Technologies for Better Tax Administration

A PRACTICAL GUIDE FOR REVENUE BODIES

OECD

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Preface

Regardless of the origins and the particular specifics of the environment in which revenue bodies' systems have developed, all revenue bodies share a common interest in technological solutions that can improve their performance. The successful application of information technology will determine the future success of revenue bodies in managing compliance risks and meeting rising service expectations.

Within the context of an increasingly connected digital society with heightened taxpayer expectations, the introduction of Big Data technology combined with advanced analytics and increased digital presence creates an opportunity to deliver significant improvements in the way countries' tax systems operate and connect. They also offer the opportunity to consider moving more to a real-time tax system and to explore new options for managing taxes, countering fraud, dealing with the shadow or hidden economy and assessing how assets are actually being used.

This report explores how technology can help revenue bodies to address issues of compliance and service delivery, primarily by focusing on the use of Big Data, Smart Portal Solutions and Natural Systems. In so doing, it provides a digital maturity model for administrations to use in their strategic and operational planning in these areas to self-assess their operations.

I would encourage administrations to adopt a systematic approach to identifying which emerging technologies may have the potential to impact the delivery of tax services in the future. The environment is changing quickly and unless administrations are alert to these technology changes, they risk not being able to transact with taxpayers in the manner that makes tax compliance easier.

I would like to thank the FTA Bureau for giving their support to the E-services and Digital Delivery Project and the OECD Secretariat whose guidance and advice aided us through the implementation. I would also like to thank members of the Advisory Group that included revenue bodies from Australia, Denmark, New Zealand and Singapore who have provided their valuable advice in identifying areas of research as well as their valuable expert reviews during the preparation on this report.

Meeting taxpayers' expectations in the delivery of digital services requires strong collaboration between revenue bodies and the private sector. I would like to thank Accenture, EY, Gartner, PwC, Teradata and Vertex for their participation in the workshops, their presentations, sharing of knowledge and research, as well as providing their insights about the future development of technology and its impact on tax administration.

Finally, I would like to thank the project team from the Federal Tax Service of Russia who led the implementation of the E-services and Digital Delivery project and prepared this report.

Mikhail V. Mishustin

Commissioner of the Federal Tax Service of Russia
Sponsoring Commissioner

Foreword

Tax Administration of the future series

This report is one of three produced in 2016 by the FTA with a particular focus on how technological and business developments can be leveraged by tax administrations to help realise operational and programme efficiencies and improve their effectiveness.

While the three reports have consistent themes around the use of data, changing customer expectations and the role of emerging technologies, they take different perspectives.

- *Technologies for better tax administration: a Practical Guide for Revenue Bodies* explores how tax administrations can utilise emerging technologies to further enhance their electronic services. It also offers a framework for administrations to assess the maturity level of these services.
- *Rethinking tax services: the changing role of tax service providers in SME tax compliance* looks at developments in the domain of tax service providers and explores how tax administrations can better co-operate with them to improve outcomes for SME taxpayers.
- *Advanced Analytics for Tax Administration: Putting data to work* provides practical guidance on how tax administrations are using analytics to support compliance and service delivery.

Caveat

Tax administrations operate in varied environments, and the way in which they each administer their taxation system differs in respect to their policy and legislative environment and their administrative practice and culture. As such, a standard approach to tax administration may be neither practical nor desirable in a particular instance. Therefore this document and the observations it makes need to be interpreted with this in mind. Care

should be taken when considering a country's practices to fully appreciate the complex factors that have shaped a particular approach. Similarly, regard needs to be had to the distinct challenges and priorities each administration is managing.

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Abbreviations and acronyms

2FA	Two-Factor Authentication
API	Application Programming Interface
ATO	Australian Taxation Office
BI	Business Intelligence
CDO	Chief Data Officer
CIO	Chief Information Officer
CPC	Centralised Processing Centre
CRM	Customer Relationship Management
COTS	Commercial Off-The-Shelf
ERP	Enterprise Resource Planning
FTA	Forum on Tax Administration
FTS	Federal Tax Service (the Russian Federation)
GST	Goods and Services Tax
HMRC	Her Majesty Revenue and Customs (the United Kingdom)
IRAS	Inland Revenue Authority of Singapore
IT	Information Technology
IVR	Interactive Voice Response
KYC	Know Your Customer
NFS	No Filing Service
NLSR	Natural Language Speech Recognition
PAYE	Pay-As-You-Earn
PIN	Personal Identification Number

PKI	Public Key Infrastructure
SCM	Supply Chain Management
SME	Small and Medium Enterprises
SMS	Short Messaging Service
SKAT	Danish Customs and Tax Administration
SQL	Structured Query Language
SSL	Secure Socket Layer
SUS	System Usability Scale
UXD	User Experience Design
VAT	Value Added Tax
XML	eXtensible Mark-up Language

Executive summary

Disruptive technologies are reshaping the economy by creating new products, services and business models. At the same time the Internet, portal solutions, social media, mobile platforms, cloud computing and Big Data technologies are creating new opportunities for citizens. They are also challenging the way tax administrations go about their work by providing new opportunities to administer taxes, support taxpayers and encourage their participation.

At the March 2015 Forum on Tax Administration (FTA) Bureau meeting, Commissioners endorsed a proposal by the Federal Tax Service of Russia (FTS) for it to lead a project to explore the latest developments in information technology that could enhance service delivery within revenue bodies, particularly focusing on developments in e-services and digital delivery.

This report focuses on two of the technological features discussed: Big Data Management, and Smart Portal Solutions & Natural Systems. These technologies are allowing revenue bodies to change the way they operate, how they provide service and manage compliance risk, and, importantly, how they develop environments that make tax compliance less burdensome and more effective for taxpayers.

For revenue bodies, these technologies are challenging them to think differently about their business and to critically look at whether their products, services and business model are sufficiently aligned to support tax administration in the 21st century. This fundamental re-examination of the *tax system as a whole* goes far beyond simply facilitating existing operations with new technologies or adding digital services to existing products and business processes. It requires revenue bodies to consider where and, importantly, how various tax responsibilities are managed. Adapting to this new environment requires them, among other things, to consider how they:

- Respond more quickly to taxpayer expectations of contemporary e-service and digital delivery;
- Become more agile and responsive to dealing with rapid and unexpected change;

- Ensure business architecture is adaptive and capable of supporting more timely digital delivery, collaborative platforms and simplified integration needs;
- Adjust compliance approaches to incorporate expanded service interventions and the use of new technologies; and
- Develop new capabilities and establish a culture that includes being data-driven and intelligence led.

With the majority of taxpayers neither interested in the internal operations of government nor generally wanting to invest time and effort in learning details of how to comply with tax laws and regulations, revenue bodies need to consider how they can better position themselves to assist and guide taxpayers to the services they need. Many administrations are taking a life events approach which also involves connecting with other government services and events. Such an approach can only be effective if administrations have improved knowledge of taxpayers and the ability to deliver new services using digital technologies. Consideration must also be given to how taxpayers are engaged in the design and development of these services to ensure they are effective and that any issues around use of data, including privacy and security where data is shared, as well as interoperability between government agencies or across borders, are appropriately considered.

Big Data technology offers revenue bodies the opportunity to extract better business value out of existing data. Investment in new capabilities creates the possibility to develop new and convenient services for taxpayers, along with the ability to create new tools that will help the administration provide proactive services; better manage and address tax risks including tax avoidance, evasion and fraud; and improve other targeted activities including debt collection or making social payments.

The availability of data in real-time or near real-time will create opportunities for revenue bodies in the future. Instead of capturing and analysing transactions that have already occurred, revenue bodies can consider how they might support tax assessment in real-time or near real-time. They can also explore options where features of the tax system are incorporated into the natural systems taxpayers use to operate their business or complete personal activities such as banking. Further, these technologies also offer administrations the opportunity to differentiate service based on the inherent risk of a transaction, a taxpayer or an event.

This report explores the opportunities that using Big Data presents for revenue bodies, and in so doing it identifies the asset value of Big Data, presents the potential business value it can deliver to revenue bodies, and highlights the new capabilities they will require to become more data-driven and to generate value from their data assets.

Many administrations have begun to use advanced analytics to assist in managing taxpayer interactions. While such practices are still in their infancy in most administrations, they are providing some positive results, encouraging tax administrations to further invest in such technologies as they look to improve tax compliance, reduce taxpayer burden, increase taxpayer trust and confidence, and improve business efficiency and revenue collection by delivering services and approaches that are more customer-centred.

This report also explores the use of Smart Portal Solutions and Natural Systems in tax administration, particularly the:

- Opportunities provided by integration of Big Data technology with portal and/or natural systems platforms;
- Key features of smart portal design that facilitate the delivery of contemporary services to taxpayers; and
- Evolving collaboration between revenue bodies and software developers and businesses to co-design and deliver contemporary services to taxpayers.

Finally, the report provides revenue bodies with recommendations on how to identify their level of digital maturity. Using a Digital Maturity Model for Big Data management and Smart Portal and Natural Systems, administrations can self-assess their current level of digital maturity and identify areas for further attention.

Chapter 1

Background and introduction to technology and tax administration

Effective deployment of e-services and emerging technologies can assist revenue bodies in providing better services to taxpayers and lower their operational cost, while at the same time enhancing taxpayer compliance. The options available to revenue bodies are many and varied. While the cost of implementation may be high, the opportunity cost of not moving decisively into this space is higher.

It is therefore important that revenue bodies have sound and relevant information at their disposal to inform organisational decision-making and reduce the investment risk, whilst improving the end-to-end customer experience and overall levels of compliance.

This chapter provides the background and context for the E-services and Digital Delivery Project, describes the methodology and the work process used in the preparation of this report, and provides the rationale for selection of the issues which this report addresses.

Context and background

At the March 2015 Forum on Tax Administration (FTA) Bureau meeting, Commissioners endorsed a proposal by the Federal Tax Service of Russia (FTS) for it to lead a project to explore the latest developments in information technology that could enhance service delivery within revenue bodies, particularly focusing on developments in e-services and digital delivery.

This project continues the FTA series of studies focused on service delivery by revenue bodies from the FTA country members.

In 2011, the FTA conducted a study entitled *Working Smarter in Revenue Administration – Using demand management strategies to meet service delivery goals* (OECD, 2012a). That report noted that despite investment in multi-channel service models and objectives to move taxpayers to online channels and self-service, many revenue bodies continued to experience high demand for services in their more expensive channels, such as in person and inbound call channels. The report identified opportunities for revenue bodies to review the way they organised the demand management task, including governance, data capture and measures of success, in order to identify and address the drivers and root causes of demand rather than managing the demand itself.

In 2012 the FTA published *Managing Service Demand: a practical guide to help revenue bodies better meet taxpayers' service expectations* (OECD, 2013a). The guide, which was based on observed best practice from member countries, provided a governance model and offered guidance to help identify and address drivers and root causes of service demand.

Acknowledging the developments in technology, continuing pressures on reducing revenue administration costs, and growing demand from taxpayers for service improvements, the FTA in October 2014 published *Increasing the use of self-service channels* (OECD, 2014a). This report proposed a framework for the evolution of digital "self-service channels" in tax administration, and made recommendations as to how to increase the take-up and use of self-service offerings. The report identified four key elements that revenue bodies needed to systematically work on to achieve change in this area, namely: monitoring and understanding service demand; applying user-centred service design; purposeful implementation, using push and pull approaches to drive take-up; and effective channel management to direct taxpayers to self-service options.

This latest report strengthens the FTA's work in advocating the use of effective service design and contemporary services to enhance taxpayer compliance, as outlined in *Right from the Start: Influencing the Compliance Environment for Small and Medium Enterprises* (OECD, 2012b). The report

also draws on other OECD publications including *Together for Better Outcomes: Engaging and Involving SME Taxpayers and Stakeholders* (OECD, 2013b) and *Tax Compliance by Design: Achieving Improved SME Tax Compliance by Adopting a System Perspective* (OECD, 2014b).

Methodology

The report is prepared by the FTS with support from the OECD Secretariat and an Advisory Group with representatives of revenue bodies from Australia, Denmark, New Zealand and Singapore. The Advisory Group was tasked with assisting the FTS in delivery of the project and in particular helping to confirm the project scope following the July 2015 workshop and approving the content and observations contained in this Report.

The Report is based on information gathered on the latest developments in information technology that are already being used, or in some cases, could be applied by revenue bodies to improve the efficiency of e-service delivery. This information was sourced from technology conferences, workshop presentations and country examples provided by revenue agencies, as well as examples provided by private sector representatives.

The FTS hosted two workshops in Moscow in July and in November, 2015. They brought together senior managers and subject matter experts from revenue bodies of 25 FTA member and non-member countries from: Armenia, Australia, Belarus, Brazil, China, Denmark, Estonia, Finland, Germany, Hungary, India, Italy, Japan, Kazakhstan, Malaysia, Mexico, Netherlands, New Zealand, Russia, Singapore, South Africa, South Korea, Spain, Switzerland and the United Kingdom. The workshops were also attended by a number of private sector consultants from Accenture, EY, Gartner, PwC, Teradata and Vertex. These industry leaders have shared their research and insights into the development of information technology as well as provided their views on how technology can be applied in service provision in revenue body.

The first workshop canvased the views of participants to explore and identify common taxpayer expectations of digital services. It also allowed revenue bodies to outline how they were responding to these. The delegates of the first workshop identified eight common technological features of particular interest to revenue bodies:

- Digital-by-default
- User-centric design with tailored engagement
- Single taxpayer file
- Leveraging partners in digital ecosystem

- Smart portal solutions and natural systems
- Use of mobile apps
- Big Data and data analytics
- IT infrastructure

Many of these technological features are part of revenue body's current work programmes to improve their service delivery capability.

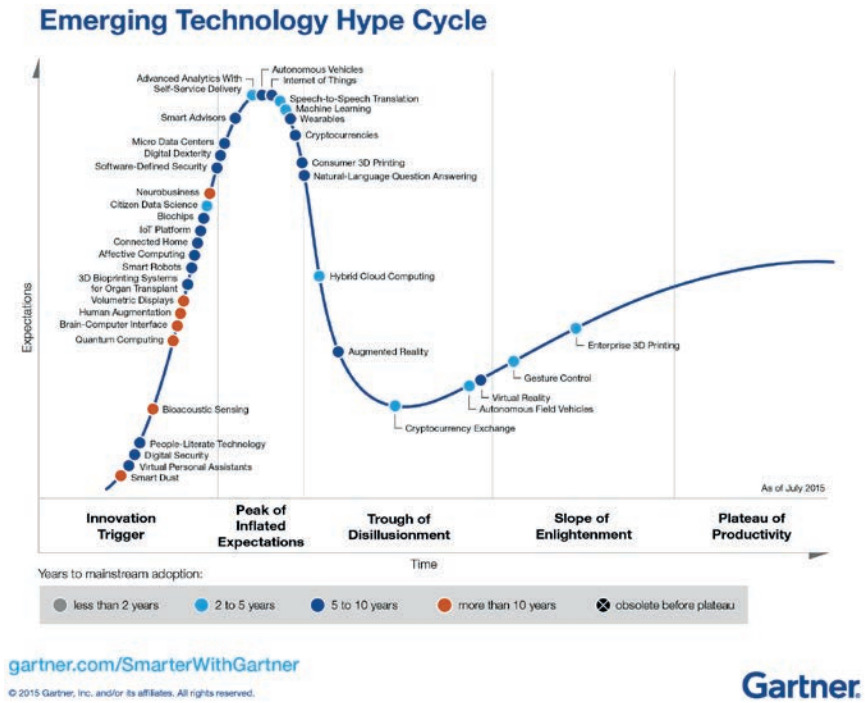
The feedback from the initial workshop was summarised for FTA members, and, after consultation with the OECD Secretariat and the Advisory Group, the FTA agreed that the project should focus on two areas that were considered to offer the most value to participating revenue agencies at this stage: *Big Data and Analytics* and *Smart portal solutions and natural systems*, with the exploration of Big Data to focus more on the technology aspects rather than data analytics, which was the subject of other work by the FTA's Advanced Analytics programme.

Big Data Management and *Portal solutions and natural systems* were explored in detail at a second workshop in November 2015. During the course of which participants agreed that the term portal solutions should be read as *digital presence* out of concern that portal tended to suggest websites accessed from laptops or personal computers (PCs), when the work was intended to explore administrations' wider thinking on the subject which included portals, apps, application programming interfaces (APIs), chat, social media, video and other digital approaches to providing access and service to taxpayers.

For a more practical approach, it was agreed with the Advisory Group that the project would develop a Tax Administration Digital Maturity Model for tax administrations to use as a tool to assist in self-assessment of their organisations' digital maturity level. In this Report the Digital Maturity Model addresses the issues of Big Data and Smart Portal Solutions and use of Natural Systems.

Besides workshop presentations and discussions, this Report was supplemented by information obtained as a result of participation in technology conferences and additional research, especially in the areas of Big Data and development of the Digital Maturity Model for revenue bodies. The project also made use of the Emerging Technology Hype Cycle. This is a branded graphical presentation developed and used by US Information Technology (IT) research and advisory firm Gartner that illustrates the maturity, adoption, and social application of specific technologies (see Figure 1.1). Tax administrations are encouraged to utilise models such as this to help them monitor and identify which emerging technologies have a potential to impact their operations and how they may leverage these in the delivery of the tax system.

Figure 1.1. **Hype cycle of emerging technologies**



Source: Gartner, 2015.

Project objectives

The effective deployment of e-services and emerging technologies can assist revenue bodies in providing better services to taxpayers and lower their operational cost, while at the same time enhancing taxpayer compliance. The options available to revenue bodies are many and varied. While the cost of implementation may be high, the opportunity cost of not moving decisively into this space is even higher. It is therefore important that Tax Commissioners have sound and relevant information at their disposal to inform organisational decision-making and reduce the investment risk, whilst improving the end to end customer experience and overall levels of compliance.

