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Future of Master's Level Education in Information Systems

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Erratum
The author team and content has changed since this panel report's publication. Please use the updated version and citation from now on.

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Abstract:

Master's level programs in Information Systems provide exciting opportunities for schools and departments that are willing to actively engage with their corporate partners and other key stakeholders to develop products that simultaneously address the needs of students, employers, and other stakeholders and build on the core strengths of the IS discipline. This article reports on the results of a panel discussion on master's level education in IS that took place at AMCIS 2010. The panelists included experienced program directors, curriculum experts, and academic administrators from both North America and Europe. Their contributions brought together descriptions of successful program models, in-depth understanding of how the context for master's programs in IS is changing, and ideas regarding the future direction for master's education in IS.

Keywords: IS education, curriculum recommendations, master's programs in IS

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I. INTRODUCTION

A panel discussion at the AMCIS 2010 conference addressed the present and future of master's level programs and curriculum recommendations in Information Systems, building on the foundation of the ACM/AIS curricula for MS degree programs in IS (MSIS 2000 and MSIS 2006) [Gorgone et al., 2000, 2006]. The participants focused on the role and importance of MS degree programs for the IS discipline, the content and structure that define these programs, and the ways in which these programs serve various stakeholders (including students, faculty, employers, universities). Despite the architectural changes introduced in MSIS 2006, many of the core elements of the IS model curriculum are still surprisingly similar to the core IS content of the first ACM recommendations presented in Nunamaker et al. [1982]. This partially bears testimony to the strength of those early recommendations, but it also is a call to review the contextual changes, student demand, and employer requirements affecting master's level programs in IS and to consider a more comprehensive restructuring of our collective thinking regarding these programs.

The panel was introduced and moderated by Heikki Topi, and the panelists included Markus Helfert, V. Ramesh (through a video presentation), Rolf Wigand, and Ryan Wright. The panel included experts in IS master's education as past or present MSIS program directors, leaders in national and international master's curriculum development projects, and/or academic administrators responsible for master's programs. After a brief background section, this report provides summaries of the panelists' remarks, all providing interesting insights regarding the best practices in and future directions for master's education in Information Systems. The article concludes with a brief summary of the key integrated findings from the panel.

II. BACKGROUND

The first master's level curriculum recommendation for Information Systems was prepared by the ACM Curriculum Committee on Computer Education for Management and reported in a CACM article [Ashenhurst 1972]. The 1972 report already included elements that are quite familiar to us today. Its courses were grouped into four categories: (1) Analysis of Organizational Systems; (2) Background for Systems Development; (3) Computer and Information Technology; and (4) Development of Information Systems. Ten years later, the name of the ACM committee responsible for IS curricula was the ACM Curriculum Committee on Information Systems. This committee, chaired by Jay Nunamaker, prepared a joint report for undergraduate and graduate levels [Nunamaker et al., 1982]. The 1982 report brought a number of important changes to the curriculum, forming the basis for many currently existing master's programs. These changes included the integration of managerial skills in the entire curriculum (oral and written communication and "behavioral skills," as defined in the report), specific focus on data management and data communications, inclusion of the core business courses in the curriculum, and the introduction of a capstone policy course.

The results of the first joint ACM/AIS effort to revise the master's level curriculum were published in 2000 [Gorgone et al., 2000], followed by an update in 2006 [Gorgone et al., 2006]. MSIS 2006 specifies the following key outcome expectations for master's level graduates in IS: (a) a core of IS management and technology knowledge; (b) integration of IS and business foundations; (c) broad business and real world perspective; (d) communication, interpersonal, and team skills; (e) analytical and critical thinking skills; and (f) specific skills leading to a career [Gorgone et al., 2006, p. 133]. The IS 2006 curriculum itself included two significant structural changes: first, it presented two different versions of the program (one for IS Technology and the other one for IS Management), and, second, it introduced the concept of tracks, providing the option of in-depth coverage of a specific subject area. Unfortunately, no efforts known to us have been conducted to discover how widespread the use of MSIS 2006 is or how it has been received by academic and industry stakeholders.

However, there has been active work in IS curriculum development at the undergraduate level. The IS 2010 revision of the undergraduate model curriculum in IS [Topi et al., 2010] provides a comprehensive review of the environmental changes for IS education and a broad overview of high-level IS capabilities as a foundation for the undergraduate curriculum. In addition, the development of IS 2010 took first steps in using Web 2.0 technologies in curriculum development. Specifically, a Web-based wiki tool was employed to encourage community-wide participation in the curriculum revision process. Two of the panelists (Topi and Wright) were actively involved in the IS 2010 development effort, and every participant was aware of IS 2010 as a background when they prepared for the panel.

III. MS INFORMATION SYSTEMS (MSIS) AT INDIANA UNIVERSITY

V. Ramesh, Indiana University

The MS in Information Systems program (www.kelley.iu.edu/isgp) at the Kelley School of Business at Indiana University was established in 2001. The program has seen continuous growth since its founding, growing from fourteen students in 2002 to 120 students entering the program in 2011. This growth has been achieved without compromising on quality or placement rates (> 95 percent every year).

We believe that there are four key reasons for the success of our program:

1. *Dedicated champion:* A key to our master's program success was that we took ownership of the entire student value chain, from student recruitment to curriculum delivery and placement. A dedicated champion who has been given an appropriate incentive structure and feels passionately about the program will ensure that this value chain is appropriately managed, utilizing various services provided by the school/university as appropriate.

