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# The AMCIS 2003 Panels on IS Education-I: Let Us Not Throw Out the Baby with the Bath Water: Information, Technology, and Systems All Matter in the Core IS Course

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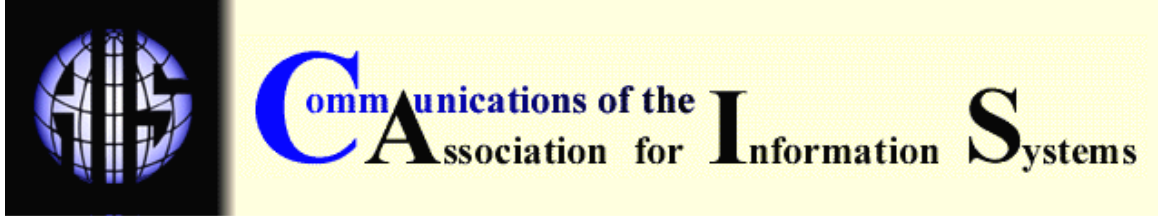
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## THE AMCIS 2003 PANELS ON IS EDUCATION-I LET US NOT THROW OUT THE BABY WITH THE BATH WATER: INFORMATION, SYSTEMS, AND TECHNOLOGY ALL MATTER IN THE CORE IS COURSE

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### ABSTRACT

Recent discussion about MIS centers on its role as an academic discipline and the utility of the core IS course in undergraduate business programs. This article presents a summary of a panel discussion at the AMCIS 2003 meeting about these issues. It includes the results of a survey on what elements of the IS 2002.1 Introduction to MIS course are being used that was presented. It also presents the discussions among panel participants and the audience and the emerging perspective on the topic by the panelists.

Some advocate a reduction in the focus on systems and technology in the core IS course. However, we believe that this view is an over-reaction to concerns about the course, and suggest (as did many before us) that systems theory is a central organizing theme of the core IS course. We believe that the response by the field should not be to water down our core course, but to identify our contribution and highlight it. To this end, we offer a concise statement of what we believe is the heart of the core IS course.

*Editor's Note:* Each year, since August 2001, the education tracks at AMCIS included panels on education. This article is one of two based on the 2003 AMCIS panels to be reported in CAIS. The panels provide a forum where academics discuss the varied ways in which they teach the IS curriculum. They are intended to inform the community of the continually changing tools and techniques used in the classroom and in practice. They provide a way for faculty to keep pace with technological change.

The two panels published this year (this paper and CAIS Volume 14, Article 7 [Vician et al. 2004] are the result of a careful winnowing process. Ten panel proposals were submitted for 2003, and five of them were presented at AMCIS. Articles about several of the panels were submitted for inclusion in CAIS. Of these, two were selected after review.

Kevin Lee Elder, AMCIS 2003 Education Track Coordinator

**Keywords:** IS2002, model curriculum, teaching, panels, IS education, IS core course, AMCIS 2003

## I. INTRODUCTION

MIS as an academic discipline and the usefulness of the IS core course in undergraduate business programs has been a major topic of discussion in recent years. This paper summarizes the panel discussion at AMCIS 2003 that focused on the findings of a survey<sup>1</sup> on what elements of the IS 2002.1 Introduction to MIS course [Gorgone, et al., 2003] are being used in the introduction to IS course. In addition to the points raised by the panel, this paper includes results of the discussion among panel participants and the audience.

### MOTIVATION FOR CONDUCTING THE PANEL

Some authors advocate a reduction in the focus on systems and technology in the core IS course. However, this response may be seen as an over-reaction to perhaps reasonable concerns about the course and the academic major preferences of enrolled students, and we suggest (as have many before) that systems theory should be a central organizing theme of the core IS course. The response by the field should not be to water down our core course, but to identify our contribution and highlight it. To this end the authors of this article offer a concise statement of what they believe is the heart of the core IS course. The authors also invite interested faculty to participate in an ongoing dialog on the Introduction to MIS Website on ISWorld (<http://www.magal.com/iswn/teaching/intromis/>)<sup>2</sup> to critique and improve the course.

### THE MIS DISCIPLINE AND THE MIS CORE COURSE

Recent discussion focuses on a general assessment of MIS as an academic discipline [e.g., Hirschheim and Klein, 2003; Benbasat and Zmud, 2003; Alter, 2003a, 2003b]. Related to this discussion is the concern about the utility of the core IS course in business programs [Ives et al., 2002], and what that core IS course should entail [Hershey, 2003]. In our opinion (and that of the IS community) knowledge of fundamental IS concepts represents a distinct and vital element of business education. Introductory IS courses generally are the vehicle by which students are exposed to fundamental IS concepts. This course also serves as a lead-in course for potential majors and minors in information systems.

However, some business school academicians and administrators do not appreciate the contribution of information systems to the creation of business value and therefore do not see a need for a separate Introduction to IS course. Some maintain that the elements that comprise the IS core course can be better delivered by disaggregating them and distributing them among other

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<sup>1</sup> The survey is included as Appendix I of this article.

<sup>2</sup> URL references were accurate as of the date of publication. The authors and CAIS are not responsible for changes that occurred after publication.

academic units, e.g., the e-commerce modules offered by some Marketing departments, systems analysis and design taught by the Accounting department, and computing principles and skills taught by a computer technology department. At some universities, accounting systems courses and IS courses often bear a striking resemblance to one another, creating an apparent duplication of efforts and potential waste of faculty resources. Further, a lack of understanding by some business faculty and deans about the importance of IS/IT concepts to a well-grounded business education made it necessary for leaders in the IS discipline to create a statement of these concepts as part of the AACSB accreditation standards [Ives et al., 2002].

