UF UNIVERSITY of FLORIDA

Office of the Provost
and Senior Vice President

235 Tigert Hall
PO Box 113175
Gainesville, FL 32611-3175
352-392-2404 Tel
352-392-8735 Fax

December 17, 2015

MEMORANDUM

TO: Richard Stevens, Academic and Student Affairs Director

FROM: Joseph Glover, Provost and Senior Vice President for Academic Affairs

SUBJECT: Doctor of Philosophy, Human-Centered Computing

Attached please find the University of Florida Doctor of Philosophy in Human-Centered Computing degree proposal (CIP Code 11.0104). The UF Board of Trustees approved this new degree at their December 4, 2015 meeting:

The full degree proposal is attached for your review. Please let me know if you have any questions or would like additional information.

JG/cdm
Enclosure

xc: Cammy Abernathy, Dean, College of Engineering
Angel Kwolek-Folland, Associate Provost for Academic Affairs
Marie Zeglen, Assistant Provost & Director, Institutional Planning & Research
Stephen Pritz, Registrar

Approved by Faculty Senate on 8/27/15

Board of Governors, State University System of Florida

Request to Offer a New Degree Program

(Please do not revise this proposal format without prior approval from Board staff)

University of Florida University Submitting Proposal	Fall 2016 Proposed Implementation Term
College of Engineering Name of College(s) or School(s)	CISE Name of Department(s)/ Division(s)
Human-Centered Computing Academic Specialty or Field	Doctor of Philosophy Complete Name of Degree
11.0104 Proposed CIP Code	

The submission of this proposal constitutes a commitment by the university that, if the proposal is approved, the necessary financial resources and the criteria for establishing new programs have been met prior to the initiation of the program.

12/4/15 Date Approved by the University Board of Trustees		[signature] 10/13/15 President	Date
[signature] 12/15/15 Signature of Chair, Board of Trustees	Date	[signature] 10/7/15 Vice President for Academic Affairs	Date

Provide headcount (HC) and full-time equivalent (FTE) student estimates of majors for Years 1 through 5. HC and FTE estimates should be identical to those in Table 1 in Appendix A. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Table 2 in Appendix A. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 (Total E&G divided by FTE).

Implementation Timeframe	Projected Enrollment (From Table 1)		Projected Program Costs (From Table 2)				
	HC	FTE	E&G Cost per FTE	E&G Funds	Contract & Grants Funds	Auxiliary Funds	Total Cost
Year 1	12	8.4	150,335	1,262,812	651,332	0	1,914,144
Year 2	20	14					
Year 3	30	21					
Year 4	40	28					
Year 5	50	35	66,323	2,321,306	900,000	0	2,321,306

Note: This outline and the questions pertaining to each section must be reproduced within the body of the proposal to ensure that all sections have been satisfactorily addressed. Tables 1 through 4 are to be included as Appendix A and not reproduced within the body of the proposals because this often causes errors in the automatic calculations.

UF | UNIVERSITY of FLORIDA

The Graduate School
Office of the Associate Vice President and Dean

164 Grinter Hall
PO Box 115500
Gainesville, FL 32611-5500
352-392-6622 Tel
352-392-8729 Fax

April 20, 2015

MEMORANDUM

TO: Juan Gilbert
Andrew Banks Family Preeminence Endowed Chair
Associate Chair of Research
Department of Computer & Information Science & Engineering

FROM: Henry T. Frierson
Associate Vice President and Dean
Graduate School

RE: #9694 new Ph.D. degree in Human-Centered Computing

The proposal from the College of Engineering for a new Ph.D. degree in Human-Centered Computing was approved at the April 16, 2015, Graduate Council meeting effective Fall 2016, pending further approvals.

The following individuals and offices will be notified by a copy of this letter so that they can complete their processes to implement the degree:

Gann Enholm, Rimjhim Banerjee-Batist, Stacy Wallace, Graduate School
Diana Hull, University Curriculum Committee and Office of the University Registrar
Marie Zeglen, Office of Institutional Planning and Research
Sue Alvers, Administrative Assistant to Faculty Senate Chair
Wesley Bolch, Associate Dean, College of Engineering

HF/ld

INTRODUCTION

I. Program Description and Relationship to System-Level Goals

A. Briefly describe within a few paragraphs the degree program under consideration, including (a) level; (b) emphases, including concentrations, tracks, or specializations; (c) total number of credit hours; and (d) overall purpose, including examples of employment or education opportunities that may be available to program graduates.

(a) The proposed degree program is a Doctor of Philosophy

(b) The major will be Human-Centered Computing (HCC). Initially, there will be no tracks, concentrations or specializations within the degree. It is possible that tracks, concentrations or specializations may be added in the future if any emerge as important or useful as the field develops.

(c) The total number of credits for the degree will be 90.

(d) The degree is focused on the design, construction, and evaluation of computational technologies as they relate to the human condition and impacts on society in general. There are currently 3 HCC PhD programs in the United States (University of Maryland Baltimore County, The Georgia Institute of Technology, and Clemson University) Once approved, the University of Florida will be the 4th HCC PhD program in existence. The purpose of the HCC PhD degree is to train a new generation of computing researchers/developers that design, implement, and evaluate computing systems and technologies in real world, or applied, contexts.

HCC PhD degrees exist because the expertise required for this degree does not fit in traditional Computer Science (CS) or Computer Engineering (CE) PhD programs. CS & CE PhD programs have requirements for computer systems and theory. These courses are not required for HCC research.

HCC researchers design user interfaces and implement them using software languages and tools and then evaluate them in context with human subjects. Essentially, HCC is an extremely broad area that encompasses design, implementation and evaluation.

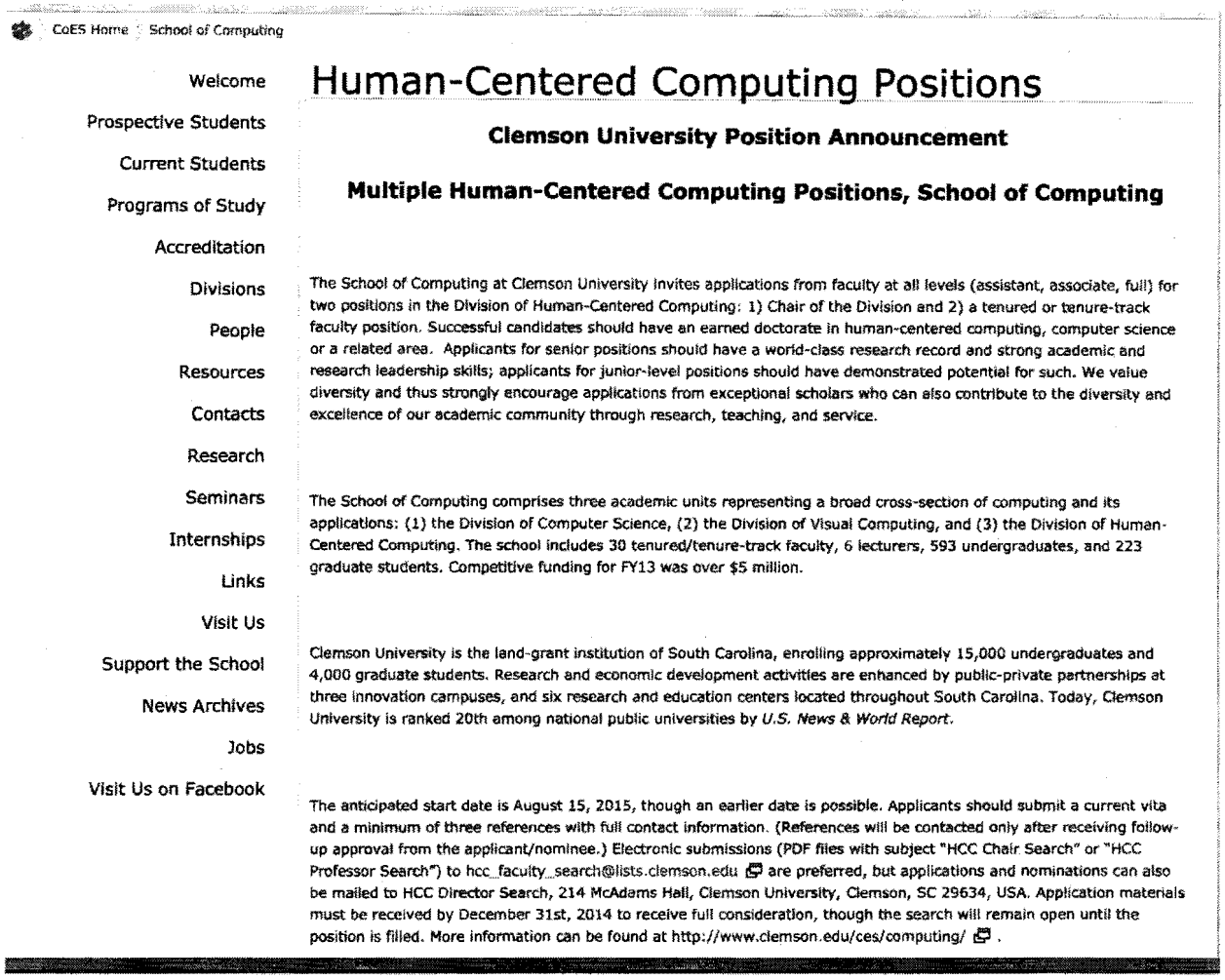
CS & CE do not have any requirements related to the human condition, human subjects research, etc. Some PhD degrees emphasize design, i.e. Industrial Design, Industrial Engineering (Human Factors), etc. There are PhD degrees that emphasize implementation or evaluation of software and/or hardware, i.e. CS & CE. There are also PhD degrees that emphasize evaluation, i.e. Psychology, Social Science, etc.

HCC in an interdisciplinary degree that combines all of these disciplines into a single degree that meets the demands of industry, the academy and government.

Employment opportunities include user experience designer, application developer, usability engineering, to name a few. A search on EmployFlorida.com for "web Designer or graphic designer or usability" yields over 500 jobs in the State of Florida. IT related jobs are in high demand across all business sectors in the State and user experience, web designers/developers, etc. are skills in demand in many of these jobs. Companies are hiring PhDs in many of these jobs because the task of designing, implementing and then evaluating those technologies can't be done by students with a BS degree or, in most cases, a MS degree. These skills requiring training across multiple disciplines and the proposed PhD in HCC gives these students the necessary skills to be competitive for these user experience/web designer/developer positions.

The following are some sample job applications:

Clemson University Ad



CoES Home | School of Computing

Welcome
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Human-Centered Computing Positions

Clemson University Position Announcement

Multiple Human-Centered Computing Positions, School of Computing

The School of Computing at Clemson University invites applications from faculty at all levels (assistant, associate, full) for two positions in the Division of Human-Centered Computing: 1) Chair of the Division and 2) a tenured or tenure-track faculty position. Successful candidates should have an earned doctorate in human-centered computing, computer science or a related area. Applicants for senior positions should have a world-class research record and strong academic and research leadership skills; applicants for junior-level positions should have demonstrated potential for such. We value diversity and thus strongly encourage applications from exceptional scholars who can also contribute to the diversity and excellence of our academic community through research, teaching, and service.

The School of Computing comprises three academic units representing a broad cross-section of computing and its applications: (1) the Division of Computer Science, (2) the Division of Visual Computing, and (3) the Division of Human-Centered Computing. The school includes 30 tenured/tenure-track faculty, 6 lecturers, 593 undergraduates, and 223 graduate students. Competitive funding for FY13 was over $5 million.

Clemson University is the land-grant institution of South Carolina, enrolling approximately 15,000 undergraduates and 4,000 graduate students. Research and economic development activities are enhanced by public-private partnerships at three innovation campuses, and six research and education centers located throughout South Carolina. Today, Clemson University is ranked 20th among national public universities by *U.S. News & World Report*.

The anticipated start date is August 15, 2015, though an earlier date is possible. Applicants should submit a current vita and a minimum of three references with full contact information. (References will be contacted only after receiving follow-up approval from the applicant/nominee.) Electronic submissions (PDF files with subject "HCC Chair Search" or "HCC Professor Search") to hcc_faculty_search@lists.clemson.edu are preferred, but applications and nominations can also be mailed to HCC Director Search, 214 McAdams Hall, Clemson University, Clemson, SC 29634, USA. Application materials must be received by December 31st, 2014 to receive full consideration, though the search will remain open until the position is filled. More information can be found at http://www.clemson.edu/ces/computing/ .

UMBC Ad

UMBC

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Accepting Applications: Tenure-Track Assistant Professor Faculty Position: Human-Centered Computing (HCC)

The Information Systems Department at UMBC invites applications for a tenure-track faculty position at the Assistant Professor level in the area of human-centered computing starting August 2015. Candidates must have earned a PhD in a related field no later than August 2015. Outstanding candidates in all areas of human-centered computing research are encouraged to apply. Ideal candidates will be engaged in research that spans several areas with preference given to those who can collaborate with the current faculty. Candidates should have a strong potential for excellence in research, the ability to develop and sustain an externally funded research program, and the capacity to contribute to our graduate and undergraduate teaching mission.

The Department offers undergraduate degrees in Information Systems and Business Technology Administration. Graduate degree programs, both MS and PhD, are offered in Information Systems and Human-Centered Computing, including an innovative online MS in IS program. Consistent with the UMBC vision, the Department has excellent teaching facilities, state-of-the-art laboratories, and outstanding technical support. UMBC's Technology Center, Research Park, and Center for Entrepreneurship are major indicators of active research and outreach. Further details on our research, academic programs, and faculty can be found at http://www.is.umbc.edu/. Members of under-represented groups including women and minorities are especially encouraged to apply.

Electronic submission of application is required at http://apply.interfolio.com/25742 . All applications must be submitted as PDF Files, which include a cover letter, CV, a one-page statement of teaching interests, a one-page statement of research interests and names and contact information for at least three references. For inquiries, please contact Barbara Morris at (410) 455-3795 or bmorris@umbc.edu. Review of applications will begin immediately and will continue until the position is filled. This position is subject to the availability of funds.

UMBC is an Affirmative Action/Equal Opportunity Employer and welcomes

applications from minorities, women, veterans and individuals with disabilities.

