



Blockchain in Action

State of the UK Market

November 2018

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Digital Catapult is the UK's leading advanced digital technology innovation centre, driving early adoption of technologies to make UK businesses more competitive and productive to grow the country's economy.

We connect large established companies, startup and scaleup businesses and researchers to discover new ways to solve big challenges in the manufacturing and creative industries. Through this collaboration businesses are supported to develop the right technologies to solve problems, increase productivity and open up new markets faster.

Digital Catapult provides physical and digital facilities for experimentation and testing that would otherwise not be accessible for smaller companies.

As well as breaking down barriers to technology adoption for startups and scaleups, our work de-risks innovation for large enterprises and uncovers new commercial applications in immersive, future networks, and artificial intelligence technologies.

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FOREWORD

The blockchain and Distributed Ledger Technology (DLT) landscape in the UK is evolving rapidly and we are in a particularly advantageous position to thrive globally.

Technology leaders in Silicon Valley have observed recently that the UK is the world leader in innovative blockchain companies. This report is the first of its kind to survey that community and to reach into a significant proportion of blockchain companies operating in the UK. Many of these companies are working on solutions that solve age-old problems such as how to match disparate data from multiple sources. They are developing new mechanisms for securing irrefutable audit trails across complex supply chain networks, increasing certainty of provenance, validity and interoperability, all of which have the potential to completely revolutionise how we interact with data.

The report finds that DLT companies are still struggling to engage clients in sectors beyond the financial services industry. Perhaps unsurprisingly, we are yet to see significant use-cases outside of FinTech, which is of course the sector that spawned blockchain in the first place. There also remains a degree of confusion in the market around two recent phenomena, GDPR and Initial Coin Offerings (ICOs). These uncertainties will need to be resolved quickly if the UK is to maintain its early lead in this rapidly developing global market.

In his UK budget statement of 2018, the Chancellor of the Exchequer mentioned that we will be conducting a number of trials exploring the potential of DLT beyond the financial services sector. We are hopeful that these Digital Catapult DLT Field Labs, will help further de-risk experimentation with blockchain in new markets. The next phase of development is dependent on corporates, innovators, government and the wider UK economy joining the early adopters on this journey to propel these exciting, game-changing technologies to new heights, going beyond the nascent phase and helping UK businesses lead the world in developing their full potential.



Dr Jeremy Silver,
CEO, Digital Catapult

EXECUTIVE SUMMARY

The UK was recognised as an early global leader in Distributed Ledger Technology (DLT) with the 2015 publication of “Distributed Ledger Technology: beyond block chain” by Sir Mark Walport, the Government’s Chief Scientific Advisor.

The intervening three years have seen rapid changes in the DLT sector worldwide, with further governmental reports from the UK and others strongly supporting practical exploration of its potential; the establishment of jurisdictional variations in regulations across major world powers including China, India, Russia, and the USA; the development of new mass crowd-funding models to support the development of DLT systems; and finally the diversity of technological evolution one would normally expect in such a fast-moving sector, accompanied by an equal mix of hope and hype.

As a result, the UK’s early lead has potentially been lost to other jurisdictions who have been more agile in their approaches to the needs of pioneers working on this technology, with multiple centres of business appearing around the globe.

Digital Catapult has, therefore, undertaken four months of detailed market research to investigate the current state of DLT companies operating in the UK. This data is invaluable for capturing this moment in history and for designing the interventions Digital Catapult can make to help the sector achieve its full potential.

Our research has uncovered a number of important, and useful findings:

1. The UK already has a fully-fledged DLT community with more than 260 DLT companies headquartered here.
2. UK DLT ecosystem can be divided into four major categories - distributed ledgers, dApp (distributed applications) developers, centralised systems, and service providers.
3. DLT companies are active across a wide range of sectors including professional services, social enterprise, recruitment, education, entertainment, consumer electronics, insurance, future of work, construction, health, sport, renewable energy, manufacturing, telecoms and data expertise.
4. The financial sector provides the main client base and vertical market for UK DLT activity, but is only third on the list of sectors these companies wish to engage.
5. DLT companies are already generating revenue, with 74% having products ready to demonstrate.
6. Despite the coverage around non-traditional investment sources, only 4.5% of companies interviewed had conducted Initial Coin Offerings (ICOs). 80% had used personal funds to start their companies, 41% had raised a traditional seed round, and 25% were not currently seeking external investment.
7. 74% of companies expressed regulatory uncertainty as their most pressing challenge, with 54% having difficulty opening a UK bank account and 45% stating they could do with more legal advice.

INTRODUCTION

Humans have been recording transactions on ledgers for thousands of years. As early as 5,000 years ago, ancient Mesopotamians recorded quantities of sheep, beer, and wheat on clay tablets. In Europe, 600 years ago, merchants and business owners began to use double-entry bookkeeping to organise business transactions between assets, liabilities and capital.



