This Progress Report documents the implementation of the School of CTI Commitments as specified in the CTI Memorandum or Agreement (MOA) as a part of the DePaul University Cycle 5 Academic Program Review process. The preparation and distribution of this Progress Report is described in the final step of the Academic Program Review process specified in the DePaul University Guidebook for University Academic Program Review.

The Academic Program Review process gave CTI the opportunity to perform an intensive and comprehensive analysis of our academic programs and practices. This has resulted in substantive improvements to our curriculum and academic advising practices. It has given us an opportunity to analyze our retention and graduation rates, as well as student and faculty diversity. It has reinforced our commitment to academic program assessment and brought about means by which faculty and students now regularly contribute feedback that allows continuous improvements to our programs and services.

The CTI APR process started by assigning all CTI faculty into one of the following Committees:

- CTI Unit Committee
- PhD Subcommittee
- Graphics and Animation Subcommittee
- Computer Science Subcommittee
- Information Systems Subcommittee
- Distributed Systems Subcommittee
- E-Commerce Technology Subcommittee
- Human-Computer Interaction Subcommittee
- Telecommunications and Data Communications Subcommittee
- Software Engineering Subcommittee

Each subcommittee (except for the Unit Committee) was then tasked with writing a historical summary of its associated area of study along with substantive issues on the learning goals (both at the program level and at the university level), assessment methods, student satisfaction, levels of rigor, modes of instruction and study, advising/mentoring issues, career preparation and graduate school preparation issues for that area. The Office of Institutional Planning and Research (OIPR) generously supported these studies with customized web sites containing all university data on CTI available at that time. Several subcommittees supplemented this data by conducting student and alumni surveys to gain feedback on various issues. CTI administration supported this work with clerical and management assistance as well as by providing food at the meetings. The CTI APR effort has been noted (Camenisch, 2004, p. 17) for its exceptionally high level of faculty involvement.
The resulting subcommittee reports, from 20 to 50 pages each, were passed up to the Unit Committee, which reviewed, compiled and summarized results, looking for common themes and trends as well as ensuring a reasonable level of uniformity in the level of the issues raised. The Unit Committee then created the CTI self-study report, which was sent to the University APR Committee for review. This eventually resulted in the CTI APR Memorandum of Agreement (MOA), attached to this document as Appendix A.

The CTI Commitments in this MOA document are specified as a series of numbered major items, with multiple subitems under each. We will follow the same organization in this document. In each section below we first quote the specific commitments from the MOA in italics and then provide documentation of our progress on these items.

1. Analyzing and Improving Advising

The CTI MOA document contains the following items concerning academic advising at the School of CTI.

   a. *Create a detailed FAQ for each program. Create centralized web pages with all academic and career advising resources. HCI: Identify those HCI courses that would be appropriate for course guides.*
   
   b. *Appoint an advising liaison for each program committee that will report changes in program requirements to advisors.*
   
   c. *Gather students’ feedback on their advising experiences using a survey process similar to the existing system for gathering students’ feedback on their course experiences.*
   
   d. *Ensure student access to faculty within their programs by diversifying advising through videoconferencing, phone, in person etc. in lieu of attempting to assign each student an advisor specializing in the student’s major, which is difficult given the fluid nature of the school’s structure.*
   
   e. *Take a more proactive approach to advising with the purpose of improving retention. Several Programs: Track students more carefully, whether quarterly or annually, to enhance advising and support and, to improve retention.*

CTI has done significant analysis and improvement to its student advising processes based on our APR studies. CTI provides academic advising through both advising staff and faculty advisors. Staff advisors advise students on administrative matters such as CTI admissions and program requirements, class registration, financial aid, credit transfers, and student account issues. CTI faculty advise students on matters requiring domain expertise, such as course content, elective course choices, career choices and directions, class substitutions, and degree changes. Both staff advisors and CTI faculty have regular open advising hours each week that can be reserved by any student through an online advising appointment system.

The Advising Committee, a voluntary faculty committee, has taken a central role in implementing a number of cross-program policies which have improved student advising at CTI. One of the first policies was to direct the Program Committees, which are responsible for curricular content, to write up detailed Advising Guides for each academic program. These guides were broken into student advising guides, which have been published
prominently on the CTI web site, and faculty guides, which have been published on the
CTI Intranet for use by faculty and staff during student advising appointments. Each
Program Committee also has an advising liaison that reports back to the central Advising
Committee. The Advising Committee has also established regular advising training and
tutorial sessions for CTI faculty to provide instruction in common advising issues. Faculty
attendance at these training sessions has been good.

CTI has greatly enhanced its program description and FAQ pages on our web site
(http://www.cti.depaul.edu) and has been making use of a customized web-based advising
support system through the CTI Faculty/Staff Intranet for more than five years. This
system provides faculty and staff advisors with all pertinent advising information for each
student, including admissions and degree program information, course history, degree
audits and approved course substitutions. In addition, an electronic Communications Log
is kept for each student. For every advising meeting that occurs, the CTI faculty or staff
member conducting the meeting makes notes of the meeting discussion and any outcomes
in the student’s Log. This system provides two essential functions. First, if the student
comes back to see a different advisor in the future, the complete history of previous
advising meetings is available to the faculty or staff member conducting the later meeting.
Second, this system provides a valuable history of previous advising requests and outcomes
that can be used to guide how advising matters are dealt with in the future.

CTI students gain access to advising information and services through an online student
intranet known as MyCTI. After logging on with their student ID and password, a student
can view course history, degree audit and advising appointment information. They can also
make or cancel advising appointments, request a change in degree program or
concentration status, or request assistance by e-mail from this system.

