

## DEVELOPING INFORMATION RISK MANAGEMENT, SECURITY AND ASSURANCE CURRICULA FOR AIS/MIS/IT EDUCATION

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### ABSTRACT

*Successful organizations of the 21<sup>st</sup> Century have to deal proactively with information security issues. The demand for information security literacy is increasing rapidly, spurred in part because of increased regulatory requirements such as the Sarbanes-Oxley Act. In order to help meet this demand, Management Information Systems and Accounting departments in universities need to develop courses and perhaps even curricula to educate students about the strategic, managerial, organizational and regulatory issues of security in addition to the technical details. One interesting development in information security is the increasing demand for IT auditors from among non-accounting graduates (such as MIS majors). In our ongoing research (partly based on discussions with practitioners), we are working on the development of new courses at the graduate and undergraduate levels to support these demands. In this continuing research-in-progress paper, we describe the development of the demand for MIS students for information risk, security consulting and IT auditing careers and what we are doing at our university to make students more aware of such careers and to better prepare them for entry-level positions. Specifically we discuss courses being taught to graduate students in our Master of Accountancy program and undergraduate students in the MIS major and minor programs. We review sources of possible class assignments and exercises and also discuss the Information Systems Audit and Control Association's Model Curriculum.*

**Keywords:** Information Security, IT Audit, ISACA, COBIT®, Sarbanes-Oxley

### INTRODUCTION

The demand for information security literacy is increasing rapidly, spurred in part because of increased regulatory requirements, such as the Sarbanes-Oxley Act of 2002 (SOX). Because of regulations in the U.S., such as SOX, the Health Insurance Portability and Accountability Act of 1996 (HIPAA), and the Homeland Security Act of 2002, the demand for information technology (IT) audit

professionals currently exceeds the supply [1, 3, 5]. Thus many companies are willing to hire management information systems (MIS) students straight out of college with little accounting and auditing education and train them to be IT auditors. Indeed, our university has been approached by several large employers in the last year to lament that, while they need to hire more entry-level IT auditors, the supply of qualified candidates is rather limited. MIS and accounting information systems (AIS) programs can help prepare their graduates for better placement in these lucrative entry-level jobs by incorporating knowledge of concepts such as IT governance, assurance, controls, ISACA and COBIT in their courses. The purpose of this paper is to discuss how MIS educators can better meet the needs of stakeholders by recognizing the demand for IT audit professionals, by making our students aware of IT audit as a potential career, and by making appropriate changes to our curricula.

### INFORMATION SYSTEMS AUDIT AND CONTROL ASSOCIATION

One important resource for IT/MIS/AIS information security educators is the Information Systems Audit and Control Association (ISACA), which is available at [www.isaca.org](http://www.isaca.org). This organization is the international association dedicated to serving the IT audit profession and “has become the leading IT governance, assurance, security and control organization [with] approximately 35,000 consultants, academics, security professionals, IS auditors and senior executive members [with] 160 chapters spread among 100 countries” (p. 5) [5]. ISACA provides numerous resources for educators and students at little or no charge, including a link on their Web site entitled “Students & Educators”; the *ISACA Model Curriculum for IS Audit and Control*; an Academic Advocate program for faculty advisors of student ISACA chapters; a set of educational materials called “COBIT in Academia”; discounted student memberships in ISACA; a series of articles called “IT Audit Basics Columns”; and the *Information Systems Control Journal*. We have found these resources to be valuable in the development of our graduate course called “Information Security and Assurance” and for a new undergraduate course

entitled “Information Risk Management, Security and IT Auditing.”

