date has focused on middle-school and high-school students. These User Centered Design (UCD) Charette outreach efforts place HCDE undergraduate students in a willing middle-school or high-school classroom for a 1-3 hour session. In the session, HCDE undergraduates lead the class through a quick UCD design cycle. This effort reflects the departmental commitment to building a diverse pipeline of potential students and funding institutional outreach to improve overall diversity.

In addition to the more detailed efforts described above, HCDE works to provide an environment supportive of diversity through the following programs or participation in the following:

- Sakson Diversity Undergraduate Scholarship
- Participation in Women in Science and Engineering (WiSE)
- Participation in the University of Washington's STEM Bridge Program
- Providing students with access to a wide range of directed research group opportunities with faculty

What is the diversity of the unit’s faculty, and staff?

HCDE is currently the most diverse unit in the College of Engineering. Our student body roughly mirrors the diversity of the University of Washington as a whole. Across our students, faculty, and staff, the ratio of men to women is approximately 40-60. Given that Engineering and the more closely aligned field of Computer Science is still heavily male dominated, the gender

composition of the department is admirable. More information on the student ethnic diversity is provided in Appendix E: Unit Diversity. Small numbers of staff and faculty can result in distorted categorical reporting for percentages.

How does the unit utilize institutional resources to recruit and retain URM faculty?
What specific strategy has the unit employed to to support career success of URM faculty?

The University of Washington has a an ADVANCE center chartered and funded to improve gender and URM diversity in the faculty (https://advance.washington.edu/). The center provides mentoring and development sessions targeted to support faculty in their careers. HCDE participates in these activities and encourages junior faculty to attend as they are able. One of our faculty is a Co-PI on an NSF grant with this center.

Further, HCDE leverages the ADVANCE center during our recruitment of faculty. During on-campus interviews, we have prospective faculty meet with ADVANCE representatives (faculty and staff) to understand what the center provides and the commitment that UW and the College of Engineering has to providing an environment that enables their academic success.

Recently, the University of Washington focused more carefully on the issue of bias in the faculty hiring process. The University President and Provost encouraged all faculty hiring committees to participate in bias sensitivity training. The CoE, with the help of ADVANCE began providing training for hiring committees during the 2016-2017 academic year. HCDE participates when we have the opportunity to hire.

Section II - Teaching & Learning

Questions for the self-study defined by the graduate school are in light grey text. The graduate school guidance suggests that Section II should be approximately +/-6 pages.

Student Learning Goals and Outcomes

Answer the following questions for each undergraduate, graduate, and certificate program. Note that the Office of Educational Assessment (OEA) can provide guidance regarding assessments.

Bachelor of Science in Human Centered Design & Engineering (BS HCDE)

What are the student learning goals (i.e., what are the students supposed to learn)?

"Putting people first, we research, design, and engineer interactions between humans and technology." Our students learn foundation theory and processes for the practice of user experience design, including research methodologies and application technologies. We aim to prepare them for professional careers or continued academic study in the field.

In what ways does the unit evaluate student learning (e.g., classroom, and/or performance-based assessment, capstone experiences, portfolios, etc.)?

All courses have established learning goals and criteria for formative and summative assessment. All courses have assignments (e.g., writing, design projects, programming) and most include requirements for portfolios and reflection practices. Most also include criteria for grading practices and assignment rubrics. All students are required to develop a senior capstone project, working in small teams. Normally, external sponsors provide context and mentorship for the capstone projects.

What methods are used to assess student satisfaction? What efforts are made to gauge the satisfaction of students from URM groups?

All instructors are expected to administer final course evaluations from the UW Office of Educational Assessment (OEA), which are used to inform the refinement of course syllabi and the selection of instructors (both internal and affiliate lecturers who may be hired). Additionally, many instructors use the services of the College of Engineering's Office for the Advancement of Engineering Teaching & Learning (ET&L) for mid-quarter feedback from students (SGID Reports). The department also conducts surveys of both applicants and degree recipients. Summary data from the UW OEA Assessments and student surveys are provided in Appendix F: Degree Program Data.

What are the findings of the assessment of student learning?

Overall, based on the range of assessments, quantitative and qualitative, the BS degree program is healthy. Students are learning important skills and the far majority are finding employment in the field. Qualitative feedback from degree recipients does not show any consistent, uniform, gap in the experience. For more details please see Appendix F: Degree Program Data.

How has the unit used these findings to bring about improvements in the programs, effect curricular changes and/or make decisions about resource allocation?

Based on our assessment and student surveys, we are constantly re-evaluating our curriculum and improving it. We are currently in the final year of having doubled our enrollment (to approximately 150 students, 70-80 students per BS cohort), which included a major overhaul of the curriculum to its current form.

If applicable, note the courses typically taken by undergraduates who will not be majors in any of the unit's programs. Are there specific learning goals in those courses designed to accommodate such non-major students? How is achievement in those goals assessed?

We have one introductory service course that is open to students across the entire University, with no prerequisites: HCDE 210 Explorations in Human Centered Design. This hands-on, studio-oriented course currently enrolls 450 students per academic year. It is a survey of human centered design practices and students produce a portfolio of projects during the course. These are assessed by a team of instructors and teaching assistants drawn from HCDE.

Master's of Science in Human Centered Design & Engineering (MS HCDE)

What are the student learning goals (i.e., what are the students supposed to learn)?

Student learning goals cover three specialized content areas: research, design, and engineering. They are encouraged to gain depth by taking additional courses within those areas. Our students learn foundation theory and processes for the practice of user experience design, including research methodologies and application technologies. The MS program focuses in particular on teaching targeted toward professional practice.

In what ways does the unit evaluate student learning (e.g., classroom, and/or performance-based assessment, capstone experiences, portfolios, etc.)?

Student learning goals cover three categories: theory, research methods, design, and engineering, and All courses have established learning goals and criteria for formative and summative assessment. They include course assignments (writing, design projects, programming), most of

which include requirements for portfolios and reflection practices. All students are required to conduct a capstone project, working in small teams. External sponsors frequently provide context and mentorship for the capstone projects. Additional programmatic feedback is provided by members of the department's External Advisory Board, which is comprised of UX professionals and academics who have a strong interest in student success.

What methods are used to assess student satisfaction? What efforts are made to gauge the satisfaction of students from URM groups?

All instructors are expected to administer OEA final course evaluations, which inform the refinement of course syllabi and the selection of instructors (both internal and affiliate lecturers who may be hired). Additionally, many instructors use the services of the College of Engineering's Office for the Advancement of Engineering Teaching & Learning (ET&L) for mid-quarter feedback from students (SGID Reports). HCDE also conducts surveys of both applicants and degree recipients.Summary data from the UW OEA Assessments and departmental surveys is provided in Appendix F: Degree Program Data.

What are the findings of the assessment of student learning?

Overall, based on the range of assessments, quantitative and qualitative, the MS degree program is healthy. Students are learning important skills and the far majority are finding employment in the field. Qualitative feedback from degree recipients does not show any consistent, uniform, gap in the experience. Lastly, the department conducts surveys of students and carefully considers the type and range of feedback to help understand the perceived effectiveness of different courses and instructors. Summary data about the University's evaluation process and departmental surveys is in Appendix F: Degree Program Data, Course Assessment Data section.

How has the unit used these findings to bring about improvements in the programs, effect curricular changes and/or make decisions about resource allocation?

Based on our course assessments, input from students, and the External Advisory Board, the MS program has made consistent updates to the program. The program implemented a set of curriculum changes in Autumn 2014 that included an expansion of the MS and UCD programs. In more recent years, the MS program has begun experimenting with special topics courses that are designed to provide more focused, in-depth experience in a number of strategic areas. Some examples include: data science for user researchers, a course on design for behavioral change, and a course in physical computing. The physical computing course was subsequently added to our regular offerings. The MS program has also begun offering some focused introductory skill building courses that enable students who come from different backgrounds to gain specific

skills that make some of our more advanced electives more tractable. As well, given the demand for the program, the MS is in the process of growing enrollments by roughly 30 students, with a concomitant reduction of 30 students in the UCD program. This shift will help balance demand between the MS and UCD programs.

Certificate in User Centered Design (UCD)

What are the student learning goals (i.e., what are the students supposed to learn)?

Our students learn foundation theory and processes for the practice of user experience design, including research methodologies and application technologies. The intent of the certificate is to provide practical project-based learning to prepare them for advancement in their current or related careers.

In what ways does the unit evaluate student learning (e.g., classroom, and/or performance-based assessment, capstone experiences, portfolios, etc.)?

All courses have established learning goals and criteria for formative and summative assessment. They include course assignments (writing, design projects, programming), most of which include requirements for portfolios and reflection practices.

What methods are used to assess student satisfaction? What efforts are made to gauge the satisfaction of students from URM groups?

Professional & Continuing Education surveys students during their final quarter in the certificate program. The results are provided to our department for review.

What are the findings of the assessment of student learning?

All instructors are expected to administer the OEA course evaluations, which inform the refinement of course syllabi and the selection of instructors. Additionally, many instructors use the services of the college's ET&L's program for mid-quarter feedback from students. Summary data from the University's Office of Educational Assessment (OEA) is provided in Appendix F: Degree Program Data.

How has the unit used these findings to bring about improvements in the programs, effect curricular changes and/or make decisions about resource allocation?

Based on assessments and student surveys, we are constantly re-evaluating our curriculum and improving it.

Doctor of Philosophy (PhD)

What are the student learning goals (i.e., what are the students supposed to learn)?

Student learning goals cover four categories: theory, research methods, design & engineering, and society & systems. The learning goals are elaborated on the departmental website; http://www.hcde.washington.edu/phd/current/electives.

In what ways does the unit evaluate student learning (e.g., classroom, and/or performance-based assessment, capstone experiences, portfolios, etc.)?

PhD students are evaluated through grading in required classes, evaluation via required doctoral milestones, and participation in an annual review procedure.

- Required classes: Grading in required doctoral classes is based on a combination of examinations, written assignments, and project work.
- Required doctoral milestones: In addition to the final examination (i.e., defense of the doctoral dissertation), doctoral students participate in a preliminary exam (submission of a conference style research paper and public presentation of the research) and a general exam in which students prepare written responses and then orally defend their responses to questions corresponding to each of the four curricular areas.
- Annual review: Students submit a set of materials (annual review form, transcript, and course of study). The faculty collectively review these materials, establish a status for each student (satisfactory progress, concern, or probation), and provide feedback to the students.

What methods are used to assess student satisfaction? What efforts are made to gauge the satisfaction of students from URM groups?

The following strategies are used to assess student satisfaction:

- Course evaluations are conducted in each of the required doctoral courses.
- The director of student services makes herself available to students and faculty and thus learns about satisfaction/dissatisfaction through this channel.
- The department periodically has workshops with PhD students that include open conversations. For example, we recently had a workshop/open conversation about the state of research funding, immigration, and other issues. For this workshop, PhD students were given an opportunity to submit questions anonymously—and the questions were then discussed.

