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**Committee of Experts on International  
Cooperation in Tax Matters  
Twenty-Sixth session**

New York, 27-30 March 2023

Item 3(k) of the provisional agenda

**Digitalization and other opportunities to improve tax administration**

**Co-Coordinator's Report**

***Summary***

This report is presented for *discussion* at the meeting of the Committee to be held in New York on 27-30 March 2023. It outlines the work carried out by the group on Digitalization and Other Opportunities to Improve Tax Administration in furtherance of its mandate and proposed plan of work.

The report includes draft prefaces for part 3 and 4 of Guide to Digitalization of Revenue Authorities, as well as 3 annexes containing the draft outline of the guide, draft part 1 on Digital Administration Framework, and draft part 2 on Data Governance Framework.

The Committee is invited to discuss and share its views and input on the various draft sections of the guide developed so far. Based on the discussion at this Session and any subsequent written comments by members of the Committee and Member State observers, the group will revise the attached drafts with a view to submitting them to a later Session for discussion and approval.

## Background and Group Mandate

1. At the Twenty-third Session of the Committee in October 2021, the Secretariat provided a paper on Digitalization and Other Opportunities to Improve Tax Administration ([E/C.18/2021/CRP.30](#)) That paper highlighted issues for consideration in assisting tax authorities to digitalize their operations and improve administration of taxes.

2. As noted in the [Report on the Twenty-third Session](#), after some discussion, the Committee established a group on Digitalization and Other Opportunities to Improve Tax Administration, with Mr. Wazona Ligomeka as Coordinator, and with the following mandate:

“The mandate of the group is to review the work done in other forums on the digitalization of tax administration, to identify existing gaps and consider the possible value added to this work by the Committee, to consider other means of improving tax administration and to suggest how to carry the work on digitalization and improvement of tax administration forward. The small group is to report back to the Committee at the twenty-fourth session on its findings and recommendations.

3. At the Twenty-fourth Session of the Committee in April 2022, the coordinator of the group presented the Coordinator’s Report [E/C.18/2022/CRP.11](#). This report outlined the working group’s plan of work to meet the mandate approved at the Twenty-Third Session and sought the Committee’s views on the Coordinator’s Report and approval of the proposed course of action, which was to

- i) continue with work geared at providing solutions in the gaps identified; and,
- ii) to that end, to encourage participation of more Committee Members in the work of the Group.

4. As noted in the [Report on the Twenty-fourth Session](#) the Committee approved the group’s workplan with several members joining the group, and a call for parties interested in the group’s work to contact the Secretariat.

5. As outlined in the [Report on the Twenty-fifth Session](#), the group proposed to develop a guide to assist countries in digitalizing their revenue administration. During this session, Mr. Ligomeka presented the Coordinator’s report [E/C.18/2022/CRP 33](#), which highlighted the proposed outline for the Guide. The Guide would address issues such as digital tax administration road maps, data governance frameworks, legal frameworks, innovative technologies, and case studies.

6. The Committee expressed support for this work, noting that the workstream was of great significance to developing countries. It was suggested that, for effective revenue mobilization, revenue authorities needed to modernize, including through the digitalization of their operations. The Committee approved the proposal to develop the Guide as proposed by the group. Also presented at the session was preambular text for parts one and two of the proposed Guide, covering digital tax administration road maps and data governance frameworks.

### ***Proposed Workplan and the Sustainable Development Goals***

7. As noted in the [Report of the Committee's Twenty-third Session](#), held in October 2021, the Committee agreed:

(a) To continue to discuss taxation and the Sustainable Development Goals regularly during sessions, as a permanent agenda item.

(b) To request the secretariat to provide regular updates on taxation and the Sustainable Development Goals, at each session:

(i) To preserve the focus of the Committee's work in the area.

(ii) To identify any gaps in guidance.

(iii) To establish priorities for technical work to be carried out by the secretariat; and

(c) To have subcommittees reflect on the link between their work and the Goals.

8. In addressing paragraph (c) of that conclusion, the small group recognizes that digitalization of TAs drastically improves domestic resource mobilization by enhancing (i) the efficiency in the provision of tax services, (ii) the trust, certainty and transparency in the tax collection processes, (iii) accuracy in the revenue data base, (iv) the ability to focus on a risk-based approach and identify defaulters much quicker and (v) it greatly reduces costs associated with TAs' functions. Hence, puts them on course to meet their SDGs.

### ***Meetings of the Working Group***

9. The group held three virtual meetings in November 2022, January 2023 and March 2023 to discuss the identified workstreams to fulfill the mandate of the working group. This report reflects the outcome of those discussions.

10. Participants discussed the feedback that had been received from the Twenty-Fifth Session and incorporated the parts of the Guide that related to Model Frameworks in the respective chapters as opposed to being stand-alone chapters. Therefore, Chapter 8 dealing with Model Digital Framework was incorporated in Part 1 (Digital Tax Administration Roadmap), whereas Chapter 9 addressing Model Legislation was incorporated in Part 3 (Legal Framework).

11. It was further considered that there was a need for case studies that struck a balance of countries at various levels of digitalization. It was vital that the case studies cover countries along the entire spectrum of digitalization so that they could be relevant to a wide range of jurisdictions. These case studies would cover the specific issues outlined in the Guide in alignment with the Working Group's mandate.

12. The Subcommittee on Indirect Taxation extended an invitation to the Working Group to attend their meeting where discussion on the use of new technologies to improve VAT compliance was held. This engagement will assist further collaboration between the Subcommittee and the Group to avoid duplication of efforts and identify areas of convergence and synergy.

## Progress Report

13. The outline to the Guide was amended in line with the discussions at the Twenty-fifth Session and deliberations of the working. The outline is attached as **Annex 1**.

14. The draft preambular text for Part 3 and 4 was also developed and is as outlined below:

### ***PART 3 – LEGAL FRAMEWORK***

#### ***PREFACE***

*Tax Administrations around the world have at least one common goal: to increase tax revenue. In the digital era, it is safe to say that it is very difficult, if not impossible, to achieve such a goal without the inclusion or improvement of digital processes and elements in the services provided by Tax Administrations. This Guide proposes to look specifically at the considerations, essential elements and possible stages and contextual analysis in the process of digitalizing a Tax Administration.*

*In this unavoidable context of the “4th Industrial Revolution”, which has been substantially disruptive for workflow processes and structures of all kinds, traditional ways of collecting taxes, registering and communicating with taxpayers, protecting and increasing countries’ expected tax revenues, protecting taxpayer rights, and enforcing tax laws have been dramatically changing in the last decades. Governments in general and Tax Administrations specifically, are globally concerned with and already in some stage of addressing these changes through introducing or improving existing digital processes and tools in their operations and structure.*

*Every substantial change through history demanded from lawmakers major legal developments and adaptations to institutions’ standards and regulations. In the pursuit of digitalizing its Tax Administrations, different countries may face several hurdles depending on the level and structure of their IT’s infrastructures, connectivity and energy supplies. Thus, challenges in digitalizing Tax Administrations and the approaches taken to address such challenges will differ from country to country. Strong domestic laws create a strong framework for a Tax Administration to have a successful digitalization process, as all existing and new processes and tools must be legally bound to safeguard its effectiveness, especially if they are aligned with the Government’s administrative and constitutional principles, but aligned with the modern digital business models and needs.*

*This section is focused on addressing the possible legal framework adjustments and considerations a Tax Administration is to undergo when intending to digitalize (or increase its digitalization levels) responding to the needs of the current and future digitalized global economy.*

## **PART 4 – INNOVATIVE TECHNOLOGIES**

### **PREFACE**

*Innovative technologies can help tax administrations in several ways. Here are some examples:*

*Automation: Artificial Intelligence (AI) and Robotics Process Automation (RPA) can help tax administrations to automate a wide range of tasks, including data entry, document processing, and even decision-making. For example, AI-powered chatbots can help to give taxpayers answers to common questions, while RPA can automatically generate tax assessment notices and other documents. Automation can help reduce the workload on tax administrators and improve the speed and accuracy of tax-related tasks.*

*Data Analytics: (Big) Data Analytics, especially Business Intelligence (BI), can help tax administrations to identify non-compliant taxpayers and take appropriate action. For example, tax authorities can use predictive analytics to identify taxpayers who are at high risk of non-compliance and target them for audit. Data Analytics can also be used to identify trends and patterns in taxpayer behavior, which can help tax authorities to develop more effective compliance strategies.*

*Distributed Ledger: Blockchain technology as one specific type of Distributed Ledger, can help tax authorities to create a more secure tax system. For example, blockchain can be used to create a tamper-proof record of tax-related transactions, which can help prevent fraud and improve compliance (e.g. VAT and TP). Blockchain can also be used to enable more efficient sharing of tax-related data between different tax authorities, improving collaboration and reducing the risk of data loss or corruption.*

*Cloud computing: Cloud-based systems can help tax authorities to access and share data more easily and securely. Cloud-based systems can be designed to be scalable, flexible, and cost-effective, enabling tax authorities to manage their data and applications more efficiently. Cloud-based systems can also provide tax authorities with real-time access to data, enabling them to make more informed decisions.*

*Electronic filing and payment: Electronic filing and payment systems can provide taxpayers with a more convenient and efficient way to file their tax returns and pay their taxes. These systems can be designed to be user-friendly and secure, and can provide taxpayers with real-time feedback on the status of their filings and payments. Electronic systems can also help tax authorities to reduce the cost and complexity of tax administration.*

*The latter example shows that the use of innovative technologies by tax administrations can be beneficial for tax authorities themselves but also for taxpayers. It can improve taxpayer experience and reduce the administrative burden on taxpayers. Other examples are AI-powered chatbots as mentioned in the first example: they are useful for tax authorities as they relieve the staff from burdensome and time-consuming work. At the same time they can provide taxpayers with instant answers to their tax-related questions. Overall, the aim of applying innovative technologies should be to help tax administrations to improve efficiency, accuracy, and compliance and equally to enhance*

*the taxpayer experience.*

15. The group has developed drafts of Part 1 – Digital Tax Administration Roadmap (**Annex 2**) and Part 2 – Data Governance Framework (**Annex 3**) herein attached.

***Next Steps***

16. The group seeks the Committee's views and input on the various sections of the guide developed.

## ANNEX 1

# **GUIDE TO DIGITALIZATION OF REVENUE AUTHORITIES**

## **PREFACE**

### **DRAFT PART 1 – DIGITAL TAX ADMINISTRATION ROADMAP**

#### **Chapter 1 – Introduction and overview**

- 1.1 Purpose of the Guidance
- 1.2 Importance of digitalization
- 1.3 Challenges faced by countries in digitalization
- 1.4 Contents of the guide

#### **Chapter 2 – Developing a roadmap to digitalization**

- 2.1 Introduction.
- 2.2 Conditions for a successful digital transformation.
  - 2.2.1 Factors to consider
    - Leadership, human factor, data quality, legal context, etc.
- 2.3 Key steps
  - 2.3.1 Vision Setting
  - 2.3.2 Mapping and Benchmarking
  - 2.3.3 Prioritization
  - 2.3.4 Building an enabling environment that supports digital development
  - 2.3.5 Cooperation and building trust
  - 2.3.6 Monitoring and evaluation
  - 2.3.7 Future proofing
- 2.4 Constraints faced in implementing digital tools
  - 2.4.1 Institutional, Legal, Technological, etc.

