



Transforming the tax function through technology

A practical guide to 2020

KPMG International

April 2018

This report was first published as *Transforming the Tax Function in China* by Lachlan Wolfers, Head of Tax Technology for KPMG China, and Alexander Zegers, Tax Technology Director, KPMG China. In its current form, this publication has been expanded upon to provide a global context and bring insights to audiences around the world. Please note that KPMG China is a limited liability partnership and one of the global network of independent member firms affiliated with KPMG International Cooperative (“KPMG International”).

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Part A — Introduction — before we begin

It is vital to remember that the use of technology in a tax function needs to serve a purpose beyond merely the use of trendy new gadgets or following the lead of others.



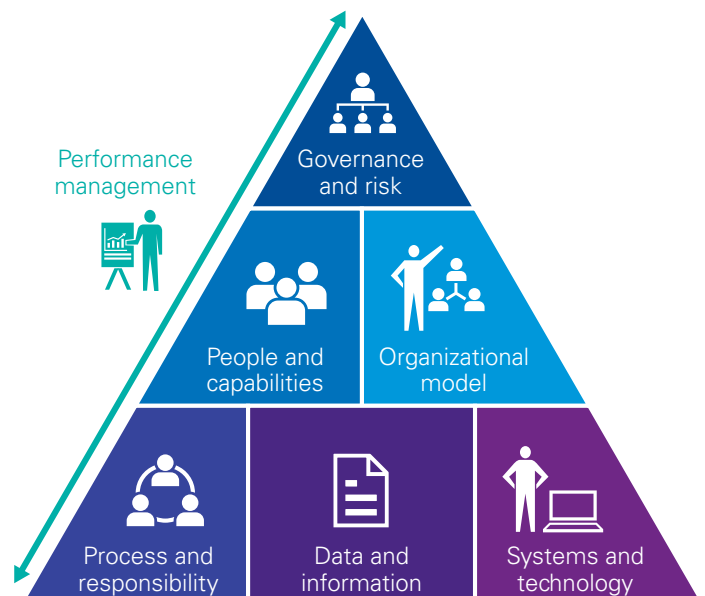
An Australian journalist described the world as being “in a moment between technology and techno-panic”.¹ This is the idea that we are both excited about and fearful of what the future may hold for us in a world where technological developments are on the precipice of a revolution, one that is increasingly being referred to as the fourth industrial revolution. The onset of this revolution has left many tax and finance managers feeling anxious about being left behind and uncertain of where to start. Indeed, the term ‘disruption’, which is so commonly bandied about to describe the effect of this revolution, evokes images more associated with fear than with education and opportunity. The goal for this publication is to provide tax and finance leaders with a foundation for transforming their departments and increased confidence in embracing technology and the benefits it can bring for managing and evolving the modern tax function.

There are now many publications in the market that discuss the ‘Tax Function of the Future’, and they typically describe, in ambitious terms, how to transform a tax function by taking advantage of technological developments in fields such as artificial intelligence, robotic process automation, blockchain, machine learning, and augmented and virtual reality. Often, these publications fail to set a practical foundation that enables tax leaders to build on the current strengths of their tax departments, veering too far into the realm of ‘techno-rapture’, which can have the adverse effect of sending readers into ‘techno-panic’.

This publication focuses deliberately on the immediate future — that is, the next 2 to 3 years. This publication is founded on the premise that, for many in-house tax functions today, the most common form of technology used to manage their tax compliance processes relies heavily on Microsoft Excel spreadsheets. In the best of cases, these spreadsheets are stored on some form of commonly accessible drive within the organization, but in many cases, they are housed in disparate parts of the business. Most tax functions of medium and large organizations still employ large numbers of people whose roles are very process oriented. For example, they may manually issue Value Added Tax (VAT) invoices, engage in fulfilling repeated requests for information and data from within their own organization’s business lines, and/or make adjustments or reconciliations between their financial statements, their tax returns, their Enterprise Resource Planning (ERP) systems, and the filing systems of the Tax Authorities of the countries in which they operate.

This publication is founded on a core belief that to transform an in-house tax function with technology, tax departments need to ‘walk before they run’. To transform an organization that is rooted in traditionally manual tasks into a highly technologically enabled tax function requires a journey over a period of time. It is not a process that happens without thoughtful planning, nor can it happen overnight simply by investing in the latest technology solutions in the market. It is vital to remember that the use of technology in a tax function needs to serve a purpose beyond merely the use of trendy new gadgets or following the lead of others. Rather, meaningful technology-enablement is about making strategic changes that benefit the function and the organization in terms of time and cost savings, efficiency gains, and helping to move the tax function up the value chain within the organization, so that the tax department becomes a true enabler of value inside the organization and beyond.

It is important to recognize that technology is but one, albeit integral, component to tax function transformation. As the below diagram highlights,² the operating model of a tax function comprises six key components, with the seventh component, performance management, as a measurement and performance tool to monitor the value contributed to the organization. Technology and the related components of data and information that feed into technology solutions are increasingly important as we move into the third decade of the 21st century. However, technology also needs people with skills to operate and maintain it, an organizational model to support it, and it needs to enable or facilitate processes, governance and risk. In short, technology may be at the epicenter of any transformation strategy, but it must work in unison with the other components in order to be truly effective.



Source: KPMG International

¹ ‘How to ensure Australia thrives when the robots come,’ Peter Hartcher, Sydney Morning Herald, 30 September 2017, smh.com.au/comment/how-to-ensure-australia-thrives-when-the-robots-come-20170929-gyrgr9.html

² ‘Designing an Indirect Tax Function which is Fit for the Future,’ KPMG International, 26 September 2016, https://home.kpmg.com/xx/en/home/insights/2016/09/designing-an-indirect-tax-function-that-is-fit-for-the-future.html

Use of this publication

This publication is not intended to be suitable for all organizations. To use an analogy to best describe the intended audience for this publication, back in the late 1990s, plasma screen and LED televisions first hit the market. You may recall seeing one for the first time, perhaps on the wall of an upscale restaurant, and being impressed by the clarity of the picture and the vividness of the colors. At that time, the price of those early plasma screen and LED televisions was high. Over the course of the next several years, the technology became more mainstream, prices dropped, competition entered the market, demand increased, prices dropped yet again, and then the price of a plasma screen or LED television became accessible to a greater cross section of the general public. In technological terms, the people who bought those early expensive plasma screens and LED televisions were regarded as 'early adopters'; while those who waited for the price to fall, for the technology to reach a point where it was also more stable and reliable, typically bought when the product reached its inflection point.

This publication is aimed at those organizations that prefer to participate at the inflection point. While some organizations that are early adopters may be more advanced and already incorporating technological advancements such as artificial intelligence and robotic process automation into their functions, KPMG International's ongoing surveys of tax leaders³ indicate that the vast majority of tax functions are earlier in their

transformational journeys. Many are asking why they should change, and how they should begin. This publication seeks to answer those fundamental questions, to help guide tax leaders on a journey towards discovery and empowerment.

Importantly, this publication is not suggesting that more advanced technological developments are beyond reach for most tax departments today. Rather, this paper posits that you must first have a strong foundation in place to then be able to take advantage of these more advanced technological developments in a few years' time, once they too have reached their inflection point. Furthermore, organizations like KPMG International and its network of member firms invest heavily in these advanced technological developments today because of the need to remain 'ahead of the curve', so as to guide organizations through these changes when the technologies reach their inflection point. With a strong foundation in place, the possibilities of what these advanced technological developments may deliver for tax functions is truly exciting.

As stated, the aim of this publication is to break down barriers to transforming an in-house tax function through technology, but to do so in a very user friendly and practical way. Throughout this publication, we try to avoid the use of complex acronyms or techno-jargon, but where it is necessary to use such terminology, we provide a clear glossary of terms for you to consult at the end for your reference.

³ KPMG International's 2017 Global Tax Department Benchmarking Study Data

Themes — Helping to understand the problem

Of course, every organization is different and the problems you may be trying to solve through technology will have elements that are specific to your organization. However,

there are many recurring themes that KPMG professionals hear when speaking with tax leaders around the world. Consider the following examples:

1

“The people on our team spend a lot of time doing manually oriented tasks to support our tax compliance process — how do we reduce that?”

5

“I’ve heard the tax authorities in my jurisdiction are investing heavily in technology so that they can carry out data and analytics testing. I don’t know what they may find with my organization.”

2

“Our organization has trouble obtaining the data we need to prepare our tax filings; the data often comes in from many different sources. Is there a better way?”

6

“Our department seems to spend much of its time trying to get the information from the business, in managing tax problems for transactions that have already happened; how do we get the time to be able to prevent problems from arising in the first place?”

3

“We need to spend a lot of time each month checking, adjusting and/or reconciling data to ensure the accuracy of our tax returns. Even then, we are often concerned it may not be correct.”

7

“The budget in my organization will not be sufficient to allow me to hire new people, or to invest in technology to help me fix some of our existing problems.”

4

“As a tax leader, I struggle to have visibility over the activities or transactions being carried out by the business, or in knowing how tax can best support our business goals. Is there a way to help me with this?”

These themes highlight the problems most organizations encounter, and suggest why many turn to technology solutions to help address inefficiencies in current systems and/or processes, to ensure greater accuracy or insights, or to mitigate potential risks. Knowing the problem you are trying to solve by technology is a critical first step in the journey. To use

an analogy, if a person wants to avoid unnecessary spending, they may prefer to write a shopping list before entering the store. The same is true with technology. Knowing what your problem is before you embark on your journey helps you map the right path to get there.

A critical framework

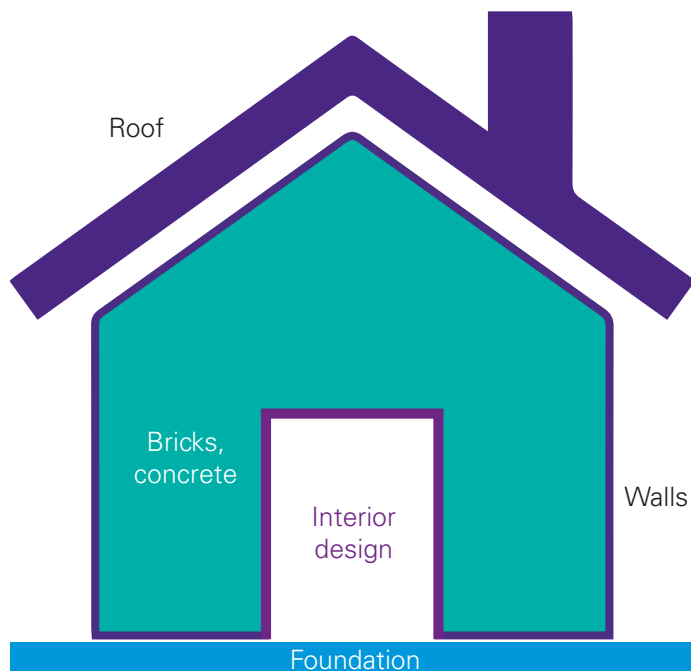
To help you start with your journey of discovery, let us share what we see as a critical framework for achieving a technology enabled tax function.

Technology helps

Most tax technology solutions in the market today can be broadly placed into one of four categories:

1. compliance
2. insights
3. process management
4. accessories, components or infrastructure, which enable or facilitate 1, 2 or 3.

Let's look at each of these in turn. First, however, let's use the analogy of a house to explore each of these areas, and the role they play in building a technology enabled tax function.



Source: KPMG International



Compliance related solutions

Compliance related solutions refer to those solutions that help you to prepare and/or file tax returns more efficiently and accurately and/or in a more automated way. They may also help you perform similar automation functions for invoicing purposes. These solutions can help either with specific taxes or with the full range of tax returns from VAT filings (including invoicing), to corporate income tax filings, even to stamp duty. Most tax professionals would readily accept that efficient and accurate management of compliance activities is at the core of their responsibilities; thus, compliance solutions are among the most common seen in use by tax departments today.⁴ To return to the house analogy, we might think of the compliance related solutions as the walls and roof of a house; they are both integral and critical to the overall structure. Most tax professionals would readily accept that to get their compliance handled both efficiently and accurately is at the core of their responsibilities.



Insight related solutions

Insight related solutions refers to the broad category of technology solutions that give you greater insights into the accuracy of your tax related data, helping you to identify potential tax risks up front and/or enabling you to identify errors or inconsistencies in your tax filings. Examples may include software solutions that allow you to carry out sophisticated data analytics to identify potential errors in your tax reporting, analyze the margins on transactions for transfer pricing purposes, identify permanent establishment risks or help calculate tax liabilities of expatriates employed by your organization around the world. In terms of the house analogy, insight related solutions may be viewed like the interior design of a house. The interior features make the house more visually appealing, and also more functional.

⁴ KPMG International's 2017/2018 Global Tax Department Benchmarking Study Data

Process management solutions

Process management solutions are those that help to manage either a specific process or an end-to-end process, by making the right information available to the right person at the right time. More specifically, these solutions may help to manage workflow within your tax function, or possibly within your organization. They are not solutions that 'do' anything in the sense that they are focused more on facilitating and optimizing the process, rather than changing the outputs of the process. As such, they may not provide insights into your tax data, and they may not prepare the tax returns you need. Rather, they help to manage these processes by helping your organization operate more efficiently. Examples include workflow solutions, which help to track the tax return preparation and approvals processes, and solutions that store your tax working papers in one place so that they are accessible to your tax team. When we think of these solutions in terms of building a house, we might consider these types of solutions the concrete that holds the bricks together.