Following the July workshop, the Advisory Group endorsed the following objectives for the E-services and Digital Delivery Project:

- Identifying emergent information technologies, especially in the area of digital delivery and e-services that can enhance service delivery

in revenue bodies, and describing how these can help address service expectations of taxpayers; and

- Exploring in detail two of the key issues identified: digital presence and natural systems, and Big Data management.

Report structure

The introductory chapter provides the background and context for the study, outlines the project scope and objectives, and explains the methodology used in preparation of this report. The remainder of this report is organised as follows:

Chapter 2 provides a strategic context for the challenges that revenue bodies face in delivery of modern services to taxpayers. Particular attention is paid to taxpayer expectations that drive development of e-services and digital delivery by revenue bodies. It also provides an overview of common technological features of a mature tax administration and includes illustrative examples that describe current best practice and countries' activity to address taxpayer's expectations of digital tax services.

Chapter 3 provides an overview of Big Data technology and elaborates on the impact it is making on business models in the commercial sector and in some revenue bodies. The chapter describes potential benefits and opportunities that revenue bodies can achieve through the application of Big Data technology. It also provides a description of Big Data architecture and practical guidance to the process of transforming a tax administration into a data-driven intelligence-led organisation, specifically addressing organisational and cultural change. These elements are brought together in a Tax Administration Digital Maturity Model for Big Data Management that allows administrations to assess their current Big Data capability and practices, and to set objectives and develop strategies for reaching higher maturity levels.

Chapter 4 explores the use of portal solutions and natural systems by revenue bodies, providing examples of revenue bodies' digital presence experience and smart customer centric portal design. It describes the approach to delivery of digital services and the main features of a tax administration smart portal with particular focus on security of access, certainty of use and proactive customised customer experience. It also provides the Tax Administration Digital Maturity Model for Portal Solutions, which will allow revenue bodies to self-assess their current services offering.

Chapter 5 summarises the key findings from previous chapters and sets out recommendations that revenue bodies may consider to make progress in this area.

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Chapter 2

Strategy and vision for leveraging new technologies in tax administrations

Disruptive technologies are reshaping the economy by creating new products, services and business models. At the same time the internet, portal solutions, social media, mobile platforms, cloud computing and Big Data technologies are creating new opportunities for citizens, they are challenging the way tax administrations go about their work. Adapting to this new environment requires tax administrations to establish a culture that is more strongly data-driven and intelligence-led.

It also requires tax administration to become more agile in responding to both the changing expectations taxpayers have of service provision, and to critically examine and possibly re-design business processes to take advantage of the expanded range of interventions made possible by the new technologies and approaches discussed in this report.

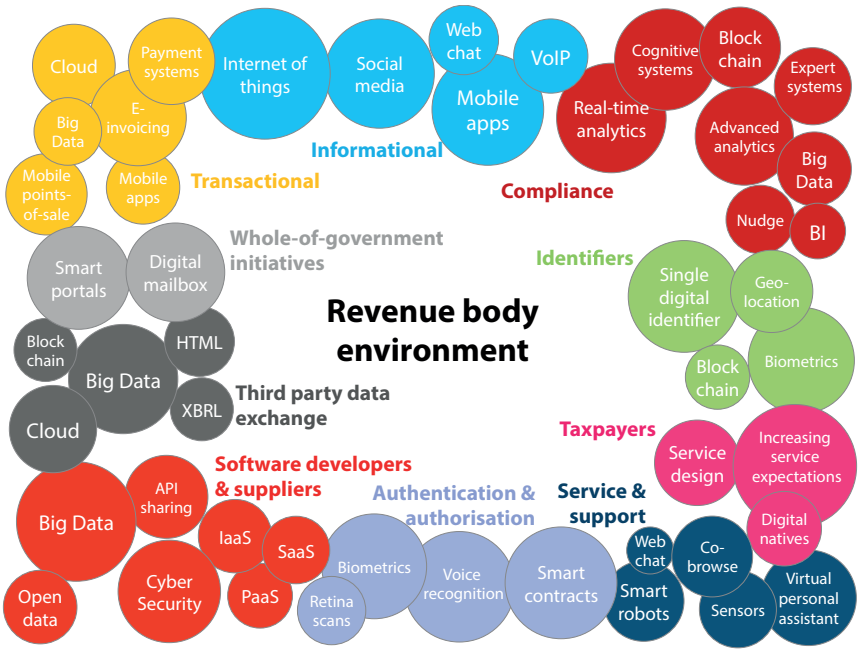
This chapter provides a strategic context for the challenges that tax administrations face in the delivery of modern electronic and digital services to taxpayers.

Digital disruption

Revenue bodies are part of a world that is becoming increasingly digital. They are operating in the environment where new technologies are disrupting the way people and businesses communicate, produce goods and provide services. The consequences of where these developments might lead to are difficult to predict and are often unexpected.

Who would have thought twenty years ago that long distance calls could be made for free or that digital cameras would practically put film manufacturers out of business? A few years ago it was almost impossible to imagine that apps would exist for almost every facet of our lives, from managing our banking, to ordering the delivery of fast food or arranging airline flights. These apps however also have downstream impacts and wider ramifications. While many have seen the emergence of new businesses and business models, they have also seen the closure of others, and considerable disruption to most. For example, the apps that allow us to call a taxi or improve how we move around cities have impacted significantly on the car manufacturing industry by

Figure 2.1. **Disruptive environment surrounding revenue bodies**



Source: Australian Tax Office (ATO), 2016.

creating a choice between ownership of a vehicle and convenience of various transportation services (Diamandis & Kotler, 2015).

Internet, portal solutions, social media, mobile platforms, cloud computing and Big Data technologies are opening up new opportunities. In doing so, they are impacting on the strategies and business models of both private and public sector organisations. These so-called *disruptive technologies* are reshaping our economies and in so doing are raising interesting questions for revenue bodies, not just as tax collectors, but also about the way they go about their business activities.

This shift is also changing how Information Technology (IT) is viewed and how businesses are considering and managing their IT investment. No longer is IT just about running the computer network or managing storage or computing software. Instead it needs to manage multimedia operations, communication networks, connectivity and content. This technology shift, which has been largely driven by mobile technology, the Internet of Things, Big Data and access to lower-cost and larger data storage options, is allowing revenue bodies to consider how they change the way they operate; the way they manage service and compliance risk; and, importantly, how they support the development of environments that can make tax compliance less burdensome and more effective for taxpayers, by:

- streamlining operations,
- improving security,
- enhancing analytics capabilities, and
- further developing compliance approaches where taxpayers can obtain the certainty and convenience they need, while revenue bodies get the transparency they require to ensure effective management of the tax system as a whole (van der Enden & Roytman, 2015).

It is increasingly clear that the successful application of information technology as a key enabler will determine the future success of revenue bodies in effectively and efficiently managing compliance risks and meeting rising service expectations (Gray, 2015; Regan, 2015).

Taxpayer expectations of digital services

The widespread availability of inexpensive devices with extremely powerful computing capabilities is simplifying access to on-the-go services that are increasingly more convenient and easier to use. In their daily lives, taxpayers are utilising technologies that accelerate sharing of views and ideas, and amplify their representation. They are also accessing a range of services electronically which creates a higher level of expectation in respect

of the services and access they want from the public sector including revenue bodies. Heightened service delivery expectations require revenue bodies to examine their investment in people and technology, and to explore how tax services fit with other services taxpayers consume.

With the majority of taxpayers neither interested in the internal operation of government nor generally wanting to invest their time and effort in learning details of how to comply with tax laws and regulations, revenue bodies need to consider how they position their services to assist and guide taxpayers to meet tax obligations or receive the entitlements they might administer. Many administrations are taking a *life event approach* to service provision. Grouping government services around key life events of the taxpayer or their family, including entering a relationship, the birth of a child, registration of a company, commencing school or tertiary study, commencing employment, buying a home, retirement, or the death of a family member to name a few. Such an approach, which involves connecting with other government services and activities, can only be effective if administrations have improved knowledge of taxpayers, the ability to bring together data and services, as well as the option to deliver these new services using digital technologies.

While many individuals and businesses are shifting to working digitally across many of the interactions they have, there are groups with legitimate needs that may never operate digitally (including the elderly and those with limited access to broadband services due to their geographic location for instance). Additionally, there may be industries that have less access to technology, or that resist or feel less confident interacting with the tax administration through digital channels, that will still require support.

Revenue bodies therefore need a comprehensive digital strategy that, among other things, addresses the following expectations of taxpayers (Ravanello, 2015):

- *To make payment of taxes a part of their natural environment:* taxpayers increasingly are looking to revenue bodies to develop e-services and digital capacity in co-operation with vendors and taxpayers. In the vast majority of cases, taxpayers may expect that paying taxes should be no more complicated or burdensome than renting a movie online. Thus, to make tax compliance more seamless and less burdensome, taxpayer services increasingly need to be integrated and aligned with the natural environment of modern taxpayers; this includes accounting and record keeping software solutions, online banking and potentially social media.
- *To provide reliable, trusted and transparent data to complete a tax transaction* (making a payment and/or filing) online and receive

confirmation thereof. Completion of tax payments may also mean that taxpayers will over time entrust revenue bodies with the right to automatically deduct tax amounts out of their accounts.

- *To achieve trust and transparency of data,* taxpayers expect revenue bodies to display their tax information online and in real-time or at least near real-time. In cases where taxpayers might disagree with online data information held about them, they want to be able to immediately provide feedback to the tax office for review and possible corrective actions. Ultimately, this may lead to changes in the way or even the need for individuals to file personal income tax returns.
- *To be able to receive or access information differently.* Use of commercial web search engines and social networks is inseparable from the habits of people who rely on these tools and often depend on information they provide. It is now common for taxpayers to search for solutions to tax issues outside of official government channels. To address specific issues, people often self-organise in social network forums or groups to share their experiences and information on a wide range of matters including taxes. To ensure that information received by taxpayers is accurate and up-to-date, revenue bodies need to monitor these initiatives and consider their presence on sites where taxpayers might be searching for information, as well as popular user forums or groups. This repositioning of revenue bodies as parts of broader ecosystems of services and information has important implications for channel strategies and the ways that information and services are developed and disseminated. The use of tax service providers is also very important in this area.
- *Digitally mature taxpayers increasingly expect to be serviced rather than informed.* Increasingly, taxpayers would rather be offered a service that can, for example, calculate a deduction and feed this information into the tax process for them, than to have to understand the information and processes in order to perform their own calculation which they then feed into the tax process. Digital technologies offer tax administrations the opportunity to *push* a range of new service options to taxpayers, rather than simply providing them with access to forms or calculators.

Addressing the drivers of demand

The OECD report *Together for Better Outcomes* (OECD, 2013a) discusses that revenue bodies have a long history of involving taxpayers and stakeholders. However, there is a clear trend towards doing so in more systematic ways.

Analysing taxpayer behaviour now plays a vital role in risk management, and this naturally causes revenue bodies to enhance engagement and involvement of taxpayers. With the help of taxpayers' knowledge, expertise and efforts, revenue bodies can strive towards improved compliance, cost reductions, enhanced customer satisfaction, and other benefits. This in turn will benefit economic growth. Moreover, enhanced trust and confidence in the revenue body and the tax system can lead to increased voluntary compliance, forming a so called virtuous circle.

As it is highlighted in the OECD report *Managing Service Demand* (OECD, 2013b), understanding the drivers and root causes of demand is becoming increasingly important. Rather than simply encouraging taxpayers to use the most efficient and effective services provided by revenue bodies, a contemporary digital service delivery and demand management strategy needs to consider how the root causes may be addressed through improvements to the system rather than managing the demand itself. This requires revenue bodies to consider demand as signals on taxpayer needs, system failures and opportunities for improvement. Focus must be placed on understanding and addressing the motives for why taxpayers require service and then considering what and how services are then provided.

To date, most revenue bodies have confined their attention to encouraging taxpayers to utilise on-line services to pay or file. With the new digital paradigm being more about in-channel access, effective end-to-end design and integrated services within the total system, as well as effective channel access and management, are essential if taxpayers are to be drawn towards channels that offer them the most effective support over time.

Adjusting compliance approach to service delivery

Innovative technologies are pushing tax compliance approaches into the service dimension. This can help to achieve better outcomes for taxpayers and the revenue body. Such approaches provide the opportunity for the revenue body to shield taxpayers from the complexity of the tax system, its tax laws or its administrative processes. In doing this it can provide them with services, or self-service options that are simplified, streamlined or seamless and end-to-end. The opportunities for revenue bodies in this regard have been thoroughly discussed, among others, in OECD reports *Managing Service Demand* (OECD, 2013b) and *Increasing the use of self-service channels* (OECD, 2014).

With many administrations now operating a unified data platform, or having a single view of the customer, it is allowing better integration of aspects of service delivery. This is bringing about advantages to the taxpayer as well as consequential benefits to taxpayer compliance, by assisting customers to meet their obligations easily and fully.

Box 2.1. **Digital vision of revenue bodies**

Underpinning the ATO's Digital Strategy is the vision to be a leading tax and superannuation administration, known for contemporary service, expertise and integrity. To achieve this vision, the ATO is transforming its end to end service offering and undertaking the following key actions:

- Improving identity and security solutions
- Delivering contemporary online tools and services
- Building the foundation for a progressive account
- Integration with Natural Systems
- Supporting clients to transition to digital
- Stabilising the technology environment

The ATO intends to deliver this through both retail and wholesale services.

In the United Kingdom (UK) the digital ambition of the revenue agency is based around the idea of becoming a fully accessible digital business capable of providing tax accounts to individuals and businesses, offering both high value and low value transactions, giving personalised user experience and showing exactly what's owed, streamlining how tax works, publishing application programming interfaces (APIs) (the issue is addressed in Chapter 5) and encouraging third party products for those choosing them.

Source: Country presentations at FTA workshop – Moscow, 2015.

Increased connectivity

With people becoming more connected through the use of mobile devices, social media and the Internet, revenue bodies are facing the challenge of developing services and products that taxpayers can access on their mobile devices. These services need to meet taxpayer expectations that services are end-to-end digital, up to date and available seemingly 24/7. Increased connectivity is also allowing individuals to share views on social media in real-time, thereby increasing the impact these comments can have on perceptions of the revenue body.

While the majority of taxpayers do not have a single preferred channel for communication with revenue bodies, and prefer to choose the approach at the time they communicate, they are looking for revenue bodies to respond almost instantly to their enquiry. While revenue bodies need to consider how they deliver consistent services through all channels and support taxpayers

in seamlessly switching between them, it is also essential that they consider how they can make the digital online experience attractive and usable for customers so that over time this option becomes their channel of choice.

Increased digital maturity

The increasing levels of taxpayer digital maturity are opening the door for new tax services that better support taxpayers in managing their tax affairs. An online mobile environment that allows the use of applications and that can be acquired from conventional sources, or is a feature of other services taxpayers will utilise, changes the game. As such, revenue bodies need to consider how these services are customised to fit a range of different needs of taxpayers.

Customer journeys

Delivering customised services implies that unnecessary steps in customer journeys have been removed and that the remaining steps have been designed with the best overall customer experience in mind. Customer journeys are made simple where services are delivered automatically where and when they are required, including being integrated into other systems taxpayers use. When designed in this way, tax administrations can make complying with obligations easier for taxpayers.

Over time, the real-time or near real-time accessing of data from across government agencies, together with data acquired from private sources, should enable the delivery of smarter services which can be customised to individuals or business taxpayers. Further, the ability to acquire information about life events of a taxpayer over time will allow revenue bodies to offer more interactive customer services, which can inform and guide taxpayers through events and activities where currently support is required.

New customer segments

Segmenting the customer base enables a revenue body to better service its customers and provides the basic information taxpayers required. It is important to segment taxpayers not only by type, but to identify similar *behaviour patterns*. These patterns help revenue bodies to develop strategies or models to predict which taxpayers are more likely to use certain types of service options, for example on-line services as opposed to say digital services. Such information can assist revenue bodies to determine how to address barriers, encourage take-up, raise awareness, and to determine what additional support may be required to help support taxpayers to shift channels.

Special attention needs to be given by tax administrations to two particular segments:

- **Younger citizens who are the taxpayers of tomorrow.** Revenue bodies' digital strategies need to consider that future taxpayers will be more used to mobile devices than personal computers, apps than portal solutions, and short and simple user journeys (Ostling, 2015).
- **Tax intermediaries, such as accountants, financial advisors and tax planners.** As the level of digital maturity of these service providers and their clients increase, they will drive demand for more sophisticated services to support new customer models, tools and services these businesses will provide to their clients (van der Enden & Roytman, 2015).

Social Media – changing communication

Communication patterns are changing. People are becoming increasingly more used to social media and the practices that come with it, including short message services rather than emails or hard copy letters, and messaging instead of phone calls. They have also become more accustomed to information being pushed to them when utilising services or products of third parties. Revenue bodies need to consider how they can make the best use of this new communication environment, recognising, however, that this approach brings with it a larger number of briefer exchanges that often require immediate response and that may occur outside the times when the tax administration may ordinarily have staff working. If this does not occur, there is the risk that taxpayers will abandon contact with the administration, and the revenue body may lose contact with taxpayers, or not be able to support them in ways that most readily support their participation and engagement in the tax system.

Penetration of social media into society has also impacted significantly on attitudes toward privacy and data security. On one hand, revenue bodies require greater measures to protect access at the outset, but then once that has been navigated, citizens are often happy to see large amounts of what some may regard as personal data shared. There are also cultural and age gaps surrounding access and use that revenue bodies need to consider fully before utilising these new channels to support taxpayers.

Data Privacy and protection

Transparency and openness form the basis for access and use of data by tax administrations. It is important therefore that taxpayers have confidence in how tax administrations use their data.

There are significant privacy issues that must be considered. In considering the use of personal data to inform services for taxpayers, tax administrations need to establish clear and transparent principles for the use of such information. These include transparency of information, access and control of data, protection and security, engagement and importantly the use the information will be put to.

Tax administrations looking to transact via social media will also need to consider their business approach to tax confidentiality and wider data sharing practices with other government agencies and the private sector.

