A Framework for an Accounting Information Systems Curriculum

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Abstract

The nineties have generated considerable demand for trained people who are knowledgeable in accounting information systems. Educational institutions are responding to the demand with new programs and course offerings, but they require a large amount of faculty time to construct. Thus, the purpose of this paper is to assist faculty in the AIS curriculum decision process. After the introduction discussion, a section identifies potential goals of an AIS program and covers various assumptions made through this process. Faculty should, of course, define the goals and assumptions for their specific institution. The results of a survey of several accounting programs is then provided to provide a picture of the current state of and demand for AIS. Next, we outline three alternative AIS curriculum alternatives: and AIS track, and AIS minor, and an AIS major. Suggested courses for each alternative are described. Then, a discussion covers an method of organizing the decision factors that govern the choice between a track, minor, and major using a SWOT (strengths, weaknesses, opportunities, and threats) analysis. The last section of the paper summarizes the curriculum decision process.

Introduction

In some ways, accounting has not changed since Pacioli introduced the double-entry system over 500 years ago. In other ways, accounting has changed dramatically just within the past decade. With the explosion of the information revolution, the field of accounting has been swept up in the rush to adopt new technology and develop new systems to provide more and more information at a faster and faster pace. Accounting systems were among the very first to be exposed to the opportunities presented by the new technology. As such, accountants are increasingly expected to not only have a strong grasp of accounting knowledge, but a firm un-

derstanding of the influence of information systems, as well. This revolution has placed demands not only on the industry, but also on educational institutions. More and more a new breed of college graduate is being sought—one that has the skills and training of a traditional accountant, as well as the understanding of and appreciation for the role that information systems play in today's world.

The purpose of this paper is to propose, for educators, a curriculum framework that is designed to bring together the fields of accounting and information systems in order to better equip the graduates of both programs with a new collection of requisite skills. The paper develops several alternatives for an Accounting Informa-

Readers with comments or questions are encouraged to contact the authors via e-mail.

tion Systems (AIS) curriculum. The curriculum framework is designed to be flexible so as to assist faculty in the selection of an appropriate offering for their particular school. The paper investigates three alternative AIS curriculum choices: an AIS "track", or concentration, an AIS minor, and/or an AIS major.

Every faculty member has participated in curriculum discussions and knows the importance of discussion. The "right" curriculum choice will encourage healthy enrollments, good job placement records, and satisfied students and faculty. However, most faculty know that the curriculum decision process is often time-consuming with the potential for poor decisions that have to be revisited time and again. A "cookbook" approach to curriculum design decisions is worthy of examination if it can help organize and simplify the decision. While comprehensive curriculums have been proposed for an AIS Major (ISACA, 1997), there are only a few resources (for example, Brecht and Martin, 1996; Goul, et al., 1997; Sharifi, et al., 1997-98) that faculty can draw upon for a more flexible approach to this particular curriculum decision—thus a major motivation for this paper.

The remainder of the paper is organized as follows: The next section identifies potential goals of an AIS program, assumptions made in the creation of the framework, and the results of a survey of several colleges and schools. This is followed by an explanation of the three curriculum alternatives, including a description of the proposed courses and a summary of their content. An analysis mechanism for examining the strengths and weaknesses of each alternative is then presented, followed by concluding remarks and implications for further research.

Goals, Assumptions, and a Sampling of Existing Programs

Goals

In creating the AIS curriculum design, the first key issue to address is the objective of

the new program. There are several worthwhile objectives that an Accounting Information Systems offering can accomplish. First, the AIS curriculum can strengthen the Accounting Major. Given the advances in technology and the increasing importance that recruiters are placing on Information Systems understanding and skills, it seems likely that a substantial number of accounting students would welcome the opportunity to focus their study in this area. An industry focus group at the authors' institution identified the need for AIS graduates, but could not specify the curriculum characteristics. Their difficulty in doing this further highlights the need for a curriculum framework such as is developed here. Second, a well-crafted AIS curriculum can attract new students who see the institution as offering a cutting-edge program which will produce highly marketable job applicants. Third, the AIS offering could be attractive to students who are interested in a more technologically-oriented approach to accounting. Fourth, considering that continuing education is a requirement of all CPAs, retraining former students could increase enrollments while enhancing the reputation of the school—when new AIS-focused course offerings become available, many former students may return to the campus to update their skills.