Many reasons could help explain why some of these issues exist with respect to the IS core course. One offered here is that perhaps IS departments may not be doing the most effective job of explaining to others in the business school what is the distinctive contribution of IS in the business core. Some excellent efforts fill this breach [e.g., [Ives et al., 2002], but these efforts apparently are not transposed to the courses we offer at the Introduction to IS level.

Another possible cause for the problem is the wide range of perspectives on what IS actually is [Benbasat and Zmud, 2003; Orlikowski and Iacono, 2001; Alter, 2003a, 2003b]. While the research aspects of these issues are beyond the scope of the present effort, the problem may also be reflected in how the IS discipline is presented in the undergraduate business core course. For example, the IS 2002 curriculum model currently lists thirteen names for the IS discipline at various institutions [Gorgone et al., 2002], which may make it difficult to identify clearly to outsiders a common intellectual heritage. Further, some misconceptions exist among business practitioners about what IS really is [Lee, 1999]. Therefore, it does not seem all that surprising that uniform understandings have not emerged.

The result of this lack of shared meaning in our discipline leads to extremes in our introductory course offerings. Some suggest that Information Systems is merely a supporting or integrating function in organizations and that an understanding of IT concepts is of negligible importance [e.g., Hershey, 2003, Carr, 2003]. On the other hand, it is easy to be seduced by technology and we sometimes may be too willing to define our discipline in terms of the most current technology (e.g., e-commerce, m-commerce, u-commerce), and thus neglect vital business linkages. Over-emphasizing technology leads to a focus not on our distinctive foundational intellectual contributions, but on the technical applications of novel IT as these technologies become available. Consequently, Information Systems courses are sometimes seen as “the place where students learn word processing, PowerPoint and spreadsheets”, to quote one unnamed colleague from another business discipline, or perhaps more charitably, where business students learn about computers.

### **TECHNOLOGICAL IMPERATIVE**

While almost certainly there are other reasons exist, it appears to us that often two divergent views exist about the importance of IS/IT in the business core:

1. Technology fundamentally changes how business is conducted.
2. IT is a tool rather than a driver.

Both of these views tend to find their intellectual heritage in the “technological imperative”, where technology is seen as a direct and consistent influence on business [cf. [Orlikowski, 1992 Woodward, 1962; DeSanctis and Poole, 1994].

The first form of technological determinism suggests that somehow technology fundamentally changes how business is conducted. [Porter, 1999]. This view, more widely seen prior to the burst of the “dot.com bubble”, suggests some sort of generational divide between those who do and do not “get it”, or rather perhaps, “get IT” [Hansen, 1998]. This form leads to a tendency to focus on the most current IT innovation and how it somehow changes business. This view sees

business as being driven by IT, and at times is rightly accused of focusing almost exclusively on novel technologies rather than how these technologies can be made most useful for business.

The other variant of the technological imperative suggests that IT is a tool rather than a driver, and that IT should be de-emphasized to the extent possible in the core IS course. This view limits the emphasis on features of the IT artifact itself, instead implying that technology artifacts are homologous units that can be applied to any business situation with relatively similar outcomes. Lee [1999] refers to this view as the “appliance mentality,” in which the underlying technological imperative is found in the tendency to de-emphasize the importance of understanding how IT can help shape business strategy, or how IT will interact with the social system already in place in a given organization. Technology is seen as a module that can be plugged in to improve a specific aspect of a business system, and in the end, IT’s utility is simply to make existing business processes work more efficiently. Any emphasis on leveraging the opportunities provided by IT to fundamentally redesign business processes receives limited attention in this view.

More critically, neither of these views on technology in organizations allows for potential influences of the social aspects of the existing organizational environment in which the technology is used. A wide range of research suggests negative consequences may result from failing to account for these influences, and that there is a middle ground where technology and people interact to create something not wholly driven by either. Research from the socio-technical systems perspective suggests that while technology offers some suite of both constraints on and opportunities for action, human agency also comes into play in this process. It is the interaction between technology and human agency that jointly drives the kinds of business possibilities that can be realized by the application of IT the form of information systems [cf. Lee, 1994; Orlikowski, 1992; Poole and DeSanctis, 1994; Bostrom and Heinen, 1977a, 1977b].

The excellent history of IT at Bank of America [McKinney, Mason, and Copeland, 1997] offers a perspective to counter the view that technology alone fundamentally changes business. It offers a view of technology that appreciates the reciprocal influence between technology and organizations. Two themes emerge from the McKinney et al. study. At first, technology tends to be used to do the same things that were done previously, but with greater efficiency (e.g., check processing machines in the 1950’s). Later, as the organization comes to understand the new technology and develops the capability to think outside previously established patterns, the technology is used to do new things (e.g., exception reporting and trend analysis capabilities added to the suite of applications at Bank of America as the capabilities of IT became better understood). Indeed, this example demonstrates clearly the influence of technology on organizations and vice versa [cf. Orlikowski, 1992]. At first the ingrained organizational understandings drove most thinking about what technology could do (resulting at first in processes being done the same basic way only faster). As the capabilities of IT became better understood and hence came to influence thinking about what was then possible, new applications were developed and put into use [cf. McKenney et al., 1997].