In Winter 2004, CTI began offering videoconference advising appointments to all students.
These are enabled via desktop video cameras that were installed on all CTI faculty and staff
workstations in Fall 2004. Students can utilize standard videoconferencing equipment at
their home or office, if available, or they can reserve one of the special CTI advising
workstations that have been installed at all campuses (Lincoln Park, Naperville, South,
O’Hare, Barat and Rolling Meadows). This allows students without videoconferencing
capabilities at their homes or businesses to go to the closest DePaul campus to meet with a
CTI advisor by videoconference rather than travel to the Loop. When students make an
advising appointment through MyCTI, they simply indicate their desired meeting mode -
In-person, Telephone or Videoconference – and the system then notifies the corresponding
faculty or staff member of the impending meeting and mode. The faculty or staff advisor is,
therefore, ready and waiting to interact in the preferred way when the appointment time
arrives. This system has been popular with students who have difficulty traveling to the
Loop campus and we have seen steady use since its introduction.

In Spring 2004 a new appointment feedback system was added. Following each advising
appointment, the appointment scheduling system automatically sends an e-mail to the
student to ask for student feedback on how successful the meeting was and how well the
student feels they were served by the advisor. Student feedback is anonymous and a
summary of all their advising feedback is sent to each advising faculty and staff member once per academic quarter. In addition, summary information gathered across all advisors in the school is used as an assessment mechanism to gauge our overall progress in improving student satisfaction with our advising processes. The student advising outcomes data gathered over the past 8-9 months shows that CTI student satisfaction with our advising processes has been increasing over this time period.

The Advising Committee has also spearheaded the implementation of new ways for advisors to communicate with their advisees. Customized advising e-mail options now allow a faculty or staff advisor to, with a single click, send e-mail to all their advisees or to some meaningful subset (such as reads, underdogs, those nearing graduation, those with low GPAs, etc.). This has greatly improved the communications between advisors and their advisees, as advisors now regularly send reminder e-mails at important times during the academic quarter (registration time, just before drop deadlines and tuition deadlines, for example). Students have reacted well to these e-mails and this initiative has clearly been a success.

In summary, due to the APR study results, CTI has dedicated considerable work to improving our advising processes to better serve our students. We now have useful feedback mechanisms to determine how students feel about our advising and it is clear that they are more satisfied with CTI advising now than they have been in the past.

2. Maintain Excellence and Currency in the Curriculum

The CTI MOA document contains the following items concerning maintaining excellence and currency in the curriculum:

a. Continue to oversee curricula with particular attention to eliminating overlap of material across courses in both existing and new programs.

b. Simplify program requirements if possible.

c. Survey alumni to obtain information regarding which skills CTI graduates feel they need and to see which skills they received from CTI that they are actually using in their work. Develop workshops, new courses, degrees, etc. to develop additional skills if necessary.

d. Adapt program curricula to respond to emerging technologies, possibly in areas such as biometrics and nanotechnology.

e. Investigate if additional lab components can be integrated into existing courses to increase hands-on experience.

f. Explore ways to increase experiential learning that link the experience and the students’ programs together. Ways that will be explored include, but are not limited to internships, final projects, and cooperative projects with the University’s Centers & Institutes.

g. Investigate if the decline since 1988 in CTI students’ perceptions of academic rigor is an indicator of rigor problems that should be addressed. Look into the numbers/percentages of students who believe that courses are too easy and the amount of time students spend on task.

h. CS: Review the introductory programming languages sequence to see if adjustments will affect retention.
i. **CS**: Correct the unintended effects of the graduate prerequisite phase on the undergraduate curriculum, as discussed in detail in section C.2. on curriculum structure in our self-study.

j. **ECT**: Restructure the graduate curriculum to provide dual emphasis on technology and technology management

k. Make the Graduate ECT program more accessible for students with an inadequate technical background by revising the prerequisite phase and making it more rigorous.

The variety and complexity of information technologies taught at CTI continues to increase each year. CTI faculty are dedicated to keeping current in this rapidly changing landscape and to provide our students with the most up-to-date topics and materials. CTI course syllabi change nearly every time each course is taught to reflect current best practices and important new innovations.

The most important driving force behind the maintenance of excellence and currency in CTI academic programs has been the dedication of the CTI faculty to teaching. The next most important factor has been the Program Committees (PCs), which have been formed for each academic program. PC membership is voluntary and is open to all full-time faculty. Each PC continuously reviews and updates the curriculum for the academic program for which it is responsible. All PCs are subcommittees of the Undergraduate Committee or Graduate Committee, as appropriate. These higher-level committees are responsible for tackling appropriate common issues that run across all degree programs, approving changes proposed by PCs, and recommending new degree programs as appropriate. Over the past few years CTI has introduced new degree programs in Digital Cinema, Computer Games Programming and Information Assurance and Security Engineering through extensive work by these committees. A graduate degree in Medical Informatics is now being considered, and several new courses in Medical Informatics topics are being introduced this year. The Program Committees have also specifically focused on increasing the number of hands-on lab experiences that are integrated into the curricula and we have seen a substantial increase in the number of lab-oriented courses.

In addition to the program-specific changes already discussed, there has also been a fundamental change across all of our undergraduate curricula. In response to MOA items (b) and (h) above, the Undergraduate Committee began in September 2003 to consider ways to improve the introductory sequence of courses for our undergraduate students, as well as the prerequisite course requirements for our graduate students. At that time, students in our undergraduate programs typically began their CTI coursework with several courses in programming and foundational mathematics. They did not get to the “fun stuff” – creating interesting software, web sites, network configurations, etc – until they had taken at least a year of intro courses. This course structure resulted in many undergraduate students becoming discouraged and, sometimes, dropping out of CTI majors during this foundational phase. Some students even commented that their first year or two of coursework were harder than their more advanced courses, due to the focus on mathematically rigorous foundational material.

