12-2008

Revising Undergraduate IS Model Curriculum: New Outcome Expectations

Heikki Topi
Bentley University, htopi@bentley.edu

Joseph S. Valacich
Washington State University

Ryan T. Wright
Washington State University

Kate Kaiser
Marquette University

Jay F. Nunamaker Jr.
University of Arizona

See next page for additional authors

Follow this and additional works at: https://aisel.aisnet.org/cais

Revising Undergraduate IS Model Curriculum: New Outcome Expectations

Authors

Heikki Topi, Joseph S. Valacich, Ryan T. Wright, Kate Kaiser, Jay F. Nunamaker Jr., Janice C. Sipior, and Gert Jan de Vreede

Communications of the Association for Information Systems

CAIS

Revising Undergraduate IS Model Curriculum: New Outcome Expectations

Heikki Topi
Bentley University
htopi@bentley.edu

Joseph S. Valacich
Washington State University

Ryan T. Wright
Washington State University

Kate Kaiser
Marquette University

Jay F. Nunamaker, Jr.
University of Arizona

Janice C. Sipior
Villanova University

Gert-Jan de Vreede
University of Nebraska at Omaha

Abstract:

This paper outlines and further specifies the key points articulated in an IS Model Curriculum panel presentation at the Americas Conference for Information Systems (AMCIS) 2008. This presentation centered on the major changes to the IS Model Curriculum that is currently being proposed by the joint Association for Computing Machinery (ACM) and the Association for Information Systems (AIS) task force. The goal of this task force is to provide the first major revision of the IS model curriculum since IS '97. The major modifications to the IS Model Curriculum involve: 1) reaching beyond the business school to include programs housed in other parts of the university (e.g., health informatics); 2) revising the outcome expectations for the IS graduates and proposing subsequent changes to the curriculum topics; 3) revising the curriculum structure by separating the curriculum core from the elective topics; and 4) involving and making relevant the model curriculum to the global IS community. Also, this paper summarizes the key components to the restructuring of the IS Model Curriculum: high-level organizational needs for IS capabilities and graduate knowledge and skills. Finally, future steps in the curriculum revision process are discussed.

Keywords: undergraduate IS curriculum, curriculum development process, computing education, model curriculum

Revising Undergraduate IS Model Curriculum: New Outcome Expectations

I. INTRODUCTION

This paper is a summary of an Americas Conference for Information Systems (AMCIS) 2008 panel that presented the work by the Association for Computing Machinery (ACM)/Association for Information Systems (AIS) joint task force charged with revising the undergraduate information systems model curriculum. The goal of the panel presentation was to provide the IS community with a comprehensive but not yet final curriculum recommendation draft for evaluation. The specific focus of the panel was on a significantly revised set of outcome expectations for the graduates of undergraduate IS programs.

The joint AIS/ACM task force was launched in January of 2007, and it hopes to produce the final, approved version of the curriculum recommendations by late spring 2009. The co-chairs are Heikki Topi (Bentley University) and Joe Valacich (Washington State University). Other members of the committee include Kate Kaiser (Marquette University), Jay Nunamaker (University of Arizona), Janice Sipior (Villanova University), Gert-Jan de Vreede (University of Nebraska-Omaha), and Ryan Wright (Washington State University). This curriculum revision is the first major revision since the IS '97 report [Davis et al. 1997], for which most of the work was done in the mid-1990s.
This paper will focus on the key changes compared to the previous curriculum recommendation, IS 2002 [Gorgone et al. 2003]. These key changes include:

1. Reaching beyond the boundaries of the business schools
2. Modifications of outcome expectations
3. Revision of the curriculum topics based on the modified outcome expectations
4. Revision of the structure which separates the core topics from the elective topics
5. Recommendations regarding the use of Web-based collaboration tools and editorial structure for the ongoing maintenance of the undergraduate IS curriculum.

This paper is organized as follows: Section II outlines the foundation and history of past IS curriculum revisions and motivation for this update. Section III details the proposed changes to the curriculum, focusing on high-level IS capabilities and IS-specific knowledge and skills. Section IV concludes the paper and discusses future activities in the process.

II. BACKGROUND AND MOTIVATION

The undergraduate IS model curriculum was first undertaken by the ACM [ACM 1983, Couger 1973) in the 1970s and 1980s and later were joint efforts by the ACM, AIS, and DPMA/AITP (Data Processing Management Association/Association of Information Technology Professionals), with the most recent model curriculum (IS 2002) being published in 2003 [Davis et al. 1997, Gorgone et al. 2003]. The IS 2002 report draws heavily from IS'97. Although the ACM, AIS, and AITP are worldwide organizations, IS 2002 does not represent a global curriculum but is quite clearly U.S-centric. As stated previously, this revision process is the first major change to the undergraduate IS curriculum in 10 years. Since the work for the IS '97 and IS 2002 reports was completed, there have been major contextual changes in practice and academia that have motivated this current curriculum revision process. These have been discussed at a more detailed level in an earlier report of this task force [Topi et al. 2007] and, thus, they will be reviewed only briefly here.