Despite a rich body of knowledge from this research tradition, the socio-technical perspective is not regarded by some as essential to the introductory IS course. As a consequence, Introduction to IS courses appear to run the gamut between being too technical and de-emphasizing business, or over-reacting by disregarding vital technical and systems concepts [cf. Hershey, 2003]. We advocate a view of the introductory course that takes advantage of the socio-technical view on technology and organizing, suggesting again (as have others) that “systems” should be part of IS [cf. Lee, 1999]. While IT innovations do not in and of themselves represent a fundamental change to how things are done in business, failing to provide students with an understanding of the underlying technologies also offers them an incomplete picture [cf. Davis and Topi, 2003], as information technologies do offer a suite of possibilities that would likely not be considered otherwise.

One key question that the panel addressed is how this understanding can be built into a set of core concepts that represent meaningful, relevant, and enduring fundamental principles that can

be communicated to students. The best of these approaches would represent an organizing scheme that, as with basic knowledge in accounting or finance or economics can be applied when environmental conditions change; they would be enduring enough to serve students over time as available technologies and the business environment evolve.

One such effort was undertaken in the Ives et al. [2002] article, and as well in the IS 2002 model curriculum, specifically in our case the introductory course IS 2002.1, *Foundations of Information Systems*. Our perspective is that this model contains many good points, and that concerns about it are peripheral rather than fundamental. One element we think the model does lack, however, is a sense of “overview”; most of the topics seem to us to be relevant and useful, but it is at times not obvious what the underlying theme(s) should be. Put somewhat simplistically, while Marketing offers its “4 P’s”, Accounting “A=L+OE”, Finance “the rule of 72”, and Strategic Management “5 Competitive Forces”, IS as a discipline (at least as reflected in some texts and some course syllabi) seems to find it difficult to make it clear how we offer a concise menu of core concepts that adds something distinctive to the business curriculum as opposed to merely technology-related applications of other disciplines’ concepts. Clearly the challenge for IS as a discipline is to identify and highlight our unique contribution to business education.

### **ISWORLD SURVEY DESIGN**

This panel is a response to a concern on our part that, despite the best efforts of a great many people, a shared reality in the IS community about what are the core concepts that should be delivered in the core IS course remains elusive. As a result, the importance of this course in the business curriculum is difficult to communicate. In our panel at the 2003 AMCIS conference, we first presented the findings from a survey that was submitted in the summer of 2003 by David Salisbury to ISWORLD participants asking them to assess how their courses at the introductory level map into suggested IS2002.1 specifications. Included in the survey were questions that captured data on the extent of coverage of IS content (as described in IS2002.1).

### **ISSUES IN THE INTRODUCTORY COURSE**

Next, the panelists and audience discussed what should be the core issues in the introductory IS course, including how our discipline might better transpose the efforts to define and elaborate IS into the classroom in the form of the core IS course. The discussion also involved some of the practical issues involved in delivering the core IS course, including how systems projects can be delivered, how students can best be helped to understand technical concepts, and how to make the course relevant to students with diverse IS backgrounds and interests (e.g., IS majors versus non-majors). Finally, we announced the renewal of the *ISWORLD Introduction to IS* course site<sup>3</sup> moderated by David Salisbury, which we hope will serve as a repository for knowledge and ideas about how to deliver the course.

### **ORGANIZATION OF THIS ARTICLE**

In the balance of this paper, we first describe the survey findings in greater detail, followed by our current conclusions about the state of the core IS course (Sections III and IV). The discussion here is based on the panel discussion and our own additions to that discussion after the conference. Guided by our classroom experiences, the survey respondents, and the panel discussion, in Section V we offer our perspective for discussion, criticism and improvement. We believe that discussions of what IS is and why it is important, not just at a theoretical level, but at a level that directly drives classroom teaching, is how IS can best achieve a more equal footing in the business curriculum.

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<sup>3</sup> <http://www.magal.com/iswn/teaching/intromis/>

**II. SURVEY FINDINGS AND DISCUSSION**

Since the IS 2002.1 course description [Gorgone, et al. 2003] exists, is widely disseminated, and at times sparked debate as to the relevance of its content, we decided to survey IS faculty about how much this course model influences content in the introductory IS course. To this end, starting with the IS 2002.1 curriculum model as a base point, the authors created a simple survey of the ISWORLD membership<sup>4</sup> to ask what aspects of the curriculum were being covered in the IS core course. While noting a somewhat disappointing response rate (n=60) and resulting concerns over generalizability, we do suggest that those who did respond are the faculty who are delivering and/or influencing the course content. Despite these limitations, the findings are worth talking about, at least as a starting point for a larger discussion. The respondent and course characteristics are shown in Table 1.

One clear implication from the data in Table 1 is that the IS 2002 model curriculum does not seem to be achieving significant penetration relative to the development of the IS core courses at the respondents' universities. Yet, it is also instructive to see the extent to which the IS 2002.1 content is offered in core IS courses.

