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THE COMPLETE GUIDE TO BLOCKCHAIN IN THE ENTERPRISE

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Chain gang

Blockchain, the distributed ledger technology that underpins the cryptocurrency bitcoin, has been slowly but surely infiltrating the enterprise over the past decade as businesses investigate whether it can solve some of their most pressing problems.

The main benefits of blockchain for businesses comes in the way it securely stores information across a distributed network of computers, meaning once a record enters the chain it is impossible to amend or deleted. This functionality has caught the eye of financial services firms for secure payments

protocols, governments to store citizen records, and manufacturers looking for better transparency into their supply chain, to name just a few.

In fact, an October 2017 survey from CompTIA found that 24 percent of businesses are looking into potential applications of the technology, while 16 percent of firms had already purchased blockchain-enabled tools.

Here we explain blockchain in the context of enterprise deployments, from financial services to governments, how technology vendors are getting in on the action with fully managed Blockchain-as-a-Service options, tips for building a career around blockchain and some real-world case studies. **Scott Carey**

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What is blockchain and can it live up to the hype?

As traders, banks and governments look into how blockchain can benefit them, will 2018 be the year it finds its place in the world?

First popularized outside of computer science circles with the cryptocurrency bitcoin, blockchain technology is now grabbing the attention of just about everyone, from financial services and governments, to discussions around the dinner table.

Understandably, there's plenty of confusion – just what does blockchain mean for business? What will and won't it be used for, and will it live up to the hype?

Here we break it all down for you.

What is blockchain?

Perhaps the most well-known blockchain project is the cryptocurrency bitcoin, but it is worth separating the two: bitcoin is a currency that makes use of blockchain technology, whereas blockchain is the underlying infrastructure.

A blockchain is in essence a list of digital records – called blocks – with each of these secured by cryptography to create a ledger of these transactions. Once a record has been verified it enters the chain and cannot be amended.

For this reason its real-world applications tend to be in areas where visibility and trust are paramount: think banks, shipping companies, regulators and supply chains. Some real-world applications include Walmart tracing its food supply from 'farm to fork', and the Royal Bank of Scotland automating mortgage delivery receipts to send to the Financial Conduct Authority.

Pretty much all of the big enterprise technology names are dabbling with blockchain to some degree, but among the leading players are IBM, Microsoft, Cisco, Fujitsu, Intel, NEC, NTT Data, Red Hat, and VMware – all of which are members of the Hyperledger project, an umbrella project for open source blockchain led by the Linux Foundation.

How can blockchain be used by businesses?

The wide range of uses for blockchain is now "a world away from bitcoin," according to Lisa Moyle, head of financial services and payments at industry group techUK.

While the finance sector has been pushing the technology, there's now the potential for applications

across plenty of different sectors. That could include new forms of clearing and settlement, as well as supply chain finance. And Everledger, for example, uses blockchain to guarantee the provenance of diamonds.

"The challenge is to test these use cases against the current regulatory framework and understand real-world viability in terms of cost, suitability and efficiency," Moyle explains.

Governments are exploring the potential for blockchain in running secure and cost-effective services. "Things like land registry, tax collection, or confirming the validity of government documents," she adds.

Indeed, chief executive for UK Research and Innovation (UKRI) Sir Mark Walport, recommended the National Health Service (NHS) use a form of blockchain technology for its databases and record-keeping. "It has the potential to redefine the relationship between government and the citizen in terms of data sharing, transparency and trust," he said at the time.

A new system of record

As blockchain enables peer-to-peer transactions with a great deal of trust and transparency, the idea is it could prove useful for any industry where multiple parties require a common record – think payments, or insurance, or voting, where the Internet of Things and connected devices are playing a bigger role.

An example: IBM's blockchain VP Jerry Cuomo imagines a world where you're only liable for your car insurance when you're on the road and driving.

By distributing information through a blockchain, it would be possible for all parties to agree exactly when a car was on the road. If a car had automatic

parking software, the record created by blockchain could determine when the driver was in control, and when it was the software – using the record to identify who was liable at that time.

