CHARTING THE FUTURE

Discovering Opportunities
Fostering Imagination
Investing for Greatness

Bachelor of Science in Business Administration

Emphasis in Computer Information Systems

November 2003
I. PAST: REFLECTING ON OUR HERITAGE

The history of the Computer Information Systems (CIS) department is a story of innovation and responsiveness. The introduction of business oriented mainframe computers in the mid 1960s revolutionized how business processed transactions. The widespread adoption of computer technology increased the need for business professionals to assist in its integration and management. To serve the need of preparing technology savvy business professionals, the College of Business established the CIS program within the Department of Administrative Services. The program first appeared in the 1969-70 University Bulletin. Its mission was, and remains, to develop the future leaders who will oversee the emerging needs of information-technology driven business models.

In response to the change from a mainframe emphasis to micro-computing, a second technological revolution, the CIS program was restructured in the early 1980s. During that same period, the college of business administration was also reorganized. The College eliminated three academic departments, all five of the college’s graduate programs, and six of the college’s undergraduate majors. One department, the CIS department, and one minor, the CIS minor, were added during the college’s reorganization. The new CIS department was designed to move closer to the emerging micro-computing and telecommunication technologies. Program requirements to respond to new technological advances and the shifting needs of the business sector were developed and implemented.

Throughout the 1980s and 1990s, the department attracted increasing numbers of students. It also connected with, and gained the respect and financial support of, the broader academic and business communities. During that time, the department provided executive editorship and housed a prestigious journal—The International Business Computing Quarterly. In addition, the college was recognized as “a Place of Best Practice in computer applications” by the American Assembly of Collegiate Schools of Business (AACSB). Businesses and campus units welcomed the department’s well-trained student interns—including the Monfort College, which continues to use CIS students to operate its own extensive computer network.

Various corporations financially supported the department’s efforts to advance CIS program development. In 1987, Hewlett-Packard awarded the department a $175,000 grant to establish the first student micro-computing lab on UNC’s campus. Later, Hewlett-Packard gave the department an additional $250,000 grant to establish a Systems Development and a computer applications Beta Test facility within the college. The Coors Corporation funded the “Coors Room” which was the precursor of the current “smart classrooms” UNC has built throughout campus. State Farm Insurance, Bank One and ConAgra Corporations joined to fund the Decision Support Center—a $150,000 room which uses computer technology in business conferencing and strategic planning. In addition, various businesses assisted in adding computer technologies and network access to the college’s classrooms and faculty offices.

The path the CIS department has taken from the past to the present provides it with the momentum needed to deal with the technological challenges of the future. With the recent plans for eliminating the Computer Science emphasis in the college of Arts and Sciences, the CIS program is currently the only undergraduate emphasis on campus that prepares UNC students in advanced computer technologies. The development of the CIS program and its transformation to a separate department reflects academic flexibility. The CIS program coursework has
continually been upgraded and modified to prepare the future leaders of business with experiences and knowledge needed for an ever-changing world.

II. PRESENT DESCRIPTORS: FULFILLING THE MISSION

A. Unit Description

The CIS department provides the “wide tech” coursework and leadership for MCB. CIS provides core business coursework of information systems to all undergraduate majors--1,090 students in 2003. Additionally, CIS provides specialized courses for the 89 business majors who have declared a CIS emphasis and over 30 students with a minor declaration of CIS. CIS minors represent a broad spectrum of UNC students, not just business majors.

The CIS program continually updates course content and the mix of required courses to reflect trends in the ever changing technology driven business world. For example, current trends of object-oriented analysis and development are reflected in several courses. Additionally, new courses in e-commerce and web design have been developed and implemented over the past several years to provide our students with skills demanded by business. With the explosion of business usage and internet connectivity, CIS is expanding the networking course offerings which serve to enhance the learning environment of CIS students. Network security and computer forensics are new topics which are being integrated into the curriculum to provide CIS students with cutting edge knowledge. A portion of the Monfort Foundation monies are focused to simulate the technology-driven business environment faced by MCB graduates. The Monfort Foundation monies allow MCB and CIS to provide innovative technology environments that are not possible with only state monies. Additionally, these Monfort monies are leveraged with participation and partnerships with businesses such as Oracle, IBM, and Microsoft providing technology solutions.