Accessories, components or infrastructure

When we speak of accessories, components or infrastructure, we are referring to those hardware or software solutions that are typically built into your tax technology software, or that enable or facilitate the automation of compliance or the delivery of insight related solutions. Examples include solutions that manage the data extraction process, help to deliver visualizations of your data, or those that allow you to store data, such as cloud computing or data warehouses. Accessories, components or infrastructure may not be the most exciting aspects of tax technology, but they will often be the building blocks that can make the difference between a successful deployment and one that may not succeed. We might think of these as the foundations of the house. A house needs to be built on a solid foundation, with well-constructed walls, held together with concrete and designed in a way that is both aesthetically pleasing and functional.

A tax technology strategy needs to combine all of these elements in harmony. Investment in one component to the exclusion of another may not achieve the intended results. However, you may not be able to invest in every area at once.

Most change will be incremental

For most organizations, the incorporation of technology solutions into your tax function will be achieved incrementally, not radically. Rather than try to lead the way in rapid technology investment, most tax functions will strive to invest gradually, focusing on becoming more efficient and cost effective, and seeking to deliver more value to their organizations, each year surpassing the last.

Again, while the early adopters may be striving more ambitiously and experimenting and investing in research and development early on, for most organizations, change will be achieved through a series of steps.

Consider that when electronic payments were first launched through the internet, consumers often expressed concern

about the security of their data. While those concerns may still be evident to some extent, advances in digital security have reduced those concerns, and most consumers engage now in electronic payments on a regular basis. In other words, what may have seemed risky or difficult 2 to 3 years ago is now a routine task.

The challenge for the tax function will be to do things each day or each month slightly differently from the day or month before. Over time, your department and your organization will adapt. Change does not happen automatically, nor does it happen without facing some challenges along the way.

Technology goals need to be realistic

It is critically important to be realistic about what will be achieved in the early days with tax technology. Sometimes, tax leaders associate automation of the tax compliance process with the idea that, each month, they will be able to press a single button on a computer and produce a perfect tax return, fully correct and complete. Unfortunately, that is the work of science fiction. Moreover, if it were true, then the role of the tax manager would likely become redundant very quickly. But there are many benefits to be gained already through early incarnations of automation, long before total automation is a reality.

Why do we say that total tax automation is more aspirational than real, at least in the period leading up to 2020?

While we may all wish for perfection in tax automation, it's important to recognize why limitations exist. For example, perfection in tax automation would require an organization to have perfect data in its ERP system, and for that data to be collected and stored in a way that is deliberately set up for the tax function; it would require the data to be complete, with no manual reconciliations or adjustments needed. This is simply unrealistic right now in most organizations, especially multinational entities operating across multiple jurisdictions. The reality is more like the following:

- **Many organizations maintain data in multiple systems** — this will often require some form of reconciliation because those systems may not always 'speak' to each other.
- **The data that is maintained in ERP systems often contains errors or anomalies or is incomplete**, because in many cases much of the data is still entered manually. In the future, this may change with advances in optical character recognition (OCR) technology, but this is still a few years away for most organizations.
- **Most ERP systems are not built with the tax function in mind**, so we cannot expect the reporting data to be perfectly suited for the tax function's needs.
- **Compliance with tax legislation in many jurisdictions requires adjustments to be made that fall outside transactions that are recorded in an ERP system.** A great example of this is deemed sales transactions whereby output VAT may be payable for goods or services which are given away for no sales revenue (essentially 'free'). Similarly, an organization may make some exempt sales for VAT purposes, or incur non-deductible entertainment expenses, and frequently these adjustments happen through manual intervention. There are many circumstances requiring changes to happen 'outside of the system', and these require real people to manage the effort.

There is an increasingly important field of expertise emerging around data integrity, especially for the tax function. This is the idea that while we may strive to use Big Data, ultimately its utility very much depends upon having trust in the data being used in preparing the tax returns — that is, that the data is accurate, correct and complete. It is the adage that any investment in technology is limited by the fact that the outputs of data will only be as good as the input. Or, as the saying goes, "garbage in will equal garbage out."

In our experience, one possible outcome when first starting to invest in tax technology is to discover that the solution being deployed does not work effectively because the underlying data lacks integrity. This may result in the immediate project being diverted to fix the problems with data integrity — for example, by including additional data points recorded through an ERP system to allow better testing and analysis, or by correcting errors in the data — referred to as 'data cleansing'. While this may seem frustrating at the time, it is important to recognize that this can happen, but that the end result of this temporary diversion in resources is a longer lasting and higher quality series of outcomes. In other words, recognize that you may need to take one short-term step backwards in order to take two longer-term steps forward.

As a concrete example of this, KPMG China tax professionals recently carried out an analysis of a client's ERP data. One of the client's objectives was to identify and reconcile the receipt of special VAT invoices as recorded in the Golden Tax System, which is China's system for taxpayers to record all transactional tax data, with potentially available input VAT credits reflected in their ERP system. However, while the team was able to carry out the reconciliation process with reasonable accuracy, through this process they identified a simple change needed in the client's data entry into their ERP system, which would enable near real-time reconciliations to occur. The primary outcome was a simple process change that would better align the client's data needs for the future, with consequential efficiency benefits.

The moral of this story is that the adoption of technology as part of a tax function transformation process may not necessarily yield the immediate results you expect, nor should you expect it to automate your tax function fully at the outset. There will be learnings along the way, and the journey you are embarking upon should be seen as a permanent feature in your organization, not as a 'set and forget' short-term project.



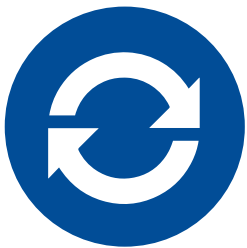
Part B — Now let's begin our journey

Starting on a journey to embrace technology, even on an incremental basis, is necessary to keep up, and also maintain or even enhance the value of the tax function to the organization it serves.



So far, we have pointed out some of the challenges within an organization that tax technology may help you to fix; we have shared a framework through which you may consider how most tax technology solutions fit; we've discussed the need to consider incremental change; and we've acknowledged the need for realism (and patience) on the journey to transformation.

Now we move on to some important aspects of tax technology, and given our emphasis on keeping this simple, we've broken the issues down into some fundamental building blocks. In the following sections we explore each of these questions in turn.



Why

Section one: Why transform?

In other words, why do you wish to transform your in-house tax function to be ready to embrace technological change?



What

Section two: What should you do?

That is, what types of tax technology do you need in your organization?



Who

Section three: Who should help you do it?

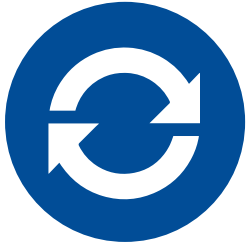
What people will you need?



How

Section four: How should you do it?

That is, how should you prioritize between different types of technology solutions, and how should you build a business case to do this?



Section one

Why transform?

Even if you know you wish to transform your in-house tax function to be ready to embrace technological change, the question is: why do it?

Is it because of the need to remove inefficiencies? Is it because of a desire to optimize tax outcomes? Is it because your organization is susceptible to tax risks that you cannot get control of? The answer is ordinarily all of the above, but different facets of your tax function may vary in terms of the priorities to be addressed.

In the previous section, we noted that most tax technology solutions can be placed into one of four different buckets or categories. Now let's give the reasons why most organizations choose to deploy them.

Types of tax technology solutions	Why do it? (most common reasons)
Compliance related solutions	<ul style="list-style-type: none"> — to remove inefficiencies in existing manual processes — to ensure greater accuracy and/or transparency of returns.
Insight related solutions	<ul style="list-style-type: none"> — to optimize tax outcomes — to obtain better insights to help manage tax risks — to create efficiencies.
Process management solutions	<ul style="list-style-type: none"> — for efficiency and accountability for decision-making — to ensure clear lines of responsibility — to share information within the organization.
Accessories, components or infrastructure	<ul style="list-style-type: none"> — to enable or facilitate compliance, insight and process management solutions — investment is not seen as a benefit in itself, but rather a means to an end.

Even though a business may choose to invest in tax technology because of the benefits to that organization, what typically causes an acceleration to any investment decision is the news that the tax authorities are doing likewise.

There may be specific reasons why your organization may wish to invest in certain technology solutions that differ from the reasons set out in the above table, so this is just a general guide.

The additional X factor — Supercharging your technology investment

Even when an organization believes it knows ‘why’ it wishes to invest in technology, there is an additional X factor that may turbocharge any such decision resulting in investment decisions being prioritized above all else. That additional X factor is the tax authorities.

What do we mean by this?

Put simply, the reason organizations often choose to accelerate their investment in tax technology is because of the threat or concern that the tax authorities may have developed their own technology that could shine a light on an

organization’s deepest darkest secrets — to highlight its risks, or any breakdown in controls that expose the organization to tax liabilities.

In our experience, even though a business may choose to invest in tax technology because of the benefits to that organization, what typically causes an acceleration to any investment decision is the news that the tax authorities are doing likewise.

In this regard, it is useful to spend just a few moments exploring what the tax authorities are doing around the world in the field of technology solutions.

Enhanced data collection and use of technology by tax authorities

The following summarizes some of the enhanced measures through which many tax authorities are either getting more data from taxpayers, or achieving higher quality data. These are but five examples of the advanced investment in technology and analytics we see happening in tax departments around the world.

Five examples of how tax authorities are using technology:

Brazil

- Brazil ranks as one of the most demanding tax jurisdictions for compliance requirements, and the Brazilian government has been using technology to streamline and simplify the tax filing process in a number of ways. In 2006, it implemented electronic invoicing to digitize product transactions and in 2009, it implemented Digital Book-Keeping System (SPED) for paperless compliance.
- Companies are required to submit transaction invoices to the Brazilian authority for verification both at the time of selling and of receiving products. SPED, implemented in 2009, created an online book-keeping system. Digital accounting booking (ECD) has been made mandatory, effective May 2016. Beginning in June 2016, there was a mandatory change from the reporting system (DIPJ) in SPED to a new reporting system (ECF) to enable the government’s access to more granular levels of information. After implementation of SPED in 2009, tax collections rose at a CAGR of 8.7 percent during 2010 to 2015, as compared with a CAGR of 7.6 percent from 2007 to 2009.
- Brazil upgraded the government web service to calculate the share of taxes for each of the states involved in the transaction of selling of goods to the final customer. In this regard, the government has also created an online document — the GNRE document. A recipient acknowledgement process has been introduced in the government web service through which companies are required to validate their vendors’ XML.
- Brazil signed the Organisation for Economic Co-operation and Development’s (OECD) BEPS initiative in October 2016, and introduced Country-by-Country (CbC) reporting in Block W of the ECF coming out of this. The Brazilian government is promoting the use of Internet of Things (IoT) to build digital services. It has also promoted Machine to Machine (M2M) communication and related products by providing tax benefits to companies. However, this may not have any direct impact on the tax landscape of the country.
- Inclusion of a ‘Block K’ requirement in SPED’s tax book-keeping (EFD) has been made mandatory for companies with revenues of more than BRL300 million beginning in January 2017. Companies are required to submit inventory and production reports on a monthly basis. e-Social, which was made mandatory for companies with revenues of over US\$78 million in September 2016, has been made mandatory for all companies, taking effect January 2017.

China

- The State Administration of Taxation (SAT) launched the “Thousand Enterprises Initiative” (TEI) in July 2015. This program covers approximately 1,000 representative large group enterprises from different industries. Under this initiative the SAT collects data from the TEI-covered group enterprises and their member entities (through local tax authorities) for tax risk analysis. Based on the analysis, the SAT has built risk analysis models with risk indicators for different industries.
- Circular Shuizongfa [2014] No. 105 SAT Opinion On Strengthening Tax Risk Management sets out key tax risk management tasks for tax authorities. These include tax enforcement goal setting, information collection, risk identification, risk ranking and risk resolution, as well as risk management process monitoring, assessment and feedback.
- The SAT on 18 April 2017 issued SAT Announcement [2017] No. 10 (Announcement No. 10), which provides taxpayers with the option of being assisted (through an automated solution) in identifying and correcting tax calculation errors, in advance of formally submitting their CIT annual filing returns. As Announcement No. 10 makes clear, this automated solution draws attention to potential issues in tax calculations, non-correlation between tax data and financial data, and other analytical results that might prompt a taxpayer to reconsider their original inputs. The information on which the analysis is based is drawn from a variety of sources, including taxpayer tax registration, historic tax filings, financial and accounting data, record filings, and third party and industry data.
- SAT Announcement [2016] No. 67 on The Filing of Financial Statements Upon Submission of Tax Returns for “1,000 Group Enterprises” And Their Member Entities was published on 26 October 2016 and took effect from 1 December 2016. This requires TEI enterprises to file financial statement information with the tax authorities, both at the time of filing periodic tax returns during the year (i.e. quarterly), and with the filing of the annual tax return (i.e. filed each May following tax assessment year-end). Financial statements (to be supplied in electronic form) include balance sheets, income statements, statements of equity changes, and their disclosure notes, for every legal entity in a corporate group in China.
- SAT Announcement [2017] No. 7 on The Management Measures on The “1,000 Group Enterprises” Catalogues took effect from 1 May 2017. This requires TEI enterprises to report certain entity information to the tax authorities on an annual basis (i.e. each May), which will be maintained on a data platform. This includes details of the taxpayer’s in-charge tax bureaus, operating locations, industries of activity, parent company, tax payments in prior years, revenue in prior years and listed status.
- The Golden Tax System Phase III provides for the centralized collection of national tax data from all taxpayers registered with the thousands of individual tax bureaus at all levels of government across the country. This covers both local tax bureaus (LTBs — responsible for local government taxes) as well as state tax bureaus (STBs — responsible for central government taxes). The Golden Tax System Phase III aggregates data from all taxpayer-authority interactions, including tax and incentive filings, tax payments, tax audits/enquiries, records of outbound payments from China, tax invoice issuance/certification and information from reviews of taxpayer internal tax controls. This is taken together with webcrawler/public website searches on taxpayers, industry profiling information used to assess tax risks, information obtained from overseas tax authorities, and from other domestic agencies, such as the foreign exchange control regulator (SAFE — State Administration of Foreign Exchange) and the commerce ministry (MOFCOM — Ministry of Commerce). Tax officials in different tax bureaus across China can tap into this system, to see prior interactions that taxpayers may have had with tax and other governmental authorities.
- Under the forthcoming new Tax Collection and Administration (TCA) Law, Chinese financial intermediaries will be required to bulk report client account transactions (exceeding a certain minimum value) to the tax authorities together with the relevant clients’ tax identification numbers (TINs) to facilitate data matching (e.g. cross-checking of IIT filings), and risk ‘red flagging’.
- SAT Announcement [2017] No. 14 on Administrative Measures on Due Diligence Checks on Tax-related Information of Non-residents’ Financial Accounts was published on 9 May 2017, and took effect on 1 July 2017. This provides the detailed rules under which China is rolling out the OECD’s Common Reporting Standard (CRS) for the automatic exchange of tax information. Financial institutions with operations in China were required to register on the SAT CRS web platform by 31 December 2017, and then report to the SAT tax information on the accounts of non-residents held with their institutions (including tax ID, balance and receipt of different income types) by 31 May every year (starting May 2018).
- Since 2016 the Golden Tax System has provided a powerful platform for pooling tax data from all levels of tax bureaus across China, covering both central government and local taxes. Its user interfaces facilitate both taxpayer and tax authority engagement and input, and drive standardization of certain key data inputs. The upgraded system also requires taxpayers to input “goods or service codes” so that the authorities obtain standardized data on what goods or services have been covered by the invoices. This facilitates the tax authorities to closely monitor invoice creation to detect fictitious invoices, ensuring the integrity of invoice information and the authenticity of filing data.

