INTOSAI
Working Group on IT Audit

Roadmap for development of future GUIDs in the 5300 seires

Project # 2
WGITA Workplan(2017-19)

Initial Draft February 2018

Roadmap for development of future GUIDs in the 5300 Series.
INTOSAI-WGITA Project 2 of Work Plan (2017-19)

Preface: (To be added at a later stage)

Table of Contents (To be added at a later stage)

Abbreviations (To be added at a later stage)

1. Background

The INTOSAI Working Group on IT Audit (WGITA) was set up during the XIII INCOSAI held in June 1989 with the objective of providing support to member SAIs' in developing their knowledge and skills in the domain of IT Auditing. Since then the membership of the WGITA has grown to 50 members (including four observers & 46 SAIs') as of 2017. SAIs of Fiji, Mexico, Argentina, Rwanda, and Turkey being the most recent members. SAI India holds the Chairmanship of the group and the last meeting of the group (its 26th meeting) was held in Seoul South Korea from 22nd to 23rd May 2017.

WGITA works by implementing triennial *"work-plans"* comprising of various projects. These projects cover a large spectrum of topics related to IT Auditing. Significant contributions have been made through the WGITA platform such as , joint development of IT Auditing Handbook, development of (erstwhile) ISSAI 5300, "Guidelines on IT Auditing", a guide on "Data mining as tool in fraud investigation", a booklet titled, GET.IT (Governance Evaluation Technique for Information Technology) etc.

In the 24th WGITA meeting held at Brasilia Brazil in April 2016, the WGITA Work-plan 2017-19 was formalized. Resultantly the subject project titled, "Development of future ISSAIs under the 5300 Series" was approved by WGITA. The team for this project comprised of eight SAIs, including SAI India, SAI Brazil, SAI Japan, SAI Poland, SAI South Korea SAI China, SAI USA and SAI Pakistan as the team lead.

2. The Project Team

The following members constituted the project team:

Sr. No.	SAI Name	SAI members
1.	Brazil	Mr. Pedro Coutinho
2.	China	Mr. Yin Qiang, Deputy Director of International Cooperation Department Ms. Yang Li, Deputy Director General of IT Center Ms. Wang Shurong, IT Engineer of IT Center
3.	India	Mr. R.M. Johri, Principal Accountant General Mr. Deepak Kapoor, Accountant General Ms. Shubhangi, Deputy Director
4.	Japan	Mr. Hideki Fujii Ms. Eri Uwatoko Ms. Kae Kobayashi
5.	Korea	Mr. Jinwon Ho, Deputy Director, The Board of Audit and Inspection of Korea
6.	Pakistan **(Team lead)**	Mr. Muhammad Ali Farooq Gheba, Deputy Director Ms. Madeeha Maqbool, Assistant Director
7.	Poland	Mr. Pawel Banas, Advisor to President of Supreme Audit Office (NIK)
8.	United States of America	Mr. Madhav Panwar, Senior Level Technologist/Director

However, subsequently in the XXII INCOSAI held at Abu Dhabi in December 2016, the INTOSAI Framework of Professional Pronouncements (IFPP) was approved and Strategic development plan (2017-19) for IFPP was initiated. According to this the 5300 Series (that dealt with the subject of IT auditing) was shifted from ISSAIs to GUIDs or Guidance. The title of project was accordingly modified as ''Roadmap for development of future GUIDs in the 5300 Series'', through WGITA Chair.

3. Audit and the Globalized IT environment

"Globalization is not something we can hold off or turn off. It is the economic equivalent of a force of nature, like wind or water. There is no point in denying the existence of wind or water, or trying to make them go away. The same is true for globalization. We can work to maximize its benefits and minimize its risks, but we cannot ignore it, and it is not going away." Remarks at Vietnam National University in Hanoi, Vietnam, on November 17, 2000 by Willian J. Clinton 42nd President of the USA.

