IMPROVING THE CAPACITY OF THE STATE AUDIT OFFICE OF THE KINGDOM OF THAILAND

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ABSTRACT

During the Covid-19 pandemic, the State Audit Office of the Kingdom of Thailand (SAO) was considerably affected by the lockdown policy. As auditors cannot carry out audits normally, they need some approaches to help them maintain their obligation. Fortunately, the advancement of science and technologies provides opportunities to mitigate this threat. Therefore, the objective of this paper is to emphasize the importance of disruptive technologies on a public audit by illustrating how it affects SAO and the Supreme Audit Institution (SAI) community. Cutting-edge technologies like AI, Blockchain and 5G are increasingly adopted into audit works by many SAIs. Likewise, the SAO has also been introduced to the new audit techniques such as a remote audit and a real-time audit during this period. Additionally, this paper provides an approach to cultivate auditors of the future who possess strategic thinking, digital analytics, and soft skills as suggested in the Moscow Declaration. The last part is to discuss the way forward including recommendations for improving the SAO, international perspectives, and proper application.

KEYWORDS: 1) SUPREME AUDIT INSTITUTION (SAIS) 2) AUDITORS OF THE FUTURE 3) DATA SCIENCE AND AUDIT

Introduction

As science and technology have rapidly developed, organizations are seeking to take advantage of the advancement to improve their performance. According to the INTOSAI Framework of Professional Pronouncements, Supreme Audit Institutions (SAIs) are expected to carry out highquality audits and hold a high degree of good governance. To achieve this, SAIs should also make full use of cutting-edge technologies including, but not limited to, Artificial Intelligence and Data Science. Therefore, the objectives of this paper are to illustrate the importance of the recent technologies on state audit, as well as the characteristics of the auditors of the future. Lastly, the paper also discusses three interesting issues for the State Audit Office of the Kingdom of Thailand to take into considerations when developing a digital strategy.

Part I The Importance of Science and Technology on Public Sector Audit

It has been almost 300 years since the first Economic Revolution occurred. (SET, n.d.) Humankind has adapted from traditional agriculture to applied agriculture, and to internet-based agriculture where a farmer can take advantage of the internet of things to support their farms. Presently, the world is encountering the latest Economic Revolution called the "Data Revolution" (M Report, 2018), that causes impacts on every aspect, even a public sector audit.

Data Revolution aims at creating, storing, and developing data in order to facilitate business. Also, with the advancement of computers, the internet, and smartphones, information can be easily accessed and shared which dramatically changes how organizations operate their businesses. (Sarunya Chansawang, 2017) Additionally, both customer and producer behaviors have been gradually altered by disruptive technologies by which the traditional systems are replaced by more advanced properties. (Sumalee Mahanarongchai, 2019)

Nowadays, the ability to make more market shares depends on the ability to manage and analyze infinite information across the world, and use them to support a business. (Supattra Ammaranon, 2020) Both public and private sectors are managing to improve their IT systems in order to enable them to efficiently and instantly store, analyze, and take advantage of useful information for their works. Furthermore, the utilization of technologies is increasing as the Covid-19 arrived and spread out. (Thai PBS, 2020)

The Pandemic of Covid-19 causes unexpected impacts on economic growth, employment rates, public health, and social security systems to most countries. (Krungthai COMPASS, 2020) Since such measures as lockdown and social distancing have been strictly enforced by the government, this phenomenon greatly stimulates the application of technologies in many aspects. For example, E-learning becomes the main approach for teachers because students cannot go to school due to the lockdown policy (Sarnrangsit, 2020), mobile applications like shopping or food delivery become much more popular than ever because people do not want to go outside. (Bangkokbiznews, 2020) Moreover, both the private and public sectors also encourage their staff to work from home using the Cloud and VIDEO conference in order to maintain the performance during the pandemic. (Nattacha Tawannachot, 2020)

