

Crypto winter or Crypto spring?

Reasons to be optimistic about
the UK's blockchain ecosystem

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Part 1: Our decentralised future?

A blockchain primer

The blockchain winter is thawing. We offer an accessible introduction to an important emerging technology.

In 2018, expectations for blockchain technology, and the value of blockchain currencies, fell to earth. The blockchain ‘winter’ has been bitter.

There are signs of green shoots. Corporate blockchain adoption has reached a ‘turning point’ (Deloitte). In 2019, 83% of large companies see compelling use cases for blockchain and 40% plan to invest at least \$5m in blockchain initiatives (Deloitte) in the year ahead. Global demand for blockchain engineers grew 517% in 2019, four times greater than for any others (Hired). The Governor of the Bank of England wrote that blockchains could “drive efficiency and resilience”, “reduce risks” and “improve financial inclusion” in the financial system (Mark Carney). The number of cryptocurrency wallets has grown 42% in 12 months (Blockchain.com).

But blockchain is complex and debate is characterised by extremes: exuberance or cynicism; idealism or defeatism; greed or fear. In this report, we provide an accessible and balanced introduction.

We explain how blockchains — shared databases — let us place trust in peer-to-peer networks instead of central authorities, enabling decentralisation. We describe how blockchains work, and their advantages and drawbacks. Why is the technology suitable for some use cases but not others? We explore blockchain’s potential to unlock ‘Web 3.0’ — a decentralised future — and how, together with ‘tokens’, blockchain could offer new business models, greater and more equitable innovation, and a shift in value in the software stack.

‘Amara’s law’ posits that we over-estimate the impact of new technologies in the short term while under-estimating their long-term impact. Today, expectations have re-set while activity is growing. In the years ahead, Amara’s Law may ring true.

Blockchain moves trust to the network

“Blockchain moves trust from central parties to network participants.”

Most consumer experiences (sending money, buying goods or sharing activities) and corporate processes (lending money, managing a supply chain or scoring credit) rely on databases that belong to trusted, central authorities (Barclays, Amazon, Facebook; Lloyds, WalMart, Experian).

Central parties provide services, maintain the record of what’s true (the ‘system of record’) and offer customer engagement and recourse. If you forget your banking password, your bank will reset it.

Blockchains are shared records — databases stored, maintained and updated by multiple parties, with no central authority. Blockchains move trust from central parties to network participants, enabling information and governance to be shared. By doing so, Blockchains enable decentralisation.

Public blockchains trade efficiency for decentralisation

Blockchains can be ‘public’ or ‘private’. Typically:

- Public blockchains enable anyone to participate. Anonymous users can access and store a copy of the ledger, and submit and validate transactions. Public blockchains — such as the bitcoin currency — are highly distributed, with thousands or millions of users.
- Private, also known as ‘permissioned’, blockchains feature administrators who restrict who can participate and what they can do. Often used by corporate consortiums, such as groups of banks, private blockchains allow only known parties to access and store data, and submit and validate transactions.

We explain blockchain’s advantages and drawbacks below — but many trade-offs relate to a blockchain’s degree of decentralisation.

Public blockchains, which are open and decentralised, enable new, global services free from central control. But without trusted participants, they struggle to operate with speed and efficiency. Private blockchains operate rapidly and at scale because trusted participants administer them. But they are not decentralised, which necessitates trusting administrators and limiting security — dynamics which many people seek to avoid.

Cryptography and consensus mechanisms enable decentralisation

“Blockchains use cryptography and consensus mechanisms to maintain a distributed ledger.”

If no single party administers a blockchain — a distributed ledger — how can it function? How can we ‘move trust to the network’? Blockchains use two mechanisms to ensure legitimate use and maintain a single version of the truth:

- **Cryptography** (a branch of mathematics) enables only legitimate transactions to be processed.
- **‘Consensus mechanism’** schemes determine how a shared ledger is updated, so everyone shares a single view of what’s true.

We’ll explain the detail of cryptography and consensus mechanisms in a future post. In brief:

Cryptography draws on established mathematical techniques used for secure online communication. Related pairs of mathematical ‘keys’ have useful properties. By exploiting these properties, blockchain networks can validate account ownership and verify that transactions were authorised by their originators.

Consensus mechanisms are processes for ledger coordination. Achieving consensus around a public blockchain — a ledger that anyone can access and update — is difficult. The mechanism must include incentives to protect against malicious behaviour, such as altering the ledger to enable an attacker to spend money twice. Typically, consensus mechanisms select a single network participant to amalgamate valid transactions and update the ledger. Selecting the leader must combine randomness with a financial incentive to promote good behaviour.

Different consensus mechanisms use different approaches:

- **‘Proof-of-work’** schemes, including that used by the Bitcoin blockchain, require parties to expend resources — computer processor cycles, and the cost of powering them — if they wish to update the ledger. Proof-of-work is intended to make disruptive behaviour computationally impractical and expensive.
- **Proof-of-stake** schemes grant validation rights in proportion to the share of value in the network that participants own. Participants with large stakes have more to lose in the event of network disruption. Aligning influence with ownership is an attempt to promote good behaviour.

There are other approaches to achieving consensus, including innovative schemes that offer leaderless consensus.

Blockchains offer many benefits...

1. **Immutability: a tamper-proof record**

For technical reasons, once information is entered into a blockchain it’s almost impossible to rewrite. Centralised databases, on the other hand, may be altered by malicious insiders or outsiders who circumvent security procedures. Many ideas and business models are impractical or impossible because reliable data are inaccessible. A decentralised system, in which information is immutable by design, unlocks new opportunities in sectors ranging from insurance to healthcare.

2. **Disintermediation: cut out the middle-man**

Peer-to-peer exchange of information and value lets us remove intermediaries, enabling more structurally efficient economies. Removing financial service intermediaries who receive a fee — for money transfer, foreign exchange transactions, transaction clearing and escrow services — can reduce friction and costs.

3. **Automation: an 'intelligent network'**

Accessible, reliable digital information shared using a common protocol enables greater automation. 'Smart contracts' — self-enforceable contracts programmed in software — can sit on top of blockchains and undertake actions automatically and autonomously when specified conditions are met. 'Escrow-on-a-blockchain', for example, could use a smart contract to release parties' funds when a defined transfer of value has occurred — without involving an escrow provider. In extremis, blockchains enable Distributed Autonomous Organisations (DAOs) — entire organisations written in code and executing autonomously on a blockchain.

4. **Resilience: no single point of failure**

Because decentralised databases are shared by many market participants, they aren't susceptible to central points of failure. Even our most reliable centralised networks, such as Amazon Web Services (AWS), suffer downtime from time to time.

5. **Censorship Resistance: freedom from state control**

Because public blockchains can be accessed by anyone with an internet connection, they can be used to exchange information and value in ways that nation states cannot control. While this could facilitate the exchange of immoral or illegal goods, it can profoundly benefit citizens in repressive, unstable, or appropriative regimes.

"In the West, people say they trust Google, Facebook or their banks. But the rest of the world doesn't trust organizations and corporations that much — I mean Africa, India, Eastern Europe, or Russia. It's not about the places where people are really rich. Blockchain's opportunities are the highest in the countries that haven't reached that level yet." (Vitalik Buterin)

...while having several drawbacks

1. **Scalability: limited throughput, high latency**

The throughput of most of today's public blockchains are limited. While centralised systems, such as Visa, can process thousands of transactions per second, Bitcoin and Ethereum manage just seven and 20 transactions per second respectively. Public blockchains also struggle with delays ('latency'). For distributed ledgers to become a new, foundational layer for the internet — to enable large-scale applications that will draw on the anticipated 75 billion devices that will be connected to the internet by 2025 (IHS Market) — public blockchains must offer high throughput and low latency. Today, many parties are working on solutions to blockchain's scalability challenge. Experiments include: bigger block sizes (enabling more transactions per block); 'sharding' (splitting block verification and running the process in parallel); and using less data from the root chain to streamline verification. Corresponding solutions are emerging. The Lightning Network operates on top of blockchain-based currencies, like Bitcoin, and enables fast transactions between participating nodes. Some solutions expand scalability at the expense of decentralisation. An application-specific balancing act between scalability and decentralisation may be required.

2. **Waste: extensive energy consumption**

Most public blockchains, such as the Bitcoin network, are resource-intensive. Many networks' consensus mechanisms are premised on market participants demonstrating the expenditure of computing resources and electricity ('Proof-of-Work'). Together, participants in many public blockchains consume vast amounts of energy, which is expensive and environmentally damaging. Currently, the Bitcoin network consumes more energy annually than Austria. Blockchain developers are experimenting with less consumptive consensus mechanisms, such as Proof-of-Stake.

