Proposed International Education Practice Statement 2.1

Information Technology for Professional Accountants

REQUEST FOR COMMENTS

The International Accounting Education Standards Board, an independent standard-setting body within the International Federation of Accountants (IFAC), approved this exposure draft, *Information Technology for Professional Accountants*, for publication on August 15, 2006. This proposed International Education Practice Statement 2.1 may be modified in light of comments received before being issued in final form.

Please submit your comments, preferably by email, so that they will be received by **November 15, 2006**. All comments will be considered a matter of public record. Comments should be addressed to:

Technical Manager
International Accounting Education Standards Board
International Federation of Accountants
545 Fifth Avenue, 14th Floor
New York, New York 10017 USA

Email responses should be sent to: Edcomments@ifac.org

Copies of this exposure draft may be downloaded free-of-charge from the IFAC website at http://www.ifac.org.

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EXPLANATORY MEMORANDUM

Introduction

This memorandum provides some background to, and an explanation of, the proposed International Education Practice Statement (IEPS) 2.1, *Information Technology for Professional Accountants*, approved for exposure by the International Accounting Education Standards Board (IAESB) in July 2006.

Background

IEPS 2.1 was first issued as International Education Guideline IEG 11 (now re-titled as a Practice Statement) by the IFAC Education Committee in December 1995, revised in June 1998, and revised again in December 2002. The document is intended to assist member bodies to prepare professional accountants to use information technology (IT) and to work in the IT environment, describing the knowledge and competences required.

Due to the rapidly changing IT and business environments, the document can become outdated within a short space of time, and therefore requires an ongoing review to ensure it appropriately reflects the knowledge and competences expected of professional accountants. The IAESB (formerly the IFAC Education Committee) agreed in August 2004 to update IEG 11, both to take account of changes in the IT and business environments, and to ensure consistency with the (then) newly published International Education Standards for Professional Accountants (IESs).

Practice Statements aim to assist IFAC member bodies in the implementation of generally accepted "good practice" in the education and development of professional accountants by providing advice or guidance on how to achieve "good practice" or current "best practice."

The proposed Practice Statement IEPS 2.1 assists member bodies to implement IES 2, *Content of Professional Accounting Education Programs*; IES 7, *Continuing Professional Development: a program of lifelong learning and continuing development of professional competence*; and IES 8, *Competence Requirements for Audit Professionals*. It provides more detail of the knowledge and competences required of professional accountants in the IT environment, to prepare them to use IT, work in the IT environment, and/or rely on IT.

IEPS 2.1 does not seek to prescribe the specific IT knowledge that specialists require to work in the IT environment. It sets out the knowledge and skills professional accountants require to ask questions of specialists such as the IT auditor, and to understand the outcome of the activities of such specialists.

Guide for Commentators

The IAESB would like to receive comments on all matters addressed in this proposed Practice Statement. Anyone offering comments should refer to specific paragraphs, include the reasons for the comments, and, where appropriate, make explicit suggestions for proposed changes to wording. The IAESB would also like to hear from respondents agreeing with the proposals in this exposure draft.

The IAESB is particularly interested in comments on the matters set out below:

1) IEPS 2.1 (formerly IEG 11) has been rewritten and updated. Is the document still helpful to member bodies in addressing the requirements of IES 2 and other International Education Standards? If you feel the document is not helpful, please explain in detail what needs to be addressed.

2) Do you consider that the updated lists of knowledge/skills areas, topic coverage, competences and competence elements contained in Appendices 1 to 6 are sufficiently comprehensive? Please explain.

3) IEPS 2.1 acknowledges that, in real work environments, member bodies may have had difficulty in requiring professional accountants to develop competence in one of the three specific roles (in addition to the user role) outlined in IES 2. In addressing this, IEPS 2.1 (paragraph 15) suggests that member bodies may wish to define other roles (e.g. an advanced user role). Is this a helpful concept?

INTERNATIONAL EDUCATION PRACTICE STATEMENT (IEPS) 2.1

INFORMATION TECHNOLOGY FOR PROFESSIONAL ACCOUNTANTS

CONTENTS

Introduction

1. International Education Practice Statements (IEPSs) assist in the implementation of generally accepted "good practice" in the education and development of professional accountants by providing advice or guidance on how to achieve "good practice" or current "best practice."

2. IEPSs may interpret, illustrate, elaborate, or expand on matters related to International Education Standards for Professional Accountants (IESs). In this function, they assist member bodies to implement and achieve "good practice" as prescribed in IESs. They may also recommend practice that is wider or deeper than the practice prescribed in IESs. Alternatively, they may outline commendable methods or practices, including those that are recognized as current "best practice," which member bodies may wish to adopt.

Purpose of this Practice Statement

3. Information technology (IT) is pervasive in business, requiring the professional accountant to be competent in this technology. IT encompasses hardware and software products, information systems operations and management processes, IT controls frameworks, and the human resources and skills required to develop, use and control these products and processes to generate the required information.

4. This IEPS assists member bodies to implement IES 2, *Content of Professional Accounting Education Programs,* IES 7, *Continuing Professional Development: a program of lifelong learning and continuing development of professional competence*, and IES 8, *Competence Requirements for Audit Professionals*. It provides more detail of the knowledge and competences required of professional accountants in the IT environment, to prepare them to (a) use IT, (b) work in the IT environment, and/or (c) rely on IT.

5. Competence is being able to perform a work role to a defined standard, with reference to real working environments. Individuals are expected to develop the appropriate IT competences required to qualify as professional accountants, and then to maintain these and develop further appropriate IT competences throughout their careers. This IEPS helps member bodies determine appropriate competences for their trainees and members.

6. This IEPS does not prescribe the specific IT knowledge that specialists require to work in the IT environment. It sets out the knowledge and skills professional accountants require (a) to formulate the precise questions to be answered by specialists such as the IT auditor, and (b) to understand the outcome of the activities of such specialists.

The Environment

7. Professional accountants often play important roles as managers, advisors and assurance providers in the adoption, deployment and use of various information technologies by organizations of all types and sizes.

8. Society expects professional accountants who accept an engagement or occupation to have the competence to perform the required work. The accountancy profession as a whole has the obligation to ensure that candidates seeking to qualify as professional accountants

possess the necessary IT competences; and, after qualifying, keep abreast of relevant developments through continuing professional development.

9. Changes in IT technologies are pervasive; they increasingly influence businesses as a whole, and business processes in particular. For example, the professional accountant needs to understand the procedures of both the IT and manual systems by which transactions are initiated, recorded, processed and reported, and how they interact and evolve.

10. The accountancy profession faces a number of challenges relating to IT:

-   Information technologies affect how organizations are structured, managed and operated. Entities can no longer develop business strategy separate from IT strategy, because IT is an enabler of business initiatives. There is therefore a need to integrate sound business and IT planning, and to incorporate effective financial and management controls within new systems. The traditional role of professional accountants: evaluating investments in business systems; evaluating business systems designs; and reporting on potential weaknesses within these initiatives, needs to be preserved and enhanced.

