

ACCOUNTANCY FUTURES ACADEMY

Technology trends: their impact on the global accountancy profession

About ACCA

ACCA (the Association of Chartered Certified Accountants) is the global body for professional accountants. We aim to offer business-relevant, first-choice qualifications to people of application, ability and ambition around the world who seek a rewarding career in accountancy, finance and management.

Founded in 1904, ACCA has consistently held unique core values: opportunity, diversity, innovation, integrity and accountability. We believe that accountants bring value to economies in all stages of development. We aim to develop capacity in the profession and encourage the adoption of consistent global standards. Our values are aligned to the needs of employers in all sectors and we ensure that, through our qualifications, we prepare accountants for business. We work to open up the profession to people of all backgrounds and remove artificial barriers to entry, ensuring that our qualifications and their delivery meet the diverse needs of trainee professionals and their employers.

We support our 154,000 members and 432,000 students in 170 countries, helping them to develop successful careers in accounting and business, with the skills needed by employers. We work through a network of over 80 offices and centres and more than 8,400 Approved Employers worldwide, who provide high standards of employee learning and development.

THE ACCOUNTANCY FUTURES ACADEMY

The Accountancy Futures Academy contributes to ACCA's programme of research and insights with powerful visions of the future. It provides a platform to look forward, to tune into the emerging trends and discussions in the global business and policy spheres and the latest reforms facing the world of finance.

By looking to the future it helps the profession stay at the cutting edge. The Academy's work fosters fresh thinking and innovative discussions, identifies the barriers to and facilitators of tomorrow's successes, and identifies the potential strategies that will enable business and finance to navigate the choppy waters that lie ahead.

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This discussion document does not aim to make predictions, but rather to stimulate discussion about a broad range of emerging and converging technologies and their potential to influence the accountancy profession.

The propositions it presents are based on available, established and emerging technologies, and the ways in which they could potentially impact on the profession over the next five to 10 years and beyond.



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Introduction

Accountants have always exploited emerging technologies to help them to complete their tasks more accurately, quickly or simply: from the incised clay tablets of the Sumerian scribes, through the adding machines of the 19th century, to the calculators and computers of the 20th century. But all of these technology developments were simple propositions by comparison with the myriad technologies that are now rapidly reshaping the worlds of business and accountancy.

Heading into the 21st century technology trends in cloud, big data, mobile and social collaboration are converging to change the ways in which we consume information technology resources, share knowledge and experiences, and access products and services. At the same time, these trends are also underpinning and influencing developments in cyber security, digital service delivery, robotics, augmented and virtual reality, and artificial intelligence. A 'new normal' is emerging.

Accountants in practice and in the finance function are part of that connected world. This is changing the ways in which they communicate and collaborate with those in the businesses they work with and for, and shaping new working patterns. It is providing accountants with the opportunity to automate and de-skill time-consuming and repetitive work and focus on higher value work, so that they can consolidate their role as advisers on finance and business.

It is impossible to predict the future with any degree of certainty. By keeping informed about technologies as they evolve, considering new technologies as they emerge, and then assessing their implications for finance professionals and those they serve and support, accountants can be prepared to minimise the burdens and maximise the benefits. In this way the profession can exploit technology and potentially change the scope of what it means to be an accountant.

The ten technology trends are:

- mobility
- cloud
- social collaboration
- digital service delivery
- big data
- payment systems
- cyber security
- robotics
- augmented and virtual reality
- artificial intelligence.

As valued advisers to the organisations they work with and for, accountants must maintain a watching brief across a broad range of technologies and trends.

Finance professionals need to consider the challenges and opportunities created by new and emerging technologies, and then use their analytical and problem-solving skills to assess their potential influence, so that they can provide the financial insights needed to guide any affected tactical and strategic business decisions.

Mobility

As broadband mobile connectivity to the internet spreads and the scope and availability of IT resources such as software expands, smartphones and tablets are morphing into seamlessly integrated devices that are indispensable in the workplace. Businesses and their workforces have fingertip access to communication and information whenever and wherever they need it. People are increasingly interconnected in their personal and professional lives and recent tablet and smartphone incarnations, fonepads and phablets, have the potential to enhance communications and connectivity further and to blur barriers across the work and personal spheres, not to mention geographic boundaries.