3. **Lack of recourse: what if there's a problem?**

Decentralisation and automation have a downside: to whom do you turn when you have a problem? If you lose the private key to your cryptocurrency wallet, or have a dispute with a counterparty, who can help? People find value in companies' services, not just their products. Further, when a smart contract or distributed autonomous organisation produces an unexpected or unwelcome result, because a particular scenario was unimagined or an individual has exploited a flaw — should the outcome be reversed? Parties are offering solutions to some of the above challenges, such as custody services for blockchain keys. But many re-introduce centralisation — a trusted authority — and therefore risk.

4. **Security: can blockchains be compromised?**

The decentralised nature of blockchains present a potential security vulnerability — the '51% attack'. If a majority of nodes in a network (in practice, sometimes more or less) are controlled by a single entity, the system becomes centralised and can be manipulated. Successful attackers could reverse transactions completed during their period of control, enabling them to double-spend coins, and prevent new transactions from being confirmed. Attacks on smaller blockchains, which use limited computational power, have occurred. In May 2018, the Bitcoin Gold blockchain suffered a successful 51% attack, in which perpetrators stole more than \$18m of the cryptocurrency by double-spending. Successful attacks on major blockchains, however, are less likely. Perpetrators would require greater computing power than the combined capability of millions of global miners, and a vast budget for the electricity to power them. The Bitcoin blockchain has never been compromised. In blockchains that use alternative, proof-of-stake consensus mechanisms, effective governance and community coordination can protect networks even after a 51% attack. Honest nodes can 'fork' the network to render the attackers' resources worthless. In practice, however, this can be difficult to achieve.

5. **Governance: who sets the rules?**

Governance is the process by which groups of people organise to make decisions. In blockchain ecosystems, governance impacts how transactions are processed and which changes to the codebase are made. Most governance frameworks evolved within centralised systems and cannot readily be applied to decentralised ones. Decisions can be made 'on-chain', with governance rules hard-coded into the blockchain protocol and proposals decided by stakeholder voting. On-chain governance offers decentralised decision-making, permanent code changes, transparency and rapid consensus given established voting periods. But infrastructure for on-chain governance is incomplete and voter apathy can enable manipulation. 'Off-chain' governance, by contrast, is social. Away from the network's code base, publicly or privately, stakeholders try to persuade each other to accept or decline proposals. While offering benefits, off-chain governance can tend towards centralisation. Governance is, perhaps, the most fundamental challenge in blockchain — because it establishes the incentives for people to address all others — and must continue to evolve.

6. **Poor user experience: few user-friendly experiences**

Today, except for buying and selling cryptocurrencies, only a small number of people engage with blockchain technology because there are few user-friendly experiences. Developing blockchain solutions is also challenging. When engaging with blockchain jargon abounds, addresses are meaningless streams of letters and numbers, and programming requires special tools such as the Solidity language for smart contracts. Emerging technologies require compelling user experiences to drive adoption. Blockchain solutions that offer attractive user experiences, such as *Coinbase*, can thrive. To expand beyond innovators and early adopters, blockchain-based solutions must offer compelling experiences.

7. **Legal uncertainty: unresolved legal questions**

Many legal questions about blockchain ecosystems are unresolved. How enforceable are smart contracts? Which blockchain tokens (an innovation we describe below) should be classified as securities? In April 2019, the Securities and Exchange Commission (SEC) issued guidance, but further clarity is required and many questions are unresolved. Uncertainty, coupled with a 'regulate by enforcement' strategy, is challenging the blockchain ecosystem while causing difficulty for regulators.

Given the disadvantages and drawbacks of decentralisation, it is vital important to select appropriate use cases for blockchain deployment and investment. In many situations, decentralisation has more drawbacks than benefits. In some others, it offers unique possibilities.

“With blockchain, it’s vital to select appropriate use cases for deployment and investment.”

Blockchain is suitable for select, existing use cases...

Given the advantages and drawbacks of decentralisation, Blockchain may be valuable when:

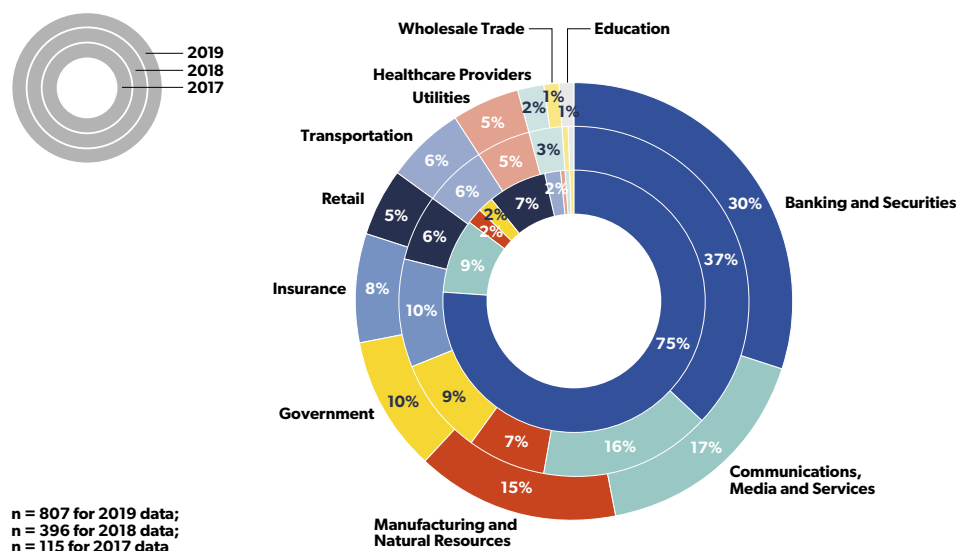
1. a process involves the transfer of information or value; and
2. many parties seek to access and update a database; and
3. existing processes require overhead to deliver shared access to secure and trusted data.

The Financial Services sector is experimenting most with blockchain. In Financial Services, multiple parties seek to transfer value and it is burdensome to manage access to the secure, trusted data required. Transferring money, settling and clearing trades, providing escrow services and undertaking Know-Your-Client (KYC) checks all require intermediaries.

If, instead, parties can interact with a trusted, shared ledger then: money can be transferred without banks; trades cleared without clearing houses; and transactions completed without escrow providers (via smart contracts).

Increasingly, other sectors are engaging with blockchain. Financial Services' share of blockchain projects has fallen from 75% in 2017 to 30% in 2019 (Fig. 1, Gartner) as manufacturers, healthcare organisations, media companies and retailers increasingly experiment with blockchain technology.

Fig. 1: Increasingly, sectors beyond Financial Services are experimenting with blockchain. (Source: Gartner)



...but has the potential to unlock 'Web 3.0'

“Decentralisation could weave the ‘missing layers’ into the fabric of the web.”

While many blockchain projects seek to improve existing processes, long-term value creation could originate from blockchain-driven business model innovation. Blockchain offers profound new possibilities by enabling the decentralised web – ‘Internet 3.0’.

Today’s internet has a big limitation: it doesn’t have a built-in mechanism to capture, or transfer, historic or current conditions — ‘state’. State represents information, which enables the capture and transfer of value.

The internet lacks native state because of the limited set of ‘protocols’ on which it’s built. Protocols are rules agreed between parties that enable cooperation. In the 1990s (‘Internet 1.0’), protocols were established to enable the world wide web and email. The TCP/IP protocol enabled data exchange. HTTP powered communication between servers and web browsers. POP/IMAP enabled email. But many protocols were missing. For example, there are no protocols for identity (your name and information) or payment built into the web.

In the absence of plentiful protocols, in the 2000s companies stepped up to capture data and value (‘Internet 2.0’). Facebook is useful because it’s a store of people’s identity — their information, interests, relationships and activities. Facebook captured data, which it monetised by displaying advertising.

In a blockchain (‘Internet 3.0’) world, data is stored securely on shared databases. With common access to permissioned data, companies cannot create value through data lock-in. If users control their identity data, and permission it to authorised parties when required, they can easily swap between applications that use it. In an Internet 3.0 world, users could swap social networks as easily as we swap between internet browsers, or email clients, today.

Blockchains, therefore, enable ‘protocolisation’. They offer open standards for the capture and transfer of information where protocols are absent. A decentralised future weaves the ‘missing layers’ into the fabric of the web. Sharing value across open networks — breaking data silos — could render old business models obsolete while enabling new ones, break monopolies,

catalyse new products and services, and re-imagine stakeholder participation. We describe these possibilities below.

Creating the decentralised internet requires great effort. Base layers in the software infrastructure ‘stack’ – from computation to storage and communication – must be developed. These, in turn, enable higher-order services.

The market for decentralised applications (‘DApps’, Fig. 2), which replace centralised services with decentralised offerings in which users control their data, is in its infancy. Most of the 2,150 DApps live or in development today (stateofthedapps.com) are experimental. Few sustain more than a few hundred users. For many, functionality capability and user experience inhibit adoption. As base layer infrastructure matures, however, DApps should deliver greater utility and offer an on-ramp to ‘Internet 3.0’.

