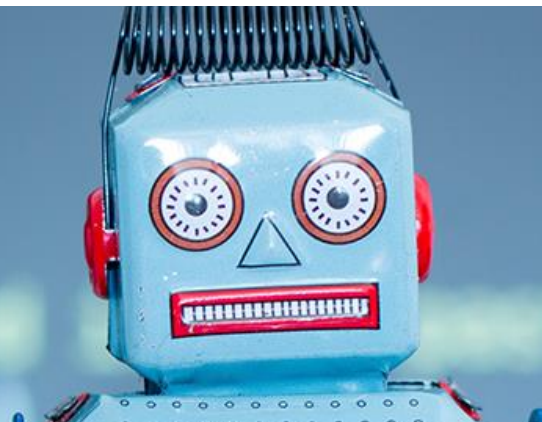


Focus: Artificial Intelligence and Machine Learning

Your guide to the hottest trend in data analytics and business applications



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In this e-guide:

Artificial Intelligence and the sub-set of it which is machine learning are hot. It's been impossible to attend an IT conference in the last year or so without encountering a dead human genius reincarnated as a software system or a robot.

What lies beyond the hype? In the data management field, experts tell us there are many **basic things organisations can do to get more business value from their data** before they over-commit to experimenting with machine learning.

And yet, as the articles in this e-guide show, there is real worth in AI/ML, and it might open up new roles and more business-central activities for IT professionals. This is suggested in the **lead article** here, which explores the impact AI/ML is having in the Law, and suggests parallels in other sectors. However, the potential for AI to **take away, but fail to replace jobs** should not be ignored, and needs to be understood and managed.

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A recent [McKinsey study](#) suggests adoption of AI/ML is fairly **modest outside the technology sector itself**, but does indicate significant investment. And there does seem to be a concatenation of technologies – [blockchain](#), [IoT](#), [machine learning](#) that might, together, transform the business applications side of IT more broadly.

[SAP](#) and [IBM](#) are among the suppliers investing in artificial intelligence and machine learning. The latter is showcasing some of its [Watson AI capability at Wimbledon](#) this summer. But all the enterprise software giants are pitching in and one of the articles in this e-guide counsels **against too hasty adoption of a “black box” approach**.

Brian McKenna, business application editor

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AI automation starts to transform legal profession

SA Mathieson, guest contributor

In February 2016, a London court supported the use of predictive coding software in a legal disclosure process, which often involves lawyers receiving huge volumes of documents from those representing the other side in a case.

In *Pyrrho Investments v MWB Business Exchange*, Master Paul Matthews of the Chancery division supported the use of software in scoring documents for relevance. He found there was no evidence that software would be less accurate than manual review and keyword searches. He added that software could provide greater consistency in searching more than 3 million documents that could be involved in the disclosure. A final reason was that both sides had agreed to the use of the software, which would be much cheaper than a manual search – they just wanted the court's approval.

However, in *May, the High Court went further* when two undisclosed parties disagreed on whether predictive coding software should be used. The “petitioner” wanted to review inboxes using an agreed list of search terms and the “respondents” wanted to use software, on grounds of lower cost

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and better results. Partly relying on the earlier judgment, the court ordered the use of the software.

These decisions show how parts of the legal profession, often perceived as a technology laggard, are catching up and starting to surpass others in use of automation and artificial intelligence (AI). “Lawtech” is aiming to transform the profession in the way that fintech is changing finance, with a [Legal Geek conference](#) planned for this October in Shoreditch.

In January, the Law Society – which represents solicitors in England and Wales – published a [report on technology innovation in legal services](#). Based on interviews with early technology adopters, it found that technology would have a “profound effect” on law firms’ staffing, pricing and location.

As last year’s court cases suggest, many corporate law firms are using software to search documents, according to the report’s author, Dr Tara Chittenden. But some are extending its use into managing legal spending, supply chain, documents and customer onboarding. “I think people are still fairly early on in exploring what it can do,” says Chittenden, with natural language processing looking like a particularly promising area.

She says other professions with more interactions with consumers may be ahead at the moment, but adds: “There is a stereotypical view out there that law is behind. I certainly don’t think that’s true. There’s a spectrum – some firms are really clued up and are really ahead of the game in what they’re

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doing, and I think others are struggling.” Law firms will also use software to monitor and reduce costs, and to gather more data on clients, with the eventual aim of predicting customers’ needs.

This may mean IT departments taking a lesser role. “The firms that I’ve seen which are doing better are those where IT decisions are integrated across the whole of the business,” says Chittenden. “The process of choosing and using an AI or an automation system has kind of bypassed the IT department.” The supplier is more likely to approach a head of innovation who will discuss it with senior partners, she says.

Delve deeper

UK-headquartered law firm Pinsent Masons has built its own AI system, TermFrame. Developed by the firm’s head of research and development, Orlando Conetta, it guides lawyers through tasks by bringing in documents, templates and information on legal precedents, such as by allowing lawyers to assess legal risks against consistent, detailed criteria set centrally. “This means we are able to delve deeper into the requirements of our clients and scale up our work to a level that would hitherto been unfeasible,” says Conetta.

While AI and big data make processes such as document review more efficient, it is at its most effective when combined with human expertise. “The system may identify and classify a clause that pertains to transfer

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rights, but the model will be unable to confidently assess whether the particular clause actually prohibits or permits the transfer of rights and obligations between parties,” says Conetta. “A lawyer would need to read the clause and make that determination, while AI ensures that the lawyer can find the clause quickly and only needs to assess the provision once, across all the documents it may be found in.”

Conetta believes that using AI across an organisation’s legal work will have implications for heads of IT. “Traditionally, CIOs have been focused exclusively on the large challenges relevant to the operational aspects of running a law firm, such as document management, email, office productivity, and so on,” he says. “The advent of AI means that technology teams will effectively become another pillar of legal service delivery in the practice, and computer scientists will find themselves working alongside lawyers and partners on actual transactions and disputes.

“This will be exciting, but will bring with it new pressures to ensure that technology teams have a good appreciation of the respective legal subject matter. And, in parallel, legal teams will need to adapt to embrace new cross-disciplinary team structures.”

