International Accounting Education Standards Board
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Committee:	International Accounting Education Standards Board (IAESB)
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Subject:	**Information and Communications Technologies Project Issues Paper – Development of Non-Authoritative Implementation Guidance: Detailed Learning Outcomes Relating to Information and Communications Technologies (04/19)**

IMPLEMENTATION SUPPORT MATERIALS

NON-AUTHORITATIVE DETAILED LEARNING OUTCOMES FOR INFORMATION AND COMMUNICATIONS TECHNOLOGIES

This non-authoritative document supports users of IES 2, 3, 4 and 8. It is grounded in the Learning Outcomes approach which "embodies the idea that learning and development experiences are most effective when based on what the individual needs to demonstrate"[i] and aims to illustrate how International Education Standards (IESs) may be implemented in an ICT environment. Linked to the IESs, Non-authoritative Detailed Learning Outcomes ("NDLOs) provide users with an opportunity to reference how a principles-based learning outcome can be viewed using an ICT lens, or for certain NDLOs more broadly, provide a menu of learning outcomes that the user may want to incorporate into their program, or provide ideas or considerations when users are developing their own learning outcomes.

The proposed NDLOs have been developed following extensive research and engagement with stakeholders.   While the majority of these NDLOs fall under Initial Professional Development (IPD) IESs, it is equally relevant to Continuous Professional Development (CPD) efforts of the professional accountant as described in IES 7 *Continuing Professional Development (Revised)*.

IES 2

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
(b) Management Accounting	(iii) Analyze data to provide meaningful information to support management decision making.	• Use ICT, including data analytics and visualization tools and techniques, to enhance the presentation, communication and interpretation of data and information used for decision making.
		• Describe how structured, semi-structured and unstructured data are used by an organization to capture and record transactions.
(f) Governance, risk management and internal control	(iii) Apply ICT to support the identification, reporting and management of risk in an organization.	• Use ICT to identify process and control failures in the organization and determine the root cause of these failures.
		• Evaluate the impact of process and control failures on an organization.
		• Develop appropriate responses to process and control failures.
		• Assess the completeness and accuracy of data and information derived from digital sources.
		• Identify opportunities to use ICT to enhance communication with those charged with governance.
		• Describe how to protect systems, data and information from internal and external security threats, including working with third parties.

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
	(iv) Analyze an organization's risks and opportunities using a risk management framework.	• Use ICT to analyze the efficiency and effectiveness of processes and controls in an organization.
		• Use ICT, including data analysis and visualization tools, to identify points in the process and controls of an organization that increase its risk.
		• Identify relevant and reliable data and information to inform the assessment of an organization's risks.
		• Use ICT, including data analysis and visualization tools to facilitate reporting to those charged with governance.
		• Explain process or system failures that contribute to increased ICT risk.
		• Discuss the importance of integrating ICT risk management factors within an organization's overall risk management framework.
		• Describe how to protect data and information shared with third parties.
		• Recognize where data handling or sharing with third parties has breached regulatory requirements and an organization's internal policies or procedures.
		• Identify similarities and differences between ICT applications and technology environments that serve as the basis for performing professional responsibilities.
		• Select appropriate ICT to communicate data and information to internal and external stakeholders.

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
		• Describe how ICT is used for governance, risk management and compliance and enterprise resource planning purposes.
(f) Governance, risk management and internal control	(vi) Assess the adequacy of systems, processes and controls for capturing, transmitting, reporting and safeguarding data and information.	• Identify additional security risks introduced by the use of ICT.
		• Identify methods of secure data transmission to support compliance with regulatory requirements and ethical principles.
		• Explain how data and information is transferred into, within and out of an organization.
		• Analyze the adequacy of processes and controls designed to protect data and information from unauthorized access, transformation and transmission.
		• Design processes and controls to protect data and information from unauthorized access, manipulation and communication.
		• Analyze the adequacy of an organization's processes and controls designed and implemented to protect data and information from unauthorized access, manipulation and communication.
		• Identify risks or threats to an organization's security of data and information posed by the external environment including in contracts with third party suppliers.
(g) Business laws and regulations (Intermediate)	(iii) Apply data protection and privacy regulations when accessing, storing, generating, using and sharing data and information.	• Demonstrate collaboration when interacting with individuals both inside and outside of accounting functions to ensure the appropriate use of data and information within an organization.

