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Uniform CPA examination content specifications update study: Information technology knowledge required by CPAs in public accounting

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American Institute of Certified Public Accountants. Board of Examiners. Content Oversight Task Force

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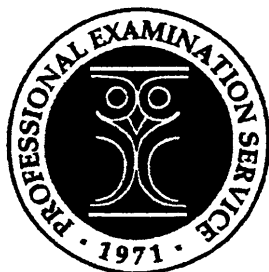
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**Uniform CPA Examination Content Specifications Update Study:
Information Technology Knowledge
Required by CPAs in Public Accounting**

Prepared for

Board of Examiners' Content Oversight Task Force
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March 1999

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March 1999

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Preface

On behalf of the Professional Examination Service (PES), we are pleased to have conducted this very important study for the American Institute of Certified Public Accountants (AICPA). This report summarizes the knowledge related to information technology (IT) used by CPAs in the conduct of audits.

Information included in this report came from the following sources: the IT Working Group of the AICPA's Content Oversight Task Force, in-depth critical incident telephone interviews, a focus panel discussion, a pilot survey, and a survey of 1000 CPAs in public practice.

Process- and content-based approaches were used to systematically delineate the impact of IT on auditing practice. The process-based approach comprises the delineation of tasks and activities, while the content-based approach comprises the delineation of IT-related topics and associated knowledge. The two delineations were integrated through the conduct of a linking task. As a result, the findings represent a dynamic description of the relationship between IT knowledge and its application in the performance of audit tasks and activities.

We are indebted to the IT subcommittee of the AICPA's Content Oversight Task Force. Its members—David B. Pearson, CPA, DBA; David L. Holyoak, CPA; and Don M. Pallais, CPA—worked closely with us during the conduct of the study. We also recognize the substantial contributions of the AICPA staff, especially Bruce Biskin, PhD, and Ahava Goldman, CPA, and the CPAs who participated in interviews, focus panel discussions, the pilot test of the survey, the completion of the survey, and the linking task. We would also like to thank Ellen A. Sawtell at PES. Her thoughtful administrative and technical support contributed to the success of the project.

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New York, New York
February 1999

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1. Executive Summary

In 1997, the American Institute for Certified Public Accountants (AICPA) contracted with Professional Examination Service (PES) to implement a targeted update study of the practice of certified public accountants (CPAs). The goal of the study was to identify any information technology (IT) knowledge that might be required of CPAs in public accounting, and to devise a means of testing that knowledge on the Uniform CPA Examination. Specifically, PES was charged with identifying the knowledge base required of CPAs to plan and conduct audits within technology-based client environments.

1.1 Methodology

The AICPA Board of Examiners' Content Oversight Task Force appointed an IT Working Group in 1997. The IT Working Group was tasked with drafting an initial delineation of the IT-related content knowledge required by CPAs in public accounting. The initial delineation consisted of two parts: a content-based listing of broad IT-related topics defined by their associated knowledge areas, and a process-based listing of the activities CPAs perform in planning and conducting audits within IT-based client environments.

PES implemented two procedures to refine and augment the draft IT delineation developed by the IT Working Group. First, PES conducted 20 critical incidents interviews via telephone with supervisors of entry-level CPAs. Second, PES conducted a focus panel. Focus panel members included (1) representatives of large-firm CPAs with responsibility for developing IT-related continuing professional education and management information systems, (2) academics knowledgeable about conducting audit engagements in an IT environment, and (3) experienced CPAs who conduct audit engagements in an IT environment.

The COTF reviewed the work of the IT Working Group and the subject-matter experts participating in critical incidents interviews and the focus panel, and approved a revised delineation that incorporated the data from all three sources. The final delineation consisted of a content-based list of 28 IT-related topics, and a process-based list of 32 auditing activities organized within four audit tasks (the 26 activities in the existing auditing CSOs plus the six specifically-delineated IT activities.)

A pilot survey was designed and tested on a sample of CPAs in public practice. After revisions, the survey was used to validate the delineation through a survey of CPAs in public practice.

The survey instrument consisted of five sections:

- Section 1: IT-Related Topics
- Section 2: Practice Areas
- Section 3: Auditing Activities
- Section 4: Background Information
- Section 5: Comments

In Section 1, respondents were asked to make three ratings for each IT-related topic:

- (1) *Importance*—the importance of knowledge of the topic to their own competence as CPAs in public accounting,
- (2) *Usage*—the level at which they used the knowledge in their work as CPAs in public accounting (recognition/recall *versus* apply/interpret/integrate), and
- (3) *Acquisition*—the point at which CPAs in public accounting should acquire the knowledge (before or after passing the Uniform CPA Examination).

In Section 2, respondents were asked to indicate the percentage of their work time they spent in the major practice areas of auditing, accounting and other assurance services, taxation, management advisory services, and “other” practice areas.

Only those respondents who devoted 20% or more of their work time to auditing were asked to complete Section 3. In this section, respondents were asked to make three ratings for each auditing activity:

- (1) *Importance*—the importance of the activity to their own competence as CPAs in the conduct of audits,
- (2) *Frequency*—the frequency with which they performed the activity during audits, and
- (3) *IT Frequency*—the frequency with which they used IT-related knowledge or skills (other than word processing and spreadsheets) when performing the activity.

In Section 4, respondents completed a background questionnaire, and described how much time they allocated to the four major auditing tasks (planning; obtaining and documenting information to form a basis for conclusions; reviewing and evaluating information obtained to reach and document conclusions; and preparing communications to satisfy engagement objectives).

In Section 5, respondents answered open-ended questions regarding the IT knowledge needs of CPAs in public accounting.

The survey was mailed to a sample of 1000 CPAs in public accounting. The sampling plan was designed to over-represent CPAs at the entry level of practice. It was also designed to include representatives from each of the 54 licensing jurisdictions. The survey mailing sequence included an invitation letter, followed by the survey and a postage-paid return envelope, followed by a reminder/thank-you postcard.

1.2 Results

- The return rate for the survey was 39%. Consistent with the sampling plan, 52% percent of respondents had 5 or fewer years of experience, and 48% had more than 5 years of experience.
- Fifty-one percent of the less-experienced respondents worked in local firms, as did 70% of the more-experienced respondents. Compared with the more-experienced CPAs, less-experienced CPAs were more likely to work in national or international firms.
- Most of the less-experienced respondents described themselves as holding the position of staff accountant, senior, or supervisor. Most of the more-experienced respondents described themselves as holding the position of manager or partner/shareholder/owner.
- More than half of the respondents at each experience level work at firms employing 50 or fewer professionals. However, less-experienced respondents were more likely to work in firms with more than 10,000 professionals than were more-experienced respondents.
- The majority of CPAs responding to the survey indicated a bachelor's degree as their highest level of education.
- Of those respondents who had earned a bachelor's degree, the vast majority held a bachelor's degree in accounting.
- Of those respondents who had earned a master's degree, less-experienced CPAs were more likely to hold a master's degree in accounting, while more-experienced CPAs were nearly twice as likely to hold an MBA.

The report presents the time spent by less- and more-experienced CPAs in the major areas of accounting practice. In summary:

- Nearly one half of the less-experienced respondents spent more than 75% of their time in auditing, accounting, and other assurance services; less than one-fourth of the more-experienced respondents did so.
- Relative to their more-experienced counterparts, less-experienced CPAs spent more time in auditing and less time in taxation.
- In contrast to the local-firm respondents, respondents working in regional, national, and international firms spent nearly twice as much time in auditing, and they spent much less time in accounting and other assurance services and in taxation.

Results related to *Importance*, *Frequency*, and *Acquisition* ratings for each IT-related topic are presented for less-experienced and more-experienced CPAs. In brief:

- Less-experienced respondents rated 12 of the 28 IT-related topics at least moderately important to their competence as CPAs in public accounting, and rated the remaining 16 topics at least minimally important.
- More-experienced respondents rated 13 of the 28 topics at least moderately important to their competence as CPAs in public accounting—including the 12 topics rated at least moderately important by the less-experienced cohort—and they rated the other 15 topics at least minimally important.
- All 28 IT-related topics were used by at least 50% of the respondents at each experience level, either at the *recognition/recall* level or at the *apply/interpret/integrate* level.
- At least 65% of respondents at each experience level believe that each IT-related topic should be acquired by CPAs in public accounting, either before or after passing the CPA examination.

Results related to time spent performing auditing engagements revealed that:

- Of the time they spent auditing, respondents with 5 or fewer years of experience spent more than one half of that on the task, Obtain and document information to form a basis for conclusions. The remainder of their auditing time was distributed fairly evenly across the other major auditing tasks.
- In comparison to the less-experienced CPAs, the more-experienced CPAs spent less time on the task, Obtain and document information to form a basis for conclusions, and spent more time on the task, Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions.
- In comparison to CPAs working in local firms, CPAs working in regional, national, and international firms spent more time on the task, Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions, and less time on the task, Obtain and document information to form a basis for conclusions.

Results related to the *Importance*, *Frequency*, and *IT Frequency* ratings for each auditing activity are presented for less-experienced CPAs and for more-experienced CPAs. Briefly,

- All 32 auditing activities were rated at least moderately important to respondents' competence as CPAs in public accounting.
- Respondents performed most of the auditing activities at least frequently during audits.

- Overall, *IT Frequency* ratings were much lower than non-IT related *Frequency* ratings for the 32 activities.
- *IT Frequency* ratings were higher for the six explicitly delineated IT-related auditing activities than for all but one of the remaining auditing activities.

1.3 Linking Task

The 45 CPAs who had previously participated in a focus panel, critical incidents interview, or pilot test of the *CPA Information Technology Survey* were called upon to “link” the IT-related topics to the auditing activities; specifically, to identify each auditing activity in which each IT-related topic plays a key role and contributes to successful task performance.

Strong and moderate links between IT-related topics and auditing activities were identified on the basis of (1) then number of SMEs indicating the link, (2) the Importance and Acquisition ratings for the topics.

- The six explicitly delineated IT auditing activities were identified as having the greatest number of linkages to the IT-related topics.
- IT-related examination items can be written to assess validated IT-topics in the context of the strongly linked, and to a lesser extent, the moderately linked, auditing activities.

The IT Working Group of the COTF reviewed the ratings for each IT-related topic and made final decisions as to the inclusion of each in the auditing CSOs. As a rule, topics that received a mean *Importance* rating greater than 1.6, and support for acquisition *Primarily Before Passing the CPA Examination* from more than 40% of respondents, were endorsed for inclusion in the CSOs.

At their November 1998 meeting, the COTF recommended the following changes to the auditing CSOs to reflect the results of the study:

- Change the introductory paragraph and make slight changes to the activity statements in the auditing CSOs to reflect the performance of auditing and other attestation engagements in *computerized* environments,
- Add an appendix of validated IT topics to Information for Uniform CPA Examination Candidates, and
- Include sample IT questions in Information for Uniform CPA Examination Candidates.

At their January 1999 meeting, the AICPA’s Board of Examiners approved these changes, effective with the November 1999 examination.

2. Background

In 1996, the AICPA Board of Examiners appointed a Content Oversight Task Force (COTF) to identify ways to expeditiously update the Uniform CPA Examination content specifications. As its first initiative, the COTF issued an invitation to comment, *Updating the Uniform CPA Examination Content Specifications* (AICPA, 1997). One question posed in the invitation to comment was, “What knowledge and skills are missing from the current Uniform CPA Examination content specifications that should be included because they are needed by newly licensed CPAs in the practice of public accountancy?” Numerous responses indicated that knowledge related to information technology, such as understanding basic computer technology, electronic commerce, the effects of information technology on audit planning and risk assessment, procedures for auditing computer-generated transactions, and performing computer-assisted auditing, should be included on the examination.

On the basis of this finding, the COTF appointed an Information Technology (IT) Working Group to examine how the Uniform CPA Examination might incorporate an assessment of the IT knowledge required of CPAs in public accounting. The IT Working Group drafted a preliminary delineation, consisting of (a) 4 auditing activities which required the use of IT-related knowledge, and (b) 20 IT-related topic areas, and 96 associated knowledge statements.

In 1997, the AICPA contracted with PES to review and amplify the draft delineation developed by the IT Working Group, and to provide guidance on integrating that IT-related content into the auditing portion of the Uniform CPA Examination content specification outline (CSOs). Specifically, PES was charged with identifying the knowledge base required of CPAs to plan and conduct audits within technology-based client environments.

3. Procedures for the Conduct of the Update Study

3.1 Delineation of IT-Related Process and Content

PES implemented two procedures to refine and augment the draft IT delineation developed by the IT Working Group. First, PES conducted 20 critical incidents interviews via telephone with supervisors of entry-level CPAs. The focus of each interview was on the identification of the critical tasks and activities involved in conducting audits in an IT environment, and the specific knowledge required to perform those activities. Interviewees included representatives of small-, medium-, and large-size firms in geographically diverse locations. Appendix 1 contains a summary report of the critical incidents interview data collection initiative.

Second, PES conducted a focus panel consisting of: (a) two CPAs at large firms who had responsibility for developing IT-related continuing professional education and management information systems, (b) two academics knowledgeable about conducting audit engagements in an IT environment, and (c) six experienced CPAs who conduct audit engagements in an IT environment. Panelists were asked to describe the steps within an auditing engagement that might require IT-related knowledge. Panelists were also asked to review and comment on the draft delineation developed by the IT Working Group. Appendix 2 contains a summary report of the focus panel data collection initiative.

PES incorporated the results of the two activities into two revised delineations. First, as part of the process-based revision, the IT-related auditing activities were augmented and placed in the context of the current Uniform CPA auditing CSOs, which comprise four tasks and 26 activities. Second, as part of the content-based revision, the IT topics and associated knowledge statements were augmented and edited. The COTF reviewed the revised delineations at their May 1998 meeting, and suggested minor revisions which were incorporated into the delineations prior to the conduct of a validation survey.

3.2 Conduct of Validation Survey

PES developed a draft validation survey designed to collect ratings from CPAs related to the delineated auditing activities, and the IT-related topics and associated knowledge. The COTF reviewed the draft survey in May 1998. Subsequently, PES implemented the COTF's suggested revisions to the survey in preparation for a pilot test of the survey.

PES conducted a survey pilot test by mail with a sample of 25 CPAs nominated by the AICPA. Participants were required to complete the survey *and* to critically review the component elements. The pilot test served as a check on the clarity and comprehensiveness of the survey and the delineation. PES also conducted a telephone-based follow-up interview with 4 of the 25 pilot test participants. The interview was designed to reveal subtle flaws in the delineation, the rating scales, and/or the instructions.

An ancillary purpose of the pilot test was to guide decision-making regarding the level of specificity of the IT knowledge delineation. Feedback from focus panel participants suggested

that the knowledge statements associated with the topics were very specific and also potentially overlapping. Accordingly, pilot test participants' ratings of the topics and the associated knowledge listings were analyzed. In most instances, there was little or no variability in the ratings of the knowledge listed within a topic; accordingly, separately listed knowledges were collapsed into a single statement. In other instances, the patterns of ratings suggested that there were distinct subsets of related knowledge associated with a single topic. In these instances, each knowledge subset was revised as a distinct topic.

The final delineation consisted of 28 content-based IT-related topics and 32 process-based auditing activities organized within four audit tasks (the 26 activities in the existing auditing CSOs plus the six specifically-delineated IT activities). The content-based delineation is presented in Exhibit 1.