Faculty resources represent the spectrum of industry experienced and academically qualified personnel. CIS faculty includes a Colorado Executive Professor with over 20 years of high-level industry experience and tenured professors with industry experiences in e-commerce, database design, and software design and development. These CIS department faculty stay abreast of the latest technology trends in business by maintaining contact with CIS graduates, current and prospective employers, professional associates, and employment forecasts.

CIS department faculty continually discuss in a collegial atmosphere how and where to employ the latest trends in the business world to give our students the technology “edge” over our competitors. Some technology trends require only modification of existing courses while other technology trends require the introduction of new courses and the retirement of old courses. The focus on e-commerce and networking are examples of bringing new technology to the classroom with new courses. Courses such as Decision Support Systems have been removed from the offerings to make room for new topics. Continuous improvement tenets guide the CIS department to provide the latest, up-do-date technologies for our students, ensuring both the relevance and quality of the CIS program.
B. Centrality to Mission

The mission of the CIS department is to “develop the future leaders who will oversee the emerging needs of information-technology driven business models.” This mission complements and further refines the UNC and MCB missions. The UNC mission of “offering a comprehensive array of selective admission standards based baccalaureate degrees” provides the framework within which the MCB mission “to deliver excellent undergraduate business programs that prepare students for successful careers and responsible leadership in business” melds. The CIS department mission further supports the UNC mission and vision by preparing students for professional careers requiring the abilities to think and act responsibly in a dynamic, diverse, and global society. The CIS emphasis reflects real-world experiences and critical thinking challenges throughout the course offerings.

CIS students gain experiences and provide community service by performing projects employing technology for non-profit organizations such as Meals on Wheels and United Way at no cost to the agencies. CIS students are often employed by small or start up local/regional businesses, yielding experiences for the students and allowing businesses to have quality work performed at reasonable costs.

C. External and Internal Demand for Program

The CIS department responds to both internal and external demand forces. The external demand is expressed in terms of needs for graduates with information technology skills and placement of recent graduates. Internal demand mirrors the market for graduates and service to other academic department requirements.

Internal Demand

Courses in the CIS department also support internal demand from other programs including economics, nutrition, community health, and all of the other MCB emphases. In addition to supporting programmatic requirements, many non business majors take CIS courses to assist them in meeting the employment market demands for technology information skills in non technology information jobs.

Internal demand from MCB majors for the CIS emphasis is currently impacted by two forces: (1) high quality admission standards, and (2) the economic downturn and highly publicized dot.com bust. This combination has temporarily reduced interest in the CIS emphasis. However, the current number of students declaring CIS, 89, is sustainable with available resources and provides room for growth mirroring the economic upturn and subsequent demand for technology workers. The following table shows the changes in CIS declarations during the 1995-2003 period. As reflected by the data, student counts in the CIS emphasis can rapidly increase. According to the Bureau of Labor Statistics, the economic stage is set for a rebound.

<table>
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<tr>
<th>MCB Student Major Counts</th>
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<tr>
<td>CIS</td>
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Is the program offered elsewhere in the state?

CU – Boulder, CU – Denver, CU – Colorado Springs, Colorado State University, and University of Denver all offer CIS programs. However, there are no readily available programs in the local area that compete with our offerings. In addition, some of our course offerings are unique, as is shown in section D. below.

External Demand

While IT industry employment growth has slowed in recent years, the placement rates for CIS graduates still remain high. Anecdotal emails from 2002 - 2003 graduates indicate similar rates though the time to secure the employment was lengthier than the red hot markets of 1998 – 2000.