2. *Employer relationships:* A key challenge for a master's program in Information Systems is that there is no well-defined market for its graduates. As a result, it is important that each program builds strong relationships with a base of employers who understand the value added from hiring from the program. In our case, given the focus of our curriculum, we have built relationships with firms that hire into positions in professional services, that is, IT advisory and consulting firms.

3. *Diversity in student profile:* Master's programs in Information Systems in the U.S. suffer from a key bottleneck. Their growth is often limited by the fact that students entering the program are required to have an undergraduate degree or work experience in a computing-related field. If this restriction is not in place, then a master's program is often forced to repeat much of the basic coursework in IS (albeit at a potentially more rigorous level). This, in turn, means that such a program is not very attractive to people who already have undergraduate degrees in Information Systems. A consequence of this vicious cycle is that master's programs in IS have a heavy dependence on students from abroad. Figure 1 shows that the MSIS program at IU has been able to attract undergraduate majors from a varied set of disciplines. We have also been able to maintain on average a 50:50 student ratio when it comes to domestic versus international students. Around 75 percent of our students enter our program with no work experience, while the average years of work experience of the other 25 percent is around two years, which we feel allows us to position ourselves between undergraduate and MBA degrees in terms of salary expectations of students and employers alike.

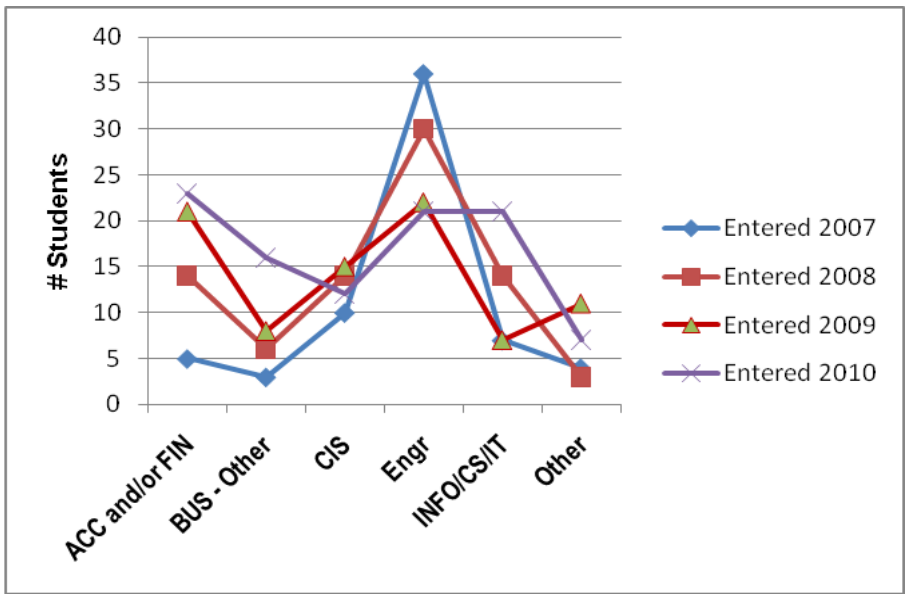

Figure 1. Undergraduate Majors of Students Entering Kelley's MSIS Program

4. In order to cater to students with such a diverse set of backgrounds, we had to think outside the box in terms of *the focus and structure of the curriculum.* Figures 2 and 3 show two views of the overall structure of the program.