According to a recent report from Deloitte (PDF), there are three key characteristics to blockchain that make it a desirable technology across industry. First, it's almost impossible to tinker with the blockchain without it being noticed, making fraud very difficult. Blockchain can also make transactions irrevocable, increasing the accuracy of records as well as simplifying back-office processes. And because it is digital, almost any document or asset can be expressed in code and then expressed in a ledger entry, Deloitte says, making the technology widely applicable.

Who is developing blockchain systems?

A number of initiatives have cropped up recently to help push blockchain into more mainstream usage. This typically means creating private networks for shared systems of records.

In September 2015, nine financial companies joined the R3 consortium to invest in blockchain in the finance sector: Barclays, BBVA, Commonwealth Bank of Australia, Credit Suisse, Goldman Sachs, JP Morgan, RBS, State Street, and UBS. Just two weeks later they were quickly joined by another 13 – turning the consortium into a who's who of big financial interest – with Morgan Stanley, Deutsche Bank, HSBC and Societe Generale just some of the members.

Meanwhile, some financial heavy hitters, like JP Morgan and Deutsche Börse Group, were joined with technology giants, including Intel, Fujitsu, IBM

and Hitachi in putting their collective muscle behind The Linux Foundation's Hyperledger project.

Hyperledger intends to advance the blockchain project by setting open standards collaboratively, so a network of businesses can agree on using one, decentralized public ledger.

IBM, meanwhile, has launched its own Blockchain-as-a-Service – available to developers on the cloud, so businesses can begin experimenting with use-cases with a fully configured blockchain out-of-the-box.

And that same Deloitte report highlights Ethereum – now available on the Microsoft Azure platform – which is a framework for supporting Internet of Things applications with transaction processing, itself trading a cryptocurrency called Ether that has been second only to bitcoin in terms of value.

Challenges

IBM's Jerry Cuomo believes there are people out there who are fundamentally misunderstanding the best uses for the technology. "We sometimes get confused with the technology – for example we can use blockchain to replace a distributed database," he argues. "But that's a terrible use of blockchain.

"There are great databases out there; this is not one of those purposes. You wouldn't apply a blockchain design pattern to solve a database problem. Blockchain makes sense when you're bringing businesses together with this consensus. The technology is important, but without building out that business collaboration? It's kind of missing the point."

Both banks and vendors that are invested in blockchain have moved on from a wait-and-see

approach to proof of concepts, active testing, and even full deployment, while at the same time enthusing about the possibilities.

While financial services and insurance industries see blockchain as a way to strengthen anti-fraud methods, the other, darker side of that is the amount of money laundering that is being conducted through cryptocurrencies such as bitcoin.

The 2017 cryptocurrency spike where bitcoin hit an all-time high of nearly $20,000 per coin drew considerable public attention – especially when a dramatic plummet soon wiped out over $550 billion in a month.

And businesses are starting to raise serious amounts of capital through something called an initial coin offering (ICO) whereby a percentage of a new business is sold to early backers, typically in bitcoin, in return for 'tokens'. ICOs are totally unregulated at the moment, but US regulators are taking ICOs seriously. The American Securities and Exchange Commission, for instance, has now raised the issue in the Senate.

While the volatility in crypto represents the unregulated side of blockchain, it's clear that big finance, pharma, supply chain and logistics businesses all see a future for the technology in driving efficiencies and transforming the way transactions are handled. Analyst house Gartner anticipates nearly $4 trillion in yearly IT spending for 2018, and this will be led by artificial intelligence, the Internet of Things, and blockchain.

So while blockchain is a nascent technology that is still finding its feet, it's also clear that it's making great strides – and businesses that leverage it successfully early are likely to reap the rewards. **Tamlin Magee**

Credit: iStock

How blockchain is being used in the real world

From supply chain management to driverless car insurance, blockchain deployments are happening in the wild

Blockchain is increasingly moving out of the research and development stages and being used in the real world. A blockchain is a distributed, digital ledger that is available for all parties to see, providing transparency across the chain – and businesses, including those in supply chain management or stamping out fraud, are all taking notice. Here are some examples of blockchain being used today.

Kodak creates photo intellectual property platform on the blockchain

After leaping some regulatory hurdles a blockchain image copyright system developed by Wenn Digital with Kodak opened for an initial coin offering on 21 May 2018 with a $50 million ceiling.