The ‘token economy’ offers new possibilities

Fig. 2: DApps, which replace centralised with decentralised applications, offer an on-ramp onto ‘Internet 3.0’ (Source: MMC Ventures, derived from Matteo Gianpietro Zago (<https://bit.ly/2poFEqV>))



*“Tokens support the **creation, operation and adoption** of blockchain networks — and offer new business models and opportunities.”*

The technical innovation of decentralised databases coincides with a business model evolution: tokenisation. ‘Tokens’ are digital resources that exist on blockchain networks. Coded to be limited in supply, they can be owned by individuals or entities.

There are three types of token:

1. **Utility tokens** offer holders access to a service.
2. **Security tokens** represent an ownership share in an asset.
3. **Cryptocurrencies** are digital currencies used to make or receive payments.

Tokens can power the **creation** of blockchains by enabling funding. In an 'Initial Coin Offering' (ICO), participants provide capital in return for tokens in a new network. Participants' money funds network development. If the network prospers, the tokens rise in value and participants profit.

The principle has potential and over 70% of the capital raised through ICOs in 2017 went to credible projects (Statis Group). But 80% of 2017 ICOs, by volume, were fraudulent, exploiting a flood of speculative money that flowed into the blockchain sector following cryptocurrency price appreciation in 2017/18 (Statis Group). The ICO bubble burst in 2018 — a welcome development within the community. Over time, a 'plateau of reality' is emerging.

Some tokens support the operation of blockchains, by facilitating distributed consensus. On the Bitcoin blockchain, miners receive valuable tokens in return for validating transactions and creating the next entries on the ledger.

Tokens also drive blockchain adoption. Great value is accrued and delivered by today's centralised applications — so why should investors, entrepreneurs, companies and users invest in decentralised systems? Stakeholders in a blockchain — including investors and network participants — frequently receive tokens in return for their support. Earlier participants tend to receive more. This creates powerful network effects. Generous token allocations incentivise early adopters. Their success attracts other participants. Over time, select protocols develop critical mass and create a magnet for future activity.

Recently, people have sought greater flexibility in the incentive structures they could create — that is, more flexible tokens. Because tokens are expressed in software, developers can experiment with token characteristics to shape the economic systems they desire. In traditional economies, central banks influence outcomes by shaping monetary policy, including the supply of money and inflation rates. But their tools are limited, change is slow and impact is unclear. In token economies, options are myriad and impact is rapid. In token economies, developers can test the impact of 'economic policy' at the speed of software.

Blockchain could have profound implications

Blockchain could have profound implications — including new services and business models, greater and more equitable innovation, and a shift in value in the software stack:

1. **New possibilities:** When combined, decentralised databases and tokens offer new value propositions and business models. Cryptocurrencies enable peer-to-peer payment and might become global stores of value independent from governments. Accessible data could catalyse the open source movement — if Facebook users could share their 'likes', to what uses could they be put? Decentralised applications could deliver more autonomous, secure services without relying on the whim of today's platform providers. Smart contracts, which trigger token transfers when specified conditions are met, could replace select intermediaries such as escrow providers. New participation models, using tokens, could

reward service users for their activity in ways previously impossible or impractical. More broadly: in the last four decades we've created digital representations of many objects, assets and events. But combining shared data (blockchains) with programmability (via tokens) presents myriad new possibilities.

2. **Greater, more equitable competition:** Many 'internet 2.0' companies create value by amassing people's data and becoming its only repository. This creates strong network effects' — the more people who use a service (say, Instagram), the more useful it becomes to any individual. Network effects create a 'catch 22' that makes it difficult for new companies to gain market share, even if they offer better features. If data resides on a shared database, however, data network effects fall away. Companies can't defend market share through data lock-in and high switching costs. More innovative solutions — 'disruptors' — can gain share more quickly and easily. More open, equitable competition will have secondary consequences. Given low switching costs, might blockchain applications retain value for shorter periods of time?
3. **A shift in value capture:** Traditionally, applications and platforms — not protocols — capture the value created on the internet. Google captures value through its email client, via advertising, but the creators of the POP/IMAP protocol that enables email exchange receive nothing. Shared databases might reverse this dynamic, so protocols capture more value than applications — the '[fat protocol](#)' thesis. Why?
 - Application providers lose a means of value creation — 'data lock-in'. If databases are shared, application providers all have access to the same data. They cannot create value by amassing individuals' data (say, their 'likes') and becoming the only source of its availability.
 - Protocols gain a mechanism for value capture. Increasing activity on a blockchain protocol drives demand for the tokens that enable its operation— so tokens enable value to flow from applications to the protocols that power them.

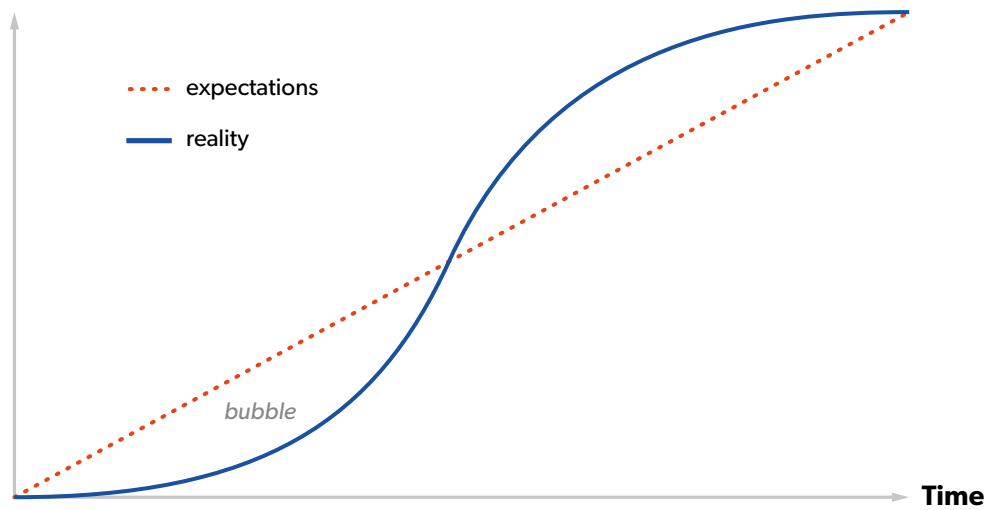
Amara's Law may ring true

"People expect new technologies to have a linear impact over time, but new technologies follow 'S-curves' of influence."

'Amara's Law' posits that people tend to over-estimate the impact of new technologies in the short term, and under-estimate their impact in the long term. This is because people expect new technologies to have a linear impact over time, but new technologies follow 'S-curves' of influence. Expectations for new technologies can be high from the outset, but the immaturity of new technologies limits their use. The gap between expectations and early reality causes bubbles to form and burst (Fig 3).

Fig. 3: New technologies form 'S-curves' of adoption. The gap between expectations and early reality causes bubbles to form and burst. (Source: MMC Ventures / Amara).

Impact of technology



In 2018, lofty expectations collided with blockchain's nascent capabilities — forming a 'blockchain winter.' Limitations in blockchain's capability, scalability, governance and user experience meant there were few use cases where the advantages of decentralisation outweighed its benefits.

Over time, however: scalability and user experiences are likely to improve; layers of blockchain infrastructure are emerging; companies are identifying more appropriate use cases; and the ICO bubble has burst and normalised. Blockchain's greatest obstacle is likely to be the change it necessitates. Replacing entrenched architectures, investments and behaviours will prove an immense challenge. Artificial intelligence withstood seven 'AI winters' before it became mainstream.

Tim Berners-Lee developed the protocol for the web in 1989. 10 years later, in 1999, its potential was glimpsed — but technological, commercial and economic challenges brought expectations back to earth with a crash. 15 years after that, Tim's vision for globalised information, e-commerce, and communication was realised. The Bitcoin white paper was published in 2008. 10 years later its potential was glimpsed — but technological, commercial and economic limitations brought expectations down to earth with a crash.

Today, expectations have re-set while activity is growing. Investors, developers, companies and central banks are advancing blockchain. In the years ahead, Amara's Law may ring true.

Part 2: Crypto winter or crypto spring?

Since the beginning of 2018, scepticism has been prevalent in the blockchain space. Negative press has become an almost daily occurrence (e.g. [WIRED](#), [Forbes](#), [FT](#)). This period of reckoning, referred to as the 'crypto winter', should be interpreted in a positive light — the build-up of hype across the ecosystem in 2017 has given way to a more grounded, pragmatic and business-case-first approach to product development.