What are the findings of the assessment of student learning?

- We have had a high success rate on preliminary and general exams. No student has failed these milestones in recent years.

- We have had recent incidents that involved students receiving some form of an unsatisfactory rating during the annual review. This included one student who was put on "concern" for not completing the dissertation, but recently finished, and another student who was put on probation for simply doing poorly in, and subsequently not taking, required courses.

How has the unit used these findings to bring about improvements in the programs, effect curricular changes and/or make decisions about resource allocation?

Changes to the program in order to better support students and student learning at the PHD level have included (but are not limited to):

- Supporting PhD student conference travel by making $1000/student available on an annual basis,
- Offering all incoming PhD students a one-year RA "rotation" in order to give them a chance to work with multiple faculty,
- Offering incoming students four years of guaranteed funding assuming they continue to make progress toward their degree,
- Moving our first PhD milestone (the preliminary exam) from the spring of the first year to the fall of the second year, in order support their successful completion of the milestone.

Instructional Effectiveness

Including the use of standardized teaching evaluation forms, describe and discuss the method(s) used within the unit to evaluate quality of instruction

The department relies on four approaches to evaluating the effectiveness of instructors and course curriculum. The department expects that every instructor will evaluate their course using an appropriate survey from the OEA. This is the University's formal method of evaluating courses and instructors. Another formal approach is through peer teaching evaluation which is conducted each year as a requirement of the University and department merit review process. A full peer teaching evaluation consists of a preparatory meeting between the evaluator and the instructor being evaluated, a classroom observation, a review of the prepared materials for the course, and a feedback meeting between the evaluator and instructor. The findings of the peer teaching evaluation is written as a memo and becomes part of the annual documentation for the merit review process. A less formal mechanism is the use of the CoE Office for the Advancement of Engineering Teaching & Learning (ET&L). The evaluations conducted by ET&L are for the instructor who elects to use those services and is not used by the department as an evaluative measure. Instead, the department finds value in maintaining the expectation that instructors engage ET&L for their individual growth and to understand their own effectiveness. Lastly, the department surveys students and carefully considers the type and range of feedback to help understand the perceived effectiveness of different courses and instructors. Summary data

about the University's evaluation process and departmental surveys is in Appendix F: Degree Program Data, Course Assessment Data section.

Note all opportunities for training in teaching that are made available to any individuals teaching within the unit. These may be opportunities to support teaching improvement, innovation, and/or best practices?

Teaching training and development opportunities provided to any individuals teaching in the department include: (a) courses and workshops offered by the UW Center for Teaching and Learning (http://www.washington.edu/teaching/), (b) training, workshops, and evaluations by the CoE Office for the Advancement of Engineering Teaching & Learning (ET&L), and (c) quarterly Instructor Dinners that the department offers to increase the exchange of best practices among instructors within the department in an informal setting.

Describe specific instructional changes you have seen made by instructors in response to evaluation of teaching within the unit.

Broadly, many of our instructors have reported using the CoE Office for the Advancement of Engineering Teaching & Learning (ET&L) to conduct mid-quarter evaluations. In these evaluations, a facilitator from ET&L visits the classroom, without the instructor present, and guides a discussion among the students regarding the course. This is generally done in weeks 4-6. The facilitator distills information and provides feedback to the instructor with specific, actionable changes that could be made to address specific student feedback. The changes that have resulted from this type of feedback include: revisiting material to address conceptual misunderstandings, adding material to elaborate course objectives, restructuring course resources such as websites or Canvas CMS sites, creating new assignments, and inserting in-class activities to make a course more interactive. In general, the nature of these types of instructional changes are the intersection of the specific instructor, his or her style, his or her experience or general approach, and the individual students in the course. In a very few cases, these changes are propagated up to the level of curriculum change, but often those are observed when something is seen consistently across the whole population of students rather than in the context of a single course with a single instructor.

Teaching and Mentoring Outside the Classroom

Describe and discuss how faculty are involved in undergraduate and graduate student learning and development other than through the classroom.

Faculty in the department run a dozen or more directed research groups (DRGs) each quarter. These groups offer students a wide range of opportunities to do hands-on work, from conducting

usability tests for local companies all the way to collecting data on communication issues internationally. Participating students are mentored during the DRG and that mentoring often continues beyond the quarter. The DRGs are open to students from all programs, providing natural peer mentoring across undergraduate, graduate and PhD participants.

Both BS and MS programs require students to complete a capstone project during their last year in the program. While the capstone experience is structured as a traditional course, much of the work is done outside the classroom, with extensive support from faculty.

Additionally, internships are required for all undergraduates and are recommended for MS and PhD students. For the undergraduates, the internship is very often structured around course credits. A faculty member often provides mentoring for individuals participating in an internship. Every internship that results in course credit requires a written reflection which is graded.

HCDE faculty also work independently with students across the BS, MS, and PhD programs through independent studies, small group projects and through research lab activities.

Describe how the unit works with undergraduate and graduate students to ensure steady academic progress and overall success in the program. Discuss any additional support provided to URM.

HCDE recognizes the importance of professional advising for all undergraduate and graduate students. Beginning at the time prospective students meet with an advisor and continuing with orientation and scheduled appointments throughout the program, students feel confident in obtaining the information and resources they need to be successful. Advisors practice intentional advising by confirming satisfactory academic progress and reaching out to those who evidence academic difficulties. They serve as a referral service for those requesting additional support, developing a relationship of trust with students in our programs.

Describe how the unit works with undergraduate and graduate students to prepare them for the next phases of their academic or professional lives?

The department creates numerous opportunities for students to interact with alumni in UX industries. We host a UX Speaker Series each winter quarter, organize an annual Mentor Night sponsored by Boeing, invite alumni to conduct workshops for undergraduate and graduate students, and host a departmental Career Fair. Career advising is a part of each meeting with students.With so many opportunities to explore careers or advanced degrees, advisors help students prepare for and reflect on events as they learn more about themselves.

Section III - Scholarly Impact

Questions for the self-study defined by the graduate school are in light grey text. The graduate school guidance suggests that Section III should be approximately +/-5 pages.

Describe the broad impact of faculty member's research and/or creative work. Feel free to note specific individuals and how their work embodies the unit's mission or distinguishes the unit from those at peer institutions.

Since the last 10-year program review, the scholarly impacts for the department have been astounding. Shortly before the department was renamed, it launched a doctoral degree. This degree expansion included a more pronounced effort to grow faculty research to support a doctoral degree. The HCDE faculty and students have excelled in research, providing clear scholarly impact that has served to raise the profile of the department. As a modest sized department of 15 tenure-track faculty, the overall research footprint is quite high.

HCDE is distinguished from other, similar, units at peer institutions by a number of key characteristics. Broadly, HCDE scholarship has focused on the question of how to design systems that include the capabilities and frailties of humans. This socio-technical approach is a departmental strength that encompasses all of the faculty. HCDE has intellectual strengths in domains that can broadly be described as (1) wellness and behavior change, (2) socio-technical resilience and crisis informatics, (3) human-centered data science, (4) social and collaborative systems and social computing, and (5) engineering and design education.

The HCDE faculty is quite distinguished among the broader set of faculty and departments that inhabit a similar intellectual space. Documenting the many ways that the faculty illustrate the strengths and uniqueness that is HCDE requires more space than this review allows. A few highlights include the way that Dr. Sean Munson and Dr. Julie Kientz are leading a team to understand how to lower the barriers to the effective use of personal health data. The challenge is not just one for the individual user, but also for clinical health practitioners like doctors and nurses. This is a hugely complex human centered design problem that challenges a wide range of sensing, visualization, sensemaking, professional practice, institutional norms and policy issues present when individuals interact with the health care system. Another example is the work that Dr. Kate Starbird and Dr. Mark Haselkorn engage in the domain of crisis informatics and the design of resilient systems. Their different projects span issues that consider the behavioral, social, normative, and governmental issues that are present when people are faced with the need to improvise and respond to natural and human generated crises. As a human centered design challenge, their work clearly illustrates the socio-technical necessity of considering how people interact with each other and with systems. Another example relates to the way that data science

is engaged at UW. Dr. Cecilia Aragon's work has been focused on defining and shaping Human Centered Data Science as a distinct approach to the methods of data science. The common approaches in data science include algorithms, machine learning, statistics, data storage, and visualization. The growing efforts to develop tools to leverage the availability of 'big data' all too often omit considerations of the human. Dr. Aragon is leading efforts to put people at the center of data science. The human centered approach was one of the distinguishing characteristics of the UW/NYU/UCB proposal to the Moore/Sloan data science competition that resulted in a roughly $35M award to the consortium.

Still, it is important to acknowledge that the HCDE faculty are leaders broadly in each of their respective intellectual areas. One way that we can illustrate that is in the impact that they have in their collective intellectual productivity. To say that the faculty research productivity is high is true, but might not reflect the quality of the overall impacts. Another way to consider both the quantity and potential quality of the intellectual impact is the number of award winning publications. Many conferences now have "Best Paper" competitions that seek to recognize publications that stand out - for potentially many different reasons. These competitions often reflect a second, and sometimes third, round of peer consideration. HCDE has had 27 best paper, journal, note, or poster awards in highly competitive publication venues and an additional 30 papers that have been acknowledged with honorable mention awards in these competitions (see Appendix G: Example Scholarly Impact for the complete list of references).

Yet another marker of the success and intellectual impacts of HCDE is the trajectory being set by the junior faculty. The NSF Early CAREER awards are designed to recognize early career faculty who show exceptional promise to intellectually lead and shape their fields. Since the last 10 year review, and the redefinition of the department as HCDE, our junior faculty have been highly effective at competing for NSF CAREER awards. Since our last 10 year review, five faculty secured these competitive awards that recognize their potential for success (Sean Munson in 2016, Daniela Rosner in 2015, Gary Hsieh in 2013, Julie Kientz in 2010, and Charlotte Lee in 2010). Additionally, Dr. Cecilia Aragon, who joined HCDE as an associate professor, secured a PECASE (Presidential Early Career Award for Scientists and Engineers) award. The PECASE award is even more selective in its recognition.

For undergraduate and graduate students, describe significant awards, noteworthy presentations or activities that have had an impact on the field while in the program.

Students in HCDE have been having great success intellectually and professionally. During the transformation of the department with a focus on human centered design, students begun participating in a range of competitions and activities where their skills standout.

Our undergraduate students have been recognized for their research with best paper awards at iConference and second place in the 2013 CHI Student Research Competition. Undergraduate students who have taken HCDE 411 Information Visualization course have been successful in student research competitions. More recently, a team of four current undergraduates were selected to compete in the CHI 2017 Student Research Competition.