The following is an older position application from Purdue University

Purdue University School of ECE
Computer Engineering Faculty Position in Human-Centered Computing
The School of Electrical and Computer Engineering at Purdue University invites applications for a faculty position at any level in human-centered computing, including but not limited to visualization, visual analytics, human computer interaction (HCI), and graphics. The Computer Engineering Area of the school (http://engineering.purdue.edu/ECE/Research/Areas/CompEng) has nineteen faculty members who have active research programs in areas including AI, architecture, compilers, computer vision, distributed systems, embedded systems, graphics, haptics, HCI, machine learning, multimedia systems, networking, networking applications, NLP, OS, robotics, software engineering, and visualization. Eligible candidates are required to have a PhD in computer science/engineering or a related field and a significant demonstrated research record commensurate with the level of the position applied for. Academic duties of the position include teaching, advising students, and maintaining a strong research program. Applications should consist of a cover letter, a CV, a research statement, names and contact information for at least three references, and URLs for three to five online papers. Applications should be submitted to https://engineering.purdue.edu/Engr/AboutUs/Employment/Applications. Review of applications will begin on 1 December 2010. Inquiries may be sent to ece-hcc-search@ecn.purdue.edu. Applications will be considered as they are received, but for full consideration should arrive by 1 January 2011. Purdue University is an equal opportunity, equal access, affirmative action employer fully committed to achieving a diverse workforce.

University of Colorado Boulder (This was an ad from a year ago. It has been filled)
The Department of Computer Science (CS) at the University of Colorado Boulder (CU) seeks outstanding candidates for a tenure-track position in human-centered computing (HCC). The opening is targeted at the level of Assistant Professor, although outstanding senior candidates at higher ranks may be considered.

The position will help shape the future of human-centered computing at the University of Colorado Boulder within the department as well as in new campus initiatives. We seek candidates with promising research records in the areas of human-computer interaction, computer-supported cooperative work, social computing, ubiquitous computing, and information visualization. Candidates should have an orientation to computer science as their primary teaching home, though an interdisciplinary research program is welcomed and has been a hallmark of HCC research at CU.

Candidates must have a Ph.D. in computer science, information studies, or a related discipline. Candidates must show promise in their ability to develop an independent research program, and demonstrate a commitment to teaching and working with both undergraduate and graduate students.

Applications will be evaluated beginning in November 2013 and will continue until the position is filled. Applications must include a letter of application specifying area of specialization, curriculum vitae, statements of research and teaching interests, and names and contact information of three references.

The Department's research and education is enhanced by many interdisciplinary programs, supporting collaborations in cognitive science, the arts and humanities, as well as in the natural sciences and engineering, and in public policy. We also benefit from Boulder's concentration of high-tech industry and its lively startup community.

The University of Colorado Boulder is an Equal Opportunity Employer committed to building a diverse workforce. We encourage applications from women, racial and ethnic minorities, individuals with disabilities and veterans. Alternative formats of this ad can be provided upon request for individuals with disabilities by contacting the ADA Coordinator at hr-ada@colorado.edu.

Quantitative UX Researcher, University Grad

*Location*Menlo Park, CA

Facebook was built to help people connect and share, and over the last decade our tools have played a critical part in changing how people around the world communicate with one another. With over a billion people using the service and more than fifty offices around the globe, a career at Facebook offers countless ways to make an impact in a fast growing organization.

Come join a diverse and collaborative team of researchers who work directly with product design to make the best social platform for Facebook's billion users. Our work ranges from formative to evaluative, ethnography to live experiments and involves collaboration between qualitative and quantitative researchers. For this position, we are looking for people with strong skills in behavioral data analysis, experimental and survey research, and statistics. The right candidates will be excellent communicators, knowledgeable about UI design, passionate about social computing, comfortable in a flat, fast moving organization, excited to collaborate, and focused squarely impacting the design of Facebook.

Responsibilities

- Work closely with product teams to identify research topics
- Design studies that address both user behavior and attitudes
- Generate insights that both fuel ideation and evaluate designs
- Conduct research using a wide variety of quantitative methods, and interpret analysis through the lens of UX, HCI, and social science
- Collaborate closely with qualitative researchers
- Work cross-functionally with design, product management, content strategy, engineering and marketing
- Partner with engineers, analysts, and other technical roles to create and share research
- Communicate results and illustrate suggestions in compelling and creative ways

Requirements

- PhD in HCI, social computing, Information Science or related social science field, or MA/MS in these areas with prior related research experience
- Experience conducting applied product research, and/or focus on directly relevant research topics
- Experience working with large scale data in multi-method studies
- Experience with applied statistics
- Experience coding, PHP, SQL and Python preferred
- Familiarity with survey design and response effects

- Understanding and appreciation of qualitative and user-centered design methods
- Ability to ask, as well as answer, meaningful and impactful questions
- Ability to communicate complex analysis and results compellingly to a lay audience

GOLDMAN SACHS - TECHNOLOGY - CLIENT PLATFORMS - USER EXPERIENCE DESIGNER

Job Summary & Responsibilities

Our team of engineers builds solutions to the most complex problems. We develop cutting-edge systems and processes that form the core of our key business and enable transactions to move in milliseconds. We provide real-time access to critical deal information and crunch billions of data points each day to inform firm-wide market insights and strategies. Team members have the opportunity to work at the forefront of technology innovation alongside industry leaders and make significant contributions to the field.

Define the user experience for Goldman Sachs applications, working with various lines of business and technology teams to envision and execute client-facing digital solutions.

Looking for an experienced UX professional to join our growing global UX team. The right candidate will play an important role in helping to shape the strategy and lead the design of the firm's next-generation, client-facing Web and Mobile analytics and trading applications.

As a lead-level Interaction Designer, you will work collaboratively with business stakeholders, clients, and development teams to craft compelling, innovative and usable solutions for the firm's traders, salespeople and clients.
You possess superior UX design chops, keen analytical problem solving skills, and are comfortable driving a user-centered design process through all phases of research and design.

You must have strong interpersonal skills, excellent communication and organizational skills and be able to work on multiple projects simultaneously in a fast-paced, collaborative environment.

Basic Qualifications

7+ years of experience as a lead-level Interaction Designer or Information Architect, with a solid understanding of user-centered design process and principles, including user research, requirements gathering, wireframing, prototyping, specification creation and usability testing.

Domain knowledge, experience in the financial services industry working on data-intensive, transaction-oriented applications

Self-motivated and self-managed with a high degree of analytical ability, able to dynamically drive communication and facilitate sessions with senior sponsors and business users

Practical understanding (including capabilities and limitations) of the current technologies used to build rich user experiences (HTML 5, CSS, Javascript)

Preferred Qualifications

Post-graduate degree or equivalent in interaction design, human factors, or related field is a plus
Experience with data visualization and visual design a plus

B. Please provide the date when the pre-proposal was presented to CAVP (Council of Academic Vice Presidents) Academic Program Coordination review group. Identify any concerns that the CAVP review group raised with the pre-proposed program and provide a brief narrative explaining how each of these concerns has been or is being addressed.

The pre-proposal was presented to the CAVP Workgroup in February 2015 and there were no formal concerns.

C. If this is a doctoral level program please include the external consultant's report at the end of the proposal as Appendix D. Please provide a few highlights from the report and describe ways in which the report affected the approval process at the university.

An external evaluation of the proposal was requested from Dr. Rebecca Grinter, a Full Professor in the School of Interactive Computing in the College of Computing at Georgia Tech. Dr. Grinter's research is in the fields of human-computer interaction, ubiquitous computing, and computer supported cooperative work. She has published over 80 scholarly articles, served as Papers Chair (2006) & Best Papers Chair (2010) for the Association for Computing Machinery (ACM) Conference on Human Factors in Computing Systems (CHI), the premier conference for human-computer interaction. In 2013 she was elected to the prestigious CHI Academy. In 2010 she was recognized as a Distinguished Alumna of the University of California, Irvine. At Georgia Tech, Dr. Grinter has served as the Program Coordinator (lead administrator) for Georgia Tech's Human-Centered Computing (HCC) Ph.D. and also as Associate Dean for Graduate Affairs for the College of Computing the academic unit in which the HCC PhD is housed. She has also served as an external reviewer on other HCC PhD programs in the country, specifically, the HCC PhD at Clemson University.

Dr. Grinter expertise in this area, and positive review of this proposal provided guidance to the faculty member, administration and staff through the approval process. She is an expert in this area and qualified to serve as an external reviewer for the proposed HCC PhD for the University of Florida.

In Dr. Grinter's review of the HCC PhD program, she acknowledges the fact that the proposed HCC PhD is consistent with existing HCC PhD programs at Georgia Tech, Clemson, University of Maryland Baltimore County (UMBC) and others.

Some specific highlights of her report are as follows:

1. She says, "the curriculum structure of the University of Florida proposal matches those that I have seen at Georgia Tech, Clemson, UMBC, and so forth."
2. "First, I want to commend the proposal for making an important distinction between Human-Computer Interaction and Human-Centered Computing. While Human-Computer Interaction has a long established history within Computer Science, it is just one discipline that is contained within the broader view of Human-Centered Computing. I particularly like and encourage the focus on policy, which has not been a central part of Human-Computer Interaction. Training graduates who can inform local, State, and National policy is not something that Computing fields have done."

In summary, Dr. Grinter supports the proposal and applauds our efforts to keep the proposed HCC PhD consistent with others. No explicit changes to the proposal were prompted by this external review.

D. Describe how the proposed program is consistent with the current State University System (SUS) Strategic Planning Goals. Identify which specific goals the program will directly support and which goals the program will indirectly support (see link to the SUS Strategic Plan on the resource page for new program proposal).

The proposed HCC PhD program will have a sustaining impact on workforce and economic development needs in Florida, across the nation, and across the globe that are consistent with SUS

strategic planning goals of excellence, productivity, and strategic priorities for a knowledge economy. The proposed HCC PhD is a STEM discipline. The SUS strategic planning goals speak consistently to increasing the number of STEM graduates and this PhD will contribute to that goal.

As technology continues to be integrated more and more into the daily lives of all people in Florida, our nation, and the planet, there is an increasing need for expertise in HCC. The concept of designing, building and evaluating computing technologies as they relate to people is at the core of the proposed PhD in HCC and this is a necessity in the modern workforce.

Job postings include user experience designer, application developer, usability engineering, to name a few. A search on EmployFlorida.com for "web Designer or graphic designer or usability" yields over 500 jobs in the State of Florida. IT related jobs are in high demand across all business sectors in the State and user experience, web designers/developers, etc. are skills in demand in many of these jobs. Companies are hiring PhDs in many of these jobs because the task of designing, implementing and then evaluating those technologies can't be done by students with a BS degree or, in most cases, a MS degree. These skills require training across multiple disciplines and the proposed PhD in HCC gives these students the necessary skills to be competitive for these user experience/web designer/developer positions.

The proposed PhD in HCC will have a significant impact on research funding at the University of Florida. UF recently hired 4 new experts in HCC (see http://news.ufl.edu/2014/05/08/human-centered-computer-science/). These hires brought with them more than $5 million dollars in external grants. The HCC faculty expect to fund 15 HCC PhD students on grants in year 1 and 20-25 in year 5. HCC researchers work across disciplines and this enables them to expand their funding sources. The NSF, NSA, CIA, FBI, NIH, U.S. Department of Education, corporations and many other agencies have funded HCC research. This program will boost funding within the Department of Computer & Information Science & Engineering (CISE) at UF and across campus through interdisciplinary collaborations.

The HCC PhD program attracts traditionally underrepresented groups to the discipline. Hager and Elton (1971) surveyed college freshmen and Sewell and Martin (1976) surveyed high school juniors. In these two studies, it was found that African-American men expressed a greater interest in social service fields versus White men, who prefer STEM disciplines. Hall and Post-Kammer (1987) reported that African-Americans choose these disciplines (helping professions) because they have a cultural orientation and expectation to help others. STEM disciplines are generally not seen as disciplines that can be used to help others. However, HCC works directly with people and connects with the notion of helping.

Currently, the proposed HCC PhD program would have an estimated enrollment that is majority female and 40-50% underrepresented minorities. Additionally, the HCC PhD program would have a significant majority U.S. Citizen enrollment (80%). The diversity that the proposed PhD brings to UF supports the goals of the SUS strategic plan.

Lastly, the proposed PhD will be the 4th of its kind in the nation. This will provide UF with an opportunity to compete nationally and globally for talent in this new STEM/IT area. It is an area the University of Florida has identified as part of its Preeminence Initiative, and therefore has committed resources to develop.

Hager, P.C. & Elton, C.F. (1971). The vocational interests of Black Males. Journal of Vocational Behavior, 1, 153-158.

Hall, E. R., & Post-Kammer, P. (1987). Black mathematics and science majors: Why so few? Career Development Quarterly, 35, 206-219.

Sewell, T.E. & Martin, R.P. (1976). Racial differences in patterns of occupational choice in adolescents. Pschology in the Schools, 13, 326-333.

E. If the program is to be included in a category within the Programs of Strategic Emphasis as described in the SUS Strategic Plan, please indicate the category and the justification for inclusion.

The Programs of Strategic Emphasis Categories:

1. Critical Workforce:
   - Education
   - Health
   - Gap Analysis
2. Economic Development:
   - Global Competitiveness
3. Science, Technology, Engineering, and Math (STEM)

The proposed HCC PhD has a CIP Code of 11.0104, which fall under the STEM Programs of Strategic Emphasis.

Please see the Programs of Strategic Emphasis (PSE) methodology for additional explanations on program inclusion criteria at the resource page for new program proposal.

F. Identify any established or planned educational sites at which the program is expected to be offered and indicate whether it will be offered only at sites other than the main campus.

The proposed PhD program in HCC will only be offered on the main campus of the University of Florida.

INSTITUTIONAL AND STATE LEVEL ACCOUNTABILITY

II. Need and Demand

A. Need: Describe national, state, and/or local data that support the need for more people to be prepared in this program at this level. Reference national, state, and/or local plans or reports that support the need for this program and requests for the proposed program which have emanated from a perceived need by agencies or industries in your service area. Cite any specific need for research and service that the program would fulfill.

The HCC PhD graduates will pursue careers as academics, industrial leaders, and as entrepreneurs. Within the academy, the graduates will take positions as professors and research scientists. Some of the industry jobs they will pursue have titles such as *user experience designer, application developer,* and *usability engineering.*

National Need: The Computing Research Association (CRA), http://www.cra.org, is an association of more than 200 North American academic departments of computer science, computer engineering, and related fields; laboratories and centers in industry, government, and academia engaging in basic computing research; and affiliated professional societies. CRA's mission is to enhance innovation by joining with industry, government and academia to strengthen research and advanced education in computing. CRA executes this mission by leading the computing research community, informing policymakers and the public, and facilitating the development of strong, diverse talent in the field. Every year the CRA releases the Taulbee Survey.