- First, globalization has changed the expectation of current information system processes. It is now very common to see globally distributed development sourced through complex arrangements. This has led to fundamental changes in how businesses develop and implement IS.

- Second, web technologies, including Web 2.0 initiatives, have become the standard platform for delivering information systems. The IS 2002 curriculum is outdated when addressing the new platform needs of the technology community. Further, basic architecture has changed to address the new web platform. We now see a need to address service-oriented architecture in the curriculum, including the use of web services. Also, cloud computing, or the outsourcing of processing and storage capabilities to the abstraction of distributed web centers, has fundamentally changed the IS development landscape.

- Third, there has been a change in how packaged software, such as ERP and CRM systems, is developed and deployed. Here we have seen growth in the capability and flexibility in these large installations, while solutions are merging to provide fewer options. Of course, outsourcing, both domestically and

Communications of the Association for Information Systems

internationally, has become a major influence on how these large installations are developed, installed and maintained.

- Fourth, as computing has become more ubiquitous, the need for mobility has changed the context on information systems. Specially, the post-desktop paradigm for delivering IS has changed as the devices get smaller, less expensive and more robust. For example, a ubiquitous or pervasive computing system could now connect everything from illumination of a room, to sales systems, to entertainment controls for a state-of-the-art airliner, and so on. This type of development is far different than the traditional assumption of the desktop model.

- Finally, over the last five years there has been significant progress in standardization of IT service management (ITSM). ITSM is centered on the customer's view of IT contribution including management of service-level agreements, help desk facilities, IT operating practices, and so on. Best practices have been outlined by practitioners but have yet to be integrated into the model curriculum.

The information systems discipline has also faced challenges regarding the enrollment crisis that must be addressed by the current curriculum revision process. Further, the academic discipline itself has engaged in a conversation about the identity of IS, which was driven by the emergence of the IT discipline. Due to these changes, the task force has identified a need for broader community involvement in the revision process. This includes an explicit acknowledgement of the global context of the information systems discipline. Since the launch of this project, the task force has realized that broad community involvement is both highly desirable and technically possible. As outlined in the Topi et al. [2007] report on the progress of the curriculum revision, a wiki environment was designed and developed for IS curriculum work. Since the launch of the wiki site (http://blogsandwikis.bentley.edu/iscurriculum), significant work has been done, by a few scholars, to comment on and suggest revisions to early drafts of the work. It is the task's force hope that we can further engage the global community to continue this process. We will discuss mechanisms for moving forward later in this document.

III. OVERVIEW OF THE REVISED CURRICULUM

As stated previously, the task force believes that the information systems landscape has changed significantly over the past several years. For this reason the foundations of the curriculum must be evaluated. There are four key elements of the revision:

1. *Reaching beyond the business school.* No longer should the Information Systems paradigm be exclusive to the business school context. Even though business will likely continue to be the primary domain for information systems, the discipline provides expertise that is critically important for an increasing number of domains.
2. *Revising the outcome expectations for IS graduates and proposing subsequent changes to the curriculum topics.* Particularly taking into account the radical contextual change both in terms of technology and business discussed earlier, these actions are a critically important and natural part of the revision process.
3. *Evaluating the assumptions of the curriculum structure.* Past revisions have ended by providing a basket of classes that were recommended for IS programs. This revision process hopes to be more inclusive by providing a short list of core topics that are essential pedagogically to information systems, allowing programs to customize other topics by creating a list of electives. Further, the task force is exploring the possibility of uncoupling topics and courses to create further flexibility.
4. *Involving the global IS community.* We hope to use the wiki environment to allow for global community involvement in the revision process. This is critical if the new undergraduate model curriculum is to reflect the perspectives of the global information systems discipline.

Next, the basic assumptions underlying the curriculum are discussed in detail.