### **PART 2 – DATA GOVERNANCE FRAMEWORK**

#### **Chapter 3 – Data collection**

- 3.1 Introduction
- 3.2 Sources of Data
- 3.3 Legacy Data
- 3.4 Data Quality
  - Collecting the relevant data, mining and cleaning of data, how to handle unstructured data, how to avoid duplication and different data standards, etc.
- 3.4 Legal Obstacles in obtaining data
  - Data quality
  - Legal obstacles in obtaining data (other obstacles)

#### **Chapter 4 – Use of data**

- 4.1 Data Storage & processing
- 4.2 Data Safeguards
- 4.3 Data Policy

## **PART 3 – LEGAL FRAMEWORK**

### **Chapter 5 - General Overview**

- 5.1 Introduction
- 5.2 Government Functions / Tax Administration's Structure
- 5.3 Constitutional/HR issues
- 5.4 Legal framework review

### **Chapter 6 Review existing laws**

- 6.1 Preliminary research on existing legal framework
- 6.2 Eliminating laws no longer needed
- 6.3 Updating the laws that are still needed
- 6.4 Introducing new laws
- 6.5 Confidentiality

## **PART 4 – INNOVATIVE TECHNOLOGIES**

### **Chapter 7 - Innovative technologies**

**Chapter 8 -** Using new technologies for administrative processes e.g. exchange of information

## **PART 6 – CASE STUDIES**

### **ANNEXES**

- Cross-referencing to other available guidance
- List of participants in the Subgroup on Digitalization of Revenue Authorities



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**Annex 2**

***Summary***

This note contains Annex 2 of the Co-Coordination Report, Part 1 of the UN Guide to Digitalization of Revenue Authorities: Developing a Roadmap to Digitalization of Revenue Authorities.

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## *Chapter 2 - Developing a roadmap to digitalization of revenue authorities.*

### **2.1 Introduction**

In recent years, an increasingly connected digital society has been reshaping the economy by creating new products, services and business models based on new technologies. Every sector of the global economy is rapidly becoming digitalized; original commercial channels were developed, while unfamiliar ways to produce, consume, work, and earn are gradually taking in place. The development and application of disruptive technologies proved to change the way taxpayers and tax authorities interact, the way taxes are paid, and information is stored and used. From this perspective, no tax administration is exempt from the need to address this new economic reality in a cooperative manner, including those from developing countries, which are prompted to deal with this new environment despite difficulties that may occur, such as lack of resources obstructing or slowing down the process.

Tax administrations are faced with more and more challenges to keep up with technological development and globalization in the performance of their tax functions. Similar to private companies and other organizations, tax administrations have a core business, which include guaranteeing that the tax laws are implemented fairly and consistently, and taxpayers comply with their tax obligations. In general, this is done so by providing services to taxpayers to facilitate the way they meet their tax obligations. Particularly, the core functions of tax administrations<sup>1</sup> include:

- registration of taxpayers, including detection of non-registration and false registration;
- processing of tax returns, withholdings and third-party information.
- verification or examination of the correctness and completeness of received information (including audit activities).
- assessment of taxes due.
- process of enforced debt collection.
- handling of administrative appeals and complaints.
- provision of service and assistance to taxpayers.
- detection and prosecution of tax fraud; and
- imposing penalties and interest payments.

Most jurisdictions have one single tax administration for direct and indirect taxes, but some may have separate organizations responsible for collecting different taxes. Customs agencies tend to, in most examples, be separate from the tax agency. Thus, processes of tax operations and customs operations may differ significantly.<sup>2</sup>

The effectiveness of the functions above depends on a set of factors that are not always internal to the tax administration's function but rather impacted by the state of the economy, the government's priorities and culture of the jurisdiction that the tax administration is inserted.

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<sup>1</sup> M.H.J. Alink & V. van Kommer, Chapter 2: Core Business of a Tax Administration in Handbook on Tax Administration (Second Revised Edition) (IBFD 2016), Books IBFD (accessed 17 Nov. 2022).

<sup>2</sup> Ibid

However, when it comes to the functions tax administrations have control over, by adopting appropriate technologies together with instituting ways to monitor and measure their operations and performances, through the so-called best practices, tax authorities will increase their efficiency and organization of work progress, as well improve the relationship with taxpayers that could in turn improve voluntary compliance, enhance trust and lead to better revenue collection.

Good principles of tax administrations' relationship with taxpayers are characterised by:<sup>3</sup> responsiveness, interactive communications with taxpayers on changes in tax law and procedures, consistency and transparency on how tax law applies, usage of taxpayer's information only to the extent permitted by law. Emerging technology such as big data, data analytics, artificial intelligence and machine learning have the potential to significantly improve all of these factors and deliver and improve the core functions of tax authorities. The efficacy of successful implementation of information and communication technology (ICT) solutions in revenue authorities is pegged to the correct digital strategy alignment.

Implementing novel digital tools and starting digitalization projects in an organization do not come without challenges. Digital transformation takes significant financial investment and time. In order to ensure a successful digital transformation, tax administrations should take a strategic rather than opportunistic approach to digitalization; before starting the process of employing technology, tax administrations are encouraged to develop a **digital tax administration roadmap** – a step-by-step plan containing basic principles to be followed by the administration having in mind the long-term goals of the tax administration and the government as a whole. This modular approach ensures that early decisions do not constrain future developments and short-term designs are guided by a long term vision.

Several factors should be considered in the strategy of designing a roadmap to digitalization, such as the legal framework of the jurisdiction in which the tax administration is inserted, the technological availability of resources, the cost and feasibility of adopting new digital tools, the adequacy of each technology to deliver the desirable result, and the objectives aimed to be achieved by each tax administration. Obstacles should not be overlooked; these are mostly related to the collection and use/management of data, the respect of due process and taxpayers' rights, budget constraints and lack of digital skills among the tax authority's personnel.

Designing and following a digital roadmap, as well as adopting appropriate technologies, are important steps in the digital journey, but monitoring and evaluating the progress in automation is imperative to provide authorities with visibility into the value created by their strategy; and it should be made an integral part of any automation initiative. Several international organizations have proposed a "maturity" or "digital maturity" benchmark for tax administrations, which is highly instructive and discussed further below.

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<sup>3</sup> OECD, Centre for Tax Policy and Administration, Tax guidance series, General Administrative Principles – GAP001 Principles of Good Tax Administration, (2001), Paris, OECD Publishing.

In summary, a digital roadmap includes:

Table 1: Key steps for a digital roadmap



Following best practices and the principles set up in this guide, the most appropriate digital roadmap can be drafted and tailor-made for a specific tax administration.

The aim of Chapter 2 of this Guide is to highlight the environment and conditions for a successful digital transformation and the principles to follow when building a digital tax administration strategy, as well as the constraints faced by authorities when implementing digital tools. The content of the guide is based on the best practices and experiences shared by tax administrations.

## *2.2 Conditions for a successful digital transformation*

The digital transformation of a tax administration depends primarily on its unique objectives, but the common overarching goals of tax administrations' digitization include ease tax collection, improve efficiency, ease capacity constraints, offer better services to taxpayers, fight tax fraud and evasion, and countering corruption. Although in many instances the goals of different administrations may converge, the needs and priorities are different. For this reason, it is not possible to provide a one-size-fits-all solution regarding the steps that each tax administration should undertake to digitalize itself in an optimal way. Alternatively, the principles and concepts set out in this Guide aim to provide a framework or a more principled guide that each tax administration can follow and tailor to each needs.

When it comes to digitalization efforts, tax administrations are at different stages in their digital development, and each authority should assess where their starting point is.

Digital maturity is distinct from the general maturity models that can be used to assess the efficiency of a tax administration. While the general maturity of a tax administration reflects the efficiency with which it performs its functions and services, digital maturity is specific to digitalization of tax procedures and is measured according to different benchmarks that take into account the sophistication of the technology itself.<sup>4</sup> (This can range from the most conventional technologies—e.g., web portals and online tax return filing—to more complex and advanced system implementation, such as advanced analytics for taxpayer risk profiling and blockchain applications.)

The existing work carried out by several international organizations to establish either general or digital maturity models and related benchmarks for tax administrations is highly instructive.<sup>5</sup>

According to one research<sup>6</sup>, based on the world-wide experience over the past few years, the digital profiles of national tax administrations can be generally grouped under six levels:

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<sup>4</sup> The sophistication is also a term indicating not a technology type per se but rather the capabilities of a technology.

<sup>5</sup> See the IMF's Tax Administration Diagnostic Assessment Tool (TADAT), the World Bank's Integrated Assessment Model for Tax Administration (IAMTAX), the IDB digital maturity model, the European Union's EC Fiscal Blueprints (2007),

<sup>6</sup> See EY, Tax Authorities are Going Digital (2017), available at [https://assets.ey.com/content/dam/ey-sites/ey-com/en\\_gl/topics/digital/ey-tax-authorities-are-going-digital.pdf](https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/digital/ey-tax-authorities-are-going-digital.pdf); EY, How Tax Administration is Going Digital (2019), available at [https://www.ey.com/en\\_gl/tax/how-tax-administration-is-going-digital](https://www.ey.com/en_gl/tax/how-tax-administration-is-going-digital)

Table 2: Levels of digital profiles of national tax administrations

Level 1	Level 2		Level 3	Level 4		Level 5	Level 6
<b>“E-file”</b>	<b>“E-accounting”</b>		<b>“E-match”</b>	<b>“E-audit”</b>		<b>“E-assess”</b>	<b>“E-government”</b>
Use of standardized electronic form for filing tax returns required or optional; other income data (e.g., payroll and financial) filed electronically and matched annually	Submit accounting or other source data to support filings (e.g., invoices and trial balances) in a defined electronic format to a defined timetable; frequent additions and changes at this level	<b>Paradigm shift</b>	Submit additional accounting and source data; government accesses additional data (bank statements) and begins to match data across tax types, and potentially across taxpayers and jurisdictions, in real time	Level-2 data analysed by government entities and cross-checked to filings in real time to map the geographic economic ecosystem; taxpayers receiving electronic audit assessments with limited time to respond	<b>Transformational</b>	Government entities using submitted data to assess tax without the need for tax forms; taxpayers allowed a limited time to audit government-calculated tax	All government interaction with citizens and enterprises digitalized; seamless international digital exchange of information between law enforcement and tax authorities in different countries