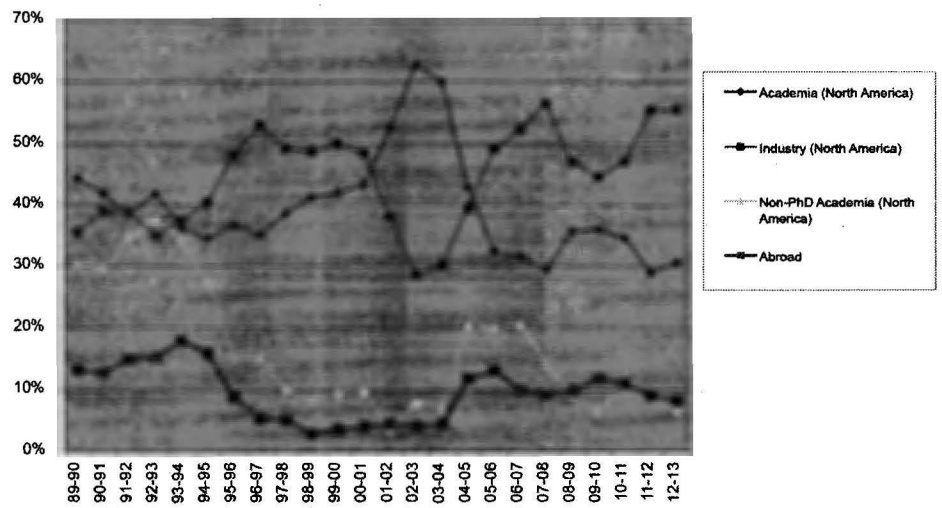
Taulbee Survey is the principal source of information on the enrollment, production, and employment of Ph.D.s in computer science and computer engineering (CS & CE) and in providing salary and demographic data for faculty in CS & CE in North America. Statistics given include gender and ethnicity breakdowns, http://cra.org/resources/taulbee/

According to the latest Taulbee Survey, there were 61 new PhDs in Human-Computer Interaction, which is where the HCC PhDs will be reported, placed in positions last year. The placement rate was

98% (only 1 was not placed at the time of the survey). 57% (35) of them were placed in industry, government or self-employed. This is consistent with all of the computing/IT PhDs produced. *Figure D6. Employment of New Ph.D.s in U.S. and Canada* below is from the CRA Taulbee Survey showing the majority of the graduates (nearly 60%) are not going to academia; therefore, industry and government entities are hiring our students as interns and coops to then later hire them as full time employees upon completion of their PhD.

Figure D6. Employment of New Ph.D.s in U.S. and Canada

CRA Taulbee Survey 2013



State Need: A search on EmployFlorida.com for "web Designer or graphic designer or usability" yields over 500 jobs in the State of Florida. IT related jobs are in high demand across all business sectors in the State and user experience, web designers/developers, etc. are skills in demand in many of these jobs. For example, in 2014, Harris Corporation, located in Melbourne, FL, setup a new User Experience (UX) Division. According to the Harris Corporation website, http://www.harris.com/about/, "Harris is an international communications and information technology company serving government and commercial markets in more than 125 countries. Headquartered in Melbourne, Florida, the company has approximately $5 billion of annual revenue and about 13,000 employees – including 6,000 engineers and scientists. Harris is dedicated to developing best-in-class assured communications® products, systems and services." Harris is moving into User Experience and having the HCC PhD here in Florida will be a valuable resource for Harris to recruit full time employees, interns, and consultants. The HCC PhD program has already met with the UX staff at Harris and they are very supportive of this new degree program.

B. Demand: Describe data that support the assumption that students will enroll in the proposed program. Include descriptions of surveys or other communications with prospective students.

Currently, there are 12 students that have moved to the University of Florida and are interested in pursuing this degree. When the HCC faculty moved from Clemson, these students were in the HCC PhD program at Clemson and expressed an interest in finishing their PhD in HCC at UF. This information was collected in conversations with those students and now they are here at UF.

There were 3 HCC faculty members (Drs. Ben Lok, Eakta Jain and Lisa Anthony) here at UF before the Clemson team moved to UF. These HCC faculty members also have PhD students that are likely to move

into the HCC PhD program as well. For the purposes of this proposal, the initial 12 students are being counted from those that moved from Clemson with the intent on finishing a HCC PhD at UF. The initial 12 students are 9 female, 8 African-American, and 2 Hispanic. There are also students looking for this degree outside of UF.

This academic year, we had 40 applications to our existing computer engineering PhD program. Six (6) of them requested information about HCC and are likely to pursue the HCC PhD. Of the 6 applicants that were interested in the HCC PhD, 2 of them have been accepted into the HCC PhD program at Georgia Tech. These students made this inquiry based on the hiring of the new HCC faculty and knowing we had a HCC PhD degree at Clemson University.

The new Preeminence hires in HCC have recruited HCC PhD students at their previous institution and the enrollment was at 30 PhD students when they left Clemson University. Currently, the HCC PhD program at Clemson University has 23 HCC PhD students and 7 faculty members. UMBC has 7 HCC faculty members and 20 HCC PhD students. Georgia Tech has 30 faculty members in their School of Interactive Computing in the College of Computing and they have 50 PhD students.

These programs have healthy enrollments and UF will compete for those students and the current estimate is that the program will start with 12-15 PhD students and reach an enrollment of 40-50 within five years based on the HCC faculty's experience in other HCC PhD programs.

C. **If substantially similar programs (generally at the four-digit CIP Code or 60 percent similar in core courses), either private or public exist in the state, identify the institution(s) and geographic location(s). Summarize the outcome(s) of communication with such programs with regard to the potential impact on their enrollment and opportunities for possible collaboration (instruction and research). In Appendix C, provide data that support the need for an additional program.**

There are no other HCC PhD programs in the State of Florida in either private or public institutions. No existing program in the State of Florida uses the CIP Code 11.0104. The closest related program is at FSU. FSU has a degree listed under CIP Code 30.3001 called Computational Science. Dr. Gilbert has reached out to Dr. Max Gunzburger at FSU to discuss these details between the proposed HCC PhD and the FSU PhD in Computation Science.

After a careful evaluation of the Computational Science PhD program and discussions with its faculty, it can be observed that the HCC PhD program and Computation Science PhD program are both interdisciplinary PhD programs; however, the HCC PhD program has a core that studies human computer interaction, user interface design and research methods for human subjects. The Computational Science PhD program has a core consisting of Scientific Programming and Applied Computational Science courses. Because of these differences, the newly proposed degree program is truly unique and not replicated in any extent on the UF campus nor across any of the State University System schools/colleges.

HCC PhD degrees exist because the expertise required for this degree does not fit in traditional Computer Science or Computer Engineering PhD programs. CS & CE PhD programs have requirements for computer systems and theory. These courses are not required for HCC research. HCC researchers can design user interfaces and implement them using software languages and tools and then evaluate them in context with human subjects. However, CS & CE do not have any requirements related to the human condition, human subjects research, etc. Essentially, HCC is an extremely broad area that encompasses design, implementation and evaluation. There are PhD degrees that emphasize design, i.e. Industrial Design, Industrial Engineering (Human Factors), etc. There are PhD degrees that emphasize implementation or evaluation of software and/or hardware, i.e. CS & CE. There are also PhD degrees that emphasize evaluation, i.e. Psychology, Social Science, etc. HCC is interdisciplinary and combines all of these disciplines into a single degree that meets the demands of industry, the academy and government.

D. Use Table 1 in Appendix A (1-A for undergraduate and 1-B for graduate) to categorize projected student headcount (HC) and Full Time Equivalents (FTE) according to primary sources. Generally undergraduate FTE will be calculated as 40 credit hours per year and graduate FTE will be calculated as 32 credit hours per year. Describe the rationale underlying enrollment projections. If students within the institution are expected to change majors to enroll in the proposed program at its inception, describe the shifts from disciplines that will likely occur.

The annual projections are 12, 20, 30, 40 and 50 for the next 5 years. We currently have 12 PhD students on campus that have expressed an interest in the HCC PhD program. These students were direct transfers from the previous institution of the HCC Preeminence hires. Furthermore, there are new students that have taken classes with the HCC faculty members at UF and those students have expressed an interest in the HCC PhD. These classes have enrollments above 20 with the primary core class, Human-Computer Interaction, having an enrollment above 80. With these students that are currently on campus, we believe we will have an initial class of 12-20 students. In the following years, we have noticed students at other institutions expressing an interest in joining our laboratories for the HCC PhD. This year, we had 6 students express an interest in joining a HCC PhD program at UF. We believe the enrollment will reach 40-50 PhD within 5 years given the interest from students that noticed the addition of the new HCC Preeminence Initiative faculty members.

E. Indicate what steps will be taken to achieve a diverse student body in this program. If the proposed program substantially duplicates a program at FAMU or FIU, provide, (in consultation with the affected university), an analysis of how the program might have an impact upon that university's ability to attract students of races different from that which is predominant on their campus in the subject program. <u>The university's Equal Opportunity Officer shall review this section of the proposal and then sign and date Appendix B to indicate that the analysis required by this subsection has been completed</u>.

The HCC faculty have met with the Department of Computer & Information Sciences (CIS) at FAMU. The faculty have a history of working together through NSF grants. The FAMU CIS and the new HCC Preeminence faculty members are in the initial stages of establishing a relationship for collaboration between the two programs. The faculty members hired from the Clemson program have a history of recruiting members of underrepresented groups, specifically African-Americans. Currently, of the 12 students that will transfer into the HCC PhD program, there are 1 Hispanic male, 1 Hispanic female, 6 African-American females, 2 African-American males, and 2 Caucasian females. The discipline of HCC attracts members of underrepresented groups given the applied nature of the discipline, see section I.D. This program is not a duplication of a program at FAMU or FIU and, therefore, the program will not compete with FAMU or FIU, but instead, it will work directly with these institutions to grow underrepresented students' participation in STEM/IT in the SUS.

III. Budget

A. Use Table 2 in Appendix A to display projected costs and associated funding sources for Year 1 and Year 5 of program operation. Use Table 3 in Appendix A to show how existing Education & General funds will be shifted to support the new program in Year 1. In narrative form, summarize the contents of both tables, identifying the source of both current and new resources to be devoted to the proposed program. (Data for Year 1 and Year 5 reflect snapshots in time rather than cumulative costs.)

There are 11 HCC faculty members. The HCC faculty members, will teach the HCC core courses and advise the HCC PhD students. Therefore, the new costs associated with the new HCC PhD are minimal. Table 2 in Appendix A shows the projected costs as they are fully covered with the hiring of the new HCC faculty members and the current HCC faculty members that were already here at UF. The College of Engineering has already committed $2,590,213 towards Human-Centered Computing in new hires, startup packages, graduate students, etc. through the Preeminence Initiative in the HCC area. The following website provides more information on the Preeminence Initiatives at UF http://news.ufl.edu/archive/2014/05/experts-on-human-centered-computing-are-coming-to-uf.html and https://www.eng.ufl.edu/research/strategic-research-areas/

B. Please explain whether the university intends to operate the program through continuing education on a cost-recovery basis, seek approval for market tuition rate, or establish differentiated graduate-level tuition. Provide a rationale for doing so and a timeline for seeking Board of Governors' approval, if appropriate. Please include the expected rate of tuition that the university plans to charge for this program and use this amount when calculating cost entries in Table 2.

The proposed degree program will not be operated through continuing education on a cost-recovery basis.

C. If other programs will be impacted by a reallocation of resources for the proposed program, identify the impacted programs and provide a justification for reallocating resources. Specifically address the potential negative impacts that implementation of the proposed program will have on related undergraduate programs (i.e., shift in faculty effort, reallocation of instructional resources, reduced enrollment rates, greater use of adjunct faculty and teaching assistants). Explain what steps will be taken to mitigate any such impacts. Also, discuss the potential positive impacts that the proposed program might have on related undergraduate programs (i.e., increased undergraduate research opportunities, improved quality of instruction associated with cutting-edge research, improved labs and library resources).

The proposed HCC PhD program does not have any impact on existing programs. There is a benefit for undergraduates to broaden their perspectives for research. Currently, there is an undergraduate summer research program in HCC under the direction of Dr. Juan E. Gilbert. Dr. Gilbert is the primary investigator for the National Science Foundation (NSF) funded Institute for African-American Mentoring in Computing Sciences (iAAMCS, pronounced 'i am c s').

The website for iAAMCS is http://www.iAAMCS.org. iAAMCS has a summer research program with the Computing Research Association's Committee on the Status of Women in Computing Research (CRA-W) called the Distributed Research Experiences for Undergraduates (DREU). See https://parasol.tamu.edu/dreu/

The DREU program matches prospective mentors with mentees from underrepresented groups in computing. The DREU program has a very successful track record of getting students from underrepresented groups to pursue graduate education.

D. Describe other potential impacts on related programs or departments (e.g., increased need for general education or common prerequisite courses, or increased need for required or elective courses outside of the proposed major).

None.

E. Describe what steps have been taken to obtain information regarding resources (financial and in-kind) available outside the institution (businesses, industrial organizations, governmental entities, etc.). Describe the external resources that appear to be available to support the proposed program.

As a PhD program, students will be supported primarily on external research grants and contracts. Some students will receive teaching assistantships (TA) as well. Currently, the prospective HCC PhD students have the following fellowships:

1. Three NSF Graduate Research Fellowship (GRF)
2. Six GEM (Graduate Engineering Minority) Fellowships
3. One Bill & Melinda Gates Scholar
4. One Generation Google Scholarship Recipient

Through the Preeminence Initiative the 4 HCC faculty members that moved to UF brought with them more than 18 PhD students, 2 postdoc researchers and more than $5 million in grant funding. The HCC faculty members have extensive funding records, see the attached resumes. HCC faculty have received funding from the National Science Foundation (NSF), Federal Bureau of Investigation, Army Research Lab, National Institutes of Health, and other foundations and government agencies. The HCC faculty members have also received funding from industry partners such as BMW, Intel, TEQGames and others. The HCC faculty members will continue to grow their relationships with industry partners here in Florida to gain additional funding for students.