External demand including forecast job growth and placement rates of our recent graduates predict a continuing market for MCB graduates with a CIS emphasis. Our CIS graduates are employed at HP, IBM, Level3, EDS, Qwest, and Microsoft on a regional/national level. Our graduates also fill a regional/local niche for small businesses such as ProBate Software, Poudre Valley Hospital, Syngistic, Arial, and UNC IT. Several of our recent graduates have started their own successful businesses in networking and software development.

What external demands suggest UNC keep the CIS program?

According to the Bureau of Labor Statistics, of the top ten fastest growing occupations forecast for 2000 – 2010, seven are computer/technology based. These include software applications engineers, computer support specialists, computer systems software engineers, network and computer systems administrators, network systems and data communications analysts, database administrators, and computer systems analysts. The average annual growth rate during the period is six percent. Thus, the employment forecast supports the continual preparation of UNC graduates with a CIS emphasis.

Average wages per worker in Information Technology industries are twice the national average according to the Office of Business and Industrial Analysis, Digital Economy 2002. More than half of IT jobs are “high skilled” requiring an associate degree or higher. The better paying jobs with career futures require a bachelor degree. Therefore, MCB graduates with a CIS emphasis are more employable at higher wage rates than the national average.

D. Quality of the CIS Program

The CIS department is a part of the Monfort College of Business, one of only 31 AACSB-accredited programs across the United State that are undergraduate only. The AACSB process promotes the pursuit of quality in the business curriculum. Technology implementation and preparation for business students is stressed as an integral part of the business educational experience.

A measure of quality is the achievement test results of graduating seniors on the Educational Testing Service exam. For the Fall 2003 results, the CIS students scored in the 90th percentile.
Their overall score of 166 exceeded the national average of 152.7 and the MCB average of 161.7.

As part of MCB, the CIS department embraces the concept of quality throughout the program. We share in the college quest to achieve the Baldrige National Quality Award and the Colorado Performance Excellence, Peak Award (for 2004). Such quality journeys require that we consistently employ processes to examine and improve how and what we do.

How has the department shifted the delivery of courses to meet the needs of students?

With the addition of technology focused labs such as the Advanced Networking Lab and the Decision Support Center, many courses in networking and computer programming are employing more lab time so that students have more “hands on” experiences. With the Smart Classroom environments availability, courses such as e-commerce utilize the team development concept to simulate real-world development scenarios.

How has the department used technology to enhance delivery?

In addition to usage of the specialized labs and classrooms, many faculty provide lectures on-line so that students may have ready access to information. Some of the lectures include PowerPoint slides with audio overlay. There are digital recordings of lectures available on the web to fill the void should students miss a class. Files and other digital data are available for downloading from the web or from file servers in the labs. The CIS department faculty seeks to fully utilize technology to provide the maximum learning experiences to meet the needs of our students.

Current technology resources include the specialized networking lab with multiple servers, client desktop stations, connectivity devices such as routers and hubs, and appropriately licensed network operating systems software for Microsoft, Linux, and Unix platforms. Computer systems in the Decision Support Lab are also utilized for networking experiences of students. Specialized software provided by Oracle for database, Rational (IBM) for development and design, Macromedia MX Suite for e-commerce, Microsoft .NET for software development, and SUN Java are supported in all MCB computer labs. Visio, Project Management, and other specialized software are utilized to further enhance the student learning environment.

How does the program provide students with real world experiences?

Many of the CIS courses utilize projects which simulate real-world business requirements. Some examples are presented the following table.

<table>
<thead>
<tr>
<th>Course</th>
<th>Project or Real World Experience</th>
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<tbody>
<tr>
<td>BACS 392- Advanced Networking &amp; Platforms</td>
<td>Installs operating systems, sets up firewalls, designs security plans</td>
</tr>
<tr>
<td>BACS 485 – Database</td>
<td>Builds actual database using Oracle (industry leading software)</td>
</tr>
<tr>
<td>BACS 486 – Adv. Database</td>
<td>Performs actual Database Administrator activities</td>
</tr>
<tr>
<td>BACS 487 – Systems Analysis &amp; Design</td>
<td>Designs real systems (previous projects have benefited Meals on Wheels as actual client)</td>
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BACS 488 – Senior Project  Implements actual information system (typical clients are local small businesses)