Master's students have impacted the field of UX through local hackathons. One example involved an interdisciplinary team of graduate students, awarded first place in a commuter-related hackathon sponsored by the City of Seattle. Their creation of an accessible trip planning app to enable safe planning on pedestrian ways for those with limited mobility is now fully operable. Another group won a hackathon sponsored by Zillow with their design of a comprehensive, filterable database of homes for sale that had specifiable accessibility features.

At the Doctoral level, some of the best examples of the awards that HCDE students win are the NSF Graduate Research Fellowships (GRF) that have been awarded to students in the department or awarded to those that have chosen to come to the department. The department has been having relatively modest PhD cohorts ranging between 7-12 students annually, making our GRF hit rate quite high given the relatively small student population in our program. In the last 5 years, the following students have won these fellowships: Dawn Sakaguchi (2016), Kathryn Shroyer (2016), John Robinson (2015), Cynthia Bennett (2015), Kiley Sobel (2013), Robin Mays (2012).

Describe how program graduates have had an impact on the field either academically or professionally.

As a maturing field, individuals who are graduating with degrees in Human Centered Design & Engineering are only beginning to have impacts on the broader field. Students who were awarded early BS degrees are beginning to move into design management positions, while individuals who received MS degrees are filling a range of positions in industry practice. Students who earned early doctoral degrees have filled some senior leadership positions in industry and a few have begun moving up the ranks in academic positions.

In what ways have advances in the field or discipline, changing paradigms, changing funding patterns, new technologies and trends, or other changes influenced research, scholarship, or creative activity in the unit?

In the 10 years since the last review, scholarship in the department has changed dramatically. The department changed from a primarily educationally focused department to one that has a strong research program. At the time of the last review, the department had begun this change,

but it could not have been as clear back then, how the character of the department would develop. In 10 years, or slightly less, the department has become a powerhouse in the field. Relative to the size of the faculty, the impact from our scholarship has allowed HCDE to become productive and intellectual peers of departments and institutes that have a history much longer than that of HCDE—and in many cases a faculty size much larger than our own.

List any collaborative and/or interdisciplinary efforts between the unit and other units at the University or at other institutions and the positive impacts of these efforts.

HCDE has not explicitly targeted other academic units or Universities for collaborative activity. However, HCDE has become the home for two research centers that are designed to bring together UW research activities. In 2014, HCDE and CoE backed the launching of a new Center for Collaborative Systems for Security, Safety, and Regional Resilience (CoSSaR) with Dr. Mark Haselkorn as center director (see: http://www.hcde.washington.edu/research/labs/cossar). The goal of CoSSaR is to provide an intellectual home for research in strategies, processes, and systems for security, safety and resilience across a wide range of government and non-governmental agencies (i.e., federal, state, county, city, tribal, international, public and private). The interest in CoSSaR and its research footprint have been growing.

As well, in 2016 HCDE became the home for the Center for Engineering Learning & Teaching (CELT) with Dr. Cindy Atman as center director. CELT has broadly focused on engineering design education and the broader improvement of engineering education practice. The most recent research project funding for CELT activities was a $4.4M award from the Helmsley Trust for the Consortium to Promote Reflection in Engineering Education (CPREE) led by Dr. Jennifer Turns and Dr. Cindy Atman. The work seeks to understand the way that reflection is incorporated in the education by focusing on a consortium of 12 2-year and 4-year academic institutions.

Another way to consider HCDE collaborations is as a function of the collaborations funded through research grants. In 2015 and, again in 2017, grant information was collected and visualized as a social network graph (see Appendix H: Grant & Proposal Collaborations). Collaborations, or edges, are assumed to exist between individuals when they were co-PIs or senior staff on the same grant or proposal. While the data are noisy because of limitations in the way grant data can be collected, the social graphs illustrate some important issues.

HCDE faculty are involved in a wide range of collaborative research activities. The faculty have significant collaborations with other departments and centers associated with the College of Engineering (CoE) that includes Computer Science & Engineering, Electrical Engineering, Chemical Engineering, Civil & Environmental Engineering and the eScience Institute. The other

significant collaborations are with departments related to health sciences which includes departments in the School of Medicine, School of Nursing, and Global Health.

How does the unit work with junior faculty to maximize their success?

HCDE works broadly with junior faculty to ensure the likelihood of their success. HCDE provides generous start-up funding with few restrictions on the way the funding is spent. This funding provides junior faculty the opportunity to fund RAs, travel, additional course release, or equipment during the early years where they are learning to garner extramural funding. Junior faculty are given course release in their first 1-2 years to provide time to launch their research agenda.

HCDE has traditionally had formal “mentoring teams” comprised of 2-3 associate and full professors for each junior faculty member. However, in the last couple of years the formal mentoring has become lax as faculty have been promoted and become more confident and successful in their respective roles. The work to re-establish the formal mentoring teams was begun, but not completed for the 2016-2017 academic year.

Lastly, the collaborative and collegial nature of the department generally makes mentoring and advice seeking part of the everyday environment with regard to pedagogy, class strategies, proposals, research methods, and publication strategy.

Section IV - Future Directions

Questions for the self-study defined by the graduate school are in light grey text. The graduate school guidance suggests that Section IV should be approximately +/-5 pages.

- Where is the unit headed?
- What opportunities does the unit wish to pursue and what goals does it wish to reach?
- How does the unit intend to seize these opportunities and reach these goals?
- Describe the unit's current benefit and impact regionally, statewide, nationally, and internationally. Given the unit's envisioned future, describe how reaching this future will augment that benefit and impact.

HCDE Impacts and Goals

HCDE is a top department, nationally, in the areas of user research, user experience (UX) design, and interaction design. The research trajectory of the department is generating a top quality reputation in areas related to health and wellness, design for behavior change, science and technology study (STS), human centered data science, crisis informatics and social computing. The primary goal for the department is to be seen as the national leader in these areas within the next 10 years. Given that there are no clear ranking mechanisms to measure our progress on this goal, one mechanism for evaluating this is to watch how our MS program begins to draw more applicants and students nationally. The demand for our students is already high, with almost 90% of MS and BS students fully employed within 18 months of graduating (See Appendix F: Degree Related Data, Course Assessment Data section, Departmental Survey of Degree Recipients subsection). The department should be seen as a "go-to" place not just for students seeking a degree but for other departments looking to replicate our success. Having our department and its faculty seen as pedagogical and intellectual leaders among other departments will be important to establishing our preeminence in the field. Yet, another piece of achieving this goal is enabling our faculty to gain international and global status and awards for their research achievements.

HCDE has huge benefits and impact on the Puget Sound region. The region is a hub for technology companies, start-ups, and established industries that benefit from the top-tier user research and user centered design that our students provide. HCDE has significant numbers of alumni employed at well known organizations that have a presence in the region (e.g., Amazon, Microsoft, Bungie, Nordstrom, Google, Alaska Airlines, Expedia, Facebook, Starbucks, Cisco). As well, many alums work as consultants or in companies that have important interests in UX research and design to satisfy client goals (e.g., Accenture, Anthro-Tech, Aquent, BlinkUX, Deloitte Digital, West Monroe). HCDE graduates also take positions in regional government and non-governmental agencies (e.g., PATH, Washington Health Exchange). As well, we have a growing number of graduates who take key positions in organizations outside of the immediate region (e.g., Apple, GE Digital, GoPro).

Regional start-ups that might not have an obvious stake in high quality user research and user centered design are beginning to reach out to HCDE. The most recent example of this was a meeting with Blue Origin, a space start-up company. They are interested in user centered research and design so as to enable more efficient enterprise systems, as well as systems that improve the safety and efficiency of spacecraft operations.

The driving force behind our students' success is that all these companies and agencies see that designing effective and satisfying products and services is a key aspect of their organizational mission. Our students are well trained to understand the broader intersection of people and the technologies that they use to achieve their goals through a socio-technical perspective. Our students are recognized as top user researchers and designers, capable of understanding users' goals, prototyping and designing interactive systems that meet those goals, and evaluating the way that an existing system can be improved to more effectively satisfy the users of those systems.

HCDE is well on its way to achieving our goal of being the top program nationally. Maintaining this trajectory precludes doing things exactly as we have before. In fact, achieving our goal requires continually iterating on our programs and our processes, adapting our organizational needs, and charting new intellectual spaces.

Academic Programs: BS & MS

As our programs have grown, we have already twice revised aspects of the curriculum and the design of its delivery. Upon the initial change of the department to HCDE (~2008-2009), the BS and MS programs were reenvisioned to more clearly focus on interaction design, user research, and evaluation. Then again in 2012-2014, with state proviso funding that enabled expansion of the BS program and with high demand for the MS program, both BS and MS programs were redesigned to facilitate doubling the number of students in the respective programs. Demand has continued to grow, and in the coming years we will have to face that growth again through programmatic and organizational change.

Across both the BS and MS programs, two issues need to be addressed in the next few years, admissions and curriculum review, both of which are being driven by high demand for these programs.

Given the current number of applicants to the respective degree programs, our process for admissions review and decision making is at a breaking point. The main issue is that HCDE has a commitment to reading and fully evaluating the merit of the far majority of the applicants. A simple solution to the problem of too many applicants would be to set GPA cut-offs and admit

by that one criteria and many departments in CoE use that approach. But, it is our firm belief that this does not—and cannot—yield a diverse population of students. We believe that a diverse and well-rounded student population requires considering the full merits of each qualified student. We have started to develop rubrics to guide a holistic evaluation of applicants. The goal is to allow us to train volunteer reviewers to apply the rubric and help the faculty make decisions about each applicant. We envision that these volunteers will be people who are committed to the department such as our alumni, advisory board members, part-time lecturers, and some current students.

Again, for both the BS and MS, it is time to begin a comprehensive curriculum review. While we have just finished rolling out revised curricula that facilitated the expansion of both programs, the goal of the review is to enable a continuous improvement process. One goal of the review is to enable adoption of new interaction technologies and new methodologies as they arise. Also, because of the recent and rapid growth in our programs, more classes are now being taught at larger scale. Assessing the effectiveness of these changes and adopting strategies that enable faculty to be effective educators with larger numbers of students is important. Broadly, a comprehensive curriculum review will also explore the instructional techniques that we employ, their general effectiveness, and how to adopt better practice when they apply. As well, it is important that our courses maintain a relevance to the field as it changes. One way that we will do that is by maintaining a connection to practitioners and leveraging the expertise in our External Advisory Board (EAB) as we review the content of individual courses and the overall composition of each degree.