-   Information technologies are changing the nature and economics of accounting activity. The career plans of professional accountants, and their related training needs, need to be based on a realistic view of the changing nature of accounting and the profession's role, and the knowledge and skills required for success as a professional accountant. Some IT user skills are indispensable, and vary according to the specific environment in which the professional accountant operates. In accordance with IES 2, IFAC member bodies are required to ensure that candidates possess these IT skills before qualifying as professional accountants. In addition, an increasing number of professional accountants provide IT related advisory and evaluative services that can affect the reliability of business systems. It is therefore important that IFAC member bodies consider appropriate pre-qualification and post-qualification education requirements to support those professional accountants in providing IT related and evaluative related services.

11. These challenges have created many new opportunities for many professionals. Opportunities arise in areas such as information systems design, information systems management, and control and information systems evaluation. Professional accountants can, with more specialized training, work in these areas.

Scope of this Practice Statement

12. Professional accountants may perform various roles including:

    (a) The accountant as user of IT, for example:

    -   Financial manager;

    -   Financial controller;

    -   Tax practitioner;

    -   Insolvency practitioner; and

- Information analyst.

(b) The accountant as assurance provider and evaluator, for example:

- Internal financial or operational auditor;

- Evaluator of information systems; and

- Audit professional, as defined in IES 8.

(c) The accountant as manager of information systems, for example:

- Knowledge manager; and

- Data center manager.

(d) The accountant as designer of business systems (alone or as part of a team), for example:

- Designer of financial information systems (member of business systems design team or task force, producer of financial information, or analyst);

- Knowledge engineer; and

- External advisor/consultant.

This IEPS and the accompanying appendices explain the competences and knowledge relevant to each role.

13. The professional accountant may perform more than one of these roles during the same period or throughout his or her career. This IEPS does not presume that all professional accountants will carry out these roles sequentially.

14. In addition to the role as an IT user, all professional accountants are expected, as part of their pre-qualification education, to participate in at least one of the three other roles, as described in paragraph 12, or a combination of these roles, as described in paragraph 15.

15. In meeting specific needs, an IFAC member body may create other specific roles, e.g. an advanced user role within a narrow or specific domain. The knowledge and competences required for these specific roles may be drawn from the knowledge and competences required in this IEPS relating to the generic roles of user, designer, manager, and assurance provider, as appropriate. For example, the designing, building, maintaining and controlling of an advanced spreadsheet model may demonstrate the achievement of many of the required competences.

16. IFAC member bodies set the assessment standards for conceptual IT control and practical IT skills to be met (a) when qualifying as a professional accountant, and (b) to act as an audit professional. After qualification, all professional accountants are expected to develop and maintain these competences as appropriate.

17. Professional accountants acting as "assurance providers" relating to information systems provide assurance in conformity with the International Framework for Assurance Engagements developed by the International Auditing and Assurance Standards Board (IAASB).

18. At a minimum, the audit professional needs the IT knowledge and competences defined in IES 8. The audit professional can gain the necessary knowledge and competences before qualifying as a professional accountant, or as a specialization after qualifying.

General IT Skills

19. Professional tasks require both conceptual IT knowledge and practical IT skills. In considering IT competence requirements for professional accountants, it is important to emphasize the need for both the relevant conceptual IT knowledge and practical IT skills.

20. Although different environments will determine the specific IT competences and skills required of professional accountants, many aspects of IT are common to all professional accountants. It is possible and desirable to describe the broad elements of an educational background that all professional accountants can be expected to share.

21. Pre-qualification knowledge education generally aims at developing knowledge and comprehension in specified subjects. Practical skills include the abilities to apply that conceptual knowledge, analyze, synthesize, control and evaluate information. Education that focuses solely on conceptual material will not be sufficient for professional accountants in any work situation.

22. IES 2 requires all professional accountants to have at least a general level of knowledge of IT and IT control before qualification. That knowledge content is detailed in Appendices 1 (General IT Knowledge /Skills Areas) and 2 (General IT Control Knowledge/Skills Areas) of this IEPS. Key knowledge and skills areas, and topics, are shown in two columns, headed: "Broad knowledge/skill area" and "Main topic coverage." A third column, headed "Illustrative Subject Matter," lists possible subject matter that might be covered under each main topic. Knowledge of all the subject matter listed in this third column is not expected. Whatever their primary work situation or role, all professional accountants, will acquire at least some general and IT control knowledge related to business systems. Control is of central importance to all professional accountants and requires particular emphasis.

User Role IT Control Competences

23. Whatever the primary work situation or role, all professional accountants need to be familiar with a broad range of tasks and how to apply IT systems and tools to them.

24. Users of various information technologies employ information systems tools and techniques to help them or others meet their objectives. These objectives, and therefore the types and uses made of IT tools and techniques, can vary widely.

25. As users of IT, professional accountants are exposed to a wide array of information systems architectures, hardware, software, and methods of organizing data. Although no user could be an expert in all of these, professional accountants need to have certain fundamental competences.

26. All professional accountants are expected to demonstrate competence in some, but not all, of the user role IT control competences listed in Appendix 3, as relevant to the individual's working environment. The second column of Appendix 3 lists various competence

elements that could demonstrate each competence. Items on this list are provided for illustration only, and are not intended to be prescriptive.

27. For qualification as a professional accountant, the minimum expected level of competence for the user role is knowledge and understanding of the competence elements. This is evidenced by the ability to describe or explain the significance of the issues related to the listed competences in a relevant business setting, and to demonstrate proficiency in those competence elements.

Assurance Provider and Evaluator Role Competences

28. The role of the assurance provider and evaluator includes internal as well as external audit functions.

29. Professional accountants concentrating on the role of assurance provider and evaluator require the specific assurance provider and evaluator role control competences listed in Appendix 4. The second column of Appendix 4 lists various competence elements that could demonstrate each of these competences. Items in the second column are provided only for illustration, and are not intended to be prescriptive.

30. In addition, required competences for the role of assurance provider include the communication and interpersonal skills required to support interaction with top management, users, steering committees, and internal and external suppliers of information systems services.

31. For qualification as a professional accountant, the expected level of competence for the role of assurance provider is knowledge and understanding of (but not necessarily proficiency in) the competence elements. This is evidenced by the ability to describe or explain the significance of issues related to the listed competences in a relevant business setting. A candidate in this role is expected to be able to participate effectively in the activities listed in the second column of Appendix 4, as part of a team or under supervision. A higher degree of proficiency is likely to be required of an audit professional performing the role of IT assurance provider.

Manager Role Competences

32. Professional accountants are often involved in financial and management roles that bring them into contact with information systems. Although the growth of IT has created new professional specialisms, many professional accountants in small and medium-sized organizations often fulfill information systems management functions themselves.

33. In a management function more emphasis would be given to IT competences such as:

- the ability to evaluate effectiveness and efficiency of information systems; and

- the ability to assess the degree to which an information system meets the needs of users and serves the objectives of the entity.