Overall Structure and Basic Concepts

The restructuring of the model curriculum is clearly driven by changes in high-level organizational needs and graduate capabilities. The work underlying the curriculum specification first identified the high-level capabilities needed by IS graduates. These overall capabilities, in turn, are based on knowledge and skills that have been categorized as IS-specific knowledge and skills, foundational knowledge and skills, and domain fundamentals. By doing so, the revised model curriculum links curriculum content and structure to graduate capabilities in a well-defined and transparent way. Figure 1 shows how the high-level IS capabilities are extrapolated to the final curriculum topics delivered through courses.
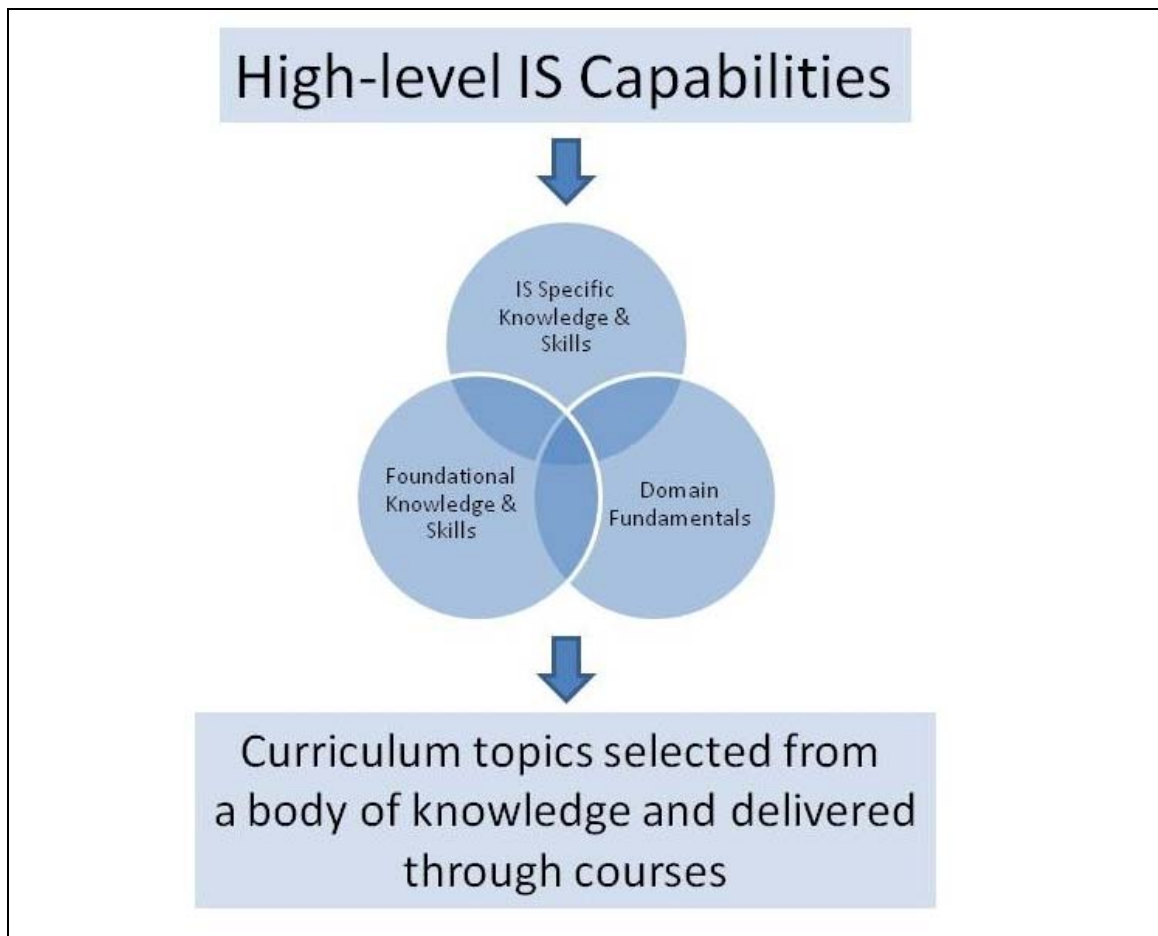
Figure 1. Overall Structure of the Basic Concepts

High Level IS Capabilities

The new curriculum will be based on a significantly revised set of degree outcome expectations, that is, expectations regarding the capabilities of graduating IS students when entering the full-time workforce. The new capability set recognizes the change in the nature of the jobs IS graduates are likely to have by focusing on business analysis, organizational processes, enterprise architecture, sourcing options, and security/risk management. The curriculum acknowledges explicitly the contribution that the information systems discipline can make to domains outside business (such as governments, nonprofits, health care, etc.) and, therefore, the high-level capabilities are not limited to a specific domain. They are, however, driven by organizational needs and are more abstract and stable than knowledge and skills. The following will give a more detailed description of each capability.

Improving Organizational Processes

The new curriculum assumes that understanding and improving organizational processes is one of the key capabilities of all IS graduates. This requires the graduates to be functional in:

- Understanding the fundamental concepts related to organizational processes

- Understanding general principles of process analysis in order to apply them to specific situations

- Analyzing existing processes based on interviewing, observation, documentation analysis, and other similar methods

- Understanding how the very large amounts of data collected by modern organizations can be used to review, redesign, and improve processes

- Identifying and capturing the essential findings from the large amount of data produced by the analysis process

- Researching and applying industry reference models and best practices in order to improve process designs

- Using the analysis results as a basis for designing revised processes based on the graduates' strong understanding of both organizations and information technology

- Simulating a proposed process and revising it as necessary

- Negotiating a solution that satisfies the political requirements for the new process

- Leading the implementation of new processes.

The specification of high-level IS capabilities does not include a particular set of process improvement methods or techniques, but the graduates are expected to be aware of and benefit from at least one such method.

Exploiting Opportunities Created by Technology Innovations

Graduates of information systems programs are experts in seeing how organizations can benefit from technology capabilities, converting opportunities created by information technology innovations into sustainable business value through systematic processes. A deep understanding of the domain context in which the information technology will reside will provide IS graduates opportunities to create value faster by providing clarity during various analysis processes than their non-IS counterparts. Achieving a high level of performance related to this capability requires in-depth knowledge of technology and the domain, skills in analyzing problems and designing solution alternatives, ability to analyze the strengths and weaknesses of various alternatives as well as demonstrable skills in sourcing, designing, and implementing technology solutions.