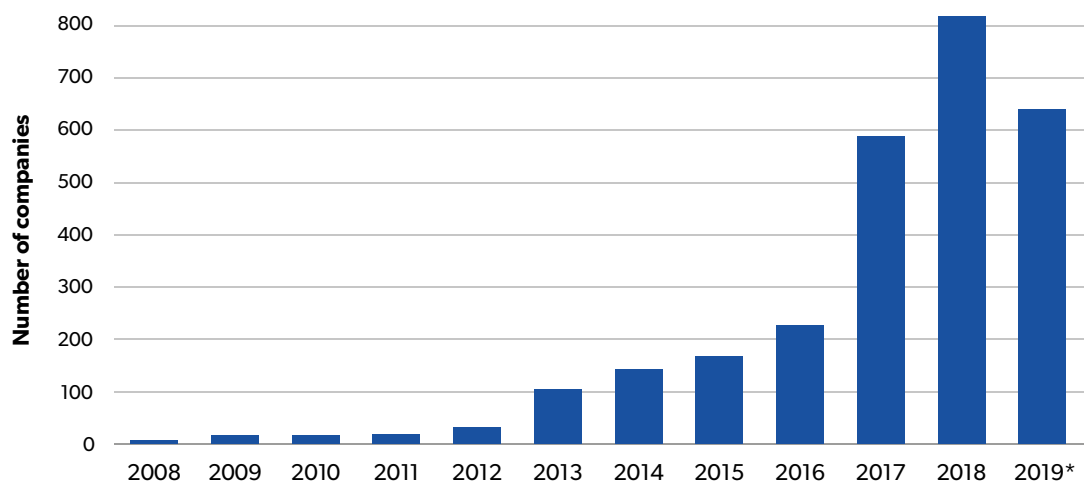
Our analysis of the UK blockchain ecosystem suggests the underlying activity remains healthy.

We expect an acceleration in business investment and entrepreneurial activity due to: improving capital dynamics, more efficient deployment of resources, greater focus on infrastructure development, and accelerating adoption by enterprises, partly driven by the urgent need for digitisation highlighted by the COVID-19 crisis.

Over 2,700 blockchain companies have been created in the UK since 2008

There has been an explosion of entrepreneurship activity with over 2,700 blockchain companies founded in the UK since 2008 (the year when the Bitcoin whitepaper was first published). More than 70% of those have been launched in the last three years. This acceleration is partly due to the technology maturing but is also an artefact of the price-induced hype that surrounded the space in 2017.

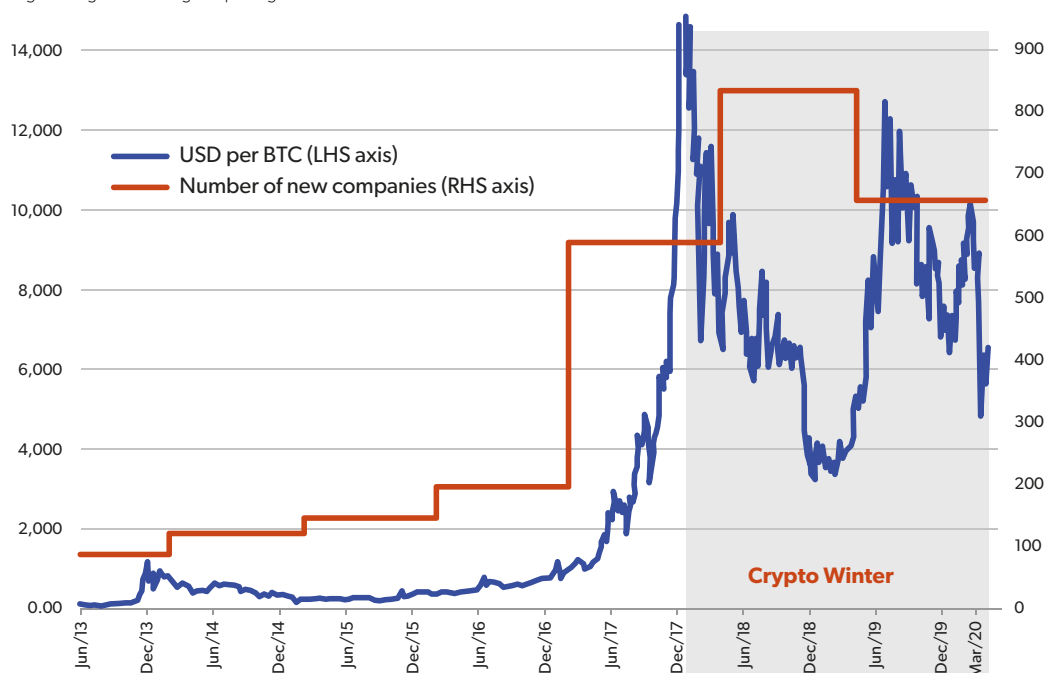
Fig 4: The number of blockchain companies has been growing rapidly. Source: MMC Ventures, Beauhurst, Crunchbase, Dealroom, Tracxn. *2019 totals might change due to a lag in reporting.



Having a live price feed for a new technology is unusual and has created unhelpful swings in sentiment.

Hype and disillusionment cycles are customary in the adoption of new technologies but, in the case of DLT (decentralised ledger technology), the live price feed has accentuated the effect. The bull run in the value of Bitcoin during 2017 fuelled a gold-rush mentality that attracted many opportunists to the space. Thus, the rally catalysed growth in entrepreneurship activity.

Fig 5: Entrepreneurship activity is impacted by bitcoin price. Source: MMC Ventures, Beauhurst, Crunchbase, Coinmarketcap, Dealroom, Tracxn. *2019 totals might change due to a lag in reporting.



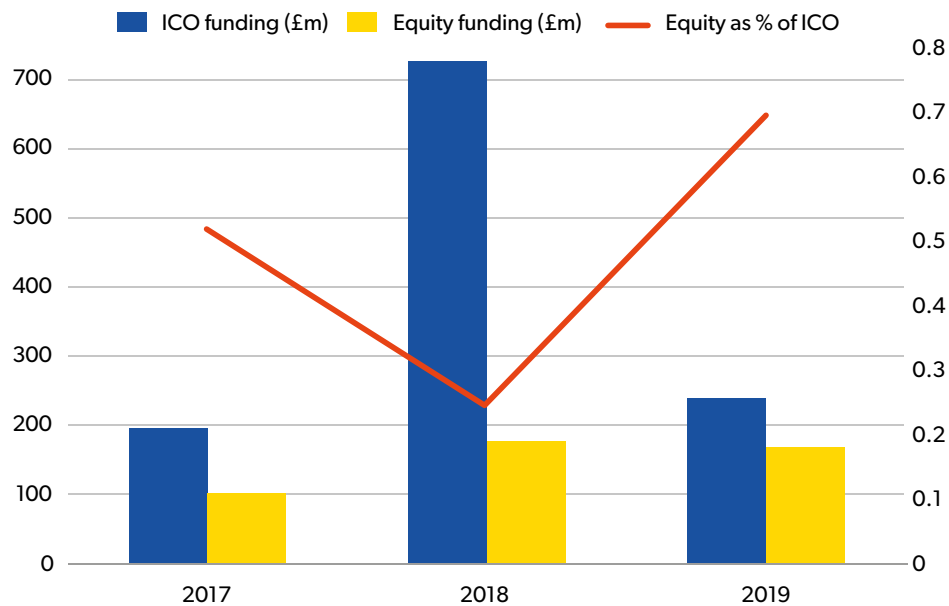
While price cannot alone explain the swings in entrepreneurship activity, the chart above suggests it certainly played a role. Another key contributor was the easy access to capital enabled by the initial coin offering model.

Capital raised through ICOs in the UK is 2.2x the equity funding

An Initial Coin Offering (ICO) is a funding mechanism in which companies sell their tokens in exchange for other crypto (typically Ether or Bitcoin) or fiat currencies (a fiat currency is a legal tender whose value is backed by the government that issued it). It is similar to crowdfunding because it enables an individual to finance a company in exchange for an asset that can appreciate/depreciate in value. Unlike crowdfunding, there was almost no regulatory oversight when ICOs first appeared.

With the explosion of tokens, ICOs quickly became the 'go-to' source of funding for blockchain companies, replacing traditional startup financing routes (VC and Angel funding). Lack of regulation, technology hype, open access and rapidly increasing prices of cryptocurrencies contributed to creating an ICO boom in 2017 and early 2018. Between January 2017 and December 2019, UK blockchain companies raised £1.2bn via ICOs (ICObench.com). This compares to £525m invested in equity to fund startups in the space (Beauhurst).

Fig 6: ICO funding has declined significantly in 2019. Source: MMC Ventures, ICObench.com, Beauhurst.com.