The two companies developed the 'image rights management platform' KODAKOne to create a digital ledger for rights ownership. Photographers will be able to license new or archived work on the platform where they will be paid in KODAKCoin, a cryptocurrency designed for the system.

The platform itself is built to constantly crawl the web looking for intellectual property infringements.

KODAKOne co-founder Cam Chell told Reuters: "We really took a step back and decided we would ensure that all Ts were crossed and Is dotted before we embark on a public sale. We wanted to make sure that we got it right."

The coin offering will move through a tool compliant with the US Securities and Exchange Commission regulator called Simple Agreement for Future Tokens, or SAFT.

De Beers successfully delivers diamond-tracing blockchain pilot

Diamond business De Beers claims to have successfully traced 100 'high-value' diamonds along the supply chain from 'mine to retail' for the pilot of its own blockchain platform.

The Diacore, Diarough, KGK Group, Rosy Blue NV and Venus Jewel diamond manufacturers collaborated with De Beers to develop the Tracr product.

According to De Beers CEO Bruce Cleaver, the pilot successfully demonstrated that a diamond can be traced through the supply chain in a "way that was not possible before".

Rosy Blue NV managing director Amit Bhansali added: "Technology has already significantly contributed to improving transparency within the diamond industry. Initiatives that use blockchain can drive this process even further, as their implementation requires collaboration and trust creation among all industry stakeholders."

The diamond industry is controversial due to the mining of 'conflict minerals'. It is thought that blockchain could help ensure these do not enter the supply chain.

Of course, 'legitimate' diamond mining businesses are not without controversy either, with De Beers facing criticisms for displacing indigenous people for its operations, described as a tribal "genocide" by Survival International.

DHL and Accenture team up for blockchain to stamp out pharma fraud

Global logistics company DHL has jointly created a life sciences and healthcare proof of concept based on blockchain with IT services business Accenture.

The serialization prototype was designed to tackle the pharmaceutical black market – with Interpol claiming as many as 30 percent of pharmaceutical products in emerging markets are counterfeit.

The proof of concept contained nodes in six geographies to track the medicine and record its journey on a shared ledger with various stakeholders including manufacturers, warehouses, distributors, pharmacies,

hospitals and doctors. Andreas Baier, Accenture's lead for travel and transportation, said in a statement: "Using a common, indelible and secure ledger, the industry can achieve much higher safety standards, from the factory to the patient, at much lower cost. This is one of several opportunities blockchain affords to restructure business processes while reducing cost and complexity."

Toyota turns to blockchain for driverless car insurance data

Carmaker Toyota's research subsidiary – Toyota Research Institute – announced its intention to partner with MIT Media Lab to contribute to the development of driverless cars. The idea is to create and store motoring data in a trusted location, generated by the usage of the cars. This data will inform insurance rates, a complex regulatory minefield for driverless cars at present.

At the time of the announcement in May 2017 Toyota Research Institute's director of mobility services and CFO said: "Hundreds of billions of miles of human driving data may be needed to develop safe and reliable autonomous vehicles. Blockchains and distributed ledgers may enable pooling data from vehicle owners, fleet managers, and manufacturers to shorten the time for reaching this goal."

MasterCard files a patent for its own blockchain money transfer service

Patent filings from MasterCard hint that the American financial services firm is building a blockchain-like system for real-time payments.

In short, the patent describes MasterCard's intention to deploy distributed ledger technology to develop a

“method and system for instantaneous payment using recorded guarantees”.

MasterCard has expressed interest in blockchain before, and now it is indicating that this technology could provide an irrefutable record of transactions, payment networks and produce a response code to verify payment. The firm wrote in the patent filing that it has developed: “A method for processing a guaranteed electronic transaction, includes: storing account profile, each include an account number and balance; receiving a transaction message from an acquiring financial institution via a payment network, the message, including a specific account number, transaction amount, and payment guarantee data.”

Tamlin Magee and Thomas Macaulay

Credit: iStock

Using blockchain to build better public services

Experts from the European Parliament and private sector discussed the potential of blockchain in government at London Blockchain Week

The blockchain hype keeps growing and governments are starting to take notice. Widespread adoption of the distributed ledger technology remains a long way off, but it could help address some major public sector challenges.