The digital and Covid-19 disruption (Twin Disruption) caused considerable impacts on the operation of the State Audit Office of the Kingdom of Thailand (SAO). Basically, SAO is a Supreme Audit Institution (SAI) of Thailand, responsible for auditing all expenditures of

the Thai government both central and local as well as promoting the fiscal and financial disciplines among audited entities as described in the Organic Act on State Audit 2018. SAO regularly conducts financial, compliance, and performance audits in accordance with the State Audit Policy established by the State Audit Commission. Furthermore, similar to other organizations affected by the pandemic, SAO's auditors cannot carry out audits normally due to the situation either, so they need some approaches to help them maintain their obligation. Therefore, SAO decided to adopt and apply technologies in its duties. For example, SAO conducted a remote audit for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), an international organization based in Vienna, Austria by using a virtual private network (VPN). Additionally, the Auditor General announced the Work From Home Policy (WFHP), and encouraged staff to use an online platform, e.g., virtual meetings, cloud storage for three months (March-May, 2020) in order to mitigate the risks of getting infected or spreading the germ. In June 2020, only 50% of staff were allowed to work at the office as the situation became better. This was the first time that SAO practically integrated technologies with audit works.

Although the concept of the remote audit, real-time audit, and other sophisticated audit approaches were introduced a decade ago, only private audit firms and some potential SAIs can effectively conduct such audits because it requires a lot of resources both knowledge and budgets.

SAI	Example of Implementation of Science and Technology on Public Audit
1. China National Audit Office (CNAO)	Use data analytics for auditing the Government's Covid-19 responses
2. Tribunal de Contas da Uniao (TCO)	Use machine learning for auditing a pension system, social security system, and screening abnormal procurements
3. Accounts Chamber of the Russian Federation (ACRF)	Establish an information analysis system in order to launch a remote audit service
4. Comptroller and Auditor General of India (CAG)	Establish the Centre for Data Management and Analytics serving as a national big data audit development center for sharing information between the Ministry of Finance and other public organizations.
5. Auditor-General South Africa (AGSA)	Use data analytics for assessing the risks for fraud

Source: https://terptoh.blogspot.com/2020/05/brics.html

It was not until 2019 that most SAIs geared up towards the advantage of science and technology. During the 23rd International Congress of Supreme Audit Institutions (INCOSAI), all INTOSAI[1] members agreed that SAIs must adapt and apply disruptive technologies and data science into their operations in order to increase audit capacity as reflected in the Moscow Declaration. (INTOSAI, 2019) The Moscow Declaration has served as a vision and direction for every SAI. One of its principles focuses on applying data analytics, source code, and algorithms into audit works, as well as encouraging SAIs'staff to acquire "Auditors of the future" skills.

Consequently, the INTOSAI Congress established the Working Group on Impacts of Science and Technology on Auditing (WGISTA) to be responsible for studying the scientific and technological contexts of each SAI, identifying factors affecting audits, and sharing knowledge and experiences among SAIs. Interestingly, SAI United Arab Emirates, as a Chair of the WGISTA, stressed the impacts of science and technology on public audit including Data Analytics, Blockchain, Artificial Intelligence, and Cognitive Technologies. (INTOSAI Journal, 2019) Basically, Data Analytics is a new audit technique that enables an auditor to examine the whole population of a dataset instead of taking samples. Together with the Blockchain, auditors can easily and safely access the auditees' database and can explore, select, and compare useful information to support their analysis. Furthermore, this process can be even more efficient by using artificial intelligence (AI) for assisting auditors in simple tasks so that they can have more time to complete more value-added tasks. Eventually, as the AI is trained consistently, it becomes more capable as a cognitive technology. Hence, the INTOSAI community must be aware of the advancement of these technologies and be ready to adopt them as possible.

Part II Moscow Declaration 2019: How to develop the auditors of the future

The Moscow Declaration addresses the fundamental changes that SAIs are encountering with including 1) the adoption of the 2030 Agenda for sustainable development, 2) the data revolution, 3) the adoption of the INTOSAI Framework of Professional Pronouncement, and 4) expectations and obligations arising from ISSAI-P 12: Value and Benefits of SAI. Therefore, INTOSAI members decided to set the future directions of audit as follows;

I. Providing independent external oversight on the achievement of nationally agreed targets including those linked to the SDGs,
II. Responding effectively to opportunities brought by technological advancement,
III. Enhancing the impact that SAIs make on public management accountability and transparency.