34. As IT managers, professional accountants need to have a sound understanding of the business functions IT can fulfill and the IT related managerial processes.

35. Professional accountants who concentrate on the IT manager role require the specific manager role control competences listed in Appendix 5. The second column of Appendix 5 lists various competence elements that could demonstrate each of these competences. Items in the second column are provided for illustration only, and are not intended to be prescriptive.

36. In addition, required competences for the manager role include the communication and interpersonal skills required to support the manager's interactions with top management, users, steering committees, and internal and external suppliers of information systems services.

37. For qualification as a professional accountant, the expected level of competence for the role of manager is knowledge and understanding of (but not necessarily proficiency in) the competence elements. This is evidenced by the ability to describe or explain the significance of the issues related to the listed competences in a relevant business setting. A candidate in this role is expected to be able to participate effectively in the activities listed in Appendix 5 as part of a team or under supervision.

Designer Role Competences

38. Professional accountants, whether they are employees or external advisors, are often involved in designing financial systems. Their design activities will often emphasize (a) identifying user needs, (b) considering costs and benefits of proposed solutions, (c) appropriately selecting and combining hardware, pre-packaged software, essential control features and other systems components, and (d) effectively implementing and integrating acquired or developed systems with business processes.

39. In support of this role, the professional accountant needs specific and/or specialist knowledge. This includes knowledge of business processes and business systems behind these processes, and the capabilities of various information technologies to support organizational objectives.

40. Professional accountants who concentrate on the designer role require the specific designer role control competences listed in Appendix 6. The second column of Appendix 6 lists various competence elements that could demonstrate each of these competences. Items in the second column are provided for illustration only, and are not intended to be prescriptive.

41. In addition, required competences for the designer role include the communication and interpersonal skills required to support the designer's interactions with top management, users, steering committees, and internal and external suppliers of information systems services.

42. For qualification as a professional accountant, the expected level of competence for the role of designer role is knowledge and understanding of (but not necessarily proficiency in) the competence elements. This is evidenced by the ability to describe or explain the significance of the issues related to the listed competences in a relevant business setting. A candidate in this role is expected to be able to participate effectively in the activities listed in Appendix 6 as part of a team or under supervision.

Appendix 1

General IT Knowledge /Skills Areas

As noted in paragraph 22 of this IEPS, IES 2 requires all professional accountants to have at least a general knowledge of IT and IT control before qualification. The knowledge content required for the former is detailed in this appendix. Key knowledge and skills areas, and topics, are shown in two columns, headed: "General IT knowledge/skill area" and "Main topic coverage." A third column, headed "Illustrative Subject Matter," lists possible subject matter that might be covered under each main topic. Knowledge of all the subject matter listed in this third column is not expected.

The tables below are intended to assist member bodies in developing courses, modules and assessment tools for the various IT knowledge areas.

Subject area: Communication

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
Communication supported by IT	General concepts of communication	Web communication E-mail SMS Digital signatures Electronic files
	Risks in communication supported by IT	Privacy Secrecy Copying data from one client and using it for the benefit of another Use of USB sticks Forwarding data that is not checked for reliability
	Making IT beneficial to communication	Web searching Use of certificates with digital signatures Internet tools: e-mail, web browser, FTP

Subject area: Information Technology Architecture

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
General systems concepts	Nature and types of systems	General systems theory, systems objectives: • Open/closed systems • Well/ill-structured • Formal/informal Operational/tactical/strategic Transaction processing vs. operational vs. decision support
	Information systems architectures (components and relationships)	Subsystems, networks, client server, remote systems, distributed systems, mobile facilities, hardware (mainframe, server, router, workstation, etc.) Networks, telecommunication systems, electronic data transfer Software: systems software, application software, utilities: • Application development environment Data organization and access methods: • Files, tables, data bases, data base management systems Protocols, standards, enabling technologies IT professionals and career paths in IT organizations
	Control and feedback in systems	Objectives, measures, monitoring, feedback and follow-up
	Systems development life cycle	Systems acquisition/development phases, tasks: • Investigation and feasibility study • Requirements analysis and initial design • Detailed design specification/ documentation • Systems installation/ implementation • Maintenance • Project management
	Nature and types of information	Routine, exception, ad hoc, predictive Quantitative, qualitative Transaction documents, screens, reports, messages, etc. Data vs. information vs. knowledge
	Attributes of information	Quality, relevance, reliability, cost Completeness, accuracy, level of aggregation, timeliness, currency, frequency, accessibility, availability, authorization, authenticity, privacy, confidentiality, etc. Decision value, competitive advantage
	Role of information within business	Users: internal, external Monitoring, problem finding, action, decision support, etc. Decision theory Human information processing strengths, limitations Communication of information Reporting concepts and systems

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
	Types of business systems	Transaction Processing Systems (TPS) Production support systems Management Information Systems (MIS) Knowledge Management Systems (KMS) Executive Information Systems (EIS) Decision Support Systems (DSS) Expert Systems (ES), Neural Networks (NN)
Transaction processing in business systems	Transaction processing phases	Data entry Edit/validation Transmission File look-ups, calculations, logical comparisons Master file update Storage, record retention, back-up Accounting, control, management and reporting Query, audit trail, ad hoc reports Error prevention, detection, correction
	Processing modes	Batch processing Transaction processing On-line processing Real-time processing Distributed processing Multi-programming, multi-tasking and multi- processing
	Business documents, accounting records, data bases, control/ management reports	Revenue/receivables/receipts Purchases/payables/payments Inventories/cost of sales Fixed assets Production planning, scheduling and control Distribution management, logistics Project management Human resources and payroll Delivery of services Logistics Treasury Administration
Physical and hardware components of a system	Processing units	Personal //workstation/mini/mainframe/supercomputer Stand alone or multi-user/network Multi-processor vs. single processor Server, server farm Central processing unit (CPU), main memory, etc. Bus-lines, cables, integrated circuit cards, micro-code, registers, instruction sets, etc.
	Input/output devices	Keyboard, mouse, scanner, Radio Frequency Identification (RFI), text recognition, voice recognition, web cam, smart card, pen display , tape, disk, printer , bar code scanning, biometrics, etc. Control units, buffers, channels, etc.