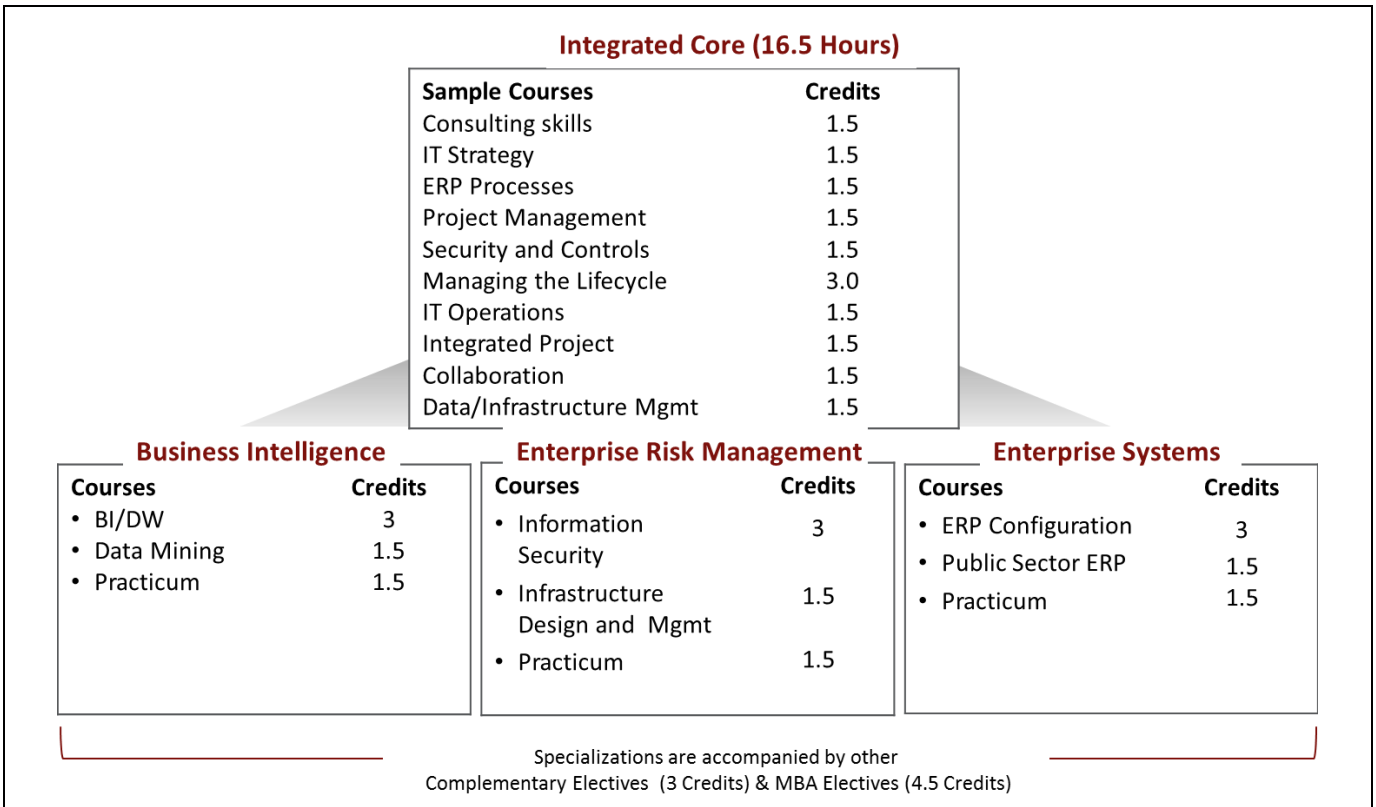

Figure 2. Program Structure Showing the Content of the Integrated Core and Concentrations

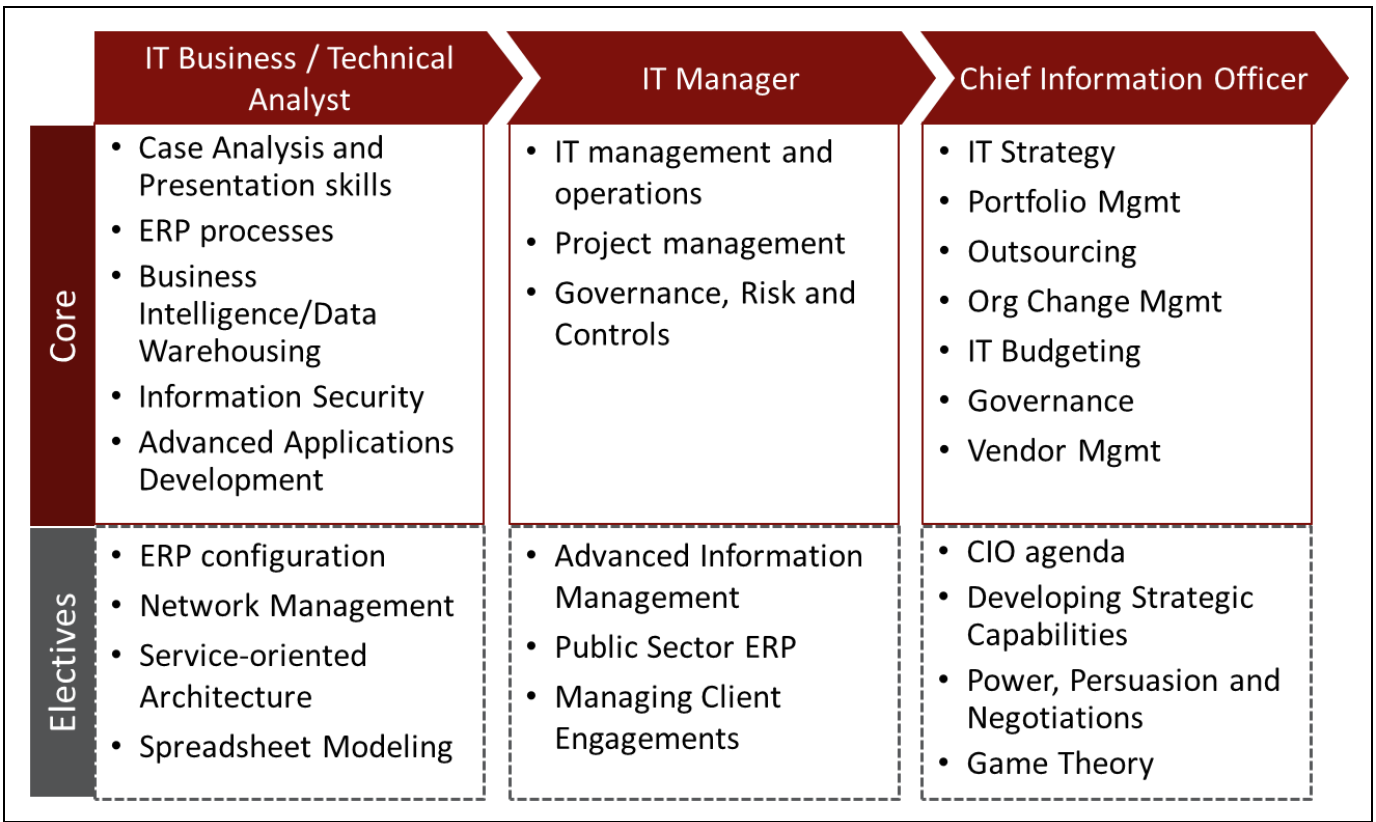

Figure 3. Program Structure Showing Subject Area/Role Matrix

The key tenets of the program can be summarized as follows:

a. The program's primary focus is on producing talent that has the knowledge-base needed to work in roles that are at the intersection of business and technology. We call these students *business technologists*.