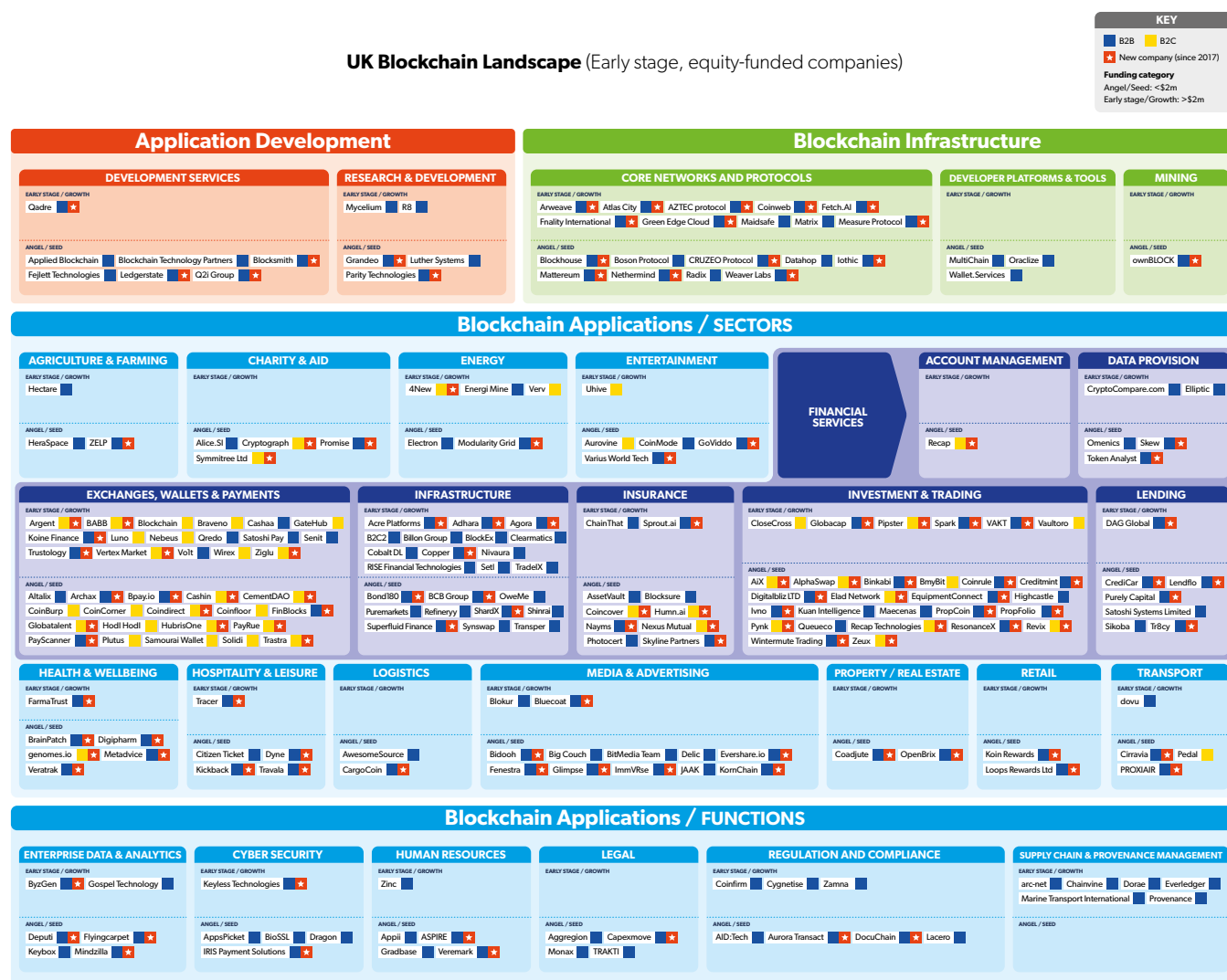


ICOs represent a valuable funding source for open-source projects. But the cheap access to capital combined with the lack of in-depth understanding of the esoteric concepts involved in most crypto projects generated the perfect conditions for a bubble. This created an environment where entrepreneurs were focused on the price action rather than the business proposition, and thus the majority were not interested in creating long-term value (e.g. [New Study Says 80 Percent of ICOs Conducted in 2017 Were Scams by Cointelegraph](#)). As a result, ICO funding considerably decelerated towards the end of 2018. We believe this trend will continue in the short to medium term.

As the ICO funding model becomes increasingly difficult, companies are shifting back to traditional capital raising strategies. This has prompted founders to place more focus on company fundamentals.

Thus, our review of the UK ecosystem focuses on startups that have raised equity financing. Companies that have used both equity and ICO funding are also captured but ICO-only plays aren't.

Fig 7: Landscape of early stage blockchain companies in the UK. Source: MMC Ventures, Beauhurst, Crunchbase, Dealroom, Tracxn.



We apologise if we've omitted or mis-classified your company. Please [get in touch](#) with additions or corrections.

Our analysis focuses on equity-funded startups and as such might not cover very early stage companies that have not raised financing yet. While the work focuses on the UK, most of the conclusions are applicable more broadly due to the global nature of the blockchain ecosystem.

Only 9% of the startups have raised equity financing

Starting with the 2,700 startups above and excluding companies that have no equity funding or are no-longer active, we are left with c.230.

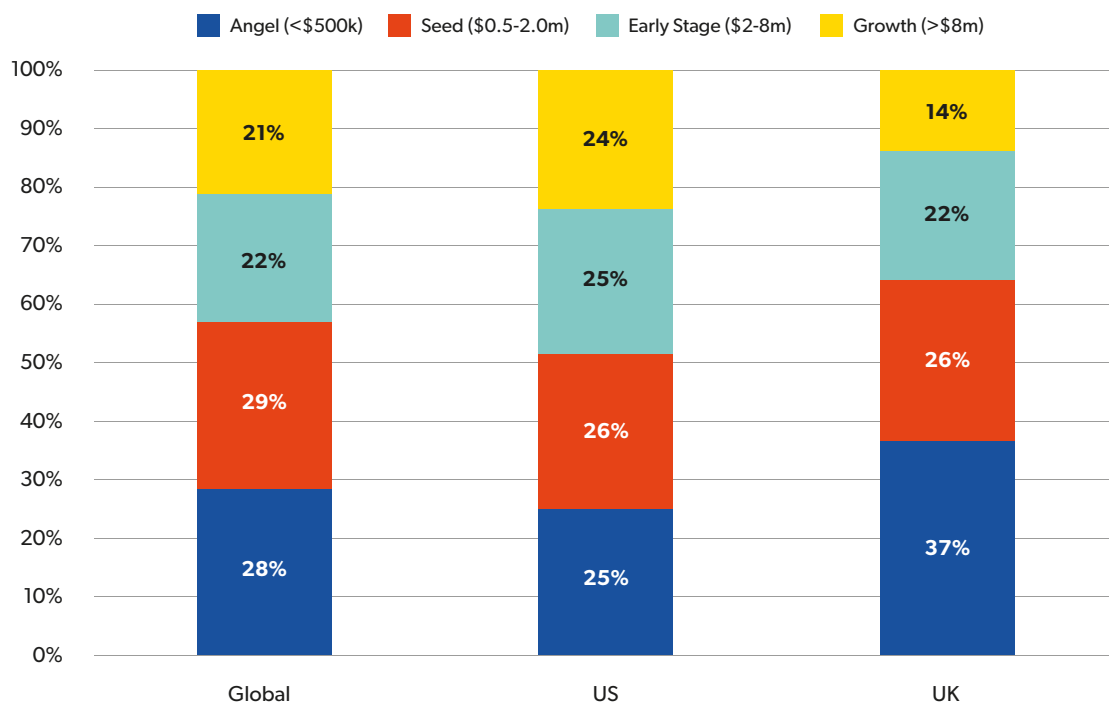
We've individually researched these early stage UK blockchain companies (those using the technology or selling crypto products/services) and spoke to more than a quarter of them so far. We've developed a map (see Fig 7 above) to place the startups according to their:

- **Purpose:** Is the company focused on improving a business function (e.g. compliance or human resources) or a sector (finance, media)? Or does the company develop new protocols or core technologies with cross-domain application?
- **Customer Type:** Does the company predominantly sell to other businesses ('B2B') or to consumers ('B2C')?
- **Funding:** How much funding has the company received to date? We bracket this from 'angel' investment (under \$500k) through to 'growth' capital (\$8m to ~\$100m).

UK's blockchain ecosystem is still nascent but...

The UK ecosystem is home to a higher proportion of seed and pre-seed blockchain companies compared to the global average and other markets such as the US. More than 60% of the UK companies have raised less than \$2m in capital. While the UK has 5x fewer blockchain companies than the US, the equity investment has been 10x lower. The discrepancy comes from later stage companies as the average Angel/Pre-seed startup has raised similar funding in the UK and US. It is difficult to pinpoint the main driver behind these dynamics — it could be that companies are not successfully scaling or it could be related to less capital being available for later stage financing. Further, European late stage investors are more conservative than the US and thus require more traction before committing to large raises. This is what a lot of blockchain companies lack.

