IT FACULTY PUBLICATION

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JULY/AUGUST 2017

Chartech

BUT SERIOUSLY...
WHY IT'S IMPORTANT NOT TO IGNORE CYBER SECURITY

THE BLAME GAME
IS IT POSSIBLE TO HOLD TECHNOLOGY ACCOUNTABLE?

The future is intelligent

How artificial intelligence will lead IT and accountancy in challenging, exciting directions

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July/August 2017 Issue 210

AI on the march

In the same way that technology seems to have moved centre-stage in the last few years, it seems that artificial intelligence (AI) is moving to the front of that stage. Encompassing a number of terms, including AI, machine-learning, neural nets and robotic process automation (RPA), our recent report (*Artificial Intelligence and the future of accountancy*) aims to take readers through all of the terminology and explain how AI is evolving in our space.

The timing of the report is fortunate. We are having more and more conversations with different stakeholders about the impact of AI on the profession. Our report outlines the positive effect that AI can have on the profession in the short to medium term, with humans and machines working together ('turbo-charging accountancy'). In the longer term we do see more profound change and an opportunity to re-evaluate the value and purpose of the profession. In this special AI issue of *Chartech*, Kirstin Gillon outlines her findings in more detail on page 14.

The report mentioned above was launched to coincide with a visit from professor Moshe Vardi, an expert in AI and professor in computer science at Rice University, Texas. Moshe was less confident than us about the impact of AI more generally, and noted its negative impact on lower-skilled members of society (you can read his viewpoint on page 16). We also held a roundtable with AI specialists, with some disagreement over the timescales but consensus about the need for training, and ran a livestreamed event with the professor going through some of the issues and questions raised by members on social media (watch it at tinyurl.com/CH-Livestream).

Our future work in this area will concentrate on building a clearer picture of where this technology will affect the profession, the implications for skills of students and members, and how it will fit with regulators and standard setters. We have already started to look at the impact of AI on audit, at both the top end as well as lower down. We are also working with the Business & Management Faculty to understand how AI and RPA is impacting finance departments. Our report includes other areas that are already being affected.

This has attention at the top level in ICAEW. I have recently returned from ICAEW's annual Council Conference, where the dominant theme was technology – equipping our students and members to be effective in this new age and ensuring the profession continues to be of value in 2030.

If you have experience of using this technology, or would like to know more, please do get in touch with us.

Richard Anning
Head of faculty

To comment on your magazine, please email publishing@icaew.com

ICAEW

IT Faculty

Jeremy Boss
Chairman
T: +44 (0)7791 293 319
E: jeremy.boss@btinternet.com

Nicola Granger
Deputy chairman
T: +44 (0)7464 652 779
E: nic.granger@ogauthority.co.uk

Neil Christie
Vice chairman
T: +44 (0)1753 471943
E: neil.christie@iomart.com

Richard Anning
Head of IT Faculty
T: +44 (0)20 7920 8635
E: richard.anning@icaew.com

Kirstin Gillon
Technical manager
T: +44 (0)20 7920 8538
E: kirstin.gillon@icaew.com

David Lyford-Smith
Technical manager, IT & the profession
T: +44 (0)20 7920 8643
E: david.lyford-smith@icaew.com

Mark Taylor
Technical manager, technical innovation
T: +44 (0)20 7920 8476
E: mark.taylor@icaew.com

Tracy Gray
Services manager
T: +44 (0)20 7920 8526
E: tracy.gray@icaew.com

Contact details
IT Faculty
ICAEW
Chartered Accountants' Hall
Moorgate Place
London EC2R 6EA UK
+44 (0)20 7920 8481
itfac@icaew.com
icaew.com/itfac

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71-73 Carter Lane
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NEWS & EVENTS

Top: Moshe Vardi speaks on AI at the ICAEW Europe Office event. Inset: Kirstin Gillon researches big data in China

THE IT FACULTY AROUND THE WORLD

Recently staff from the IT Faculty have undertaken a range of activities outside the UK. This work helps us gain a better understanding of how IT is being used in organisations, while at the same time allowing us the opportunity to promote ICAEW and the IT Faculty.

Richard Anning travelled to the ICAEW office in Brussels to listen to their annual lecture by professor Moshe Vardi on the effects of artificial intelligence (AI). The following day the IT Faculty hosted an AI roundtable and live video hangout with professor Vardi at Chartered Accountants' Hall in London. You can view a recording of the hangout at tinyurl.com/CH-LiveHangout

Kirstin Gillon travelled to Kenya to present a well-received keynote session on the impact of AI and automation on the future of accountancy, at the Institute of Certified Public Accountants of Kenya's annual seminar. While in Kenya she also presented to a group of students at Oshwal College and met separately with a number of members. To top it all off, she appeared on National TV talking about the effect of AI and automation. Kirstin also presented at an event in Prague, held to debate AI with leading figures from the profession in the Czech Republic. You can read more about AI on pages 14-19.

The explosion in the use of big data has led us to China to understand the impact of vast amounts of data in a rapidly growing economy. This visit forms part of a larger piece of work, which you can read about at tinyurl.com/CH-BigChina

David Lyford-Smith visited Le Cercle de l'Union Interalliée in Paris, where he presented on the impact of blockchain on the finance profession.

Visit our blockchain hub at icaew.com/blockchain

THIRD TECH ESSENTIALS SUPPLEMENT OUT NOW

Following on from the first two Tech Essentials supplements about GDPR and data analytics, mailed with this issue you'll find our latest publication on blockchain.

Ahead of a faculty report due out later in the autumn, the guide sheds light on this exciting new area of computing that has been developed well past the use envisaged for the cryptocurrency known as bitcoin. Blockchain is already being looked at to transform finance disciplines including audit, as well as being deployed in the verification of objects such as precious stones, fine art and wine.

There are fascinating business case studies, easy-to-follow explanations of what blockchain is and how it works, plus an indispensable glossary, penned by IT Faculty technical manager David Lyford-Smith, to help you navigate the unusual terminology accountants are likely to start encountering in the coming months and years.

Next issue, you can look forward to the fourth Tech Essentials guide – an updating of our ever-popular *10 Steps to Cyber Security*.

Email itfac@icaew.com if you have missed any of our guides so far.

NEW OFFICE HOLDERS

Following the AGM in May, three new office holders were elected:

Jeremy Boss (chairman) is a chartered accountant with over 20 years' experience as a chief information officer and a digital leader working at board level.

Jeremy is a non-executive director at the DVLA and the Royal United Hospitals Bath NHS Foundation Trust. He also formed his own company to provide insight to organisations on the opportunities from digital services and managing risks in the cyber age – Boss Cyber Limited. Jeremy is currently the chairman of the Audit Insights working group on cyber security, and he also represents the IT Faculty as a member of Council.

Nicola Granger (deputy chairman) gained an honours degree in business information systems before undertaking a number of accountancy roles in both the private and public sector. Currently she is director of corporate and chief financial officer of the Oil and Gas Authority and has been a member of the faculty committee since 2013.

Neil Christie (vice chairman) is the managing director of the IaaS division of the iomart Group, one of the UK's largest consultancy and infrastructure organisations providing hosting solutions.

Neil provides commercial and technical consultancy to businesses looking to undergo digital transformation programmes to improve the delivery of software to their staff and clients. He has written a number of guides as a basis for providing a head start for organisations looking to modernise the way in which they deliver their software applications.

IT FACULTY TRAINING AND WEBINARS

2017 WEBINARS

10 steps to cyber security for the smaller firm

17 October 2017

A lot of small organisations struggle to understand how they should approach cyber security. Mark Taylor will discuss the 10 steps to good cyber hygiene. The webinar will also provide you with the opportunity to ask questions about cyber security.

Financial modelling using Excel – the hows and whys

19 October 2017

Liam Bastick will highlight the 'do's and 'don't's of setting up a financial model. The webinar will include: layout, formats vs styles, the importance of units, key issues with number formatting, hyperlinking and creating a workable template.

Charts and graphs in Excel

7 December 2017

Make the most out of your charts and graphs in Excel. Excel trainer John Tennent will explain tips on every aspect of producing charts, and will look at: when and how to use charts, producing complex chart combinations, analysing chart data, and how to present data visually to maximum effect.

The webinar will be presented within Excel, showing you exactly where each option lies and how to use it in practice.