As well, for both the BS and MS degree programs, we feel it is important for our students to be seen as leaders in the field. Strategically, we see two ways that we can facilitate and recognize this goal. First, one way is to help our students fill strategically important positions in organizations. The goal is to move UX strategy beyond the roles of UX manager up into the ‘c-suite’ as chief user experience officer (CUO) or chief design officer (CDO). Our goal here aligns with organizations that believe user centered design will be a key differentiating market advantage for their enterprise and end-user products. This ‘turn to design’ as a management strategy has been slowly evolving and there are companies large and small who demonstrate how this approach can be successful. A second way that we can help our students lead the field is to prepare them to communicate and demonstrate their successful methods and results. For practitioners this can take forms that are different from those of academics. However, one place where these begin to intersect is in practitioner oriented conferences such as UXPA (User Experience Professionals Association). For that setting, we can prepare and encourage our students to effectively demonstrate application of methods, development of new methods, foundational user research, and the resulting designs they develop. Through this type of venue, we can begin to see how our students lead as practitioners.

Specific to the BS program, we plan to expand our offerings of introductory courses. With our shift to HCDE from technical communication to human centered design, we have begun to change the lower division courses that we offer. Our first effort in this area, HCDE 210 Explorations in Human Centered Design, enrolls 150 students per quarter in a studio style introduction to the techniques in the field. This course has been wildly successful, with offerings every quarter for the past 2 years, filling to capacity with waitlists every quarter. One expansion we are considering is growing HCDE 210, specifically exploring how to offer and manage a studio style course at scale. Another expansion is to consider other lower division offerings that broadly appeal to other units in the College, as well as the university at large. One specific example that we are currently ideating is a course that would be in the area of accessibility and alternative access and how HCDE techniques address the challenges of alternately abled persons. Our vision for this course is to illustrate the way that the University's recent diversity general education requirement for undergraduate education can be built into a coherent user and technology centric course rather than simply being bolted on. The outcomes of the course would align with the department's goals of illustrating the positive benefits of human centered design and of helping undergraduates appreciate one facet of diversity in society.

Academic Programs: PhD

Our PhD program is relatively modest as a function of the faculty commitment to careful mentoring and apprenticeship for the students who are admitted. There are only 15 tenure-track faculty in HCDE and a faculty member generally supervises 4-6 students for an overall program size of about 40 doctoral students. Some of the goals for this program over the coming years include:

1. Revisions to course requirement/course offerings that (a) advance student preparation for contributing to contemporary scholarship in the HCDE field, and (b) provide student flexibility that complements student interests and other aspects of PhD life.
2. Enhanced support for advanced PhD students (years 3+) that facilitates their sustained progress toward their degree and improves overall in time to degree.
3. Stabilization of the annual cohort size through enhanced approaches to recruitment into the program and student support during the program.

Intellectual Directions

The department potentially has a broad and growing charter. During the transition to HCDE the faculty developed a characterization of a set of broad research areas that were being pursued (i.e., http://www.hcde.washington.edu/research/areas). As more and more technology is put in more and more hands of people, there will be more and more need for a human centered approach to design. Given growing, but still limited resources, the department has to make choices as to where and how it will grow intellectually. Further, given that we have a goal of both addressing

practitioner needs as well as setting new technological trends, our intellectual direction has both short term and longer term visions.

In the short term (the next 3-5 years), the intellectual strategic vision has some pragmatic concerns that align with programmatic considerations and resource constraints. In 2016, HCDE decided to join other departments in the college and the larger university to contribute to a new global initiative; the University's Global Innovation eXchange (GIX) program. This agreement required designing and staffing six new courses that would become part of the Master's of Science in Technology Innovation (MSTI) degree that the GIX program would offer. In exchange for that, GIX provided two tenure-track lines and a senior lecturer to facilitate the course coverage. While the two tenure-track lines are not dedicated to specifically teaching in the GIX program, the decision by the faculty to participate in GIX MSTI has created some pragmatic alignments between that program and our faculty that are exciting. One key alignment is in the domain of the design of novel technical devices. From an HCDE perspective, this could be manifest in a number of ways. For example, we should consider the way that scholars focused on "making," "makerspaces" or the "maker movement" contribute broadly to human centered design and new human centered techniques. Alternatively, we might consider researchers and educators who take a human centered approach to physical computing and the Internet of Things (IoT) as meeting both pragmatic needs for the MSTI program and our focus on human centeredness.

Another clear short term intellectual strategy is to expand in the area of Human Centered Data Science. We offered a course in Data Science for User Researchers that was quite popular. Given that the majority of data science programs focus exclusively on storage, statistics, algorithms and machine learning, our specific, human centered approach is very likely to be a key differentiating characteristic. User researchers who are capable of communicating and collaborating with data scientists will likely be in high demand. This strategy would have some payoffs for our GIX collaboration, for our existing PhD program, and for our support of the UW MS in Data Science.

Overall, HCDE, the faculty, staff, students, academic programs and research efforts are on an upward trajectory. The department is well positioned to take advantages of changes in the intellectual landscape and emergent aspects of the professional field.

Part B
Unit Defined Questions

Part Unit Defined Questions

Questions proposed by the department for the self-study are in light grey text. The graduate school guidance suggests that Part B should be approximately +/-5 pages.

How has the transformation to “Human Centered Design & Engineering” (HCDE) created an academic and research trajectory for future success?

The department's transformation has created a trajectory of programmatic success based in user research, interaction design, experience design, design prototyping techniques, data science, and system evaluation. The growth of user research, design related, and technology companies has created high demand for students who can fill research and design related positions. In contrast to the many design programs that focus on visual composition, the broader field of research and design for technology includes the challenges of process, transitions among focal and nonfocal activities, and the way we satisfy human needs as human leverage technology throughout the day. Graduates from our academic programs are well suited to meet these challenges and the demand for highly capable graduates in this area seems to be growing.

Our refocused academic programs have significantly boosted enrollment in the Master's program, providing substantial funding for department growth. Without the transformation, it is highly unlikely that the department could have afforded much of the growth in staff and student initiatives that we have undertaken in the past 5 years. The programmatic changes at the undergraduate level, including the creation of new service courses such as HCDE 210, have resulted in massive growth in demand for the undergraduate program. This growing demand would not likely have been possible without the overall shift in intellectual focus and the necessitated changes in the BS program.

The shift in intellectual focus also initiated a departmental transformation where faculty are expected to have active research portfolios. Research growth and successes have mostly been in the areas of Human Computer Interaction, Computer Supported Cooperative Work, Social Computing, Science & Technology Studies (STS), Human Centered Data Science, Crisis Informatics, and Design Research. The broad research charter in the department aligns with the discipline area often called user research or user experience research. The efforts to promote and grow a research active culture has also benefited the department, in particular, with a significant growth in research funding, specifically a growing portfolio of funded research. The research cost recovery (RCR) has funded doctoral student travel and additional staff to facilitate pre-award and post-award management for the faculty. Output from the research activity has raised the profile and status of the department in important research venues. In the top HCI

related conferences, HCDE's presence is as significant as departments with longer history, more faculty, and larger resources.

Overall, the transformation has enabled significant changes for the department and created academic and research opportunities that were unlikely in the past. The academic program trajectory is strong and the programs are in high demand. The research trajectory is strong and can leverage a wide human centered skill set to address relevant research trends that emerge in the current uncertain research funding environment.

How have programmatic changes to the Master's and Bachelor's degree programs changed the educational experience of our students and alumni?

It is a little difficult to judge how programmatic changes have changed the experience of HCDE students and alumni in the department. Changes in the last few years in all advising staff have made it challenging to gather data that assess how students experiences have changed. The department has only recently begun regular survey of admitted students and recent graduates.

There are some obvious changes during the past 10 years. The department's transformation and its rising popularity has resulted in over 80% of applicants being declined admission (see Appendix F: Degree Program Data, HCDE BS Admissions Data section), making the HCDE BS program the most competitive program in CoE. This is with the modest growth in resources that the department has received from the College through state proviso funding. State proviso funding supported doubling the BS program, but the popularity of the program has quickly outstripped that growth. It is disappointing that many qualified students are regularly turned away and further growth in the Bachelor's program is constrained based on resources from CoE and the State. We are planning for some modest growth in the Master's program. In the last ten years, we have doubled the size of the PhD program.

One consistent issue is the trouble that some students have navigating the job market with a degree where the title does not completely describe the breadth and depth of their educational experiences. Confusion can arise when a degree program title does not align with a common job title in the workforce. Busy human resource people look for a clear and direct line between a job title and the credentials of an individual who might possibly fill the position. The department could do more to reach out to employers to clarify the many types of positions that students might capably fill. This effort could result in additional Corporate Affiliates, capstone projects, or internships. Students also need to clearly communicate what skills and knowledge they bring to an organization.

One consistent factor is how students generally want 'more'. This is not judged in a negative sense. For example, when students have requested more technically oriented courses, as we have added a few, they again request more--more courses, more depth. As students have asked for more research oriented courses, faculty have offered more DRGs and we have added more methods courses, but then some students request yet more. This patterns is observable in the student comments in Appendix F: Degree Related Data, Course Assessment Data section. One way to judge this is that the students want to be challenged and our faculty, career and part-time, provide a high-quality experience even when challenging our students.

What are some emerging areas related to HCDE that could provide strategic openings for new programs or new research initiatives?

HCDE actively collaborates with other units to develop new programs and strategic initiatives. HCDE continually develops new curriculum as part of growing the program. Some established collaborations that illustrate HCDE's ability to collaborate include the MHCI+D (https://mhcid.washington.edu/) and MSDS (https://www.datasciencemasters.uw.edu/) degree programs. Both the MHCI+D and MSDS collaborative Master's degrees involve multiple departments to deliver an interdisciplinary degree. HCDE's participation in the MHCI+D program helped elaborate our studio approach to course instruction and provided an early implementation of our physical computing course. HCDE's participation in the UW Master's program in Data Science by provides students in this program with access to our course in Information Visualization and. Additionally, we are designing a new signature course in "Human Centered Data Science" that brings human centered methods, techniques, and perspectives to the growing data science discipline.

The HCDE faculty recently made a strategic decision to participate in the GIX (Global Innovation Exchange) program. This is a collaborative program between the University of Washington, Microsoft and an envisioned set of international University partners, the first partner being Tsinghua University in Beijing, China. HCDE will participate by teaching six different courses in the MSTI master's degree program. The degree focuses on the design of novel device technologies. HCDE will offer courses relating to Design Thinking, History of Technologies, User Research, Physical Prototyping, and Visual, Industrial and Interaction design. Our participation reflects both strengths that HCDE can bring to the program as well as some challenges to develop and cover courses that are a stretch for our current faculty. Specifically, HCDE has not taught a history of technology course and has less experience in visual and industrial design. Expanding the range of courses that we can offer from a human centered perspective is an important strategy that the department has begun to pursue.

The hype related to the 'maker movement' and 'maker spaces' has yielded an interesting opening for developing pedagogy that incorporates those tools and techniques into human centered prototyping. HCDE faculty recently developed a physical computing course at the BS and MS levels that begins to address challenges in this space. Initial offerings of these courses have been very popular. This expands the range of prototyping techniques that are offered from a human centered perspective.