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
(h) Information, communication and technology (ICT) (h) Information, communication and technology (ICT)	(i) Analyze the adequacy of processes and controls.	• Describe how ICT risks can be mitigated through design and implementation of effective processes and controls.
	(iv) Explain how ICT supports data analysis and decision making.	• Identify improvements to processes using ICT, including but not limited to producing summarized management reporting for decision making, protecting access and integrity of financial information and identifying new sources of technology that enhance reporting.
		• Identify process and controls improvements to facilitate the effective implementation of new ICT within an organization.
		• Explain the differences between prescriptive, predictive, diagnostic and descriptive data analysis.
		• Discuss the integrity of data and information obtained from digital sources.
		• Identify new and emerging ICT that can support improved decision making.
(h) Information, Communication and Technology (ICT)	(v) Use ICT to analyze data and information.	• Recognize stakeholders' data and information needs and expectations.
		• Explain the integration of people, technology and processes when developing ICT strategies.
		• Advise on appropriate ICT strategies that support an organization's business objectives.
		• Analyze the benefits and costs of ICT for improved business outcomes.
		• Describe an organization's data and information processes including the flow of information, movement of documents, human intervention and ICT dependencies.

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
		• Prepare data and information visually to support effective decision making.
		• Use relevant and reliable data when performing analysis.
		• Describe the source for the data and the nature and extent of procedures performed when conducting data analysis.
		• Select appropriate ICT through consideration of its costs, benefits and limitations.
		• Apply ICT to interrogate a technology data source .
		• Describe how data and information was analyzed and presented.
		• Use data and information from a variety of sources to support decision making and solve problems.
		• Use ICT to identify trends, patterns and outliers in data and information.
		• Prepare data and information in a form that is useful for internal and external stakeholders.
		• Use ICT to review, extract and transform relevant data.
		• Use visualization tools to communicate insights from an analysis of data.
		• Describe the advantages and disadvantages of using different graphical options or other outputs generated by visualization tools.
(i) Business environment and organizational environment	(i) Describe the environment in which an organization operates, including the primary economic, legal, political, technological, social, and cultural aspects.	• Discuss emerging ICT trends impacting an organization.

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
(i) Business environment and organizational environment	(ii) Explain the impact of ICT developments on business and organizational environments.	• Describe how ICT can impact business models and drivers of value.
		• Identify the impact of risks, processes and flows of data and information, to an organization.
		• Analyze the implications of technological, operational, security and business issues critical to maintenance of an ICT environment.
		• Identify when an organization should seek advice from experts on the adoption and integration of ICT.
		• Summarize the advantages and disadvantages of data visualization tools.
		• Identify the appropriate timing to adopt new ICT.
		• Plan the effective implementation of new ICT.
(k) Business strategy and management	(iv) Explain the processes that may be used to develop and implement the strategy of an organization.	• Identify how processes can be improved by using ICT, such as producing summarized management reporting for decision making, protecting access and integrity of data and information and identifying technologies that enhance communication.
		• Describe relevant ICT processes and controls applicable to an organization.
		• Describe how strategic business decisions can be based on the integration of appropriately analyzed data sets and professional judgment.
		• Describe the impact ICT has on business models and risk, including how current and emerging ICT have the potential to impact the way business is conducted and measured.

IES 3

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
(a) Intellectual	(i) Evaluate data and information from a variety of sources and perspectives through research, integration, and analysis.	• Apply ICT to analyze structured data and information and facilitate the analysis of semi-structured and unstructured data and information.
		• Identify meaningful insights through the consideration of trends, patterns, outliers, and unexpected relationships within data and information.
		• Evaluate the reliability, accuracy and relevance of data and information used by an organization.
		• Apply ICT to conduct data extraction and interrogation.
		• Use visualization tools to conduct data analysis.
		• Apply predictive analytics to solve business problems.
		• Evaluate the results of data interrogation, synthesis and analysis to conclude on applicability and reasonableness of different outcomes.
		• Describe how new and emerging ICT operate, are used, and impact the generation, processing, and flow of data.
	(ii) Apply critical thinking skills to solve problems.	• Identify similarities and differences between ICT applications and environments when performing work activities.