Exhibit 1
Content-Based Delineation of 28 IT-Related Topics

Role of Information Systems within Business

Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures

Includes knowledge of decision support systems, executive information systems, expert systems, and artificial intelligence

Hardware

Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices

Software

Includes knowledge of operating systems, applications, and security

Includes knowledge of utilities, programming languages, and library management

Data Structure

Includes knowledge of file organization, types of data files, and database management systems

Networks

Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/ decentralized processing; distributed data processing; client/server computing; and end-user computing

Transaction Processing Modes

Includes knowledge of batch, on-line, real-time, and distributed processing

Electronic Commerce

Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions

Application Processing Phases

Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow

IT Control Objectives

Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives

Control Activities and Design

Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls

Physical Access Controls

Includes knowledge of user identification, keypad device, and card reader controls

Logical Access Points

Includes knowledge of paths, consoles, workstations/terminals, and dial-up access

Controls/Security

Includes knowledge of user identification, access rights, file attributes, and passwords

Includes knowledge of encryption, digital signatures, dial back, and firewalls

Roles and Responsibilities within IT Department

Includes knowledge of roles and responsibilities of database/network/web administrators, computer operators, librarians, systems programmers, and applications programmers

System Development Life Cycle

Includes knowledge of system acquisition, system development, system maintenance, program changes, and archiving

Disaster Recovery/Business Continuity

Includes knowledge of data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management

Audit Tests of General and Automated Controls

Knowledge of inquiry and observation tests

Knowledge of reperformance tests

Knowledge of parallel simulation tests

Knowledge of integrated test facilities (ITF)

Knowledge of test data

Computer-Assisted Auditing Techniques (CAATs)

Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs

Auditing around the Computer (without using CAATs)

Includes knowledge of available tools/techniques

Legal and Ethical Requirements

Includes knowledge of trading partner agreements, service level agreements, and licensing (e.g., software copyright)

Auditing Standards Relevant to IT

Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit: An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter

The process-based delineation is presented in Exhibit 2.

Exhibit 2
Process-Based Delineation of 32 Activities Associated with Four Audit Tasks

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Determine nature and scope of engagement

Assess engagement risk and the CPA firm's ability to perform the engagement

Communicate with the predecessor accountant/auditor

Decide whether to accept or continue the client and engagement

Enter into an agreement with the client as to the terms of the engagement

Obtain an understanding of the client's operations, business, and industry

Perform analytical procedures

Consider preliminary engagement materiality

Assess inherent risk and risk of misstatements

Consider internal control

- *Obtain an understanding of business processes and information flows in an IT environment¹*
- *Document business processes and information flows in an IT environment*
- *Identify risks and exposures in business processes and information flows in an IT environment*
- *Assess control risk in an IT environment*

Consider other planning matters (e.g., using the work of other independent auditors, specialists, or internal auditors; related parties and related party transactions)

Identify financial statement assertions and formulate audit objectives

Determine and prepare the work program defining the nature, timing, and extent of the auditor's procedures

- *Develop effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)*

Task II. Obtain and document information to form a basis for conclusions

Perform planned procedures including planned applications of audit sampling

- *Implement effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)*

Evaluate contingencies

Obtain and evaluate lawyers' letters

Task II. Obtain and document information to form a basis for conclusions (cont.)

Review subsequent events

¹¹ Italicized type denotes explicitly delineated IT-related auditing activity.

Obtain representations from management

Identify reportable conditions and other control deficiencies

Identify matters for communication with audit committees

Task III. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions

Perform analytical procedures

Evaluate the sufficiency and competence of audit evidence and document engagement conclusions

Review the work performed to provide reasonable assurance that objectives are achieved

Task IV. Prepare communications to satisfy engagement objectives

Prepare reports

Prepare letters and other required communications

Consider omitted procedures after the report date or the subsequent discovery of facts existing at the date of the auditor's report

Following the conduct of the pilot test, PES prepared recommendations regarding revision of the content and format of the survey. A 3-member COTF subcommittee reviewed those recommendations, and suggested final revisions to the survey.

The survey document consisted of five sections. (A copy of the survey can be found in Appendix 3.)

- In Section 1, respondents were asked to make the following three ratings for each of the 28 IT-related topics:
 - (1) *Importance*—the importance of knowledge of the topic to their own competence as CPAs in public accounting,
 - (2) *Usage*—the level at which they used the knowledge in their work as CPAs in public accounting (recognition/recall *versus* apply/interpret/integrate), and
 - (3) *Acquisition*—the point at which CPAs in public accounting should acquire the knowledge (before or after passing the Uniform CPA Examination).

- In Section 2, respondents were asked to indicate the percentage of their work time they spent in the major practice areas of auditing, accounting and other assurance services, taxation, management advisory services, and “other” practice areas.

- Only those respondents who indicated that they devoted 20% or more of their work time to auditing were asked to complete Section 3. In this section, respondents were asked to make the following three ratings for each of the 32 auditing activities:
 - (1) *Importance*—the importance of the activity to their own competence as CPAs in the conduct of audits,
 - (2) *Frequency*—the frequency with which they performed the activity during audits, and
 - (3) *IT Frequency*—the frequency with which they used IT-related knowledge or skills (other than word processing and spreadsheets) when performing the activity.
- In Section 4, respondents completed a background questionnaire, and described the amount of time they allocated to the four major auditing tasks (planning, obtaining and documenting information to form a basis for conclusions, reviewing and evaluating information obtained to reach and document conclusions, and preparing communications to satisfy engagement objectives).
- In Section 5, respondents answered open-ended questions regarding the IT knowledge needs of CPAs in public accounting.

The survey was mailed to a sample of 1000 CPAs in public accounting. The sample included representatives from every licensing jurisdiction. The sample over-represented CPAs at the entry level of practice: 65% held the CPA certificate 3 or fewer years (that is, they were certified by AICPA between 1995 and 1998), while the other 35% held the AICPA certificate for more than 3 years.

Individual letters were sent to the members of the sample inviting them to participate in the survey, which would be mailed to them in 2 weeks. Then, 2 weeks later, CPAs *not* declining to participate in the survey received the survey and a postage-paid return envelope. The survey mailing was followed up 2 weeks later by a reminder/thank-you postcard.

4. Results of the Validation Survey

4.1 Return Rate

The return rate for the survey was 39% (391 of the 991 surveys eligible to be returned). The number eligible was defined as the number of surveys mailed (N=1000), minus the number that could not be delivered (N=8) and the number that were delivered to CPAs who were no longer practicing (N=1). The return rate was consistent with expectations, and is similar to rates obtained for surveys in other professions.

4.2 Demographic and Professional Characteristics of Respondents

To compare the practice of CPAs closer to the entry level with that of more-experienced CPAs, two subsamples were created: those with 5 or fewer years of experience and those with more than 5 years of experience. Of the sample, 202 members (52%) had 5 or fewer years of experience, and 187 (48%) had more than 5 years of experience. Two respondents did not indicate years of experience. Survey data were analyzed separately for the two subsamples of respondents.

Demographic characteristics of the two subgroups follow. Fifty-one percent of the less-experienced respondents worked in local firms, as did 70% of the more-experienced respondents (see Table 1). Compared with the more-experienced CPAs, less-experienced CPAs were more likely to work in national or international firms.

Table 1
Percentage of Respondents by Type of Firm

Type of Firm	≤ 5 yr (N=201)	> 5 yr (N=185)
Local	51	70
Regional	17	13
National/International	31	16
Other	1	2

Note. Percents do not add to 100 due to rounding.

Table 2 illustrates the positions that respondents held in their firms. Most of the less-experienced respondents described themselves as holding the position of staff accountant, senior, or supervisor. Most of the more-experienced respondents described themselves as holding the position of manager or partner/shareholder/owner.

Table 2
Percentage of Respondents by Present Position in Firm

Position	≤ 5 yr (N= 200)	> 5 yr (N=185)
Sole practitioner (one professional)	4	8
Partner/shareholder/owner	2	36
Manager or equivalent	13	34
Supervisor or equivalent	18	10
Senior or equivalent	46	9
Staff accountant	16	3
Other	1	0

As seen in Table 3, more than half of the respondents at each experience level work at firms employing 50 or fewer professionals. However, respondents with 5 or fewer years of experience were somewhat more likely to work in firms with more than 10,000 professionals than respondents with more than 5 years of experience. This is consistent with the results documented in Table 2, which showed that less-experienced respondents were more likely to work in national/international firms.

Table 3
Percentage of Respondents by Number of Professionals
(Including Partners/Shareholders/Owners) in Firm

Number of Professionals	≤ 5 yr (N= 199)	> 5 yr (N=185)
1	4	7
2 – 9	24	40
10 – 50	27	27
51 – 100	8	4
101 – 500	7	7
501 – 1,000	<1	<1
1,001 – 5,000	4	2
5,001 – 10,000	3	<1
More than 10,000	23	12

Respondents at both experience levels represented the major geographic regions of the United States (see Table 4).

Table 4
Percentage of Respondents by Each Region/Territory

Region/Territory	≤ 5 yr (N=202)	> 5 yr (N=186)
Northeast	17	24
Midwest	25	24
West	20	23
South	37	27
Puerto Rico	1	2
Guam	<1	<1

The majority of CPAs responding to the survey indicated a bachelor's degree as their highest level of education (see Table 5). About equal percentages of respondents at both levels indicated they had earned either a 150+ credit-hours bachelor's degree or a master's degree.

Table 5
Percentage of Respondents by Highest Level of Education

Highest Level of Education	≤ 5 yr (N= 202)	> 5 yr (N= 187)
Some college/no degree	0	<1
Associate's degree	0	<1
Bachelor's degree <150 credit hours	59	55
Bachelor's degree ≥ 150 credit hours	22	31
Master's degree	18	12
Doctorate	0	1
Other	1	0

Of those respondents who had earned a bachelor's degree, the vast majority held a bachelor's degree in accounting (see Table 6). At both levels, 10% or more of the respondents had earned a bachelor's degree in some "other business area." Respondents who received bachelor's degrees in "other" areas earned those degrees in a variety of disciplines. No more than one or two respondents had earned a bachelor's degree in any one "other" discipline.

Table 6
Percentage of Respondents by Discipline of Bachelor's Degree

Bachelor's Degree Discipline	≤ 5 yr (N=202)	> 5 yr (N=185)
Accounting	89	85
Information systems/computer science	2	2
Other business area	10	14
Engineering	0	0
Social sciences	1	3
Humanities	2	2
Other	9	7

Note: Multiple responses permitted.

Of those respondents who had earned a master's degree, less-experienced CPAs were twice as likely to hold a master's degree in accounting than more-experienced CPAs. On the other hand, more-experienced CPAs were nearly twice as likely to hold an MBA than less-experienced CPAs (see Table 7). Respondents who indicated they had earned a master's degree in an "other" area earned those degrees in a variety of disciplines. No more than one or two respondents had earned a master's degree in any one "other" discipline.

Table 7
Percentage of Respondents by Type of Master's Degree

Type of Master's Degree	≤ 5 yr (N= 38)	> 5 yr (N=24)
Master's in accounting	34	17
Master's in taxation	16	8
Master's in other business area	0	4
MBA (concentration in accounting)	18	33
MBA (concentration in other business area)	16	29
Other	21	13

Note: Multiple responses permitted.

4.3 Percentage of Time Spent in Accounting Practice Areas

The average percentage of time that less- and more-experienced respondents spent in different accounting practice areas is presented in Table 8. Relative to their more-experienced counterparts, less-experienced CPAs spent more time in auditing and less time in taxation. The large standard deviations associated with the mean percentages of time indicate that there is a great deal of variation in the amount of time spent in each area of practice across the samples.

Table 8
Percentage of Work Time Devoted to Each Practice Area
During the Past Year by Years of Experience
(Mean and Standard Deviation)

Practice Area	% of Work Time (S.D.)	
	≤ 5 yr (N=202)	> 5 yr (N= 187)
Auditing	52 (33)	35 (29)
Accounting and other assurance services	18 (17)	22 (16)
Taxation	21 (23)	30 (23)
Management Advisory Services	7 (16)	9 (11)
Other	1 (4)	5 (14)

Note. Percents do not add to 100 due to rounding.

The amount of time spent by less- and more-experienced CPAs in auditing, accounting, and other assurance services is explored further in Figure 1. Nearly one half of the less-experienced respondents spent more than 75% of their time in auditing, accounting, and other assurance services, while less than one fourth of the more-experienced respondents did so.

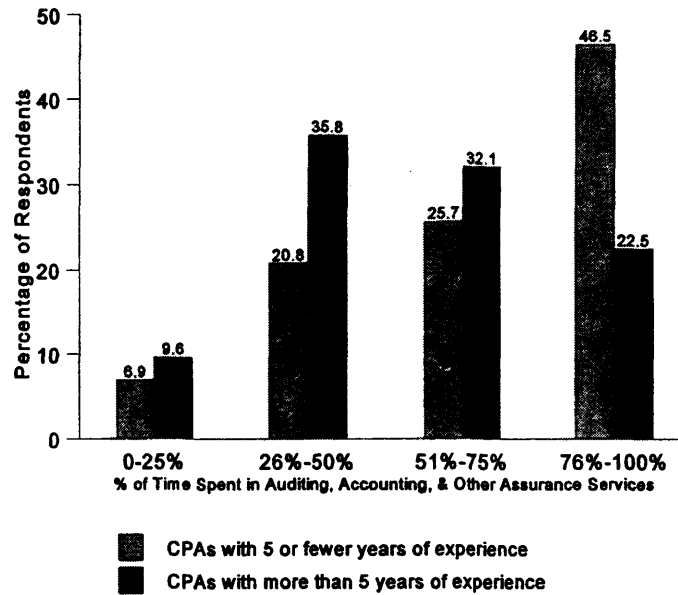


Figure 1. Percentage of time spent performing auditing, accounting, and other assurance services by years of experience.

Table 9 presents a comparison of the percentage of time spent in the accounting practice areas by respondents in local and non-local (i.e., regional, national, and international) firms. Respondents in local firms spent the most time in the auditing and taxation practice areas (33% each). They spent another 23% of their time providing accounting and other assurance services, 8% providing management advisory services, and 3% performing “other” services. In contrast to the local-firm respondents, respondents working in non-local firms spent nearly twice as much time in auditing (63%), and they spent much less time in taxation (13%) and in accounting and other assurance services (14%) than did the less-experienced CPAs. Again, the large standard deviations indicate wide variations in the time spent by CPAs in both local and non-local firms in each of the different practice areas.

Table 9
Percentage of Work Time Devoted to Each Practice Area
During the Past Year by Type of Firm
(Mean and Standard Deviation)

Practice Area	% of Work Time (S.D.)	
	Local (N=231)	Non-Local (N=151)
Auditing	33 (26)	63 (31)
Accounting and other assurance services	23 (17)	14 (14)
Taxation	33 (19)	13 (23)
Management Advisory Services	8 (11)	8 (16)
Other	3 (8)	3 (11)

Note. Percents do not add to 100 due to rounding.

The amount of time spent by CPAs working in local and non-local firms performing auditing, accounting, and other assurance services is explored further in Figure 2. Nearly two thirds of the CPAs working in non-local firms spent more than 75% of their time providing auditing, accounting, and other assurance services. Only 16.5% of the respondents working in local firms spent that much time providing auditing, accounting, and other assurance services.

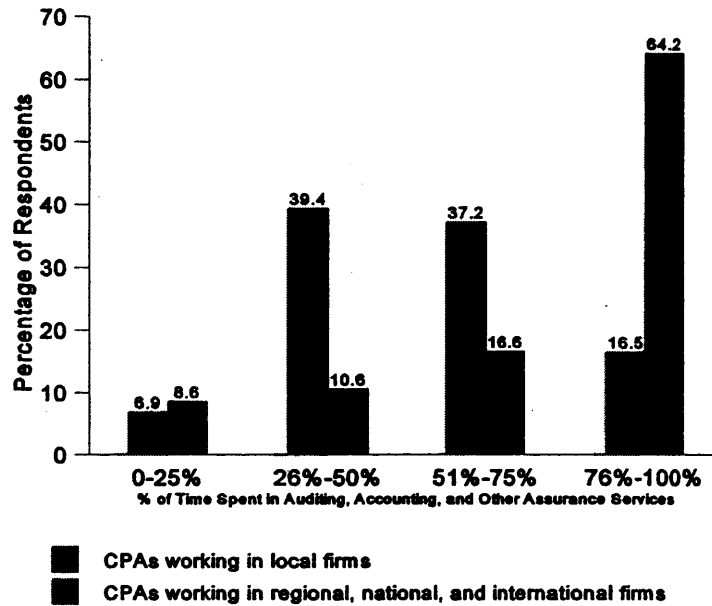


Figure 2. Time spent performing auditing, accounting and other assurance services by firm type.