EXCEL ONLINE TRAINING

Do you consider yourself a competent Microsoft Excel user? Have you ever had any formal training or have you picked it up by trial and error, reading or watching online tutorials and talking with colleagues? Excel and Advanced Excel online training courses are part of your IT Faculty membership. You can formally assess your level of spreadsheet expertise and improve your skillset using personalised online training. This training is available for beginner, intermediate or advanced Microsoft Excel users through two comprehensive online training courses. Find out more and start your training today.
icaew.com/excel

EXCEL COMMUNITY MEMBERSHIP

Did you know that as an IT Faculty member you automatically have access to all the member services provided by the Excel Community? Watch our webinar recording showing what is available to you – including the comprehensive webinar archive and the hints and tips provided by our range of experts. Not forgetting the two suites of Excel online training. Watch a demonstration of how to make the most of the online facilities and discover how to get the best from the Excel online training.
icaew.com/excelwebinars

WEBINAR ARCHIVES

Don't forget, you can access the recordings of our previous webinars via our webinar archives. Topics include: Keeping safe in the new digital tax world; The use of IT in audit; Secure client communications; Risks in models; Excel top tips; and minimising spreadsheet errors.
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The mpg figures quoted are sourced from official EU-regulated test results (EU Directive and Regulation 692/2008), are provided for comparability purposes and may not reflect your actual driving experience.

BIK values were correct at the time of printing and are based on taxation rates for 2017/18 tax year. P11D value is the sum of RRP (plus VAT) and number plate charge (£25). Options available at additional cost.

BYTE SIZE

LESSONS FROM IOT SUCCESSES

New research from Cisco suggests that the Internet of Things (IoT) might not be the panacea that many companies hoped. A survey of 1,845 IT and business decision-makers across the US, UK and India, in companies implementing and/or that had completed IoT initiatives, found that 60% of IoT projects fail to get past the proof-of-concept stage.

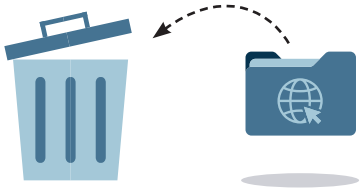
Moreover, only 26% of companies in the survey felt able to say they've had an IoT project they would call a total success, and a third of all completed IoT projects were not considered a success.

Some of the most important factors in IoT project successes are human rather than technological. The study found that culture, organisation and leadership were all critical. Indeed, collaboration between IT teams and the business side was the most important success factor cited by 54% of respondents, while having a technology-focused culture was seen as key by 49%.

The research also found that IoT projects often proved more difficult to achieve than expected with 60% saying this. The most significant challenges people reported were: time to completion, limited internal expertise, quality of data, integration across teams and budget overruns.

Even so, the survey found real benefits – 73% said they are using data from completed projects to improve business. The top three benefits were improved customer satisfaction (70%), operational efficiencies (67%) and improved product/service quality (66%).

It might sound surprising, but improved profitability was cited as the top unexpected benefit (39%).



60%

OF IOT PROJECTS FAIL TO GET PAST THE PROOF-OF-CONCEPT STAGE

DATA PROTECTION RULES TOUGHEN UP

There is less than a year to go until the General Data Protection Regulation (GDPR) comes into force in the UK. It will apply from 25 May 2018 and come into force regardless of the nature of the UK's relationship with the EU. It will apply to any organisation that continues to process data about individuals in the context of selling goods or services to them.

The faculty recently released its tech essentials guide, *The Essential Guide to GDPR* (available at tinyurl.com/CH-ITF-Online). This contains all you need to know about the regulation and what you need to do.

On the back page, there is a cut-out-and-keep guide to help you prepare, as well as some useful links. The Information Commissioner's Office also has a range of information available to organisations, accessible from its website at tinyurl.com/CH-GDPR-Reform

In particular, look out for the links to the overview of GDPR, the checklist, a downloadable booklet, *Preparing for the General Data Protection Regulation (GDPR) 12 steps to take now*, and a video message from Information Commissioner Elizabeth Denham.

Our resource centre can be found at icaew.com/gdpr

By **Sandra Vogel**
Freelance IT writer
sandra@svogel.com

ARE YOU BEING UNKNOWINGLY TRACKED?

Why do some phone apps request access to your handset's microphone when they don't actually facilitate voice communications? Perhaps they're using ultrasonic tracking.

This technique uses sounds that aren't audible to the human ear. They can be transmitted from beacons in store, billboard ads, websites, TVs and more – anything that can transmit sound.

It could be used for location tracking – for example by advertising beacons, with a view to targeting and tailoring advertising. Or perhaps it could identify individuals who might think they are using services anonymously, for example Bitcoin and Tor users.

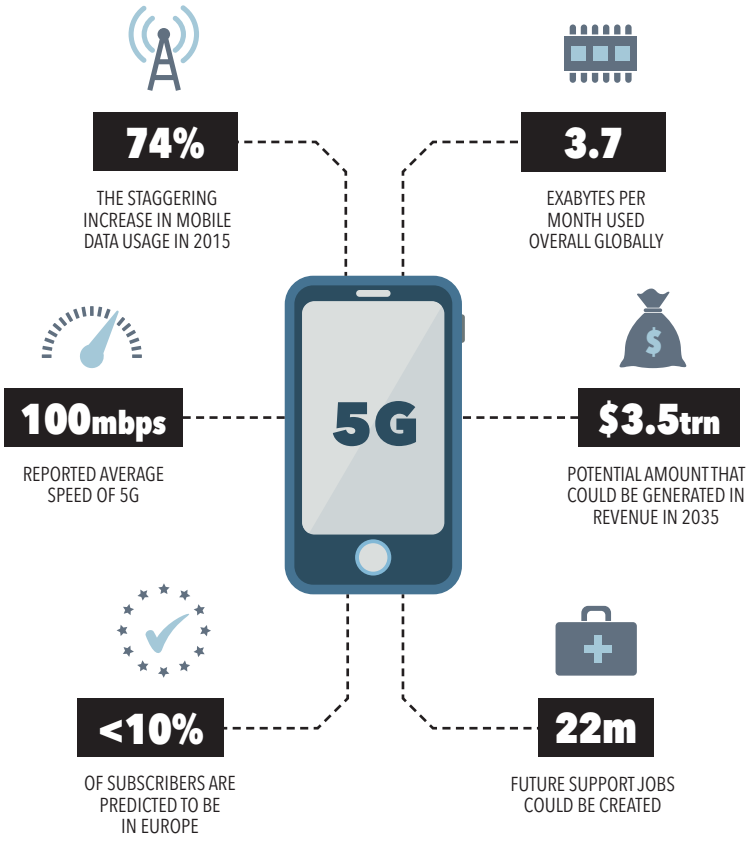
According to a paper, *Privacy Threats Through Ultrasonic Side Channels on Mobile Devices*, there has been no systematic investigation into its prevalence or privacy implications. The paper is a fairly technical, but highly illuminating, read (tinyurl.com/CH-Ultrasonic).

FORGET 4G, THE NEXT ADVANCEMENT OF MOBILE DATA IS COMING

Mobile data use is soaring, but what happens when 4G can no longer cope? Step up, 5G.

5G has been designed to meet rapidly increasing data handling needs and connect more devices, pooling bandwidth to boost range and speed. According to the National Infrastructure Commission: "5G means ultra-fast, ultra-reliable, ultra-high capacity transmitting at super-low latency." You can read their reports at tinyurl.com/CH-NIC-Future

A Qualcomm-led study claims that by 2035, when 5G's full economic benefit should be apparent across the globe, the industry could produce up to $12.3trn worth of goods and services, all enabled by 5G. It predicts that 5G will boost real global GDP growth by $3trn cumulatively from 2020-2035 – roughly the equivalent of adding an economy the size of India.



CONTACTLESS DEBIT CARD PAYMENTS ON THE RISE

Cash looks set to lose its spot as our favourite payment method to debit cards by the end of 2018 according to the trade association for the payments industry, Payments UK. But that doesn't mean cash is likely to disappear any time soon. Payments UK expects it will still be used for 21% of all payments made in 10 years' time.

But, it is the rise of debit cards that is the real story here. By 2018, says Payments UK, 13.4 billion debit card payments are predicted, of which one in three are expected to be contactless. Cash is expected to be used for 13.3 billion payments in 2018, meaning that for the first time cash won't be the most frequently used payment method.

