

CURRICULUM DEVELOPMENT: DEVELOPING A GRADUATE DEGREE PROGRAM IN COMPETITIVE INTELLIGENCE

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ABSTRACT

Information has become an integral part of every organization. However, very few organizations have the ability to effectively manage information or gain benefit from investments in information systems. To further complicate the problem, there is a shortage in the number of individuals who are sufficiently qualified to design, build, and manage such systems. In response, Robert Morris University has created the Master of Science in Competitive Intelligence Systems degree. This paper outlines the conception, development, and implementation of this innovative program.

Keywords: Competitive Intelligence, Business Intelligence, Decision Support Systems, Graduate Curriculum

BACKGROUND / RATIONALE

Today's executives can no longer afford to rely on instinct when making strategic business decisions. Increasingly, modern organizations are relying on Competitive Intelligence (CI) and Business Intelligence (BI) to leverage information and gain return on investment from information systems. Unfortunately, there is a shortage in the number of individuals who are qualified to design, build, and manage such systems.

In response to this Competitive Intelligence "skills-gap" in the public and private sectors, Robert Morris University (RMU) has created the Master of Science in Competitive Intelligence Systems degree program. This paper discusses the conception, development, and implementation of a graduate curriculum in CI/BI. This paper outlines the demand for skilled professionals in the CI/BI industry, as well as the impact of such systems on industry, government, and academia. The Master's degree program at Robert Morris University is discussed, along with the underlying rationale for course content and course sequencing. Finally, the associated tools, techniques, and skill sets needed for a successful CI/BI curriculum are discussed.

Private Sector Demands

Technologies were "... originally introduced to business as tools to make work easier and more efficient [3]. During the 1990s, Enterprise Resource Planning (ERP) systems revolutionized modern organizations by tying together and automating the basic business processes [7]. Despite their complexity and high price, ERPs did not deliver on all that they had promised. First, ERP systems are not able to communicate outside the bounds of the organization. Second, most planning and decision making from such systems is based on historical information. Finally, and perhaps the most poignant limitation of ERP systems is the limited access to an organization's stockpiles of collected data [5].

Now, industry and academics agree that simply capturing and storing business transactions is not enough. The next set of information technologies needs to “. . . uncover the valuable business intelligence hidden in the data” [3]. Uncovering decision-making value in data takes specialized tools and, more importantly, specialized personnel skills. However, the lack of employee skill has hampered many CI/BI initiatives. Specifically, a 2005 Gartner Group study found that “Lack of user skills and knowledge of best practice is the greatest barrier to deploying business intelligence software” [9]. The study, which surveyed 920 companies, also predicted that “large enterprises will need three times as many business intelligence personnel in 2008 as they did in 2004” [9].

Other firms concur with the Gartner findings. Robert Half Technology has noticed a sizeable increase in demand for personnel with skills in business intelligence systems from vendors such as Business Objects, COGNOS, and SAS Institute. According to Robert Half’s Ryan Gilmore, “People who know how to use technology to help their companies make better strategic business decisions are in demand” [1].

Public Sector Demands

The demand for specialized Competitive Intelligence and Business Intelligence skills is further intensified by the needs of the public sector. To combat terrorist attacks following 9/11, the U.S. Government has had to combine and tap countless intelligence databases. Skilled analysts working for all levels of the government have the daunting task of mining through millions of names, places, and events to find patterns in the data that point to known terrorists or warn of impending attacks. As in the private sector, professionals in the public sector with specialized “information intelligence” skills are in scarce supply [10].

Academia

Given the increasing demand for Competitive Intelligence and Business Intelligence skills in the private and public sectors, it is not surprising that CI/BI concepts have found their way into higher education. In a recent study, the Society of Competitive Intelligence Professionals (SCIP) identified 18 universities and colleges within the U.S. who incorporate CI/BI instruction into their curricula [1].

Some of the schools in the SCIP list offer degree programs in CI and/or BI. Other schools in the list offer professional certifications in CI and/or BI. The majority of the institutions, however, offer individual courses in CI/BI only; which may be applied to master’s degrees such as an MBA or an MS-MIS. Table 1 lists the 18 schools, as well as the degree programs, certifications, and courses offered by each.