4.4 Results Related to the IT Topics

This section documents the results for the 28 IT-related topics. Exhibit 3 contains the response categories for each rating scale.

Exhibit 3
Rating Categories for IT Topics

Importance	Usage	Acquisition
How important is the knowledge of this topic to your competence as a CPA in public accounting? (<i>Circle one.</i>)	What level best represents your use of the knowledge of this topic in your work as a CPA in public accounting? (<i>Circle one.</i>)	At what point should the knowledge of this topic be acquired by CPAs in public accounting? (<i>Circle one.</i>)
0 Not important	0 I do not use the knowledge	0 Not necessary at any point
1 Minimally important	1 I recognize/recall the knowledge	1 Primarily before passing the CPA examination
2 Moderately important	2 I apply/interpret/integrate the knowledge	2 Primarily after passing the CPA examination
3 Very important		

The mean *Importance* rating for each topic is presented in Table 10, along with the percentage of respondents endorsing each *Usage* and *Acquisition* response category. Less-experienced respondents rated 12 of the 28 IT-related topics at least moderately important to their competence as CPAs in public accounting (i.e., mean rating above 2.0), and rated the remaining 16 topics at least minimally important. More-experienced respondents rated 13 of the 28 topics at least moderately important to their competence as CPAs in public accounting—including the 12 topics rated at least moderately important by the less-experienced cohort—and they rated the other 15 topics at least minimally important. No topic was rated less than minimally important by either the less-experienced or the more-experienced respondents. In summary, *Importance* ratings of the less-experienced and more-experienced respondents were virtually identical, suggesting that the two groups have similar perceptions of the importance of the topics.

Table 10
Importance, Usage and Acquisition Ratings for IT-Related Topics by Years of Experience
(Mean and Standard Deviation for Importance, Percentage for Usage and Acquisition)
N=202 for ≤ 5 yr and N=187 for >5 yr

IT-Related Topics	Importance		Usage (%)						Acquisition (%)					
	≤ 5 yr	> 5 yr	≤ 5 yr			> 5 yr			≤ 5 yr			> 5 yr		
	Mean	SD	0	1	2	0	1	2	0	1	2	0	1	2
Role of Information Systems within Business														
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures	2.6 (.6)	2.6 (.6)	2	35	63	2	32	66	3	56	41	3	70	28
Includes knowledge of decision support systems, executive information systems, expert systems, and artificial intelligence	1.5 (.8)	1.8 (.8)	35	51	14	27	47	26	27	18	56	17	22	61
Hardware														
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices	1.9 (.8)	2.0 (.8)	9	51	40	10	42	48	14	48	39	10	49	41
Software														
Includes knowledge of operating systems, applications, and security	2.4 (.7)	2.4 (.7)	3	36	61	2	39	60	3	55	42	2	63	36
Includes knowledge of utilities, programming languages, and library management	1.3 (.8)	1.5 (.9)	31	50	20	28	45	27	34	25	42	23	33	44
Data Structure														
Includes knowledge of file organization, types of data files, and database management systems	1.6 (.8)	1.7 (.9)	17	57	26	20	50	30	20	34	46	20	39	41
Networks														
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing	1.8 (.8)	1.8 (.9)	15	55	29	17	50	33	12	37	50	15	41	44
Transaction Processing Modes														
Includes knowledge of batch, on-line, real-time, and distributed processing	1.7 (.9)	1.8 (1.0)	19	52	29	21	47	32	18	43	39	16	49	35
Electronic Commerce														
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions	1.9 (.9)	1.9 (.9)	23	49	28	19	51	31	10	44	46	12	46	42

IT-Related Topics	Importance		Usage (%)						Acquisition (%)					
	≤ 5 yr	> 5 yr	≤ 5 yr			> 5 yr			≤ 5 yr			> 5 yr		
			0	1	2	0	1	2	0	1	2	0	1	2
Application Processing Phases Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow	2.2 (.8)	2.1 (.9)	13	41	47	12	44	44	8	53	39	8	50	43
IT Control Objectives Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives	2.5 (.7)	2.5 (.7)	5	31	64	7	36	58	3	74	24	4	67	29
Control Activities and Design Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls	2.5 (.7)	2.4 (.8)	7	30	63	10	36	55	3	70	27	5	65	31
Physical Access Controls Includes knowledge of user identification, keypad device, and card reader controls	1.9 (.9)	1.9 (.9)	26	37	37	17	47	35	17	44	38	16	45	39
Logical Access Points Includes knowledge of paths, consoles, workstations/terminals, and dial-up access	1.5 (.9)	1.7 (.9)	27	53	19	27	43	31	21	29	51	23	36	41
Controls/Security Includes knowledge of user identification, access rights, file attributes, and passwords	2.0 (.9)	2.0 (.9)	14	52	35	19	40	41	12	44	45	14	50	36
Includes knowledge of encryption, digital signatures, dial back, and firewalls	1.3 (.9)	1.4 (1.0)	44	51	5	47	41	11	33	22	46	28	31	41
Roles and Responsibilities within IT Department Includes knowledge of roles and responsibilities of database/network/web administrators, computer operators, librarians, systems programmers, and applications programmers	1.7 (.8)	1.8 (.9)	25	55	21	23	53	24	20	32	48	15	40	46
System Development Life Cycle Includes knowledge of system acquisition, system development, system maintenance, program changes, and archiving	1.4 (.9)	1.6 (.9)	34	49	17	27	47	26	30	27	42	22	28	51
Disaster Recovery/Business Continuity Includes knowledge of data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management	2.1 (.9)	2.2 (.9)	18	41	41	11	42	47	10	45	46	10	46	44

IT-Related Topics	Importance		Usage (%)						Acquisition (%)					
	≤ 5 yr	> 5 yr	≤ 5 yr			> 5 yr			≤ 5 yr			> 5 yr		
			0	1	2	0	1	2	0	1	2	0	1	2
Audit Tests of General, and Automated Controls														
Knowledge of inquiry and observation tests	2.4 (.7)	2.4 (.9)	10	26	64	15	23	62	2	70	28	2	74	24
Knowledge of reperformance tests	2.1 (.8)	2.0 (.9)	19	39	42	24	34	42	6	55	40	6	63	31
Knowledge of parallel simulation tests	1.7 (.9)	1.8 (.9)	33	53	14	32	39	29	14	47	40	9	54	37
Knowledge of integrated test facilities (ITF)	1.6 (.9)	1.6 (1.0)	44	45	11	39	42	20	17	44	39	13	49	38
Knowledge of test data	2.1 (.8)	2.0 (1.0)	17	48	34	23	40	37	5	60	35	6	62	32
Computer-Assisted Auditing Techniques (CAATs)	1.8 (1.0)	1.9 (1.0)	38	37	25	31	35	34	12	47	42	9	55	37
Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs														
Auditing around the Computer (without using CAATs)	2.3 (.8)	2.4 (.8)	14	37	49	7	26	67	3	62	35	3	73	25
Includes knowledge of available tools/techniques														
Legal and Ethical Requirements	1.8 (.9)	1.8 (1.0)	25	48	27	25	45	30	13	48	39	16	38	47
Includes knowledge of trading partner agreements, service level agreements, and licensing (e.g., software copyright)														
Auditing Standards Relevant to IT	2.5 (.8)	2.5 (.7)	11	29	60	10	25	66	2	77	21	1	78	21
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit: An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter														

The most important topics (i.e., topics rated 2.5 or higher by either the less- or more-experienced respondents) were:

- Role of Information Systems within Business (including knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures),
- IT Control Objectives (including knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives),
- Control Activities and Design (including knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls), and
- Auditing Standards Relevant to IT (including knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit: An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter).

The least important topics (i.e., topics rated 1.5 or lower by either the less- or more-experienced respondents) were:

- Role of Information Systems within Business (including knowledge of decision support systems, executive information systems, expert systems, and artificial intelligence),
- Software (including knowledge of utilities, programming languages, and library management),
- Logical Access Points (including knowledge of paths, consoles, workstations/terminals and dial-up access),
- Controls/Security (including knowledge of encryption, digital signatures, dial back, and firewalls), and
- System Development Life Cycle (including knowledge of system acquisition, system development, system maintenance, program changes, and archiving).

Usage ratings indicate that all 28 IT-related topics were used by at least 50% of the respondents at each experience level, either at the *recognition/recall* level or at the *apply/interpret/integrate* level. At the same time, the knowledge associated with three topics was *not* used at all by more than 35% of the less-experienced CPAs. Those topics are:

- Controls/Security (including encryption, digital signatures, dial back, and firewalls),

- Audit Tests of General and Automated Controls (knowledge of integrated test facilities [ITF]), and
- Computer Assisted Auditing Techniques [CAATs] (including knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs),

The knowledge associated with the first two of these topics was *not* used at all by more than 35% of the more-experienced respondents

Acquisition ratings reveal that at least 65% of respondents believe that each IT-related topic should be acquired by CPAs in public accounting, either before or after passing the Uniform CPA examination. Examination of the modal response of the less- and more-experienced respondents reveals general agreement as to whether a particular topic is perceived as necessary primarily before, or primarily after, passing the Uniform CPA examination. Exhibit 4 lists those topics for which the modal responses of less- and more-experienced CPAs supported the acquisition of the IT-related topic primarily before passing the Uniform CPA Examination.

Exhibit 4
IT-Related Topics with Modal Response of “Acquired Primarily before Passing the CPA Examination”

Supported by CPAs with ≤5 Years of Experience and by CPAs with >5 Years of Experience

Role of Information Systems within Business

Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures

Hardware

Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices

Software

Includes knowledge of operating systems, applications, and security

Transaction Processing Modes

Includes knowledge of batch, on-line, real-time, and distributed processing

Application Processing Phases

Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow

IT Control Objectives

Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives

Control Activities and Design

Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls

Physical Access Controls

Includes knowledge of user identification, keypad device, and card reader controls

Audit Tests of General and Automated Controls

Knowledge of inquiry and observation tests

Knowledge of reperformance tests

Knowledge of parallel simulation tests

Knowledge of integrated test facilities (ITF)

Knowledge of test data

Computer-Assisted Auditing Techniques (CAATs)

Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs

Auditing around the Computer (without Using CAATs)

Includes knowledge of available tools/techniques

Auditing Standards Relevant to IT

Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit: An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter

Supported Only by CPA with ≤ 5 Years of Experience

Disaster Recovery/Business Continuity

Includes knowledge of data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management

Legal and Ethical Requirements

Includes knowledge of trading partner agreements, service level agreements, and licensing (e.g., software copyright)

Supported Only by CPAs with > 5 Years of Experience

Electronic Commerce

Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions

Controls/Security I

Includes knowledge of user identification, access rights, file attributes, and passwords

4.5 Results Related to Audit Tasks and Activities

Ninety percent of the less-experienced respondents spent at least some time performing auditing engagements, as did 95% of the more-experienced respondents. The average percentage of time spent by these respondents in the four major tasks of an audit engagement is presented in Table 11. Respondents with 5 or fewer years of experience spent over one half of their auditing time (53%) on Task 2, Obtain and document information to form a basis for conclusions. The remainder of their auditing time was distributed fairly evenly across the other three major auditing tasks. In comparison to these less-experienced CPAs, the more-experienced CPAs spent less time on Task 2, *and* spent more time on Task 3, Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions.

Table 11
Percentage of Auditing Work Time Spent on Each Audit Task
During the Past Year by Years of Experience
(Mean and Standard Deviation)

Audit Tasks	% of Audit Work Time (S.D.)	
	≤ 5 yr (N=190)	> 5 yr (N= 167)
1. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client	15 (9)	16 (11)
2. Obtain and document information to form a basis for conclusions	53 (20)	46 (23)
3. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions	19 (12)	24 (17)
4. Prepare communications to satisfy engagement objectives	14 (10)	14 (8)

Note. Percents do not add to 100 due to rounding. Five percent of the less-experienced sample and 10% of the more-experienced sample did not spend any time performing audit engagements during the past year.

The average percentage of time spent by CPAs in local and non-local firms in the four major tasks of an audit engagement is presented in Table 12. Respondents working in local firms spent over one half of their auditing time (53%) on Task 2, Obtain and document information to form a basis for conclusions. The remainder of their auditing time was distributed across the other three major tasks. In comparison to CPAs working in local firms, CPAs working in non-local firms spent more time on Task 3, Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions, and less time on Task 2. This pattern of results was nearly identical to that observed for less- and more-experienced respondents.

Table 12
Percentage of Auditing Work Time Spent on Each Audit Task
During the Past Year by Type of Firm
(Mean and Standard Deviation)

Audit Tasks	% of Audit Work Time (S.D.)	
	Local (N= 210)	Non-Local (N= 145)
1. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, enter into an agreement with the client	14 (9)	17 (11)
2. Obtain and document information to form a basis for conclusions	53 (20)	44 (23)
3. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions	19 (14)	25 (17)
4. Prepare communications to satisfy engagement objectives	14 (9)	15 (9)

Note. Percents do not add to 100 due to rounding. Twenty-one respondents (9%) who work in local firms and 6 respondents (4%) who work in non-local firms did not spend any time performing audit engagements during the past year.

Two hundred and seventy-eight respondents who spent at least 20% of their time auditing rated the 32 activities delineated within the four audit tasks (the 6 explicitly-delineated IT activities and the 26 activities contained in the auditing CSOs). Exhibit 5 contains the scale stops for each of three rating scales.

**Exhibit 5
Rating Scales for Auditing Activities**

Importance	Frequency	IT Frequency
How important is this activity to your competence as a CPA in the conduct of audits? <i>(Circle one.)</i>	How frequently do you perform this activity during audits? <i>(Circle one.)</i>	How frequently do you use IT-related knowledge or skills (other than word processing and spreadsheets) when you perform this activity? <i>(Circle one.)</i>
0 Not important 1 Minimally important 2 Moderately important 3 Very important	0 Never 1 Infrequently 2 Frequently 3 Very frequently	0 Never 1 Infrequently 2 Frequently 3 Very frequently

Mean ratings for each rating scale are presented in Table 13. As summarized in Table 13, in regard to *Importance*, all 32 auditing activities were rated at least moderately important to respondents' competence as CPAs in public accounting (i.e., mean rating above 2.0). *Importance* ratings of the less-experienced and more-experienced respondents were virtually identical, suggesting that the two groups have similar perceptions of the importance of the component activities of an audit.