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
	Data communication devices	Modem, switch, router, concentrator, bridge, monitor, etc. Wireless transmitter, receiver, Bluetooth, infrared devices etc.
	Physical storage devices	Data representation by computer, data compression Tape, disk, Compact Disk Read Only Memory (CD-ROM), Digital Video Discs (DVD), Storage Area Network (SAN), Network Attached Storage (NAS).
Networks, and electronic data transfer	Network components, configurations and designs	Local area networks/wide area networks Wireless/mobile systems Distributed processing networks Data transmission options, public and private carrier services, etc. Data communication and transmission devices/software
Software	Components of a software configuration	Distinction between systems and application software Workflow managers, middleware and other utilities Software designs for various processors Open vs. proprietary systems
	Operating systems	Graphical user interfaces Network, client/server, etc. Single user vs. multi-user Process management Memory and file systems management
	Communications systems	Terminal monitors, network directories, etc. Communication protocols
	Security software	Authentication and access control software Anti-virus software Firewall Intrusion detection Security assessment tools
	Utility software	Text editor, directory manager, file backup/recovery, file compression, etc. Performance monitoring software, scheduling software, etc.
	Programming languages/ compilers	Program control structures Open source, testing during application development, application development techniques such as RAPID Program specification, verification and validation Machine code/assembly languages Procedural vs. non-procedural languages Language evaluation and selection approaches Object-oriented languages, multimedia authoring systems, etc.
	Programming aids, interactive programming software	Application development environment CASE tools and programming environment UML (Unified Modeling Language) Methods of program design and development

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
		Testing and documentation
	Library management systems	Version control, migration, etc.
	Data management systems	Tape/disk management systems Hardcopy/microfiche/optical imaging On-line, archival Report generators and data retrieval software Data base management systems
	General application software	Distinction from systems software Competitive advantage Piecemeal vs. organization-wide development/ integration Package vs. custom software Distributed vs. centralized processing End-user computing Internet/intranet/extranet applications
	E-business enabling software	Supply Chain Management (SCM) Customer Relationship Management (CRM) Sales Force Automation (SFA) Human resources management Asset management Enterprise Resource Planning (ERP) Manufacturing (CAD/CAM, CIM) Distribution, logistics Enterprise Application Integration (EAI): • Electronic commerce systems • Brochure, catalog, exchange • Order entry (shopping cart), payment processing, fulfillment Knowledge management systems: • Knowledge creation, capture, sharing, maintenance Financial Reporting, XBRL
Protocols, standards, enabling technologies	Common standards	Seven-layer OSI Reference Model: • Physical, Data Link, Network, Transport, Session, Presentation, Application Common Object Request Broker Architecture (CORBA) Electronic data interchange (EDI) Transmission control protocol / Internet protocol (TCP/IP) Wireless application protocol (WAP)
	Internet protocols	Packet switching Uniform Resource Locator (URL) Domain Name Server (DNS) File Transfer Protocol (FTP) Hypertext Transfer Protocol (HTTP) Hypertext Markup Language (HTML) Extensible Markup Language (XML)

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
		Extensible Business Reporting Language (XBRL) Internet Relay Chat Protocol (IRC)
	Standard-setting organizations	Institute of Electrical and Electronic Engineers (IEEE) International Organization for Standardization (ISO) Open Systems Interconnections (OSI) American National Standards Institute (ANSI) World Wide Web Consortium (W3C) Project Management Institute (PMI) Software Engineering Institute (SEI) International Federation of Accountants (IFAC) XBRL International
Data organization and access methods	Data structures and file organization	Data coding: characters, records, files, multi-media Precision of data Data relationships: one-to-one, one-to-many, many-to-many Conceptual data modeling Normalization of data Logical vs. physical Entity-relationship diagramming Referential integrity Table structure vs. user interface Distributed structures
	Access methods	Sequential access Direct (random) access Indexed sequential access
	Types of data files	Master/transactions/tables Array, list, stack, queue, tree, index Database: Relational, Network, Hierarchical, Object-oriented Benefits of using a database
	Data base management systems features, functions, architectures	Data storage, access, and sharing Roll back / journaling Performance tuning and metrics Stored procedures
	Data base administration	Defining/ documenting data base requirements File layout/ schema/ data dictionary Model data bases, distributed systems
	Document management	Capture, index, store, retrieve, display/print Optical imaging systems
IT professionals and career paths in IT organizations	Job functions	Chief Information Officer (CIO) Business analyst Systems analyst Programmer Operations manager and staff Data base administrator / data administrator Knowledge base administrator / knowledge administrator

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
		/ knowledge engineer Security officer Network controller Librarian Webmaster, web designer Quality assurance roles
	Recruiting/ developing IT human resources	Training and development Sourcing Career paths
	Organization	Organization structure Relationships of the IT department IT governance

Subject area: Systems acquisition / development process

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
Systems acquisition/development life cycle phases, tasks	Approaches	Waterfall, spiral, interactive, prototyping Effect of new development techniques and management theories on formal systems development life cycle
	Acquisition/development phases	Investigation and feasibility study Requirements analysis and initial design Detailed design specification/ documentation Systems installation/ implementation Maintenance
	Standards, methods and controls	Documentation requirements Main risks and reasons for failure of systems projects economic, technical, operational, behavioral
Investigation and feasibility study	Investigation	Analysis of existing systems; business process integration; business process re-engineering Scope of proposed systems and information needs, technology options Nature and size of business
	Feasibility study	Cost/benefit analysis Statement of application requirements Feasibility analysis
Requirements analysis and initial design	User requirements elicitation	Processing modes User interface: screen, report, form layouts Data bases/files/records Integration with existing applications and systems Volume, scalability, extensibility requirements
	Systems analysis/design tools and techniques	Structured analysis and design methodologies Questionnaires, interviews, document analysis, observation Data flow diagrams; entity-relationship modeling, etc.

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
		Decision tables and decision trees Computer Aided Software Engineering (CASE) tools Unified Modeling Language (UML) Object methods
	Process design, data organization, software requirements	Application architecture Technical architecture Infrastructure requirements: facilities, hardware, network
	Control requirements	Availability, security/privacy, integrity, maintainability
Systems design, selection, acquisition/development	Infrastructure and software services	Selection of hardware, facilities, networks Selection of software packages Selection of vendor/ supplier/ service providers Service level agreements Escrow agreements Contracting/leasing/licensing considerations
	Software development	Application development environment (programming languages/compilers, etc.) Programming aids: Structured, event driven, object-oriented approaches
	Systems design	User interface: screen and report design Data base/file design; systems and data base integration Audit trail; transaction flows Interfaces Systems and network transaction load requirements Computerized and user controls Acceptance testing approach
	Documentation	Statement of technical requirements User and operations manuals
Systems implementation	Systems implementation plan	Change management requirements User training User acceptance Systems roll-out Data conversion Risk management Operation and recovery procedures Documentation
	Install/deploy systems	Install/deploy components: infrastructure, software User/operator procedures and controls Recruit/train personnel
	Acceptance testing	Acceptance testing approach: • Identify resources required • Develop high level testing scenarios • Relate to functional and technical / architectural requirements Tools and support: • Automated test tools

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
		• Test environment • Support Test scripts and related data Quality assurance/pre-implementation review
	Systems conversion/ changeover	Data transformation requirements Automated / manual Operational considerations (pilot, parallel running and going live) Timing consideration Tests Risk management Resources required: • Data transformation tools • Conversion environment • Support Tests to ensure data is complete, accurate and authorized
	Post-implementation review	Meets business requirements Impact on users, management and staff Project schedule and resources (financial and people) consumed Benefits realized Opportunities for improvement
Systems maintenance and program changes	Maintenance standards	Infrastructure Software Personnel competences Information architecture Business processes Version management Implementation controls Authorization controls Documentation standards and controls Migration planning
	Change controls	Custody; change authorization Emergency change controls Testing and quality assurance
Project management, project planning, project control methods and standards	Initiate the project	Project sponsorship and funding Stakeholders Terms of reference Apply project management tools and techniques
	Plan the project	Scope, objectives and deliverables Strategy to achieve objectives and deliverables Project schedule, including sequence of tasks and milestones Resources and budgets Quality standards that will be used to evaluate the project Communication needs of all project stakeholders