Box 2.2. **Changing communication patterns**

In Singapore, short messaging service (SMS) notifications have been used to provide enhanced services to customers by improving dissemination of information as well as providing reminders to file and to pay. The content and timing of the SMS strategy is designed to "nudge" taxpayers to comply. For instance, taxpayers who filed late in the prior year are reminded to file on time to avoid penalties, and property taxpayers are informed by SMS of how much they owe and the payment reference number to complete tax payments without referring to their notice of assessment. In 2015, almost 6 million SMS's were sent and over 96% of customers surveyed agreed that the SMS service was timely and met their needs.

Source: Inland Revenue Authority of Singapore (IRAS).

Customer involvement

With taxpayers increasingly expecting revenue bodies to design services around them rather than around the systems and processes of the revenue body, administrations are more frequently, like their private sector counterparts, engaging with customers to help them design services. In the OECD study *Together for Better Outcomes.* (OECD, 2013a) the concept of "engaging and involving" taxpayers in the design of tax services is explained in detail. The approach outlined is based on the premise that public services work better when designed and delivered in partnership with citizen participation. Further that if knowledge and insights of citizens are not made use of, public services tend to be designed on the basis of assumptions by service providers about what citizens need and want. As such, these services, no matter how well intentioned the service provider may be, are far removed from those required by users (OECD, 2013a).

If not already the case, revenue bodies need to consider engaging and involving taxpayers to improve the design of services.

Further embedding tax e-services into "natural systems" will call for closer collaboration between revenue bodies and private sector developers and vendors of these solutions.

Channel of choice

One of the features taxpayers expect in a tax system that promotes simplicity, is the ability to choose the channel that best suits their requirements, habits or ways of doing business. While some taxpayers may favour portal solutions, others would prefer call centres, mobile platforms or access to e-services through "natural systems" such as financial systems of companies, accounting software, practice management systems of tax intermediaries or personal online banking solutions. Regardless of the preferred channel, revenue bodies need to be in a position to offer end-to-end tools that allow authenticating, informing, interacting and transacting with taxpayers in an online environment.

Transparency of services

With the efficiency of the revenue body very much tied to the quality of their data for transactions, managing compliance and sharing, the growth of data has increased the importance to tax administrations of ensuring its data is accurate and complete. To assist with this process, some tax administrations, like their private sector counterparts, are allowing personal information held by them to be viewed via a personal online account. Taxpayers are invited to view and provide feedback on the accuracy or other aspects of this information. This transparent approach not only helps to improve data quality, avoid errors, and increase operational efficiency and compliance, it has also helped to strengthen the trust relationship between the revenue body and the taxpayer, and to reinforce that data accuracy is a joint responsibility.

Box 2.3. **A more transparent tax administration**

The ATO recognises that taxpayers increasingly think of their government obligations in a collective sense and want visibility of their overall "universal" position. Importantly, taxpayers are also indicating a preference to have this visibility on an ongoing basis, with the ability for their tax and other obligations to be reconciled in real-time. *myTax*, the ATO's streamlined, web-based service for the lodgement of individual income tax returns, is a foundational product that can be built upon in the future to deliver this experience. *myTax* makes better use of data (including third party data) to tailor the service, and prefills a substantial amount of information for taxpayers to review and finalise. The ATO's *myDeductions* tool complements *myTax* by allowing taxpayers to record

Box 2.3. **A more transparent tax administration** *(continued)*

their tax deductible expenses throughout the year. From 1 July 2016, taxpayers will be able to automatically upload this information into *myTax*. For taxpayers with straight forward affairs, the *myDeductions* prefill function within *myTax* completes most of their return, minimising the need to make changes or add in additional information. This provides an initial basis for the ATO to "push" a completed return to these taxpayer. Beyond the concept of a "push" return, the future end state is the real-time collection of data on an ongoing basis. This will enable visibility of a taxpayer's overall tax position at any point in time and may facilitate real-time reconciliation. For example, a taxpayer's withholding tax rate could be varied to ensure that their tax obligations are met "as they go" – rather than generating either a debit or credit balance at the end of the financial year. This approach could expand over time to include all taxpayer types and roles, enabling the integration and reconciliation of all obligations.

In India, taxpayers can view online their tax payments and taxes deducted at source as well as certain information reported by third parties. This has helped taxpayers to report missing credits and has improved the accuracy of processing their claims for refunds.

In Russia the online personal account of an individual taxpayer displays information about all personal income sources as well as all movable property and real estate in ownership of the account holder. Taxpayers have access to an online tool for providing feedback of their disagreement about their property positions directly to a local tax office where the property is located and local taxes are paid. A local tax office makes an assessment of validity of such claims. As a result, the tax administration is receiving fewer complaints about the quality of data and taxpayers are more confident in using online payment tools.

Source: Country presentations at FTA workshop – Moscow, 2015.

Certainty

Taxpayers want to know if their return, payment, submission or correspondence has been received, how long the process might take, where the process is at that moment, and if there are deadlines for the revenue body to comply with. Increasingly they also want to understand what information the tax administration has about them and where that information has been sourced.

Greater agility

From both tax compliance and service delivery perspectives, these developments call for tax administrations to become more agile and responsive, not just to business-driven activity, but to the rapid and unexpected changes that are occurring in the economy as well as to the changing attitudes and expectations of citizens.

As such, traditional approaches to project planning and implementation that have historically well supported the development of systems may no longer be as effective. Accordingly, revenue bodies may need to look to adopt methods that ensure they have sufficient flexibility to respond to a fast paced environment and to profound changes that may involve challenges or opportunities for the way revenue bodies operate. The changing roles, processes and attitudes of revenue bodies have been thoroughly discussed, among others, in OECD reports *Managing Service Demand* (OECD, 2013b) and *Increasing the use of self-service channels* (OECD, 2014).

Project approaches that cover long time frames, with clearly defined outputs, which are strongly internally driven, may not offer revenue bodies the flexibility and agility to respond to the challenges presented in a digitally disrupted environment. Revenue bodies may need to consider giving those developing solutions greater flexibility to experiment and design new e-services and digital responses.

In particular, managers need to accept that working with Big Data is a process of discovery rather than a straightforward administrative practice. As such, attention needs to be given to how a culture that facilitates such outcomes can be established and nurtured in an agile environment inside revenue bodies.

New capabilities

Revenue bodies need to develop or acquire new capabilities to support new ways of operating. The use of digital technologies to increase reach and engagement and the introduction of sophisticated tools to analyse Big Data to adjust and improve customer experience require specialist skills, especially in the areas of service promotion, data analytics and IT.

For revenue bodies to become digital-by-default, the governance mechanisms they have used to help manage risk and deliver traditional services may need to be reviewed, as in most instances traditional project approaches may not support iterative development or the speed to market that new products and services developed for the digital user require.

While current IT experts are used to working within legacy mainframe environments, agile solutions require new skills and may have impacts on the

wider organisation and operating models as well. Efficient delivery of digital services for taxpayers and internal users requires the change of culture within the organisation. Revenue bodies will have to consider what people, process and technology changes are required to make the new taxpayer experience work.

Efficient use of Big Data within revenue bodies also requires revenue bodies to ensure their culture values using data to improve services for customers.

Revenue bodies that begin the transformation process to becoming digital will benefit from enhancement of relationship with taxpayers and improved compliance. These new engagement approaches and interactions also require new capabilities of administrations.

Common technological features of revenue bodies

For different revenue bodies, their digital transformation journey may have different starting points. While some are building e-services and digital capabilities basically as a green field development, others are looking to re-engineer new service offerings in a legacy environment; while others are utilising or considering commercial off-the-shelf (COTS) solutions to deliver new digital or e-services. Despite these differences, there are common features of revenue bodies' experiences in their digital transformation and consequent delivery of e-services (Hay & Keys, 2015; Owen, 2015; Potter, 2015; Schloss, 2015).

Digital-by-default

Transition to a fully digital tax administration is often a part of a more general agenda of e-government, delivering public online services to citizens. With interactions between taxpayers and revenue bodies becoming digital across all existing digital channels, including face-to-face service where that remains, taxpayers are being guided towards use of a personalised single access point to all e-services that will, over time, be tailored to their specific requirements.

To achieve this, all information about individual or business taxpayers will, over time, only be accepted in digital form, with information received in hard copy during a transition period being digitised either by revenue bodies themselves or outsourced to vendors who will be given the right of access to private tax data and be able to maintain security of information. All relevant historic data may also be digitised.

Box 2.4. **No Filing Service**

In Singapore the "No-Filing Service" (NFS) provides a seamless experience using income tax data from employers and other government bodies which has eliminated the need to file personal income tax returns for many taxpayers. The NFS was piloted in 2007 with 45 000 taxpayers and has grown to 1.39 million in 2015. Taxpayers can preview their Notice of Assessment on the web portal even though they need not file. The use of reliable third party data to automate the tax filing process reduces the risk of non-compliance and the need for contact between the customer and the revenue authority. Based on 2015 Taxpayer Survey Findings, more than 96% of taxpayers were satisfied with the Inland Revenue Authority of Singapore.

Source: Inland Revenue Authority of Singapore (IRAS).

The concept of "digital-by-default" approach in providing services to taxpayers was previously observed in the OECD's *Increasing taxpayers' use of self-service channels* (OECD, 2014). This report observed that most service delivery strategies developed by revenue agencies either promoted a "digital by default" approach, with the digital channel expected to be the primary channel for all interactions with taxpayers, or the provision of services through a mix of channels that reflect taxpayer preferences. This approach is usually primarily driven by a whole-of-government agenda. The report noted that interaction with taxpayers via digital channels was becoming more and more important and should be recognised as a preferred service mode of delivery. It also identified the main objective of applying a "digital by default" approach, which is a paradigm shift from traditional offline to digital (online) service channels, the drivers for this shift including reduced costs of tax administration and enhanced user experience.

User-centric approach with tailored engagement

Several OECD publications over the last five years have commended revenue bodies for taking a user-centred approach to the design of services, and note that services deliver better outcomes for taxpayers and the tax administration when they are designed and delivered in co-operation with users. Similarly, in developing e-services, administrations are drawing heavily on the needs, preferences, requirements and limitations of a specific individual or business taxpayer. Furthermore, many are looking to design services based on minimising the involvement or effort of the taxpayer. Making it easy for the taxpayer often comes, however, with high levels of complexity for the tax administration; something that is not visible to the taxpayer.

Box 2.5. **Becoming digital**

In Australia, the Government has invested in a Digital Transformation Agenda to drive innovation, transform digital interactions, improve the community experience and contribute to the advancement of digital service delivery. The priority is to deliver high volume services (volumes of 50 000 or more per annum) digitally end to end by December 2017. The programme will create a digital end to end infrastructure that will leverage the community's natural systems, support whole-of-government initiatives and establish common platforms that help make all of government more efficient.

In Finland, digitising is the main objective for the whole public sector. It is expected that by 2020 the tax administration will be able to contact, receive information and handle all tax related issues electronically 24/7. This goal will be achieved by:

- building taxpayer's access point (portal) where customers can view and change all their tax information,
- compliance by design for individuals and businesses with online income tax register and real-time VAT data collection,
- efficiency in digitising hard copy documents, and
- developing mobile apps and online payment functions, etc.

In Singapore, under the Government's Digital Service Strategy, public services are to be designed and delivered such that citizens would want to go "Digital by Choice". Key initiatives of the strategy include *(i)* engagement and research to identify citizen pain points, unmet needs and ways to encourage channel migration, *(ii)* outcome-based design standards to improve user experience, and *(iii)* data sharing and "Tell Us Once" principle so that citizens should not be required to provide the Government with data it already has.

Source: Country presentations at FTA workshop – Moscow, 2015.

Tailored engagement also involves interacting with taxpayers based on risk profiles. Taxpayers with simpler tax positions and higher levels of transparency require less active attention compared with those taxpayers who need to access information services and tools to meet their particular need(s) or those who will seek additional support from revenue bodies.

Box 2.6. **Combining information from multiple sources**

In New Zealand, the intent is to move towards increasing levels of pre-population of data supported through enhanced and improved data sharing (both public and private information) to significantly reduce customer effort and provide customers the ability to easily confirm their tax position through smart, easy to use online digital services. This includes a focus on policy intent, significant technological change and simplified and integrated business processes to support customer outcomes.

In Russia**,** assessment of property taxes is done on the basis of information which is supplied to the tax administration in an xml file format by property registry which provides descriptions of taxable properties and tax base values. The information on established tax rates is received from local governments. Tax information accompanied by descriptions of taxed properties, regardless of their location in the country, can be accessed by taxpayers online through a personal secure account in the tax administration's web portal.

Source: Country presentations at FTA workshop – Moscow, 2015.

Single taxpayer file

The goal here is for revenue bodies to assemble all information about a single taxpayer in a designated single file. A single taxpayer file provides the location where all data collected or received from various sources can be stored to form a comprehensive taxpayer profile. This avoids duplication and discrepancies of data. It also allows data to be better organised for entry, access and sharing, thereby saving memory, computing and human resources as well as enabling tax staff and taxpayers to access and use consistent data sets regardless of their physical location or the platforms used.

Leveraging partners in digital ecosystem

Development of e-services and digital delivery capabilities should also be considered in the context of creating a common digital platform for whole-of-government programmes. Such an approach provides a single digital access point for all interactions with government.

Where sensitive taxpayer information is not involved, data has to be shared across all government agencies. This eliminates the need for taxpayers to provide the same information about events to multiple agencies. Some countries approach this issue by developing the whole-of-government standard business reporting package.

Data sharing across government agencies should make better use of information and facilitate the supply of smart services that are customised to meet the service demands of a particular individual or business taxpayer.

Big Data and data analytics

For some revenue bodies, all input data either arrives in a digital form or is digitised by the tax agency for further storage analyses and consumption. Processed and analysed data should be made available both to taxpayers and tax officers in real-time or close to real-time. The OECD report *Right from the Start* (OECD, 2012) contains in-depth analysis of revenue bodies' practices in terms of e-invoicing and other similar instances of data use.

Data analytics is an important tool in assisting revenue bodies target specific needs of individual and business taxpayers. Apart from helping perform tax auditing and assessment functions, data analytics should be able to identify and track changes in taxpayer's life cycles in order to assist them in complying and help inform about how their changes of situations might affect their tax positions or entitlement to other government services. Getting the right data for the right customer at the right time to provide the right customer experience is becoming the focus area for revenue bodies.

Box 2.7. **Applying Big Data to tax processes**

In Parana State, Brazil, the State Finance Secretariat has implemented electronic invoicing in the VAT transactions that cover wholesale and retail circulation of goods, distribution of energy, interstate transportation as well as telecom services. Sellers of goods or services must issue invoices in the extensible markup language (XML) format, authenticate them with a digital signature and file invoices to the tax authority. The tax authority validates all invoices by crosschecking them with other available information and either authorises, rejects or denies them. The validation process of an invoice on average takes less than 0.1 seconds. After authorisation of an invoice, the seller can proceed with shipment. The buyer is obliged to check if the invoice was authorised. More than 100 crosschecking reports involving invoices and bookkeeping are developed in the form of a business intelligence solution that is used for data discovery (ad hoc queries), reporting and predictive analysis.

Among other things the system reports unregistered invoices, and conducts queries on transactions that are performed by specific taxpayers or with specific goods. It allows visualisation that identifies possible underground economy transactions between companies and isolates problematic nodes for in-depth analysis and targeted auditing action.

Source: Country presentations at FTA workshop – Moscow, 2015.

Big Data collected by revenue bodies, when combined with a transparent approach to data, offers tax administrations the opportunity to contribute to improving the lives of citizens and countries' economies.

Box 2.8. **Enhancing financial services with tax data**

When taking out a bank loan or a mortgage, time may be of the essence. In Denmark, the tax administration has collaborated with the financial sector to offer to their customers the possibility of sharing relevant data held by the tax administration with the banks in digital form. Customers who consent to this flow of data (by use of a digital signature proving their identity to a range of public and private service providers) will no longer need to access the data in their digital tax folder, print it out and bring the physical copies to the bank for further processing. Instead the data feeds directly into the loan approval process. This dramatically speeds up the process, which may be critical to customers who, for instance, are in the process of buying a new home. At the same time, it reduces costs and risks to banks, which can be certain that the information is accurate and can be relied upon as a basis for granting the loan. The service was used for more than 500 000 loan approval processes in 2015, and the number of transactions is expected to rise to somewhere between 1mn and 1.5mn a year before reaching market saturation.

Source: Danish Customs and Tax Administration (SKAT).

Smart portal solutions and natural systems

Use of data by revenue bodies should not be limited to compliance or post filing interventions. Increasingly it should be used to address customer services, which can be extended to taxpayers through portal solutions that provide a single platform for all business operations of a tax administration. Overall, smart portal should access all tax administration data so that with the use of advanced analytics, taxpayers can be provided with services that are both more timely, tailored to meet the specific demands of the taxpayer, and that proactively facilitate compliance.

Natural systems should be leveraging off third party accounting and software solutions, which are developed in close co-operation with revenue bodies. They enable the ability to integrate tax compliance practice into regular daily business activity of taxpayers.

Mobile apps

Mobile devices have deeply penetrated societies globally and have become an integral part of life for many. In a contemporary world, using mobile apps

and devices as means of communicating and interacting has become a critical element of firms and businesses interactions. Apps developed for taxpayers are expected to offer authenticated end-to-end services. To date only a small number of revenue bodies have developed tax apps or have these embedded in third party service offerings.

In many countries it is becoming more common for people to use multiple devices to access services. In designing new e-services, revenue agencies' need to consider the extent to which their web-design and delivery

Box 2.9. **Mobile apps in tax administration**

In Australia, the ATO launched its mobile app in July 2013. The initial services accessible via the app targeted individual taxpayers and included checking progress of an individual's return, Frequently Asked Questions and the ability to calculate tax to be withheld. The ATO has continually increased functionality for individuals through iterative release cycles, allowing more individual taxpayers to access the services they need from their preferred device, while "on the go". The July 2015 release of digital services for individuals in business (sole traders) also enabled these taxpayers – for the first time – to manage both personal and business affairs online in the same place. The November release enabled taxpayers to enrol their voice print for identity authentication when transacting with the ATO. The ATO will continue to deliver business services via the ATO app and support third parties developing mobile apps via API's to ensure more services are accessible from all mobile devices, further expanding the holistic experience so that more taxpayers can transact seamlessly via the mobile channel.