IV. Projected Benefit of the Program to the University, Local Community, and State

Use information from Tables 1 and 2 in Appendix A, and the supporting narrative for "Need and Demand" to prepare a concise statement that describes the projected benefit to the university, local community, and the state if the program is implemented. The projected benefits can be both quantitative and qualitative in nature, but there needs to be a clear distinction made between the two in the narrative.

CISE PhD graduates in Human-Centered Computing (HCC) will be successfully employed in academic faculty positions, industrial research positions, product development, and national research and development laboratories.

As previously mentioned, Human-Computer Interaction (HCI) and HCC have been successfully placed in jobs industry, but the academy as well, see II.A and the Figure D6 from the CRA Taulbee Survey. There is a growing demand for people with these skills at the PhD level. Google, Intel, Apple, Harris Corporation and many others all have User Experience positions and hire graduates at the PhD level in HCC from Georgia Tech, Clemson, UMBC, Carnegie Mellon and now UF.

Within the State of Florida, there are many jobs available for graduates with these skills. Harris Corporation is an example of a large company looking for these skills as they have created a new User Experience division and a facility to support this work. There are at least 12 current CISE PhD students that are committed to the HCC PhD. These students came from Clemson University with several of the current HCC faculty members. Therefore, these students have already committed to the HCC PhD.

V. Access and Articulation – Bachelor's Degrees Only

A. If the total number of credit hours to earn a degree exceeds 120, provide a justification for an exception to the policy of a 120 maximum and submit a separate request to the Board of Governors for an exception along with notification of the program's approval. (See criteria in Board of Governors Regulation 6C-8.014)

N/A.

B. List program prerequisites and provide assurance that they are the same as the approved common prerequisites for other such degree programs within the SUS (see link to the Common Prerequisite Manual on the resource page for new program proposal). The courses in the Common Prerequisite Counseling Manual are intended to be those that are required of both native and transfer students prior to entrance to the major program, not simply lower-level courses that are required prior to graduation. The common prerequisites and substitute courses are mandatory for all institution programs listed, and must be approved by the Articulation Coordinating Committee (ACC). This requirement includes those programs designated as "limited access."

If the proposed prerequisites are not listed in the Manual, provide a rationale for a request for exception to the policy of common prerequisites. NOTE: Typically, all lower-division courses required for admission into the major will be considered prerequisites. The curriculum can require lower-division courses that are not prerequisites for admission into the major, as long as those courses are built into the curriculum for the upper-level 60 credit hours. If there are already common prerequisites for other degree programs with the same proposed CIP, every effort must be made to utilize the previously approved prerequisites instead of recommending an additional "track" of prerequisites for that CIP. Additional tracks may not be approved by the ACC, thereby holding up the full approval of the degree program. Programs will not be entered into the State University System Inventory until any exceptions to the approved common prerequisites are approved by the ACC.

N/A

C. If the university intends to seek formal Limited Access status for the proposed program, provide a rationale that includes an analysis of diversity issues with respect to such a designation. Explain how the university will ensure that Florida College System transfer students are not disadvantaged by the Limited Access status. NOTE: The policy and criteria for Limited Access are identified in Board of Governors Regulation 6C-8.013. Submit the Limited Access Program Request form along with this document.

N/A

D. If the proposed program is an AS-to-BS capstone, ensure that it adheres to the guidelines approved by the Articulation Coordinating Committee for such programs, as set forth in Rule 6A-10.024 (see link to the Statewide Articulation Manual on the resource page for new prSecogram proposal). List the prerequisites, if any, including the specific AS degrees which may transfer into the program.

N/A

INSTITUTIONAL READINESS

VI. Related Institutional Mission and Strength

A. Describe how the goals of the proposed program relate to the institutional mission statement as contained in the SUS Strategic Plan and the University Strategic Plan (see link to the SUS Strategic Plan on the resource page for new program proposal).

The proposed HCC PhD program aligns well with both the SUS strategic plan, see section I.E, and the UF mission. The proposed HCC PhD will increase diversity in an area of STEM/IT, it will broaden the skills of future STEM/IT employees, it will advance research in an area of national and global need, it will provide solutions to societal issues, and it will raise the prestige of the UF as the program increases its ranking in this area.

The missions of the CISE Department is "The mission of the Computer & Information Science & Engineering Department is to educate students, as well as the broader campus community, in the fundamental concepts of the computing discipline; to create and disseminate computing knowledge and technology; and to use expertise in computing to help society solve problems." The HCC PhD aligns with this mission by providing education and also using computing to help solve societal problems. The research agenda in HCC is applied and addresses issues in Cybersecurity, Voting Technologies, Learning, and more.

B. Describe how the proposed program specifically relates to existing institutional strengths, such as programs of emphasis, other academic programs, and/or institutes and centers.

The proposed HCC PhD program will make interdisciplinary connections with the College of Education through learning technologies, the UF Transportation Institute through user experience and driver distraction research, Cybersecurity researchers through biometrics, English, History and the Libraries through games research, the College of Business through entrepreneurship and the College of Medicine through health informatics. The HCC PhD program connects people and technology and this provides interdisciplinary collaborations across the university. For example, Dr. James Oliverio, Director of the Digital Worlds Institute, held a reception for the HCC faculty that has resulted in several collaboration opportunities in games related research for learning. Dr. Carole Beale, Director of the Online Learning Institute at UF, has submitted a proposal to the Institute of Education Sciences with Dr. Juan E. Gilbert as a CoPI. Drs. Janice Krieger and Sri Kalyanaraman in the College of Communications and Journalism have established collaborations with HCC faculty to share research facilities and submit joint proposals. These are just a few examples of collaborations that are happening with the HCC faculty.

C. Provide a narrative of the planning process leading up to submission of this proposal. Include a chronology in table format of the activities, listing both university personnel directly involved and external individuals who participated in planning. Provide a timetable of events necessary for the implementation of the proposed program.

In April 2014, the College of Engineering at UF hired 4 new HCC faculty members under the Preeminence Initiative, http://news.ufl.edu/archive/2014/05/experts-on-human-centered-computing-are-coming-to-uf.html. The researchers had set up a successful HCC PhD program at Clemson University and naturally, the researchers decided to create a HCC PhD program at UF. The process began with Dr. Juan Gilbert, the primary lead for the proposal, meeting with the HCC faculty to establish the HCC PhD program criteria. There were multiple meetings from April to August. The proposal was presented three time to the faculty in the CISE department and approved on October 30, 2014. The HCC PhD proposal has also been approved by the College of Engineering and the Office of Institutional Planning and Research.

Planning Process

Date	Participants	Planning Activity
April - August 2014	HCC Faculty; Drs. Juan Gilbert, Eakta Jain, Lisa Anthony, Christina Gardner-McCune, Kyla McMullen, Damon Woodard	Discussions on the criteria for the HCC PhD program.
September 10, 2014	Dr. Juan Gilbert	Presented the HCC PhD proposal to the CISE Department Curriculum Committee
October 3, 2014	Dr. Juan Gilbert	Presented the revised HCC PhD proposal to the CISE Department Curriculum Committee
October 30, 2014	Dr. Juan Gilbert and CISE Faculty	CISE Department voted to approve the HCC PhD proposal
December 15, 2014	Dr. Juan Gilbert and College of Engineering Curriculum Committee	Approve HCC PhD proposal
December 16, 2014	UF Office of Institutional Planning and Research	HCC PhD proposal approved
December 16, 2014	Wesley E. Bolch, PhD, PE Associate Dean for Academic Affairs College of Engineering University of Florida	HCC proposal submitted for External Review
December 18, 2014	Dr. Rebecca E. Grinter, Professor School of Interactive Computing College of Computing Georgia Tech	External review returned to Dr. Wes Bolch
February 2015	CAVP Workgroup	HCC PhD pre-proposal approved

Events Leading to Implementation

Date	Implementation Activity
Summer 2014	UF hires Dr. Juan Gilbert and 3 other HCC faculty members from Clemson University. These hires, plus the existing 3, brought the HCC core faculty to 7. Three additional faculty members have affiliated with the HCC PhD, bringing the total to 10.
Fall 2014	Advertise and survey existing and prospective students on the HCC PhD program. There are at least 12 HCC PhD students to start the program.
Spring 2015	Approvals and Notifications by AP for Academic and Faculty Affairs Graduate Council University Curriculum Committee Notified Faculty Senate Steering Committee
Fall 2015	UF hires Drs. Kristy Boyer and Shaundra Daily as HCC faculty members. Faculty Senate Approves HCC PhD Academic Affairs Board of Trustees
Spring 2016	Board of Governors Academic Affairs Notified Graduate School Notified Office of the Registrar OIPR Notified College Notified SACS Notification
Fall 2016	Begin accepting students into new program. (Requires application and web site revisions)

VII. Program Quality Indicators - Reviews and Accreditation

Identify program reviews, accreditation visits, or internal reviews for any university degree programs related to the proposed program, especially any within the same academic unit. List all recommendations and summarize the institution's progress in implementing the recommendations.

The BS computer engineering program, which is jointed offered by CISE and the Department of Electrical and Computer Engineering (ECE), is accredited by ABET. The most recent accreditation review occurred in Fall of 2012. No deficiencies of weaknesses were indicated. This BS program will be one key source of student recruits to the PhD in HCC. UF was also re-accredited by the Southern Association of Colleges and Schools Commission on Colleges in 2014 and there were no deficiencies noted.

VIII. Curriculum

A. Describe the specific expected student learning outcomes associated with the proposed program. If a bachelor's degree program, include a web link to the Academic Learning Compact or include the document itself as an appendix.

Students that obtain the HCC PhD will have the following learning outcomes:

1. Student will be capable of conducting HCC research, including publishing.
2. Students will be capable of creating user interface designs.
3. Students will be capable of building software applications.
4. Students will be capable of evaluating software applications and other technologies with human subjects.

B. Describe the admission standards and graduation requirements for the program.

To receive full admission to graduate study in human-centered computing (HCC), a student must have completed an undergraduate degree from a regionally accredited institution or equivalent, and have taken computer programming courses through data structures. Data structures are a topic of computer science (CS) typically taught at the undergraduate level in a sequence of CS 1, CS 2 and sometimes, CS 3, depending on the specific department. An applicant with minimal deficiencies may be admitted with prerequisites, while one with several deficiencies may be required to satisfactorily complete prerequisite work as a non-degree student prior to admission as a graduate student. Students are not required to have a computer science degree. Each student will be reviewed for their qualifications as they relate to the field of HCC. The students must meet the minimum general graduate school requirements:

- GPA: B for all upper-level courses
- GRE: see CISE Department requirement below
- TOEFL: 550 on paper-based; (213 on computer-based; 80 on Internet-based). Applicants from India are exempt from the TOEFL (see a list of other countries that are exempt at http://graduateschool.ufl.edu/admission/english-exemption-countries). The University of Florida's school code for submission of TOEFL scores is 5812.
- You may substitute for TOEFL with:
    - IELTS with a minimum score of 6; or
    - MELAB with a minimum score of 77.

The majority of our accepted students have an undergraduate GPA of at least 3.3/4.0.

- GRE: GRE scores will be used in the context of a holistic credential review process. A strong performance is expected. For reference, the past year's averages were: 153 verbal, 164 quantitative, and 317 total (verbal and quantitative.) NOTE: See the most recent Concordance

Table, published by ETS, for comparable scores from the older GRE test format. The University of Florida's school code for submission of GRE scores is 5812.
- GRE scores are valid for 5 years only.
- TOEFL: 600 (250 computer-based; 95 internet-based). Applicants from India are exempt from the TOEFL (see a list of other countries that are exempt, http://graduateschool.ufl.edu/admission/english-exemption-countries). The University of Florida's school code for submission of TOEFL scores is 5812.
- You may substitute for TOEFL with:
  - IELTS with a minimum score of 7; or
  - MELAB with a minimum score of 90.

C. Describe the curricular framework for the proposed program, including number of credit hours and composition of required core courses, restricted electives, unrestricted electives, thesis requirements, and dissertation requirements. Identify the total numbers of semester credit hours for the degree.

To receive full admission to graduate study in human-centered computing (HCC), a student must have completed an undergraduate degree from a regionally accredited institution or equivalent, and have taken computer programming courses through data structures. Data structures are a topic of computer science (CS) typically taught at the undergraduate level in a sequence of CS 1, CS 2 and sometimes, CS 3, depending on the specific department. An applicant with minimal deficiencies may be admitted with prerequisites, while one with several deficiencies may be required to satisfactorily complete prerequisite work as a non-degree student prior to admission as a graduate student. Although formal course requirements for the PhD degree are minimal, a typical program requires two to four years of study beyond the MS degree. Each candidate is required to pass a comprehensive qualifying examination, a dissertation proposal, and a defense of the dissertation.