**Table 13
Mean and Standard Deviation for Importance, Frequency, and IT Frequency Ratings
for Auditing Activities by Years of Experience
(N=154 for ≤ 5 years and N=124 for >5 years)**

Auditing Activities	Importance		Frequency		IT Frequency	
	≤ 5 yr	> 5 yr	≤ 5 yr	> 5 yr	≤ 5 yr	> 5 yr
1. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client						
1.1 Determine nature and scope of engagement	2.9 (.3)	2.9 (.4)	2.6 (.7)	2.6 (.6)	1.0 (.9)	.8 (.8)
1.2 Assess engagement risk and the CPA firm's ability to perform the engagement	2.8 (.5)	2.9 (.4)	2.4 (.9)	2.6 (.7)	1.0 (.9)	.9 (.9)
1.3 Communicate with the predecessor accountant/auditor	2.5 (.8)	2.5 (.8)	1.6 (1.0)	2.0 (.9)	.5 (.8)	.4 (.6)
1.4 Decide whether to accept or continue the client and engagement	2.6 (.7)	2.7 (.6)	1.9 (1.1)	2.3 (.9)	.6 (.8)	.6 (.9)

Auditing Activities		Importance		Frequency		IT Frequency	
		≤ 5 yr	> 5 yr	≤ 5 yr	> 5 yr	≤ 5 yr	> 5 yr
1. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client (cont.)							
1.5	Enter into an agreement with the client as to the terms of the engagement	2.7 (.7)	2.8 (.6)	2.1 (1.1)	2.6 (.8)	.5 (.7)	.5 (.8)
1.6	Obtain an understanding of the client's operations, business, and industry	2.9 (.3)	3.0 (.2)	2.7 (.5)	2.8 (.4)	1.4 (1.0)	1.4 (1.0)
1.7	Perform analytical procedures	2.9 (.3)	2.9 (.3)	2.9 (.4)	2.8 (.5)	1.8 (1.0)	1.8 (1.0)
1.8	Consider preliminary engagement materiality	2.8 (.5)	2.8 (.4)	2.7 (.6)	2.7 (.5)	1.0 (1.1)	1.2 (1.0)
1.9	Assess inherent risk and risk of misstatements	2.8 (.5)	2.9 (.4)	2.6 (.6)	2.7 (.5)	1.1 (1.0)	1.2 (1.0)
1.10	Consider internal control	2.9 (.4)	2.9 (.3)	2.7 (.6)	2.8 (.5)	1.4 (1.0)	1.4 (1.1)
1.11	— Obtain an understanding of business processes and information flows in an IT environment	2.6 (.6)	2.7 (.6)	2.3 (.8)	2.4 (.8)	1.5 (.9)	1.6 (1.0)
1.12	— Document business processes and information flows in an IT environment	2.6 (.6)	2.6 (.6)	2.1 (.8)	2.3 (.8)	1.5 (.9)	1.6 (1.0)
1.13	— Identify risks and exposures in business processes and information flows in an IT environment	2.5 (.6)	2.6 (.6)	2.0 (.9)	2.2 (.8)	1.5 (1.0)	1.5 (1.0)
1.14	— Assess control risk in an IT environment	2.5 (.6)	2.6 (.6)	2.0 (.9)	2.2 (.8)	1.6 (1.0)	1.6 (1.0)
1.15	Consider other planning matters (e.g., using the work of other independent auditors, specialists, or internal auditors; related parties and related party transactions)	2.4 (.8)	2.4 (.7)	2.0 (.9)	2.1 (.9)	.7 (.7)	.8 (.9)
1.16	Identify financial statement assertions and formulate audit objectives	2.8 (.5)	2.7 (.5)	2.6 (.7)	2.5 (.7)	1.0 (.9)	1.1 (1.0)
1.17	Determine and prepare the work program defining the nature, timing, and extent of the auditor's procedures	2.8 (.5)	2.8 (.5)	2.7 (.6)	2.6 (.6)	1.3 (1.0)	1.3 (1.1)
1.18	— Develop effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)	2.4 (.7)	2.3 (.9)	1.7 (1.0)	1.8 (1.0)	1.5 (.9)	1.5 (1.0)

Auditing Activities		Importance		Frequency		IT Frequency	
		≤ 5 yr	> 5 yr	≤ 5 yr	> 5 yr	≤ 5 yr	> 5 yr
2. Obtain and document information to form a basis for conclusions							
2.1	Perform planned procedures including planned applications of audit sampling	2.8 (.5)	2.7 (.5)	2.5 (.7)	2.5 (.7)	1.5 (1.0)	1.6 (1.1)
2.2	— Implement effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)	2.3 (.8)	2.2 (.8)	1.7 (.9)	1.8 (1.0)	1.4 (.9)	1.6 (1.0)
2.3	Evaluate contingencies	2.6 (.6)	2.8 (.4)	2.4 (.7)	2.5 (.7)	.6 (.7)	.6 (.8)
2.4	Obtain and evaluate lawyers' letters	2.7 (.6)	2.9 (.4)	2.6 (.7)	2.7 (.5)	.4 (.7)	.4 (.7)
2.5	Review subsequent events	2.8 (.5)	2.8 (.4)	2.7 (.6)	2.8 (.4)	.6 (.9)	.7 (.8)
2.6	Obtain representations from management	2.8 (.4)	2.9 (.3)	2.8 (.4)	2.8 (.4)	.5 (.8)	.5 (.8)
2.7	Identify reportable conditions and other control deficiencies	2.8 (.4)	2.8 (.4)	2.5 (.7)	2.6 (.6)	.9 (1.0)	.9 (1.0)
2.8	Identify matters for communication with audit committees	2.8 (.6)	2.8 (.5)	2.4 (.8)	2.4 (.8)	.8 (1.0)	.8 (.9)
3. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions							
3.1	Perform analytical procedures	2.9 (.3)	2.9 (.3)	2.8 (.4)	2.8 (.5)	1.5 (1.0)	1.5 (1.1)
3.2	Evaluate the sufficiency and competence of audit evidence and document engagement conclusions	2.9 (.3)	2.9 (.3)	2.8 (.5)	2.8 (.4)	1.0 (1.0)	1.1 (1.0)
3.3	Review the work performed to provide reasonable assurance that objectives are achieved	2.9 (.3)	2.9 (.3)	2.7 (.6)	2.8 (.4)	.9 (.9)	.7 (1.0)
4. Prepare communications to satisfy engagement objectives							
4.1	Prepare reports	2.9 (.3)	2.9 (.3)	2.8 (.4)	2.8 (.4)	1.0 (1.0)	.9 (1.0)
4.2	Prepare letters and other required communications	2.8 (.4)	2.8 (.4)	2.7 (.5)	2.7 (.5)	.7 (.9)	.8 (1.0)
4.3	Consider omitted procedures after the report date or the subsequent discovery of facts existing at the date of the auditor's report	2.5 (.7)	2.7 (.6)	2.0 (.9)	2.0 (1.0)	.5 (.7)	.6 (.8)

Respondents performed most of the auditing activities at least frequently as indicated by mean ratings at or above 2.0 on the *Frequency* scale. Less-experienced respondents performed 28 of

the 32 activities at least frequently. They performed the remaining four activities (1.3. Communicate with the predecessor accountant/auditor, 1.4. Decide whether to accept or continue the client and engagement, 1.18. Develop effective audit procedures in an IT environment, and 2.2 Implement effective audit procedures in an IT environment) less frequently—average ratings were between 1.6 and 1.9. More-experienced respondents performed 30 of the 32 activities at least frequently. The remaining two activities, 1.18. Develop effective audit procedures in an IT environment and 2.2. Implement effective audit procedures in an IT environment, were performed less frequently, on average, with mean ratings of 1.8. These two activities were also identified by the less-experienced CPAs as having been performed less frequently.

Mean *Frequency* ratings of the less- and more-experienced respondents were virtually identical. In no case did the mean ratings vary by more than 0.5.

IT Frequency ratings were much lower than the *Frequency* ratings. Less-experienced respondents rated 13 of the 32 activities less than 1.0, and more-experienced respondents rated 16 of the 32 activities less than 1.0, indicating very infrequent use of IT-related knowledge and skills when performing those activities. For both less- and more-experienced respondents, the remaining activities were rated between 1.0 and 2.0, indicating that respondents use IT-related knowledge and skills infrequently to frequently when performing those activities.

As expected, *IT Frequency* ratings tended to be higher for the six explicitly delineated IT-related auditing activities than for the 26 remaining auditing activities. Only the audit planning activity, 1.7. Perform analytical procedures, received higher ratings than did the six explicitly delineated IT-related auditing activities. *IT Frequency* ratings were generally similar for less-experienced and more-experienced respondents.

5. Conduct of Linking Task

In order to develop an integrated understanding of the relationship between the 32 auditing activities and the 28 IT-related topics, PES implemented a procedure to identify the key IT-related topics which contribute to the successful performance of the auditing activities. Accordingly, the 45 CPAs who had previously participated in a focus panel, critical incidents interview, or pilot test of the *CPA Information Technology Survey* were called upon to perform one additional activity—that is, to “link” the IT-related topics to the auditing activities.

Specifically, these individuals were asked to identify the auditing activities for which each IT-related topic plays a key role and contributes to successful task performance. Exhibit 6 contains an example of the linking task.

Exhibit 6 Linking Task Example

Place a check mark (✓) to the left of each auditing activity below for which this IT-related knowledge area plays a key role and contributes to successful task performance.

Knowledge Area 1: Role of Information Systems within Business I

Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.

Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

- 1 Determine nature and scope of engagement
 - 2 Assess engagement risk and the CPA firm’s ability to perform the engagement
 - 3 Communicate with the predecessor accountant/auditor
 - 4 Decide whether to accept or continue the client and engagement
 - 5 Enter into an agreement with the client as to the terms of the engagement
 - 6 Obtain an understanding of the client’s operations, business, and industry
 - 7 Perform analytical procedures
 - 8 Consider preliminary engagement materiality
 - 9 Assess inherent risk and risk of misstatements
 - 10 Consider internal control
 - 11 Obtain an understanding of business processes and information flows in an IT environment
 - 12 Document business processes and information flows in an IT environment
 - 13 Identify risks and exposures in business processes and information flows in an IT environment
 - 14 Assess control risk in an IT environment
 - 15 Consider other planning matters (e.g., using the work of other independent auditors, specialists, or internal auditors; related parties and related party transactions)
 - 16 Identify financial statement assertions and formulate audit objectives
 - 17 Determine and prepare the work program defining the nature, timing, and extent of the auditor’s procedures
 - 18 Develop effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)
-

In total, participants were required to review each of 28 IT-related topics in the context of the 32 auditing tasks; that is, they were asked to make judgments regarding 896 possible linkages. (Appendix 4 contains the instructions and two sample pages from the *CPA Information*

Technology Linking Task document that was mailed to the 45 participants.) Completed linking task materials were received from 27 of 43 CPAs (63%). (Two of the original 45 CPAs were not available to complete the linkages.)

Two sets of criteria were developed to identify strong and moderate links between validated IT-related topics and auditing activities. Strong links between validated IT-related topic and auditing activities were those which met the following three criteria:

- the IT-related topic was linked to the auditing activity (rated as playing a key role and contributing to successful task performance) by more than 50% of linking task participants;
- the mean *Importance* rating for the IT-related topic was 1.5 or higher (as rated by CPAs with 5 or less years of experience); and
- the IT-related topic was endorsed as *Acquired Primarily Before Passing the CPA Examination* by more than 33% of the total sample of CPAs responding to the survey.

Moderate links between validated IT-related topics and auditing activities met the following three criteria:

- the IT-related topic was linked to the auditing activity (rated as playing a key role and contributing to successful task performance) by between 34% and 50% of linking task participants;
- the mean *Importance* rating for the IT-related topic was 1.5 or higher (as rated by CPAs with 5 or less years of experience); and
- the IT-related topic was endorsed as *Acquired Primarily Before Passing the CPA Examination* by more than 33% of the total sample of CPAs responding to the survey.

Table 14 indicates the number of strong and moderate linkages between auditing activities and IT-related topics. Fifteen auditing activities were strongly linked with at least one IT-related topic—11 of these activities were part of Task 1, Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client. These same 15 activities were also moderately linked with at least one additional IT-related topic, as were five other auditing activities. The other 4 auditing activities that were strongly linked with at least one IT-related topic were part of Task 2, Obtain and document information to form a basis for conclusions. No IT topics were strongly linked to Tasks 3, Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions, or Task 4, Prepare communications to satisfy engagement objectives.

As expected, the six specifically delineated IT auditing activities and the activities under which they are subsumed (i.e., activities 1.10, 1.17, and 2.1) were identified as having the greatest

number of linkages to the IT-related topics. Each of the six IT auditing activities was strongly linked to 10 or more IT-related topics.

Appendix 5 provides the detailed results of the linking activity. Each auditing task is listed, along with the IT-related topics with which it had strong and/or moderate links.

Table 14
Number of Linkages between Auditing Activities and IT-Related Topics

Auditing Activities	# of Strongly Linked IT Topics	# of Moderately Linked IT Topics
1. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client		
1.1 Determine nature and scope of engagement	1	1
1.2 Assess engagement risk and the CPA firm's ability to perform the engagement	1	3
1.3 Communicate with the predecessor accountant/auditor	0	0
1.4 Decide whether to accept or continue the client and engagement	0	0
1.5 Enter into an agreement with the client as to the terms of the engagement	0	0
1.6 Obtain an understanding of the client's operations, business, and industry	3	5
1.7 Perform analytical procedures	0	3
1.8 Consider preliminary engagement materiality	0	0
1.9 Assess inherent risk and risk of misstatements	5	6
1.10 Consider internal control	19	3
1.11 — Obtain an understanding of business processes and information flows in an IT environment	14	5
1.12 — Document business processes and information flows in an IT environment	12	7
1.13 — Identify risks and exposures in business processes and information flows in an IT environment	20	2
1.14 — Assess control risk in an IT environment	21	2

Auditing Activities	# of Strongly Linked IT Topics	# of Moderately Linked IT Topics
1. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client (cont.)		
1.15 Consider other planning matters (e.g., using the work of other independent auditors, specialists, or internal auditors; related parties and related party transactions)	0	1
1.16 Identify financial statement assertions and formulate audit objectives	0	0
1.17 Determine and prepare the work program defining the nature, timing, and extent of the auditor's procedures	5	5
1.18 — Develop effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)	15	5
2. Obtain and document information to form a basis for conclusions		
2.1 Perform planned procedures including planned applications of audit sampling	6	6
2.2 — Implement effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)	13	7
2.3 Evaluate contingencies	0	1
2.4 Obtain and evaluate lawyers' letters	0	0
2.5 Review subsequent events	0	0
2.6 Obtain representations from management	0	0
2.7 Identify reportable conditions and other control deficiencies	2	11
2.8 Identify matters for communication with audit committees	1	3
3. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions		
3.1 Perform analytical procedures	0	1
3.2 Evaluate the sufficiency and competence of audit evidence and document engagement conclusions	0	3
3.3 Review the work performed to provide reasonable assurance that objectives are achieved	0	0
4. Prepare communications to satisfy engagement objectives		
4.1 Prepare reports	0	0
4.2 Prepare letters and other required communications	0	0
4.3 Consider omitted procedures after the report date or the subsequent discovery of facts existing at the date of the auditor's report	0	0

At the September 10, 1998 meeting of the COTF, PES presented the results of the survey and the linking task. At that time, PES recommended that the AICPA use the results as guidance to construct IT-related auditing questions for the Uniform CPA Examination. Specifically, PES suggested that IT-related examination items could be written to assess validated IT-topics in the context of the strongly linked, and to a lesser extent, the moderately linked, auditing activities.

During an October 29, 1998 conference call, PES, AICPA staff, and the IT subcommittee of the COTF reviewed the ratings for each IT-related topic and made final decisions as to the inclusion of each in the auditing CSOs. As a general rule, topics that received a mean *Importance* rating greater than 1.6 and support for acquisition *Primarily Before Passing the CPA Examination* from more than 40% of respondents were endorsed for inclusion in the CSOs. Topics that approached, but did not meet, these criteria were reviewed and discussed individually. On the basis of the COTF review, 22 topics were endorsed for inclusion in the CSOs.

During the October 29, 1998 call, AICPA staff was tasked with revising the language of the 26 activity statements in the auditing CSOs so as to reflect the performance of auditing and other attestation engagements in *computerized* environments. Specifically, staff were tasked with incorporating the six explicitly delineated IT-related activities into the existing activity statements.

At their November 23–24, 1998 meeting, the COTF reviewed: (1) the proposed listing of IT-related topics to be added to the auditing CSOs, and (2) the revisions to the activity statements in the existing auditing CSOs. Minor revisions were made to the wording of both listings. The final listing of IT-related topics to be added to the auditing CSOs appears in Exhibit 7. The final listing of revisions to the task and activity statements in the auditing CSOs appear in Exhibit 8.