Table 1. U.S. Universities and Colleges with Offerings in CI/BI

Degree Program	American Military University, Dominican University, Simmons College
Professional Certificate	American Military University, Dominican University, Drexel University, Simmons College, Trinity College
Courses Only	Anderson School at UCLA, Brigham Young University, California Institute of Technology, Champlain College, Hawaii Pacific University, Idaho State University, Indiana University, Mercyhurst College, Rutgers, Thunderbird Graduate School, University of Hartford, University of Pittsburgh, University of Texas at Austin

TEMPLATE CURRICULUM

Curriculum Overview

As outlined in the previous section, few colleges and universities in the U.S. offer a graduate degree in Competitive Intelligence and/or Business Intelligence. In response to increased demand for employees with CI/BI skills, Robert Morris University has created the Master of Science in Competitive Intelligence Systems. The 30 credit degree program is comprised of 21 credits of required coursework and nine credits of restricted elective coursework. The restricted electives allow students to specialize in a particular area by selecting from a list of 12 course options.

The RMU program was developed based on input from curriculum guidelines published by the SCIP and from current and past practitioners in the CI/BI field [12]. The seven required courses in the program provide the student with a foundation of Competitive Intelligence concepts, tools, and techniques. The courses also provide a base in traditional and burgeoning Information Systems concepts. After completing the required courses, students are prepared to utilize CI/BI tools and apply the four-step *Intelligence Cycle* to conduct Competitive Intelligence effectively, efficiently, legally, and ethically [14]. The required courses are defined in Table 2.

In an effort to design flexibility into the program and allow graduate students to pursue individual areas of interest, nine credits of restricted electives are incorporated into the Master of Science in Competitive Intelligence Systems degree. Table 3 lists the restricted electives. Students in the program may select any three courses from the list.

Table 2. Specific Courses and Sequencing

1. INFS 6010 **Decision Support Systems Analysis and Design** - This course presents the concept of decision making within the framework of a contextualized (organizational or corporate) management information system that utilizes databases and/or spreadsheets as tools in the decision-making process.
2. INFS 6240 **Database Management Systems** - This course presents the concept of a database environment and the spectrum of capabilities considered to be part of the database management system. The course provides an overview of the

related issues in planning, designing, implementing and managing a database.

3. INFS 6510 **Competitive Intelligence Systems** - This course provides an overview of Competitive Intelligence and its functions. Emphasis is on understanding the intelligence cycle and the role of Competitive Intelligence within decision-making, strategic planning, and business development.
4. INFS 6730 **Data Warehousing** - This course explores the evolution and current theories regarding data warehousing. Data warehouse (DW) development methodologies and issues surrounding the planning and implementation of a successful DW are also covered. Emphasis is placed on DW architecture, technical concerns, and administrative issues.
5. INFS 6720 **Data Mining Applications** – This course offers the student an overview of data mining with emphasis placed on using data mining as an appropriate problem-solving strategy. The statistical techniques behind the wide variety of available data mining tools are explored. Various software packages, such as MS-Excel, SPSS, COGNOS, Data Analyzer, or Clementine may be used with case problems to give hands-on experience.
6. INFS 6490 **Computer Network Security** - This course directs the student to develop methodologies for the control and audit of computerized information systems. Topics include: security threats, preventing, detecting and dealing with viruses, security standards, authentication methods, encryption methods, access control, LAN security, firewall: TCP/IP, and security policies.
7. INFS 6310 **Cyberlaw and E-Commerce** - This course is designed to enable students in organizational studies, information technology, et al. to concentrate on the legal issues and challenges that changes in technology have created. Topics covered include: online contracting, computer crime, fraud, privacy, defamation, hate speech, indecency, obscenity, cyber-squatting intellectual property, data/software protection, and security.

Table 3. Restricted Electives

COIS	Project Management in Communications/Information Systems
INFS	Management Information Systems
INFS	Systems Analysis and Design
INFS	Networks and Data Computing/Communications
INFS	Corporate Systems Risk Mitigation
INFS	Managing Intelligence Systems
INFS	Knowledge Management
INFS	Leadership Skills in IT Project Management
INFS	Managing Software Development in IT Projects
INFS	Project Management for E-Business Applications
INFS	Quality Issues in IT Project Management
INFS	Strategic Planning in IT Project Management

Comparison of Curricula

Of the three U.S. schools that offer a graduate degree in Competitive Intelligence, RMU's program is most similar to that of Simmons College. The graduate programs at RMU and Simmons are both based on the SCIP recommendations for CI program development, including adherence to 1) The Competitive Intelligence Cycle, 2) Competitive Intelligence Curriculum Guidelines, and 3) Competencies for Intelligence Professionals [14].

The RMU program is unique, however, in that it builds on a solid background in Information Systems. This innovative approach aims to prepare the student to both *understand* and *leverage* the various and diverse information systems that may be encountered in today's organizations.

