



College of Computing and Informatics (CCI) 2010-2015 Strategic Plan

I. EXECUTIVE SUMMARY

1-2 pages

<p>A. Mission and goals:</p>	<p>The mission of the College is to transform society by advancing the state of art in computing and informatics and educating future leaders.</p> <p>The goal of the College is to become a leading and trend setting computing and informatics program for the 21st Century needs. In particular, CCI will</p> <ul style="list-style-type: none"> • Strive to lead in growth and emerging areas, where we have an advantage so as to short cut the competition. • Establish selected areas of excellence, critical mass and core competency. • Balance core computing and technology education with new program development in key growth sectors of industry and the economy. • Achieve global focus, visibility, and reputation built on a strong Charlotte identity.
<p>B. Summary of process used to develop unit goals:</p>	<p>The CCI strategic planning started in August 2009 with the following process:</p> <ol style="list-style-type: none"> 1) The CCI Leadership Council met bi-weekly to set the process, timeline, framework, and strategic focus of the planning effort 2) Individual departments kicked-off their planning efforts in September 2009 3) Three college-level faculty/staff committees (research, education, people & operations) commenced in September 2009 to conduct environmental scan, frame key planning issues, produced study reports and coordinate College Faculty Retreat. 4) College Faculty Retreat took place on November 20, 2009 to discuss College strategic goals and priorities 5) The College committees produced respective retreat reports in December 2009, and continued to drill down specific action plans in key areas. 6) CCI Leadership Council finalized strategic goals and key action plans in December 2009 7) Individual departments completed respective departmental plans in April 2009 8) Various college committees submitted their findings in key planning areas in April 2009 9) Consultation with the Provost regarding CCI strategic plan in April 2009 10) The College finalized its plan in late May 2009
<p>C. Summary of major goals in strategic plan:</p>	<p>Goal 1. Position CCI as a recognized leader for competitive, innovative and market-responsive computing and informatics education.</p> <ul style="list-style-type: none"> • Develop market responsive program design, aligned with the changing national priorities and market needs. • Establish innovative and adaptive pedagogy and educational delivery to improve student success and competitiveness.

	<ul style="list-style-type: none"> • Design T-shaped education and training for our students to meet the 21st Century skill needs. • Institute streamlined end-to-end education process to ensure student success. • Position CCI as the go-to place for talent needs by employers in the region. • Significantly improve the recruitment, quality, and competitiveness of CCI Ph.D. programs. <p>Goal 2. Develop focused and trending setting research excellence with national and international recognition.</p> <ul style="list-style-type: none"> • Develop CCI leadership and critical mass in selected key emerging and growth areas of computing and informatics • Effectively leverage CCI’s scale and areas of critical mass • Identify critical societal problems as driver for high impact, collaborative research. • Position CCI as a center for interdisciplinary and collaborative research. • Align CCI development with regional strengths and needs. <p>Goal 3. Establish CCI as a leader and go-to place for partnership and collaboration.</p> <ul style="list-style-type: none"> • Develop strategies to align partnership and collaboration with core CCI missions. • Establish collaboration as a core competency for CCI, supported by strong culture, policy, organization, and infrastructure system. • Build CCI reputation and creditability as a leader in key areas of collaboration in research and education. • Position CCI as a key partner to Charlotte region’s industry and community. <p>Goal 4. Streamlined College organization and operation.</p> <ul style="list-style-type: none"> • Organize College operations and staff into functional clusters for better defined responsibility, communication, coordination, and teamwork. • Improve information gathering, organization, and dissemination. • Streamline marketing and communication for College’s programs and people. • Establish forward looking infrastructure design and space planning • Enhance service oriented support system. <p><u>Note:</u> All CCI departments share the common College goals in this planning cycle. For department specific aspects of the plan, refer to departmental plans attached as Appendices A-C.</p>
<p>D. Summary of new resources required to achieve new goals:</p>	<p>Please refer to Appendix E for specific resource requests, and note that the College goals, action plans, and projected performance outcomes assume that proper, new resources and support as described in the appendix are provided.</p>

II. ENVIRONMENTAL SCAN/ UPDATES SINCE LAST FIVE –YEAR STRATEGIC PLAN	
1-2 pages	
A. Assessment of	

<p>cumulative progress in meeting goals in current strategic plan:</p>	
<p>B. Environmental scan/updates of challenges, opportunities, and obstacles since last strategic plan:</p>	<p>We are at one of the most exciting times in the history of computing and informatics. The late 20th Century marked the first wave of the information technology revolution, the impact of which has been enormous. One example - various studies have shown that up to 25% of US GDP growth is attributed to the information technology. At the same time, computing and information have touched every aspect of people’s lives and every corner of our society. Computing and information have become truly ubiquitous.</p> <p>It is fair to say that we are now at the beginning of the 2nd wave of the revolution. In addition to its ubiquity, information technology has become the core driver for innovation in every aspect of our industry, economy, government, national defense, and society at large. The field has evolved and expanded from its focus on computing to data, information and knowledge. How to manage extraordinary amount of data, and to convert data into information, insight and knowledge have taken the front seat. In the 21st Century innovation economy, every industry has become a “technology and information industry”. There is a fast increasing trend of integration between the field of computing and informatics with other major (existing and emerging) disciplines. The marriage between computing and biology gave birth to the modern life science and bioinformatics, one of the most important disciplines in this century. This trend of integration has been expanding in our fields.</p> <p>The implications, impacts, and reach of computing and informatics in the increasingly globalized world have been repeatedly emphasized in various studies and recommendations by the Federal Government (e.g. the President’s Council of Advisors on Science and Technology (PCAST) report) and the national academies, as well as by various industry reports. Computing and informatics have been among the core driver for the birth of every new and potentially transformational field, from nanotechnology, to modern material science and life science. A recent Wall Street Journal article indicated that, from the mid 1990’s, over 90% of ALL innovations in cars we drive are software related.</p> <p>Looking at the key sectors of our regional industry and economy, from banking and financial services, healthcare, energy, retail, and logistics, as well as emerging biotechnology, all of them are in the midst of a major transition or transformation, which will determine the future competitiveness of our industry and economy. Computing, information technology and informatics are and will be more so a core driver for the changes.</p> <p>These trends and changes have major and far reaching implications for the College of Computing and Informatics, and for UNC Charlotte at large:</p> <p>On the education side, if what and how to better teach and train the next generation leaders and professionals have always been a major issue in computing, they will become an even more important and pressing issue. Today and even more so in the future, the field of computing and informatics is much wider than even 10</p>

years ago. The needs for information technology talents and skills from industry and society are far broader, interdisciplinary, and rapidly changing. In addition to the traditional computer science and information technology degrees, demand for people in bioinformatics, health and healthcare technology, financial informatics, future energy technologies, information/cyber security, to name a few, are rapidly expanding. The growing needs are for professionals who understand not only information technology but also industry specific knowledge, business, organization and people (the so called T-shaped knowledge and skills). The supply side of such new human capital regionally, nationally and internationally is still very limited and at an early development stage. An important part of this strategic plan is to address such issues.

The need and scope of computing and informatics research are also rapidly changing and expanding. Many important sub-disciplines for our field did not exist 10 years ago and many more are continuously being created. In addition to research for advancing the state of art in computing and computational sciences and technology, it has become an integral part of computing and informatics research to address issues and challenges in human life, health, medicine, material, energy, environment, and many others. In other words, our field is now inherently interdisciplinary. Use inspired and society relevant research has become an increasingly important part of the nationally and international research enterprise. There are increasing need, mandate and opportunities of mobilizing and leveraging university research to tackle challenges in the industry, economy and society. Federal research funding policy and practice are increasingly reflecting and driving these changes.

The analyses above indicate that an up and coming research university, like UNC Charlotte, in general, and CCI, in particular, is faced with a golden opportunity to make our mark and to establish ourselves as a future leader in higher education, nationally and internationally. The reasons are simple. First, there is a wide range of areas in both computing and informatics education and research, which require changes and innovation, where the playing fields and leadership ranks are wide open. Many of these areas will play central roles in the future economy, industry, society, science and technology. Second, UNC Charlotte and its CCI are rapidly growing, which giving us the opportunity to develop new programs, faculty, and areas, which many established and matured universities don't have. Third, as a relatively young and evolving university, we have fewer legacy problems that hinder changes and agility compared with universities with deeply entrenched traditions and structure.

To seize the opportunity, a challenge for CCI and the university as a whole, is that we must embrace change and have the foresight to position our institution at the forefront of the changes mentioned earlier: to build the culture, organization, policy and practice. This will enable us to bootstrap, support, and reward interdisciplinary collaboration, innovation and partnership, within the University and with the key Charlotte region industries, both at the individual faculty level and at organization levels. Within the scope of CCI, these issues are key parts of our strategic planning process.