Read the free 2017 summary report at tinyurl.com/CH-PayUK

NEW HEADPHONES ALLOW YOU TO LISTEN TO YOUR PAST

A new concept of headphone technology could create a kind of sonic map, as it will allow people to replay conversations, music and ambient noise from the past.

The technology is a collaboration between Fujitsu and Yamaha, and is currently known only as Sound Innovation. Comprising of a pair of wireless earbuds, this product has built-in GPS, Bluetooth and a microphone. Sound recording will start automatically and be uploaded to a cloud-based artificial intelligence platform via your smartphone.

The general idea is to enable people to revisit locations and be able to hear what you heard there in the past. As all sounds are geo-tagged, your sonic memories will play automatically when you revisit that location wearing the earbuds.

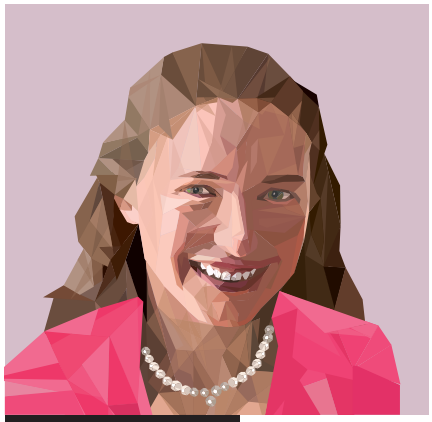
Developers are also looking at introducing additional sensors that would enable the earbuds to sense how someone is feeling and start playing appropriate audio. However, the concept is still in very early stages, so it will likely be a long while before any of this technology could be available to the ordinary consumer.

OFCOM PROPOSALS TO LEVEL FIBRE PLAYING FIELD

Ofcom has set out a series of proposals aimed at broadening out access to the Openreach network of telegraph poles and cable tunnels to premises, in the interests of making it cheaper and easier for competing providers to deploy fibre broadband to homes and offices.

There are five main proposals: providers should be able to lay fibre using BT's ducts and poles as easily as BT itself, and the cost to BT for providing this access should be spread across all users; Openreach must repair faulty infrastructure and clear blocked tunnels for providers to access them; companies can lay fibre for consumers and large businesses, provided the purpose of the network is primarily to deliver broadband to homes and small offices; BT should ensure capacity is available on its telegraph poles for additional fibre cables that connect buildings to a competitor's network; and Openreach will continue to develop a digital map of its duct and pole network so competitors can plan new networks.

This is part of a wide-ranging piece of work, Ofcom's *Wholesale Local Access Market Review* (tinyurl.com/CH-Ofcom-Rev).



JESSICA PILLOW

GOING ON RECORD

How losing track of time can help you be more in control of your workflow

When seeking time recording software, you first need to decide which method of time recording you are going to use.

When I first started my practice in 2009, I religiously recorded every six minutes of my time during the working day, as drummed into me from my training days. However I felt trapped by the timesheet into trying to do every job as quickly as possible rather than focusing on client satisfaction. Plus I got frustrated at the amount of time that the timesheets took to complete each day, especially as I frequently jumped between numerous different clients all day long.

FIXED FEES APPROACH

So I tried to step back from timesheets and work out their value compared to the cost of completing them. I looked at our invoices for standard work that we were doing as a practice and found that the billing rates were all clumped together so there was a fairly standard charge for doing repeating work. Hence we moved to fixed-fee billing. I couldn't see the need for time recording anymore since it wouldn't change the end price we charged to clients.

Thus we took the drastic step of removing time sheets altogether, which was great for staff morale but less great for managing the practice. Also, cloud software came along so our role moved further into advisory one-off work rather than just compliance repeating work. We gave over and above as we were driven by customer satisfaction and service levels rather than time taken, but our pricing didn't keep up with this. However, you have to make enough profits to keep the practice going otherwise you're no use to your clients either!

So we've come back to a halfway point where we use time sheets as a management tool: to ensure that we are covering our costs and to identify when we need to talk to the client about a higher fee or a different way of working with them; and to work out how much capacity we've got in the practice to help us plan when we need to employ more resources to meet customer requirements.

We use timesheets as a management tool: to ensure that we are covering our costs and to identify when we need to talk to the client about a higher fee or a different way of working

BEST OF BOTH

So we're looking for time recording software to track time spent on our client tasks only, and ideally we want to record it at the same time as marking the progress on the task within our practice management system. I never want to see my team wasting time at the start or end of the day trying to remember what they did and how long it took – desperately ensuring that their time sheet shows their full working hours!

We need some reporting in order to allow us to compare the number of hours spent on a job compared to the amount invoiced for that job, and to show the average time taken to complete standard tasks so we can identify where tasks are taking longer.

It would be even better if we could start to use this data that we are collecting to help us plan future years' tasks and team capacity, if the time reporting was linked into job planning within a practice management system.

We use time recording within our own mTrio practice management software, but similar time reporting software that works on a task-by-task basis includes MinuteDock, which integrates with Xero. Most of the traditional server-based time recording software works on a full time sheet basis where you fill in your time sheet at the end of the day, or at least in a different screen from the workflow management. ●

Jessica Pillow, managing director, Pillow May chartered accountants

ALAN CALDER

DON'T GO RISKING IT ALL

Despite all the warnings, it seems some people aren't taking cyber security seriously enough. Perhaps the GDPR will change that…

Increasing public awareness of cyber risk hasn't halted the culture of denial – not least in business, where there remains a major disparity between boards' estimations of cyber defences and the capability to mitigate the risks faced.

According to the Accenture survey *Building confidence: facing the cybersecurity conundrum*, large organisations face, on average, more than 100 targeted cyber attacks each year, roughly a third of which are successful.

The effect of these attacks is likely to be exacerbated by the time they are detected – more than 51% of breaches are not discovered for several months and 17% take a year or longer. In spite of this, 70% said cyber security was "completely embedded into their cultures and [was] a board-level concern".

Such misplaced confidence could prove ruinously expensive for businesses when the General Data Protection Regulation (GDPR) comes into effect.

According to the government's *Cyber security breaches survey 2017*, only 26% of respondents "reported their most disruptive breaches externally to anyone other than a cyber security provider". At present only the public sector is obliged to report breaches, but this will change under GDPR from 25 May 2018.

Regulation (EU) 2016/679 – the GDPR – supersedes the EU's 1995 Data Protection Directive (DPD) and replaces domestic data protection laws such as the UK Data Protection Act 1998. It applies to all organisations that process the personal data of EU residents.

Among other innovations, the GDPR will significantly extend the data rights of individuals, and mandates that organisations adopt "appropriate technical and organisational measures" to protect personal data. It also introduces mandatory data breach reporting. The penalties too have been widely reported, including here (see also the Tech Essentials series and icaew.com/gdpr).

As the Information Commissioner Elizabeth Denham observed in her speech to ICAEW in January: "The new legislation creates an onus on companies to understand the risks that they create for others, and to mitigate those risks. It's about moving away from seeing the law as a box-ticking exercise, and instead working on a framework that can be used to build a culture of privacy that pervades an entire organisation."

HOW ARE YOU COVERED?

What is the best way of closing the gap between security and compliance risk? Article 32 of the GDPR states that data controllers and processors should implement "technical and organisational measures" to ensure a level of security appropriate to the risks presented by processing – particularly risks related to "accidental or unlawful destruction, loss, alteration, unauthorised disclosure of, or access to personal data". It also states that "adherence to an approved code of conduct [...] or an approved certification mechanism [...] may be used as an element by which to demonstrate compliance" for secure processing.

ISO 27001 is the international standard for information security management systems (ISMSs), against which organisations can achieve independently audited certification. It provides an enterprise-wide approach to information security that covers people, processes and technology, and depends on regular risk assessment to ensure confidentiality, integrity and availability of information.

Organisations that establish an ISO 27001-compliant ISMS implement controls based on the risks they face, – meaning they shouldn't overestimate their capabilities any longer. I think ISO 27001 certification is the best way to demonstrate compliance with GDPR.

For organisations not implementing ISO 27001 however, certification to the government's Cyber Essentials scheme is a good place to start. The scheme sets out five simple security controls designed to prevent about 80% of cyber attacks.

Another good stepping stone towards GDPR compliance can be found in the Payment Card Industry Data Security Standard (PCI DSS), which specifies 12 security requirements for all organisations that process cardholder data. If you are a merchant under the PCI DSS and are already compliant with this, you can use it as a framework to help meet the GDPR's 'integrity and confidentiality' principle.