The European Union

- The European Commission has established a special electronic and technological infrastructure and system called Electronic Tax Management System (ETMS) for e-filing of taxes. The majority of direct and indirect taxes are filed electronically throughout the European Union (EU). The e-filing process has been further simplified through auto-filled returns and a standard e-invoicing format for VAT/GST returns. The EU is focused on increasing the e-governance offering in taxation by modernizing the tax processes and reporting framework through use of Information and Communications Technology (ICT).
- The EU as part of its e-governance initiative launched 20 public services in 2002 that included six offerings related to tax. These e-tax initiatives evolved over the period as the government established a special electronic and technological infrastructure and system (ETMS) for e-filing of taxes. Currently, nine major taxes including direct and indirect can be filed electronically.
- The EU provides the option of pre-filled tax returns to ease the process of filing taxes. In 2014, the EU passed a standard e-invoicing format for VAT/GST filing. The EU has implemented System of Exchange of Excise Data (SEED) and VAT Information Exchange System (VIES) for providing a consolidated view of tax payable across the EU. The EU has developed an EU Standard Audit File for Tax (SAF-T) to facilitate voluntary tax compliance and tax audits.
- Over 60 percent of the direct taxes were filed electronically in the EU in 2013 with Italy, Austria and Belgium among leading countries. In July 2014, Electronic Identification and Trust Services (eIDAS) regulation was issued to simplify the authentication process. It will enable EU citizens to use their national eID in other EU nations when accessing public and private services online. The mandatory mutual recognition among EU nations would apply beginning in mid-2018.
- In January 2015, the EU set up a Mini-One Stop Shop (MOSS), a web portal, to simplify and automate VAT payment by companies offering digital services to EU nations. In December 2016, the EU proposed extending the applicability of MOSS to online sales of tangible goods by 2021, removal of VAT exemption for import of small consignments and the introduction of a new One Stop Shop system for import of goods. Taxes accounted for around 40 percent of the EU's GDP in 2015.
- The EU is adopting and going through digitalization mainly aimed to ensure free flow of information driven by regulations such as AEOL, BEPS and other regulatory requirements. The EU SAF-T was developed to ease tax audit and Eurofisc, a network for exchange of information, to control carousel fraud. In 2017, the EU developed a central repository for storing information on advance cross-border

tax rulings and advance pricing arrangements issued by any one member state.

- By 2020, the EU is looking to upgrade IT collaboration tools such as Automatic Exchange of Information (AEOL) modules to ensure transparency of information among the EU member nations. The EU is looking to adopt blockchain technology to improve tax compliance.

The United Kingdom

- The UK has one of the most advanced tax administrations and the majority of direct and indirect taxes are filed online in the UK. The British government is investing around GBP1.3 billion to move to a completely digitized platform through its 'Making tax digital' initiative.
- Electronic submission of all company tax returns was made mandatory for periods post 31 March 2010 — implemented in April 2011. As of April 2012, VAT-registered businesses in the UK were required to file their VAT returns and Intrastat declarations electronically.
- Following the EU guidelines, the UK adopted the MOSS system. All businesses supplying digital services are required to register for MOSS. Following Brexit, the UK government might comply with EU-wide initiatives such as adoption of MOSS as a non-union member.
- Her Majesty's Revenue and Customs (HMRC), the tax authority in the UK, is planning to integrate all its internal systems to consolidate and provide tax information digitally. As per the 'Making tax digital' initiative, all taxpayers will have secure digital tax accounts and will be required to record and pay all their taxes online by 2020. The new system, besides enabling taxpayers to better manage their tax returns and file error free returns, is believed to save HMRC around GBP6.5 billion of tax that otherwise goes unpaid every year.
- Already, HMRC has mobile apps that help taxpayers access their personal tax account information. HMRC introduced voice recognition technology for its mobile app in 2017. The government also plans to introduce a number of technical changes to streamline and simplify aspects of the tax rules for employee share plans.

The United States

- The US has been a catalyst of change in the tax technology landscape, and has now reached a stage of maturity. The developments in the field of tax technology are micro in nature and particularly deal with updating operating systems or replacing legacy systems.
- The Modernized e-Filing (MeF) system is used for e-filing and ensures faster processing of returns. The Internal Revenue Service (IRS), the governing tax authority, has launched a mobile application providing various e-services and also interacts with taxpayers on social media platforms such as Twitter, Facebook and YouTube.

- Launched in 2011 by the IRS, the IRS2Go app is a mobile application that lets taxpayers check their refund status, make electronic payments and receive tax preparation assistance. In 2012, the legacy 1040 e-file program was completely phased out and replaced by the MeF system. MeF supports XML, which is both easily readable by humans and machines, and also ensures faster processing of returns.
- In 2015, 91 percent of all returns were filed electronically. As a part of its Future State Initiative, the IRS is developing online accounts to help taxpayers manage their accounts, filings, correspondence, payments and data, and also identify and resolve issues digitally. The MeF system now supports the XML format for electronic return data.
- The IRS is trying to simplify data management and warehousing through its Customer Account Data Engine (CADE2) program, which will merge the Individual Master File (IMF) and Customer Account Data Engine (CADE) databases into a single database that will house all individual taxpayer accounts.
- The Return Review Program (RRP) is an initiative of the IRS to replace the legacy system, Electronic Fraud Detection System (EFDS). The project is currently in an early phase.
- The IRS is trying to mitigate refund frauds by bringing in a new system, the Real-Time Tax System, which will assist in up-front quality checks on tax returns being filed with the IRS. A consolidated authentication process is a focus of the IRS to implement a better, standardized authentication mechanism for all forms requiring an electronic signature. Through Assisted services, the IRS plans to initiate more consistent taxpayer interactions, including secure email, e-fax, enhanced online and automated telephone services.

What may hold back investment in tax technology?

The most common reasons in our experience for organizations to hold back their investment in tax technology fall into one of these four categories:

1. apathy
2. fear of the unknown
3. poor data quality
4. future finance transformation.

Let's take each of these roadblocks in turn.

Apathy is the idea that, because the organization has always done things in a certain way, why would there be a need to change it? It's the old saying — 'if it ain't broke, don't fix it.'

The problem with this paradigm is that the world is changing, business models are evolving and tax authorities are enhancing their technology as we have already discussed. In short, technology is everywhere, and it is advancing at a very rapid pace. So to do nothing in a world of technological advancement is in fact to fall backwards rather than to lie stagnant. Those who do nothing risk being replaced, or perhaps more likely, for the status and value of their tax function in their organization to reach a state of terminal decline. Therefore, starting on a journey to embrace technology, even on an incremental basis, is necessary to keep up and also maintain, or even enhance, the value of the tax function to the organization it serves.

The other phenomenon that we see all too commonly among tax leaders is '**fear of the unknown**'. It is the idea that by deploying tax technology tools such as data and analytics solutions, it will highlight errors, which may result in a loss of face or status for those who have presided over those errors.

The problem with this type of fear is that, while it may defer exposure or correction in the short term, in the longer term it's a strategy that will prove disastrous. Those same errors will continue to accumulate, and moreover, with an ever greater likelihood that they will be uncovered by the tax authorities rather than by the organization itself. This is where the CFO and other C-level executives need to take a greater role in overseeing the governance and strategy of the tax function, to ensure that they demand a high-performance culture and a modern tax function. But it also requires an understanding and acceptance that technology tools enable the tax team to identify the proverbial 'needle in the haystack', which was simply not possible before.

So the culture and environment in which tax technology is deployed needs to recognize the value in shining a light on an organization's previously unseen problems. This will help get them under control, prevent their recurrence, and align reward and recognition with the detection and prevention of risks rather than being associated with the identification of past liabilities. Moving to this type of culture produces long-lasting benefits.

Another common excuse often heard is that '**tax technology solutions will not be beneficial to our organization because the quality of our data is poor.**' And so it shall remain if this mantra is accepted! Here is where the deployment of tax technology solutions may produce benefits in two stages — the first stage being the identification of data improvements that need to be made, and the second stage being the greater insights obtained from those data improvements.

And finally, an oft-cited reason for deferring investment in tax technology is that **'we are rolling out a new ERP system in X years' time.** While future changes in ERP systems may reasonably defer major tax technology investment decisions, typically this is put forward as an excuse for apathy. For example, if the organization is really rolling out a new ERP system in the future, then where is the strategy for how tax technology will be deployed upon its arrival? And what is the tax function doing to ensure that the new ERP system delivers them the data they will need? The simple point here is that there is much that can and should be done in readiness for such a new ERP system — this should drive greater change, not lessen it.

So, in short, the evidence clearly shows that organizations need to consider turbocharging their investment in technology if they perceive they may be exposed, either through errors or heightened tax risks, or even where there is a lack of transparency over their data, or controls over their tax processes. Tax authorities now have an exponentially greater prospect of finding them, even if you don't. Furthermore, many of the reasons put forward for not deploying tax technology solutions merely represent excuses for apathy, which potentially creates greater problems later.

Returning to the question of 'why' you would invest in tax technology — the answer is for all of the reasons set out above. However, in today's environment, there is an added pressure in place in many jurisdictions: namely, the prospect of the tax authorities being able to shine a light in the deepest darkest crevices of your organization's data and tax reporting. Would you prefer to be in control of finding it and fixing it, or would you prefer others to do it for you?





Section two

What should you do?

Once you know the answer as to ‘why’ you would choose to embrace technological change in your in-house tax function, you then need to consider ‘what’ you will do. To help answer this question, we have returned to our four ‘buckets’ or categories of tax technology solutions, and our aim here is to provide you with insights into some of the tax technology solutions that are available, and aspects we see as being ‘core’ to your business needs, or ‘optional’ depending on your specific organizational risks, efficiencies or business activities.

Category one – Automating the tax compliance process

The main purposes of tax compliance solutions are to improve efficiency in generating tax returns as well as the accuracy of those returns.

These kinds of solutions leverage data that has already been collected as part of the core business processes carried out by the finance function, namely procure-to-pay, order-to-cash and record-to-report (general ledger accounting). In those processes a variety of data is captured in the ERP system.

Let’s take the example of the order-to-cash process. Salespeople initiate sales orders for the sale of products or services. Information about the nature of these transactions (goods or services) and critical location information such as ‘ship-to’ and ‘ship-from’ countries is captured as part of this process.

ERP systems support these processes and help to automatically calculate (indirect) taxes as well as reporting revenue for CIT purposes on an accruals basis, based on the business characteristics of the transaction. In the case of automated tax determination software, these decisions are made based on what information is captured — for example, the product code or service code may determine the applicable VAT rate, or whether the sale is to be exempted or zero rated. In the case of manual tax decisions, these decisions are based on the level of tax expertise of the users that capture these transactions.

Now, getting back to the tax compliance process itself. In order to generate a tax return, the outcomes of the key business processes relevant for tax are used to map these tax outcomes to the relevant sections/boxes in a tax return. As such, the key features of any tax compliance technology

solutions are to: (1) collect the relevant tax information from the various data sources in an organization; and (2) make sure that this information is automatically mapped to the tax return.

The core intelligence of these solutions sits in the underlying logic that bridges relevant tax data with tax return requirements. Furthermore, by deploying appropriate infrastructure or technology components, additional benefits beyond merely automation may be created by means of visualization (to enhance user experience and oversight), central data storage and even workflow. But we’ll discuss this later as part of Category four, below.