Table 1. Respondent and Course Characteristics (n=60)

	Yes	No
Respondent Aware of IS2002	41 (68%)	19 (32%)
Course Coordinator Aware of 2002	30 (50%)	30 (50%)
IS 2002 or IS 1997 Used to Design Course	17 (28%)	43 (72%)
Respondent is course instructor/coordinator	46/60 (77%) current instructor/coordinator 55/60 (92%) current/past instructor/coordinator	
Academic rank of coordinator	15/60 (25%) Instructor or Lecturer 44/60 (73%) Tenured/Tenure Track Professor	
Region of world	41/60 (68%) from US	

Before proceeding with the survey response analysis, some elaboration is necessary. IS 2002.1 specifies several content areas. For each of these areas, the respondent was asked to rate on a scale from 0-5 (N/A to Heavy Coverage) the extent to which each element was covered. The responses to these items are shown in Table 2. For our analysis, the authors decided to categorize the responses into "low" and "high" categories. While it would seem reasonable for categorization to group the first three responses (i.e. 0-2) into the "low" category and the upper three (i.e. 3-5) into the "high" category, a few concerns drove our presentation of findings. First, we were concerned about the relatively low number of respondents, so we did not wish to focus on minute differences that might be washed out if more data were available. Next, we were also concerned about a possible central bias in responses; i.e. when offered a range if a respondent is uncertain s/he will tend toward a neutral answer [Shapiro and Varian, 2000]. Finally, there is a potential bias because of our stated position about the IS 2002.1 curriculum model. Since our thesis is that this model is a reasonable one for the core IS course, if anything, we would want to compare and weight our analysis against the model curriculum for this course. Each of these arguments suggests that it would seem prudent to be cautious as to counting the middle responses in either direction. Hence, the responses of 0-2 for each item are counted as "low". Responses of 4 & 5 are counted as "high" and responses equal to 3 are simply dropped from the analysis. Scores for "low" and "high" are created by simply adding the responses. Again being somewhat cautious in our conclusions, we only discuss items where the difference between totals for "low" and "high" is 10 or greater (although we shaded the higher values for each item in our analysis). In addition to our analysis, we provide the raw data for further examination by interested readers. The IS 2002.1 categories are sorted in descending order of the totals for "high" responses (i.e. 4 & 5), with the categories where we see a clear separation outlined more heavily.

<sup>4</sup> The survey is available at [http://www.davesalisbury.com/IS\\_2002.1\\_Survey/](http://www.davesalisbury.com/IS_2002.1_Survey/)

Table 2. Responses by IS2002.1 Content Area (respondents = 60)  
Extent of Class Exposure to Content:0 = N/A, 1=Low, 5 = High

	0	1	2	3	4	5	0-2	4&5
Database	1	1	7	7	33	10	9	43
Competitive advantage of information	2	4	5	16	21	11	11	32
System components & relationships	2	3	10	16	21	8	15	29
Information security, crime & ethics	5	4	0	20	20	8	9	28
System concepts	2	4	5	22	14	13	11	27
Networks and telecommunications	2	3	8	20	18	9	13	27
Application versus system software	2	5	13	16	11	13	20	24
Package software solutions	1	7	9	22	15	6	17	21
Cost/value & quality of information	2	6	14	19	14	5	22	19
IS Specification, design, re-engineering	1	7	16	16	12	7	24	19
Object-oriented design	8	21	13	4	10	4	42	14
IS professionals & IS career paths	1	14	13	19	11	2	28	13
Procedural v. non-procedural languages	7	16	12	13	7	5	35	12

One key implication of this analysis is that several components of the IS2002.1 model are seen as important (i.e. they are covered more heavily) by the majority of our respondents. Systems concepts and system components and relationships both seem fairly important in this analysis, which would seem counter to the logic presented in some recent writings regarding the importance of various topics in the core IS course [e.g., Hershey, 2003]. Competitive advantage of information seems to be a fairly important topic, at least to the respondents. Clearly respondents in this sample believe that database is an important topic, and telecommunications/networks and security, crime and ethics are seen as important as well. The only items that clearly fall out from the IS 2002.1 categories in our sample are languages, object-oriented design, and professional career paths. The overlooked items may not be a concern and they seem perhaps more relevant to IS majors rather than the other majors represented in the core IS class at the undergraduate level.

In sum, while noting the limitations inherent in a small, self-selected subset of ISWORLD readers, the survey and findings do indicate support for the panelists' initial perspective on IS2002. While the model does not appear to be implemented as designed at many schools, several of the key concepts in the IS2002.1 document are seen as important by IS faculty who deliver the introductory IS course. Hence these concepts should not be deemed non-essential and dismissed as some might suggest [cf. Hershey, 2003].

### III. A UNIQUE CONTRIBUTION TO THE BUSINESS CORE

It seems that one of the recurring themes around the core IS course is how it can be seen as adding something unique to the business curriculum. The critical question returns; why is IS important, and what ought to be in the introductory class? Like many before us, we propose in our courses that Management Information Systems at its core is about understanding the following:

- information systems and their use by organizations
- the capabilities provided by information technologies to capture, organize, store, and process information rapidly

The AMCIS 2003 Panels on Education-I. Let Us Not Throw Out the Baby with the Bath Water: Information Systems, and Technology All Matter in the Core IS Course by W.D. Salisbury, M. Huber, C. Piercy, and K.L. Elder



- how the capabilities of information technologies offer an entirely new suite of constraints and opportunities for doing business [cf. Alter, 2003 a, 2003 b].

Like those who completed the survey, we see several of the IS 2002.1 content areas as vital components of the introductory IS course. We describe our approach below and how it addresses each of the IS 2002.1 categories we found important in our analysis.