After considerable study, the Undergraduate Committee recommended that the introductory course sequence for all undergrad programs be revised so that students began
by taking a series of introductory topics courses in Computer Systems, Networking, Security, and Web Development that immersed them in interesting topics with hands-on and experiential components immediately. These introductory courses did not require extensive mathematics or formal computer science theory. The new courses were given an IT (Information Technology) label to emphasize their applicability across all degree programs in CTI. The foundational materials originally tackled during first-year courses were placed into intermediate coursework (where they can now be taught better to students with context and experience under their belts) and are applied to advanced projects during the junior and senior year coursework. This redesign provides accessible courses for non-CTI majors as well, and most IT courses have now been approved for Liberal Studies credit. The recommended curricular changes took effect in the Fall quarter of AY 2005 and have been well received.

In the Fall of 2004 we did send out a survey to most CTI alumni concerning their job skills and how well CTI has prepared them for their careers. The results have provided us with some interesting feedback and have been used to make some curricular changes. Another survey of CTI alumni and CTI employers is being conducted in Fall 2005. In addition, CTI has recently formed its first Leadership Council. The membership of the CTI Leadership Council is now at 20 individuals (June 2005) with a goal of 25 members by September 2005. The membership includes alumni, non-alumni representing major corporations and government representatives. The Council meetings are providing us with valuable information about the expectations of industry leaders for CTI graduates.

CTI experiential learning experiences have been significantly increased over the past few years. There are now 6 CTI courses that have been approved to satisfy the Junior Year Experiential Learning requirement of the Liberal Studies Program, and CTI is working with the Steans Center to develop more such courses. CTI Internship programs have also been improved. In addition, in 2004 CTI began a series of foreign study courses as a part of our Global CTI initiative. These courses are typically 2-week, faculty-led trips to other countries to investigate an aspect of the internationalization of IT. Students are introduced to the notion that Information Technology is a global, borderless enterprise and also get a flavor for dealing with other cultures in their working lives. So far CTI has led trips to Argentina and Brazil, China, the Czech Republic, Japan and Italy. The themes of these trips have covered IT in emerging markets, outsourcing, and computer gaming and animation, and computer design.

A study on academic rigor in CTI courses was completed in November 2003 and documented in the CTI College Assessment Report filed at that time (Brewster, 2003). This study looked at student responses to question Q4 on the CTI course evaluation, which asks “How difficult was this course material?” Students respond with a number between 1 and 10, where 1 represents “very easy” and 10 represents “very difficult”. We used course evaluation response data from all CTI courses offered between Fall 1995 and Spring 2003. This data consisted of 88,468 individual student evaluation responses about the difficulty of 2838 different course offerings. The results showed that student perception of difficulty or “rigor” in CTI courses increased substantially from 2001 to 2003 in both undergraduate and graduate coursework.
For all undergraduate courses, the average course difficulty rating rose from 6.62 in the year 2000 to 6.95 in 2003 – a 5% increase. The 2003 rating (6.95) was the highest average annual course difficulty rating since 1995. For graduate courses, the average course difficulty rating went from 6.59 in 2001 to 6.83 in 2003 – a 3.6% increase – which put the graduate course difficulty rating at its highest level since 1996.

Finally, the graduate ECT program has been restructured to provide a dual emphasis on technology and management. Prerequisites have been revised to require more technical material by including a Data Structure course (CSC 383) a web development course (ECT 310) and a software engineering course (SE 325). In addition, the core course requirements have been revised to provide a balance between technology courses (ECT 455, ECT 480) and technology management courses (ECT 480, ECT 582). Students are now given more latitude in choices for elective courses so they can emphasize whatever aspects of ECT are most important to them. In addition, the capstone degree requirement has been split into a capstone course for business technology (ECT 589) or an E-business technology practicum course for technology management emphasis (ECT 590).

3. Retention and Diversity of Students

The CTI MOA document contains the following items concerning retention and diversity of students.

a. Contact and work with OIPR to investigate CTI’s retention rate (one CTI sub-unit reported its “inactive passing” rate as 44%), including its possible relation to the “cast a wide net” enrollment policy, develop criteria by which to assess the implication of that rate, and, as needed, develop strategies for addressing it.

b. Investigate gender and ethnicity imbalance in retention and graduation of CTI students. Work with OIPR to compile a list of appropriate programs to benchmark against. Determine if interventions can be implemented to improve retention and graduation.

c. Continue to find ways to improve CTI’s sense of community. Continue and enhance student academic groups, clubs, and organizations designed for women and other minority groups.

d. Create orientation sessions for CTI majors.

In November, 2004, the Office of Institutional Planning and Research (OIPR) published a report titled “Benchmarking DePaul’s Retention and Graduation Rates.” (Filkins, 2004). This report compared retention and graduation rates for cohorts of DePaul full-time students entering between 1995 and 2001 to these same statistics for twenty reference institutions, representing the best mix of private, public and urban institutions who had such data available.

The results documented in this report show that DePaul students rank well above the median retention and graduation rates for the group of public institutions and for doctoral/research universities studied, while ranking slightly below median retention rates and well below median graduation rates for other private universities studied. Further, for the chosen set of comparable reference institutions, DePaul students rank well above
median for retention and graduation rates when split out by ethnic group (African-American, Asian/Pacific Islander, Latino/Latina and Caucasian groups were each studied).