In Singapore, e-services available online are now optimised for use on mobile devices including editing tax return data and e-filing. User Experience Design principles have been applied to the responsive web design to ensure optimal usage experiences and high taxpayer satisfaction for e-services are maintained at or above the current level of 97%. Other mobile services include the use of Short Messaging Service (SMS) which is used to send reminders and disseminate information to taxpayers.

In Korea, the tax administration is providing mobile services using Android and iOS operating systems. Mobile apps allow taxpayers to deal with many tax affairs such as receiving information on filing and payment schedules as well as useful tax information. For small-sized entrepreneurs, smart phones allow using and filing of pre-filled tax returns online. Entrepreneurs can view the details of digital tax invoice issuance, information about business partners, etc. Individuals use mobile apps for deduction of expenses for tax settlement at the end of the year.

Source: Country presentations at FTA workshop – Moscow, 2015.

approaches should allow seamless navigation and transaction of services on a range of devices, including smartphones, tablets or desktops.

IT infrastructure

The system architecture that revenue bodies are designing and installing now is likely to be in operation for the next 10 to 15 years. While it is difficult to foresee what particular tools or methods of communications might be in use at that point in the future, revenue bodies need to ensure they retain flexible business architecture, an adaptive technology toolkit, an iterative approach to business processes, and the ability to work with others within the value chain/service chain for customers.

Further implementation of a system that will be able to provide seamless and sustained support of revenue bodies' business processes and meet challenges of customer demand requires installation of robust physical IT infrastructure. Some revenue bodies are building dedicated data centres with the capability to:

- concentrate all Big Data,
- process Big Data with analytic tools,
- enable and leverage automatic back office system, and
- seamlessly deliver proactive and tailored tax services.

Box 2.10. **Building Data Centres**

Russia has completed construction and introduced data centres to provide a single platform for all tax administration business.

India has formed a Centralised Processing Centre (CPC) for processing Income Tax Returns. The objectives of the CPC is to manage routine tax administration functions, enable and leverage technology to automate back-office operations, establish a data storage management system, establish robust accounting system as well as to provide taxpayer services.

Source: Country presentations at FTA workshop – Moscow, 2015.

The approach revenue bodies take to their digital transformation and consequent delivery of e-services is impacted by certain features of unique environments that each of them has developed in. Accordingly, revenue

bodies can be grouped into three general categories that govern their strategies and tactics in developing e-services and digital delivery:

- **New systems:** Relatively young revenue bodies that built their e-services and digital delivery capabilities basically as a "green field development." Most of these tax systems were being designed at the start of the digital age, and, as such, administrations benefited from the experience of other revenue bodies, allowing more rapid development and deployment. New legislation was often written with IT solutions in mind. With the right resources and management in place these countries were able to use this unique opportunity and started offering efficient e-services to customers almost from the beginning.
- **Re-engineered systems:** Revenue bodies that are looking into re-engineering their existing e-service capabilities and replacement of their core systems. These revenue bodies have widely introduced their e-services and digital delivery systems over the last two decades. Often these services have been added to existing processes rather than re-designed around digital. While they offer customers a wide range of e-services and cover many of the activities administrations require taxpayers to do, including online return filing and payment of taxes, the offerings are often not seamless and can fall short of customer expectations.

  Revenue bodies in these countries realise the need to become more responsive to taxpayer demand, and offer contemporary digital services. They are now looking for ways of increasing the efficiency of provided e-services, often employing COTS architecture, through reengineering of their business processes and the modernisation of IT systems. Part of the system reengineering process agenda is also linked to integrating tax administration e-services and digital delivery into wider e-government or whole-of-government programmes.
- **Legacy Systems**: Revenue bodies focusing on development of e-service capabilities and digital service delivery platforms, which interface with existing core legacy systems. These revenue bodies often face the challenge of how IT systems and processes developed prior to the digital era can be enabled to know and support digital delivery of services to taxpayers.

While each of these environments has its own unique challenges, there are common challenges that tax administrations face if they are to improve their performance on both the compliance and service parts of their organisation. These features include: managing the complexity created by providing APIs to the market to enable third parties to develop or integrate

services; managing the load and demand placed on systems that need to be available 24/7; identifying the legislative changes to support digital delivery; rethinking business processes; and, establishing the up-grade path for existing IT systems.

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Chapter 3

Using big data in tax administrations

Big Data technology offers revenue bodies the opportunity to extract better business value out of existing data and improve service delivery for taxpayers as well as the ability to develop new tools that will help manage tax risks including tax avoidance, evasion and fraud.

This Chapter provides background on the emergence of Big Data technology. It proposes a framework to assist revenue bodies to determine whether they have the pre-conditions necessary to commence using Big Data technology. It also provides practical approaches that revenue bodies should consider in leading this change, in the structuring of their data architecture, and in the stewardship of a data-driven culture.

The Chapter also provides a Digital Maturity Model for revenue bodies. The assessment tool, which was developed within the framework of Project, will allow revenue bodies to self-assess their administration against a range of capabilities including technological, business process, people, and data; and, to identify delivery goals that will allow for a transformation into a revenue body that makes effective use of Big Data technology.

Revenue bodies are data rich organisations. Traditionally, information available to revenue bodies was that filed by the taxpayer themselves through tax returns and schedules, or through third parties required to supply information, often as part of tax withholding arrangements. These information sources were usually supplemented by information collected during tax audits or controls, and research.

Typically, the bulk of data which is supplied by taxpayers and tax intermediaries arrived and continues to arrive in a structured form specified by tax administration generally in accordance with legislation or regulation. Unstructured data sets were infrequently accessed or supplied, often because revenue bodies lacked the tools to unlock the value from such data or to be able to present it in a form usable by their administration in core tax activities.

Big Data technology now offers revenue bodies the opportunity to not only extract better business value out of existing data, but the possibility – through investment in new capabilities – to develop new, convenient services for taxpayers. Big Data also provides the ability to create new tools that will help revenue bodies provide proactive services, better manage and address tax risks – including tax avoidance, evasion and fraud – and improve other targeted activities including debt collection or benefit delivery (Gray, 2015).

This part of the report explores the opportunities that using Big Data presents for revenue bodies, and in so doing it:

- Identifies the strategic importance of Big Data;
- Presents the potential business value that tax administration can be delivered; and
- Highlights the new capabilities that a revenue body requires to become data-driven and generate business value for itself and taxpayers from its data assets.

Big Data as a strategic asset

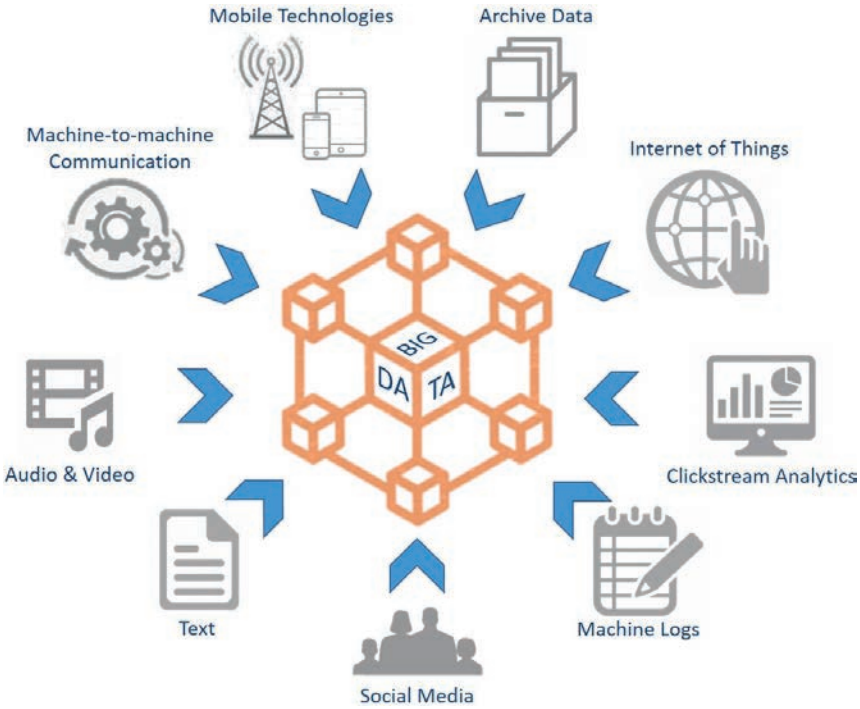
Until recently, data was generally perceived by most organisations as a component of an IT system. In a digital world however, data has become a significant business asset. The digital revolution is generating exponential growth in data flows that are creating a shift towards what is now known as Big Data (Diamandis & Kotler, 2015).

Big Data represents large and complex, often unstructured, datasets that are difficult to work with using conventional tools and techniques. Big Data is not a "data base". It is data that has been collected from a large variety of sources including the Internet, social media, sensors, text messages, video, images and audio files as well as other often unstructured sources (Franks, 2014; Gray, 2015b; Willcox, 2015).

Location services on mobile devices mean that app providers and cellular companies now have information on where their customers visit and what digital services they use. Cable or satellite companies are able to track viewer preferences and habits. Internet stores are generating flows of data about searches, purchases and habits of their users. Social media providers maintain copies of content and are able to provide unprecedented information from the data they collect on their users.

No longer is this data inaccessible because of file formats. Neither is the distinct formats used for weblogs, sensor data, images, video, and speech files an impediment to the advanced analytics tools that are extracting information to drive business value and enhance the provision of digital services to customers. While there are obvious ethical and privacy issues that need to be addressed, data integration and analytics are now allowing the more accurate profiling of individuals and companies. It is also opening up new opportunities to create new, customised products or services on a mass basis or at an individual customer level (Franks, 2015; Franks & Grolimand, 2015).

Figure 3.1. **Sources of Big Data**



Source: Russian Federal Tax Service.

In the private sector many senior executives have identified the value of data and its role in supporting digital strategy and innovation in their organisations and have earmarked Big Data as being critical to the future success of their organisations. According to EY, 79% of businesses believe that Big Data will have an increasing effect on their revenue, while 59% of business decision makers use customer-generated data for customer insight (Nikolic et al., 2014).

Convergence

The widespread use of inexpensive connected mobile computing devices has changed the business model from capturing transactions and analysing and inferring behaviour of customers, to measuring it directly. Instead of transaction analytics and data-driven forecasting, the commercial sector has started to use data and real-time access to customers to interact with them and provide individually tailored digital services.

This ability, in association with advanced analytics, and new service delivery practices of providing data-driven actionable insight in a visually interactive and rapidly iterative agile manner, is a key benefit associated with Big Data. The ability to analyse data in real-time or near real-time offers revenue bodies the opportunity to change how risks are managed and services are presented to users.

Big Data technologies are also providing cost-effective platforms for data management and data governance solutions for varying data volumes.

Changing Risk Assessment

These opportunities are further enhanced by what is now known as the Internet of Things. This network of physical objects – devices, vehicles, buildings and other items which are embedded with electronics, software, sensors, and network connectivity – is enabling these objects to collect and exchange data. It is also allowing organisations to gather information, which can be further used to improve, innovate and shape services, and facilitate new ways of interacting with customers and third parties (Franks, 2015).

Before the availability of this type of data, organisations undertaking advanced risk assessment used data drawn from analysis of past experience or events. The availability of new sources of data is now allowing organisations to monitor and react to issues and opportunities happening in real-time based on live data. Whether it is tracking the performance of business critical assets, monitoring quality and risk, or providing performance information, sensors installed inside equipment have the ability to monitor and automatically send reports to business managers. According to *Intel,* by 2020 industry sources

predict that the number of connected devices will reach 200 billion, meaning that almost everything we interact with or use, whether in our homes or in the economy, will also be supplying data measurements about themselves and the surrounding environment (Intel, 2015).

Figure 3.2. **Number of devices connected to the Internet of Things (bn)**

Source: Intel, 2015.

With organisations like Intel predicting that analysing sensor data will soon become a standard part of the way businesses operate, tax administrations will also need to consider the opportunities that this data presents. While initially much of this information will involve real-time monitoring of contact volumes or measuring customer interactions the availability of online sensor data will also improve the ability of administrations to address issues and interact with customers in real-time.

Use of Big Data is stimulating increased customer expectations of service delivery which is setting higher standards for all providers of e-services, including those in the public sector. The disruptive power of Big Data has the ability to impact business behaviour models, influence management decision making processes, and turn businesses into data-driven, information rich organisations.

Public sector agencies are starting to take advantage of Big Data streams for their programmes, including pre-emptive crime and public safety, as well as facilitating responses to disasters, and improving social services. As the world is becoming increasingly digital, revenue bodies need to look closely at Big Data and the opportunities its use present both for them as administrations, and as revenue collectors.

Benefits for revenue bodies: from transactions to online interactions

New data sources and ways of data collection, the speed of data acquisition and ways of data handling hold tremendous promise for transforming decision making in tax administration. With revenue bodies dealing with ever-increasing volumes of input data, from a variety of sources, there are large gains to be made in becoming more efficient in their operations. The challenge for revenue agencies is learning how to turn Big Data into actionable information to enhance compliance, improve services and reduce costs.

Collecting Big Data from third party sources and combining it with tax data will allow revenue bodies to develop and create tailored e-services that target specific needs of individual and business taxpayers. New synergies can be gained from combining Big Data with such advanced analytics technologies as geospatial analytics, network analytics, text and voice analytics, clickstream analysis, operational intelligence and real-time analytics.

Box 3.1. **A unified approach to smart use of Big Data**

In Australia**,** ATO is implementing the strategic Smarter Data programme that is centred on making smart use of data to improve decisions, services and compliance. This involves a unified approach to risk assessment, intelligence, analytics, data management and associated technology.

Four key areas of data and analytics work include *(i)* transforming current disparate elements of data management into a cohesive corporate asset, *(ii)* capturing a holistic, real-time view of a customer's profile, *(iii)* automating the use of customer profile data to differentiate engagement, and *(iv)* driving increased productivity through automation of analytics across processing systems.

Source: Australian Tax Office (ATO).

The availability of data in real-time or near real-time will create opportunities for revenue bodies in the future. Instead of capturing and analysing transactions that have happened in past, revenue bodies can consider placing themselves in a position to make tax assessments in real-time or near real-time, depending on the inherent risk of assessment and provided that their tax systems are integrated with the natural environment of taxpayers (Gray, 2015).

Near real-time co-operative compliance monitoring of taxpayer transactions and their counterparties, joined with the facility to match and analyse information flows – accompanied at the same time with a significantly improved

customer experience – creates new level of taxpayer transparency thereby reducing the opportunity for tax fraud. Big Data and Block-Chain approaches open the possibility of new ways of managing large VAT transactions involving refunds or cross-border transactions.

Combining Big Data technology with digital filing of tax returns and other broader responsibilities carried by revenue bodies will have a significant effect on tax administration in the future. Revenue bodies will be able to introduce real-time or near real-time monitoring of risks as well as compliance assessment. Combining Big Data technology with advanced analytics creates opportunities to counter VAT and tax fraud, deal with the shadow or hidden economy, or to assess how assets used in the shared economy are actually being used. These developments are highlighted in more detail the report on *Advanced Analytics for Tax Administration: Putting data to work* (OECD, 2016).

Strong data and information management discipline are essential if revenue bodies are to develop a better understanding of taxpayers, and use this knowledge to predict taxpayer patterns of behaviour, a vital component in developing contemporary service strategies.

As part of this approach, Big Data can assist revenue bodies in examining and understanding historical activity and taxpayer behaviour through (van der Enden & Roytman, 2015):

- Storage of the original, unaltered information. The greater the volumes of raw data, the wider the possibilities are to process, analyse and assess it.
- Analysis across multiple periods, taxpayers and tax domains, allowing administrations to plan their compliance, control and risk management activities and improve service delivery;
- Gathering customer insight on taxpayers' experience, preferences and behaviour and to use this in highly personalised user-centred service design approaches.
- Identifying and tracking changes in taxpayer abilities and performance to enable revenue bodies to respond more effectively and in a timelier manner. This could be determined by features such as the relative experience of a taxpayer in a new business, particular life events that may trigger the need for more tailored responses, or how a taxpayer may operate differently across a range of tax or programme types the tax administration operates, or changes in the geographic conditions or location.
- Supporting whole-of-government outcomes by sharing of insights and information.

- Using predictive analytics and simulations. Proactive analysis of taxpayer behaviour can help revenue bodies save time, money and effort during risk profiling.

Risk profiling and scenario-based calculations are impacting the ability of administrations to target compliance interventions, whether at an industry segment or individual level, thereby contributing significantly to improving outcomes, reducing cost, and increasing levels of taxpayer satisfaction.

Given most taxes are a by-product of business transactions performed by taxpayers, it is possible over time that revenue bodies may, by utilising Big Data technologies to ingest transactional data and moving taxation to the point of transaction, remove the need for filing of most tax returns.

Big Data processing technologies can also allow revenue bodies to examine and review all transactions across the wider economy and industry groups and compare, and not just analyse, risks of selected taxpayers. In short, the pathway for revenue bodies is to move from analysing historic transactions to a position where they can review near real-time interactions with taxpayers both on the compliance and service sides of business. An example of implementation of such an approach is provided in Box 3.2.

Box 3.2. **Real time compliance**

Since 2015, FTS of Russia is using Big Data technologies to monitor VAT compliance. VAT tax returns containing information about all taxpayers' transactions are filed digitally in the XML file format. All incoming data is cross-matched and potential fraud cases are identified automatically. Creation of VAT "value added" is monitored by the FTS throughout the life cycle of commodity or service. In comparison to the previous year, the implementation of the system has allowed to increase the VAT collection in 2015 by 12.2%.