As mentioned earlier in this publication, it is highly unlikely that tax returns will be generated straight from ERP data, at least for the foreseeable future. This is because of two main factors: (1) the way the data in an ERP system is entered will need to be ‘sliced and diced’ differently from the way it needs to be presented for tax return purposes; and (2) because ERP data is not the sole source of information for tax return purposes — other sources and indeed manual interventions may be needed.

By way of example, in many jurisdictions data such as from customs or from manually prepared spreadsheets, which record various adjustments, is needed for VAT return preparation, and for reporting such as Country-by-Country (CbC) reports, employee or human resources related data may be needed. As such, the role of tax compliance solutions is to serve as a channel or funnel to bring together these different data sources, to ‘slice and dice’ the data to prepare it for tax reporting purposes, and to serve as a prompt for any necessary manual adjustment processes.

Another key aspect of high quality tax compliance solutions is the functionality to run ‘**trend analysis**’, by comparing key indicators of the current return against previous periods. If the total throughput VAT (i.e. the sum of VAT output and VAT inputs) in the current period is significantly higher (>20 percent) than for the previous period or significantly greater than for the comparable period 12 months ago (for seasonal businesses), this might be an indication that something is wrong in the source data or some unusual transactions have taken place. Similarly, an organization will want to monitor its effective tax rates for CIT purposes, or its proportion of entertainment expenses, to ensure it is properly capturing this information given the propensity of tax authorities to monitor non-compliance.

The core intelligence of tax compliance solutions sits in the underlying logic that bridges relevant tax data with tax return requirements.

A concrete example of a tax compliance solution is **KPMG’s technology enabled compliance solution for tax**. This solution is a KPMG in-house developed software solution for VAT and corporate income tax compliance purposes. This solution has all the components described above, generating returns in four simple steps: (1) data upload, (2) data consistency checks, (3) manual adjustments and (4) return preparation. As part of the fourth step (return preparation), the KPMG solution has trend analysis functionality with key indicators that can be used to identify potential errors, risks or anomalies. And, as noted earlier, tax authorities are already deploying similar tools, some of which allow taxpayers to voluntarily check for errors in their returns through the use of automated tools.

Finally, on the topic of tax compliance solutions, as noted previously it is not simply the ability to produce the final return, which is the end of the process. Consider the other features of KPMG’s Technology Enabled Compliance Solution for Tax that highlight the need not only to consider the end product, but also the means to that end, as well as the other interdependencies with other categories of the solution:

Key features of KPMG’s tax compliance solution

- **Automated** VAT and Corporate Income Tax returns ready to file, together with **local tax and surcharge calculations**.
- **Flexibility** to be provided as either an outsourced service, where returns are prepared by KPMG, or for your in-house use.
- **Trend analysis**, which allows you to highlight potential risks, errors or anomalies, before you file the return.
- **Visibility** over the current status of each return and relevant due dates, with control and approval functionality.
- Data storage flexibility utilizing either the **cloud or within your secure environment**.
- **Uploading of invoices** validated through the filing systems of your local jurisdictions.
- Specialist **VAT compliance modules** for complex taxpaying industries such as trusts or funds.
- Dedicated telephone contacts to provide **user support** for your compliance needs.

Category two – Solutions that provide greater insights

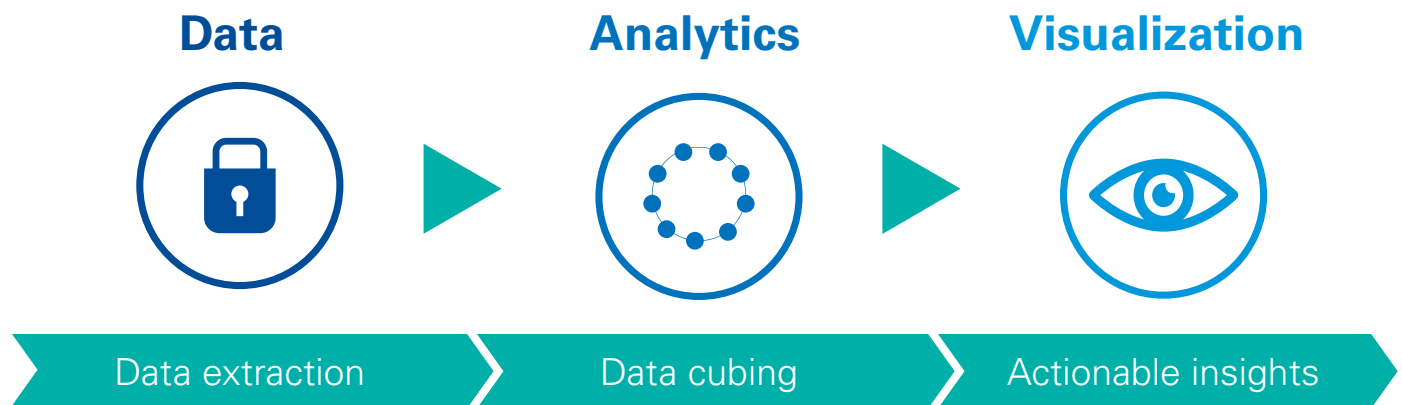
The second category of solutions are those that typically aim to show you data, information or outcomes that you need to know but may not have been able to see before. The main idea here is to **transform data into insights**, which can then deliver value to your organization.

In the data driven world in which we now live, these solutions have the greatest potential for growth over the coming years. Consider the operation of Moore's Law,⁵ which is the observation that the number of transistors in a dense integrated circuit doubles approximately every 2 years — a theorem that is now routinely applied to data, too. It then follows that the growth of data, and therefore the need to be able to analyze it and identify trends or insights from it, will also grow. It is truly amazing how much information and value may be concealed in your data, which can be unlocked if you deploy data and analytics solutions.

Solutions providing insights into data typically have three main aspects to them:

1. **data extraction** — that is, where the data comes from and how it gets into the solution
2. **data transformation (or cubing)** — which we colloquially call 'slicing and dicing', or more accurately, where the data points are transformed, dissected, amalgamated or cleansed
3. **data visualization** — this is what the user (you) sees and is able to generate insights from.

Whereas 1 and 3 are mainly components, though very critical, the core intelligence of insights (D&A) solutions is in the data cubing area. This is where the data is transformed into value.



Aspect one – data extraction

An important component of a data insights solution is the availability of sophisticated technologies to facilitate the data extraction process. Data extraction is referred to as the process of pulling or obtaining relevant tables and fields from ERP systems, tax authority systems or customs. As data volumes nowadays are incredibly large, data extraction technologies are essential. The 'old days' of obtaining data through requesting and delivering Excel spreadsheets is well and truly over. If data extraction does not work or takes too much time for the organization's IT department to prepare, insights solutions simply cannot be successfully deployed. In other words, data extraction is the foundational component upon which all insights solutions are built. Absent the data, absent the insights!

Effective data extraction needs to be able to work with multiple ERP systems, and for multinational organizations, this process can be complicated further by the fact that there is much greater variety in the types of ERP systems used across jurisdictions. For example, across much of Europe and the US, multinational companies will typically use well-known ERP systems such as SAP, Oracle, JD Edwards and similar. Data extraction from these systems will often be pre-configured so that the tax insights solutions can map the data fields from these well-known ERP systems to the tax insights solution. However, the same company may operate in China using other ERP systems such as Kingdee, Inspur, Aisino and other local Chinese systems. This means there is a need for data extraction to be able to work with virtually any ERP system when it comes to the needs of most multinational organizations.

⁵ Merriam-Webster, <https://www.merriam-webster.com/dictionary/Moore's%20law>

Aspect two — data transformation (or cubing)

The data transformation or cubing part is where the various data points are connected to each other to build a so-called 'tax data warehouse model', which is a model that brings all tax related data together with the right granularity and a lot of calculated fields that contain critical information, to drive the tax insights solution. As mentioned, this is where the data is transformed, dissected, amalgamated or cleansed. Let's explain what we mean by this.

If you consider a common ERP system may have 50 different data points for every transaction, such as the date the order was placed, the price for the goods or services, the

number, quantity or extent of goods or services being sold or purchased, the general ledger account number, details of the seller or buyer, the delivery date, the 'ship from' country, the 'ship to' country, and the list goes on. Some of these data points may be relevant for tax purposes for certain insights, but many will not be relevant — so the first objective of data cubing may be to exclude those irrelevant data points for each of the insights to be delivered. The second objective may be to aggregate or disaggregate certain data points, or to match different data points from each transaction. Think of it like a very complex series of Excel spreadsheet formulas.

Aspect three — data visualization process

This is the end result or product of any insights-based solution, and it is what the user experiences. Ease of use of any tax insights solution is critical. The tax insights solution needs to be logical, and for the most effective solutions, they are often the result of many hours of user acceptance testing, feedback and improvements. It is often said that what makes Apple products so successful in the market is that they are so intuitive, as evidenced by the number of 4- and 5-year-old children able to operate products such as iPads and iPhones. Just as these products are intuitive to the user, effective tax technology solutions must be visually appealing, attractive and enticing to the user, and above all else, produce insights the user can readily see and interpret.

But it is equally important to remember that data visualization must go hand in hand with proper data extraction and data cubing. For example, we recall seeing for the first time the demonstration of a new tax technology solution developed by a third party software provider — it looked visually very appealing.

However, what differentiated those clients without much technology experience from those with it, is that the former group focused on the 'wow' factor, whereas the latter group focused their questions on the following:

- what data sources did you use in this solution?
- what types of ERP systems can the data be extracted from?
- how is the data cubed?
- what types of analytics tests can be conducted?

It was only after these questions had been asked that it became clear that the software provider had built what was akin to a brand new car, but without building the engine. In short, what they were showing was a fancy presentation but without the underlying extraction and cubing having been built.

So in short, tax insights solutions will only grow in importance to an organization's tax function as data expands at an

incredible pace, as the demands of tax authorities increasingly shift to real-time reporting and as the multitude of different reporting obligations continues to expand. But, as a buyer or user of these tax insights solutions, the focus needs to be on not just the ease of visualizing insights associated with these solutions, but also their data extraction and cubing capacities.

If you take a look at a typical end-to-end tax process, tax insights solutions will provide insight into the quality and efficiency of the various steps in the process before the compliance process starts. Typical examples of areas where insights solutions can be of benefit include:

- highlighting the **accuracy of indirect tax calculations**
- **calculating actual gross and net margins** on intercompany transactions
- providing an overview of actual **supply chains** based on real transactions
- determining **business scenarios that are not reported for tax purposes** (but should have been reported)
- **managing tax residency risks** through the tracking of employee time in various countries
- identifying **anomalies in HS codes** used for goods importations for customs purposes
- finding **indirect tax savings opportunities** due to the use of wrong tax codes.

An example of a typical insights solution is **KPMG's Tax Intelligence Solution (TIS)**.

TIS is KPMG's global data and analytics solution for tax purposes.

At present, KPMG has developed specific modules of TIS for VAT, Customs, Transfer Pricing and (soon) for Direct Tax.



Key features of KPMG's Tax Intelligence Solution (TIS)

General features

- Built with data security in mind, as the data never leaves the organization's premises.
- Availability of industry-leading data extraction tools, which minimizes the burden on an organization's IT departments when collecting the data.
- TIS has been developed using a 'common data model', meaning that it works for most ERP systems.
- User friendly data visualization and reporting tools to allow easy manipulation and refinement of outputs.

TIS VAT features

- 50+ available VAT exception reports.
- Visibility over VAT throughput, including whether VAT is overpaid and/or where VAT credits have been under-claimed.
- Oversight to reconcile invoices recorded in your ERP system and those sent or validated by the local tax authorities.
- Oversight over input VAT transferred out as a result of exempt sales or non-creditable purchases.
- Insights into whether organizations comply with provisions for accounting for VAT on free gifts and other benefits.

TIS Transfer Pricing features

- Provides valuable insights into the global supply chain, by analyzing sales and intercompany transactions.
- BEPS13 module enabling data collection for Master File/Local File drafting, as well as for Country-by-Country reporting.
- Operational Margin Analysis: Calculation of gross margin and net margin by legal entity, product group and SKU level.
- Standard exception reports to test for anomalies in net and gross margin calculations.

TIS Customs features

- Identification of irregularities and inconsistencies in the data reported to customs authorities.
- Insight in supply chain savings opportunities as well as opportunities for process improvements.
- Ability to highlight different areas (valuation, classification or country of origin) that may have led to overpayments of customs duty and value-added taxes.
- The ability to analyze trade and customs data on free trade agreements available based on specific trade lanes and identify untapped trade agreement benefits.
- Data visualization and reporting to allow easy manipulation and refinement of relevant trade data topics (e.g. tariff classification, country of origin, entry type, incoterm, etc.).

Effective tax technology solutions must be visually appealing, attractive and enticing to the user, and above all else, produce insights the user can readily see and interpret.

Category three — Process management solutions

The third category of solutions is usually referred to as ‘workflow’ solutions since the main purpose of these solutions is to create better controls, governance or efficiencies over the completion of work tasks, usually by ‘enforcing’ a process.

During a process a lot of information may be captured and processed by a number of different people. Furthermore, there may be a lot of dependencies between various steps in an end-to-end process. By way of example, the completion of a single tax return may require data to be input by three or four different people within an organization; the tax return may be prepared by one person, reviewed by a second person and ultimately approved by a third person.

In order to facilitate this process, technology solutions may be used. These solutions have modelling capabilities in order to bring in the relevant company-specific process steps, documentation requirements and activity dependencies.

In modern tax functions, process management solutions are being used for:

- **handling of research and development (R&D) claims** (see case study on page 29)
- **preparation of VAT and CIT returns** (as a component of any tax compliance solution)
- **Transfer Pricing** documentation preparation
- **tax invoice handling**
- **Global Mobility** process tracking.