To study retention and graduation rates for CTI students, we first obtained OIPR data providing detailed counts of CTI students retained into year 2, year 3 and year 4, as well as graduating after year 4, year 5 and year 6 for cohorts of CTI freshman arriving between 1995 and 2003. OIPR also provided us with the DePaul student data they used for the November 2004 report referenced above. Since we were only given DePaul data for first-time students and all comparisons in the OIPR report were for first-time students, our results below are for CTI first-time students only and does not include data for transfer students. We plan to analyze CTI transfer student retention and graduation rates in the future when we can find meaningful comparable data for DePaul or other institutions.

![Figure 1: Retention and Graduation Rates for CTI and DePaul students](image)

Figure 1 above shows the retention rates (fraction of students retained) to years 2, 3, and 4 as well as the graduation rates for 4 years, 5 years and 6 years past matriculation in the School of CTI. Data across all cohorts (1995 through 2003) was averaged, weighting for cohort size, to a single rate for each value.

We can see that CTI retention rates are slightly better than those of DePaul students overall through Years 2, 3 and 4. Also, CTI graduation rates are slightly better at Year 4 and Year 5. The overall DePaul student graduation rate at Year 6 is slightly higher than the CTI graduation rate at Year 6. Since the OIPR retention report already establishes that the DePaul rates are better, on average, than those of their chosen comparison group of 20 institutions, this implies that the CTI retention and graduation rates are also better, on average, than those of the comparison group.

Figure 2 below splits the retention and graduation rate data for School of CTI students and DePaul students by gender. Again we see that CTI retention rates and graduation rates are better than the corresponding rates for DePaul as a whole in all categories except female graduation rate at year 6, where DePaul female students graduate at a slightly higher rate than CTI female students. We note that female students graduate at a higher rate than male
students across both data sets and that the DePaul student cohorts show a greater disparity in graduation rates between male and female students than the CTI student cohorts.

![Figure 2: Retention and Graduation Rates by Gender](image)

Figures 3 and 4 below split the retention and graduation rate data for School of CTI students and DePaul students by ethnicity. We note with concern that African-American retention and graduation rates are generally lower for CTI cohorts than for DePaul cohorts, except for the Year 4 graduation rate, where they are equal. Further study is needed into the reasons why African-American students do not appear to be retained or graduated as well as other groups at CTI and at DePaul.

![Figure 3: CTI Retention and Graduation Rates by Ethnicity](image)

We can see that Latino/Latina retention and graduation rates are approximately equal for DePaul and CTI students and that CTI retention and graduation rates are generally higher than DePaul rates for Asian/Pacific Islander and Caucasian students.
We note that there seems to be an anomaly in the Asian/Pacific Islander graduation data for CTI, which shows graduation rates for this group decreasing in years 5 and 6 – something which would not happen for large data sets, since students cannot “un-graduate”.

However, the number of Asian/Pacific Islander students per year used for this study are as follows:

<table>
<thead>
<tr>
<th>Cohort</th>
<th>N</th>
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<tbody>
<tr>
<td>1994</td>
<td>5</td>
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<td>1995</td>
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<td>1996</td>
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<td>1997</td>
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<td>2001</td>
<td>53</td>
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<tr>
<td>2002</td>
<td>35</td>
</tr>
<tr>
<td>2003</td>
<td>18</td>
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</table>

Full-time Asian/Pacific Islander (A/PI) students admitted to CTI

We note that the number of A/PI students admitted per year is quite small until 1999, and then spikes with unusually large cohorts of A/PI students in 1999 and 2000. Due to our data being analyzed in Nov. 2004, the 1999 and 2000 cohorts are not included in Grad Year 6 average and the 2000 cohort students are not included in the Grad Year 5 average, perhaps offsetting those averages from their true long-term values.

The School of CTI has increased the level of student engagement through an increasingly active consortium of student organizations. There have been a number of initiatives in the past five years to encourage and support co-curricular activities among CTI students.
• The CTI Student Affairs Committee hosts a quarterly meeting of student organization advisors with student leaders to promote communication and cooperative networking among student-led efforts in CTI. There are approximately 12 active student organizations that associate themselves with CTI.
• The CTI web pages were expanded to include Student Life pages; student organizations associated with CTI are given server space for their web sites and have access to post news and calendar items directly to the web site.
• Monthly e-newsletters are published to the CTI web site. The undergraduate newsletter (10 editions) averages 900 hits per month, while the graduate newsletter (20 editions) averages about 1800 hits per month.
• CTI is the only school at DePaul that sends its quarterly newsletter, The Hyperlink, to both students and alumni.
• Career opportunities are disseminated to email lists of students connected with student organizations.
• A searchable list of internships is available through the Student Life pages.
• The Graduate Student Association has aligned itself with the CTI Alumni Board and co-sponsors several activities with them each year.
• CTI makes its facilities available to professional organizations for public meetings and the student body is invited to these meetings.

CTI provides active support, including office space, web services, and other support, for the following student organizations:

• The **Computer Science Society (CSS)**, a network of students who wish to learn more about computing and associated activities.
• The **Software Development Society**, a professional organization dedicated to learning and implementing the latest technologies through member projects, presentations, and seminars.
• The DePaul student branch of the **Institute of Electrical and Electronics Engineers (IEEE) Computer Society**, a professional organization for the information technology industry.
• The **DePaul Fundamental Research in Academic Gaming Club (DeFrag)**. DeFrag concentrates on computer and console games and game development.
• The **DePaul Linux User’s Group (DLUG)**. A group of students and faculty who wish to explore all aspects of the Linux operating system and its associated applications.
• The DePaul CTI **Graduate Student Association (GSA)**, an organization comprised of graduate students for graduate students.
• **W-ACM** - the DePaul chapter of the Association of Computing Machinery (ACM) special interest group on Women in Computing.
• The **DePaul Pakistani Student Association (PSA)**, providing support and activities for Pakistani students.
• The DePaul CTI chapter of **The National Society of Black Engineers**.
• The DePaul student chapter of the **Black Data Processing Associates (BDPA)**.
• **United Muslims Moving Ahead (UMMA)**, the Muslim Student's Association chapter at DePaul University.