Pinsent Masons already has scientists and engineers working with lawyers on categorising clauses and data within legal documents and structuring AI legal assessment questionnaires.

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Suppliers to law firms are also aiming to provide automation. LexisNexis, which owns long-established legal publisher Butterworths, has developed automated tools based on its information. “We are trying to move the risk of automation projects from the client to ourselves,” says document automation manager Adrian Stafford.

The company offers automated documents for lawyers and non-legal staff, with the latter including sales and non-disclosure agreements, which can be populated by a questionnaire. Stafford says the former are designed to generate a good first draft of a document, ensuring that one piece of information appears consistently in hundreds of places in a document, with lawyers doing further checks. But for the non-legal documents, “they are looking for something that’s signature-ready” , he says. Such automation saves time, but consistency and the avoidance of error can be more important.

If law firms provide such specific versions of these documents to non-legal staff at their clients, questions including securing access to the system and the location of hosting must be considered. “The IT department has a role in all these issues,” says Stafford.

He says the use of automated documents has spread rapidly across law firms, including into their own processes, such as client engagement letters and human resources. “It’s trying to provide what could be called a digital butler that will sit alongside the lawyer as they work to be able to identify

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what it is they want to do,” says Stafford. “If it’s a simple task, be able to do it for them, and if it’s a more complex task, be able to offer them the advice and materials that they need to deliver it in the way and at the point at which they need them.”

Smart contracts

Such automation will change what lawyers do, particularly as smart contracts are introduced that can carry out transactions as well as codify them. “What starts to become important is the intention of the parties, negotiating on intentions rather than necessarily the words on the page,” says Stafford. “The role of the lawyer will change to become much more of a legal business adviser to their clients, assisting them in what they can and can’t do, what they should and shouldn’t do, rather than just working out that there needs to be a comma at this point in this clause.”

The wording of documents will become more standardised, and automation and AI will focus on helping corporate lawyers in their roles as business analysts, he says.

Much of the progress on automating process is taking place at larger law firms. Legal startup Amiqus is targeting firms with a small number of offices. It carried out research to find out what they most wanted automating – and, as a result, has launched a service for anti-money-laundering checks, something firms will have to carry out from June this year.

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“Law firms are a traditionally risk-averse, conservative profession – they’re not what you would call early adopters,” says [Amicus chief executive Callum Murray](#). He says the company originally planned to focus on larger firms, but adds: “Smaller law firms are actually at a greater risk, because they lack process automation at all.”

Amicus plans to develop a range of services for smaller firms as well as having a platform with APIs that can be used by developers for larger firms. “We’re not trying to get rid of solicitors as such, we’re trying to future-proof the way they deliver their service through automating,” he says.

Automated contract analysis

The company is looking at automated contract analysis – already used by larger companies – and an online dispute resolution system that can help settle many cases more cheaply than in court. “The issue with that at the moment is access to the volume dataset,” says Murray, with a lot of data currently behind paywalls. The Ministry of Justice is looking at openly publishing some court information, he says.

“It’s going to take some time to change that, but once that changes, it’s really going to open the floodgates to an open innovation approach.”

This use of automation and AI could allow firms to consider potential clients by collecting data, then comparing it to previous cases. “You could triage

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cases to say is this a case worth taking on, what's our chance of success – almost a forecasting tool for litigators,” says Murray. Another option would be a third-party system that collected information from possible litigants, then offered their cases to a number of firms, which would choose whether or not to offer their services. “Effectively, the lawyer becomes far more accessible because you don't have the huge barrier of the discovery cost,” he adds.

Murray thinks CIOs will have to work more closely with legal officers to allow such automation. “It's not entirely a technical problem – some of it is process, some of it is change management,” he says. But a more automated legal profession will need to work closely with technologists.

Law catching up

Murray believes law is catching up with other professions, most of which have already adapted to new technology, but that it is more likely that automation and AI will support lawyers rather than entirely replace them in the fashion of financial “robo-adviser” services. “People aren't quite ready for a computer to say no,” he says. “They are used to that on a mortgage application, but when someone is telling you that the custody of your child is not going to happen, you want a bit more of an explanation.”

[Richard Susskind](#) co-developed the world's first commercially available legal AI system in the 1980s and has recently co-written *The Future of the*

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Professions about the impact of technology on professional jobs. “In the 2020s, legal professionals will have a stark choice – compete with machines or build the machines,” he says. “By competing with machines, I have in mind that human lawyers will be doing things that machines cannot.

“By building the machines, I have in mind recognising that there will be AI solutions in the future for many of the problems that bring clients to their lawyers today; and so the way to meet clients’ needs will be to be involved in building these AI systems.”

Susskind says AI is likely to carry out work including due diligence reviews in transaction work, predictions of court decisions and online dispute resolution. “All of this means that legal professionals will not just be legal advisers, they will also be legal knowledge engineers, legal data scientists, legal technologists and legal process analysts.”

Although he reckons medicine and tax are more advanced, Susskind believes the legal profession has invested heavily in AI – and is ahead of teaching and the clergy.

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McKinsey AI research finds slender user adoption outside tech

Brian McKenna, business applications editor

Few user companies and organisations are putting artificial intelligence (AI) to work at significant scale, according to a [McKinsey Global Institute](#) (MGI) discussion paper. It shows AI adoption outside the technology sector to be exiguous and experimental, deployed commercially in only 12% of 160 use cases.

The MGI's paper, [Artificial intelligence: the next digital frontier](#), draws on a survey of 3,000 executives in organisations across 10 countries and 14 sectors, as well as the case studies.

Only 20% of the 3,000 executives said they currently use any AI technology at scale or in a core part of their businesses. Just 10% reported adopting more than two technologies, and only 9% reported adopting [machine learning](#), a type of AI that provides computers with the ability to learn without being explicitly programmed.

But the paper's authors said: "Leaders' adoption is both broad and deep, using multiple technologies across multiple functions, with deployment at the core of their business. Auto makers use AI to develop self-driving

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vehicles and improve operations, for example, while financial services firms are more likely to use it in customer experience-related functions.”