b. To create a somewhat level playing field for students from various backgrounds, all incoming students are expected to have coursework or work experience to cover five key business areas (Accounting, Finance, Operations Management, Strategy, and Marketing) and two technical areas (Introductory Programming and Database Management). The knowledge is expected to be at the undergraduate equivalent level, and we have come up with creative ways (including online delivery) of providing students with this knowledge at a reasonable cost.

c. Given the variety of technical backgrounds of the students and the above focus, the majority of the courses have a strong managerial/client engagement orientation.

d. One of the flagship components of the MSIS program is the integrated core. Modeled after the core concept that is often used in MBA programs, the core is taught as an integrated whole with students receiving one grade for the entire 16.5 credit hours. What is represented in the figure above is an approximate distribution of credit hours across the topics. Significant effort is taken to coordinate the content across the topic areas and to create assignments that require using concepts from multiple content areas.

e. We readily embrace the coverage of various IT management and governance frameworks such as CoBIT, ITIL, ValIT, RiskIT, and PMBOK.

f. Our classes, while not targeted at industry certifications, do take input from these certifications for their design. For example, our Information Security class is designed around the CISSP content.

g. In addition to having a formal class on developing consulting skills (e.g., structured thinking or storyboarding), these concepts are also emphasized throughout the curriculum.

h. In addition to a formal course on collaboration, teamwork and collaborative skills are developed throughout the curriculum since the majority of the classes use team-based exercises.

i. IS knowledge gained from the core and concentrations is supplemented with MBA electives such as Negotiations, Spreadsheet Modeling, and Game Theory.

In summary, the MSIS program at Kelley has embarked on a number of curriculum innovations that have enabled it to provide a value-added IS curriculum to students from a variety of backgrounds. This, in turn, has enabled the program to grow at a substantial pace without compromising on quality. While the model we have here may not be applicable to all schools, it is our hope that a school can benefit from the approach as a whole or from specific aspects of the program enumerated above.

IV. MASTER'S EDUCATION IN IS: FROM "KNOWLEDGE" TO "CAPABILITIES"

Markus Helfert, Dublin City University

The work presented in this section aims to provide a European informed view on IS curricula that has been influenced by three main initiatives with which the author has been involved over several years:

- The establishment of the European MSc in Business Informatics at Dublin City University
- A reference curriculum development project for a common Master's Degree in Business Informatics in Europe
- Development of the IT-Capability Maturity Framework (IT-CMF)

Along these initiatives we carried out a study of IS programs and curricula development [Helfert, 2008, 2011]. The results identified a large variety of different IS degrees. When comparing the focus of different degree programs, our results demonstrate the identity problem of IS lacking a clear thematic profile that is unique to the discipline. We analyzed IT, IS and Business focus of the degrees. Figure 5 shows the profile diagram of the three foci. IT-oriented degrees show an emphasis on ICT, Programming, and Mathematics with a slight shift to System and Data Engineering. Comparing Business and IS degrees, it appears that both streams are characterized by a similar thematic profile.

European MSc in Business Informatics at Dublin City University

In 2005 we introduced a master's program in Business Informatics at Dublin City University—the European M.Sc. in Business Informatics. The central focus of the curriculum is to qualify individuals to lead IS-related transformations of business, enabling them to apply technological solutions and develop information system architectures to solve business problems of organizations [Helfert and Duncan, 2006]. The curriculum supports the building of capabilities for managing transformations by aiming to expand transferable skills. With this goal in mind, the curriculum focuses on an engineering perspective and the integration of cultural studies. The program is designed to be completed in one calendar year of full-time study and is intended for students with a computing background (see curriculum structure in Table 1).