	<p>The analyses above also suggest that it is to our institutional advantage to continue our growth mode. Indeed, a number of new education programs, particularly in the group of Professional Science Master (PSM) degrees, are proposed and new research and partnership initiatives are planned for CCI in this planning cycle. CCI's enrollment, faculty, research, external funding, and partnership initiatives have grown tremendously in the last a few years. However, CCI's budget, staffing, space and infrastructure (with the exception of the new Bioinformatics building/facility) have not kept pace with the growth. If these issues are not addressed adequately, it will be a major obstacle to implement this strategic plan. Specific resource needs are outlined later in this plan.</p> <p>CCI has a dynamic, motivated, collaborative, and productive faculty and staff team. Our faculty team is young by several measures, which on one hand is an advantage, but on the other hand, indicates an urgent need to invest and build a larger team of senior faculty leaders with national and international reputation in all departments, to help to organize and drive the college initiatives outlined in this plan at the national level, and to improve the visibility, reputation and confidence of our organization.</p>
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III. NEW STRATEGIC GOALS, ACTION PLANS AND PERFORMANCE OUTCOMES FOR 2010-2015

<p>A. Unit, Dept. or College Goal #1: <i>Position CCI as a recognized leader for innovative and market-responsive computing and informatics education</i></p> <p>This goal directly address the issue of the rapidly changing needs of talent and the changing landscape of the job market in the fields of computing and informatics described in the environmental scan section.</p>

<p>B. Relationship of goal to next higher reporting unit goal:</p>	<ol style="list-style-type: none"> 1. To offer a portfolio of educational programs that are forward looking and responsive to the intellectual, cultural, and economic needs of the region. 2. To graduate students prepared for personal success and civic responsibility in the 21st century by offering challenging degree programs, encouraging community engagement, and integrating the values of liberal education throughout the undergraduate curriculum. 3. To integrate at the graduate level quality teaching and mentoring with research to prepare the next generation of leaders. 4. To respond to the educational needs of a diverse community of learners through innovative programming and delivery of credit and non-credit programs of study. 5. To promote student achievement and personal development by providing high quality advising, academic services, curricular enrichment, and international experiences. 6. To engage in focused efforts to creatively address University and community needs through internal collaboration and partnerships with
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	<p>public, private, and non-profit organizations.</p> <ol style="list-style-type: none"> 7. To actively promote diversity among faculty, students, and staff, and in the curriculum. 8. To create a flexible, responsive culture that uses effective review and assessment as the basis for improvement.
<p>C. Action plans to achieve goal:</p>	<ol style="list-style-type: none"> 1. New degree programs in response to changing job market needs: <p>CCI will actively pursue new interdisciplinary and/or Professional Science Masters degree programs that reflect shifting trends and demands for human capital from industry and society regionally, nationally, and internationally. Specifically, CCI plans to investigate and to possibly develop the following new degree programs in this planning period:</p> <ol style="list-style-type: none"> a) Health Informatics PSM (jointly with the CHHS and the Graduate School) b) Financial Informatics PSM c) Cyber Security and Information Assurance PSM d) BS in Information Technology and Security e) BS in Bioinformatics and Genomics f) Forensic Sciences PSM <p>In addition, CCI will active promote and grow new degree programs (the undergraduate Financial Service Informatics track and Bioinformatics Ph.D. (pending)).</p> <p>The offering of these new degree programs is still at an early stage nationally and internationally, while substantial job market demand is already a reality. By pursuing these new opportunities, the university will be positioned to take leading roles in these areas nationally. Whenever possible and appropriate, CCI will pursue these new degree programs in partnership or collaboration with other colleges.</p> 2. Comprehensive and consistent assessment, evaluation, and improvement for all CCI undergraduate and Master’s degree programs. <ul style="list-style-type: none"> • CCI will establish the organization, process and procedure for comprehensive assessment, evaluation and quality improvement for undergraduate and Master’s degree programs. • Each department will designate 1-2 assessment coordinators for undergraduate and Master’s program assessment, respectively. The team will attend ABET (or similar) training programs. • A systematic process will be developed to address the issues of data collection, measurement, and evaluation of learning outcomes, and data-driven process improvement, as well as coordination among departmental and College committees. • A comprehensive capstone exam will be developed for the Bioinformatics PSM to assess student learning outcomes.

3. Improving undergraduate student success in terms of retention and graduation rate through:

- a) Improved model, pedagogy and practice for undergraduate education:
 - Developing strategy to enhance CCI undergraduate recruitment, thus improving the quality and preparedness of new CCI students. We will investigate the feasibility of establishing a College wide (CS and SIS departments) pre-major in computing and establish suitable requirements for entering CCI majors.
 - Improving course instruction with enhanced laboratory-based instruction for core areas. Investigating and instituting a structured, thread-like, multi-path curriculum and will continue to develop and evolve this structure as part of this 5 year plan. The goal is to both improve retention and increase the quality of CS/SIS undergraduate education.
 - Developing a comprehensive learning environment (tentatively called “Community of Practice”) to strengthen not only the students’ technical knowledge and skills , but also soft skills (leadership, communication, team work), creativity, and professionalism. The strategy is to develop and implement a sustainable model that synergistically integrates (existing and new) standalone functions/initiatives from REU, enhanced student organizations, peer mentoring, STAR leadership corps, community service, diversity, faculty mentorship, and industry internships into an inherent part of the student learning experience.
 - Strengthening cooperation and coordination between the Department of Computer Science, and the Department of Software and Information Systems in undergraduate education in terms of advising, curriculum design, course scheduling, and classroom instruction.
- b) Streamlined industry partnership for internships, co-training, and placement. We will develop scalable and sustainable partnership programs with major employers of CCI students to:
 - Better secure industry’s commitment to provide internship opportunities for CCI students,
 - Develop consistent pipelines of CCI students to better enable CCI students to pursue the internship opportunities and to better serve industry needs,
 - Improve CCI organization, coordination, and communication to streamline the end-to-end process.
- c) Establish a CCI Student Service Center to achieve end-to-end student services. We will develop the organization, coordination, and communication to enhance and improve the mentorship and service to students, linking recruitment, orientation, advising, mentoring, instruction, and internship (Item b) into a streamlined process. This will help to connect many “islands” we currently have and help to maximize the guidance, advice, service, and opportunity to the students.
- d) Defined a sustainable 2+2 program. We will develop and implement broader and more sustainable (win-win) partnership programs with community colleges in the region and across the state that will:
 - Broaden pipeline of transfer students from the community colleges,

	<p>develop pilot programs with regional community colleges to ease transfer of students to CCI, and investigate feasibility of developing and implementing a full-fledged 2+2 articulation agreement between CCI and the community colleges.</p> <ul style="list-style-type: none"> • Help the community colleges improve graduation rates of their students and improve readiness of the students to the College and the University. <p>e) Institutionalized strategy and practice to promote diversity in student body. In conjunction with our initiatives from a) – d), we will develop mechanism to integrate existing and new diversity initiatives into the normal functions of the College, hence make them scalable and sustainable.</p> <p>4. Significantly improve quality of CCI Ph.D. programs. Highly competitive Ph.D. student body and programs are indispensable to any highly competitive academic research program. CCI will take concrete and systematic steps to increase the competitiveness of its Ph.D. programs in the following areas:</p> <ul style="list-style-type: none"> a) Broaden the pipeline and increase the quality of Ph.D. student recruitment, both domestically and internationally. Special attention will be paid to nurture and/or recruit domestic and under-represented minorities, particularly our own undergraduate and MS students into the Ph.D. program. b) Improve Ph.D. program design, student training, and supervision to enhance both technical accomplishments and professional skills (communication, leadership, teamwork, independent thinking) of the students c) Strengthen policy and practice for enhanced Ph.D. program quality assurance. All departments will: <ul style="list-style-type: none"> • Consistently monitor Ph.D. student progress and keep students on target in meeting milestones towards graduation. • Institute rigorous annual review of Ph.D. student performance d) Improve support, including financial support, to Ph.D. students e) Develop systematic ways to track and enhance CCI Ph.D. student placement
<p>D. Effectiveness measures/methods to assess outcomes/goal attainment:</p>	<ol style="list-style-type: none"> 1) Perform rigorous learning outcome assessment based on ABET and/or SACS style assessment as planned in Section C.2 2) Measure student retention rate, time to graduation, and trend of improvement 3) Develop mechanism for systematic collection of student placement data and measure student placement at all levels 4) For Ph.D. students, measure time to pass qualifier exam, candidacy, and graduation, as well as year-to-year comparison of CCI Ph.D. graduate placement.
<p>E. Assessment schedule to assess goal:</p>	<ol style="list-style-type: none"> 1) Once every semester on learning outcomes 2) Annually on retention and placement 3) Ph.D. student progress will be assessed annually 4) Bioinformatics PSM students will be assessed near the end of their 2 year course of study