The ATO's Smarter Data programme is supported by the Smarter Data Capability Framework, applied to drive insight into taxpayer behaviour and better understanding of their needs. The Framework is used to build a real-time, holistic view of the taxpayer's position and inform tailored engagement that reflects the taxpayer's individual circumstances and needs. This programme will create and maintain a real-time view of a taxpayer's tax and superannuation position, current circumstances and compliance behaviour. This programme will play a key role in tailoring the ATO's interactions to the taxpayer's circumstances and streamlining interactions.

Source: Country presentations at FTA workshop – Moscow, 2015.

Towards data-driven tax administration

Revenue bodies have begun to realise the opportunities associated with Big Data and are starting the process of transforming themselves into organisations with strong data-driven cultures. In doing so they are having to critically examine their data policies and their approaches to governance, data security, and investment in Information Management.

The introduction of Big Data technology implies transformation to a new cultural environment and the adoption of agile work models and a knowledge-based environment. This includes acquiring and developing new skill sets, improvement of horizontal level relationships between different departments, development of a new data-driven culture, and consequently, an improvement of the quality of management and staff within a tax administration – in effect a shift in culture towards knowledge based, customer centred and intelligence led administration.

The investment in technology architecture, redesigning of business processes, development of new capabilities, and organisational change to deliver business value through Big Data is large and should not to be underestimated. The desire to start using Big Data should not be driven solely by the availability of the data itself. Instead, it should be a business driven decision where an administration decides what challenges it wants to address and then tests how data might help it find a solution. Such an approach allows an organisation to not invest too significantly until such time as the administration is in a position to utilise the outcomes of these approaches.

The decision to begin to utilise Big Data should be based on a clear strategy and a realistic assessment of the challenges the organisation will face. While expectations and interest may be high, it is considered advisable to start with small tests, build on modest but visible successes, and gradually move ahead to larger projects involving more of the organisations resources. Organisations need to avoid a situation where investments or organisational change decisions are made, but a tax administration is not yet able to utilise these new, innovative resources.

The need for a clear and well defined data strategy is essential. As revenue bodies acquire increasing amounts and types of data, it is important that the Big Data component of this strategy is well understood and aligned with the priorities of the tax administration more broadly.

Signs of need for transition

While there is no hard and fast rule that can determine when an organisation may have reached a point where it has become mature enough to consider the

adoption and implementation of the Big Data technology, at a certain point administrations encounter issues that can only be addressed by a change in the way they consider data. This happens when existing analytics tools and data bases can no longer cope with growing amounts of data, existing data sets cannot provide the information the organisation is seeking or large amounts of collected data is not analysed and is simply left unused in the databases. As a result, certain features start to appear at different levels of organisation:

- **Senior executive level:** Revenue bodies' senior executives become increasingly occupied with the question of how to harness Big Data and find an efficient use for it or use it to rationalise existing business process within their organisations. The need to harness Big Data is often heightened by knowledge that their peers in other revenue bodies or the private sector are already benefiting from the use of technology. The executive level, however, is not always able to see details of problems that lower levels of organisation come across on daily basis.
- **Mid-level management:** Mid-level managers might have difficulty obtaining answers to their analytics queries in a reasonable timeframe. They often find that accessing the necessary data is difficult, and requires special skills of IT professionals who usually are not part of their team or may be focused on maintaining and supporting operational capacity of the existing architecture. The results of the collaboration between IT and the business sides of the organisation are often not consistent and accurate enough.
- **Operational level:** Operational staff may see new potential that can be derived from integrating increasing amounts of data, both from the analytics and taxpayer service sides of business. It is better visible at the operational level that data is stored across many disconnected systems and often requires considerable efforts to be assembled and analysed. According to Teradata:

  > Business analysts often report spending approximately 80% of their time finding data and 20% making use of data for business purposes. End users have often developed extraordinary skills in technologies such as MS Excel, MS Access, structured query language (SQL) and other tools to collect, assemble and assess the quality of data. While these are impressive capabilities, this time would be better spent analysing the data looking for business insights that lead to valuable actions, or responding to insights sensed and proactively communicated through the analytic environment itself.

Interactions with customers are also providing indications that change is needed. Customers might be repeatedly asked to provide the same information simply because different parts of revenue bodies might not have shared resources. Multiple points of data collection and entry not only create duplication of data in the system; there is a strong probability that every time a different department feeds a similar item into the system, it does it in slightly different way, which results in duplication of efforts, consequent inconsistency of records, and poorer data quality (Lewis, 2014). These notions may have an impact on improving tax collection, reduction of tax fraud, and delivering better convenience and services to taxpayers.

The following indicators might provide managers with a strong sense that change in the digital delivery is required (Schloss, 2015):

- increasing discussions about faulty data infrastructure affecting customers at all levels of organisation;
- the organisation becoming more taxpayer-centred and customer-oriented;
- more staff members benchmarking the services provided by the administration with those provided by leading private sector companies;
- more frequent use of customer research and customer involvement in development and testing;
- collaboration with third party vendors and service integration with taxpayer systems;
- participation in delivery of wider government programmes; and
- increasing activity on social media.

Building a data-driven culture

If organisations are to truly take advantage of what Big Data has to offer, a culture change will be needed. This transformation of culture is not about facilitating existing business processes with newer technology, instead as highlighted by Gartner (Ostling, 2015), a data-driven culture involves promoting a change in the mind set and behaviour in managers and staff, where data is leveraged by the organisation to inform and improve decision making processes. This approach will inevitably lead to discussions on access to and the sharing of data, as well as how a knowledge-based workforce is supported and operates.

Leadership of change

The leadership of the change is critical if the business value is to be realised. The move must be driven from the top, and supported by a strong sponsor at the second tier. It will require active engagement of the lead team as it will affect every part of the operation. Senior managers will have to accept that like with any research or discovery process it will take time to deliver results and there may well be a number of perceived failures before the capabilities become embedded and the value of the approach is seen.

While the information technology side of the organisation that is more likely to be familiar with technology innovations and their benefits may initiate the transition, if it is to be successful the approach must be business led and have substantial input from the service delivery part of the administration. It is important that those leading the change have had experience not only in working with data within the organisation but are familiar with the nature of the problems that the organisation is looking to solve by accessing Big Data.

Every part of the organisation will need to invest itself in the transition. Assembling a *guiding coalition* is essential to ensuring the success of any change. Some organisations have done this by establishing a multifunctional team of highly skilled resources which as well as having strong business skills, include individuals who are analytic, creative, technical, social, and have sound design and policy skills. Supplementing this with fresh talent with knowledge in data science or data engineering facilitates the expansion and movement towards a data-driven culture. Equally, many administrations are reaching out to key stakeholders and involving them in the assessment of opportunities and requirements, of business impacts as well as organisational processes (Dyche, 2015; Gray 2015).

At its infancy stage the multifunctional team needs to be safeguarded against cultural resistance within the organisation. At later stages, the individuals from the multifunctional team may form the core management of the new data-driven tax administration. Commissioners need to support this new set of responsibilities as it becomes embedded into the organisation. While Commissioner sponsorship is no cure for resistance to change, lack of sponsorship is certain to make the resistance more difficult to overcome.

At the management level closer relations between departments need to be facilitated by a group of business leaders who understand the overall transformation strategy and directly benefit from the use of data. It is essential that data sources are organisational and that data collected by one part of the administration is available to the entire organisation (Dyche, 2015; Bodkin, 2015).

Bringing a data-driven culture into a tax administration implies developing a culture in which data and analysis drive all aspects of the organisation. This is

a journey not a destination. It will continue as new technologies emerge; digital disruption creates even greater innovation and customer expectations change. To move forward with introducing innovative technology a tax administration needs to have a clear vision for how it wants to engage and respond to customer demands. Actionable plans to develop a new operating capacity and a strategy for how it will acquire or develop its staff and change its operating processes to drive a new more agile approach are also necessary.

Stewardship of change

Revenue bodies require clear structures and responsibilities concerning data governance. For instance, it should be clear who has access to what information and who is responsible for it. The structure should be clear so that all responsible parties can benefit from it. This may challenge revenue bodies in how they bridge gaps across technology, tax compliance, taxpayer services, data management, and analytics. The need to take a comprehensive view and co-ordinate data management practices across the organisation on a tangible basis while facilitating overall integration of people, processes and technology and maintaining a focus on improving the capabilities of a tax administration is essential.

As the need for transformation to a data-driven tax administration becomes evident, organisations might consider introducing an executive level position that will align the revenue bodies' data management and data architecture capabilities from the origination and sources of data to end use. To ensure ownership of newly acquired knowledge and skills, introducing a new position which in a number of operations is referred to as the Chief Data Officer (CDO) or Chief Information Officer or Chief Analytics Officer within a tax administration might be considered (Griffith, 2015).

The title is less important than the role. The position is responsible for the integration of source data, data management, data cleansing, consistency of data on all service delivery platforms, data governance, data stewardship, data quality, metadata management, data architecture, data model, data re-use as well as, to a certain point, data security. From a data architecture point of view, this position could be responsible for the development of core data models, semantic models and virtual data models, where both traditional and unstructured data is loaded onto an architecture which is designed for data re-use and supports data connectivity across different platforms to ensure portal operation, use of business intelligence tools, advanced analytics, internal and external reporting, data mining, compliance and flawless provision of taxpayer services. It is as important that the executive who is selected for this position has an enterprise mind set who will care for the success of projects across multiple departments.

While the responsibilities of the CDO or its equivalent within a tax administration will include data governance affecting tax administration regulatory obligations, it is important that it extends to integrating into the digital strategy of the organisation how new data sources, analytics tools and e-services will be used, as well as how internal processes can be streamlined, while maintaining data integrity and the management of master data management as data is turned into an asset.

Depending on the needs and culture of an organisation the CDO or its equivalent might report directly to the Commissioner or to a senior level executive. In some agencies there may be a tendency for the role to report to IT, however, as business understanding and knowledge is essential to the success of this role, it is considered having this role strongly aligned with the core business activities is essential to ensure successful implementation. It is critical that the person in this role works closely with the parts of the organisation that are responsible for compliance and taxpayer services. While the application and IT architecture of tax administration should remain within the scope of the CIO, the CDO should provide appropriate input to these areas as well (Griffith, 2015).

At the same time, the issue of developing the seamless supply of services across a range of delivery channels might be approached from the taxpayer service side of an organisation. In this case, creation of the Chief Taxpayer Relations Officer or Customer Experience Officer might also be considered. The responsibilities of this position might include functional stewardship and responsibility over:

- development of user experience architecture,
- taxpayer segmentation,
- customer engagement strategy,
- development of taxpayer ecosystem in collaboration with third party vendors,
- co-ordination of service offer across all channels,
- education and outreach including social,
- face-to-face outreach,
- online assistance and chats, advertising and etc.,
- corporate brand development,
- support of agency compliance, and
- insights on online taxpayer service experience and behaviour and development of compliance models for online service delivery.

People and process

As outcomes are best achieved through collaboration and experimentation to explore and deliver new solutions, project management and governance structures may need to be modified. New skills and capabilities will need to be acquired or developed, and leaders will need to consider devolving some decision-making to staff who can react in a more timely way to what the data is indicating. Overall data-driven cultures have a more entrepreneurial, creative and flexible approach to problem solving than more traditional organisations.

People within the organisation should be allowed to challenge how current processes could be redesigned and improved in the light of Big Data. This requires experimentation with data to create new analytic tools and e-services as well as discover trends and patterns that can assist in the development of better services and compliance interventions. Creation of such an environment will provide tax administration with new insights and new ways of working (Dyche, 2015; Gray, 2015).

New innovative technologies and ways of working, including agile approaches to projects and developing a more open and sharing approach to information and data for decision making will enable employees to collaborate and improve productivity and outcomes. Clearly redefined processes and ways of operating will replace legacy reporting schemes, as well as fostering sharing of information and expertise in a transparent way. The result will be improved workforce effectiveness, and significant reduction in the time, risk and investment required to transform targeted work processes (Cooper, 2014).

Revenue bodies should involve themselves in mapping new business processes and activity. Such approaches also provide the opportunity for administrations to examine and challenge their existing business processes and boundaries by considering how to make greater use of data as well as how these services are best delivered to the taxpayer across the entire *supply chain* of the tax system.

Big Data architecture

The approach to Big Data architecture plays a critical role in addressing the issue of transformation to a data-driven tax administration. To avoid losing operational capabilities activities and existing service delivery capabilities, it is considered advisable that the data architecture design solution should approach the Big Data capability as the establishment of a new capability rather than the replacement of an existing one.

This is of course contingent on any other wider architectural changes that may be occurring such as larger scale system replacement or transformation.

Such changes will require the administration to consider how its new design addresses the issues associated with managing multi-structured data as well as data with continuously changing structures; ingesting continuous flows of Big Data which is growing and changing constantly; and re-examining its business processes. These challenges entail securing access to economic resources that offer the ability to match these constantly expanding demands for increased flexibility and load performance (Forbes Insights, 2015).

In a mature tax administration, Big Data architecture should facilitate addressing the issues of real-time or near real-time collaboration with taxpayers, including implementation of co-operative compliance arrangements or programmes, supporting fully automated compliance and service processes, providing guidance in risk assessment including the use of data analysis and discovery tool, as well as performance of projections, tax audit planning and overall administrative support. To support and provide consistency of compliance and taxpayer service delivery, revenue bodies' capability to deliver taxpayer services should also be based on the same architecture. A typical data architecture solution might be considered as consisting of three integrated platforms (Franks, 2014; van der Enden & Roytman, 2015; Keys, 2015, Owen & Sutherland, 2015; Willcox, 2015):

- **Data platform:** This covers data input, and includes the revenue bodies' ability for receiving raw data from taxpayers, third parties, other government agencies or the revenue body's own compliance as well as research and discovery operations. A mature revenue body must be prepared to take in both structured and unstructured data which might be sourced from enterprise resource planning (ERP) systems, text files, audio and video, social media, sensors, etc. regardless of sources, formats or platforms. The design of the platform must be flexible enough to adjust to new information sources and flows as they evolve. Under all circumstances the issue of incoming data security is critical for addressing concerns over confidential information being inadvertently released or shared publicly.

  It is preferable that information is received in a "tax ready format". Close collaboration with taxpayers, third party providers and software developers is essential to easing the process of receiving and further management and handling of data.

  An enterprise-wide data hub is an integral part of any data platform. Its typical set of functions would include rapidly ingesting, archiving and storing data as well as ensuring data security and supporting its high availability for users of the data discovery platform. It might be developed internally by the tax administration or it could be sourced from third party vendors.

A data hub should be designed as a part of taxpayers' natural systems that accommodates both wholesale and retail data management arrangements. It should be capable of providing direct access for individuals or business taxpayers as well as accounting firms or tax consultants that might have a respective arrangement with the tax administration.

The data hub should also be able to accommodate third party data flows that are outside of immediate scope of tax compliance and tax service delivery business but that could have potential value. Revenue bodies have to be both critical and open-minded about obtaining noisy data sets that might not have evident immediate utility and require additional storage capacity. Yet they might have potential use in later data discovery work. This implies that designers of data platforms should give priority to lower cost open source tools that are capable of online investing, filtering and pre-processing of multi-structured data sets, offering cost effective data storage solutions of low value and infrequently used data (Franks, 2014).

- **Data discovery platform:** Its main objectives are to provide rapid support for analytic research and to test performance of any tools or services before they become part of the operational system. The Data discovery platform must have the capability of supporting use of any type of analytic tools or methods capable of working with both structured and unstructured data to perform data virtualisation, indexing, search, common statistics, network analysis, ad-hoc reporting, business intelligence as well as other functions.

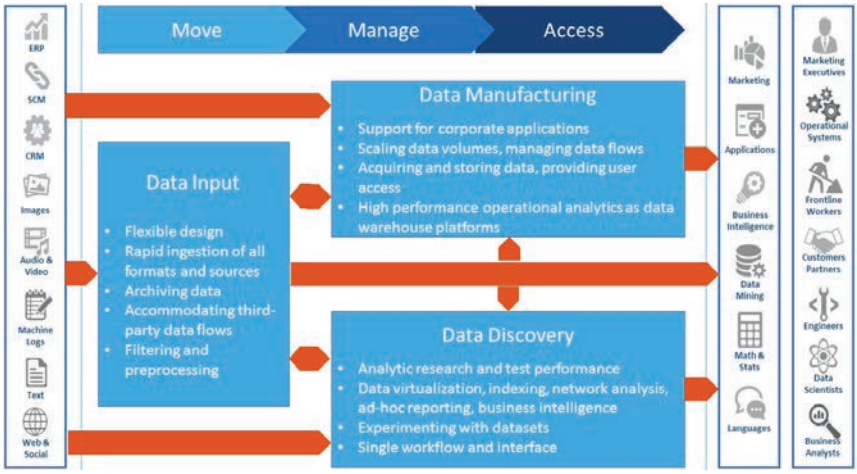
  The strength of maturity of this approach to data discovery depends on the way the discovery platform is connected with other corporate systems within a tax administration. While remaining within the bounds of tests and pilot data, the discovery platform is integrated with other corporate systems and allows synergies that are not possible in an isolated data discovery environment. At the same time, a contemporary data discovery platform must provide enough flexibility to support experimenting with data sets, which is impossible to achieve in an operational environment with established and running business processes.

  Data discovery should not necessarily fit into existing business processes. On the contrary, the freedom to experiment with Big Data allows for the revealing of hidden relationships, patterns and trends and identifying what adjustments or reengineering tasks need to be undertaken to streamline existing or introduce new business processes on compliance and service delivery sides of organisation.

- **Analytic or data manufacturing platform:** Its main objective is to provide support for corporate applications that are used in the operational business processes of an organisation. This platform contains mostly structured data which is most frequently used by different types of users. Relational technologies used by this platform allow the scaling of data volumes and ensure resources to accommodate different types of user requirements and manage data flows. Data scalability and the ability to integrate with enterprise solutions facilitate the transformation from traditional analytics to operational analytics which can be accessed and used by wider numbers of operational staff.