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General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
		Goods and / or services that will be required to complete the project
	Risk management approach on the project	Project management risk Business risk
	Execute the project plan	Ensure: Goods and services are selected and contracted, as required Quality standards are understood Staff are properly trained and managed Defined communication strategy
	Control the project	Control and coordinate changes across the project Manage the project budget Ensure results meet quality standards and identify methods to rectify any problems noted Report project performance and revised schedule, as necessary Ensure effective risk management Monitor risk mitigation Identify new risks and change plan accordingly Issue identification, escalation and resolution process
	Complete the project	Stakeholder communication and sign-off Open items Post-implementation review

Subject area: Management of Information Technology

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
IT Organization	IT policies, procedures and methodologies	Process to create and amend IT organization Process to maintain documentation Alignment with entity's strategic plan IT organization to address: • Infrastructure, software, people, procedures, data
	IT human resource policies	Skills assessment Performance evaluation Job descriptions Training and certifications Recruitment and retention
Management of IT operations, effectiveness, and efficiency	Resources management processes used to maintain organizational efficiencies	Resource procurement Ongoing support procedures Maintenance of updates and upgrades
	Relationship of infrastructure to applications and user requirements	Developing operational priorities Compatibility of components Planning IT capacity Impact of IT on procedures

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
		Data/information architecture IT infrastructure (hardware, facilities, networks) software (systems, applications, utilities)
	Monitoring service provider activities	Performance measurement (productivity, service quality) Service level agreement monitoring Collaborative computing Distributed systems EDI and electronic commerce Outsourced services (ISPs, ASPs, etc.)
Asset management	Asset life cycle	Acquisition Change Retirement
	Asset management and control	IT inventory Contracts and licenses and intellectual property issues Data ownership, reliability and privacy issues Cross-border transportation and storage of data Service provider documentation Privacy User documentation, on-going training and end-user support
Change control and problem management	Segregation of environments	Three environments: • Development • Test • Production Transport mechanisms Acceptation processes Authorization procedures Monitoring and logging
	Change control techniques	Impact analysis Authorization Internal control Testing / Feedback Documentation Human resources, including training Approval Migration plans Release management
	Problem management	Integration with change control management Help / Service desk support systems Problem resolution / escalation procedures Routing and assignment of problems Problem analysis and trend analysis
	Management of end-user computing	Technology diffusion Information centre, help desk End-user systems security Support for end-user applications

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
Security management	Facilities	Data centers, outsourced facilities Storage, media libraries, backup vaults Uninterruptible power source (UPS) Disaster recovery sites
	Physical security	Threats Impact analysis Contingency planning Physical access Continuity
	Logical security	User identification / passwords Authentication / authorization Logical access path Security packages Password management / password change procedures Firewalls
Performance monitoring and financial control over IT resources	Performance metrics	Defined Monitored Measured and compared to standards and reported
	IT cost controls	Capital budget Time/expense tracking Accounting for systems costs Costs identifiable and measurable Costing procedures defined and implemented Billing and chargeback procedures to user departments
	IT control objectives	Effectiveness, efficiency, economy of operations Reliability of financial reporting Effectiveness of controls (design, operation) IT asset safeguarding Compliance with applicable laws and regulations Systems reliability: • Availability and continuity (back-up, recovery) • Access controls (physical, logical) • Privacy, confidentiality • Processing integrity (completeness, accuracy, timeliness, authorization) Data integrity
Software for professional use	Office software	Presentation software Internet tools: e-mail, web browser Word processor Spreadsheets Data base management systems
	Computer-assisted audit techniques	Accounting packages and CAATs Professional research tools Analytical tools Pattern matching / recognition

Subject area: Information Technology Strategy

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
Enterprise strategy and vision	Internal and external business issues	Business focus of the entity Position of the entity within its industry Relationship of IT strategy and business strategy Operational dynamics that influence the business Business processes as they relate to the strategic plan
	Factors that impact IT	Flexibility of changes in technology or business Speed to market Legal, regulatory and assurance Business units (customers, markets, industries) Budgets Service level and operational requirements: availability, scalability, security, integrity, extensibility, maintainability, manageability
Assess current and future IT environment	Current status of entity's use of IT to support business processes	Infrastructure Software People Procedures and controls Knowledge Data
	IT risks and opportunities	Trends, issues concerns in current environment Business and IT alignment Compliance with service level agreements / targets Capacity and performance capabilities Stakeholder attitudes
IT strategic planning	Envision future status of the entity's systems	Communicating with stakeholders Sourcing strategy Critical success factors, appropriate measurements
	Align future IT strategy with business strategy	IT management's goals and objectives Overall feasibility and scope Business constraints (quality, time, cost) Action plans, timelines, transition elements Sponsor and stakeholder approval
Ongoing governance and outcome monitoring process	Framework for IT governance	Control environment / culture Risk assessment Policies and procedures Information and communication Monitoring of controls and risks
	Outcome measurement	Cost-effectiveness of IT processes Utilization of IT infrastructure Satisfaction of stakeholders Staff productivity Sharing of knowledge and information Linkages between IT and enterprise governance

Subject area: Business Process enablers

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
Stakeholders and their requirements	Monitoring service level performance against service level agreements	Quality of service Availability Response time Security and controls Processing integrity Privacy Remedies Amending service level agreements
The entity's business models	Business models	Revenue Distribution Supply Market Organization Legal and regulatory issues
	Effectiveness of the entity's individual business processes	Revenue/receivables/receipts Purchases/payables/payments Inventories/cost of sales Fixed assets Production planning, scheduling and control Distribution management, logistics Human resources and payroll Delivery of services Logistics Treasury Administration
	Framework of controls	Relation between user controls, application controls and IT general controls
Risks and opportunities	Barriers and enablers	Technology Alignment of business processes and IT with business strategy Business Process Re-engineering (BPR) Organizational structure and culture Leadership Human resources Capital Legal and Regulatory
Impact of IT on the entity's business models, processes and solutions	Applications of internet-commerce	Internet-commerce issues and trends Business to Business (B2B) • Exchange, Portal, Public / private exchange, EDI, • Credit authorization, Wire lines (ACH, EFT) Business to Consumer (B2C) Consumer to Consumer (C2C) Business to Employee (B2E) Distance learning; distributed learning Electronic government
	Enterprise systems	Supply Chain Management (SCM)

General IT knowledge/skills area	Main topic coverage	Illustrative subject matter only
		Customer Relationship Management (CRM) Sales Force Automation (SFA) Human resources management Asset management Enterprise Resource Planning (ERP) Manufacturing (CAD/CAM, CIM) Distribution, logistics Enterprise Application Integration (EAI): • Electronic commerce systems • Brochure, catalog, exchange • Order entry (shopping cart), payment processing, fulfillment Knowledge management systems: • Knowledge creation, capture, sharing, maintenance Financial Reporting, XBRL

<div align="right">**Appendix 2**</div>

General IT Control Knowledge/Skills Areas

As noted in paragraph 22 of this IEPS, IES 2 requires all professional accountants to have at least a general knowledge of IT and IT control before qualification. The knowledge content required for the latter is detailed in this appendix. Key knowledge and skills areas, and topics, are shown in two columns, headed: "General IT Control knowledge/skill area" and "Main topic coverage." A third column, headed "Illustrative Subject Matter," lists possible subject matter that might be covered under each main topic. Knowledge of all the subject matter listed in this third column is not expected.