Assumptions

After the AIS curriculum goals have been identified, it will be necessary to tailor the decision to a particular institution's constraints. Understanding that a single curriculum framework may not be appropriate in every given situation, several assumptions are made. These assumptions focus on current offerings in accounting and IS, faculty resources, computer resources, and software.

Most business schools have well-established accounting programs at the undergraduate level. Many have also begun adding graduate course offerings due to the 150-hour rule in most states. A quick search on the World Wide Web helped identify over two hundred

colleges and universities in the United States that offer a program in the area of Information Systems. Schools that do not offer a separate major in IS often provide a concentration through a management program, or perhaps even a business concentration in Computer Science. Thus, the first assumption that is made in the development of the AIS Curriculum Framework is that a school currently has course offerings both in Accounting and in Information Systems. While our proposed framework draws heavily on existing courses, the creation of an AIS curriculum will generally require additional courses beyond those currently offered. This presumption not only implies that additional faculty are needed to teach these new courses, but it further suggests that some of the course offerings may require faculty qualifications that are not yet present.

The courses suggested for the AIS curriculum tend to be relatively intensive in the use of computer technology. Classrooms for teaching such courses should be equipped with computers and appropriate projection technology. The ideal situation may call for a teaching lab where each student has access to a computer, or perhaps even a dedicated computer lab devoted to AIS majors.

The AIS courses may need additional software beyond the normal requirements of either Accounting or Information Systems offerings. Sufficient copies or licenses will be required to populate the labs, teaching classrooms or teaching labs, and faculty computers.

Existing Program Offerings

In order to gain insight into the “nature of the industry”, a survey was conducted of business schools in the US. The survey of accounting programs was taken as a random sampling of the *Accounting Faculty Directory* (Hasselback, 1998). A total of 65 accounting faculty members were queried. Forty faculty members responded, for a 61.5% response rate. Each faculty member was asked to answer six different questions as indicated in Table 1.

The survey was conducted in three phases. Initially, of the 55 subject schools randomly selected, 45 were contacted by electronic mail. The other 10 had no e-mail address listed. From the first e-mail sent, 20 subjects responded. A second e-mail was sent to a different faculty member at the 25 non-responding institutions. On this mailing, 8 subjects responded. A third contact was initiated by fax. The remaining 17 subjects, plus 10 from the original group who had no e-mail address were all sent the same questionnaire in fax form. Twelve responded to this contact, representing the total of 40 subjects who ultimately responded. While non-response bias is a possibility, there were no significant differences in the responses between individuals using email and those using fax.

The responses reveal several interesting patterns. Almost everyone (85%) offers at least one course in accounting information systems.

Table 1 – A Survey of the Status of AIS Offerings

Survey Question	Yes	No
1. Do you offer a course in AIS?	34	6
If so, is it required?	28	4
2. Do you offer a concentration in AIS?	3	35
3. Do you offer a minor in AIS?		39
4. Do you offer a major in AIS?	1	37
5. Does your college or school offer a program in MIS?	30	6
6. Are you considering any further offerings in AIS?	3	25

However, very few programs go beyond this into a concentration, minor, or major (a total of 4 out of 40, 10%). Most (83%) of those surveyed also have a program in MIS or CIS, thus a certain degree of technological expertise is available. It appears that only 6 of the MIS/CIS programs are located in the same academic unit as accounting.

Few programs have any immediate plans to extend their AIS offerings. In two cases, the respondents went on to indicate that they had upgraded the technological content of all of their accounting courses. This is not necessarily the same thing as broadening their curriculum. Having faculty equipped with, and teaching with, the latest in technological tools is different from offering AIS courses that teach *about* the technology.

This section has discussed the overall goals for the AIS Curriculum, several assumptions made in the creation of the framework, and an overview of the current state of AIS programs across the country. The next section will describe the framework and explain the three primary options in establishing an AIS Curriculum.

AIS Curriculum Options

We have chosen to concentrate on three options in the combining of the accounting and information systems disciplines. Although certainly there are countless more variations, these three represent the most likely choices. Referring to the model in Figure 1, the three options are: an AIS track, an AIS minor, and an AIS major. As the model indicates, accounting and information systems begin as separate and distinct disciplines, but can eventually merge, and culminate in the creation of an entirely new major—Accounting Information Systems.