The different digital maturity models will be explored further in this report, but in summary, most international organizations currently adopt 4 levels of digital maturity using a broad evaluation framework, assessing (a) what systems are in place that allow access to online tools for tax services provision, (b) whether data are simply entering a system or are further processed, (c) whether in the above process the tax result is automated merely for internal purposes with low taxpayer interaction or there is a more advanced real time data collection and processing that includes real time cooperation of taxpayers with tax administrations, and (d) a relevant legal framework in place that authorizes the system to operate.<sup>7</sup>

### 2.3 Key steps of a roadmap to digitalization

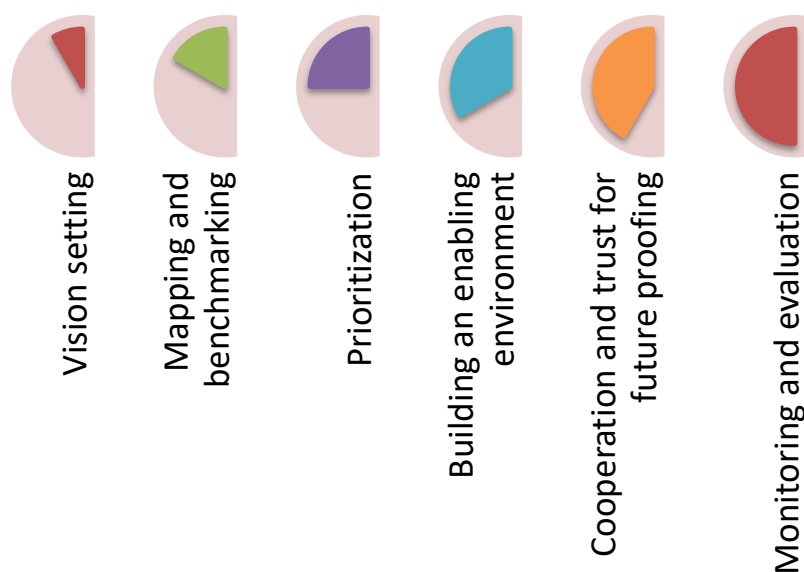
The goal of a roadmap to digitalization is to map out best practices and guiding principles that revenue administration can consult to draft their own strategic plan to digitalization, tailor made for their unique needs.

The optimal way to go digital is not always linear. However, following these steps secure a smoother transition in terms of consistency in tax services provision and efficiency. Following diligently a strategy is important, as automation can be a costly endeavor if applied incomplete

<sup>7</sup> CIAT. (2020). ICT as a Strategic Tool to Leapfrog the Efficiency of Tax Administrations. CIAT. Available at [https://www.ciat.org/Biblioteca/Estudios/2020-ICT\\_STL\\_CIAT\\_FMGB.pdf](https://www.ciat.org/Biblioteca/Estudios/2020-ICT_STL_CIAT_FMGB.pdf); OECD. (2011). Tax Administration in OECD and Selected Non-OECD Countries: Comparative Information Series (2010). OECD Publishing.

and inaccurately, and government administrations are not likely to benefit from the initial steps taken in automation projects if a clear strategy is not followed.

Table 3: Guiding principles for drafting a tax administration digital roadmap



### Overarching principles of digitalization projects

Before going into details of the key steps of a tax administration digital, there are three overarching principles that should be kept in mind throughout each step of the roadmap: ensuring data quality, considering the human and cultural factor and establishing leadership commitment.

#### *Human and cultural factors*

Digital transformation is more about people than technology. A common challenge that government bodies face is that their organizations lack the right talent for the digital era. Nowadays, digital transformation requires upskilling all employees so they can harness digital tools and data. Thus, a strategic stage of the digitalization of revenue administration is ensuring that the human factor is considered. This means the administration should understand what the level of skills of their current staff is and ensure the personnel is informed and aligned with the digitalization efforts.

Often the reason behind the failure of digitalization processes is that strategic teams and leadership lack to consider the human capital in their decisions. The challenges faced by tax administrations related to this step should be mapped out and considered. These may include:

- Difficulties with the explainability and interpretability of digital solutions by tax administration staff
- Less understanding of new capabilities among senior leaders



- Limited availability of relevant expertise and lack of awareness of innovative technologies'' potential<sup>8</sup>
- Retention issues and workforce dissatisfaction around potential impacts of automation
- Lack of collaboration and training across functions,
- Weak vision/buy-in from top management.
- Insufficient data/knowledge management sharing

Tackling these human and cultural barriers is an integral part of a digital strategy since no operating model will succeed long-term without focus on creating a culture where all practitioners can thrive.

It is key to define an operating model that brings tech skills close to each department individually. As opposed to having a separate IT department to serve the whole organization, each department may have an IT person inserted into their context. Some of the best practices implemented by organizations are:

- Support the model with an administration-level team charged with focusing on activities that will yield the highest value across units and functions.
- Establish strong leadership commitment at executive level.
- Consider formally change management programs, with the formation of teams or Centers of Excellence to spread initiatives across the organization
- Implement management committee that aligns and collaborates, removing potential blockages.
- Put significant focus on recruiting, developing, and retaining individuals who can serve as advanced analytics 'leaders' in various parts of the business.
- Create a talent management strategy that fosters the right mix of skills and experience (IT, statistical, analytical and tax domain knowledge) needed to drive informed decision-making.
- Provide capacity building and continuous reskilling and upskilling of the human capital (both in handling the system and in management of the provision of new services)
- Provide clear, concise procedural and policy manuals for each of the tax administrations' functions, closely followed by skilled staff
- Make sure staff embraces change and is part of the process.
- Engage with frontline staff in initiative design.
- Work with professional associations and universities to ensure that the next generation of officials have the required technical skills.

### ***Leadership commitment***

Automation can rarely be addressed in isolation of other strategic imperatives. Improvements in the provision of tax services via digital means should be complemented with improvements in the core processes of the tax administrations if the current administration structure does not

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<sup>8</sup> FATF (2021), Opportunities and Challenges of New Technologies for AML/CFT, FATF, Paris, France

allow for them. This means that investments in ICT will usually need to be backed up by political commitment and willingness to implement the essential changes.<sup>9</sup>

In particular, establishing leadership commitment and involvement is imperative. The personnel in the executive level should be aligned with the rest of their team on what the goals are and the potential of digital tools. There should be a buy-in from leaders in the organization who understand not only the ins and outs of the operations of the revenue authorities, but the digital strategy being built.

### ***Data quality***

Data is crucial in the digitalization process, and it can provide an understanding of trends and patterns across multiple information sources. Authorities have access to a number of different databases (tax returns, financial data, payroll data of employers, audit information, third party information from banks, pensions, exchange of information, social media, etc.).

Tax authorities should not focus on building a data-driven culture, but rather data-informed one. Collecting relevant data from taxpayers and other stakeholders is a starting point, but the ultimate goal is to extract value from the data collected. This is achieved by applying data analysis tools to the available information.

By matching and linking the data from variable sources, authorities get the ability to do more systematic profiling of taxpayers and extract valuable insight into future compliance trends and taxpayer behavior, putting the authorities in a better position for (i) data driven decision-making, (ii) present data visualization and storytelling, and (iii) construct helpful dashboards. This requires the use of simpler and more sophisticated technology tools to create comparisons of the data and insights.

A key question for administrations is whether their data matching process produces results such as linking companies to VAT transactions, payroll, and import/export transactions; linking companies to foreign affiliates and non-arm's length foreign transactions; statistical data correlation with taxpayer compliance.<sup>10</sup>

However, if the data that is fed to the digital system is inaccurate, not comprehensive, inconsistent or biased, the technology implemented is unlikely to provide usable outputs for tax administrations. Thus, authorities should understand which data sources are available to them, how to collect the data and, more importantly, actively manage data to verify that it is fit

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<sup>9</sup> Similarly, according to Taliercio, the factor that enables politicians to make their commitment credible is the level of autonomy given to the revenue authority. Politicians are interested in making a credible commitment because they believe it will increase tax compliance. Autonomy of TAs has an effect on people's perceptions regarding the political commitment to a potential reform. This means that autonomy has merit in itself and not only as a means to better performance of the TAs' functions. Because revenue performance results from a variety of factors, both institutional and extra-institutional which does not permit the extraction of results regarding the impact of autonomy itself on TAs' performance. See in this respect Robert Taliercio, (2003), *Administrative Reform as Credible Commitment: The Impact of Autonomy on Revenue Authority Performance in Latin America*, Washington, DC: World Bank.

<sup>10</sup> J. Owens, B. Schlenker, Development in use of technologies in African Tax Administrations, Tax Notes (forthcoming)

for purpose and relevant. Duplicated data should be avoided, as well as inconsistent formats and incomplete information, the use of multiple units and languages, and inaccurate data.

Ideally, governments should implement the principle of asking citizens for their personal information only once. This means that relevant data enters the system only once and different departments seamless share the collected information with each other<sup>11</sup>.

In practical terms, for example, demands for superfluous information in tax returns can be eliminated and perhaps tax returns and payment invoices can be consolidated. In addition, governments should consider adopting administration-wide data strategies. It is also imperative that tax administrations are able to draw upon data sources outside of their organization, which is facilitated if technical platforms are interoperable between different government departments.

According to research,<sup>12</sup> the best practices in the use of technology and information processes for tax collection are based on the following principles:

- Data enters the system only once (data-only-once)
- Data is managed and processed centrally for various products and services (single source of truth)
- Data travels and is stored on digital media (paperless)
- Information is received and processed in real time (real time)
- Measures are adopted to protect confidentiality.

### *Guiding principles for drafting a tax administration digital roadmap*

#### *2.3.1 Vision Setting*

Before implementing digital solutions, tax administrations should consider their unique needs and set their long-term strategy and vision based on what they want to achieve by using such technology. As mentioned, different countries have different needs usually dependent on the context and the varying levels of "implementation or development". The implementation plan should be appropriate and customized for each tax administration.

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<sup>11</sup> This is already a reality in some countries, such as Estonia. Estonia is universally recognized for the digital transformation of its government. After gaining its independence in 1991, Estonia got off to a good start by investing heavily in its digitization. There are two main factors that have made this process a success: the use of the X-Road software that interconnects various services of public and private sectors, and the adoption of a compulsory national digital ID. The implementation of these two initiatives in 2001 has allowed the Baltic country to provide various e-services to its citizens, including inter alia, tax related services. Every person residing in Estonia receives a personal identification number (*Isikukood*) that consists of 11 digits based on the sex and date of birth of the person. This number represents the person both in the physical and virtual world, and it is displayed on the physical ID card, a mandatory identification document in Estonia. In addition to the physical ID card, citizens can also obtain Digi-ID and Mobile-ID cards. Through these identification mechanisms taxpayers have secure access to e-MTA, the online environment established by the Estonian Tax and Customs Board to provide e-services. On this website taxpayers can file their taxes electronically, initiate correspondence with the Tax Authority, get certificates and documents, view their balance of liabilities, make queries, file requests for refunds, etc. See Kattel, R., and Mergel, I. (2019). Estonia's Digital Transformation: Mission Mystique and the Hiding Hand. In M. Compton and P. Hart (Eds.), *Great Policy Successes* (pp. 143–160). Oxford University Press, available at <https://doi.org/10.1093/oso/9780198843719.003.0008>.