The tables below are intended to assist member bodies in developing courses, modules and assessment tools for the various IT knowledge areas.

General IT Control knowledge/skills areas	Main topic coverage	Illustrative subject matter only
Internal IT control environment	IT risk management philosophy	Beliefs and attitudes IT risk strategy Policy statements, oral and written communications and decision making reflecting the philosophy Error, fraud, vandalism/abuse, business interruption, competitive disadvantage, excessive cost, deficient revenues, statutory sanctions, social costs Regulatory environment
	IT risk tolerance	Acceptability of IT risk level Relation IT risk/entity risk/corporate risk/social risk Qualitative / quantitative risk approach strategies
	IT oversight	IT governance Level of IT oversight in the organization Knowledge of IT in the oversight board Pro-active IT risk detection systems
	Integrity, ethical values, and competence of the IT personnel	Corporate IT social responsibility systems and reports Corporate IT data integrity policy statements Organization structure of IT functions IT corporate governance processes and reports
	Authority and responsibility, organization and development	Segregation of IT functions Authority structure Responsibility IT control structure: • Board, top management • IT management and IT personnel • User departments, individuals • Auditors
Setting IT objectives	IT strategic objectives	Mission/Vision/Purpose Relation entity strategy objectives/IT strategy objectives IT goals/measurements
	IT objectives	IT operations objectives: effectiveness and efficiency of

General IT Control knowledge/skills areas	Main topic coverage	Illustrative subject matter only
		the IT operations IT reporting objectives: accurate and complete management information for IT purpose IT compliance objectives: conduct IT activities in accordance with relevant laws and regulations
	Overlap of IT objectives	Integrated framework of entities objectives
	Selection of IT objectives	Relation with IT risk management philosophy Relation with IT risk appetite IT risk tolerance, acceptability of different levels
Identifying IT risk events	IT risk factors	External factors: • Economic • Natural environment • Political • Social • Technological Internal factors: • Infrastructure • Personnel • Process • Technology
	IT event identification techniques	IT event inventories IT internal analysis Escalation or threshold triggers Facilitated workshops and interviews Process flow analysis Leading event indicators Loss event data methodologies
Conducting IT risk assessments	IT risk categories	Inherent IT risk Residual IT risk Likelihood and impact Data sources Economic, technical, operational, behavioral Main reasons for failure of computer projects Error, fraud, vandalism/abuse, business interruption, competitive disadvantage, excessive cost, deficient revenues, statutory sanctions, social costs,
	Assessment techniques	Benchmarking Probabilistic models Non-probabilistic models Relations between events
Establishing IT risk response	Response categories	Avoidance Reduction Sharing Acceptance
	Possible responses	Effect on IT risk likelihood and Impact

General IT Control knowledge/skills areas	Main topic coverage	Illustrative subject matter only
		Assessing cost versus benefit Opportunities in IT response options
Conducting IT control activities	IT control frameworks	COBIT, ITCG, SysTrust, WebTrust, OECD, BS7799, etc
	IT control objectives	Effectiveness, efficiency, economy of operations: • Cost effectiveness of control procedures Reliability of financial reporting: • Relevance • Reliability • Comparability/consistency Effectiveness of controls (designing, implementing and operating): • At a point in time • During a period of time IT asset safeguarding: • Evaluation of facilities management • IT asset safeguarding Compliance with applicable laws and regulations: • Prevention/detection of fraud, error and illegal acts • Privacy • Confidentiality • Copyright issues Systems reliability: • Availability and continuity (back-up, recovery) • Access controls (physical, logical) • Processing integrity (completeness, accuracy, timeliness, authorization) • Maintainability Data integrity: • Comparability • Authorization • Auditability • Input/output • Reception/distribution controls
	Types of control activities	IT top-level reviews Direct IT functional or IT activity management Information processing Manual controls IT performance indicators Segregation of IT duties and functions
	Controls over information systems	Control design : • Objectives, framework, environment, activities, monitoring • Legal, ethical, professional standards/requirements • Preventive/detective/corrective strategies • Effect of control environment (personnel management methods) • Preventive application controls

General IT Control knowledge/skills areas	Main topic coverage	Illustrative subject matter only

		• Detective application controls
		• Contingency plans, insurance
		Control procedures:
		• Authorization
		• Separation of incompatible functions (organizational design, user identification, data classification, user/function/data authorization matrix, user authentication)
		• Adequate documents and records
		• Asset safeguards
		• Limitation of access to assets
		• Independent checks on performance;
		• Verification of accounting records,
		• Comparison of accounting records with assets
		• Computer-dependent controls (edit, validation, etc.)
		• User controls (control balancing, manual follow-up, etc.)
		• Audit trails
		• Error identification/investigation /correction/tracking
		Control over data integrity, privacy and security:
		• Understanding of data protection legislation
		• Consideration of personnel issues and confidentiality
		• Classification of information
		• Access management controls
		• Physical design and access controls
		• Logical access controls (user authorization matrix)
		• Network security (encryption, firewalls)
		• Program security techniques
		• Data security techniques
		• Monitoring and surveillance techniques
		Availability/continuity of processing, disaster recovery planning and control:
		• Threat and risk management
		• Software and data backup techniques (problems of on-line systems, etc.)
		• Alternate processing facility arrangements
		• Disaster recovery procedural plan, documentation
		• Integration with business continuity plans
		• Periodic tests of recovery procedures
		• Insurance/Escrow
		IS processing/operations:
		• Planning and scheduling; service levels; risks
		Standards
		     • Infrastructure (hardware, facilities, networks)
		     • Software
		     • Human resources (skill sets and staffing levels)

General IT Control knowledge/skills areas	Main topic coverage	Illustrative subject matter only

		• Business processes
		• Performance monitoring
		    • Costs/benefits (quantitative and qualitative impact on management, jobs and office procedures)
		    • Business drivers that impact IT (e.g., scalability, right-sizing flexibility of changes in technology or business, speed to market, cross-platform capability)
		• Control over productivity and service quality
		• Software/data library management
		• Input/output distribution and control
		• Security and back up and recovery