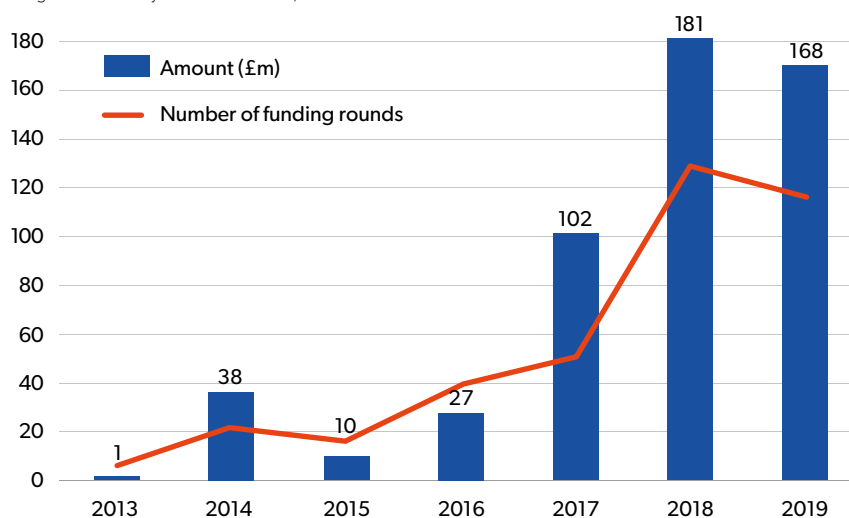
Fig 8: UK's blockchain ecosystem is nascent compared to global peers. Source: MMC Ventures, Crunchbase.



...availability of capital remains healthy despite the crypto winter

Despite the negative sentiment surrounding the blockchain space, equity capital dynamics have remained robust. Since 2013, UK blockchain startups have raised £525m in equity funding with more than 85% occurring since 2017. 2019 is on track to become the second strongest year for equity capital raising with £168m announced so far (funding rounds could be announced with a lag).

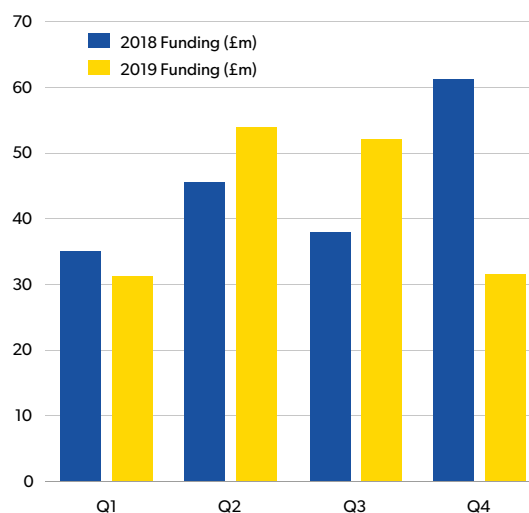
Fig 9: Equity funding remains healthy. Source: Beauhurst, MMC Ventures.



While equity likely declined year-on-year in 2019, the quarterly progression presents an optimistic picture. Capital raised was higher year-on-year in both Q2 and Q3. Deals are announced with some lag, so we expect the Q4 gap between 2018 and 2019 to narrow. The number of rounds in the first nine months of 2019 was lower year-on-year, meaning that investors still active in the space are not shying away from putting forward larger checks. Consequently, blockchain/DLT entrepreneurs in the UK maintain adequate access to capital.

Through 2020 and beyond, the COVID-19 crisis is likely to impact funding activity for all early-stage companies. That said, the increasingly pragmatic, business-case-first approach of the teams in the blockchain/crypto space makes them relatively well-positioned to weather this downturn, compared to previous periods of weakness in the funding environment.

Fig 10: Equity funding is recovering. Source: Beauhurst, MMC Ventures.

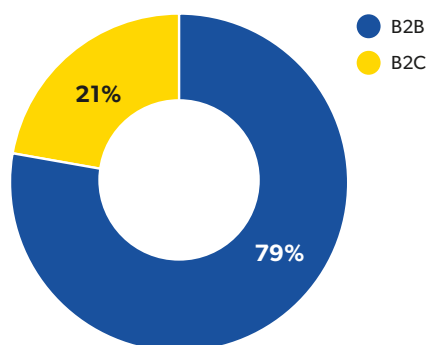


8 in 10 blockchain startups in the UK target business clients

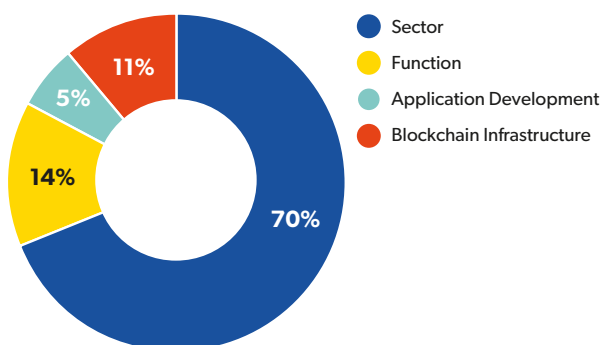
8 in 10 blockchain businesses in the UK target business customers. This is not hugely surprising given we are early in the adoption cycle of the new technology.

Fig 11: UK equity-funded blockchain companies mostly have a vertical focus and target business clients.
Source: MMC Ventures, Beauhurst, Crunchbase, Dealroom, Tracxn.

Eight in ten companies focuses on business clients



Nearly 85% of companies are vertically focused



The shift from centralised to decentralised architectures is highly complementary to the 'offline' to 'online' transition. We are still in the early phases of this and there are significant opportunities for young B2B companies to support traditional businesses on this journey. The COVID-19 crisis underscores the need for true digitisation (as opposed to merely replicating offline processes on a digital medium) across all industries by showcasing the vulnerability of the current system. DLT is compelling as an enabling architecture for digital transformation, especially when combined with other technologies such as IoT and machine learning. Hence, the current shock could further increase enterprise interest in DLT/digital assets and accelerate adoption.

At the same time, decentralised architectures are still not mature enough to power the majority of consumer use cases. Most platforms suffer from poor user experience, lack of scalability, and difficult deployment. As a result, the value creation potential for entrepreneurs, focusing on developing the blockchain infrastructure stack, is significant.

Somewhat counterintuitively, the proportion of equity-funded startups focusing on infrastructure projects, headquartered in the UK, is significantly lower than those pursuing a vertical. Our conversations with startups point to several factors contributing to this dynamic:

- **Monetisation:** Most infrastructure projects (such as *Radix* and *Medicalchain*) are open-source. As such, entrepreneurs have chosen to use tokens as a value transfer mechanism instead of directly monetising the activity in their ecosystems through traditional rent-seeking models. ICO funding is well-suited to companies in this space and many might not be pursuing equity capital.
- **Business case:** Blockchain deployments that are use-case specific find it easier to monetise their products. With ICO funding drying up, entrepreneurs are increasingly adopting a narrower, vertical focus in order to demonstrate ROI in a short period of time.
- **Regulation:** Infrastructure projects tend to be geographically distributed but headquartered in jurisdictions with favourable regulatory regimes. Examples in Europe include Malta, and Switzerland. These provide greater legal certainty, government support and easier access to capital.

The growing share of 'live' blockchain (or 'blockchain-inspired') deployments suggests we are seeing first signs of maturity in the technology.

While it took the internet approximately 30 years to become 'usable' by businesses (early 1960s to early 1990s), DLT has made that transition in a third of the time.

Higher focus on infrastructure development during the crypto winter

Technology nascency is widely considered an impediment to blockchain adoption. Successful decentralised Web 3.0 applications and services are conditional on solving the scalability, transaction throughput, and speed challenges hampering public DLT networks.

The majority of the capital attracted during the ICO frenzy focused on the application layer. These projects, however, lacked a strong infrastructure foundation and strong business case. During the crypto winter, there has been a rebalancing of developer effort. Analysis of global Github activity by Electric Capital reveals that smart contracts and infrastructure open-source projects have been gaining developers, while applications have been net losers (see [Electric Capital's H1 2019 Developer Report](#)). The space is also becoming increasingly rigorous when it comes to debugging, code checks and audits. This has led to the emergence of strong ecosystems with powerful network effects. For example, Ethereum is continuing to gain full time open-source developers that work across the stack, resulting in Web 2.0-grade experiences such as user-friendly wallets to access the innovation occurring in the decentralised finance (DeFi) space. While capital is less abundant than it was during the ICO bubble, resources are being deployed more efficiently and targeted at fundamental areas of the technology stack.

Infrastructure projects have also started adopting a more pragmatic approach, putting the user proposition at the core of the development efforts. In the UK, projects such as *Radix* and *Catalyst* (developed by *Atlas City*) have chosen to deploy private networks first to learn and iterate before the public network launches.

The innovation occurring at the infrastructure layer over the past 18 months might not be as easy to appreciate from a distance but it is laying the foundations for more sustainable growth in both business and consumer adoption.

Consumer businesses are mostly focused on cryptocurrency products

Despite the clear skew towards B2B models in the UK (see Fig 11), there is a sizeable proportion of entrepreneurs with a B2C focus. Most of these start-ups offer products facilitating easier access to and management of cryptocurrencies.

Fig 12: Financial services is a core focus for UK equity-funded blockchain companies targeting consumers.
Source: MMC Ventures, Beauhurst, Crunchbase, Dealroom, Tracxn.