Did you know?

The terminology around this technology is still evolving, so for the purposes of this report, we will use the more encompassing term, DLT, in favour over the more specific 'blockchain'.



Ancient Sumerian agricultural ledger referring to flocks and herds, dating from around 2400BCE.

They would create and transfer lists of transactions from their journal to a double entry ledger. This period brought forth the idea of keeping a record of something in two locations at the same time to increase transparency, security and efficiency. In the early 1900s, ledgers were used as a way of entering money and redeeming ledger entries for gold. The idea of digital cash was conceptualised in the second half of the twentieth century, however early attempts were hindered by an inability to ensure a balance between centralisation, anonymity and double-spending. 2009 marked the launch of Satoshi Nakamoto's "Bitcoin: A Peer-to-Peer Electronic Cash System", which offered the first distributed digital peer-to-peer ledger that was not controlled by any central figure or authority and prevented double-spending of funds.

Distributed ledger technology (DLT) is in essence a distributed and cryptographically secured 'database'.

Properties of distributed ledgers

Distributed

All network participants have a full copy of the ledger for full transparency

Time-stamped

Transaction timestamp is recorded on block

Immutable

Any validated records are irreversible and cannot be changed

Programmable

A blockchain is programmable 'smart contracts'



Anonymous

The identity of participants is tracked but these can be known, or unknown (anonymous, or pseudonymous)

Unanimous

All network participants agree to the validity of each of the records

Secure

All records are individually encrypted



Did you know?

Ethereum is an open-source, public, blockchain-based distributed computing platform featuring smart contract functionality released on 30 July 2015 by Vitalik Buterin, Gavin Wood and Joseph Lubin.

Blockchain is one type of DLT, which serves as a peer-to-peer, decentralised, immutable and distributed ledger that consists of validated blocks of transactions linked into a time-sequenced chain. Distributed ledgers can be public or private.

Private DLT is a system only accessible to certain participants.

Public DLT is a system that permits anyone with a computer to create a node holding transaction records and take part in the consensus process for ensuring irrevocability of transaction sequencing. Often references to the technology use DLT or blockchain interchangeably, however we must note that the term DLT encompasses more than just blockchain-type systems.

Bitcoin was the first use case of blockchain and continues to be the most well known, in the form of a cryptocurrency of the same name.

Cryptocurrency is a form of digital money that is exchanged between participants of a DLT.

Cryptoasset, by extension, is a digital asset (including cryptocurrencies and tokens).

Although this report will engage with some of the numerous opportunities presented by cryptocurrencies, it will mostly showcase those in industry sectors outside of FinTech.

Ultimately, DLT seeks to bring multiple independent and non-colluding computers to agreement on a single shared state of truth. Computers that connect to a DLT network are called nodes. DLT resolves the validity of data passing between different nodes to come to network wide consensus on the final state of the data. Consensus is the agreement between nodes that the current state of the shared ledger is mathematically valid. In a DLT-based system any attempt to rewrite history is seen as an attack on consensus and is instantly rejected by all parties. Therefore, DLT provides the mechanism for securing irrefutable audit trails of digital interactions between ledger participants, without requiring a central or trusted authority.

Within the coming decade, DLT has the potential to disrupt established modes of operation across multiple sectors including manufacturing, creative industries and healthcare. Some of the main opportunities created by the technology include: streamlining processes, supply chain tracking and verification, and revolutionising our relationships with centralised authority. This report highlights the opportunities presented by the technology in the UK and analyses some of the challenges currently facing DLT companies, including funding, regulation, banking and legal services. These challenges are based on market research conducted by Digital Catapult and will serve to offer areas for future research and intervention.



Did you know?

Permissioned DLT systems only allow pre-authorised nodes to finalise transactions into the shared and distributed ledger. By contrast, permissionless DLT systems allow all nodes the possibility of being selected to finalise transactions into the ledger. There is a further division into public and private where these describe who is allowed to submit to and read from the common ledger.

POTENTIAL APPLICATIONS OF DLT

Shortly after Nakamoto released his white paper in 2008 theorising the technology behind a peer-to-peer electronic currency, the cryptocurrency Bitcoin was released as an open-source computer programme. Over the next five years, it became evident that further applications of blockchain technology could be found across multiple economic sectors. Since 2014, there has been a flurry of investment and exploration around DLT-backed legal contracts, supply chain tracing, Internet of Things (IoT), insurance, GovTech and much more. These fields are looking to employ DLT for its combination of immutability and verifiability, as transactions cannot be falsified or amended once they have been added to the ledger. Despite this widespread interest, financial services firms currently see the most commercial use cases of blockchain in the global marketplace.