Globalization did not become a reality for people overnight. It was the result of steady progress made by them over the previous century. The permanence of globalization as pointed out by the Ex-President of the United States lies in the fact that the way people live and conduct their activities, businesses and other work has essentially changed. This change cannot be reversed rather only adapted to and managed by considering its risks and benefits. This change has only been possible due to certain key-drivers which have led to the end result of globalization. Digitalization and IT represent such key change agents which have enabled the world to become a global village in the true sense of the word.

Digitalization represents the impact Information Technology has made in the modern age. All sectors of society have been affected from this change and essentially we now live a growingly interconnected IT world. The affordable value of IT solutions has enabled them to flourish in both personal and commercial market domains. Resultantly manual operations are rapidly being replaced by their corresponding IT solution.

The changing global IT environment has had a profound impact on the working of SAIs. ISSAI-100 (at Para 17) defines the SAI's Auditing Environment as, "The public-sector audit environment is that in which governments and other public-sector entities exercise responsibility for the use of resources derived from taxation and other sources in the delivery of services to citizens and other recipients."

The Audit environment for the SAIs' therefore covers the whole spectrum of processes that the auditee organization undertakes including its interface with further national and international public and private sector organizations. Hence Audit has to analyze a matrix of activities to establish a complete audit trail.

Similarly ISSAI-100 (at para 45) defines understanding an auditee entity as, "Auditors should obtain an understanding of the nature of the entity/programme to be audited This includes understanding the relevant objectives, operations, regulatory environment, internal controls, financial and other systems and business processes, and researching the potential sources of audit evidence.

Hence as more and more public sector entities utilize a whole variety of IT solutions, the auditor is mandated to have a thorough understanding of this IT environment in order to be able to perform proper audit analysis on the activities of the auditee entity. In the absence of such understanding any assurance by the auditor would be superficial.

4. Existing INTOSAI framework with regards to IT Auditing

According to INTOSAI framework IT auditing domain has been placed under [1]GUID (Guidance) 5000 – 5999 Series on "Subject specific Audits". At present only two pronouncements pertaining to IT Audit exist, which are:

i.   [2]GUID 5300 -- Guidelines on IT Audit
ii. ISSAI 5310 -- Information System Security Review Methodology - A Guide for Reviewing Information System Security in Government Organizations. (Its status is under review by INTOSAI)

As IT Auditing is as fast developing field having material impact on the work of SAIs, the existing two pronouncements do not do justice with the needs of the SAIs. Not only does IT Auditing facilitate the three conventional forms of audit, namely, Financial attest audit, Compliance audit and Performance audit but it also provides SAIs with necessary capacity to assess the IT functions implemented in an organization along prescribed objectives. These objectively may include the reliability, effectiveness and sustainability of the IT function in place in the auditee organization.

Hence a need was felt by WGITA to formulate a roadmap for development of future pronouncements in IT Auditing which could then be used as a useful reference point by INTOSAI forums as per requirement.

5. Main Objectives for making the Roadmap document

This roadmap document has been prepared to act as a primary reference document for future GUIDs to be developed by INTOSAI under the domain of IT Auditing. The document strives to encompass the vast domain of Information technology with an aim to highlight areas against which guidelines for SAI auditors would greatly facilitate them in conducting their audit exercise. The document envisages development of future GUIDs in a logical manner so that coherence is maintained between different pronouncements made from time to time.

This roadmap only identifies significant subjects for development of future GUIDs. The same could then be used for consideration and evaluation by relevant forums. The target groups for this product are the Professional Standards Committee and Knowledge Sharing Committee of the INTOSAI.

6. A live document

As the IT environment is evolving, new challenges and opportunities are presented by it over time. Hence in order to remain relevant this document shall remain a live paper, subject to

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[1] Row 2.8 Table 3 of SDP for IFPP 2017-19
[2] http://www.issai.org/en_us/site-issai/issai-framework/4-auditing-guidelines.htm

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review after every five years till the time it is felt by WGITA that saturation with respect to new requirements has been reached.

7. Methodology used for Roadmap development

This roadmap represents the continued efforts made by WGITA members in the field of IT Auditing. Earlier WGITA products such as ISSAIs, handbooks, guides, surveys etc all have been used as a knowledge pool for the development of this document. Additional international publications found relevant to the subject have also be reviewed and used as reference where needed with due disclosure.