ADOPTION

Accountants are exploiting mobile technologies to deliver productivity and efficiency gains, bring businesses closer to their clients, and stay connected to them whether they are in the office or travelling. Numerous mobile devices are being combined with cloud services to provide anywhere anytime access to specialist software and the associated business and finance data. Businesses and practices are developing their own mobile device applications to attract publicity and new clients and to better service existing customers. As those entering the profession, or in early stages in their careers, become more integrated into the workforce, mobility is also providing businesses with a tool to attract customers and talent across traditional geographical boundaries.

IMPLICATIONS

Reliable broadband networks are essential to the exploitation of the ever-expanding mobile ecosystem. For countries, investment can be crucial to economic recovery, as it contributes to gross domestic product, stimulates employment and raises productivity.

Opportunities

- Faster and more connected workforce across the globe.
- Improved productivity and efficiency gains.
- Improved client servicing.
- Exploit Generation Y workforce to leverage technologies across business.

Challenges

- The profession must understand which services are best delivered 'on the move'.
- Security concerns on potential theft or loss of information.
- Implementing the right mobile technology at the right time is paramount.
- Working patterns will change as the internet becomes more pervasive.

ACTIONS

A recent survey of ACCA and IMA members identified mobile technology as the most important for business in the years ahead. Accountants will need to:

- identify and deploy effective mobile solutions that can work in the decade ahead
- manage the transition to full mobility in a consistent and safe manner
- consider the potential offered by an interconnected internet of things, from mobile devices to appliances, cars, and industrial equipment.

Cloud

The internet has evolved from a platform that connects millions of computers, into the network of interactive computing platforms now known as 'the cloud'. It can deliver IT resources (such as software applications, computing power and data storage) flexibly and efficiently online, as a service. These resources can be scaled up and down to meet demand, and accessed anytime, anywhere, from fixed and mobile devices. Numerous services are offered from 'public clouds', businesses are creating their own 'private clouds' and these are evolving into 'hybrid clouds' that meet spikes in demand with public cloud services.

ADOPTION

Accountants and the organisations they work with and for, are exploiting the cloud - in business, practice and the third sector. Accounting systems were among the first software to become available online where they (and their associated data) have been joined by a growing range of business 'software as a service' (SaaS): from budgeting to spreadsheets. Using cloud-based infrastructure such as computers and data storage can provide access to unlimited resources without the need for up-front investment, maintenance or IT expertise. But the consumption-based, pay-as-you-go approach is a mixed blessing.

IMPLICATIONS

Cloud has the potential to deliver many business benefits but these can create opportunities and challenges for accountants.

Opportunities

- Ease of access, scalability, data sharing and collaboration.
- Reduced up-front costs and management overheads.
- Fewer physical and logical space constraints.
- Basis for developing new products and services.

Challenges

- False perception that pay-as-you go is 'cheaper' than other ways to resource IT.
- Difficult to monitor/control/analyse IT costs (particularly for infrastructure).
- Inadequacy of traditional approaches to IT cost/benefit analysis.
- Expectation that IT systems will be available online (often 24/7).

ACTIONS

Being proactive can help accountants, and those they work with and for, to make better tactical and strategic decisions and to gain competitive advantage. Accountants will need to:

- explore ways of establishing actual costs – the devil is in the detail
- educate those outside the finance function (including practice clients) on the complexity of total cost calculations
- clarify national and international tax regulations and complications
- demand more granular use of, and price data from, cloud vendors – particularly infrastructure providers.

Social collaboration

Social media has come a long way in the 20 years that have passed since people first started using the internet to create, share and exchange information and ideas, but the biggest changes have emerged over the past few years. Social media sites for blogging, crowdsourcing, instant messaging, internet telephony, and sharing pictures and music quickly gained critical mass as popular personal tools for communication and collaboration. Then they were picked up and exploited by businesses, government bodies, charities and other organisations that want to improve communication and collaboration with and between their many internal and external stakeholders.