Lastly, the department program chairs (BS, MS, PhD) have been working with HCDE faculty and guest instructors to develop special topics courses to explore emerging topics that might eventually become part of the regular curriculum. Some of these special topics include: (a) a course on the design of behavior change technologies, (b) a course on leveraging big-data for user research, (c) inclusion of sustainability and ethics topics to departmental writing courses, (d) a course on video communication techniques and strategies, (e) a course on designing with bioluminescence, (f) a course on the Internet of Things.

In what ways does HCDE provide a strategic advantage for the College of Engineering and the University of Washington?

HCDE is not the only design and engineering department within a school or college of engineering. However, it is the only human centered “design” department within a college of engineering. The primary strategic advantage that HCDE presents for the CoE in this regard is expertise in methods and techniques for understanding users, their goals and needs, and the ways that information can be incorporated into a design process. This is being leveraged in the CoE for a number of research related projects. In collaborative research proposals that are funded and that include HCDE faculty members, our expertise in bringing a human centered orientation to the project is often leveraged for specific projects.

It is not completely clear how the department’s strategic advantage can serve the CoE in an academic and programmatic sense. Each engineering discipline has a set of design techniques th atit wants to teach in a specific way. In fact, the need to teach some aspects of design in a specific way is often structured into the ABET accreditation process. That can make it very difficult to influence design instruction to include more human centered techniques and methods.

The current approach that HCDE has taken to make human centered design programmatically available is to develop general education courses at the 200 level that can serve as a broad introduction to methods and techniques in the field. Exactly how these will serve different engineering disciplines is an open question that we are only beginning to address.

How can HCDE best leverage the College of Engineering 'Direct to College' (DtC) admissions program to maintain the diversity and strength of the HCDE student population?

The UW College of Engineering has proposed to change the way undergraduate students are admitted to the college. In the 'old' (i.e., current) model, the University admits new undergraduates without weighing the student's desired major. The result is that almost 50% of admitted freshmen express interest in an engineering degree, but the College has capacity for at most 20%.. This results in a highly competitive 1st year experience, and very disappointed students who are unable to declare their desired engineering major. With the Direct to College (DtC) admissions model (i.e., new model), the UW admissions office will conduct its holistic admissions evaluation, and for a specified number of freshmen, they will offer admission to UW and directly to the College of Engineering. If DtC students maintain satisfactory academic standing, they are 'matched' to a desired engineering major during the sophomore (2nd) year. Within CoE, students would not have a competitive experience unless the major they wanted was too popular among the set of individuals who were being matched at the same time.

HCDE is participating in the DtC as part of CoE. However, HCDE has traditionally attracted 'interest changers' from the wider range of individuals who are admitted to UW. As such, HCDE needs to be careful with regard to the number of seats we reserve each year for DtC students. As we increase the percentage of seats reserved for DtC, we restrict the possibilities for individuals who came to UW not knowing they could do something like HCDE as an engineering major. During the debate about participating in DtC, the HCDE faculty settled on reserving 40% of the seats for DtC and allowing for up to 60% of any given cohort to come from an open application process from among the students at UW.

While the effort to evaluate student applications has increased, one primary concern is that the current diversity of CoE students is significantly behind that of HCDE. Our departmental commitment to create diverse cohorts is enhanced by admitting students from the broader population of the UW campus. Attracting and retaining strong students is a priority for the College and the department. Allowing a reasonable number of DtC students to be 'matched' into HCDE would likely help maintain a strong technical skill set within a student cohort.

What are some strategies to increase the geographic and URM diversity in the HCDE student applicant pool across BS, MS and PhD programs?

As an interdisciplinary department within the College of Engineering, HCDE is uniquely positioned to successfully recruit a diverse group of applicants across all programs. One of the challenges the department faces is explaining what it means to study human-centered design and engineering, particularly for those applying to the university as freshmen. The Direct to College

(DtC) initiative has provided an opportunity for the department to develop strategies for recruiting diverse, academically talented students.

This year, in partnership with the UW Pipeline Project, HCDE students participated in our first Alternative Spring Break (ASB). During ASB a team of five undergraduates lead middle school students in a Human Centered Design Workshop. HCDE students worked with school and community leaders to identify a problem or need that can be addressed by our user-centered design process. Over the course of a week, the middle school students, guided by the HCDE student team, researched a community identified problem, design and prototype a solution, and presented their project idea. This workshop built on HCDE's existing UCD Charrette for K-12 Outreach program. We intend to continue expanding our K-12 outreach pipeline through the ASB workshop and UCD Charrette activities.

The department is increasing its recruitment of diverse graduate students as well. HCDE has drawn national interest for several years now with more recent bachelor's graduates applying to our master's and PhD programs. The department has begun attending graduate school fairs for diverse universities in northern and southern California. Both campuses visited in 2016 (UC Santa Cruz and Cal Poly Pomona) have been designated as Hispanic Serving Institutions by the US Department of Education. Next year, we will again participate in the graduate school fairs of those two schools and will add two more graduate school fairs in California. In addition, we will be sending our Student Services Manager and several students to the national SACNAS (Society for Advancement of Chicanos/Hispanics and Native Americans in Science) conference. We continue to collaborate with other engineering departments in sending materials and/or students to professional conferences with a focus on supporting URM and women in STEM fields.

The department is also working on the creation of a departmental scholarship to support students in the MS program. Currently, there is no scholarship or fellowship for students enrolled in the MS program. The faculty have approved the scholarship in principle; however, because the scholarship funding is derived from MS program revenues, the program administration needs to meet University and state legislated guidelines. We are working on developing appropriate language for an application and will continue to reach out to the scholarship-granting offices.

Reflect on the unique branding of HCDE relative to the range of national and international design schools?

It is very difficult to compare HCDE directly to what are commonly described as design schools. There are important aspects of HCDE that are not touched by the far majority of design schools, and the design school tradition is only partially covered by HCDE. For example, we only partially cover the visual communication perspectives of many design schools. Likewise few

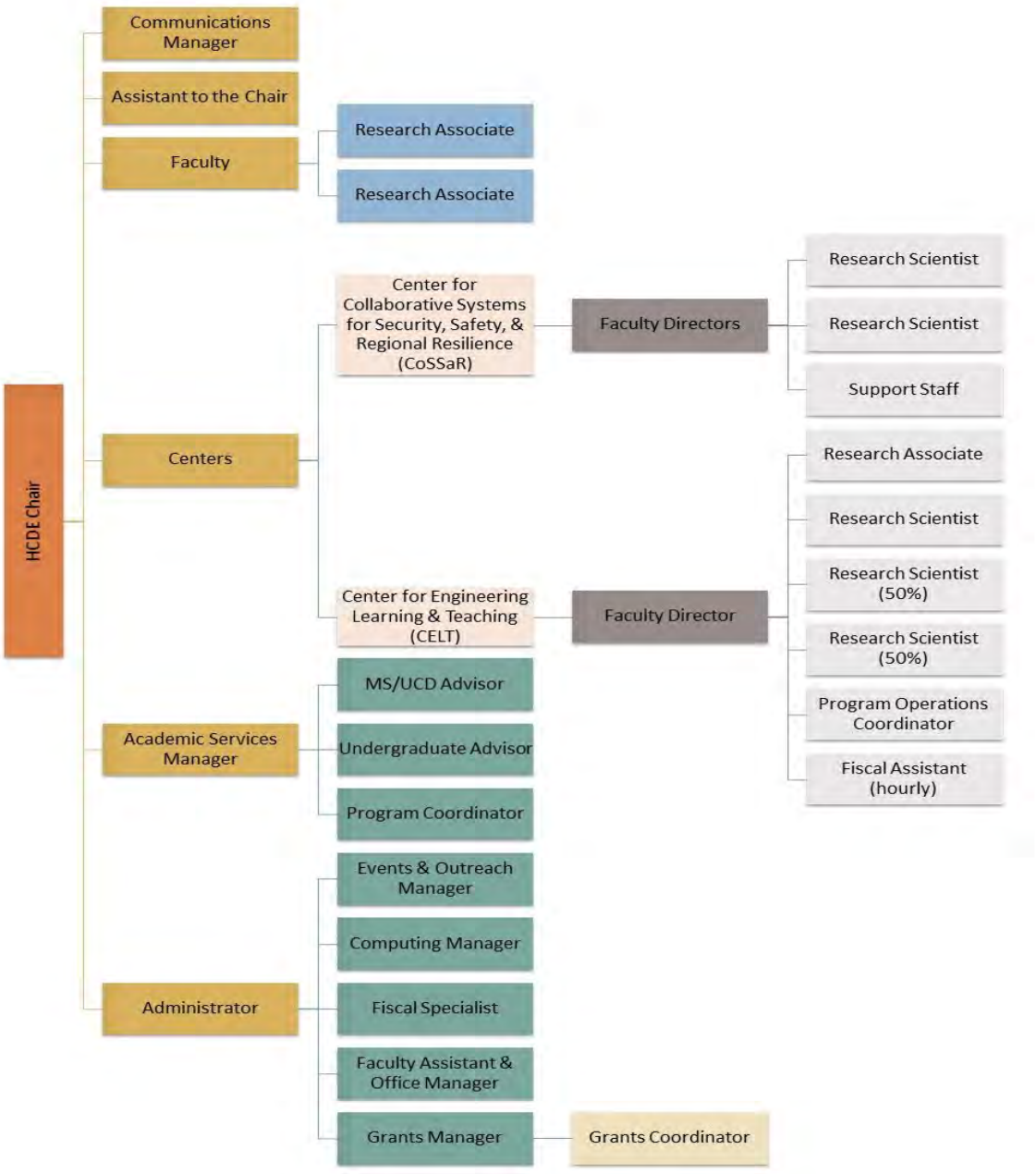
design schools consider research methods to the depth that is covered in HCDE. Perhaps one value of addressing this question from the perspective in which it was asked, is to begin to frame potential programs to which HCDE might compare itself as it grows.

The branding of national and international design schools that offer degrees most closely related to HCDE can be broadly categorized by their originating perspective: (a) schools that originate from an engineering perspective, (b) those that originate from an information science perspective, and (c) those that originate from art and design. Among the programs that originate from an engineering perspective, the most significant players are Stanford d.school (https://dschool.stanford.edu/), Carnegie Mellon HCI Institute (https://www.hcii.cmu.edu/), Georgia Tech (multiple programs, http://dm.lmc.gatech.edu/, http://www.cc.gatech.edu/) and MIT Media Lab (https://www.media.mit.edu/). Programs that originate from the information science perspective that have programs closest to HCDE include University of Michigan School of Information (https://www.si.umich.edu/), Penn State College of Information Sciences and Technology (https://ist.psu.edu/), and the University of Washington's own Information School (https://ischool.uw.edu/). High profile art and design institutions in the US include Pratt Institute (https://www.pratt.edu/), Parsons School of Design (http://www.newschool.edu/parsons/), Rhode Island School of Design (http://www.risd.edu/), and the School of the Art Institute of Chicago (http://www.saic.edu/). Significant design institutes from the UK include the Royal College of Art (https://www.rca.ac.uk/) and University of the Arts, London (http://www.arts.ac.uk/). This is not meant to be a complete list but the point is to illustrate examples from each of these different originating perspectives. While HCDE has clearly originated from the engineering perspective, we differ from some of these schools in some important ways.