• **The DePaul Indian Students Association (DISA)**, a service organization for the Indian/Indian American students at DePaul University.

• **The Chinese Student Association (CSA)**, which provides students with community building events, online bulletin board, guest book and news to connect the many Chinese students studying at CTI and DePaul

The CTI admissions and advising staff have established new student orientation sessions for both undergraduate and graduate students which have proven to be quite helpful and popular.

### 4. Assessment

The CTI MOA document contains the following items concerning assessment:

1. **Investigate and report on both best practices and current actions regarding the assessment of the effectiveness of distance learning, that goes beyond faculty impressions and student perceptions to include actual learning outcomes and a comparison of distance learners and non-distance learners.**

2. **Continue the development of school wide and program specific (learning) goals and assess the achievement of one goal each year.**

Course OnLine (COL) is CTI's system for the capture and rebroadcast of classroom activity, providing asynchronous access to most CTI lectures for registered students. The system captures audio, video, the instructors’ PC screen display, and information written on the whiteboard. After class the pieces are synchronized and uploaded to the internet for students to view and review until the end of the current quarter.

In the spring of 2001, the School of CTI began offering distance learning (DL) courses using the COL system to deliver online recordings of on-campus lectures. Course OnLine had been used previously only as a supplement for students who attended class on campus, allowing them to review lectures they may have missed. With the start of the distance learning program, CTI students were able to register for online sections, allowing them to view the entire class online, coming to a physical location only to take exams. For truly remote students, proctored exams are arranged at local trusted locations through CTI Distance Learning services.

In that first quarter, CTI offered 35 distance learning sections, each taught by a regular CTI faculty member teaching the course on campus. Participation of faculty was voluntary, as it remains today. In that first quarter, 212 CTI students accounted for 239 enrollments. The added flexibility allowed by the distance learning program quickly became a popular option for students; enrollments in distance learning grew by over 110 percent in the first year and an average of 31 percent in each subsequent year. Four years later, in the spring of 2005, 904 students accounted for 1151 enrollments in 84 distance learning sections.
Distance learning has proven successful by other measures as well. Student satisfaction surveys consistently return satisfaction rates better than 90 percent and instructor evaluation scores are similar for on-campus and online courses. Grades and withdrawal rates are equivalent to on-campus sections for most courses, and long-term completion rates appear to improve for students who take a mixture of online and on-campus courses during their career.

The School of CTI has also begun a DL assessment initiative to measure and compare the attainment of specific learning goals by both DL and non-DL students. During the Fall quarter of 2005, four courses with significant DL populations have been identified for this study: CSC 444, SE 430, ECT 425, IS 577. Each of these courses has 15-20 DL students and 15-20 non-DL students enrolled. Each course instructor has defined an important course learning goal which will be tested over several questions on the midterm exams. The scores attained by DL and non-DL students will be compared to determine whether any differences in learning goal attainment is found between these two groups. These results will be analyzed in October, 2005.

CTI has actively participated in the DePaul University assessment process since the first meetings were called to define this process in the late 1990s. Assessment can be a complex and time-consuming task for a large school such as CTI. Our first decision was to divide our assessment efforts by academic program - since CTI has no departments, this was a logical unit of assessment for our school. However, since we offer so many degree programs, this introduced some complexity into the process. Fortunately, due to the recognition by the CTI faculty of the importance of the assessment effort as well as their genuine desire to improve our academic programs, we were able to find a faculty member willing to be in charge of assessment for each program. These faculty volunteers together formed the CTI Assessment Committee, which meets regularly to oversee and customize the CTI assessment processes.

Realizing that we could not do everything at once, CTI devised the following schedule in the summer of 2001 for introducing assessment processes to our school:

<table>
<thead>
<tr>
<th></th>
<th>Masters degrees</th>
<th>Bachelors degrees</th>
<th>Ph.D. degree</th>
<th>School-wide goals</th>
<th>Institute for Prof Develmt</th>
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</thead>
<tbody>
<tr>
<td><strong>Definition of goals</strong></td>
<td>2001-2002 academic year; then annual</td>
<td>2002-2003 academic year; then annual</td>
<td>2002-2003 academic year; then annual</td>
<td>2002-2003 academic years; then annual</td>
<td>2003-2004 academic year; then annual</td>
</tr>
<tr>
<td><strong>Evaluation of one goal per year, including actions for improvement</strong></td>
<td>2001-2002 academic year; then annual</td>
<td>2002-2003 academic year; then annual</td>
<td>2003-2004 academic year; then annual</td>
<td>2002-2003 academic years; then annual</td>
<td>2003-2004 academic year; then annual</td>
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</table>
We have successfully implemented this schedule over the past 4 years, such that we now define and measure learning goals annually for each of our 12 bachelor’s degree programs, 11 master’s degree programs and our PhD program. All of these schedule objectives were met as planned except the PhD degree evaluation, which was delayed by one year (i.e., the first year of PhD program goal evaluation is the 2004-2005 academic year) due to the difficulties encountered in trying to define a common learning goal for such a disparate group of specialized students. In addition to defining new goals each year, each program also continues to measure goals defined in previous years. All of our annual assessment reports are available online at http://condor.depaul.edu/~tla/html/assessment_main.html. We have also begun work on assessing the joint degrees that CTI offers in conjunction with other colleges (there are currently 7 joint degree programs).