[1] INTOSAI stands for the International Organization of Supreme Audit Institutions (INTOSAI). It operates as an umbrella organization for the external government audit community.

MOSCOW DECLARATION

I. PROVIDING INDEPENDENT EXTERNAL OVERSIGHT ON THE ACHIEVEMENT OF NATIONALLY AGREED TARGETS INCLUDING THOSE LINKED TO THE SDGs

1. SAIs are encouraged to contribute to more effective, transparent and informative accountability for outcomes, keeping in mind the complexity of government efforts needed to support the achievement of national priorities and the SDGs.
2. SAIs are encouraged to develop a strategic approach to public auditing to support the achievement of national priorities and the SDGs.
3. SAIs can enhance the value of public auditing by extending the provision of audit-based advice on important and strategic issues of parliament, government and public administration.

II. RESPONDING EFFECTIVELY TO OPPORTUNITIES BROUGHT BY TECHNOLOGICAL ADVANCEMENT

4. SAIs could promote the principle of availability and openness of data, source code and algorithms.
5. SAIs could aim to make better use of data analytics in audits, including adaptation strategies, such as planning for such audits, developing experienced teams for data analytics, and introducing new techniques into the practice of public audit.

III. ENHANCING SAIs' IMPACT

6. SAIs can foster an experimental mindset to enhance innovation and development.
7. SAIs may extend the focus on (a) identifying risk areas of national and international interest and raising awareness of risks; (b) the need for managing systemic risks in the government, in addition to operational, enterprise and other risks of a single entity.
8. SAIs are encouraged to nurture the auditors of the future who can employ data analytics, artificial intelligence tools, and advanced qualitative methods, enhance innovation; and act as strategic players, knowledge exchangers, and producers of foresight.
9. SAIs should consider finding more ways to address inclusiveness when conducting audits as a key point of the 2030 Agenda with its principle of leaving no one behind and other development agendas.
10. SAIs can increase their positive impact by establishing productive interaction with the auditee, and enhancing cooperation and communication with the academic community and public in general.

source**:** https**://**www**.**intosai**.**org/fileadmin/downloads/news/2019/10/EN_23_Moscow_Decl_300919**.**pdf

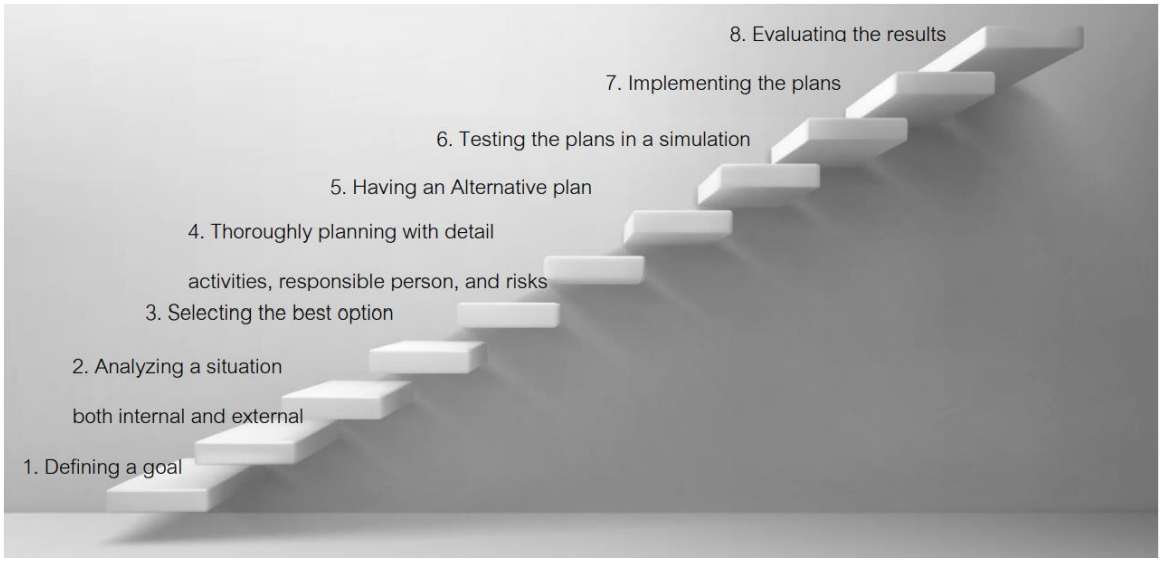
Additionally, to enhance the impact of SAIs as suggested in this document, auditors are encouraged to acquire the "auditors of the future" skills. That is, the auditors of the future are expected to be capable of employing data analytics, applying Artificial Intelligence (AI) and advanced qualitative methods into their works, promoting innovation; and acting as strategic players, knowledge exchangers, and producers of foresight, and so on. In other words, these characteristics can be classified as strategic thinking, digital analytics, and soft skills.