One of the most important of these resources for educators looking to add significant IT audit content into their courses is the *ISACA Model Curriculum*, which was initially developed by a diverse task force in the late 1990s and has been revised into its second version. As noted in the Curriculum document (which is freely available at [isaca.org](http://isaca.org)) most traditional accounting or MIS programs are deficient in meeting the needs for entry-level IT audit professionals, who must have a multi-dimensional set of skills such as understanding emerging IT and being able to discern the impact of these technologies on control processes and audit procedures. The framework chosen for this revised model is based on the Certified Information Systems Auditor ® (CISA®) certification examination. The CISA certification is the prominent professional designation for IT auditors (and, based on another, related research project we are working on, seemingly the most prestigious in the IT audit profession), and it has been earned by over 38,000 professionals worldwide. Several CISA examination content areas and their related subtopics form the basis of the *Model Curriculum*:

1. audit process,
2. management planning and organization of IS,
3. technical infrastructure and operational practices,
4. protection of information assets,
5. disaster recovery and business continuity,
6. business application system development, acquisition, implementation and maintenance, and
7. business process evaluation and risk management.

It is obvious from this high-level list that few MIS or accounting curriculums alone would cover this entire spectrum of content. Thus, specialized courses may be the best way to meet the needs of our stakeholders (and most importantly, our MIS students and the employers who may hire them).

In addition to these resources from the international ISACA organization, we have received significant support from our local metropolitan area ISACA chapter. Indeed, this chapter’s members were so anxious to establish a relationship with our university (in order to recruit our students and influence our curriculum) that they came to us and initiated our student chapter and made a donation to it. This local professional chapter invites our students to their dinner meetings and gives them a significant discount

off the fee. They also send speakers to the student chapter’s meetings. In short, we feel that the strong encouragement of both the international ISACA organization and the local chapter is a strong indicator of the increasing demand for IT security and audits professionals, and we intend to help meet the needs of these stakeholders by continuing to include content and courses in our ever evolving curriculum. In order to identify the most important content matter, the remainder of this paper will discuss some important skills students need to develop in order to be an effective IT auditor and highlight some of the course content and assignments we have developed thus far.

### SKILLS FOR IT AUDITING

In our ongoing research of the literature and in informal discussions with employers (such as at the ISACA chapter meetings), we have identified several skills and concepts that MIS graduates should possess in order to be highly desirable candidates for entry-level IT audit positions, both in industry and in public accounting (e.g., the “Big Four”). Hunton, Bryant, & Bagranoff [4] argue that “[w]hile technical computer skills are important to an IT auditor, general communication and business skills probably matter even more. IT auditors...write up their work” and make various presentations to the auditees and other stakeholders (p. 8). Hunton *et al.* also summarize the key success skills and knowledge for IT auditors: oral and written communication skills, interpersonal skills, teamwork, business process understanding, and the ability to use statistical analysis tools.

The *ISACA Model Curriculum* [5] supports the importance of oral and written communication and interpersonal skills (e.g., negotiation skills and team building) and adds that IT governance, assurance, security, and control domain topics and subtopics are required to meet “the knowledge expectations for a recent college graduate seeking to fill an entry-level position in the IS audit and control field” (p. 11). For example, under the audit process domain in the *Model Curriculum*, subtopics include professional regulations, independence, IT governance, risk assessments, internal control objectives and frameworks, and control classifications. These are just a few of the many necessary subtopics that an MIS major probably will not get in the usual MIS curriculum. So one could argue that just one well-designed course could substantially raise the knowledge level of entry-level IT auditor candidates, and we believe our new undergraduate course does this well. For example, we focus on risk assessments, control frameworks (such as COBIT), and IT audit

objectives and procedures as a major framework throughout the course.

In addition to information gleaned from prior research and authoritative professional practitioner resources, we conducted several informal structured interviews to determine the views of recent hires (performing IT audit roles) and their managers. The results of these interviews are discussed below using some of the questions we asked during the interviews.