8. Structure of the "Roadmap"

The structure of this roadmap can be illustrated as follows:
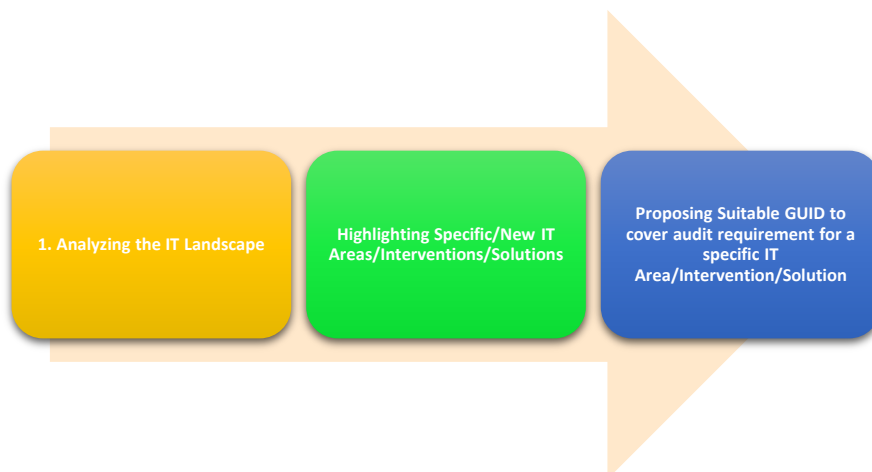
As shown above this roadmap document envisages to encompass the current IT interventions in public and private sector, related emerging technologies and related management practices, all with an aim to translate such IT system components/areas into specific requirements for future GUIDs dealing with these specific IT system components/areas.

9. The broad contours of today's IT Landscape

Before going into the specifics of proposing different subjects for development of GUIDs it is important to have a view of the broad IT landscape. This is necessary to be able to access the needs for future GUIDs in a comprehensive manner and in order to avoid myopic or shortsighted proposals.

An IT system in an organization comprises of basic core components which can be classified as follows:

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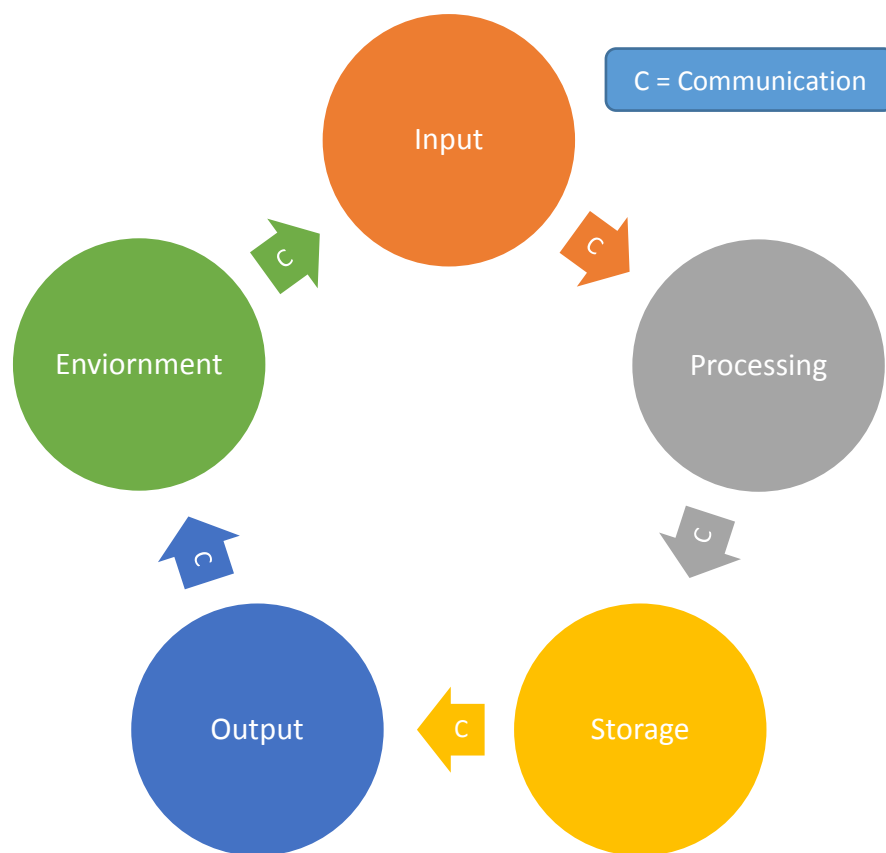
The above illustration is the simplest possible picture of an IT environment which can be far more complex in today's IT world. This rudimentary classification has been given to establish a clear baseline against which to view and classify IT solutions and their multifarious manifestations. Moreover these components also necessarily do not in all cases have a sequential flow and can have multipronged and two-way communications amongst components at any stage depending upon the nature of IT solution being used.