	Systems acquisition/ development process	Investigation and feasibility study: • Steering Committee • Cost/benefit analysis • Risk assessment Requirements analysis and initial design: • Control requirements Detailed design specification/ documentation: • Controls Implementation: • System installation/ implementation • Acceptance testing • Conversion/changeover • Quality assurance • Post-implementation review Systems maintenance and change: • Maintenance of hardware and software • Change authorization, logging and testing • Systems documentation and operations manuals • Personnel training and development Project management/ planning/control methods and standards: • Project phases, tasks and controls • Project characteristics and risks • Project staffing • Project scheduling • Expense budget • Documentation requirements
Information and communication in relation to IT	Information	IT strategic and integrated systems Integration with IT operations Depth and timeliness of IT information IT information quality People, procedures, data, software, infrastructure Key processes • Identification and recording of all valid transactions • Proper/timely classification of transactions

General IT Control knowledge/skills areas	Main topic coverage	Illustrative subject matter only
		• Appropriate measurement/valuation • Appropriate timing/cut-off • Appropriate presentation
	Communication	Business practices, codes of conduct, policy manuals, memos, etc. Documentation of systems, operations, user responsibilities, Reporting relationships Training, supervision
Monitoring in relation to IT	Ongoing monitoring activities	Management Regulators
	Separate evaluation	Systems analysis and documentation (e.g., flowcharting packages, review of program logic, etc.) Systems/program testing (e.g., test data, integrated test facility, parallel simulation, etc.) Data integrity testing (e.g., generalized audit software, utilities, custom programs, sampling routines, etc.) Problem solving aids (e.g., spreadsheet, database, on-line data bases, etc.) Administrative aids (e.g., word processing, audit program generations, work paper generators, etc.)

<div align="right">**Appendix 3**</div>

User Role IT Control Competences

All professional accountants are expected to demonstrate competence in some, but not all, of the competences outlined in this appendix. The specific areas of competence required will depend on the individual's working environment.

This appendix lists various competence elements (or tasks) that could be used to demonstrate each competence. They are provided for illustrative purposes only and are not intended to be prescriptive.

Competences	Possible elements to demonstrate competence
Select suitable control criteria to analyze and evaluate controls	Identify relevant IT control framework to apply to the analysis and evaluation of internal control
	Identify relevant IT control objectives to apply to the analysis and evaluation of internal control
	Identify relevant layers of control to be included in the analysis and evaluation
	Identify areas of responsibility for identified control objectives
Evaluate the internal IT control environment	Understand external regulatory controls
	Analyze and evaluate effectiveness of board of directors or audit committee participation
	Analyze and evaluate effectiveness of management philosophy and operating style
	Analyze and evaluate the effectiveness of organizational structures
	Analyze and evaluate the effectiveness of assignment of authority and responsibility
	Analyze and evaluate the effectiveness of management control methods
	Analyze and evaluate the effectiveness of human resource policies and practices
	Analyze and evaluate the effectiveness of financial policies and practices
Evaluate the selected IT objectives	Analyze and evaluate IT strategic objectives
	Analyze and evaluate IT objectives
	Analyze and evaluate overlap of IT objectives
	Analyze and evaluate selection of IT objectives
Evaluate the identified IT events	Analyze and evaluate IT driving events factors
	Analyze and evaluate IT event identification techniques
Evaluate IT risk assessment	Analyze and evaluate process for identifying the entity's exposures to risks
	Analyze and evaluate process for estimating probability of loss
	Analyze and evaluate process for estimating monetary and non-monetary consequences
	Analyze and evaluate process for developing cost-effective preventive/detective/corrective strategies to address risks
Evaluate the selected IT risk responses	Analyze and evaluate effectiveness of response categories
	Analyze and evaluate effectiveness of possible responses
Evaluate the IT control	Analyze and evaluate IT control frameworks

Competences	Possible elements to demonstrate competence
activities	Analyze and evaluate effectiveness of design and operation of entity's information processing and communication activities in support of organizational objectives
	Analyze and evaluate effectiveness of controls over data integrity, privacy and security
	Analyze and evaluate effectiveness of controls over completeness, accuracy, timeliness and authorization of systems processing
	Analyze and evaluate effectiveness of controls over systems availability, continuity of business processing and disaster recovery planning
	Analyze and evaluate effectiveness of systems acquisition/development methodology, including make/buy criteria
	Analyze and evaluate effectiveness of standards for systems development project management and control
	Analyze and evaluate compliance with standards for systems investigation and feasibility study
	Analyze and evaluate compliance with standards for determination of user requirements and initial systems design
	Analyze and evaluate compliance with standards for systems design, selection, acquisition/development
	Analyze and evaluate compliance with standards for systems implementation, including systems testing, training, data conversion and quality assurance
	Analyze and evaluate compliance with standards for systems maintenance and change management
Evaluate the information and communication in relation to IT	Analyze and evaluate information processes
	Analyze and evaluate communication processes
Evaluate the monitoring process and taken actions in relation to IT	Analyze and evaluate internal monitoring processes, including their effectiveness in leading to changes in controls or control environment
	Analyze and evaluate performance review process
	Analyze and evaluate process for addressing non-compliance or deterioration in compliance identified by monitoring activities of management, users, internal auditors, external auditors
	Apply appropriate computer-assisted audit techniques to analyze and evaluate monitoring processes and activities.
Apply appropriate IT systems/tools to business/ accounting problems	Apply operating systems
	Apply word processing software in a relevant accounting/business context
	Apply spreadsheet software in a relevant accounting/business context
	Apply database software in a relevant accounting/business context
	Apply Internet tools (E-mail, Web Browser, FTP, Other) software in a relevant accounting/business context
	Apply professional research tools in a relevant accounting/business context
	Apply business presentation software in a relevant accounting/business context
	Apply anti-virus and other security software in a relevant accounting/business context
	Apply utility software and other relevant software in a relevant accounting/business context

Competences	Possible elements to demonstrate competence
Demonstrate understanding of business and accounting systems	Demonstrate understanding of accounting packages
	Demonstrate understanding of e-business systems (ERP, CRM, and other business automation systems)
	Demonstrate understanding of networks (LAN)
	Demonstrate understanding of electronic commerce features (B2C and B2B models, encryption tools, digital signatures/certificates, key management)
Apply controls to personal systems	Ensure processing integrity of IT resources
	Ensure security and safeguarding of IT resources
	Ensure availability/continuity provisions (back-up and recovery) for IT resources

Appendix 4

Assurance Provider and Evaluator Role Competences

This appendix lists various competence elements (or tasks) that could be used to demonstrate each competence. They are provided for illustrative purposes only and are not intended to be prescriptive.