1. Strategic Thinking Skills

Strategic thinking is an approach to find the best option under a dynamic circumstance. This skill was developed based on multidisciplinary concepts so it includes both science and arts. The underlying concepts of strategic thinking skills are Holistic Thinking, Paradigm Shift, Vision, Innovative Thinking, Creative Thinking, Scenario Planning, Risk Management, and Game Theory.

The integration of these concepts affects the characteristics of strategic thinking skills. In other words, a person with the strategic thinking skills could logically think as a process, analyze and evaluate a situation step by step, effectively deal with potential alteration, and easily adapt to a given situation.

Generally, there are 8 steps to think strategically including (1) defining a goal(s); (2) analyzing a situation both internal and external as well as opportunities and threats; (3) selecting the best option; (4) thoroughly planning with detail activities, responsible person, and risks; (5) having an alternative plan; (6) testing the plans in a simulation; (7) implementing the plans; and (8) evaluating the results.



Source: http://tpso4.m-society.go.th/images/DatabaseTPSO4/Research/2561/AcademicWork2561/P1.StrategicThinking.pdf

Strategic thinking skills are important and necessary for auditors. With these skills, auditors could comprehensively plan an audit, understand the strengths and weaknesses of an audit team as well as an auditee. Auditors can also seek the best approach or technique for dealing with a given situation and analyze possible limitations in order to get prepared in advance.

2. Digital Analytic Skills

As stressed in the previous part, the Data Revolution is beneficial to auditors of the future in many aspects especially the application of Data Analytics. Auditors are encouraged to work with data, be able to analyze complicated information, and translate the insight into a very understandable format. For instance, in order to publish an audience-friendly audit report, an auditor may use data visualization or infographic, without audit jargon, for efficiently communicating with stakeholders.

(Comptroller and Auditor General of India, 2016)