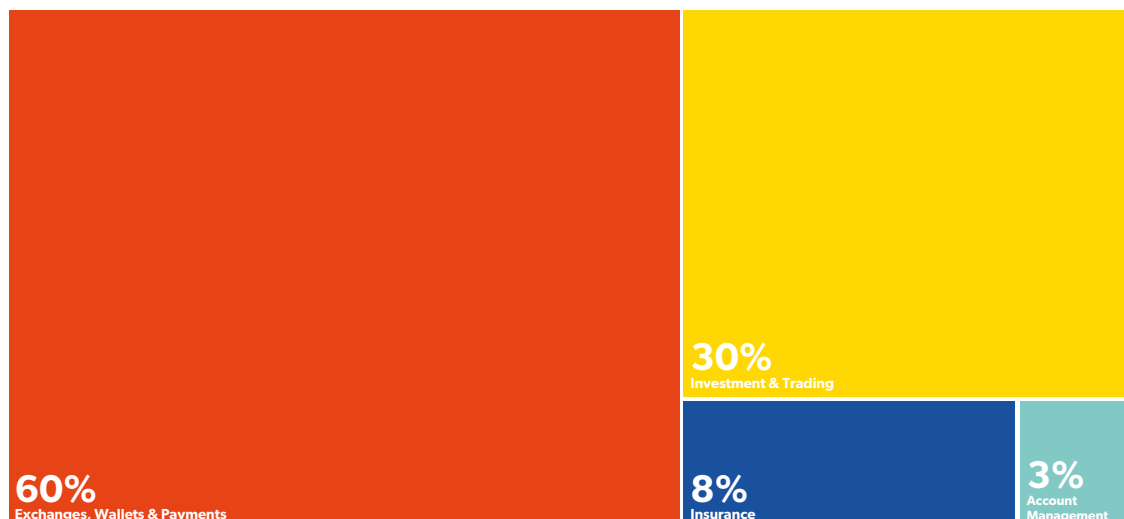


This is hardly surprising given Bitcoin, a cryptocurrency use case in itself, was the genesis of blockchain technologies. A decade on since the launch of Bitcoin, there are tens of other cryptocurrencies available (thousands have been launched but the vast majority are not used regularly). Accordingly, a suite of services has been developed to allow the public to exchange, store and trade these assets. In the UK, 6 in 10 startups provide such services:

- consumer wallets for storage of currencies (e.g. *Argent, Luno, Samourai Wallet*),
- exchanges (e.g. *Coinfloor, Bitstamp*),
- payment services (e.g. *Wirex*), and
- current accounts serving both business and consumer customers (e.g. *Cashaa*).

With crypto users numbering tens of millions already (see the [2nd Global Cryptoasset Benchmark Study by the Cambridge Centre for Alternative Finance](#)), the need for safe and user-friendly bank-like services will only grow.

Fig 13: Exchanges, Wallets & Payments account for the majority consumer equity-funded blockchain businesses in the UK. Source: MMC Ventures, Beauhurst, Crunchbase, Dealroom, Tracxn.



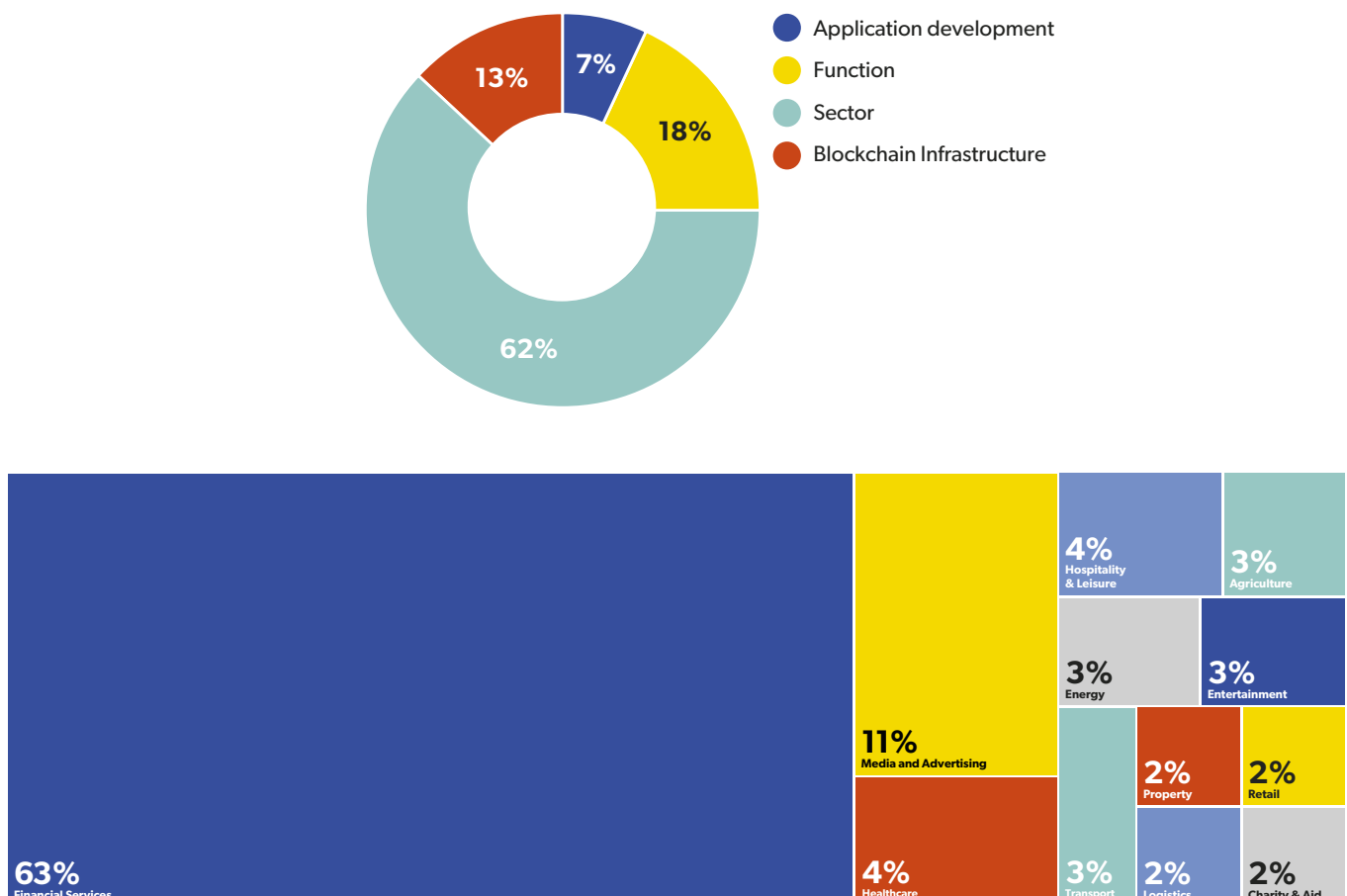
The high volatility of most cryptocurrencies makes them a poor replacement for fiat. Stablecoins are a promising development towards a more effective transactional asset but their adoption is still nascent. Therefore, currently, cryptocurrencies are mainly viewed as an investment vehicle. New trading and asset management solutions (e.g. *Revix* and *AiX*) are emerging to help consumers access these investments with greater ease. Other products (such as tax services platform *Recap*) that help with portfolio management are also being developed to cater to the growing ecosystem of cryptocurrency users.

Good examples of startups that have been funded in non-crypto consumer space are *Uhive*, a social network, and *Aurovine*, a music service. While these are not fintech focused applications, both of them are using utility tokens to provide additional functionality to their users. These tokens are not considered currencies but they require similar basic infrastructure to enable storage and trading. Therefore, user friendly, secure and regulated 'gateway' products such as wallets and exchanges are critical in further accelerating the adoption of the technology.

6 in 10 B2B focused startups serve the financial sector but...

Most B2B startups that have raised equity funding focus on addressing sector specific challenges. Fewer companies are focusing on business functions. This could indicate that entrepreneurs consider blockchain use cases that are applicable across industries harder to develop or monetise currently.

Fig 14: Most B2B equity-funded blockchain businesses in the UK target the financial services sector. Source: MMC Ventures, Beauhurst, Crunchbase, Dealroom, Tracxn.



As with B2C, the financial services sector dominates entrepreneurial activity among business-focused startups. Being a key financial services centre and a fintech powerhouse, London is an ideal launchpad for startups targeting the industry. We see three broad groups of offerings:

- **Facilitating issuance, investment and management of digital assets.** These include custodial services, exchanges, and tokenisation platforms. This category contains 'gateway' products that are key to improving the institutional adoption of digital assets. The growing evidence that crypto assets are increasingly being considered an institutional asset class but better infrastructure is required to facilitate access underpins our thesis behind the recent investment in *Copper*. Other examples include *Globacap*, *Lacero*, *Trustology*.
- **Providing blockchain products to improve the back-end processes powering the capital markets and the legacy banking infrastructure.** These range from automating trade settlement to offering new platforms for commodity trading and improving the insurance claim management process. Data providers also fall in this category. Examples include *Acre*, *Agora*, *Blockclaim*, *Nivaura*.
- **New financial products.** There is substantial opportunity in this space to reimagine the SME lending market through innovative trade financing, asset financing and other working capital offerings. Services based on tokenised assets also hold great promise as we move towards a world of programmable finance. The burgeoning DeFi ecosystem is particularly important in this respect. DeFi is the movement to open source financial product building by using Ethereum protocols to design composable financial architectures. The creativity enabled and fostered by DeFi could result in an explosion in the number of financial products. Examples include *CrediCar*, *DAG Global*, *Superfluid.Finance*.