AIS Track

Slightly to the right of where the two disciplines are completely autonomous is the point where we would place the first option, the AIS "Track." This track, or concentration if you

will, builds on existing, but separate, programs in accounting and information systems. A track, or concentration, implies a focus towards a particular area of study that can generally be fulfilled by taking, either as electives or other business electives, relevant courses in that particular area. Within the group of required accounting courses there can and should be an introductory AIS course. (Suggested course descriptions and material coverage is presented in the following section.)

An accounting major interested in an AIS track would also take an advanced AIS course, a Systems Analysis and Design course, and a Database Concepts course (each a 3 semester credit hour course). The advanced AIS course would most likely be a new course in the accounting curriculum, preferably taught by an individual with a strong accounting systems background. The remaining two courses would, most likely, already be offered through the IS program. The particular selection of these two IS courses was made in partial consideration of the understanding gained of the overall systems process and of the most prevalent methods of information storage and retrieval currently found in organizations today.

Thus, accounting majors would take a total of 9 hours specific to the AIS track that would generally fit within their allotment of elective hours. Information Systems majors would also have the option of completing an AIS track by taking the introductory AIS course and the advanced AIS course, a total of 6 additional credit hours (assuming that both Systems Analysis and Design and Database Concepts are required courses for the Information System major).

The AIS track offering provides an attractive option for accounting programs with limited faculty resources, or for those schools that might prefer to ease towards the convergence of these two disciplines. Essentially all that is required is the introduction of one additional accounting course, provided that an intro-

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Figure 1

ductory AIS course is currently part of their program.

AIS Minor

Moving further towards the merging of accounting and IS, the next option we propose is the AIS Minor. The minor represents a more concentrated focus on a specific area of study—in this case, accounting information systems—than does a track. What this translates to is a larger number of classes and semester credit hours. In examining a variety of Minor programs, a common requirement is 15 to 21 hours in the subject matter. Building on the four courses suggested in the track option (Introductory AIS, Advanced AIS, Systems Analysis and Design, and Database Concepts), we propose 2 additional courses, each 3 semester credit hours, for a total of 18 hours required for the AIS Minor. One of these courses would be what has traditionally been called “EDP Auditing”. With the evolution of Information Systems having progressed far beyond traditional electronic data processing (EDP), this course would be more aptly referred to as “Information Technology (IT) Auditing.” (Again, suggested course description and material coverage are presented in the following section.) This course would be most appropriately taught by accounting faculty, and should require as a prerequisite, the regular auditing course.

The second would represent a semi-“capstone” course. This course would be designed to pull together the, perhaps still seemingly disparate, disciplines. Depending on the strengths and background of various faculty members this course could be taught by either accounting or IS faculty. Thus, to complete an AIS Minor, accounting majors would be required to take 15 hours beyond their introductory AIS course. Information Systems majors would also be required to complete an additional 15 hours (which includes the regular auditing course as a prerequisite to IT auditing) beyond their major, again assuming that both Systems Analysis and Design and Database Concepts were required courses in their program.

AIS Major

The third proposed option, represented in our model as the complete convergence of the two disciplines, is the offering of a business degree with a Major in Accounting Information Systems. While able to stand alone as a recognized and successful field of study, the AIS Major could very appropriately be half of a double major, alongside strictly accounting or information systems, or perhaps another business major, particularly general business.

Continuing to build on the previous options, the AIS major would include Introductory AIS, Advanced AIS, Systems Analysis & Design, Database Concepts, Auditing Information Technology, and the capstone AIS course plus three additional courses which will complete an in-depth course of study in the new Accounting Information Systems discipline.

To help strengthen the student’s understanding of systems development, one of the three additional courses should be a programming course, such as COBOL. We suggest this particular course for a variety of reasons, not the least of which is that the greatest majority of legacy systems as well as many new, mainframe-oriented systems, are written in COBOL. Furthermore, many, if not most IS programs require their majors to take at least one COBOL course as part of their program, and thus a new course would not be required. Additionally, the very nature of COBOL offers a good environment in which to learn structured programming techniques.

We recommend that the second of the three additional courses required for the AIS major be focused on telecommunications and networking. Because much of the business world is intimately connected to the various members of their value chain, an understanding of the nature of this telecommunications and networking connection is necessary for the AIS professional. Again, this course is often already

a part of the IS curriculum, and thus does not represent a “new” course. Rather we are identifying another appropriate group of students for whom the course would be beneficial.

