



Think Ahead



**MEANINGFUL WORK FOR THE DIGITAL PROFESSIONAL**  
ROADMAP BEYOND THE PANDEMIC

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We believe that accountancy is a cornerstone profession of society that supports both public and private sectors. That's why we're committed to the development of a strong global accountancy profession and the many benefits that this brings to society and individuals.

Since 1904 being a force for public good has been embedded in our purpose. And because we're a not-for-profit organisation, we build a sustainable global profession by re-investing our surplus to deliver member value and develop the profession for the next generation.

Through our world leading ACCA Qualification, we offer everyone everywhere the opportunity to experience a rewarding career in accountancy, finance and management. And using our respected research, we lead the profession by answering today's questions and preparing us for tomorrow.

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## **MEANINGFUL WORK FOR THE DIGITAL PROFESSIONAL ROADMAP BEYOND THE PANDEMIC**

This report, collaboratively produced by EY Global Services Limited and Association of Chartered Certified Accountants (ACCA), shines a light on how accountancy and finance professionals can embrace the digital age to achieve work experiences that are truly meaningful and rewarding. A deep and resilient connection to work is always critical but it matters even more with the economic uncertainty arising from the COVID-19 global pandemic.

The report is anchored in a practical roadmap for accountancy and finance professionals who wish to pivot their work towards greater engagement with digital tools. It also features examples of jobs with input from practitioners, that could be of interest to the digital professional. The views are informed by a global survey of 4,281 respondents and 55 interviews conducted during April–May 2020. 22 of these were with EY leaders globally (primarily in audit and assurance) and 33 were leaders across small, medium and large organisations.

# Foreword



**Helen Brand**  
Chief executive, ACCA

**Satisfaction in work is a fundamental building block of a happy and successful life. For accountancy and finance professionals, digital tools offer new possibilities for meaningful work that will outlast the economic challenges posed by the global pandemic.**

ACCA's vision is to develop the accountancy profession the world needs. In a fast-changing world with unexpected challenges – of which COVID-19 is a prime example – this requires an agile and forward-thinking mindset.

By embracing the potential of technology, the digital professional will create new types of work and be driven by a sense of purpose in that endeavour. This report highlights several implications of the COVID-19 pandemic, but also looks beyond that to a practical roadmap for exciting work that awaits those willing to grasp the opportunities.

As a joint publication, the report benefits from a complementary mix of views that will support practitioners to deliver cutting-edge services while bearing in mind public interest considerations.



**Ruchi Bhowmik**  
EY Global Vice Chair –  
Public Policy

**For every generation, new tools allow people to do some things more efficiently as well as to do entirely new things and solve entirely new problems.**

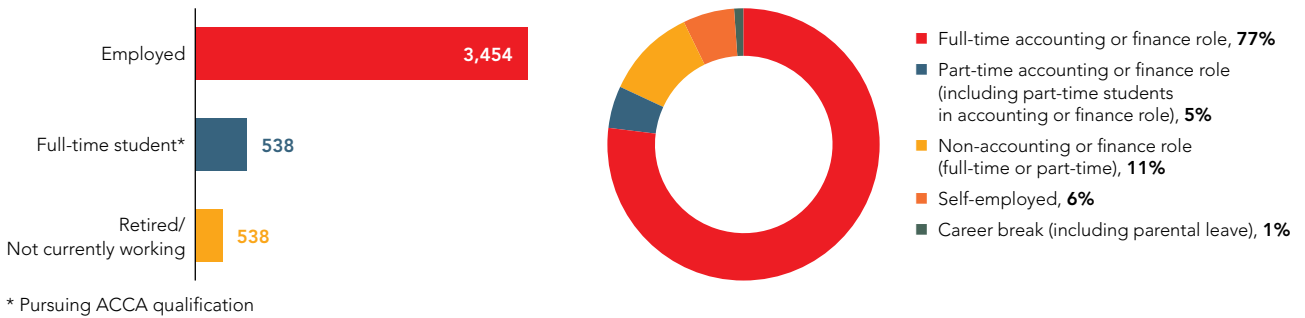
Today's accountancy and finance professionals face increasingly complex issues as well as broader societal expectations around what their public interest role entails. What's more, they want their jobs to provide them with a sense of purpose. Embracing new technology will accelerate their progress on both fronts.

At EY, professionals are already leveraging technology to handle routine tasks, analysing data to illuminate hidden patterns, and staying curious enough to ask better questions that lead to new insights. This approach will help to elevate their daily work, build essential skills of judgment and professional scepticism, and lead to rich and meaningful careers.

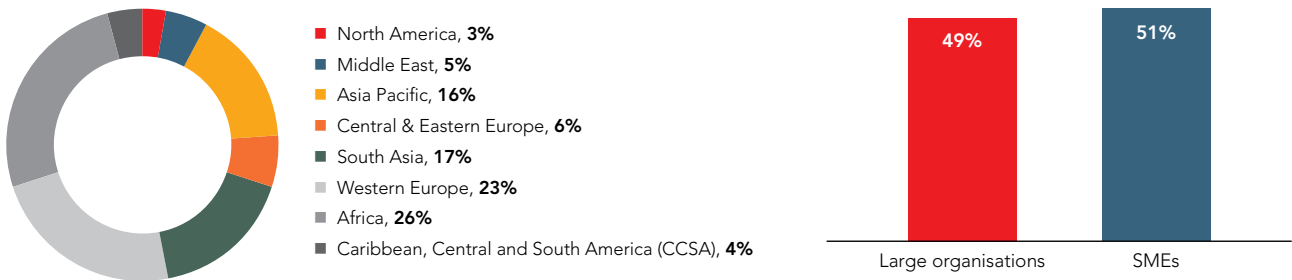
We are grateful to ACCA for the opportunity to collaborate on this valuable project.

# Survey demographics

## By employment type, breakdown of employed



## By world region, size of organisation\*

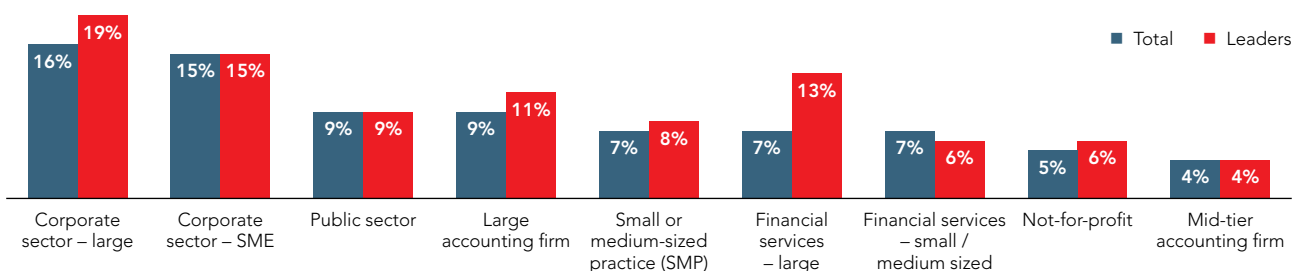


\*SMEs (small and medium-sized enterprises) are those with fewer than 250 employees, 'Large' organisations are those with 250 or more.

The report benchmarks against a 'Leader' group of 827 employed respondents (c.20% of sample) who scored 4 or 5, ie high performance on a 5-point scale, for each of eight criteria indicating their organisation's approach:

- keen to adopt emerging technologies
- uses technology to create new products and services for clients
- uses technology to enable flexible working, such as from remote locations and for non-standard hours of work
- has conducted employee skills-mapping to identify gaps
- allows staff to experiment with new ideas
- supports initiatives for employees' well-being and happiness
- tries to understand whether employees find their work fulfilling
- provides a fulfilling work experience for me.

Data on 'Leaders' refers to respondents who worked in organisations that satisfied the above criteria.







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# Executive summary

There are many philosophical interpretations of what ‘meaningful’ signifies in the work context. In simple terms, it refers to a deeper connection with one’s work that goes beyond just ‘getting the job done’.

To identify what constitutes meaningful work for the digital professional, we need to examine how professionals engage with technology, rather than just focusing on what it does. And to ask ourselves: to what end is the technology being used? This is essential for creating purpose-led work that makes a difference.

To facilitate this, the report starts by scanning the digital landscape, the headline findings from which are as follows.

- **The digital landscape isn’t just about technology:** Accountancy and finance professionals must consider the technology in relation to delivery models for their services, evolving consumer preferences, and regulation, as well as ethics and the public interest. A technology might seem attractive from a product development point of view, ie it solves a problem, but may be unsuitable in light of one or more of the above.
  - **There’s a lot of room for driving up digital adoption:** Globally, adoption among our sample is highest for community technologies (55%) such as social media, messaging; the next highest being ‘Next-generation’ computing (eg Cloud, Serverless, Edge) at 36% and data technologies at 30%. Over the coming decade, the expectation is for engagement across technologies to approach 90%.
  - **Leaders work at organisations that embrace data:** On current adoption across 10 technology clusters, the biggest difference between leaders in our sample and the rest is in use of data technologies, eg big data, analytics, visualisation – 10% more leaders are adopting these than in the overall sample.
- This was followed by reflecting on the impact of COVID-19 on this digital landscape, leading to the following conclusions.
- **Digitisation remains a key priority for the profession:** Periodic disruption by technology has been navigated by the accountancy profession through business cycles over the long term and this will continue. The pandemic has, in fact, accelerated digital adoption in areas such as e-commerce (for reaching clients) and remote working (for reaching staff) that relate directly to maintaining operations.
  - **Leaders work at organisations that outperformed in adjusting their delivery model:** 95% of leaders say their organisations are well prepared for using technology for working during the pandemic. This is against a global average of 74%; with a 62%–82% spread across world regions.
  - **Flexible working has been more difficult for those at earlier career stages:** On their organisation being well prepared for using technology during the pandemic, scores are nine points higher for those with 10+ years of post-qualification experience than for those with less (83% versus 74%).
  - **Digital adoption projects focus on immediate needs...for now:** A significant minority (44%) are scaling back on digital adoption projects with a focus on tactical digitisation to ‘keep the lights on’ as mentioned above. But looking ahead over the next five years, only 17% continue to predict scaling back among their top three challenges, which suggests this may not be an enduring structural adjustment.



The above factors have a number of implications for the digital professional seeking meaningful work.

- **Beware of diving straight into technology and product details**, without paying enough attention to surrounding factors (such as delivery models or regulatory implications); in a fast-moving world with risks of technology obsolescence, it could turn to a wasted effort.
- There will be **a need for professionals who can lead the digital engagement** in their organisations as adoption increases over the coming years. Also, COVID-19 seems unlikely to affect the strategic investment in digital projects over the longer term. Examples of job roles relevant to accountancy and finance professionals are included in this report.
- **Organisations that are serious about their data strategy** are more likely to offer meaningful work, regardless of the specific technology one may be working with.
- **Evaluate an organisation's offer on flexible working**, because emerging examples of a permanent move to full or substantially remote working, beyond the pandemic response, suggest that this could become an important influencer in shaping one's work experience.
- **Actively reflect on factors relevant to working flexibly**, for example, level of face-to-face contact that is needed for delivery and progression in a job role, autonomy in planning one's work, the need for guidance on day-to-day basis, or issues such as motivation and engagement.
- Seek out organisations that value **learning and development**. Leaders are 49% more likely to work at organisations that conducted an employee skills mapping exercise to identify gaps; this was the highest differential between leaders and the sample for control criteria used to pick Leader group.
- A sense of **purpose is critical for achieving meaningful work** with an enduring long-term connection and commitment, and this often goes beyond financial factors alone. Leaders were 38% more likely to work at organisations that try and understand whether employees find work fulfilling. This was the second-highest measure of differential between leaders and the sample for the criteria used to pick Leader group.
- Recognise the **multidisciplinary nature of the digital professional**, and the need for a balanced approach that builds digital capabilities alongside technical and ethical skills, commercial acumen, and inherently human competencies such as emotional intelligence, vision and creativity.
- **Partner effectively** with experts across multiple domains, for instance data engineers or cybersecurity specialists. Given the specialised nature of technology and the rapidity of technological change, this will be critical as it is not possible to acquire deep expertise in everything. As part of this, consider whether the organisation model allows for access to multidisciplinary capabilities in a quick, seamless way.

ACCOUNTANCY AND FINANCE  
PROFESSIONALS MUST CONSIDER  
THE TECHNOLOGY IN RELATION TO  
DELIVERY MODELS FOR THEIR SERVICES,  
EVOLVING CONSUMER PREFERENCES,  
AND REGULATION, AS WELL AS ETHICS  
AND THE PUBLIC INTEREST.



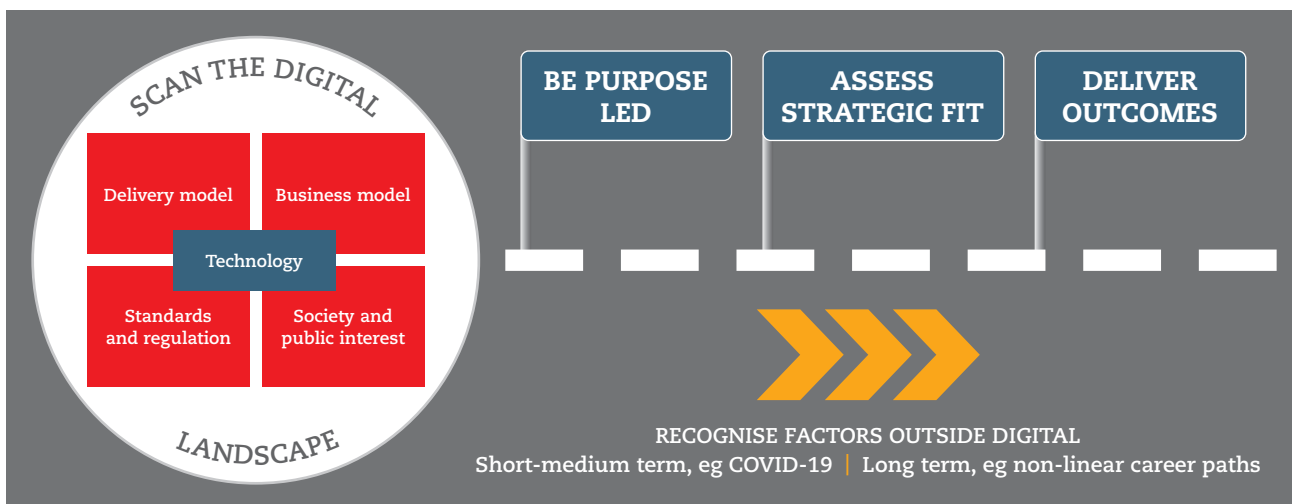
The roadmap for the digital professional starts with continual scanning of the digital landscape that goes beyond understanding how an individual technology works. This provides a basis for understanding one’s purpose, and for reflecting deeply on why one wants to work in roles with a high component of digital skills: why working with technology reflects one’s interests and values.

Once there is clarity on this, the next step is to assess strategic fit with the organisation and to plot a direction of travel that supports learning and development. This involves looking beyond immediate deliverables and understanding how the work fits into the overall picture, for example, the value created for stakeholders and career paths that map to the agenda of those stakeholders.

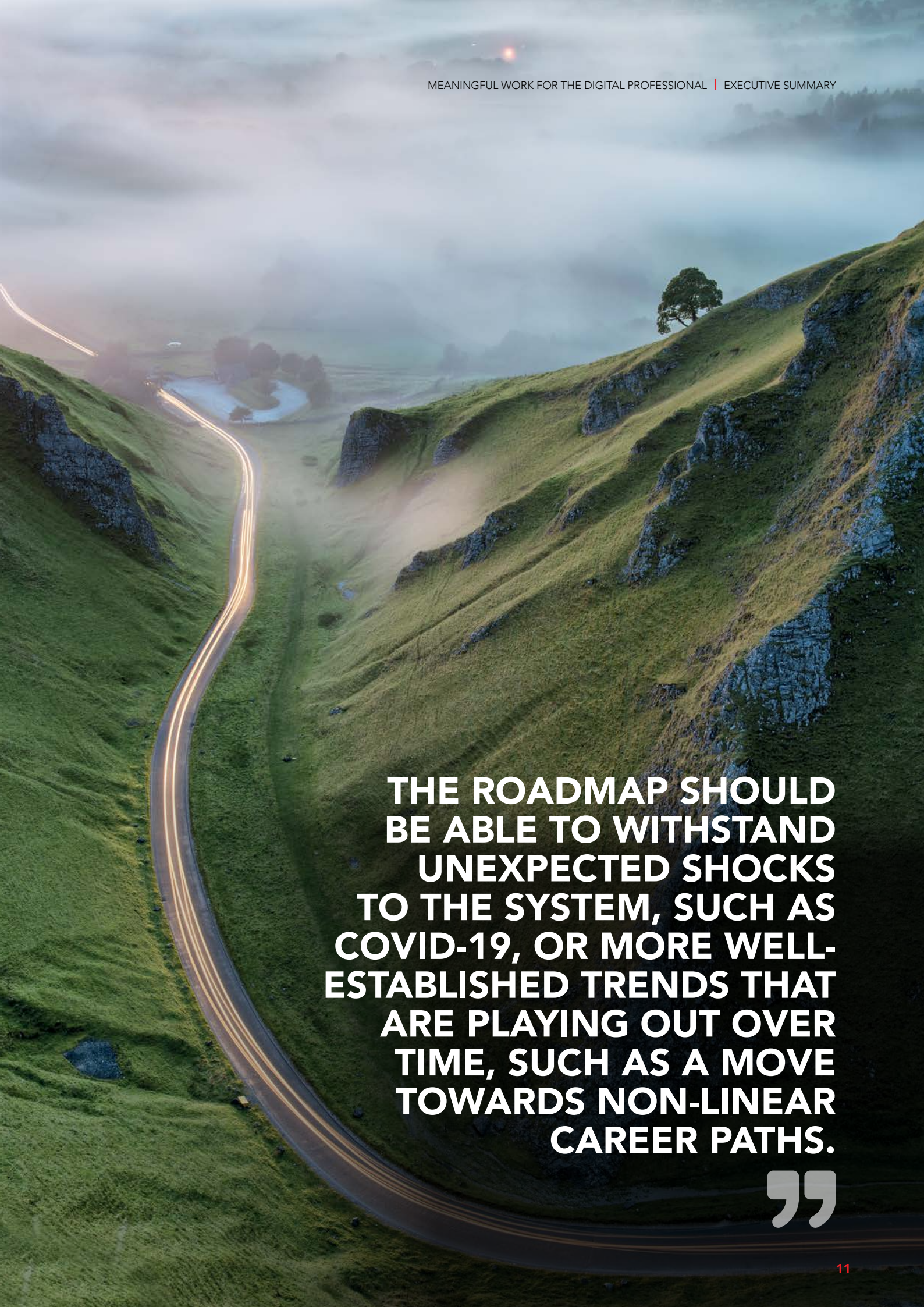
The preceding steps provide the appropriate context for achieving optimum outcomes in the role itself, ie with a proper understanding of the key responsibilities and ways of working for that role. Focusing directly on this step, ie just ‘getting the job done’ may produce results in the short term but is unlikely to provide an enriching and meaningful work experience in the long term.

Furthermore, digital professionals must also consider factors in their peripheral vision, beyond digital aspects. The roadmap should be able to withstand unexpected shocks to the system, such as COVID-19, or more well-established trends that are playing out over time, such as a move towards non-linear career paths.

**FIGURE ES1:** Roadmap for the digital professional







**THE ROADMAP SHOULD BE ABLE TO WITHSTAND UNEXPECTED SHOCKS TO THE SYSTEM, SUCH AS COVID-19, OR MORE WELL-ESTABLISHED TRENDS THAT ARE PLAYING OUT OVER TIME, SUCH AS A MOVE TOWARDS NON-LINEAR CAREER PATHS.**

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# Introduction

This report explores the impact of digital on the work of accountancy and finance professionals. It shines a light on critical factors relevant to a future of work that is meaningful and rewarding. In doing so, it sets out a roadmap for preparing to work in a digital age.

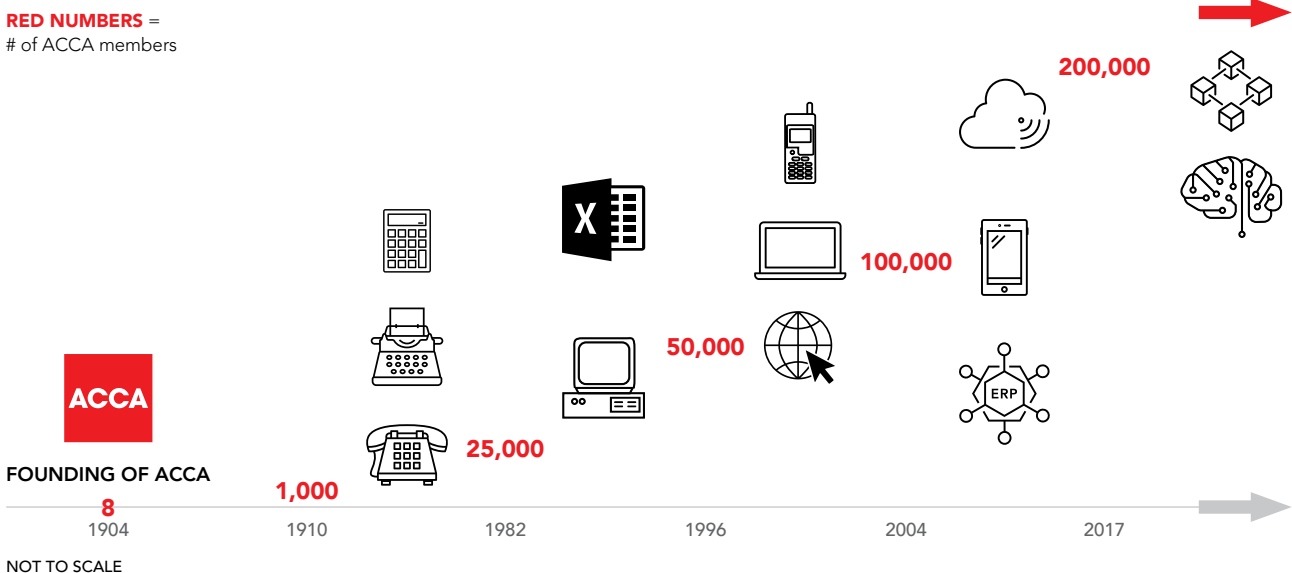
Periodic disruption by technology is a fact of life that has been navigated by the accountancy profession through business cycles and over the long term. In previous instances of disruption linked to technological innovation, the profession has shown itself to be adaptable and to recognise the role of technology in enabling and improving what the profession can offer.

The arrival of desktop computers in the 1980s, for example, did not remove the need for professional accountants. In fact, a scan of ACCA's own membership

(Figure I1) shows that, over the years, membership has steadily increased as a range of technologies have arrived.

When spreadsheets were invented in the 1980s, they revolutionised the accounting industry (NPR 2015). About 400,000 bookkeeping jobs in the US were made redundant as a result, but 600,000 accounting jobs were created to work the software, perform more complex calculations, and facilitate the greater number of queries that companies now requested as a result of spreadsheet software.

**FIGURE I1:** ACCA membership growth and technological innovation





Two large-scale shifts will also have an effect. The first is that the world's labour force peaked in 2012, and is now in decline, as population growth rates slow down (World Bank Group 2016). Some commentators, with a focus on asset allocation impact, have suggested that we are at the start of a demographic transition that will increase the bargaining power of labour (eg Nangle 2015).

The second is the growth in the services sector as a share of the whole economy. In the UK, the US and France, this sector now represents 80% of economic activity (possibly a peak level), and 70% in Germany. Even in emerging markets, China and India have started transitioning towards services while their share of manufacturing is below the peaks seen in the richer economies. The services sector is harder to automate, precisely because they involve service. The quality of labour, and its social construction, becomes part of the delivery to the customers; done well, this typically involves soft skills, even 'emotional labour'.

There is merit to the assertion that cognitive technologies such as artificial intelligence (AI) and machine learning are fundamentally different – but experience so far suggests they also have limitations. Some AI researchers suggest that the gains in AI to date have been rapid because of the specificity of the problems they have been set, and because rapid gains are typically seen in the earlier stages of software development before the costs of complexity kick in. This has led to speculation about whether machine learning can be as autonomously smart as some might believe (Strickland 2019).