In general for all these kinds of processes, process management solutions help to improve the efficiency and transparency of the entire process. They make sure that information is available on a timely basis and to the right people. The time taken to complete the process may also be reduced because the waiting time due to missing information may be minimized and miscommunication in terms of roles and responsibilities is also clarified.

Workflow management solutions also serve to better control risks associated with various tax processes. For example, the policy of an organization may be that issuing a special VAT invoice higher than a certain amount requires approval from

a certain tax manager before issuing it to the customer — a workflow management solution can be used to force these kinds of approval steps.

Similarly, company processes that were historically documented and defined using manuals gathering dust on the shelves can now be embedded into workflow management solutions, to ensure clear lines of accountability. An excellent example of this is for companies deploying the RACI framework — this is the framework through which key tax risks or decisions should be assigned based on who is to be ‘responsible’, ‘accountable’, ‘consulted’ or ‘informed’. Now these frameworks can be built into workflow management solutions. User access, approvals or tasks may be assigned to a variety of different users with different profiles (roles and responsibilities).

In practice, we very often see process management solutions combined with compliance or insights solutions, rather than being implemented as stand-alone solutions. In other words, they may be a feature of either Category one or Category two solutions.

Process management solutions make sure that information is available on a timely basis and to the right people.

Category four — Accessories, components and infrastructure

The last category of tax technology solutions, previously referred to in this article as akin to the foundation of a house, are key enablers for all tax technologies. The solutions in categories one to three simply cannot run without having a proper infrastructure in place to host the technology or to be the visualization towards the end-user via a user interface.

A key characteristic of any accessories, components or infrastructure is that they are not tax-specific in the same way as the core tax intelligence (compliance, insights or process solutions) referred to in categories one to three. Other non-tax technologies used in the business may be able to leverage the same underlying infrastructure, accessories or components.

To use an Apple iPhone analogy, the platform is the iOS that enables all apps (our categories one to three) to run smoothly and leverage the usage of shared components (storage, visualization libraries, etc.)

So in fact this category isn't a solution in itself but rather a part of all the other three categories of tax technology solutions, however equally important.

Usually this category contains existing software applications developed by third party providers, programming language work benches or cloud environments. Let's discuss some specific examples of what types of software are contained in this category.

Take the example of a powerful tax insights solution, which needs a **good visualization front-end** in order to make it easy for the end-user to see vast quantities of data, or to identify patterns from that data. Industry-leading Business Intelligence (BI) software providers like Qlik, Tableau or Microsoft have developed applications (QlikView, QlikSense, Tableau or Power BI) that can be used in any tax technology solution. The benefits and importance have already been outlined in the tax insights solution category.

Similarly any tax technology solution that uses data also needs to deal with the process of receiving data and making sure it is loaded into the right format for the solution. The process of moving from obtaining data, transforming it into a structured format and then loading it into a database is usually referred to as **Extraction, Transform and Load (ETL)**. The ETL process is a very technical process, but critical in the sense that if it isn't done properly, the data engine that contains cubing procedures simply does not work. Once the ETL process has been set up, usually starting with a one-off definition of the various process steps, it can then be set up

as a repetitive process. This is also an interesting area for the application of Robotics Process Automation (RPA), which is discussed later in Part C of this publication. There are various third party software solutions available to support the ETL process. The most well-known software applications are Informatica PowerCenter, SAS Data Integration Studio and Oracle Data Integrator.

A third example is related to infrastructure: **hosting and storage**. Any tax technology solution provided on a cloud/online basis needs to use hosting and storage services. Hosting is effectively an online environment where programs can run. Storage refers to the amount of space that is available in that online environment to store data. Users of technology solutions usually only notice hosting and storage servers when they are not working; for example, when the server is down and they cannot access their programs and data. Or when there is not enough storage to capture data — i.e. the disk is full.

Therefore, an important quality criteria for third party providers of hosting and storage services is to provide an environment that is accessible anytime, anywhere and with virtually no down-time. Furthermore they should provide sufficient flexibility to scale up or scale down in terms of data storage, processing power, etc., in case there are unexpected increases in data volumes that need to be processed. This is indeed one of the key benefits of using cloud services, because most customers pay cloud providers based on an actual cloud 'usage' basis, rather than on a fixed license basis. Some major cloud-service providers on a global scale are Microsoft (Azure), Amazon (Web Services) and Alibaba (Cloud).

Although these examples don't seem to have a lot in common at first sight, the real benefits to support tax technology solutions will arise when you start combining and packaging them into a **platform concept**. The term 'platform' is, in our view, an often over-used or mis-used term because people associate the success of many e-commerce giants with having an effective 'platform' and therefore others have often tried to mimic this by describing particular solutions as comprising a platform.

A 'platform' is simply the package of solutions, applications or components that all come together effectively for the benefit of its users. The platform may have standard components that may be relevant for each 'application', such as data visualization, ETL, storage, workflow, etc.

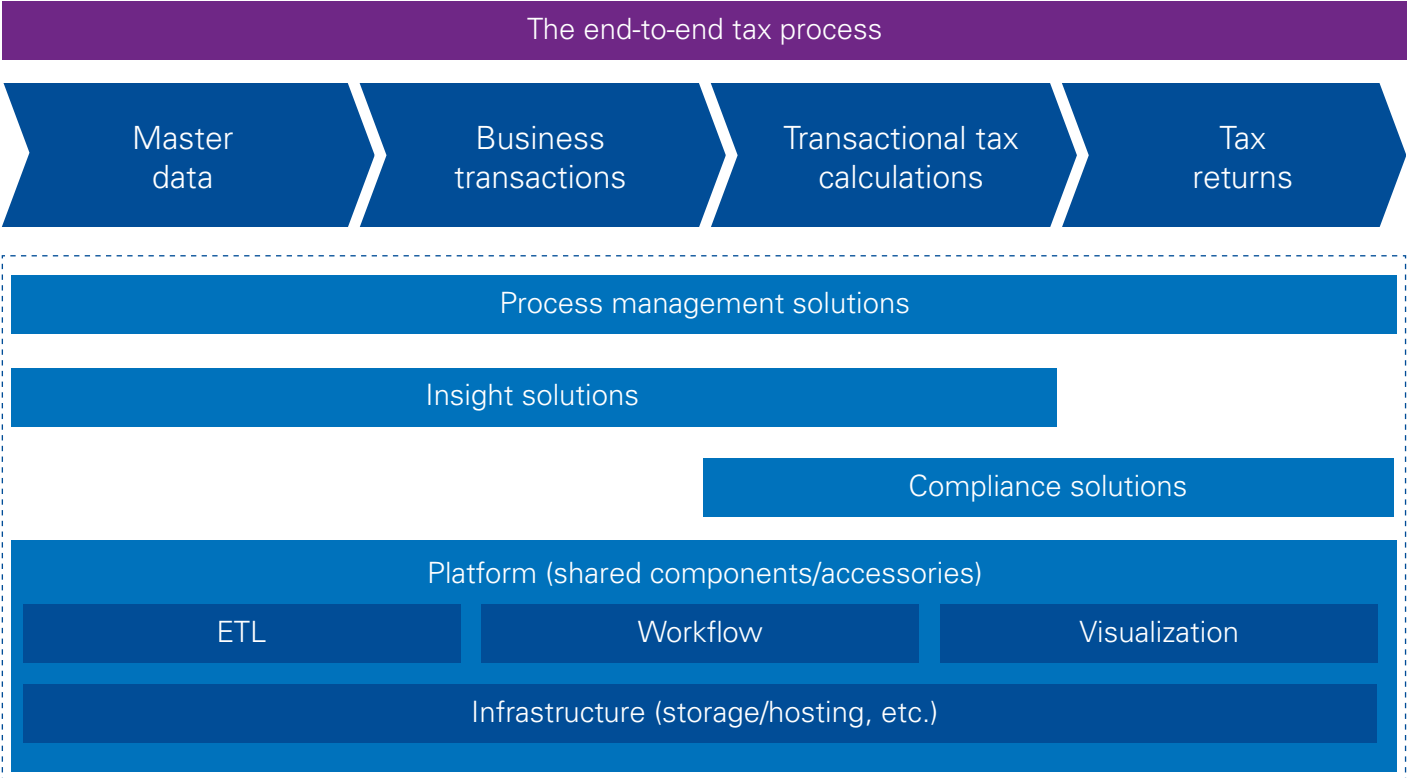
An important quality criteria for third party providers of hosting and storage services is to provide an environment that is accessible anytime, anywhere and with virtually no down-time.

The combination of these is what creates a **common platform** on which various solutions (or apps) can then run. With a common platform a lot of benefits can be realized:

- **uniformity of user experience:** all applications have the same look and feel
- **rapid development and/or deployment of new applications:** components may only need to be set up once and can be leveraged across new applications
- **centralization of data storage:** data can be used for multiple purposes across different applications
- **centralization of user management:** users can access applications via a single login and access is granted based on a 'need to know, need to have' basis.

So what we have learned is that the accessories, components or infrastructure may not be specific to the tax function, but rather they typically leverage these within the broader organization. Their significance is akin to the foundations of a house — they are integral to the success of deploying any tax technology solution.

In the below figure we have outlined a typical client end-to-end tax process and mapped each of our four described types of tax technology solutions in order to illustrate where in the process the typical benefits are created.





Section three

Who should help you do it?

The short answer, if you spend too much time reading sensationalist media reports, is that you don't need people, instead you just need robots. You can happily make your staff redundant and replace them with robots — machines that don't take coffee breaks, don't need to get paid overtime, and don't take sick leave or require annual leave — the perfect employee!

Thankfully the above paragraph is nothing more than a work of fiction.

An Australian journalist recently pulled apart some of the sensationalist reporting that had suggested that 40 percent of jobs would be automated within the next 10 to 15 years. The journalist referred to more reasoned studies by organizations such as the McKinsey Global Institute, which suggest something much more balanced:

“ The McKinsey Global Institute, for instance, estimates that only 5 percent of occupations will be able to be fully automatised by 2065. But it reckons that about half of the activities within occupations will be automatable. So, 95 percent of occupations will remain but the work within will change. Over the next half-century. You can see why this study didn't get as much publicity as the apocalyptic ones — jobs will change over the next 50 years, nothing too shocking, not many hurt.”

The same journalist portrayed the future as follows:

“ But the most important counter to the panic is the evidence of the past three centuries. As each wave of technological change has hit, from the agricultural revolution to the industrial to the digital, many job categories have indeed been wiped out. But many more have been created. So that there has been a net gain every time. The simple fact is that we can always see jobs disappearing but we can never imagine the jobs that will arise in their place.”

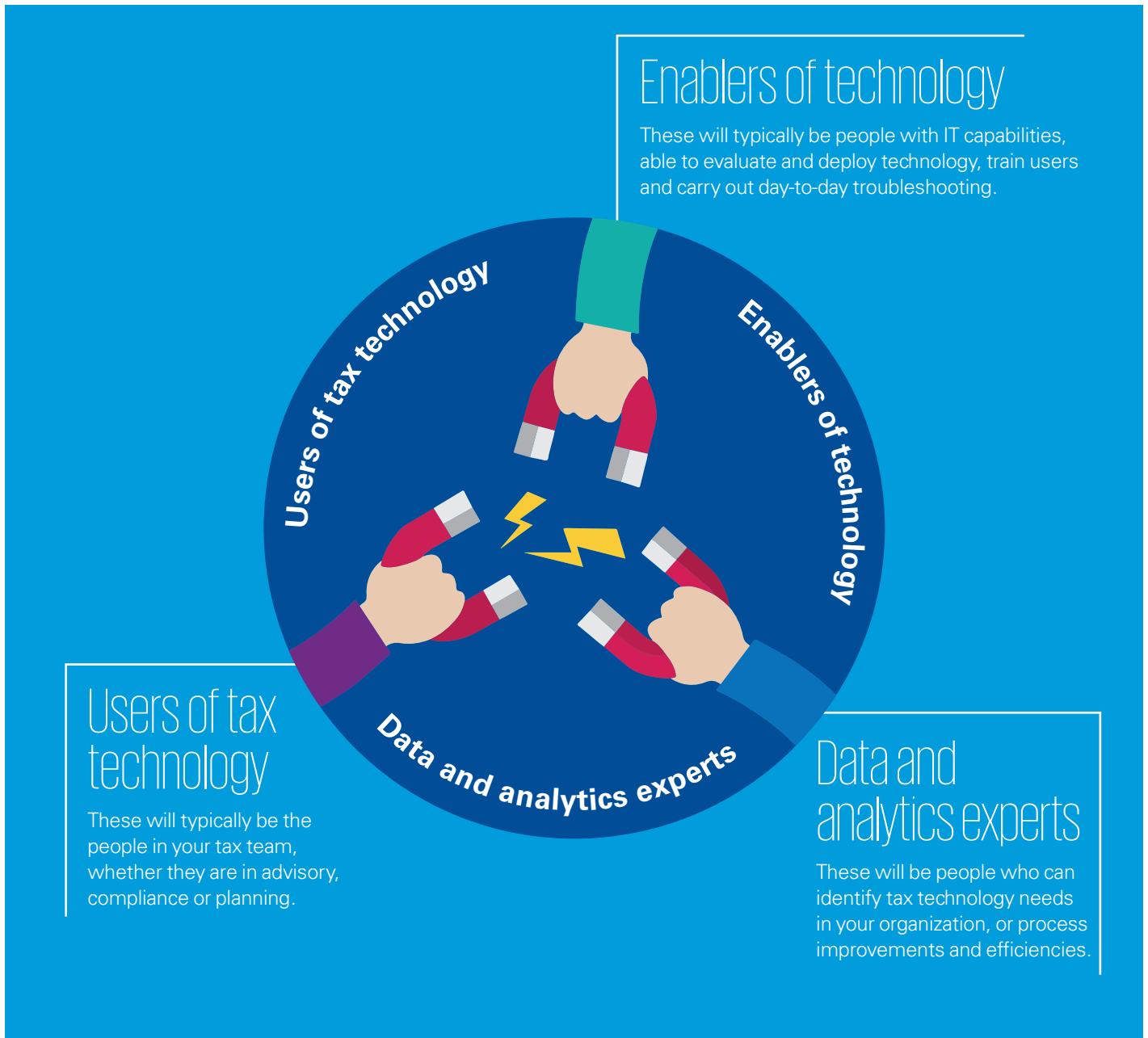
The significance of these quotes is twofold. First, the vast majority of jobs will not disappear, and will not be *replaced* by robots, at least over the next 50 years. Rather, the nature of the tasks and responsibilities in most jobs will *change*. Second, while some jobs may disappear (and obviously there is not a consistent view from the experts on the percentage affected), new jobs will emerge in their place. In other words, it's an evolution, not a revolution!