Input: The component "input" represent all types of devices, processes and actions that have the final effect of digital information being entered into the IT system of an organization from the outside environment. The input can vary from application user logins to complex multi-factor inputs such as biometric devices, virtual machines and dedicated machines (radar, chemical monitors, GPS devices etc). The inputs may also vary in form such as radio waves, satellite signals, encrypted digital network protocols etc. For example for a [3]National Identification

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[3] Example draws analogy from an IS Audit of National Database & Registration Authority (NADRA) undertaken by SAI Pakistan

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Issuance Authority using IT systems, input may comprise of form data (i.e. data regarding name, family details and other testimonials of an individual), biometric data (finger prints, photographs, iris scan etc), system user access/authentication data and case review comments/approval information etc.

Hence inputs of an IT system can be further be classified into a number of categories. Each type of category represents a specific IT action linked with a specific type of software or hardware being used for the entry of data. Common categories are, inputs for user access/authentication, inputs for network communication/protocols, and inputs for business data. With new innovations the categories under inputs continue to increase.

Processing: Processing represents that component of an IT system where the core operations of the entity are processed. For example for a National Identification Issuance Authority, the software application processing the new ID issuance cases would constitute the processing component. The processing component represents the core business of the auditee entity and is an area upon which maximum application controls are exercised.

Based on the nature of its operations, the organization may have multiple processing applications for its needs. For example a hospital IT system may comprise of multiple applications such a patient management system, a decease record system, a medicine inventory system, hospital financials etc. One the other hand it may use a full business wide ERP IT solution for its needs.

A large variety of IT solutions used by organizations fall under this component. From simple data recording software to complex GIS solutions, decision support systems and financial analysis tools, various data processing solutions are commonly being used. With growing IT interventions in the public sector the main manifestation of change is in the application processing domain and constitutes an important area of understanding for the auditors.

Storage: The storage component of an IT system represents the method by which all kinds of data pertaining to the IT system is being stored on a temporary or permanent basis. The nature of storage and its types vary greatly. IT solutions falling under the category of storage form the key "information assets" of the organization. Management of IT data storage, forms a critical IT system sustainability and continuity factor for the organization.

Data from all other components of an IT system, including input, processing and output are directly or in-directly linked with the storage solution in place in an organization. With rapidly increasing IT innovations in the storage domain, more and more diversified type of storage solutions are easily and economically available for domestic and commercial use. Some common type of storage techniques include, distributed/centralized databases, online real-time replication, onsite and off-site storage area, data redundancy solutions and data libraries etc.

An organization may deploy more than one storage management tools for its needs. Continuing with our example of a National Identification Issuance Authority, such an organization may deploy local temporary databases to hold field office temporary un-processed data, a centralized database, a data replication system and an off-site data repository solution. An auditor needs to

have a sound understanding of the storage solution implemented in-order to draw an assurance on the reliability of data being reviewed.

The storage component of an IT system also represents the different type of data storage algorithms that are used for storing data. Various forms of data encryption techniques are deployed. Such methods are directly linked with confidentiality of data being stored and form an important area for audit review.