The institute’s paper looks at investment in AI and describes how it is being deployed by organisations. Its findings focus on five technology systems – robotics and autonomous vehicles, [computer vision](#), language, virtual agents and machine learning. The paper contains case studies from five sectors – retail, electric utilities, manufacturing, healthcare and education.

It says large firms have much higher rates of adoption and awareness, adding: “Across all sectors, larger firms – which we define as those with more than 500 employees” – are at least 10% more likely than smaller firms to have adopted at least one AI technology at scale or in a core part of their business. In sectors with lower rates of AI uptake, the adoption rate of bigger companies was as much as 300% that of smaller companies.”

The paper says AI investment is accelerating and amounted to between \$26bn and \$39bn in 2016, dominated by firms such as Google and Chinese search engine company [Baidu](#). Venture capital, private equity and M&A funding in AI technologies has tripled since 2013, with 60% of current investment being in machine learning.

The report says: “Machine learning and a subfield called [deep learning](#) are at the heart of many recent advances in artificial intelligence applications and have attracted a lot of attention and a significant share of the financing that

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has been pouring into the AI universe – almost 60% of all investment from outside the industry in 2016.”

The MGI said in a statement: “Early evidence suggests that AI can deliver real value to serious adopters and can be a powerful force for disruption. In our survey, early AI adopters that combine strong digital capability with proactive strategies have higher profit margins and expect the performance gap with other firms to widen in the future.”

The paper also draws on the strategy firm’s client consultancy, with McKinsey Analytics and Digital McKinsey practices feeding into the research.

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Business applications embrace IoT, blockchain to face future

Lindsay Clark, guest contributor

Global organisations do not replace enterprise applications often. The pain of re-engineering processes, together with the technical challenges, mean it is common to find systems that have been running a business for 10 to 15 years.

But, at the same time, technology does not stand still. The [internet of things](#) (IoT) promises businesses timely data about physical and environmental conditions in remote locations. It offers information about the condition of things companies buy, make, manage or sell.

Meanwhile, advocates of [smart contracts](#) say they offer automation of business transactions to speed up processes, while reducing cost and risk.

To [fully exploit these technologies](#), IT managers will have to share the data they produce across the existing, perhaps ageing, enterprise applications stack. The question is whether the software is up to the task.

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Getting to grips with IoT data

“ERP [[enterprise resource planning](#)] systems are designed to last 10 to 20 years. But these older systems are not designed [to handle the volume of data generated by] the IoT. Most systems are not ready for that much data today,” says Stephen Tatton, director of business systems and new technology at [JBT AeroTech](#).

Because the manufacturer of airport equipment – including air-conditioning units, mobile gangways and de-icers – installs its products over disparate geographies, it has been remotely monitoring them for more than 20 years, starting out using dial-up modems.

In recent years the IoT has created an explosion of data, so-called [big data](#), but there is a limit to what companies can monitor and how frequently, says Tatton. As such, JBT AeroTech has built an IoT infrastructure to monitor its own equipment and third-party equipment used by its customers.

“The availability of the data drives new thinking in the way we can do maintenance. It is also a value-added proposition for our customers. We can manage maintenance in a way we could not before. The data comes into our ERP and asset management electronically, not manually, speeding up processes,” he says.

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For example, engineers once checked the performance of air-conditioning units in an airport by visiting each one to take a temperature reading. It would take hours, if not days, in a large airport. Now, they only visit units that are not performing well and require maintenance. It means the engineers make fewer journeys and have the right tools and spare parts with them, greatly improving overall efficiency, says Tatton.

JBT AeroTech's IoT platform was built in the cloud to manage the [IoT data](#) flowing into enterprise applications. "We record data in the IoT platform every time it changes. If a reading goes up by one degree, that goes into the database," says Tatton.

"But in the enterprise asset management system, we don't care about each reading, we care about thresholds. For example, if an air-conditioning performs outside its target temperature for three continuous minutes, the event is then recorded in the asset management system," he adds.

JBT Aerospace uses Infor's [Enterprise Asset Management](#) system and a mixture of [Oracle](#) and [JD Edwards](#) for ERP and other enterprise applications. Its IoT platform publishes an HTML front end, and uses a [Microsoft SQL](#) database, as well as storing data in [Hadoop](#) and [Cassandra](#) NoSQL data stores. The company has developed its own [analytics tools](#) to make sense of the data. The resulting insight not only helps in maintenance, it also feeds into future product development, he says.

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IoT data management adds complexity

Businesses looking to exploit IoT data are likely to tread a similar path to JBT Aerospace, by using an intermediate layer or platform, says Claudio di Nella, managing director of technology strategy at consultancy firm Accenture. But the approach could be storing up difficulties for the future.

“In the medium term, businesses will have to add to the existing software estates. But in many cases that estate is under pressure and businesses are struggling to deal with the cost of running the legacy enterprise applications,” he says.

“As we shift into being truly digital, with sensing technologies across organisations, complexity is going to mushroom. Meanwhile, corporate IT must do the day job: keeping the lights on and coping with regulation – all these things continue to take investment and effort. Most organisations are ill prepared for onboarding additional layers of technology. It places a huge burden on integration, skills and architecture,” says di Nella.

Some enterprise software suppliers are stepping up to offer systems to cope with the deluge of IoT data. For example, SAP is positioning its in-memory database, [Hana](#), as apt for these kinds of application (see *Trenitalia case study, below*).

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But according to Mark Darbyshire, vice-president of integration at SAP, ultimately, it will be the speed of business processes that will put a limit on responding to IoT data. “The problem is not the speed of the technology, but of the people in the business,” he says.

Enter blockchain

Yet plans to speed up business processes could lead to another hornet's nest of challenges for those responsible for planning the future of enterprise application portfolios.

The quest to automate business processes with smart contracts dates back to the early years of this century, but the advent of [blockchain](#), the tamper-proof distributed database behind cryptocurrency [bitcoin](#), is giving the field new impetus, says Ron Hirson, chief product officer of DocuSign, an electronic signature and transaction management software supplier.