ADOPTION

The professional lives of accountants are being reshaped by social collaboration and the new possibilities it creates. Crowdsourcing is being used to accelerate and improve the development of products and services, and crowdfunding is bringing start-ups and projects together with sources of finance. The US Securities and Exchange Commission recently announced that social media outlets such as Facebook and Twitter can be used to make disclosures to investors as long as they have previously been advised that this is a possibility. Social tools are being integrated into systems such as customer relationship management and enterprise resource planning to provide new ways for finance to collaborate with its 'customers' in other parts of the enterprise and outside it.

IMPLICATIONS

As the use of social tools becomes the 'new normal' all accountants will be affected by changing approaches to, and expectations of, communication and collaboration.

Opportunities

- Removing barriers to communication.
- Speeding up month-end processes.
- Enhance decision-making and productivity.
- Opening up new routes to investment.

Challenges

- Removing barriers to communication.
- Risk to sensitive corporate data.
- Positioning finance as strategically important.
- Assessing and explaining the financial implications of new developments.

ACTIONS

As social tools and their use proliferate, the profession will need to adapt its working methods and reassess models in business and in practice. Accountants will need to:

- introduce better controls and education to enforce governance
- develop new skills and attract digital natives of Generation Y
- adapt to meet the changing expectations of the profession.

Digital service delivery

Digital services are transforming business, practice, central and local government, charities and other third sector organisations, by exploiting new IT architectures and technologies to deliver web-based business processes, e-commerce, mobile commerce, and cloud-based software and services using the internet and intranets. Many digital services include key features such as self-help and self-assessment solutions for service users, and use technologies such as chat bots (see page 13, artificial intelligence) to handle initial enquiries and requests for support (rather than, or in addition to, email), offer interactive live chat from websites and portals, and communicate using social media channels such as Facebook and Twitter.

ADOPTION

Accountants are using digital services to provide resources and to access resources. Accountancy practices are offering self-service features, such as online data vaults that clients can use to access statutory and management reports and other material the firm has worked on. Banking, shopping, booking flights and more is being made more efficient for customers and more cost-effective for providers. Regulatory services are increasingly delivered digitally: the eXtensible Business Reporting Language (XBRL) is being exploited to streamline and automate processes by regulators ranging from the Australian Federal Government to the European Insurance and Occupational Pensions Authority.

IMPLICATIONS

As accountants and those they work with and for deliver more products and services electronically, new skills are required and new risks must be addressed.

Opportunities

- Potential to transform efficiency and customer satisfaction.
- Business models can be automated and streamlined.
- Global standardisation.
- The cost of public service delivery and compliance can be minimised.

Challenges

- Digital connectivity is central to cultures and hence business models.
- Robust business cases can be hard to build.
- Lack of interoperability of legacy systems.
- Time taken to develop classifications and use of multiple taxonomies.
- Financial benefits can be hard to unlock.

ACTIONS

As 'digital by default' becomes the norm in more scenarios and sectors, accountants will need to:

- recruit those with the required digital literacy skills and/or develop them
- plan tactically and strategically to deliver competitive advantage
- consider the implications of businesses, advisers, regulators, and others becoming progressively more connected and exchanging data automatically.

Big data

The world creates 2.5 quintillion (10¹⁸) bytes of data each day in the form of barcodes, phone signals, digital images, transactional databases, personal location records, statutory reporting systems, online searches, radio-frequency identification tags, social data, video clips, website visits, and more. Converging technology trends, the shift from analogue to digital, widespread mobile device adoption, internet-connected systems and 'exhaust data' from physical objects (the internet of things) are constantly creating vast amounts of structured and unstructured data. The ability to collate, manage and analyse it effectively can lead to better decisions and generate a competitive advantage for business, and the technology to do this is becoming more accessible and affordable.

ADOPTION

Amazon, IBM and Google are among the organisations using big data to business advantage by targeting sales efforts and personalising products, driving efficiency and quality, and producing higher levels of customer satisfaction and experience. Researchers are exploiting big data in aerospace, broadcast, genetics, manufacturing, retail and transport. Vendors of software for business intelligence, enterprise resource planning, sales management and more are adding the capability to analyse vast amounts of data 'in-memory', and cloud-based platforms are emerging to provide on-demand access to the tools that organisations and individuals need to tap into the 'internet of things' and unlock the power of big data.