Outside of cryptocurrencies, 'the commercial model that is most likely to succeed in the short term is permissioned rather than public blockchain.' Permissioned blockchains, unlike public blockchains such as Bitcoin, are hosted between known groups of participants and seek to regulate visibility, access and editing rights to shared data. There are additional subtleties to the public/private distinction that are beyond the remit of this analysis.

SUPPLY CHAIN TRACEABILITY

In the case of supply chain traceability, objects can be tracked by multiple interested parties using a shared DLT-enabled network as they pass through the supply chain. As supply chains become increasingly complicated with multiple locations, timings, regulations, and participants, and with consumers demanding increasingly ethical or environmentally-sound sourcing of goods, 'supply chain traceability' leverages the transparency of DLT to operationalise organisational goals related to raw material origins and provide context to a final product or service.

The first proof-of-concept traceability application was demonstrated by the UK company Project Provenance Ltd. in 2016 in Indonesia, enabled by the Ethereum blockchain. Using their solution, breeds of tuna could be tracked from the point of fishing along the entire supply chain through to distribution. Each unit (fish or catch) was associated with a digital token to track it along the supply chain, with the information accessible via a smartphone app by the end user to demonstrate the fish was caught in a specific governmentally-approved geolocation, and was therefore a sustainable catch.

SMART CONTRACTS

Smart contracts are software programmes which execute across a distributed network, and utilise the fact that blockchain can be a tool for 'distributed consensus'. The concept was first conceived by the computer scientist and cryptographer Nick Szabo in the early 1990s, who compared its conditional performance to a vending machine that automatically transfers a product when the buyer inputs money. In the same way, contractual legal obligations written in human-readable language can be encoded into a smart contract and triggered by a specific set of circumstances or on a specific date. The practical application of distributed smart contracts became more achievable with the launch of Ethereum in 2015. Smart contracts go beyond the simple A to B transfer of assets and are being increasingly explored across a wide range of fields such as legal processes, calculating insurance premiums, and crowdfunding agreements.

GOVTECH

One potential application of permissioned blockchains is in GovTech. Governments require much of the data they hold to be secured but also shared with and accessible by others, and so could make sense to deploy a DLT solution that would allow for trust by consensus with only certain parties permitted to view and accept changes to the data. One example could be a future land registry, where we know that multiple parties have vested interests in the truth and state of the data, yet hold multiple competing interests over the state of that data. A DLT-based land registry could present additional benefits over a centrally-held database, and allow multiple parties (mortgage lenders, law courts, government, construction firms) to take an equal role in securing the data that they wish to use for their own purposes, without being able to override the needs of the others.

In conjunction with an upper AI layer, DLT provides the framework to redefine public services in a decentralised, low cost, more efficient, and personalised way. The concept of a public facing 'Chief Blockchain Officer', along with a long term 'blockchain departmental target' of UK Government departments making a one percent efficiency saving by embracing blockchain and other associated innovation technologies, has been suggested by Eddie Hughes, MP for Walsall North.

DLT LANDSCAPE

GLOBAL PICTURE

There is global recognition that DLT will revolutionise how we interact with data. Within Europe, a number of countries are exploring the potential of DLT. In April 2018, 23 of the 28 EU member states, including the UK, signed up to a Declaration on the establishment of a European Blockchain Partnership. This followed an €80m investment into EU blockchain projects by the European Commission in 2018, including the creation of the EU Blockchain Observatory and Forum in February 2018. The Commission has also set aside more than €300m for blockchain investment by 2020. This collaboration will allow the associated nations to explore blockchain to share data more easily, and define new models for governance, consent and rights.

Several countries in Europe have been experimenting with DLT over recent years. Estonia has been using DLT for registries in national health, judicial, legislative, security and commercial code systems, while simultaneously linking it to other technologies. In 2000, Estonia launched the Digital Signature Act, which allowed citizens to use digital signatures on legal documents, and Estonian government infrastructure has since been fortified by DLT to increase security and enhance privacy.

The Netherlands too has made a concerted effort to embrace and pioneer the use of DLT, but focusing more on how government interventions can support the DLT landscape. In 2017, Rotterdam launched Blocklab, with the Port of Rotterdam authority, Innovation Quarter and the City of Rotterdam joining forces to create a field lab to de-risk experimentation with distributed ledger technology for energy and logistics. The Netherlands is the first country to embrace this form of public experimentation as a way of increasing visibility of the supply chain in distributed ledger, and in doing so they have created a testing ground for concrete applications of the technology.

Germany is also very engaged with the technology, and Berlin is home to several fast growing startups and scaleups such as BigChainDB, a blockchain-backed database offering decentralisation, immutability and native assets. Germany boasts approximately 180 DLT companies, with several non-profits including Blockchain Hub, Energy Web Foundation (EWF) and Bundesblock spearheading the technology.