Understanding and Addressing Information Requirements

Another key capability of all IS graduates is the ability to analyze and document organizational information requirements at various levels, starting from those of individual knowledge workers responsible for specific tasks and ending with very high-level institutional requirements. IS graduates are experts in analyzing the information needs of an individual, organizational unit, or an organization in order to determine how information technology-based solutions can best be designed to support these information needs. Increasingly often, the core capabilities in this area are related to effective utilization and integration of data that is generated in a rich variety of organizational systems and includes multiple types and formats.

Designing and Managing Enterprise Architecture

Information systems graduates are experts in high-level design and management of IT capabilities that are fully aligned with general organizational goals. Currently, these capabilities are typically organized and presented as an enterprise architecture, consisting of high-level internally compatible representations of organizational business models, data, applications, and information technology infrastructure. The capabilities of the graduates of undergraduate IS programs are typically at a level suitable for focusing on the component architectures. One of the knowledge and skill areas that is directly derived from this high-level IS capability is related to IT infrastructure, including networking technology, data centers, and so on. This high-level capability also requires an understanding of the IT management and control frameworks, such as Information Technology Infrastructure Library (ITIL), which provides a set of policies for managing IT infrastructure, and Control Objective for Information and related Technologies (COBIT), which is a framework for best practices provided by the Information Systems Audit and Control Association (ISACA).

Identifying and Evaluating Solution and Sourcing Alternatives

Graduates of IS programs are capable of producing high-level design alternatives for various organizational IT-based solutions. There are always a large number of ways to achieve a specific set of organizational capabilities using information technology, but not all approaches are feasible in a specific context. An essential high-level capability that IS graduates have is an ability to identify a small subset of realistic, financially and technically feasible solution alternatives and the mechanisms through which an organization can acquire these technology resources. Most projects require reusing or building on the existing components (such as modules, reusable objects, databases, information architectures, and so on) used in the current systems, and therefore, it is essential that graduates have the capability to understand a variety of technologies and their integration.

In particular, the globalization of the IS/IT supply chain has made the traditional "buy versus build" questions significantly more complex to answer, but the core issues are still the same: once an IT capability need has been identified, what is its high-level design and how should an organization acquire this capability?

Securing Data and Infrastructure

It has been increasingly important for organizations to ensure that their data and IT infrastructure resources are protected from a variety of security threats, which can potentially create significant financial liabilities as well as

damage the organizational image. Understanding these threats and identifying high-level solutions to protecting the organization are essential capabilities of all graduates of information systems degree programs.

Understanding, Managing and Controlling IT Risks

IS graduates should have strong capabilities in understanding, managing, and controlling organizational risks that are associated with the use of IT-based solutions (e.g., security, disaster recovery, obsolescence, and so on). At the undergraduate level, the emphasis should be on in-depth understanding of a variety of risks. Because IT solutions are so closely integrated with all aspects of a modern organization, it has become essential to manage the risks related to their use in a highly systematic and comprehensive way.

Knowledge and Skills of IS Graduates

Graduates of information systems undergraduate degree programs need a wide variety of specific skills and knowledge as a foundation for the high-level IS capabilities specified earlier. The high-level capabilities typically encompass skills and knowledge from various areas. For example, in order to determine and address information requirements, an IS graduate needs to understand and apply data management technologies, have excellent interpersonal, analytical, and problem solving skills, as well as have a strong command of the organizational domain for which the information requirements are specified. The knowledge and skills that graduates in Information Systems are expected to have can be divided into three categories:

1. Information Systems Specific Knowledge and Skills
2. Foundational Knowledge and Skills
3. Knowledge and Skills Related to Domain Fundamentals

The category "Information Systems Specific Knowledge and Skills" includes elements that are in the core of the IS discipline. These skills and knowledge would not be developed by other types of educational programs; they are specific to Information Systems as a discipline. "Foundational Knowledge and Skills" are shared by many disciplines that educate knowledge professionals, and they include broad categories such as leadership and collaboration, communication, and analytical and critical thinking. Finally, "Domain Fundamentals" covers skills and knowledge related to the domain in which a specific information system is utilized. For most IS programs, the domain is general business, but it could focus on a specific business specialty (such as finance), industry (e.g., healthcare), organization type (e.g., government, nonprofit), and so on. As discussed earlier, undergraduate IS programs will develop knowledge and skills in each of these three categories; when combined over the course of a student's studies, they will lead to the high-level IS capabilities.