### Framing the discussion

Taking all this into account, there is a case for thinking about how jobs will evolve, rather than retaining simplistic all-or-nothing notions of things staying the way they are or of existing practices vanishing altogether. Things will certainly change. Technologies can carry out work previously done by people, they can change how work is organised, and they can change what is involved in doing work (Pettinger 2019). They also create new types of work.

Jobs are clusters of tasks, rather than a single one. Technological change makes some tasks redundant, amplifies the importance of other tasks, and adds completely new tasks to a job. Though there are some tasks within jobs that are easy to automate, the bundle of tasks that make up a job is often much more difficult to unpick. It has been said that tasks are 'a high-dimensional bundle of activities, the elements of which must be performed jointly to produce output. For example, flight attendants engage in both interpersonal and physical tasks...and managers perform both analytical and interpersonal tasks'

(Autor and Handel 2009). Both jobs and tasks require complementary skills, including human flexibility and judgement. For example, during the 1990s, in business process re-engineering, one of the biggest challenges was capturing within formal job descriptions the informal roles that moved tacit knowledge around a business.

In general, repeated studies show that, across both cognitive and manual work, demand for jobs that involve non-routine tasks has been increasing, while demand for those involving routine tasks has been falling. The Pearson/NESTA study validated this hypothesis via a complex model of skills; it used multiple research methods to produce its conclusions (Bakhsh et al. 2017). It found that the jobs which showed future growth were likely to involve high levels of interpersonal skills and social skills, and/or higher-order cognitive skills. Broad-based educational knowledge also seemed to be an asset, perhaps because it would probably underpin the other two. Jobs that required psychomotor skills or specific physical abilities were likely to decline.

Overall, therefore, this is a more complex area than screaming headlines might suggest. The current wave of technologies such as AI, robotics and blockchain do represent significant shifts, but also the potential for these to significantly augment the effectiveness of professional accountants. The profession can continue to play a critical role if, as before, it engages proactively with these developments and adapts to an evolving environment.

**SERVICES SECTORS ARE HARDER TO AUTOMATE, PRECISELY BECAUSE THEY INVOLVE SERVICE. THE QUALITY OF LABOUR, AND ITS SOCIAL CONSTRUCTION, BECOMES PART OF THE DELIVERY TO THE CUSTOMERS; DONE WELL, THIS TYPICALLY INVOLVES SOFT SKILLS, EVEN 'EMOTIONAL LABOUR'.**

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# digital





# 1. Scanning the digital landscape

On the one hand, blockchain is a genuine contender for redesigning the world. But it awaits a ‘killer app’, as email was for the internet. Again, on the one hand, quantum computing could break the public key cryptography on which blockchain is based. On the other hand, quantum-resistant encryption could evolve to address this eventually.

The point of the above comments is to emphasise that simplistic ideas of a technology as either the permanent answer to all problems or a complete waste of time must be avoided. And it is necessary to mitigate against the risk of blind spots, because it is not useful or indeed possible to understand everything in detail.

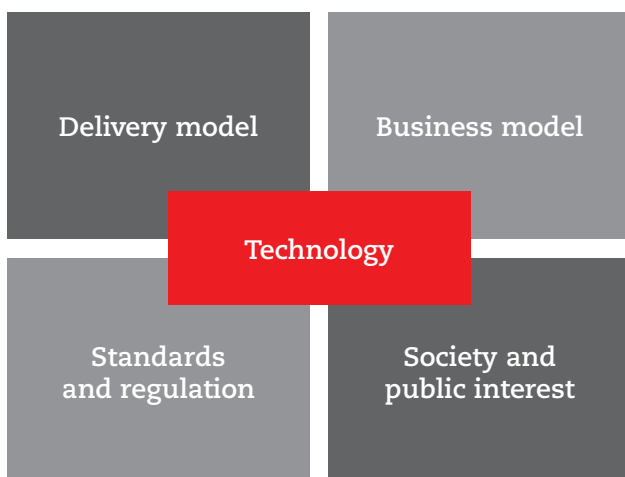
Scanning the digital landscape for the latest developments will, over time, improve the ability to identify what is most relevant. And, as highlighted in Figure 1.1, even though technology is at the heart of it, scanning is not just a matter of monitoring development of technological products.

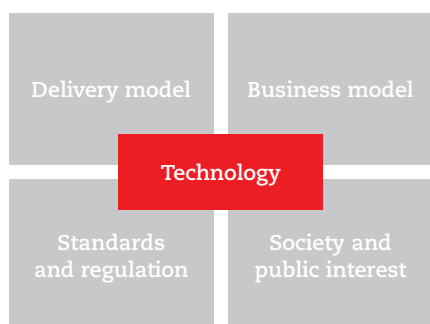
For meaningful work relevant to accountancy and finance professionals, the most effective scanning additionally informs how business and delivery models, and regulatory direction, are evolving, and the implications for the public interest.

**‘TODAY’S AUDIT PROFESSIONAL REQUIRES A DEEP UNDERSTANDING OF THE TECHNOLOGY BEING USED IN THE DELIVERY OF THE AUDIT. AUDITORS MUST ALSO UNDERSTAND EMERGING TECHNOLOGY TRENDS, AS WELL AS THE IMPACT OF OUR CLIENTS’ INVESTMENTS IN TECHNOLOGY. AS ORGANISATIONS EMBRACE TECHNOLOGIES, INCLUDING AUTOMATION AND MACHINE LEARNING: HOW DOES THIS IMPACT THE PROCEDURES THAT THE AUDITOR NEEDS TO PERFORM?’**

Paul Goodhew, EY Digital Markets Leader, Global Assurance

**FIGURE 1.1:** Scanning the digital landscape





### 1.1 Technology

A good place to start is with a broad look at the technology landscape. This sets context and gives a sense of some of the changes that are approaching (Tables 1.1 and 1.2).

As the tables show, the innovation landscape is diverse, busy and fast-moving. Inevitably, it also comes with risks. These emerging technologies have implications that exceed the sphere of accountancy and finance, or even business operations. They can change the way society operates and how, or whether, power within society is regulated and harnessed in a fair, equitable manner.

**TABLE 1.1:** The digital landscape over the next three years

TIMELINE*	EMERGING TECHNOLOGY**	DESCRIPTION	RELEVANCE (EXAMPLES)
Current (0–1 year)	Robotic Process Automation (RPA)	Automation of rules-based processes using bots	Processes such as order-to-cash, purchase-to-pay and record-to-report
	AI – Machine learning; Natural Language Processing (NLP)	Statistical analyses for advanced pattern recognition in data; analysis of unstructured (text) data	Transaction fraud/anomaly detection; Analysis of contracts at scale to extract relevant key words and clauses of interest to an audit
	Internet of Things (IOT)	Devices with sensors that can connect to the internet (and to each other)	Inventory management with sensors sending data about the ‘state’ of an item eg temperature, location to Cloud for analysis and optimisation
	Blockchain	Decentralised and immutable trusted record (ledger) of events	Secure logging of details about goods across supply chain to confirm their authenticity, origins and real-time location (relates to IOT example above)
	AI Supercomputing	High performance computing (HPC) for distributed machine learning on massive sets of big data	Indirect systemic benefits from scalable processing capability for algorithms to be ready for the volume of data that is increasing exponentially
	WiFi6	Next-gen wireless connectivity	Improved network speed and connectivity, particularly if multiple devices connected to it or heavy use through home working
1–3 years	Edge Inference Chip	Running AI models and high levels of computation at the Edge rather than sending data back to Cloud for processing	Perform AI tasks eg linked to advanced data analysis on mobile device without needing to be connected to the internet
	5G	Next-gen cellular networks	Faster downloads and ability to connect multiple devices to the network
	Extended Reality (XR)	Full sensory experience combining real and virtual; human and machine	More realistic corporate training and simulation-based learning
	Biometric Identification (ID)	Facial and voice recognition; digital fingerprinting	ID verification using biological or personal data characteristics

\*Fast-moving space and timelines are approximations \*\*Not exhaustive

Source: SenseTime Intelligent Industry Research Institute

**‘COMPUTING DRIVES THE NETWORK, THE NETWORK DISRUPTS THE MEDIA, AND THE MEDIA BREEDS A NEW SOCIETAL AND BUSINESS CULTURE. THEREFORE, THE COMMERCIAL REVOLUTION IN THE COMING 50 YEARS WILL ORIGINATE FROM INNOVATIONS OF THE BASIC TECHNOLOGY SET (COMPUTING + NETWORK + HUMAN-COMPUTER INTERACTION) OVER 10 YEARS FROM NOW.’**

Feng Tian (Ben), Dean of SenseTime Intelligent Industry Research Institute

As technologies evolve, the profession therefore must consider their implications in the fullest sense, far beyond what they offer from a product-development point of view. Risk of ethical compromise can come from a range of areas like lack of understanding (professional competence and due care) or confidentiality breaches in a world where keeping track of who is accessing which data is important. In addition to ethics, there are business model risks, where emerging technologies can change the structure of entire industries. As well as legal and regulatory risks of operating in an environment where the existing frameworks may not have considered new situations created by these digital tools.

**TABLE 1.2:** Digital landscape beyond the next three years

TIMELINE*	EMERGING TECHNOLOGY**	DESCRIPTION	RELEVANCE (EXAMPLES)
3–5 years	VloT (Visual Internet of Things)	Based on vision recognition, Augmented Reality (AR), big data and 5G, VloT enables smart ‘things’ to capture visual data, and combine with advanced analysis across structured/ unstructured data types	Photos of car number plates captured in real-time combined with near instantaneous analysis to establish ownership/usage rights with data processing at the Edge
	Artificial Human Assistant	Its appearance and behaviour are like a human, with the ability to learn expressions, skills, reactions and express emotion	Machine can communicate with people in natural language, complete tasks assigned by users, or assist in complex services with human-like responses
	Autonomous driving	Independent machine control for cars and other vehicles	Self-driving taxis and transportation applications embedded in smart city infrastructure
>5 years	Quantum computing	Order-of-magnitude higher levels of processing beyond current supercomputers	Processing AI algorithms at a scale and speed greater than supercomputers and in a more energy efficient manner; quantum resistant encryption for cybersecurity as quantum can break existing cryptographic protocols used for securing data
	6G	Higher capacity cellular networks	Industrial use cases for IOT devices
	Satellite internet	Internet access via transfer of information using satellite dish	Full global coverage to enable internet access in areas where it is difficult to set up physical cables
	Brain-Computer interface	Communication between neural electrical signals and external processing units	Ability for those with diseases such as Alzheimer's that impair verbal communication to communicate thoughts through nerve signals

\*Fast-moving space and timelines are approximations \*\*Not exhaustive

Source: SenseTime Intelligent Industry Research Institute

## Technology adoption for accountancy and finance professionals

An innovation may be relevant to work done by accountancy and finance professionals for a variety of reasons. For instance, it may enable new products and services or deliver existing products and services better, quicker, or cheaper.

Equally important is recognising when it may not be relevant. A common pitfall here is the 'solution in search of a problem'. This may happen, for example, because the problem facing the digital professional does not need such a complicated solution; or the stakes are not high enough, or perhaps, the problem has additional characteristics when deployed in a real-world business scenario for which the technology is not quite right.

As a result, there is a time lag between the emergence of the innovations shown in Tables 1.1 and 1.2 above, and adoption more broadly. The remainder of this report focuses on digital issues pertaining to use in more mature environments at scale – the typical arena of work for accountancy and finance professionals.

### Adoption timeline

**'I WAS INVOLVED IN SETTING UP TENTHREE LABS IN CANADA WHERE WE WORKED ON DATA EXTRACTION, ANALYTICS, AND VISUALISATION, ALONG WITH RPA, AND AI THEREAFTER. AND WE'VE BEEN FORTUNATE TO WORK WITH CLIENTS AS PILOTS IN SOME CASES TO TEST THE TOOLS. I'M CONNECTED AS THE EXECUTIVE SPONSOR FOR THE LAB WHICH HAS GONE FROM 2 PEOPLE IN CANADA TO 900 ACROSS THE AMERICAS. ITS FAST MOVING AND WE RESET GOALS EVERY 3 MONTHS.'**

**Daniela Carcasole, Partner, Ernst & Young LLP, Canada**

On current adoption (Figure 1.2), leaders outperform the overall sample by between 3% and 10%, with an average leader premium of 6%. The greatest difference is in data management, where the proportion of leaders that are already engaged is 10% higher than the overall sample – leaders are forging ahead with better use of data.

Adoption is a function of the extent to which real problems are addressed. For example, the enterprise resource planning (ERP) system may hold useful information but extracting it in a useable form can be the issue, with time wasted getting in and out of it. Analytics tools can help to manage process flows and build reusable workflows.

**'WE CAN NOW LOOK AT MUCH MORE DATA IN THE AUDIT AND INTERROGATE IT INTELLIGENTLY. TAX PLATFORMS CAN HELP WITH PREPARING RETURNS OR DOING CALCULATIONS FOR INTERNATIONAL AND WITHHOLDING TAXES; IN THE PAST WE'D HAVE BIG SPREADSHEETS WITH COUNTRIES FILLING DETAILS AS PER THEIR TAX LAWS, NOW ITS ALL AUTOMATED. AND FOR TRANSACTION SUPPORT, WE USE LOTS OF TOOLS THAT IN THE PAST WOULD'VE BEEN IN DATA ROOMS AND ARE NOW SHARED ON SECURE PLATFORMS BETWEEN CLIENTS AND TEAMS.'**

**Eoin MacManus, Partner, Ernst & Young Chartered Accountants, Ireland**

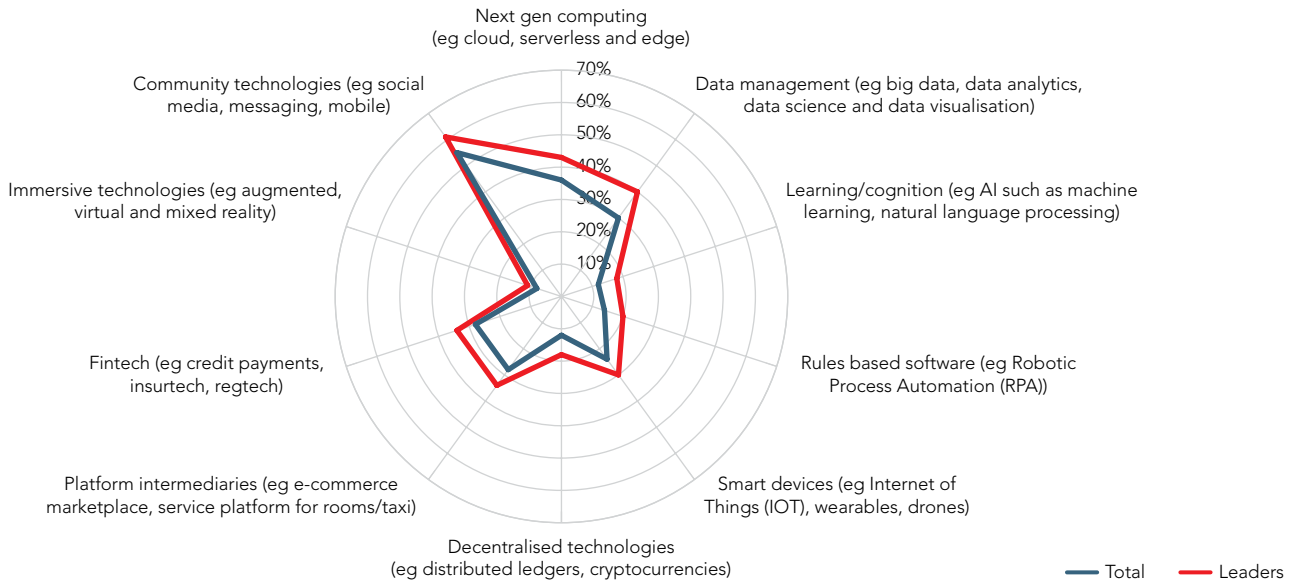
For most technologies surveyed, the largest proportion of respondents expected adoption in the next one to three years (Figure 1.3). Among those already using digital technology, there's a skew towards community technologies (55%), with Cloud (36%) and data management (30%) being the next most common. There is a successively smaller proportion of respondents anticipating adoption in next year, or 3 to 5 and 5 to 10 years.

**'THERE'S A STEADY SHIFT HAPPENING FROM ON-PREMISES SYSTEMS TO CLOUD. WE HAD FIVE DIFFERENT ERP SYSTEMS, WHICH WE INTEGRATED AS PART OF MOVING TO CLOUD. WITH GDPR, PCI COMPLIANCE ETC. DATA SECURITY IS CRITICAL. THE USER HAS FRONT-END RESPONSIBILITY, BUT THE CLOUD PROVIDER CAN BUILD SECURITY INTO THE INFRASTRUCTURE LAYER UNDERNEATH.'**

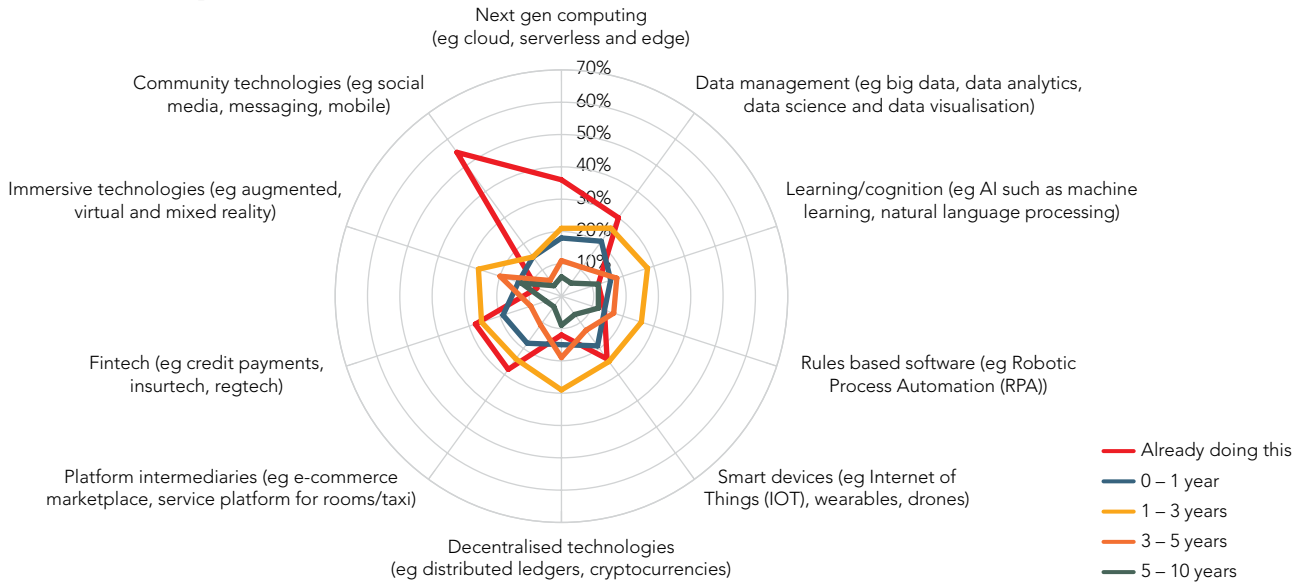
**Andrew Burdall, CFO, Network Innovations, Canada**

On average, 87% of respondents reported current or anticipated engagement over the coming decade with technology. Data, community and Cloud-related tasks show the highest levels of engagement. For these, over 9 in 10 respondents are either already engaged, or expected to do so over the coming decade. Engagement is relatively low for immersive technologies such as augmented and virtual reality, though still high in absolute terms (Figure 1.4).

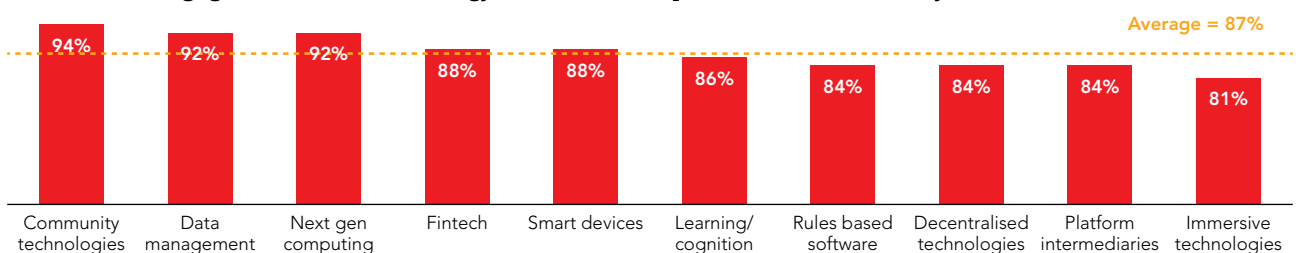
**FIGURE 1.2:** Current adoption, Leaders versus overall sample

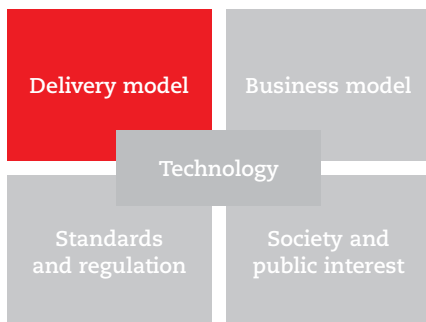


**FIGURE 1.3:** Adoption timeline



**FIGURE 1.4:** Engagement with technology – current or expected within next 10 years





## 1.2 Delivery model

The way the resources of an organisation are optimised determines whether its digital journey will be successful – getting this right is highly relevant to the work of the digital professional. Ultimately this is about how technology can assist to deliver existing services better, faster, cheaper and/or with added value.

In scanning the digital landscape, we see several aspects relevant to the delivery model. These include both process considerations such as how digital technology is embedded into the core processes of the organisation, and people factors, particularly the need for building digital skills. The skills aspect is also discussed more broadly, beyond digital skills, in section 3.

The observations in this section are explained using the context of audit and assurance to make it more specific. But the ideas discussed below are applicable more generally.

### Embedding into core processes

Embracing innovation is good but this can tip over to become unbalanced if adoption is driven by a fear of 'missing out'. Consider the use of analytics in audit as an example when looking at embedding innovative approaches into core processes.

Here, the general ledger provides a large pool of structured transactional data that can be linked to semi-structured marketing data in a customer relationship management (CRM) system or to unstructured big data from customer reviews on the firm's website. These activities are rightly valued for the insight they generate, and the goal is to leverage them within the delivery model in an optimised way. Otherwise, there is a risk of creating unproductive additional workstreams in which all the work of a traditional audit is carried out as before, and some extra analysis is simply added on top for additional confidence in the data.

**'WE DON'T SEE ANALYTICS AS BEING JUST ABOUT COOL VISUALIZATIONS AND FANCY ANALYSIS. IT NEEDS TO BE BUILT INTO THE AUDIT METHODOLOGY. ONCE I GET THE GL AND SUB LEDGER DATA, HOW DOES THE AUDIT CHANGE? WE WORK WITH TECHNOLOGY TEAMS TO DEVELOP AND ACTIVATE ASSETS FOR ADOPTION AT SCALE. IF I SEE 50 TEAMS ACROSS THE GLOBE DEVELOPING VERSIONS OF A SIMILAR PIECE OF AUTOMATION INDEPENDENTLY, THEN IT'S CLEARLY A SIGNAL FOR A STANDARDISED SOLUTION.'**

Hermann Sidhu, EY Global Assurance Digital Leader

This is first and foremost about mindset. The standards have not fundamentally changed in their intent, in that the auditor is still needed to satisfy certain tests and to assess the risks. The question is: how can one perform the procedure better with data? A lot of the change is in the scoping, strategy and planning.

The starting point is a structured approach to data collection that reflects a deep understanding of the flow of information through the entity. Data can be collected for the entire population, not just a sample. Sampling may struggle to pick up systematically fraudulent behaviours or low signals, for example where each instance is small and below the materiality threshold, but that in aggregate present a risk.

The data is cleaned, structured and mapped to specific processes, such as sales, by considering all interactions in the end-to-end process, documents accessed, automated elements, and so on.

Data analytics can then be used to uncover patterns or unusual correlations to reveal which accounts need to be checked and to what extent. This gives a granular view on where to look or what to look for in specific transactions. In doing so, it moves the audit towards being driven by data, rather than just using it.