The third course should be designed as a survey of Intermediate Accounting. Obviously, the AIS major should have a firm understanding of the elements of financial accounting. While not going quite as in-depth as the typical 6 hours of Intermediate Accounting, this 3-hour survey course should be designed to provide a comprehensive, challenging overview of the various facets of financial accounting.

Upon completion of this program the student would be strongly versed in not only traditional accounting aspects, but would also be able to converse with both accountants and systems professionals in topics related to accounting systems design, development, implementation, and operation.

This proposed curriculum for the AIS Major is consistent with that provided by the ISACA Model Curricula for Information Systems Auditing (ISACA, 1997), however our focus is more towards a broader AIS emphasis rather than solely Information Systems Auditing. Furthermore, the importance of this approach lies in the flexibility and selection of alternatives other than an entire major course of study.

This section has presented three options for merging the disciplines of accounting and information systems. These options range from (1) a slight convergence with the AIS track, (2) a moderate convergence through the AIS Minor, and (3) a complete convergence resulting in the AIS Major. The next section will present suggested course description and material coverage for each course proposed above.

Course Descriptions and Material Coverage

Nine courses were suggested in the previous section as making up the AIS Curriculum. Only the AIS Major would be required to take

all nine—the AIS Minor would be required to take six, the AIS Track, four. These courses will be presented in the suggested order in which a student should complete them. The order of the courses also provides a potential arrangement for prerequisite purposes. The courses for the track, minor, and/or major are indicated with a T, m, or M, respectively.

IS 201 – Structured Programming using COBOL (M)

This course provides instruction in the fundamentals of the COBOL programming language to include moving and printing data, report preparation, computing, selection, iteration, debugging, data validation, table processing, sequential file processing, control break programming, good programming practice and principles of structured programming.

AIS 301 - Introduction to Accounting Information Systems (T, m, M)

This course provides an introduction to accounting information systems and examines objectives, concepts, techniques, tools, controls, and audits of systems that capture, process, and summarize accounting information for internal decision making and internal and external reporting of financial information. Topics include systems design, document flows, internal control, audit trails, and electronic data processing.

IS 301 – Systems Analysis and Design (T, m, M)

This course provides an understanding of the systems development life cycle used to develop computer-based information systems. The life cycle approach, prototyping, and rapid application development are studied. Team-oriented projects are utilized to aid in understanding how systems concepts are developed in the business world.

IS 302 – Database Concepts (T, m, M)

Through this course students develop an

understanding of database development including data modeling, normalization, and implementation in the relational model using SQL, database administration, and other database models including the object-oriented model and client-server implementations.

AC 301 – *A Survey of Intermediate Accounting* (M)

This course provides a study of the conceptual and technical aspects of financial accounting theory as related to assets, liabilities, equity, revenue, and expense items. This course will focus on the proper development of financial statements in accordance with GAAP.

AIS 401 – *Advanced Accounting Information Systems* (T, m, M)

This course furthers the understanding of accounting systems, particularly with respect to control issues and the development of accounting systems. Students will complete a comprehensive project creating an accounting information system using COBOL and/or a database management system while developing an understanding of the underlying concepts of systems analysis and design of accounting systems.

IS 401 – *Telecommunications* (M)

This course presents an examination of the history of telecommunications, current trends in telecommunications and networking technology, the importance of understanding and using telecommunications in business, and the management issues with respect to telecommunications.

AIS 402 – *Auditing Information Technology* (m, M)

This course examines the design of accounting systems from the point of view of the operating information and control needed by management. This includes reference to the records, procedures, and machines commonly used

in such systems. Such information is related to independent audit examinations, which rely heavily on the client's procedures and system of internal control. Audit objectives and procedures are studied with respect to the system controls that must be designed into a system in order to provide reasonable assurance that the accounting objectives are being met. Discussions also focus on the work of the internal auditor.

AIS 501 – *Seminar in Accounting Information Systems* (m, M)

This course serves as a capstone to bring together the areas of information systems and accounting and provide a through understanding of the importance of IS to accounting.