In 2003 CTI created separate committees, known as Program Committees (PCs), to oversee each degree program. Since that time, the assessment function has simply become another responsibility for each PC. Each PC appoints an Assessment Liaison who coordinates assessment activities for that particular academic program, attends Assessment Committee meetings, and writes the annual assessment report for the particular academic program.

In addition, we have now completed 3 annual cycles of college-level assessment. Two of these college reports have evaluated different aspects of our student advising systems. The third college report dealt with trends in student perceptions of CTI course rigor. Each of these studies result in useful information for improving CTI processes. The advising studies prompted improvements in our online advising systems and advising evaluation surveys. The course difficulty study showed that CTI students evaluate our courses as being increasingly rigorous and difficult over the past few years (which dispelled some faculty concerns, raised during the APR process, that our courses were getting less rigorous). In addition, it showed that our students tend to give higher instructor evaluations to those faculty who are teaching courses that are perceived as more rigorous.

5. Faculty

The CTI MOA document contains the following items concerning the faculty:

a. Expand efforts to enhance gender and ethnic diversity of CTI faculty.
b. Continue efforts to better integrate the large number of non-tenure track and adjunct faculty, including the course mentoring program which pairs adjunct faculty with full time faculty.
c. Improve and formalize the process for reviewing and providing feedback to faculty including non tenure-track/adjunct faculty.

Diversity is an active goal in the School of CTI faculty recruitment process. Our on-line job application form (http://www.cs.depaul.edu/news/jobs.asp) contains the following statement:
DePaul draws students of many backgrounds and cultures from a diverse urban setting; the School of CTI supports chapters of the ACM-W (Women), IEEE, National Society of Black Engineers and the Society of Hispanic Engineers as well as university groups for Chinese, Taiwanese, Indian, and Muslim students. Thus, CTI is interested in recruiting and maintaining a diverse group of faculty. Members of all underrepresented groups, women, veterans, and persons with disabilities are invited and encouraged to apply.

Faculty gender and ethnicity statistics for academic years 1997 – 2004 are summarized in Graphs 1 and 2 below. The CTI faculty data for these charts is taken from the Office of Institutional Planning and Research (OIPR) Fact File (OIPR, 2005). The comparable US institution data is taken from the annual Taulbee survey conducted by the Computing Research Association (CRA, 2005). The Taulbee survey provides data on faculty at all PhD-granting departments of Computer Science and Computer Engineering in the United States. We can see that CTI has consistently had a higher percentage of female faculty members compared to the national average. CTI also has nearly 3 times the percentage of African American faculty members, compared with the Taulbee national average.

![Graph 1](attachment:image1.png)

![Graph 2](attachment:image2.png)
CTI has also improved and formalized the process for reviewing and providing feedback to faculty as a result of the APR process. The CTI Personnel Committee has always conducted annual review meetings with all probationary faculty to advise them on how well they are doing in the areas of Teaching, Research and Service in comparison with the typical standards for promotion and tenure that have been established in the past. For each faculty member to be reviewed, the Personnel Committee reviews all CV materials and scholarly works done over the previous year, looks at all teaching evaluations received during that year, and reviews classroom teaching through in-class peer review. The Committee then writes up an annual performance report on each probationary faculty member as a record of these meetings.

In January, 2005 the Personnel Committee voted in a new policy where special meetings of the probationary faculty are held after the annual tenured faculty meeting vote on P&T cases so the probationary faculty can be advised of the specific issues that were raised by CTI faculty during the P&T voting process. In addition, the Personnel Committee has worked to formalize and state more precisely the CTI evaluation criteria for P&T cases to the probationary faculty.

6. Other Program Area Items

The CTI MOA document contains a number of other program items to be addressed:

a. Program Core Faculty

Several units: Investigate the nature and depth of and the possible remedies for the need felt by several programs for a core faculty or “administrative unit” to take on-going responsibility for specific programs including curricular matters and strategic planning.

The need for administrative units to take on-going responsibility for specific programs, including curricular matters and strategic planning was satisfied by the creation of Program Committees (PCs) in the Fall of AY 2004. One PC is now specifically responsible for each academic program at the undergraduate and graduate level. These PCs are designated as subcommittees of the Undergraduate and Graduate Committees, which must approve all PC policies. Any policies involving significant curricular revision must be approved by full CTI faculty after they have gone through Grad or Undergrad approval.

b. Lab Issues

ECT: Continue upgrading lab and software support for the ECT curriculum based on instructor, course and student demands.
HCL: Investigate need, space and appropriate equipment for usability lab.

ECT course lab requirements have been admirably met by a large new lab facility in CTI room 400 with 45 PC workstations and room for dozens of additional students to form ad-
hoc study groups around wireless laptop computers. This lab has specialized ECT software and development facilities.

HCI has established a usability lab in room 804 which has various types of monitoring hardware, including eye-tracking hardware. This lab has been utilized for various projects by the HCI faculty and students.

c. COL (Course On-Line) Issues

\textit{HCI: Investigate extending access to all HCI COL (course-on-line) courses to all faculty teaching in HCI. Propose to the Dean of CTI that all faculty who teach in HCI be permitted to teach on-line/distance learning. The unit will be open to working with the Dean to ensure that all faculty receive proper training.}

All faculty in all disciplines are welcome to teach COL courses at CTI. However, including DL students into class discussions and encouraging active participation in class for DL students are dual challenges for DL technologies. This concern has been particularly felt by the HCI faculty, who emphasize classroom discussions of both quantitative and qualitative aspects of web design. CTI has made steady progress in improving COL technologies to improve the student experience. We have improved the threaded discussion group capabilities of the DLweb course management software, allowing student group interactions to be supported and encouraged if faculty choose to use them.