So the true answer to the question — what people will I need to help me do that? By and large, you will still need your current people. However, the nature of their roles will need to change, and you need to start them on that transformational journey now, albeit by taking incremental steps.

⁶ 'How to ensure Australia thrives when the robots come,' Peter Hartcher, Sydney Morning Herald, 30 September 2017, smh.com.au/comment/how-to-ensure-australiathrives-when-the-robots-come-20170929-gyrgr9.html

⁷ 'How to ensure Australia thrives when the robots come,' Peter Hartcher, Sydney Morning Herald, 30 September 2017, smh.com.au/comment/how-to-ensure-australiathrives-when-the-robots-come-20170929-gyrgr9.html

Let's consider how best to do that. Set out below we provide a framework of the skillsets you will need within a technology powered tax function:



Critical to the success of a tax technology enabled tax function is that you will need IT people to develop some tax skills and tax people to develop some IT skills.

The very simple proposition is to recognize that if your tax function uses technology to carry out much of its work, then you will need people within your organization with tax skills and IT skills. However, critical to the success of your technology enabled tax function is that these skillsets need to meet in the middle — in other words, you will need your IT people to develop some tax skills, and your tax people to develop some IT skills. Let's explore this a little further.

Starting with your IT people: they may currently sit within your IT function, and your role is to provide them with only a high-level of information about your tax systems and processes. They need just enough knowledge to be able to help you to 'fix' the problems you encounter. Spend some time with them so that they know what you do, and how you do it. They don't need to understand tax technical issues — rather, they need you to walk through things like the compliance process — show them how you progress from the data in your systems to the completion of tax filings. Also show them the problems you are currently experiencing — say, for example, you don't receive the data in the format you need it, or you don't have visibility over certain data.

Importantly, for those with IT-related skills, as mentioned you can typically access these people within your existing IT function. However, it may be important that you get a specific allocation of those people. Put simply, you do not want a situation where you are calling a virtual help line every time there is a problem and encountering someone different without any background knowledge in the technology solution. Otherwise, they won't be able to meet you in the middle.

You want them to develop an affinity for your business; you want them to develop experience so that they get to see the same issues over and over and learn from them; you want them to have formed working relationships with you, so that they are accountable to, and feel invested in, the outcomes from your tax function. And if you don't have these people available to you within your organization already, then you will either need to hire them, or you need to ensure that full and consistent access is provided to you as part of any outsourcing arrangement. In other words, if your organization will not allow you to invest in IT expertise in-house, consider whether you can access that expertise under an arrangement with your technology provider.

For the tax people in your organization, you need them to develop some IT-related expertise. This does not mean they need to learn how to program, nor do they need to become

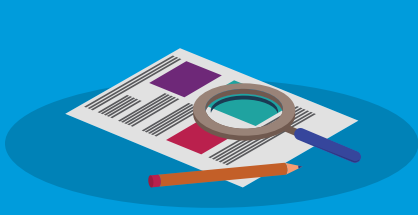
IT experts. Rather, you want your tax team to possess skills in areas such as data and analytics — that is, the ability to identify anomalies or discrepancies in data, or to see patterns in data. They may need to be able to see how solutions can be built through computer programming, though they need not have the skills to do the programming themselves. They need to understand the processes within your organization — for example, how to get from data entry through to the completion of a tax return. These people will often have a background in areas such as mathematics, science or computer science. Even consider people who write Excel spreadsheets at the moment and are adept at thinking of tax problems in terms of formulas, or tax compliance in terms of a series of processes.

To use a football or soccer analogy, the whole aim of this exercise is to develop people who can 'kick with both feet', meaning they can speak intelligently or proficiently to both tax and IT matters, while not necessarily being an expert in both. Think of these people as akin to translators — they need to be able to speak the language of tax and of IT well enough that they can build a bridge in communication between your tax and IT teams.

The most important aspect to recognize is that this is a skill that can be learned, rather than necessarily acquired. A tax person who is adept with numbers and at problem solving can develop the IT capability by working hand-in-hand with their IT counterparts, and in generally taking an active interest in technology developments, and what the market needs. Likewise, an IT person who invests sufficient time understanding your tax function, being co-located with your team, and learning the processes and systems you use will quickly develop the capability to serve as the 'bridge' for your organization.

Critically, the tax technology solutions your organization is either acquiring or developing serve to 'enable' the tax function — they do not serve to 'replace' decision-making within the tax function. This means, for example, that workflow solutions should serve to facilitate processes within your organization, but in each step of the process, it may not necessarily act as a substitute for your tax knowledge or ability. Oftentimes we see tax people becoming bogged down in trying to design processes to deal with the 1 percent of situations, whereas a process that automates the other 99 percent of situations with the ability to override for the 1 percent, would suffice.

Let's take a simple case study to illustrate how this comes to life.



Case study

An R&D claims process

Assume your organization currently makes claims for various tax concessions applicable to research and development expenditure in one of your operating countries. Those R&D claims are currently prepared and lodged by a member of your tax team. That tax team member complains, on a regular basis, that the challenge they have in preparing the R&D claims is in accessing the data that helps to quantify the eligible R&D expenditure. That is because the expenditure is not coded into your ERP system each month as 'R&D expenditure'. Instead, it may be buried among employee labor costs, in specific equipment or parts purchases, or in hiring third parties to provide expert support. Let's assume that your staff member who prepares the R&D claims also complains that he or she has difficulty assessing whether the R&D your company carries out sufficiently contributes new knowledge, or whether it makes substantial improvements in technologies, in products or processes.

The 'old' way of doing this would be for your tax team member to regularly engage in discussions with those staff who are principally responsible for the development of the R&D and, through a process of discussions and consultations, to then work backwards and search expenditure records to try to reconstruct what was actually done. The outcome was usually an underclaiming of R&D expenditures because the eligible expenditure records were not readily identifiable.

A tax person with some IT capability may see this as an opportunity for improvement — an example of where a technology solution could be used to solve the time intensive and frequently inaccurate problems of the past. So the tax team member sits down with your IT team and the engineers in your organization (because they usually carry out the R&D) and they each start by asking the engineers to outline the processes they follow.

From this process, the tax and IT team will start to get a clear picture of the end-to-end process from the decision-making surrounding potential exploration of R&D, right through to its realization (whether successful or not). The whole secret in bringing everyone together is to see the process as leaving a series of 'data points' or digital footprints. For example, if the engineers are required to follow some sort of process in which investment in R&D is considered, approved, developed, tested and then brought to an outcome, each step of that process will ordinarily leave some form (or more likely multiple forms) of digital footprint. You now have the components necessary to apply a technology solution.

The tax and IT team can then explore the tax technology solutions that may be available in the market to assist companies in managing their R&D claims. And in doing so, they will be looking to deploy a technology solution that leverages those 'digital footprints'.

An IT person who invests sufficient time understanding your tax function, being co-located with your team, and learning the processes and systems you use will quickly develop the capability to serve as the 'bridge' for your organization.



Section four

How should you do it?

In the previous sections of this publication we have considered why you should develop your tax technology capabilities, what you should do to develop a technology centered tax function and who should help you do it. The last question is: how should you do it?

In our experience, even where the tax managers in an organization may want to implement a technology centered tax function, they still need to overcome one of the biggest inhibitors to any change, and that is the need to have a valid business case to support any investment decision.

In this section of our publication, we examine some of the key aspects to building a **successful business case** for change. And the process for building any business case for change is really no different from any normal budgetary process. The numbers need to add up.

Consider the following two examples:

The tax leader at Organization A learns about a new tax technology solution being provided by a third party software provider. He examines the costs and submits a request to buy the technology solution at a total cost of US\$1 million. The tax leader says it will make his job more efficient and will help him in preparing tax compliance returns. The tax leader puts this proposition to the CFO but is rejected.

Now consider the position of a tax leader at Organization B, who learns about the same tax technology solution. He examines the costs in some detail, understands the different 'purchase' options available — from an outright purchase, to a periodic license, to full outsourcing of the tax compliance process. He concludes from his assessment that a 3-year license period most likely represents the effective life of the solution. He assesses the extent of man hours that the solution will save and the consequential flow on impact to costs. He then approaches the CFO with a proposition around deploying the tax technology solution in exchange for a reduction in headcount in the compliance function (to be achieved through natural attrition). The outcome of the proposition is a net cost saving, and this is even before factoring in the benefits of greater accuracy. To help to manage any unexpected problems or risks in deploying the solution, the tax leader also negotiates an obligation-free trial period for deploying the tax technology solution. Not surprisingly, the CFO accepts the proposition. Please see an example business case to deploy a tax data insights solution in the breakout box.



Case study

Example business case to deploy a data insights solution

An organization wants to implement a data insights solution to identify opportunities and risks sitting in the indirect tax (VAT) process in four countries. The strategy is to build in-house capabilities to work with a data insights solution from an end-user perspective. From a development perspective they are looking to existing solutions and preferably deploy them on an on-premises basis in order to manage IT data security risks.

The tax manager has decided to run a ‘proof-of-concept’ (PoC) with a tax D&A solution, delivered by an external tax technology service provider, with a relatively small fee (US\$15,900).

By analyzing a 6-month period of transactions for only one country, they found an amount worth US\$28,700 of unclaimed VAT. Furthermore, the PoC showed invoices that were not reported in the VAT return because the ERP system did not flag them as relevant for VAT. This has potentially led to an underpayment of VAT, which might result in the imposition of penalties and fines from the tax authorities if the organization is subject to audit or review by the tax authorities.

Based on the PoC results, the tax manager has presented the high-level business case to the CFO to deploy the tax D&A solution based on an on-premises implementation for a 3-year usage period. The high-level business case highlights:

- the potential VAT savings over a 3-year period across four countries, assuming a comparable level of unclaimed VAT is detected
- the potential savings to the business in terms of mitigation of audit costs, fines and/or penalties
- the costs of implementing the technology solution for the 3-year period, covering one-off costs, maintenance costs and some minor new IT components needed to implement the tax D&A solution.

The business case looked like this:

Benefits		3 Years (US\$)
Direct (one-off) VAT/GST cash savings (unclaimed VAT/GST)	Four countries for 3 years at US\$28,700 per half year per country	688,800
Risk mitigation of potential fines/penalties	For four countries, high-level assessment of likely interest/penalties	79,600
Reduction of manual work to perform monthly VAT return checking	0.5 FTE per year per country	165,600
Total benefits (3 years)		934,000
Costs		
One-off implementation costs (incl. PoC)	Consultancy fees to deploy the solution (incl. training)	119,400
One-off investment in IT components	Fees for IT services (e.g. hardware)	23,900
Tax D&A solution usage fee, incl. maintenance (recurring)	License fees over 3 years	71,700
Total costs (3 years)		215,000
Total net benefit (3 years)		719,000

Source: KPMG International

What these examples highlight is that the same tax technology solution, when proposed in two different ways but for the same purpose, may give rise to two very different outcomes. The outcome of any proposal is very much a function of how it is positioned within the business, and the ability to present a business case in a persuasive way to stakeholders.

While this example may be overly simplistic, in the real world there may be other more complex factors that can be used to support any business case for change. Fundamentally though, the task is always the same — it is around aligning the benefits from deploying the tax technology solution with your organization's overall strategy and objectives, and this may mean pitching any solution as fulfilling objectives such as:

- **providing stronger governance and controls**, which is especially important in organizations that may have recently been subject to adverse audit outcomes, or self-reporting of unexpected liabilities
- **providing cost savings or efficiency gains** to the organization, through reductions in headcount, overcoming manual processes or freeing up resources to focus on high value added activities
- **meeting new compliance challenges**, which may be as diverse as country-by-country reporting, new R&D incentives or even an organization's internal audit requirements to enhance controls
- **moves to adopt greater real-time reporting**, which may necessitate investments in insights-based solutions to monitor data reporting
- **measurement of tax function performance** (or even individual performance) through Key Performance Indicators (KPIs) aligned with the successful deployment of value creating tax technology solutions.

In addition to aligning tax technology investment decisions with overall business strategies and objectives, consider a few tips that may help to get investment decisions 'over the line', such as:

- **Do you really need to buy it?** For many organizations, large capital investments may be subject to greater oversight and control, as compared with periodic expenditure. Software-as-a-Service (SaaS) based solutions may help to bridge that gap.