Cardholder data is personal data as defined by the GDPR. If compromised, the breached organisation is likely to be liable under both PCI DSS and GDPR.

As the deadline gets closer, boards need to do a lot better to assess their security risks and react appropriately – for their own sake and their clients'. ●

Alan Calder, CEO, IT Governance

BANKING ON THE CLOUD

Tim Fouracre explores the notion of accounting banks and how they could revolutionise the way we manage our finances in the future

Are you using an accounting bank? Of course not - they don't exist yet. I coined the term to describe the intersection between online banking and cloud accounting software in one product. The concept is fascinating, and real accounting banks are just around the corner.

The concept of an accounting bank might appear to be a far-fetched contention, but consider why online banking and cloud accounting software aren't already combined in one single product right now.

The answer, in the first instance, is that it hasn't been possible up to now. But technology and regulation are changing that through a cocktail of cloud accounting software (Clear Books, SageOne and Xero), mobile first challenger banks (Atom Bank, Monzo and Revolut), application programming interfaces (APIs), the Second Payment Services Directive (PSD2), machine learning and Making Tax Digital (MTD).

The challenger banks have made it possible to innovate with banking. In simple terms, most have taken an initial approach of creating a layer on top of existing banking infrastructure. Equipped with a bank account number and sort code and using APIs, the challenger banks are able to carry out day-to-day banking activities such as faster payments, BACS and direct debits.

As the challenger banks are a layer on top of banking infrastructure, it's now possible for them to do interesting things

with that layer, like incorporate cloud accounting software functionality. There is actually a wider opportunity here, bigger than just an accounting bank. The challenger bank approach makes it possible to create literally any software product on top of a bank account.

TOO MUCH LIKE HARD WORK?

A current objection for anyone changing banks is the fact that it's not easy. You usually have to go into a branch, fill in numerous forms, send a signed copy of your ID off in the post and then wait a few weeks. This is changing with the challenger banks. With the likes of Monzo and Revolut - which have ID verification tools built into their mobile app - you can literally sign up for an account in a few minutes and have your card in the post the next day.

Assuming an accounting bank is a possibility and the barriers to signing up are minimal, is there any merit in combining accounting and banking in one single product?

At the heart of an online bank is the cash ledger of debits and credits recording the real flow of payments in and out. And at the heart of cloud accounting software is the cash ledger of debits and credits, which is recording a replica of the flow of payments in and out. There is an overlap in the core underlying data, which first prompted me to consider the concept of an accounting bank.

With the advent of online banking and cloud accounting software over the past decade, small businesses and their accountants have come to expect that bank transactions from Barclays, Metro Bank and Santander will be automatically imported into cloud accounting software like Clear Books, SageOne and Xero.

Supporting the idea for an accounting bank is the user behaviour I have observed from the small businesses using the cloud accounting software Clear Books. The imported bank statement is increasingly used as the primary source of record keeping. Indeed the bank import tool in Clear Books is the most used feature in the whole application.

Each automatically imported bank transaction simply needs to be explained with a contact, VAT rate and account code category. It's a huge time saver for whoever is doing the books. Increasingly, cloud accounting software also recognises repeat transactions and is able to automate the categorisation of transactions, which saves even more time. There is no doubt that online banking and cloud accounting are becoming tightly coupled. If that's the case then is there any point reinventing the wheel by combining these two services into one accounting bank? But, flipping that question on its head, why would you use two products from two vendors when you could just use one? One is simpler, quicker and with an accounting bank, the bank account will always reconcile.

Imagine logging into your accounting bank and all the transactions are automatically coded to the correct account code for you. Bookkeeping as we know it today could become largely automated

GROWTH IN THE DIGITAL AGE

Further innovation will come from machine learning. The fact that the accounting bank is the one true source of transaction data across an entire customer base provides a vast data set and as a result a number of possibilities. The opportunity to automate transaction categorisation is significant. Imagine logging into your accounting bank and all the transactions are automatically coded to the correct account code for you. The accounting bank will be able to leverage advances in artificial intelligence to do this. Bookkeeping as we know it today could become a largely automated task.

These machine learning productivity gains are why I am an advocate of MTD. Yes, on the face of it MTD will require quarterly submissions of data. This is an unwelcome change for many as it means more work for small businesses and accountants, particularly those doing their accounts on spreadsheets, desktop software or using paper records.

My belief is that cajoling UK Plc into the digital age with MTD will lead to a step change in growth for the whole country. If UK Plc was digitised at scale through accounting banks, for example, then the time freed up from rote bookkeeping tasks could be better used by small business owners to grow their businesses and that could have a material impact on GDP.

If this sounds a little too next generation then consider this: according to a recent PwC report, by 2020, millennials will form 50% of the global workforce. These millennials are the small business owners and next-generation accountants who live in the digital age.

An accounting bank won't be for everyone. It wouldn't work particularly well for larger organisations who bank with multiple providers. The ideal customer would likely be a simple micro-business with one bank account and one corporate card - the type of small business that is currently using a spreadsheet and hasn't heard about MTD yet. Or perhaps they have heard, and are worried about what MTD means for them in terms of additional reporting work and accounting fees.

Cloud accounting software has been with us for nearly a decade and is establishing itself as the technology of choice for small businesses. Challenger banks are disrupting banking. Keep an eye out for the two coming together and the next wave of innovation in small business software: the accounting bank. ●

GLOSSARY

- APIs – a set of functions and procedures allowing the creation of applications that access the features or data of an operating system, application or other service.
- PSD2 – Revised Payment Service Directive, which will enable bank customers, both consumers and businesses, to use third-party providers to manage their finances.
- Machine learning – a type of artificial intelligence that provides computers with the ability to learn without being explicitly programmed.
- Making Tax Digital – MTD is a UK goverment initative allowing individuals and businesses to file tax returns using digital means across the internet.

Tim Fouracre,
CEO, Clear Books and an ICAEW IT Faculty Committee member

GETTY

AI AND THE FUTURE OF ACCOUNTANCY

What does AI mean for accountants today and in the future? **Kirstin Gillon** highlights some of the thinking behind the IT Faculty's latest report on AI and the future of accountancy

Artificial intelligence (AI) is in the headlines every day, reflecting developments in areas like medicine and gaming. It has long been a dream of computer scientists (and sci-fi writers), but only recently has the tech industry started to talk seriously about AI becoming part of mainstream business activities. As is typical in the tech world, it's difficult to separate hype from reality.

Machine learning - the main AI field under discussion today - is not new. It means that computers can learn from data, find patterns and predict or classify on that basis. As they are data-driven, the sheer volume of data and computing capacity now available has transformed the power of these techniques.

Companies such as Google, Amazon and Facebook have been at the cutting edge of developing and using machine learning for a number of years. Often, we don't even know it's being used - from search to translation to recommendation engines; the tools just seem more intelligent. But as machine learning increasingly moves into business and accounting tasks, it's important to recognise its real power, as well as the limits and risks.

Machine-learning techniques are so powerful because they can process and analyse enormous volumes of data - in many cases, producing far more accurate and consistent outputs than we can. They also don't rely on pre-defined rules. Because machine-learning models work out the rules themselves, they should be able to get much further into complex business areas than previous technology.

But machine learning needs lots of good quality data, and while it may produce better outputs than us, it is not perfect. We need to retain our critical faculties so that we interpret and use outputs appropriately.

ILLUSTRATION: JACOB STEAD

MOVING UP THE VALUE CHAIN

In reality, the profession is still in the early stages of working out how to use machine-learning capabilities and there are many possibilities. The cloud accounting provider Xero, for example, has talked about using machine learning to automatically code accounting entries, which could significantly improve on existing rules-based approaches. Audit and forensics specialists are looking at how machine learning could help to model 'abnormal' transactions far more accurately, especially when looking at large data volumes. Finance functions are using machine learning-based predictions to inform their revenue forecasting. There is also a great deal of interest in using AI techniques to process and analyse unstructured data, such as text in contracts.

All of these developments enable accountants to do their jobs more efficiently and effectively. AI can provide powerful new decision aids. It also can link with other automation trends to free up accountants' time to spend on more valuable activities.