Requirements for Awarding the HCC PhD Degree

- 90 credit hours beyond the Bachelor's degree. (May include 30 hours from Master's program)
- 4 supervisory committee members (1 member from outside CISE)
- A Ph.D. qualifying exam
- Ability to pursue research (typically demonstrated by a research publication)
- A dissertation proposal and oral defense on a specific topic
- A dissertation
- A dissertation defense
- 5 years limit for PhD from admission to candidacy

PhD Student w/ prior Master's	PhD Student w/o prior Master's	
credit hours	**credit hours**	**TYPE**
30	n/a	from prior Master's degree (maximum allowed)
9	9	**Program Core** 3 hours of CAP 5XXX User Experience Design (in the approval process) 3 hours of CAP 5100 Human-Computer Interaction 3 hours of CAP 5XXX Research Methods in Human-Centered Computing (in the approval process)

9	9	**CISE required graduate-level courses from the list below.** CAP 5100 Human-Computer Interaction (3) CAP 5416 Computer Vision (3) CAP 5510 Bioinformatics (3) CAP 5515 Computational Molecular Biology (3) CAP 5635 Artificial Intelligence Concepts (3) CAP 5705 Computer Graphics (3) CAP 5805 Computer Simulation Concepts (3) CAP 6402 Aesthetic Computing (3) CAP 6516 Medical Image Analysis (3) CAP 6610 Machine Learning (3) CAP 6615 Neural Networks for Computing (3) CAP 6617 Advanced Machine Learning (3) CAP 6685 Expert Systems (3) CAP 6701 Advanced Computer Graphics (3) CDA 5155 Computer Architecture Principles (3) CDA 5636 Embedded Systems (3) CDA 6156 High Performance Computer Architecture (3) CEN 5035 Software Engineering (3) CEN 6070 Software Testing and Verification (3) CEN 6075 Software Specification (3) CIS 6930 Special Topics in CIS (3; max: 9) CIS 6935 Graduate Seminar (1) CNT 5106C Computer Networks (3) CNT 5410 Computer and Network Security (3) CNT 5517 Mobile Computing (3) CNT 6107 Advanced Computer Networks (3) CNT 6885 Distributed Multimedia Systems (3) COP 5536 Advanced Data Structures (3) COP 5555 Programming Language Principles (3) COP 5615 Distributed Operating System Principles (3) COP 5618 Concurrent Programming (3) COP 5625 Programming Language Translators (3) COP 5725 Database Management Systems (3) COP 6726 Database System Implementation (3) COP 6755 Distributed Database Systems (3) COT 5405 Analysis of Algorithms (3) COT 5442 Approximation Algorithms (3) COT 5520 Computational Geometry (3) COT 5615 Mathematics for Intelligent Systems (3) COT 6315 Formal Languages and Computation Theory (3)
9	9	**Cognate Area** (focused group of related graduate courses in a specific area and approved by the student's committee)
15-18	45-48	In addition to the courses listed below, other graduate-level courses excluding courses numbered 6971, 7979, or 7980. See cognate

		course listing for additional examples. CIS 6905 Individual Study CIS 6910 Supervised Research CIS 6930 Special Topics in CIS
12-15	12-15	CIS 7980 and CIS 7979 - research for doctoral dissertation and advanced research
90	90	TOTAL (minimum)

HCC PhD Qualifying Exam

Prior to taking the qualifying exam, students must pre-qualify by taking at least 2 out of the 3 core courses and obtaining a 3.4 GPA. The PhD qualifying examination is a two-part written exam and is administered by a faculty committee that is relevant to the selected exam area. The two qualifying exam areas will be selected from the existing PhD qualifying exam areas within the CISE department.

Students must take the examination for the first time, no later than their 5th semester. They may retake a failed examination once, within one year.

D. Provide a sequenced course of study for all majors, concentrations, or areas of emphasis within the proposed program.

Note: Courses within the HCC PhD core are designated by **(HCC)**

Student without a Master's degree:

	Year 1	Year 2	Year 3	Year 4	Year 5
Fall Semester	-User Experience Design **(HCC)** -Grad Electives (6 hours)	-Qualifying Exams -CISE Elective -Grad Electives (6 hours)	-Cognate Electives (6 hours)	Grad Electives (12 hours) Research Hours	Grad Electives (12 hours) Research Hours
Spring Semester	-HCI **(HCC)** -Research Methods **(HCC)** -Grad Electives (6 hours)	-CISE Electives (6 hours) -Grad Electives (6 hours)	-Cognate Elective -Grad Electives (6 hours)	Grad Electives (6 hours) Dissertation Proposal	Dissertation Defense
Summers					

Student with a Master's degree (30 credit hours credit for Master's degree):

	Year 1	Year 2	Year 3	Year 4	Year 5
Fall Semester	-User Experience Design **(HCC)** -Grad Electives (9 hours)	-Qualifying Exams -CISE Elective -Grad Electives (6 hours)	-Cognate Electives (6 hours) Grad Electives (3 hours) Dissertation Proposal	Dissertation Defense	

Spring Semester	-HCI (HCC) -Research Methods (HCC) -Grad Electives (6 hours)	-CISE Electives (6 hours) -Grad Electives (6 hours)	-Cognate Elective Research Hours		
Summers					

E. Provide a one- or two-sentence description of each required or elective course.

Program Core - 9 hours

CAP 5XXX User Experience Design (currently in approval process) (3)
Introduces methods and tools used in User Experience Design (UXD): the early stages of software design focused on meeting user needs. Key concepts include user research, contextual design, design thinking, ideation, iterative design, prototyping, and design documentation. Software tools used in industry are used in class projects.

CAP 5100 Human-Computer Interaction (3)
Prereq: COP 3530, and any one programming course (CGS 2414, CGS 3460 or CGS 3464).
Topics related to interaction with technology, including interface design, software tools, 3-D interaction, virtual environments, interaction devices, collaboration, and visualization.

CAP 5XXX Research Methods in Human-Centered Computing (currently in approval process) (3)
Introduces the fundamental methods and techniques to collect data from humans for building and evaluating technologies, including experimental design, types of variables, types of errors, hypothesis testing, survey design, behavioral and psychophysical methods.

CISE Required Courses 9 hours from the list below

CAP 5416 Computer Vision (3)
Prereq: MAC 2312, CGN 3421 or C-language.
Introduction to image formation and analysis. Monocular imaging system projections, camera model calibration, and binocular imaging. Low-level vision techniques, segmentation and representation techniques, and high-level vision

CAP 5510 Bioinformatics (3)
Prereq: COP 3504 or equivalent.

Basic concepts of molecular biology and computer science. Sequence comparison and assembly, physical mapping of DNA, phylogenetic trees, genome rearrangements, gene identification, biomolecular cryptology, and molecular structure prediction.

CAP 5515 Computational Molecular Biology (3)
Algorithms related to molecular biology. Sequence comparisons, pattern matching, pattern extraction, graph techniques in phylogeny construction, secondary structure prediction, multiple sequence alignment, contig search, DNA computing, computational learning theory, and genetic algorithms.

CAP 5635 Artificial Intelligence Concepts (3)
Prereq: COP 3530
Heuristic search, game theory, knowledge representation, logic, machine learning, AI languages and tools. Applications such as planning, natural language understanding, expert systems, and computer vision

CAP 5705 Computer Graphics (3)
Prereq: COP 3530
Display device characteristics; system considerations, display algorithms. Curve and surface generation. Lighting models and image rendering.

CAP 5805 Computer Simulation Concepts (3)
Prereq: COP 3530
Introduction to concepts in continuous and discrete simulation. Emphasis on fundamental concepts and methodology, using practical examples from a wide variety of disciplines.

CAP 6402 Aesthetic Computing (3)
Prereq: COP 5705, CAP 5805
Principles of artistically motivated, personalized representations of formal model structures in computing and mathematics.

CAP 6516 Medical Image Analysis (3)
Image formation, reconstruction mathematics (Fourier slice theorem, Abel, Hankel and Radon transforms), PDE-based denoising and segmentation, multidimensional clustering algorithms, iso-surface extraction, basic differential geometry of curves and surfaces, multidimensional splines, active 2D/3D models, image matching/registration with application to multimodal co-registration.

CAP 6610 Machine Learning (3)
Prereq: CAP 5615
Review of attempts, within the artificial intelligence community, to construct computer programs that learn. Statistical pattern recognition with its applications to such areas as optical character recognition. Inductive learning, automated discovery.

CAP 6615 Neural Networks for Computing (3)
Prereq: CAP 5635
Neural network models and algorithms. Adaptive behavior, associative learning, competitive dynamics and biological mechanisms. Applications include computer vision, cognitive information processing, control, and signal analysis.

CAP 6617 Advanced Machine Learning (3)
Prereq: CAP 6610
Advanced concepts in developing computer programs that learn and improve with experience. Emphasis on methods based on probability, statistics, and optimization.

CAP 6685 Expert Systems (3)
Prereq: CAP 5635

Production systems, meta-knowledge, heuristic discovery, in-depth examination of several expert systems including TEIRESIAS, AM, DENDRAL, MYCIN, IRIS, CASNET, INTERNIST, BACON, PROSPECTOR.

CAP 6701 Advanced Computer Graphics (3)
Prereq: CAP 4730 or CAP 5705 or consent of instructor
Curved surface representations, representation and visualization of higher-dimensional fields, advanced rendering, collision detection and collision response, and scene navigation in context of high-level graphics environments.

CDA 5155 Computer Architecture Principles (3)
Prereq: CDA 3101, COP 3530, and COP 4600
Fundamental design issues of processor and computer architecture, a variety of design approaches for CPU, memory, and system structure.

CDA 5636 Embedded Systems (3)
Prereq: CDA 3101 and knowledge of programming and data structures
Design and verification of low-cost, high-performance, low-power, and reliable embedded systems. The course covers all aspects related to embedded systems design including modeling, specification, exploration, estimation, optimization, synthesis, and verification of both software and hardware (analog as well as digital components) in embedded systems.

CDA 6156 High Performance Computer Architecture (3)
Prereq: CDA 5155, COP 5615

Design and evaluation of instruction-level (superscalar, superpipeline) and task-level (fine and coarse-grained) parallel architecture. Language and operating system support for instruction and task scheduling and task synchronization.

CEN 5035 Software Engineering (3)
Prereq: COP 3504 and COT 3100
Topics in projects organization, specification techniques, reliability measurement, documentation.

CEN 6070 Software Testing and Verification (3)
Prereq: CEN 5035
Concepts, principles, and methods for software testing and verification. Topics include human and machine-based testing strategies, formal proofs of correctness, and software reliability.

CEN 6075 Software Specification (3)
Prereq: CEN 5035
Concepts, principles, and methods for practical specification. System modeling, requirements exploration, validation and prototyping, and documentation techniques.

CIS 6930 Special Topics in CIS (3; max: 9)
Prereq: vary depending on topics

CIS 6935 Graduate Seminar (1)

Prereq: graduate status in CIS. M.S. students may take 1 time toward M.S. degree; Ph.D. students must take 3 times toward Ph.D. degree
Presentations by visiting researchers, faculty members, and graduate students.

CNT 5106C Computer Networks (3)
Prereq: CEN 4500C and COP 4600
The course covers the design, implementation and internals of modern computer networks. While all layers will be introduced, the layers below the Application Layer will be the main focus. The main effort will be spent on the design issues for Transport Layer, Network Layer, Data-Link and MAC Layer, and other related topics.

CNT 5410 Computer and Network Security (3)
Prereq: COP 3530, COT 5405; coreq: COP 4600
Issues, analysis, and solutions. Viruses, worms, logic bombs, network attacks, covert channels, steganography, cryptology, authentication, digital signatures, electronic commerce

CNT 5517 Mobile Computing (3)
Prereq: CEN 4500C
Emerging topics of wireless and mobile computing and networking including mobile computing models, mobile-IP, adhoc networks, Bluetooth, and 802. 11b. Mobile database access and mobile transactions in context of emerging field of M-commerce.

CNT 6107 Advanced Computer Networks (3)
Prereq: COP 5615, COP 5536, and CNT 5106C
Computer network architecture, including topologies, media, switching, routing, congestion control, protocols, and case studies.

CNT 6885 Distributed Multimedia Systems (3)
Design issues; survey of recent advances, including compression, networking, and operating system issues.

COP 5536 Advanced Data Structures (3)
Prereq: COP 3530
Development of efficient data structures used to obtain more efficient solutions to classical problems, such as those based on graph theoretical models, as well as problems that arise in application areas of contemporary interest

COP 5555 Programming Language Principles (3)
Prereq: COP 3530
History of programming languages, formal models for specifying languages, design goals, run-time structures, and implementation techniques, along with survey of principal programming language paradigms

COP 5615 Distributed Operating System Principles (3)
Prereq: COP 4600
The concepts and techniques of efficient management of computer system resources.

COP 5618 Concurrent Programming (3)
Prereq: COP 3100, 3530
Overview of principles and programming techniques. Reasoning about concurrency, synchronization, program structuring, multi-threaded server applications.

COP 5625 Programming Language Translators (3)
Prereq: COP 5555
Anatomy of translators for high-level programming languages.

COP 5725 Database Management Systems (3)
Prereq: COP 3530, 4600, or equivalent
An introduction to systems and procedures for managing large computerized databases.

COP 6726 Database System Implementation (3)
Prereq: COP 4600 and 4720 or 5725
DBMS architecture, query processing and optimization, transaction processing, index structures, parallel query processing, object-oriented and object-relational databases, and related topics

COP 6755 Distributed Database Systems (3)
Prereq: COP 5615, 5725, and a course in computer networks

Distributed database systems including the areas of distributed database design, resource allocation, access plan selection, and transaction management.

COT 5405 Analysis of Algorithms (3)
Prereq: COP 3530
Introduction and illustration of basic techniques for designing efficient algorithms and analyzing algorithm complexity.

COT 5442 Approximation Algorithms (3)
Prereq: COP 3530 or COT 5405
Fundamentals of algorithmic paradigms, analysis, techniques, and software. Topics include greedy methods, randomized algorithms, IP-rounding, approximability, covering, packing, clustering, and network problems.

COT 5520 Computational Geometry (3)
Prereq: COP 3530
Design, analysis, and implementation of algorithms and data structures to solve geometric problems. Applications in graphics, robotics, computational biology, data mining, and scientific computing. Convex hulls, Voronoi diagrams, triangulations, arrangements and range searching.

COT 5615 Mathematics for Intelligent Systems (3)
Prereq: MAC 2313, Multivariate Calculus; MAS 3114 or MAS 4105, Linear Algebra; STA 4321, Mathematical Statistics. Mathematical methods commonly used to develop algorithms for computer systems that exhibit intelligent behavior.

COT 6315 Formal Languages and Computation Theory (3)

Prereq: COP 3530 and familiarity with discrete mathematics and data structures
Introduction to theoretical computer science including formal languages, automata theory, Turing machines, and computability.

Cognate Core (Here are some sample cognate areas. These are selected by the student and his/her advisor and approved by the committee.) 9 hours

Entrepreneurship (Innovation Institute Certificate in Entrepreneurship)

EGN 6640: Entrepreneurship for Engineers
Credits: 3 Grading Scheme: Letter
Introduction to entrepreneurship, idea generating and feasibility analysis, and business planning. Lectures, case studies, student-led discussions, team business plans, and investor presentations.

EGN 6642: Engineering Innovation
Credits: 3 Grading Scheme: Letter
Concepts of innovative thinking and innovation practices. Using lectures, case studies, team exercises, and guest speakers, the course teaches life skills in innovative thought and action that students can use in careers ranging from starting companies to executing R&D projects in large companies.

EGN 6039: Engineering Leadership
Credits: 3 Grading Scheme: Letter
Concepts, theory and practice of engineering leadership; effective written and oral communications and presentations; engineering leadership characteristics, individual differences and self-awareness; developing and building teams; managing change, conflicts, and crises; and understanding real-world ethics and core values.