Advocates envision blockchain ledgers creating a future connected government that is paperless, interoperable, auditable, distributed and tamper-proof.

"Blockchain offers governments a fast, secure, efficient, transparent means of being able to deploy government services and communicate with their populations," argued Dr Jane Thomason, the CEO of research firm Abt Associates-Australia, at London Blockchain Week earlier this year. "This is the panacea. This is what we're going for."

Areas in which governments could use blockchain include supply chain, health records, transportation, voting, energy, taxation, land titles, tokenizing welfare payments, engagement with citizens and digital currencies. It could provide easy and secure permission to access public sector data and support digital IDs for sim on-boarding for services, benefits that a number of tech-savvy governments are already exploring.

Use cases for blockchain in government

Eastern European governments have often led the way on blockchain adoption, most notably Estonia's, which began testing the technology in 2008. Since 2012, it has used blockchain across registries in healthcare, the judiciary, the legislature, and security.

Georgia's government has also experimented with blockchain, in a land registry project developed with the Bitfury Group, dubbed the National Agency of Public Registry (NAPR).

"The Bitfury Group and NAPR implemented a custom-designed a blockchain system that is now integrated into the digital records system of NAPR," Willem-Jan Bruin, the director for Western European blockchain-based solutions at Bitfury Group, told us.

"This private, permissioned blockchain is anchored to the bitcoin blockchain through a distributed digital

timestamping service. Distributed digital timestamping allows NAPR to verify and sign a document containing a citizen's essential information and proof of ownership of property.

"The importance and disruptive potential of the project lies in its ability to make land titles – and, in general, property rights – available to billions of people who are currently unable to legally register their property. Blockchain technology also permits significant time and cost savings in the registration process. Therefore, the blockchain land-titling project could have a big global impact beyond Georgia."

Lithuanian MEP Antanas Guoga has made investments of his own in blockchain, and believes the general authorization of documents will be the most successful early use case for the technology.

"Everything can be on blockchain; when you purchase your title, whenever you've had a service done that's important, whenever you've been to the doctor and you have to show your insurance numbers," he suggested.

Ashley Fox, the MEP for the Southwest of England and Gibraltar, and leader of the British Conservatives in the European Parliament, added access to criminal records to the list.

Employers who need to check these records in the UK currently have to contact an agency in most cases, a slow and costly process that blockchain could completely transform.

"Individuals would know what the state held on them and could then grant access to a school or a nursing home, and that whole process would be speeded up enormously, and that would grant great reassurance to

citizens and to future employees," said Fox, a member of the European Parliament's all-party Innovation Group.

Thomason from Abt Associates-Australia was also enthusiastic about the potential for blockchain voting, which the Flux party in Australia is using for its voting systems. She said that every voter in a state election in Australia costs the government around AU$2,500, which a new platform developed by Melbourne blockchain start-up Horizon State promises to cut to 50 cents. To put this into practice, the platform would first need to gain the elusive trust of both citizens and government though.

Challenges to government adoption

There are still a number of constraints to widespread adoption of blockchain. Governments are particularly worried about cybersecurity, the dark web, and regulatory compliance.

They will also be concerned that the pathway to adoption will be costly and complex. To overcome this barrier, both Bruin and Fox recommend starting with simple pilot schemes that can demonstrate success to attract support for further applications.

"You'll find that most politicians are really very nervous of using new technology, of introducing new schemes, because they're fearful of what will happen when it goes wrong," explained Fox.

"So I think governments will be quite slow to introduce blockchain technology, even though it has great potential."

Citizens will also be concerned about their privacy and the security of the system, particularly when the hype hits its peak and crashes down to reality, as the cryptocurrency collapse recently proved.

The bitcoin boom attracted investment from many members of the public, and the bust then lost their trust.

Their anger could also trigger a draconian response from governments.