Switzerland has recently become infamous for its Crypto Valley in the Zug region, an association that aims to drive sustainable impact and thought leadership, and boasts 400 corporate members. In February 2018, the Swiss financial authority, FINMA, was also one of the first in the world to clarify guidelines for companies dealing in cryptocurrencies and tokens, including Initial Coin Offerings (ICOs). This has led to an influx of these businesses that, being digital, are not typically bound by jurisdictions.

Outside of Europe, Dubai, Singapore and the US have been making significant headway with DLT. In 2016, Dubai announced its aim of transitioning to a paperless government by 2020, with blockchain forming a significant part of their solution. Singapore has been exploring the use of DLT to ensure clearing and settlement in trade finance, payments and securities, but also to combat money laundering. In 2016, the Monetary Authority of Singapore launched Project Ubin to enable a consortium of banks to develop software for decentralised inter-bank payments. The US has numerous fast-growing companies in the DLT space, which include Coinbase, Pantera Capital, Polychain, Circle, Blockchain Capital and Ripple. Several American companies beyond financial services have been investing in DLT including SBI Holdings, Google, Overstock, Citi and Goldman Sachs.

THE UK

Where the UK can truly set itself apart is in the strength of its higher education and research institutions, its historic environment for innovation, and the presence of global corporations. Furthermore, the UK has a global reputation in the areas of business, commercial finance, and law, and can therefore leverage this to create a progressive and reputable ecosystem to attract and retain top DLT businesses, entrepreneurs and developers. In fact, as early as January 2016, the Government Office for Science published 'Distributed Ledger Technology: Beyond Blockchain', which outlined the UK's strategic vision for pushing forward this nascent technology, stating that:

"Distributed ledger technologies have the potential to help governments to collect taxes, deliver benefits, issue passports, record land registries, assure the supply chain of goods and generally ensure the integrity of government records and services. In the NHS, the technology offers the potential to improve healthcare by improving and authenticating the delivery of services and by sharing records securely according to exact rules. For the consumer of all of these services, the technology offers the potential, according to the circumstances, for individual consumers to control access to personal records and to show who has accessed them."

The DLT landscape in the UK is growing considerably, and Digital Catapult's market research has identified over 200 companies based here. In addition to these companies,

the report Blockchain in the UK: Blockchain Industry Landscape Overview 2018 identified some 180 institutional investors and 30 think tanks, hubs, and accelerators that are focusing in some part on DLT. These companies are from a wide variety of industries including GovTech, healthcare, marketing, advertising, security, entertainment, FinTech, cryptoasset trading, Internet of Things (IoT) and artificial intelligence (AI), and are at varying stages in their development.

Below are four company profiles that highlight the use cases of DLT across both creative industries and manufacturing:

CREATIVE INDUSTRIES



Founded in 2017 by Irina Albita and Maria Tanjala FilmChain is a platform for the collection, tracking, and settlement of revenues generated by film, TV and digital video content. FilmChain's infrastructure is powered by blockchain. Through its intuitive dashboard, the platform provides transparency between all stakeholders in a project by facilitating clear recoupment schedules, providing real-time settlements of payment, real-time reports, and revenue analysis for films of any budget. FilmChain was endorsed as a valuable blockchain solution by the UK government, and has received a grant from Innovate UK. They are developing the technology in collaboration with Imperial College London. FilmChain is currently piloting their technology with three feature films.



Founded in 2016 by Phil Barry with a mission to “complete the potential of the internet for the creator,” Blokur has developed a blockchain-based platform to help musicians and music companies get paid what they should, when they should. Partnered with many of the world’s most influential artists and rights owners, the company is building the most accurate source of music rights data in the world by reconciling different sources of rights data to a single blockchain state through an easy-to-use interface allowing music publishers and CMOs to explore their catalogue in the cloud and compare their data with the global consensus view. Blokur’s smart algorithms resolve data conflicts automatically, eliminating labour-intensive tasks and increasing revenue for rights owners. By radically increasing the accuracy and availability of creative rights information, Blokur works to ensure that whenever a creator’s music gets played, the creator gets paid.

MANUFACTURING



Founded in 2015 by Leanne Kemp Everledger is a global emerging technology enterprise that uses blockchain for real-world applications in industries where transparency, trust and provenance matter most.

This is delivered through Everledger’s proven and scalable blockchain-enabled platform, expertise in emerging technologies as well as its deep domain knowledge through its strategic industry partnerships. Everledger combines these with the latest forensic approaches to give physical assets an identity, enabling items to have proof of authenticity. As the first in the world to successfully turn a proof-of-concept blockchain platform into a scalable commercial application for the diamond industry, Everledger is today trusted by a growing number of industries - from diamonds to coloured gemstones and critical minerals and metals - to enable more efficient, transparent and collaborative business models.