BACS 490 – Advanced e-commerce  Create working e-commerce systems (currently performing work for Lake County Sheriff and United Way)

Internships  BOCES – setting up networks for schools, SUN Microsystems – development and support

### E. Unit, Staff Productivity, Expenditures and Revenue

<table>
<thead>
<tr>
<th>MCB Placement Results</th>
<th>MCB- Bachelor Degree Recipients – Graduates Employed CIS Emphasis</th>
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<tbody>
<tr>
<td>% Placed</td>
<td>% Placed</td>
</tr>
<tr>
<td>88.9</td>
<td>100</td>
</tr>
</tbody>
</table>

Placement of graduates reflects the ultimate measure of productivity. Rates for graduates from 1998 – 2002 are presented in the accompanying table.

The faculty of CIS consistently contribute to the intellectual body of knowledge in the field. During the five year window of 1998 – 2002, the CIS faculty published or presented a total of 67 articles in the field.

During 2001-2002 and 2002-2003 academic years, the CIS faculty was responsible for producing 4,918 and 4,565 hours of undergraduate credit. On the average, this represented over 550 hours per faculty over the academic year.

### III. THE FUTURE: EXPRESSING OUR DREAMS

The University of Northern Colorado is at a cross roads in its history. Recent budget problems have caused tremendous difficulties for many units across campus. However, these same budget problems have provided the opportunity for re-evaluation and reflection on our goals, priorities, and dreams. In this, the final section of the report, we examine and discuss our vision of what UNC and the CIS department can become. If our plan for the future is supported, we believe that UNC has the potential to become a truly world-class university.

Our vision for the CIS department is guided by a set of strategic objectives. These objectives are long term in nature and will require some environmental changes at the college and university level. The objectives are listed below.

In order to be more successful in the future, the CIS department must:
- Take advantage of its unique abilities and market them aggressively, both within the University and to the external community.
- Position itself as the provider of leading-edge technology training and services for the University and surrounding region.
- Actively seek cooperative agreements with businesses and other UNC programs.
- Use its partnering contacts to generate internships, scholarships, and financial support.
- Develop products and/or services that generate revenue so that the CIS department is less dependent upon state funds over time.
These strategies will be achieved by implementing a group of tactical initiatives. The following sections describe these proposed initiatives in the context of the questions suggested in the Charting the Future guidelines document.

A. What services and functions are essential in the “new” UNC and what programs must be offered to ensure student success?

In the most general sense, UNC exists to provide educational services to the state and beyond. These services have always been, and should continue to be, geared toward a broad-based liberal arts foundation with professional preparation and real-world experience. One component that is necessary to this outcome is the existence and support of a strong College of Business Administration. Small, medium, and large-scale businesses have always been the engine that powers the economy. This will not change in the future.

Real-world businesses require information in order to make good decisions. This information is generally provided by the computer systems that collect, process, and disseminate raw data into the form and place where it is most needed. Computer systems and the information needs they support are continually changing and evolving. This creates a dynamic field of study that is absolutely necessary for modern business to survive. Because of this relationship, a viable College of Business requires a strong Computer Information Systems emphasis. By projecting this logic outward, it is also true that UNC absolutely needs a vibrant, thriving CIS emphasis.

B. How should the “new” UNC be structured?

The new UNC should be structured to foster more collaboration and cooperation between colleges and programs. This collaboration could be in the form of joint degree programs, shared courses, cross-discipline faculty research, multi-discipline student projects, and any number of other cooperative ventures. The key factor for success in all these efforts is that the University bureaucracy should not hinder cooperation; rather, it should facilitate the efficient formation of collaborations.

The new UNC should also be structured to encourage partnering between programs and external businesses. These partnerships will provide significant advantages to the University, College, and program unit including (but not limited to):

- direct financial support for students through scholarships,
- direct financial support for programs and faculty through grants and gifts,
- indirect support of students through internships and full-time employment opportunities,
- indirect support of faculty and programs through access to industry resources,
- support of program units through part-time instructors,
- support of College units through executive professors and advisory board members,
- support of the University through political contacts and advisory board members.