**'TRADITIONALLY THE AUDITOR'S CHALLENGE IS A BIT LIKE BEING IN A DARK ROOM, TOUCHING A SAMPLE OF ITEMS AND SEEKING TO HIT UPON KEY MATTERS. WITH ANALYTICS, ONE CAN TURN ON THE LIGHTS. FOR RELEVANT ACCOUNTS PROCEDURES THERE ARE TOOLS BASED ON A DATASET RELEVANT TO WHAT THE STANDARD IS TESTING.'**

Herton Teles, Associate Partner, Ernst & Young Auditores Independentes S/S, Brazil



**'TODAY, TECHNOLOGY CHANGES FASTER THAN ACCOUNTING PRACTICES AND AUDIT OBJECTIVES. TO REFLECT THE DIFFERENT SPEED, THE AUDITING STANDARDS WILL REMAIN TO BE TECHNOLOGY NEUTRAL. THIS ALLOWS THE TECHNOLOGY BACKBONE OF OUR CORE AUDIT PROCESS TO ADOPT TO PROGRESS FAST AND FLEXIBLY. AT THE SAME TIME WE NEED TO ENSURE THAT EMERGING TECHNIQUES SUCH AS DATA ANALYTICS AND ARTIFICIAL INTELLIGENCE CAN BE "PLUGGED" INTO THE AUDIT RISK MODEL. MOST EMERGING TECHNIQUES NEED A REDESIGN BEFORE WE CAN MAKE THEM AVAILABLE TO THE AUDIT PRACTICE. WHENEVER WE WERE SUCCESSFUL WITH THAT, NEW TECHNIQUES PROVIDED BENEFITS FOR OUR CLIENTS AND OUR AUDIT PROFESSIONALS.'**

**Karen Leah Somes, Partner, Ernst & Young GmbH, Germany**

### **Role of the professional**

The approach depends on being able to validate the data to confirm it has not been manipulated or contains errors – this needs human involvement. Judgement is also needed because manual checks of transactions occur by exception. The individual decides where to put the emphasis, which needs experience and contextual understanding. Higher levels of judgement are now needed earlier in a career. While judgement is needed even in the traditional model, the amount of time junior staff spend on just gathering the evidence is dramatically reduced or removed.

**'SAY A COMPANY IS DIVIDING A PORTFOLIO OF COMMERCIAL PROPERTY INTO DIGITAL TOKENS THAT PEOPLE ALL OVER THE WORLD CAN BUY. A DETAILED EVALUATION OF THE EXISTENCE OF THE PROPERTY, AND THE RIGHTS AND OBLIGATIONS THAT THE TOKENS CONFER, IS NECESSARY TO ESTABLISH TRUST IN THE LINK BETWEEN THE PHYSICAL ASSET AND THE TOKEN.'**

**Adam Gerrard, EY Asia-Pacific Assurance Blockchain Leader**

**'OVERALL, MORE TIME IS SPENT ON UNDERSTANDING WHAT THE IMPACT OF THE BUSINESS ENVIRONMENT IS ON THE ACCOUNTS AND WHAT SHOULD BE INCLUDED IN FINANCIAL STATEMENTS. INTERPRETATION, JUDGEMENT AND THE DOCUMENTATION OF THESE IS VITAL.'**

**Łukasz Piotrowski, Associate Partner, Ernst & Young Audyt Polska spółka z ograniczona odpowiedzialnoscia sp. k., Poland**

### **Transforming the delivery**

**'CHANGE MANAGEMENT IS A CRITICAL PART OF ONBOARDING TECHNOLOGY. A COMPLEX MULTI-LOCATION MODULE MAY HAVE A 12 MONTH OVERLAP BEFORE TURNING OFF THE OLD SYSTEM. AND ONCE ALL STAFF HAVE BEEN ONBOARDED, THERE'S SAY, TWO UPDATES PER YEAR AND SHORT SWEET YOUTUBE VIDEOS TO EXPLAIN THE UPDATES.'**

**Hermann Sidhu, EY Global Assurance Digital Leader**

The idea is for the data-driven way to be the sole basis on which the work is done, rather than also conducting sampling in parallel. And over time, particularly as newer staff are exposed only to a digital-first approach, it is embedded into the core processes.

The service delivery model is then less squeezed around the 'busy season', with a lot of the work being done initially, which spreads the mountain of effort through the year more evenly. This improves the quality of the discussion and reduces the number of back-and-forth interactions requesting information or clarification; a lot can be uncovered directly from the source data.

If the general ledger data is received quarterly, 80% of the audit file may be complete by December, with January and February being used to look at consolidation, tax, impairment etc; and to test the data or the tagging of journal entries.

One of the big challenges when transforming the delivery model is the availability of good-quality, clean data. The entire edifice of data-driven insight is built on the assumption of such data. Yet in practice, the data needed is often in different locations, in various premises or in multiple clouds, and in various formats. As a result, embedding into core processes will frequently require specialist expertise to bring the data into acceptable, usable forms.

**'WE SELL 35-40 TYPES OF SERVICES FOR EG WITHOUT LOCK-IN CONTRACTS THAT INVOLVE ONLY VARIABLE COSTS; OR 3-YEAR CONTRACTS WITH FIXED COSTS. WE USE ANALYTICS TO MAP OUT TRENDS ACROSS FIXED AND VARIABLE COSTS, REVENUES, AND CUSTOMER LOYALTY METRICS; AND TO USE HISTORICAL DATA FOR PREDICTIONS ON INCOME AND CHURN. WE HAVE MILLIONS OF TRANSACTIONS EVERY MONTH SO THERE'S LOTS OF DATA, ACROSS DIFFERENT SYSTEMS. THE ERP HOLDS THE P&L, BILLING SYSTEM; CRM FOR CLIENT DATA, LEGACY DATA FROM OLDER ERPS ETC. WE'RE AWASH WITH DATA AND WE USE IT TO DO VALUABLE ANALYSIS. BUT A LOT OF THE WORK IS TO COLLATE AND CLEAN THE DATA BEFORE WE CAN READ ANY OF IT.'**

**Andrew Burdall, CFO, Network Innovations, Canada**

If there is a structural problem, such as the existence of only small amounts of relevant data, it could be necessary to explore techniques such as transfer learning, wherein machine learning models from one environment can be applied to a different data set to drive insights.

**'I'VE GOT POSITIONS ON MY TEAM THAT DIDN'T EXIST 2 YEARS AGO LIKE THE RPA MANAGER. WE EXPECT CONTINUED GROWTH FROM A REVENUE AND HEADCOUNT STANDPOINT. AND WE HAVEN'T SEEN THE DIGITAL IMPACT IN TERMS OF REDUCING OUR NEED FOR TALENT, ITS BEEN ABOUT INTEGRATING DIGITAL INTO OUR OPERATING MODEL.'**

**Scott Sanders, Chief Information Officer, Sikich**

Ultimately, regardless of the hurdles faced in transformation, leaders bring a value-focused mindset to the way they approach change. As Figure 1.5 shows, they tend to see digital developments as an opportunity rather than a challenge. This is often the difference between a successful transformation and one that fails.

**'INTELLIGENT (AUTONOMOUS) PROCESS AUTOMATION COMBINES RPA AND AI, PROCESSES UNSTRUCTURED DATA AND USES PREDICTIVE ANALYTICS FOR DYNAMIC, INTELLIGENT, AND AUTOMATED ACCOUNTING AND FINANCE PROCESSES. THIS CAN: ACCELERATE THE FINANCE TRANSACTION CYCLE/PERIOD-END CLOSE TIMELINE, INCREASE TRANSACTION PROCESSING ACCURACY, OPTIMISE WORKING CAPITAL (PAYMENTS ON TIME, REVENUE LEAKAGE, REDUCE INVENTORY SURPLUS AND OUTAGES THROUGH JUST-IN-TIME), PROVIDE NEAR REAL-TIME DATA INSIGHTS TO SUPPORT BUSINESS DECISION MAKING, AND EXPEDITE RESPONSE TIMES TO QUERIES (EG FROM AUDITORS, REGULATORS, CUSTOMERS, BUSINESS).'**

**Lutamyo Mtawali, Finance Transformation, IBM, UK**

**FIGURE 1.5:** Opportunities and challenges over the next five years as a result of technology



### Interaction with the ecosystem

Next-generation ERP systems with deep analytics and cognitive capabilities can make it possible to run analytics directly on the client's systems. On the one hand, this can offer step-changes in insight and real-time updating of the same. On the other, there are questions to consider, such as how to ensure independence and oversight if running the analysis on client systems.

**'ANALYTICS NEEDS TO BE FLEXIBLE SO THAT WE CAN HARNESS DATA SETS ON LAPTOP, MEDIUM SIZE ONES ON SQL SERVERS, AND VERY LARGE ONES ON CLOUD. CLIENTS ARE MAKING SIGNIFICANT INVESTMENTS IN UPGRADING THEIR ERP INFRASTRUCTURE AND EMERGING TECHNOLOGIES SUCH AS SMART AUTOMATION AND AI, SO PART OF WHAT WE NEED TO CONSIDER IS HOW WE MAXIMISE OUR CLIENT'S INVESTMENTS.'**

Hermann Sidhu, EY Global Assurance Digital Leader

**'MODERN ERP SYSTEMS UTILIZE A SINGLE SOURCE OF TRUTH ARCHITECTURE, ADDRESSING THE BURDEN OF SUB-LEDGERS RECONCILIATIONS – HENCE 100% OF THE TRANSACTIONS ARE IN ONE PLACE. AN INCREASE IN IMPLEMENTATION OF SUCH SINGLE LEDGER ARCHITECTURES WILL CERTAINLY EASE THE AUDIT INDUSTRY'S DATA ACCESS CHALLENGES. ULTIMATELY THIS WILL DRIVE CONSISTENCY AND THEREFORE QUALITY OF THE AUDIT.'**

Jeanne Boillet, EY Global Assurance Innovation Leader

The interaction is not just within the digital ecosystem, it overlaps with the physical world as well. For instance, if expenses were tracked via blockchain it might be possible to check for segregation of duties, so one cannot approve one's own expenses. But two individuals could collude and falsely approve each other's and, as the blockchain is immutable, it would legitimise a fraudulent entry.

In this instance, understanding interactions 'off-chain' in the physical world matters. Machine-learning-based approaches can help here by identifying unusual patterns in the data. So, interactions in the physical domain may create a problem that is reinforced by one technology but resolved by another.

The aim is to avoid forcing technology onto a bad process – amplifying something bad makes it worse. And equally, to avoid forcing a process onto badly functioning technology, as where multiple ERP systems are 'band-aided' together.

**'WE'LL SIT DOWN WITH THE CLIENT AND GO ACROSS THE APP LANDSCAPE TO LOCATE THE BEST IN BREED FOR WHAT THEY NEED. THE GOAL IS OFTEN TO EXTRACT EFFICIENCIES FROM BEING ON THE CLOUD – BECAUSE JUST PUTTING INFORMATION ON THERE DOESN'T AUTOMATICALLY CHANGE ANYTHING IF ITS STILL PAPER INVOICE, PRINTING, AND SCANNING. WE HELP CLIENTS NAVIGATE A LARGE VOLUME OF SOLUTIONS/ APPS. OFTEN, THIS INVOLVES 'MICROSLICES', IE SOLUTIONS THAT WORK IN SPECIFIC PARTS OF THE PROCESS ALONG WITH INTEGRATING AND COMBINING SOLUTIONS WITH APIS. FOR A LOT OF WHAT WE DO, WE NEED PEOPLE WHO CAN 'KNIT' THINGS TOGETHER.'**

Ulrich Britting, Founder, ba Tax gmbh

### Building digital skills

Accountancy and finance professionals can add additional value if they have skills beyond core accountancy technical skills. The emphasis in this section is on digital skills, but its worth noting that these must be accompanied by a balanced mix including human competencies like emotional intelligence, and this wider multi-disciplinary skillset is examined in section 3.

An often-mentioned aspect on digital skills is coding. It is helpful to have an appreciation of the principles of coding, ie logical constructs and ways of thinking that underlie the code, even if one doesn't create code oneself. Perhaps a rough comparison is with understanding the principles of accounting standards and how the impact of accounting treatments flow between the various financial statements without a detailed knowledge of the underpinning double entry bookkeeping.

**'WE HIRED PEOPLE WITH IT PROGRAMMING AND SOFTWARE ENGINEERING SKILLS FROM BANKS, STATUTORY BODIES AND MULTINATIONAL CORPORATIONS; AND PAIRED THEM WITH AUDIT ENGAGEMENT TEAMS TO DEVELOP AUDIT AUTOMATION TOOLS. THE SOFTWARE ENGINEERS WERE HELPFUL IN HELPING ACCOUNTANTS UNDERSTAND THE POSSIBILITIES. WE LEARNT THAT WITHOUT SUCH COLLABORATION, THE SOFTWARE PERSON MAY NOT BE ABLE TO DEVELOP A TOOL THAT IS EASY TO DEPLOY IN AUDIT SITUATIONS. WE ALSO TRAIN OUR YOUNGER PEOPLE WHO ARE ABLE TO PICK UP SOFTWARE SKILLS FAST; SO IN OUR EXPERIENCE, IT IS NOT DIFFICULT FOR AN ACCOUNTANT TO LEARN SOFTWARE AND COLLABORATION WITH IT ENGINEERS WOULD ACCELERATE THE LEARNING PROCESS.'**

**Yew Kiang Chan, Partner, Ernst & Young LLP, Singapore**

It is worth noting, though, that technology also offers options for those who do not have coding skills. So-called low-code and no-code software allows non-technical users to build software in an intuitive environment. Gartner estimated (in 2019) that by 2024, low-code application development would be responsible for more than 65% of application development activity.

**'EY TEAMS ARE DIVERSE, WE HAVE CAS/CPAS, BUSINESS DEGREE, DATA-PROFESSIONAL, AI MAJOR, MATHEMATICIAN, LAWYER AND SCIENTIST. THEY HAVE ONE THING IN COMMON – AN UNDERSTANDING OF HOW A PROCESS HANGS TOGETHER AND THE WILLINGNESS TO LEARN THE TECH. WE DON'T ALWAYS SEE THE VALUE IN HIRING SOMEONE WITH VERY SPECIFIC TECH SKILLS AS IT CAN GO OUT OF DATE IN 6 MONTHS AS TECHNOLOGY EVOLVES. THE PREFERENCE IS FOR SOMEONE WHO'S A GO GETTER, CAN LEARN AND THRIVES ON CHANGE.'**

**Fiona Habermehl, EY Asia-Pacific Assurance Technology Leader**

As a result, it can become possible without programming knowledge to create a range of business process applications, eg for advanced and customised visualisations or dashboards; extracting specific feeds of data; or performing bespoke analytics. And one could do this as a 'citizen developer' without the lead times involved in going back and forth with a technology specialist.

This self-service approach enables individuals to play to their strengths. An accountancy and finance professional can use their knowledge of the intended outcome, and end-to-end components of the business process, without having to master the coding in full detail. And the technologist can hand over responsibility for relatively simple coding tasks to citizen developers and focus on more challenging and rewarding problems.

**'CODING KNOWLEDGE IS GOOD, THOUGH IT IS ALSO INCREASINGLY GETTING PACKAGED AS A SERVICE FROM AWS ETC.'**

**GS Jayendran, Co-founder Vyakya Technologies, India**

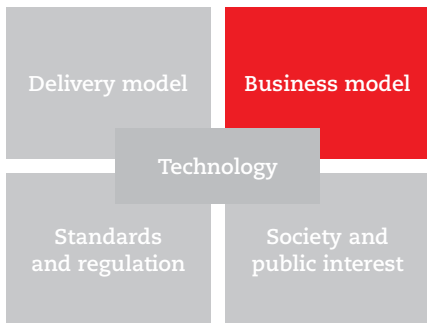
The delivery model benefits from additional skills that should not be lost in process inefficiencies. If not handled correctly, there could be a proliferation of poorly coded applications with sub-optimal outcomes resulting in a 'shadow IT' that prevents the standardised processes needed for quality control and efficiency.

**'IF YOU'RE NOT AN EXPERT, IT'S IMPORTANT TO PICK THE RIGHT PEOPLE WHO UNDERSTAND THE TECHNOLOGY. LEGAL TECH WAS SOMEWHAT OVERSOLD TO GENERAL COUNCILS. THEY WERE MADE TO BELIEVE IT WAS PLUG-AND-PLAY; BUT THE ADOPTION PROCESS CAN BE MORE COMPLICATED WITH DATA SECURITY AND OTHER ISSUES.'**

**Cornelius Grossmann, EY Global Law Leader**

**'I RAN AN ACCOUNTANCY PRACTICE FOR 17 YEARS DURING WHICH I MOVED FROM COMPLIANCE TO FINANCIAL MANAGEMENT AND ADVISORY TO GROW THE CLIENT'S BUSINESS; TO HOW TO BRING THEIR BUSINESS ONLINE. PICKING UP TECHNOLOGY SKILLS HAS BEEN NEW TO ME, BUT THE UNDERLYING BUSINESS QUESTIONS ARE FAMILIAR. THIS IS WHY I'M PASSIONATE ABOUT SUPPORTING PRACTITIONERS TO TRANSFORM THEIR FIRMS WITH THE POWER OF DIGITAL.'**

**Dato' Vimmy Yap, Founder 6Biz Sdn Bhd, AI Practice Management Platform, Malaysia**

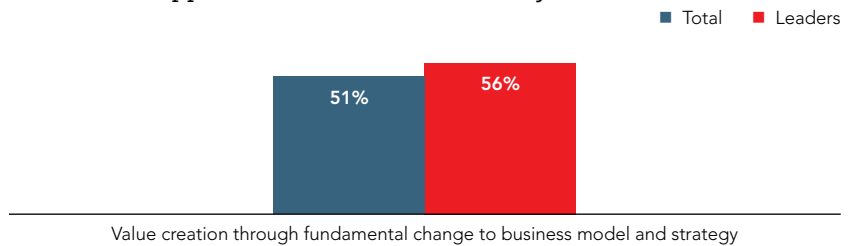


### 1.3 Business model

Digital business models can allow us to reimagine the way value is created for consumers, and consequently for the organisation itself. Leaders in our survey are relatively bold in their imagination and ambitions (Figure 1.6), with more of them seeing the big opportunity in a fundamental reimagining of their business model and strategy.



FIGURE 1.6: Opportunities over the next five years



### Organisations reach out to consumers in a different way

More than ever before, this is a consumer-driven age, with consumer-to-consumer (C2C) and consumer-to-business (C2B) models shaping the structure of the marketplace. One of the big disruptors has been the huge growth in the market power of platform-based business models. Online marketplaces have shifted their value extraction from product/service delivery for the end-user; to mining data assets obtained as an intermediary. The same logic drives other types of platform, such as search engines that connect those seeking information with those providing it.

These platforms are in the middle of massive data flows, and this truly is big data. While numbers will vary, the large platforms could have hundreds of millions of consumers, and each with tens of thousands of granular data points describing them (who they are, what they like, etc). So being able to extract connections and patterns within a consumer’s behaviour, and across consumers, quickly enough to act upon the insight is a complex task.

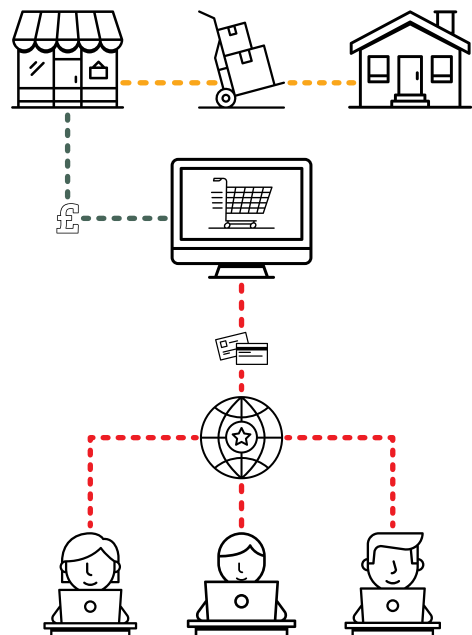
#### Scenario

An SME in the local community has long-standing loyal customers, an established local presence and distribution capabilities (in-person home delivery) in its area of operations. Its accountant works for a small-to-medium-sized practice (SMP).

With increasingly online purchases, rather than building its own website, the SME chooses to get absorbed as a participating retailer on a large e-commerce platform. Now the customers are attracted to, and owned by, the platform. And the nature of the goods it sells is decided by the analytics insight of the platform, which cross-references information against its vast database to determine which items are likely to sell best. Related to this, the ‘customer’ for the SME shifts from the local resident, to the platform that pays it a proportion of sales income.

So for the SME, its business model has shifted to one where the choice of products is determined by the analytics, the channel is the sophisticated website front-end of the platform; the brand promise gets linked to the well-known brand of the platform; and the payment is done online. The SME is now involved only in fulfilment, ie packaging and home delivery.

This change can represent both benefits and risks for the SME, depending on the specifics that are negotiated. But what’s clear is that for the SMP accountant this is a very different kind of business to be working with. ■



**Consumers reach out to organisations in a different way**

There is a dynamic nature to the interaction between organisations and consumers in a digital age, driven by the ‘power of the crowd’. Consumers are no longer content to be passive recipients of the outcomes of organisational strategy. They wish to be part of shaping that strategy.

Historically, such outside influence would have been restricted to activist investors or shareholders seeking to make their views known. Often this may have been on matters linked to management salaries or big contentious decisions such as a project deemed to be socially or environmentally harmful.

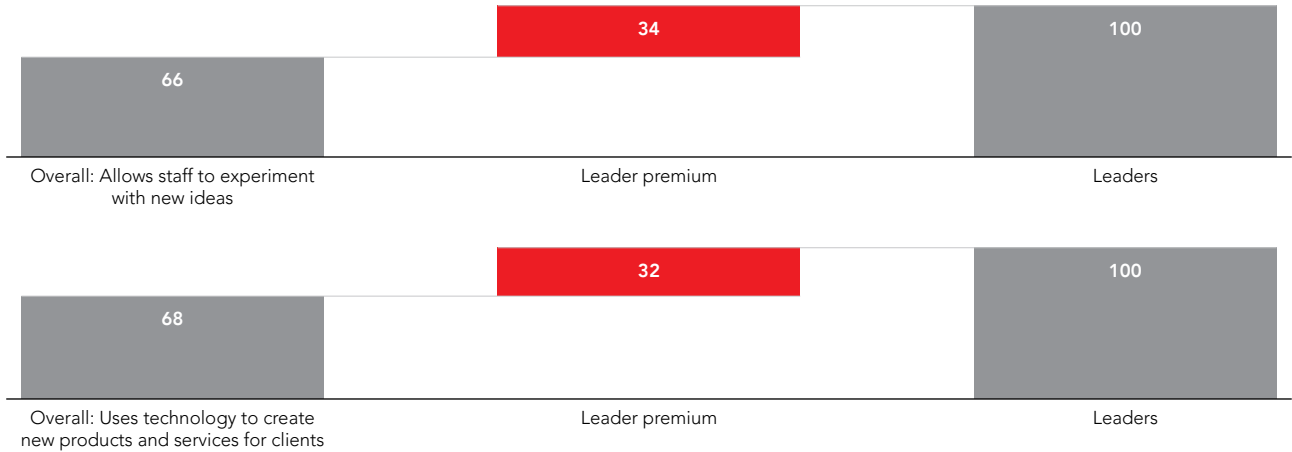
But the power of the crowd represents a very different kind of feedback. It often speaks to the day-to-day activities of the organisation: what it sells and how it sells it. This feedback could be via social media or other online channels where the views can be aggregated and fed quickly back to managers.

And it happens in real time. No one is waiting for an annual general meeting (AGM) to make their views known. And perhaps most significantly, organisations are acting upon this feedback almost as soon as it is available online.

Huge live-stream sales events aimed at a global audience provide real-time data on consumer preferences based on who bought what, click through rates, etc. For some items, such as fashion accessories, where preferences change each season, this information can be quickly processed to reveal current consumer preferences in a fast-moving market, and the product range can be quickly adapted to incorporate preferred features. This is crowd-sourced ideation, where the consumers not only pay for the product, but design what the organisation is going to sell to them.

When looking at responses to the control questions, it becomes clear that leaders think ahead (Figure 1.7). They enjoy over a 30-point premium for doing so when looking at percentage of respondents who agree with the statements provided. They are more likely to try new things, whether internally via staff, or externally with clients.

**FIGURE 1.7:** Leader premium for thinking ahead







## Swarm AI

Looking ahead at the technology landscape, Swarm AI<sup>1</sup> could add a critical variation to the already much discussed impact of AI. This is a form of intelligence that derives its approach from the natural world, such as a colony of ants. These aggregations achieve learning at scale, which far exceeds by many orders of magnitude the sum of the learning capacities of the individuals therein.