  It must be capable of acquiring, storing, moving and managing data as well as providing user access to perform analytics and deliver services. The analytic platform includes enterprise information management, high performance operational analytics as data warehouse platforms.

Figure 3.3. **Big Data Architecture Model**



Source: Teradata, 2016.

Conclusion

Big Data technologies offer the promise of improving many aspects of the way revenue bodies operate. The transition from an information rich organisation that derives most of its data from information provided by taxpayers, to one that sources information from third parties and uses this to determine when and how it interacts with a taxpayer is a long journey.

This change, which needs to occur at the same time as the tax administration continues to perform its usual functions, can succeed if the organisation has a clear vision that establishes data as a key asset; strong executive leadership, which can galvanise the organisation; and the appetite to critically examine its business processes and activities and determine how these can be reshaped by the use of data, rather than merely adding better data into existing work practices.

Administrations are encouraged to think big but start small. To test, learn and iterate, and use pilot initiatives that allow rapid release and delivery of tangible results. They are also encouraged to continue to share their experience and learning in this emerging area of tax administration.

Tax Administration Digital Maturity Model: Big Data management

Transformation to a digitally driven tax administration will not occur overnight. This journey can be described as a series of phases that a tax administration has to go through to achieve the highest level of digital maturity.

This Model allows administrations to self-assess against a range of capabilities including technological, business process, people, data and change features of revenue bodies that were highlighted by participants of the first E-Services and Digital Delivery Project workshop in Moscow in July 2015. These features were then discussed further at the second Workshop that focused on Big Data and portal solutions and use of natural systems. At this stage, other features of revenue bodies digital maturity have not been addressed, but may be the focus of future work by the FTA should members find the format and approach helpful.

This Tax Administration Digital Maturity Model delivers a simple to use instrument that does not require in-depth knowledge of information technology. It provides sequential references that allow revenue bodies to easily identify their level of digital maturity across arrange of capabilities. It suggests potential areas of focus should an administration want to move to the next phase of maturity (Dyche, 2015; Nikolic et al., 2014; Fath-Allah et al., 2014; Forbes Insights, 2015; Halper and Krishnan, 2013; Halper & Stodder, 2014; Sanger & Thomas, 2015).

The model is not intended to compare revenue bodies or to identify best practice for particular jurisdictions. In the longer term, the Model could be used as the basis for conducting a survey of revenue bodies that would not only establish the digital maturity level of participating administrations, but also identify better practices and patterns at different levels of maturity.

The OECD report *Increasing Taxpayer's Use of Self-service Channels* (OECD, 2014a) approaches the evolution of digital self-service. It provides the basis for positioning case studies from revenue bodies on both successful

and unsuccessful self-service strategies. The Digital Maturity Model offers to address the issue from a technology rather than from a service perspective.

Using the model

The model offers five possible self-assessment phases, which extend from nascent to emerging, adoption, advanced and best practice. The Model addresses six areas of self-assessment which include matters of organisation, capacity, infrastructure, governance, data, and Big Data use.

A tax administration's Big Data maturity level is specifically measured by assessing the presence of a data management strategy in the organisation, as well as data quality and availability, levels of data centralisation and access, Big Data use applications, and the use of structured and unstructured data by revenue bodies.

The self-assessment approach offered by the Model in Table 3.1 allows the senior management of a tax administration to arrive at an unbiased assessment, identifying areas that may require attention and investment.

Table 3.1. **Tax Administration Digital Maturity Model: Big Data management**

	Nascent	Emerging	Adoption	Advanced	Best practice
Organisation	Senior executives have little awareness of the advantages of data-driven approaches.	A small number of senior executives are lobbying, suggesting there are advantages in the administration being data-driven.	The executive team understand the benefits of being data-driven and have commenced exploring initiatives that may generate benefits.	The organisation understands what being data-driven means. The Chief Data Office (or equivalent) role or position may have been introduced.	Executives and staff view the administration's culture as data-driven.
	IT controls access to data.	IT and business segments or functions discuss business issues and options	IT and business segments or functions work collaboratively to address selected issues.	IT and business segments or functions are working together as a team.	Initiatives are well governed and managed.
	Business segments or functions undertake their own analysis using data they source and collect.	Little collaborative work to understand data or solve business issues.	Joint working groups spread the advantages of a data-driven culture through the administration.	Projects with successful implementation history are bringing all parts of the administration into a data-driven culture.	Flexible data access is available for business users with some level of guidance and support from IT.
Capacity	There is an absence of a data sharing culture within the administration.	There is an absence of a data sharing culture within the administration.	While there is no express data sharing culture, new capabilities are being developed with some existing staff being trained.	A data sharing culture is evident in the way problems and issues are worked on.	A digital data sharing culture exists within the administration.
	IT departments' priorities for data do not match the needs of users.	It takes IT too long to respond to queries of business departments.	Multifunctional teams address issues of data use and sharing.	A data centre of excellence might be established to serve different parts of the administration.	Staff can work in an agile environment.

Table 3.1. **Tax Administration Digital Maturity Model: Big Data management** *(continued)*

	Nascent	Emerging	Adoption	Advanced	Best practice
Capacity *(continued)*	A small number of people within the administration are using analytical software and working on e-services initiatives.	Limited use of commercially available analytics software in the administration.	Analytics technology may be in place, but typically there is no dedicated platform or applications for analytics. Some analytics planning occurs.	A range of new or emerging technologies are in place and delivering new services to taxpayers, and support to the administration.	Staff at various levels of the administration are capable of exploring data, using data discovery platforms and developing visualisations in a self-service way.
	Data access limited to staff in the IT department.	Staff have started to develop capacity in Big Data, attending conferences and self-learning.	Some staff have commenced exploring productive analytics.	Staff are thinking in terms of a digital ecosystem that encourages innovation and enables users to explore new types of data and e-services on a variety of platforms.	Staff have enough knowledge to use self-service analytic tools and are capable of achieving objectives using agile development methods.
	Some capacity to use spread sheet software in business departments.	Referencing best practices of other revenue bodies and the private sector, the administration has begun to establish the case for being data-driven.	Skills for new technologies like self-service business intelligence (BI), Hadoop, or NoSQL databases as well as more advanced analytics are being developed within the administration.		Big Data platforms and technology such as commercial Hadoop and enterprise NoSQL databases etc. are used within a tax administration, and are seamlessly integrated with legacy infrastructure.
Infrastructure	Understanding of need for holistic approach to development of IT infrastructure.	IT is still considered as a cost centre but the understanding of the value of IT is growing.	Recognition of IT as facilitating improvement of compliance and taxpayer services.	Digital strategy programme is financed on par with other business programmes in a co-ordinated way.	Infrastructure development takes place in an agile environment.

Table 3.1. **Tax Administration Digital Maturity Model: Big Data management** *(continued)*

	Nascent	Emerging	Adoption	Advanced	Best practice
Infrastructure *(continued)*			To support experimentation and discovery, sandboxes and testing contours are created within the administration.	Data and IT are viewed as value-generating rather than cost-generating sides of administration.	Data and IT are seen as value-generating part of the administration.
	Administration is investing in procurement of hardware and software, which is generally responsive to need.	Limited investments in analytic tools and service delivery.	The share of the annual cost of IT investments in computing, data storage and data acquisition is higher than in talent, analytic tools and service delivery.		Administration is focused on development of effective analytic tools and digital service products.
				Hybrid cloud is used to utilise public and private clouds as well as other data centre deployments.	Increasing capacity of staff to work in the new digital culture.
	Ability to combine data for analysis is limited by decentralised data sets, a lack of software and absence of data sharing culture within the administration.	IT is starting to develop digital infrastructure, often without involving business departments.	The administration is starting to consider building a unified architecture.	Architecture takes an ecosystem approach and is unified to support analytics and provision of taxpayer services regardless of technology platforms.	Unified data platform is expanded across entire tax administration.

Table 3.1. **Tax Administration Digital Maturity Model: Big Data management** *(continued)*

	Nascent	Emerging	Adoption	Advanced	Best practice
Governance	No data governance in place.	Need for governance is realised.	Administration adopts a governance plan. A steering committee that oversees data established. Administration is starting to implement data quality management and control.	Robust governance policy provides stewardship of data management across the administration.	Governance of data management is well established and understood at all levels of the organisation.
Data	No formal digital strategy.	Business and IT managers have started to develop a holistic vision for data and data integration to assist in developing new e-services.	Although no digital strategy is in place, infrastructure is being developed that enables users to access multiple data sources and different types of data, including unstructured content.	A digital strategy is in place and implementation is viewed as a corporate priority.	Digital strategy is updated in an agile way to meet new challenges and make best use of innovative technologies and growing knowledge within the tax administration.
	Poor data quality and consistency. Low data volumes.	Poor data quality has been identified, but remedial work is limited. Inconsistences and errors are contained in the data basis.	The administration is investing resources into improvement of data quality.	The administration is making use of available data and is using new data, as the need arises. New data can be quickly made part of the digital infrastructure and used for analytic and e-service delivery purposes.	The administration is using data across its operations to provide innovative approaches and technologies to draw insights that create the environment for better compliance and delivery of services.
	Data is decentralised and stored in disconnected silos. No horizontal data sharing is taking place.	Creation of a shared data resource is being discussed to ensure that users have relevant, consistent and timely data.	Administration is working on data consolidation to provide consistency of data to all internal and external users.	Data is stored in shared resources with administered data access rights.	Data is stored in shared resources with administered data access rights.

Table 3.1. **Tax Administration Digital Maturity Model: Big Data management** *(continued)*

	Nascent	Emerging	Adoption	Advanced	Best practice
Big Data use	Big Data is not used.	Big Data awareness is starting. Some ad hoc querying and visualisation is occurring based on descriptive analytics but is not necessarily used to identify emerging trends.	Big Data is starting to provide more sophisticated discovery and visualisation tools, largely to analyse and manage tax compliance risks and inform the delivery of customer centric services.	Big Data is facilitating compliance activity, business processes and taxpayer services. Big Data is used to move tax closer to the point of transaction.	Big Data is used in a real-time or near real-time mode to make tax assessments of individual taxpayers, deliver services, and support *no-return* or *pre-filled return* approaches
			Experiments with bringing together different data sources.New analytic tools and digital services are starting to be implemented.	Data from multiple channels including social media is used to: allow a better understanding of taxpayer behaviour and needs; manage risk; improve customised service; and improve responsiveness to change.	Non-traditional data are included in the risk models to highlight non-compliance or opportunities to improve services.
	Tax administration uses mostly structured transactional or event type information.	Only structured data is used.	Tax administration understands the value of unstructured data such as texts, emails, video, audio – including recorded call centre conversations, social media, graphs, etc. and is considering its fusion into analytic and digital service delivery tools.	Structured and unstructured Big Data sets are fused to support business processes in some or all parts of tax administration, firstly for case identification, selection, compliance audits and decision-making.	Structured and unstructured Big Data sets are used to support all business processes across the revenue body.

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Chapter 4

Use of portal solutions and natural systems in tax administrations

Many revenue bodies are now exploring how they re-position their service offerings to allow provision of the contemporary services taxpayers are seeking. New technologies that allow for the personalisation of delivery by identifying a taxpayer and generating their real-time digital profile using core data and insights make possible the provision of customised seamless service accessible from multiple platforms.

This chapter explores the use of portal solutions and natural systems in a revenue body, particularly in the areas of integration of Big Data technology with portal and/or natural systems platforms and facilitating the delivery of contemporary services to taxpayers. This includes examining security of access, certainty of use, proactive customised service, simpler user journeys and technology enabled support, as well as evolving collaboration between revenue bodies and software developers to co-design and co-deliver contemporary services to taxpayers.

Digital service delivery approach

Introduction

While the service delivery path taken by most tax administrations strongly mirrors that of many private sector organisations, the availability to taxpayers of e-service offerings significantly lags those provided by business and, more importantly, the digital maturity and expectations of taxpayers. According to a recent EY survey, most taxpayers expect to be able to use e-services to: file their return, track their refund, make on-line payments, obtain a copy of their prior year's return or income details to access other services, and to be able to do all this through one single access account or portal. Further, two-thirds want to be able to do these things from any device, with an increasing number (currently 42%) wanting to have access to live chat for any support they require (Sanger & Thomas, 2015). While most FTA member countries offer some on-line filing and payment options, many still do not. Of those that do offer these options, most cannot support access to services from a range of different devices, and live chat support is still in its infancy. These results and those of other surveys of tax administration service offerings provide a strong indication of the need for administrations to continue to improve the electronic services they provide to taxpayers.

Initial e-service efforts in tax administrations focused on the development of capacity to provide information to visitors to tax administrations' web site and to deliver generic web services to essentially *anonymous taxpayers*. Second generation tax e-services facilitated delivery of generic web services by allowing access to information or the downloading of forms or returns for completion. Tax administrations quickly identified the business case for electronic payment of tax and for the filing of returns and information on-line, with these services becoming the backbone of current offerings and architecture. More recently, tax administrations have developed online taxpayer accounts, expanding the range of services they provide within a secure environment. Access to on-the-go tax services has only started to emerge in tax administrations over the last four years, and then only in a relatively small number of administrations and for a very narrow range of services, although a number of countries are now offering filing and confirmation type services.

Many tax administrations are exploring how they re-position their service offerings to allow provision of the contemporary services taxpayers are seeking. New technologies are allowing for the personalisation of delivery by identifying a taxpayer and generating their real-time digital profile using core data and insights, which allows for the provision of customised seamless service accessible from multiple platforms, including portals, mobile, call centres or natural systems used by taxpayers.

Segmentation of customers using advanced analytics is allowing tax administrations to provide more customised services tailored to meet the specific demands and expectations of different groups or taxpayers. Traditional one-dimensional segments have been replaced with segments based on knowledge of channel preference, tax type, tax habits and preferences, previous experience or interaction with a tax administration and the digital maturity of the taxpayer. These factors are being combined with other information including demographics, status of return, likelihood of under/over payment, and historic payment behaviour, meaning administrations can increasingly provide more personalised treatments and approaches to individual taxpayers. These segments can also be used to proactively manage the tax return process using the appropriate mix of channels, devices and media. Particular focus can be applied to target segments that may require higher levels of advice and guidance such as non-digitally active, elderly or vulnerable users.

Administrations are also using analysis to manage taxpayer interactions based on the compliance risk associated with particular micro-groups, individuals or businesses. While such practices are still very much in their infancy in most administrations, they are providing positive results and encouraging tax administrations to further invest in such technologies as they look to improve tax compliance, reduce taxpayer burden, increase taxpayer trust and confidence, and improve business efficiency and revenue collection by delivering services and approaches that are more customer-centred.

This part of the report explores the use of portal solutions and natural systems in tax administration, particularly the:

- Opportunities provided by integration of Big Data technology with portal and/or natural systems platforms.
- Key features of smart portal design that facilitate the delivery of contemporary services to taxpayers including: security of access, certainty of use, proactive customised service, simpler user journeys, and technology enabled support.
- Evolving collaboration between tax administrations and software developers to co-design and deliver contemporary services to taxpayers.

Features of a tax administration smart portal

A smart portal refers to a "web portal" that brings information together from diverse sources in a way that allows for a degree of tailoring by both the administration and the user. This configuration and customisation allows information to be presented to the user either proactively or in response to service requests, in ways that reflect past use or preference. To deliver a service, a smart portal draws information from a variety of sources, particularly accessing Big Data.

Key features of smart portal design that facilitate delivery of contemporary services to taxpayers include: security of access, certainty of use, proactive customised service, simpler user journeys, and technology enabled support via online help and customer service.

For tax administrations, the design of smart web portals needs to consider how the administration moves over time to provide greater access to real-time or near real-time data flows. Such data flows allow the tax administration to explore the provision of secure and responsive personalised services to taxpayers, which can be seamlessly adjusted to the device they are using and where and how they are accessing the service.

Individuals and self-employed entrepreneurs or small businesses might prefer portal or mobile solutions developed by tax administrations, while companies and larger businesses may prefer third party solutions that are part of the natural systems they used to operate their business and which increasingly are able to integrate with the data systems of tax administrations. All these data flows need to be co-ordinated from a single-source data warehouse where a taxpayer is uniquely identified to facilitate linking of all attributed and related data.

Technology allows tracking every digital service delivered to a taxpayer, which itself can then be used to optimise services by informing taxpayers about key events.

Integration of Big Data technology with portal and/or natural systems platforms opens new opportunities for the delivery of customised user-centric

Box 4.1. **Delivering smarter services**

In Russia, personal income tax is withheld at the source by employers, and individual taxpayers only have to declare non-employment income or apply for tax deductions. Filing of non-employment income and tax deductions returns can be made online though a secure personal account. Property taxes assessments are provided to individuals on the web portal through secure personal accounts and property tax payments can be made online.

In Singapore, as part of the digital services transformation, User Experience Design (UXD) methodology has been adopted in re-designing myTax Portal for use on desktop and mobile. Selected taxpayers were invited for usability tests to provide feedback and improvements to the design of the prototypes through the use of various techniques and tools such as the eye tracker and the System Usability Scale (SUS).

Source: Country presentations at FTA workshop – Moscow, 2015.

taxpayer services. Taking advantage of these opportunities to optimise service to taxpayers, though, requires tax administrations to address a range of service design and delivery issues, the most significant of which include:

- A commitment to examine all their service offerings and determine how and where these activities are best performed,
- Developing capacity for online real-time or near real-time interaction with taxpayers,
- Establishing how to make effective use of available data, and
- Coordination of proprietary portal and mobile solutions with online tools and solutions developed by third parties.

Security of access

Trust and the consequent use of digital delivery channels and e-services by taxpayers are strongly linked to how revenue bodies ensure security and access to collected data. For most administrations the requirement to maintain confidentiality of taxpayer information is more than just a good business practice; it is required of the administration by legislation.

Commonly used security access and authentication technologies include digital certificates, personal identification numbers, passwords, shared secrets, tokens, and code cards. As criminals become more organised and sophisticated, these traditional systems are increasingly coming under attack, requiring tax administrations to look to strengthen their approach to secure and protect taxpayers' digital identity and information. In addition, the increased use of Big Data and cloud technologies is also increasing the demand for new and more robust methods of taxpayer identification and authentication.