Exhibit 7
Information Technology Topics to be Tested on the Uniform CPA Examination

Role of Information Systems within Business

Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks

Hardware

Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices

Software

Includes knowledge of operating systems, applications, and security

Data Structure

Includes knowledge of file organization, types of data files, and database management systems

Networks

Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/ decentralized processing; distributed data processing; client/server computing; and end-user computing

Transaction Processing Modes

Includes knowledge of batch, on-line, real-time, and distributed processing

Electronic Commerce

Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions

Application Processing Phases

Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow

IT Control Objectives

Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives

Control Activities and Design

Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls

Physical Access Controls and Security

Includes knowledge of user identification, keypad device, and card reader controls; access rights; file attributes; and passwords

Roles and Responsibilities within IT Department

Includes knowledge of roles and responsibilities of database/network/web administrators, computer operators, librarians, systems programmers, and applications programmers, and appropriate segregation of duties

System Development Life Cycle

Includes knowledge of system acquisition, system development, system maintenance, program changes, and archiving

Disaster Recovery/Business Continuity

Includes knowledge of data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management

Audit Tests of General and Automated Controls

Includes inquiry and observation tests, reperformance tests, parallel simulation tests, embedded audit modules, and test data

Computer-Assisted Auditing Techniques (CAATs)

Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs

Risks of Auditing around the Computer (without using CAATs)

Includes insufficient paper-based evidence and insufficient audit procedures

Exhibit 8
Revisions to the Auditing CSOs

The auditing section covers knowledge of generally accepted auditing standards and procedures and the skills needed to apply them in auditing and other attestation engagements. *This section also covers the knowledge of information technology necessary to perform audit and other attestation engagements.* This section tests that knowledge and those skills, in the context of the four broad engagement tasks in the outline that follows. *Appendix D lists information technology topics that CPAs need to understand in order to perform auditing and other attestation engagements in a computerized environment.*

I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

A – I. No Change

J. Consider internal control

1. *Obtain an understanding of business processes and information flows*
2. *Identify risks in business processes and information flows*
3. *Document understanding of internal control*
4. Assess control risk
5. Consider the effects of service organizations on internal control

K – M. No Change

II. Obtain and document information to form a basis for conclusions

A. Perform planned audit procedures including planned applications of audit sampling

1. Tests of controls
2. Analytical procedures
3. Confirmation of balances and/or transactions with third parties
4. Physical examination of inventories and other assets
5. Other tests of details
6. Computer-assisted audit techniques, *including data interrogation, extraction, and analysis*
7. Tests of unusual year-end transactions

B – G. No Change

III. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions

A – C. No change

IV. Prepare communications to satisfy engagement objectives

A – C. No change

At their November 1998 meeting, the COTF developed the following recommendations regarding the auditing CSOs for the AICPA's Board of Examiners:

- Add the validated IT topics (i.e., Exhibit 7) to *Information for Uniform CPA Examination Candidates*,
- Edit the introductory paragraph and the activity statements in the auditing CSOs as shown in Exhibit 8 to reflect the performance of auditing and other attestation engagements in *computerized* environments, and
- Include sample IT questions in *Information for Uniform CPA Examination Candidates*.

At their January 1999 meeting, the AICPA's Board of Examiners approved the COTF's recommended changes, effective with the November 1999 examination.

6. Appendices

Appendix 1

Summary Report of the Critical Incident Interviews

**Critical Incident Interviews Report
CPA Information Technology Study**

**Prepared for
American Institute of Certified Public Accountants
Board of Examiners
Content Oversight Task Force**

**Prepared by
Professional Examination Service
475 Riverside Drive
New York, NY 10115**

May 1998

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American Institute of Certified Public Accountants, Inc.
1211 Avenue of the Americas, New York, NY 10036-8775

PURPOSE

This report summarizes the results of the critical incidents interviews conducted with certified public accountants for the *Information Technology Study*. The interviews were designed to elicit a list of critical knowledge and skills required for auditing in an information technology environment.

At the December 11, 1997 meeting of the COTF, participants defined key professional parameters by which to constitute the group of critical incident interviewees. Accordingly, the nominees were designed to comprise CPAs representing seasoned practitioners at small, medium, and large firms who may supervise and/or manage other CPAs.

Potential panelists were recruited by a professional staff member from the AICPA's Examination Division. Panelists represented diverse practice settings and locations. Appendix 1 contains a roster of the interviewees including name, work affiliation, and jurisdiction, as well as a description of the demographic and professional background of the interviewees.

PROCEDURES

Nineteen potential participants were nominated by the Content Oversight Task Force. The interviews were conducted during April 1998. Participants were contacted by telephone in advance of the actual interview. At that time, a convenient date and time for the interview was established. All interviews were conducted by telephone. The length of the interviews ranged from 20 to 70 minutes. (See Appendix 2 for a copy of the protocol used to conduct the interview.)

Each critical incidents interview began with a brief introduction to the *Information Technology Study* and a description of the purpose of the interview. The interviewer then asked the following ten questions:

- Describe your major duties and responsibilities as a certified public accountant.
- You were identified as a CPA who audits in an "information technology" environment. Can you tell me more about the nature of that IT environment? What kinds of IT do you come in contact with? How does the technology impact what you need to know? How many CPAs in your firm have this knowledge?
- Given the significant changes in technology, are there new sets of activities you must perform in your practice? What do you do differently now?
- What do you need to know about information technology now that you did not need to know 5 years ago?
- What types of computer hardware do you need to be familiar with?

- What types of software do you need to know about?
- What level of understanding does a CPA have to have about “the flow of information in a paperless environment?”
- Think of one time since you have been practicing as a CPA in an IT environment when you have felt particularly effective in your work. Describe what happened. What specific knowledge and skills made you particularly effective in that situation?
- Now, think of one time since you have been practicing as a CPA in an IT environment when you felt particularly ineffective in your job, a time that was a personal low point. Describe what happened. What specific knowledge and skills would have helped you in this situation?
- Imagine you were going to hire a newly-licensed CPA. What IT-related knowledge and skills would be essential for that person to possess?

FOLLOW-UP AND RESULTS OF THE CRITICAL INCIDENT INTERVIEWS

Subsequent to the completion of the interviews, PES reviewed the results of each interview and prepared annotated delineations including additions and revisions. Based on a discussion held at the focus panel conducted on behalf of the IT Working Group by PES, a decision was made to combine the results of both the Critical Incident Interviews and the Focus Panel. Subsequently, PES summarized the results of both complementary data collection initiatives and prepared annotated delineations including additions and revisions to both the knowledge and skill listing and the task listing. (Document 1, *Augmented Information Technology Content Specifications Incorporating Results of Critical Incidents Interviews and Focus Panel*, and Document 2, *Augmented Task Listing*, contain the revised listings.)

**Appendix 1:
Roster of Critical Incident Interviewees**

Name	Firm	State
Bill Albin	Deloitte & Touche	NE
Howard Cohen	Goldstein, Golub, & Kessler	NY
Carlos Perez-Abrou	Morrison, Brown, & Argiz	FL
Mike Yates	Crowe Chizek	IN
Lori Reiner	Morgolies & Co	PA
Brandon Jackson	Sartain Fishbein	OK
Lyndee Black	Thomas, Watts, & Hershberger	NE
Paul Goetz	Urbach, Kahn, & Werlin	NY
Daryl Bailes	Robertson, Bailes, & McClland	LA
Mike Schnoes	KPMG Peat Marwick	IA
Luke Ebersold	Simione, Scillia, Larrow & Dowling	CT
Vicky Crowe	Harden Silva	CA
Rob Horton	Lattimore, Black, Morgan & Cain	TN
Travis Webb	Baird, Kurtz, & Dobson	MO
Jonathan Rothman	Deloitte & Touche	NJ
Cheryl Fletterick	Coopers & Lybrand	CT
Jennifer Gettman	Moss Adams, LLP	WA
Rebecca Schroeder	BDO Seidman	IL

Professional and Background Information of Critical Incident Interviewees (N=18)

1. In what type of firm do you work?

7	Local
6	Regional
5	National/International
0	Other

2. What is the number of professional accountants that work for your firm, in total?

0	1
1	2 – 10
8	11 – 100
4	101– 1000
5	1000+

3. What is your present position in your firm?

0	Sole practitioner
0	Partner or stockholder
13	Manager or equivalent
3	Supervisor or equivalent
2	Senior or equivalent
0	Staff accountant
0	Other

4. How many years of experience to you have in public accounting?

0	0
6	1 – 5
6	6 – 10
6	10+

5. How many years of experience do you have in non-public accounting?

13	0
3	1 – 5
2	6 – 10
0	10+

6. What is your highest level of education?

0	Some college/no degree
0	Associate's degree
15	Bachelor's degree
3	Master's degree
0	Doctorate
0	Other

7. What is your gender?

6	Female
12	Male

Appendix 2

Interviewee's Name: _____

Date: _____

**CRITICAL INCIDENTS INTERVIEW
for the
Information Technology Study**

**Conducted for
American Institute of Certified Public Accountants
Harborside Financial Center
201 Plaza Three
Jersey City, NJ 07311-3881**

**Conducted by
Professional Examination Service
Departments of Research and Development
475 Riverside Drive
New York, New York 10115**

CRITICAL INCIDENTS INTERVIEW PROTOCOL
AICPA INFORMATION TECHNOLOGY STUDY

Before we begin with questions and answers, I would like to give you some background on the study we are conducting for the AICPA, and our reasons for interviewing you at this time.

Accounting practice is changing rapidly, and the AICPA is committed to ensuring that the Uniform CPA Examination reflects those changes. A Content Oversight Task Force appointed by the AICPA identified information technology as an area where new developments have had a major impact on the work of accountants, especially as they perform auditing engagements.

The AICPA contracted with us (PES) to gather more specific information on how information technology has affected accounting practice. One source of information is interviews with accountants who are familiar with the technology-related aspects of auditing practice.

The information that you provide in this interview is confidential, and will only be used in connection with the AICPA study. The call should take 30 – 45 minutes to complete. Do you have any questions before we move on?

1. Describe your major duties and responsibilities as a certified public accountant.
2. You were identified as a CPA who audits in an “information technology” environment. Can you tell me more about the nature of that IT environment? What kinds of IT do you come in contact with? How does it impact what you need to know? How many CPAs in your firm have this knowledge?
3. Given the significant changes in technology, are there new sets of activities you must perform in your practice? What do you do differently now?
 - A. What do you need to know about information technology now that you did not need to know 5 years ago?
 - B. What types of computer hardware do you need to be familiar with?
 - C. What types of software do you need to know about?
4. What level of understanding does a CPA have to have about “the flow of information in a paperless environment?”
5. Think of one time since you have been practicing as a CPA in an IT environment when you have felt particularly effective in your work. Describe what happened. What specific knowledge and skills made you particularly effective in that situation?
6. Now, think of one time since you have been practicing as a CPA in an IT environment when you felt particularly ineffective in your job, a time that was a personal low point. Describe what happened. What specific knowledge and skills would have helped you in this situation?
7. Imagine you were going to hire a newly-licensed CPA. What IT-related knowledge and skills would be essential for that person to possess?

Appendix 2

Summary of Focus Panels

**Focus Panel Report
CPA Information Technology Study**

**Prepared for
American Institute of Certified Public Accountants
Board of Examiners
Content Oversight Task Force**

**Prepared by
Professional Examination Service
475 Riverside Drive
New York, NY 10115**

May 1998

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1211 Avenue of the Americas, New York, NY 10036-8775

PURPOSE

On April 20, 1998, PES conducted a focus panel meeting on behalf of the Information Technology (IT) Working Group of the Content Oversight Task Force. The focus panel methodology permitted specific and targeted data collection to supplement the draft delineations of IT-related tasks and IT-related knowledge and skills developed by the IT Working Group.

At the December 11, 1997 meeting of the COTF, participants defined key professional parameters by which to constitute the Focus Panel. Accordingly, the focus panel was designed to comprise CPAs representing academic programs, corporate in-service education initiatives, and seasoned practitioners.

Potential panelists were recruited by a professional staff member from the AICPA's Examination Division. Panelists represented diverse practice settings and locations. Appendix 1 contains a roster of the participants including name, work affiliation, and jurisdiction, as well as a description of the demographic and professional background of the participants.

PROCEDURES

The focus panel lasted 4 hours and was facilitated by two moderators from PES. Two members of the Working Group participated in the panel. Finally, two representatives of the AICPA served as a resource during the meetings.

A protocol was prepared to guide the discussion among participants. The protocol was designed to elicit descriptions of IT-related tasks and activities performed by CPAs in the conduct of audits and other attestation engagements, and the associated knowledge and skills. (See Appendix 2 for copies of the protocol and stimulus materials.) Participants were required to respond to both general and specific questions, and to document the IT-related requirements of audit and attestation engagements.

FOLLOW-UP AND RESULTS OF THE FOCUS PANEL MEETING

Following the conclusion of the Focus Panel, representatives of the IT Working Group, the AICPA, and PES reviewed the conduct and outcomes of the meeting. Based on that discussion, a decision was made to combine the documentation of the results with the documentation of the results of Critical Incidents Interviews conducted on behalf of the IT Working Group by PES. Subsequently, PES summarized the results of both complementary data collection initiatives and prepared annotated delineations including additions and revisions to both the knowledge and skill listing and the task listing. (Document 1, *Augmented Information Technology Content Specifications Incorporating Results of Critical Incidents Interviews and Focus Panel*, and Document 2, *Augmented Task Listing*, contain the revised listings.)

**Appendix 1:
Focus Panel Roster**

Representing	Name	Firm/School	State
Academic	Paul Steinbart	University of AZ	AZ
IT	Sam Rubenstein	Ernst & Young	OH
IT	Don Warren	Coopers & Lybrand	CT
National	Scott Jennings	Deloitte & Touche	NJ
National	Kristen Kavanaugh	Ernst & Young	NY
Regional	Angela Roby	Larsen Allen	MN
Regional	Kent Rodgers	George S. Olive	IN
Local	Jay Goldman	American Express	MD
Local	Andrew Glickman	Paneth Haber Zimmerman	NY

Professional and Background Information of Focus Panelists (N=9)

8. In what type of firm do you work?
- 1 Local
 - 2 Regional
 - 5 National/International
 - 1 Other
9. What is the number of professional accountants that work for your firm, in total?
- 0 1
 - 0 2 – 10
 - 1 11 – 100
 - 3 101– 1000
 - 4 1000+
 - 1 N/A
10. What is your present position in your firm?
- 0 Sole practitioner
 - 2 Partner or stockholder
 - 3 Manager or equivalent
 - 1 Supervisor or equivalent
 - 2 Senior or equivalent
 - 0 Staff accountant
 - 1 Other
11. How many years of experience to you have in public accounting?
- 1 0
 - 3 1 – 5
 - 3 6 – 10
 - 2 10+
12. How many years of experience do you have in non-public accounting?
- 6 0
 - 1 1 – 5
 - 2 6 – 10
 - 0 10+
13. What is your highest level of education?
- 0 Some college/no degree
 - 0 Associate's degree
 - 6 Bachelor's degree
 - 2 Master's degree
 - 1 Doctorate
 - 0 Other
14. What is your gender?
- 2 Female
 - 7 Male

Appendix 2
Protocol/Stimulus Materials

Focus Panel Protocol
AICPA Information Technology Study

We'd like to introduce ourselves and welcome you to a Focus Panel conducted on behalf of the AICPA. We're employed at Professional Examination Service in the Department of Research and Development.

Accounting practice is changing rapidly, and the AICPA is committed to ensuring that the Uniform CPA Examination reflects those changes. A Content Oversight Task Force appointed by the AICPA identified information technology as an area where new developments have had a major impact on the work of accountants, especially as they perform auditing engagements.

The AICPA contracted with us (PES) to gather more specific information on how information technology has affected accounting practice. You were invited to be here today because you are CPAs who are familiar with the technology-related aspects of auditing practice, and you can help us understand the essential knowledge and skills required of the CPA in the information age.