An individual ant could search for days and still not find any food, though in searching it learns lots of different ways of doing this task that fail. But in a colony, all the ants are sharing their learning with each other very rapidly, which exponentially increases their capability of learning many more ways – both those that work and those that do not. Consequently, as a group, they have much greater success in locating food. Typically, these aggregations work when there is a clearly defined goal shared by all the individuals in the group.

In the context of business models, this can be useful for organisations in more effectively making use of crowd intelligence. For example, if an organisation wants a view on a product or service, Swarm AI could distil information from a large pool of consumers to uncover insights in real-time that might be virtually impossible to see otherwise. It's also worth noting that the individuals don't always have to be human. Swarm AI can be used for aggregating intelligence across large groups of bots or indeed a mixed group of humans and bots.

These developments are being helped by other technological changes, such as improvements in the IOT for better data capture by an individual sensor, 5G networks with superior capacity, and advancements in Edge computing, which mean that more processing can be done at the IOT node, reducing the latency associated with data going back and forth to the Cloud server. ■



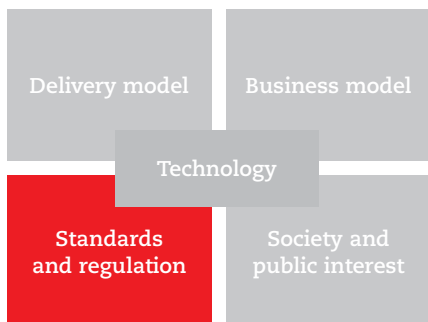
Advances in blockchain<sup>2</sup> that allow reliable data sharing within a public network could radically reshape business models. Historically, the concern has been the ability to ensure data security and confidentiality on a network open to all. Now, Zero Knowledge Proofs<sup>3</sup> enable validation without revealing the details of the transactions themselves.

This may eventually allow for a single public blockchain, like a single World Wide Web: in other words, one would transact on top of a base infrastructure layer without realising it is a blockchain. This would be similar to the way that TCP/IP provides infrastructure for the internet, though one would not think about that when sending an email.

1 ACCA's report on machine learning (ACCA 2019) provides an introduction for accountancy and finance professionals.

2 See ACCA 2017a for an introduction to blockchain for accountancy and finance professionals.

3 EY Nightfall is a cutting-edge technology application that achieves this.



### 1.4 Standards and regulation

Regulators must balance supporting innovation with protecting the consumer, which limits the speed of approval. This is a fast-moving process, however, and both innovators and regulators are continually engaged in educating and updating each other.

**'WE PARTNER WITH TEAMS LIKE PRODUCT MANAGEMENT AND ENGINEERING TO ENSURE PRODUCTS AND FEATURES LAUNCH SAFELY AND SUCCESSFULLY. THIS INCLUDES COMPLIANCE AND CONTROL MEASURES TO SUPPORT PAYMENTS ON THE PLATFORM. THE WORK CAN REQUIRE USE OF MYSQL TO QUERY DATABASES, UNDERSTANDING DATA POINTS AND BEHAVIOUR TO INFORM THE BUSINESS PROBLEM, AND ANALYSIS WITH PYTHON FOR EG CLUSTERING TECHNIQUES. COMPLIANCE AND RISK MANAGEMENT FOR A 21ST CENTURY FINANCE PROFESSIONAL DEPEND HEAVILY ON TECHNOLOGY BECAUSE OF THE MILLIONS OF TRANSACTIONS.'**

**Risk Product Strategy, Global technology platform, US**

Another factor is the need for alignment across countries and jurisdictions. In the European Union (EU), the GDPR creates strict requirements for data privacy, with penalties of up to 4% of global turnover. There is a thriving industry of data intermediaries with vast lists of data about the general public that they monetise, so there is a need to know the origin of data obtained from third parties.

A business, even if its outside the EU but using a Cloud server based in the EU, may find itself subject to regulations it wasn't aware of. It also remains to be seen how any impact of protectionist policies may affect creation of consistent global standards – technology is global by design, but regulatory jurisdictions are not.

**'TO ENSURE COMPLIANCE WITH REGULATIONS AND CLARITY WITH RESPECT TO DATA PROTECTION, WE'VE LEANED TOWARDS A PREFERENCE FOR THE DATA CENTRES TO BE HOUSED IN CANADA – WITH DATA PARTLY IN CLOUD, PARTLY IN DATA CENTRE. INITIALLY, WE'D PUT NON SENSITIVE DATA TO CLOUD, WITH MORE SENSITIVE DATA KEPT LOCALLY.'**

**Gary Kent, CFO at City of Mississauga, Canada**

Compliance is not the only issue and digital issues also inform the future direction of regulation. In a complex technology landscape, multidisciplinary firms provide

quick, seamless access to a wide range of capabilities from cybersecurity experts to data analytics specialists. So future models will need to consider whether similar levels of access to cross-functional capabilities can be made available when auditing, say, a large multinational.

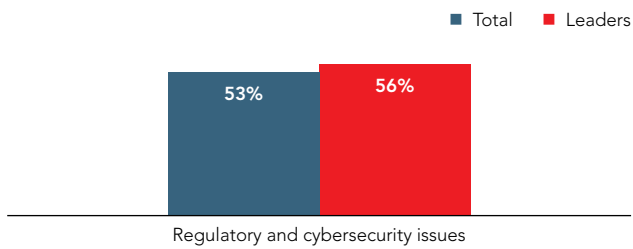
**'AS AUDIT IS INCREASINGLY EMBEDDED WITH TECHNOLOGY, THERE MAY BE A NEED FOR THE STANDARDS SETTERS TO CLARIFY AND DEFINE WHAT'S NEEDED FOR APPROPRIATE CONFIDENCE AND DOCUMENTATION. FOR EG HOW THE PROCESS SHOULD BE DESIGNED, DIRECT/THIRD PARTY ASSURANCE ON DATA QUALITY ETC. OR IF INFORMATION IS PASSED VIA A WIRELESS NETWORK, WHAT CONTROLS IT OR WHAT EVIDENCE WOULD SATISFY ONE THAT DATA IS PROPERLY PROCESSED THROUGH IT?'**

**Łukasz Piotrowski, Associate Partner, Ernst & Young Audyt Polska spółka z ograniczona odpowiedzialnoscia sp. k., Poland**

The standards of the International Auditing and Assurance Standards Board (IAASB) have started to modernise and incorporate the use of technology by auditors. For example, ISA 315 (Revised) Identifying and Assessing Risks of Material Misstatements, recognises the changes in the way that automated tools and techniques (ATT) are being used to undertake risk assessments.

Fraud<sup>4</sup> and regulatory breaches are an ever-present issue. As Figure 1.8 demonstrates, no one is immune from these challenges, with leaders in our sample rating challenges here as a risk as well, reflecting their keen awareness of these issues.

**FIGURE 1.8:** Challenges for my organisation over the next five years as a result of emerging technologies



**'BLOCKCHAIN HAS UNIQUE RISKS, BUT THE EXISTING APPROACH DOES MAP ACROSS AS WELL. FOR EG IT GENERAL CONTROLS AROUND ISSUES OF ACCESS ARE EQUALLY VALID WHEN EXPLORING THESE TYPES OF SYSTEMS. SO, IT'S IMPORTANT NOT TO FORGET THE BASICS.'**

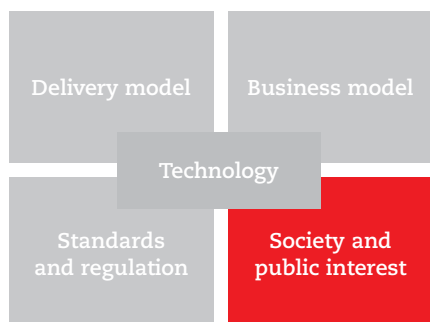
*Amarjit Singh, Partner, Ernst & Young LLP  
United Kingdom, EMEA Assurance  
Blockchain Leader, Financial Services*

**'REGULATION IS NOT A BARRIER FOR USING DATA ANALYTICS AS IT'S A TOOL. IT CAN BE ACCOMMODATED IN A WAY THAT'S COMPLIANT WITH THE AUDIT STANDARDS AS THE FOCUS IS ON OUTCOMES NEEDED RATHER THAN THE TOOLS USED TO GET THERE.'**

*Igor Buyan, Partner, Ernst & Young LLC, Russia*



<sup>4</sup> ACCA and EY explored these issues in *Economic Crime in a Digital Age* (ACCA and EY 2020).



### 1.5 Society and public interest

Technology shapes the way society operates, and accountancy and finance professionals have an obligation to work with it in a way that supports the public interest. Thinking about sustainable ways of operating is needed in a world where resources are not infinite. Being a responsible steward that tracks, manages and uses these resources in the best possible way is paramount.

**'DATACENTRES CONSUME A LOT OF POWER FROM THE GRID, IT'S A HEAT BALL ABSORBING ELECTRICITY. A BIG PRIORITY FOR CLOUD PROVIDERS THEREFORE IS REDUCING, TRACKING AND REPORTING A COMPANY'S PROGRESS AND GREEN FOOTPRINT. HAS LEADERSHIP BUY IN BEEN SECURED? ARE BEST EFFORTS DIRECTED TO MINIMIZE THE CARBON FOOTPRINT? ARE CALCULATIONS AND ASSUMPTIONS CORRECT? HAVE WE FACTORED IN THE CARBON TAX AMOUNT AND TAX REGULATIONS ON CARBON CREDITS? FOR CLOUD PROVIDERS A DIFFERENTIATING FACTOR MOVING FORWARD WILL BE HOW GREEN THEIR OFFERING IS.'**

Head of Business Development, Data centre provider

In addition to sustainability, an area where the views of society are important is the audit expectations gap. This is a way of measuring the public concern about audit. ACCA's report<sup>5</sup> expresses the overall gap as being the result of gaps in knowledge (between what auditors do and what the public thinks they do), performance (between what auditors do and what they are supposed to do) and evolution (between what auditors do now and what the public wants them to do in future). Technology could help with mitigating some of the effects here for example, machine learning solutions can help with detecting anomalies in transactions. This provides a leading indicator to increase the ability to identify fraudulent transactions at scale. In turn that can help to reduce the evolution gap where the public is looking for auditors to play a bigger role in identifying fraud.

On another note, digital is a double-edged sword that can both improve and worsen inequalities in society, depending on how it is used. A badly designed algorithm in the criminal justice system can inadvertently penalise innocent

people whose demographics match a large proportion of prior offenders. On the other hand, a well-designed credit platform can provide fair anonymous-data-based criteria for determining who is eligible for a loan, which might allow an ethnic minority female entrepreneur to secure financing even if she does not have the contacts to directly approach the venture capital community. To make technology work for society, it needs to have principles like trust embedded into it by design. EY Trusted AI Platform is one such initiative to create tools and methodologies to build trust in AI<sup>6</sup>.

It is also going to be important to remember that society is made up of human beings, no matter how much technology we have all around us. In fact, work in areas such as the care sector is set to become even more important in the future.

There can be value in work that doesn't have a business model associated with it. Teaching a child to play or taking care of an elderly person are all integral to the human experience and for shaping the kind of society we wish to have.

**'WE'RE A NOT FOR PROFIT, PREDOMINANTLY FUNDED BY THE GOVERNMENT, THAT PROVIDES SUPPORT TO START-UPS SEEKING TO OVERCOME BARRIERS TO COMMERCIALIZATION AND SCALING. SO, IF THEY WANT TO CREATE AND TEST AN APP: WE HAVE A DATA CENTRE, SUPPORT INFRASTRUCTURE, DEBUGGING SKILLS OR JUST PHYSICAL SPACE FOR THEM FOR TESTING. WE ALSO HAVE A MEMBERSHIP MODEL WITH LARGE TECH COMPANIES THAT ARE HELPING TO CLOSE THE GAP TO COMMERCIALIZATION FOR START-UPS.'**

Robin Ramrup, Director of Finance, Centre of Excellence in Next Generation Networks

5 Closing the expectation gap in audit, [www.accaglobal.com/content/dam/ACCA\\_Global/professional-insights/Expectation-gap/pi-closing-expectation-gap-audit.pdf](http://www.accaglobal.com/content/dam/ACCA_Global/professional-insights/Expectation-gap/pi-closing-expectation-gap-audit.pdf)

6 [https://www.ey.com/en\\_gl/advisory/trusted-ai-platform](https://www.ey.com/en_gl/advisory/trusted-ai-platform)

**Ethics and trust**

**'TECHNOLOGY IS CRITICAL TO THE WAY WE WORK, BUT I'VE HAVEN'T SEEN ANYTHING SO FAR THAT RELIABLY AND FULLY REPLICATES HUMAN EXPERIENCE, GUT FEEL, AND PERCEPTION.'**

**Eoin MacManus, Partner, Ernst & Young Chartered Accountants, Ireland**

A key element, running through all aspects of achieving meaningful work, is ethics. There are a range of ethical issues that can result from working in a digital age. Some, such as the role of bias in the data used for AI algorithms, are prominently in the spotlight. Others, such as dealing with corruption when procuring technology, are less glamorous but equally dangerous.

A key finding from a report conducted with support from the International Ethics Standards Board for Accountants<sup>7</sup> was that the five fundamental principles remain as valid in a digital age but need to be applied effectively to new situations.

**'ETHICS IS NOT JUST ONE PERSON'S JOB, ITS EVERYONE'S RESPONSIBILITY. IF IT'S MADE A SEPARATE ROLE DISCONNECTED FROM THE BUSINESS, THERE'S A RISK THAT IT'S SEEN AS CONFRONTATIONAL AND STOPPING DELIVERY. YOU NEED TO AVOID A CHECK BOX APPROACH; AND TO ENGAGE WITH LOTS OF SMALL DECISIONS THAT NEED TO BE MADE ON AN ONGOING BASIS.'**

**Ansgar Koene, EY Global AI Ethics and Regulatory Leader**

The principles of professional competence and due care emerged as critical because when dealing with emerging technologies, the big risk can be that of simply not understanding the questions involved. All principles are, of course, important. But as an example, the risk to integrity from dishonest behaviour cannot be properly assessed if there is a hesitation about probing because the investigator does not understand how the technology works.

**'WHEN INFORMATION IS RECORDED IN DIFFERENT WAYS, IT REQUIRES PEOPLE TO ADAPT THEIR SYSTEMS AND PROCESSES. BUT IT DOESN'T REDUCE THE NEED FOR PEOPLE TO EXERCISE THEIR JUDGEMENT, OR TO BE ACCOUNTABLE.'**

**Adam Gerrard, EY Asia-Pacific Assurance Blockchain Leader**

Independence considerations are also important. This could relate to areas such as data privacy or where an individual selling or delivering products and services is connected to a related technology (eg by owning shares in its creator company) without appropriate disclosure. Looking ahead (Figure 1.9), leaders are more aware, both of the risks and of the consequently increased role for ethics.

**FIGURE 1.9:** Impact of technology over the next five years



<sup>7</sup> ACCA's report *Ethics and Trust in a Digital Age* explores these issues in more detail (ACCA 2017b).



**LOOKING AHEAD, LEADERS ARE  
MORE AWARE, BOTH OF THE RISKS  
AND OF THE CONSEQUENTLY  
INCREASED ROLE FOR ETHICS.**

”



# 2. Digital and the global pandemic

COVID-19 has represented a significant disruption with tragic consequences for society. The impact of this pandemic is still unfolding and will be felt for years to come.

Yet even as the world adjusts to this, it is also simultaneously throwing up a new understanding of the way people could live and work. For business operations and finance there has been a level of digitisation, and at a speed, which was simply not thought possible. There have been regular commentaries on how changes that would normally have taken two years, were completed in two weeks.

For accountancy and finance departments, these could very well represent a long-term shift towards more flexible and remote ways of working that go beyond responding to the pandemic. And on a more strategic level, the longer-term trend on the impact of digitisation on the profession seems as relevant as ever.

## 2.1 Ways of working

There has been a huge shift in working patterns forcibly induced by social distancing measures. The most immediate and visible aspect of this is the rise of remote working.

Overall 74% of respondents claimed that they were well prepared for using technology for efficient working during the COVID-19 outbreak, with a spread from 62% to 82% across world regions (Figure 2.1).

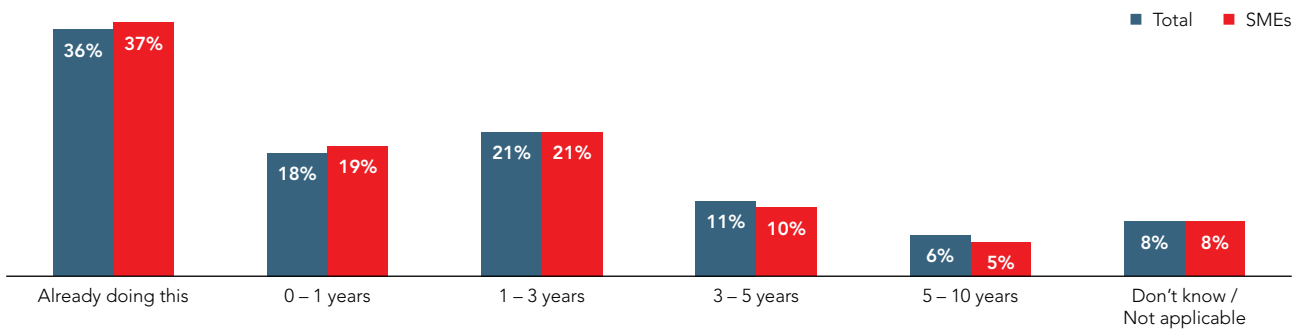
**FIGURE 2.1:** Well prepared for using technology for efficient working during the COVID-19 pandemic



**FIGURE 2.2:** Percentages of firms that were well prepared for using technology for efficient working during the COVID-19 pandemic



**FIGURE 2.3:** Cloud adoption timeline



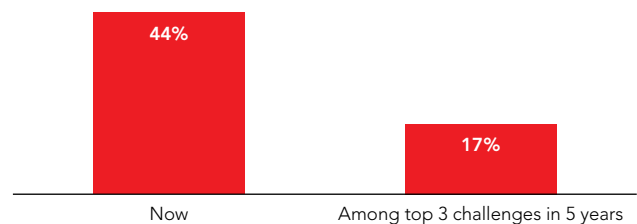
Leaders did significantly better at 95%, demonstrating that remote and flexible working is embedded into their practices. SMEs at 72% were slightly below the 76% reported by those at large organisations (Figure 2.2).

There is also some evidence to suggest that SMEs are thinking about better ways of managing data and documents remotely. For instance, their anticipated timelines for Cloud adoption are in line with the overall sample (Figure 2.3).

**'COVID IS ACCELERATING CLOUD ADOPTION, EFFICIENCY THROUGH AUTOMATION AND INSIGHT FROM DATA ANALYTICS. IN A FEW MONTHS, FIRMS HAVE MADE CHANGES THAT WOULD'VE TAKEN TWO YEARS ORDINARILY IN AREAS LIKE REMOTE WORKING. THEY'RE ALSO LOOKING HARD AT WHAT THEY ALREADY OWN TO EXTRACT FULL VALUE, FOR EXAMPLE BILLING REMOTELY AND REAL TIME REPORTING. I WELCOME THIS TIMELY REPORT AS COLLABORATION IS REQUIRED ACROSS THE PROFESSION TO RAISE DIGITAL ADOPTION.'**

**Stephen Heathcote, CEO Prime Global**

**FIGURES 2.4:** Scaling back of technology adoption projects owing to COVID-19 pandemic



The pandemic is, however, causing a reassessment of digital adoption plans more generally, with 44% reporting a scaling back of projects. That said, looking ahead at expectations for the next five years, far fewer (17%) expect this to remain among their top three challenges, so it seems unlikely to be a structural shift (Figure 2.4).

Overall, the fact that more than 7 in 10 are well prepared suggests fairly high levels of comfort for finance professionals in adapting to these changed circumstances, though there are variations, depending on levels of experience.

Those with more experience (Figure 2.5) are finding it easier to work flexibly. Scores are nine points higher for those with 10 or more years of post-qualification experience than for those with less (83% versus 74%). This appears to challenge a notion that younger workers are more comfortable with digital ways of working. The working environment at home could be a factor driving responses. Those with more experience may have access to their own space to work, whereas younger professionals may be in environments where they are sharing working space with others.

So as part of COVID-19 response strategies, it will be important for organisations to pay attention to the impact on less-experienced employees. They may have less autonomy in planning their work, or may need more guidance on a day-to-day basis, making remote working more challenging.

Differences may also be linked to new or underlying mental health or well-being challenges. A 2019 report on remote working highlighted a range of well-being-related areas, such as difficulty in mentally ‘switching off’, loneliness

and sustaining motivation (Buffer.com et al. 2019). Looking ahead, it may be important for organisations to offer on-the-job coaching specifically in areas such as well-being and communication when working remotely.

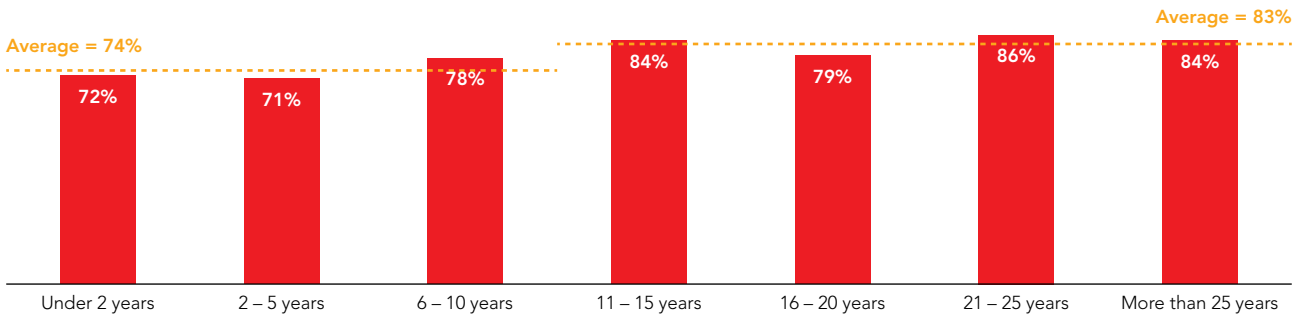
**'COVID-19 IS AN EXAMPLE OF WHERE WE NEED TO SHIFT PRIORITIES UNEXPECTEDLY. THIS NEEDS INDIVIDUALS TO FIND THE ENERGY TO PIVOT QUICKLY. AND YET TO TAKE THINGS ONE STEP AT A TIME, AND NOT GET OVERWHELMED.'**

*Fiona Habermehl, EY Asia-Pacific Assurance Technology Leader*

**COVID-19 HAS ACCELERATED THE FOCUS ON HOW TO IMPLEMENT REMOTE WORKING. AND RELATED TO THIS, HOW TO STAY CONNECTED WITH RESPECT TO EMOTIONAL AND SOCIAL INTERACTIONS.'**

*Denis Mugisha, Partner, Ernst & Young LLP, Kenya*

**FIGURE 2.5:** Relationship between years of experience and preparedness for using technology for efficient working during COVID-19 pandemic



### Remote working: from convenience to compulsion to competitiveness?

There is a broader question about the need for large swathes of the population to converge in high-density offices in the centre of town. This includes the lost productivity from travel time, traffic stress and tiredness; as well as the environmental impact of so many people on the move.

Pre COVID-19, remote working was largely seen as an added convenience, but during the pandemic it transformed into a compulsory requirement. In the process, organisations have realised that a lot of work can be done this way and, post COVID-19, it could become a more competitive and efficient way to operate.

**'PREVIOUSLY IF AN AUDIT INVOLVED SEVERAL LOCATIONS/COUNTRIES, WE VISITED LOCATIONS OF COMPONENT TEAMS FOR REVIEW. POST COVID-19, WE'RE VIEWING AUDIT WORKING PAPERS OF COMPONENT TEAMS REMOTELY USING TECHNOLOGY, WHILE ENSURING COMPLIANCE WITH RELEVANT LOCAL LAWS (FOR INSTANCE ON TAKING DOCUMENTS OUT OF COUNTRY). AND WITH ENCRYPTION, WE CAN DO SO IN A COMPLIANT AND SECURED WAY AND USE TECHNOLOGY TO FACILITATE INTERACTION WITH LOCAL AUDITORS TO IDENTIFY GAPS.'**

**Yew Kiang Chan, Partner, Ernst & Young LLP, Singapore**

Some jobs need a face-to-face presence, of course – a dentist cannot extract teeth remotely. And there are also intangible elements such as maintaining team spirit, the value of interpersonal interaction and maintaining client trust. But even so, there will be a serious re-evaluation of how much face-to-face presence is really needed. One multinational, for example, has announced its intention for 75% of its 450,000 staff to work permanently from home by 2025 (Khetarpal 2020). Meanwhile, another intends a permanent hybrid model that will involve many staff working from home (Akala 2020).