Once these partnerships are in place, considerable synergistic benefits will be produced in the areas of student recruitment, student retention, higher graduation rates, and alumni donations (as a result of successful careers with sponsor corporations).
In order for these partnerships to work, the University bureaucracy should be streamlined to remove barriers and encourage participation. Current procedures have occasionally had the opposite effect. Suggested changes include:

- reduce and streamline the steps needed to enter into contracts with external businesses,
- speed-up the time-frame required to enter into contracts with external parties,
- review and possibly modify the rules concerning the distribution of revenue collected from external entities.

C. How should the CIS emphasis be structured and how can partnerships help us achieve our goals?

The CIS emphasis should continue to be structured as a key component within the Monfort College of Business. However, revenue generation activities also should be supported and encouraged within the CIS department. These activities would be contained within the domain of a ‘Not-for-Profit’ entity managed by the CIS department. Specific details about these activities and their structure are given in section ‘D’ below.

In addition to revenue generating activities, curricular changes should be incorporated into the program to take advantage of the new opportunities that corporate partnering and joint programs provide. Specific suggestions are introduced below.

- Joint programs with other units within UNC should be pursued. These could include (but are not limited to) an Accounting Information Systems program that combines CIS with components of Accounting, a graphics arts CIS program, a program to combine CIS with medical services, and an agreement whereby the CIS department provides specific computing courses for the various sciences housed in the College of Arts and Sciences. The key goal of these suggestions is to effectively utilize the expertise and talent found in the CIS program.

- All CIS students should be supported and encouraged to have a valid internship experience as part of their graduation requirements. These internships would be arranged with the University, local, and regional companies and would likely take advantage of our extended corporate partnerships as they develop. The internships would provide students with the type of real-world experiences that are difficult to reproduce in the classroom and would also serve as a springboard for many students to achieve full-time employment upon graduation. In addition, the corporate sector would come to value our interns as a good source of quality part-time employees at a reasonable price.

- Our current curriculum needs to be re-worked to include subject tracks (e.g., a networking track, a database track, a web-design track, etc.). This would provide an easy way to dynamically update the program to keep up with external market demand.

- Along the same lines, the CIS minor should be restructured to require 14 to 16 hours instead of the current 18. This will require a change in the way that the University defines a “minor,” but will make our minor much more attractive to other programs on campus. Both the re-sized minor and the creation of tracks will be relatively easy ways to market the CIS program with the current staffing and resources.
Certificate programs are currently very popular in industry. These programs provide intensive training on specific subjects to individuals and corporate employees for a fee. While these programs fall outside the traditional scope of the University, they could easily be included by taking advantage of our current staffing and building infrastructure. The inclusion of certificate training programs necessarily would require the creation of the revenue generating CIS entity described below.

D. How should resources be generated and how should resources be allocated?

The CIS department is in a unique position within the University to generate revenue. The availability of the skills and talents of our faculty and students combined with an external demand for those skills provides us the opportunity to create a not-for-profit entity managed by the department. This entity would provide fee-based services to businesses using the existing faculty and students in the program. The revenue generated by these activities would be used to support the following:

- Paid student internships
- Student Scholarships (including books, fees, housing, etc.)
- Faculty research support (hardware, software, clerical, summer support)
- Faculty travel support
- Faculty training support

The suggested areas where the revenue generating entity would operate fall into three general categories. These categories, and some example activities, are briefly outlined below.

1. **Product & Service Generation Activities:**
   - Technical support desk using paid students. Subscribers would be charged a fee for access. This would provide internships for students.
   - Software development by faculty and students for a fee. The products would be owned by the not-for-profit entity and the revenue generated would be allocated by the CIS department. This could be a source for student internships. Students would not be given academic credit for participation in the internships.