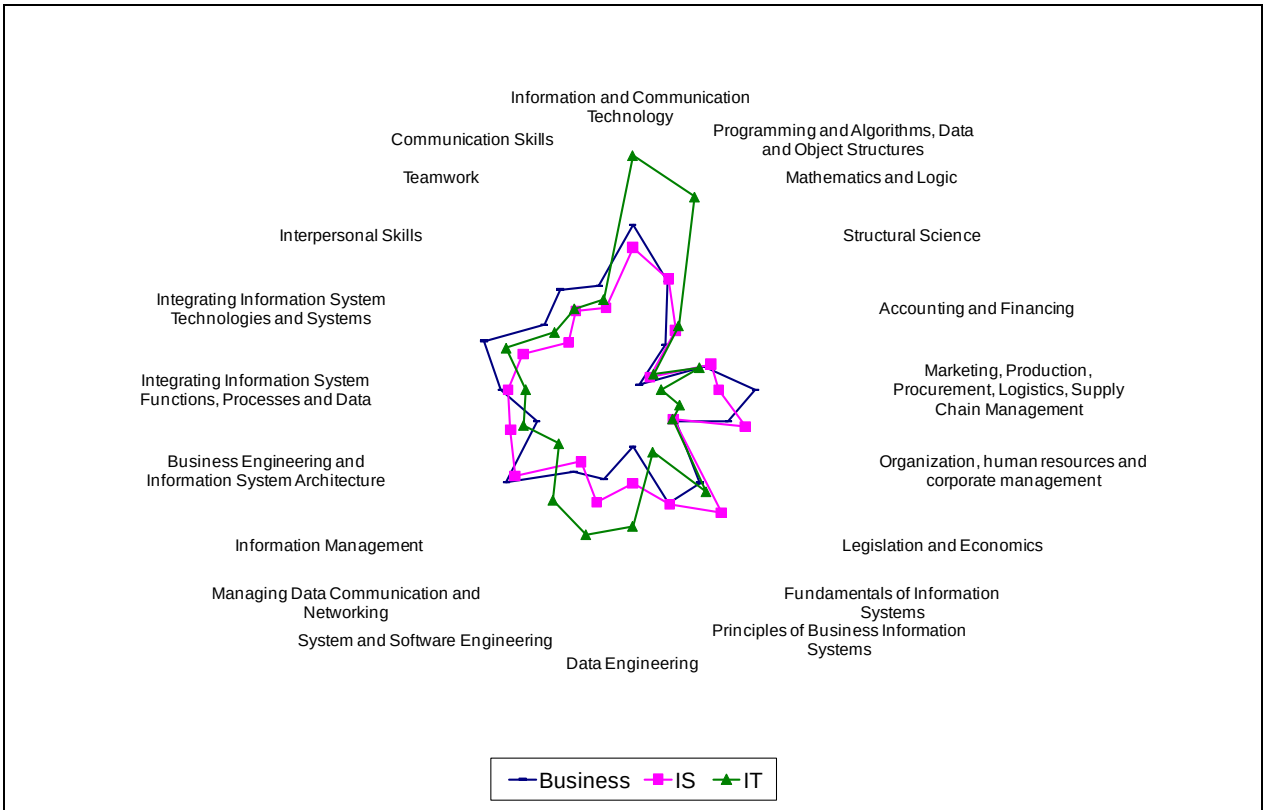

Figure 5. Thematic Profile Considering the Focus of the Programs

Table 1: Curriculum Structure of the European MSc in Business Informatics	
Semester 1	• Professional & Research Practice • Information Systems Architecture • Management & Information Technology • Data Analysis
Semester 2	• Managing & Working in an Intercultural Environment • Managing Projects and Change • Supply Chain Management
Options	• eCommerce Infrastructure • Web Design & Implementation • Service-Oriented Architectures • Software Process Quality
Summer	• Practicum

An important element of the program is the practicum, during which students work on a major project of a practical nature. The general objective of the practicum is to allow students to draw on the theoretical knowledge gained over the taught element and to apply it in a practical setting in a European environment.

BIN-Net: Business Informatics Network in Common Europe

Simultaneously to the curriculum development at Dublin City University we were involved in a European Curriculum project, the BIN-Net: Business Informatics Network in Common Europe. The project was funded under the European Erasmus scheme and involved ten partnering universities in eight European countries. The developed curriculum structure of this program is seen as characteristic for many continental European study programs in business informatics and together with our own business informatics curriculum can provide a reference profile for business informatics (Figure 6).

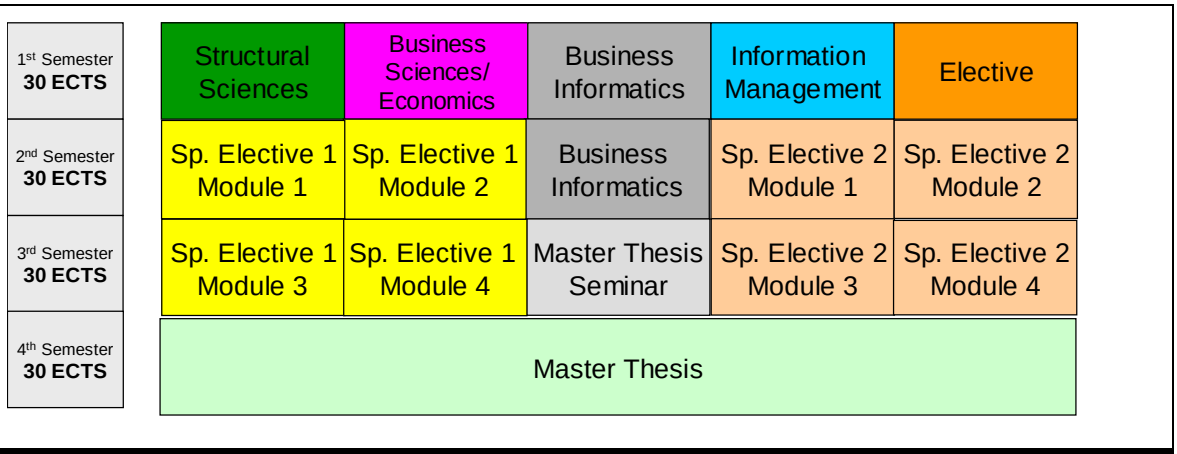

Figure 6. Reference Business Informatics Curriculum Structure

Although the two curricula presented above present a different structure, on closer examination, both aim to achieve similar learning outcomes and develop individuals to be competent problem solvers in the area of business informatics. The curriculum comprises a balanced and interdisciplinary structure, which centers on engineering principles and focuses on transformation, models, and methods. The engineering penetration throughout the program is seen as one important characteristic, which differentiates the program from management-oriented Information Systems degrees. As such, business informatics can complement the management-oriented stream of the IS discipline. Indeed, the focus on engineering principles in business informatics could provide a clearer identity and may play an important role in future education programs.

