



**Auditor-General's Office**  
**Singapore**

**COUNTRY PAPER ON  
LEVERAGING TECHNOLOGY TO ENHANCE  
AUDIT QUALITY AND EFFECTIVENESS**

**AUDITOR-GENERAL'S OFFICE, SINGAPORE**

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## **Executive Summary**

1. Over the past three decades, the Government of Singapore has successfully harnessed infocomm technology (ICT) to achieve greater productivity and efficiency in the public sector. The governance framework in place and legislations enacted help to address potential issues that arise from the use of ICT.

2. Technology has not only benefited the public agencies, it has also helped to fundamentally transform and improve audit approaches. As the national auditor, the Auditor-General's Office of Singapore (AGO) actively uses technology in its audit processes. In this paper, AGO shares how it has leveraged technology to enhance audit quality and effectiveness.

## **Singapore's e-Government Journey & Governance**

3. From the Civil Service Computerisation Programme in the 1980s to the current e-Government Masterplan 2011-2015 (or eGov2015), the Government has taken continuous digitalisation efforts to transform public administration and improve service delivery. Expanding the integration from within the Government to beyond, eGov2015 aims to create an interactive environment where the Government can collaborate with the private sector and the people through the enabling powers of ICT.

4. The Ministry of Finance (MOF) is the e-Government owner, setting the direction and policies on the use of ICT in the Government. The Infocomm Development Authority of Singapore (IDA), on the other hand, acts as the Chief Information Officer for the Government to provide technical advice and recommendations to public agencies in the implementation and management of e-government programmes and systems. As the independent national auditor, AGO would not be involved in the e-Government/ICT systems implementation. Instead, AGO could audit these systems after they have been implemented as part of the financial statements and selective<sup>1</sup> audits.

5. The Government issues administrative directives, such as the Government Instruction Manual on information technology (IT) management, to govern and regulate all stages of the ICT life cycle (i.e.

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<sup>1</sup> Compliance audit, internal controls audit and audit for excess, extravagance and gross inefficiency leading to waste.

pre-implementation, implementation and post implementation). Public sector agencies are required to comply with these directives, and AGO would check for compliance when performing audits.

### **Legislations to Address e-Government/ICT Security**

6. To address the potential issues over the use of ICT, the Government has introduced legislation, such as the following:

a. Electronic Transactions Act

The Act provides for the continuing security needs with regard to the use of electronic transactions, and addresses issues such as the rights and obligations of transacting parties for e-commerce transactions. In addition, the Act contains specific provisions for the development of security procedures such as the Public Key Infrastructure<sup>2</sup> and biometrics.

b. Computer Misuse and Cybersecurity Act

To combat the ever-evolving cyber threats such as hacking and virus attacks, the Act functions as a safeguard to prevent incidents such as unauthorised access to or modification of computer materials. It also gives the Minister for Home Affairs the powers to direct any person or entity to take such measures or comply with such requirements as may be necessary to prevent, detect or counter any threat to computers or computer services.

### **Impact of Technology on Auditing**

7. The growing reliance on IT systems gives rise to several risks in the event of lapses in internal controls. Examples of such risks include systems errors which result in inaccurate data used for decision-making, and possible unauthorised access or changes to data leading to loss or corruption of important information.

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<sup>2</sup> The Public Key Infrastructure supports the distribution and identification of public encryption keys, allowing users and computers to exchange data securely over networks and verify the identity of the other party.

8. Hence, the audits by AGO would cover whether internal controls are in place to ensure the reliability and security of public service IT systems, and whether the relevant Government IT policies, laws and regulations are complied with.

### **Capacity Building**

9. In keeping up with the rapid advancement in technology, it is vital for auditors to keep abreast of technological changes so as to be able to carry out audits efficiently and effectively.

10. In this regard, AGO provides training to its auditors to equip them with the relevant IT knowledge and skills for use in their audits. AGO also invites professionals to share knowledge with AGO auditors on latest developments in the field.