COVID-19 may increase interest in flexible staffing models, ie the gig economy, for tasks that can be modularised (eg where one needs a resource for six months for coding). While this has been happening for some time, organisations may now become much more comfortable with hiring remote workers.

**'LOOKING AHEAD, WE SEE A MORE COLLABORATIVE ENVIRONMENT WITH AGILE TEAMS. THIS REQUIRES MORE CREATIVITY IN THE ABILITY TO ANTICIPATE WHAT'S COMING AND TO WORK WITH FLEXIBLE AND CHANGING DEMANDS. IF CONSUMERS ARE DEMANDING REFUNDS IN A COVID ENVIRONMENT, THE FINANCE STAFF MEMBER NEEDS TO QUICKLY ADAPT, AND UNDERSTAND THE IMPACT ON THE WHOLE BUSINESS; NOT JUST THE IMMEDIATE PAYMENT.'**

**Detmar Ordemann, Partner, Ernst & Young GmbH, Global Innovation Leader, Financial Accounting Advisory Services**

The core activities, such as those in audit, are also adapting to new needs. Inventory testing, which may have previously been done physically, is relying on additional procedures for virtual observation, using soft copy information from a mobile device, webcam or with drones.

**'COVID HAS BROUGHT THE VIRTUAL OFFICE TO THE FORE, WITH MORE COLLABORATION TOOLS/SHARING SCREENS AND SECURE INFORMATION EXCHANGE ONLINE. BUT THE MOST IMPORTANT IS THE SHIFT IN MINDSET AND MANAGING THE CHANGE, AS NOT EVERYONE MAY WILLINGLY EMBRACE THIS. PRACTICAL PROBLEMS NEED TO BE CONSIDERED – REVIEWING ON SOFT COPY CAN BE HARD FOR SOME, FLIPPING BACK AND FORTH TO CHECK THE INFORMATION TIES TOGETHER; DOES ONE NEED TWO SCREENS?'**

**Yoon Hoong Hoh, Partner, Ernst & Young PLT, Malaysia**

## 2.2 Digital as part of the solution

### Public health

COVID-19 has the property of exponential rather than linear growth in transmissions. While physically delivered treatment cannot be scaled exponentially, the management of data surrounding it can. An example is mobile applications for contact tracing that use blue tooth technology for alerts if one has been near someone diagnosed as COVID-19-positive. There are outstanding questions about data privacy, and the need for global consistency in how such applications are built.

Another example, perhaps less visible in mainstream media, is the use of Graph databases or knowledge graphs to track connections between data points. These are used in Google searches to uncover what a search item may be referencing. COVID-19 is a new disease and scientific research is catching up with it. Knowledge graphs can digest large volumes of unstructured data, such as research papers, and update in real-time as more research becomes available. Working with AI, they can enable the spotting of patterns between the types of symptom and a positive diagnosis.

### Remote learning

The social-distancing restrictions imposed affect 1.38bn primary, secondary and tertiary learners globally (United Nations Educational, Scientific and Cultural Organization (UNESCO) figures as at 23 March 2020), which together with the need to mitigate unemployment risk, are creating an increased demand for digital education, learning and assessment.

Those engaging with digital education often benefit from the flexibility of being able to work at their own pace/location, engaging offerings (multilingual, gaming or 'adaptive' for a personalised experience) and robust certification, as skills are assessed multidimensionally, often through simulations using AI and psychometrics.

Also, whether education is delivered digitally or not, digital applications still have a role. This role extends across the entire education process from content creation, through validation to result determination, and sometimes personalisation.

- **Content creation:** AI can be used to generate multiple versions of content from a single humanly created base source, changing wording or numerical information, content reordering, and/or making thesaurus amendments.
- **Validation and results determination:** AI algorithms quality assure content, referencing the underpinning technical learning material and prior assessments of similar content. Validation extends to the actual assessment experience, to confirm the identity of the test taker, in the form of biometric scanning, as with border control. During assessments, AI can invigilate effectively, from room scanning to focusing on just one test taker for the whole duration, considering factors such as facial expression, physical movement, and, for digitally conducted assessments, keyboard stroke patterns. This, together with psychometrics (data analytics), can assess the likelihood of cheating, which can also be used later in results determination, providing potential impact on performance. Psychometrics can be used to determine both the result and its reliability, linking factors such as invigilation data and actual performance against content difficulty and candidate profile, making for robust and legally defensible assessments, protecting both the educator and learner. ACCA is taking steps to ensure that its students will be able to take their exams at home or in another location in circumstances where centre-based exam sittings are disrupted (Hatfield 2020).
- **Personalisation:** AI is used to determine the learner's preferences, from which it can identify suitable learning products or be embedded in the learning, thereby tailoring it. Learning can be tailored through adapting the pace, coaching through tutorials or adapting the next step of learning in line with an assessment of past performance: 'adaptive testing'. This means test takers are only required to take the assessment to the point where a reliable result has been determined. Here, the question delivered is dependent on previous question performance, which helps hone the result to the one best reflecting learner performance.

While digital education can have a high initial investment, greater exposure to it during COVID-19 has reaffirmed how well it can work. We've seen that it can meet the needs of learners and educators, be scalable, and importantly has the scope to place less pressure on the environment, as fewer buildings and less printing and transport to the education source are needed, potentially making for a good return, beyond profit.



### Digital economy

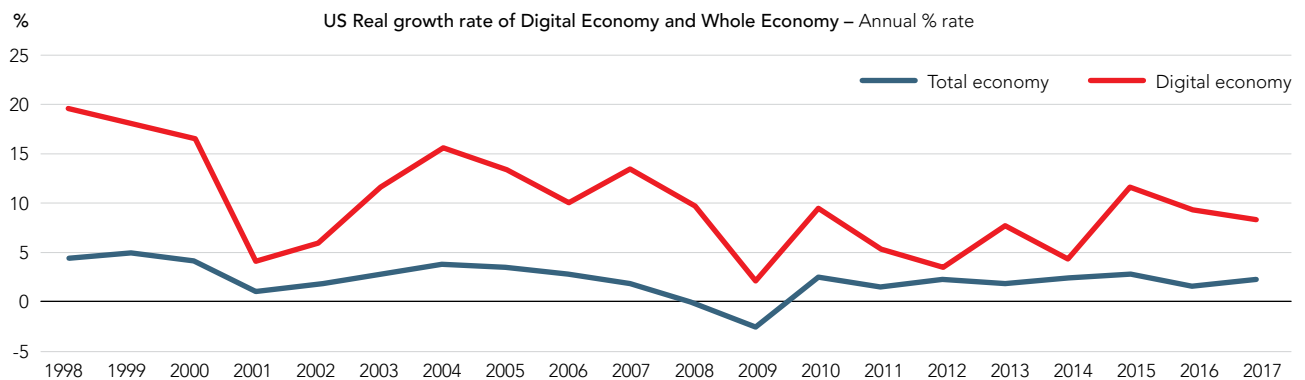
Any economic activity in the first quarter of 2020 has been almost exclusively the result of the digital economy; ie ways of producing and consuming that can be supported with minimal, if any, physical presence. One could say that digital has been sustaining the economy.

There is no agreed definition of the 'digital economy'. The US Bureau of Economic Analysis (BEA) includes in the digital economy the information and communication technology (ICT) sector as well as the digital-enabling infrastructure needed for a computer network to exist and operate, the digital transactions that take place using that system ('e-commerce'), and the content that digital economy users create and access ('digital media'). This definition includes the sharing economy, the main components of which are peer-to-peer services such as Airbnb and Uber, and collaborative finance (eg peer-to-peer lending).

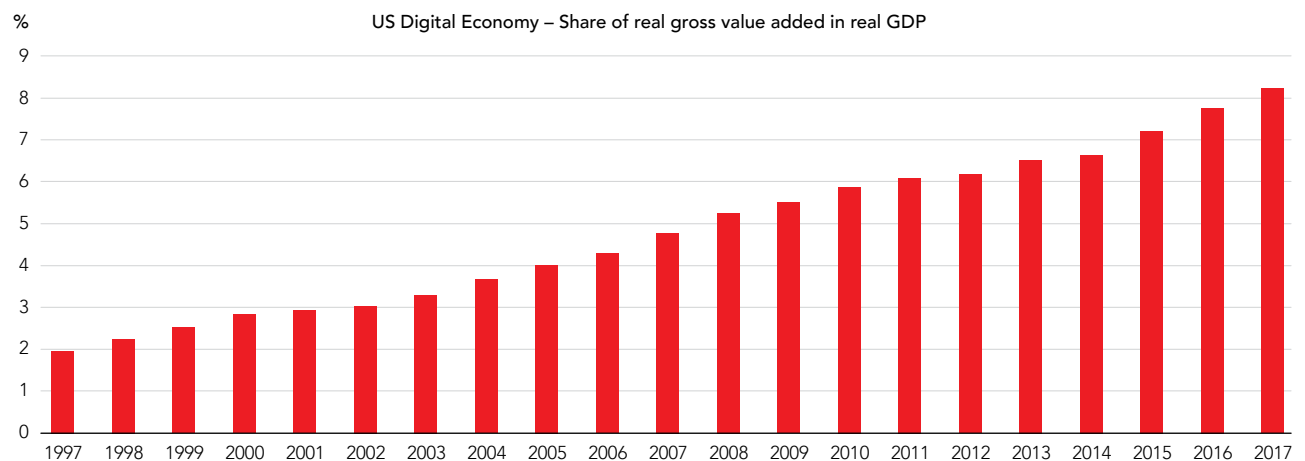
The International Monetary Fund (IMF) notes that the digital sector, defined as above, is still less than 10% of most economies if measured by value added, income or employment. A 2019 paper from the BEA provides updated information on the US digital economy, using a similar definition. The BEA conclusion is consistent with that of the IMF: in 2017 the digital economy accounted for around 8% of US GDP (Figure 2.6), which corresponded to 3.3% of total employment (5.1 million jobs).

But the digital economy is growing much faster than the rest of the economy (BEA 2018; 2019). Real value added in the digital economy grew at an average annual rate of 9.9% per year from 1998 to 2017, compared with 2.3% growth in the overall economy. This means that it consistently makes a disproportionate contribution to overall GDP growth. For example, in 2017, 8.3% of real growth in the digital economy accounted for fully one-quarter (0.55 percentage point) of the total 2.2% growth in real GDP.

**FIGURE 2.6:** US growth and the share of the digital economy



Source: US Bureau of Economic Analysis



Source: US Bureau of Economic Analysis

In recent years e-commerce and digital media have superseded hardware and software as the fastest growing elements of the digital economy, according to the BEA analysis (Figure 2.7).

The COVID-19 crisis may result in increased digitalisation of economies. E-commerce is one area where initial temporary behavioural changes may persist even when COVID-19 restrictions are removed. Many consumers will have been effectively forced to adopt digital services when the physical alternative became unavailable during lockdown. A significant proportion of these consumers may continue to use digital services in normal circumstances, having appreciated their advantages and familiarised themselves with the technology.

Another factor which may play a part is a digital currency issued by a central bank which would bring economic benefits by eliminating or greatly reducing the significant costs involved in transporting physical cash around a country. A central bank digital currency (CBDC) is fiat money, ie backed by government rather than by gold or another commodity and issued by a central bank in digital form. Unlike cryptocurrencies, CBDCs will be legal tender since they will be issued by government regulation or law.

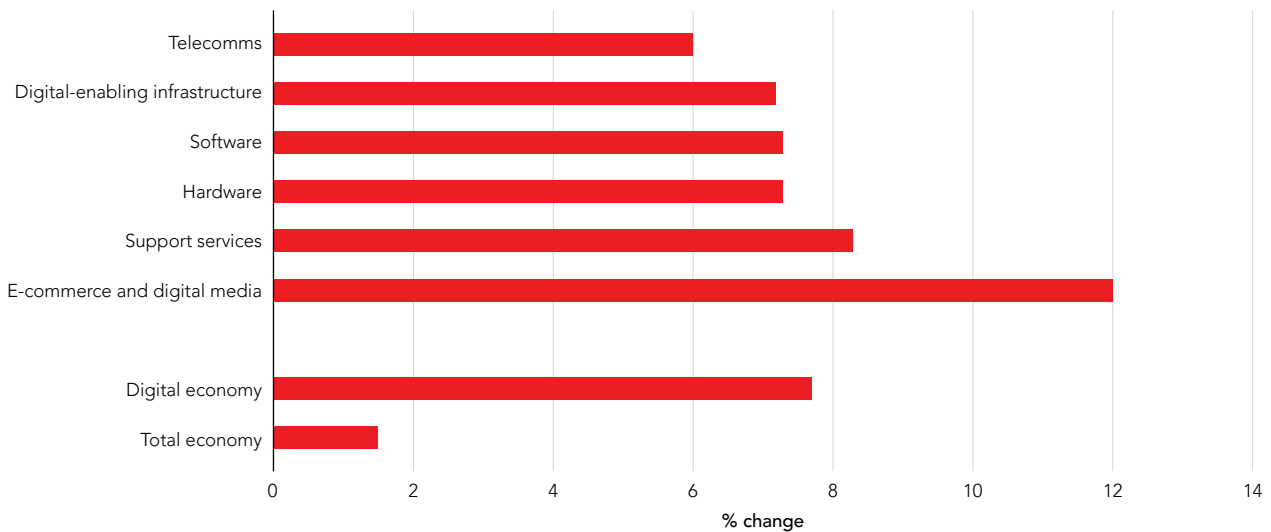
Adoption of a CBDC would give the digital economy a major boost by transferring transactions to a digital platform: particularly given concerns that handling physical cash is a transmission mechanism for COVID-19.

A CBDC may also help central banks support an economy during a crisis such as the COVID-19 pandemic because it could:

- permit the implementation, theoretically to an unlimited extent, of negative interest rates; this is not possible in an economy with physical cash
- facilitate quantitative easing (QE) or so-called 'helicopter money', whereby funds could be transferred instantly by central banks to all domestic households, boosting spending power. In the current crisis transfers to households have tended to be made through the tax system, involving a considerable administrative burden, adding to delays in implementation.

To conclude, the digital economy, narrowly defined, is growing faster than the rest of the economy but accounts for less than 10% of GDP in advanced economies. A further widening of this gap between the growth rates of the digital and non-digital economy is likely in the aftermath of the COVID-19 crisis. The crisis may also accelerate discussions about the introduction of CBDCs.

**FIGURE 2.7:** Components of the US digital economy



Source: US Bureau of Economic Analysis



# 3. Roadmap for the digital professional

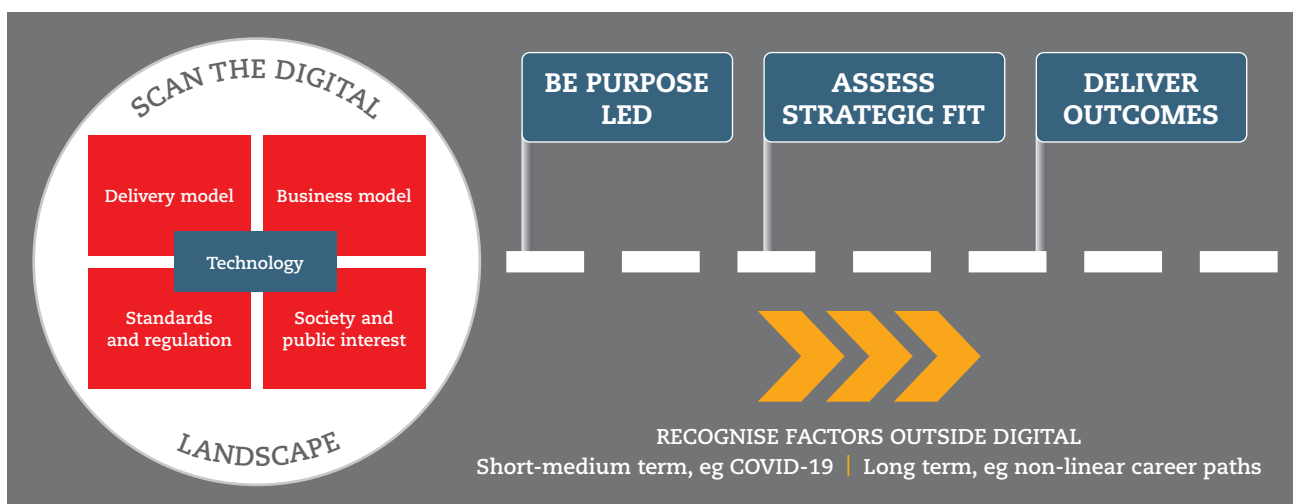
Securing work that is meaningful is a process rather than a one-time event. There are many philosophical interpretations of what ‘meaningful’ signifies. In simple terms it refers to a deeper connection with one’s work that goes beyond just ‘getting the job done’.

There are several factors that affect the achieving of meaningful work for the digital professional, but that go beyond technology. These include, for example, a multi-generational and diverse workforce, migration, urbanisation and globalisation (or its reversal), non-linear career paths in flatter organisations with less directive forms of management; and continuous learning for broader skills beyond the technical.<sup>8</sup> Layered onto all this is the significant disruption over the short to medium term from the COVID-19 global pandemic.

This report is anchored in observations on digital but recognises the critical importance of all these factors. Figure 3.1 summarises these impacts as a roadmap for the digital professional.

The key background activity, before even thinking about jobs, work or careers, is inculcating an approach of staying current with an evolving digital landscape. This can then be built upon with a purpose-led approach that combines strategic thinking with delivery capabilities.

**FIGURE 3.1:** Roadmap for the successful digital professional



<sup>8</sup> ACCA’s report on the future of careers identifies a range of trends affecting work more broadly (ACCA 2020).

The discipline and curiosity that underlie constant scanning feed into the pursuit of meaningful work. Thinking about society and the public interest more broadly is relevant to a sense of purpose that informs why one wants to do a certain kind of work.

Delivery and business model perspectives inform how the organisation is going to interact with this technology. This helps to assess strategic fit and ensure that one is embarking on work with the potential for a longer-term fit.

And all these aspects, alongside understanding the technology, standards and regulation, relate to the specifics of delivering outcomes in the role itself.

### 3.1 Being purpose-led

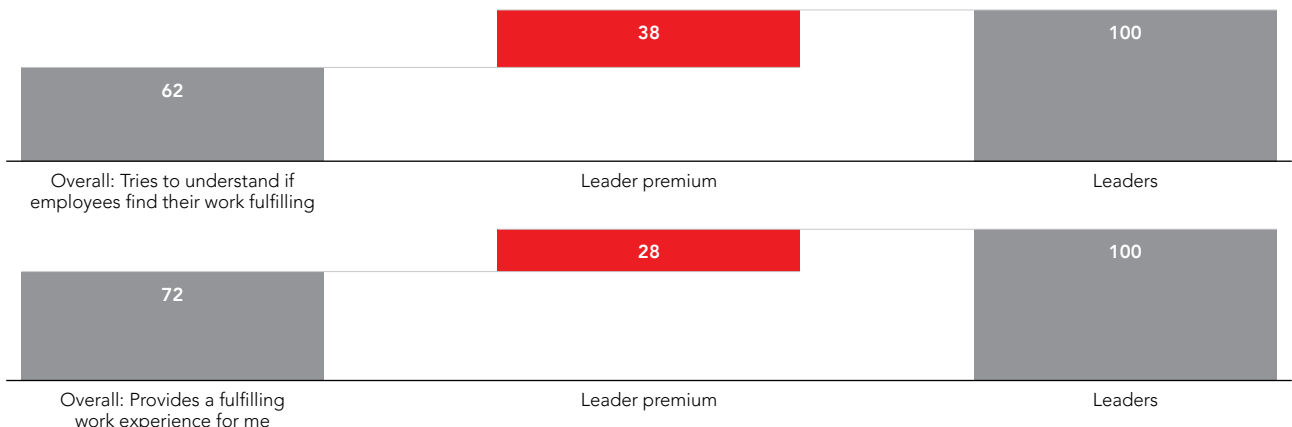
Meaningful work experiences are closely tied to ideas of fulfilment, well-being and happiness. Each person has their own definition of what this involves, but the deepest connection to work with long-term resilience and satisfaction requires asking questions that go beyond financial parameters alone (Figure 3.2).

FIGURE 3.2: Be purpose-led – example considerations

BE PURPOSE-LED
■ Why do I want to do this type of work?
■ How does my attitude to technology reflect my values and beliefs?
■ How am I (even if indirectly) contributing to a greater good?

A thought experiment to use to test oneself, is to consider how motivated and engaged one would be if financial considerations were excluded. As Figure 3.3

FIGURE 3.3: Purpose and the leader premium



reveals, there is a significant leader premium pertaining to fulfilment at work when looking at percentages of respondents agreeing with the statements.

**'ULTIMATELY FOR INNOVATION TO REALLY HAVE IMPACT, IT MUST CHANGE THE LIFE OF COMMON PEOPLE AT THE GRASSROOTS LEVEL. SUSTAINABLE ADOPTION HAPPENS WHEN BENEFITS FROM DIGITAL SOLUTIONS FLOW THROUGH THE ECO-SYSTEM, RATHER THAN BEING RESTRICTED IN THEIR RELEVANCE ONLY TO THE NEEDS OF A FEW.'**

Subh Ghosh, Partner,  
Ernst & Young Associates LLP, India

### 3.2 Assessing strategic fit

This is about taking a step back and critically analysing the 'direction of travel' of one's career path (Figure 3.4). People who find their work meaningful are typically those who can look beyond the immediate tasks that they have been set in their current role. They have a sense of how their work 'fits' into the overall picture.

FIGURE 3.4: Assess strategic fit – example considerations

ASSESS STRATEGIC FIT
■ What is the value created for my stakeholders by the work I do?
■ What career paths map to the agenda of my stakeholders?
■ What are the opportunities for my continuing learning and development?



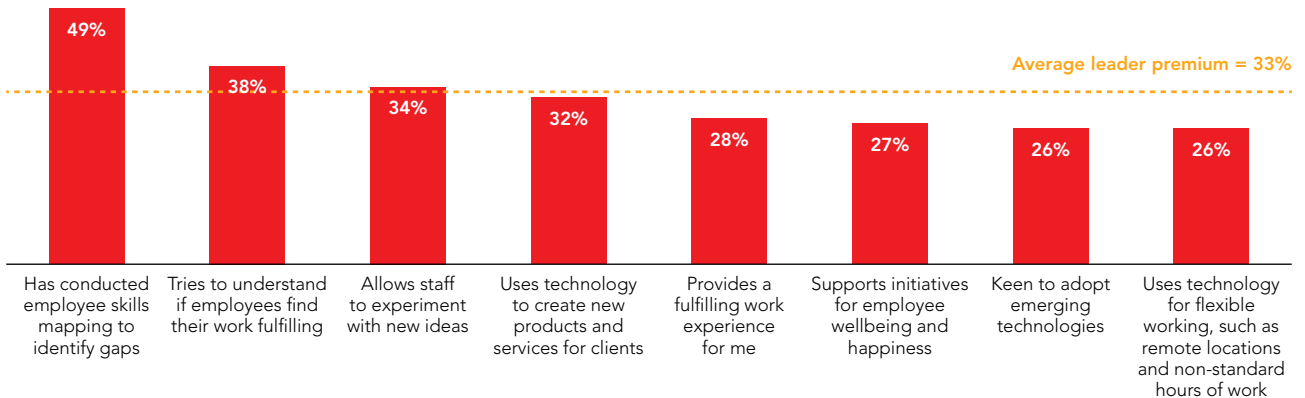
Of the eight control criteria used for defining the leader group, the element with the highest leader premium (Figure 3.5) was where the organisation had conducted an employee skills-mapping exercise to identify gaps. This finding was echoed when looking ahead to the top three challenges over the next five years as a result of the impact of emerging technologies (Figure 3.6).

To assess strategic fit with one's work, understanding career paths and learning opportunities in the organisation are crucial. It is not just a matter of the immediate job.