Output: The output component of an IT system represents the manner in which a client of the organization can get the required service/data or any other deliverable from the organization. A number of IT solutions offer both output and input in the same interface for the convenience of clients. Online banking websites, libraries, HR systems, interactive dashboards are all example of such IT interventions. However it is important to view output as a separate component of an IT system as important controls (both application and general) are applicable against the output solutions implemented in an organization.

Communication: Communication represents the manner in which all the components of IT system communicate or "talk" with one another and also the manner in which the IT system communicates with other systems across its environment. IT communication takes place using different carrier channels. The communication channels in-turn form the communication network amongst IT devices.

A communication takes place between two or more devices. It has a basic communication protocol and a carrier language. The broad spectrum of IT Network solutions fall under the domain of communications. Affordable and exceptionally time saving means of IT communication has been a main cause for the overall rapid growth of the IT industry. It has made different business solutions possible through virtual IT networking. The internet, VPN, cloud computing etc are all manifestations of IT communication techniques.

Within a typical IT system, all different components and users of the system talk with one another. The communication is two-way and is both hardware and software based. Having a sound understanding of the communication network being used in an IT system is essential to gauge the security, sustainability and reliability of the IT solution implemented.

Environment: Environment represents [4]"everything external to a system that interacts with the system". Moreover everything that exists outside of the IT system and is capable of directly or indirectly effecting the system also fall under the category of environment. Hence environment can be the manner in which different users of an IT system interface with it. The environment can also be the physical conditions in which the IT solution is implemented. Understanding the environment of the organization is critical to the overall design of the IT solution. If the same is not done the effectiveness and overall business feasibility of the IT solution can be compromised.

Managing the IT System: Apart from its core components, an IT system is greatly effected by the manner in which the "IT function" in an organization is managed. The size, shape and

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[4] Modern System Analysis and Design (Second Edition) by Jeffrey A. Hoffer, Joey F. George & Joseph S. Valacich

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complexity of the IT solution all depends upon the way in which an organization intends to use, maintain and draw value from the IT system in place. In turn, all manifestations of IT management practices become part of the IT landscape. Common features of this area include:

- IT Business Case analysis
- IT Strategic Oversight
- IT Governance
- Internal Controls
- Information assets sustainability
- Information assets redundancy/backups
- Information assets security and confidentiality

Components of IT system such as DRP sites, encryption methods, SLAs etc all are linked with the broader IT management style of the organization.

Current prominent trends in IT: A discourse on the IT landscape cannot be complete without highlighting the major technologies and practices that are presently shaping the IT universe. Some of these are as follows:

- **The Internet of Things:** [5]"The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. "Smart City" initiatives – and connected cars, smart houses, wearables – all largely fall under the IoT umbrella."

- **Big Data:** A large and complex data set comprising of both structured and unstructured data may be termed as Big Data. Big data ranges from traditional transactional information and encompasses "[6]information garnered from social media, data from internet-enabled devices (including smartphones and tablets), machine data, video and voice recordings, and the continued preservation and logging of structured and unstructured data". Normal database analysis tools are insufficient to analyze big data information hence more complex analytical methods are necessary for Big Data review.

- **Cloud Computing:** According to the National Institute of Standards and Technology (NIST) (USA), cloud computing is "a means for enabling on-demand access to shared and scalable pools of computing resources with the goal of minimizing management effort or service provider interaction." That is an approach of acquiring desired IT service without having to purchase all the required IT equipment.
  The Cloud Computing Services can further be classified into three broad categories.

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[5] International Institute for Analytics, Discussion Summary on "The internet of Things: Opportunities & Applications across Industries", December 2015.
[6] Article by EY on " Big Data and Analytics in the audit process: mitigating risk and unlocking value" Sep 2015

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i.   Infrastructure as a Service (IaaS): Under this model the [7]IT infrastructure requirements such as Servers, Storage systems, Network equipment etc are provided by the service provider. The client/customer can then deploy his/her application on the hired infrastructure.

ii. Platform as a service (PaaS): Under this model in-addition to infrastructure the service provider also provides a layer of software development platform for the client to use and build his/her own applications.

iii. Software as a Service (SaaS): Under this model apart from the above facilities the service provider provides the software application [8]which is made accessible from various client devices through an interface.