Tips for government use of blockchain

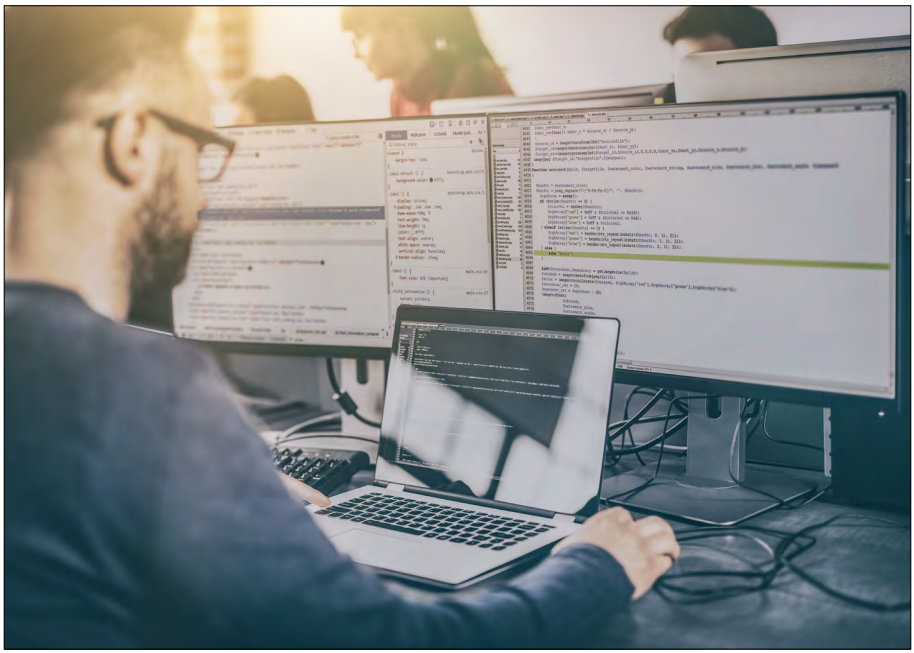
Gibraltar has made some early inroads of its own with the technology, including the Gibraltar Blockchain Exchange, a subsidiary of the stock exchange plans. Its government plans to soon create a new a licence for start-ups working with blockchain.

Fox attributes the territory's success to its focus on quality. Gibraltar takes a principles-based approach to regulating its gaming industry, with a focus on honesty and integrity that mean nine out of every 10 licenses are turned down. If they later misbehave that license will be taken away.

Receiving a Gibraltar license therefore shows a company is a serious player. Fox believes a similar approach to granting blockchain licences will support quality applications.

"It's just impossible for politicians to draft a law that's going to deal with every eventuality in the future, and I think that were we to try we would fail," he explained. "So I think a principle-based approach is entirely right."

Lithuanian MEP Guoga believes that blockchain will develop best if government limits regulations and allow it to be tested in real environments. "This is where we have to let people in and be open-armed," he said. "Give leeway and allow them to develop." **Tom Macaulay**



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How to get a job as a blockchain developer

Interested in working with blockchain systems? Here is what you need to know to make it as a blockchain developer

In the past year, the price of bitcoin has fluctuated massively – jumping to a eye-watering $20,000 last December. But whatever the current state of bitcoin is, interest in the underlying blockchain technology continues to grow outside of the crypto world.

Blockchain refers to a list of records or 'blocks' that are linked to one another and secured by cryptography.

This takes the form of a distributed ledger that can be shared across many parties to create a system of record with no single point of failure.

One major use for blockchain is to authenticate cryptocurrency payments, but the common consensus is that blockchain systems can be adapted in a much wider range of processes.

And as businesses and even public sector bodies realise the potential of blockchain-based systems, demand for expertise to create pilot projects and launch products has grown swiftly.

Required skills

There are a variety of blockchain related roles that businesses are hiring for. For some, this means taking on leading experts with experience of creating and running distributed ledger systems in production.

But often a large corporate will build a team around a core of blockchain experts. In this case, all that is needed, in addition to strong software development or engineering skills, is a solid understanding of the principles around blockchain systems.

Of course, blockchain is just one piece of a typical technology stack. Engineers that specialize in networking or security, for instance, play a vital part alongside those with core software development skills.

An awareness of modern technology tools such as Docker containers and microservice architectures is a plus, too.

Qualifications

Obvious, perhaps, but the first thing a developer needs is a background in computer science or engineering.