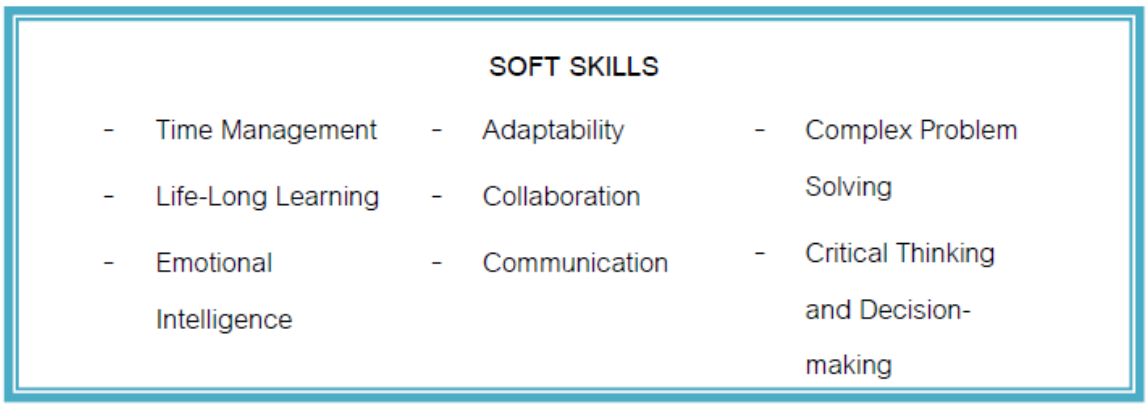
Furthermore, Data Analytics is useful and necessary to auditors in the digital era, since they can utilize plenty of data for efficiently supporting an audit called "audit data analytics".
Audit data analytics is an advanced audit technique for discovering and analyzing patterns, identifying anomalies, and extracting useful information from collected data in order to plan or perform an audit. (Audimation Services, 2019) In other words, Audit Data Analytics is based on multidisciplinary concepts, especially applied mathematics and statistics, as well as computer coding. That is, auditors must firstly have advanced mathematics and statistics knowledge in order to understand the statistical relationship among complex variables. The next step is to code a programming command in which they are required to use the programming language skills so that they can analyze those relationships. Lastly, they have to use their auditing experiences for deciding whether that information can support an audit. Therefore, with this skill, an auditor would become both a data scientist as well as a data analyst at the same time. (Shri Deepak
Mathew, 2020)
In the INTOSAI community, there is a group of SAIs that have credible experiences in big data auditing called INTOSAI Working Group on Big Data Audit. The main objective is to share knowledge and experiences in adopting and applying big data auditing in the real audit. For example, the Forensic Audits and Investigative Service (FAIS) of the U.S. Government Accountability Office (GAO) planned to examine potential fraud by using Data Mining and Data Matching techniques for comparing data of Medicaid providers with the United State Postal Service database. As a result, FAIS found that the USPS recognized several service providers who submitted invalid addresses. (GAO Watch Blog, 2014)

Programming Languages

- C
- R
- Java
- Python

3. Soft Skills

Auditors are required to have hard skills in order to carry out the duties. Nevertheless, because of the nature of an audit that includes considerable communication, auditors are encouraged to also possess soft skills.
Soft skills are the integration of personal qualities (integrity, ego, responsibility, self-management, and social skills) and interpersonal skills (teaching, negotiation, leadership, and teamwork). Therefore, a person with good soft skills is outstanding and beneficial to society. (Positioning, 2020)



Source: https://positioningmag.com/1220556

For auditors of the future, soft skills are very crucial for their obligations because of the nature of an audit that requires them to engage with stakeholders whether auditees or audit teams. By mastering soft skills, auditors can create a positive working environment that eventually increases the efficiency of an audit. Furthermore, the INTOSAI Development Initiative (IDI) has also embedded the relates-to-others skills in many training and workshops. These skills include respect for different views, the ability to work together, the ability to motivate others, communicate in an open and transparent manner, and being a good listener. (INTOSAI Development Initiative, n.d.)
Even though, SAIs. However, some of them may not be able to work with others or work as a team which makes it difficult, or even impossible, for the SAI to achieve challenging goals. On the other hand, if the SAI can embed auditors with the relates-to-others skills or soft skills, these auditors could together drive the organization towards the goals. Therefore, fostering these skills is advantageous to both SAIs and auditors. SAIs could accomplish their objectives and auditors could become valuable resources.

Part III Discussion

As SAO decided to take advantage of science and technology, a thorough study should be firstly conducted in order to examine factors affecting the accomplishment. Therefore, this part provides potential and interesting issues for future considerations. Consequently, the authors divided the discussion into three issues including institutional factors, international perspectives, and proper application.

1. Institutional Factors

Institutional factors are policy and regulation governing the organization. As SAO is encountering the twin disruptions, the immediate policy recommendations for effectively and efficiently responding. The authors classified the institutional factors into three levels including Macro,
Meso, and Micro level as follows;

- **Macro-level**: According to the Organic Act on State Audit 2018, the State Audit Commission (SAC) is responsible for determining the State Audit Policy in order to serve as a direction for SAO. The current State Audit Policy (2018 - 2022) focuses on various aspects regarding the application of science and technology on

audit work including, but not limited to, establishing a database management system and encouraging auditors to acquire the data analytics skills. In other words, the policy is comprehensive covering three important components of digital development including hardware, software, and peopleware. Nevertheless, the most important part of the policy cycle is the implementation phase where theories are transformed into practice. (UKEssays, 2018)