“[Blockchain is an opportunity](#). It creates a distributed ledger that increases trust. It provides a protocol for independent entities to talk to each other. It could be an important part of how smart contracts work,” says Hirson.

Smart contracts promise to automate business decision-making according to pre-existing rules, both between companies and within them. Combined with the IoT, they could help orchestrate delivery and payment for goods

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and services, all recorded in blockchain (see “Blockchain needs agreed standards”, below).

But that does not remove the question of whether existing enterprise applications, which businesses are reluctant to rip and replace, can cope with these new technologies.

“All of the use cases are powerful, and the beauty of blockchain is its integrity,” says Accenture’s di Nella. “But most companies at this stage are only dipping their toes in the water and experimenting with smart contracts. We are a few years away from seeing them rolled out in a live production environment, but it will happen.

“When you combine blockchain, smart contracts and the IoT, you can drive the next wave of operational efficiency, eliminating manual processes.”

To do so, business will need to adopt a new approach to enterprise applications in the form of blockchain and [in-memory computing](#). Both present eye-watering challenges in technology and business change. Sooner or later, businesses will need to ask themselves whether they can they afford it or afford to be left behind.

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Case study: Trenitalia IoT system's light touch with enterprise application

Braking systems, toilets, batteries and sliding doors: since 2014, [Trenitalia](#) has fitted all of these, and more, with hundreds of sensors to collect data in real time.

Italy's national rail company is working with SAP, inputting data into the supplier's cloud system, which is based on its in-memory Hana technology, every 10 minutes. Further analysis of this data allows Trenitalia to build predictive models for machine learning. It also triggers maintenance and other actions.

Trenitalia CIO Danilo Gismondi says the system is fully integrated with the national train company's application landscape. It imports data about its trains and services, as well as the availability of spare parts and maintenance resources. It also exports maintenance notifications and scheduling instructions to the ERP and train operations systems in charge of execution.

The system was designed from the beginning to reduce, as much as possible, the impact on the connected existing systems, but that may change in the future, he says.

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“We created a number of interfaces, but we didn’t change much on the existing systems themselves. Progressively, we believe that some functionalities [of enterprise applications] will be migrated to the Dynamic Management Maintenance System, which can perform more effectively because of the higher level of intelligence it can deploy, and slowly discontinue the existing systems.”

Blockchain needs agreed standards before it can transform business applications

The [combination of smart contracts and blockchain](#), the tamper-proof distributed database, could have powerful implications for business applications – if it can overcome divergent standards and organisational inertia.

Smart contracts should be thought of as a container that can store both data and code, says Peter Bidewell, chief marketing officer of Applied Blockchain, which counts Siemens among its clients. This way, the container can store code to process data in other smart contracts, a form of self-executing process.

For example, the smart contract could initiate a payment process to a supplier once its goods have passed through a geo-fence at the buyer’s operations, he says.

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Applied Blockchain has built an agnostic application and privacy framework that sits on top of any underlying blockchain to avoid the difficulty of picking winners among competing platforms, including Ethereum, Hyperledger, IPFS and BigchainDB.

“We’ve seen trying to place bets is very dangerous. There needs to be a [TCP/IP](#) for blockchain, but we are not there yet,” says Bidewell.

Guy Halford-Thompson, CEO and co-founder of BTL Group, a blockchain specialist, says the technology has the potential to vastly simplify corporate IT, because solutions to problems such as access control and data provenance are built in from the outset.

“If you want to share data with a counterparty, that is built in by design – you don’t have the firewall and other security around data,” he says.

However, Halford-Thompson recognises that expecting businesses to remodel processes on entirely new technology and replace applications that have been trusted for years is too much to ask.

“We don’t want to disrupt our clients. The approach we take is to pick the smallest project which can demonstrate real value. It will be the least disruptive, not necessarily the problem areas where we can offer the most financial benefit in the long run. If we can demonstrate the savings, we might be allowed to tackle bigger problems,” he says.

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AI and robots will 'create political instability' until humans find new occupations

Karl Flinders, Emea content editor

“Almost one-third of UK jobs could be done by robots in 10 years’ time.”

Warnings of this kind are often softened by the suggestion that new and better occupations will replace defunct jobs. But such is the pace of technological advancement, this is no longer guaranteed.

PwC is the latest to predict the [decimation of work carried out by people](#) due to rapid advances in technology. It said in a report that by the 2030s, about 30% of jobs – more than 10 million – performed by people will be at risk of being automated through technology such as software robots.

And, according to PwC, those with the lowest education levels face the biggest risk of losing their jobs.

“Around 30% of existing UK jobs could be at risk of automation by the early 2030s, with the most exposed sectors including retail and wholesale,

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transport and storage, and manufacturing,” the report said. “Less educated workers face the highest risks of automation.”

However, the percentage of jobs at risk in the UK was lower than in the US (38%) and Germany (35%), it said.

And PwC is not alone in its predictions. Earlier this month, [financial services management consultancy Opimas](#) declared that globally, 230,000 jobs in the capital markets sector alone would become defunct because of the adoption of artificial intelligence (AI) technology.

PwC, like many other number-crunchers, has inserted the caveat that efficiency and productivity gains will create new jobs, but adds: “The government needs to respond by reshaping education and vocational training to help workers adapt to this fast-evolving technological world.”

Like any significant cultural shift, the challenges facing humankind and its relationship with work have not escaped the attentions of the artistic world.

An event discussing the future of work, hosted by Konica Minolta, was addressed by Douglas Coupland, author of the novel *Generation X: Tales for an accelerated culture*, which tells the stories of a group of people in the generation born between the early 1960s and early 1980s – known as Generation X.

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Coupland told Computer Weekly: "People always say 'don't worry, we will invent new job categories' and I think in the past this has been more or less the case, but we are dealing with algorithmic technologies which have no historical or ontological precedence."

AI, robots and the internet of things (IoT) will have an unprecedented impact on what people do, he said.