<sup>12</sup> See [Digital Maturity Index: How to measure digital transformation progress in tax administrations - Gestión fiscal \(iadb.org\)](#)

However, a principle that should be applied equally to all tax authorities is that, when setting a strategy, there needs to be a sharp focus on what the initiative is attempting to accomplish; the various steps of the design process should be driven by this clear vision, which is well thought through and agreed between adequate teams of the administration and leadership. The tax administration also has to define what it means to have (and how to build) a disruptive tech mindset and culture.

### *2.3.2 Mapping and benchmarking*

The first step is to know what the organization aspires to achieve, but the subsequent one is to understand how to get there. During the mapping and benchmarking stage, tax administrations should focus on mapping out the current processes and regulations that are in place in the organization, as well as establishing what the limitations they impose on progress and efficiency are. The level and extent of digital transformation strategy of the tax administration is preconditioned on their institutional structure in addition to their tax structure.

### ***Functional analysis***

In order to efficiently perform a functional analysis, tax administrations should map out their functions and obligations. The core tasks of a tax administration concern the implementation and enforcement of tax legislation and regulations; thus, the power to administer taxes imposed by law. These activities include:

- registration of taxpayers, including detection of non-registration and false registration.
- processing of tax returns, withholdings and third-party information.
- verification or examination of the correctness and completeness of received information (including audit activities).
- assessment of taxes due.
- process of enforced debt collection.
- handling of administrative appeals and complaints.
- provision of service and assistance to taxpayers.
- detection and prosecution of tax fraud; and
- imposing of penalties and interest payments.

The description of the above tax administration's functions are connected to the taxpayers' main obligations or duties. The services encompass a reciprocal or transactional element as they are addressed to the taxpayer directly and aim to assist the taxpayer in fulfilling his/her tax obligations. These services are essential to and sometimes precede the performance of the core tax function of tax administrations (i.e., tax collection either enforced or not) and are a way of achieving high rates of voluntary compliance.

These services listed above can be separated in two broad categories: (a) tax services performed by electronic and digital means and falling within the core tax service function of tax administration (i.e. e-filing and pre-filing/e-assessment and in turn, e-payments and refunds) and (b) services that concern the assistance provided to the taxpayer (consultation, information, notification before deadlines and legal guidance, all of which have the potential to be carried

out by electronic means or be fully automated). These are mostly communication channels and processes that facilitate the tax administrations provision of services and their relations with taxpayers (i.e. tax inboxes, chatbots, virtual assistants and virtual file systems as well as digital bookkeeping).

In addition, other functions not directly taxpayer facing are performed internally by tax administrations and can also be transformed by digital means. Technology can be applied in analyzing the high amounts of data collected by tax authorities – e.g., through the application of data analytics technologies – and thereby improving risk management; to nearly fully automating processes and making them more efficient; to facilitate the cooperation between different government bodies.

Tax administrations need to develop effective organizational structures and be provided with adequate resources to effectively and efficiently implement and operate the tax systems they administer. Every tax administration needs an adequate level of autonomy that is reflected in its structure and operational responsibilities and is accountable for its operations. Moreover, the relationship of tax administrations with taxpayers must be laid down in a system of rights and obligations.<sup>13</sup>

### ***Legal and regulatory analysis***

Tax administrations must review the legal and regulatory framework of the jurisdictions they are inserted in, including existing information and reporting requirements, and potentially adapt the design and operation of tax returns and penalty regimes.

When moving to a digital tax administration, some of the processes and regulations described in the tax laws will still be meaningful and needed, but others will have to be reviewed and adapted for a digital age.

During the legal and regulatory analysis, these are some questions that should be considered by tax administrations:

- Are certain existing regulations redundant in a digital age?
- Do laws written in the analogue age work for the digital era?
- Do we need new laws to ensure confidentiality of information?
- Do we need new laws to protect taxpayers' right?
- Should legislation be drafted in cooperation with technologists and other stakeholders?

### ***Eliminating laws and regulations that are no longer needed.***

When analyzing the aptness of the legal framework for the integration of technologies, authorities will often realize that laws and regulations that used to serve a purpose in the analogue age are now redundant if new and emerging technologies are implemented. For

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<sup>13</sup> Most tax legislations have codified the legislation governing the relationship between taxpayers and TAs in order for both parties to be aware and have easy access to the rights and obligations and the steps regulating each tax process.

example, rules that require physically certifying documents (e.g. notarizing, stamping etc.) are an archaic way of ensuring the validity and truthfulness of paper documents that are no longer needed in a digital environment.

Moreover, the deployment of new technologies might lead to rethinking entire systems such as the one on VAT. Under existing VAT systems, neutrality is achieved by a complex system of setting off input and output VAT with the necessary refunds involved whenever applicable. This makes the system susceptible to fraudulent refund claims. Digital technology such as the blockchain might introduce real-time data for all transactions making the system fraud resilient and even potentially obsolete in a move to a one-layered final consumption tax.

### ***Updating the remaining laws***

Some existing rules, however, would remain necessary also in the context of digital tax procedures. For example, this category would include the data protection rules, the rules on good administration, or the right to a fair trial. Such general principles of the legal system would have to be taken into account when embarking on a digital transformation.

Furthermore, often laws are not sufficiently clear or do not relate to evaluating solely quantifiable objective factors. For this reason, sometimes one might find it difficult to automate when the underlying rules entail too great subjectivity or possible different interpretations. To overcome this deficiency a move towards greater reliance on rebuttable presumptions might be necessary whenever automation within a tax system is sought. Naturally, the outcomes of these rebuttable presumptions would be subject to review upon request by the interested parties (i.e. the tax administration and the taxpayer).

Finally, the existing legal system would need to be complemented by a new set of rules that are put in place for introducing the new digital processes. Since such new rules would be of increasingly technical nature, account would have to be taken of the principle of legal certainty, ensuring that the law is clear to those subject to it. In this sense, the guiding principles behind any digital system would have to be set out in a statute that is sufficiently clear and not overly technical.

### ***Challenges of the functional and legal analysis***

The functional and legal analysis step comes with its own challenges. For instance, the responsible team may come to the realization that the organization lacks:

- Alignment between initiative team and business teams
- Consistent methods/processes
- Well-defined desired business outcomes
- Clear responsibilities across functions
- Clear and engaged sponsorship.
- People with appropriate skill sets to define the right approach.

Building a modular approach on how to tackle each of these fundamental challenges is determinant for the success of the digital transformation. One strategic approach is for tax administrations to form a digital steering committee and appoint project managers and a team with sufficient technical expertise.

### *2.3.3 Prioritization*

Once tax administrations have thoroughly understood their processes, available resources, legal framework and current infrastructure they are inserted in, and clearly defined the problems and inefficiencies that they want to address, potential solutions should be considered.

An initial question to be considered is: Could the inefficiencies identified be solved in a traditional way (i.e., with tools already available to the administration)? If not, which technology (or combination of technologies) should be explored?

In this stage, it is important to anticipate that old technologies will continue to coexist with new technologies during the transitional period. Often, there are good reasons for this: replacing a system that is working well can be risky and expensive, while keeping the current system is functional and cheaper. In addition, improvements to the existing systems can always be made and there might not be a need for radical transformation of the ICT systems in place.

However, new technologies may fulfill the revenue authorities' objectives more efficiently. In order to decide what the best solution for an identified inefficiency is, tax administrations must assess what the cost benefit of changing the traditional systems is. It is not unusual for organizations to layer new technologies on top of older ones, rather than totally replacing them.

While it can be expensive to implement new digital systems, sticking to legacy systems can prove to be even more costly in the longer term. Once a new digital tool is in place, the benefits brought by automation are many: more efficiency in the operations of the administration, less costs and time spent by employees, more possibilities of analysis of data and compliance behavior, better targeting of high-risk cases, better and more efficient targeted services, improved governance and lower incidence of bribery and corruption in general.

When making the decision on a suitable solution, authorities should take into account the needs of the organization and understand the environment in which the administration operates (i.e., what are the levels of IT skills in the organization, what is the infrastructure in the country, what is the level of automation in the business community; to what extent governmental agencies are already automated, etc.). This is part of step number 2.

### *Assessing which technology to implement*

When a decision is made to implement a new digital tool, a core element in the process is to identify which IT system is best to adopt to replace the system that is to be discontinued: (a)

an in-house custom-built system developed by staff or a service provider, or (b) commercial off-the-shelf (COTS) product.<sup>14</sup>

The more appropriate decision depends on the needs of each revenue authority. It is a strategic business decision that must conform to the tax administration's overall strategic objectives while it will ensure usability and will be preceded by a cost-benefit analysis measuring the appropriateness of the resources spent.

The nature of the problem that the organization would like to address also plays a role in deciding which system to implement. As seen in sections above, digital tools can be applied in many ways: to deliver better and more efficient services to taxpayer (the so-called “e-services”); to assist in analyzing the high amounts of data collected by tax authorities, i.e., through the application of data analytics technologies, and thereby improve risk management; to nearly fully automate tax processes and make them more efficient; and to facilitate the cooperation between different government bodies.

The table below illustrates the main differences between the two systems that might affect the TAs choice on outsourcing.<sup>15</sup>

*Table 4: Advantages and disadvantages of custom-built ICT solutions and COTS products*

Custom Built ITC solutions	COTS products
<p><i>Advantages</i></p> <ul style="list-style-type: none"> <li>- A solution tailored to the tax administration's structure and needs</li> <li>- Lower initial development cost and potential for more rapid initial implementation</li> <li>- Greater buy-in from counterparts as they have more control over the system and have ownership over design and implementation</li> <li>- Leverages internal expertise</li> </ul>	<p><i>Advantages</i></p> <ul style="list-style-type: none"> <li>- Higher quality, fully-integrated solutions</li> <li>- Built-in industry best practices for all IT competencies (core tax, management information, compliance performance system, and e-tax systems)</li> <li>- Reinforces best practices</li> <li>- Future development costs shared with other customers</li> <li>- Implementation track record</li> <li>- Cutting edge technology</li> <li>- Shorter implementation timescales</li> </ul>

<sup>14</sup> It refers to software and hardware that already exists and is available from commercial sources. When appeared in the early 2000s, COTS systems were ready-made and usually based on leading practice. Although they may require customization and investment expenses, they were marketed as integrated and configurable to meet the varying requirements of modern tax administrations with reduced implementation timelines and investment costs. Later on, COTS expanded to include enterprise resource planning (ERP) and customer relationship management (CRM) applications. Their main characteristic when they were addressed to TAs was that they constituted all-encompassing solutions, meaning that they did not only offer the means to automate processes but also to manage resource allocation and workflow more efficiently while monitoring progress through enhanced management information systems. See Glenn P. Jenkins, *Information Technology and Innovation in Tax Administration*, Kluwer Law International, 1996.