- **Meso-level**: Once the policy was set, it is the mandate of SAO to turn those policies into practice. The SAO Strategic Plan (2019 - 2022) is an implementation tool. The plan consists of 4 strategies including development of audit, promotion of fiscal and financial discipline, engagement with stakeholders, and high potential organization. Digital and technology adoption is also emphasized in the strategic plan, the 4th Strategy. However, only the strategic plan is insufficient for fostering digital behaviors among auditors, but
the tone at the top is also very crucial for this situation. Management should encourage their staff to embrace and apply digital behaviors into their works. As mentioned earlier, some offices in SAO have used virtual meeting programs instead of a face-to-face meeting since March 2020, even for a general meeting. Additionally, digital signature and remote audits were also used during the Covid-19 pandemic. Therefore, it is very important for the Management to be a role model who is willing to adopt technologies and have a growth mindset so that other staff would do accordingly.
- **Micro-level**: This level emphasizes on individuals. That is, staff should be encouraged to possess an experimental mindset in addition to the aforementioned skills. According to the Moscow Declaration, experimental capacities, including learning, testing, and evaluating phases, can enhance innovation and development. However, SAO, itself, should provide opportunities for staff to test their assumptions through an organized setting such as an audit laboratory so that cutting-edge technologies and new audit approaches could be tested. Furthermore, in order to efficiently accelerate the experimental mindset[2], auditors and staff must be resilient and have a growth mindset. (Kaufman, 2012)

[2] The Experimental Mindset is the healthy approach to business. There's no way to tell what will work and what won't. You need to constantly experiment. Every experiment will teach you something new and prepare you better for the next challenge. Experimentation is learning through play. It is the center of living a productive and fulfilling life. (Kaufman, 2012)

Changing the organization to meet international standards is not a one-man task, yet it is a responsibility of everyone in SAO from the very top position to the bottom staff. As SAC places the issue of science and technology as a high priority, SAO has a very strong direction to follow. However, one concerning issue is about fostering an appropriate mindset among the staff so that changes can be easily successful.

2. International Perspectives As the Moscow Declaration suggests, the auditors of the future should possess Strategic Thinking, Digital Analytics, and Soft Skills. Additionally, the Association of Chartered Certified Accountants (ACCA) also provided a moredetailed range of quotients for auditors especially financial professionals.

The ACCA believes that the future auditors should equip themselves with these characteristics including

1) Technical skills and ethics: the skills and abilities to perform activities consistently to meet a defined standard while maintaining professionally and ethically;

2) Intelligence: the ability to acquire and use knowledge for thinking logically and strategically;

3) Creative: the ability to use existing knowledge in a new situation, to make connections, explore potential outcomes, and generate new ideas;

4) Digital: the awareness application of existing and emerging digital technologies, capabilities, practices and strategies;

5) Emotional: the ability to identify and manage your own emotions as well as others;

6) Vision: the ability to anticipate future trends accurately by extrapolating existing trends and facts, and filling the gaps in knowledge by thinking innovatively; and

7): the ability and skills to understand stakeholder's expectation, meet desired outcomes, and create value.

Source: (European Court of Auditors, n.d.)