Advantages and Disadvantages

Taking what has been presented and applying it to an institution's particular situation requires organization for the curriculum decision-making process. Examining the strengths, weaknesses, opportunities, and threats (SWOT) of each alternative is a useful technique for evaluating alternatives, such as in a curriculum decision (Peters, 1993a; Peters, 1993b; Proctor and Ruocco, 1992; "SWOT", 1993). Using Figure 2 as a guide, a school can conduct an analysis of these issues across the three curriculum alternatives.

It is quite possible that a given alternative will have both definite strengths as well as weaknesses, and by organizing the decision process these issues can be addressed. For example, the staffing issue is based upon a fundamental resource assumption that an institution must make with regard to its prospective program. If a school has a hiring freeze, capable faculty may be available to institute an AIS Track (strength), but may not be sufficient to create an AIS Major (weakness). Similarly, the school's alumni and recruiters may indicate that the immediate geographical area will only hire those individuals with an AIS Major (strength), and would not generally hire anyone with less

Figure 2 A Decision Matrix of AIS Curriculum Alternatives by Program Characteristics (SWOT)			
	TRACK	MINOR	MAJOR
STRENGTHS			
WEAKNESSES			
OPPORTUNITIES			
THREATS			

knowledge (a weakness for the Track and Minor).

Concluding Remarks

The paper presents a curriculum model that can be used to assist the decision making process involved in establishing an AIS curriculum. The paper examines three alternative AIS curriculum formats of a Track, Minor, and Major. Depending on a school's circumstances and resources, one curriculum choice should emerge as the most appropriate using a decision-making tool such as a SWOT analysis. Considering the pervasive influence of technology on the field of accounting, colleges and schools of business would do well to begin the process of combining these two disciplines in order to produce the types of graduates that are, and will be, highly sought after for many years to come.

Implications for Further Study

The development of an AIS curriculum is the result of an evolution in business and education as what were once disparate fields of study are now being linked ever tighter. Accounting and Information Systems are prime candidates for this cross-functional approach. However, as the business world acknowledges the pervasive influence that technology has throughout an organization, more disciplines may very well recognize the need to "link", particularly with information systems. In the near future we may start seeing additional new fields of study such as Marketing Information Systems

and Economic Information Systems. These curriculum issues are just beginning to come to the forefront, and business faculty need to remain aware of the possibilities.

References

1. Brecht, H. David, and Merle P. Martin. "Accounting Information Systems: The Challenge of Extending Their Scope to Business and Information Strategy," *Accounting Horizons*, 10(4), December 1996, 16-22.
2. Goul, M., A. Philippakis, H. Reneau, and J. Smith-David. "Merging Accountancy and Computer Information Systems Programs at Arizona State University: A Snapshot of Current Progress and Continuing Challenges," *Proceedings of Association of Information Systems Conference*, August 1997, 284-286.
3. Hardy, John W, Larry A. Deppe, and Jay M. Smith. "A Curriculum for the 1990s and Beyond," *Management Accounting*, 75(3), September 1993, 66-67.
4. Hasselback, James R., "1998-1999 Accounting Faculty Directory," Prentice-Hall, 1998.
5. Information Systems Audit and Control Association (ISACA). "Model Curricula for Information Systems Auditing at the Undergraduate and Graduate Levels," 1997.
6. Lin, Binshan, and Barbara E. Edwards. "Accounting Information Systems in Local Accounting Firms: A Survey of Cur-

-
- rent Practices," *Journal of Computer Information Systems*, 36(4), Summer 1996, 42- 45.
 7. Novin, Adel M., and Michael A. Pearxon. "Educating Internal Auditors," *Internal Auditor*, 51(6), December 1994, 54-57.
 8. Peters, John. "On Audits: Analysis of Strengths, Weaknesses, Opportunities, and Threats," *Management Decision*, 31(6), November 1993, 26-27.
 9. Peters, John. "On Strategy: A Framework for Strategic Planning," *Management Decision*, 31(6), November 1993, 5-8.
 10. Proctor, Tony and Paul Ruocco. "Generating Market Strategies: A Structured Creative Decision Support Method," *Management Decision*, 30(5), September 1992, 50-53.
 11. Sharifi, Mohsen, Gary B. McCombs, and Susan C. Kattelus. "Using a Capstone Accounting Information Systems Course for Assessment and Development of Team Skills," *Review of Accounting Information Systems*, 2(1), Winter 1997-1998, 31-38.
 12. "SWOT Or Go Under: Private Schools," *The Economist*, 327(7810) May 8, 1993, 65-66.