"We put people first." This statement, from our website, encapsulates the unique quality of HCDE. Our emphasis on human centered design is the core of our teaching and research and is our unique branding. In our department, we find research, teaching, and communities of practice that are not only concerned with making technology for a specific set of user needs and motivations, but also actively considering the surrounding stakeholders of society, culture, health, politics, governance, and so much more. Our research and our programs employ a social science lens to understand the people and their practices as a lens on the design of technology. As a program, we foreground concerns for design history, concept, theory, method, and process over design execution as a specific form. In short, our branding highlights the diverse intellectual pursuits of our faculty and students who attempt to deepen our understanding of the complex relationships, systems, and attitudes that undergird humans and technology.

Part C
Appendices

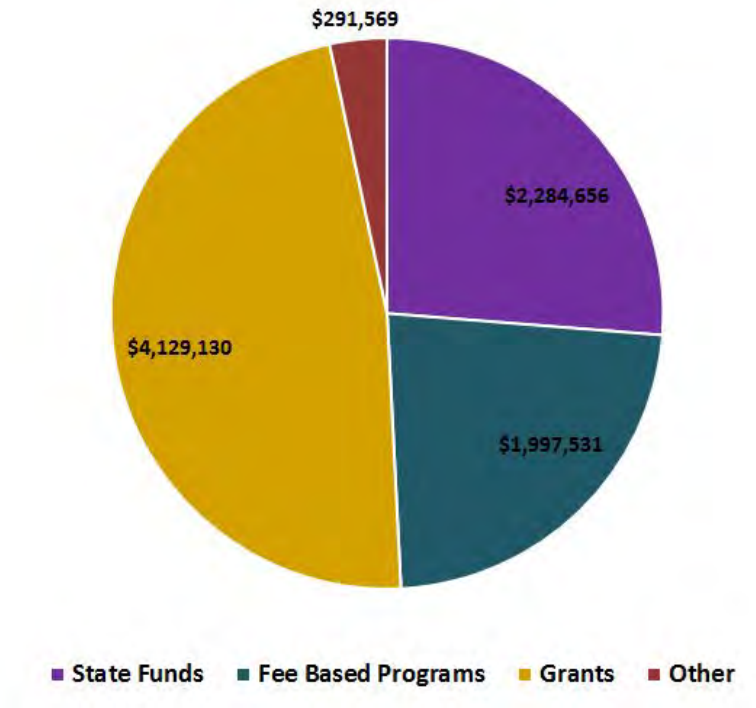
Appendix A: Organization Chart



Appendix B: Budget Details

The budget in Human Centered Design and Engineering (HCDE) consists of three main funding sources: State Funds, Fee-Based Programs, and Grant Funding. A small amount of funding also comes from other department controlled funds, such as Research Cost Recovery funds, endowments and gift funds.

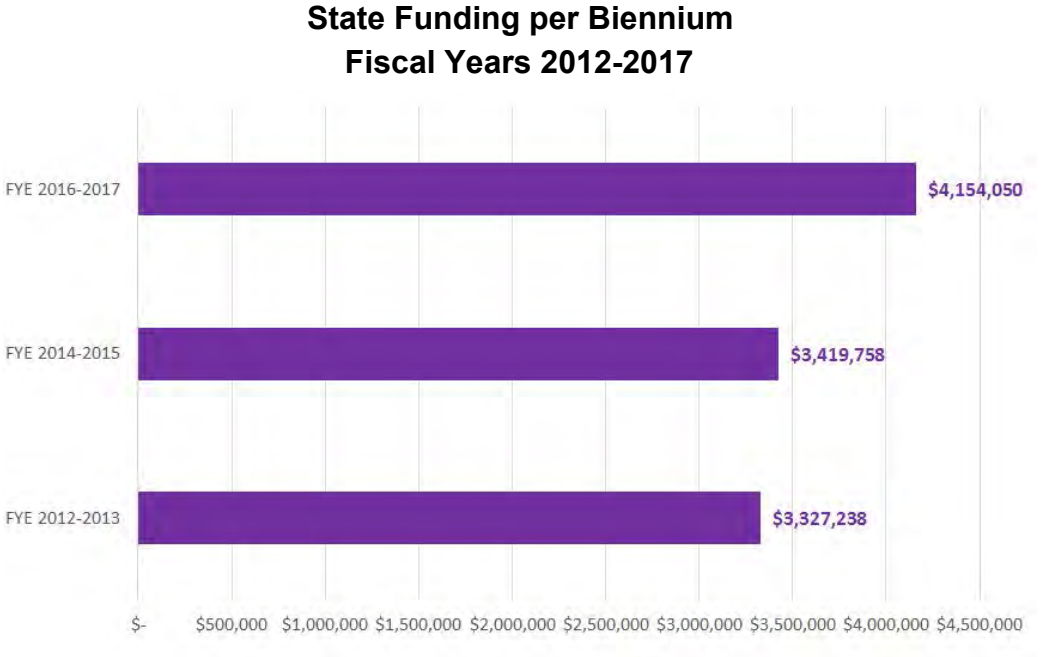
Average Spending from Different Funding Sources
Fiscal Years 2014-2016



State Funds
The state of Washington budgets in bienniums. Our current biennium will be ending in June 2017. At the start of the biennium, we are given a fixed amount of money from the College of Engineering based on the amount of state funds they received, and their own internal calculations. When the state determines that raises are in order, we get additional money from the state, but only based on the number of people officially on the state budget (all tenure track faculty and 3.27FTE of staff), and generally not the full amount of the raise. Ex. We are told raises should be between 3-4%, but the state covers only 2% of that. Often the rest is made up from additional pools of money from the University or the College of Engineering, but not always.

The HCDE state budget is used solely for salaries. No other operating expenses come from this budget. In addition to 3.27 staff FTEs on the state budget, there are 15 tenure track faculty lines currently covered. Two additional tenure track faculty will be added to the department from HCDE participation in the University's Global Innovation EXchange (GIX) program.

Our faculty teach (on average) one quarter per academic year in our Master's program, which is self-funded, and that covers a percentage of their salaries (60% in FY2016 and prior, 70% in 2017, projected 80% in 2018 and 90% 2019 and after). Salary recapture, based on faculty salary directly covered by the Master's program, is used to cover full time lecturers and some staff.



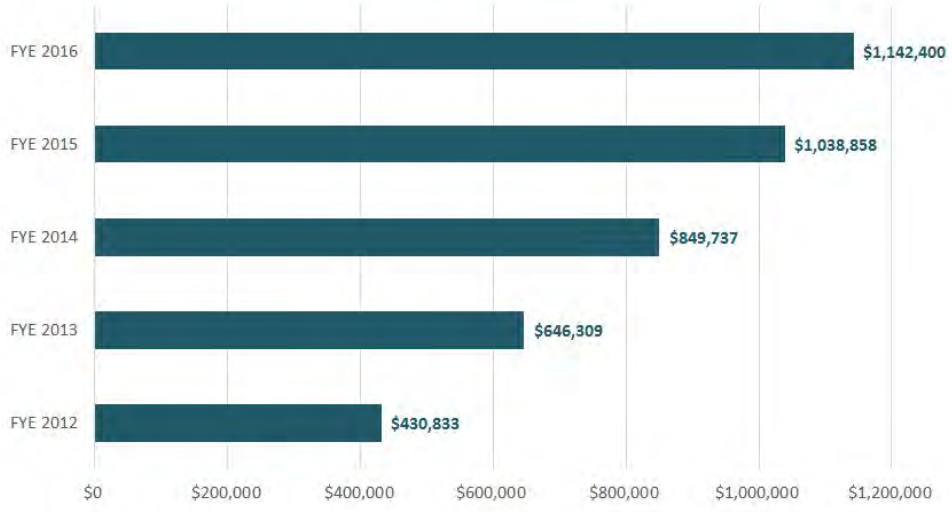
Fee Based Programs

The majority of HCDE's fee based program funding comes from the HCDE Master's degree and certificate programs. However, there are still funds from the (now retired) Technical Writing certificate program, and additional money comes each year from interdisciplinary fee based programs in which HCDE participates, specifically, the Master's in Human Computer Interaction + Design (MHCI+D) and Master's in Data Science (MSDS) (new for FYE2017), and the Global Innovation Exchange (GIX) program (new for FYE2018).

The money earned by these professional programs covers their own program expenses and then also returns additional revenue to the department on an annual basis. Program expenses include the Program Directors for the HCDE Master's program and GIX. The programs also pay a percentage of the salary of faculty currently teaching in the programs, and the full salaries of part time lecturers teaching in those programs. Additionally, the HCDE Master's program pays

for 2.0 FTE of staff as part of standard expenses. We are also able to charge travel expenses for guest speakers in the autumn and winter speaker series to this program budget.

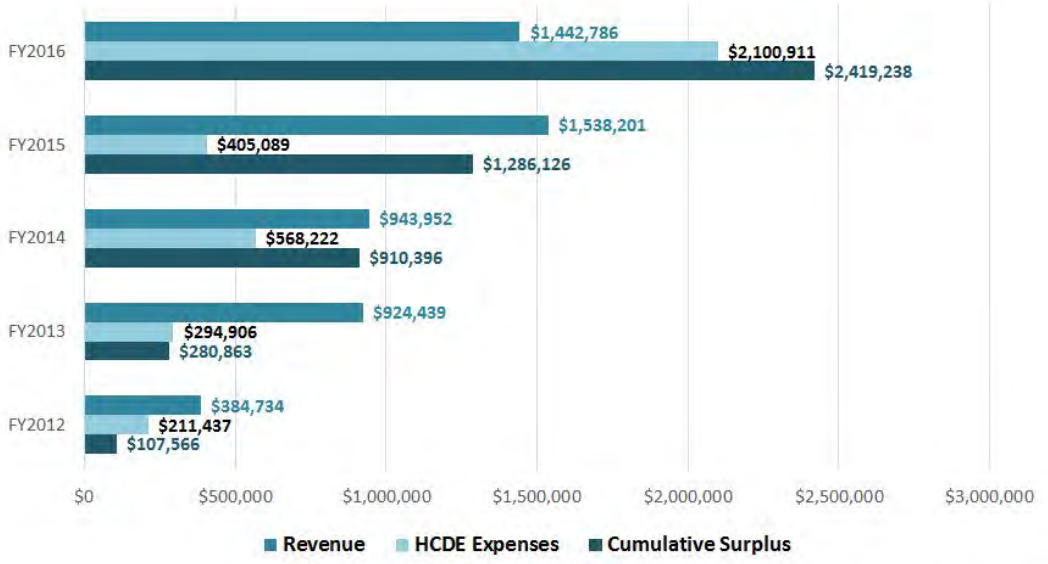
HCDE MS Program Expenses
Fiscal Years 2012-2016



As the programs has grown, the program expenses have grown, but so has the revenue generated by the different professional programs. Each year, HCDE pays the University's Continuum College fees and a percentage of fee-based programs revenue. The proceeds after direct costs and Continuum College fees are then divided up, 5% for the College of Engineering and 95% for HCDE, and distributed on an annual basis. We use those funds to cover the general operating budget for the department, including all office and teaching supplies, as well as staff salaries not covered by faculty salary recapture on the state budget.