2. **Employment Agency Activities:**
   - Match employer needs to faculty talents. Collect a fee for these services.
   - Match employer needs to available students. Collect a fee for these services.
   - Coordinate student talent into labor pools for employers (including fee-based consulting). Accept project tasks from employers and assign students as labor. Provides a good value for the business, real-world experience for the students, and revenue for the program.

3. **Re-training Programs:**
   - Short, technically-oriented courses for the community at large. The courses would not be degree oriented and could be in coordination with the continuing education department.
   - Customized training courses for corporations. These could be provided in an on-line format or could be taught in the traditional face-to-face mode.
   - Seminars for professionals. These could include certificate courses or stand-alone training on current topics.
   - Provide a specific number of "re-training" credits for our graduates that can be traded for free skills upgrades in the future. These would utilize the same training courses
described above. This would be a unique feature of our program as compared to other programs in the region. These revenue generating ideas represent a small sample of what could be done. The key idea behind the concept is to create an environment where faculty and students can work toward common entrepreneurial goals. This will require the modification of any rules that discourage faculty from participating in revenue generating activities. It will also likely be necessary to revisit the rules that define overhead and grant ownership of revenue generating products to the University.

E. How can we advance quality teaching and how can technology be used to create quality learning programs?

Quality teaching occurs when students are placed in an environment that encourages them to seek knowledge and ask questions. There are many ways to achieve this, but from the CIS perspective, quality teaching relies heavily on the use and availability of technology. It is also necessary to engage students in real-world activities that require creative, cooperative thinking. We believe that the following are the minimum requirements for the creation of a quality teaching and learning environment for the CIS department.

- Students and faculty should have access to cutting-edge hardware and network infrastructure.
- Students and faculty should have general access to market-leading packages and databases.
- Teaching classrooms should be equipped with modern technology to allow on-line computer demonstrations, slideshows, video presentation, and digital lecture capture.
- Students should be encouraged to complete an internship experience prior to graduation.
- CIS classes should require realistic computer projects that expose students to actual data and end-users whenever possible.
- Students should be required to write papers and to work on group projects as often as possible.
- Faculty periodically should be sent to software and hardware training seminars.
- Faculty should be provided with funds to support research activities so that the knowledge gained from these activities can be brought back into the classroom.

The curricular aspects are already in place. Likewise, many of the software and hardware components are achieved through the computer labs in the Monfort College. The main deficiencies, which our vision seeks to correct, lie in the areas of classroom and network infrastructure, and faculty research and training support.

F. How can we be more efficient and effective?

The CIS department can be more efficient and effective by leveraging our efforts through the use of technology. Examples of this include the digital capture and re-use of lecture material on specific topics, the creation of a library of on-line slideshows and software demonstrations for web-based distribution, and more extensive use of class web-sites for class administration and content distribution. All of these technology-based suggestions require an investment in hardware and software infrastructure by the University along with the requisite faculty training needed to utilize the resources.
G. How will the roles and responsibilities of faculty need to change to meet our goals and how should faculty be assisted in this process?

To achieve success, faculty must be afforded more freedom and flexibility to pursue activities that (1) benefit students, (2) enhance our programs, and (3) generate revenue. This will require streamlining and, in some cases, removal of rules that restrict these activities. For example, it should be possible to quickly create flexible program offerings that are generally available to UNC students, members of the local community, and businesses. Any revenue generated by offering these courses should be shared with the faculty and College units that create them. These funds could be used to enhance the program, create student scholarships, or reward participating faculty members.

This degree of freedom will require faculty to take a much more active role in curriculum issues and program offerings. In addition, faculty will need to become more active in the following areas.

- Faculty will need to create and nurture relationships with corporations.
- Faculty will need to submit grants for external funding.
- Faculty will need to actively seek-out internship opportunities for students.
- Faculty will need to enter into revenue generating activities. For this to occur, many of the organizational restrictions that hinder these pursuits will need to be removed.

Once the faculty are given the freedom to accept these new responsibilities, we believe that they will see the benefits and begin to act with a true entrepreneurial spirit. This spirit will benefit the students, the CIS department, the Monfort College, and UNC well into the new millennium.