- **Do you really know the cost or value to the organization?** In the above example, the savvy tax manager was able to successfully deploy the tax technology solution initially on a trial basis, which can help to validate and quantify the potential benefits to the organization before committing to a longer-term investment decision.
- **Whose budget should the investment come from?** While the cost of tax compliance solutions would logically fall within the tax budget, solutions providing insights to particular aspects of your business operations, such as an R&D technology solution, may reasonably have their costs met by other parts of the business. Likewise, infrastructure, accessories or components may serve many parts of the organization and therefore their costs allocated accordingly.
- **Can you get some quick 'wins'?** Tax technology solutions such as certain data and analytics solutions can initially be deployed to find tax savings, which in turn justify the costs of deploying the technology solution.

The flipside is to recognize potential 'traps' or hazards along the way. For example, consider how to manage key risks in deploying tax technology solutions, such as:

- **the risk of premature redundancy** — that is, the risk that the technology solution or even the tax problem the technology is seeking to solve may become redundant earlier than anticipated. Access to regular updates as part of a solution package should be seriously considered
- **the need for maintenance and repairs** — all technology solutions require regular repairs and maintenance and this should be packaged into any budget request
- **the risk of cost overruns or delays in deployment** — the tendency for many IT-related projects to be subject to cost overruns or delays is very real, and the same is true with tax technology deployment. Project managing this is critical, and so too is the need for input and 'ownership' by your IT specialists.

While all of these aligning features, tips and traps should form part of your business case for investment in tax technology, it is worthwhile to quickly summarize the key components of any business case. They are:

1. What is the specific request you are making, and the context in which you are making it?
2. What are the objectives in deploying this tax technology solution, and how do they align with both your broader tax function goals and your organization's overall objectives?
3. What value or benefits will this deliver for the organization? Consider short-term versus long-term, and financial versus non-financial benefits.
4. How will the tax technology be deployed, what is the timeline including key milestones, what is the allocation of responsibilities, what are the key risks, the dependencies, etc.?

5. What are the other available alternatives to deploying this technology solution, and how do they stack up on a comparative basis?
6. What other similar organizations are deploying this technology and what has been their experience?
7. How will success be measured, and are there ways to mitigate investment risks?

Finally, and perhaps most fundamentally, any investment in tax technology solutions needs to be aligned with the objectives of the business, and it must serve the business. For example, consider how the deployment of any tax technology solution aligns with your organization's broader risk tolerance, or how it aligns with your organization's governance procedures.



Part C — A glance into the future

Bots are another way of using process and technology to solve a problem.

They are best implemented when there is (or can be) high standardization and high volume.



In this publication we described a framework that helps to determine, deploy and deliver on a tax technology strategy.

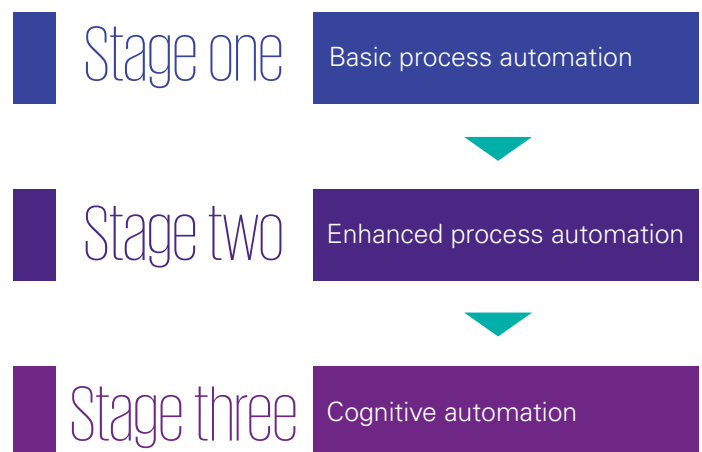
The 'why' question is fundamental and effectively provides the basis for the other three key questions (what, who and how), independently of the type of technology being used. As such when we talk about new and emerging technologies, these do not really affect the reason 'why' we deploy them — the 'why' is still to achieve benefits in areas such as efficiency, optimization, accuracy, insights, etc. However, new and emerging technologies typically impact 'why' is being deployed, as well as 'who' you will need to deploy them, and 'how' to deploy them.

To better understand some of these new and emerging technologies, and how these can help the tax function in the future, we have grouped a vast array of new and emerging technologies into two main categories — intelligent automation technologies and distributed ledger technology (commonly referred to as 'blockchain'). While these two categories may not perfectly encapsulate the full spectrum of new and emerging technologies, it does provide a framework through which to understand an increasingly complex and fast changing environment.

Intelligent automation technologies

Readers may have heard of new and emerging technologies with buzzwords like robotic process automation (RPA), machine learning (ML), enhanced process automation, natural language processing (NLP), artificial intelligence (AI) and cognitive automation. It is not difficult to feel intimidated by this vast array of terminology, which sometimes feels like it belongs to a dystopian universe.

In a recently published article in *Tax Executive*,⁸ KPMG professionals in the US helpfully clustered these solutions under the banner 'intelligent automation', and then equally as helpfully plotted the timeline for their usefulness to tax and finance functions. The summary below is extracted from that article, though with minor modifications to remove US-specific references:



⁸ 'Bots, Natural Language Processing, and Machine Learning', Rainey, S, Brown B and Kirk, D, *Tax Executive*, 21 September 2017, taxexecutive.org/bots-natural-language-processing-and-machine-learning/

Stage one — Basic process automation

Robotic process automation, bots, process automation, basic process automation, basic robotic process automation — these terms describe essentially the same thing. Confusion often arises from the term ‘robotic’ in robotic process automation; why call such a solution ‘robotic’ if the automation doesn’t use physical robots?

The short answer is that ‘robotic’ describes the underlying process, not the automation. In other words, we are automating a process that is naturally robotic, even if humans perform it with manual labor. Such work is done the same way over and over, like copying content from field A and pasting it into field B. When we apply automation technologies to this process — that is, we automate it — we consider that solution a software robot.

Basic process automation (or, for simplicity’s sake, a ‘bot’) leverages a class of technology to automate rudimentary processes found in almost all organizations today. Many tax departments have begun exploring the use of bots to automate repetitive tasks.

You may be familiar with creating a macro within Microsoft Excel. That macro typically automates sequential mouse clicks within Excel. By analogy, in its simplest form, a bot is also a macro. However, the bot is a macro that can sit atop multiple software programs rather than be confined within Excel. In this way, bots appear to integrate various software programs.

In the past, a computer programmer could always write software code to integrate disparate software programs. However, the newer class of bot software has a user interface where a tax professional can more easily program a bot. As a result, professional software programmers may be unnecessary.

The processes most suitable for basic process automation are typically repetitive, involve multiple systems and follow very explicit steps, such as when a human captures (cuts) information from one system (e.g. the trial balance from a legacy mainframe system), possibly reformats that data, and then enters (pastes) it into another system (e.g. an Excel spreadsheet).

These tools leverage capabilities such as workflows and rules engines to automate existing manual processes.

The real power of cognitive computing is its ability to ingest massive amounts of data about which to formulate hypotheses.

A particular bot program may reside on the desktop and run at the user level (acting as human users, with system logon credentials like users have), or it may be deployed on a server and accessed by multiple users.

As an example, suppose your new tax software requires that you set up a folder for every unique branch. The setup involves selecting (or clicking) the same six options for each folder. You click once to create the folder, click again to select which branch you want, then again to indicate that you want all the subfolder options, and so on.

Without being augmented with a bot, a tax professional would be required to click 60,000 times just to set up the folders needed to ensure compliance. But with a bot, because the process is standard and repeatable, it can be automated using the bot software, thereby reducing 60,000 clicks to a single click. Once programmed, with a press of a button, the bot will go through all 60,000 steps in a fraction of the time and far more precisely than any human could.

In general, these basic automation tools can be thought of as quick-hit technologies that allow for an incremental approach to automation. Bots are another way of using process and technology to solve a problem. They are best implemented when there is (or can be) high standardization and high volume. Like all tools, they have strengths and weaknesses. Bots should be viewed as a supplement to other technology tools; they may be great tools in specific situations, but may not be the best in others.

Tax functions are often seen as being more compliance-driven with less focus on adding value to the core revenue driving processes.

Stage two — Enhanced process automation

Enhanced process automation leverages capabilities beyond those discussed above. The tools/platforms involved with enhanced process automation typically can:

- understand natural language (through natural language processing, or NLP) and therefore interpret unstructured data (i.e. data that is not organized in a predefined structure, such as free-form text)
- use machine learning (ML) to develop a knowledge base by consuming significant amounts of data to learn and develop a set of algorithms. This set of algorithms is then used to make predictions about data.

With these abilities, tools in this category can deal with processes that may involve many complex transactions and require a deeper level of analytics involving both structured data (e.g. a database) and unstructured data (e.g. free-form

text). At the same time, these tools can leverage years of experience gained across multiple sets of data, information and knowledge.

A combination of natural language processing and machine learning makes it possible to automate the capture, array and analysis of unstructured data and transform it into structured data that may be used in a tax application. Hence, the tax filing process may be expedited, and quality and consistency can be enhanced by reducing the likelihood of manual errors.

In general, enhanced process automation tools are more complex and take longer to develop and implement than basic process automation. These tools typically also take longer to integrate into the environment, do not reside on the desktop and may require connections to the cloud to gain the maximum benefits.

Stage three — Cognitive automation

Cognitive automation is probably the most confusing and most hyped technology but also holds the greatest potential to revolutionize how you work. Not surprisingly, it also requires the largest investment in time and dollars.

What is cognitive automation? Cognitive software mimics human activities such as perceiving, inferring, gathering evidence, hypothesizing and reasoning. And, like humans, cognitive software is taught rather than traditionally programmed.

In other words, while we program explicit steps into a traditional computer to solve a problem, in a cognitive solution, we teach the tool the area of interest, or 'domain'. Once the base domain knowledge is established within the software, the cognitive solution typically continues to learn and solve problems within that domain, generally all on its own.

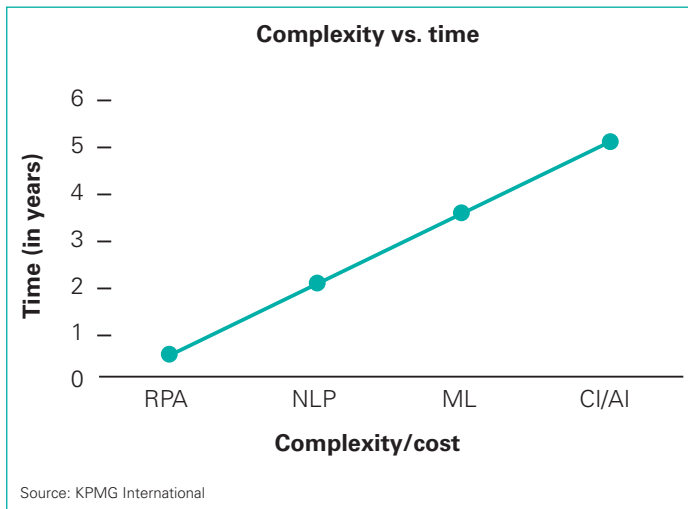
A domain may include all or a portion of a tax regulation or rule.

The real power of cognitive computing is its ability to ingest massive amounts of data about which to formulate hypotheses. The human brain cannot handle this volume of data and does not have the time to absorb it, let alone process it.

When cognitive solutions are combined with automation, these systems can be trained to execute judgment-intensive tasks.

What this means

When plotted on a graph, the evolution of these technologies may appear something like this:



A concrete example for a tax function is to use RPA software for periodic (often time-consuming) VAT/GST reconciliation processes. These processes are repetitive and contain relatively simple tasks: run ERP reports, load into Excel, compare and match certain data points and produce a list of non-reconciling items. By using RPA, the time to run such a process can be reduced from 3 to 4 hours to a matter of a few seconds.

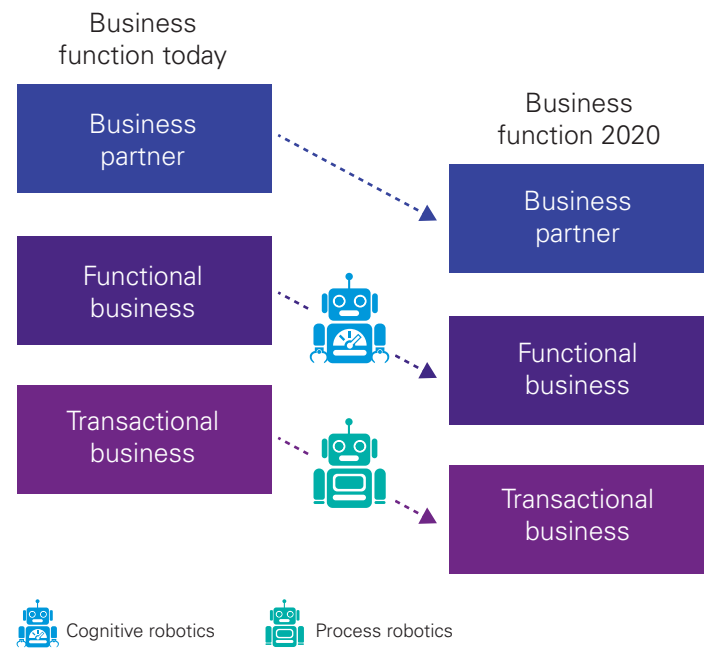
The diagram on the right illustrates how we foresee that tax functions will change over the next 5 years and the role which basic automation (RPA) and cognitive automation will play.