The most recent innovation in these COL improvements has been the introduction of a synchronous DL technology in Fall 2005 that allows remote students to participate in a live classroom session from a distance using off-the-shelf workstation video cameras and microphones. Multiple distant students use simple videoconferencing client software to observe all class activities as they happen. Distant student can ask questions and participate in classroom discussions in real time. Distant student images can be put up on the class screen to allow them to make presentations to the rest of the class. Training in these new technologies is being provided by CTI technical staff.

d. Contact with Industry Leaders

\textit{IS: Form a student group dedicated to networking with both students and alumni who are interested in Information Systems and sponsoring events where students and alumni can meet with local IS industry leaders.}

Recognizing the need to formalize and expand its ongoing interactions with local IT business leaders, CTI has recently formed its first Leadership Council.

Planning for the CTI Leadership Council began in the summer of 2004 with the hiring of a Director for Development. During the summer months the name for the advisory council was chosen and the by-laws and mission statement were written. Through the Office of Advancement’s prospect research office a list of qualified alumni was generated and reviewed by Dr. Epp, Dean of CTI. This list included individuals who had achieved a high
level of success in their career (CIO, CEO, etc). John Fisher, CIO of SmithBucklin Corp and former president of the CTI Alumni Association, was also consulted regarding his contacts in the Chicago area for names of individuals who could play a valuable role on the council in advising CTI on issues relating to information technology.

The fall of 2004 was spent recruiting founding members of the CTI Leadership Council. The goal was to recruit 20-25 founding members. Each prospective member was introduced to Dr. Epp, where he explained his vision for the council. Prospective members were given a copy of the draft mission and by-laws and informed of the $2,500 annual commitment to the Fund for CTI. Two long-time CTI volunteers were recruited for the roles of Chair (John Fisher) and Vice-Chair (Laurel McGrath, Vice-President, American Express).

The membership of the CTI Leadership Council is now at 20 individuals (June 2005) with a goal of 25 members by September 2005. The membership includes alumni, non-alumni representing major corporations and government representatives.

The CTI Leadership Council was officially launched on January 26, 2005 with 15 founding members present at the first annual meeting. Fr. Holtschneider, President of DePaul University, was on hand to welcome and thank the members for their commitment to CTI and DePaul University. Dr. Epp presented on the State of the School. The meeting was highly interactive and was followed by a reception where faculty, staff and students from CTI were able to interact with the Leadership Council members.

e. Strategic Planning for TDC

*TDC: Develop a strategic plan over the course of the next year. This includes exploring all aspects of the Telecommunications program, including programs, courses, labs, research, industry trends, comparison with similar programs at other educational institutions, participation in external forums (symposiums, standards, etc.), and joint activities with industry and academia.*

The TDC Program Committee has completed an extensive review of the BS in Network Technologies and the MS in Telecommunications Systems degree programs. This has resulted in considerable curriculum modifications, including better organization of topics, new laboratory equipment and increased lab components in the courses and an increased inclusion of industry trends in the curriculum. DePaul CTI has joined and is an active participant in the Global Wireless Education Consortium (GWEC), a nationally active organization of universities and cellular/wireless industries, as a part of these efforts.

f. Research and Scholarly Activities

*PhD: Increase the visibility of research and scholarly activity at CTI through the web site.*

The Research and PhD Program portions of the CTI web site (http://www.cti.depaul.edu) have been reviewed and modified to better emphasize a number of research projects in progress at CTI. The new Research page now contains quick links to 16 active research
area groups, 11 different active research labs and 12 difference weekly research seminars that are open to all students and faculty. Most research groups and labs maintain their own web pages containing events and information about current activities. CTI has seen a significant increase in undergraduate research over the past few years.

A recent poll of 38 current CTI PhD students found an average of 4.5 peer-reviewed publications per student. PhD students had attended an average of 4.3 research conferences on their particular topic of study. Anecdotal evidence indicates that this represents an increase in scholarly activity for our PhD students from typical averages of the past.

7. Conclusions

The Academic Program Review process has resulted in substantial improvements in CTI academic programs and academic advising practices. It has given us an opportunity to analyze our retention and graduation rates and faculty diversity and review processes. It has reinforced our commitment to academic program assessment and brought about means by which faculty and students now regularly contribute feedback to help us to continuously improve our programs and services. Overall, the Academic Program Review process has been a very positive and useful experience for us.
Works Cited


Appendix A:

DePaul University Academic Program Review

Cycle 5: Spring 2002--Spring 2003

Memorandum of Agreement -- December 2003

School of Computer Science, Telecommunications, and Information Systems

As a result of the fifth cycle of DePaul University's Academic Program Review Process (Cycle 5), the participants in the process enter into the following agreements. The participants understand that this document will be available to be made public once all the signatures are in place.

University Commitments to Cycle Five Units:

1. Academic and Career Advising:
   a. The University will look into providing institutional assistance for graduate/professional school preparation in terms of publicizing and making certain that standardized test preparation programs are available.
   b. The University will look into implementing advising alerts through Campus Connect that encourage students to contact their advisors prior to enrolling in courses.

2. Diversity:

   Consistent with the University’s mission, DePaul University remains strongly committed to promoting the diversity of faculty, students, and staff. Academic Affairs will support a variety of strategies developed by departments and programs to enhance such diversity.