Our discussions will focus on your own experiences and opinions, so there are no right and wrong responses. Before we begin, we have to review the ground rules for the session:

- The session will last 4 hours; we'll take a brief break about ½ way through.
- Light refreshments are available; please help yourself anytime you wish.
- We'll be recording the session and we'll also be taking notes throughout the session. For those reasons, we ask you to make sure that only one person speaks at a time. On the other hand, be assured that your comments are completely confidential; no names will be attached to the summary report of the session.
- And finally, before we begin, we do need you to read and sign a form indicating that you agree to be recorded. Further, we ask that before you leave, you complete a brief survey regarding your background.

Introductory Discussion

To get us started, I'd like each of you to briefly describe your employment situation, including the type of firm you work for and the type of work that you perform.

We are interested in learning about how information technology impacts auditing practice. What types of information technology are your clients using that you have to be familiar with in order to perform an audit?

What types of information-technology driven audit procedures does your firm use?

Transition Questions

What do CPAs need to know about information technology now that they did not need to know 5 years ago?

If you were going to hire a newly-licensed CPA, what information technology-related knowledge, skills and abilities would you require of applicants?

What level of understanding does a newly-licensed CPA need regarding "the flow of information in a paperless environment"?

What IT-related training does your company provide to get CPAs up to speed in technology-related areas?

Key Questions

(Present stimulus #1)

Think about the audit process in terms of the four broad areas listed on this page. How has IT impacted each of the four areas? Please annotate your sheet with your comments.

(Present stimulus #2)

Think about the specific steps in performing an audit listed on this page. Circle the activities that CPAs are now performing differently because of developments in IT? Then for each task you circled, annotate your copy with the specifics of how that activity has changed due to IT.

If any IT-related activities that CPAs perform are *missing*, take time to write them down where they belong in the sequence.

(Present stimulus #3)

This sheet lists areas of IT-related knowledge and skills. The areas are organized under three headings. Are the headings useful in thinking about the knowledge and skills listed within them? What other classification systems might you use to group the KSs?

Are there any KSs missing from this list? Write down any missing items on your copy.

What is the extent of knowledge a newly-licensed CPA needs in each of these areas? Basic familiarity? Skill in applying/using the concepts?

Ending Questions

Summarize the main points for the panel. Then ask, "What have we missed"?

What aspects of information technology do you think should be tested on the Uniform CPA examination?

Stimulus #2

AUDITING TASKS

I. Evaluate the prospective client and engagement, decide whether to accept/or continue the client and the engagement, enter into an agreement with the client, and plan the engagement

Determine nature and scope of engagement

Assess engagement risk and the CPA firm's ability to perform the engagement

Communicate with the predecessor accountant/auditor

Decide whether to accept or continue the client and engagement

Enter into an agreement with the client as to the terms of the engagement

Obtain an understanding of the client's operations, business, and industry

Perform analytical procedures

Determine preliminary engagement materiality

Assess inherent risk and risk of misstatements

Consider the internal control structure

Consider other planning matters

Identify financial statement assertions and formulate audit objectives

Determine and prepare the work program defining the nature, timing, and extent of the auditor's procedures

II. Obtain and document information to form a basis for conclusions

Perform planned procedures including planned applications of audit sampling

Evaluate contingencies and obtain and evaluate lawyers' letters

Review subsequent events

Obtain representations from management

Identify reportable conditions and other control deficiencies

Identify matters for communication with audit committees

Review unusual year - end transactions

III. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions

Perform analytical procedures

Evaluate the sufficiency and competence of audit evidence and document engagement conclusions

Review the work performed to provide reasonable assurance that objectives are achieved

IV. Prepare communications to satisfy engagement objective

Prepare reports

Prepare letters and other required communications

Other matters

Stimulus #3

Information Technology Content Specifications

We have considered the effects of information technology (IT) on the practice of public accountancy. We believe that it is important for newly-licensed CPAs to have an understanding of information technology concepts, such as general system concepts, control concepts, and others, so that they can:

- Understand business processes and information flows in an IT environment
- Identify risks and exposures in business processes and information flows in an IT environment
- Assess control risk in an IT environment
- Develop effective audit procedures in an IT environment

I. General System Concepts

Role Within Business

Reporting Concepts and Systems
Transaction Processing Systems
Management Information Systems
Decision Support Systems
Executive Information Systems
Expert Systems, Artificial Intelligence
Risks and Exposures

Hardware

CPU
File Server
Workstations/Terminals
Input/Output Devices
Physical Storage Devices
Memory
Communication Devices

Software

Operating System
Application
Security
Utility
Programming languages
Library Management
Data Management

Data Structure

File Organization
Types of Data Files
Database Management Systems

Networks

LAN/WAN/VAN
Internet, intranet, and extranet
Centralized/decentralized
Distributed data processing
Client/server
End user computing

Transaction Processing Modes

Batch
On-line
Real-time
Distributed

Electronic Commerce

Electronic Data Interchange
Electronic Fund Transfer
Point of Sale

Application Processing Phases

Data Capture
Edit
Master File Maintenance
Reporting, Accounting, Control,
Management
Query, Audit Trail, Ad Hoc Reports
Transaction Flow

II. CONTROL CONCEPTS

IT Control Objectives

- Completeness
- Accuracy
- Validity
- Integrity
- Timeliness

Control Activities and Design

- Effect of general controls
- Preventive Controls
- Detective Controls
- Automated Controls
- User Controls

Physical Access

- User identification**
- Photo IDs
- Video cameras
- Keypad devices
- Card readers

Logical Access

- Paths**
- Console
- Workstation/Terminal
- Dial-up

Controls

- User Identification
- Access Rights
- File Attributes
- Passwords
- Encryption
- Digital signatures
- Dial back

Segregation of Duties within IT

Department

- Database/Network Administrator
- Computer Operator

- Librarian
- Systems Programmer
- Applications Programmer

System Acquisition and Development

- Acquisition
- Development
- Maintenance
- Program Changes

Disaster Recovery

- Data Backup
- Data Recovery
- Alternate Process Facilities (Hot Site)
- Threat and Risk Management

Testing of General & Automated Controls

- Inquiry & Observation
- Reperformance
- Parallel simulation
- Integrated Test Facilities (ITF)
- Test data

III. Other Concepts

Computer-Assisted Auditing Techniques

- Approaches (Around, Through, With)
- Feasibility
- Categories of CAATs
- Available Tools/Techniques
- Definition and Design
- Execution and Control

Legal & Ethical Requirements

- Trading Partner Agreements

Auditing Standards Relevant to IT

- SAS 70
- SAS 78
- SAS 80

Appendix 3

CPA Information Technology Survey



The CPA. Never Underestimate The Value.™

CPA Information Technology Survey

Board of Examiners
Content Oversight Task Force
American Institute of Certified Public Accountants

Prepared by
Professional Examination Service
475 Riverside Drive
New York, NY 10115

July 1998

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American Institute of Certified Public Accountants, Inc.
1211 Avenue of the Americas, New York, NY 10036-8775

The CPA Information Technology Survey

The Board of Examiners' Content Oversight Task Force of the American Institute of Certified Public Accountants (AICPA) is studying the effects of information technology (IT) on the auditing practices of certified public accountants (CPAs). The goal of the study is to determine the knowledge and skills that a CPA should have in order to audit and to follow the flow of information in an IT environment. The outcomes of the IT study will contribute to the construction and validation of the Uniform CPA Examination. The outcomes may also guide colleges and universities, CPA firms, and CPE developers in their education and training initiatives.

The *CPA Information Technology Survey* has five sections that address your experience as a CPA. Please answer each question honestly and completely based on your experience as a CPA in public accounting.

Specific instructions are provided for each section of the survey. In general, we will ask that you circle the most appropriate answer or fill in a word or number. The survey should take no more than 30 minutes to complete. Please return your completed survey within the next two weeks to Professional Examination Service (PES), the AICPA's contractor on the project. A postage-paid envelope addressed to PES is provided.

Your answers to the questions in the survey will be kept completely confidential and will not be identified with you in any way. Our data file will not include your name, and the final report will present only aggregate data.

Your responses will contribute significantly to the success of this important project.

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Section 1. IT-Related Topics

On the following pages, you will be presented with IT-related knowledge areas that may be encountered by CPAs in public accounting. The IT-related knowledge areas have been grouped together under topic headings.

For each topic and/or its associated knowledge areas, circle the appropriate response codes, indicating: (a) the importance of the knowledge of the topic to your competence as a CPA in public accounting; (b) the level that best represents your use of the knowledge of the topic in your work as a CPA in public accounting; and (c) the point at which the knowledge of the topic should be acquired by CPAs in public accounting.

Importance	Usage	Acquisition
How important is the knowledge of this topic to your competence as a CPA in public accounting? <i>(Circle one.)</i>	What level best represents your use of the knowledge of this topic in your work as a CPA in public accounting? <i>(Circle one.)</i>	At what point should the knowledge of this topic be acquired by CPAs in public accounting? <i>(Circle one.)</i>
0 Not important 1 Minimally important 2 Moderately important 3 Very important	0 I do not use the knowledge 1 I recognize/recall the knowledge 2 I apply/interpret/integrate the knowledge	0 Not necessary at any point 1 Primarily before passing the CPA examination 2 Primarily after passing the CPA examination

For example, consider the IT-related topic, *“Role of Information Systems within Business”* and its associated knowledge areas including *“reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.”*

- If the knowledge of this topic is very important to your competence as a CPA in public accounting, circle the 3 under the column labeled **Importance**.
- If you apply/interpret/integrate the knowledge of this topic in your work as a CPA in public accounting, circle the 2 under the column labeled **Usage**.
- If you believe the knowledge of this topic should be acquired primarily before passing the CPA examination, circle the 1 under the column labeled **Acquisition**.

	Importance	Usage	Acquisition
Role of Information Systems within Business Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures	0 1 2 (3)	0 1 (2)	0 (1) 2

Rate each IT-related topic using all three scales. Remember:

- The **Importance** and **Usage** scales focus on your own work.
- The **Acquisition** rating scale focuses on your judgment regarding the profession in general.

Importance	Usage	Acquisition
How important is the knowledge of this topic to your competence as a CPA in public accounting? <i>(Circle one.)</i>	What level best represents your use of the knowledge of this topic in your work as a CPA in public accounting? <i>(Circle one.)</i>	At what point should the knowledge of this topic be acquired by CPAs in public accounting? <i>(Circle one.)</i>
0 Not important 1 Minimally important 2 Moderately important 3 Very important	0 I do not use the knowledge 1 I recognize/recall the knowledge 2 I apply/interpret/integrate the knowledge	0 Not necessary at any point 1 Primarily before passing the CPA examination 2 Primarily after passing the CPA examination

Topics	Importance	Usage	Acquisition
Role of Information Systems within Business			
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures	0 1 2 3	0 1 2	0 1 2
Includes knowledge of decision support systems, executive information systems, expert systems, and artificial intelligence	0 1 2 3	0 1 2	0 1 2
Hardware			
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices	0 1 2 3	0 1 2	0 1 2
Software			
Includes knowledge of operating systems, applications, and security	0 1 2 3	0 1 2	0 1 2
Includes knowledge of utilities, programming languages, and library management	0 1 2 3	0 1 2	0 1 2
Data Structure			
Includes knowledge of file organization, types of data files, and database management systems	0 1 2 3	0 1 2	0 1 2
Networks			
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing	0 1 2 3	0 1 2	0 1 2
Transaction Processing Modes			
Includes knowledge of batch, on-line, real-time, and distributed processing	0 1 2 3	0 1 2	0 1 2

Topics	Importance	Usage	Acquisition
Electronic Commerce Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions	0 1 2 3	0 1 2	0 1 2
Application Processing Phases Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow	0 1 2 3	0 1 2	0 1 2
IT Control Objectives Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives	0 1 2 3	0 1 2	0 1 2
Control Activities and Design Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls	0 1 2 3	0 1 2	0 1 2
Physical Access Controls Includes knowledge of user identification, keypad device, and card reader controls	0 1 2 3	0 1 2	0 1 2
Logical Access Points Includes knowledge of paths, consoles, workstations/terminals, and dial-up access	0 1 2 3	0 1 2	0 1 2
Controls/Security Includes knowledge of user identification, access rights, file attributes, and passwords	0 1 2 3	0 1 2	0 1 2
 Includes knowledge of encryption, digital signatures, dial back, and firewalls	0 1 2 3	0 1 2	0 1 2
Roles and Responsibilities within IT Department Includes knowledge of roles and responsibilities of database/network/web administrators, computer operators, librarians, systems programmers, and applications programmers	0 1 2 3	0 1 2	0 1 2
System Development Life Cycle Includes knowledge of system acquisition, system development, system maintenance, program changes, and archiving	0 1 2 3	0 1 2	0 1 2
Disaster Recovery/Business Continuity Includes knowledge of data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management	0 1 2 3	0 1 2	0 1 2

Importance	Usage	Acquisition
How important is the knowledge of this topic to your competence as a CPA in public accounting? (Circle one.)	What level best represents your use of the knowledge of this topic in your work as a CPA in public accounting? (Circle one.)	At what point should the knowledge of this topic be acquired by CPAs in public accounting? (Circle one.)
0 Not important 1 Minimally important 2 Moderately important 3 Very important	0 I do not use the knowledge 1 I recognize/recall the knowledge 2 I apply/interpret/integrate the knowledge	0 Not necessary at any point 1 Primarily before passing the CPA examination 2 Primarily after passing the CPA examination

Topics	Importance	Usage	Acquisition
Audit Tests of General and Automated Controls			
Knowledge of inquiry and observation tests	0 1 2 3	0 1 2	0 1 2
Knowledge of reperformance tests	0 1 2 3	0 1 2	0 1 2
Knowledge of parallel simulation tests	0 1 2 3	0 1 2	0 1 2
Knowledge of integrated test facilities (ITF)	0 1 2 3	0 1 2	0 1 2
Knowledge of test data	0 1 2 3	0 1 2	0 1 2
Computer-Assisted Auditing Techniques (CAATs)			
Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs	0 1 2 3	0 1 2	0 1 2
Auditing around the Computer (without using CAATs)			
Includes knowledge of available tools/techniques	0 1 2 3	0 1 2	0 1 2
Legal and Ethical Requirements			
Includes knowledge of trading partner agreements, service level agreements, and licensing (e.g., software copyright)	0 1 2 3	0 1 2	0 1 2
Auditing Standards Relevant to IT			
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit: An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter	0 1 2 3	0 1 2	0 1 2

Section 2. Practice Areas

During the past year, what percentage of your work time was devoted to each of the practice areas listed below?
 (Enter percentage of time for each practice area. Responses must add to 100%)

Practice Area	% of Work Time
Auditing	1a _____%
Accounting and other assurance services	1b _____%
Taxation	1c _____%
Management Advisory Services	1d _____%
Other (<i>Specify.</i>) _____	1e _____%
	<u>100%</u>

Completing Section 3, Auditing Activities: Your response to question 1a determines whether you should complete Section 3.

- If your response to question 1a (percentage of your work time devoted to Auditing) was **20% or more**, complete Section 3, pages 9 to 12, and then continue on to Section 4, page 13.
- If your response to question 1a (percentage of your work time devoted to Auditing) was **less than 20%**, do not complete Section 3. Instead, turn to Section 4, page 13.

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Section 3. Auditing Activities

Tasks and activities are the functions CPAs perform in their professional roles. *Tasks* are large segments of work, such as “*Obtain and document information to form a basis for conclusions.*” *Activities* associated with the tasks are discrete units of work that are performed in a logical sequence to complete the task. For example, “*Perform planned procedures including planned applications of audit sampling,*” and, “*Evaluate contingencies,*” are two activities associated with the task, “*Obtain and document information to form a basis for conclusions.*”

In this section, you will be presented with auditing activities associated with a variety of tasks. For each activity, you are to circle the appropriate response codes, indicating: (a) the importance of the activity to your competence as a CPA in the conduct of audits, (b) the frequency with which you perform the activity during audits, and (c) the frequency with which you use IT-related knowledge or skills (other than word processing and spreadsheets) when you perform the activity.