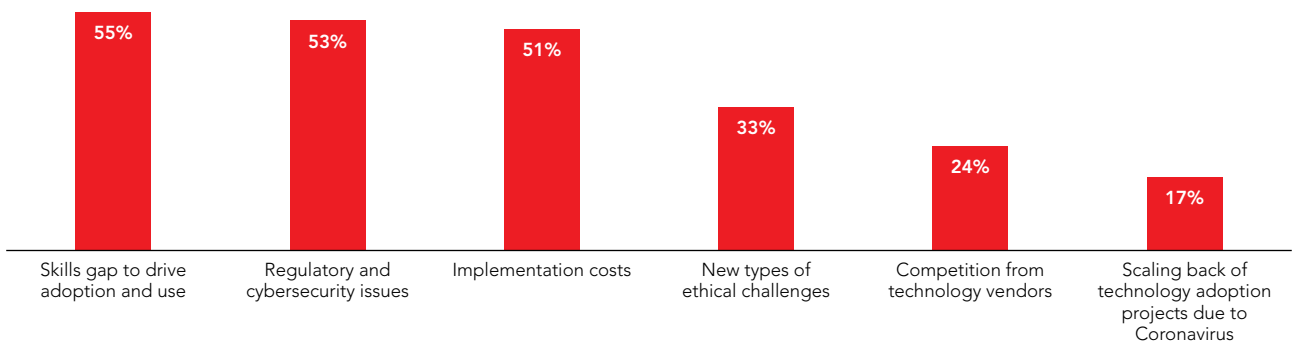
**'EMBRACING TECHNOLOGY IS AN IMPORTANT SKILL THAT WE ENCOURAGE ALL ACCOUNTANCY AND FINANCE EY PROFESSIONALS TO ACTIVELY ENGAGE WITH. WHEN EXCEL FIRST CAME OUT, THERE WERE SPECIALISTS, NOW EVERYONE USES IT. WHEN I LOOK BACK 25 YEARS, THERE WAS SIMILAR PUSH FROM THE MARKET TO FOCUS MORE ON AN ENTITY'S BUSINESS AND OPERATIONAL PROCESSES. IT WASN'T INCLUDED IN THE PROFESSIONAL ACCOUNTING CURRICULUMS BUT ACCA DID LEAD THE WAY TO INCORPORATE THIS. THERE'S A SIMILAR NEED TODAY TO PUSH FOR GREATER EDUCATION ON THE LATEST TECHNOLOGIES.'**

**Alan Young, EY Global Methodology and Data Analytics Leader**

**FIGURE 3.5:** Leader premium across all control questions

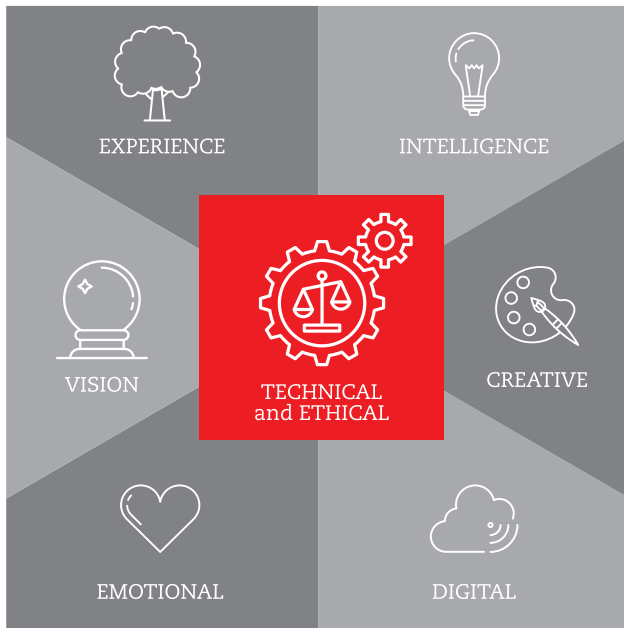


**FIGURE 3.6:** Challenges over the next five years



In addressing this skills gap it will be important to take a balanced view that recognises the role of a variety of competencies across a range of areas. ACCA captures this idea (Figure 3.7) with its professional quotients for success, which inform its qualification.

**FIGURE 3.7:** ACCA professional quotients for success



Looking ahead, there is (Figure 3.8) an expectation of an increasing need for technology skills, as well the ability to think critically, analyse and solve problems. Along with leadership capabilities, these skills are vital for problem solving in new types of digital scenarios that have not been seen before.

**'AUDITORS WHO CAN'T DEAL WITH DATA WILL STRUGGLE TO ADD VALUE, AND THAT INCLUDES PARTNERS. WHEN I WORK WITH A TEAM, ONE NEEDS TO BE ABLE TO NAVIGATE DIGITAL TOOLS, PLATFORMS, MACROS OR PROGRAMMABLE INTERFACES, DYNAMIC SPREADSHEETS ETC. THE AUDIT TEAM OF THE FUTURE WILL BE MORE OF A PATCHWORK THAN A PYRAMID. WE'LL NEED MORE SPECIALISTS AS A SINGLE AUDITOR CAN'T UNDERSTAND EVERYTHING, THE CLUB OF EXPERTS TO WORK WITH HAS GOT LARGER. THERE'S A NEED TO ALWAYS BE A STUDENT IN LEARNING MODE.'**

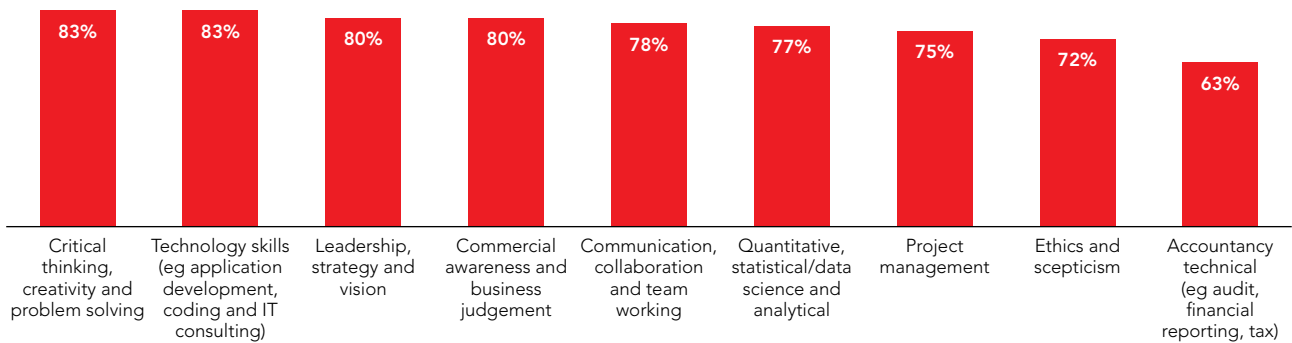
*Jeanne Boillet, EY Global Assurance Innovation Leader*

Commercial and business skills are vital for scanning the digital landscape, to map the delivery and business model implications.

**'DO WE NEED DATA ANALYTICS SPECIALIST IN THE AUDIT TEAM? THE ANSWER DEPENDS ON THE ASPECTS OF DATA ANALYTICS. WE HAVE SEPARATE SPECIALISTS TO DEAL WITH DATA CAPTURE AND PREPARATION – THAT IS NOT A SKILL THAT PROFESSIONAL ACCOUNTANTS REQUIRE. HOWEVER, FOR ANALYSING THE DATA, WE DON'T HAVE A SEPARATE PERSON AS YOU REALLY NEED TO UNDERSTAND THE CLIENT AND INDUSTRY/DOMAIN TO TRANSLATE THE DATA PROPERLY TO THE BUSINESS CONTEXT. AND THAT'S A SKILL WE NEED EVERYONE IN THE TEAM TO HAVE RATHER THAN TRYING TO SEPARATE IT INTO ONE INDIVIDUAL.'**

*Alan Young, EY Global Methodology and Data Analytics Leader*

**FIGURE 3.8:** Requirement for skill is expected to increase over next five years as a result of technology



**'TRAINING OF STUDENTS SHOULD EMPHASIZE ANALYTICS WITH THE AVAILABILITY OF BIG DATA; AND WITH AN UNDERSTANDING OF AREAS LIKE COMMERCIAL AWARENESS (KEY RATIOS) ON TOP OF THE ACCOUNTING STANDARD. ALSO, THERE SHOULD BE AN EMPHASIS ON SECTOR SPECIFIC INFORMATION.'**

**Yoon Hoong Hoh, Partner, Ernst & Young PLT, Malaysia**

Communication and team working reflect the reality, that regardless of the technology, people skills matter.

**'EFFECTIVE COLLABORATION IS A KEY SKILL. IT'S NOT EASY TO FIND SOMEONE WITH EXPERTISE IN ONE AREA WHO CAN COLLABORATE WELL WITH SOMEONE HAVING EXPERTISE IN A DIFFERENT AREA. IT REQUIRES RELATING TO A DIFFERENT WAY OF THINKING AND A DIFFERENT LANGUAGE TO EXPRESS ONESELF.'**

**Daniela Carcasole, Partner, Ernst & Young LLP, Canada**

Competencies such as emotional intelligence (EQ)<sup>9</sup> are regularly flagged as key differentiators, with a common example being the inability of machines to manage interactions with groups of people. One of the elements of EQ, the Growth Mindset also has a role to play in being able to engage with a lot of new information as it is presented. It needs a certain kind of person who wants to volunteer, say an extra 20 hours a week and deal with the pain points and effort associated with additional learning. But the rewards are there for those wishing to engage.

**'MICROSOFT'S MISSION: EMPOWER EVERY PERSON AND EVERY ORGANIZATION ON THE PLANET TO ACHIEVE MORE. WE WILL ONLY ACHIEVE OUR MISSION IF WE LIVE OUR CULTURE. WE START WITH BECOMING LEARNERS IN ALL THINGS – HAVING A GROWTH MINDSET. THEN WE APPLY THAT MINDSET TO LEARNING ABOUT OUR CUSTOMERS, BEING DIVERSE AND INCLUSIVE, WORKING TOGETHER AS ONE.'**

**Dermot Igoe, Sr. Finance Director – Microsoft EMEA Operations Centre, Ireland**

Humans can instantly adapt in a meeting of multiple individuals to very large numbers of response and counter-response options and draw on accurate contextual information. While those who believe in an approaching 'technological singularity'<sup>10</sup> disagree, as things stand, machine intelligence is largely based on probabilistic outcomes, and such scenarios represent a combinatorial intensity that they cannot process.

**'LOGICAL THINKING IS VERY IMPORTANT; THOSE WITH PROGRAMMING TRAINING MAY HAVE AN INITIAL ADVANTAGE IN THIS AREA, BUT ULTIMATELY IT IS THE ABILITY TO APPLY LOGICAL THINKING TO OPERATIONAL ISSUES THAT MAKE THE DIFFERENCE. ALSO, COMMUNICATION SKILLS ARE CRITICAL AND SOME UNDERSTANDING OF PSYCHOLOGY MAY BE USEFUL. SUCCESS DEPENDS ON A PERSON'S ABILITY TO CLEARLY UNDERSTAND AND CONVEY (1) WHAT IS THE JOB AT HAND, (2) HOW TO APPLY PERSONAL STRENGTHS AND COMPETENCIES TO THE SITUATION, AND (3) THE ABILITY TO INFLUENCE OTHERS AND LEVERAGE ORGANISATIONAL CAPABILITIES. THINK AHEAD AND BE ACTIVELY INVOLVED! WHAT'S THE LATEST TECHNOLOGY THAT I'VE GRASPED? WHICH SYSTEM OR BUSINESS OF THE COMPANY CAN IT BE APPLIED TO? THERE'S A NEED TO PARTICIPATE IN AND CONTRIBUTE TO THE OVERALL DEVELOPMENT OF THE ORGANISATION. IF ONE ADOPTS THE ATTITUDE OF "THIS HAS NOTHING TO DO WITH ME" OR "THIS IS BEYOND MY SCOPE", THE GAP CANNOT BE CLOSED.'**

**Kathleen Chien, co-founder and CFO of 51job, Inc., a leading recruitment website in China (100m registered resumes, 300m+ daily page views)**

Core skills remain important, with the need for technical skills to increase expected by 63% and the need for ethics and scepticism expected by 72%, possibly linked to new types of digital ethics dilemmas. As experience rises (Figure 3.9), there is less emphasis on technical skills, presumably because issues facing senior professionals are broader in scope.

<sup>9</sup> See ACCA's report for information on the role of emotional intelligence for accountancy and finance professionals (ACCA 2018).

<sup>10</sup> A point at which technological changes become irreversible, with dramatic effects on human societies.

'HIGH QUALITY AUDITS ARE THE TOP PRIORITY FOR PROFESSIONAL SERVICES FIRMS LIKE EY. RISING SOCIETAL EXPECTATIONS ON BUSINESS NECESSITATE TRUSTED INFORMATION FLOWS THAT GO WAY BEYOND PURE FINANCIAL INFORMATION TO COVER AREAS LIKE ENVIRONMENT OR WORKFORCE. CAPITAL MARKETS WILL DEMAND ASSURANCE ON THIS INFORMATION BECAUSE IT WILL HELP THEM DETERMINE LIKELY FUTURE CASHFLOWS. THIS CAN ONLY BE DELIVERED BY MULTI-SKILLED PROFESSIONALS; AUGMENTED BY TECHNOLOGY RATHER THAN REPLACED BY IT.'

Andrew Hobbs, EY EMEA Public Policy Leader

There are increasingly examples of individuals who were on a traditional audit career path and have deviated. This may be people from accountancy backgrounds who have worked with a technology or been exposed to a range of technologies and who can combine that with domain knowledge (eg the oil and gas sector), communication, strategy and governance. The objective is to support transformation in moving from an 'as-is' model to the technology enabled 'to-be'.

'GOING DIGITAL IS MANDATORY, NOT JUST BEST PRACTICE; AND THAT'S TRUE FOR EVERY SIZE OF FIRM.'

Rowland Kew, Partner, Y.M. Kew and Company, Singapore

'IN WORKING WITHIN THE FUND MANAGEMENT SPACE, WE USE DIGITAL FEEDS AND AUTOMATED ANALYSIS FOR INFORMING VALUATION FOR THOSE WHOSE STRATEGY IS IN QUOTED, LIQUID MARKETS. BUT WHERE VENTURE CAPITAL/PRIVATE EQUITY IS INVOLVED THERE IS MORE NEED FOR HUMAN JUDGEMENT.'

Venetia Lau, Partner, Ernst & Young LLP, Singapore

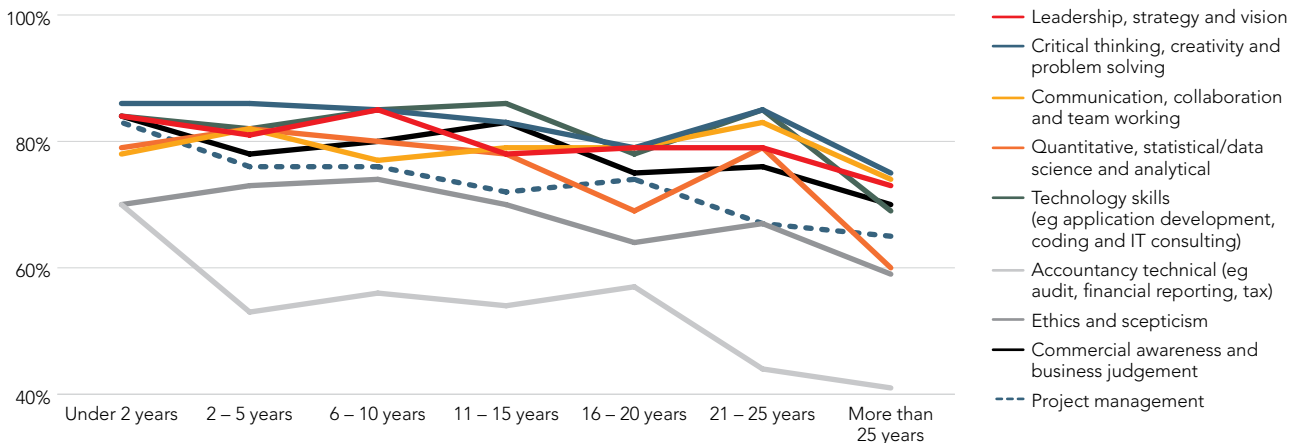
### 3.3 Delivering outcomes

Delivering outcomes on a day-to-day basis is needed to convert thought to action (Figure 3.10). Being purpose-led can inform which direction the car should move in and assessing strategic fit can help to decide which roads to travel on to get there. But to get the car started, its necessary to deliver on a day-to-day basis.

FIGURE 3.10: Delivering outcomes: example considerations

DELIVER OUTCOMES	
■	What are the <b>key responsibilities</b> associated with this role?
■	What <b>skills and competencies</b> are needed to perform this role?
■	How does digital influence the <b>ways of working</b> ?

FIGURES 3.9: Skills expected to increase over next five years as a result of technology, by number of years of post-qualified experience



## Categories of tasks

ACCA's report on *Future Ready: Accountancy Careers in the 2020s* looked across careers (ie not digital alone), highlighting five broad career 'zones' (Figure 3.11) (ACCA 2020).

These have been interpreted for the focus of this report, and the main categories of tasks emerging as relevant to the work of accountancy and finance professionals are listed below.

1. **Checking** and validating: Establishing that the use of the technology is reliable. Examples of tasks include interrogating the results generated by the technology; assurance; oversight and control of systems or their outputs; evaluating the reliability and performance of technology over time; and reconciliation of system outputs.
2. **Transforming** the delivery model: Organising the resources of the enterprise to be best placed to benefit from the use of the technology. Examples of tasks include leading digital transformation; driving changes to roles and processes to support adoption; operational support/management; creating a talent strategy; setting up governance structures in the organisation; and facilitating greater collaboration between teams.
3. **Developing** solutions: Building the technology stack and tools. Examples of tasks include design, architecture, or coding to create technology products or services; data cleansing/management; and developing support infrastructure to enable adoption.
4. **Looking ahead** to evaluate strategic implications: Understanding avenues of future value from the use of the technology. This may be done by formulating a

FIGURE 3.11: Career zones

### The assurance advocate

The assurance advocate brings new levels of trust and integrity to organisational operations. They may focus on enterprise risk, helping drive transparency and understanding of emerging issues affecting business performance, or be at the forefront of shaping future forward-looking audit practices as the capabilities of digital tools and technologies expand. They could be driving best practices in emerging control frameworks or helping organisations meet ever-growing regulatory demands or managing complex tax issues. They may even be auditing algorithms in the future. They are essential to the strong stewardship of sustainable organisations for the future.

### The business transformer

The business transformer is the architect of organisational change. They could be driving major business change initiatives or transforming finance operations. They may be leading innovative smaller accountancy firms that transform client businesses. They could be exploring growing careers in external advisory services driven by technological innovation and economic growth. Or they may be leading smaller enterprises as digital platforms open the door to new commercial opportunities. They are critical to creating change, driving the strategies of organisations, and supporting sustainable organisations for the future.

### The data navigator

The data navigator is a true business partner. They see extraordinary opportunities from the expansion of data and use emerging tech and analytical tools to drive insights that deliver business outcomes and sound financial management of the organisation. They champion ever-growing multi-rich data sets and use smart data to generate brilliant forward-looking analysis to support decision-making. This could be exploring new geographic market opportunities or building the case for investment. They understand that the currency of good information is at the heart of building sustainable future organisations.

### The digital playmaker

The digital playmaker is a technology evangelist. They see remarkable possibilities for emerging digital tools in transforming the organisations in which they work. They are champions of technology adoption and data governance within the organisation. They look to connect across teams and functions to leverage the power of technology. They may focus on digital implementation programmes or have specialised expertise in particular finance and business technologies. They understand that digital transformation in today's global economy is the lifeblood of future sustainable organisations.

### The sustainability trailblazer

The sustainability trailblazer is at the heart of performance management in the organisation. They play a key role in establishing frameworks that capture, evaluate and report on the activities that truly drive value and in ways that are much more transparent and meaningful to the outside world. They will transform management accounting fit for a multi-capital world and see emerging opportunities with better external disclosures to ever-growing stakeholder groups. They understand that aligning the pursuit of profit with the pursuit of purpose is integral to building sustainable future businesses.



new strategy or business model, generating predictive insights, business partnering effectively to inform future direction or spotting opportunities for future value from performance improvement.

**5. Using technology** to support an existing job:

The relates to an end-user who benefits from the technology as a tool for improving current workflows. For example, tasks include learning to use a newly developed integrated global platform to support all

audit clients. The focus here is still on performing the audit, but there will be a need to understand aspects of the configuration of the system that pertain to the user interface.

**6. Advising** on technical or specialist areas: Tasks requiring an understanding of the technology to support specialist advice, such as for risk management, forensics, regulatory implications, tax or reporting, for example, taxation treatment for cryptocurrencies.

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*'Specialized Solution Developers are needed where a new or customised digital tool is required, say for assessing highly bespoke impairment risks or dealing with unique client processes. They need to be able to use specialized techniques, such as design thinking, agile to design what audit teams need ('custom automation technology' as some regulators term it). Such non-standard, higher risk technologies demand a high degree of documentation and rigour. They typically involve using a variety of applications such as data automation solutions, visualisation technologies, workflow process building tools etc, many of which are now available as low-code platforms.*

*In the future we'll need more people in Audit and Assurance functions who are digitally specialized. Their role is not just to ideate, design, build and supply such advanced custom technologies, but also enable the wider team to confidently and appropriately adopt them. Such specialists need to understand aspects like change control, how to document, how to build/test/certify; just like risks seen with spreadsheets, building one's own complicated solution is dangerous. Wider audit and assurance teams will still need to ideate but also work closely and effectively with specialists when needing to create solutions.*

*Collaboration with enabling specialists will become ever more critical – the agenda is simply too diverse and complex for any one individual to do it all well. At the audit planning stage, the specialists will query the client facing audit team, for example - what they did the previous year, key client and sector risks and aspects that could impact in future. Through this, the core audit team is supported with latest global assets, capabilities and comparisons and can shape any custom technology needs, taking confidence in both relevance and ability to help deliver. This also accelerates the insights agenda (eg: growing revenue, reducing cost, enhancing compliance); and the long-term value agenda ('front half' of accounts). The plan formed creates a multi-year commitment, with project management critical and repeatable, scalable processes at its heart.'*

**Gareth James, UK&I Head of Audit Analytics, Ernst & Young LLP, United Kingdom**



Figure 3.12 shows technologies with the top two levels of penetration for a given task; for example, 17% of respondents envisage themselves using Cloud to transform the delivery model of their organisations. Cloud and community technologies, both with high levels of engagement, are key for supporting existing jobs and transforming the delivery model for changes that are already happening or will occur quite soon.