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
		• Apply reasoning and professional judgment to identify, evaluate and conclude on the optimal solution based on the facts, circumstances and risk assessment.
(b) Interpersonal and communication	(i) Display cooperation and teamwork when working towards organizational goals.	• Prepare and provide constructive feedback to peers on areas for professional growth and development.
		• Create opportunities for peers to provide constructive feedback needed for professional growth and development.
	(iii) Communicate clearly and concisely when presenting, discussing and reporting in formal and informal situations.	• Apply ICT to communicate effectively and enhance professional relationships.
		• Identify where ICT could negatively impact interpersonal communication.
		• Evaluate how new and emerging ICT has the potential to change the channels of communication from and across systems.
		• Discuss the potential for emerging ICT to improve processes, controls and stakeholder engagement.
	(vi) Apply consultative skills to minimize or resolve conflict, solve problems, and maximize opportunities.	• Identify opportunities to communicate to individuals outside of the finance or governance functions who will benefit from understanding how technology impacts the use of data and information as it flows through the financial reporting cycle.
		• Identify the appropriate channel to communicate to individuals within the organization, or externally
		• Apply ICT to identify, prepare and share information with internal and external stakeholders.
(c) Personal	(i) Demonstrate a commitment to lifelong learning.	• Demonstrate a commitment to adapt to and make use of new and emerging ICT impacting an organization's business information systems.

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		• Prepare a professional development plan to increase awareness and understanding of current and future ICT.
		• Identify gaps in ICT knowledge and skills by performing a periodic self-assessment.
		• Demonstrate a commitment to seek out, use and evaluate new ICT tools and techniques.
(d) Organizational	(iii) Apply people management skills to motivate and develop others.	• Create opportunities to address identified ICT gaps in other individuals' competencies and skills through, for example, use of on the job training, peer feedback or encouragement to attend formal training.

IES 4

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
(b) Ethical Principles	(v) Apply the fundamental principles of integrity, objectivity, professional competence and due care, confidentiality, and professional behavior to ethical threats and determine an appropriate approach.	• Demonstrate objectivity, integrity, professional competence, due care, and, professional skepticism.
	(vi) Apply ethical principles when accessing, storing, generating, using and sharing data and information.	• Identify regulatory requirements applicable to access, storage, generation, use and sharing of data and information.
		• Identify personally identifiable data and information and evaluate how it is used for business purposes.

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
		• Describe how personally identifiable data and information has the potential to be misused.
		• Apply working practices that limit access to data and information, for example, use of secured storage, clean-desk policy and sharing data and information only when there is an appropriate business purpose.

IES 8

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
(f) Information technology	(i) Evaluate the ICT environment to identify controls that relate to the financial statements to determine the impact on the overall audit strategy.	• Analyze the implications of technological, operational, security and business issues critical to maintenance of an ICT environment that supports financial reporting or an organization.
		• Evaluate the sufficiency of digital evidence to demonstrate controls operated effectively.
		• Evaluate the flow of data and information distinguishing between manual and automated activities to identify key controls that reduce risk of material misstatement.
		• Develop familiarity with cybersecurity attacks, defenses and related forensics to help investigate issues.
(j) Personal	(i) Promote lifelong learning.	• Adopt new ICT to effectively conduct business activities relevant to work responsibilities.

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
		• Promote an environment of innovation using ICT.
		• Select ICT related professional development activities to better prepare for changes in the business environment.
		• Support the development of staff during the audit engagement through effective use of ICT research activities and on the job training.
		• Support development of staff during the audit engagement through effective supervision and review.
		• Instruct formal learning and development courses using ICT to increase its effectiveness.
		• Demonstrate active participation in learning programs.
(n) Ethical Principles	(i) Apply the fundamental principles of integrity, objectivity, professional competence and due care, confidentiality, and professional behavior in the context of an audit and determine an appropriate resolution to ethical threats.	• Demonstrate objectivity, integrity, professional competence and due care throughout the audit engagement and while interacting with client management and those charged with governance.
		• Demonstrate diligence in obtaining sufficient evidence before forming conclusions, including the reliability of data and information.
		• Evaluate pressures that introduce biases when forming conclusions by client management and the engagement team, in order to mitigate the effect of the biases.
(n) Ethical Principles	(iii) Act ethically when accessing, storing, generating, using and sharing data and information of the entity.	• Demonstrate behaviors that support the ethical conduct and application of regulatory environments governing the use, handling, and sharing of data and information specific to privacy requirements.

Proposed Competence Area – Exposure Draft	Proposed Learning Outcome - Exposure Draft	Proposed Non-Authoritative Detailed Learning Outcomes (NDLOs)
		• Demonstrate behaviors that support the importance of protecting personally identifiable information from inappropriate use and disclosure.

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[i] IAESB Guiding Principles for Implementing a Learning Outcomes Approach.