We encourage accountants to learn more about AI and think about how these capabilities could help them add value, whether through freeing up time or providing insight

So, in the foreseeable future AI is very much an opportunity to move up the value chain - whether spending more time on advisory work, solving complex client problems or helping businesses get more insight from their data.

In many cases this kind of functionality will simply become embedded into accounting and business software so that (as with Amazon) accountants won't even realise they're using it - the system will just seem more intelligent. But many firms and businesses are likely to invest in AI capabilities to solve specific problems, and will need the resources and skills to do so.

Building the right skills across the profession to support machine learning is therefore a key priority. While accountants will not become machine-learning experts, many of them will need to be informed users of systems, with sufficient knowledge to interpret results appropriately. This builds on trends for accountants to develop more skills in data and statistics to support the use of data analytics.

While AI presents many opportunities, we can't avoid some of the longer-term challenges, and in particular the predictions that robots will take over large numbers of jobs. The accountancy profession is often cited as at high risk of being made largely redundant as more complex decision-making is automated. So, should we be worried that AI will take computers so far up the value chain that there won't be anything left for human accountants?

There are very different views about the future, and we don't know how these developments will play out in the next 10, 20 or 30 years with any level of certainty. Furthermore, the future of accountancy isn't an isolated issue - it will be settled in the much broader context of the changing nature of employment across the economy. But we are thinking about the future, and how the profession can be best prepared for change.

Most importantly, we need to be open-minded and not defensive. I often hear the argument that "we'll always need human judgement" and so there will always be a large space for the profession in providing this judgement. But we need to be prepared to challenge these kinds of arguments.

There may well be distinctly human capabilities that can't be replicated by machines - empathy, creativity, storytelling, ingenuity, etc. Computers are also not perfect and human intervention may well be required for a variety of reasons. But in many cases today human judgement is needed because there isn't enough data. In a world of big data and intelligent systems, that need may well largely disappear. So while I'm sure there will still be a role for humans, it may be a totally different one to what we see today.

THE NEXT STEPS

We see AI as an evolving picture. In the short term, we encourage all accountants to learn more about the topic and think about how these capabilities could help them add more value, whether through freeing up time or providing more insight. In the faculty, we will provide advice and updates where this is helpful.

Using AI capabilities in real life will also help us to understand the practical limits and challenges. How much data do you need? How easy is it to use, and what skills do you need? Sharing this experience helps us understand how the roles of accountants are evolving, and the skills they need.

But there are longer term questions and we encourage you all to join the debate about how the profession might develop in the future, as accountants work alongside very powerful systems. Are you optimistic or pessimistic? What are new ways that accountants can add value to clients and businesses? And what are the unique qualities that accountants bring to businesses that can't be replaced by computers?

We welcome views and experiences in this space to help us shape the response of ICAEW and ensure that the profession is well-prepared for change. ●

Kirstin Gillon,
technical manager,
IT Faculty

ARE ROBOTS TAKING OUR JOBS?

People ridiculed the Luddites for opposing technological change that ultimately created new work, but did they have a point? **Moshe Y Vardi** examines the economic indicators for today

If you put water on the stove and heat it up, it will at first just get hotter and hotter. You may then conclude that heating water results only in hotter water. But at some point everything changes - the water starts to boil, turning from hot liquid into steam. Physicists call this a "phase transition".

Automation, driven by technological progress, has been increasing inexorably for the past several decades. Two schools of economic thinking have long been engaged in a debate about the potential effects of automation on jobs, employment and human activity. Will new technology spawn mass unemployment, as the robots take jobs away from humans? Or will the jobs that robots take over release - or even create - demand for new human jobs?

The debate has flared up again recently because of technological achievements such as deep learning, which recently enabled a Google software program called AlphaGo to beat Go world champion Lee Sedol, a task considered more challenging than beating the world's chess champions.

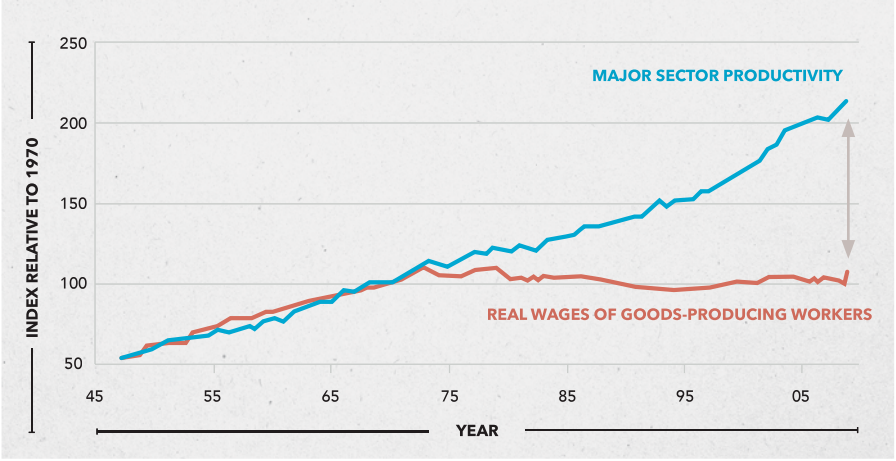
Ultimately, the question boils down to this: are today's technological innovations like those of the past, which made the job of buggy-maker obsolete, but created the job of car manufacturer? Or is there something markedly different about today?

PRODUCTIVITY GAP

Malcolm Gladwell's 2006 book *The Tipping Point* highlighted "that magic moment when an idea, trend, or social behaviour crosses a threshold, tips, and spreads like wildfire". Can we really be confident that we are not approaching a tipping point, a phase transition - that we are not mistaking the trend of technology both destroying and creating jobs for a law that it will always continue this way? This is not a new concern. Dating back at least as far as the Luddites of early 19th-century Britain, new technologies cause fear about the inevitable changes they bring. It may seem easy to dismiss today's concerns as unfounded, but economists Jeffrey Sachs of Columbia University and Laurence Kotlikoff of Boston University argue: "What if machines are getting so smart, thanks to their microprocessor brains, that they no longer need unskilled labour to operate?" After all, they write: "Smart machines now collect our highway tolls, check us out at stores, take our blood pressure, give us directions, answer our phones, print our documents, transmit our messages, rock our babies, read our books, turn on our lights, shine our shoes, guard our homes, fly our planes, write our wills, teach our children, the list goes on."

There is considerable evidence that this concern may be justified. Eric Brynjolfsson

FIGURE 1: PRODUCTIVITY AND AVERAGE REAL EARNINGS



SOURCE: US BUREAU OF LABOR STATISTICS

and Andrew McAfee of MIT recently wrote: "For several decades after the Second World War the economic statistics we care most about all rose together here in America as if they were tightly coupled. GDP grew, and so did productivity – our ability to get more output from each worker. At the same time, we created millions of jobs, and many of these were the kinds of jobs that allowed the average American worker, who didn't (and still doesn't) have a college degree, to enjoy a high and rising standard of living. But... productivity growth and employment growth started to become decoupled from each other" (see Figure 1).

As the decoupling data shows, the US economy has been performing quite poorly for the bottom 90% of Americans for the past 40 years. Technology is driving productivity improvements, which grow the economy, but most people are not seeing any benefit from this growth. While the US economy is still creating jobs, it is not creating enough of them. The labour force participation rate, which measures the active portion of the labour force, has been dropping for some time (see Figure 2).

While manufacturing output is at an all-time high, manufacturing employment is lower than in the later 1940s. Wages for private nonsupervisory employees have stagnated since the late 1960s, and the wages-to-GDP ratio has been declining since 1970. Long-term unemployment is trending upwards, and inequality has become a global topic, following the publication of Thomas Piketty's 2014 book *Capital in the Twenty-First Century*.

Most shockingly, the economists Angus Deaton - winner of the 2015 Nobel Memorial Prize in Economic Science - and Professor Anne Case found that the mortality rate for white middle-age Americans has been increasing over the past 25 years, due to an epidemic of suicides and afflictions stemming from substance abuse.

NEW JOBS FOR OLD?

Is automation, driven by progress in technology, in general, and artificial intelligence and robotics, in particular, the main cause for the economic decline of working Americans?