PROVENANCE

Founded in 2014 by Jessi Baker Provenance is a platform that empowers brands to take steps toward greater transparency by communicating the origin, processes and impacts of the products they make. Provenance began with a frustration for how little we know about the things we buy. Opaque supply chains are devastating environments and compromising the wellbeing of people, animals and communities. With Provenance’s platform, companies can easily gather and verify claims, and create the story of their products before communicating these to shoppers through their channels, both online and in-store.

With thanks to the companies consulted as part of this research



MARKET RESEARCH

Between May and August 2018, Digital Catapult undertook market research to better understand the demands of the UK's DLT space. This was underpinned by desk-based research, in-depth telephone interviews, and the advice of in-house experts.

Our ultimate aim was to have more concrete data on the UK's DLT landscape and understand what interventions would most benefit DLT companies in the UK. All 264 DLT companies identified were contacted to be interviewed either over the phone or in person, and of these 15% were interviewed in detail. However, a significant number of companies who were initially contacted withdrew from follow up. Some parties informed us that their reluctance to share information was due to competitive secrecy.

These interviews enable us to substantiate our quantitative analysis of the DLT space and are the main way for Digital Catapult to capture detailed qualitative information about companies and design market interventions to help grow nascent sectors of the UK economy.

Our research and discussions focused on:

- How the DLT landscape is currently developing in the UK
- Where the greatest opportunities for the technology are
- What some of the main challenges that DLT companies in the UK are facing are
- What strategic interventions by Digital Catapult or government bodies would be most impactful

There was continual reference by respondents to DLT being at the convergence of other advanced digital technologies, whereby DLT would establish the registry, chain of custody and tracking services for data, including from IoT devices, and thereby enable better data availability and analytics, in addition to machine learning on this data.

THE NATURE OF THE SAMPLE

We attempted to obtain as complete a sample as possible for this report. Company names were initially sourced from existing lists of blockchain companies in official publications, but accompanied by extensive research at Companies House, and through references and conversations with multiple people and parties active in the UK's DLT space. Each organisation was researched in depth to ensure a UK presence (focusing largely on the mainland, with some companies located in British Overseas Territories or Crown Dependencies), and to confirm that they were an ongoing business. We purposely excluded co-operatives, university departments, research groups, and think-tanks in order to focus solely on commercial entities (both for-profit and not-for-profit) active in the UK.

THE FOUR MAJOR SUBSECTORS IN THE UK'S DLT ECONOMY

CENTRALISED APPLICATIONS - 15%

41 of the UK's blockchain/DLT companies operate centralised services which are enabled by the rest of the ecosystem. These include online shops accepting cryptocurrency payments, and coin or token exchanges.

EXCHANGES AND TRADING

The majority of centralised companies are involved in cryptocurrency sales or exchange. This is not surprising given the entire sector grew from the success of bitcoin.

DISTRIBUTED LEDGERS - 13%

35 companies in the UK are building the fundamental distributed ledger systems underpinning the rest of this economy.





SERVICE PROVIDERS - 37%

The largest sector in the UK's distributed ledger economy. These companies are providing a range of services such as consultancy, custom development, legal advice, venture capital, and recruitment, amongst others.

DISTRIBUTED APPLICATIONS (DAPPS) - 35%

The UK is currently home to some 94 companies who are dedicated to building next-generation decentralised applications (dApps) based upon distributed ledger systems.

DISTRIBUTED LEDGER COMPANIES

Some of these systems are modifications of existing codebases such as Ethereum, Hyperledger Fabric, or others. However, at least 22 companies are busy building entire systems from scratch.

QUANTITATIVE FINDINGS

This research has illustrated an ecosystem composed of four major categories of DLT company active in the UK, which we accompany with definitions where necessary.

DISTRIBUTED LEDGER DEVELOPERS (13%)

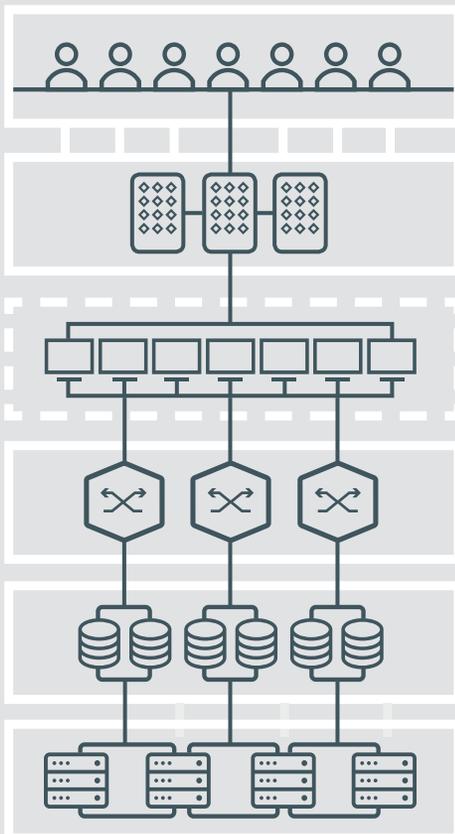
A distributed ledger is formed of a number of elements, as a DLT 'stack'.