<p>F. Person/group responsible:</p>	<ul style="list-style-type: none"> • Overall responsible: Dean • MS and Ph.D. programs: Associate Dean of Research and Graduate Studies, Track Coordinators, Chairs • Undergraduate programs: Associate Dean of Administration and Undergraduate Studies, Chairs
<p>G. Performance outcomes for goal:</p>	<p>1) Maintain CCI (CS and SIS) undergraduate retention and graduation rates above the university averages, and significantly improve in-major retention and graduate rates in 5 years compared to the current level as defined below:</p> <p>Freshmen:</p> <ul style="list-style-type: none"> 1-year retention: 10% 2-year retention: 15% 4-year graduation: 20% 6-year graduation: 15% <p>Transfers:</p> <ul style="list-style-type: none"> 1-year retention: 10% 2-year retention: 12% 4-year graduation: 12% 6-year graduation: 12% <p>2) Achieve and maintain diversity in the CCI undergraduate student population significantly above the national average (based on data in the well respected Computing Research Association (CRA) annual survey).</p> <p>3) Achieve college enrollment growth at undergraduate, Master’s and Ph.D. levels as summarized in Appendix D. The enrollment level for Ph.D. programs subject to proper level of University budget allocation and availability of external funding needed for supporting the Ph.D. students.</p> <p>4) College wide, achieve an average of graduating 20 Ph.D. students per year, with tracking of quality and placement of the Ph.D. graduates.</p> <p>5) Subject to approval from the University and the UNC GA, as well as availability of resource support, successfully develop and launch the group of new degree programs listed in Section C.1.</p> <p>6) For Bioinformatics and Genomics, all Ph.D. students will pass their respective assessment tests; and all Ph.D. and PSM students will either be hired or continue their education (postdocs or Ph.D. programs) within 1 year of graduation</p>
<p>H. Resources Required:</p>	<p>Refer to Appendix E.</p>

ANNUAL REPORT	
<p>I. Annual progress assessment of</p>	<p>Calendar 2012</p>

performance outcomes:

BIG

Goal #1: Workforce Development: There is a broad consensus that biotechnology will be a major economic driving force in the 21st century. Many of these new developments will rely heavily on a workforce with broad interdisciplinary training in both the computational and life sciences.

During the last year we expanded the PSM advisory committee to add members who can offer internships to our students. We also increased our PSM enrollment by approx. 30% and have a nearly 100% placement rate. 7 PSM students graduated along with 4 PhDs. Our PhD applications are down considerably.

CS

Goal #1: Leader for competitive, innovative, and society relevant computer science education

- Computer Science undergraduate enrollment growth slowed to a couple of percent after a cumulative increase of around 40% in the previous two years. However, M.S. enrollment surged by nearly 23% to 157 students. This puts a strain on our teaching and classroom resources. We are working to cap M.S. enrollment at about 140 by requiring higher test scores and grades for those we admit.
- Five CS students received prestigious NSF Graduate Research Fellowships with stipends of \$30,000 per year over 3 years. The students are Samantha Finkelstein, Jordana Hodges, Brandon Kerr, Amy Ingram, and Drew Hicks. This is the largest number of these fellowships ever awarded to a UNCC department and, indeed, is the largest number awarded to UNCC in a single year. The students were all members of the REU and STARS leadership programs, showing the effect of these programs.
- CS faculty continue to lead the development of the UNC Charlotte and Bank of America Applied Technology Program. This significant internship program has now had its first graduating class (9 this Spring). Next year there will be 17 students in the program, 11 from CCI. We expect the program to continue to grow.
- CS successfully launched ITCS 1213 and 1213L, the second course in the core computing sequence and the second lab-based course. Both ITCS 1212 and 1213 now have fixed course plans across all sections and synchronization across all labs. This permits uniformity of teaching and greatly enhances our ability to consistently measure learning outcomes for the students. We are seeing improved grades over these first two courses in the core sequence and, more importantly, students are entering 1213 and the other courses in the core sequence better prepared. Finally, Min Shin, a senior faculty member, has taken oversight of all 4 courses in the core sequence. Senior faculty leadership will permit the courses to be developed and evaluated strategically.
- The DITI projects led by Teresa Dahlberg with able assistance from Tiffany Barnes and others continue to be the largest collaborative effort in the department. Teresa was awarded three grants totaling almost \$4 million this year to initiate two new programs (STARS Scaling Project and ACM SIGBP), as well as a supplement to an existing grant, bringing DITI funding over its history to over \$14 million. The STARS scaling grant will bring the number of university and college partners from 20 to 50 over the next 5 years. This will increase CS national leadership in the areas of student leadership and quality student development.

SIS

Goal #1: Recognized leader for competitive, innovative and market-responsive computing and informatics education.

The SIS Department has developed a draft curriculum of the new BS degree in Information Technology and Security. It is on track to be formally submitted in 2013 to general administration for implementation with the current planning period.

The SIS Department is developing a draft curriculum for a MS in Cyber Security. This program will build on the Department's strengths in the undergraduate, graduate and research programs and will make this strength more visible to students looking for

qualifications at the Masters level.

The SIS department played a leadership role in the establishing the Professional Master's Degree Health informatics, an interdisciplinary program between the College of Computing and Informatics and College of Health and Human Services. The SIS department plays a critical role by offering both core courses that will be taken by all students, as well as special tracks within the PSM.

The SIS Department participated in the development of a dual degree for a Masters in Design and Computing in collaboration with Architecture and Computer Science. The dual degree with start in Fall 2013.

The SIS Department has developed new courses expanding our offerings in intelligent and adaptive systems and HCI. These courses include: Network Science, Mobile Application Development, and Web Mining. We have further developed the eScience course to promote it as a successful General Education Laboratory Science course injecting Computational Thinking into the intellectual discourse of the campus community.

The SIS Department has made a significant effort to recruit more U.S. students into the Ph.D. program representing the department for college's annual Ph.D. student recruitment effort. The department continued its tradition of rigorous annual Ph.D. student performance review with emphasis on high quality publications.

The SIS undergraduate program continues to grow at a very healthy pace. The department is actively engaged in helping place graduates (e.g. the Cyber Corps program and Bank of America's Applied Technology Program).

The SIS Department has enhanced existing relationships with private industry (e.g. the Bank of America Internship program), and federal government (e.g. the Federal Scholarship for Service Program), marketing to parents, students by hosting Explore UNC Charlotte events, and representing department in various community events to build reputation for quality, leadership and create opportunities for students as well as creating more pipeline relationships with private industry.

Working closely with CS, the SIS Department made significant efforts to integrate SIS and CS courses into respective curricula. In collaboration with the Chair of CS, a charge was given to the CS and SIS Undergraduate Curriculum Committees to recommend changes in the undergraduate curriculum to address issues of retention and graduation.

The department offered summer camps on Computer Forensics and Networking as ways to increase pipeline of high quality freshman by targeting motivated high school students and community college students. Department provided discretionary funding support for students to attend competitions (ICTF, SECCDC, Carolina Con, and Shmoo Con).

Department sponsored annual events, the Cyber Security and Privacy Symposium as well as the Software as a Service Conference, attracted enthusiastic student participation. The department has created internship opportunities for students (e.g. Deloitte, Avid Exchange, Earnest and Young, Bank of America, TIAA-CREF).

The department has three active student organizations: 49th Security Division with membership of 70+, the Student OWASP Chapter membership with membership of 10+ and Interact. The student OWASP chapter is the first student chapter of the Open Web Application Security Project (OWASP).

Overall the department has made satisfactory progress towards meeting this strategic goal. Department resource is severely stretched with continued enrollment increase on the one hand and budget reductions on the other. The department is short of full time teaching staff due to reassignment of duties and this will continue in 2013 with 2 faculty on maternity leave. We have to cover a large number of sections using part time faculty. We have experienced some difficulties in finding qualified adjunct faculty member. One approach we are taking to

mitigate this challenge is to actively develop a cadre of qualified part time instructors.

We are recently working on developing online and hybrid courses, moving towards flipped classroom teaching whenever possible. While these efforts may improve our curriculum, they do not necessary change the resource constraint picture as many of our classes are reached the size limit for lab space and the number of TAs available to run labs online or on campus. As a result we are increasing the number of sections thereby increasing the need for classroom space and TAs.

The department is actively engaged in discussions on ways to more sharply define the identity of the department, based on our strategic plan. This will not only help us establish a more visible national profile, but also lead to significant growth in academic programs and research funding.

Lack of diversity in Ph.D. student population continues to be a difficult challenge. More efforts need to put into this area in the future.

CIS PhD

In 2012, new requirements for qualifying exams have been passed and implemented, effective for PhD students first enrolled in Fall 2012. The new requirements are to ensure that students passing the qualifying exams not only have sufficient core knowledge, but also have breadth of knowledge, as well as research capabilities. The new requirements also streamline the management of qualifying exams by offering all exams for students in each track at the same time at least twice a year.