IT-Capability Maturity Framework

Based on our involvement in these two projects, it became apparent that instead of providing detailed reference curricula for many different contexts and the various institutional, organizational, and country-specific requirements, we need to rely on a more general and constant framework. Based on our observations, we feel that an overarching framework describing core capabilities of IS/Business Informatics graduates would be beneficial in this regard. In this way, the IS community together with practitioners may consolidate a framework of capabilities for various career paths, roles, and levels. How these capabilities are achieved during the study program should then be subject to individual program designs or specific reference curricula. Therefore, capabilities can provide stable and unifying element for the IS curricula.

As an example of a capability-oriented framework, the IT-Capability Maturity Model (IT-CMF) was presented and its usability as capability framework discussed. This IT-CMF is designed as a systematic framework that enables senior chief executives to interrogate, understand, and improve an organization's maturity, ensuring realization of IT capabilities and optimal delivery of business value from IT investments [Curley, 2004]. The IT-CMF is developed at the Innovation Value Institute (www.ivi.ie) within a consortium of more than fifty companies and academic organizations. It comprises three integrative layers: strategy, macro, and micro, whereas on the micro levels thirty-two critical processes are described. To capture the content of critical processes, each critical process adjuncts capability building blocks describing key capabilities for this process.

Together with the engineering oriented topic of business informatics, we feel that a capability-oriented framework could provide a beneficial contribution to shape the future of the master's level education in IS.

V. REFLECTIONS ON MSIS 2006 IN THE CONTEXT OF OTHER MASTER'S LEVEL COMPUTING CURRICULA

Heikki Topi, Bentley University

A shared understanding within a discipline regarding its degree programs and the curricula that reflect this are continuously changing and affected by a number of external factors. The same forces articulated in IS 2010 [Topi et al., 2010] for the undergraduate curriculum are also influencing the graduate-degree programs, including changes in technologies and practices (globalization of IS design and development processes, widespread use of technologies providing ubiquitous mobile connectivity, emergence of new architectural paradigms, and increasingly frequent use of IT control and management frameworks, such as ITIL and COBIT), declines in enrollments, new possibilities for engaging the broader IS community in the curriculum development process, among others.

An additional set of factors a discipline has to consider is related to the work-related disciplines are doing with their curricula. For the master's curriculum in Information Systems, such a development is the recent introduction of a carefully designed graduate-level curriculum in Software Engineering (Graduate Software Engineering 2009 or GSwE 2009 in brief; see GSwE 2009). This curriculum was developed in a U.S. Department of Defense funded project entitled Integrated Software and Systems Engineering Curriculum (iSSEc), and GSwE 2009 is the first deliverable of the iSSEc process. In 2010, the IEEE Computer Society and ACM decided to sponsor GSwE 2009 as one of their joint curriculum recommendations.

Software Engineering and Information Systems are clearly different disciplines, and curriculum development efforts in one area will not directly impact the other, as can be seen based on the comparison of the core topics in Figure 7 or the comparison of computing disciplines outlined in Computing Curricula 2005 Overview Report [Shackelford et al., 2005]. At the same time, the disciplines share overlapping curriculum elements and areas of emphasis.

MSIS 2006 Core	GSwE 2009 Core
IT Infrastructure	Ethics and Professional Conduct
Analysis, Modeling, and Design	Systems Engineering
Enterprise Models	Requirements Engineering
Emerging Technologies and Issues	Software Design
Project and Change Management	Software Construction
Strategy and Policy	Testing
Integrated Capstone	Software Maintenance
HCI or Implications of Digitization	Configuration Management
	Software Management
	Software Process
	Software Quality

Figure 7. Comparison of Core Topics of the MSIS 2006 and GSwE 2009 Curricula

There are at least three reasons why GSwE 2009 should be considered when thinking about the future of master's level IS curriculum recommendations.

First, the iSSEc process set a very high bar for all curriculum development processes in computing, including those in Information Systems. It was well-funded by an external party, allowing a very broad-based involvement of a number of stakeholder groups. Clearly, the resources were used well to bring together an impressive coalition of participants. Industry participation in the process was particularly strong, and it is likely that this forms a new benchmark for future curriculum processes in other computing disciplines.

Second, the GSwE 2009 curriculum sets specific and rigorous expectations for both incoming students and graduates of programs that want to be compatible with the curriculum recommendation. In these dimensions, the key differences between MSIS 2006 and GSwE 2009 are as follows:

1. MSIS 2006 includes a very high-level, abstract specification of outcome expectation, including the following elements: (a) a core of IS management and technology, (b) integration of IS and business foundations, (c) broad business and real-world perspective, (d) communication, interpersonal, and team skills, (e) analytical and critical thinking skills, and (f) specific skills leading to a career [MSIS 2006, p. 133]. GSwE 2009, however, specifies outcomes much more explicitly and at a more detailed level, including a comprehensive

specification of the body of knowledge that graduates are expected to master and the levels of learning that should take place [GSwE 2009, p. 3].