"Maybe there will be new job categories created but maybe it will take a long time for that to happen, but in the meantime you will get AI replacing millions of jobs and people will ask themselves what their jobs will be."

Coupland, an artist as well as an author, said his fear was that there is "too much, too quick".

"We are at this hyper-accelerated pace now," he said. "We are going to lose jobs faster than we create them and during that different zone it is going to be very politically unstable, and I hope governments have a plan B."

This is a challenge that governments, academics and business leaders are all grappling with. The recent World Economic Forum (WEF) in Davos, Switzerland, discussed the risks posed by technology to jobs and political stability.

Problems highlighted by the [WEF's Global Risks 2017](#) report included the fact that, as a result of AI and other disruptive technologies, long-term jobs

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were giving way to self-employment in the “gig” economy, leaving individuals to [shoulder more responsibility for the costs](#) of unemployment, sickness and old age.

Unless there is a concerted effort from governments and the private sector, this will put pressure on economies and may lead to social unrest, said Cecilia Reyes, chief risk officer of [Zurich Insurance Group](#). “Without proper governance and reskilling of workers, technology will eliminate jobs faster than it creates them,” she said. “Governments can no longer provide historic levels of social protection, and an anti-establishment narrative has gained traction, with new political leaders blaming globalisation for society’s challenges.”

Huge social disruption

Governments, academics and businesses should be planning for huge social disruption because there are many real-life examples across the world of AI replacing people in the workplace. These range from education to transportation.

For example, by the end of this year, [children in the Gulf Cooperation Council group of countries will have robot assistants](#) in their classrooms. Teachers will be supported by physical robots connected to cloud-based software. These will be used to access information and provide students with answers to their questions.

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In the transportation sector, Singapore was the first country in the world to [launch self-driving taxis](#) through nuTonomy, developer of state-of-the art software for autonomous cars.

Meanwhile, taxi drivers in Dubai face competition from above. The UAE city's Roads and Transport Authority has revealed that plans to unveil passenger-flying drones are in the final stages, with the initiative expected to launch in July this year.

Robots are now being trusted to support customers when it comes to their finances. Japanese insurance company Fukoku Mutual Life Insurance has [replaced 34 members of its claims assessment team](#) with IBM Watson.

And in the UK public sector, the London borough of Enfield is [using a software robot](#) to provide customer services so that it can redirect resources. The IPSoft platform, known as Amelia, has an understanding of the semantics of language and can learn to solve business process queries much like a human. It can read 300 pages in 30 seconds and learn through experience by observing the interactions between human agents and customers.

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▶ SAP Leonardo positioned as digital transformation catalyst

Brian McKenna, business applications editor

SAP used its 2017 Sapphire conference to advance a concept, dubbed [Leonardo, made up of a “toolbox” of its internet of things \(IoT\), artificial intelligence \(AI\) and blockchain technologies](#) whose purpose is to realise digital transformation at its customers.

The concept seems to be pitched more at business leaders, up to CEO level, rather than just at corporate IT. The supplier contends that it is also more than a portmanteau of software technologies because it is also a services play, involving other suppliers, such as systems integrators and consultancies, and also telcos.

SAP chief executive Bill McDermott (*pictured above*) told a group of Europe, Middle East and Africa (Emea) journalists at the conference last week that his own approach to companies or organisations that are trying to bring together “mode 1” IT – business as usual, core operations – and “mode 2” – in support of digitally transformative high-level strategy, is to start with a study of their strategy.

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“It starts with their strategy,” he said. “I try to get deeply into that, using publicly available data, or their commentary. So, when I am going into a C-level meeting, I have a good feeling for what they are using, and for where they want to take their company.”

“If you think about running a great operation in mode 1, S/4 Hana, the cloud line of business [software] we have for HR, sales and procurement is there. When you start talking about mode 2, you have to realise this is a team sport. C-level executives have to align.”

“For example, there is a utility company's CEO who wants to digitise plants, processes and people by training them. That is the CEO's vision. He wants to simplify 90 customer support processes. And when I spoke to him about Leonardo, that got him to bring along his CFO and head of strategy.”

“We try to unify all the senior executives by means of [SAP's] [digital boardroom](#), where all the management team can act as a team, seeing the same information.”

“Mode 2 is about business model innovation. Most companies that do not realise they need to be digital are almost too late. [Previously] you had leaders and followers, some faster than others. In this age there will be first movers, and no one else. All these leaders are asking: ‘how do I defend my core?’ That's mode 1. And ‘how do I create the next generation business?’ Mode 2. And this is in every industry, and every geography in the world.”

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Franck Cohen, president of SAP Emea, said at Sapphire: “The first product that will benefit from machine learning will be our [public cloud ERP](#).

Leonardo is a set of tools that allows organisations to achieve digital transformation. Instead of having a prototype of IoT, and one of machine learning, and one of blockchain, you put them all together.

“Digital transformation will happen at the level of the CEO. It might be that the CIO will have a say, or may decide for some aspect of it. But if it is a real digital transformation at the company level, then I believe the CEO will lead. But we didn't target Leonardo [exclusively] at the CEO, as such.”

Nils Hertzberg, global go-to-market lead for IoT at SAP, said: “We have [invested significantly in IoT](#), and then we gave the baby the name of SAP Leonardo. And we've repositioned it to be more than IoT, so that it is an analytics platform for other business purposes. Leonardo will contain all the capabilities that will enable our customers to innovate: access to blockchain, to machine learning, and also basic things like access to prediction libraries and to a development environment to enable them to develop applications of their own.

“The story behind Leonardo in the grand scheme of things is that a lot of our customers believe in bi-modal [innovation and business as usual] IT.” The idea is that Leonardo belongs squarely in the realm of mode 2 – innovation.

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Hertzberg said Leonardo entails SAP working with other types of partner than the usual systems integrators. “We are partnering with telcos now, for example, with connectivity,” he said.

“Leonardo is all you need, and with the cloud it is not so much about the ingredients separately. This is a comprehensive, forward-looking offer for enterprise customers who want to do innovation. It is a pre-integrated toolbox.”