Information Systems Specific Knowledge and Skills

Information systems specific knowledge and skills are divided into the following four main categories (and subcategories), as follows:

1. **Identifying and designing opportunities for IT-enabled organizational improvement.** The integrating theme of this category is the focus on an organization and the ways it can develop its capabilities using information technology. In many ways, the specific items in this category are related to requirements analysis and specification at a high level of abstraction, including strategic alignment, the analysis of information needs, and the evaluation of user experience. These include:

   a. Ensuring alignment between IT strategy and organizational strategy
   b. Improving organizational processes with information technology solutions
   c. Understanding and designing the role of information systems in managing organizational risks and establishing controls
   d. Identifying and exploiting opportunities created by emerging technology innovations
   e. Understanding and documenting information requirements
   f. Improving various stakeholders' experience in interacting with the organization, including issues in human-computer interaction.

2. **Analyzing trade-offs.** One of the most important knowledge and skill categories for information systems graduates is the ability to design and compare solution and sourcing alternatives Several considerations must be taken into account including sources of risks, dimensions of feasibility (i.e., technology characteristics), availability of and organizational ability to utilize human resources, scheduling, organizational politics, regulatory issues, and return on investment. A particular strength of information systems graduates is the ability to integrate a variety of these perspectives and avoid analysis that narrowly

focuses on only technology or business requirements. A key element of this capability is to be able to evaluate sourcing alternatives. Subcategories include:

    a.   Identifying and designing high-level solution and sourcing options
    b.   Analyzing and documenting the feasibility of various options
    c.   Comparing solution options using multiple decision criteria
    d.   Capital budgeting for IT-intensive projects; making a financial justification for choosing between alternatives.

3. **Designing and implementing information systems solutions.** Although the knowledge and skills that IS graduates need have recently moved significantly toward higher levels of abstraction, individual skills related to design and implementation are still essential for IS graduates. Those who can demonstrate the ability to integrate high performance in design and implementation, along with strong business capabilities, are typically the most highly sought after graduation. This category of knowledge and skills includes also the management of people and organizations that are used to develop IS/IT capabilities, whether internal or external, regardless of their geographic location. Knowledge and skills related to specific issues of IS project management are in this category. The specific subcategories include:

    a.   Designing enterprise architectures
    b.   Identifying, evaluating, and procuring detailed solution and sourcing options; configuring and integrating organizational solutions using packaged solutions
    c.   Designing and implementing solutions that provide a high-quality user experience
    d.   Designing secure systems and data infrastructures
    e.   Designing and implementing applications, application architectures and integrated systems
    f.   Managing and exploiting organizational data and information; designing data and information models
    g.   Managing information systems development/procurement resources
    h.   Managing information systems projects.

4. **Managing ongoing information technology operations**. IS graduates need knowledge and skills related to the management of the ongoing information systems operations within the organization, including the management, operation, and securing of the IT infrastructure. This can include:

    a.   Managing the use of enterprise technology resources
    b.   Managing application performance and scalability
    c.   Maintaining existing information systems
    d.   Managing relationships with technology service providers
    e.   Securing data and systems infrastructure
    f.   Ensuring business continuance.

Foundational Knowledge and Skills

Foundational knowledge and skills are not unique to information systems as a discipline. Instead, most programs that educate knowledge professionals intend to develop some or all of these skills and capabilities. Still, they are very important for information systems programs because it is impossible for IS graduates to exhibit the required high-level IS capabilities without these foundational knowledge and skills. Individual IS programs typically implement educational experiences that develop these areas in an IS specific context.

1) **Leadership and collaboration**. The graduates of information systems programs will be required to act in various collaborative roles during their professional careers, and it is likely that most of them will be assuming leadership positions at various levels. Increasingly often, these roles are performed in a genuinely global context. It is essential that programs prepare their graduates to be effective collaborators and inspiring leaders. Capabilities should include:

    a)   Leading cross-functional global teams
    b)   Managing globally distributed projects
    c)   Working effectively in diverse teams
    d)   Structuring organizations effectively.

2) **Communication**. It is impossible for an IS professional to perform effectively in any organizational role without very good oral and written communication skills**.** IS professionals work closely with colleagues in a

variety of different organizational roles, and invariably, their job performance is partially dependent on their ability to communicate. Capabilities should include:

a) Listening, observing, interviewing, and analyzing archival materials
b) Writing memos, reports, and documentation
c) Using global collaboration tools (such as wikis, blogs, shared collaboration spaces, and so on)
d) Giving effective presentations.

3) **Negotiation.** Related to the previous category, negotiation skills are also very important for IS professionals. In their organizational roles, they have to navigate carefully between different, competing interests within the organization. In these situations, excellent negotiation skills are essential. Finally, IS professionals increasingly play a role in the negotiations with external IT service providers and other vendors. Capabilities should include:

a) Negotiating with users about funding, resources of time, staff, and features
b) Negotiating with providers about service levels
c) Negotiating with providers about quality and performance of deliverables
d) Facilitating negotiations between competing internal interests.

4) **Analytical and critical thinking; creativity**. Strong analytical and critical thinking skills are a foundation for everything IS professionals do. It is essential that graduates are able to systematically analyze complex systems and situations, break them down into manageable components, understand deep connections within systems, and create solutions based on the results of a systematic analysis. Problem solving is also omnipresent in the life of IS professionals. Capabilities should include:

a) Analyzing the ethical and legal implications of complex situations
b) Analyzing the risks associated with complex systems
c) Solving complex problems
d) Using quantitative analysis techniques appropriately and effectively
e) Enhancing innovation and creativity in oneself and others.