In its publication *Security and Authentication Issues in the Delivery of Electronic Services to Taxpayers* (OECD, 2012), the FTA, drawing on a survey of 25 member countries, provided a comprehensive picture of the major security and identity authentication issues faced by tax administrations in delivering e-services. The report also describes aspects of security and authentication frameworks identified by tax administrations. Despite the steady growth in the range and uptake of electronic services in taxpayer services, the most widely used security and authentication technologies have remained largely unaltered over the past decade. Further, given the issues surrounding the management and maintenance of many of these (including digital certificates, personal identification numbers (PIN), passwords, tokens and code cards) a number of administrations had commenced exploring or using new technologies.

These approaches, which include biometrics, or the use of cloud computing in areas such as the management of digital certificates, offer the promise of better management of taxpayer and tax administration risk. The report encouraged administrations to share information on their experiences in using emerging technologies once they had become more mature. It also strongly supported the adoption of a whole-of-government approach to identity and authentication where feasible. Interestingly, in the four years since that report was authored, the challenges in this area for administrations and the risk exposure have not diminished, and, if anything, with the increased use of cloud storage and open source software, together with the introduction of open government data platforms, may have increased.

As tax administrations become more digital, they are increasingly becoming vulnerable to sophisticated attacks on their portals and web applications. These attacks are often carried out by people taking advantage of data, which is openly available in social media and other open sources, in an attempt to access individual taxpayer information. Further, with many taxpayer services moving from information-based to transaction-based (including payment of taxes or claiming for tax refunds), and this information being available in the cloud, the risk of identity theft and refund fraud continues to push demand for higher levels of security and authentication technologies for tax administrations.

Further, a security solution that works for all parties requires a balance between ensuring the level of appropriate control over taxpayer specific data being accessed and ensuring the security access solution is not too complicated or cumbersome that it drives users away. Ideally, it should be designed so as not to require any special knowledge from an individual, without the need to memorise passwords or use identity cards that can be duplicated, lost or forgotten.

To identify taxpayers and authenticate them for access to secure systems, some tax administrations have turned to the use of biometrics (Owen, 2015). Biometrics security refers to the authentication technics that rely on measurable physical characteristics that can be digitised and automatically verified by the system. Unlike other known security access tools, biometric features are not likely to be alienated, copied, lost or forgotten.

Technologies that support biometric access to secure systems typically involve verification of such individual identity characters as fingerprints, palm, hand geometry, retina, iris, handwriting and voice. Each of them provides a strong link between an individual and a claimed identity, helping to address issues of prevention of identity fraud and identity theft as well as of multiple identities and maintenance of duplicate records. With different biometric options available, tax administrations will need to consider not just technology considerations but cultural traditions, society attitudes to privacy, and other ethical issues that the capturing of personal information of the taxpayer may present (Malik, 2015).

Box 4.2. **Using biometrics for taxpayer identification**

In Australia and New Zealand, voice recognition systems are deployed to identify taxpayers calling for customer support. A voice print is as distinctive as a fingerprint yet people do not see it as such an intrusion into their privacy.

Voice Biometrics was introduced into New Zealand Inland Revenue in 2011 as part of its natural language speech recognition (NLSR) system implementation with the intent of providing secure verification enabling increased self-service and reduced manual support. The first phase of this was the deployment of a NLSR Interactive Voice Response (IVR) front end, enabling customers to state the reason for their call and upon recognition of the reason for calling, to be routed to the most appropriately skilled agent. This "skills based routing" meant that the overall rate of transferred calls reduced from over 30% to approximately 8% of all calls. There were also significant additional benefits which had not been expected, such as a greater level of call control gained from agents being able to confirm the reason for the call with the customer and get straight to resolution of the call rather than long explanations or clarification with the customer.

The second major phase of the deployment was the introduction of voice biometrics as an identity authentication tool. Voice biometrics involves the matching of a stored voice print from a library against the caller's voice. Registration for this service involved a manual authentication process and then a recording of a number of known number combinations or statements. The customer is asked to say their verification number and the voice print matched to the stored file. Whilst primarily introduced as a security system to provide an authenticated identify verification, it was identified early that there was significant additional benefits as a result of the ability to push customers into self service functions within the IVR. A key example would be bank account changes which previously would not ever have been possible in self-service, but with an authenticated caller providing absolute certainty of identity and the call being recorded so a record of confirmation was held, this meant that almost all bank account change phone-calls are managed with no human touch.

From a benefits perspective the financial opportunities that were identified with the introduction of Voice Biometrics included:

- Decreasing the time CSRs spend authenticating callers, saving between 50-150 seconds per call dependant on the number of successful tokens.
- Increasing self-service over the phone; and
- Supporting new self-service offerings, including password activation and re-sets.

In South Africa, biometric identification of taxpayers is governed by the Tax Administration Act. According to the law, biometrics means biological data used to authenticate the identity of a natural person by means of *(a)* facial recognition; *(b)* fingerprint recognition; *(c)* voice recognition; *(d)* iris or retina recognition; and *(e)* other, less intrusive biological data.

Source: Country presentations at FTA workshop – Moscow, 2015.

Box 4.3. **Other selected security approaches**

In Denmark and Singapore, individuals and business are equipped with national digital IDs allowing them to access a range of public and private digital services, including taxes and banking. This serves to mitigate identity theft problems and simplify access to services.

In Singapore, in addition to the digital ID and password (called Singpass), there is a second factor authentication (2FA) that is required for all accesses to sensitive Government Electronic Services, such as tax filing. Citizens can choose their preferred mode of 2FA – either by using a physical token or via their mobile phones. This significantly strengthens the security of Government e-transactions while making the access as user-friendly as possible.

In Denmark, legislation provides that every person and business must have a special bank account designated for payments and refunds from the public sector. All payment transactions are done electronically without any cash or check payments involved. This reduces the burden imposed on individuals and businesses, dramatically reduces the time taken to process a payment, and improves security.

In India, the Tax Department is leveraging Federated Identity Authentication services for authentication of taxpayer identity. These services are provided by Government agencies such as the Unique Identification Authority of India or trusted private entities such as Banks or Depositories that are centrally regulated and have to conduct Know Your Customer (KYC) for their clients. In the first year itself around 17% of taxpayers have filed their returns with such authentication. Additionally, 8 % taxpayers have filed their returns using Digital Signatures.

In Italy, the revenue agency is working on a whole-of-government general digital agenda that includes a single ID sign-in to every portal in the entire country including government, municipal and public services. This new approach is expected to change the whole concept of public e-service delivery in the country.

Source: Country presentations at FTA workshop – Moscow, 2015.

Ease of access and wide availability of particular technologies might need to be considered. It is advisable to employ biometrics verification technologies that are likely to already be at taxpayer's disposal and do not entail any additional compliance cost for them. This will ease the transformation to a new system and reduce the possibility of a negative reaction from a taxpayer perspective. For example, use of a voice biometrics system is likely not to require any special additional equipment by the taxpayer since a mobile device microphone is the only device needed to verify a person's voice and log a taxpayer on to a personal file.

Big Data technology can also facilitate security of access to personal data and use of online digital services by taxpayers. As part of this tax administrations could consider the use of cyber security analytics applications that are capable of ingesting large volumes of clickstream and social media data to make comparisons with the knowledge base of known taxpayer behaviour patterns and to recognise emerging patterns, suspicious behaviours and discover cyberattacks. This can be achieved by integrating individual taxpayer data into cyber security analytics tools and looking for any abnormalities in system access. The system should track failed authentication attempts and correlate them with other identity breaches.

Increasing taxpayer awareness of growing identity theft risks and possible tax consequences, as well as educating taxpayers about ways of avoiding these risks, may also be an important part of tax administrations' efforts to address the issue of cyber security (Koskinen, 2015).

Data quality and certainty

Taxpayers expect the information they access and the data they use to be accurate.

While tax administrations have long histories in safeguarding the quality and accuracy of the data they use in service delivery and compliance activities, accessing and utilising Big Data that they neither generate nor control presents new challenges. While actively engaging with providers ahead of data being acquired and using systems tools available with many Big Data sets can help to improve the quality and accuracy of information, a growing number of administrations, like their private sector counterparts, are allowing taxpayers to view and provide feedback on the accuracy or otherwise of personal information held by the tax administration.

Such approaches not only significantly reduce errors and inconsistencies, but they also help strengthen the trust relationship between the tax administration and the taxpayer, and reinforce that data accuracy is a joint responsibility. Clearly, judgment needs to be exercised in determining which Big Data sources a tax administration would allow its taxpayers to view and validate, but the principle of involving taxpayers in the review and validation of their data appears sound.

To acquire a deeper understanding of taxpayer's needs and preferences, a revenue body might also consider giving taxpayers more discretion over their own personal data and also disclosing both where data was sourced and how the data is used.

Every tax system has transactions where the tax consequences may not be readily ascertainable and therefore may require the taxpayer to seek external advice. With taxpayers increasingly looking to tax administrations to help

provide certainty in respect of their tax position, the more that the data the tax administration holds can be relied upon, the greater the opportunity for the development of tools and approaches that can provide certainty for taxpayers.

In the provision of digital services, certainty extends to include confidence that communications are secure and private. Existing technologies support the use of dedicated encrypted data transfer channels as well as establishing direct communication links with specific individuals or companies. Using dedicated digital mailboxes allows tax administrations to reduce large volumes of paper correspondence (e.g. notices of assessment, taxpayer accounts) that are sent to taxpayers using costly postal services. The use of a digital mailbox capability enables such information to be made available to taxpayers electronically via a secure portal.

Applying this approach enhances the trust between taxpayers and tax administrations and is fast becoming the preferred design feature for tax administrations in providing services to and communicating with taxpayers.

Box 4.4. **Building trust**

In Denmark**,** it is mandatory for citizens and businesses to have a digital secure e-mail account, which is provided by government. All private information ranging from tax to health data can be sent through this secure channel. Citizens and business are obliged to open their secure e-mail boxes and are prompted to do so through text messages notifying them that new correspondence is available.

In Russia**,** a digital mailbox is integrated into a secure personal taxpayer online account which can be accessed from the tax administration's web portal. This tool is currently available only in the online solution developed for self-employed entrepreneurs, but the tax administration is planning to extend it to other types of taxpayers as well.

Source: Country presentations at FTA workshop – Moscow, 2015.

Proactive customised service

Big Data technology provides the opportunity for administrations to consider providing more proactive services to taxpayers that can be better customised to their situation. To support this, portals will need access to new and different information on the taxpayer themselves, including analysis of interaction patterns, transaction types and times, and where and how services are accessed. It also requires the ability to provide forms, guidance and answers to questions as and when needed, in order to manage the choice of service delivery channels.

Simpler user journeys

With taxpayers increasingly looking to administrations to deliver online services that minimise the time and effort they need to invest in meeting their tax obligations, administrations are increasingly looking to utilise a range of approaches used by private sector services providers, including: seamless customer experience when switching between service platforms, simple intuitive interfaces, standard case based scenarios that save user search time, process re-engineering to remove additional or duplicate steps, and using real-time or near real-time data to determine services and pre-populate forms and documents.

In addition, a number of tax administrations are using data available through e-government channels and other trusted third party sources to implement a *no-return service concept* that does not require a taxpayer to file tax returns, but rather to confirm the accuracy of information the tax administration presents to them.

Modern tax administrations need to invest in understanding how advancements in technology and in new service delivery platforms can support tax outcomes, if they are to avoid either inadvertently excluding users from services, or being unprepared to support new ways of operating (Kammeyer, 2015).

A modern portal solution typically represents a complicated collection of webpages dedicated to various aspects of service and compliance. For a taxpayer, navigating through webpages to find needed resources or services may be time consuming and challenging. It is advisable to standardise these processes by identifying standard user patterns and scenarios that will guide taxpayers towards the service and provide advice on how to comply. The wide use of mobile devices calls for development of apps and/or rendered web services that are focused on specific functions and requirements. It is important to maintain user app interfaces on a simple intuitive level with minimum intervention required from the taxpayer's perspective.

Many tax administrations are using or are exploring the use of *no return or pre-filled/pre-populated returns* as a way of improving compliance, reducing the taxpayer burden, and simplifying and stream-lining business process. While such approaches at present draw heavily on traditional information available within a tax administration, this is changing as third party data sources are accessed and administrations increase the range and extent of their pre-filling activity. Smart portals should offer the opportunity to support prefilled forms and other initiatives that increase the use of e-filing for the major taxes, making it easier for taxpayers to file returns or return information, reducing the revenue bodies' costs in processing returns, and potentially expediting refunds to taxpayers. To support these operations, modern tax administrations need to have the capability to receive information from a wide range of sources and bring this together in a summarised way for the taxpayer, where it can be accessed using simple intuitive interfaces.

Technology enabled support

Smart portals can also enable the provision of efficient online assistance to taxpayers using chat or virtual video assistant facilities including those that employ artificial intelligence tools. Providing taxpayers with in-channel help is essential to retain taxpayers in digital self-service channels. This in-channel help should include simple and intuitive online support options that will allow taxpayers to locate the information they need within the channel they are using or to move seamlessly between channels. Examples of online support tools include Virtual assistant and click to call or click to chat (or live chat) options. Virtual assistants supported with an online knowledge base enable taxpayers to immediately find information they need, without the need to switch channels or wait for a response from support staff. According to the EY survey, three quarters of taxpayers said that they are likely to use online chat services to communicate with their tax authorities, should such chat opportunity exist (Sanger & Thomas, 2015).

Smart portals should improve the tax administration's reputation and brand recognition as well as enhance the proactive provision of necessary information, support and guidance to taxpayers and community members to facilitate their compliance activities and, where necessary, educate them about the tax system.

Box 4.5. **Reducing taxpayer burden**

By 2020, most UK businesses, self-employed people and landlords will be required to keep track of their tax affairs digitally and update the tax authority (HMRC) at least quarterly via their digital tax account. Businesses will be required to use digital tools, such as software or apps, to keep records of their income and expenditure. HMRC will ensure that free apps and software products are available, but many businesses and their advisers will choose to use commercially-available tax software packages. Businesses will use software that compiles their tax data as part of their ordinary day-to-day activity, highlighting any possible errors (for instance, arithmetical mistakes or figures which look out of place) and offering prompts for information that might otherwise be overlooked. Once the software has compiled the relevant data, businesses or their agents will feed it directly into HMRC systems via their computers or smartphones. Updating HMRC directly in this way will be secure, light-touch and far less burdensome than the tax returns of today.

Source: HM Revenue and Customs (HMRC), 2016.

Smart portals should help direct taxpayers to the best channel for them to access the assistance they need. It should also allow the tax administration to direct many contacts to low or no cost options, while at the same time ensuring the taxpayer receives the support they require. While implementation of contemporary customer support will require additional expenditure on the part of the tax administration, the experience of administrations that have undertaken this expenditure is that there are realisable benefits in the form of: lower administrative costs, more timely revenue flows, increased participation and access, and compliance cost reductions. These sit alongside benefits which are harder to measure, including increased trust and confidence in the tax system and the tax administration, as well as on-going gains in compliance behaviour.

Box 4.6. **Leveraging natural systems**

One of the cornerstones of the ATO's Digital Strategy is integration with natural systems. By embedding services within the systems taxpayers use day to day (e.g. accounting software, point-of-sale systems) the ATO can facilitate seamless transactions between individuals, government, and businesses. This integration with natural systems relies on delivery via third parties, which the ATO will enable through development of rich Application Programming Interfaces (APIs). Integration will enable taxpayer reporting and payment obligations to be met easily, quickly and automatically in "real-time", as a by-product of their day to day activities. This in turn will significantly reduce red tape for the community whilst enhancing compliance.

Integrated services also facilitate the collection of data that the ATO use to prefill services for taxpayers, making it quicker and easier for taxpayers to complete certain lodgements.

Services will be prioritised for integration when market demand exists, and when integration will enhance compliance and deregulation outcomes.

A pilot in New Zealand, which is expected to be rolled out in the later part of 2016, addresses the issue of filing goods and services tax (GST) information through two accounting software providers. This reduces the burden on businesses, saves them time to re-invest in their business activity, increases the likelihood of Inland Revenue receiving valid and correct information, and overall improves compliance and the customer experience.

In another initiative, New Zealand Inland revenue intends to work with selected Payroll Intermediaries (initially as a trial) who provide monthly employment information for Pay-As-You-Earn (PAYE) employees for employers to enable

Box 4.6. **Leveraging natural systems** *(continued)*

real time sharing of information around aspects such as changes in customer circumstances, e.g. new employee, employee exits, increased income etc., which can then be used to support the delivery of social benefit payments as well as assist in the pre-population of individual income tax information.

Since the mid-2000s business taxpayers in Russia have been using commercial-of-the shelf (COTS) accounting software with the embedded capability of automatic preparation and filing of tax returns for all types of taxes. Accounting software is designed by private developers on the basis of standards provided by the FTS. Over 90% of tax returns are filed through a system of certified private providers that maintain secure digital communication channels and ensure timely and confident and secure delivery.

In Singapore, IRAS embarked on a collaborative programme with another Government agency (Accounting & Corporate Regulatory Authority) to leverage industry accounting software to help small companies in better meeting their record-keeping as well as corporate and GST filing obligations. The software will be able to generate financial accounts and tax computations and allow the companies to file their required information electronically.

Source: Country presentations at FTA workshop – Moscow, 2015.

Leveraging natural systems

Tax administrations cannot simple rely on portals as their only form of digital access for taxpayers. They need to make available access points including those embedded in financial systems of companies and personal banking solutions. Smart portals should support the integration of accounting and records keeping software developed by third party vendors. Over time, taxpayer services increasingly need to be integrated and aligned with the natural environment of modern taxpayers; this includes accounting and record keeping software solutions, online banking and potentially social media (Schloss, 2015).