The perspective we present implies that trying to build a course solely around any technologies that currently exist is a losing game as the technologies are rather diverse and change rapidly. On the other hand, simply focusing on integration of existing business processes leaves out half of the equation; that of creatively leveraging the capabilities of IT to implement existing business processes in novel ways, for example micropayments.

### **INFORMATION AND SYSTEMS DO MATTER**

Rather than reducing its coverage, systems theory should be a central theme of the IS course. In our course delivery we draw heavily upon basic systems theory [cf. Lee, 1999; von Bertalanffy, 1947] as an organizing theme. We may teach students about aspects of information, or currently extant hardware or software. However, unless we also provide this knowledge within a framework to integrate these concepts and others, it is unlikely that they will understand and appreciate the business value that can be created through the integration of information systems with organizations, and perhaps more critically to their future careers, they will not be able to assess how emerging technologies may be applied to create business value for the organization.

Building from a base of systems theory, we propose that students must be educated as to the criticality of information to the success of business organizations. Porter and Millar [1985] coined the phrase ‘information intensity’, which we apply here as the extent to which a product, service, business process or business relationship is comprised of information. This concept helps to define and establish the value of IS as a business discipline. By systematically identifying the business products, processes and relationships with a high degree of information content one should find opportunities where information technologies (be they Web-based services, a data warehouse, or an intranet, for examples) can and do enable business to perform more effectively and/or efficiently.

We assert that designing systems to leverage information and thereby transform the implementation of essential business processes is a core competence of the IS discipline. Hence, we designed the core IS courses at our schools to highlight systems. This design implies that the tools, techniques, and software packages we identify and apply should all be subsumed under this over-arching goal: to build information systems that are designed to co-function with social systems to achieve the organization’s goals in its environment. We make a point not to focus solely on the specific technologies that may exist at any given point in time; rather we attempt to integrate these technologies in a framework that recognizes and highlights essential business processes and how businesses can use information technologies to leverage the information in their inputs, processes and outputs (e.g., SCM, automation, CRM). Further, we attempt to make it plain to students that by leveraging the information component that exists in products, services, relationships with other businesses, and customers, organizational decision-makers can expand the range of strategies available to pursue and achieve organizational goals.

### **INFORMATION AND SYSTEMS INFLUENCE ORGANIZATION STRUCTURE**

The notion of information intensity is a powerful concept that helps explain a range of information technology influences in organizations. For example, that business processes and business relationships can be redesigned around their informational component implies that information technology implementations will influence organizational structure. On the other hand, socio-technical systems theory informs us that technology is not the sole driver. Regardless of major, students will be working in organizations and may find themselves a part of “new” organizational or inter-organizational forms. For example, virtual integration as operationalized by Dell [Magretta, 1998] and its business partners is in essence vertical integration that leverages the

The AMCIS 2003 Panels on Education-I. Let Us Not Throw Out the Baby with the Bath Water: Information, Systems, and Technology All Matter in the Core IS Course by W.D. Salisbury, M. Huber, C. Piercy, and K.L. Elder

information linkages between firms. The ability to exchange information through inter-related systems (e.g., SCM systems) in essence enables distinct entities to coordinate their activities rather than organizing as a hierarchy [cf. Williamson, 1975; Maitland, Bryson and Van de Ven, 1980; Coase, 1988; Ouchi, 1980]. Organizational impacts such as the increase in telecommuting can be seen as examples of leveraging the information component of the employee's work relationship with their firm to achieve efficiencies in availability of office space or commuting time.

### **INFORMATION AS A RESOURCE**

The concept of information intensity also suggests a view of information as a critical business resource, a concept the authors believe is essential for our students to grasp. From this foundation, the students need to understand how information is converted to, used in, and moved about in an electronic form. Although this perspective does not mandate great technical detail, it does imply the need to understand basic information technologies and infrastructures such as computing hardware and telecommunications. The focus is not just on the ones that currently exist but the basic principles on which they all work so that future IT can be understood and called into use. For example, if a student grasps the concept of information intensity, then the student will need to understand the mechanism or coding scheme to transform that information into something that can be transmitted easily using information technology and networks. Further, it is useful for students to be able to understand how the capabilities of various input and output devices can influence the kinds of computing jobs that can be done (e.g., processor-bound jobs such as rendering a 3-D model, or input-output-bound jobs such as running monthly billing).

### **THE IMPORTANCE OF STANDARDS**

Relevant to any understanding of information technology is a discussion of standards. Students can easily understand the notion of standards; they plug their hair dryer into a standard outlet using a standard plug; they drive a car on a standard side of the road to school. From these everyday concepts, it should be relatively straightforward to understand why standards are important in business information systems, in terms of standards for databases to talk to one another (e.g., ODBC or SQL) telecommunication systems (e.g., TCI/IP, or Ethernet, or Token-Ring), and for devices to attach to various hardware (e.g., USB, FireWire). Having said all this, some see the IS core class as having too much of a focus on technology. For instance, one introductory text has no less than 47 new terms in the hardware chapter, some of them focusing on things as categorizing laptops versus desktops. Simply listing the technologies that are out there is not a particularly useful exercise; if one teaches students about the underlying foundations, it is not that hard for them to figure out that a "jump drive" (as an example) is just another way to store information that interfaces with the computer by plugging into a defined standard port (i.e., USB).