This is akin to a 'software stack' or a 'network stack' from other areas of computer science. The choices made when building a distributed

ledger define the function and behaviour for all subsequent users. The UK is home to some 34 companies creating distributed ledger systems. This includes Parity Technologies (one of the major Ethereum client development teams), R3 (the developers of the Corda ledger), and Everledger (securing diamonds and other precious gemstones).

While some companies are developing their own systems based upon publicly available codebases (Ethereum, Hyperledger Fabric, Monero), the majority are offering systems built

THE DLT STACK



Users

The people who will ultimately determine whether a product or service is successful

dApp

Products or services built from computer programmes stored on and executed by the virtual machine

Virtual Machine

The ability to execute computer programmes stored on the distributed ledger. These programmes are often termed 'smart contracts'

Consensus Protocol

The algorithms ensuring every node agrees on the canonical sequencing of transactions/messages within the distributed ledger

Database

Local storage of the distributed ledger on each participating node

Network Layer

Peer-to-peer communication of transactions/messages between nodes participating in the distributed ledger

from the ground up, and variously optimised for transaction throughput, privacy, ease-of-implementation, and the veracity of smart contract execution. Around 80% of the companies in this group are designing private 'consortium' DLT solutions. This is likely to be the most hotly contested space in the DLT ecosystem over the coming few years. We may see a repeat of the late 1990s browser wars, with companies fighting to offer the best security, scalability, and developer experience to provide utility to those wishing to transition their businesses to DLT-based systems.

DAPP DEVELOPERS (35%)

The second largest category in the UK's DLT ecosystem are those developing dApps - so called 'distributed applications'. There are 92 such companies active in the UK.

We define a dApp as a computer programme whose state transitions are enforced by a distributed ledger.

This definition specifically excludes companies using distributed ledgers for notarisational purposes (for example, oraclisation, root pinning, message passing) where the state transitions are decided on non-distributed systems but are replicated to a distributed system, or vice versa. It also intentionally avoids the term 'smart contract', although dApps are often said to be built from a combination of one or more 'smart contracts' atop a distributed ledger.

These companies are developing their dApps on a broad range of distributed ledgers, and in some cases using combinations of ledgers for their different functionalities.



Did you know?

We define a dApp as a computer programme whose state transitions are enforced by a distributed ledger.

Ledger

| | |
|-----------------------|-----|
| Ethereum | 66% |
| Fabric | 11% |
| Corda | 5% |
| Stellar | 2% |
| BTC | 2% |
| EOS | 2% |
| Tendermint | 1% |
| Unknown/no preference | 16% |

Ethereum remains the leading platform for dApp developers due to its widespread uptake and active developer community. However, developers appear to be experimenting with a range of systems available at present, and appear willing to search for those that best meet their needs. It is also worth noting that 20% of dApps are being developed on private DLT systems.

dApps are currently being developed to service a broad range of sectors, including social enterprise, recruitment, education, virtual reality, Internet of Things, insurance, future of work, construction, health, sport, renewable energy, manufacturing, film, music, and telecoms. The market response over the coming few years will indicate whether these are suitable applications of DLT.

SERVICE PROVIDERS (37%)

Service providers are those who are enabled by the existence of DLT, and who provide value to other companies in the DLT industry, or to non-DLT companies interested in the industry. This group is the largest by number, containing some 97 companies specialising in areas such as:

| Activity | Number |
|-----------------------------------|--------|
| Development Consultancy | 28 |
| VC / Investment Groups | 16 |
| Price Feeds / Market Analytics | 7 |
| News Organisations | 3 |
| Training / Education | 3 |
| Smart Contract Review | 2 |
| Data Oraclisation | 2 |
| DLT-Specific Recruitment Agencies | 2 |

The remaining companies within this category provided a range of services including boutique regulatory or legal advice, KYC/AML (Anti-Money Laundering and Know Your Customer), and mining (selling mining rigs and providing mining as a service).

CENTRALISED SYSTEMS (15%)

The opposite of a dApp is a system which operates on a private server or computer, and where the user has little visibility over the operation of the system. This group mostly contains cryptocurrency exchanges or trading websites. While it may be the case that they are fundamentally enabled by DLT, and rely on the availability of DLT systems for their functionality (for example, coin transfers), they occupy a separate category due to the nature of their operations.