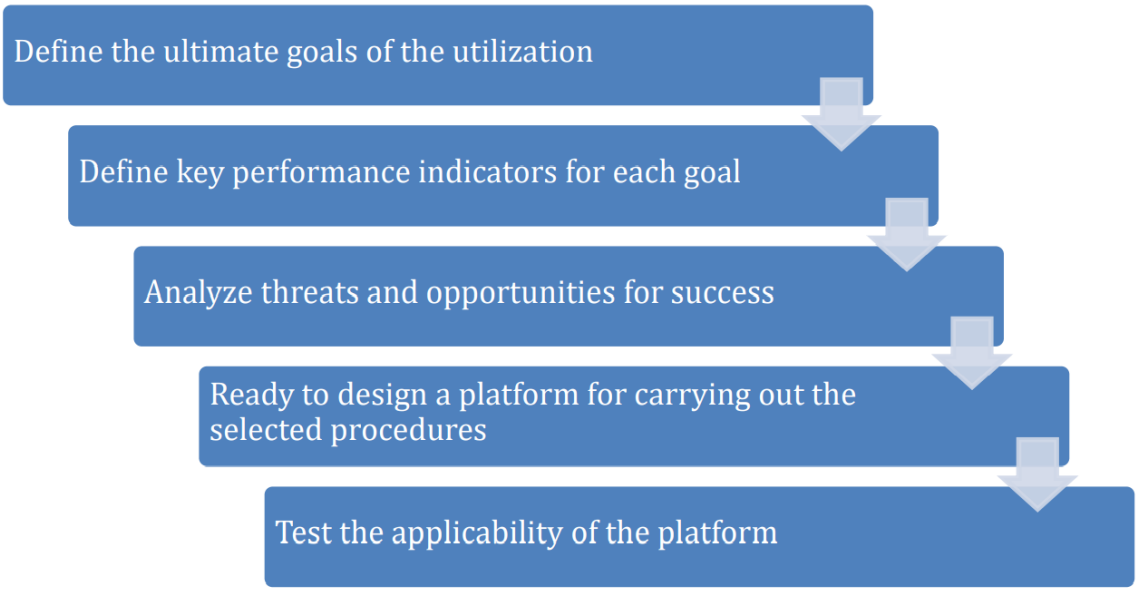
SAO realizes the benefits of these characteristics and encourages staff to practice accordingly. The SAO's Strategic plan (2019 - 2022) focuses on being a high potential organization (HPO) driven by high performing staff. Therefore, by raising awareness and providing knowledge in every possible means (bulletins, infographics, podcasts, multimedia, etc.), staff, especially the young ones, can be accustomed to the terms and vocabs used in these concepts. Once the staff is aware of the necessity of these concepts, they are likely to change their attitudes towards the new working mindsets and are ready to adapt to their works, which eventually change their practices as a result. However, one concerning issue is how to design an effective incentive system in order to motivate staff since mechanisms used in a private sector are not applicable for SAO.

Furthermore, in order to efficiently align itself with the international directions, SAO can take benefits from being a member of the WGISTA. Amid many INTOSAI working groups, WGISTA is new, yet very important. WGISTA facilitates SAIs in orienting the strategic direction of the auditing profession as a result of disruptive technologies and developments in the fields of science and technology, as well as how SAIs could respond to these developments. Therefore, SAO can greatly learn from others, and on the other hand, contribute to the community simultaneously.

The WGISTA is interested in topics including, but not limited to, Blockchain, Artificial Intelligence (AI), Machine Learning, Data Analytics, Quantum Computing, and 5G[3]. Among these topics, SAO also focuses on AI and Data Analytics. Recently, SAO signed an MoU with the Digital Government Development Agency and National Electronics and Computer Technology Center regarding the development of AI in auditing. Nevertheless, in order to sustainably develop the digitized organization, SAO should also conduct a feasibility study on the readiness of the organizational transformation towards AI.