IMPLICATIONS

The profession's trademark analysis and problem-solving skills can help accountants to manage the complexity of the vast amounts of data being generated.

Opportunities

- Improve understanding of market conditions, forward planning and risks.
- Potential to increase business effectiveness and lower process costs.
- Transform audit and forensic accounting by improving corporate.
- Level playing field for small businesses and larger organisations.

Challenges

- Shortage of data mining and interpretations skills.
- Knowing which questions to ask to gain insights.
- Affordability, interoperability and standards.
- Obtaining high quality data. Lots of data is not the answer.
- Data security, privacy and other important legal issues.

ACTIONS

As every aspect of business and personal life adds to the volumes of information being amassed, accountants will need to:

- apply their analytical and critical skills to establish a broader and more strategic remit
- explore ways to manage the increasing volume and complexity of the data to be analysed and audited
- help other parts of the business to better analyse and exploit data
- investigate new ways to estimate cost and return on investment.

Payment systems

The internet has become both a centre and a platform for commerce and this is reshaping payment systems across the world. Changes include moves to phase out cheques and a decline in the rate at which the use of credit and debit cards increases. But the most significant change to payment systems has been the rise of electronic banking – and numerous associated payment platforms. Services offered by traditional banks are increasingly accessed online from internet-connected fixed and mobile devices; statutory payments must increasingly be made electronically; payment options using mobile phones are proliferating; businesses and consumers have a myriad of ways to make and accept payments for goods and services.

ADOPTION

E-commerce features are increasingly being built into software and e-banking is following: even entry-level accounting systems now automate links with bank accounts. Consumers and businesses are exploiting pre-paid smart cards and mobile phones as 'electronic wallets' using services such as Barclays (Pingit) and the start-up Square. Affordable access to mobile phones has enabled new players to introduce m-banking services in developing economies. Alternative online payment platforms are using virtual currencies such as Bitcoin and the Linden Dollar, and to peer-to-peer (P2P) lending sites such as Funding Circle and Zopa are increasing routes to finance. Not all emerging 'financial services' are regulated: governments have been slow to act.

IMPLICATIONS

The speed and magnitude of change is disrupting existing business models and ways of working while creating huge new opportunities and challenges.

Opportunities

- Increased levels of transparency in transactions can change business and the role of finance professionals.
- Potential to overcome persistent market failures in business financing.
- Simplified reconciliation process can save time and money.
- Full automation of transactions.

Challenges

- New payment providers operate outside existing regulatory frameworks.
- Increase in number and value of transactions will increase fraud.
- Lack of interoperability between systems.
- The demise of some existing payment systems.
- A move away from traditional notions and concepts of money and currency.

ACTIONS

Over the last decade new systems have been introduced while older systems have not been eliminated. Accountants have a valuable role to play in simplifying and streamlining the resulting complexity and fragmentation and reducing costs. Accountants will need to:

- acquire new skills to adapt and exploit new money paradigms and methods of exchange
- use their experience and insight to innovate current systems and adapt to new and emerging payment systems
- position themselves as advisers and guides as P2P platforms reduce dependency on banks
- develop expertise and guidance on areas such as online and virtual payments and their taxation.

Cyber security

The world has become reliant on computers and digital personal and business information. This has exposed individuals, organisations and entire countries to significant threats, and these must be managed as new forms of cyber-terrorism, cyber-crime and cyber-fraud that are emerging. With products and services increasingly provided, sourced and accessed online, the security of sensitive personal and corporate data and systems is vital if cyber attacks are not to damage operations and reputations. Theft of digital information has become the most commonly reported fraud, surpassing physical theft, and recent research indicates that the relative insecurity of small and medium-sized enterprises is making them a growing focus for cyber attacks.