### **What Skills Should New Hires Possess for the IT Audit Function?**

Consistent with the literature, nearly all of the interviewees indicated that “soft” skills, i.e., communication skills, were as or more important for job success as general or specific technical skills. Particularly important to several of the new hires was writing skills. The interviewees were surprised at the amount of writing involved in summarizing and documenting activities and communicating these results to interested managers. Also important to the managers of new hires was the ability to learn quickly and the motivation to learn. Some of the descriptions used to describe this skill included eager to learn, self-starter, and enthusiastic. The managers also mentioned specific types of communication skills, including interviewing to gather information, conflict management for delivering bad news, and diplomacy. Some of the specific technical skills that were mentioned included disaster recovery planning, change management strategies, segregation of duties, logical access controls, backup and documentation techniques, and identifying risks and related controls.

### **Are There Specific Software or Hardware Skills that are Required or Desired?**

Nearly all the interviewees indicated that they did *not* have specific software or hardware “requirements” for new hires. But they did indicate that candidates with skills in database, operating systems, and specific hardware that matched what they or their clients used would probably have a “comparative advantage” over other candidates. Some of the specific technologies mentioned included Oracle database, MS Visual Basic / Studio, C++ and Java, and COBOL. However, this desire for programming language skills was more concerned with understanding how applications are built and run rather than for developing new programs. There was also a preference for candidates to have a fundamental understanding of information

technology architecture, i.e., mainframes, client-server, and networking.

### **What are the Benefits of Becoming an IT Auditor?**

On top of the quantity of job opportunities currently available, the general perception of both new hires and managers in IT audit toward long-term career growth and development is very positive. The interviewees identified several benefits for IT auditors not normally available in traditional IT career paths. Major benefits mentioned included a wide breadth of experiences and much visibility across the organization. Given that the IT audit function involves nearly every business process in the organization, new IT auditors are exposed to many different organizational units and deal with individuals at all levels, including executives, within the first two years of their careers. This characteristic of the job also benefits young professionals that may not be certain of their career aspirations or those that may not know of all the many different functions and roles within organizations. Another benefit mentioned often was the focus on close supervision leading to high quality mentoring. Because of the heightened importance of the IT audit function, close supervision of new employees is necessary to ensure compliance with internal governance processes and with external auditing standards; this naturally leads to formal (and informal) development of bonds between senior and junior staff members.

### **Are There Potential Disadvantages of the IT Audit Role?**

The only significant drawback mentioned for traditional MIS majors was the possible limitation on working with the “latest and greatest” emerging technologies. However, given the general perception that organizations are much more concerned with cost control and containment and because of the outsourcing / offshoring phenomenon, the opportunities for our graduates for the positions that work with emerging technologies may be diminishing anyway.

## **COURSE DEVELOPMENT**

In order to develop our new courses to help meet the entry-level career needs of our students, we first took the general approach of reviewing potential textbooks that might provide the majority of the necessary foundational knowledge (that we mostly gleaned from ISACA). In this way, any major gaps in a text’s coverage could be filled with supplemental readings

from ISACA or other credible sources, such as the SANS Institute ([www.sans.org](http://www.sans.org)), CERT® Coordination Center ([www.cert.org](http://www.cert.org)), the Institute of Internal Auditors (IIA; [www.theiia.org](http://www.theiia.org)) or the Association for Information Systems ([www.aisnet.org](http://www.aisnet.org)). Whereas the *ISACA Model Curriculum* is an excellent guide for the integration of key IT audit content into an existing MIS curriculum, it is far too comprehensive to cover in one course. (ISACA recognizes this and provides a checklist where the domain subtopics can be checked off as being covered in several different courses.) Thus a smaller subset of concepts must be chosen for coverage in a single course, and an existing textbook is often a good starting point for such a process.

In addition, we have solicited feedback from our practitioner colleagues about content they think is important, and, in personal discussions with some of our advisory board members and employers, several issues emerged. One of these is the multidisciplinary nature of this topic; it includes and requires prerequisite knowledge in topics from both accounting and information systems. This issue has implications for the range and depth of material that can be covered in a course, what course prerequisites are needed for the course, and which department should offer the course.