CIS 6930: Recent Advances in Social Network Computing
Special Topics in CIS (3; max: 9)
Prereq: vary depending on topics

CIS6930 - DEPT / CIS4930 - 9024 Data Mining
Special Topics in CIS (3; max: 9)
Prereq: vary depending on topics

Virtual Environments User Experience/ Natural User Interactions

DIG 6751C Protocols for Multimedia Interfaces
Credits: 2-4 Max: 4 Grading Scheme: Letter
Prerequisite: Admission into the MA in DAS program as a full-time Major or written consent of Instructor.
Covering protocols that control the interface components of a wide range of human-computer interaction devices including computers, mobile phones, multimedia players etc. Principles of interactive event handling and skills in coding touch screen interaction using contemporary platforms and mobile device environments, virtual world interaction,

web-based interaction, as well as standard interaction methods for computer applications.

CAP 5XXX Natural User Interfaces (CISE Course Under Review for Approval) (3)
Introduces design, development, and evaluation of Natural User Interaction (NUI) technologies (e.g., non-keyboard and mouse technologies, such as touchscreen interaction, gesture interaction, speech interaction, etc.). Key concepts include hardware-to-software NUI pipeline and considerations in NUI software development (including existing platforms, toolkits, and APIs used to create NUI software).

DIG 6126C - Interaction Design
Credits: 1-3 Max: 6 Grading Scheme: Letter
Prerequisite: admission in MA DAS program or consent of instructor.
Extend theoretical and practical perspectives into several focused projects using interaction principles prevalent in the entertainment and simulation industries, by creating and evaluating solutions across iterative design and testing cycles researching usability and affective influence. Emphasizes principles of cognitive psychology, including mental models, targeting and interface metaphors.

Other graduate-level courses including research courses (15-18 or 45-48)

CIS 6905 Individual Study
Credits: 1-3 Max: 6 Grading Scheme: Letter, S/U
Prerequisite: consent of faculty member supervising the study

CIS 6910 Supervised Research
Credits: 1-5 Max: 5 Grading Scheme: S/U
Prerequisite: graduate status in CIS.

CIS 6930 Special Topics in CIS
Credits: 3 Max: 9 Grading Scheme: Letter
Prerequisite: vary depending on topics.

Research Credits (12-15)

CIS 7979: Advanced Research
Credits: 1-12 Grading Scheme: S/U
Research for doctoral students before admission to candidacy. Designed for students with a master's degree in the field of study or for students who have been accepted for a doctoral program. Not appropriate for students who have been admitted to candidacy.

CIS 7980: Research for Doctoral Dissertation
Credits: 1-15 Grading Scheme: S/U

F. For degree programs in the science and technology disciplines, discuss how industry-driven competencies were identified and incorporated into the curriculum and indicate whether any industry advisory council exists to provide input for curriculum development and student assessment.

At this time, the CISE Department has an Industry Advisory Board (IAB). The IAB will advise the department on all curricula activities. The HCC PhD program was created under the advisement of User Experience groups at BMW, Intel, Tesla and now Harris. These companies were all informed of our proposal and they have all commented on the proposal. Furthermore, the HCC PhD proposal is consistent with existing HCC PhD programs at Georgia Tech, Clemson, and UMBC.

Specific industry driven competencies include: User Interface Design, Software Development, and Usability Testing. These are the core industry driven competencies related to the HCC PhD. These competencies were identified in discussions with the industry partners (BMW, Intel, Tesla, Harris) and the university partners (Georgia Tech, Clemson, UMBC)

G. For all programs, list the specialized accreditation agencies and learned societies that would be concerned with the proposed program. Will the university seek accreditation for the program if it is available? If not, why? Provide a brief timeline for seeking accreditation, if appropriate.

We are investigating accreditation from the Human Factors and Ergonomics Society (HFES), see http://www.hfes.org/web/Students/grad_programs.html

H. For doctoral programs, list the accreditation agencies and learned societies that would be concerned with corresponding bachelor's or master's programs associated with the proposed program. Are the programs accredited? If not, why?

Given the interdisciplinary nature of the proposed HCC PhD program, we could accept students from numerous disciplines. For example, we have worked with students from the Arts, Humanities, Social Sciences, in addition to our Engineering students. Therefore, it's very difficult to name all the possible accrediting agencies for all of the prospective students we will admit.

I. Briefly describe the anticipated delivery system for the proposed program (e.g., traditional delivery on main campus; traditional delivery at branch campuses or centers; or nontraditional delivery such as distance or distributed learning, self-paced instruction, or external degree programs). If the proposed delivery system will require specialized services or greater than normal financial support, include projected costs in Table 2 in Appendix A. Provide a narrative describing the feasibility of delivering the proposed program through collaboration with other universities, both public and private. Cite specific queries made of other institutions with respect to shared courses, distance/distributed learning technologies, and joint-use facilities for research or internships.

The HCC PhD will use the traditional deliver system on the main campus. No other university in the State of Florida has a HCC PhD program; therefore, it is not feasible to collaborate with other universities with respect to instruction delivery. As noted earlier, students will be recruited from Florida institutions, specifically, FAMU and FIU. Dr. Gilbert delivered the keynote for the Florida McNair Scholars Research Conference on October 17, 2014 at FIU. During his time at FIU and in other McNair Scholar meetings, discussions have occurred to pursue ways to recruit FIU students to the HCC PhD. Dr. Gilbert also visited FAMU and met with the Computer and Information Sciences (CIS) faculty and department chair on January 29, 2015. He also met with the Dean of the College of Engineering. In their meetings, Dr. Gilbert shared with the Dean and the FAMU CIS faculty information about the proposed HCC PhD and the fact that there are new HCC faculty, students and postdocs at UF. With their move, UF has the largest population of African-American computing sciences PhD students in the nation. As such, FAMU agreed

to establish a relationship with the new HCC faculty, students and postdocs.

IX. Faculty Participation

A. Use Table 4 in Appendix A to identify existing and anticipated full-time (not visiting or adjunct) faculty who will participate in the proposed program through Year 5. Include (a) faculty code associated with the source of funding for the position; (b) name; (c) highest degree held; (d) academic discipline or specialization; (e) contract status (tenure, tenure-earning, or multi-year annual [MYA]); (f) contract length in months; and (g) percent of annual effort that will be directed toward the proposed program (instruction, advising, supervising internships and practica, and supervising thesis or dissertation hours).

See Table 4 in Appendix A.

B. Use Table 2 in Appendix A to display the costs and associated funding resources for existing and anticipated full-time faculty (as identified in Table 2 in Appendix A). Costs for visiting and adjunct faculty should be included in the category of Other Personnel Services (OPS). Provide a narrative summarizing projected costs and funding sources.

See Table 2 in Appendix A.

C. Provide in the appendices the abbreviated curriculum vitae (CV) for each existing faculty member (do not include information for visiting or adjunct faculty).

See CVs in Appendices.

D. Provide evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service. Such evidence may include trends over time for average course load, FTE productivity, student HC in major or service courses, degrees granted, external funding attracted, as well as qualitative indicators of excellence.

Collectively, the list of achievements and awards received by the faculty include two recent Fulbright Scholars; twelve NSF Career Awards; four IEEE Fellows; one Association for Computing Machinery (ACM) Fellow, two AAAS Fellows, SCS Fellow, and SPIE Fellow; two members of the European Academy of Sciences; one IEEE Computer Society Taylor Booth Education Award; one IEEE Computer Society Wallace McDowell Award; one SIAM Fellow; one AAAS Mentor Award; one Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM) award and one ACM Karl Karlstrom Education Award. One faculty member was recently named Editor-in-Chief of the ACM journal Computing Surveys (The ACM is the premier professional association for computer science. Computing Surveys has the highest impact of all the ACM journals.) Research expenditures for the 2012-2013 academic year were over $4 million in direct cost and 1.1 million in indirect cost. Combined it was over $5.2 million.

Below are the enrollments for Ph.D.'s in the CISE Department from Fall 2010 – Fall 2014. They are broken-down by the headcount numbers by term. (Fall begins each academic year)

Term	Headcount
Fall 2010	144
Spring 2011	131
Summer 2011	131
Fall 2011	131
Spring 2012	120
Summer 2012	115
Fall 2012	116
Spring 2013	106
Summer 2013	95
Fall 2013	110
Spring 2014	103
Summer 2014	94

Below are the Ph.D.'s awarded from Fall 2010--Fall 2014. These are broken-down by the numbers by term. (Fall begins each academic year)

Term	Ph.D, Degrees Awarded
Fall 2010	15
Spring 2011	4
Summer 2011	7
Fall 2011	11
Spring 2012	8
Summer 2012	10
Fall 2012	9
Spring 2013	9
Summer 2013	7
Fall 2013	5
Spring 2014	6
Summer 2014	2

X. Non-Faculty Resources

A. Describe library resources currently available to implement and/or sustain the proposed program through Year 5. Provide the total number of volumes and serials available in this discipline and related fields. List major journals that are available to the university's students. Include a signed statement from the Library Director that this subsection and subsection B have been reviewed and approved.

Please see attachment with library resources defined.

B. Describe additional library resources that are needed to implement and/or sustain the program through Year 5. Include projected costs of additional library resources in Table 3 in Appendix A. Please include the signature of the Library Director in Appendix B.

The George A. Smathers Libraries currently maintain a strong collection to support a PhD program in Human-Centered Computing. New resources added to the ACM and IEEE digital libraries are automatically included in their licensed packages. No additional funding is required beyond accommodating the annual price increases of existing resources.

C. Describe classroom, teaching laboratory, research laboratory, office, and other types of space that are necessary and currently available to implement the proposed program

through Year 5.

CISE Departmental Offices, Classrooms, and Labs are described below.

In the main building (CSE Building, Bldg #42), CISE now has 48,096 square feet of space. Of this, 33,128 SF is office space, 5,495 SF is research laboratory space, 4,950 SF is instructional space, 1,875 SF is conference and seminar rooms, and 2,648 SF is miscellaneous space for systems rooms, maintenance, and storage. In addition, we now have 416 SF (room CSE-E202). The instructional space is either totally dedicated to CISE (as in labs) or is allotted to other departments on a per semester basis if CISE does not claim it for a particular period (for classrooms only). Six teaching laboratories are provided in the CSE Building, in addition to the general UF computer laboratories. These focus on multimedia, architecture, and graphics, and are of a size suitable for the classes assigned to them. Students often meet with instructors in these areas to acquire skills in a hands on setting requiring specialized resources.

These are as follows:

- Room CSE E113: 16 PCs running Linux.
- Room CSE E114: 12 PCs running Linux, and 31 PCs running Windows.
- Room CSE E115: 24 PCs running Windows.
- Room CSE E116: 17 PCs running Linux.
- Room CSE E313: 3 PCS running Windows, and 12 PCs running Linuxall with high-end graphics capabilities.
- Room CSE E309: 18 PCS running Windows, used primarily for TAs to hold office hours.

CISE public labs are available 24/7 to anyone who has a CISE account. Labs are locked between 5PM and 7AM, and require a valid Gator 1 card to access them. Also, labs are monitored with security cameras. After-hours access to computer labs is granted using enrollment information. This information comes from the College of Engineering, which in turn works directly with the Registrar. At the beginning of the semester downloads are done weekly. Afterwards, downloads are only done by special requests. Four additional labs are available for course-specific work, corresponding to five Research Centers:

Human-Computer Interaction Laboratory
Center for Vision, Graphics, and Medical Imaging (CVGMI)
Database Systems Research and Development Center
Mobile and Pervasive Computing Laboratory
Computational Science and Intelligence Laboratory

D. Describe additional classroom, teaching laboratory, research laboratory, office, and other space needed to implement and/or maintain the proposed program through Year 5. Include any projected Instruction and Research (I&R) costs of additional space in Table 2 in Appendix A. Do not include costs for new construction because that information should be provided in response to X (E) below.

None

E. If a new capital expenditure for instructional or research space is required, indicate where this item appears on the university's fixed capital outlay priority list. Table 2 in Appendix A includes only Instruction and Research (I&R) costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase as a result of the program, describe and estimate those expenses in narrative form below. It is expected that high enrollment programs in particular would necessitate increased costs in non-I&R activities.

No new capital expenditures for instruction or research space is required.

F. Describe specialized equipment that is currently available to implement the proposed

program through Year 5. Focus primarily on instructional and research requirements.

On the 5th floor of the Computer Science & Engineering building, we have a usability lab with a two way mirror between our experiment room and an observation room.

The Department of Computer and Information Science and Engineering possesses the following departmental computer resources supporting the academic and research missions:

- Five CISE CPU servers (a Solaris SPARC, two Linux AMD 64 and two Windows 20008R2 servers) are available via SSH, VNC or remote desktop to all users to run jobs, and to log in to from remote locations. These tend to be some of the fastest machines in the department and have the most memory.

- All faculty offices are equipped with a Windows or Linux workstation. Standard software installations include Ubuntu 10.04 or Windows 7, Java, jGRASP, many Microsoft packages due to the Microsoft Development Academic Alliance, Mozilla Firefox, Second Life, and XMing (X Windows on a Windows PC). Database software includes MySQL, PostgreSQL, and Oracle. Wireless access is available throughout the CSE Building and all of campus, including student dorms, cafeterias, and other public areas.

- The classrooms in the CSE building have all been provided with multimedia support and computers housed in a locked kiosk. In addition, all have access to the University's wireless network. That, combined with the college's requirement that all students possess an adequately-provisioned laptop computer, makes it easy to access resources in the classrooms.

- The bulk of the CISE's disk storage comes from a Sun 7410 with 66TB of raw disk space. An additional 60TB is provided by other servers. There are about 35 servers running a mix of Red Hat Enterprise Linux 6 and Solaris 10 providing such services as:

    - web hosting
    - email
    - database hosting – MySQL, PostgreSQL, Oracle
    - Kerberos / LDAP authentication
    - DNS
    - DHCP
    - backups via Tivoli Storage Manager and disk based rsyncs
    - Samba
    - NFS
    - security-related services

- Our web servers run on a Sun T5220 server with Solaris 10, 32GB of memory, and 1.2 GHz UltraSPARC-T2 CPUs. They serve Department content, user content, and various web applications that support the Department.