ADOPTION

As internet use has increased, the tools to manage cyber security and to protect against deliberate attacks and accidental loss of data have become widely available – and affordable. Those at risk have boosted spending on cyber security and introduced policies and procedures, but these must be regularly reviewed to ensure their effectiveness against new threats. A recent ACCA and IMA member survey found 60% of respondents taking some measures against cyber attacks: large organisations such as the Big Financials and the Big Four were more likely to take steps to mitigate cyber-crime risks, and initiatives appear to be prompted by a feeling that risks are becoming more plentiful, threatening and costly.

IMPLICATIONS

In the future most indicators signal that cyber attacks will become more complex, more severe, and more difficult to prevent, detect, and address.

Opportunities

- Accountants can be crucial to identifying, assessing and mitigating the risks.
- Constant monitoring/updating defences can reduce risk and costs.
- Internal audit can provide assurance on controls and policies to govern data privacy and security.

Challenges

- CFOs and the finance function need to act as guardians of data.
- Miniaturisation. Memory and processing chips too small to see with the naked eye will be embedded into objects such as jewellery as 'smart dust' with the capacity to constantly collect and transmit information.
- Further into the future, beyond 2025, biotech-engineered bacteria will also be able to contain electronic circuits. If they are made capable of reproduction, they could become impossible to avoid – and eliminate privacy and security.

ACTIONS

Today's mostly reactive security models give cyber criminals advantages that they quickly exploit. To counter the evolving cyber threat accountants will need to:

- become more proactive
- take an integrated approach to cyber security that reflects their business and risk profile
- regularly review security procedures in light of new and emerging threats and risks.

Robotics

A robot is a system that contains sensors, control systems, manipulators, power supplies and software, which all work together to perform a task or series of tasks. Science fiction has equipped us with expectations of a physical body too, and many robots do have one, but the emergence of software agents known as 'bots' has created some room for debate about what constitutes a robot (see page 13, artificial intelligence). Basic characteristics include the ability to: power itself, using sources such as a battery, light, electricity and biofuel; move around its environment; sense its surroundings; digest information and make decisions.

ADOPTION

Forget the androids in Terminator and Star Wars. Being humanoid in appearance or behaviour is not necessarily helpful to the vast majority of robots, which are being designed and used to do work that is too boring, dangerous, or demanding for humans, and work that requires levels of precision and consistency of standards that are beyond most people. As they have become more cost-effective the use of robots has become commonplace in industries ranging from medicine and manufacturing to structural engineering and space exploration. Online 'bots' are being used to offer advice on finance, pensions, and insurance.

IMPLICATIONS

As robotics evolves and converges with other emerging technologies a new world of ethical, financial, practical, and operational possibilities will emerge.

Opportunities

- The capacity to improve our personal and professional lives.
- Separating skill and expertise from the people and professionals who possess it.
- Human brakes and overrides are needed.

Challenges

- Robots are only as smart as their designers – today.
- Self-learning systems make progressively higher-level judgement calls.
- Where accountancy is most rule-based it is easiest to automate.

ACTIONS

The finance profession will not be alone in needing to adapt its working practices, but it will need to develop new ways to measure value and success. Accountants will need to:

- explore and anticipate the possibilities and their need for regulation
- consider the impact on management accounting and control systems
- devise new methods for measuring robot performance and return on investment.

Augmented and virtual reality

Reality is not what it was. Augmented reality (AR) can enhance our perceptions of the real environment by overlaying images of it with sensory input such as sound, graphical overlays, video and various other types of data. Technology can also simulate our physical presence in virtual reality (VR) worlds where we can interact online: some of our experiences of virtual worlds can be largely visual and aural with simple interfaces such as keyboard, mouse and headphones, or they can be much more immersive, using devices such as wired gloves and head-mounted displays to overlay and augment our perceptions.

ADOPTION

Nanotechnology is being used to make tiny objects (100 millionth of a millimetre or less) that can augment reality: such as contact lenses with overlays and a Braille keyboard with refreshable soft cells that will improve interaction with computers. Apple is among those developing technology to make our mobile use of AR more interactive. VR has become essential in industries such as automotive, oil and gas, to the visualisation of complex processes. Accountants are using the virtual world Second Life to recruit trainees, attract clients and develop new lines of business, and holding meetings in online role-playing games such as World of Warcraft.

IMPLICATIONS

As virtual experiences become more immersive and interactive, accountants will face new opportunities and new challenges.