<sup>15</sup> The table summarizes and reproduces the findings of Guillermo Jimenez, Niall Mac Sionnaigh, and Anton Kamenov, *Technology for Tax Administration*, USAID's Leadership in Public Financial Management, February 2013, available at [https://pdf.usaid.gov/pdf\\_docs/pnaea485.pdf](https://pdf.usaid.gov/pdf_docs/pnaea485.pdf).



<ul style="list-style-type: none"> <li>- Capitalizes on existing investments (e.g., leverages existing technology investments)</li> <li>- Internal control of enhancements and maintenance</li> <li>- Flexibility to make changes as needed to be responsive to needs</li> </ul>	<ul style="list-style-type: none"> <li>- Rigorous testing and deployment methodologies</li> <li>- Customization required to meet local requirements (including laws and procedures)</li> </ul>
<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> <li>- Dependency on availability of internal expertise</li> <li>- Significant internal project management capability required for large information technology projects</li> <li>- Difficulty retaining key IT staff</li> <li>- Difficulty keeping pace with advanced technological change</li> <li>- Difficulty enforcing best practice (e.g., integration across tax types)</li> <li>- Difficulty maintaining high documentation standards</li> <li>- Longer development</li> </ul>	<p><i>Disadvantages</i></p> <ul style="list-style-type: none"> <li>- Lack of buy-in with respect to changes in existing business processes, organization, and IT infrastructure by users</li> <li>- Requires significant change management capability in absence of leading practice</li> <li>- Relatively high initial license and implementation costs</li> <li>- Vendor reliance for support and maintenance</li> <li>- Not component-wise (full package offered)</li> </ul>

As far as tax services are concerned, most countries in the developed and developing world are opting for COTS systems that through their interfaces allow taxpayers to perform online routine transactions (i.e. tax return filing, tax refunds, payments).<sup>16</sup> The decision to go for a bespoke in-house system or a COTS is usually based on several factors ranging from technical capabilities of tax administrations to the amount of available funding and the goals of each public organization.<sup>17</sup> Developing economies usually use a combination of IT solutions across the tax administrations' functions. However, in the OECD countries, integrated ICT systems in tax administrations is a more common phenomenon than in developing countries. Historically it has been observed that OECD countries prefer custom-built systems for the more traditional functions of tax administrations and COTS systems for the more innovative functions of tax administrations.<sup>18</sup> The distinction though between traditional and innovative functions is much blurred the more we opt for digital integration and the more the TAs are performing most of their services online.

<sup>16</sup> This is the main way that e-services are provided to taxpayers in Asia and South America, see among others ADB. 2013. *Electronic Taxpayer Services in Asia and the Pacific*. Manila.

<sup>17</sup> See also David Tansey, *Tax Administration Information Systems, Concept, Design, and Implementation*, The Governance Brief, issue 36, (2019), pp.1-10.

<sup>18</sup> Taxpayer Services Sub-Group, Information Note: Tax Reference Model – Application Software Solutions to Support Revenue Administration in Selected Countries, OECD Centre for Tax Policy and Administration, Forum on Tax Administration, March 2010.

One of the most prominent obstacles that TAs still face when they are called to decide on what ITC to implement is the relevant costs. In general, the costs of ICT implementation tend to include hardware, software, procurement, implementing, integrating, operating, training, and replacement expenses, indirect costs, including staff time spent on requirement definition and other procurement activities, training, testing, and general downtime, while the solution is being deployed. There are, however, many other non-quantifiable costs such as frustration of tax personnel which may outweigh the benefits that certain IT offers. For example, third-party data matching can improve compliance, enforcement and institute a perception of fairness among taxpayers while promoting voluntary compliance resulting in higher collections and taxpayer satisfaction. Difficulties of measuring such non quantifiable costs should not deter tax administrations from making a tailored cost benefit analysis depending on the situation.

Many tax administrations in emerging and transitional economies have difficulty in securing the necessary funding.<sup>19</sup> In these cases, the ICT decision should be based on how the strategic objective of each tax administration can be achieved with limited ICT spending or ICT solutions of lower cost.

In principle, choosing among different ITC requires a sequencing. The starting point should be the effective delivery of basic e-services such as taxpayers' registration, e-filing and e-payment of tax obligations. These services are the preconditions for moving afterwards to the provision of pre-filled income or VAT tax returns, based on the information shared among the competent tax offices. Tax administrations could also adopt e-invoicing systems after having implemented an effective system of e-services as per above (although not all countries go into e-invoicing after having a solid system of e-services already in place).

### *2.3.4 Building an enabling environment that supports digital development*

Building an enabling environment that supports digital development includes:

- a) Certifying that the human resources of the organization are considered in the digital reform and being upskilled. This can be done by putting significant focus on recruiting, developing and retaining individuals who can serve as advanced analytics 'leaders' in various parts of the business; providing capacity building and continuous reskilling and upskilling of the human capital, both in handling the system and in management of the provision of new services; and creating a talent management strategy that fosters the right mix of skills and experience (IT, statistical, analytical and tax domain knowledge) needed to drive informed decision-making).
- b) Consider cultural factors of the organization and building a digital friendly environment (e.g., making sure staff embrace change and is part of the process and engage with frontline staff in initiative designs).
- c) Seeking stakeholder buy-in from government leadership and establishing strong leadership commitment at executive level. For example, by supporting the model with

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<sup>19</sup> KfW Development Bank, Information Technology in Tax Administration in Developing Countries, July 2015, available at <https://www.taxcompact.net/sites/default/files/resources/2015-07-ITC-IT-Tax-Administration.pdf>

an administration-level team charged with focusing on activities that will yield the highest value across units and functions.

- d) Ensuring data quality by collecting relevant, clean, non-repetitive and non-bias data that are fit for purpose (i.e., fed for data analysis to extract valuable insights).

These factors are key in the success of digital transformation in any organization and should be considered throughout each step of the digital roadmap. Given its importance, the items have been explored under the section '[overarching principles of digitalization projects](#)' above.

Moreover, organizations should build a digital and change-friendly environment by providing the necessary resources through the change management program. Tax administrations can consider formally change management programs, with the formation of teams or Centers of Excellence to spread initiatives across the organization. It can implement management committees that aligns and collaborates, removing potential blockages; and it can provide clear, concise procedural and policy manuals for each of the tax administrations' functions, closely followed by skilled staff.<sup>20</sup>

### *2.3.5 Cooperation and building trust for future proofing*

Cooperating and building trust with internal and external stakeholders to understand their needs, their experiences, and to obtain their feedback on the program is key in successful digitalization projects.

In order to get the most out of new technologies' potentials, a level of trust between tax administrations and taxpayers is required. If both players work together to build an open, transparent and constructive environment, technologies could be applied to design programs which minimise the compliance costs for taxpayers and administrative costs for governments. Cooperative compliance programs, focused on building trust, may play an important role in the implementation of technologies by law enforcement agencies.

Increased automation in tax administrations and the use of novel disruptive technologies improve tax compliance and modernize taxpayers' services based on the model of customer's experience. This is to be achieved by enabling an "end-to-end view" of taxpayers' cases and interactions, through aggregating data on customer experience from every taxpayer's interaction with tax administrations.<sup>21</sup> Through monitoring of these interactions, tax administrations are able to identify the points where taxpayers are satisfied and then improve

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<sup>20</sup> For example, Serbia Tax Authorities recognize the potential of digital reforms. Their vision for change management programs in the future includes: Implementing strategic oriented documents, which requires dedicated, strong team with divers skills in project management (project orientation is not common approach in state owned institutions and must be encouraged by high management); For employees within the administration, dedicating reform activities while avoiding a conflict with day-to-day job; Monitoring and timely identification of risks; Developing a proper tools for stimulation and sanctions. See Serbian TA's presentations during the Conferences on 'Transforming Tax Administration: The Role of Technology' (30 November 2020) and 'Digital Platforms: New Opportunities and Challenges for Tax Administrations' (31 March 2021), organized by the World Bank, WU GTPC and EY.

<sup>21</sup> Canada Revenue Agency, 2019-20 Departmental Plan, 35; Internal Revenue Service, IRS Integrated Modernization Business Plan, 21.

the overall service provided. In addition to advancing the users' experience, the use of technology in taxpayers' services enhances the integrity of the system.<sup>22</sup>

A clear and well-informed dialogue with taxpayers is a game changer in the digitalization process. Due to the increasing use of digital communication systems, taxpayers can be promptly informed about their tax obligations. They save time and tax administrations reduce significant resources such as staff time taken addressing queries through telephone services or tax offices.

In addition, legal guidance through digital means is a new trend with significant potential but also with many challenges. For example, many tax jurisdictions have already started using most of the social media platforms for their communication with taxpayers which, among others, increases taxpayers' awareness about tax issues. Facebook, Twitter, and YouTube are increasingly employed by tax administrations as a means to reach also younger generations of taxpayers and this is further related to a change in culture on how communication with revenue bodies can be made in the future<sup>23</sup>. Specifically, OECD has endorsed the use of social media in terms of its effectiveness because it tends to promote dialogue between tax administrations and taxpayers together with the image taxpayers have about the tax administrations' function.<sup>24</sup>

In the same line, to enjoy the full benefits of technology, there needs to be a shared view between business and tax administrations on what technology can and cannot deliver, as well as a willingness to embed new technologies into "normal business processes", which requires a buy in from business to work with tax administrations and a level of trust.

### *2.3.6 Monitoring and evaluation*

Drafting and following a digital roadmap and adopting appropriate technologies is a first step, but instituting ways to monitor and measure the operations and performances of tax administrations, through the so-called "best practices", will increase their efficiency and organization of work progress. Monitoring and evaluating progress in automation is imperative to provide authorities with visibility into the value created by their strategy. It should be made an integral part of any automation initiative.

There are a variety of tools available to tax administrations that measure progress in digital reforms, out of which can be mentioned: Tax Administration Diagnostic Assessment Tool (TADAT); Tax DIAMOND (Development of implementation and monitoring directives for tax reform); the ATAF African Tax Outlook (ATO); OECD FTA Maturity Models; Revenue

<sup>22</sup> The integrity is achieved by the accurate matching of computer data for a desired action. TAs are committed to secure privacy, integrity, and verification of any data disclosed for computer matching by the government. See i.e. Kimberly Houser & Debra Sanders (2017)

<sup>23</sup> See also OECD, Social Media Use by Governments: A Policy Primer to Discuss Trends, Identify Policy Opportunities and Guide Decision Makers, Working Papers on Public Governance No. 26, discussing among others the importance of social media beyond simply improving communications, such as the potential of this channel to re-build mutual trust between governments and their constituents, and to improve government's responsiveness to citizens, promote inclusive and participatory access of taxpayers to government services and improve public service delivery.