### **BUSINESS MODELING**

Before the importance of information systems and information technology can be fully realized, however, students in the core IS course need to understand the notion of essential business modeling, that is, logical data and process modeling. Students need to understand the essential business processes, coupled with a solid understanding of what information technology can do. This model should prepare students to either enhance the current physical process, or identify how the capabilities of IT can be leveraged to re-engineer the implementation of a given business process. Fundamentally Perhaps in the introductory course the more detailed aspects of process modeling (e.g., multi-level DFD's) might not be included, but diagrams that allow students to see where various systems and sub-systems fit into an overall business environment (e.g., context and decomposition diagrams) should have value, even for introductory students. Further, this kind of systems understanding will serve students well even if they are not IS majors [Ives et al., 2002]. The same logic applies to data modeling. Students can certainly be expected to understand the kinds of data that organizations would need to capture about its customers.

Teaching them about entities, relationships and attributes would therefore seem reasonable and appropriate in the introductory course.

We believe that understanding how information systems work involves building one. Like many IS faculty, our offering of business modeling in the core IS course at our universities takes the form of a systems project requirement in which students build an information system to support some business process. This requirement requires the students to build a system such that it captures the relevant informational component of a business process and creates a simple information system to support this process<sup>5</sup>. The students are asked to provide an assessment of the system objectives, how their system fits in with other business systems, and the inputs, processes, outputs and data that the system requires. Our experience is that while some students tend to build the simple "video store" example, some develop other relevant models, such as systems to support family businesses, or systems to support some aspect of a club in which they are a member. For example one system built for a sorority captured information about its members and the many events in which they could participate. Among other things, the system involved building a query in Microsoft Access to generate at any point in time a list of students who were of eligible drinking age prior to a given social event using a calculation of the member's age from their birth date and the current system date. This might not seem a particularly profound problem, but if one is running the social event in question it does demonstrate the importance of being able to process information quickly and accurately about members and events.

### **SUPPORTING DECISION-MAKING**

Another important aspect of the authors' thinking for the core IS course is that of the importance of IS for supporting decision-making. Support includes enhancing decision-making by using decision support systems, or business intelligence systems. Students need to use appropriate IT to seek out and search through patterns of data to reach and defend a course of action. For example, one assignment could be given to build a database to capture all relevant information about a company's employees, and then search through salary and gender data to identify if gender-based discrimination exists. One decision-making assignment offered by one of the authors involves having the students build a simple DSS model in Excel to track their course grades, using inputs such as the course assignments and relative weights from the syllabus. Using this spreadsheet, they do a "what-if" analysis to figure out what their course grade might be if they get "X" on the final, a goal-seeking analysis to see what they need on the final to receive a course mark of "X", or a sensitivity analysis to see which assignments influence the final grade the most when their grades are changed (suggesting where they should put more effort in their course studies).

### **AN ADAPTABLE FRAMEWORK**

We suggest that the perspective we offer our students offers them a means by which they can view information systems in terms of their impacts on the achievement of organizational objectives. IS and IT investment in operational systems should enhance efficiency thereby reducing costs (e.g., ERP systems, bar-coding or RFID technologies). Other systems and/or technologies (e.g., CRM systems, strategic systems) can help to generate more revenue. Finally, systems to enhance decision-making (e.g., DSS, EIS) can lead to both increased revenues and decreased expenses. All of these systems, however, presume:

- a basic understanding of a socio-technical view of an organization as a system,
- what information technology can do once information is converted into a computer-readable format, and

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<sup>5</sup> At one of the authors' institutions, this system requires at a minimum, that the data model resolve at least one M:N relationship using appropriate normalization.

- an understanding of the organizational realities that surround information systems and technology implementations.

## **SECURITY & ETHICS**

We also believe our perspective provides a strong platform from which to discuss information security and ethics. For example, it can be reasonably asserted that an individual's information is how they are represented to a great majority of entities, both public and private. Further, the most far-reaching public face of any institution today is its website. Therefore, the widespread storage of information in the form of CRM, public documents, or traces that we all leave behind as we move about on the Internet implies that much harm could come to the individual if this information were inappropriately used, accidentally destroyed or inaccurately recorded [cf. Mason, 1984]. Further, malicious attacks on either the infrastructure that is used to move information, be they in the form of DOS attacks, or on individual companies' websites represents a potentially devastating blow. For example, what would be the impact on Amazon.com if its Internet access were denied for 24 hours? Given the heavy dependence of even "bricks and mortar" stores on the Internet for B2B transactions, what would be the impact on these firms? Clearly understanding such issues involves understanding the underlying information and communication technologies.

## **HAS BUSINESS REALLY CHANGED?**

In sum, students should understand that many of the essential business processes (e.g., the actual transaction of money for a product or service) did not change fundamentally. However, their implementation changed, in some cases significantly. For example, one of the proposed explanations for why Wal-Mart grew to a position of dominance involves their intelligent application of existing technologies that enabled them to out-compete their rivals [cf. Walton and Huey, 1992, cited in Ives et al., 2002]. Sustainable competitive advantage never comes from any particular technology itself [Clemons and Row, 1991; cf. Hitt and Brynjolfsson, 1996]; it comes from the intelligent application of this information technology to support business strategies that leverage unique resources [Barney, 1991; Wernerfelt, 1984] of a given organization. That strategies must be enacted more rapidly does not indicate fundamental change; it indicates that actions happen faster, just like they did when EDI came into the picture, the telephone before that, and the telegraph even earlier [cf. Standage, 1998].