5) **Mathematical foundations**. Even though IS professionals do not need the same level of mathematical depth as many other computing professionals, there are, however, some core elements that are very important for IS professionals (of course, these needs will vary depending on an individual's specialty). To support in-depth analysis of data, IS professionals should have a strong background in statistics and probability. For those who are interested in building a strong skills set in algorithmic thinking, discrete mathematics is important.

Knowledge and Skills Related to Domain Fundamentals

Domain fundamentals provide the context for which knowledge and skills and can be applied. For example, a graduates understanding of the domain fundamentals (e.g. healthcare information issues) will direct how the skills and knowledge are applied to a IS solution (e.g. medical records system). The most common domain for Information Systems is business in general, but many other domains are possible components, including business specialties (such as accounting or finance), government, healthcare, the legal profession, and nongovernmental organizations.

Within each domain, it is typically possible to identify at least three subcategories of domain knowledge:

1. **General models of the domain.** This subcategory refers to the general foundational material that provides an overall understanding of the domain at the level that is needed to both understand the general concepts within the area and form a basis for studying the key specializations within the domain.
2. **Key specializations within the domain.** Within each domain, there is a core set of most important specializations that are essential for understanding the domain and operating within it. It is obvious that between and within specific domains there is vigorous discussion regarding what these specializations are. For example, within business it appears that few experts would dispute the need to include finance, accounting, marketing, and management (both organizational behavior and strategy).
3. **Evaluation of performance within the domain**. Within many domains, issues related to performance analysis and evaluation are essential for understanding the domain fully, and, therefore, we include it as a separate subcategory. Performance evaluation also reveals important aspects of the philosophy of a domain: for example, both general models and key specializations might be essentially the same for businesses and non-profit organizations, but their key performance metrics could differ quite significantly.

Examples of these three subcategories within the general business domain are as follows:

1. General models of business
   a. Business models
   b. Business process design and management
   c. Organizational theory
   d. Business strategy
2. Key business specializations
   a. Finance
   b. Accounting
   c. Marketing
   d. Operations management; service science and management
   e. Organizational behavior
   f. Business law
3. Evaluation of business performance
   a. Analysis of organizational performance
   b. Analysis of individual and team performance
   c. Business analytics
   d. Business intelligence

Linking Knowledge and Skills to Topics and Courses

In this paper, we have focused on outcome expectations. They are not, of course, sufficient for specifying a complete curriculum; they alone do not provide sufficient details regarding the curriculum content and pedagogy. As part of this curriculum development effort, we will later present a hierarchical structure of **topics** and **subtopics** as a step between outcome expectations (specified as knowledge and skills, as discussed earlier in this paper) and courses or other educational experiences. The topics and subtopics will be selected so that they ensure a sufficient breadth and depth of coverage that allows the students to reach the outcome expectations. In the final curriculum document, the task force will also include a recommendation for a possible course structure that incorporates the topics and subtopics derived from the outcome expectations. We do, however, acknowledge that schools around the world will design a wide variety of different courses and other educational experiences based on the local needs and conditions. These will still be fully in alignment with this curriculum recommendation, as long as the coverage of the topics and subtopics is compatible.

As has been the case in prior IS curriculum recommendations, the curriculum recommendation will not address the specifics of the coverage of foundational knowledge and skills or the domain fundamentals, even though these in many cases constitute a substantial percentage of the degree. For example, if we consider a North American business school context, an undergraduate information systems degree typically consists of about 50 percent of general education content (much of which addresses the foundational knowledge and skills), 25-35 percent of domain foundations (that is, general business and a minor business specialization), and only 15-25 percent or 6–10 semester-long courses of content that specifically focuses on information systems knowledge and skills.

In the current draft, the core topics are as follows: Foundations and Role of Information Systems; Enterprise Architecture; IS Strategy, Management, and Acquisition; Data and Information; Systems Analysis and Design; IT Infrastructure; and Project Management. The curriculum recommendation will also provide examples of the content for commonly used elective topics, such as Application Development, IT Audit and Controls, and IT Security and Risk Management.

The curriculum recommendation will recognize the richness of the contexts in which it will be used by separating core topics from elective topics and, thus, acknowledging that the existing "one size fits all" model is not any more relevant or inclusive. In addition, the model recognizes that ultimately topics matter more than courses, acknowledging that individual institutions often want to organize the coverage of the topics in a variety of ways, based on the local requirements and resource availability. As discussed earlier, the curriculum document will, however, include a sample selection of courses following the tradition of prior IS curriculum documents.

All information systems curricula must offer sufficient coverage of the seven core topics related to information systems specific knowledge and skills. In addition, the curricula for a particular program must cover a selection of elective topics depending on the career track(s) that a given institution has decided to offer, along with topics related to foundational and domain knowledge. Figure 2 below represents the relative importance of each of the topics (both

core and elective) for various career tracks (note that the career track list is not intended to be exhaustive). Figure 2 does not, however, include topics related to the foundational and domain knowledge.