In economics, it is easier to agree on the data than to agree on causality. Many other factors can be in play, such as globalisation, deregulation, decline of unions and the like. Yet in a 2014 poll of leading academic economists conducted by the Chicago Initiative on Global Markets, regarding the impact of technology on employment and earnings, 43% of those polled agreed with the statement that "information technology

A 2015 study by the International Monetary Fund concluded that technological progress is a major factor in the increase of inequality

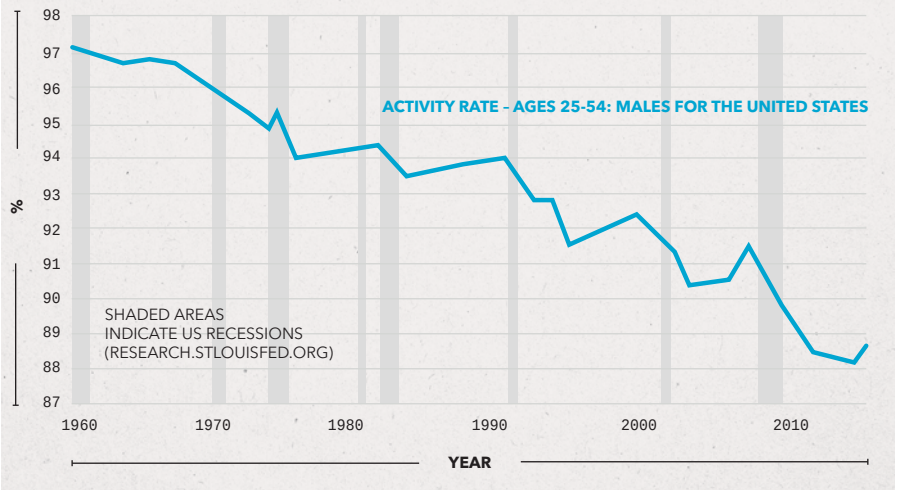
and automation are a central reason why median wages have been stagnant in the US over the decade, despite rising productivity," while only 28% disagreed. Similarly, a 2015 study by the International Monetary Fund concluded that technological progress is a major factor in the increase of inequality over the past decades.

While automation is eliminating many human jobs in the economy, there is no sign that the introduction of technologies in recent years is creating an equal number of well-paying jobs to compensate for those losses. A 2014 Oxford study found that the number of US workers shifting into new industries has been strikingly small: in 2010, only 0.5% of the labour force was employed in industries that had not existed in 2000.

The discussion about humans, machines and work tends to be a discussion about some undetermined point that is in the far future. But it is time to face reality. That future is now. ●

Moshe Y Vardi, professor of computer science at Rice University, US. This article originally appeared on *The Conversation*

FIGURE 2: LABOUR FORCE PARTICIPATION RATE



SOURCE: ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ILLUSTRATION: JACOB STEAD

INTELLIGENT THINKING

As the application of artificial intelligence takes hold across the financial sector, **Richard Kemp** investigates what legal issues this raises

ILLUSTRATION: JACOB STEAD

To make AI an accessible concept, ponder this observation: it's only AI until you know what it does, then it's just software.

Fuelled by exploding volumes of big data - digital data is growing at a compound rate of 60% per year - AI can be seen as the convergence of machine processing, learning, perception and control. Exponential growth in machine processing power has enabled the techniques of machine learning, by which computers learn by example and teach themselves to carry out pattern recognition tasks without being explicitly programmed to do so.

Combining machine learning with billions of internet-connected sensors enables machine perception - advances in implantable and wearable devices, personal digital assistants, connected homes and smart cities. Add actuation - the ability to navigate the environment - to static machine learning and perception and you get machine control - autonomous vehicles, domestic robots and drones.

RECOGNITION PATTERN

Deep learning, a type of machine learning, is worth calling out for particular attention. In Gartner's *Top 10 Strategic Technology Trends for 2017* survey, Gartner vice president and fellow David Cearley said: "Over the next 10 years, virtually every app, application and service will incorporate some level of AI. This will form a long-term trend that will continually evolve and expand the application of AI and machine learning for apps and services."

Deep learning, a machine learning technique, is emerging as AI's killer app enabler. It works by first using large training datasets to teach AI software to accurately recognise patterns from images, sounds and other input data, and then, once trained, the software's decreasing error rate enables it to make increasingly accurate predictions.

Deep learning is the core technology behind the current rapid uptake of AI in a wide variety of business sectors from due diligence and e-discovery by law firms to the evolution of autonomous vehicles. To show how this happens, in October 2016, Microsoft released an updated version of Cognitive Toolkit, its deep learning acceleration software, and provided in its

accompanying blog (tinyurl.com/CH-CogTools) an example (reproduced in Figure 1) of how the toolkit used training sets to increase training speech recognition accuracy.

This pattern – using the machine learning software to reduce prediction error through training and fine tuning, then letting the software loose on the workloads it has to process – is at the core of AI in professional services. It's what's behind the AI arms race in law (standardising componentry of higher-value work like due diligence, e-discovery in litigation, property reports on title, regulatory compliance), accountancy (audit processes, tax compliance, risk) and (coupled with IoT sensors) insurance, for example.

Increasingly rapid adoption of AI over the next five years will bring challenges for law and policymakers as the law struggles to keep up. It's worth remembering a couple of initial dos and don'ts. First, don't anthropomorphise AI: in legal terms, AI is personal property not a person (what you might call the 'I Robot fallacy'), AI systems aren't 'agents' in any legal sense (the 'agency fallacy') and AI platforms themselves don't possess separate legal personality (the 'entity fallacy').

Second, don't be blinded by the glare of the new and do go back to first principles – whether it's regulation or in contract, tort or copyright law.

Data law is now right at the centre of AI. In the run-up to May 2018, when both the General Data Protection Regulation and the Network and Information System Directive take effect, data protection and data security are rising up the business agenda as firms prepare themselves for a new data-centric world. But it's not just privacy and security – legal rights and duties around data licensing and data sovereignty are also becoming more important.

QUESTIONS OF LIABILITY

Regulators around the world are grappling with how to address AI. What happens when an autonomous car and bus collide? Or when smart contract systems incorrectly record a negotiated mortgage or personal loan agreement? Or when AI-enabled due diligence misses the point? The emerging consensus on approach involves a number of steps: establishing governmental advisory centres of AI excellence; adapting existing regulatory frameworks to cater for AI where possible; and (perhaps) some system of registration for particular types of AI.

Increasingly rapid adoption of AI will bring challenges for law and policymakers as the law struggles to keep up

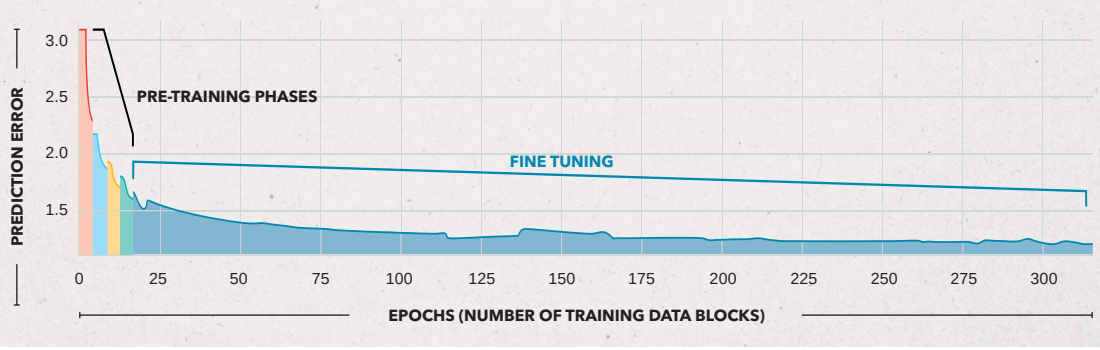
We're likely to see rapid and complex developments around legal theories of liability. For professional services firms, these are unlikely to be as acute as, say, for autonomous vehicles (ethical, liability and communications issues around autonomous vehicle accidents will figure large over the next few years) but important legal issues still remain to get worked out as AI becomes the norm. What is the balance of rights and responsibilities between the firm and its AI software provider and cloud service provider? What is negligence (breach of the common law duty of care) in AI terms? And how will the state and industry regulators intervene to manage AI and AI liability?

At the moment, using AI in professional services in the mid-market and above isn't easy: getting the right input data, getting the dataset tuning right, and then correctly applying the trained dataset to the production workload – none of this is plain sailing. Contractually, in terms of the statement of work between firm and client, the accent should be on collaboration and setting realistic expectations and outcomes.