From there it's possible to do further training courses in blockchain specifically, but these are scarce given how new the technology is.

Experience in a back-end developer role is crucial, and in addition to strong back-end skills blockchain developers need to have at least the fundamentals of cryptography.

Once a developer has those core pillars they can begin to learn more about the different blockchain platforms at which point it becomes more systematic, according to Gavin Pacini from Deloitte's EMEA Blockchain Lab.

There are a few options in terms of programming languages for blockchain, but Pacini says a lot of the APIs and SDKs that are developed for blockchain are in JavaScript, or more specifically, node.js.

"The reason is that it's a relatively new platform and pretty quick to set up and people in the blockchain industry are trying to stay on that track, they don't want to use older technologies," he explains.

However, Polyglot software engineers – those able to code in a number of languages – seem to be preferred. Knowledge of Java and C++ appear as a requisite in many job listings, for instance.

Potential earnings

As with any emerging technology, the low supply and growing demand for expertise means that many businesses are willing to pay a premium.

The rate of pay for blockchain specialists varies considerably. Start-ups will typically pay somewhere between £40,000 to £60,000 for someone without experience and then look to give them training. In some

instances, they may offer equity in the company, too. For large corporates such as banks, this can be significantly higher, ranging from £70,000 for a developer with five years experience or more, up to £150,000 in some cases.

From a business perspective, accessing skills can be a significant challenge. Some estimate that – in the UK specifically – there are in the region of 250 developers who truly 'get' blockchain.

Attracting potential employees from this small pool of experts is tough. Many of those who first got to grips with blockchain in the form of bitcoin's open, permissionless ledger, may have been attracted by the cryptocurrency's libertarian ethos. So switching to building private ledgers for a multinational bank may not be their aim.

Furthermore, considering that blockchain technology remains fairly niche, even getting into contact with the right people can be tough.

Responsibilities

Most blockchain development roles expect developers to be responsible for research, design and testing of blockchain systems. However, these developers are expected to take ownership of a lot more as well.

Seeing as a blockchain developer will have experience or at least knowledge of cryptography and common algorithms and data structures, you'll most likely be in charge of large codebases and peer-to-peer (P2P) networks. You'll have ongoing project,s which will mean breaking down existing code and frameworks, and rebuilding them, as well as evaluating existing and proposed blockchain structures.

Additionally, most companies rely on the blockchain developer to design different blockchain technologies

and implement them in their internal platforms, as well as maintaining the environments they are being built in.

Lots of companies are also looking for their developers to offer some business insights and logic. They will be responsible for integrations and will be asked for evaluations based on business metrics as well as IT-related ones. From the job descriptions we've looked at, most roles will offer some form of training and ask that the candidates have knowledge in source control and agile tools, experience with large-scale, secured, distributed systems and have an interest in the way money can virtually travel through secure systems.

How to become a blockchain developer

We spoke with Niamh O'Connell and Gavin Pacini from Deloitte's EMEA Blockchain Lab, to gather their advice on becoming a blockchain developer.

Keep up with industry trends

In such a new and dynamic landscape, it's important for developers to take responsibility for their own learning, particularly if they want to accelerate their career. Reach out to people in your network who can help you build your portfolio and attend events with speakers who you find interesting.

Pacini suggests using Reddit to keep up to date with relevant industry discussions and GitHub, a website for software development projects, to learn from your peers and share code. "Developing your own skills and knowledge is important. We're lucky that the blockchain lab in Deloitte operates as a start-up environment, so it's easier to share information, but in other environments it's good to look to the online platforms," he added.

Be agile

If you're looking to work in blockchain you need to be adaptable and willing to get stuck in. Given the new nature of the blockchain space, there's not always documentation to rely on and developers need to be comfortable looking to open source code and learning on the job.

"It's not an established platform, so it's a real learning curve. We've had cases where we've had to dig through the source code of open source projects, which normally isn't required when using existing technologies but with blockchain, we don't have a choice. Tracks are being laid in front of us and our job is to make the best use of that," Pacini explained.

O'Connell predicts that from the business perspective too, self-education will become more and more prominent, with non-techies beginning to learn the basics of code. "It's adapt or die," she argued. "Even the more traditional industries are beginning to expand their tech abilities to stay relevant."