Career Track:	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Core IS Topics:																	
Foundations and Role of IS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Enterprise Architecture	○	●	○	○	○	●	○	○	○	○	●	○	○	○	●	○	○
IS Strategy, Management and Acquisition	○	●	○	○	○	●	○	○	●	○	●	○	○	○	●	○	○
Data & Information	●	○	○	●	●	○	○	●	●	○	●	○	●	○	○	○	○
Systems Analysis & Design	●	●	●	○	○	○	○	○	○	○	○	○	○	○	●	●	●
IT Infrastructure	○	○	○	●	○	○	○	●	●	●	○	○	●	●	○	○	○
Project Management	●	○	○	○	○	●	○	○	○	○	●	○	○	○	●	●	●
Elective IS Topics:																	
Application Development	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	●
Business Process Management		●	●			○	○	○		○	●			○			
Collaborative Computing					○									○			○
Data Mining / Business Intelligence		●		●	●	○	○	○	●		○	○	○	○	○		○
Enterprise Systems		●	●	○	○	○	●	●	○		●	●	○	○			
Human-Computer Interaction	●				○	○			○							●	
Information Search and Retrieval		○		○	●								○				●
IT Audit and Controls	○		●	○	○	○	○	●		●	○		○	○	○		○
IT Security and Risk Management	○			○	○	○	○	●	●	○	○		●	●	○		○
Knowledge Management		●		○		○	○		○								
Social Informatics													○		○		

A = Application Developer
B = Business Analyst
C = Business Process Analyst
D = Database Administrator
E = Database Analyst
F = e-Business Manager
G = ERP Specialist
H = Information Auditing and Compliance Specialist
I = IT Architect
J = IT Asset Manager
K = IT Consultant
L = IT Operations Manager
M = IT Security and Risk Manager
N = Network Administrator
O = Project Manager
Q = Web Content Manager

Key:
● = Significant Coverage
○ = Some Coverage
Blank Cell = Not Required

Figure 2. Structure of the IS Model Curriculm

IV. CONCLUSION

The IS Model Curriculum is currently undergoing its first major revision since the IS '97 report [Davis et al., 1997] in order to respond to a number of influencing factors (such as globalization, new IS sourcing models, significant advances in technology, and so on). As part of the revision process, a number of objectives for the revision have been established, including: 1) reaching beyond the business school to include programs housed in other parts of the university (e.g., health informatics); 2) revising the outcome expectations for the IS graduates and proposing subsequent changes to the curriculum topics; 3) revising the curriculum structure by separating the curriculum core from the elective topics; and 4) involving and making relevant the model curriculum to the global IS community. This report includes detailed descriptions of the overall restructuring on the curriculum foundations. First, high-level capabilities were identified. In turn, overall capabilities were discussed based on knowledge and skills that have been categorized as IS-specific Knowledge and Skills, Foundational Knowledge and Skills, and Domain Fundamentals. This group of overall capabilities will then inform the curriculum topics. The final curriculum recommendation will also discuss possible mechanisms for the ongoing maintenance of the new IS curriculum. Despite the slow adoption of the curriculum wiki environment that has been introduced in this project, the task force still believes that the era of infrequent, very large-scale curriculum revisions is over, and the IS community should establish a mechanism through which the model curricula will be continuously revised, enabling significantly quicker responses to technological and environmental changes.

To maintain the integrity of the curriculum, it is essential to develop an editorial process for reviewing and approving suggested changes to the curriculum. The editorial process could include the following roles:

- Executive committee named by the participating organizations
- Editor-in-Chief (EIC)
- Associate editors (AE) of various areas (e.g., courses, topics, career tracks, domain areas).

The editor-in-chief would have the following responsibilities:

- Approving or rejecting changes, with consultation with the executive committee
- Managing the AEs' approvals to assure fairness and balance
- Ensuring that changes reflect the best interests of the overall curriculum
- Reporting to ACM/AIS status on an annual basis
- Submitting new models (major revisions) to cooperating organization (AIS and ACM) every five years for a five-year blanket approval (or whatever cycle length is deemed optimal by the committee)
- Producing one published (frozen) version per year that is approved by the curriculum committee.

The ultimate oversight of the process would be the responsibility of the executive committee. The task force will present more detailed recommendations regarding the administrative structure in its final report.

It is the hope of the AIS/ACM curriculum task force that the community at large takes an active role in providing feedback to the proposed changes via the wiki. Announcements via the AIS listserv and appropriate SIG channels will be ongoing throughout the revision process.

REFERENCES

ACM. (1983). *Recommendations for Information Systems*. Vol. II. New York, NY: ACM Committee on Computer Curricula of ACM Education Board.

Couger, J. (1973). "Curriculum Recommendations for Undergraduate Programs in Information Systems," *Communications of the ACM* (16) 12, pp. 727-749.