The **Importance**, **Frequency**, and **IT Frequency** rating scales are as follows:

Importance	Frequency	IT Frequency
How important is this activity to your competence as a CPA in the conduct of audits? (Circle one.)	How frequently do you perform this activity during audits? (Circle one.)	How frequently do you use IT-related knowledge or skills (other than word processing and spreadsheets) when you perform this activity? (Circle one.)
0 Not important 1 Minimally important 2 Moderately important 3 Very important	0 Never 1 Infrequently 2 Frequently 3 Very frequently	0 Never 1 Infrequently 2 Frequently 3 Very frequently

For example, consider the activity, “*Perform planned procedures including planned applications of audit sampling,*” associated with the task, “*Obtain and document information to form a basis for conclusions.*”

- If this activity is very important to your competence as a CPA in the conduct of audits, circle the 3 under the column labeled **Importance**.
- If you perform this activity frequently during audits, circle the 2 under the column labeled **Frequency**.
- When you perform this activity, if you use IT-related knowledge and skills (other than word processing and spreadsheets) frequently, circle the 2 under the column labeled **IT Frequency**.

Activity	Importance	Frequency	IT Frequency
Perform planned procedures including planned applications of audit sampling	0 1 2 (3)	0 1 (2) 3	0 1 (2) 3

Rate each activity using all three scales. Remember that all three rating scales focus on your own work in the conduct of audits.

Importance	Frequency	IT Frequency
How important is this activity to your competence as a CPA in the conduct of audits? <i>(Circle one.)</i>	How frequently do you perform this activity during audits? <i>(Circle one.)</i>	How frequently do you use IT-related knowledge or skills (other than word processing and spreadsheets) when you perform this activity? <i>(Circle one.)</i>
0 Not important 1 Minimally important 2 Moderately important 3 Very important	0 Never 1 Infrequently 2 Frequently 3 Very frequently	0 Never 1 Infrequently 2 Frequently 3 Very frequently

Activities	Importance	Frequency	IT Frequency
Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client			
Determine nature and scope of engagement	0 1 2 3	0 1 2 3	0 1 2 3
Assess engagement risk and the CPA firm's ability to perform the engagement	0 1 2 3	0 1 2 3	0 1 2 3
Communicate with the predecessor accountant/auditor	0 1 2 3	0 1 2 3	0 1 2 3
Decide whether to accept or continue the client and engagement	0 1 2 3	0 1 2 3	0 1 2 3
Enter into an agreement with the client as to the terms of the engagement	0 1 2 3	0 1 2 3	0 1 2 3
Obtain an understanding of the client's operations, business, and industry	0 1 2 3	0 1 2 3	0 1 2 3
Perform analytical procedures	0 1 2 3	0 1 2 3	0 1 2 3
Consider preliminary engagement materiality	0 1 2 3	0 1 2 3	0 1 2 3
Assess inherent risk and risk of misstatements	0 1 2 3	0 1 2 3	0 1 2 3
Consider internal control	0 1 2 3	0 1 2 3	0 1 2 3
— Obtain an understanding of business processes and information flows in an IT environment	0 1 2 3	0 1 2 3	0 1 2 3
— Document business processes and information flows in an IT environment	0 1 2 3	0 1 2 3	0 1 2 3
— Identify risks and exposures in business processes and information flows in an IT environment	0 1 2 3	0 1 2 3	0 1 2 3
— Assess control risk in an IT environment	0 1 2 3	0 1 2 3	0 1 2 3

Activities	Importance	Frequency	IT Frequency
Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, enter into an agreement with the client (Cont'd).			
Consider other planning matters (e.g., using the work of other independent auditors, specialists, or internal auditors; related parties and related party transactions)	0 1 2 3	0 1 2 3	0 1 2 3
Identify financial statement assertions and formulate audit objectives	0 1 2 3	0 1 2 3	0 1 2 3
Determine and prepare the work program defining the nature, timing, and extent of the auditor's procedures	0 1 2 3	0 1 2 3	0 1 2 3
— Develop effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)	0 1 2 3	0 1 2 3	0 1 2 3
Task II. Obtain and document information to form a basis for conclusions			
Perform planned procedures including planned applications of audit sampling	0 1 2 3	0 1 2 3	0 1 2 3
— Implement effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)	0 1 2 3	0 1 2 3	0 1 2 3
Evaluate contingencies	0 1 2 3	0 1 2 3	0 1 2 3
Obtain and evaluate lawyers' letters	0 1 2 3	0 1 2 3	0 1 2 3
Review subsequent events	0 1 2 3	0 1 2 3	0 1 2 3
Obtain representations from management	0 1 2 3	0 1 2 3	0 1 2 3
Identify reportable conditions and other control deficiencies	0 1 2 3	0 1 2 3	0 1 2 3
Identify matters for communication with audit committees	0 1 2 3	0 1 2 3	0 1 2 3

Importance	Frequency	IT Frequency
How important is this activity to your competence as a CPA in the conduct of audits? <i>(Circle one.)</i>	How frequently do you perform this activity during audits? <i>(Circle one.)</i>	How frequently do you use IT-related knowledge or skills (other than word processing and spreadsheets) when you perform this activity? <i>(Circle one.)</i>
0 Not important 1 Minimally important 2 Moderately important 3 Very important	0 Never 1 Infrequently 2 Frequently 3 Very frequently	0 Never 1 Infrequently 2 Frequently 3 Very frequently

Activities	Importance	Frequency	IT Frequency
Task III. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions			
Perform analytical procedures	0 1 2 3	0 1 2 3	0 1 2 3
Evaluate the sufficiency and competence of audit evidence and document engagement conclusions	0 1 2 3	0 1 2 3	0 1 2 3
Review the work performed to provide reasonable assurance that objectives are achieved	0 1 2 3	0 1 2 3	0 1 2 3
Task IV. Prepare communications to satisfy engagement objectives			
Prepare reports	0 1 2 3	0 1 2 3	0 1 2 3
Prepare letters and other required communications	0 1 2 3	0 1 2 3	0 1 2 3
Consider omitted procedures after the report date or the subsequent discovery of facts existing at the date of the auditor's report	0 1 2 3	0 1 2 3	0 1 2 3

Section 4. Background Information

This information is being collected for statistical analysis only. All responses will be kept strictly confidential.

15. During the past year, of the work time you spent performing audit engagements, what percentage was spent on each of the following tasks? (*Read the list of tasks below, review the activities associated with each task [pages 10 - 12], and then estimate the percentage of your work time on audits that you spent on each task. Your responses must add to 100%.*)

If you did not spend any time performing audit engagements during the past year (see page 7, question 1a), check the box below and skip to Question 2.

I did not spend any time performing audit engagements during the past year.

Audit Tasks	% of Audit Work Time
I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, enter into an agreement with the client	_____ %
II. Obtain and document information to form a basis for conclusions	_____ %
III. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions	_____ %
IV. Prepare communications to satisfy engagement objectives	_____ %
	<u>100%</u>

16. In what type of firm do you work? (*Circle one.*)

- 1 Local
- 2 Regional
- 3 National/International
- 4 Other

17. What is your present position in your firm? (*Circle one.*)

- 1 Sole practitioner (one professional)
- 2 Partner/shareholder/owner
- 3 Manager or equivalent
- 4 Supervisor or equivalent
- 5 Senior or equivalent
- 6 Staff accountant
- 7 Other (*Specify.*) _____

18. What is the total number of professionals (including partners/shareholders/owners) in your company/organization? (Circle one.)

- | | | | |
|---|-----------|---|----------------|
| 1 | 1 | 6 | 501 – 1,000 |
| 2 | 2 – 9 | 7 | 1,001 – 5,000 |
| 3 | 10 – 50 | 8 | 5,001 – 10,000 |
| 4 | 51 – 100 | 9 | Over 10,000 |
| 5 | 101 – 500 | | |

19. What is the zip code at your office? (We use this information to determine the number of surveys we receive from CPAs in each jurisdiction.)

_____ (Write in zip code.)

20. How many years of experience do you have working in public accounting?

_____ (Write in number.)

21. How many years of experience do you have working in non-public accounting?

_____ (Write in number.)

22. In which year did you successfully complete the CPA examination?

_____ (Write in year.)

23. What is your highest level of education? (Circle one.)

- | | | | |
|---|--------------------------------------|---|-----------------------|
| 1 | Some college/no degree | 5 | Master's degree |
| 2 | Associate's degree | 6 | Doctorate |
| 3 | Bachelor's degree <150 credit hours | 7 | Other (Specify) _____ |
| 4 | Bachelor's degree ≥ 150 credit hours | | |

24. If you have earned a bachelor's degree, indicate the discipline(s) in which the degree was awarded. (Circle all that apply.)

- | | | | |
|---|--------------------------------------|---|-----------------------|
| 1 | Accounting | 5 | Social sciences |
| 2 | Information systems/computer science | 6 | Humanities |
| 3 | Other business area | 7 | Other (Specify) _____ |
| 4 | Engineering | | |

25. If you have earned a master's degree, indicate the type(s) of degree(s) awarded. (Circle all that apply.)

- | | | | |
|---|---------------------------------|---|--|
| 1 | Master's in accounting | 4 | MBA (concentration in accounting) |
| 2 | Master's in taxation | 5 | MBA (concentration in other business area) |
| 3 | Master's in other business area | 6 | Other (Specify) _____ |

26. What is your gender? (Circle one.)

- 1 Female
- 2 Male

Section 5. Qualitative Comments

1. If any IT-related knowledge areas were not included in the survey, please describe them below.
2. During the past year or so, what IT-related knowledge and/or skills (other than word processing and spreadsheets) have you personally had to acquire in order to conduct audits? Please be as specific as possible in describing the knowledge and/or skills.
3. What do you believe will be the IT-related changes that will occur over the next 5 years in auditing and other assurance services in the CPA profession? We are especially interested in changes that may affect the knowledge and skills required of new CPAs.
4. What do you believe will be the other changes that will occur over the next 5 years in the practice of the profession? We are especially interested in changes that may affect the knowledge and skills required of new CPAs.

We very much appreciate the time you have spent on the survey. Your answers will be very helpful to the Board of Examiners in determining the content of the Uniform CPA Examination. The results of this study will be made available by the Board of Examiners.

Using the enclosed postage-paid envelope, please return the completed survey to:

PROFESSIONAL EXAMINATION SERVICE, 475 RIVERSIDE DRIVE, NEW YORK, NY 10027-9823

Appendix 4

Linking Task Assignment



The CPA. Never Underestimate The Value.™

CPA Information Technology Linking Task

Submitted by: _____

Date: _____

Board of Examiners
Content Oversight Task Force
American Institute of Certified Public Accountants

Prepared by
Professional Examination Service
475 Riverside Drive
New York, NY 10115

August 1998

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1211 Avenue of the Americas, New York, NY 10036-8775

The CPA Information Technology Linking Task

The Board of Examiners' Content Oversight Task Force of the American Institute of Certified Public Accountants (AICPA) is studying the effects of information technology (IT) on the auditing practices of certified public accountants (CPAs). The goal of the study is to determine the knowledge and skills that a CPA should have in order to audit and to follow the flow of information in an IT environment. The outcomes of the IT study will contribute to the construction and validation of the Uniform CPA Examination. The outcomes may also guide colleges and universities, CPA firms, and CPE developers in their education and training initiatives.

In this *CPA Information Technology Linking Task* we ask you to indicate how each of 28 IT-related knowledge areas are used by CPAs in the performance of audits. The linking task should take no more than one hour to complete. Please return your completed linking task by **August 24, 1998** to Professional Examination Service (PES), the AICPA's contractor on the project. A postage-paid envelope addressed to PES is provided.

Your data will be kept completely confidential and will not be identified with you in any way. Our data file will not include your name, and the report to the Board of Examiners will present only aggregate data.

Your responses will contribute significantly to the success of this important project.

Board of Examiners' Content Oversight Task Force

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Place a check mark (✓) to the left of each auditing activity below for which this IT-related knowledge area plays a key role and contributes to successful task performance.

Knowledge Area 1: Role of Information Systems within Business I

Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.

Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

- 1 ___ Determine nature and scope of engagement
- 2 ___ Assess engagement risk and the CPA firm's ability to perform the engagement
- 3 ___ Communicate with the predecessor accountant/auditor
- 4 ___ Decide whether to accept or continue the client and engagement
- 5 ___ Enter into an agreement with the client as to the terms of the engagement
- 6 ___ Obtain an understanding of the client's operations, business, and industry
- 7 ___ Perform analytical procedures
- 8 ___ Consider preliminary engagement materiality
- 9 ___ Assess inherent risk and risk of misstatements
- 10 ___ Consider internal control
- 11 ___ Obtain an understanding of business processes and information flows in an IT environment
- 12 ___ Document business processes and information flows in an IT environment
- 13 ___ Identify risks and exposures in business processes and information flows in an IT environment
- 14 ___ Assess control risk in an IT environment
- 15 ___ Consider other planning matters (e.g., using the work of other independent auditors, specialists, or internal auditors; related parties and related party transactions)
- 16 ___ Identify financial statement assertions and formulate audit objectives
- 17 ___ Determine and prepare the work program defining the nature, timing, and extent of the auditor's procedures
- 18 ___ Develop effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)

Obtain and document information to form a basis for conclusions

- 19 ___ Perform planned procedures including planned applications of audit sampling
- 20 ___ Implement effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)
- 21 ___ Evaluate contingencies
- 22 ___ Obtain and evaluate lawyers' letter
- 23 ___ Review subsequent events
- 24 ___ Obtain representations from management
- 25 ___ Identify reportable conditions and other control deficiencies
- 26 ___ Identify matters for communication with audit committees

Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions

- 27 ___ Perform analytical procedures
- 28 ___ Evaluate the sufficiency and competence of audit evidence and document engagement conclusions
- 29 ___ Review the work performed to provide reasonable assurance that objectives are achieved

Prepare communications to satisfy engagement objectives

- 30 ___ Prepare reports
- 31 ___ Prepare letters and other required communications
- 32 ___ Consider omitted procedures after the report date or the subsequent discovery of facts existing at the date of the auditor's report

Place a check mark (✓) to the left of each auditing activity below for which this IT-related knowledge area plays a key role and contributes to successful task performance.

Knowledge Area 2: Role of Information Systems within Business II

Includes knowledge of decision support systems, executive information systems, expert systems, and artificial intelligence.

Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

- 1 ___ Determine nature and scope of engagement
- 2 ___ Assess engagement risk and the CPA firm's ability to perform the engagement
- 3 ___ Communicate with the predecessor accountant/auditor
- 4 ___ Decide whether to accept or continue the client and engagement
- 5 ___ Enter into an agreement with the client as to the terms of the engagement
- 6 ___ Obtain an understanding of the client's operations, business, and industry
- 7 ___ Perform analytical procedures
- 8 ___ Consider preliminary engagement materiality
- 9 ___ Assess inherent risk and risk of misstatements
- 10 ___ Consider internal control
- 11 ___ Obtain an understanding of business processes and information flows in an IT environment
- 12 ___ Document business processes and information flows in an IT environment
- 13 ___ Identify risks and exposures in business processes and information flows in an IT environment
- 14 ___ Assess control risk in an IT environment
- 15 ___ Consider other planning matters (e.g., using the work of other independent auditors, specialists, or internal auditors; related parties and related party transactions)
- 16 ___ Identify financial statement assertions and formulate audit objectives
- 17 ___ Determine and prepare the work program defining the nature, timing, and extent of the auditor's procedures
- 18 ___ Develop effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)

Obtain and document information to form a basis for conclusions

- 19 ___ Perform planned procedures including planned applications of audit sampling
- 20 ___ Implement effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)
- 21 ___ Evaluate contingencies
- 22 ___ Obtain and evaluate lawyers' letter
- 23 ___ Review subsequent events
- 24 ___ Obtain representations from management
- 25 ___ Identify reportable conditions and other control deficiencies
- 26 ___ Identify matters for communication with audit committees

Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions

- 27 ___ Perform analytical procedures
- 28 ___ Evaluate the sufficiency and competence of audit evidence and document engagement conclusions
- 29 ___ Review the work performed to provide reasonable assurance that objectives are achieved

Prepare communications to satisfy engagement objectives

- 30 ___ Prepare reports
- 31 ___ Prepare letters and other required communications
- 32 ___ Consider omitted procedures after the report date or the subsequent discovery of facts existing at the date of the auditor's report

Appendix 5

Key Links Between IT-Related Topics and Auditing Activities

**KEY LINKS BETWEEN IT-RELATED TOPICS
AND
AUDITING ACTIVITIES**

**Board of Examiners
Content Oversight Task Force
American Institute of Certified Public Accountants**

**Prepared by
Professional Examination Service
Department of Research and Development
475 Riverside Drive
New York, NY 10115**

September 1998

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1211 Avenue of the Americas, New York, NY 10036-8775

In order to develop an integrated understanding of the relationship between the (a) auditing tasks and activities and (b) IT-related knowledge, Professional Examination Service (PES) implemented a procedure to identify the *key* IT-related topics which contribute to the successful performance of auditing tasks and activities. This integrated approach is consistent with the conceptualization that it is most appropriate to establish a valid *context* for testing important *content* (IT-related knowledge) required at entry-level.

Accordingly, the 45 CPAs previously participating in a focus panel, critical incidents interview, or pilot test of the *CPA Information Technology Survey* were called upon to perform one additional activity—that is, to “link” the IT-related topics to the auditing activities. More specifically, the CPAs were asked to identify each auditing activity in which an IT-related knowledge plays a key role and contributes to successful task performance. In total, the participants were required to review 28 IT-related topics in the context of 32 auditing tasks; that is, 896 possible linkages. In August, PES mailed a document, *CPA Information Technology Linking Task*, to the 45 CPAs. By September 4, completed materials were received from 27 of 43 CPAs (63%). (Two of the original 45 CPAs were not available to complete the linkages.)

The following pages provide a summary of the results of the linking task. Two sets of criteria were developed to identify valid links between IT-related topics and auditing activities.

Strong link between IT-related topic and auditing activity:

- IT-related topic linked to the auditing activity (as playing a key role and contributing to successful task performance) by more than 50% of linking task participants;
- Mean *Importance* rating for IT-related topic is 1.5 or higher (as rated by CPAs with 5 or less years of experience); and
- IT-related topic is endorsed as *Acquired Primarily Before Passing the CPA Examination* by more than 33% of CPAs with 5 or less years of experience.

Moderate link between IT-related topic and auditing activity:

- IT-related topic linked to the auditing activity (as playing a key role and contributing to successful task performance) by between 34% –50% of linking task participants;
- Mean *Importance* rating for IT-related topic is 1.5 or higher (as rated by CPAs with 5 or less years of experience); and
- IT-related topic is endorsed as *Acquired Primarily Before Passing the CPA Examination* by more than 33% of CPAs with 5 or less years of experience.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 1. Determine nature and scope of engagement

Strong link between IT-related topic and auditing activity:

1 Role of Information Systems within Business (I)

Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.

Moderate link between IT-related topic and auditing activity:

28 Auditing Standards Relevant to IT

Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit: An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 2. Assess engagement risk and the CPA firm's ability to perform the engagement

Strong link between IT-related topic and auditing activity:

1 Role of Information Systems within Business (I)

Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.

Moderate link between IT-related topic and auditing activity:

11 IT Control Objectives

Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 6. Obtain an understanding of the client's operations, business, and industry

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.

Moderate link between IT-related topic and auditing activity:

- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 27 Legal and Ethical Requirements**
Includes knowledge of trading partner agreements, service level agreements, and licensing (e.g., software copyright).
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 7. Perform analytical procedures

Moderate link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 25 Computer-Assisted Auditing Techniques (CAATs)**
Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs.
- 26 Auditing around the Computer (without using CAATs)**
Includes knowledge of available tools/techniques.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 9. Assess inherent risk and risk of misstatements

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.
- 11 IT Control Objectives**
Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.
- 12 Control Activities and Design**
Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls.

Moderate link between IT-related topic and auditing activity:

- 3 Hardware**
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices.
- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 26 Auditing around the Computer (without using CAATs)**
Includes knowledge of available tools/techniques.
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 10. Consider internal control

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 3 Hardware**
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 8 Transaction Processing Modes**
Includes knowledge of batch, on-line, real-time, and distributed processing.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.
- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 11 IT Control Objectives**
Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.
- 12 Control Activities and Design**
Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls.
- 13 Physical Access Controls**
Includes knowledge of user identification, keypad device, and card reader controls.
- 15 Controls/Security (I)**
Includes knowledge of user identification, access rights, file attributes, and passwords.
- 19 Disaster Recovery/Business Continuity**
Includes knowledge of data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management.
- 20 Audit Tests of General and Automated Controls (I)**
Knowledge of inquiry and observation tests
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Activity 10. Consider internal control (cont.)

Moderate link between IT-related topic and auditing activity:

- 6 Data Structure**
Includes knowledge of file organization, types of data files, and database management systems.
- 26 Auditing around the Computer (without using CAATs)**
Includes knowledge of available tools/techniques.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 11. — Obtain an understanding of business processes and information flows in an IT environment

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 3 Hardware**
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 8 Transaction Processing Modes**
Includes knowledge of batch, on-line, real-time, and distributed processing.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.
- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 11 IT Control Objectives**
Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.
- 12 Control Activities and Design**
Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls.
- 15 Controls/Security (I)**
Includes knowledge of user identification, access rights, file attributes, and passwords.
- 20 Audit Tests of General and Automated Controls (I)**
Knowledge of inquiry and observation tests
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Moderate link between IT-related topic and auditing activity:

- 6 Data Structure**
Includes knowledge of file organization, types of data files, and database management systems.
- 13 Physical Access Controls**
Includes knowledge of user identification, keypad device, and card reader controls.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 12. — Document business processes and information flows in an IT environment

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 3 Hardware**
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 8 Transaction Processing Modes**
Includes knowledge of batch, on-line, real-time, and distributed processing.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.
- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 11 IT Control Objectives**
Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.
- 12 Control Activities and Design**
Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls.
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Moderate link between IT-related topic and auditing activity:

- 6 Data Structure**
Includes knowledge of file organization, types of data files, and database management systems.
- 13 Physical Access Controls**
Includes knowledge of user identification, keypad device, and card reader controls.
- 15 Controls/Security (I)**
Includes knowledge of user identification, access rights, file attributes, and passwords.
- 20 Audit Tests of General and Automated Controls (I)**
Knowledge of inquiry and observation tests

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 13. — Identify risks and exposures in business processes and information flows in an IT environment

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 3 Hardware**
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 8 Transaction Processing Modes**
Includes knowledge of batch, on-line, real-time, and distributed processing.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.
- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 11 IT Control Objectives**
Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.
- 12 Control Activities and Design**
Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls.
- 13 Physical Access Controls**
Includes knowledge of user identification, keypad device, and card reader controls.
- 15 Controls/Security (I)**
Includes knowledge of user identification, access rights, file attributes, and passwords.
- 19 Disaster Recovery/Business Continuity**
Includes knowledge of data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management.
- 20 Audit Tests of General and Automated Controls (I)**
Knowledge of inquiry and observation tests
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Activity 13. — Identify risks and exposures in business processes and information flows in an IT environment (cont.)

Moderate link between IT-related topic and auditing activity:

6 Data Structure

Includes knowledge of file organization, types of data files, and database management systems.

25 Computer-Assisted Auditing Techniques (CAATs)

Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 14. — Assess control risk in an IT environment

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 3 Hardware**
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 6 Data Structure**
Includes knowledge of file organization, types of data files, and database management systems.
- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 8 Transaction Processing Modes**
Includes knowledge of batch, on-line, real-time, and distributed processing.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.
- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 11 IT Control Objectives**
Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.
- 12 Control Activities and Design**
Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls.
- 13 Physical Access Controls**
Includes knowledge of user identification, keypad device, and card reader controls.
- 15 Controls/Security (I)**
Includes knowledge of user identification, access rights, file attributes, and passwords.
- 19 Disaster Recovery/Business Continuity**
Includes knowledge of data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management.
- 20 Audit Tests of General and Automated Controls (I)**
Knowledge of inquiry and observation tests
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Activity 14. — Assess control risk in an IT environment (cont.)

Moderate link between IT-related topic and auditing activity:

- 25 Computer-Assisted Auditing Techniques (CAATs)**
Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs.
- 26 Auditing around the Computer (without using CAATs)**
Includes knowledge of available tools/techniques.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 15 Consider other planning matters (e.g., using the work of other independent auditors, specialists, or internal auditors; related parties and related party transactions)

Moderate link between IT-related topic and auditing activity:

28 Auditing Standards Relevant to IT

Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 17. Determine and prepare the work program defining the nature, timing, and extent of the auditor's procedures

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 11 IT Control Objectives**
Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.
- 25 Computer-Assisted Auditing Techniques (CAATs)**
Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs.
- 26 Auditing around the Computer (without using CAATs)**
Includes knowledge of available tools/techniques.
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Moderate link between IT-related topic and auditing activity:

- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 12 Control Activities and Design**
Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls.
- 20 Audit Tests of General and Automated Controls (I)**
Knowledge of inquiry and observation tests
- 21 Audit Tests of General and Automated Controls (II)**
Knowledge of reperformance tests
- 24 Audit Tests of General and Automated Controls (V)**
Knowledge of test data

Task I. Plan the engagement, evaluate the prospective client and engagement, decide whether to accept or continue the client and the engagement, and enter into an agreement with the client

Activity 18. — Develop effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 3 Hardware**
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 6 Data Structure**
Includes knowledge of file organization, types of data files, and database management systems.
- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.
- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 11 IT Control Objectives**
Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.
- 21 Audit Tests of General and Automated Controls (II)**
Knowledge of reperformance tests
- 24 Audit Tests of General and Automated Controls (V)**
Knowledge of test data
- 25 Computer-Assisted Auditing Techniques (CAATs)**
Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs.
- 26 Auditing around the Computer (without using CAATs)**
Includes knowledge of available tools/techniques.
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Activity 18. — Develop effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation) (cont.)

Moderate link between IT-related topic and auditing activity:

- 8 Transaction Processing Modes**
Includes knowledge of batch, on-line, real-time, and distributed processing.
- 12 Control Activities and Design**
Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls.
- 20 Audit Tests of General and Automated Controls (I)**
Knowledge of inquiry and observation tests
- 22 Audit Tests of General and Automated Controls (II)**
Knowledge of parallel simulation tests
- 23 Audit Tests of General and Automated Controls (IV)**
Knowledge of integrated test facilities (ITF)

Task II. Obtain and document information to form a basis for conclusions

Activity 19. Perform planned procedures including planned applications of audit sampling

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 6 Data Structure**
Includes knowledge of file organization, types of data files, and database management systems.
- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 25 Computer-Assisted Auditing Techniques (CAATs)**
Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs.
- 26 Auditing around the Computer (without using CAATs)**
Includes knowledge of available tools/techniques.

Moderate link between IT-related topic and auditing activity:

- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.
- 21 Audit Tests of General and Automated Controls (II)**
Knowledge of reperformance tests
- 22 Audit Tests of General and Automated Controls (III)**
Knowledge of parallel simulation tests
- 24 Audit Tests of General and Automated Controls (V)**
Knowledge of test data
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Task II. Obtain and document information to form a basis for conclusions

Activity 20. — Implement effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation)

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 3 Hardware**
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.
- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 11 IT Control Objectives**
Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.
- 12 Control Activities and Design**
Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls.
- 21 Audit Tests of General and Automated Controls (II)**
Knowledge of reperformance tests
- 22 Audit Tests of General and Automated Controls (III)**
Knowledge of parallel simulation tests
- 24 Audit Tests of General and Automated Controls (V)**
Knowledge of test data
- 25 Computer-Assisted Auditing Techniques (CAATs)**
Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs.
- 26 Auditing around the Computer (without using CAATs)**
Includes knowledge of available tools/techniques.
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Activity 20. — Implement effective audit procedures in an IT environment (e.g., interrogation, data extraction, and manipulation) (cont.)

Moderate link between IT-related topic and auditing activity:

- 6 Data Structure**
Includes knowledge of file organization, types of data files, and database management systems.
- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 8 Transaction Processing Modes**
Includes knowledge of batch, on-line, real-time, and distributed processing.
- 20 Audit Tests of General and Automated Controls (I)**
Knowledge of inquiry and observation tests
- 23 Audit Tests of General and Automated Controls (IV)**
Knowledge of integrated test facilities (ITF)

Task II. Obtain and document information to form a basis for conclusions

Activity 21. Evaluate contingencies

Moderate link between IT-related topic and auditing activity:

27 Legal and Ethical Requirements

Includes knowledge of trading partner agreements, service level agreements, and licensing (e.g., software copyright).

Task II. Obtain and document information to form a basis for conclusions

Activity 25. Identify reportable conditions and other control deficiencies

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 19 Disaster Recovery/Business Continuity**
Includes knowledge of data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management.

Moderate link between IT-related topic and auditing activity:

- 3 Hardware**
Includes knowledge of CPUs, file servers, workstations/terminals, input/output devices, physical storage devices, memory, and communication devices.
- 4 Software (I)**
Includes knowledge of operating systems, applications, and security.
- 7 Networks**
Includes knowledge of LANs/WANs/VANs; internet, intranet, extranet; centralized/decentralized processing; distributed data processing; client/server computing; and end-user computing.
- 9 Electronic Commerce**
Includes knowledge of electronic data interchange, electronic fund transfers, point of sale transactions, and internet-based transactions.
- 10 Application Processing Phases**
Includes knowledge of data capture; edit routines; master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow.
- 11 IT Control Objectives**
Includes knowledge of completeness, accuracy, validity, integrity, timeliness, and authorization control objectives.
- 12 Control Activities and Design**
Includes knowledge of effects of general controls, preventive controls, detective controls, automated controls, and user controls.
- 15 Controls/Security (I)**
Includes knowledge of user identification, access rights, file attributes, and passwords.
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Task II. Obtain and document information to form a basis for conclusions

Activity 26. Identify matters for communication with audit committees

Strong link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.

Moderate link between IT-related topic and auditing activity:

- 19 Disaster Recovery/Business Continuity**
Includes knowledge of data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management.
- 28 Auditing Standards Relevant to IT**
Includes knowledge of SAS 70—Reports on the Processing of Transactions by Service Organizations; SAS 78—Consideration of Internal Control in a Financial Statement Audit An Amendment to Statement on Auditing Standards (SAS) No. 55; and SAS 80—Amendment to Statement on Auditing Standards No. 31, Evidential Matter.

Task III. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions

Activity 27. Perform analytical procedures

Moderate link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.

Task III. Review the engagement to provide reasonable assurance that objectives are achieved and evaluate information obtained to reach and to document engagement conclusions

Activity 28. Evaluate the sufficiency and competence of audit evidence and document engagement conclusions

Moderate link between IT-related topic and auditing activity:

- 1 Role of Information Systems within Business (I)**
Includes knowledge of reporting concepts and systems, transaction processing systems, management information systems, and risks and exposures.
- 25 Computer-Assisted Auditing Techniques (CAATs)**
Includes knowledge of feasibility of CAATs, categories of CAATs, available tools/techniques, definition and design of CAATs, and execution and control of CAATs.
- 26 Auditing around the Computer (without using CAATs)**
Includes knowledge of available tools/techniques.