School of CTI Commitments:

SPECIAL NOTE: Because the inclusion of all the individual items proposed by the various CTI program areas created a document that seemed too long and unwieldy, most of them have been dropped from this document since they seem to fit under the CTI items listed below, and would seem naturally to arise as CTI pursues its initiatives throughout the college. APRC urges the specific program groups to retain those proposed items to pursue them as their part of the larger CTI initiatives. However, some items from the program areas seem sufficiently focused and/or specific to the program area suggesting them, that it was thought appropriate to retain them here as examples of what the CTI initiatives might mean for specific program areas, and to make certain that the program areas proposing them did not lose sight of them in light of the broader CTI initiatives. These have been written in italics with the initials of the program from which they have come. A third category of items from the programs did not seem to fit under the general CTI initiatives and so have been retained at the end of this document as “Other Program Area Items.”

1. Analyzing and Improving Advising
   a. Create a detailed FAQ for each program. Create centralized web pages with all academic and career advising resources. HCI: Identify those HCI courses that would be appropriate for course guides.
   b. Appoint an advising liaison for each program committee that will report changes in program requirements to advisors.
   c. Gather students’ feedback on their advising experiences using a survey process similar to the existing system for gathering students’ feedback on their course experiences.
d. Ensure student access to faculty within their programs by diversifying advising through videoconferencing, phone, in person etc. in lieu of attempting to assign each student an advisor specializing in the student’s major, which is difficult given the fluid nature of the school’s structure.

e. Take a more proactive approach to advising with the purpose of improving retention. Several Programs: Track students more carefully, whether quarterly or annually, to enhance advising and support and, to improve retention.

2. Maintain Excellence and Currency in the Curriculum
   a. Continue to oversee curricula with particular attention to eliminating overlap of material across courses in both existing and new programs.
   b. Simplify program requirements if possible.
   c. Survey alumni to obtain information regarding which skills CTI graduates feel they need and to see which skills they received from CTI that they are actually using in their work. Develop workshops, new courses, degrees, etc. to develop additional skills if necessary.
   d. Adapt program curricula to respond to emerging technologies, possibly in areas such as biometrics and nanotechnology.
   e. Investigate if additional lab components can be integrated into existing courses to increase hands-on experience.
   f. Explore ways to increase experiential learning that link the experience and the students’ programs together. Ways that will be explored include, but are not limited to internships, final projects, and cooperative projects with the University’s Centers & Institutes.
   g. Investigate if the decline since 1988 in CTI students’ perceptions of academic rigor is an indicator of rigor problems that should be addressed. Look into the numbers/percentages of students who believe that courses are too easy and the amount of time students spend on task.
   h. CS: Review the introductory programming languages sequence to see if adjustments will affect retention.
   i. CS: Correct the unintended effects of the graduate prerequisite phase on the undergraduate curriculum, as discussed in detail in section C.2. on curriculum structure in our self-study.
   j. ECT: Restructure the graduate curriculum to provide dual emphasis on technology and technology management.
   k. Make the Graduate ECT program more accessible for students with an inadequate technical background by revising the prerequisite phase and making it more rigorous.

3. Retention and Diversity of Students
   a. Contact and work with OIPR to investigate CTI’s retention rate (one CTI sub-unit reported its “inactive passing” rate as 44%), including its possible relation to the “cast a wide net” enrollment policy, develop criteria by which to assess the implication of that rate, and, as needed, develop strategies for addressing it.
   b. Investigate gender and ethnicity imbalance in retention and graduation of CTI students. Work with OIPR to compile a list of appropriate programs to benchmark against. Determine if interventions can be implemented to improve retention and graduation.
   c. Continue to find ways to improve CTI’s sense of community. Continue and enhance student academic groups, clubs, and organizations designed for women and other minority groups.
   d. Create orientation sessions for CTI majors.

4. Assessment
   a. Investigate and report on both best practices and current actions regarding the assessment of the effectiveness of distance learning, that goes beyond faculty impressions and student perceptions to include actual learning outcomes and a comparison of distance learners and non-distance learners.
b. Continue the development of school wide and program specific (learning) goals and
assess the achievement of one goal each year.

5. Faculty
   a. Expand efforts to enhance gender and ethnic diversity of CTI faculty.
   b. Continue efforts to better integrate the large number of non-tenure track and adjunct
      faculty, including the course mentoring program which pairs adjunct faculty with full
      time faculty.
   c. Improve and formalize the process for reviewing and providing feedback to faculty
      including non tenure-track/adjunct faculty.

Other Program Area Items

PROGRAM CORE FACULTY
   Several units: Investigate the nature and depth of and the possible remedies for the need felt by
   several programs for a core faculty or “administrative unit” to take on-going responsibility
   for specific programs including curricular matters and strategic planning.

LAB ISSUES
   ECT: Continue upgrading lab and software support for the ECT curriculum based on instructor,
   course and student demands.
   HCI: Investigate need, space and appropriate equipment for usability lab.

COL (COURSE ON LINE) ISSUES
   HCI: Investigate extending access to all HCI COL (course-on-line) courses to all faculty teaching in
   HCI. Propose to the Dean of CTI that all faculty who teach in HCI be permitted to teach
   on-line/distance learning. The unit will be open to working with the Dean to ensure that all
   faculty receive proper training.

CONTACT WITH INDUSTRY LEADERS
   IS: Form a student group dedicated to networking with both students and alumni who are interested
   in Information Systems and sponsoring events where students and alumni can meet with
   local IS industry leaders.

STRATEGIC PLANNING
   TDC: Develop a strategic plan over the course of the next year. This includes exploring all aspects
   of the Telecommunications program, including programs, courses, labs, research, industry
   trends, comparison with similar programs at other educational institutions, participation in
   external forums (symposiums, standards, etc.), and joint activities with industry and
   academia.

RESEARCH AND SCHOLARLY ACTIVITY
   PhD: Increase the visibility of research and scholarly activity at CTI through the web site.
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