Competences	Possible elements to demonstrate competence
Plan systems evaluation	Identify IT assurance service requirement or opportunity
	Analyze/evaluate and advise on entity's IT assurance needs based on legal, ethical, professional standards and other requirements and best practices
	Identify nature of particular IT assurance engagement or project and standards and other requirements governing the engagement
	Analyze and decide whether to accept the IT assurance engagement or project
	Define the scope of the IT assurance engagement or project
	Identify, analyze and evaluate risk factors and business issues affecting the IT assurance engagement or project and their implications
	Define level/frequency of systems errors, flaws and failures that are deemed significant/material
	Design effective and efficient verification procedures, to meet evaluation objectives while complying with professional standards
	Assign and schedule staff with appropriate IT skills, including IT specialist personnel, to perform the IT assurance engagement or project
	Decision on audit strategy Use of CAATs Develop audit plan
Evaluate systems	Collaborate with colleagues, client and others, including IT specialist personnel
	Perform planned procedures, exercising required controls over their execution
	Evaluate general IT controls, application control
	Evaluate relations between user controls / application controls / IT general controls
	Adjust planned procedures for changes in circumstances
	Document procedures and their findings
	Analyze and evaluate evidence/results of procedures
	Perform supervision, review and quality assurance procedures
Communicate results of evaluations and follow-up	Prepare appropriate type of communication, including verbal communication, "seal" or printed report
	Present communication verbally, electronically or in printed format to client or other intended recipients
	Update communication as frequently as required (e.g., refresh the "seal" or report posted on a web site)
	Follow up as required

<div align="right">**Appendix 5**</div>

Manager Role Competences

This appendix lists various competence elements (or tasks) that could be used to demonstrate each competence. They are provided for illustrative purposes only and are not intended to be prescriptive.

Competences	Possible elements to demonstrate competence
Manage entity's IT strategy	Understand enterprise strategy and business issues and related IT risks and opportunities
	Develop an IT strategic plan to support the entity's business plan
	Align/integrate IT strategic plan with entity's business/program objectives and success factors
	Translate strategic business/program objectives into operating principles for IT planning
	Facilitate business process enablement through the use of IT
Manage IT organization	Define job functions and responsibilities of the IT department
	Define organization chart/reporting relationships of the IT department
	Define and implement processes for recruiting, staffing, personnel development and performance evaluation
Manage IT operations' effectiveness and efficiency	Measure, analyze and evaluate the consistency and compatibility of systems components
	Analyze, evaluate and plan IT capacity
	Analyze and evaluate impact of IT on management, jobs and office procedures
	Define/maintain data/information architecture
	Acquire/develop/maintain responsive IT infrastructure (hardware, facilities, communication networks)
	Acquire/develop/maintain software (systems, applications, utilities)
	Plan and schedule systems operations priorities and allocate resources
	Measure, analyze and evaluate IS effectiveness and productivity enhancement
	Measure, analyze and evaluate IT function performance, productivity and service quality, quality assurance processes, continuous improvement
	Monitor outsourced services (ISPs, ASPs, etc.) and inter-organizational computing such as EDI and e-commerce services
Maintain financial control over IT	Develop capital budget
	Account for systems costs
	Implement systems for tracking costs
	Monitor expenses
Manage IT controls	Implement physical and logical safeguards for hardware, facilities, software and information
	Implement systems and data security (i.e., physical, logical/electronic access controls)
	Implement systems availability and business continuity controls (back-up/recovery, disaster planning)
	Implement systems processing integrity (i.e., completeness, accuracy, timeliness and

Competences	Possible elements to demonstrate competence
	authorization) controls
	Implement data integrity, privacy and confidentiality controls
Manage systems acquisition, development and implementation	Identify and evaluate appropriate development/ acquisition alternatives such as in-house/ outsourcing
	Implement and monitor systems acquisition/ development and implementation standards
	Determine and provide systems project staffing requirements and budgets
	Implement project management processes to manage and monitor systems projects
	Use appropriate methodologies to identify, analyze, evaluate and select appropriate supplier(s) and system(s)
	Manage expectations by communicating systems acquisition/development plans and status to users, top management/steering committee
Manage systems change and problem management	Manage technology diffusion
	Implement and manage information centre, help desk
	Implement and monitor standards and controls applicable to IS maintenance activities
	Implement and monitor version management
	Manage custody of systems, change authorization
	Implement and monitor process for migrating systems from legacy to state of the art
	Implement and monitor emergency change controls
	Implement and monitor testing and quality assurance for all systems changes

Appendix 6

Designer Role Competences

This appendix lists various competence elements (or tasks) that could be used to demonstrate each competence. They are provided for illustrative purposes only and are not intended to be prescriptive.

Competences	Possible elements to demonstrate competence
Analyze and evaluate the role of information in the entity's business processes and organization	Facilitate the development of the entity's strategic vision for IT
	Identify stakeholders and their requirements
	Assess the business impact of entity's strategic vision for IT on the entity, its customers, suppliers and employees
	Facilitate communication between users, technologists and management
	Analyze, evaluate and design information architecture (i.e., role of data bases and data base management systems including knowledge management systems, data warehouses)
	Analyze, evaluate and design entity's business processes
	Analyze framework of controls Analyze relations between user controls / application controls / general IT controls
	Analyze, evaluate and design entity's systems development life cycle (SDLC) phases, tasks
	Analyze and evaluate systems risks and opportunities
	Analyze, evaluate and design controls
Apply project management methods	Analyze and evaluate project characteristics and risks
	Organize project into phases and tasks corresponding to relevant stages of the systems development life cycle
	Identify appropriate staff and other resources and assign to project phases and tasks
	Assign time, expense and other resource budgets to project phases and tasks
	Apply appropriate standards and controls to the project phases and tasks
	Identify required project documentation and assign responsibility for its preparation
	Monitor project activities for compliance with budgets, standards, controls and documentation requirements and take corrective action when required
Apply systems investigation, project initiation methods	Perform systems investigation
	Identify business process integration/re-engineering opportunities
	Research relevant technology options
	Prepare feasibility study and evaluate project risks
Apply user requirements determination and initial design methods	Apply information requirements elicitation methods
	Document information requirements (including control requirements)
	Facilitate communication of information requirements between team members, users, management
	Analyze requirements and perform initial design (including controls)
Apply detailed systems design, acquisition/ development methods	Prepare and document detailed design specifications
	Evaluate and acquire infrastructure
	Evaluate and acquire/develop required systems, application and utility software

Competences	Possible elements to demonstrate competence
	Select suppliers and service providers
	Prepare hardware contracts, facilities leases, software licenses, network service level agreements in consultation with legal advisors
	Prepare documentation and operations manuals
Apply systems implementation methods	Prepare implementation plan
	Supervise installation/deployment of systems components
	Develop user/operator procedures and controls and recruit, train personnel
	Test (verify and validate) systems against specifications and requirements
	Convert systems, balance pre-post data, and start-up
	Perform post-implementation review
Apply systems maintenance and change management methods	Maintain IT infrastructure
	Maintain software; control versions
	Test all systems changes
	Maintain personnel competences through hiring, training
	Maintain IT standards and controls
	Maintain information architecture
	Maintain business processes