At this moment, most time in organizations is spent on transactional (task-driven) and functional (reasoning) processes. These functions are usually more internally oriented, since they aim to support internal business operations. Less time is spent on activities that truly add value associated with being a business partner in the organization. This is why tax functions are often seen as being more compliance-driven with less focus on adding value to the core revenue driving processes. Importantly though, the use of RPA and cognitive solutions will enable those transactional and functional processes to be largely automated, thereby allowing more time to be spent on value adding activities, more closely associated with being a business partner in the organization.

Right now, as much as 80 percent of the world’s data is unstructured.⁹ What’s more, 90 percent of this unstructured data has been created since 2011.¹⁰ The ability to leverage this data, meaningfully consume it and build the associated knowledge ontology in an automated fashion changes the promise of this technology.

While the tremendous upside of cognitive automation tools is tantalizing, they generally require a much more significant investment in time and resources, including personnel, training and dollars. The contextual learning stage alone can represent an investment measured in years, not months. These are not back-office tools for which you can write a script and fire off an automation program.

The role of cognitive automation in the tax profession, and in the business world in general, is still evolving. But we are still in the early days of the evolution of these technologies, and much has to be learned, developed and tested — and these are not inexpensive endeavors.



Source: KPMG International

⁹ 'Structure, Models and Meaning: Is 'Unstructured Data Merely Unmodeled?' Seth Grimes, *Information Week*, 7 February 2005 informationweek.com/software/information-management/structure-models-and-meaning/d/d-id/1030187?

¹⁰ 'Big Data, for Better or Worse: 90% of World's Data Generated Over Last Two Years', SINTEF, *Science Daily*, 22 May 2013, sciencedaily.com/releases/2013/05/130522085217.

Distributed ledger technologies (i.e. blockchain)

One of the most hyped technologies over the past year or so is distributed ledger technology, often referred to as blockchain. The most widely known example of blockchain technology is Bitcoin. However, while many people may have heard of Bitcoin and some may have a rudimentary understanding of blockchain, its use in the tax function is less well known.

In its simplest form, **blockchain** technology or distributed ledger technology (DLT) refers to a distributed database — that is, data not being stored in a central place but rather, decentralized across multiple platforms. At the core of the blockchain are ‘digital ledgers’ that are distributed among all network participants to serve as a common source of truth — all parties store and access their copy of the database, but with no single control hub holding a master key. In this respect, one of the key advantages of blockchain is that databases can be shared across many users without having a central administrator who proves and validates all transactions. Instead, blockchain transactions contain their own validity proof so that the role of an intermediate authority in that transaction (for example, a bank) may become obsolete.

The technology ensures that access to records in the database is granted to the users that own the specific part or a ‘block’. Blockchain therefore also feeds demand for transparency, as the ledger may be public and searchable. It is also almost impossible to change the information in the blocks because all blocks refer to other blocks (the chain) and are cryptographically protected.

The best analogy to describe how blockchain works is to relate it to how real estate transactions may occur. Assume you are buying a parcel of land. However, in order to buy that parcel of land, you will want to prove that the seller owns the land so that they can convey good title to you. Likewise, when that seller wanted to prove title to the land they purchased, they also sought proof of ownership of the land from the seller they bought from. This process of proving each owner of the land may repeat itself until such time as we establish good title to the land right back to the original grant of the land use rights by the local government. This is effectively what blockchain is. It is a series of blocks that establish or record ownership or title

to an asset between parties. In reality though, this proof of ownership is managed for us through the system of property registration managed by the government. The variation in the analogy in this case though is that blockchain allows private parties to do this directly between them, without the need for a governmental authority acting as an arbiter.

While this analogy may be helpful to explain the concept of ‘blockchain’, let’s use a different analogy to explain how it also serves as a common source of truth.¹¹ If we remember back to our school days in the playground playing lunchtime soccer with our classmates, typically there was no referee, or in transactional terminology, there was no intermediary. Similarly, there was no scoreboard. Instead, the ‘source of truth’ in terms of the score would always be the collective decision of the players on the field. This means that if a goal was scored and accepted as being legitimate, both teams would acknowledge the score was 1–0. In this sense, the source of truth lies in all participants, and no single participant would be the arbiter. This is again how blockchain works. Where the transaction follows the rules laid down by the participants, the outcome of the transaction in terms of how it is recorded in the blockchain itself would be the source of truth.

Now there is one further concept that needs to be understood before we examine the application of blockchain in a tax context. And that is the concept of ‘smart contracts’. This is a term we do not particularly like, because it firstly implies that other contracts are somehow ‘not smart’, and secondly, it suggests some kind of shortcut way to contracting. In reality, even things like standard terms that are used by many companies to manage straightforward commercial arrangements for the supply of goods or services do not replace the need for negotiation, in certain circumstances.

The concept of ‘smart contracts’ really only refers to contracts that underpin how the blockchain works, and are entered into, verified and settled automatically. In the analogies used above, the blockchain acts as the source of truth in terms of the ownership of the land, or in terms of the score on the soccer field. But what ‘smart contracts’ seek to do is to expand the blockchain beyond merely recording ownership or title to an asset, to actually executing the transactions. In other words,

¹¹ This analogy is adapted from the following blog - <https://martinjeeblog.com/2017/10/10/the-best-blockchain-analogy-ever/>

'smart contracts' attach to, and form part of, the blockchain transaction to record not only the transfer of title but also the commercial terms of such a transfer.

Although the concept of blockchain is very complex and its potential application in the field of taxation is yet to fully emerge, we believe it may serve in the following areas:

- **Helping to prevent VAT fraud.**¹² Blockchain technology can be used to link purchase and sale transactions and therefore to ensure that the output VAT of the seller is matched by the input VAT of the buyer.
- **In facilitating the collection of taxes** (like VAT) based on the place in which goods or services are consumed, for example, by validating the residency of the consumer. While its application in many jurisdictions is mostly limited to VAT, over time it is expected that taxes such as CIT will move more from a source basis to a destination basis.
- **In withholding individual income taxes**, in terms of both separating withholding taxes from salaries and wages, and in automating the collection of those taxes from employers.¹³
- **In transfer pricing**, in facilitating profit splits on individual transactions for transfer pricing purposes, rather than on an aggregated basis.¹⁴
- **Generally in supporting the tax collection process by tax authorities.** Tax authorities in various jurisdictions have expressed ambitions to make the entire tax process digital. This means providing 100 percent real-time access to tax authorities' systems for taxpayers, which enables tax authorities to improve the tax collection process significantly. For tax authorities this will have a big impact on how they are organized in terms of managing data, which technology to use and which (new) people skills are needed to support the digital tax process. The application of blockchain in this area serves to provide secure and auditable access to tax authorities' applications.
- **In a stamp duty context**, it may be questioned whether blockchain potentially poses a threat to it. Given that stamp duty is traditionally levelled on documents, a shift may be needed to ensure its continued application in an entirely electronic environment of blockchain transactions.
- **In electronic invoice issuing.** Some governments have expressed interest in using blockchain technology to support the process of electronic invoicing. China, for example, has announced its intention to do so.



¹² 'Blockchain Technology might solve VAT fraud', Ainsworth, Richard T, Shact, Andrew, *Tax Notes International* (Volume 83, no 13).

¹³ 'New Frontiers: Tax Administrations Explore Blockchain', Johnston, Stephanie Soong, *Tax Notes International*, 2017.

¹⁴ *Ibid.*



Overall, we see more and more use cases for the application of blockchain technology, though we do not expect that it will radically change the tax function within the next 2 to 3 years. However, when thinking about your tax technology (digital) strategy we recommend keeping an eye on the potential benefits and developments in blockchain for your organization and whether your organization has the required skillsets to adapt to the application of these new technologies. There may also be opportunities to obtain a competitive advantage by finding a way to use blockchain technology for better interactions with business partners and even tax authorities. Finding the right technology alliance partner may be a very good first step in this journey.

Blockchain transactions contain their own validity proof so that the role of an intermediate authority in that transaction (for example, a bank) may become obsolete.

Conclusions— Putting it all together



By now, you should be ready to begin your tax technology journey, supercharged with our framework through which to put your ideas and plans into action, and some pointers and tips on what to do and what not to do.

Now all that is left is to summarize how to do it through the following 10 pointers:

- 1 The embedding of technology into your tax function is generally achieved incrementally ('walk before you run'), and recognize that it needs to be a permanent feature of your tax strategy and plans. This cannot be a 'set and forget' approach.
- 2 Transforming a tax function relies on technology as an integral component of any transformation strategy, but it must not be the sole component. You need people with the skills to make the technology work and to be maintained; your data and processes need to work in harmony with the technology; and your technology should serve to help you manage risk and implement your governance framework.
- 3 Before investing in tax technology solutions, make sure you know 'why' you are trying to do it. Once you know that, spend some time investigating and considering 'what' you should do, 'who' should help you to do it, and 'how' you should do it. This is really about knowing the problem you are trying to solve before you embark upon any investment. Consider whether your tax technology strategy will rely predominantly on outsourcing your technology needs, or in-house development and deployment (or possibly a mix of both), because this will impact on your resourcing needs and your speed to market.
- 4 The two most common forms of specific tax technology solutions are those solutions that automate compliance, and those that provide tax insights in helping you to either manage risk or achieve efficiencies. Be realistic — automating the tax compliance function is not like clicking a single button and out pops a perfectly completed tax return.
- 5 Any investment in tax technology solutions is like building a house — you need strong foundations (these are the accessories, components or infrastructure), you need the walls and roof of the house (these are the tax compliance solutions), you need the concrete to hold the bricks of the house together (these are the process management solutions), and you also need the interior decorations of the house to better enjoy it (these are the insights related solutions).
- 6 Any investment in tax technology solutions needs to be supported by a persuasive business case. This may require alignment with your broader organizational objectives in better serving the business (for example, to manage risk), through efficiency gains (in terms of headcount reduction spent on compliance), in the realization of real cash savings, or to mirror technology developments made by the tax authorities.
- 7 Any investment in tax technology solutions needs to ensure that these solutions work properly in the markets in which you operate, and in the context of your ERP systems and data security policies. Also consider ways in which you can invest flexibly and in a more agile way, for example, through SaaS solutions or trial testing, or in taking advantage of updates that take account of regulatory change.
- 8 When you embark upon your tax technology journey, expect to encounter unexpected problems. For many organizations, once you have the tax technology in place, the new challenge is around the integrity (i.e. the accuracy and completeness) of the data feeding into to your technology.
- 9 Keep an eye out for new and emerging technologies such as intelligent automation and blockchain, and don't be intimidated by them. If your organization usually invests at the inflection point, then this may still be a few years away before they enter the mainstream. Following them now will help to ready you for this change.
- 10 Start the journey today. Apathy, fear of the unknown, poor data quality and future finance transformation are the most commonly used excuses for not starting on a journey of transformation. If change is not made, then the value of the tax function to the organization will diminish, and very commonly, you may lose the ability to control or be involved in that change.

Glossary of terms

Artificial intelligence (AI)

A form of technology that can imitate and even exceed human performance through self-learning. It has the ability to understand complex content and draw its own conclusions. Common examples of AI include self-driving cars and automatic speech recognition.

Blockchain

Blockchain or Distributed Ledger Technology (DLT) refers to a decentralized database that consists of several sequentially grouped 'blocks', forming an immutable chain secured by cryptographic techniques. The most famous example of an application where blockchain technology is used is Bitcoin, a cryptographic currency.

Cloud computing

The concept of using (a network of) remote servers hosted on the internet to store data, rather than a local server or a personal computer. Applications, platforms and even infrastructure components can be hosted on cloud platforms provided by cloud server providers.

Examples of large cloud computing service providers are Alibaba, Microsoft, Amazon, Google and IBM.

Cognitive automation

A form of technology in which software is taught to act like the human brain to help improve human decision-making. Cognitive software is able to interpret, gather evidence, judge and reason — just like the human brain.

Data cubing

The concept of bringing (raw) data together in a multidimensional way from different data sources so the data can be analyzed and viewed in different ways. For example, financial data (such as general ledger data) can be connected to logistics data in order to enrich accounts payable transactions with supply chain information.

Enterprise Resource Planning (ERP) system

Integrated business management software that organizations use to collect, store, manage and interpret data from many business activities, like financial accounting, inventory management, production planning or sales/procurement. Examples of internationally well-known ERP systems are SAP, Oracle, JD Edwards and Microsoft Dynamics.

Extract, Transform, Load (ETL)

The process of moving from obtaining (extracting) data, transforming it into a structured format, and then loading it into a database. Each technology/solution that consumes data needs to have ETL components in order to ensure that different source data can be used in the application itself.

Machine learning

An area of computer science that explores and constructs algorithms that are able to learn and make predictions from data. These algorithms use computational methods to learn information directly from data without relying on a predetermined equation as a model. Machine learning is an application of artificial intelligence (AI).

Natural language processing (NLP)

A form of technology that helps computers understand, interpret and manipulate human language.

NLP helps to fill the gap between human communication and computer understanding by using a combination of techniques in disciplines such as computer science and computational linguistics.

NLP is an application of artificial intelligence (AI).

Optical character recognition (OCR)

The concept of software that recognizes printed or written text characters so that unstructured data can be transformed to structured data (e.g. in table form). OCR is commonly found in invoice scanning systems for ERP systems and mobile applications like real-time translation of foreign languages.

Robotic process automation (RPA)

A form of technology to automate repetitive and often rules-based processes by 'software robots' or 'bots' for short. These tasks may include (financial) transaction processing, IT management and automating online assistants. These software robots can replace human beings for these tasks.

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Designed by Evalueserve.

Publication name: Transforming the tax function through technology

Publication number: 135226-G

Publication date: April 2018