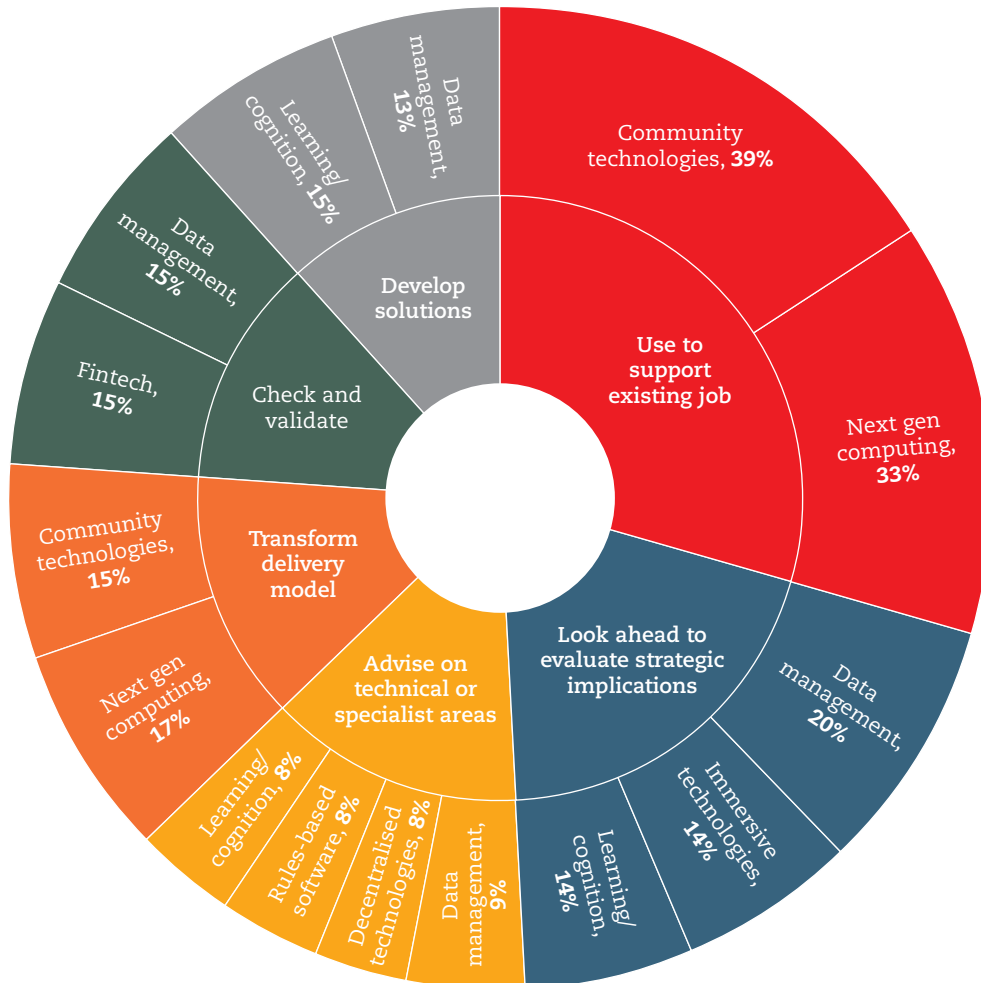
Data management is much more widely relevant to the tasks performed by accountancy and finance professionals and interrelates with many of the other technologies. Its task focus includes:

- developing solutions (applications), alongside AI that consumes vast amounts of data
- looking ahead to strategic implications, also alongside AI, in recognition of its game-changing potential

- checking and validating information alongside doing so for Fintech applications that deal with sensitive financial data, and
- advising on technical or specialist areas alongside AI, RPA and blockchain, for example regulatory implications for how data flows through automated processes or is held in cognitive/decentralised systems.

The rest of this section provides some examples of work that is strongly connected to digital skills, and relevant to accountancy and finance professionals. It is partly structured like a job description to give a realistic sense for information purposes. In practice, advertised roles will differ from these depending on the needs of the hiring organisation. Any references to specific products, software or organisations is not an endorsement.

**FIGURES 3.12:** Task penetration



## Data translator

### Acknowledgment: Jamie Renehan, analytics expert, banking sector

As an advanced analytics business translator in a large commercial bank, you will develop customised analytics models and algorithms to identify actionable insights within large internal and external data sets.

#### It is suitable for you if you like to work in an environment where you can:

- help to ensure that the company achieves its strategic objectives in areas such as resource allocation, commercial return, and new launches with fact-based decision making
- play an essential role in creating a bridge between the technical expertise of data engineers and scientists and the business understanding of different areas across the company
- help to ensure that insights generated through analytics are contextualised and translated into impact at scale
- be at your best when both technical and business teams claim you as your own. This means that translators are equal parts technical and functional in their expertise and interests.

#### You will contribute by:

- drawing on your domain knowledge to help business leaders identify and prioritise high impact business problems
- using your working knowledge of AI and analytics to translate the business problems to the data professionals who will create the models and analytics applications
- ensuring that the application created produces insights that the business can interpret and act on, and communicate these insights to business users to drive adoption and ensure discussions on the implementation, supporting, if needed, potential corrective actions
- advocating and driving a culture of data-driven and fact-based decision making.

#### For this position you will need the following education, experience, and skills:

- you will have domain knowledge in an area of banking
- mastery of project management skills is essential. As a translator, you should be able to guide an analytics project from ideation through production and adoption. This means you understand the life cycle of an analytics project and are aware of the common pitfalls
- you can build bridges between the functional and technical teams while challenging each team about their assumptions
- as a translator, you possess strong quantitative skills and you solve problems structurally
- you don't necessarily need to be able to build analytics models yourself, but you need to be knowledgeable of the types of model that are used and the business problems to which they can be applied

- you need to be able to challenge the data engineers and data scientists and possess an 80/20 mindset to push for fast model iterations
- as a translator, you must also be able to interpret model results and identify potential model errors (eg overfitting, model bias, correlation vs causation)
- you have an agile mindset and love to test and learn
- you are a crisp communicator and can tailor your communication style to technical and non-technical audiences alike. This means you can build a storyline to communicate the analyses to business leaders
- you have an entrepreneurial spirit and can create creative solutions to technical and organisational roadblocks that can immerse
- you are driven by impact
- you have the ability to use data tools as a front-end user, eg Power BI, Tableau, Alteryx.

*'One of the important tests as a practitioner is the ability to have a sense of the minimum data needed to get to the answer. Whether it's about the cost of acquiring a customer (CAC), employee retention, budgeting/forecasting or something else, being extremely clear about the business question is paramount. Otherwise you risk drowning in a lot of noise and extra data that's irrelevant to meet your objectives. This clarity allows one to form a map of the higher-level variables, and the sub variables they break into. Reporting effectively is also key. We use data visualisation tools like Tableau, Qlik or Klipfolio that we pre-design for the client based on questions they're asking, who can then sift and filter as they need. Ultimately, I see myself as a critical friend. If the client says they'll do 100k of business next month, my job is to provide an evidence-based view to critique and test that.'*

**Alastair Barlow, Founder and Chief Dreamer, flindr**

*'Accountants are good at analysis, but also need to present data to tell a compelling, coherent and internally consistent story. Data analytics is based on mathematics/statistics, and accountants are systematic, logical and structured which is a good fit. But they also need to move beyond financial, so they can see possibilities within the business. It's not just about how to get the accounting data to answer financial questions. It involves more creative and lateral thinking to discover and relate accounting and non-accounting data that can help answer key business questions. In line with the evolving CFO's strategic role in the business, accountants who are independent thinkers, who don't look for step-by-step guidance all the time, will perform better.'*

**Ong Meng Gee, Digital Transformation Trainer, 6biz Sdn Bhd, AI Practice Management Platform, Malaysia'**

## Data engineer

**Acknowledgments: Jamie Renehan, analytics expert, Banking sector**

The successful data engineer will be responsible for acquiring, structuring and leveraging data to support growth and innovation.

### The person will:

- have a passion for acquiring data and using data to improve the performance of the organisation and the experience that customers receive
- have a strong data engineering background building reusable data assets and features
- have experience in supporting the development of key strategic analytics projects and delivering continuous enhancements to the analytics pipeline (segmentation, propensity modelling and analytically driven process change)
- leverage exceptional attention to detail to deliver scalable datasets
- be an individual who is excited to learn and test new toolsets and someone who keeps in touch with emerging trends in data and analytics.

### Key responsibilities:

- using your engineering background to build robust datasets to support insight generation and analytics
- building and extending the customer analytics record, which is a foundational building block for analytics and predictive modelling
- identifying and acquiring the relevant data to build out the engineering requirements behind customer journey analytics
- working collaboratively with the data analysts and data scientists to analyse raw data sources and data transformation requirements
- designing and developing code, scripts and data pipelines that leverage structured and unstructured data integrated from multiple sources
- being the analytics engineering representative on big data projects.

### Essential qualifications:

- Level 8 degree or MSc in computer science, engineering or equivalent field.

### Key requirements:

- at least five years of experience working with Teradata, Oracle or SQL Server
- at least five years' hands-on experience as an 'extract, transform, load' (ETL)/data warehousing (DWH) developer with strong knowledge in designing, developing and delivering end-to-end data integration processes for large-scale data warehouses
- advanced knowledge of architecture, design and business processes

- certifications in Teradata, Oracle or SQL Server an advantage
- previous experience in implementation of ETL applications, DWH principles, architecture and its implementation in large environments
- previous consulting experience is an advantage
- being a strong collaborator and relationship builder
- strong leadership, communication and interpersonal skills.

### Desirable skills and experience:

- agile development methodology
- knowledge of DevOps tools and practices
- knowledge of Cloud-based data and analytics tools.

*'Data ingestion is the starting point to get the raw material for analysis. We use multi source ingestion including historic financial data, CRM systems that pulls in open opportunities/ leads, referral network data, and other relevant non-financial applications. The format might be Excel/CSV or something else like JSON or XML. There's an integration piece, typically involving APIs to connect to the core applications in order to access this raw financial and operational data. We use a mix of our own tech stack, such as Flask, Python, Liquid and off-the-shelf apps like Silverfin (financial data aggregation) and Fathom (consolidation) to make the most of the data.'*

**Alastair Barlow, Founder and Chief Dreamer, flindr**

*'60-70% of the effort in analytics involves obtaining the data and scrubbing it, so this is a key skill. Once a business question has been identified, one needs to determine the sources of data that can provide answers. Also, to be considered are the state of the data i.e. whether it's feasible to "cleanse" it or look for alternative data sources that're more usable. SQL may need to be used for extracting from accounting and non-accounting systems databases. There may also be the need to import and relate internal structured data with external semi-structured data eg social media comments, customer reputation and reviews (1 star, 2 star etc). Tools like Power BI and Tableau have wizard-like features so one may not need to learn the syntax of SQL. Additionally, these tools also have connectors for semi-structured file types like XML or JSON.'*

*For those wishing to explore further, they may want to familiarise themselves with an ecosystem that supports big data, like Apache Hadoop. An accountant may not need to learn how to set up Hadoop; but more as a user eg learn how to retrieve data from there, and then bring that into Python, Tableau and Power BI to perform analytics.'*

**Ong Meng Gee, Digital Transformation Trainer, 6biz Sdn Bhd, AI Practice Management Platform, Malaysia**

## Robotic process automation (RPA) manager

**Acknowledgements: Jerina Loh, RPA Manager, Accountancy practice**

For a fast-moving audit practice, an important pillar of its strategy is the increased use of automation to scale up the ability to serve more entities, deliver results more quickly and continually enhance the value and insight provided. The practice takes a strategic view of automation, supported by the vision of senior leadership, for whom this is a high-priority concern.

The practice is building capabilities for the use of RPA to improve end-to-end processes across all parts of the practice, starting with a focus on audit workflows. The RPA manager will champion the adoption and embedding of RPA into the firm's operations. The role requires a good understanding of how to lead the delivery of a successful RPA implementation.

Hands-on experience of using RPA tools is required for this role, while knowledge of coding and developing bots is advantageous but not mandatory. A good understanding of the audit process and workflows as well as of audit software is required. The aim is to examine over 200 clients to identify broad areas suitable for RPA and to work with developers to create and test production-ready applications.

This role is discussed in the context of an SMP, where there is a higher likelihood that the manager performs an end-to-end coordination role, from overseeing technology development to managing stakeholders in the business. In larger organisations, these may be split, with the manager focusing more on overseeing development and delivery, and a more senior role setting out a roadmap for what needs to be automated and obtaining the stakeholder buy-in for this.





**Key responsibilities:**

- **gathering requirements:** creating list of potential automation projects based on discussion with teams across the firm on pain-points and high-value areas/processes for audit automation
- **assessing opportunities:** working with a developer to assess opportunities, formulate reasons to proceed or not for a given area; identifying interdependencies and synergies across projects; and prioritising
- **setting workplan:** agreeing priorities with the partners, devising timelines and milestones for delivery of individual automation projects
- **standardising data:** considering the range of data (including unstructured data) across (several hundred) clients and 15 or more different kinds of software; developing a list of data templates for use across the firm
- **creating governance protocols:** developing scalable governance procedures in the firm for users to request changes, fixes or assistance with the software tools
- **evaluating processes:** for a given use-case, mapping out the end-to-end process and assessing whether it can be improved before automation
- **designing and iterating:** creating a draft design for the automated process; working with users to incorporate feedback and iteratively improve it
- **overseeing coding:** working with a developer to code an initial version of the design; incorporating user feedback, iterating and overseeing the building of code to be used in production
- **system testing and user acceptance testing:** checking user interfaces; identifying/hiring an individual to support quality testing; testing against various scenarios of 'what could go wrong'
- **overseeing user readiness:** development of user manual and user acceptance testing (UAT)
- **supporting post-launch:** providing assistance as needed once a process has migrated to using RPA; training staff on how to engage with tools
- **maintaining solutions and operating change control processes:** ensuring applications stay current to user needs and operate appropriately
- **optimising infrastructure:** working in partnership with IT teams; exploring opportunities to improve system hosting and performance
- **building a technology team:** managing the existing developer, and over time, as the practice expands, considering the case for additional support in RPA and/or other emerging technologies.

**Person specification:**

- professional accountant with audit experience, ideally across a range of sectors/clients
- passionate about technology; hands-on experience of using RPA tools (eg Blue Prism, UiPath, Automation Anywhere); experience in coding is advantageous (eg C++, C-Sharp, VB.Net, JavaScript, SQL); active interest in other emerging technologies
- understanding and/or experience of running AGILE projects
- having a process improvement approach with the ability to identify gaps and situations where automation can help
- strong project management skills for managing and monitoring multiple work streams and individuals
- business partnering and communication skills for dealing effectively with users across the practice
- a curious mindset with a liking for new challenges and continuous learning
- a problem-solving mentality, finding creative solutions where there are no previous comparable problems
- team management and leadership capabilities
- a wide awareness of technologies and their adoption is an advantage, eg low-code platforms such as Mendix, Outsystems, PowerApps; Visualisation (Qlik, Tableau, Spotfire, PowerBi); interest in/understanding of design thinking techniques.

*'Robotic Process Automation (RPA) can be used to automate repetitive and low judgement audit tasks. For example, thousands of audit confirmations would be needed for audits of large investment funds with various types of investments, custodians, counterparties, investees and accounts. Traditionally, a significant number of man-hours would be incurred by the auditors and client personnel to prepare, review, approve and send out thousands of confirmation request letters. The auditors would also spend significant hours tracking and following up the receipt of these confirmations. Total number of hours incurred could add up to weeks' worth of time. With RPA, a bot could populate thousands of confirmation requests from the different templates and account information from the client and send these out to the respective contacts in a matter of seconds. The bot would then send an exception report where there are errors or incomplete information for the auditors and client personnel to focus on. RPA would significantly reduce the hours incurred in the confirmation process and increase the accuracy of the confirmations.'*

**Denis Mugisha, Partner, Ernst & Young LLP, Kenya**

## Cloud integrator

### Acknowledgements: Robert Davidson, co-founder at Cloud adoption consultancy

This role supports the transition from legacy on-premises data management solutions and ERP systems to secure Cloud-based solutions (including hybrid Cloud combining on-premises, private and public Cloud). For SMPs it's a key value driver that improves the ability to operate and secure document access remotely, and benefit from the flexibly scalable nature of Cloud.

The quality of migration is as important as making the shift. Moving to Cloud but retaining old processes reduces the return on investment (ROI) and does not accelerate practice growth as hoped for. Not many are using it as an operational piece of software from day to day. It is fine for annual accounts, but effectively one is using a real-time piece of software annually or quarterly, merely looking at a 'snapshot' of information produced at a given point in time. For a VAT return, the calculation could be done and sent to the client for approval. But is one looking at client key performance indicators (KPIs), such as debtor days, etc to get insight into their operations?

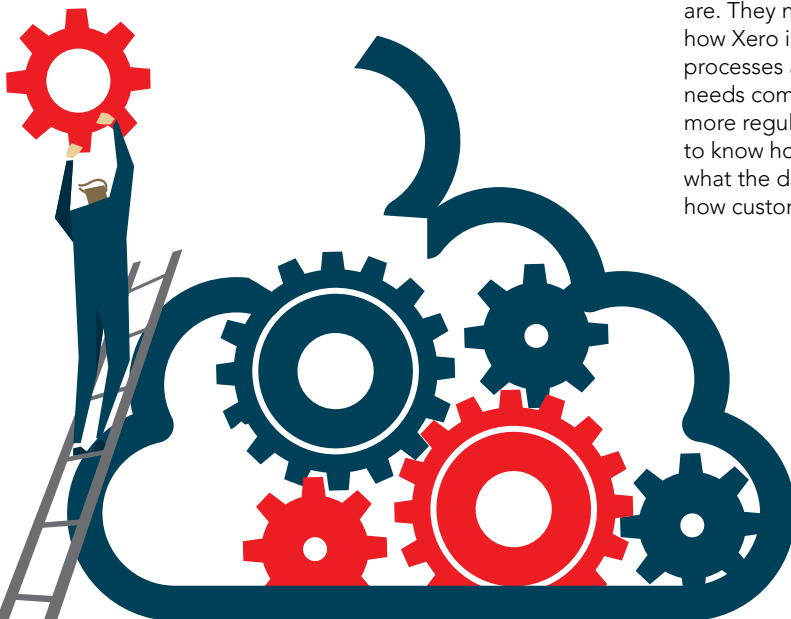
The Cloud environment is evolving, with thousands of applications designed to solve specific problems, with new ones being developed all the time. The adoption cases that have worked best are those where there has been an efficient/quick decision process led by a nominated partner within the practice. This needs support at the leadership level for committing to the vision of being a successful Cloud accountancy practice.

The initial step is scoping to understand areas such as how the business operates, its main processes, and the volume of transactions. This could include, for example, sales and purchase invoices, reporting feeds from systems, bank payments, expenses and fixed assets information, and data from electronic point of sale (EPOS) systems. It is then possible to identify the simplest processes and the safest clients with whom to initiate the migration. Automatic bank feeds, for example, would be a simple process to migrate to the Cloud, while a complex task with lots of approval steps would be better to work on later. This process can take longer than expected for many SMPs as all the information about their clients may not be in one place.

Where there is lots of data, such as VAT returns for a quarter or data for a full year, it may be more efficient to keep it in another system and use apps to condense and translate data for software, such as Xero, which is Web-based. This can help in areas such as inventory or where there are thousands of purchase orders or sales transactions, so the information provided is less granular than VAT but still appropriate to report on.

Accountants of the future will need to combine technical knowledge with systems knowledge.

If there is a full migration to the Cloud, it tends to work best where there has been a project manager/integrator working with two or three staff members. Cloud integrators need accounts knowledge as well as understanding of systems. ie what these systems can do, as well as what their limitations are. They need to be problem solvers who might understand how Xero is set up, and able to look at clients' systems and processes and see what is needed to get the best results. This needs communication skills, as they will be speaking to clients more regularly through the year. They don't necessarily need to know how to set up APIs but they do need to understand what the data is, how it moves from one place to another, and how customisable it is.



**Key responsibilities:**

- **creating a project plan in line with business vision** – understanding the vision of the business and creating a project plan to move the firm and its client base to Cloud systems, including staffing requirements, prioritising clients for conversion, systems to use, training requirements, milestones, timelines
- **building a Cloud team** – following the size and scope of the project being understood, creating a team to help deliver the agreed outcomes
- **creating Cloud processes** – changing existing processes or creating new processes for businesses looking to move to Cloud or new services created by modern technology
- **assessing opportunities** – assessing the current and future opportunities the new systems will create
- **training and education** – training staff on the systems that will be used, the steps to be taken in setting-up, how to process, things to look out for, and continuing education about updates
- **building partnerships** – building long-term relationships with the software vendors and negotiating licence agreements
- **promoting Cloud** – being an advocate for Cloud systems both internally and to clients at events and roadshows. Host sessions to raise awareness of the systems which are used and the benefits of being on such systems
- **providing support** to the Cloud team and all levels within the business during set-ups and servicing of clients
- **building a support network** – creating an internal support network for all queries, and potentially supporting the Cloud team by working with businesses that provide external support for all application-related concerns
- **managing projects** – ensuring project targets and timelines are being met and managing all aspects as agreed
- **conversion support** – supporting team members and staff with converting clients' data and processes to new Cloud systems
- **keeping up to date** – Cloud software is very fast moving and forever changing, and the individual will need to keep up to date with product changes and legislative updates that affect clients and the staff using these systems.

**Person specification:**

- professional qualified accountant with at least five years' experience, ideally across a range of sectors/clients
- passionate about technology; hands-on extensive experience of using Cloud accounting systems and associated applications
- experience of converting client's data and processes from desktop systems to Cloud accounting systems
- active interest in other emerging technologies and systems
- strong project management skills to manage and monitor multiple work streams and individuals
- business partnering and communication skills to deal effectively with users across the practice and with software vendors

- process improvement approach with the ability to identify gaps and where automation can help
- desire to understand dataflows and workflows and either change or create new processes for clients
- problem-solving mentality, finding creative solutions to issues as they arise
- a curious mindset, with a liking for new challenges and continuous learning
- ability to assess the value of opportunities and relate these opportunities to the practice
- confident discussing Cloud accounting technology and relating specific uses back to the end user
- confident doing presentations and training, both internally and externally
- team management and leadership capabilities
- experience of one or more of the following applications: Cloud accounting (eg Xero, QuickBooks Online); invoice automation (eg Receipt Bank, Auto-entry, Hubdoc), reporting (eg Spotlight, Futrli, Fathom), cash flow (eg Float, Fluidly).

*'Cloud integrators can sit within the accounting firm, and help them map the data flow, systems etc. between the Xero marketplace and accountants. Some accounting firms decided to build that capability themselves or launch and develop Cloud consulting departments within the SMP. They redeployed their graduates/junior accountants from tax/financial reporting to cloud consulting to learn the apps. People initially thought it was about IT implementation, but it doesn't need that. One just needs a subscription to Xero and to one of the apps in marketplace eg Spotlight reporting (3-way forecasting, scenario planning, cash flow forecasting). Many practices now have a cloud consulting arm to advise clients for classic service lines like tax or book-keeping. And they're starting to win more new clients through that channel than through tax and audit. This is less about working to timesheets, and more about the outcomes, its about being a consultative accountant.'*

*In a Cloud accounting model, data can be transferred securely from source (say, bank account), to Xero, via an API and once reconciled/analysed and approved then submitted to a tax authority like HMRC, all on Cloud. Xero is essentially a collection of APIs, and we have open APIs, so people can build their own APIs to map to Xero. We have a store with 1,000+ apps, a bit like an Apple store. This allows flexibility to add, say a cash flow forecasting tool from the app store, along with support for practice management, job management, hotel booking systems, or e-commerce apps. There are 250 banks globally that feed transactions to Xero.*

*We don't see a world where accountants do data entry. Even for areas like bank reconciliation, machine learning can be used. Once Xero sees transactions more than twice, it will remember where in the GL that entry should be posted. In 3-5 years, we see potential for the GL to be mainly/fully populated from bank reconciliation, and only 1-2% of transactions will be unreconciled and need a manual review.'*

**Kevin Fitzgerald, Managing Director – Asia, Xero, Singapore**

## Digital transformation lead

This is a cross-cutting senior role that oversees a team responsible for driving the adoption of emerging technologies within a large accountancy practice. It is a role with executive-level support, and directly contributes to the future strategic direction of the organisation.

The role is not technology specific and cuts across a range of areas such as the development of tools for delivering audits, integration into Cloud platforms, adoption of data analytics, and visualisation and robotics tools, as well as incorporating technologies such as artificial intelligence (machine learning and natural language processing) and blockchain as they scale up.

### Key responsibilities:

- **understanding the current digital model:** building a clear picture of existing processes and technologies, pain points/bottlenecks, use of legacy or outdated systems, and resultant impacts such as missed revenue opportunities, employee or client dissatisfaction
- **continuously scanning an evolving landscape:** implementing a framework for opportunity identification to prioritise areas for transformation; managing staff for continuous scanning of latest technology developments and assessing relevance to the firm's needs
- **defining the target digital model:** providing a comprehensive vision that reimagines business and operating models across multiple teams and departments, considering organisation and external market realities, articulating benefits, synergies between projects and risks/dependencies
- **winning sponsorship for projects:** presenting to strategic investment forums, proposals for projects with associated prioritisation for funding; undertaking detailed business case and ROI analysis; agreeing critical success factors and parameters for funding
- **preparing a delivery roadmap:** developing project plans for individual projects, key activities, timelines and milestones; direct previous experience of working across the end-to-end product development lifecycle is required
- **management across lifecycle:** overseeing and leading activities across projects, and with line management across multiple types of stakeholders:
  - business analysts – for requirements gathering, defining details of the specific problem to be solved, unpacking the proposed solution and breaking it down into digestible components
  - designers – to conduct user research and translate analyst outputs into initial solution design, and formalised visual design (exactly what appears on screens/clicking options, what is visible to end users); creation of prototype product
  - developers and engineers – who implement solutions to fit all the requirements
  - quality control specialists – for testing
  - project managers supporting pilot release – carrying out refinement and user-acceptance testing, and deployment in production
- post-launch support, including responding to queries; developing training materials, user guides, activation and roll-out guides.