- **Virtual Private Network (VPN):** A VPN is network communication model in which a private network is "Virtually" extended over a public network. It is "[9]constructed though some form of partitioning of a common underlying communications medium, where this underlying communications medium provides services to the network on a non-exclusive basis".

- **Virtual Machines (VM):** [10]"A virtual machine (VM) is a software program or operating system that not only exhibits the behavior of a separate computer, but is also capable of performing tasks such as running applications and programs like a separate computer. A virtual machine, usually known as a guest is created within another computing environment referred as a "host." Multiple virtual machines can exist within a single host at one time."

- **Digital Signatures:** Digital signatures represent the IT replacement of a manual signature accorded by an individual of a piece of paper. This digital data represents all those characteristics that manual signatures signify. That is it, [11]"provides sender authenticity, message integrity and nonrepudiation". Digital signatures are communicated over the internet using secure verifiable protocols such as public keys and certification authorities.

- **E-governance:** E-governance represents the manner in which IT solutions/IT interventions are made to deliver government services to the citizens and amongst various government offices. E-governance covers all components of an IT system. Citizen facilitation Centers and Citizen Feedback helplines represent common manifestation of e-governance. Emerging IT solutions in the market directly impact the manner in which e-governance is implemented.

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[7] Article on Cloud Computing by Tony Harris Business Solutions at website:
http://www.thbs.com/downloads/Cloud-Computing-Overview.pdf
[8] Report by GAO (USA) on Cloud Computing, April, 2016.
[9] Paper on " What is VPN " by Ferguson & Huston April 1998 at website: https://www.potaroo.net/papers/1998-3-vpn/vpn.pdf
[10] Definition of Virtual Machines at website: https://www.techopedia.com/definition/4805/virtual-machine-vm
[11] CISA Review Manual 2013 by ISACA

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10. Co-relating IT Landscape into major and sub-areas

As illustrated in the previous chapter the IT landscape is a broad universe of IT components and related solutions that keep on changing and growing with the advent of new technological interventions. In order to logically analyze the IT landscape it is important that it is classified into major and sub-areas. The major areas represent a complete category of IT interventions. For example some common IT major areas include: Databases, Wide Area Networks (WAN), Graphic User Interfaces, Application Development, Application management, Rights management, Information Security etc.

Accordingly each major area further comprises of multiple subareas. For example Databases may comprise to subareas such as Data base management systems, Centralized/Distributed database models, Data backup libraries, data warehousing etc. Similarly WAN may include further sub areas such as internet, vpn, cloud computing etc.

Thus while designing this roadmap the logical correlation between broad IT areas and their more specific manifestations has been kept in mind and mapped out accordingly.

11. Linkage between IT landscape and IT Audit requirements

The broad spectrum of the IT landscape directly translates into the audit requirement for the use and analysis of this IT universe. The same can be illustrated as:

For each component of an IT system a separate set of audit requirements arise. For example if cloud computing is in use in an entity than audit requirement would include on how to measure the reliability and effectiveness of the cloud computing solution in place. It would further highlight the risks and controls associated with cloud computing and detail on how the auditor can test the given IT environment to draw an assurance that sound controls are in place. On a separate vein each IT area also represents a set of IT tools and techniques which the auditor can use for management of his/her own audit exercise.

Some major IT Areas and their corresponding audit requirements are as follows:

IT Area	IT Audit Requirement
[12]IT Governance	Methodology for review of IT Governance
[13]IT Development & Acquisition	Methodology for review of IT Development & Acquisition
Network communication	Methodology for review of IT Networks
[14]Outsourcing solutions	Review of adequacy of Outsourcing functions
IT sustainability framework	Review of adequacy for the IT sustainability framework
IT Application Processing	Review of adequacy of Application Controls
Data Repository Systems	Review of adequacy of Data storage methods
[15]Protection of Information System Assets	Review of adequacy of Information Systems Security
[16]IT Resource Management	Review of adequacy of IT resource management practices.