Rubrics have been further improved and applied for measuring Student Learning Outcomes in the PhD Program. Annual evaluation of PhD students has been conducted. The goal of graduating 20 PhD students per year on average has been achieved for the first time

CSI

Goal #1: The Institute will be recognized as the leader in the US in at least two application domains.

Research

- Established credibility among Complex Systems research groups and funding agencies in the country. CSI is often invited to participate in major initiatives initiated by major research universities (e.g., Arizona State University, UNC Chapel Hill), funding agencies (e.g., DARPA), and defense contractors (e.g., Institute for Defense Analyses)
- For the fourth year in a row, CSI has been one of the major research groups organizing national conferences and workshops in the area of complexity
- Under contract for three edited volumes and a chapter in the fourth volume, all related to complex systems
- All current CSI projects are extensively interdisciplinary in nature

Notable accomplishments related to Regional, National, or International Engagement

- Participated in coalitions preparing NSF proposals for national centers on computational social science, one led by Arizona State University and the other led by the University of North Carolina at Chapel Hill.
- Organized two national conferences in complexity and the humanities
- Led an international coalition preparing a series of proposals in behavioral economics
- Helped organize a short course on Complex Systems and Policy at the Annual Meeting of the American Political Science Association (the Annual Meeting was ultimately cancelled due to a hurricane)

DITI

Goal #1: Increase the size, diversity, and quality of the computing workforce, including the professoriate.

Performance outcomes have been met or exceeded, as follows:

- All continuing program requirements have been met. We received approval from all of our sponsors for annual reports and currently manage approximately **\$7 million in active awards**. We received renewal funding for all existing funded programs, including:
 - The STARS Extension grant (~\$3 million from previous years), received a no cost extension through the end of 2013.
 - The **STARS Alliance Scaling Project** received \$2.5 million from the National Science Foundation (2011-2016), and an additional \$750,000 was approved for continuation following successful review from the NSF in October 2012.
 - The **STARS Haiti Project** – \$21,000 in supplemental funding to the STARS Scaling grant initiated student service-learning in Haiti during an alternative spring break experience
 - Scaling REU supplement (\$48,000)- received supplemental funding to support undergraduate research experiences.
 - Scaling supplement (\$150,000) to expand STARS activities into high schools
 - Scaling supplement (\$26,800) to provide support to STARS Alliance leaders, staff, and participants to travel to Arlington, VA to participate in a reverse site visit with NSF
 - The **REU Site Grant** (\$180,000 received in previous years) – received one-year no-cost extension to support a few more students during 2012 and complete this grant. (In early 2012, Dr. Jamie Payton successfully received a new REU Site grant to continue the DITI REU Site for another three years.)
 - The **SSTEM Scholars** grant (~\$600,000 received in prior year)
 - The **PIRE** grant (~\$190,000) Received a no cost extension through 2013 to continue to support faculty and graduate student research at PIRE institutions here and abroad
 - The **GAANN Computing Scholars Grants** (~\$386,000) – closed out our final year of second grant.
 - **ACM SIGBP**, ~\$144,000 awarded from prior year
 - Expanding Computing Education Pathways (~\$24,000) new subcontract from Georgia Tech for STARS to provide outreach activities to improve and support computer science in ECEP states
 - The number of participants in DITI funded programs has increased and includes:
 - STARS Scaling projects: 42 partnering colleges and universities were supported
 - UNC Charlotte STARS Leadership Corps: continued regional partners, particularly with Charlotte Mecklenburg Schools and Citizen Schools
 - GAANN Computing Scholars: 11 PhD student participants and their faculty research advisors
 - REU Site: hosted 19 student participants in 8-week summer research experience
- SSTEM Scholars: The first cohort (2010) of 10 undergraduate transfer students status is as follows: two completed their degrees, 3 will graduate in May 2013, 2 withdrew due to employment, two obtained other scholarships, and one transferred to another institution. A second cohort (2011) of 9 scholars is as follows: 1 completed an MS degree, 5 are continuing, 1 became ineligible for the scholarship, and another withdrew from the scholarship program (still pursuing CS degree). A third cohort began with 2 scholars starting in Fall 2012 and 2 scholars began in Spring 2013.
- PIRE: The PIRE program supported two CCI students to undertake international research experiences in Spain/Poland and Germany.
- Positive trends in attitude and behavior indicators, learning outcomes, and academic success outcomes, among program participants, were achieved across all programs. Detailed assessment is provided in the annual reports for each individual program, with highlights mentioned in the highlights section of this report.

CyberDNA

Goals#1,2: Core Competency in Research Accomplishment

- Planning for creating an NSF IUCRC Center for Configuration Analytics and Automation in (in March 2013), which had commitment of support from various agencies and industry.
- Publishing in top tier- journal and conferences: 4 journals, and 17 conference papers in 2012-2013.
- Awarded a new grants during 2012-2013:
 - a. IUCRC Planning for \$15K, 2012
 - b. NSF Student Grant Award for \$14K, 2011-2012
 - c. NSA/ARL for ~\$370K over three years
 - d. NSF existing grant supplement for \$50K
- Gaining a national visibility in smart grid security research based on our contribution and publication in this area. This leads to invited talks by NIST and Intel and also a site visit by a team from NSA.
- Submitting SIX NSF (2 medium and 4 small) and 2 industry proposals in moving target defense, security analytics, cloud security, and cyber physical security.
- **Proposal Submitted during 2012:** The Director, Ehab Al-Shaer has submitted six proposals four of them are collaborative:
 - a. NSF IUCRC with George Mason University for \$550,000.
 - b. NSF SaTC (medium) with UNC Chapel-Hill and U Michigan for \$1,200,00.
 - c. NSF NeTS (small) with Georgia Tech for \$500,000.
 - d. NSF CREATIV (small) with UNC Charlotte Civil Engineering for \$200,000.
 - e. NSF SaTC (individual small) for \$500,000.
 - f. NSF CSR (individual small) for \$500,000.
 - g. Nominated for IBM Faculty Research Award (submitted 3/2013).

Goals# 3,4: Professional and Visibility Accomplishment

- UNC Charlotte (CyberDNA) was invited to join NSA Science of Security which is an elite team of top universities including: UIUC, CMU, NCSU and UNC Charlotte.
- General Chair of IEEE SafeConfig 2013
- Invited speaker by Bell Labs, IBM Watson, IBM RTP, ACS, NCSU, RIT.
- The creation of the NSF IUCRC Center on Configuration Analytics and Automation (CCAA) lead by UNC Charlotte offers a unique opportunity for national and international leadership and visibility in this important area.
- The outcome of our research activities in term of publication, grant award and publicity in the past two years looks substantial and promising. This will potentially lead to create critical mass in the area of security configuration analytics if the appropriate resources are provided.
- With the increasing number of projects and activities in CyberDNA, the contention between “maintaining the status quo” and “expanding the center activities to pursue the vision” also increases. Therefore, hiring faculty in the area of security formal analytics and providing annual support for the center activities become key issues for any sustainable growth of CyberDNA in order to be a national center that can provide significant societal impact in research and education.

Defense Computing

Vis Center

Goal #1: Develop trend setting research excellence in visualization and visual analytics with national and international recognition.

- During 2012, we have maintained active research funding at a level somewhat below our target of \$200K per core faculty member. The target is commensurate with other

	<p>research extensive computer science programs. We expect improvement in the next year. Current funding is from a range of sources including NSF, DHS, ARO, NIH, NIJ, EPA, and several companies.</p> <ul style="list-style-type: none"> • We have essentially met our goal in faculty membership with over 30 faculty members from a range of disciplines. Disciplines include computer science, software and information systems, bioinformatics, architecture, civil engineering, earth and atmospheric sciences, electrical and computer engineering, and others. • We have sustained a publication record of at least 4-5 peer-reviewed publications per core faculty member for a period years. These publications are in journals and conference proceedings. A majority are tier 1. • Professional leadership is demonstrated by membership on multiple program committees for top conferences, steering committees for main international conferences in the field, and associate editorships or editorial board memberships for tier 1 journals. • VisCenter members have expanded research collaborations with faculty at Kent State University, Texas A&M and other entities in Texas, Tableau Inc., and the University of Minnesota. • VisCenter faculty collaborated with Bioinformatics faculty on 3 projects. Two of these had funding from NSF and from CRI. Funding for the third project looks likely next year. • The VisCenter had major funding from DHS. This makes it one of the most prominent centers supported by DHS in the university and in the state. Two of the grants are for DHS Centers of Excellence, one in Command, Control, and Interoperability (VACCINE) and one in Natural Disasters, Coastal Infrastructure, and Emergency Response (DIEM). A grant with international partners, the University of Konstanz and the University of Stuttgart in Germany, has been awarded on critical infrastructure resiliency. • The VisCenter maintained a broad range of support with grants from NSF, NIJ, NIH, DHS, EPA the state of North Carolina, U.S. DOT, Google Research, Microsoft Research, and other agencies and companies.
<p>J. Follow-up plan to make changes as a result of assessment findings:</p>	<p>Calendar 2012</p> <p>BiG</p> <p>Goal #1: Workforce Development: There is a broad consensus that biotechnology will be a major economic driving force in the 21st century. Many of these new developments will rely heavily on a workforce with broad interdisciplinary training in both the computational and life sciences.</p> <p>We need to offer a more competitive stipend to PhD students if we expect to maintain quality and competitiveness. We plan to expand the minor with a goal of expanding the pool of potential PSM and PhD students. We are actively marketing the minor to majors in the health and info sciences.</p> <p>CS</p> <p>Goal #1: Leader for competitive, innovative, and society relevant computer science education</p> <p>We have made significant progress toward goal #1 over the past year. We have maintained the number of Ph.D. students while improving the retention rate and increasing the number of graduates per year. We now have two lab-based courses in our core curriculum, ITCS 1212 and ITCS 1213. We have synchronized teaching across sections in these courses and connected all core courses in a sequence to determine what should be taught from course to course. A senior faculty member, Min Shin, is providing strategic oversight for the whole core sequence. Based on our assessment, we will continue to pursue our plan in the coming year without major changes.</p> <p>SIS</p> <p>Goal #1: Recognized leader for competitive, innovative and market-responsive computing and informatics education.</p>