Opportunities

- Make better sense of financial data using visual, aural and special immersion.
- Apply VR to areas of accounting and finance.
- Alternative approaches to business activities and development.

Challenges

- The perception of AR and VR as digital gimmickry.
- Cherry-picking the technologies that have the most potential.
- Assessing the financial case for and against research and development and adoption.
- Identifying and managing new areas of risk.

ACTIONS

The profession will need to prepare for changes in areas ranging from education, through customer service to data processing and analysis. Accountants will need to:

- explore new ways to attract talent and deliver and access training
- develop new approaches to measuring and analysing costs and return on investment
- consider new ways to conduct business/enhance services by applying AR.

Artificial intelligence

Artificial intelligence (AI) describes a machine or software that can demonstrate behaviour indistinguishable from that of the human brain. This is not yet possible but there are many examples of software that can demonstrate limited 'intelligence' (depending on how you define this). Most of us have used software that can emulate the decision-making processes of an expert: lots of software now has expert knowledge built in and the capacity to 'learn' how to improve its own processes and performance. The internet is awash with software agents (bots) that mimic human behaviour as they make independent decisions, learn and interact with each other.

ADOPTION

Accountants increasingly rely on the expert knowledge built into software in a range of scenarios. Auditors use smart software to automate parts of the auditing process, and there are other specialist applications to help with compliance in areas ranging from financial reporting to international tax. E-commerce businesses are using AI chat bots to gain attention, engage users, and to act as sales people, as well as FAQs and support agents: the bots use sophisticated algorithms to interpret natural language questions and then deliver answers using online chat or computer-generated voice – they even integrate back into accounting, CRM, and inventory systems.

IMPLICATIONS

Smart systems, bots and other AI tools can deliver benefits in business and practice but, they can also create opportunities and challenges for accountants.

Opportunities

- Automating routine and repetitive tasks and processes.
- Replacing humans with software-based entities.
- Improving compliance and decision-making.
- Delivering focussed services more efficiently and effectively.

Challenges

- Deciding when to use professional judgement/rely on software.
- Progressive de-skilling of the accountancy profession.
- Managing expectations.
- Self-learning systems could become more effective than expert professionals.

ACTIONS

As AI technology and expert systems become more commonplace accountants will need to become more adept at monitoring, assessing and exploiting them. Accountants will need to:

- stay informed and know what is possible
- assess the potential to automate tasks and procedures
- up-skill to take advantage of the potential to focus on higher value work.