### Key skills:

- in-depth understanding of process, workflows and technologies associated with an area pertinent to accountancy and finance professionals, such as audit and assurance, taxation, reporting, risk management, and/or cybersecurity
- blend of professional expertise with product expertise to communicate with business and technology personnel
- professionally qualified accountant preferred
- product management qualification covering end-to-end product development is advantageous, such as Certified Product Manager
- strategic mindset and able to think conceptually about future design options, and their implications
- passionate about emerging technologies; understanding of how they bring new considerations for increased scale or intelligent workflows
- exceptional stakeholder-management skills; effective coordination across multiple stakeholder groups with competing priorities
- persuasive, clear and consistent communication style to build trust and obtain buy-in
- understanding the technology development environment, culture and ways of working
- change readiness and flexibility; being able to respond to changes in direction or requirements in a fast-paced environment
- direct experience working with a technology (eg coding) is helpful, but not essential.

*'The scope and context for technology adoption is varied, but broadly will cover questions like how we optimise our own operations as a firm, transform the delivery of our services to clients and advise clients on how to transform their own businesses.'*

Angus Chapman, EY Global Assurance

## Roles for accountants and auditors in managing smart contracts

**Acknowledgements: Dev Ramnarine, partner at accountancy practice and founder, blockchain consultancy**

Blockchain is at an earlier stage of maturity than other digital job areas being discussed, such as data analytics or Cloud. There are, however, some broad areas emerging where we may anticipate a role for accountancy and finance professionals.

A key area of relevance is smart contracts. These are self-executable pieces of code that trigger events when certain conditions are met. For example, quarterly corporation tax payments might automatically add or subtract expenses such as meals and entertainment while applying the appropriate tax percentage rates. Other examples include smart contracts designed to execute on a specific date affecting specific accounts in the general ledger, extracting the data, performing calculations, and returning the result. Smart contracts may also be linked to external data sources (called 'oracles'), such as a list of government tax sites around the world to pull in the latest tax rates.

Given the above, we may expect two complementary roles for the accountancy and audit profession: the smart-contract accountant and the smart contract auditor. This is analogous to current roles, where there are a preparer of statements (an accountant) and a checker who validates post-fact (an auditor).

The smart contract accountant would bring a deep knowledge of the process and business context for the use of the contract. They could be partnering with a developer who builds the contract within the blockchain being used, for example a programming language such as Solidity might be used by a developer building smart contracts in the Ethereum blockchain.

This smart-contract accountant role will have elements of the business analyst skill set relating to requirements gathering. The post holder will need to assess that the requirements are appropriate for the business process being considered and to check that, once it is developed, it fulfils the requirements that were documented against it.

In doing so, the smart-contract accountant will test that the logical constructs embedded into the contract reflect reality, ie if a certain event occurs, then the contract executes follow-on activities as designed. The accountant will also need to consider what data the smart contract needs to operate effectively and whether all the data involved needs to be on the blockchain or stored in an external server.

Typically, data that is directly relevant to the organisation's operations, and which needs a reliable immutable record, would be placed on the chain. Other data may be relevant to the functioning of the smart contract but held off-chain. In the tax example above, the amount of tax the company needs to pay would be calculated by the smart contract and could be held on the chain.

But a view might be taken that the entire historical database of corporation tax rates across all jurisdictions of operations over time, may be held off-chain, where it can be referred to if needed. This data would have fed into the tax calculations at various stages but may not itself need to be held on-chain.

There may be the need to understand what happens if someone is adding information that relates to or relies on this contract. This could involve running reports periodically to monitor any changes to the ecosystem within which the smart contract is running, or perhaps understanding the APIs that are linked to the blockchain and this contract.

A related but separate issue: the smart-contract auditor can be expected to validate that the contract executes its function in line with design expectations. This role is likely to focus on auditing the output from the smart contract or the internal controls around the smart contract. The contract, once executed on the blockchain, is immutable, so it is important to ensure its legitimacy.

This may involve best practice in testing for operational/process design risk or IT general controls. For example, what checks exist for access control to prevent unauthorised individuals from making changes to the code? How frequently are these checks performed? What is the documentation to capture who has touched data that feeds as an input to the smart contract? Was it properly approved/authorised before being made live? In an ERP when developers add forms or make changes, it goes through levels of approvals, budget checks and testing before it goes live – and elements of the same may need to be applied.

Where the functioning of the smart contract could have a material impact on the financial statements, there could be checks on the accuracy and completeness of the information on which its outputs are based. And tests can be done to check whether the outputs generated match what is expected. In some platforms, there are tools available when designing smart contracts, which can translate code into understandable outcomes in plain English. This can make it easier to interrogate what the smart contract is doing.

Despite many benefits from the straight-through nature of the technology, it is theoretically possible to set up a smart contract with fraudulent intentions, eg to trigger cash flows to the wrong beneficiaries. The validation and oversight needs to check the setting up of the contract from an architecture point of view as well as for human interference or collusion.

By understanding the role of smart contracts in the business environment, we may be better prepared for future opportunities in our practices and forms of employment.



## AI auditor

The AI auditor is responsible for leading audit and accounting assignments that are driven by data analytics, risk assessment of the complete ledger, and the appropriate investigations, to deliver client-specific insights on the audit file. This requires a good understanding of how data analytics can be applied to audit methodologies and workflows, as well as knowledge and experience of the AI software to be used.

### Key responsibilities:

- assessing the profile of transactions and entries in key financial and operational data sets using data science techniques
- ensuring the reliability of automated audit testing by reviewing the results of always-live AI applications
- supporting the design and implementation of new AI algorithms for specific businesses, industries, and use cases, to ensure that auditors can stay up to date with modern businesses
- translating the results of AI analysis into meaningful insights for the users of the financial statements
- using AI techniques to ensure that businesses and organisations run efficiently and are free from fraud and error
- leading and teaching the next generation of auditors about the application of data science and AI techniques to the audit process.

### Person specification:

- professional accountant with audit experience, ideally across a range of sectors and clients
- passionate about technology; hands-on experience of using AI tools
- experience of understanding the performance of machine learning techniques
- continuous improvement mindset with the ability to identify gaps and areas where AI can help
- business partnering and communication skills to deal effectively with users across the practice
- curious mindset with an interest for new challenges and continuous learning
- problem-solving mentality with ability to find creative solutions where there are no previous examples
- experience collaborating with cross-functional teams
- team management and leadership capabilities.

Roy Sarkar, author at AI enabled audit solutions provider

### Algorithm Quality Testing involves a range of considerations:

#### A. Testing biases in Algorithms (design thinking)

- selecting the right model
- selection of true representative data sets
- testing with real data [test data after trail data]
- prioritising de-biases.

For financial models bringing insights on data, such budgets and stress testing, accountants can help to design the scenarios ensure that the input to the model and weightages are true and fair. Secondly, accountants are in a better position to articulate the results of such a model and to put checks and balances in place.

#### B. Requiring transparency in Algorithms

- clear ownership and accountability when things go wrong, eg with client data
- bring a Data Scientist and Social Scientist together – to ensure the logic set is fair, ethical and appropriate. And anyone can understand the model intent
- quality assurance.

#### C. Challenging supremacy of Algorithms

- check whether the overall logic makes sense?
- simplified underlying logic which has been tested to work
- ensure that not just the past cases, but thought also given to possible future scenarios in Machine Learning Data sets (QC is process, not point in time) – example one would not be able to find past data sets for COVID-19 like events
- allow option of Manual Over-ride with appropriate approval.

Bala Iyer, AI expert, Singapore

# Conclusion

While a fast-evolving and automating world presents challenges, for those willing to engage there are wins to be had. The digital landscape presents significant opportunities for accountancy and finance professionals to achieve meaningful work experiences – ones that are driven by purpose and which afford the potential to stretch oneself in new and fulfilling ways.



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# Acknowledgements



## Adam Gerrard

Adam works with colleagues across Asia-Pacific to provide audit and other related services to clients with blockchain based business models and blockchain-enabled processes. He is a

member of EY's IFRS digital assets group and has spoken about the accounting and auditing implications of blockchain at various industry events.



## Alan Craven

Alan Craven, FCCA, is the founder of Phoenix TP Limited. Alan has 30 years of experience in tax technology, including senior roles at leading tax software suppliers and a Big 4 firm. At Phoenix,

Alan developed a multi-year, corporation tax minimisation/optimisation application using the quantitative analysis technique, linear programming.



## Alan Young

Alan has over 35 years with EY and serves as the EY Global Leader of the EY Helix data analytics program, responsible for the design, development and implementation support of a range of data analytic tools. In addition, he leads the development of

methodologies to help enable auditors to address the use of emerging technologies.



## Alastair Barlow

Alastair is founder and Chief Dreamer at flinder – an international and multiple award-winning accounting, consulting and data analytics business. flinder is developing a new category in

accounting; helping SMEs make better strategic decisions through aligning the finance function to the business strategy and delivering efficiency, control and business-wide insight through emerging technologies.



## Amarjit Singh

Amarjit is the EY EMEIA Assurance Blockchain leader and leads EY's extended assurance services across Financial Services as well as representing EY externally on regulatory matters in the Financial

Services Industry. In addition to audit, his focus has predominantly been in the regulatory space with regards to prudential issues.



## Andrew Burdall

Currently CFO of Network Innovations Inc., Andrew has worked in the satellite communications & technology space for over fifteen years' holding various commercial roles

within that time. Andrew has experience working in Executive roles for multi-national public companies, and privately held businesses alike in the AsiaPacific & North America territories.



## Andrew Hobbs

Andrew leads the EY EMEIA Public Policy team, working with key stakeholders to strengthen the working relationship between the public and private sector. Andrew is particularly interested in

the critical role good governance plays in both business success and serving the public interest.



## Angus Chapman

Angus is the Product Lead for an EY R&D team responsible for designing and developing the next generation of technology for EY Assurance. He is a certified product manager as well as a chartered

accountant with experience serving large multinational companies.



## Dr Ann Kayis-Kumar

Dr Ann Kayis-Kumar is a Senior Lecturer at UNSW Sydney's School of Taxation & Business Law. She is author of *Taxing Multinationals*

(Oxford University Press) and has pioneered the use of optimisation modelling to simulate tax-minimising behavioural responses of multinationals.



## Ansgar Koene

Dr Ansgar Koene is EY Global AI Ethics and Regulatory Leader and Senior Research Fellow at Horizon DER institute, University of Nottingham.

Ansgar chairs the IEEE P7003 Standard for Algorithmic Bias Considerations, is Bias leader for IEEE Ethics Certification Program for AI Systems (ECPAIS), and trustee of 5Rights Foundation.



## Bala Iyer

Bala is the Chief Product Officer at ALMUG Technologies Pte Ltd Drive. An entrepreneur specialising in bringing innovation to Financial Services Industry using AI Machine Learning.

Bala has over 20 years' experience with Financial Markets.



## Ben Tian

Mr TIAN has published 10 books on cloud strategy, internet 3.0 and other emerging technologies. He has rich industrial practical experiences in artificial intelligence, blockchain, cloud computing, big data. He is a member of the Chinese Digital Economy 100 Expert Forum, the managing director of China Cloud System Pioneer Strategic Alliance and a consultant for China's government.



**Cephas Karanja**

Cephas is a Certified Public Accountant with Bachelor of Commerce (Finance Option) and MBA (Project Management). A finance professional with passion for digital transformations, he has 18 years experience on finance, audit and digital transformation. He has worked in Oracle for the last 7 years enabling customers in digital transformations especially for Finance. Currently he is a Solution Engineer with Oracle.



**Collin Jin**

Mr. Jin is the National Audit & Assurance Innovation Leader, and Managing Partner of Innovation & Digital Development Center of Deloitte China. With extensive experience in technological innovation and digital application, particularly in areas of artificial intelligence, robotics, big data analytics, and Cloud Computing, he has directly led and driven Deloitte China's development, marketing and application of a number of innovation and digital products.



**Cornelius Grossmann**

Cornelius is the EY Global Law leader with currently over 3,500 lawyers in 85 jurisdictions. His experience includes large domestic and international reorganization projects, post-merger integration and financial and operational management. With more than 20 years of experience in providing business advisory services, Cornelius has been lead legal counsel in numerous large cross-border projects.



**Daniela Carcasole**

Daniela is an Assurance Partner at Ernst & Young LLP, Canada and the Canadian Power & Utilities Market Leader. She also serves as the Digital & Innovation Leader and is responsible for leading the Assurance innovation hub with a goal to imagine, incubate, visualize and design new initiatives.



**Dato' Vimmy Yap Mee Ling**

Founding Chairman of GoKudos Sdn Bhd, aims to "Lead the Transformation, Own the Disruption" by providing AI Online Smart Office cloud platform to accounting practitioners that assist firms to scale confidently. At the same time, founded 6Biz Academy too and created a "Pathway to Data and Analytics for Accountants".



**Denis Mugisha**

Denis is the Insurance and Asset Management Leader for Ernst & Young LLP, Kenya and has more than 17 years of experience serving clients in various sectors across the globe. He leads teams in the applying of emerging technologies to provide effective services and business insights to clients.



**Dermot Igoe**

Dermot leads the EMEA Operations Finance organisation in Dublin. He has worked in Microsoft for 25 years in both regional and global management roles across operations and finance. He is also chairman of the Ireland crisis management team. He previously worked in finance controllership roles for Bechtel Corporation, McDonnell Douglas (Boeing), and Chesterfield International Financial Services in London and Switzerland.



**Detmar Ordemann**

Detmar is the EY Global Innovation Leader in Financial Accounting Advisory Services, driving the research and product development by combining the finance organization's needs with subject matter knowledge in accounting, mathematics and technology. Since joining EY in 1994, Detmar has led a number of audit and advisory-type engagements from mid-market to large multi-nationals in various sectors.



**Dev Ramnarine**

Dev Ramnarine, an ACCA member, is a cofounder of Thrudheim LLC, a blockchain consultancy focused on education and solutions for accounting and finance professionals. Thrudheim specializes in enterprise solutions built using the VeChain blockchain and related technologies to create innovation and unlock business value.



**Ellie Dignam**

Ellie qualified as a chartered accountant in 2017 and specialised in audit. After realising her passion for technology and digital transformation, managed the successful roll out of Data Analytics across the audit division of BHP. Passionate about impacting change that will help to future proof the profession.



**Eoin Donohoe**

Dropbox International Controller responsible for Finance Transformation, Global Source to Pay and International Accounting. In 2019 completed MIT online course: AI Implications for Business Strategy. Previously held Google US GAAP, Internal Audit, Financial and Tax Reporting roles, and trained in KPMG Audit. Dublin City University Accounting Degree and Masters.



**Eoin MacManus**

Eoin is Managing Partner for EY Ireland Financial Services (FS) and Deputy Managing Partner for EMEA FS with responsibility for delivering its strategic vision. This includes recruitment and retention of top talent, development of the EY brand and acting as a senior leadership contact for some of its most valued clients.



**Fiona Habermehl**

Fiona is an experienced Technology and Innovation Leader assisting the business in large scale transformation activities. She leads the EY Asia-Pacific Technology team for Assurance. Key part of her role is identifying and assessing new innovation and its application to EY practitioners and clients focusing on centralisation, simplification and automation.



**Gareth James**

As an experienced Digital Assurance Partner at Ernst & Young LLP, UK. Gareth leads several UK, EMEA and Global initiatives to help deliver audit quality improvements through transformation in EY service delivery model, such as greater specialisation and centralisation, and enabling EY teams to adopt more digital, data driven ways of working.



**Gary Kent**

Gary is the Commissioner of Corporate Services and CFO for Canada's 6th largest City, Mississauga, and the CEO of Enersource Corporation, a strategic utility public- private partnership.

ACCA's 2019 Canadian advocate of the year, he currently volunteers on ACCA's Public Sector Global Forum and has spoken internationally on multiple topics including Digital Transformation.

**Hamish Thomas**

Hamish is a Partner in EY EMEIA Financial Services Advisory business where he leads the UK Banking Technology team and EY EMEIA payments practice. Hamish started his career

designing satellite communications systems prior to moving into Advisory services. Hamish has a primary focus on banking technology, payments and financial crime.

**Hans Gunawan**

Hans has a broad background, holding qualifications in accounting and finance (ACCA), engineering (Nanyang Technological University) and pursuing an MBA with National University of

Singapore. Hans is currently with AirTrunk as the Head of Business Development, driving customer success and AirTrunk's new market expansion across APAC.

**Hermann Sidhu**

As EY Global Assurance Digital Leader, Hermann Sidhu is responsible for utilizing game-changing technologies and practices to drive large-scale connectivity and innovation across the global assurance practice. By leading a team focused on creating a differentiated audit by incorporating analytics, automation and AI he is transforming the approach to audit.

**Herton Teles**

Herton is an Associate Partner at Ernst & Young Auditores Independentes S/S. With over 14 years of audit experience, serving audits of global subsidiaries, private clients and FPI substantial roles, in diversified industries. He is the Brazilian Digital Audit Leader, a regular presenter on innovation and digital audit topics and assists on audit transformation processes.

**Igor A Buyan**

Igor is a Partner at Ernst & Young LLC, Russia working in the Energy, Chemicals and Utilities Group. He is in charge of regulator relations, deals with matters related to strategic development of audit services including the impact of IT technologies.

**Jamie Renehan**

Jamie Renehan FCCA is a Senior Analytics Manager with 17 years' experience across Financial Services, Data and Analytics. Jamie leads the Advanced Analytics team at Bank of Ireland. He has written

Data and Analytics articles for Accounting and Business magazine and is a member of the ACCA Ireland Technology Group.

**Jayendran GS**

Jayendran is a Chartered accountant and data scientist with more than 15 years' experience in the intersection of Accounting & emerging technologies. In his present role as Founder &

CEO of Prudent.ai, he works on building AI driven solutions for Financial Auditing.

**Jeanne Boillet**

Jeanne is the EY Global Assurance Innovation Leader. She is responsible for managing disruption and fostering innovation across the Assurance practice. Jeanne brings our vision for the audit of

the future to life by exploring emerging trends and technologies to provide high-quality digital audits and a new client experience.

**Jehan Perinpanayagam**

Jehan serves as CEO Infomate Pvt Limited and Vice President John Keells Holdings PLC. He is a ACCA fellow serving on ACCA's Member network panel Sri Lanka. Pioneering the country's

first ever rural BPO is an achievement Jehan is very proud of. He currently serves as a Member Advisory Committee on ICT / BPM – Export Development Board of Sri Lanka, previous Director / Treasurer of SLASSCOM.

**Jerina Loh**

Jerina Loh Wei Jing has been an auditor since 2014, qualifying as an ACCA member in 2019.

In 2018, Ms Loh became the RPA Manager at KLP LLP and has since created several automation projects for audit and other business processes, which involves project management, data analytics and coding.

**Karen Leah Somes**

Karen is the EY GSA Assurance Leader (Germany, Switzerland and Austria), as well as signing partner at Ernst & Young Gmbh, Germany. As the recent EY EMEIA Assurance Talent leader, Karen has a

strong interest in how technology and our people work together.

**Kathleen Chien**

Kathleen joined 51job in 1999 and is CFO and a Senior VP. Prior Ms. Chien worked in the management consulting and financial services industries. Ms. Chien consulted a number of

companies on strategic and marketing issues, including entry into the Chinese market and achieving cost and operational efficiencies.

**Kevin Fitzgerald**

Kevin Fitzgerald is the Managing Director, Asia at Xero, where he leads the growth and performance of the Asian business, spending his time between

Singapore and Hong Kong offices. Kevin and his team help small businesses and their advisors across Asia embrace emerging cloud technology to run productive, more profitable businesses.

**Lukasz Piotrowski**

Lukasz is an Associate Partner working in Poland.

He has gained a wide range of experience working for various private and public companies across different industries. He's a member of the CESA Assurance Digital Leadership Team and TMT Leader for Poland since 2018.

**Lutamyo Mtwali**

Lutamyo is an experienced Digital Finance Transformation expert with extensive experience in the Financial Services Sector working on large scale technology led, complex global Business

and Finance transformation programmes. He focuses on digital strategy, business development and leading delivery of innovative digital transformation solutions (AI, Automation, Blockchain, Cloud ERP, Open Banking Platform).



**Nurhassen Mensur**  
Business Communication Director, YenePay  
Financial Technologies P.L.C.



**Olayinka Adams**  
Program Manager, Risk Product Strategy,  
Facebook Inc, US.



**Ong Meng Gee**  
Mr. Ong Meng Gee is director of a digital  
consultancy company that helps SMEs realise  
profitable results using automation with AI and  
other cutting-edge "game changer" solutions.

He is also Chief Advisor of 6Biz Academy, an organisation that  
focuses in upskilling working professionals in data literacy and  
modern analytics.



**Paul Goodhew**  
Paul leads an EY R&D team focused on  
developing and applying next generation  
technology. In his role, he collaborates closely  
with EY Assurance and technology professionals  
to harness the power of disruptive innovation in the audit.



**Robert Davidson**  
Robert Davidson, a highly experienced, qualified  
ACCA accountant who co-owns an Accountancy  
Practice and an App Advisory business supporting  
Accountants moving to digital systems.

Maintaining the finger on the pulse of new technology to help  
solve pain points and revolutionise businesses.



**Robin Ramrup**  
Robin Ramrup has over 20 years management  
experience, both in Canada and Internationally,  
in various business sectors including; not-for-profit  
organizations, venture capital (tech. focused) and  
public accounting. Robin holds the FCCA, MBA and the Canadian  
CPA designations. He has volunteered with a number of  
organizations including sitting on their boards.



**Rowland Kew**  
Rowland Kew is the Managing Partner of CA  
Practice (Singapore) and Advisor of MySoft  
Technology, an ERP (MySoftSG) solutions provider.  
He possesses the passion to enable enterprises to  
Go Digital! To Thrive, going digital is no longer a choice but a  
'must-have' for every size of firm.



**Scott Sanders**  
Scott Sanders, Chief Information Officer at Sikich  
LLP is responsible for internal technology strategy  
and innovation for the firm's global offices and  
1,000+ professionals throughout the country.

Scott drives Firm initiatives in the areas of emerging technologies,  
security, cloud computing, and data governance.



**Shamus Rae**  
In 2019, Shamus formed Engine B which aims to  
expedite the digitisation of the Professional  
Services industry. Previously Partner and Head of  
Innovation and Digital Disruption at KPMG,  
Shamus is a dedicated change-maker, focused exclusively on  
leveraging AI and data to transform organisations.



**Stephen Heathcote**  
Stephen is CEO of PrimeGlobal, one of the world's  
largest associations of independent accounting  
firms. Stephen's' extensive background in the  
accounting profession include, the COO role at the  
UK Financial Reporting Council, a senior management position at  
KPMG and over ten years as a key member of the Association of  
Chartered Certified Accountants (ACCA) executive team.



**Subh Ghosh**  
Subh is an Assurance Partner at Ernst & Young  
Associates LLP, India and leads the digital &  
innovation initiatives in the Assurance practice  
focusing on smart technologies providing  
effective and efficient audits and bringing new business insights  
to clients. Subh also served on the Digital Accounting Assurance  
Board of ICAI.



**Ulrich Britting**  
Ulrich Britting, a German and US CPA, is the  
founder and CEO of ba tax gmbh a German  
accounting firm which did grow from 5 to 50  
employees since 2013 by developing solutions  
for the needs of emerging Tech Startups and Scaleups.



**Venetia Lau**  
Venetia is a Partner with the Financial Services  
group at Ernst & Young LLP, Singapore and leads  
the Wealth and Asset Management Assurance  
practice. Venetia is driving the innovation  
agenda forward by embedding the use of automation such as  
WAMapps in the audit process to enhance audit quality and  
improve audit efficiency.



**Yew Kiang Chan**  
Yew Kiang is an Assurance Partner at Ernst &  
Young LLP, Singapore working with fast growing  
companies in the technology and media space.  
He is presently the leader of the TMT assurance  
service in Singapore and an adjunct faculty with Singapore  
Management University. He is a strong advocate of using  
technology to improve audit efficiency and quality, and at the  
same time, improving the work life harmony of his people.



**Yoon Hoong Hoh**  
Yoon Hoong is a Partner at Ernst & Young PLT,  
Malaysia. He is the EY ASEAN Digital Assurance  
Leader as well as the Real Estate leader  
focusing amongst other things on the design  
and development of audit procedures. Yoon Hoong is also a  
member of the ACCA (Malaysia) Advisory Committee and Public  
Practice committee.