	<p>None</p> <p>CIS PhD</p> <p>We will continue recruiting high quality applicants and improving the quality of the PhD programs, especially the core requirements of each track, and the new BCB PhD program. We have initiated some changes in the requirements for qualifying exams to improve quality and will continue discussing ways to further improve the qualifying examination process. We have initiated a discussion on the responsibilities of faculty advisors in the progress of students and suggested some guidelines. We will continue this discussion and investigate ways to increase the productivities of the PhD students.</p> <p>CSI</p> <p>Goal #1: The Institute will be recognized as the leader in the US in at least two application domains.</p> <p>The group is still acting as a collection of individuals rather than as a well-defined team working on large projects. There should be a greater attention paid to identifying a few relevant issues in defense computing, healthcare, and economics; which would lead to the submission of a significant number of large-scale proposals to federal funding agencies. This will also result in a greater number of joint research publications.</p> <p>DITI</p> <p>Goal #1: Increase the size, diversity, and quality of the computing workforce, including the professoriate.</p> <p>No change to plans</p> <p>CyberDNA</p> <p>Goals#1,2: Core Competency in Research Accomplishment Goals# 3,4: Professional and Visibility Accomplishment</p> <p>Leveraging our success in the past years in creating the critical mass in this area, we will pursue/continue our activities including communicating with the more agencies and industry to increase the membership and collaboration with both CCAA and CyberDNA. We will also plan to submit I/UCRC proposals to NSF to request more supplement funding for CCAA, and organizing SafeConfig to collocate with NSA/NIST annual security automation conference. We plan to put more effort in the coming year in the visibility and creating critical mass. The college and university support is critical to be fully engaged in this activity.</p> <p>Defense Computing</p> <p>Vis Center</p> <p>Goal #1: Develop trend setting research excellence in visualization and visual analytics with national and international recognition.</p> <p>No change to plans</p>
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III. NEW STRATEGIC GOALS, ACTION PLANS AND PERFORMANCE OUTCOMES

A. Unit, Dept. or College Goal #2:

Develop focused and trend setting research excellence with national and international recognition.

B. Relationship of goal to next higher reporting unit goal:

1. To offer a portfolio of educational programs that are forward looking and responsive to the intellectual, cultural, and economic needs of the region.
2. To advance programs of research and scholarship that expand the frontiers of knowledge, including those that solve problems at the interface of disciplines and leverage discovery for the public benefit.
3. To graduate students prepared for personal success and civic responsibility in the 21st century by offering challenging degree programs, encouraging community engagement, and integrating the values of liberal education throughout the undergraduate curriculum.
4. To integrate at the graduate level quality teaching and mentoring with research to prepare the next generation of leaders.
5. To engage in focused efforts to creatively address University and community needs through internal collaboration and partnerships with public, private, and non-profit organizations.
6. To support the success of faculty and staff through career development opportunities, mentoring, and access to supportive infrastructure.

C. Action plans to achieve goal:

1. Develop CCI research leadership in selected key areas of computing and informatics. Key factors in building selected areas of excellence include a) existing college strengths and critical mass, b) emerging trend of the field , such as national priorities, job market and economy, c) University priorities, and d) regional industry and economic focus and characteristics.

The following will be CCI's focus areas in which we will dedicate resources to build critical mass and leadership:

- a) Data, knowledge and visualization (CS)
- b) Perceptive, networked robotic and intelligent systems (CS)
- c) Computer games (CS)
- d) Information, network, and cyber-security and privacy (SIS)
- e) Complex system modeling and analysis (SIS)
- f) Human Computer Interaction (SIS)
- g) Computational Genomics (BiG)
- h) Computational Proteomics (BiG)

The development of critical mass and clustering in Computer Science (CS) will follow two main themes – informatics and analytics. These two themes represent major, promising directions for discovery and innovation in the 21st Century, and are keys of using research to address critical societal problems, with major interests and investments from government and industry. They are intrinsically

interdisciplinary and require collaborative efforts. The goal of the Department of Computer Science is to establish its national leadership in informatics and analytics through the above focus areas.

The Department of Software and Information Systems (SIS) is well positioned to take advantage of new research opportunities in the emerging and growing areas including: a) leveraging our strengths in cyber security particularly in areas of emerging interests: secure and reliable infrastructure, security and privacy for social networks, software security and security for cloud computing; b) Grow our capacity in analytics, particularly modeling and simulation of complex systems; and c) promoting interdisciplinary research in human-computer interaction such as design and art informatics. These are areas of regional, national and international importance. The SIS goal is to build a cluster of 5-10 faculty/research scientists in each of its three focus areas.

The Department of Bioinformatics and Genomics has defined two key research areas and an enabling technology. The two major areas are 1) Computational Genomics and 2) Computational Proteomics. The enabling technology is High Performance Computing (HPC). Within Computational Genomics, the major subareas are plant genomics, metagenomics, and biomedical genomics, which correspond to 3 of the 4 areas noted by the National Academy. The two major subareas in Computational Proteomics are structural proteomics and analytical proteomics. These are also closely related to the National Academy's areas. Our goal is to have a minimum of 10-12 active researchers (non exclusive) in each major area. It is also likely that any funding opportunity will involve HPC. While the hardware facilities are likely to be excellent, we lack the HPC expertise to be truly competitive.

In conjunction to building critical mass and leadership in these focal areas, CCI will pay special attention in developing synergy and alignment with key industry sectors in the Charlotte region, including banking and financial services, energy, healthcare and biotechnology. This focus will also be reflected in the recruitment of new faculty members.

2. Build capacity and organization to support interdisciplinary, collaborative, high-impact, and/or use-inspired research.
- a) Actively identify and pursue critical societal problems as drivers for large-scale use-inspired research, which has received increased attention nationally and internationally.
 - b) In conjunction with a), actively pursue stronger and broader partnerships and alliances with key regional industries in banking/financial services, healthcare, energy, and biotechnology sectors. Through these partnerships, CCI will seek stronger integration of CCI's computing and informatics research and sector-specific innovation to achieve four major goals – i) establish stronger identity for CCI research across all these sectors, where Charlotte has major presence and which have global importance; ii) position CCI to better compete for external, particularly Federal, funding that are expected to increase significantly in these sectors; iii) position CCI for a major role in regional economic development; and iv) help to shape identity

	<p>and competitiveness of CCI education programs and broaden opportunities for CCI students through these partnerships. (Note that the action plan for Goal 1 calls for a similar expansion of CCI education programs to key regional industry sectors.)</p> <ul style="list-style-type: none"> c) Actively engage and build collaborations with NCRC (Kannapolis), and involve NCRC personnel in Bioinformatics and Genomics (BiG) initiatives and faculty hiring. Similarly, BiG will actively engage CMC, as well as relevant departments on campus, in its faculty hiring and initiatives, to build critical mass and collaboration. d) Actively seek and build partnerships at the University, with industry and with other academic/industry/government partnerships nationally and internationally, to increase our capability to participate and lead large-scale and interdisciplinary projects. (See Goal 3) e) Systematically improve the CCI culture, support system, infrastructure, resources and policies necessary to support large-scale and collaborative research and partnership.
<p>D. Effectiveness measures/methods to assess outcomes/goal attainment:</p>	<ul style="list-style-type: none"> • Grant proposals and awards, overall and per faculty • Research publications in high impact journals and proceedings • Indicators of national recognition for our faculty (program chairs, editorial boards, membership of key committees, special awards) • Number/scale of collaborative projects and partnerships • Intellectual property creation • Trend data for Ph.D. student retention, graduation, and placement.
<p>E. Assessment schedule to assess goal:</p>	<p>Annually</p>
<p>F. Person/group responsible:</p>	<p>Dean and Chairs</p>
<p>G. Performance outcomes for goal:</p>	<ul style="list-style-type: none"> • Achieve and maintain \$10 million college wide annual external funding. • Significantly increase CCI faculty’s national recognition compared to the current level. The College and its departments will systematically collect the data and make comparative analysis on an annual basis. • Department of Computer Science will pursue 1-2 major collaborative research projects per year. Achieve 2-3 major, multiyear collaborative projects by the end of the planning period. All tenured/tenure-track faculty members have external funding • Department of Bioinformatics and Genomics will achieve 2-3 publications in high impact journals annually per faculty, with 1 ultra-high impact publications every 3 years. Achieve sustained annual average of \$200K external funding per faculty member • Department of Software & Information Systems will strive to place 25% of Ph.D. graduates in respected research institutions or top research labs. Have 2 large scale collaborative projects at any given time. Have at least 2 publications in high impact venues per faculty annually; and at least 1 publication in top journals or conferences every other year per research faculty.
<p>H. Resources Required:</p>	<p>See Appendix E.</p>