Hence this roadmap envisages formation of GUIDs on each significant component of the IT landscape, enabling the auditor to have clarity of concept and sound competency in review of the complex IT solutions in place in today's organizations.

12. Subjects/Topics proposed for development of GUIDs under the 5300 Series

Based on the prevailing IT landscape and current status of pronouncements pertaining to IT auditing, the following subjects/topics are proposed for development of GUIDs in the 5300 Series:

- **Guidelines on IT Governance Audit**:
  Basic theme: The proposed guideline would enable the auditor to access whether an IT governance structure to establish the ownership of senior management on the IT operations of the organization, exists. It would further enable the auditor to analyze how effective is the IT governance framework and are the IT systems aligned with the overall strategic direction of the entity. Review of policy level documents would be covered.

- **Guidance on IT Evidence collection & analysis**:
  Basic theme: This proposed guideline would enable the auditor to collect audit evidence in a non-refutable manner and enable him/her to carry out primary methods of data analysis on the collected data.

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[12] Handbook on IT Audit for SAI by WGITA & IDI
[13] Handbook on IT Audit for SAIs by WGITA & IDI
[14] Handbook on IT Audit for SAIs by WGITA & IDI
[15] CISA Review Manual by ISACA
[16] COBIT Framework by ISACA

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- **Guidance on formation of IT Materiality**:
  Basic theme: While conducting subject specific IT Audits and accessing the adequacy of the IT solutions in place in an entity, the auditor is faced with a basic challenge. That is, how to quantify/grade the lapses in the IT system and translate them into his/her overall assessment of the IT solution in place. In this context this guideline will help auditors to categorize and rate different controls parameters of an IT solution implemented in an organization. It would guide how an IT grading matrix could be established and a IT materiality benchmark defined for the IT system being reviewed.

- **Guidance on Audit of IT Development & Acquisition:**
  Basic Theme: This proposed guidance document would look to cover the various manners in which an information system could be developed in-house by an organization or acquired off the shelf. Accordingly it would guide the auditor to gauge the feasibility and utility of such an exercise by the organization with a view to ascertain that inherent business risks have been addressed in the development/acquisition process and that the deliverables of the development/acquisition process are in-line with the core operational objectives of the organization.

- **Guidance on review of outsourced IT services:**
  Basic theme: The proposed document would enable the auditor to access whether an outsourcing solution implemented by the organization adequately safeguards the core functions of the organization and whether all major risks pertaining to the outsourcing model have been covered in the outsourced IT service agreement.

- **Guidance on Network Essentials review:**
  Basic Theme: This proposed document would act as a level 1 or basic level review of the network solutions in place in an IT organization. Considering that Network Communication is a key factor in most IT system implementation, this document would act a basic guiding tool on how to evaluate the network infrastructure used by an entity with regards to, effectiveness, confidentiality and security amongst other factors.

- **Guidelines on Auditing Advance Networks & Cyber Security:**
  Basic Theme: This proposed document would act as a level 2 or advance level guideline for auditing network solutions and internet security. It would look to address complex networking concepts such VPNs, Internet of things etc. Additionally the guideline would envisage a broad set of parameters along which cyber security could be assessed for adequacy and reliability.

- **Guidance on Cloud Computing Audit:**
  Basic Theme: This proposed GUID would deal with the specific subject of Cloud Computing, its various forms and models. It would provide the guiding steps which would enable the auditor to review the cloud computing solution being used by an

organization along parameters such as, reliability, sustainability, security etc. In detail it would address each component and model of cloud computing and risks and control measures required for each model.

- **Guidance on Audit of ERP systems:**
  Basic Theme: ERP systems are a unique form of IT interventions as they encompass the full operations of an organization. From financials to inventory and HR management they comprise of different dedicated modules. How these IT sub-modules interact with one another and how they fulfill the overall functions of the organizations are amongst the auditable subjects. This guidance will look to support the auditor to review an ERP system implementation for its' overall feasibility, integrity and effectiveness amongst other risk based objectives.