The emergence of new or expanded service offerings by third parties interacting with taxpayers and the tax systems has presented both taxpayers and, importantly, tax administrations with the opportunity to foster tax compliance by leveraging off of these services, which are increasingly part of the taxpayers' overall ecosystems. As noted in the OECD report *Tax Compliance by Design* (OECD, 2014), the goal is to create a system where all different parts co-operate intentionally to make the compliance process smooth and correct.

To take advantage of these opportunities, a new collaboration model is emerging between third-party developers and tax administrations, where third party innovation can deliver services taxpayers need and at the same time provide information tax administrations require. For example, a cloud-based banking or accounting service a taxpayer uses to run their business will seamlessly access rules or information from the tax administration that will allow it provide VAT and payroll information to the tax administration without the need for completion of separate returns or dedicated filings.

This model of co-operation often implies working with Application Programming Interfaces (API). APIs are open sets of standards that describe how information can be exchanged between applications and services. They are based on the concept of open data, which is increasingly adopted by governments around the world. Open data can be defined as data that can be used, re-used and disseminated by all stakeholders without restrictions, with the sole requirement that users share their final work as well (OECD, 2014).

Delivery of API's requires tax administrations to ensure that their infrastructure can support making them available for external organisations, and, more fundamentally, requires a re-examination and adaption of their business model. This adaption requires the tax administration to move away from providing what, for many, may be regarded as fundamental parts of the tax administration's role, including, for example, providing access for taxpayers to file electronically, or developing electronic returns and forms for use.

APIs allow external organisations to innovate and develop agile services which are more tailored than those offered by revenue bodies (OECD, 2014). This creates a foundation for automated transactions between different networks. The platform unlocks hidden value within the organisation by exposing its core as an API. In this way, it acts as a centrepiece for open innovation, co-creation and collaborative development.

Another way of increasing efficiency of portal solutions development is to involve software vendors in the design and provision of services. Growing dependence on technology, the Internet and digital devices also means that software developers are playing an increasingly important role in creating and delivering additional value to their clients through their products. This value can be delivered through seamless interactions with the revenue body driven directly from their software, better integration with the natural processes of a business, and the provision of additional features that make their product more attractive for end users.

The OECD report *Together for Better Outcomes* (OECD, 2013) highlights the emergence of new forms of collaboration, including co-creation, co-production and co-delivery. Tax administrations and software developers

need to work in partnership to co-design and co-deliver contemporary services to taxpayers. The synergies of this collaboration enhance opportunities to use technology, know-how and the ability to access and process data in real-time to self-serve. It is anticipated that in time, the dependence of revenue bodies on software developers and other third party providers will increase and is likely to evolve into a more dynamic approach in the context of a broader taxpayer ecosystem.

There are two principal ways to use an API as an inbound channel: as the means to build extensions that are available to end users through a tax administration's app, or as the platform on which numerous apps can be created and marketed independently. The former technique will result in a better user experience due to a tighter integration and control of the ecosystem through an application marketplace. The latter will generate the biggest impact as an inbound acquisition channel: a tax administration can encourage third parties to build entirely new applications that use its API in completely new ways (Spencer et al., 2014).

Box 4.7. **Third party software**

In the UK, according to HMRC's, third party tax software and application programming interface (API) strategy, HMRC currently has APIs in place for 21 of our services and the majority of transactions carried out online with HMRC come via third party software.

HMRC is responsible for more than two-thirds of all government transactions, or 1.24 billion per year counting online, post and telephone. More than 1.1 billion (92.7%) are digital and three quarters of these are completed through an API using a third party product.

These API submissions are supported by a community of more than 600 third party software developers who are responsible for the products many of its customers use. "We will build a suite of APIs that will enable third party products to carry out more tax functions and in greater detail" – HMRC third party tax software and API strategy.

Integrating tax services with natural systems can radically reduce the compliance burden for businesses, without compromising the quality and accuracy of information that legislation requires to be supplied. Another way in which APIs assist third parties and business partners is exposing business rules, which saves the effort and costs of interpreting them, and at the same enabling, supporting and encouraging innovation from the wider market.

Source: HMRC.

Conclusion

Introducing smart portals and supporting the delivery of services through third party systems is strongly aligned with tax administrations' intent to reduce the burden faced by taxpayers in meeting their tax obligations and improve customer experience. Delivering contemporary services also provides administrations with the opportunity to better manage compliance risk and provide more targeted and tailored interventions to support taxpayers.

In making use of these new technologies, administrations will need to address a number of challenges. Over time, security access should be better integrated into the systems taxpayers employ so as not to place additional costs or burden on taxpayers. Tax administrations should also engage with taxpayers to improve the certainty of use of online services and to improve the quality of data. They also need to ensure that digital services can be consistently delivered across channels and platforms and be accessible from multiple devices. When combined with advanced analytics, Big Data technology provides the opportunity for tax administrations to improve the way they personalise information to taxpayers, particularly when this data is accessible in real-time. Finally, involving private sector professionals in the development of smart portal solutions, including apps, requires administrations to reconsider their business models and their approach to delivery of services. These developments are highlighted in more detail the report on *Rethinking tax services: the changing role of tax service providers in SME tax compliance* (OECD, 2016).

Tax Administration Digital Maturity Model

This Model allows administrations to self-assess against a range of capabilities including technological, business process, people, data and change features of revenue bodies that were highlighted by participants of the first E-Services and Digital Delivery Project workshop in Moscow in July 2015. These features were then discussed further at the second Workshop that focused on Big Data and portal solutions and use of natural systems. At this stage, other features of revenue bodies digital maturity have not been addressed, but may be the focus of future work by the FTA should members find the format and approach helpful.

Using the Model

The issues of assessing the digital maturity of tax administration with reference to development of portal solutions and natural systems are addressed in Table 4.1 of the report. The method of assessment that is applied here is the same as in the previous chapter (Dyche, 2015; Fath-Allah et al., 2014; Halper & Stodder, 2014; Sanger & Thomas, 2015).

The Model supports self-assessment across both delivery of portal services and the use of natural systems. In respect of portal services, the model considers: the maturity of web presence; authentication and security; use of taxpayer segmentation for service delivery; provision of personalised services; information available via portal services, co-design and insights, including integration with whole-of-government solutions; and third party involvement in service development. The model for natural systems provides for assessment of third party engagement, use of API's and capacity.

Table 4.1. **Tax Administration Digital Maturity Model: Smart portals and natural systems**

	Nascent	Emerging	Adoption	Advanced	Best practice
A. Delivery of services via a portal					
Web presence	Tax administration has an established web presence.	Web presence is enhanced with one-way or simple two-way communication services.	Two-way interaction with taxpayers is commonplace.	Taxpayers have access to full digital end-to-end service for most activities they access.	Digital services are consistently delivered and can be accessed from multiple devices and across all delivery channels.
Authenticated services	No services that require authenticated access.	No services that require authenticated access, but plans for development.	Parts of portals that provide personalised services are protected by authenticated access with logins and passwords, personal identification numbers, shared secrets, tokens and/or code cards.	Portal provides a single point of access. Security control is calibrated by the sensitivity of data being accessed. Digital certificates are common. Biometric authentication technology is starting to be used.	Security access is integrated into taxpayers' natural environment and taxpayers are no longer required to have specialised knowledge to access their personal online accounts or memorise passwords. Big Data analytic tools are used to identify and respond to potential cyber-attacks.
Segmentation	Taxpayers are not segmented by types.	Service delivery might be provided to taxpayers in a segmented manner.	Service delivery is made to segmented types of taxpayers.	Complete personalised end-to-end portal delivery of services developed from taxpayer perspective.	The delivery of services is personalised to meet taxpayer expectations and are often based around life events.

Table 4.1. **Tax Administration Digital Maturity Model: Smart portals and natural systems** *(continued)*

	Nascent	Emerging	Adoption	Advanced	Best practice
Personalisation of services	Services are not personalised.	The portal provides some personalised service which is generally based on static data.	Portal provides access to basic account enquiry, e-filing and e-payment options, but still requires much of the content to be downloaded. Some forms may be able to be completed on-line or scanned and returned, but many cannot.	Portal is able to: georeference to display information which is most relevance to the taxpayers' current location; identify the device or platform being used to access services and seamlessly direct taxpayer to the most suitable version; derive additional facts about the taxpayer through other information sources; track user journey's; identify language preferences; and identify taxpayers service preferences.	Portal provides taxpayers with the ability to customise for their use with information which is most relevant to their current context. Personalisation is done in real-time or near real-time based on available data about a taxpayer at any particular moment in time. Omni Channel multi-platform real-time response to taxpayer demand holds the key.
Information available	The website provides basic static information about the tax administration.	Information is regularly updated. Taxpayers can download generic forms or send emails to the tax administration via a generic email address.	Search engines are available but poor. Portals provide some personalised services. Government or third-party calculation software is incorporated into the portal.	Delivery of digital services uses Big Data which may be shared between different parts of tax administration.	Tax administration portal is seamlessly integrated into the natural ecosystem of a taxpayer, and is capable of analysing and responding to taxpayer online or near online and to provide customised digital services.

Table 4.1. **Tax Administration Digital Maturity Model: Smart portals and natural systems** *(continued)*

	Nascent	Emerging	Adoption	Advanced	Best practice
Information available *(continued)*			Certain transactions can be completed online. Taxpayers are able to: email tax administration staff; e-file tax returns; access prior year return transcripts; view workflow and refund status; Be supported via online chat available or other forms of real-time help.	Portal is taxpayer centric and capable of supporting: secure e-mail boxes that provide safe communications between taxpayers and revenue bodies, multi-device access to perform secure financial transactions online, delegated access, ability to leverage multiple tax calculation engines, and live chat employing artificial intelligence technology.	Subject to legislative limitations the portal is able to share data with taxpayers, other government agencies and third parties.
Co-design and Insight	Whole-of government portal is under discussion.	One or two whole-of government services are under development, but not yet available to citizens.	Limited exchange of personalised data with the whole of government portal. Access to tax administration's web portal can be achieved through a link from the whole-of-government web portal. Separate security procedure is required to access tax services.	Access to tax administration services can be achieved from a whole of government portal using a unified authentication procedure.	A single portal can be used to access all government services from different platforms.

Table 4.1. **Tax Administration Digital Maturity Model: Smart portals and natural systems** *(continued)*

	Nascent	Emerging	Adoption	Advanced	Best practice
Third party engagement	Taxpayer insights into service development are actively used.	Taxpayer views are collected from complaints and passive sources.	Tax Administration is under pressure from taxpayers to deliver contemporary e-services. Limited interaction with taxpayers to learn what is driving demand, mean most services are developed based on the "gut-feel" of staff.	Digital service delivery is based on taxpayer feedback and expectations, with reference groups structured by segment and/or types of e-services supporting this.	Taxpayers are involved in the development of digital services in an agile environment.
	Revenue bodies do not engage with third parties in service provision.	Revenue bodies enter into agreements with third parties, including pilot projects.	Revenue bodies have agreements with major third party institutions.	Revenue bodies actively collaborate with many third party organisations, covering most taxpayers.	Full mutually beneficial co-operation with business partners, covering all taxpayer segments.
B. Use of Natural Systems					
Engagement	Taxpayers have to regularly engage in costly interaction with revenue bodies.	Only participants of pilot projects have the chance to test new capabilities of natural systems.	Customers of major organisations have the possibility to interact with revenue bodies through natural systems.	Most taxpayers are able to interact with revenue bodies by means of third-party organisations.	Taxpayers can fulfil all their obligations through elements of their natural environment. A fully seamless experience.
Use of APIs	No APIs are available for third parties.	Revenue bodies look into exposing their APIs: first test projects are undertaken.	First steps of transforming into an API platform: third parties have the opportunity to create new value for customers.	An increasing number of APIs are available for business partners to build upon: revenue bodies become more open to co-creation.	Tax administration is a fully fledged transparent API platform allowing third parties to create innovation in a collaborative environment.

Table 4.1. **Tax Administration Digital Maturity Model: Smart portals and natural systems** *(continued)*

	Nascent	Emerging	Adoption	Advanced	Best practice
Use of APIs *(continued)*	Legacy technology infrastructure prevents exposing APIs and interacting with third parties.	Senior officials realise the need to invest in necessary technology to allow exposure of APIs.	Legacy technology is reoriented to new ways of business or gradually replaced by contemporary solutions.	A large part of technology infrastructure becomes suitable for working with multiple APIs and third party partners.	State-of-the-art technology is employed to seamlessly interact with a large number of third parties.
Capacity	Staff largely support legacy roles and processes rather than working with APIs and natural systems.	Senior staff realise the need to acquire new skill sets and start preparing for this change.	Staff are gradually being re-oriented to be capable of working with APIs. Roles and processes are being overhauled.	Most staff learn new skills necessary to work within natural systems; new capabilities are sourced for the organisation.	Revenue bodies have professional qualified staff with clearly assigned roles to work with natural systems.

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Chapter 5

Findings and recommendations for leveraging new technologies in tax administrations

This chapter summarises the key findings from the previous chapters and sets out recommendations that revenue bodies may consider in order to leverage Big Data, portal solutions and natural systems.

Findings

Technology is playing an increasingly important role in the economy and society. Technological innovations are disrupting existing markets and value chains and impacting how we live our lives as well as how we access an increasing range of the services we use. Many of these changes are linked to the exponential growth in the use of mobile devices, and the new services which they support. These services draw heavily on access to Big Data, the internet of things and to lower-cost and larger volume data storage options.

These new technologies are also *disrupting* the work of revenue bodies, requiring them to reconsider the way they operate, the way they manage service and compliance risk, and, importantly, how in light of this and the increasing levels of digital maturity in all societies, they support the development of environments and services that make tax compliance less burdensome for taxpayers.

Big Data technology with improved access to data and new data sources that can be accessed in real-time or near real-time, and the ability to combine data and analytics, hold tremendous promise for transforming decision making in revenue bodies. They also offer revenue bodies the opportunity to extract better business value out of existing data and thereby transform the support they provide to taxpayers in meeting their tax commitments while also improving tax compliance, reducing taxpayer burden, and increasing levels of taxpayer trust.

Recommendations

Drawing on the conclusions set out in this report, it is recommended that tax administrations:

- *Consider how they maximise the opportunity Big Data presents* in the effective administration of their tax systems, paying particular attention to the need for a clear vision that establishes data as a strategic asset, and being willing to critically examine business processes and activities rather than simply adding better data into existing work practices;
- E*xamine how they support the effective delivery of services to taxpayers* in light of the opportunity to use smart portals and to support the delivery of services through third party systems, noting that such approaches provide them the opportunity to personalise information to taxpayers, particularly when this data is accessible in real time;
- *Utilise the Digital Maturity Models* for Big Data Management, and for Smart Portal and Natural Systems, to assist them in assessing

their current level of digital maturity and to identify specific areas for further attention;

- *Increase their monitoring of new and emergent technologies* that have the potential to disrupt both the delivery of services to taxpayers and the more broader management of revenue collection; and
- *Continue to share best practices and experiences* with other FTA members to stimulate further co-operation in advancing the practices of revenue bodies in the delivery of digital services to taxpayers, particularly considering the use of emergent technologies.

Glossary

Application Programming Interface (API)	Open sets of standards that describe how information can be exchanged between applications and services.
Biometrics	Method for uniquely recognising a taxpayer based upon one or more physical characteristics, for example: fingerprint, voice, iris recognition, face recognition.
Big Data	Extremely large sets of structured and unstructured data that may be analysed computationally to reveal patterns, trends, and associations, especially relating to human behaviour and interactions.
Block chain or blockchain	A distributed database that maintains a continuously growing list of data records protected against tampering and revision, even by its operators.
Click to call	Refers to a form of web-based communication, in which a customer clicks a button (image or text) to request an immediate connection with a customer service representative in real time by phone call.
Click to chat	Refers to live "chat" support offered on a website. It allows the customer to click a button (image or text) to converse with a customer service representative in real-time via typing. It may also be referred to as a "live chat support".
Data confidentiality	Assurance that data transmitted (in both directions) remains confidential.
Digital Certificate/ Digital Signatures	Refers to Public Key Infrastructure (PKI)– basically this is a security protocol that uses a pair of "keys", one normally held by the taxpayer (not always the case) and the other by the administration. A taxpayer uses their key to log in, sign and submit information which is compared against the key held by the administration. Both must match in order for data to be accepted or for the user to be allowed access to the tax administration's secure services. A digital certificate or digital signature fulfils the same function.

Data driven culture	A culture where data is viewed as an asset; it is visible and accessible and valued as much as intuition and experience.
Data governance	Overall management of the availability, usability, integrity, and security of the data employed in an organisation.
Data stewardship	A set of activities and programmes aimed at improving the quality of data owned by an organisation.
Digital ecosystem	The convergence of the media, telecoms and IT industries. It consists of users, companies, governments and civil society, as well as the infrastructure that enables digital interactions.
Disruptive technology	An innovation that creates a new market and value network and eventually disrupts an existing market and value network, displacing established market leaders and alliances as well as making societal impact.
Identity Authentication	Assurance as to the identity of the person or his/her intermediary who transacted the data (both directions) or accessed taxpayer data.
Internet of Things	Network of physical "smart" devices that use wireless technology to collect data and talk to each other and to people.
Natural systems	An environment within which individuals and businesses carry out their daily activities, also called their "ecosystem".
Sand box	An online environment in which code or content changes can be tested without affecting the original system.
Service	A product or activity that meets the needs of the user or can be applied by the user. It may also mean the action of helping or doing work for someone.
Single taxpayer file	Comprehensive information regarding a particular taxpayer assembled in real time or near to real time by a tax administration in digital form.
Shared Secrets	Challenging the taxpayer to reveal information that only the Revenue authority and the taxpayer should know, usually information contained in the taxpayer's tax records.
User-centred design	A design process, in which the needs, preferences, requirements and limitations of end users of a service or product (in the tax context: taxpayers) are given the priority at each stage of the design process. In user-centred design, the designers not only analyse and foresee how end users are likely to use a service or product but also test the validity of their assumptions with regard to user behaviour in real world tests with actual users.

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A PRACTICAL GUIDE FOR REVENUE BODIES

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