...adoption is challenging

Despite the high entrepreneurial and enterprise activity, financial services (FS) presents some key adoption challenges. A study of over 800 enterprise projects by Gartner suggests that only 10% of the FS pilots get into production. Corporates cite regulation, implementation complexity and stakeholder involvement as significant impediments: "creation of ecosystem participants was a challenge," "... challenge in getting internal buy-in" and "technology considered not feasible" (Gartner). Our conversations suggest that most enterprise projects with a blockchain component start with a substantial consultancy-like pilot phase that is not easy to monetise, resulting in longer sales cycles and poor capital efficiency.

Regulation is also often cited as barrier. Regulatory certainty is slowly coming to blockchain and digital assets with both regulators and entrepreneurs taking a more proactive approach. The UK's FCA has been one of the pioneers in the space with DLT companies representing 30% of the participants in its Sandbox programme since 2015. This process is a crucial step towards broader adoption of the technology, just as the development of the internet legislation in the early to mid 1990s paved the way for the growth in the years leading up to the dot-com bubble.

Beyond Financial Services, Media, Compliance and Supply Chain are emerging as early adopters

More than 50% of global enterprises consider the technology a strategic priority and are investing in developing their capabilities ([Deloitte's 2019 Global Blockchain Survey](#)).

From an enterprise perspective, decentralised technologies are no longer just the remit of financial services.

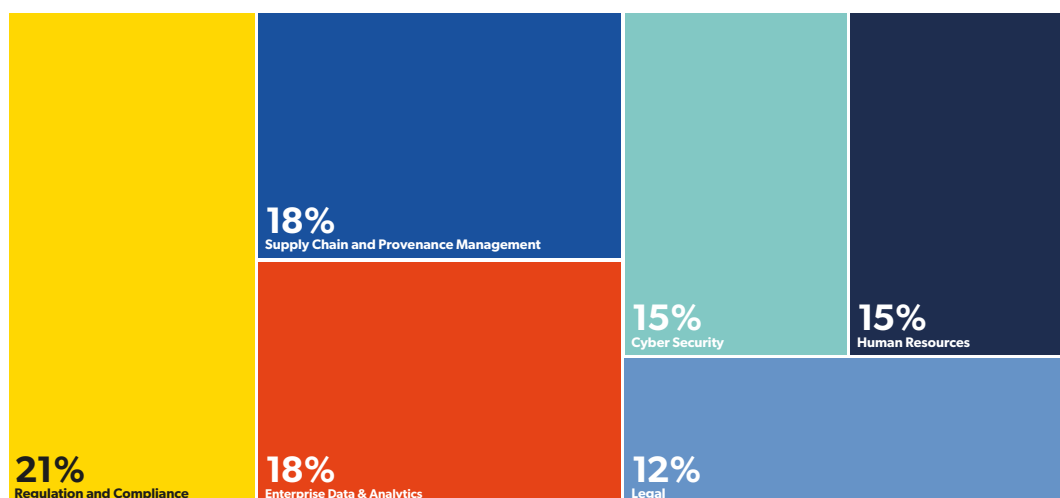
The survey by Gartner established that the proportion of DLT projects focused on the financial industry has decreased to 30% from 75% two years ago. The media, manufacturing and government sectors are conducting various exploratory projects that leverage core DLT use cases such as asset tracking and shared record keeping.

As reflected in Fig 14, the Media & Advertising vertical in the UK is seeing high levels of activity.

Shared record-keeping and identity management delivered through blockchain solutions could significantly reduce challenges faced in digital advertising and IP management.

- **Advertising:** The digital advertising value chain is inefficient and fragmented. More than 60% of the money paid by the advertiser in a typical programmatic campaign are captured by middlemen instead of going to the publisher, the so-called 'tech tax' (World Federation of Advertisers). In addition, fraud and non-transparent behaviour are costing advertisers billions each year. Blockchain could address these issues by creating cryptographically-secured digital assets/identifiers (e.g. digital ads) that can be tracked across the ecosystem to provide higher transparency. A decentralised network, which leverages smart contracts to programmatically control the flow of data and ad inventory in the digital advertising supply chain, should, in time, also reduce the number of intermediaries required. Companies such as *Fenestra* are working towards providing such alternatives. Others like *Glimpse* have the ambitious goal of putting consumers at the centre of the advertising ecosystem by giving them control over the monetisation of their personal data.
- **Media and IP Management:** The current system of rights management was set up to cater to a much more centralised world with tight control on distribution. New consumer behaviours present new opportunities for content monetisation but outdated rights management systems prevent content creators, IP holders and artists to fully benefit from those. Blockchain could address these issues by enabling efficient traceability via digital asset management and micropayments. Blockchain can enable content registries that can quickly and autonomously identify assets and establish ownership every time the content is consumed. This will disrupt the business model of the intermediaries involved in the value chain and better align the rewards to the value created. Further, a potential new system should generate structured data that could later be fed through AI algorithms to enable additional upside (e.g. more effective discovery for artists, recommendations for consumers and revenue forecasting for distributors/artists). Startups tend to specialise in specific verticals. For example, *Blokur* and *Delic* are working in the music industry, *Filmchain* is targeting the film industry, and *Aggregation* is targeting the software licensing space.

Fig 15: Most B2B equity-funded blockchain businesses in the UK, focusing on functions, target supply chain use cases. Source: MMC Ventures, Beauhurst, Crunchbase, Dealroom, Tracxn.



Regulation & Compliance is a focus area for startups serving business functions. Blockchain delivers 'out-of-the box' capabilities that are fundamental building blocks in regulatory use cases:

- Immutability by design
- Transparency and auditability
- Proof of ownership

Most of these attributes are currently provided by additional overhead. For example, large financial institutions are often required to (semi-)manually reconcile customer data across business unit silos and public databases to satisfy know-your-customer (KYC) and anti-money laundering (AML) requirements. Separately, organisations need additional processes to demonstrate compliance with regulations. Blockchains could provide a transparent, immutable, and auditable single source of truth ledger that both streamlines operations and serves as a record of compliance. DLTs could also provide regulators with real-time-monitoring capabilities. Companies such as *AID:tech* and *Zamna* aim to build such personal identity records shared among organisations to provide efficiency and reduce regulatory burden. Others such as *ByzGen* are sitting at the intersection of **enterprise data, security and compliance**, showcasing the unique capabilities a blockchain-based architecture can deliver in the context of digital transformation. While the benefits are promising, deployment is non-trivial due to lack of common standards, legacy processes, legacy infrastructure, and reluctance from companies to share data with competitors.

Enterprises also often choose the easy but ineffective shortcut of moving current processes to DLT instead of devising new ways of working that are native to the new paradigm.

Provenance is another core use case for blockchain technologies. Therefore, it is no surprise that supply chain management attracts relatively high activity. *Everledger*, for example, helps clients track the provenance of diamonds, art and wine, helping customers reduce business risk and enhance customer value. The fashion and retail industries are increasingly focusing on improving transparency for their customers, as well as reducing counterfeits. *Provenance* (the company) is working with brands such as Martine Jarlgaard, Unilever, and Sainsbury's to track the journey of raw materials and prove sustainable sourcing of products. In fashion, tracking products through the supply chain and enabling consumers to prove authenticity could supercharge the resale markets, which are seeing as much as \$23bn worth of goods transacted

(ThredUp). *Provenance* use cases, however, often depend on successfully and reliably linking the physical goods to digital identifiers — a solution is as strong as the weakest link in the chain. Ongoing research in IoT technologies should help solve outstanding issues in this aspect.

Conclusion: The UK blockchain ecosystem is primed for growth

While sentiment in the blockchain space remains volatile, the underlying activity in the ecosystem is considerable:

- **Focus on infrastructure:** the number of full-time developers continues to grow and effort is focused on key areas of the infrastructure stack.
- **Enterprise activity:** Adoption and experimentation of blockchain technology is accelerating in large sectors beyond financial services.
- **Stronger fundamentals:** Entrepreneurs are adopting business-case first approach to product building while also prioritising UX.

The ecosystem is emerging stronger from the crypto winter and this presents significant opportunities in the years ahead.

Are you an entrepreneur working with blockchain technology and interested in venture funding? Get in touch with MMC via Twitter ([@MMC_Ventures](https://twitter.com/MMC_Ventures)) or reach out directly at asen.kostadinov@mmcventures.com



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