- **Guidelines on Audit of Database Management Systems (DBMS) including analytics:**
  Basic Theme: This proposed document would look cover various data storage practices in use by organizations. It would highlight the salient features of different types of the confidentiality and reliability controls of each type of data storage solution whether being an online storage solution or an off-site backup storage system. Accordingly the proposed guideline would enable the auditor to review the data base management system implemented by the organization, identify the risks and weak controls and propose improvements to the management/stakeholders.

  Further this proposed GUID would deal with the subject of Data Analytics with regards to structured data residing in the database solutions of the auditee entity. It would guide the auditor how data analytical procedures could be performed on the data residing in a DBMS to ensure that the data is consistent and free from logical errors.

- **Guidelines on Big Data Audit:**
  Basic Theme: This proposed GUID would deal exclusively with the subject of Big Data audit. It would highlight the different features of Big Data and how the auditor can perform Big Data analysis in order to further strengthen the audit report and its subject findings. It would guide the auditor on how Big Data evidence can be correlated with the functions and operations of an auditee organization and enable the auditor to draw analytical assessment and conclusions from such collected evidence.

- **Guidelines on Audit of Information Systems Performance:**
  Basic Theme: This proposed GUID would enable the auditor to formulate basic KPIs (Key Performance Indicators) to gauge the overall performance of an Information System implemented in an organization. The whole canvas of an Information System from its infrastructure design to HR management and third party feedback would be covered for audit assessment, in the guideline. The efficiency of the implemented system in terms of its deliverables and economy shall be analyzed. Thus the guideline if prepared would significantly facilitate the Performance Audit exercise being carried out by SAI by

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enabling them to draw an quantitative analysis on the performance of the Information System being used the auditee organization.

- **Guidelines on Audit of Information Systems Sustainability:**
  Basic Theme: This proposed guideline would enable the auditor to assess the adequacy of Information Systems continuity and sustainability methods adopted by an organization. Sustainability and continuity both in terms of HR and IT would be covered. It would enable the auditor to review whether the BCP, DRP, related policy documents and SLAs used by the organization are sound enough to ensure sustainability of the IT solution along with its data and HR knowledge-base over an extended period of time. It would also enable the auditor to highlight risks in the sustainability paradigm in place for review by the auditee.

- **Guidance on Audit of Bank transactions:**
  Basic Theme: This proposed GUID would look to first highlight the specific dynamics of bank transactions and their various manifestations. It would then provide a tool set on how to analyze and authentic the reliability and accuracy of the banking transactions. Considering the increasing various forms of financial transactions used by auditee organization this GUID would have over-arching impact in assisting the SAI audit in all forms of audit.

- **Guidance on Audit of E-governance:**
  Basic Theme: This proposed GUID would look to assist the auditor in use of tools and techniques for audit of e-governance operations being run by an organization. It would enable the auditor to identify risks pertaining to e-governance solutions and analyze whether sufficient controls are in place to address the risk and ensure that desired value is derived from an e-government initiative.

- **Guidelines on real-time auditing techniques:**
  Basic Theme: This proposed guideline would aim at assisting SAIs on how to carry out real-time auditing through the use of IT solutions. It would highlight how different data analytical techniques could be used to monitor the transactions of the auditee organization and "exceptional events" reported automatically in an Audit repository. The exceptional events would be programed into the procured IT solutions with the basic aim to initiate a trigger upon incidence of an exception. Data anomalies and high risk events would thus automatically become part of the audit data repository. In turn this could facilitate the auditors in concurrent auditing or enhanced desk auditing as per the relevant SAI practice.

13. Conclusion

The subject project of roadmap development comes at a very opportune time. INTOSAI is reviewing the framework for its pronouncements and a strategic development plan on the matter

is in place. Through the platform of WGITA our SAI team has the unique opportunity of making some fruitful contributions/proposals towards the greater objectives of INTOSAI. The current GUID/ISSAI pertaining to IT Auditing do not completely address the subject of IT auditing in the working of SAIs. IT auditing is all set to take center stage in all kinds of audit work in the future and hence mandates further development of pronouncements related to it. In this context this roadmap is logical discourse on the subject of IT auditing with an aim of proposing subjects/topics for development of future GUIDs under the 5300 series of INTOSAI framework.