- We have, in total, about 100 Linux PCs running Ubuntu Desktop 10.04 and 130 Windows 7 PCs. They serve as lab machines and workstations for students, Teaching Assistants, Research Assistants, and Faculty. Of these, 58 Windows PCs and 65 Linux PCs are in public labs that are intended for general student use as well as use in lab sections of graduate and undergraduate classes.

- We provide a compute cluster consisting of a head node with dual Opterons, 16GB of memory and 3.5TB of storage with 20 worker nodes with dual Opterons and 32GB of memory running Linux (Ubuntu Server 10.04).

- We also provide a GPU compute cluster comprising five machines, each with up to three different high-end GPUs for those that make use of the unique compute capabilities that GPUs provide. These machines have dual twelve core CPU's, 64Gigabytes of memory and five TB of storage per node.

- The networking in the Department consists mainly of 100 Mb and 1 Gb connections, except for the servers which utilize a minimum of 1 Gb connections. Many have higher bandwidth connections utilizing EtherChannel. Our Cisco hardware—one Catalyst 6513, one Catalyst 6509E, and three Catalyst 4506s—provides routing and switch capabilities to the more than 600 devices and 80 networks in the Department. Our external connection is via 1Gb fiber connection to the University of Florida's core network.

G. Describe additional specialized equipment that will be needed to implement and/or sustain the proposed program through Year 5. Include projected costs of additional equipment in Table 2 in Appendix A.

None

H. Describe any additional special categories of resources needed to implement the program through Year 5 (access to proprietary research facilities, specialized services, extended travel, etc.). Include projected costs of special resources in Table 2 in Appendix A.

None

I. Describe fellowships, scholarships, and graduate assistantships to be allocated to the proposed program through Year 5. Include the projected costs in Table 2 in Appendix A.

A number of graduate students will be supported by teaching assistantships (TA) and research grants. The TA will be allocated to HCC students as needed from the total available for PhD students in CISE. Faculty write research grant proposals to fund graduate students. The HCC faculty have a very strong funding record and they support several graduate students through this funding. Currently, the prospective HCC PhD students have the following fellowships:

1. One NSF Graduate Research Fellowship (GRF)
2. Six GEM (Graduate Engineering Minority) Fellowships
3. One Bill & Melinda Gates Scholar
4. One Generation Google Scholarship Recipient

J. Describe currently available sites for internship and practicum experiences, if appropriate to the program. Describe plans to seek additional sites in Years 1 through 5.

We have students that have worked on internships and/or planning internships with the following companies:

- Intel
- Harris Corporation
- Nielson
- Institute for Human Machine Cognition

Intel has awarded 4 GEM Fellowships to HCC students, see http://www.gemfellowship.org/students/gem-fellowship-program/ The HCC PhD students have worked at Intel the past 3 years. The HCC faculty have established a working relationship with Intel where students are being hired as interns and Intel is funding projects at UF.

Harris Corporation and the HCC group at UF are establishing a relationship for internships, collaborative research, and future hires. This is an early relationship, but it is working.

Nielson hired a HCC PhD student as an intern this summer in Tampa, Florida. We are building a relationship with Nielson.

The Institute for Human Machine Cognition (IHMC) has also established a relationship with the HCC group. They have hired a HCC PhD student as an intern this summer and there are discussions for future hires.

APPENDIX A

TABLE 1-A (DRAFT)
PROJECTED HEADCOUNT FROM POTENTIAL SOURCES
(Baccalaureate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Upper-level students who are transferring from other majors within the university**	0	0	0	0	0	0	0	0	0	0
Students who initially entered the university as FTIC students and who are progressing from the lower to the upper level***	0	0	0	0	0	0	0	0	0	0
Florida College System transfers to the upper level***	0	0	0	0	0	0	0	0	0	0
Transfers to the upper level from other Florida colleges and universities***	0	0	0	0	0	0	0	0	0	0
Transfers from out of state colleges and universities***	0	0	0	0	0	0	0	0	0	0
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.
** If numbers appear in this category, they should go DOWN in later years.
*** Do not include individuals counted in any PRIOR CATEGORY in a given COLUMN.

APPENDIX A

TABLE 1-B

PROJECTED HEADCOUNT FROM POTENTIAL SOURCES

(Graduate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE****	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Individuals drawn from agencies/industries in your service area (e.g., older returning students)	0	0	0	0	0	0	0	0	0	0
Students who transfer from other graduate programs within the university**	12	8.4	0	0	0	0	0	0	0	0
Individuals who have recently graduated from preceding degree programs at this university	0	0	4	2.8	10	7	10	7	10	7
Individuals who graduated from preceding degree programs at other Florida public universities	0	0	8	5.6	10	7	15	10.5	20	14
Individuals who graduated from preceding degree programs at non-public Florida institutions	0	0	8	5.6	10	7	15	10.5	20	14
Additional in-state residents***	0	0	0	0	0	0	0	0	0	0
Additional out-of-state residents***	0	0	0	0	0	0	0	0	0	0
Additional foreign residents***	0	0	0	0	0	0	0	0	0	0
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**12**	**8.4**	**20**	**14**	**30**	**21**	**40**	**28**	**50**	**35**

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.

** If numbers appear in this category, they should go DOWN in later years.

*** Do not include individuals counted in any PRIOR category in a given COLUMN.

APPENDIX A

TABLE 2
PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 1							Year 5					
	Funding Source							Funding Source					
	Reallocated Base* (E&G)	Enrollment Growth (E&G)	Other New Recurring (E&G)	New Non-Recurring (E&G)	Contracts & Grants (C&G)	Auxiliary Funds	**Subtotal E&G, Auxiliary, and C&G**	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Auxiliary Funds	**Subtotal E&G, Auxiliary, and C&G**
Faculty Salaries and Benefits	532,412	0	0	0	0	0	**$532,412**	599,234	0	0	0	0	**$599,234**
A & P Salaries and Benefits	0	0	0	0	0	0	**$0**	0	0	0	0	0	**$0**
USPS Salaries and Benefits	22,320	0	0	0	0	0	**$22,320**	25,121	0	0	0	0	**$25,121**
Other Personal Services	26,250	0	0	0	0	0	**$26,250**	29,545	0	0	0	0	**$29,545**
Assistantships & Fellowships	681,830	0	0	0	651,332	0	**$1,333,162**	767,406	0	0	900,000	0	**$1,667,406**
Library	0	0	0	0	0	0	**$0**	0	0	0	0	0	**$0**
Expenses	0	0	0	0	0	0	**$0**	0	0	0	0	0	**$0**
Operating Capital Outlay	0	0	0	0	0	0	**$0**	0	0	0	0	0	**$0**
Special Categories	0	0	0	0	0	0	**$0**	0	0	0	0	0	**$0**
Total Costs	**$1,262,812**	**$0**	**$0**	**$0**	**$651,332**	**$0**	**$1,914,144**	**$1,421,306**	**$0**	**$0**	**$900,000**	**$0**	**$2,321,306**

*Identify reallocation sources in Table 3.

**Includes recurring E&G funded costs ("reallocated base," "enrollment growth," and "other new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring.

Faculty and Staff Summary

Total Positions	Year 1	Year 5
Faculty (person-years)	4.95	4.95
A & P (FTE)	0	0
USPS (FTE)	0	0

Calculated Cost per Student FTE

	Year 1	Year 5
Total E&G Funding	$1,262,812	$2,321,306
Annual Student FTE	8.4	35
E&G Cost per FTE	$150,335	$66,323

APPENDIX A

TABLE 3
ANTICIPATED REALLOCATION OF EDUCATION & GENERAL FUNDS*

Program and/or E&G account from which current funds will be reallocated during Year 1	Base before reallocation	Amount to be reallocated	Base after reallocation
19140100-101-CRRNT, Department E&G Funds	6,728,289	988,809	**$5,739,480**
19140100-107-CRRNT, UF Preeminence Funds	739,285	274,003	**$465,282**
Totals	$7,467,574	$1,262,812	**$6,204,762**

*** If not reallocating funds, please submit a zeroed Table 3**
Note: the $6,728,289 is the CISE department budget

APPENDIX A

TABLE 4
ANTICIPATED FACULTY PARTICIPATION

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Speciality	Rank	Contract Status	Initial Date for Participation in Program	Mos. Contract Year 1	FTE Year 1	% Effort for Prg. Year 1	PY Year 1	Mos. Contract Year 5	FTE Year 5	% Effort for Prg. Year 5	PY Year 5
A	Lisa Anthony, Ph.D.	Asst. Prof.	Tenure-track	Fall 2016	9	1.00	0.50	0.50	9	1.00	0.50	0.50
A	Kristy E. Boyer, Ph.D.	Aso. Prof.	Tenure-track	Fall 2016	9	1.00	0.50	0.50	9	1.00	0.50	0.50
A	Shaundra B. Daily, Ph.D.	Aso. Prof.	Tenure-track	Fall 2016	9	1.00	0.75	0.75	9	1.00	0.75	0.75
A	Christina Gardner-McCune, Ph.D.	Asst. Prof.	Tenure-track	Fall 2016	9	1.00	0.50	0.50	9	1.00	0.50	0.50
A	Juan E. Gilbert, Ph.D.	Professor	Tenure-track	Fall 2016	12	1.00	0.50	0.50	12	1.00	0.50	0.50
A	Eakta Jain, Ph.D.	Asst. Prof.	Tenure-track	Fall 2016	9	1.00	0.50	0.50	9	1.00	0.50	0.50
A	Benjamin Lok, Ph.D.	Professor	Tenure	Fall 2016	9	1.00	0.50	0.50	9	1.00	0.50	0.50
A	Kyla McMullen, Ph.D.	Asst. Prof.	Tenure-track	Fall 2016	9	1.00	0.50	0.50	9	1.00	0.50	0.50
A	Daniela Oliveira, Ph.D.	Aso. Prof.	Tenure-track	Fall 2016	9	1.00	0.10	0.10	9	1.00	0.10	0.10
A	Damon Woodard, Ph.D.	Aso. Prof.	Tenure-track	Fall 2016	9	1.00	0.10	0.10	9	1.00	0.10	0.10
C	New Hire, Ph.D.	Aso. Prof.	Tenure-track	Fall 2016	9	1.00	0.50	0.50	9	1.00	0.50	0.50
	Total Person-Years (PY)							**4.95**				**4.95**

Faculty Code		Source of Funding	PY Workload by Budget Classsification Year 1	Year 5
A	Existing faculty on a regular line	Current Education & General Revenue	4.45	4.45
B	New faculty to be hired on a vacant line	Current Education & General Revenue	0.00	0.00
C	New faculty to be hired on a new line	New Education & General Revenue	0.50	0.50
D	Existing faculty hired on contracts/grants	Contracts/Grants	0.00	0.00
E	New faculty to be hired on contracts/grants	Contracts/Grants	0.00	0.00

Overall Totals for	Year 1	4.95	Year 5	4.95

APPENDIX B

Please include the signature of the Equal Opportunity Officer and the Library Director.

9/15/15

Signature of Equal Opportunity Officer **Date**

Judith C. Russell

Judith C. Russell
Dean of University Libraries

September 9, 2014

Date

This appendix was created to facilitate the collection of signatures in support of the proposal. Signatures in this section illustrate that the Equal Opportunity Officer has reviewed section II.E of the proposal and the Library Director has reviewed sections X.A and X.B.

Appendix C Summary of Similar Programs

The proposed PhD in Human-Centered Computing (HCC) is focused on the design, construction, and evaluation of computational technologies as they relate to the human condition and impact society in general. There are currently 3 HCC PhD programs in the United States (University of Maryland Baltimore County, The Georgia Institute of Technology, and Clemson University). Once approved, the University of Florida will be the 4th HCC PhD program in existence. As such, there are no HCC PhD programs in the State of Florida at private or public institutions. Within the State of Florida the closest program to the proposed HCC PhD is at Florida State University.

FSU has a degree listed under CIP Code 30.3001 called Computational Science. After a careful evaluation of FSU's Computational Science PhD program, it can be observed that the HCC PhD program and Computation Science PhD program are both interdisciplinary PhD programs; however, the HCC PhD program has as its core studies in human computer interaction, user interface design, and research methods for human subjects. The Computational Science PhD program has a core consisting of Scientific Programming and Applied Computational Science courses. Owing to these differences, the newly proposed degree program is truly unique and not replicated to any extent on the UF campus nor across any of the State University System schools/colleges. Dr. Gilbert has reached out to Dr. Max Gunzburger at FSU to discuss these details between the proposed HCC PhD and the FSU PhD in Computation Science.

The HCC PhD degrees exist because the expertise required for this degree does not fit in traditional Computer Science or Computer Engineering PhD programs. CS & CE PhD programs have requirements for computer systems and theory. These courses are not required for HCC research. HCC researchers can design user interfaces and implement them using software languages and tools and then evaluate them in context with human subjects. However, CS & CE do not have any requirements related to the human condition, human subjects research, etc. Essentially, HCC is an extremely broad area that encompasses design, implementation and evaluation. There are PhD degrees that emphasize design, i.e. Industrial Design, Industrial Engineering (Human Factors), etc. There are PhD degrees that emphasize implementation or evaluation of software and/or hardware, i.e. CS & CE. There are also PhD degrees that emphasize evaluation, i.e. Psychology, Social Science, etc. HCC combines all of these disciplines into a single degree that meets the demands of industry, the academy and government. Therefore, HCC cannot effectively be incorporated into an existing PhD as a track because it's broader than any single degree and requires the ability to be interdisciplinary.

Rebecca E. Grinter
Professor
School of Interactive Computing,
College of Computing
Atlanta, Georgia 30332-0280 U.S.A.

beki@cc.gatech.edu
http://www.cc.gatech.edu/~beki

Thursday, December 18, 2014

Recommendation Letter for the Human-Centered Computing Ph.D. program at the University of Florida

To Whom It May Concern:

I am delighted to write this recommendation letter in support of the proposed Human-Centered Computing Ph.D. To set context, I am a Professor in the School of Interactive Computing, at the Georgia Institute of Technology. Prior to joining the faculty at Georgia Tech, I worked at Bell Laboratories and the Computer Science Lab at Xerox PARC. At Georgia Tech I have served as the Program Coordinator (lead administrator) for Georgia Tech's Human-Centered Computing (HCC) Ph.D. and also as Associate Dean for Graduate Affairs for the College of Computing the academic unit in which the HCC PhD is homed.