The chronological sequencing of courses in the RMU program also emphasizes the Information Systems foundation. Prerequisites force students to develop a foundation in fundamental Information Systems concepts such as Database Management Systems and Systems Analysis and Design. Building on the fundamental concepts, students are then introduced to the burgeoning fields in Information Systems such as Data Warehousing, Data Mining, and Knowledge Management. Finally, students are exposed to the ethical, legal, managerial, and communication concepts that are essential to knowledge sharing and dissemination.

Mapping the CI Curriculum to the Competitive Intelligence Cycle

Since the RMU CI Curriculum was developed in close concert with SCIP guidelines, the program courses and course sequencing readily map to the SCIP Competitive Intelligence Cycle. The four-step *Competitive Intelligence Cycle* outlines the process and sequence for translating stores of disparate data into actionable information intelligence [14]. The steps and the corresponding courses in the RMU Master of Science in Competitive Intelligence Systems degree program are presented in Table 4.

Table 4. Mapping of Curriculum to SCIP Competitive Intelligence Cycle

CI Cycle	RMU Required CI Course
1. Obtain CI Requests	INFS 6010 – Decision Support Systems Analysis and Design INFS 6220 – Systems Analysis and Design (Prereq. for INFS 6510)
2. Collect Necessary Information	INFS 6240 – Database Management Systems INFS 6730 – Data Warehousing
3. Analyze & Synthesize Information	INFS 6510 – Competitive Intelligence Systems INFS 6720 – Data Mining
4. Communicate Intelligence	INFS 6490 – Computer Network Security INFS 6310 – Cyberlaw and E-Commerce

TOOLS, TECHNIQUES, AND SKILL SETS

In order to develop qualified faculty for the CI degree program, RMU consulted the SCIP *Competencies for Intelligence Professionals*. SCIP recommends the development of faculty via four main competency sources: 1) Traits, 2) Teachable Skills, 3) Professional Experience, and 4) Mentoring [13].

In an effort to adhere to the *Traits* recommendation by SCIP, RMU sought (and continues to seek) qualified faculty with a combination of information systems, business, and communications skills. Specifically, ideal candidates are those who have a background in Information Systems concepts, such as Decision Support Systems, Systems Analysis and Design, and Database Management Systems. In addition, qualified candidates should also have business acumen in the form of an MBA or equivalent business experience.

The *Teachable Skills* guideline will be met by employing certain educational tools and techniques. More specifically, qualified faculty should have experience using CI/BI software tools and be able to bring that experience into the classroom via case studies and project assignments. Industry-leading CI/BI software tools from vendors such as Business Objects, COGNOS, SAS, and Clementine should be considered for classroom use. Qualified faculty should also have and be able to convey effective research, analysis, and presentation skills.

Since CI/BI concepts are new to academia, course textbooks on the subject are difficult to find. “Practitioner series” texts, such as *The Corporate Information Factory* (John Wiley and Sons, Inc. publishers) may be useful in conveying CI/BI theory to the graduate classroom. Other established authors in the field of CI/BI include William Inmon, Claudia Imhoff, Ralph Kimball, and Thomas Davenport. An effective CI/BI curriculum should include texts by these authors.

Professional Experience may be met by leveraging faculty who are current or past practitioners in the CI/BI field. Ideally, faculty should be able to discuss actual implementations of CI/BI systems in bona fide organizations.

Finally, the *Mentoring* guideline may be met in a number of ways. First, classroom projects may be developed around business problems in actual organizations. In this scenario, graduate faculty and students work with business organizations to analyze and make recommendations to solve existing business problems. Second, the knowledge and experience of industry *advisory boards* may be leveraged to help develop, implement, and continually improve the CI/BI curriculum.

CONCLUSION

There is an increasing demand for employees with Competitive Intelligence and Business Intelligence experience. In addition, this “skills gap” of qualified professionals has actually hampered many CI/BI implementations. To meet the demand for information intelligence professionals, many schools are incorporating CI/BI courses and degrees into their curricula.

Currently, only three U.S. schools offer a graduate degree in Competitive Intelligence and/or Business Intelligence. In response, Robert Morris University has developed the Master of

Science in Competitive Intelligence Systems. The RMU program is deeply rooted in Information Systems concepts and theory and was developed in adherence to curriculum guidelines set forth by the Society of Competitive Intelligence Professionals.

Finally, tools and techniques used in the classroom, as well as actual skill sets required by faculty, were developed from SCIP's *Competencies for Intelligence Professionals*. These competencies are derived from Traits, Teachable Skills, Professional Experience, and Mentoring.

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