2. Based on MSIS 2006, students can enter an MSIS program with any undergraduate degree [MSIS 2006, p. 132]. GSwE 2009 requires at least an undergraduate minor in computing, forming a more level starting point in terms of computing capabilities [GSwE 2009, p. 3].

3. MSIS 2006 does not include a work experience requirement, whereas GSwE 2009 requires at least two years of relevant work experience.

Third, GSwE 2009 specifies very clearly the target for the degree: it is a professional degree for practicing software engineers, defining a professional identity for the graduates. MSIS 2006, however, suggests a very broad range of possible career paths without a well-defined integrating identity, ranging from managing sourcing and global projects to data administration and networking, telecom, and infrastructure.

Overall, a comparison between MSIS 2006 and GSwE 2009 leads to the following questions regarding the model curriculum and master's level education in Information Systems in general:

1. Are we, as a discipline, bold and brave enough to stage rigorous, well-defined, and easily understandable learning outcome requirements for master's degrees in Information Systems? When communicating to our external stakeholders (particularly employers) the capabilities that the graduates of our programs have, are we, with confidence, able to tell them what they can expect with a reasonable level of variance? This is a particularly important question at times when programs are struggling with low enrollments—will survival instincts make them give up essential quality standards in order to make the program appear more attractive for prospective students?

2. Do we, as a discipline, genuinely share an understanding of what constitutes an acceptable master's program or curriculum in Information Systems, or are the programs largely driven by the demands of local contexts (either institutional or related to employers)?

3. If such an understanding exists, is it based on the core strengths of our academic discipline and the best we as a discipline have to offer to the world of practice in Information Systems? Do we have sufficient clarity regarding what our core strengths and differentiating capabilities are compared to other computing disciplines?

4. Are we able to articulate clearly enough what differentiates a graduate of an MSIS program from, say, a GSwE graduate or the graduates of any other master's program in computing?

5. Will we find ways to fund our own curriculum development efforts at a level that allows broad and deep participation by a number of different stakeholder groups?

Any future curriculum development efforts in Information Systems require a careful consideration of these and related questions.

VI. MSIS CURRICULUM: SELECTIVE REFLECTIONS AND OPINIONS

Rolf T. Wigand, University of Arkansas at Little Rock

Many of these observations were formed by the author's membership on two major efforts designing and shaping the Master of Science in Information Systems Model Curriculum and Guidelines for Graduate Degree Programs in Information Systems in 2000 and 2006. Both efforts were published in *Communications of the Association for Information Systems* [Gorgone et al., 2000, 2006]. Moreover, these comments are influenced by the author's role as the director of the Master's Program in Information Management at Syracuse University from 1991 through 2002, his long-term active participation within the Society for Information Management (SIM), as well as his own observations and experiences in academia and industry.

John King, University of Michigan, commented at the 2010 AMCIS doctoral consortium in Lima that "The world is infested with information technology," arguing that Information Technology (IT) is everywhere, i.e. at home, on the street, and we encounter IT while driving, in our cars, our refrigerators, and in our organizations. In short, IT is omnipresent. From this we could reason: How can we possibly be in trouble? How is it possible that our enrollments are down or that our graduates think they cannot find jobs in our field?

There are a number of developments that have influenced the current state of affairs of the master's degrees in Information Systems (IS)—and probably the undergraduate degree programs in this field as well. Briefly, I would like to highlight and reflect on just a few of these developments.

- There appears still to be a perception among potential students (including high school students as well as their parents) that all IS and IT jobs are being outsourced to India and other countries. Consequently, these students perceive this situation negatively and wonder why they should bother to pursue IS and IT as a field of study. As a result, many students are no longer considering a degree in IS or IT.

- Recognizing the above developments, the Society for Information Management (SIM), the worldwide professional society of high-level corporate IS and IT executives, has pursued a campaign through local SIM chapters and has presented to high schools (students and their counselors) that there is indeed a shortage today of IS workers in the United States and that plenty of such jobs are available and go unfilled. These SIM representatives invite and encourage students to pursue a career in IS and IT and assert that there are solid, promising, and lucrative career opportunities in this field.

- Several major outsourcing firms, including such Indian firms as Infosys, have hired large numbers of United States IS and IT graduates and trained them for six months in India. After this training period, they return to the United States and work for Infosys on U.S. jobs to which the company assigns them. Infosys has placed these individuals in career tracks within its company, even though the work carried out may be for different Infosys clients within the United States.

- It is rather unclear what we may surmise from the recent economic/financial crash in terms of the implications for IS and IT. One wonders what this means for and what we are going to do about this in terms of our IS and IT curricula. Do we need to make adjustments; does anything need to be changed? Moreover, one wonders if we have learned anything from such recent experiences and if there are consequences suggesting that we need to do things differently. One would think that we at least could, and probably should, talk about this, but where does such a discussion take place? Or should we continue and follow past practices and conduct business as usual?