<sup>24</sup> OECD, Forum on Tax Administration: Taxpayer Services Sub-Group, Social Media Technologies and Tax Administration (2011), Center for Tax Policy and Administration (CTPA), available at <https://www.oecd.org/tax/administration/48870427.pdf>

Administration Gap Analysis (RA-GAP); International Survey on Revenue Administration (ISORA); and models developed by CIAT and IDB.

There are similarities in the tools' design, but while some imply the need for self-assessment from the tax administration side, others include an active involvement from the international organization to perform this assessment. These tools are helpful in improving tax administration through the acknowledgment and implementation of internationally recognized good practices.<sup>25</sup> Often, a maturity model may function both as a benchmark and offer guidance on how tax administrations of a lower level can follow a best practice for improving their performance.

In summary, most international organizations currently adopt 4 levels of digital maturity using a broad evaluation framework, assessing (a) what systems are in place that allow access to online tools for tax services provision, (b) whether data are simply entering a system or are further processed, (c) whether in the above process the tax result is automated merely for internal purposes with low taxpayer interaction or there is a more advanced real time data collection and processing that includes real time cooperation of taxpayers with TAs, and (d) a relevant legal framework in place that authorizes the system to operate.<sup>26</sup>

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<sup>25</sup> J. Owens, B. Schlenker, Development in use of technologies in African Tax Administrations, Tax Notes (forthcoming)

<sup>26</sup> CIAT. (2020). ICT as a Strategic Tool to Leapfrog the Efficiency of Tax Administrations. CIAT. Available at [https://www.ciat.org/Biblioteca/Estudios/2020-ICT\\_STL\\_CIAT\\_FMGB.pdf](https://www.ciat.org/Biblioteca/Estudios/2020-ICT_STL_CIAT_FMGB.pdf); OECD. (2011). Tax Administration in OECD and Selected Non-OECD Countries: Comparative Information Series (2010). OECD Publishing.

## 2.4 Constraints faced by organizations when implementing digital tools

<b>Budgetary considerations and legacy systems</b>	Complexities and costs involved in replacing or updating legacy systems make it challenging to exploit the potential of innovative technologies. Adapting practices to new and (sometimes) untested systems, as well as the ability of actors to understand and train staff to implement them are core issues reported in the digitalization process.
<b>Legal issues</b>	Jurisdictions will have to address the challenges stemming from the legal framework and review the existing rules. While some rules are necessary (e.g., protection of fundamental rights), others were created in an analogue age and are made redundant in a digital environment (e.g., procedural rules enforcing physical certification of documents should be replaced by the possibility of electronic signatures).
<b>Taxpayers' rights</b>	Concerns are often raised by public and private parties on how to ensure the privacy and security of technology tools and how these systems will interact with data protection laws. When implementing technology, there is usually a trade-off between efficiency and data protection and privacy. Finding the right balance is not always easy and authorities must be aware of the concerns and discuss possibilities to address them.
<b>Human factors</b>	Often when digitalization projects fail, it is not because of the technology itself, but because of the people behind the reform. Organizations need to carry the workforce with them by upskilling and consulting them, hiring appropriate staff and putting in change management programs.
<b>Regulatory uncertainty</b>	Even when staff, senior management and supervisors are technologically-literate, the regulatory practices are slow to adjust to a digital reality. Most of the times the regulatory updates lag behind the technology advances
<b>Data quality</b>	Data collected should be consistent, comprehensive, timely and unbiased. This aspect tends to be neglected by organizations, but the premise of "garbage in, garbage out" prevails - the output of a digital tool will only be as good as the data that was initially fed into the system.
<b>Fear of disruption</b>	Implementing novel digital systems in an organization can temporarily disrupt the activities and functions of that body. However, this should not be an impeditive for digital reforms. The focus should be on how to transition into a new digital system while avoiding disruption?

Reference: FATF (2021), *Opportunities and Challenges of New Technologies for AML/CFT*, FATF, Paris, France

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**Annex 3**

***Summary***

This note contains Annex 2 of the Co-Coordination Report, Part 2 of the UN Guide to Digitalization of Revenue Authorities: Data Governance Framework.

## Part 2 – Data Governance Framework

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## **Introduction**

Data and Information have become valuable assets of modern tax administration. This was not the case in time past, when data was seen more as a byproduct of operations. Data provides valuable insights into all facets of revenue administration. The quality of decision-making in Revenue Administration (RA) is greatly impacted by the quality of data and information available to decision-makers.

The digitalization of tax administration in many countries through the use of technology is accelerating the value of data on an ever-increasing scale. Technology is contributing to the increased risk of unauthorized data access and disclosures. The increasing value-addition of data and its associated risk makes an appealing case for a holistic data governance framework in revenue administration.

Data management and governance, essential for sustainable revenue administration, enable growth in revenue and facilitate seamless operation. A sound data governance framework is important for the digital transformation of revenue administration. The prime objective of data governance in a digitalized revenue administration is to create value for tax administrations by ensuring that data attributes (ownership, availability, quality, and relevance) and risk mitigation controls are in place.

This part of the guide is dedicated to discussion on the guiding principles, standards, policies, structures, and procedures of data collection, processing, storage, classification, use, security, archival, and destruction.

## **Chapter 3 – Data collection**

This chapter discusses data source, data attributes, data mining and cleansing, unstructured data management and deduplication techniques. Data collection, which can be used interchangeably with data creation, is the first step of the data life cycle.

Data collection mechanism in TAs can be categorized into the following:

- i. Data acquisition - obtaining data that has been produced by a third-party organization.
- ii. Data entry - manual input of data by humans or devices.
- iii. Data capture – generation of data by devices such as sensors

## Sources of Data

Tax Administrations collect data from multiple sources. Primarily, taxpayers and third parties are the two major external sources of data.

Taxpayers' data is obtained at various stages of engagement. From the onset, data is obtained at registration. Subsequently, data is sourced from taxpayers through filing, surveys, and inquiries. Data from taxpayers is collected through either electronic or manual means.

To administer taxes efficiently, Tax Administrations cannot rely on data supplied by taxpayers only. TAs must utilize data from third parties to enhance taxpayers' compliance. With third party data, TAs can detect potential taxpayers that have not registered and identify false or under-declaration of taxpayers' incomes. Third parties include (but not limited to):

- Treasury Department
- Banks
- National Registry
- Social Security Office
- Immigration Department
- Labor Department
- Transportation Department

## Data Collection Tools

Tax Authority can collect data in a variety of ways, including:

- Forms: Web forms, paper forms and applications forms are some of the most common ways Tax Administrations generate data.
- Surveys: Surveys can be an effective way to gather vast amounts of Information from a large number of respondents.
- Interviews: Interviews and focus groups session conducted with taxpayers offer opportunities to gather qualitative and subjective data that may be difficult to capture through other means.
- Direct Observation: Observing how taxpayers interact with websites, application, or product can be an effective way to gather data that may not be offered through the methods above.
- Device: Use of sensor on products or web metric to gather Information about taxpayer such as number of visits on TAs' website, location of goods etc.

- Web service: use of software protocol or web application programming interface (API) to obtain data from third parties.

## **Types of Data available to TA**

The set of data available to tax authority has expanded to include unstructured data. Before, Tax Administrations harnessed structured data alone for analysis and decision making. What is the difference between structured data and unstructured data? Structured data are data that conform to a pre-defined format and is therefore straightforward to analyze. Unstructured data are Information that either does not have a predefined data model or is not organized in a pre-defined manner.

Structured data include data such as taxpayer registration information, filing and payment Information. These are stored easily in relational database. Storage of unstructured data, such as social media post, chats, emails and sensor data, in relational database is very difficult and impractical. Most times, unstructured data are stored in non-relational (NoSQL) databases.

Unstructured data is a rich source for data analytics to detect events and predict taxpayers' behavior. Tax evasion, fraud, under-declaration can all be detected using unstructured data, as much as structured data.

## **Data Quality**

For data to create value for Tax Administrations, it must have integrity. If data are collected only to satisfy volume requirements, less value will accrue to TAs from data collected. TA should ensure quality controls are in place to enhance the quality of data collected, processed and stored. Quality data are accurate, complete and relevant (timely). TAs should strive to use digital tools for data collection. Collection of data with non-digital tools (paper or manual) minimizes the quality of data. TAs should consider the following to ensure quality data is collected and maintained.

- i. Instill data validation control at time of data capture.  
This includes the use of field validation of data type (Number, letters, email format, phone number format, use of check digit)
- ii. Provide facility to update information  
Some taxpayer information is dynamic. Over time, Information provided may become outdated due to changes in taxpayer situation, status, location etc. outdated

Information needs to be updated and TAs should ensure taxpayers or tax officers can update Information seamlessly.

iii. Compares data across multiple sources

With the use of technology, TAs can validate Information supplied by taxpayers with similar Information at other sources. Inconsistent Information across multiple sources should be investigated and the necessary correction should be made. Continuous data cleansing shall ensure that data is relevant, accurate and complete.

### **Data Mining and Analytics**

Many Tax Administrations collect data from a variety of sources to develop a more complete picture of taxpayers' profiles. Taxpayers are increasingly being required to submit client invoices, statements of accounts, customs declarations, vendor invoices and bank records, mostly in real or near-real time to Revenue Authority. In addition, TAs collect data from sources other than directly from taxpayers.

As Tax Administrations gather troves of data mostly through the use of digital platforms from many sources, the task of analyzing data becomes cumbersome for tax officers. Data analytics techniques and tools are necessities for TAs to derive insight from data. With more data available to TAs, Analytics is no longer an optional tool. Data Analytics has become the driver of compliance risk management program. Risk engines are built using technology to analyze taxpayers from a 360-degree angle.

TAs should use data analytics to mine data to help increase tax collections, target compliance initiatives, and improve overall efficiency. Analytics reveals patterns, trends, and associations in tax and taxpayer data.

Moreover, RA should leverage Big Data and analytics to detect fraud or predict taxpayers' behavior. Big data refers to the increasing volume of data available, the variety of formats and the speed at which it can be processed. Data mined from social media, taxpayers' registers, filing, and other third-party sources can help to:

- i. validate taxpayers invoices,
- ii. verify sales and purchase declarations,
- iii. verify payroll and withholding declarations,
- iv. compare data across jurisdictions and taxpayers,
- v. examine taxpayer lifestyle,
- vi. predict tax residency,
- vii. manage tax debt, and

viii. combat evasion.