We believe the perspective on the core IS course presented here to be more compelling than one that focuses on IT simply as an integrating mechanism. That view does not encompass thinking about IT for undertaking strategic initiatives that leverage the informational component of a firm's product, service, process, or relationship. One example of why this distinction is important may be found in the discussion of micropayments and the disaggregation of information-based goods (e.g., books and music). One of the authors of this paper describes to students the case of the Encyclopedia Britannica and the development of Encarta by Microsoft [Evans and Wurster, 1997; cf. Hillis, 2000]. One may assert that Encyclopedia Britannica was so severely impacted by Microsoft's Encarta because Britannica did not realize it was not really selling books. A focus on "IT as integration" would look for ways to apply IT for making the production and distribution of physical books more efficient. However, this approach may well overlook the fundamental issue that Britannica never was selling books; it was selling information using books as a medium. Given a more convenient choice, most people do not wish to buy an entire set of encyclopedias so that they may own that as a resource, just as most people do not read every article in their daily newspaper. Information products can be disaggregated, and hence can be bought in smaller units and delivered less expensively. A view of the product and business process in terms of an information-intense business system, along with an understanding of the underlying information technologies, would account for what happened with Britannica and Microsoft, Napster (and later I-Tunes) and the music recording industry, and the disaggregation of newspapers and magazines, enabled to some extent by micropayments [Huang, 2003].

The kind of assessment described here requires understanding of the technology, the environment, and the business process. To apply information technologies intelligently, a basic understanding of the hardware and infrastructure and how these are built into information systems is necessary. We should not simply take these technical concepts out of the core IS course because they are not popular with students. We would be doing no better than if we were taking the time value of money calculations out of a finance course. One cannot manage what one does not understand, and the core IS course is the only place where students see these topics fully enacted. We believe that reducing the core IS course to an introduction to business course is simply not a wise choice for the discipline, a view we share with others [cf. Ives, 2002].

#### **IV. CONCLUSION**

In summary, IS should be about building and using systems to manage information to advance organizational objectives. Earlier in this paper, we lamented what we perceive as the lack of a concise, over-arching statement of themes for the core IS course. We conclude the paper by proposing such a statement based on our perspective and informed by our survey respondents and panel participants:

- Information Systems as a discipline focuses on creating, supporting and enhancing organizational socio-technical systems to leverage the informational component of a business organization's products, services, business processes or business relationships. The purpose is to advance the organization's objectives.
- This perspective on IS implies understanding how to model essential business processes and data, accurately and how to apply information technologies intelligently. This goal is reached through the development and use of information systems to enhance the organization's efficiency and effectiveness in its environment.
- The systems should process and deliver information to organizational decision-makers. To the extent possible, the information should not be distorted.
- Processes and data should be secured against misuse and/or unauthorized activity because the lives of individuals are often represented mainly in the information stored and processed by these systems. Further, because of the increasingly inter-networked world, potential exploits in one individual or organization's systems can translate into damage for other systems and/or networks, individuals and organizations should take appropriate measures to harden their systems against attack.
- To apply information technologies to build, implement, maintain and secure information systems, one must also understand, at a basic level, the essential functions of information technologies. These technologies include communications infrastructure and technology standards. This knowledge makes it possible to evaluate current and emergent technologies and to understand how systems built on these technologies may be vulnerable to misuse and/or unauthorized activity.

We believe that neglecting any of these points is to offer students in the IS core course an incomplete and inaccurate view of our field. For the development of future business leaders of all disciplines, we propose that the perspective on the core IS course described here will enable students better to understand the business value of information and the important contribution IS can and does make to organizations [cf. Thomas, 2004]. We believe that simply focusing on "enough IS" to establish IS as a business-support tool, gives a student and future businessperson an incomplete conceptual foundation upon which to base future business decisions.

#### **A VENUE TO CONTINUE THIS DISCUSSION**

Whether the reader agrees or disagrees with our effort here, we welcome further discussion. Indeed, we believe that this discussion of the content should be ongoing, and everyone in the IS community who delivers the core course should have the opportunity to contribute.

The AMCIS 2003 Panels on Education-I. Let Us Not Throw Out the Baby with the Bath Water: Information, Systems, and Technology All Matter in the Core IS Course by W.D. Salisbury, M. Huber, C. Piercy, and K.L. Elder

Consequently, we have renewed the Core IS Course page for ISWORLD, hosted on a site (as are the other education pages) developed by Simha Magal of Grand Valley State University. Our "Introduction to MIS" page takes material previously offered on the page managed by Mark Silver, Lynne Markus, and Cynthia Beath<sup>6</sup> and offers sections where faculty can recommend texts, assignments, and other knowledge items. We hope to add a discussion forum in the future. The page may be found at <http://www.magal.com/iswn/teaching/intromis/>.

## ACKNOWLEDGEMENTS

This paper draws from a survey of the ISWORLD readership, the panel discussion at AMCIS 2003 and our own emerging perspective on the topic. We offer our profound thanks to Joey George and Jeff Hoffer for their participation as guest panelists at this session, and those who attended the session and contributed to the discussion. The comments and discussion added to our thinking on this topic. That being said, however, the responsibility for the final product is ours.

*Editor's Note:* This article was received on May 24, 2004 and was published on August \_\_\_\_\_. It was with the authors 1 month for 1 revision.

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<sup>6</sup> We thank these authors for generously providing their content for the renewed site.

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<sup>7</sup> And many other excellent IS academics, who due to space limitations are not named here.