Consider the business case

O'Connell believes that having an understanding of the business case as well as the technology is extremely important when working with blockchain.

One of the unique challenges of her role in the lab has been to educate clients on the unique properties of the technology and analyse whether or not it would be a good fit for the business.

"Blockchain was getting a lot of hype, particularly last year, and this meant that people were keen to use it without understanding how it should be used in comparison to a traditional database," she said. "We

found that clients were coming to us with use cases that they wanted to explore and after running workshops we found that blockchain actually didn't make specific sense for their business," she added.

Have a genuine interest

As with most other things in life, the more you put in the more you get out. Pacini told us that if you really want to succeed as a blockchain developer, it's important to have a genuine interest in the field. Not only will you be more motivated to work harder and be willing to continue learning outside your working hours, you'll also be more likely to excel at it.

"My previous experience was in payment authentication and working on payment systems mainly in the back-end but I had a personal interest in blockchain and when I joined Deloitte in the blockchain lab, it was an extension to the back end for me really, which made it easier to adapt," he said.

Who is hiring?

First, let's take a look at where the demand for jobs is coming from. There are indications that increased hiring is occurring in a variety of sectors and industry verticals.

Some are more advanced in their blockchain strategies than others, with banks like Barclays and BBVA investigating the technology, while others have an understanding but are just testing the waters.

Blockchain start-ups and consortiums: Start-ups hiring in this space are numerous – from those providing the foundation building blocks of the technology, such as Ethereum and Eris, to companies specializing in business

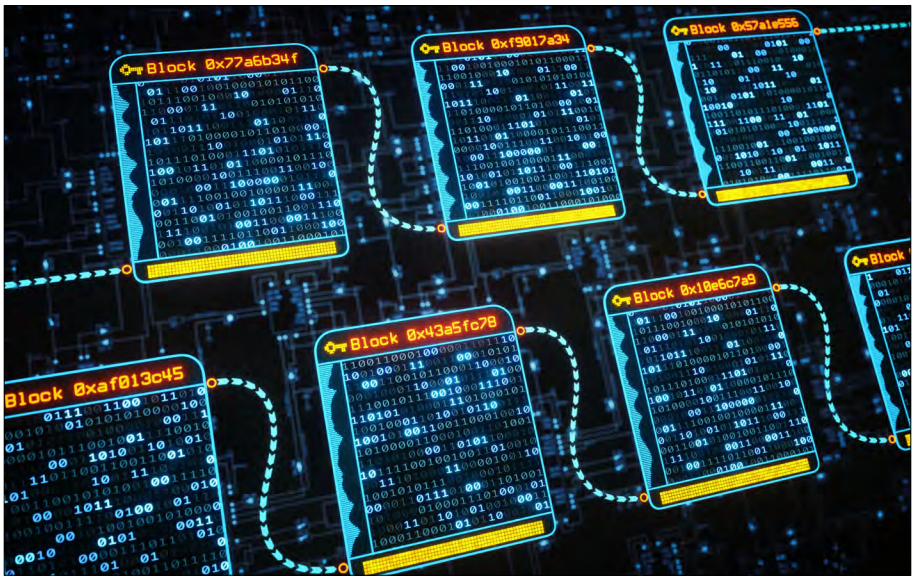
applications, including Everledger. Also, groups such as New York-based R3, which is creating blockchain standards in the financial sector.

Large tech firms: IBM and Microsoft have been creating products to support blockchain development with Blockchain-as-a-Service tools built into their existing cloud portfolios. Others that have joined the open source Hyperledger project include Intel and Fujitsu.

Banks and other private sector firms: Barclays has been particularly active in the blockchain space, alongside UBS, Santander and BBVA. Also, Dutch lender ABN Amro is investigating blockchain use. It is not just the banks either. Visa and Thomson Reuters have also been on the lookout for specialists, while Airbnb hired a team of blockchain and bitcoin developers in 2016.

Government: A report published by the government's former chief science advisor, Sir Mark Walport, highlighted the potential in government and conversations have begun in the public sector around how blockchain can be used. A variety of use cases have been discussed, such as tracking student loan payments.