These funds also cover all major one time expenses such as remodeling, purchasing equipment for the department, and creating start up funds for new faculty hires. They also cover first year RA-ships for all PhD students and TAs for the undergraduate program, including full tuition for Master's level students who TA for the department.

Fee Based Program Revenue, Expenses, and Cumulative Surplus
Fiscal Years 2012-2016



In FYE 2016, the department incurred additional expense (around $325,000) for salaries of lecturers teaching HCDE 231. In previous years, this had been considered primarily a service course that HCDE provided for the college with expenses covered by funds from the College of Engineering. HCDE has stopped providing this as a service and starting in FYE 2017 the College covers the costs under the Engineering 231 program.

FYE 2016 expenses were also increased due to a 19% pay increase negotiated by the Associated Student Employees Union, and overing the pay of all Teaching Assistants (TAs) and Research Assistants (RAs). Prior to 2016, the department had paid directly for only a few TAs and RAs, but that changed in 2016, with over $500,000 spent on TA and RA salaries, and another $300,000 in tuition paid back to the University for hiring students in the professional Master's program into those roles.

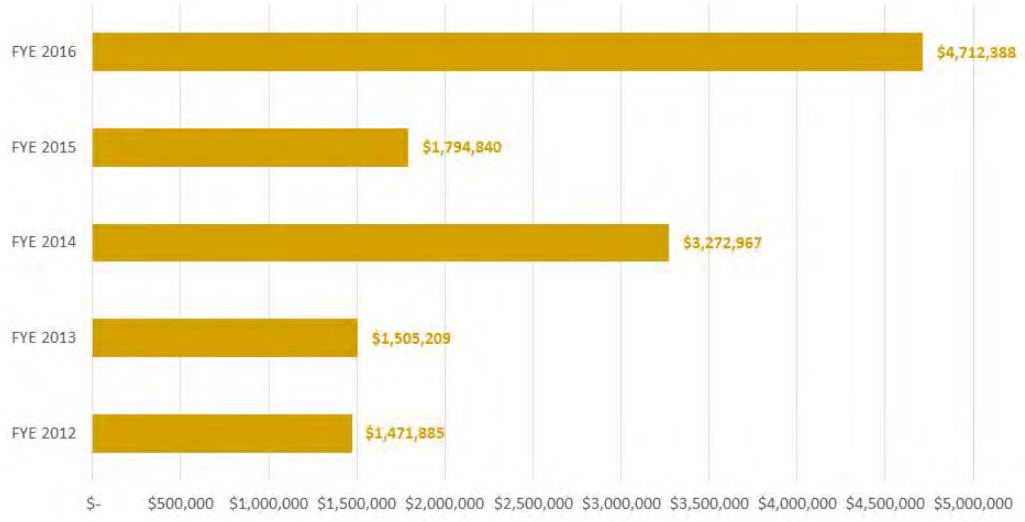
The other reason for the increased spending in FYE 2016 was staff salaries. Because it was the first year of the biennium, there had yet to be any benefit from salary recapture on the state budget, so more full staff salaries were paid for from the fee based revenues. This will change for FYE 2017, when more staff salaries are transferred back onto the state budget.

With the exception of 2016, the department generally has more revenue from the fee based program than it spends, thus growing a cumulative surplus that can be used for large projects.

Grants

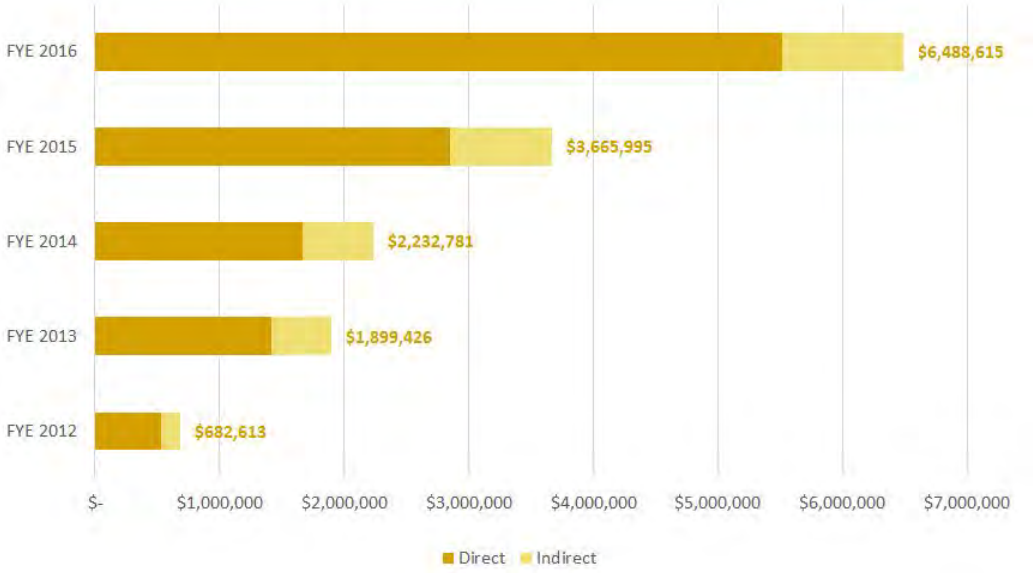
Spending from grants makes up almost 50% of the department spending. However, the department has little control over what gets spent out of grant budgets or when it gets spent, relative to when it was received. Grant expenditures are managed by the respective PIs.

Grant Dollars Received
Fiscal Years 2012-216



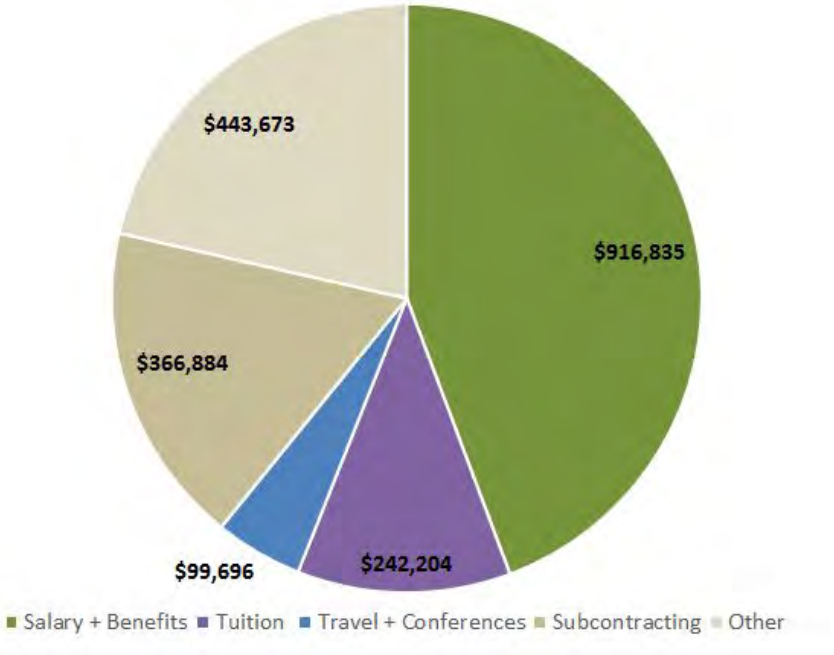
Money spent on grant budgets is classified as either direct or indirect spending.

Direct and Indirect Spending on Grants
Fiscal Years 2012-2016



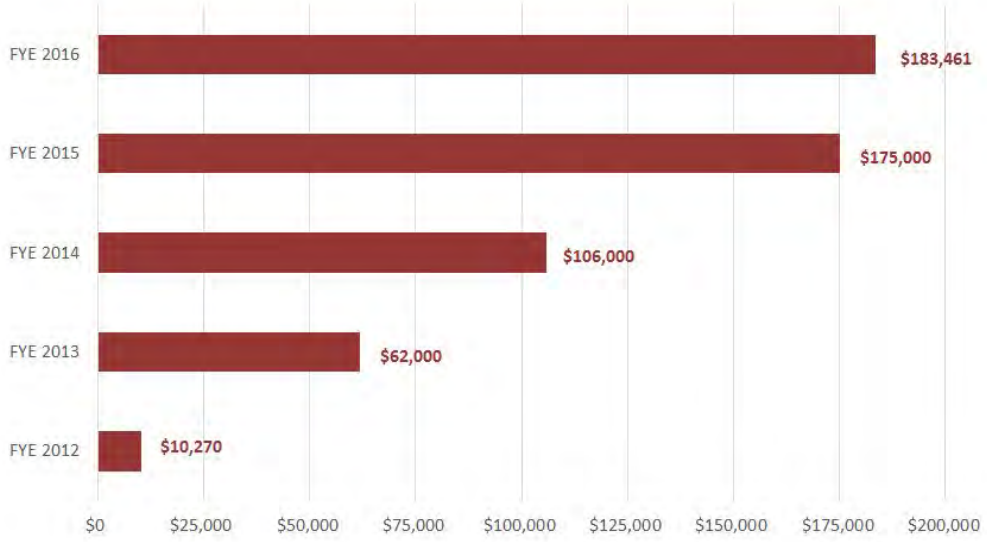
Over the last five years, roughly 80% of the money spent on grant budgets has been spent on direct costs. The other 20% has gone toward indirect costs. Of the direct costs, almost half (about 44%) is spent on salaries and benefits for faculty and students, while another 12% is spent on student tuition and fees. About 5% each year is spent on travel and conference registration. Just under 18% is spent on sub-contracting. The remaining 22% of the money is spent on various other costs, including equipment, space rental, and services provided by non-university vendors.

Average Direct Spending on Grants
Fiscal Years 2012-2016



Indirect costs have made up about 20% of grant spending. Indirect costs fund University overhead, a portion of which is returned to the department as Research Cost Recovery (RCR) funds. While these funds do not make up a large portion of our budget, RCR money is used to fund 1.8FTE of staff (specifically those who work in the HCDE Grants office) and $1,000 annually for each PhD student to travel to conferences not otherwise covered by grants.