A smaller number of centralised companies were operating storefronts selling various items for cryptocurrencies (including clothes, games and gold).

QUALITATIVE FINDINGS

The companies we consulted represented each sector within this emerging economy, with one cryptocurrency trading company, nine distributed ledger developers, 15 dApp developers, and 14 service providers.

The interviewees highlighted three main opportunities that the adoption of DLT presents to the UK economy.

COMPANY LOCATIONS

216 London,
5 Oxford,
5 Manchester,
3 Edinburgh,
3 Edinburgh,
all others in 1-2 range



Firstly

Most companies referenced 'streamlining processes' as one of the main opportunities presented by DLT. This would lead to the evolution of new business models and processes that increase efficiency. This primarily encompasses FinTech and the enabling of frictionless online payments or decreasing the burden of international remittances. Across all UK industries companies of all sizes, from startups to large corporates, would be able to resolve process disputes and agree upon financial settlements more efficiently with increased transparency enabled by DLT.

Secondly

Many companies referenced the impact that DLT can have on the transparency and verification of supply chains. Areas such as oil, gas, food and financial services were referenced. Supply chain networks in these industries tend to be comprised of numerous different actors (ranging from raw material suppliers, distributors, manufacturers, retailers, and end consumers), which consist of concealed parties or routes and an inability to demonstrate effective and secure monitoring. DLT can provide traceability frameworks to develop a credible and robust chain of custody standards and product certification along a supply chain. In so doing, DLT can provide the context of a product or service in a complex multi-stakeholder network and an immutable and distributed record of custody. The UK's strength in supply chain-heavy industries could allow the country to demonstrate global leadership and standards for future DLT-enabled supply chains.

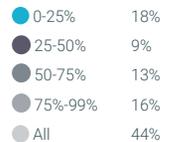
Many participants referenced the fragmented and siloed nature of supply chain data as a hindrance to the connectivity between companies and individuals. DLT-based audit trails and access controls could greatly improve the way we connect currently isolated parts of our economy. In pursuit of this vision, several UK-based DLT companies have built their business models

on revolutionising supply chain networks. For example, the UK-based DLT company Everledger is a leading emerging technology enterprise that tracks the provenance of high-value assets on a global digital ledger. They created the Diamond Time-Lapse Protocol in 2017, which is a historical ledger of the movement of certified diamonds to combat conflict diamonds. Similarly, UK based Agriledger was founded in 2015 to enable the agricultural industry to use blockchain as a confirming and trust mechanism across these supply chains.

Finally

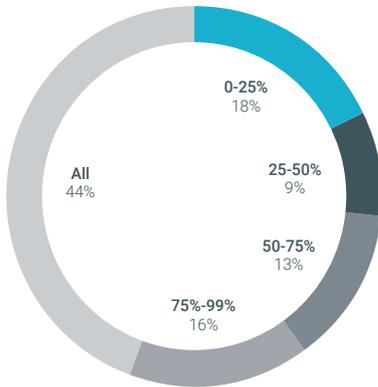
Many of the companies interviewed referenced the potential of DLT to revolutionise our relationships with central authorities, and with government and banks in particular. DLT can enable a radical change in the transparency of governance structures and regulatory oversight. If distributed consensus systems can be established between key parties, then there is an opportunity to create a more democratic system for smaller participants in the economy. The economic models proposed by cryptocurrency and token advocates would certainly challenge existing behaviours in the short-term, but could lead to a better balance of economic incentives and achieve equality in an increasingly digitised society. As we have seen, security through radical transparency, immutability, and decentralisation can also create increased market efficiencies by eliminating the need for trusted, and often costly, third parties. This increase to economic efficiency is brought on by the fact that connections through this technology are made in a direct peer-to-peer fashion. However, all of these potential opportunities are predicated on the resolution of at least some of the challenges experienced by DLT companies in the UK.

▶ **Figure 1: Proportion of sample companies' activities enabled by DLT**



FOCUS AREAS

Figure 1: Proportion of sample companies' activities enabled by DLT



As Figure 1 demonstrates, 44% of the companies interviewed stated that their businesses were wholly enabled by DLT and that without it, their business would not exist. Some stated that they did not engage in a project if there was no use case for DLT. Others could not yet quantify the amount to which their activities were enabled by DLT, as their businesses were too early stage. Most companies, however, stated that their use of DLT would increase over time.

As shown from Figure 2, a third of companies interviewed considered themselves to be technology companies first and foremost. Figure 3 shows that 20 companies felt their technology could be applied to all vertical markets. Interestingly, the second most represented vertical market was finance, despite most DLT companies not deeming themselves as FinTech or finance companies, which highlights the need for corporate players outside of financial sector to increase their exploration of DLT as a future enabler of their businesses.