I'd like to begin my review by offering some insight into the almost decade of history that Georgia Tech has had with its Human-Centered Computing Ph.D. Like the proposal before you at the University of Florida, it was designed as a response to an emerging area of intellectual inquiry, that that sat squarely at the intersection of computing and humanity. While our Computer Science Ph.D. was and remains extremely good at training a generation of future researchers and scientists who want to tackle fundamental problems associated with Computer technologies, the HCC PhD responded to the recognition that Computing skills are not the only type of skills necessary to address fundamental problems in human-centered research. The HCC Ph.D. not only allowed us to broaden our offerings in both classes and research to train people with these new human-centered computing skills (e.g. in the social sciences and humanities), but it allowed us to recruit new types of students, ones with a very diverse set of undergraduate and masters backgrounds.

Georgia Tech's Human-Centered Computing Ph.D. was approved in 2005 and today we have graduated students who've taken a variety of academic and industrial positions. Our alumni are now faculty at Universities including Carnegie Mellon, Drexel, Georgetown, Maryland, Michigan, Michigan State, Minnesota, Northeastern, Rose-Hulman and Virginia Tech. Others have taken positions at Google, Salesforce, and Samsung. Other HCC PhD programs have been launched as the proposal enumerates, and others have taken up the name to describe focus areas within computing research such as the University of Colorado, Boulder. The broad range of Universities that our graduates have joined as faculty suggest a broad national demand for people who can teach classes at both the graduate and undergraduate level that will prepare a workforce that can design and build systems that meet human-centered requirements. Our industrial graduates are leading those efforts inside various companies.

I would like to comment on several important points in the proposal. First, I want to commend the proposal for making an important distinction between Human-Computer Interaction and Human-Centered Computing. While Human-Computer Interaction has a long established history within

Computer Science, it is just one discipline that is contained within the broader view of Human-Centered Computing. I particularly like and encourage the focus on policy, which has not been a central part of Human-Computer Interaction. Training graduates who can inform local, State, and National policy is not something that Computing fields have done. And yet, it's hard to think of an agency that doesn't need to factor technical considerations into the policy that is made. From having computationalists inform the review of Patents, through to advisors who can make sensible recommendations about the value and role of technology in Healthcare, Education and Disaster Response, to name just three, is increasingly important in Government. I think there is significant promise for any program that can develop graduates who want to help policy-makers draft legislation and so forth informed by a deep understanding of what is actually technically possible, and what human-centered concerns should inform any systems designed, deployed and evaluated.

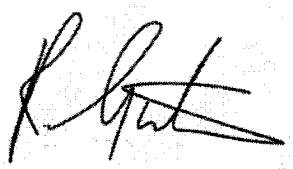
The proposal argues that a Human-Centered Computing degree will attract a diverse body of students into the STEM workforce. I concur based on our experiences at Georgia Tech. The Ph.D. has always been roughly 50-50% men/women. While we can always do more to recruit and develop minorities, we have also had a number of African American students in the program as well. I was very impressed by diversity of the students who have expressed an interest in an HCC Ph.D. at the University of Florida; it is much to the credit of the faculty that they have such gender and racial diversity.

In many ways, the curriculum structure of the University of Florida proposal matches those that I have seen at Georgia Tech, Clemson, UMBC, and so forth. This is nice in that it continues to build a brand of Human-Centered Computing that employers recognise irrespective of where the education was attained. I believe that this will not only benefit the broader Human-Centered Computing faculty community, but that it will help the graduates of this program find employment.

I would like to close by saying how excited I am to see a Human-Centered Computing Ph.D. proposal from the University of Florida. There is an important and vibrant community of people focused on fundamental research and workforce training in areas in which a combination of technical and human skills are essential for forward progress. These problems are vital to the success of the nation. I look forward to what the graduates of this program will do in service of these goals.

If you have any questions, please do not hesitate to contact me.

Sincerely,



Rebecca E. Grinter

STATE UNIVERSITY SYSTEM of FLORIDA
Board of Governors

Office of the Chancellor
325 West Gaines Street, Suite 1614
Tallahassee, FL 32399
Phone 850.245.0466
Fax 850.245.9685
www.flbog.edu

April 8, 2016

MEMORANDUM

TO: Dr. Joseph Glover
Provost and Senior Vice President for Academic Affairs
University of Florida

FROM: Dr. Jan M. Ignash
Vice Chancellor for Academic and Student Affairs

SUBJECT: Ph.D. in Human Centered Computing (CIP 11.0104)

The initial review of the Ph.D. in Human Centered Computing (CIP 11.0104) has been completed and the following clarifications are needed before it can be placed on the agenda for the June Board of Governors meeting.

- Please adjust the "Calculated Cost per FTE" in table 2 so that the calculations include only the E&G funding for year 5 and exclude the C&G funds. Once the revision is complete please update the "Projected Program Costs" table included on the cover page.
- The E&G cost per student FTE is projected to be $150,335 in the first year and decrease to $40,609 by the fifth year. Based upon the SUS Expenditure Analysis for 2014-2015 the calculated system average cost per student FTE for doctoral level CIP 11 is $22,528. Additionally, UF's calculated average cost per FTE for 2014-15 is $23,440 for CIP 11 and $25,133 for CIP 14. The high projected cost per FTE for this program appears to be due in large part to an unusually high amount of E&G funding for student assistantships and fellowships shown in Table 2 of Appendix A. Please revisit the methodology used to project the costs in Table 2 and determine if the $681,830 in E&G funds for assistantships and fellowships in year one and $767,406 in year five are accurately calculated. If not, a revised Table 2, Table 3, and cover page will be needed. If they are accurate, then please provide an explanation for how a total of $1,333,162 in year one will be used to support assistantships and fellowships for just 12 students.

Your response by April 20, 2016 will help to ensure that the program is placed on the June agenda for consideration by the Board of Governors. Should you have questions, please contact Richard Stevens at (850) 245-9702, or Richard.Stevens@flbog.edu.

JMI/dgb

c: Dr. Angel Kwolek-Folland
Mr. Richard P. Stevens

Board of Governors, State University System of Florida

Request to Offer a New Degree Program

(Please do not revise this proposal format without prior approval from Board staff)

University of Florida	**Fall 2016**
University Submitting Proposal	**Proposed Implementation Term**
College of Engineering	**CISE**
Name of College(s) or School(s)	**Name of Department(s)/ Division(s)**
Human-Centered Computing	**Doctor of Philosophy**
Academic Specialty or Field	**Complete Name of Degree**
11.0104	
Proposed CIP Code	

The submission of this proposal constitutes a commitment by the university that, if the proposal is approved, the necessary financial resources and the criteria for establishing new programs have been met prior to the initiation of the program.

Date Approved by the University Board of Trustees		**President**	**Date**
Signature of Chair, Board of Trustees	**Date**	**Vice President for Academic Affairs**	**Date**

Provide headcount (HC) and full-time equivalent (FTE) student estimates of majors for Years 1 through 5. HC and FTE estimates should be identical to those in Table 1 in Appendix A. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Table 2 in Appendix A. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 (Total E&G divided by FTE).

Implementation Timeframe	Projected Enrollment (From Table 1)		Projected Program Costs (From Table 2)				
	HC	FTE	E&G Cost per FTE	E&G Funds	Contract & Grants Funds	Auxiliary Funds	Total Cost
Year 1	20	14	17,707	247,898	275,760	0	523,658
Year 2	20	14					
Year 3	30	21					
Year 4	40	28					
Year 5	50	35	14,166	495,796	1,149,000	0	1,644,796

Note: This outline and the questions pertaining to each section must be reproduced within the body of the proposal to ensure that all sections have been satisfactorily addressed. Tables 1 through 4 are to be included as Appendix A and not reproduced within the body of the proposals because this often causes errors in the automatic calculations.

APPENDIX A

TABLE 1-A (DRAFT)
PROJECTED HEADCOUNT FROM POTENTIAL SOURCES
(Baccalaureate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Upper-level students who are transferring from other majors within the university**	0	0	0	0	0	0	0	0	0	0
Students who initially entered the university as FTIC students and who are progressing from the lower to the upper level***	0	0	0	0	0	0	0	0	0	0
Florida College System transfers to the upper level***	0	0	0	0	0	0	0	0	0	0
Transfers to the upper level from other Florida colleges and universities***	0	0	0	0	0	0	0	0	0	0
Transfers from out of state colleges and universities***	0	0	0	0	0	0	0	0	0	0
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.
** If numbers appear in this category, they should go DOWN in later years.
*** Do not include individuals counted in any PRIOR CATEGORY in a given COLUMN.

APPENDIX A

TABLE 1-B

PROJECTED HEADCOUNT FROM POTENTIAL SOURCES

(Graduate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE****	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Individuals drawn from agencies/industries in your service area (e.g., older returning students)	0	0	0	0	0	0	0	0	0	0
Students who transfer from other graduate programs within the university**	20	14	0	0	0	0	0	0	0	0
Individuals who have recently graduated from preceding degree programs at this university	0	0	4	2.8	10	7	10	7	10	7
Individuals who graduated from preceding degree programs at other Florida public universities	0	0	8	5.6	10	7	15	10.5	20	14
Individuals who graduated from preceding degree programs at non-public Florida institutions	0	0	8	5.6	10	7	15	10.5	20	14
Additional in-state residents***	0	0	0	0	0	0	0	0	0	0
Additional out-of-state residents***	0	0	0	0	0	0	0	0	0	0
Additional foreign residents***	0	0	0	0	0	0	0	0	0	0
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**20**	**14**	**20**	**14**	**30**	**21**	**40**	**28**	**50**	**35**

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.

** If numbers appear in this category, they should go DOWN in later years.

*** Do not include individuals counted in any PRIOR category in a given COLUMN.

****For assistance with this calculation, check with UF Office of Institutional Research

APPENDIX A

TABLE 2
PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 1							Year 5					
	Funding Source						Subtotal E&G, Auxiliary, and C&G	Funding Source					Subtotal E&G, Auxiliary, and C&G
	Reallocated Base* (E&G)	Enrollment Growth (E&G)	Other New Recurring (E&G)	New Non-Recurring (E&G)	Contracts & Grants (C&G)	Auxiliary Funds		Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Auxiliary Funds	
Faculty Salaries and Benefits	223,613	0	0	0	0	0	**$223,613**	447,226	0	0	0	0	**$447,226**
A & P Salaries and Benefits	0	0	0	0	0	0	**$0**	0	0	0	0	0	**$0**
USPS Salaries and Benefits	11,160	0	0	0	0	0	**$11,160**	22,320	0	0	0	0	**$22,320**
Other Personal Services	13,125	0	0	0	0	0	**$13,125**	26,250	0	0	0	0	**$26,250**
Assistantships & Fellowships	0	0	0	0	275,760	0	**$275,760**	0	0	0	1,149,000	0	**$1,149,000**
Library	0	0	0	0	0	0	**$0**	0	0	0	0	0	**$0**
Expenses	0	0	0	0	0	0	**$0**	0	0	0	0	0	**$0**
Operating Capital Outlay	0	0	0	0	0	0	**$0**	0	0	0	0	0	**$0**
Special Categories	0	0	0	0	0	0	**$0**	0	0	0	0	0	**$0**
Total Costs	**$247,898**	**$0**	**$0**	**$0**	**$275,760**	**$0**	**$523,658**	**$495,796**	**$0**	**$0**	**$1,149,000**	**$0**	**$1,644,796**

*Identify reallocation sources in Table 3.

**Includes recurring E&G funded costs ("reallocated base," "enrollment growth," and "other new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring.

Faculty and Staff Summary

Total Positions	Year 1	Year 5
Faculty (person-years)	1.16	2.55
A & P (FTE)	0	0
USPS (FTE)	0	0

Calculated Cost per Student FTE

	Year 1	Year 5
Total E&G Funding	$247,898	$495,796
Annual Student FTE	14	35
E&G Cost per FTE	$17,707	$14,166

APPENDIX A

TABLE 3
ANTICIPATED REALLOCATION OF EDUCATION & GENERAL FUNDS*

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Totals	$7,467,574	$247,898	**$7,219,676**

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								1.16				2.55

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C	New faculty to be hired on a new line	New Education & General Revenue	0.11	0.23
D	Existing faculty hired on contracts/grants	Contracts/Grants	0.00	0.00
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		Overall Totals for Year 1	**1.16**	**Year 5 2.55**

Georgia Tech College of Computing
School of Interactive Computing

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I would like to comment on several important points in the proposal. First, I want to commend the proposal for making an important distinction between Human-Computer Interaction and Human-Centered Computing. While Human-Computer Interaction has a long established history within

Computer Science, it is just one discipline that is contained within the broader view of Human-Centered Computing. I particularly like and encourage the focus on policy, which has not been a central part of Human-Computer Interaction. Training graduates who can inform local, State, and National policy is not something that Computing fields have done. And yet, it's hard to think of an agency that doesn't need to factor technical considerations into the policy that is made. From having computationalists inform the review of Patents, through to advisors who can make sensible recommendations about the value and role of technology in Healthcare, Education and Disaster Response, to name just three, is increasingly important in Government. I think there is significant promise for any program that can develop graduates who want to help policy-makers draft legislation and so forth informed by a deep understanding of what is actually technically possible, and what human-centered concerns should inform any systems designed, deployed and evaluated.

The proposal argues that a Human-Centered Computing degree will attract a diverse body of students into the STEM workforce. I concur based on our experiences at Georgia Tech. The Ph.D. has always been roughly 50-50% men/women. While we can always do more to recruit and develop minorities, we have also had a number of African American students in the program as well. I was very impressed by diversity of the students who have expressed an interest in an HCC Ph.D. at the University of Florida; it is much to the credit of the faculty that they have such gender and racial diversity.

In many ways, the curriculum structure of the University of Florida proposal matches those that I have seen at Georgia Tech, Clemson, UMBC, and so forth. This is nice in that it continues to build a brand of Human-Centered Computing that employers recognise irrespective of where the education was attained. I believe that this will not only benefit the broader Human-Centered Computing faculty community, but that it will help the graduates of this program find employment.

I would like to close by saying how excited I am to see a Human-Centered Computing Ph.D. proposal from the University of Florida. There is an important and vibrant community of people focused on fundamental research and workforce training in areas in which a combination of technical and human skills are essential for forward progress. These problems are vital to the success of the nation. I look forward to what the graduates of this program will do in service of these goals.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Rebecca E. Grinter