Much of the work is currently effectively in beta rather than at scale, and this will be reflected from the firm's point of view in lower service (and likely lower fee) levels, with the expectation that as more experience is gained so service levels and fees will rise. Firms' professional indemnity insurers are getting more interested in the risks that arise using AI in professional services, so an early conversation to let them know and get advance notice of anything they particularly care about may not be out of place. ●

Richard Kemp,
Kemp IT law

FIGURE 1: MICROSOFT COGNITIVE TOOLKIT: INCREASING SPEECH RECOGNITION ACCURACY BY EPOCHS OF TRAINING



SOURCE: MICROSOFT

SOUND FX

Excel's functions can boost your processing power, but all too often their use causes significant errors. **Simon Hurst** guides you through the pitfalls

Almost all Excel users will have used at least one Excel function, even if it is only a SUM() function created by the AutoSum command on the Home or Formulas Ribbon tab. Functions significantly extend Excel's capabilities and a good knowledge of the range of functions available, and what can be done with them, is essential to the efficient and effective use of Excel. However, as useful as functions can be, they can also be the cause of significant errors in Excel workbooks.

NO WORKINGS

It's worth considering how functions work. You choose the function that you want to use, then feed between 0 and 255 inputs, or arguments, into the function. The function then performs its particular calculation on those inputs and spits out an answer. Generally, there is nothing to show you the details of how the calculation has been performed or allow you to check stages of the calculation. This isn't usually a problem, as long as you fully understand how the function works and what the values are that you need to enter. However, for many functions, the arguments are very specific and failing to understand what the function requires can lead to a wildly incorrect answer. As an example, we will look at the PMT() function. This function calculates the payments on a mortgage-type loan. The function needs to know an interest rate, the number of payments to be made and the initial value of the loan. We will set up the details of our loan and use PMT() to work out our monthly repayments (see Figure 1).

Here, we are entering our function using the keyboard. The prompt shows we need to enter rate, nper (number of periods) and pv (present value) with two further, optional, arguments shown in brackets. We might select B1 as the cell containing the rate, B2 for the number of periods and B3 for the initial amount. Were we to do so, PMT() would calculate our monthly repayment as -8,971.07. This is clearly incorrect. The fact that it's a negative value isn't the concern. If we enter our loan amount as positive, the repayments should logically be the opposite sign.

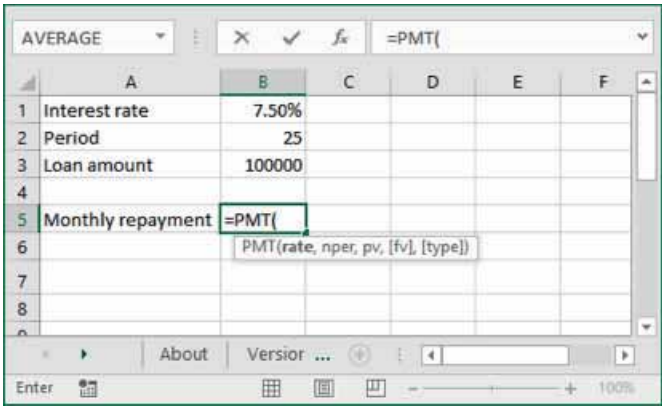


Figure 1

INSERT FUNCTION

Let's now repeat the process, but this time using the Insert Function screen (see Figure 2).

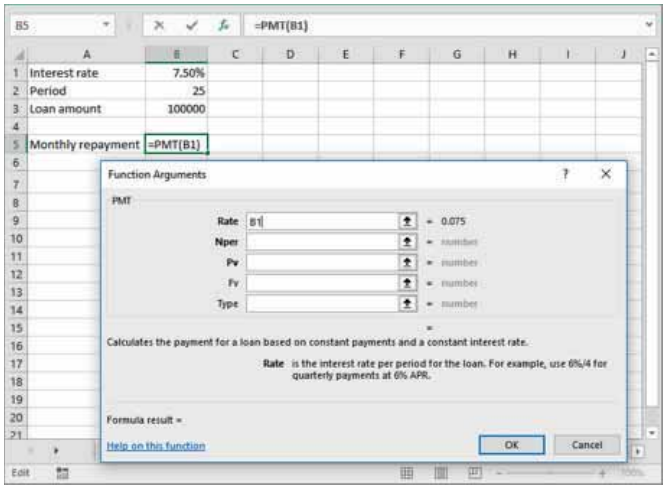


Figure 2

The Insert Function screen can be accessed using the small fx icon to the left of the formula bar. It allows you to search for functions by entering a description of what you want to achieve or by looking through the various categories of functions. Once you have found the function that you want to use, you can advance to the Function Arguments screen which prompts for each of the required arguments in turn. As you enter each argument, Excel will display the resulting value to the right of the argument and also display some brief help text for each argument. If we read this, we can see that we need to be careful as to how we enter our arguments.

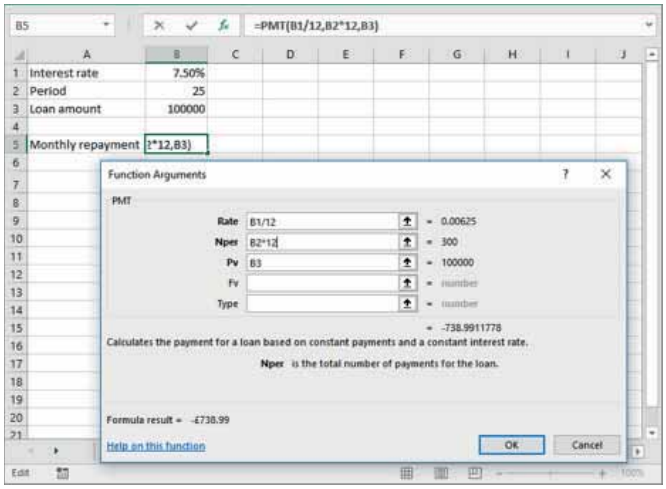


Figure 3

We want to calculate monthly repayments and, if we just enter an annual interest rate, we would need to convert this to a monthly equivalent. Leaving aside any discussions of the approximations that may be involved, we need to divide our interest rate by 12 to convert years to months. Similarly, when we enter the number of periods, Excel points out to us that this should be the total number of payments for our loan. If the loan period is 25 years and we are making monthly repayments, we need to multiply B2 by 12 to convert years to months once again. Once we have entered our arguments using a consistent period basis we get a much more reasonable value of -738.99 for our monthly repayments as shown by the Formula result in the bottom left-hand corner (see Figure 3).

HELP!

If you are using a function for the first time, and you are not entirely sure of how it works, it's not only worth using the Insert Function screen to help but it's also well worth using the 'Help on this function' link to read through the detailed help on how the function is used. In the case of the PMT() function this includes a clear explanation of the need to be consistent in the use of periods, as well as worked examples (see Figure 4).

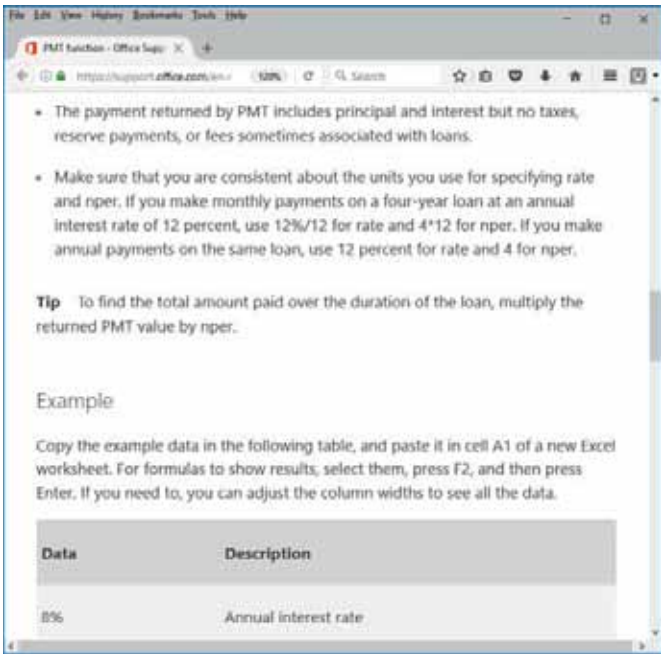


Figure 4

CHECK

For many functions, it is possible to create a manual check just to ensure that you have understood how the function works. In this case we have created a table using our input values and the value calculated by the function and showing that after the required number of payments the loan has been repaid (see Figure 5).