Davis, G., J. T. Gorgone, D. L. Couger, and D. Feinstein et al. (1997). "IS '97: Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems," *ACM SIGMIS Database* (28) 1.

Gorgone, J., G. Davis, J. S. Valacich, and H. Topi et al. (2003). "IS 2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems," *Data Base* (34) 1.

Topi, H., J. S. Valacich, K. M. Kaiser, and J. Jay F. Nunamaker et al. (2007). "Revising the IS Model Curriculum: Rethinking the Approach and the Process," *Communications of AIS* (20pp. 728-740.

ABOUT THE AUTHORS

Kate M. Kaiser has been involved in information technology (IT) as a practitioner, researcher, faculty member, and consultant. She is researching the future IT skill needs and the impact of offshore outsourcing from Ireland, Russia, and India through research grants from the Sloan Foundation, 3M Foundation, and the U. S. State Department as a Fulbright Scholar. Kate has served on the faculty of McGill University, University of Wisconsin-Milwaukee, University College Dublin, and Marquette University and worked for Giga Information Group on the Y2K team. She has published in a variety of practitioner and academic journals.

J. F. Nunamaker, Jr., is Regents and Soldwedel Professor of MIS, Computer Science, and Communication and Director of the Center for the Management of Information at the University of Arizona, Tucson. He received his Ph.D. in operations research and systems engineering from Case Institute of Technology, an M.S. and B.S. in engineering from the University of Pittsburgh, and a B.S. from Carnegie Mellon University. He received his professional engineer's license in 1965. In a 2005 journal article in *Communications of the AIS*, he was recognized as the fourth to the sixth most-productive researcher for the period 1991–2003. Dr. Nunamaker received the LEO Award from the Association of Information Systems (AIS) at the International Conference on Information Systems (ICIS) in Barcelona, Spain, December 2002, and he was elected as a fellow of the AIS in 2000.

Janice C. Sipior is associate professor of Management Information Systems at Villanova University. Her research interests include ethical and legal aspects of information technology, system development strategies, and knowledge management. Her research has been published in more than 65 refereed journals, international conference proceedings, and books. She is chair of the Association for Computing Machinery - Special Interest Group on Management Information Systems (ACM-SIGMIS). She served as a senior editor of *Data Base*, an associate editor

of *Information Resources Management Journal* and is currently the editor-in-chief of *Information Systems Management.*

Heikki Topi is the associate dean of Business for Graduate and Executive Programs at Bentley University. His research has been published in journals such as *European Journal of Information Systems, JASIST, Information Processing & Management, International Journal of Human-Computer Studies, Journal of Database Management, Small Group Research*, and others, and he is currently serving as a senior editor of *Information Systems Management.* He has been actively involved in national computing curriculum development and evaluation efforts (including IS2002 and CC2005 Overview Report). Currently, he is a member of the ACM Education Board and co-chair of the IS curriculum revision project.

Joseph S. Valacich is The George and Carolyn Hubman Distinguished Professor of MIS at Washington State University. His teaching interests include systems analysis and design, collaborative computing, project management, and the management of information systems. He is currently co-chairing the task force designing *IS 2008 Undergraduate Model Curriculum* and served on the task forces designing *IS '97* and *2002* as well as *MSIS 2000* and *2006: The Master of Science in Information Systems Model Curriculum.* He also served on the Executive Committee, funded by NSF, to define the *IS Program Accreditation Standards* and on the Board of Directors for CSAB (formally, the Computing Sciences Accreditation Board), representing the Association for Information Systems (AIS). He was the general conference co-chair for the 2003 International Conference on Information Systems (ICIS) in Seattle and was the vice-chair of ICIS 1999 in Charlotte, NC. His primary research interests include technology-mediated collaboration, human-computer interaction, mobile and emerging technologies, e-business, and distance education.

Gert-Jan de Vreede is Kayser Distinguished Professor at the Department of Information Systems and Quantitative Analysis at the University of Nebraska at Omaha where he is director of the Institute for Collaboration Science. His research focuses on Collaboration Engineering, the theoretical foundations of (e)-collaboration, and the diffusion of collaboration technology. His articles have appeared in *Journal of Management Information Systems, Communications of the ACM, Communications of the AIS, Small Group Research, DataBase, Group Decision and Negotiation, Journal of Creativity and Innovation Management, International Journal of Technology and Management, Journal of Informatics Education and Research, Simulation & Gaming,* and *Simulation*.

Ryan T. Wright is a doctoral candidate in the Department of Information Systems at Washington State University. He holds both a MBA and a BS in MIS from the University of Montana. His research interests include human-computer interaction (HCI), and e-business strategy issues. His research has been broadly published including in the *Communications of the AIS*, *Group Decision and Negotiation* and the *Journal of eCommerce Research*. Also, Ryan has won university and college-wide awards in recognition of his classroom excellence. His professional experience includes tenure as CTO of a successful technology startup, time in management at Amoco Oil (now BP Amoco), and consulting projects for the U.S. Department of Commerce.