<p>I. Annual progress assessment of performance outcomes:</p>	<p>Calendar 2012</p> <p>BiG</p> <p>Goal #2: Focused, Trend Setting Research Excellence</p> <p>New awards are up about 15%, and the success rate for grants and contracts has improved. There has been a very substantial increase in numbers of peer reviewed publications over last years totals.</p> <p>CS</p> <p>Goal #2: Excellence in focused, trend-setting research</p> <ul style="list-style-type: none"> • For the past year, CS new external research awards amounted to over \$2.25M. The total value of active awards is \$18.3M. This constitutes strong external support for research in a year when budgets at funding agencies have tightened considerably. • The CS track of the IT Ph.D. program maintained its level of 66 Ph.D. students, thus retaining its position as the largest departmental Ph.D. track at the university. This is in spite of graduating 5 Ph.D. students in the past year. Although the number of graduates will fluctuate from year to year, CS is on track to increase its graduation rate in the coming years. Tenure-track positions are tough to find right now, of course, but the CS graduates are getting good research positions at universities and companies. • The CS Department strengthened its university-wide and regional leadership in homeland security, resilience, and emergency response with faculty being involved in or leading several government-funded national and international efforts. Among these are co-leads in two DHS Centers of Excellence, for disaster response, emergency management, and coastal infrastructure (DIEM) and for command, control, and interoperability (VACCINE). In addition, a collaboration between faculty in CS and SIS (led by Bill Ribarsky and Bill Tolone from the 2 departments) has led to a new project on visual analytics for critical infrastructure and resiliency, centered around the energy grid. This is a joint project with universities and a utility company in Germany and with U.S. partners (Purdue, Pacific Northwest National Lab, Duke Energy). This project will strengthen both homeland security and energy/smart grid partnerships. • Four CS faculty members were granted promotion to associate professor with tenure this year. The faculty members are Aidong Lu, Robert Kosara, Zachary Wartell, and Jing Yang. This attests to a strong departmental research program with substantial accomplishments by the promoted faculty members and good mentorship by senior departmental faculty.
	<p>SIS</p> <p>Goal #2: Focused, Trend Setting Research Excellence</p> <p>The department has initiated a number of large collaborative research initiatives, continues to attract support in existing research areas, and has new support for individual faculty research.</p> <p>A NSF I/U CRC Center on Configuration Analytics and Automation with strong support from NSA, DoD, and DHS is being established. This work is primarily based on the research expertise of SIS faculty in the Cyber DNA center but will provide an umbrella organization for collaboration more broadly in the Department and the College. The IU/CRC has already received industry support from Bank of America, and we expect to launch the Center in 2013. The center is likely to bring national visibility to UNC Charlotte in this important area of information security.</p> <p>Design Lab: The Department established a Design Lab for research and education in design computing. The research in this lab is funded by two NSF grants: one on designing for citizen science and the other on tangible interaction and creativity. This lab provides a strong base for continuing interaction with arts and architecture as well as cross-area collaboration within the College and the Department.</p>

Carolina Cyber Defender Scholarship: This scholarship program continues to receive significant external funds, with a renewal in 2012 for 4 years for a total of \$2,929,518 from NSF.

Smart Grid Research: The department has initiated research projects in smart grid security with funding from Duke Energy. This represents a concrete step towards our strategic goal of developing trend setting research in energy and sustainability. The first phase project in smart grid security was successful and discussions of follow on phases are being carried out. SIS faculty are also actively engaged in Envision Charlotte smart grid projects. A large proposal to NSF on interaction design and integrated models was submitted in collaboration with CS, Architecture, and the Department of Computational Social Science at GMU.

New funding in 2012 for individual faculty research includes an award from Google in usable security, a new award from the Naval Postgraduate School on non-linear risk, and 2 NSF awards: one on designing for citizen science and the other on designing tangibles for enhancing creativity.

Performance level for Ph.D. student continues to improve. The Cyber DNA seminars have had a positive impact on the research atmosphere of the department.

Overall the department has made satisfactory progress towards meeting this strategic goal. Department resources are severely stretched with continued enrollment increase on the one hand and budget reductions on the other. As a result faculty teaching load is high. We plan to mitigate this negative impact to some extent by using more part time teaching and TA support. However, in the long run more faculty resources must be added to sustain and grow our research program.

CIS PhD

N/A

CSI

N/A

DITI

Goal #2: Continue to advance UNC Charlotte as a national leader for broadening participation in computing research

We exceeded goals set forth, as follows:

Maintain presence as regional and national leadership of activities to broaden participation and enhance education in computing

- T. Dahlberg continued to give talks, lead initiatives, and serve on advisory boards for initiatives related to broadening participation. Efforts for 2012 are given:
 - Continued appointment to the NSF CISE Advisory Committee
 - Participant in NSF CE21 (Computing Education for the 21st Century) program meeting 2012
- Began implementing the STARS Computing Corps non-profit organization, leading the Partnership development program
- Were awarded supplemental funding for STARS Haiti project. Collaborating with nonprofit organizations Mothering Across Continents and WavePlace Foundation to provide laptops and leadership training for women and girls in third world countries.

Dissemination

- Published 1 journal article related to DITI program research outcomes
- Gave several talks around the country

	<p>National participation and adoption</p> <ul style="list-style-type: none"> • 35 colleges and universities nationally who have NSF CISE REU Sites, over half of the total number of sites, used evaluations and support tools that we created as leaders of the CISE REU Sites Evaluation Working Group • 49 colleges and universities nationally have participated in the STARS Alliance and implemented the STARS Leadership Corps; in 2012, 11 new schools joined and 31 continued • 353 students, faculty and community partners attended the STARS Celebration, including our first Industry Expo • The STARS Computing Corps, a 5013c nonprofit organization, has been established to leverage the annual STARS Celebration, to expand the STARS Alliance and to increase its participation and visibility beyond the timeframe of the STARS Scaling Project <p>CyberDNA N/A</p> <p>Defense Computing</p> <p>Vis Center Goal #2: Be a leader in educating and preparing students in research and especially develop research leadership in Ph.D. students We exceeded goals set forth, as follows:</p> <ul style="list-style-type: none"> • The VisCenter has 18 Ph.D. students in its core lab, an average of 3 Ph.D. students per core faculty member. 89% of the Ph.D. students had satisfactory ratings in the semi-annual Ph.D. review and were making good progress towards their degrees. • The VisCenter supported 6 M.S. students and 4 undergraduate students (2 were REU students) on research projects. Most of these students have or will contribute to research papers. • Of the over 20 refereed VisCenter publications in 2012, most had student co-authors. (Several of them had students a lead authors.) • The VisCenter was a main CCI participant in all the Explore UNC-Charlotte events during 2012. Students, including some undergraduate students, led these efforts in all cases. • VisCenter faculty and students took the lead in many demos for companies, including those involved with the CCI Partners Program and the DSBA Initiative, and for government visitors
<p>J. Follow-up plan to make changes as a result of assessment findings:</p>	<p>Calendar 2012 BiG Goal #2: Focused, Trend Setting Research Excellence We will continue to work to increase the visibility of our faculty in the research arena. We will continue to emphasize collaborations, especially those with the potential to lead to high dollar value grants and contracts.</p> <p>CS Goal #2: Excellence in focused, trend-setting research We have made significant progress toward goal #2 over the past year. CS is developing faculty leadership in its key research areas. This year 4 visualization faculty members were granted tenure, showing substantial strength in the research area. In addition, it is expanding its research areas while maintaining robust external funding. Based on our assessment, we will continue to pursue our plan in the coming year without major changes.</p>

	<p><u>SIS</u> Goal #2: Focused, Trend Setting Research Excellence None</p> <p><u>CIS PhD</u> N/A</p> <p><u>CSI</u> N/A</p> <p><u>DITI</u> Goal #2: Continue to advance UNC Charlotte as a national leader for broadening participation in computing research Our efforts to create an ACM SIGBP as an international community for broadening participation in computing (BPC) have changed. Instead, we are using the IEEE Computer Society (CS) to serve as a platform for an international community for BPC. We have received permission to launch an IEEE CS Special Technical Community on BP.</p> <p><u>CyberDNA</u> N/A</p> <p><u>Defense Computing</u></p> <p><u>Vis Center</u> Goal #2: Be a leader in educating and preparing students in research and especially develop research leadership in Ph.D. students No change to plans</p>
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III. NEW STRATEGIC GOALS, ACTION PLANS AND PERFORMANCE OUTCOMES

A. Unit, Dept. or College Goal #3:
Establish CCI as go-to place for partnership and collaboration

There are several key characteristics for the field of computing and informatics – it is not only an important field in its own right, but equally important, a critical driver and enabler for virtually every discipline and every sector of the economy and society. It is decidedly cross cutting. Most substantial scientific challenges (hence opportunities) in the field of computing and informatics require inter- or multi-disciplinary collaboration. There is an increasing demand for interdisciplinary knowledge and skill set for C&I professionals. Consequently, establishing CCI as hub for partnership and collaboration is critically important to the future of

the College. While specific initiatives for partnership and collaboration are embedded and incorporated in Goal 1 and Goal 2, action plans in Goal 3 focus on building organizational culture, capability, and environment.