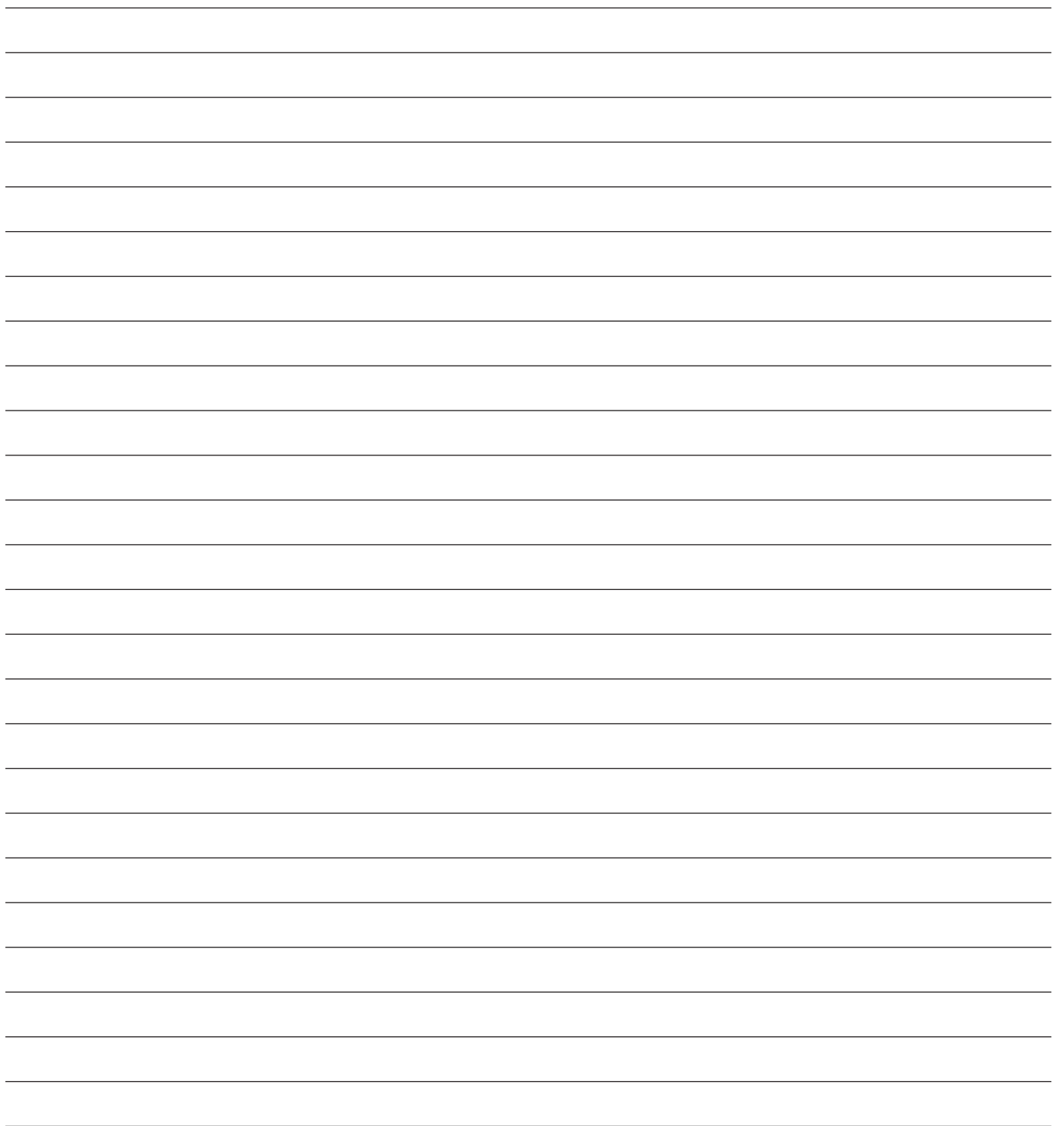
Talking points

At the moment it seems clear that these 10 technologies are coming together to create the 'new normal'. Accountants have a significant role to play in this increasingly connected and interconnected ecosystem. The internet and cloud-based technology resources are reshaping myriad aspects of business: from the way we finance, resource and develop new and existing enterprises, to the way we create, buy and sell products and services. Nothing in the future is certain, and the unforeseen interactions between these technologies promise to be both interesting and challenging.

This document does not aim to make predictions, but rather to stimulate discussion about a broad range of emerging and converging technologies and their potential to influence finance professionals. The following propositions are based on available, established and emerging technologies, and the ways in which they could potentially impact on the finance profession over the next five to 10 years and beyond.

THE IMPACT OF TECHNOLOGIES ON THE FINANCE PROFESSION

- 1. By 2015 every accountancy firm will give clients an app they can use to access their business/accounting data from a mobile device such as a tablet or smartphone.**
- 2. Accountants will need to re-skill to retain their emerging role as the gatekeeper of corporate data.**
- 3. The profession must develop new ways to measure and value technology costs and benefits for the world of cloud computing and social networking.**
- 4. The accountancy profession will shrink as software vendors build progressively more finance expertise into self-learning products and services.**
- 5. The CFO of the future will need to know as much about technology as they do about financial management.**
- 6. Unless accountants embrace technology they will follow the dinosaur into extinction – individually and as a profession.**
- 7. By 2020 audits may well be real-time. Regulators will conduct them automatically pulling data in from business systems and sensors embedded in everything – from stock to livestock and even human beings.**
- 8. If accountants do not position themselves as subject matter experts on emerging trends such as crowdfunding and new payment platforms then other professionals will.**
- 9. Accountants must exploit emerging technologies to attract talent and to develop and manage existing talent.**
- 10. By 2025 all digital data will be available to everybody.**



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