### **Unstructured Data in Tax Administration**

The participation of Tax Authorities in the social networking space has only increased the data available for analysis. Unstructured data is becoming a treasure trove of insight and data-driven value addition. Posts, tweets, logs, chats, location data, email, video, audio and other types of unstructured data are rich data sources with leverages for Tax administration. But how can one analyze unstructured data to draw conclusions?

The analysis of unstructured data is possible using technologies and concepts such as Big Data, analytics, NoSQL database, artificial intelligence (AI), machine learning, the Internet of Things (IoT), mobility and cloud computing. On its own, unstructured data are meaningless. They must be transformed with some semblance of structure to be meaningful.

In analyzing unstructured data and extracting insights, TAs should consider the following:

- Determine analysis goal: For example to detect taxpayer sentiment, to identify evasion etc.
- Identify data source.
- Select analytics technique and technology.
- Pre-process and cleanse data.
- Classify and segment data.
- Visualize data.
- Draw conclusion.

### **Avoid Duplication of Taxpayer Registration Data**

In all tax authorities, registration of taxpayers is the prerequisite for all other taxpayer responsibilities. Taxpayer register forms the basis of any taxpayer compliance program. Therefore, a credible taxpayer register is sine qua non to effective tax administration. Credible tax register adheres to tax legislation that forbids multiple Tax Identification Number for a single person (legal or natural). Often, tax authority is faced with duplication in registration data of taxpayers – same person registering more than once and obtaining multiple TIN. Duplication registration may be attributed to many factors – ranging from manual registration process to unsophistication of registration system.

To address issues of duplication in taxpayer registration data, tax authority should strongly consider the following:

- i. The use of automated system with robust duplicate check algorithm to record registration data.  
It is almost impossible to maintain a manual taxpayer registration process and ensure unique taxpayers. An automated system with robust duplicate check algorithm ensures taxpayers are unique by cross-checking registrant information with existing taxpayers' data for similarity. Similarity checks should be on taxpayer identity document (primarily), location, email, name, telephone number, address and/or relationships.
- ii. Requirement of a singular set of government issued identity documents for taxpayer verification.  
The use of singular set of document reference to verify an individual or organization improves the credibility of taxpayer registration. Government issued identity documents may include National Identification card, passport, social security card, driver license, company registration certificate, Business registration certificate etc. Allowing the use of multiple sets for taxpayer registration eviscerates credibility of taxpayer register especially when national systems are not linked. For instance, an individual may be registered twice if he/she presents two sets of identification documents at different times for registration. However, with singular national document requirement, even an unsophisticated system will detect duplication of national document reference number when it is entered more than once.
- iii. Interface Taxpayer registration system with other national systems.  
Taxpayer register is credible if the data provided by taxpayers during registration has integrity. One way to ensure data integrity is to link registration system with other national systems to validate the Information captured from taxpayer and/or retrieve Information for national systems. The interfacing of tax register with national systems may simplify the registration process by requiring taxpayers to provide data that is not available in other national systems.
- iv. Maintain a single registration database  
For duplication check to be effective, taxpayer registration data must be stored in a single database. The use of multiple databases may pose resource constraints on the system and may even be ineffective in ensuring unique registration. Only in extreme cases where a single database may be impracticable should tax authority allow multiple registration database. In such case, duplicate check algorithm should apply to all data regardless of where it is stored – a resource intensive process.
- v. Generate unique Tax Identification Number (TIN) with validation control.

Tax authority should have control over the issuance and allocation of Taxpayer Identification Number. A unique TIN controlled by the tax administration and used for all taxes is essential for effective tax administration. TIN should be generated, preferably by an automated system, with validation controls such as check digit. Revenue Administration should ensure that a single TIN is not assigned to multiple taxpayers and that no taxpayer is assigned multiple TINs.

vi. **Maintaining Taxpayer Register**

The credibility requirement of taxpayer register does not end with the entry of credible data at registration. Over time, taxpayers' Information changed because of changes in taxpayer address, legal status, contact information, or business status. Changes in taxpayer information should be reflected in the taxpayer register. The tax authority should provide mechanisms for taxpayers to make changes and tax officer to validate taxpayers' changes as well as capture changes identified internally.

### **Obstacles to obtaining data**

Since data is the panacea of insightful decision making and value creation, should tax administration collect data from every source possible? Ideally, the answer will be in the affirmative. However, there are obstacles to obtaining data directly or indirectly. Some obstacles to obtaining data are grounded in legal precepts while others may border on capacity constraints. Below are two legal constraints to obtaining data:

i. **Privacy, Confidentiality, and other data protection laws**

Most Tax Administration are bound to adhere to privacy laws which prohibit the sharing of personal Information with third parties unless with expressed consent of the data subject. Similarly, confidentiality laws put a requirement on organizations to protect data against unintentional, unlawful and unauthorized access, disclosure or theft. Violation of these laws has far-reaching effects on the survivability of organizations. As such, organizations exercise extreme care to avoid violation of these laws and regulations. Refusal to share data or limit the amount of data shared with tax authority may be part of the safety measures enacted by organization.

ii. **Data localization and data sovereignty Laws**

One of the important sources of data for TAs is other Tax Administrations under Information Exchange arrangement. A TA ability to freely obtain Information from other TAs are greatly

impacted by data location laws in other TAs' countries. Data localization and data sovereignty laws require data about natural and legal persons to be collected, processed and stored locally. Some data localization laws are flexible and allow transfer to other national jurisdictions, but others are inflexible and prohibit transfer of data across national borders. Where data localization and data sovereignty laws are inflexible, access to relevant Information for other TAs to investigate cross-border tax evasion cases may not be possible.

Besides these legal obstacles, operating incapacity may also pose a challenge to data collection. Operationally, tax authority data collection capacity is impaired by the following:

- i. **Lack of or limited processing and storage capacity**  
The capacity of information systems and data infrastructure is a factor in determining the volume of data to be collected. Where information systems and data infrastructure capacity are limited, the quantum of data collected will be minimum. TAs with manual processes are less likely to obtain large volume of data.
- ii. **Lack of or limited data security**  
Most times, third parties assess TAs data security arrangement and risk management process before finalizing exchange of information agreement. These assessments are necessary because third parties are still accountable for protection of data shared with TA. Where TAs' data security arrangement and risk management are inadequate, third parties will be reluctant to share data with TAs. Third parties assessment looks at areas of data encryption, access control, auditability, roles and responsibility for data ownership and custody.

## **Chapter 4 – Use of Data**

### **Data Storage**

After data is collected by TAs, it is then stored for processing and use. Data storage is the second stage of the data lifecycle. In today's digital world, data are mostly digital. Data are stored in either a database or a file system on a server hosted in an on-premise data center or in the cloud.

Decision on whether to store data in cloud or on premise depends on multiple factors including legal and regulatory compliance, cost, security, and scalability. Cloud storage is advantageous with respect to cost, scalability, availability whereas on-premise storage is advantageous in respect of security, control, and data regulatory compliance.



Even with a decision on cloud storage, TAs need to decide further on the cloud deployment model and cloud service model. There are four cloud deployment models:

- Private cloud: The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and may exist on premise or off premise.
- Community cloud: The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party.
- Public cloud: The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.
- Hybrid cloud: The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds).<sup>1</sup>

Similarly, there are three cloud service models:

- Software-as-a-Service (SaaS): The cloud service provider (CSP) provides software for the user, which is running and deployed on cloud infrastructure. In this case, the user (consumer) is not responsible for managing or maintaining the cloud infrastructure, including network, servers, OSs, or any other application-related issues. The consumer just uses the software as a service on demand.
- Platform-as-a-Service (PaaS): The CSP provides a platform to the consumer to deploy consumer-created applications written in any programming language supported by the CSP. The consumer is not responsible for managing or maintaining the underlying infrastructure, such as the network, servers, OSs, or storage. However, the consumer controls the deployed applications and the hosting environment configurations.
- Infrastructure-as-a-Service (IaaS): The CSP provides the consumer with the processing, storage, networks, and other essential computing resources to enable

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<sup>1</sup> J.R. Wrinkler, *Securing the Cloud: Cloud Computer Security Techniques and Tactics*. (Massachusetts: Syngress, 2011), 29

the consumer to run his or her software, which can be OSs and applications. This model involves managing the physical cloud infrastructure by the provider.<sup>2</sup>

Data storage is also contingent on the type of data TAs collect. Structured data are suited for relational databases while unstructured data typically makes use of non-relational or NoSQL databases.

### **Data usage**

This is the third stage of data lifecycle. During this stage, data is available to TAs, taxpayers, and other stakeholders. Access Control Management enables TAs to define users and usage. Usage of data may include computation of taxpayers' tax liability, generation of reports, data analysis and visualization. Data-driven Tax Administrations leverage data and analytics to solve perennial problems of fraud, low filing ratio, undetected taxpayer, under-declaration, and low payment ratio. Some analytics available to TAs include clustering, predictive modelling, network analysis, visualization and many more. Data analytics results in decision-making and reporting to various stakeholders.

More to that, sharing of data to third party is also consider usage of data. Other TAs, who request and obtain data, use data for similar purposes as the primary TA. Other third parties such as banks, Treasury Department, Purchasing and Procurement Department may use data to validate clients and foster regulatory compliance.

### **Data archival and destruction**

Statutes of limitation on collection of assessed tax and assessment of tax obligation and data retention laws and regulations may render some data no longer useful for everyday operations. Such data are removed from active production and archived and may be destroyed where retention period has elapsed. Data Archival and Data Destruction are the fourth and fifth stages of data lifecycle respectively.

Before data is destroyed, it is critical to confirm adherence to all policies on retention. Even more, data may need to be kept beyond retention where it may be useful for potential litigation and investigation. Tax Administrations should avoid destroying data and maintain a rich data warehouse for analytics purpose.

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<sup>2</sup> John R. Vacca, Computer and Information Security Handbook, 3rd Edition. (Massachusetts: Morgan Kaufmann, 2017), 109

Destruction of data should be handled with extreme care else data may lead to exposure to unauthorized access. Where data is stored on a media which is no longer needed, the data should be destroyed by physical destroying the media. However, if the media is needed for economic reason, then data should be destroyed by demagnetizing or degaussing of the media. Demagnetization avoids recovery of deleted data from a media.

## **Data Safeguards**

The protection of information assets is mandatory to ensure compliance with legal, regulatory and contract agreement and derive the intrinsic value of data. In order to protect data, TAs should consider a combination of legal and institutional framework, physical security and logical security to safeguard data.