<p>B. Relationship of goal to next higher reporting unit goal:</p>	<ol style="list-style-type: none"> 1. To offer a portfolio of educational programs that are forward looking and responsive to the intellectual, cultural, and economic needs of the region. 2. To advance programs of research and scholarship that expand the frontiers of knowledge, including those that solve problems at the interface of disciplines and leverage discovery for the public benefit. 3. To graduate students prepared for personal success and civic responsibility in the 21st Century by offering challenging degree programs, encouraging community engagement, and integrating the values of liberal education throughout the undergraduate curriculum. 4. To integrate, at the graduate level, quality teaching and mentoring with research to prepare the next generation of leaders. 5. To respond to the educational needs of a diverse community of learners through innovative programming and delivery of credit and non-credit programs of study. 6. To promote student achievement and personal development by providing high quality advising, academic services, curricular enrichment, and international experiences. 7. To engage in focused efforts to creatively address University and community needs through internal collaboration and partnerships with public, private, and non-profit organizations. 8. To support the success of faculty and staff through career development opportunities, mentoring, and access to supportive infrastructure. 9. To actively promote diversity among faculty, students, and staff and in the curriculum.
<p>C. Action plans to achieve goal:</p>	<ol style="list-style-type: none"> 1. CCI will systematic build and improve better Infrastructure and support system for supporting collaboration. In particular, CCI will devote resources, whenever possible, to build up shared research infrastructure, and develop a policy and culture that encourage the faculty to share research infrastructure funded via external sources. The College will also strengthen the communication and coordination of its various offices and staff members to more effectively support collaborations. 2. CCI will establish and strengthen appropriate policy and practice, including RPT, faculty/staff evaluation, merit raises and awards to recognize, encourage, and reward leadership and accomplishment for building <u>effective</u> partnership and collaboration. 3. CCI, whenever possible, will seek close interaction and partnership with other colleges and offices at the University, and put a priority in developing inter-college and interdisciplinary education programs (Goal 1), research collaboration, and community partnerships.

	<ol style="list-style-type: none"> 4. CCI will consider, as a major priority, and rally its resources to systematically build and strengthen its relationship, collaboration, and partnership with the Charlotte region industries, and to position the College as the key provider of human capital, expertise, innovation, and resources to regional economic development. 5. CCI will significantly expand its Business Affiliates Program into a robust CCI Business Partnership Program, and use it as a key gateway for the College to engage with the industries in the region. 6. CCI will continue to strengthen the distinction, representation (of the Charlotte industry and community) and engagement of its Advisory Board, and position the Board as an integral partnership to advance the College’s strategic goals and initiatives. 7. Leveraging its partnerships, CCI and its departments will pro-actively engage, promote, and support entrepreneurship and technology transfer to commercialize its faculty’s research results. 8. CCI will systematically increase and enhance collaboration and coordination among its units and faculty.
<p>D. Effectiveness measures/methods to assess outcomes/goal attainment:</p>	<ul style="list-style-type: none"> • Number and impacts of partnerships established • Number and amount of sponsorships and donations • Scale, activeness, and initiatives of CCI Advisory Board • New policies and practice established to stimulate collaboration • Effectiveness in achieving Goal 1 and Goal 2
<p>E. Assessment schedule to assess goal:</p>	<p>Annually</p>
<p>F. Person/group responsible:</p>	<p>Overall: Dean and Chairs Industry Relations: Executive in Residence Development and fund raising: Director of Development Policy and Procedure: Associate Dean of Undergraduate Programs and Administration</p>
<p>G. Performance outcomes for goal:</p>	<ul style="list-style-type: none"> • Expand CCI Advisory Board to 20+ members with significantly improved representation of regional industries. Significantly increase the Board’s initiatives. • Recruit 30 companies in CCI Business Partnership Program (from the current level of 7) • Achieve \$150,000 annual fund raising/sponsorship in 5 years • Establish departmental and College policies that recognize effective collaboration in annual evaluation, RPT, and merit raises • Significantly increase the number of CCI faculty members involving or leading collaborative research and education initiatives or projects
<p>H. Resources Required:</p>	<p>See Appendix E.</p>

ANNUAL REPORT	
<p>I. Annual progress</p>	<p>Calendar 2012</p>

assessment of performance outcomes:

BIG

Goal #3: Cutting edge services

We continue to grow the Service Center (facilities and personnel) and expand the range of services offered. The Center has partnered with our faculty and students to greatly expand their capabilities.

CS

Goal #3: Leader in collaborations for solving critical societal problems (or grand challenge problems)

The CS Department is taking a leadership role in developing funded research initiatives in energy and sustainability. A partnership with Duke Energy has been developed involving projects on analyzing aspects of the smart grid infrastructure and on developing tools (including serious games for citizen education) for Smart Energy Now, Duke's project to use the smart grid to reduce energy consumption in downtown Charlotte buildings. A strategic plan for seeking joint external funding with Duke will be worked out by the end of the summer.

SIS

Goal #3: Establish SIS as go-to place for partnership and collaboration

In 2012 there was a significant increase in collaborations:

- within CCI department faculty maintained active collaboration with 32 collaborative projects, an increase from 11 in 2011,
- other colleges at UNC Charlotte with 30 collaborative projects, an increase from 22 in 2011, (4),
- regional partners with 14 collaborative projects,
- other universities with 52 collaborative projects, an increase from 42 in 2011,
- international collaboration with 25 projects, an increase from 17 in 2011.

The department actively participated and endorsed college's effort to revise the RPT policies for promoting, recognizing and rewarding meaningful and effective collaborations.

The department is developing large scale collaborative projects in a number of key areas in our strategic plan: defense/home land security, smart grid, infrastructure security configurations, design, and health care. Details of these collaborations are described in section I of goal II.

The department successfully organized the annual security symposium and the annual SAAS/Cloud computing symposium. These conferences offer a great opportunity for the SIS department to develop collaborative partnerships with industry on research partnership, student internship, and student career placement.

Overall the department has made satisfactory progress towards meeting this strategic goal. However, collaborations in smart grid and healthcare have yet to reach a critical scale and attract national recognition. College level strategic funding has made a significant different in some areas and we should continue to use limited resource to fund the development of large scale collaborative proposals.

CLS PhD

N/A

CSI

N/A

DITI

Goal #3: To engage CCI faculty and students in best practices for broadening participation in computing

CCI faculty and students continue to be engaged in broadening participation through DITI activities. This year, we continued our focused on integrating “engagement” (a best practice from the STARS Alliance) throughout CCI education programs, through continuation and adaptation of four service-learning courses and the required first year engagement course. Activities and outcomes are highlighted below.