For our graduate course taken almost exclusively by master's of accounting students, we chose the Hunton *et al.* [4] and the Whitman and Mattord [7] textbooks in the first year and the Hall and Singleton [2] and Whitman and Mattord [6] textbooks in the second year, plus selected readings from resources from ISACA and the "COBIT in Academia" materials, also from ISACA. COBIT® (short for *Control Objectives for Information and Related Technology*) is a publication of the IT Governance Institute, an affiliate of ISACA. COBIT is a framework or model for control and governance of IT, consisting of 34 high-level control objectives and audit guidelines classified into four domains: Plan and Organize (the IT strategy), Acquire and Implement (IT solutions), Deliver and Support (required information services), and Monitor and Evaluate (IT processes).

Although COBIT is a bit overwhelming at first glance, we found the COBIT Presentation Package, COBIT Student Book, the COBIT Caselets, and COBIT Case Study particularly useful for giving our students the big picture perspective and then allowing them to drill down into the details of the framework to apply to the contexts of a particular text chapter and/or topic. However, we deemed it necessary to supplement the teaching notes for the case and

caselets and to develop our own suggested solutions to demonstrate how the framework could be used. Eventually, we intend to submit our materials to the COBIT in Academia for their use (a condition for using the materials), and we encourage our colleagues to do the same.

For our undergraduate course (which attracts both MIS and accounting majors), we chose the Hall and Singleton [2] textbook because it covers Computer-Assisted Audit Tools and Techniques (CAATs), includes an instructional version of ACL™ software (which is a data extraction and analysis CAAT tool), and includes coverage of SOX. The ACL software can be used as part of an integrated teaching case that spans three chapters. Eventually we hope to attract many more MIS majors to this course, most of whom will likely only have taken the required foundation accounting courses. From that standpoint, we have found this textbook to be a balanced mix of auditing/assurance and information technology topics.

## ASSIGNMENTS

The course assignments for the graduate level course have taken several forms, including (1) individual or group assignments where the students are expected to prepare a research report or paper and presentation of course content (e.g., access controls) and to apply the COBIT framework as appropriate; (2) application of the topics being discussed to "real" world problems, e.g., the COBIT Caselets and the Enron fraud case; and (3) typical homework related to the students' reading assignments, e.g., review and discussion questions at the end of the textbooks and the COBIT Student Book. Other assignments are being developed, especially hands-on computer assignments for the use of CAATs.

For our undergraduate course, we have actively engaged the use of many of the materials from ISACA, such as the COBIT Student Book and IS Auditing Guidelines for particular topics, including ERP (Guideline G21) and CAATs (Guideline G3). We are also requiring academic research papers on relevant topics of their choosing (but with instructor approval), where they are required to use resources from professional organizations, such as ISACA and the Institute of Internal Auditors and to apply the COBIT framework as appropriate. In addition, we have incorporated hands-on assignments, such as ACL. Our long-term plans are to investigate using SAP in Academia's security modules as another source of hands-on applications. We are also working closely with our industry stakeholders (e.g., public

accounting firms hiring entry-level IT auditors) to develop simulated audit procedures and tests and the relevant work paper documentation for the students to gain a clearer understanding of the daily activities of an audit professional.

### CONCLUSION

The demand for IT audit professionals is increasing, as evidenced by ISACA's simple, but powerful statement: "In the information-based business environment, business professionals who are technically competent in IS, or IS specialists who understand accounting, commerce and financial operations, are in great demand for IS audit careers" (p. 7) [5]. In response, over the past couple of years we have integrated content and courses into our MIS curriculum, where it basically was nonexistent beforehand. We encourage IT/MIS/AIS educators to use ISACA's resources to the benefit of their stakeholders. We will continue to conduct research into the skills needed by entry-level IT auditors and develop content and assignments for our new courses, and we look forward to sharing ideas and course materials with other educators.

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