The supplier has [framed Leonardo as a technology set](#) for the cloud. Darren Roos, president, SAP S/4 Hana Cloud, said cloud delivery makes Leonardo-type capabilities readily accessible.

“Take the invoice-matching machine learning capability that we shipped in the new release [of S/4 Hana],” he said. “That means processing invoices in 10 seconds instead of two minutes. Your on-premise competitor won’t get that for maybe another two years. It’s a tiny example of what can amount to a competitive advantage.

“Within the Leonardo ‘toolbox’, we [the S/4 Hana public cloud service] consume the machine learning, the analytics, and the [SAP Cloud Platform](#), which is our extensibility layer”.

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At IBM's Watson lab, customers marry the power of AI with the IoT

Alex Scroxton, networking editor

At about lunchtime on an unseasonably warm February day, a small commercial drone hovered alongside Highlight Tower; a striking, angular glass block soaring 126m over a suburban Autobahn on the outskirts of Munich, with equally striking views.

Inside the building, [Harriet Green](#), general manager of [Watson Internet of Things](#) (IoT) at IBM, and Ilse Aigner, deputy prime minister of the state of Bavaria, linked hands over a big red button, watching the video pictures relayed by the drone.

As it climbed to the very top of the tower, the familiar, linear IBM logo swam lazily into view, and to applause from their audience, Green and Aigner pushed the button, lighting up the sign and officially inaugurating the IBM Watson IoT Headquarters. Although, since it was midday and sunny, it is unlikely many people noticed it at first.

It is a little over a year since IBM first announced [its intention](#) to locate the global base for its Watson IoT platform in Munich, and since then it has been very busy, not only fitting out its new home, but advancing IoT technology

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and drawing businesses such as [automaker BMW](#), [outsourcing and facilities practice ISS](#), and [ICT channel distributor Avnet](#) to its banner.

At the inaugural event, which saw customers, collaborators and journalists descend on Munich en masse to find out more about what the IoT can deliver for enterprises, IBM announced a new round of enterprise partnerships at the Watson IoT lab, described by Green in her opening remarks as a “collaboratory” .

It would probably be fair to say that, despite its long history, IBM is not renowned for its expertise in networking, and nor has it sought to be. But it doesn't need to, for what IBM is bringing to the picture is not connectivity, or a desire to push a proprietary network standard, but the growing power of Watson.

IBM wants to offer a whole range of offerings, capabilities and partnerships to extend the power of cognitive computing (so memorably demonstrated by Watson on [US quiz show Jeopardy](#)) to the IoT via the Watson IoT Cloud.

Andy Stanford-Clark, IBM distinguished engineer and a key figure in the Watson IoT project, argues that while there have indeed been many rushed IoT projects that pushed to market the minimum viable product – often riddled with massive security holes – and got the IoT a bad name. Therefore it is important to take the time to get the IoT right, which is where IBM comes in.

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The whole point of Big Blue's involvement is not that it can't resist trivial use cases – such as a *Red Dwarf*-style [talking toaster](#) that can “print” the weather forecast on your toast, or any number of silly applications – but rather that if one of its partners sees a business opportunity and a monetisable stream for selling something as a service, then IBM will have their back, according to Stanford-Clark.

“The Watson tools like speech enablement, conversational understanding, image processing, whatever API [application programming interface] it is gives them the building block to make that product,” says Stanford-Clark. “We're not sitting here saying, yes you can do it but if you want to do it, we're here to help.”

Gabi Zodik, IBM Research director of IoT and mobile platforms, says: “One way to think about the IoT is not just as an isolated thing, but as a gateway to cognitive systems. How do we access cognitive systems? Through the IoT devices that are around us all day, so that's the shift. The IoT is not out there on its own, it's in cloud and cognitive.”

SNCF plots a path to the cognitive IoT

[Customers flocking to the IoT lab](#) include Dutch drone maker Aerialtronics, industrial hardware supplier Bosch, entrepreneur funding platform Indiegogo, Finnish lift and escalator builder Kone, office technology supplier Ricoh, French state railway operator SNCF, and financial services giant Visa.

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Public transport has been at the forefront of use cases for the IoT pretty much since the term IoT was first coined, so for SNCF's CTO, Raphael Viard, the concept of connecting anything and everything he can is not new. Indeed, we have previously reported [on its efforts in this area](#).

Sitting down over coffee with Computer Weekly, Viard explains how SNCF is using Watson IoT on the IBM Cloud to address its biggest challenge, maintenance.

Like other rail operators, SNCF suffers from two big problems: its maintenance depots are generally located on constrained sites near city centre termini; and its trains are increasingly sophisticated and carry more and more components. All this adds up to means that its maintenance windows are far longer than they used to be, and with no room to grow, its support infrastructure is at capacity.

On its most heavily trafficked Parisian commuter routes, SNCF is outfitting new generation trains with 2,000 sensors that forward 70,000 data points every month, so its engineers can remotely monitor the stock to get early warning of issues with doors or air conditioning, for example, freeing up their maintenance capacity.

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Improving communication around delays

For passengers, says Viard, the harvested data can be used to improve its communication around delays and helping them plan around any problems on the rail network. He is also looking to use the IoT to monitor lineside trees.

“We are doing a lot with big data for vegetation, trying to analyse where we may have issues due to high winds and trees falling on the catenaries [the overhead power supply], and so on, so we’re doing a lot of experimentation around that,” he says.

Right now, SNCF has not started to use Watson’s cognitive capabilities, but Viard is keenly observing developments and coming up with use cases for the railways.

“In the first phase we are looking much more at analytics and big data, but when we have done this, cognitive may be involved,” he says. “In addition when you do cognitive you need to have all of your data in Watson, and right now we don’t, we just have our IoT data there.

“We are gathering data and when we have enough to analyse in that way we’ll look more at cognitive, but the challenge for us at this time is trying to gather more data.”

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For SNCF, cognitive computing will likely find a strong use case in passenger facing areas, according to IBM general manager of global technology services Remi Lassaille. “You could imagine cognitive in the CRM sphere to manage customer relationships, and maybe also in the call centre,” he says.