- More than a dozen CCI faculty are PI, co-PI, or senior personnel on DITI grants.
- More than ten CCI faculty and students are co-authors on DITI publications.
- More than a dozen CCI faculty include DITI broader impacts components in their research proposals
- The REU Site programs (2006-2012) have supported 131 research experiences for undergraduates (at least 35 from CCI) and have resulted in 20 students pursuing doctoral degrees in the CCI; 10 of which have receive national recognition through NSF and Dept of Homeland Security fellowships. These students are primarily from the underrepresented groups in computing
- The GAANN Computing Scholars programs have provided full scholarships for 18 high-achieving domestic IT PhD students to date, with 11 in 2012, primarily from underrepresented groups. Two of these students have been recipients of NSF fellowships.
- The SSTEM grant provides 21 high-achieving transfer students (primarily underrepresented) with three-year scholarships
- The STARS Leadership Corps has been institutionalized as a series of four service-learning courses – ITCS 3610, 3211, 3212, and 1610 continue to be offered. These courses received official service-learning designations for students’ transcripts from UNC Charlotte in 2012.
- An “engagement” course to extend STARS Leadership Corps engagement practices throughout the undergraduate program was successful and continued. The course, ITCS 1600 Computing Leaders Professionals, was taken by every new freshman and transfer student during Fall 2011 and Spring 2012. SIS will require the course, beginning 2012-2013. An additional course section is being adapted for transfer students.
- The STARS Leadership Corps has engaged over 1,000 college students (over 130 in CCI) performing outreach to over 48,000 K-12 students (over 4,000 in Charlotte) from 2006-2012.
- About 10 CCI faculty have been involved in the STARS Leadership Corps. Corps students serve as ambassadors for lab tours, Soar and other CCI activities.
- The REU Site program involves four CCI labs and has involved more than twelve CCI faculty as research mentors. DITI staff provides support for numerous other CCI REU students supported by faculty REU supplements or other programs.
- Over 12 CCI faculty participate in the GAANN program as research and teaching advisors. These faculty benefit by having their students educational and living expenses fully supported by the grants and by having their students supported by the developmental components of the GAANN program.
- The DITI manages K-12 partnership development for CCI.
- The DITI provides K-12 outreach opportunities to all CCI faculty and students, even those not directly participating in DITI programs.
- The DITI was instrumental in initiating the student engagement opportunities page on the CCI website.

CyberDNA

N/A

Defense Computing

	<p>Vis Center</p> <p>Goal #3: To develop and sustain substantial capability in partnership and collaboration</p> <ul style="list-style-type: none"> • The VisCenter had 3 collaborations with regional organizations, 9 with other universities and research labs, 3 international collaborations, and numerous collaborations with partners in CCI and UNC Charlotte. • Members of the VisCenter demo for nearly every significant visitor or group to CCI. In the past year these have included several corporations, government representatives (including from funding agencies), distinguished speakers, and regional, national, and foreign groups. Over 400 visitors participated in VisCenter demos. • The VisCenter faculty are substantially involved in the major CCI effort in data science and big data analytics. This has resulted in a funded by project on customer analytics that involves multiple companies in the region and an emerging project on business process modeling with the Special Operations Command. VisCenter faculty have led the development of a research effort in urban sustainability that resulted in a pre-proposal to NSF and a joint proposal with colleagues in SIS. Finally, VisCenter faculty are working with SIS collaborators on a project funded by CCI to develop a visual analytics + urban simulation approach. This approach will be an integration point for multiple modeling and analysis efforts resulting in a unique, powerful comprehensive predictive system. The modeling and visualization system is now a key part of the UNCC partnership with Envision Charlotte. • The VisCenter research faculty was expanded to provide support for larger efforts. In 2012, Xiaoyu Wang was promoted to Research Assistant Professor, Jack Guest became a research associate, and Wenwen Dou became a postdoctoral fellow. • We are now in Phase 2 of our project funded by the National Institute of Justice. The work addresses the notoriously hard problem faced by police and firefighters of emergency entrance, routing, and exit in large, multistory buildings. We have developed 3D routing models for all the buildings on the UNCC campus. The iPhone-based interface for mobile use of the system is now fully implemented. With it first responders can find their own routes in large buildings, keep up with the positions and actions of their colleagues, and receive precise geographically placed instructions from the command center. We are working with both the Charlotte Police Department and the Fire Department on evaluation of the system. During 2012 we ran major exercises in coordination with the UNC Charlotte Police and the Public Safety Office. Run in the Campus Library and a residence hall, the exercises were full scale training for the police SWAT team. The Chief and the Emergency Response Planner were enthusiastic about the system. Use of both our emergency response and situationally aware evacuation capabilities are being planned for the UNC Charlotte campus and discussions are underway to import the system to other campuses in the UNC system.
<p>J. Follow-up plan to make changes as a result of assessment findings:</p>	<p>Calendar 2012</p> <p>BIG</p> <p>Goal #3: Cutting edge services</p> <p>We continue to explore markets for services outside the Charlotte area, with the express goal of obtaining high value grants and contracts.</p> <p>CS</p> <p>Goal #3: Leader in collaborations for solving critical societal problems (or grand challenge problems)</p> <p>CS has taken leadership in partnership on energy and, in particular, the smart grid with Duke Energy. Joint projects have been launched with Duke Energy, an international program with German counterparts and energy companies is underway, and proposals for additional funding have been written. One or two major proposals are planned for the coming year. CS is also leading research efforts with Bank of America. . Based on our assessment, we will continue to pursue our plan in the coming year without major changes.</p>

	<p>SIS Goal #3: Establish SIS as go-to place for partnership and collaboration None</p> <p>CIS PhD N/A</p> <p>CSI N/A</p> <p>DITI Goal #3: To engage CCI faculty and students in best practices for broadening participation in computing No change to plans</p> <p>CyberDNA N/A</p> <p>Defense Computing</p> <p>Vis Center Goal #3: To develop and sustain substantial capability in partnership and collaboration No change to plans</p>
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III. NEW STRATEGIC GOALS, ACTION PLANS AND PERFORMANCE OUTCOMES

A. Unit, Dept. or College Goal #4:
Streamline College Organization and Operation

This goal focus on improving the efficiency and effectiveness of CCI organization and operations in such a way to better support Goals 1-3

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| <p>B. Relationship of goal to next higher reporting unit goal:</p> | <ol style="list-style-type: none"> 1. To offer a portfolio of educational programs that are forward looking and responsive to the intellectual, cultural, and economic needs of the region. 2. To advance programs of research and scholarship that expand the frontiers of knowledge, including those that solve problems at the interface of disciplines and leverage discovery for the public benefit. |
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	<ol style="list-style-type: none"> 3. To engage in focused efforts to creatively address University and community needs through internal collaboration and partnerships with public, private, and non-profit organizations. 4. To support the success of faculty and staff through career development opportunities, mentoring, and access to supportive infrastructure.
<p>C. Action plans to achieve goal:</p>	<ol style="list-style-type: none"> 1. Organize major CCI operations into functional clusters to achieve: <ol style="list-style-type: none"> a) Well defined points of responsibility for every major aspect of College operations, b) Well defined and informed channels of communication and coordination c) Cross training of key staff functions to reduce or eliminate bottleneck and to maintain business continuity d) Service oriented support system, mind-set, and culture 2. Establish uniform and consistent fiscal planning, management, and oversight to better support CCI's operations and priorities. 3. Consistent data/information collection, management, analysis, and dissemination to aid effective decision making <ol style="list-style-type: none"> a. Document, codify, and effectively disseminate College and departmental policies, procedures, and processes. b. Develop consistent and comprehensive data collection, organization and analysis at departmental and College levels; and establish data driven projection and planning on enrollment growth, external funding, staffing, and resource needs. 4. Streamlined and integrated college communication, marketing, development and outreach. <ol style="list-style-type: none"> a. Continue to improve and achieve a first class CCI's web presence, position CCI website as a powerful and effective means for information, marketing and outreach. b. Establish consistent and effective CCI communication, marketing and branding (through professional grade websites, newsletters, brochures, annual reports) to promote the College's programs, faculty, and students. c. Build robust alumni relations and network. d. Integrate College fund-raising with industry/community partnerships and alumni relations. 5. Establish necessary staffing in the College to bootstrap and support large scale research and education partnerships, funding, and projects. 6. Forward looking education and research infrastructure design, planning, and implementation 7. Institute a service oriented culture and organization in OTS, and improve CCI technology support and services. 8. Sustainable space planning and management (in conjunction with 6) for the Woodward building.
<p>D. Effectiveness measures/methods to assess outcomes/goal attainment:</p>	<ul style="list-style-type: none"> • Reorganization of College operations as described in the action plans, and measure its effectiveness. • Measure improvements and effectiveness in College information collection

	<p>and dissemination.</p> <ul style="list-style-type: none"> • Measure improvements and effectiveness in College marketing • Measure whether necessary staff positions are in place during this plan cycle. • Annual survey faculty/staff on technology support and service and measure improvements. • Analysis of CCI infrastructure and space effectiveness and adequacy.
E. Assessment schedule to assess goal:	Annually
F. Person/group responsible:	<p>Overall: Dean Marketing: Director of Marketing Fiscal Management: Dean, Business Manager, Chairs Information Organization: Associate Dean of Undergraduate Programs and Administration Technology Services: Director of OTS, Associate Dean of Undergraduate Programs and Administration</p>
G. Performance outcomes for goal:	<ol style="list-style-type: none"> 1. Complete reorganization of CCI staff and operations 2. Complete cross training of all CCI key staff members 3. Complete implementation of the uniform CCI fiscal planning, management, and oversight process. 4. Complete implementation of systematic CCI data/information collection, organization, and dissemination. 5. Significantly improved CCI marketing operations. 6. Improved satisfaction of CCI technology support and services as measured by faculty/staff survey.
H. Resources Required:	See Appendix E.