11. For the use of computer-aided audit tools (CAATs), AGO ensures that its auditors are able to utilise these tools to perform effective and efficient audits. This is done through foundation courses for new officers and advanced courses for more experienced officers. To supplement knowledge sharing, an annual discussion forum is held to allow auditors to share how they have successfully utilised CAATs in their audit projects over the course of the year. Such sharing also helps to develop greater data analytics capabilities.

12. For audits of IT systems which would require greater technical expertise, AGO has established a specialised IT audit department staffed by auditors who have different IT skill sets, experience and background. These IT audit specialists regularly update themselves on emerging technology and have also attained professional IT certifications<sup>3</sup>.

### **Use of Technology to Enhance Audit Quality and Effectiveness**

13. Through the use of technology in various audit processes such as identification of risks, testing of controls and performing data analytics, auditors are able to achieve a far higher level of assurance than is possible through traditional audit methods. In this regard, the following

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<sup>3</sup> These include Certified Information Systems Auditor, Certified Information Systems Security Professional and Cisco Certified Network Associate.

paragraphs elaborate on how AGO has used technology to enhance audit quality and effectiveness.

### Data Analytics

14. Recent developments in technology have resulted in the emergence of many data analytics tools. These tools make it easier for auditors to combine different sets of data, analyse the relationships between these huge data sets, and draw meaningful conclusions.

15. AGO auditors use CAATs to perform data analytics. This has proven to be immensely useful in identifying risk areas, performing tests and identifying exceptions. With these tools, auditors can analyse huge volumes of data efficiently and effectively.

16. CAATs software that AGO auditors use includes Microsoft Excel and ACL. CAATs have empowered our auditors to process bulk raw data received from auditees in different formats (e.g. text file, pdf documents, etc.). Furthermore, in performing data mining, CAATs allow auditors to carry out analyses to help in the detection of fraud. An example of such analyses would be the Benford's Law Analysis<sup>4</sup>.

17. Some of the CAATs also have the option for auditors to write expansive scripts<sup>5</sup>. These scripts allow auditors to apply the same set of rules to prospective assignments, thus improving audit efficiency. Besides, they also help to enhance audit quality by allowing auditors to perform complex analyses, which would be time-consuming and prone to errors if performed manually.

18. From analysing the data, AGO can then identify potential risk areas such as related party transactions, duplicate payments and unauthorised access to systems.

19. Following the analysis, any finding would be followed up and reported on a timely basis. The methodology of employing CAATs as part of the audit process will also be extensively documented so that the same method of analysis can be applied to future projects.

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<sup>4</sup> Benford's Law is a mathematical theory of leading digits that helps to detect anomalies in data sets.

<sup>5</sup> A script is a set of commands used to process and analyse data in CAATs.

## AGO Intranet

20. AGO hosts an intranet website, which is used to store and disseminate audit information such as audit manuals and checklists. With the existence of this intranet, AGO auditors can conveniently retrieve required information in the course of the audit.

21. Moreover, as institutional knowledge would need to be preserved for use in the future, having an online database allow for this knowledge to be captured and shared amongst all auditors.

22. As regards the security of the intranet, measures have been taken (e.g. firewalls and secure logins) to ensure that the integrity of the data would not be compromised.

## **Concluding Remarks**

23. As public agencies shift towards using more ICT for public administration and service delivery, Supreme Audit Institutions (SAIs) would need to be at the forefront of technology to ensure that their audit competency is kept relevant.

24. Leveraging on the many technological solutions available, auditors would now be able to enhance the quality of the audit process. AGO would continue to explore ways to make use of technology to increase audit efficiency and effectiveness, and to equip its auditors with the necessary skills.

## **Acknowledgements**

25. We would like to express our appreciation of the efforts of the National Audit Department of Malaysia in coming out with its Principal Paper on Leveraging Technology to Enhance Audit Quality and Effectiveness. We believe that many SAIs would have much to share on their experiences in this area and we look forward to the fruitful discussion at the 6th Symposium of ASOSAI in Kuala Lumpur.