3. Proper Application

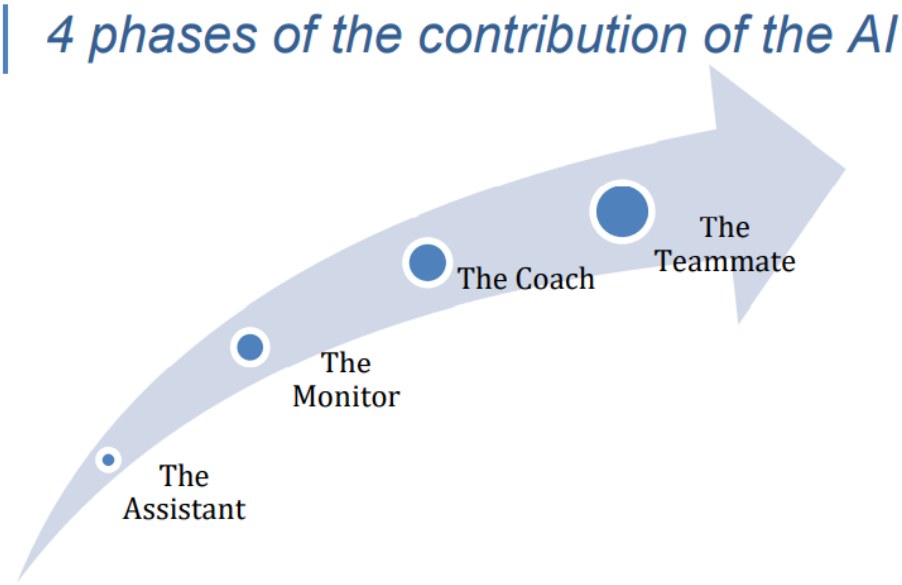
As mentioned previously, SAO may consider the following approaches when developing a digital strategy. According to the Discovery-Driven Planning concept, an organization should adopt technologies step by step. Firstly, an organization has to define the ultimate goals of the utilization by reviewing what procedures can be strengthened by technologies. Secondly, once the goals are set, the organization has to define key performance indicators for each goal in order to effectively monitor the progress. The next step is to analyze threats and opportunities for success, as well as stimulate the success factors while mitigating the risks. Up to this step, the organization is ready to design a platform for carrying out the selected procedures. The platform should be able to connect databases among users from one party with users from other parties so that the organization does not have to invest a considerable budget to establish a large system. Lastly, the organization has to test the applicability of the platform by defining milestones and incrementally experimenting. (Mcgrath R., & Mcmanus R., 2020)



Source**: (**Mcgrath R**.**, & Mcmanus R**.**, 2020**)**

[3] For more information: https://wgista.saiuae.gov.ae/Pages/default.aspx

Additionally, as SAO decided to collaborate with the Digital Government Development Agency and National Electronics and Computer Technology Center regarding the development of AI in auditing, SAO may also consider to what extent the AI can contribute to the organization. There are four phases of the contribution of the AI. The first phase is the assistant. The AI will be trained to learn rules and regulations governing the organization and be assigned with simple, yet routine, tasks including, but not limited to, sorting information and automatically completing such as suggesting most used words or functions, etc. Therefore, auditors will have more time to carry out more valuable tasks. The second phase is the monitor in which the AI can provide real-time feedback. With a machine learning technique, the AI can precisely predict a human's decision and notify when there is an irregularity. This ability is suitable especially when a human is impaired or distracted while making a decision. The third phase is the coach in which the AI can provide staff with their performance evaluation. Unlike a traditional performance evaluation that staff will be evaluated once or twice a year in order to adjust their salary, with the ability of the AI, the staff could see their strengths and weaknesses regarding their obligation on a monthly basis so that they can develop themselves regularly. The last phase is the teammate. The AI will be considered a teammate as long as it can prove its performance and gain trust among staff. This phase is the ultimate goal of applying AI in an organization where staff and the AI can work together seamlessly. In order to achieve this phase, every decision made by the AI must be transparent. In other words, every stakeholder can understand the fundamental variables used in the algorithm which eventually affect decisions made by the AI.



Source**: (**Harvard Business Review, 2020 a**)**

However, one concerning issue is about the bias of the AI. The AI can possibly provide biased information if it was trained by staff with bias inputs in the first place. Therefore, staff must be considerably careful when training the AI. (Babic B., Chen D. L., Evgeniou T., & Fayard A., 2020)

Part IV Conclusion

During the twin disruptions, SAIs need to adapt themselves and take advantage of the advancement of science and technology so that they can deliver the most value and benefits to citizens who are the true owners of public money. In addition to investing in digital-related infrastructures, nurturing staff with the necessary digital skills is also the best strategic move. Auditors, as well as supporting staff, should be encouraged to acquire digital analytics and soft skills. Policies from the Management and tone at the top are very crucial for cultivating expected behaviors and stimulating the adaptation process. Furthermore, together with other members of the WGISTA, SAIs can share knowledge and experiences to strengthen the development and watch over the emerging issues, and eventually adapt themselves again to the dynamic world. Lastly, SAIs may consider the incremental approach when developing their digital strategy, and should clearly determine the boundary of technological utilization.

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