EEBus uses cognitive to improve energy efficiency

SNCF may be at a relatively early stage in its use of cognitive computing, but for [EEBus](#), a major new pan-European IoT alliance initiated by the German government to explore initiatives in the energy industry, the benefits are already writ large.

The members of EEBus, which besides IBM itself include leading connected home stakeholders such as Bosch, Miele, Schneider and Vaillant, are exploring a standardised and common language for an interoperability of devices that support communication between, for example, smart heating systems, electric vehicles, solar panels and household appliances.

“Our solutions and algorithms learn from the consumer side, and connect to cognitive systems to combine the knowledge and experience from many homes to improve the user experience, because we can learn very quickly about the user and what he or she needs,” says Sven Schreiber, executive vice-president of residential business at EEBus member SMA Solar Technology, and also a member of the initiative’s executive board.

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For Schreiber, it is vitally important that future [smart energy systems](#) are able to run as unobtrusively as possible, so that they become essentially a background component of people's lives.

“At the end of the day there should be no loss of comfort for the end user, and they don't want to have to go back to university to be able to run a domestic system, so it must be an intuitive system, hence there is big potential to connect the intelligence of Watson,” he says.

Bernd Wunderlich, IBM Watson IoT industry leader for Europe, says IBM's involvement in EEBus will accelerate the use of the IoT in the energy industry.

“We have one showcase that we have built already for a heat pump, where we have developed a minimum viable product in just a few weeks, which shows how we are bringing external APIs into the game, such as from the Weather Company [a recent IBM acquisition] to make such systems much more intelligent,” he says.

Cognitive keeps users happy

Like Viard at SNCF, Hugues Delval, executive vice-president of services at Kone, a leader in escalator and lift technology, [is already using IoT sensors](#) to monitor the health of the firm's installed base of equipment, checking

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whether or not a lift car is levelling correctly, or noting abnormal vibrations, alarm system function, and so on.

For Kone, which makes half its €8.8bn annual revenues from recurring services contracts, bringing cognitive analytics into play to extrapolate trends in its datasets that may indicate an oncoming problem is a key differentiator for its businesses.

“We are able to tell our technicians that this elevator’s doors are vibrating abnormally, it’s probably coming from the door lock, so please make an intervention in the next 48 hours and make sure you have this component in your van,” Delval tells Computer Weekly.

“This enables us to guarantee the availability and performance of the equipment, and for customers it is also very important. We can provide the information to the customer on his mobile so that when he, as a tenant of the building, calls Kone to say he has noticed this issue, we can say we’re already intervening.

“It brings value for us in terms of our ability to serve our customers in terms of performance, safety and availability, and it also helps us make our people look more professional, because they come with the right information,” says Delval.

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In the future, Kone hopes to expand its use of Watson artificial intelligence (AI) to introduce services that will enhance the user experience still further. In years to come, Delval predicts that lifts in apartment blocks will recognise mobile device owners when they walk through the front door, and knowing that said device is associated with a property on the eighth floor, will have a car ready to whisk the resident home without them having to wait for it.

More prosaically, Kone hopes to use Watson to analyse inbound calls to its [contact centres](#) to help its agents ask the right questions and find the potential root cause of a problem quicker. Such a system may also be used to identify how the caller is feeling – angry, calm, and so on – which the contact centre agent can then use to tailor his or her approach and line of questioning.

“We will augment people’s capabilities to better serve our customers, that’s a key element for us,” says Delval. “We are entering a period where we can really tap into the cognitive analytics capabilities to design these new services, and the further we go down this road the more cognitive and AI capabilities will go with us.”

A guided tour of the IoT

Visitors to Watson IoT’s new home can be left in no doubt as to how lavishly IBM has spent on the experience. While other suppliers tend to demonstrate small-scale use cases, often involving model cars and cuddly toys, IBM

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pulled out all the stops to impress the press corps, enlisting some of its top technologists, such as [electrical engineering veteran John Cohn](#), to run guided tours of the facility.

At the client experience centre, IoT explorers can peruse every single connected component of BMW's i8 electric supercar, hear music generated by real time IoT data flows from the trains on Munich's U-bahn network, and see case studies projected onto a digital tabletop.

Elsewhere, a clearly excited Cohn demonstrated some of the IoT capabilities IBM has built into its offices, using a text-to-speech interface to book a hotdesk, while overhead, lights lit up to guide him to it.

Meanwhile, strategically placed mood lighting lit up in shades of red and green to let busy IBMers know how long the queue at the downstairs coffee bar was getting – it is illegal in Germany to show anybody's face over a webcam without their consent, but not to display the fact of their presence in the space, so a network of infrared IoT sensors reads the ambient temperatures in the room to see how many people are there, and changes the lights to achieve the same effect.

In other parts of the building, IBM engineers used Watson cognitive computing and the IoT to convert speech from English text to Chinese calligraphy written by a robotic arm, and showed off Olli, a US-built electric vehicle that uses Watson IoT not only to analyse and learn from high

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volumes of transportation data, but also interact with its passengers using Watson developer APIs: speech to text, natural language classifier, entity extraction and text to speech.

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📌 Beware the AI black box

Matt Jones, guest contributor

Big tech vendors have been piling into analytics and now AI. IBM's Watson has been charming the media with disease diagnosis and Jeopardy prowess, and Palantir has been finding terrorists. Other major vendors such as Oracle and SAP have also been joining the scene, albeit with slightly less fanfare.

These companies have been leading tech innovation for years; one would expect them to offer a credible AI solution, and indeed their technology is good.

But the black box approach that many such companies currently offer presents problems. The first is that analytics is not a plug and play solution; it needs to be built with [an understanding of data and context](#).

The second is that, in buying a black box solution, you lose control of your data. This means you are not sure what it's telling you, you allow others to benefit from it for free, and you may not be able to access it in future.

And now you may even be in for a big bill for the privilege. A recent court case ruled that drinks company [Diageo had to pay SAP additional licences](#)

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for all customers that indirectly benefitted from SAP software used in their organisation, costs that could run to £55m.