These are just four selective developments that seem to influence and challenge past and current IS and IT curricula. Aside from such external developments, we can also recognize several internal developments, constraints, and even competition:

- It seems that for many years we recognize somewhat of a chasm between what we teach in our curricula and what employers want and expect from our graduates. This chasm at times is reflected in the expected skills that our students should bring along, and we encounter conflicts such as, employers would like our students to bring along skills such as COBOL, yet most IS departments are not likely to offer such courses. This chasm seems also to be reflected in the research we do as professors and what firms seem to find useful.

- In recent years we can recognize how certain IS and IT areas and applications have become absorbed by functional departments in the business school. A good number of areas and applications and tasks have been picked up or absorbed in other functional areas such as finance, marketing, purchasing, sales, and others.

- We can recognize new and additional players in the IS and IT fields. Certain inroads have been made by neighboring fields and disciplines, including Computer Science, areas within Engineering such as Software Engineering, areas within Arts and Sciences such as Communication, the fields of Information Science and Information Studies, various Informatics, Business Informatics and Social Informatics programs especially such as in Europe, but also informatics programs at the University of California at Irvine or at Indiana University. Last, one should recognize the entire movement of the *i*Schools (see: www.ischools.org) such as Syracuse University's School of Information Studies, the University of Michigan's School of Information or the University of California at Berkeley's School of Information.

It seems that the impact from the *i*Schools may be the most formidable; yet, it does not seem to find much traction among us. The *i*Schools organization with over eighty member programs, departments, schools, and colleges worldwide describes itself as follows:

"The **iSchools** are interested in the relationship between information, people and technology. This is characterized by a commitment to learning and understanding the role of information in human endeavors. The iSchools take it as given that expertise in all forms of information is required for progress in science, business, education, and culture. This expertise must include understanding of the uses and users of information, as well as information technologies and their applications" (http://www.ischools.org).

Moreover, this organization asserts (see: http://www.ischools.org/site/about/) that the information field is the "rapidly evolving profession of our time" and that:

"Just as business careers and MBAs became *de rigueur* in the industrial age, information professionals are now in high demand, as businesses and society grapple with the challenges and opportunities of the digital age.

The study of information is interdisciplinary, fed by multiple diverse fields. Librarianship and computer science have historically been the primary feeders of the field, but information studies is also fed by fields such as education, psychology, anthropology, business, journalism—indeed, the range of social sciences. The study of information focuses on the intersection of information, technology, and people, which requires a broad interdisciplinary approach to those phenomena, the relationship between them, and their relationships to other aspects of culture and human endeavor. The ubiquity of information in human endeavor requires that the field of information aims to have an impact on all fields of science and all aspects of culture."

It seems that we need to become concerned about our field(s) of IS and IT and engage in some serious soul-searching. There are indeed some ominous signs as hinted at above. Moreover, it is unclear how we should digest recent major enrollment drops and cancellations of courses, as well as the dissolution of entire degree programs in once stellar programs across the country. What do these developments suggest and imply? What do they mean in terms of competition within the university? Will deans of colleges of business, engineering, and arts and sciences fight with each other in the long run? Ultimately, it seems that the dean of the college of business will be interested only in the enrollment numbers of IS students in his/her college of business. Shouldn't we engage in some dialogue and talk among each other about what strategies we can and must develop to grow or minimally at least survive in this environment?

VII. CONCLUSION

The panel both recognized the challenges that IS education at the master's level faces and identified the great potential these programs form for the field:

- Exciting opportunities exist at the master's level in Information Systems for schools and departments that are willing to innovate and work actively to find a program model that fits their capabilities and local conditions. Successful departments have been able to grow their master's program offerings continuously while maintaining or improving quality. Achieving this requires a proactive approach to managing the curriculum, a dedicated champion for each program, close collaboration with employers, and a strong focus on maintaining the diversity of the student body. The MSIS program at Indiana University shows that by focusing on the issues that are at the intersection of business and technology, it is possible to create a program that can attract students from a variety of backgrounds and yet successfully understand how technology can be leveraged to solve business problems.

- Master's programs in IS are very well positioned to prepare students for those IT-related jobs and careers that will continue to be available in the high-cost areas of the world, such as the U.S. and EU.

- It is important that we as an IS community understand our core identity and the key value-added we can provide compared to other disciplines and their degree programs. We should boldly embrace what we do best and ensure that we prepare our graduates so that they have the capabilities and level of motivation required for success. Both changes in the traditional computing disciplines (such as software engineering represented by the new GSwE 2009 curriculum) and *i*Schools have changed the competitive landscape, and the discipline can ignore these developments only at its peril. Our discipline adds value particularly well by integrating multiple perspectives so that the total is more than the sum of the parts, and we need to find ways to communicate this clearly to relevant target audiences.

- Close collaboration with external stakeholders is essential from the perspective of understanding the expectations key employers have for our graduates. Frameworks, such as the IT-CMF, that are developed by a practitioner–academia consortium might provide a template for understanding and maintaining these expectations.

- IS as a field and master's programs in IS should consider reaching beyond the traditional business disciplines and beyond business as the domain context of the degree. IS departments can gain a lot by collaborating with experts across disciplinary boundaries to create new program options, essentially providing value domains outside the business school (as suggested also by IS 2010 at the undergraduate level).

- The IS discipline should consider reviewing and revising the MSIS 2006 curriculum to capture the discipline's current understanding of the field at the master's level and to address the internal and contextual changes.

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Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the article on the Web, can gain direct access to these linked references. Readers are warned, however, that:

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