### **1. Legal and Institutional Framework**

- i. **Taxpayer Confidentiality and Privacy Laws:** Tax laws in many jurisdictions designate taxpayers' Information as confidential and prohibit unintentional, unauthorized and unlawful disclosure and theft.
- ii. **Exchange of Information (EOI) and Automatic Exchange of Information (AEOI) standard:** EIO and AEOI standards ensure that data recipient TAs or global forum members (on transparency and exchange of Information for tax purposes) are pre-assessed and post-assessed (periodically) to ascertain the adequacy of confidentiality law and information security management framework to safeguard data.
- iii. **Security Policy:** security policy is a comprehensive document that outlines the rules and procedures for accessing, using, and protecting information technology and data assets.

### **2. Physical Security**

When data is stored in a datacenter on-premises, TAs should consider some or all of the following physical access and safety controls:

- i. **The use of Bolting Door Lock at the Datacenter entry door:** Bolting Door Lock is a traditional control that requires the use of metal key to open and lock a door. The keys should be under strict control and duplication of keys should be prohibited.

- ii. The use of Cipher Lock at the datacenter entry door: Cipher lock is a numeric keypad that requires the preset combination of access code to allow access to authorized persons. The access code should be changed at periodic intervals and when staff is transferred or terminated.
- iii. The use of Electronic Door Lock at the datacenter entry door: Electronic Door requires the use of a magnetic or embedded chip-based plastic access card to gain access to an enclosed space. Access card issuance and maintenance process should be carefully controlled. When an employee service is terminated or a card is lost, such card should be deactivated.
- iv. The use of Biometric Door Lock at the datacenter entry door: Biometric grants access through any of the biometric features of the authorized person such as voice, retina, iris, fingerprint, and hand geometry.
- v. The use of Deadman Door or mantrap: Deadman door or mantrap reduces the risk of tailgating wherein an unauthorized person follows an authorized person to gain unauthorized access to an enclosed space. Two doors are set up with a space between the doors where a single person fits. The first door must be closed and locked for the second door to open.
- vi. The use of Closed-Circuit TV (CCTV) camera at data center entrance to monitor entry and exit. Videos and images must be kept for a period to facilitate any future investigation.
- vii. The use of fire suppression to detect and suppress the spread of fire or heat. FM-200 is the most commonly used fire suppression gas.
- viii. The placement of a water detector under a raised floor in data center and computer rooms.
- ix. The deactivation of USB ports on computer hardware to avoid the theft of data with USB drive.

### 3. Logical Security

Unlike Physical security that requires the use of physical object to control access and secure resource, Logical Security controls access to and secure data and information technology resources on the basis on computerized logic.

- i. Identification and Access control

Logical Access Controls can be classified as either Mandatory or Discretionary. TAs should implement more Mandatory Access Controls (MAC) and less Discretionary Access Control (DAC). Under MAC, Control rules are governed by an approved policy and users or data

owners cannot modify the access role. DAC allows activation and modification of access control based on data owner discretion.

TAs should ensure that logical access to data and information resource satisfies the following principles:

- Identification

Identification is the ability to uniquely identify a user (an individual or system). An individual or system is enrolled with a username or biometric feature for subsequent recognition.

- Authentication

Authentication is the process of verifying the claim of identity. It is the combination of identification and verification.

There are 3 common factors of authentication:

- Knowledge (something you know) – such as Password, PIN or Passphrase.
- Possession (something you have) – such as Access Card, Token or phone.
- To Be (something you are) – such as Fingerprint, retina.

Authentication of users can be single-factor (use of one of the above factors) or multi-factor authentication (use of two or all of the above factors).

Single sign-on is a trending authentication technique that TAs can leverage as part of identity and access management program. Single sign-on permits the use of the same authentication information across multiple applications and systems. While the impact of a compromise of authentication information is severe, single sign-on reduces the risk of users writing down passwords where multiple passwords are used for multiple systems, and it is difficult for each user to keep all passwords in memory. It also improves system administrator's ability to manage user accounts.

- Authorization

Authorization is the level of access an identified and authenticated user can have or perform. It is best practice to institute Role-based access control (RBAC). RBAC allows access to data and system based on user role, job description and responsibility. It facilitates Least privilege (exact access needed and no more) and Need-to-know (authorized based on user needs) principles.

- Accountability

Accountability is the capability to identify actions performed by each unique user who was granted privileges. Accountability is assured by the use of audit logs where every activity on data and system is monitored and recorded.

- ii. Data Encryption

One means by which TAs can secure data is to implement Public Key Infrastructure. (PKI). PKI covers encryption of data while in transit or at rest. Encryption is the process of converting data into an unreadable form so it cannot be accessed or read by any unauthorized person. This unreadable data can again be converted into readable form by a process of decryption. Data is encrypted by the sender and decrypted by the recipient. There are many types of encryption algorithm. Some are AES, 3-DES, SNOW, RSA, Blowfish, Twofish etc.

Encryption algorithms can be categorized into two types: Symmetric and Asymmetric Encryption.

Symmetric Encryption involves the use of a single key to encrypt and decrypt data. Asymmetric Encryption, on the other hand, involves two keys – public key and private key. Either public or private key can be used to encrypt data, but decryption is only possible with the corresponding key.

Public Key Infrastructure facilitate adherence to the following digital identity principles:

- a. Confidentiality – access to view or use data is granted to only the authorized person or system.
- b. Authentication– is the verification of the identity of the source of the data.
- c. Non-repudiation – is the indisputability of the source of data or action of a user.
- d. Integrity – ensure that data is original, correct, and complete and is not modified by an unauthorized person or system.

The most efficient use of Public Key Infrastructure (PKI) is to combine the best features of asymmetric and symmetric methods. To achieve enhanced security of data, TAs should consider the use of both symmetric and asymmetric encryption in its PKI implementation.

- iii. Data Backup and Recovery

Tax Administration should institute a comprehensive Business Continuity and Disaster Recovery Planning. Business Continuity Planning (BCP) involves the conduct of risk

assessment and business impact analysis to identify mission-critical business processes and system and identify risk to information assets.

As part of measures to ensure resilience under a full or partial BCP, TAs should adopt and implement a data backup and restoration strategy. Data backup and restoration strategy should be documented in a data backup policy. Data backup is the process of copying data to a separate device or remote location (generally) so that it may be used in the event of original data loss. There are many factors that may cause data loss –internal or external. Some factors include computer viruses, hardware failure, fire, natural calamities, and hacking attacks.

Generally, there are 3 types of backup strategy:

- Full Backup: the entire database is copied up every time, regardless of previous backups. The Backup consumes a lot of time and space, but it is the fastest in recovery.
- Differential Backup: only the new data created since last full backup is copied. It requires less time and storage capacity when compared with a full backup but requires more time and storage capacity than an incremental backup. On the other hand, it is faster for restoration when compared with incremental backup but slower in restoration when compare with Full Backup.
- Incremental Backup: only the new data created since the last full backup or incremental backup is copied. It requires less time and storage capacity when compared with a full backup and differential backup, but it is the slowest of the three in data restoration.

The frequency of data backup should be an important component of TAs' data back plan. The frequency of data backup is determined by an organization Recovery Point Objective (RPO). RPO is the measure of an organization tolerance for data loss. For example, an RPO of 0 hour indicates that data loss is unacceptable and backup procedure is carried out in real-time. Similarly, an RPO of 6 hours indicates an organization accepts a maximum data loss of 6 hours and will carry out a backup procedure every 6 hours.

It should be noted that there is a trade-off between cost and business resilience. The more resilient TAs become (low RPO), the higher the cost of operation and maintenance.

#### iv. Network security

In today's digital world, access to data and resources of TAs are mostly accomplished through network connection. Whether data is stored in a datacenter on-premises or in the cloud, the network to access data must be secured.

#### a. Use of Firewall

The use of firewall to secure the network is common and necessary practice in many organizations and TAs must ensure that network is secured with a firewall.

Firewall is a device or software that monitors and controls incoming and outgoing network traffic as per defined rules. A firewall is designed to allow authorized users and disallow unauthorized users. Application-level firewall is the most secure and highly recommended for TAs to protect network and data.

In the definition of firewall policy, TAs should ascertain the trustworthiness of its sources of network traffic. It is recommended to implement a Default Deny Access Control Policy where network traffic is from untrusted sources. Default Deny Policy restricts all network traffic and allows only preapproved traffics. Unlike Default Deny, Allow All policy allows all traffics except for predefined restricted traffic.

#### b. Use of Virtual Private Network

Virtual Private Network, VPN for short, allows remote access to data and resources through a secure channel using the internet. It extends a private network over the internet in a secure manner. The VPN server is configured at head offices or branches and client software is installed on end-user computers. End-users can connect to data or resources at head office or branches from a remote location by logging into the VPN Client application on his/her laptop or desktop.

The VPN encrypts and encapsulates data in a tunnel when in transit over the internet to safeguard the data from intruder. It is a cost-effective option as it relies on public infrastructure (public internet) to transmit data. The use of dedicated lease line is another option for remote communication, but it is very expensive.

#### v. Education and Awareness Program

While automated controls are highly recommended to safeguard data, they alone cannot prevent or mitigate risk to data assets. Security awareness programs and training should be conducted for TAs staff and other stakeholders to play a key role in mitigating information security risk.

TAs stakeholders should be educated on various aspects of security events to minimize any impact of security breaches. Security awareness programs should include topical areas of the security policies including password standard, email usage, internet usage, social engineering, and other relevant factors.



TAs can offer security awareness to staff and other stakeholders by any of the following ways:

- Workshop and training programs
- Security tips via email
- Documented security policies and procedures
- Non-Disclosure Agreements with employees and third-party vendors
- Awareness through newsletters, posters, screensavers, and suchlike
- Documented security roles and responsibilities
- Simulated drills and security scenarios.

Security Awareness programs are most effective in curbing social engineering attacks. Social engineering attacks are less sophisticated but rely on human intelligence. Baiting, scanware, pretexting, phishing and spear phishing are common social engineering attacks.

### **Data policy**

Tax Administrations (TAs) collect a lot of data from natural and legal persons. This data is used for operational purposes and are routinely exchanged with other TAs and third parties. TAs have a responsibility to ensure confidentiality of data obtained by national laws, bilateral and multilateral information exchange agreements. Data Policy is necessary for TA to meet its confidentiality responsibilities and at the same time derive value from data.

Data Policy is a document that outlines guidance for the management of TA information assets in accordance with laws and regulations. It covers the data life cycle and offers guidelines on attributes of data quality, roles and responsibilities, access, usage, security and privacy.

Data Policy should be developed by a high-level committee comprising of senior executives and process owners of TAs. The committee should oversee the implementation of the policy. At a high-level, data policy should cover the following:

- a. Background
- b. Policy Purpose
- c. Policy Scope
- d. Policy Principles

- e. Roles and Responsibilities
- f. Review Process
- g. Resources
- h. Contacts
- i. Terms and Condition

The effectiveness of Data Policy depends on how well the policy is communicated to all stakeholders. Data Policy should be communicated to all relevant stakeholders. Communication may be achieved through meetings, training, seminars, workshops and email circulation.