Professional services firms: All of the big consulting firms are at some stage of building out blockchain teams to advise their clients on what is expected to be a hugely transformative technology. Deloitte acquired blockchain start-up Rubix, PwC recruited a team from Bitnet and is continuing to expand, Capgemini planned to have 100 specialists by the end 2016 and KPMG has been hiring too. **CIO staff**



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Best Blockchain-as-a-Service (BaaS) options

A growing number of vendors are providing blockchain services off the shelf. Here's our pick of the crop

For the past few years, blockchain has been one of the buzziest of buzz words. It's the technology that bitcoin (and all the other cryptocurrencies launched since) were built on, but has many other applications, and has been investigated for application in everything from banking to social media platforms.

The distributed ledger technology is useful for sharing business processes and data across a number of organizations, which can reduce the risk of fraud

and increase transparency. It also adds visibility to supply chains by allowing all parties to have one, real-time view of transactions. Large banks and insurance companies are among the heavyweight industries taking an interest in the technology. So it's no wonder then that a crop of firms are now offering Blockchain-as-a-Service (BaaS) capabilities.

Here, we take a look at some of the best.

IBM Blockchain Platform

IBM's blockchain platform allows businesses to, 'develop, govern and operate a blockchain ecosystem quickly and cost-effectively on a flexible, cloud-based platform'.

In 2017, Juniper Research discovered that 60 percent of tech executives and leaders named IBM as the blockchain market leader. You can sign up to the Starter Membership Plan for free during the beta period and at a low cost after that. Alternatively, the Enterprise Membership Plan, costing $1,000 per month for each peer deployed, offers 'premium support, a secure blockchain environment for early production workloads, and added layers of security'.

Some of the businesses already taking advantage of IBM's blockchain service include Walmart, which is using it to improve traceability and transparency within the food supply chain, and Northern Trust, which is using it to increase clarity in private equity deals.

Microsoft Azure Blockchain

On the Microsoft Azure platform, you can 'develop, test, and deploy secure blockchain apps'.

A big selling point of Microsoft's blockchain platform is the reduced time taken to develop an application thanks

to the modular and preconfigured options. Another plus is that clients aren't charged for the blockchain solution itself, only the resources consumed such as compute, storage and networking.

Clients can select the blockchain ledger that is most appropriate to build their solution on, including: Corda, Ethereum and Hyperledger Fabric.

An example of a company using the service is Webjet, which is using it to power Rezchain, a payment reconciliation service for the online travel market.

Amazon's Blockchain Templates

Launched in April 2018, Amazon's Blockchain Templates are a bit late to the party, but may well instil fear in companies more established in the blockchain space such as IBM and Microsoft.

Blockchain Templates offer BaaS for Amazon Web Services (AWS) that facilitates the development of projects built upon blockchain.

The software allows users to build on top of two forms of blockchain ledger technology – either Ethereum or the Linux Foundation's Hyperledger Fabric.

The difference between the two centres on the fact that Ethereum is geared towards public applications, while Hyperledger Fabric is more suited to private cloud applications.

Given that AWS is the largest cloud infrastructure platform in the world, adding blockchain capabilities may well prove attractive to developers.

Oracle Blockchain Cloud Service

Oracle has launched its Oracle Blockchain Cloud Service as part of its already beefy Platform-as-a-

Service (PaaS) offering. Their service offers enterprise customers a way to get involved with blockchain with a fully managed approach. It's built on top of the open source Hyperledger Fabric project.

Baidu Blockchain Open Platform

Chinese web search company, Baidu, launched its own BaaS platform earlier in 2018. The service is based on technology developed by Baidu, and is aimed to facilitate the making and tracking of transactions using distributed ledger technology. The firm has named various different potential applications of the service, including digital currency, insurance management, digital billing and bank credit management.

Huawei's Blockchain Service

Chinese telecommunications giant, Huawei, recently launched a BaaS platform aimed to help companies develop smart contracts on top of the blockchain technology. Huawei's new blockchain solution is built on top of the open source Hyperledger Fabric 1.0 software.

The technology is currently focused on developing solutions related to supply chain, public services such as ID verification and financial auditing and tokenized securities assets. **Laurie Clarke**