If upheld, this could have a chilling effect on the analytics platform industry. Could every beneficiary of data insights across and beyond your organisation now need a licence? Companies should now think a lot harder before committing to a platform on which their whole business relies.

Your data is your company's lifeblood - value it

Even before this case, it's stunning how much control of data companies were willing to give up to vendors, and how little thought goes into the consequences of over reliance on one technology.

Vendor lock-in is nothing new of course, consumers have been allowing Apple and Google to track their every move, and global businesses putting everything in the Microsoft cloud, for years.

But data and AI represent this problem on steroids. Data projects done right are embedded throughout the entire organisation. Some solutions will suck in all your data from every system, lock it away, and even refuse you access to it. So these platforms have all your data, the context, and the insights it provides. And now they have even more power to charge you to benefit from it.

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How to plan for an analytics solutions

So, how can you benefit from data analytics without storing up future problems?

Before you even think about technology, get the right mix of technical and business people to look at what your business needs to achieve and how data can help you. Then get people in with data science expertise who can explore how your data can be used to support those needs.

Only then should you look at what platforms you need to achieve this. The most powerful is not necessarily the most suitable, find one suited to your need. In doing so, consider licensing models and demands from your data - does it leave your site? Can you access it when you need to? Look at the company's overall culture - are they transparent or opaque? This will guide you in how they are likely to handle your data.

Perhaps more important is to consider whether you need a black box at all. Google, [Microsoft](#) and Facebook, amongst others, all offer openly available Artificial Intelligence (AI) APIs on which anyone can build bespoke AI or machine learning platforms – which are as sophisticated as any black box on the market. Furthermore this allows you complete control and transparency of how the data is fed in, processed and presented, so you can identify causal links between data and outcomes, rather than having to trust someone else's insights into your business are correct.

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If you do need a black box solution - and there are times when they are the right option – you should ask whether the vendor is a partner or just a platform. Do they understand your business context? Do they integrate with your particular data setup? Do they leave you with control of your data? Do they make the data analysis process clear, so you can understand whether your business insight is based on a causal links or just an unsupported pattern spotted in the data.

The approach you take should be driven by the most appropriate approach to solving your challenge or finding the insight you require to make better decisions - not by the platform itself - and it should consider what level of data control and oversight you are willing to give up. Once you have properly defined that, then you can make the best decision about how to use your data to meet those goals.

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IBM Watson holds court at Wimbledon 2017

Brian McKenna, business applications editor

Summer's here and Wimbledon is about to begin again with a raft of new digital fan experience elements, including a virtual assistant named after [Fred Perry](#), the last British tennis player before Andy Murray to win the men's championship.

This year, IBM is contributing a battery of IT to the All England Lawn Tennis Club's (AELTC) annual championship, much of which turns on uses of its [Watson super computer](#).

The AELTC and IBM have targeted four areas for new activities. These lie in changing fans' views of the event, using artificial intelligence (AI) to assist visitors to the tournament, AI-automated video highlights, and a "what makes a great tennis player" data analytics system.

The IBM [SlamTracker](#) with Cognitive Keys to the Match system is billed as a cross platform application that provides real-time scores, statistics and insights for all the matches in progress. The application has been deployed before and the updated Keys to the Match service is said to be more

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detailed, including insights such as pace of play, serve placement spread and baseline proximity.

Real-time data will be integrated from sources including courtside statisticians, chair umpires, radar guns, ball position, player location and Twitter for social sentiment.

IBM is also producing insights based on “pressure situations” in a match, such as a particular player being down love-40 in a game and down two sets. These insights will, it is said, show the historical performance for a player when in that specific situation, revealing hidden patterns in player and match dynamics to determine the pressure situations.

For visitors to the tournament grounds, there will be a Watson-enabled bot, Ask Fred. This new mobile app will dish up information about dining options, and features a natural language interface and an interactive map of the venue.

AI-based automated video highlights will, it is said, be generated using [IBM Watson](#) and other video and audio technologies to show action from the six main courts.

The AI system created by IBM Research scientists and IBM iX consultants will automatically “curate highlights based on analysis of crowd noise,

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players' movements and match data to help simplify the video highlights production process and focus on key moments in the match” .

The Wimbledon IBM team has also put together a “What Makes Great” data and analytics system to help fans play the pundit. Sam Seddon, Wimbledon programme executive at IBM, said this is based on “a database on-site built on IBM DB/2 with a reporting layer built on top of that” .

He added: “From a Watson perspective, we use [Discovery Services](#) to ingest information, and then we analyse that information with natural language classification. We are also tracking the debate on social media, and putting out points of view to elicit responses.”

The system is being pointed at about 54 million tennis data points captured since 1990, 6,000 or so newspaper print articles from *The Telegraph* written during the Wimbledon championships since 1995, 22 years of articles, daily blogs and interviews from the websites Wimbledon.com and *The Telegraph's* since 1995, and 10 Wimbledon annuals, interview transcripts and social media commentary that total some 11 million words.

Seddon said it surfaces information in six areas to help fans analyse players – their passion, performance under pressure, serve, stamina, how they adapt to their opponent's game or, contrariwise, impose their own game, and their success in return of serve.

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“Cognitive computing is the next revolution in sports technology and, working with us, Wimbledon is exposed to the foremost frontier of what technology can do as we work together to achieve the best possible outcome for the brand and the event,” said Seddon. “Cognitive computing is now pervasive from driving the fan experience, to providing efficiency for digital editors, to IT operations.”

Alexandra Willis, head of communications, content and digital at the AELTC, said: “With help from IBM, we are providing new on-site features in the SmartPhone apps, such as the Ask Fred assistant, allowing fans to plan their day at the championships and make the most of their visit. Similarly, we are working with IBM to access additional insights in order for our fans to truly understand and share the moments that matter. This year, a combination of design and data-driven content and insights will provide fans with the unique Wimbledon experience they expect and more.”

At a press event to launch this year’s digital technology programme with IBM, Willis added: “A lot of what we are doing is test bedding and learning for the future.” She said she expects the highlights automation activity to expand beyond the six show courts next year.

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