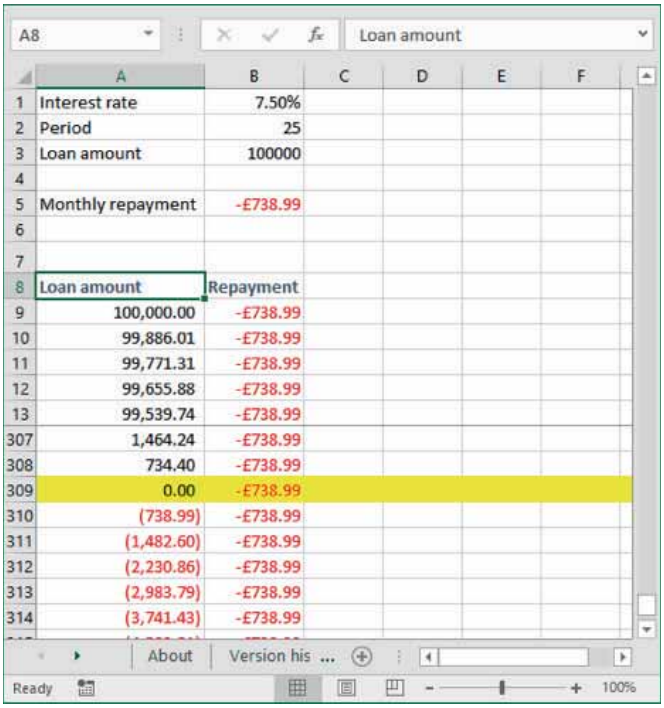


Figure 5

FUNCTION LIBRARY

As well as the categories of function shown in the Insert Function screen, the Formulas Ribbon tab also includes a Function Library group. It's very worthwhile browsing through the different categories of functions just to get an idea of the range of calculations that functions can help deal with. ●

OTHER OFFICE TIPS

The Excel Community site includes many articles on Excel and other office software. In addition, there is a forum where you can ask, and answer, questions on a wide range of Excel issues: ion.icaew.com/excelcommunity

The IT Counts site includes articles of more general interest including office software and hardware, IT security, management reporting and cloud computing. It too has a forum: ion.icaew.com/itcountshome

Both IT Counts and the Excel Community are available for free to all IT Faculty members as part of their subscription.

Simon's book *Essential Excel for Accountants* (the hard copy version was formerly known as *Maximising the Impact of Accounting and Financial Spreadsheets for Finance Users*) is now available as a PDF to download from tkb.co.uk/towiee.htm

Simon has also included many useful Excel tips in the 'Lunchtime Learning' section of his website at tkb.co.uk/lunchlearn.htm

LEO WALDOCK

THING FROM THE CRYPT

The ransomware attack on the UK's NHS was a lesson for us all in the importance of software patching and upgrades

On 11 May 2017 the National Health Service appeared to be under direct attack from ransomware called WannaCrypt (or WanaCrypt or Wcry). It rapidly became clear this was a global problem hitting at least 74 countries and in each instance the malware announced the files on targeted PCs had been encrypted and were no longer available to the user. The ransom notice demanded the payment in Bitcoin of the equivalent of $300 per computer affected. To date it is unclear whether or not the few who paid up recovered their files.

The reason the attack appeared to focus on the NHS is because WannaCrypt relies on a flaw in unsupported versions of Windows and in particular Windows XP. Although support for Windows XP ended in 2014, the likes of the NHS and UK police forces failed to upgrade their systems across the board.

It rapidly became clear the UK was not the main target and in fact Russia, Ukraine and Taiwan were top of the list.

Initially WannaCrypt spread at a rate of 100 IP addresses a minute and then, by chance, it was killed by a British security researcher. The WannaCrypt code includes an instruction to check a bizarre and lengthy web address. If there is no response the malware proceeds but if it gets a response it deactivates itself. The researcher found the URL was not registered so he paid his £11 fee, registered the domain and immediately stopped the advance of WannaCrypt, entirely by chance.

WannaCrypt has become old news but it is still important. This particular version of the malware has been stopped and the specific vulnerability has been plugged, but the root of the problems actually stems from the NSA. The American security people found a flaw in Windows some while back and, instead of alerting Microsoft, they instead developed a tool called Eternalblue. This tool, and a great many others, was stolen from the NSA and posted online during April 2017 in a collection known as Vault 7, as discussed in the March/April issue of *Chartech*.

Microsoft had been alerted to the theft, patching modern versions of Windows in March and later releasing an XP update. But older versions remained vulnerable so WannaCrypt actually started life as an NSA tool. What is to be done?

The ideal solution is for Apple, Google and Microsoft to pay researchers and hackers to report any flaws they uncover – and then fix the flaws in their software.

It would be lovely to think the NSA would learn the lesson that hoarding flaws and working to break encryption can have devastating consequences. However, that is probably naïve.

Institutions and companies should maintain periodic backups and ongoing incremental backups. In the event you suffer a PC or server failure, or an attack by malware, you need to be confident you can roll back to files that predate the problem. It's common sense but when did you last check? Really, when was that?

Those back-ups need to be checked as they won't do much good if they have also been infected by the same malware.

The vector of attack for WannaCrypt appears to be email with a dodgy hyperlink or file attachment. 16 NHS trusts were hit by WannaCrypt so if that is about 10% of the total that might be 100,000 staff. You can train staff all you like, but with those sorts of numbers spearfish emails will hit targets all day long.

Realistically the only long-term solution is to junk those clunky old PCs running clunky old software on XP and update to something considerably younger and more secure. Honestly, it's the only way. ●

The researcher found the URL was not registered, so he paid his £11 fee, registered the domain and immediately stopped the advance of WannaCrypt, entirely by chance

Leo Waldock, freelance IT writer

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- On-demand webinars
- Events and networking
- 30% discount for ICAEW's Academy of Professional Development training courses, including a comprehensive NED training and certification programme (visit icaew.com/academy for further information)

icaew.com/corporategovernance

V90 Cross Country D4 AWD, Metallic Paint,
Personal Contract Purchase Representative Example*

48 monthly payments	£319.00
Customer deposit	£7,589.00
On the road price	£41,305.00
Member saving	£5,580.00
Revised on the road price	£35,725.00
Total amount of credit	£28,136.00
Interest charges	£4,472.78
Total amount payable	£40,197.78
Duration of agreement (months)	49
Fixed rate of interest (per annum)	2.52%
Optional final payment	£17,297.00
Mileage per annum	10,000
Excess mileage charge	14.90p per mile
Representative APR	4.9%

Available with 3 years' complementary servicing when purchased on Volvo Advantage Personal Contract Purchase.

A WELL-DESERVED OPPORTUNITY

EXCLUSIVE V90 CROSS COUNTRY OFFER

As a member of ICAEW, you can benefit from an exclusive saving of £5,580 on the refined elegance and rugged, robust edge of the new V90 Cross Country D4 AWD, as well as a £250 contribution towards Volvo accessories.

TO FIND OUT MORE, VISIT **ICAEW.COM/VOLVO**
OR CALL THE VOLVO CAR BUSINESS CENTRE
ON **03333 204 147**

ICAEW
MEMBER REWARDS
PARTNER

Official fuel consumption for the Volvo V90 Cross Country D4 AWD in MPG (l/100km): Urban 45.6 (6.2), Extra Urban 60.1 (4.7), Combined 54.3 (5.2). CO_2 emissions 138g/km. MPG figures are obtained from laboratory testing intended for comparisons between vehicles and may not reflect real driving results.

*Finance subject to status. Retail sales only. Subject to availability at participating dealers only on vehicles registered by 30th September 2017. At the end of the agreement there are 3 options: (i) Part exchange the vehicle, (ii) Pay the Optional Final Payment to own the vehicle or (iii) Return the vehicle. Further charges may be made subject to the condition or mileage of the vehicle. Terms and conditions apply. Applicants must be 18 or over. Guarantee/Indemnity may be required. Volvo Car Credit, RH1 1SR. The complementary servicing offer is only available when purchasing on Volvo Advantage Personal Contract Purchase at participating dealers, on vehicles ordered between 01/07/2017 and 30/09/2017. Services must be carried out at a Volvo Authorised Repairer. Retail offer only. Excludes fleet operators and business users. See volvocars.co.uk for full terms and conditions.