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## APPENDIX I. IS 2002.1 FUNDAMENTALS OF INFORMATION SYSTEMS COURSE SURVEY

David Salisbury  
University of Dayton

As part of a panel discussion about Core Introductory MIS courses at the upcoming AMCIS conference, I would appreciate your input about the following aspects of the Fundamentals of Information Systems Course offered at your university, and to gather some information about the general use of the IS 2002 Model Curriculum and Guidelines. Please complete the items in the following survey (it should take about 5-10 minutes). Although I would greatly appreciate your input, your participation is voluntary, you may withdraw at any time, and you may refuse to answer any specific item. When complete, a summary of this data collection will be presented at AMCIS 2003, will be made available to the IS community via ISWORLD, and may be published in other outlets. Any questions or comments about the survey may be sent to [David Salisbury](mailto:David.Salisbury@universityofdayton.edu).

Are you familiar with the IS 2002 Model Curriculum and Guidelines relevant to this course?

Yes  No

To the best of your knowledge, is the faculty member most responsible for content in this course at your University familiar with the IS 2002 Model Curriculum and Guidelines?

Yes  No

To the best of your knowledge, were the IS 2002 (or IS 1997) Model Curriculum and Guidelines consulted prior to designing the current delivery of this course at your University?

Yes  No

Which of the following best describes your role with respect to this course?

1-**Current** Course Instructor       2-**Current** Course Coordinator       3-**Past** Instructor/Coordinator       4-Have no role

Which of the following best describes the academic rank of the coordinator, or the person most responsible for this course?

1-Instructor       2-Lecturer       3-Tenured/Tenure Track Professor       4-Other

University Name \*

Department Name \*

\*This information will only be used to account for multiple responses from the same university/department.

Location (Region)

Email address (for possible follow-up)

The AMCIS 2003 Panels on Education-I. Let Us Not Throw Out the Baby with the Bath Water: Information Systems, and Technology All Matter in the Core IS Course by W.D. Salisbury, M. Huber, C. Piercy, and K.L. Elder



**IS 2002.1 Fundamentals of Information Systems Topics Coverage**

This section is intended to capture the extent to which students in your Business College/School are exposed to IS 2002 topics. Please use the drop-down boxes associated with each item to indicate to the best of your knowledge the extent of students' exposure in your Business College/School to each topic.

Course Topic		Extent of Exposure					
		(0=N/A, 1=low, 5=high)					
		0	1	2	3	4	5
1	Systems concepts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	System components and relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Cost/value and quality of information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Competitive advantage of information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Specification, design, and re-engineering of information systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Application versus system software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Package software solutions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Procedural versus non-procedural programming languages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Object oriented design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Database features, functions, and architecture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Networks and telecommunication systems and applications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Characteristics of IS professionals and IS career paths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Information security, crime, and ethics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**IS 2002.1 Fundamentals of Information Systems Learning Unit Goals**

The following are learning unit goals as specified in the IS 2002 Model Curriculum. To the best of your knowledge, to what extent are these goals being met in the Introduction to MIS course at your University? Please indicate this using the drop-down box for each item.

Learning Unit Number**	Learning Unit Goal	Extent to which learning unit goal is achieved					
		(0=N/A, 1=low, 5=high)					
		0	1	2	3	4	5
5	To introduce systems and quality concepts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	To provide an introduction to the organizational uses of information to improve overall quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	To present hardware, software, and related information technology concepts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	To provide concepts and skills for the specification and design or the re-engineering of organizationally related systems of limited scope using information technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	To show how information technology can be used to design, facilitate, and communicate organizational goals and objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	To explain the concepts of individual decision making, goal setting, trustworthiness, and empowerment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	To show career paths in Information Systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	To present and discuss the professional and ethical responsibilities of the IS practitioner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\*\*See [www.is2002.org](http://www.is2002.org) for a complete discussion of IS learning units.

IS content is sometimes offered in a variety of academic units. To the best of your knowledge, what academic units on your campus are offering coverage of IS topics (i.e. topics specified in the IS 2002 Model Curriculum and Guidelines)? Please check all that apply.

Accounting	<input type="checkbox"/>	Management	<input type="checkbox"/>
Computer Science	<input type="checkbox"/>	Marketing	<input type="checkbox"/>
Decision Sciences	<input type="checkbox"/>	Operations Management	<input type="checkbox"/>
Economics	<input type="checkbox"/>	Telecom	<input type="checkbox"/>
Finance	<input type="checkbox"/>	Other (please specify below)	<input type="checkbox"/>
Information Systems	<input type="checkbox"/>		

Other academic units offering IS content not listed here (please separate with commas).

If you teach and/or coordinate the Introduction to IS course at your university, would you be willing to share any assignments, approaches or tips that you think are unique or innovative? If so, describe them below, and be certain to provide an email address above (please separate with commas).

Finally, if somebody were to ask you the question “What are the 3-5 key concepts that every business student must know about Information Systems?” what would you say? (please separate with commas).

**Thank you very much for your time.**

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**Wm. David Salisbury** is Assistant Professor in the MIS, OM & Decision Sciences Department at the University of Dayton. His research focuses on the organizational impacts of information technologies, specifically in computer-mediated group work. His more recent work includes the study of knowledge-management and virtual aspects of criminal and terrorist organizations. His work is published in *Information Systems Research*, *Small Group Research*, *Information & Management*, and *Decision Support Systems*. He received his Ph.D. from the University of Calgary.

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