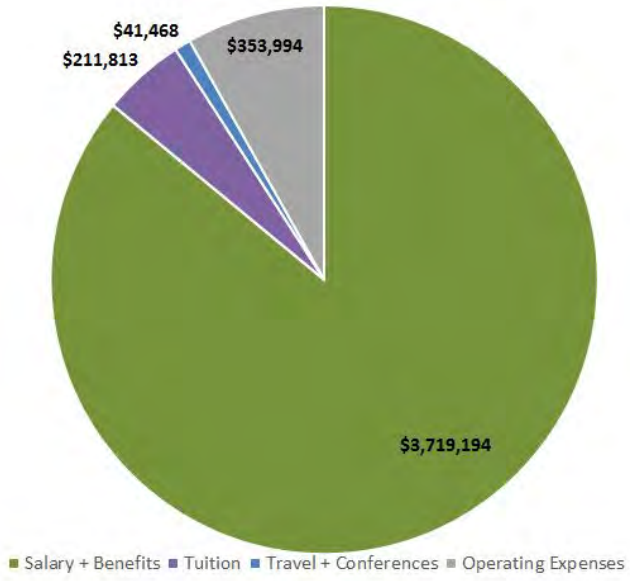
RCR Dollars Returned to HCDE
Fiscal Years 2012-2016



Annual Spending of Department Controlled (non-Grant) Funds
Department controlled funds refers to money the department has control over that do not come from grants and contracts. These funds include our state budget, the costs of running the professional masters and certificate programs, revenue from the professional masters and certificate programs, and research cost recovery dollars.

As compared to how grant dollars are spent, an average of 86% of department controlled funds are spent on salary and benefits for faculty, staff, and students. 5% are spent on tuition for students, and only 1% are spent on travel and conferences (including professional development for staff). The remaining 8% are used for general operating funds for the department.

Average Yearly Department Controlled Spending
Fiscal Years 2014-2016



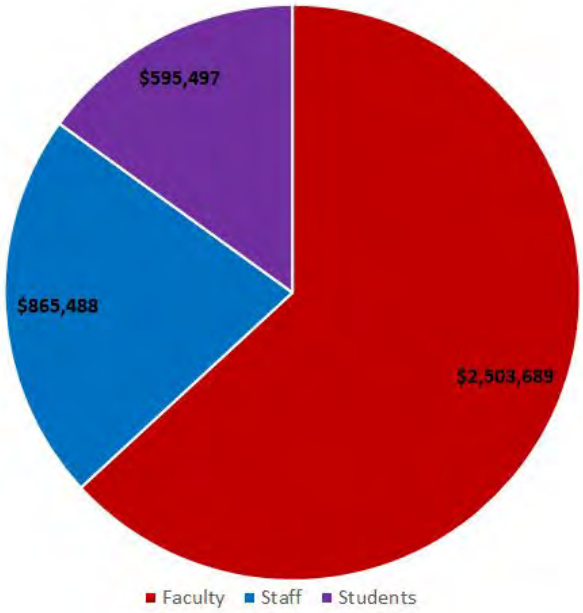
Looking at the trends in spending over the last three years, we are able to see that general operating expenses have held fairly steady. However, in 2016, there was a significant jump, around $1.9million, in spending. The majority of this jump was in salary and benefits (about $1.6million). Half of that came from the HCDE 231 lecturers, TAs and RAs (as explained in the Fee Based section). The other half came from increases in faculty pay. In FYE 2016, we grew our faculty by one senior lecturer, and hired on a tenure track faculty line before the person in the position retired, creating a 6 month overlap, in addition to the retirement payout.

Another $275,000 of that increase came from paying tuition for professional Master's students hired as TAs and RAs. The rest came in the form of increased travel and conferences for faculty and staff.

Yearly Department Controlled Spending (in dollars)
Fiscal Years 2014-2016

Another way of looking at spending at the department level is to see who we spend the money on. After pulling out the general operating expenses and a few other expenses that benefit the department as a whole, the department on average spends 63% of the remaining money on faculty - salary, benefits, travel, conferences, etc. Another 22% is spent on staff, and 15% on students - salary, benefits, travel, conferences, tuition, etc.

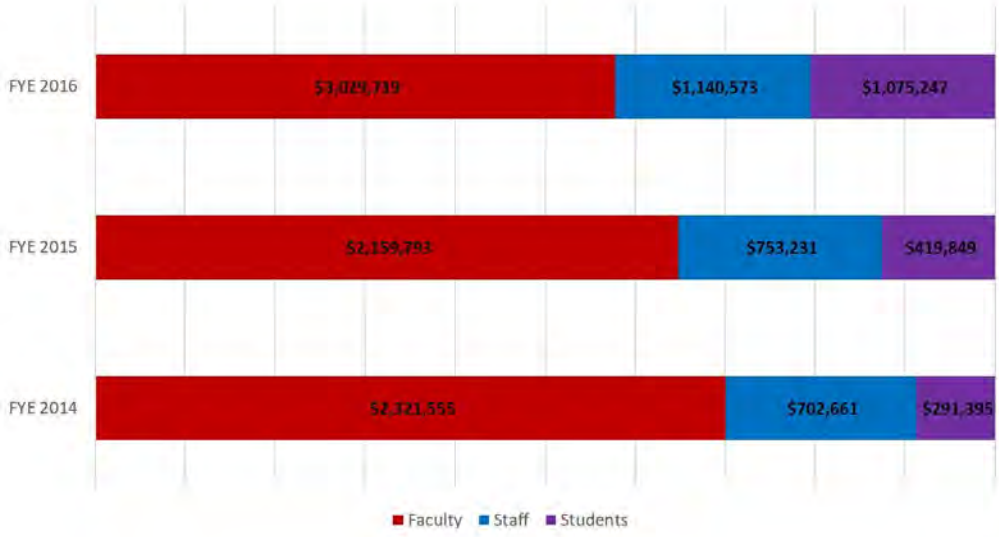
Average Yearly Department Controlled Spending on Faculty, Staff, and Students
Fiscal Years 2014-2016



While the chart above shows the average spent on groups over the last three completed fiscal years, it is also important to note that over those same three years, there has been a definite trend toward spending less (as a percentage of what is being spent) on faculty and more on students. The percentage being spent on staff had been holding steady, though that trend is changing, and as of December 2016, for FYE 2017, the department had spent more money on students than on staff.

The percentage spent on faculty decreased by 5% in 2016, despite HCDE covering the salary and benefits of more part time lecturers (specifically the HCDE 231 lecturers) than any other year. At the same time, the amount spent on students increased around 8%.

Percentage of Department Controlled Funds Spent on Faculty, Staff, and Students (with dollar amounts shown)
Fiscal Years 2014-2016



Appendix C: Information about Faculty

Cecilia Aragon
Professor
PhD, Computer Science; University of California, Berkeley
Specialization: Human-centered data science; visual analytics; data science ethnography; scientific collaboration; human-computer interaction (HCI); computer-supported cooperative work (CSCW); eScience, visualization.

Cynthia Atman
Professor
PhD, Engineering and Public Policy; Carnegie Mellon University
Specialization: Engineering education; engineering design learning; students as emerging engineering professionals; use of education research to improve student learning.

Brock Craft
Senior Lecturer
PhD, Computer Science; University College London
Specialization: Physical computing; information visualization; human-computer interaction; learning design; engineering education.

Andrew Davidson
Senior Lecturer, Director of HCDE BS program
MSE, Computer Science; University of Pennsylvania
Specialization: Interaction design; human-computer interaction; physical computing; STEM and design education; secondary education outreach.

Tyler Fox
Lecturer
PhD, Interactive Arts and Technology; Simon Fraser University
Specialization: Critical making; posthumanism; systems thinking; art-science relations

Mark Haselkorn
Professor
PhD, English; University of Michigan
Specialization: Strategic management of information and communication systems; risk and resilience; safety and security systems; visual analytics.

Gary Hsieh
Assistant Professor
PhD, Human Computer Interaction; Carnegie Mellon University
Specialization: Human-computer interaction; social computing; social media; tailoring motivators; persuasive technology.

Julie Kientz
Associate Professor
PhD, Computer Science; Georgia Institute of Technology
Specialization: Human-computer interaction; human-centered computing; supporting record-keeping and reflection; computing for healthy living and learning.

Beth Kolko
Professor
PhD, English; University of Texas at Austin
Specialization: Technology design for low-resource environments; innovation; hacker and maker cultures; gaming; design for digital inclusion; Hackademia.

Charlotte P. Lee
Associate Professor
PhD, Information Studies; University of California, Los Angeles
Specialization: Computer supported cooperative work (CSCW); human-computer interaction (HCI); science and technology studies (STS): design processes.

David W. McDonald
Professor, Department Chair
PhD, Information and Computer Science; University of California, Irvine
Specialization: Social computing; Computer supported cooperative work (CSCW); human-computer interaction (HCI); large scale information systems.

Sean A. Munson
Assistant Professor
PhD, Information; University of Michigan
Specialization: Social computing; selective exposure and political diversity online; systems to support health and wellness; persuasive technology.

David Ribes
Associate Professor
PhD, Sociology; University of California, San Diego
Specialization: Science and technology studies (STS); information studies; cyberinfrastructures (CI).

Daniela Rosner
Assistant Professor
PhD, Information Management and Systems; University of California, Berkeley
Specialization: Interaction design; Science and Technology Studies (STS); Digital craft; Repair studies; Design, computing, and fieldwork around digital technology.

Elizabeth Sanocki
Senior Lecturer, Director of HCDE MS and HCDE Certificate programs
PhD, Physiological Psychology; University of Washington
Specialization: User experience research and design; information architecture; human sensation and perception.

Jan Spyridakis
Professor
PhD, Educational Curriculum and Education; University of Washington
Specialization: User experience research and design; remote user assessment research and methodologies; learning in professional and technical contexts.

Kate Starbird
Assistant Professor
PhD, Technology, Media and Society; University of Colorado, Boulder
Specialization: Human-computer interaction; computer supported cooperative work; crisis informatics; human computation; crowdsourcing.

Jennifer Turns
Professor, Director of HCDE Doctoral program
PhD, Industrial and Systems Engineering; Georgia Institute of Technology
Specialization: User-centered design; design processes and strategies; human-computer interaction; engineering education; educating reflective practitioners, and technology adaption.

Linda Wagner
Senior Lecturer
MDes, Strategic Design Planning; Institute of Design Illinois Institute of Technology
Specialization: Design and product strategy; ethnographic research; innovation; user-centered design.

Mark Zachry
Professor
PhD, Rhetoric and Professional Communication; Iowa State University
Specialization: Human-computer interaction; social computing; technology for change; communicative practices of organizations.