Figure 2: Sample companies by industry

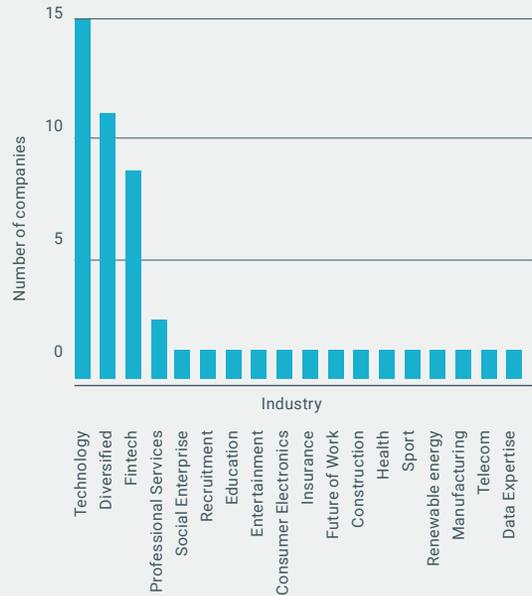
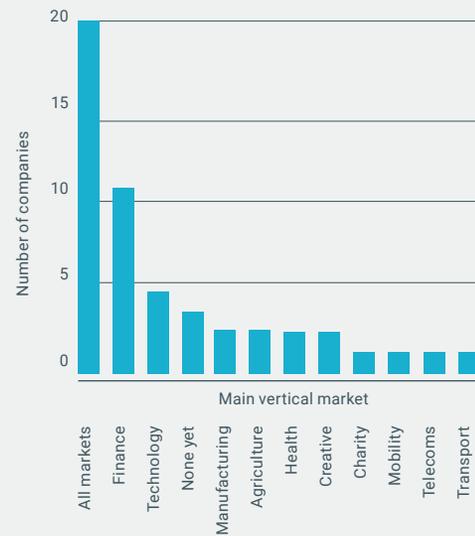


Figure 3: Sample companies by main vertical market



FUNDING

Figure 4: Proportion of sample companies currently seeking investment

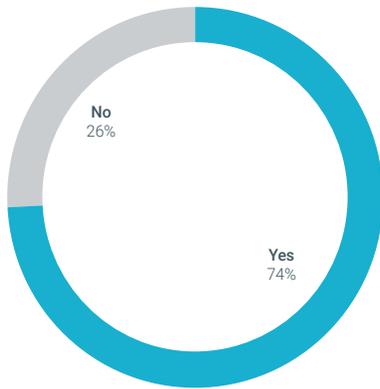


Figure 4: Proportion of sample companies currently seeking investment

| | |
|-----|-----|
| Yes | 74% |
| No | 26% |

Funding is often a challenge for early companies. Despite this, we have seen investments in UK-based DLT companies of both traditional equity investment as well as occasional Initial Coin Offerings (ICOs). These investments rose from just over US\$50m in Q3 of 2016, to US\$150m by Q2 of 2018 (with ICO-related investments topping US\$100m in Q4 of 2017 and fiat investments climbing to over US\$100m in Q2 of 2018). Deal numbers have reflected the buzz around the potential of DLT therefore, the main issues faced by DLT companies with regard to funding are not related to a lack of investment, but to the difficulty or lack of clarity in merging two worlds on the investment side: traditional equity investment and crowd-funded ICOs. Many of the companies interviewed claim to have 'struggled' to bring along old investors when choosing to do a token sale.

Figure 5: Sample companies by funding stage

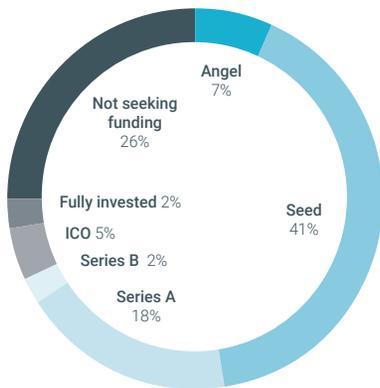


Figure 5: Sample companies by funding stage

| | |
|---------------------|-----|
| Angel | 7% |
| Seed | 41% |
| Series A | 18% |
| Series B | 2% |
| ICO | 5% |
| Fully invested | 2% |
| Not seeking funding | 25% |

Importantly however, the sample does not reflect the concerns raised over the last 12 months around the perceived overcapitalisation brought on by ICOs. Figure 5 reveals that merely 5% of companies interviewed had pursued an ICO. Most were pursuing traditional funding. Many of the companies consulted were hesitant of pursuing a token sale without there being more regulatory clarity in the UK. This result is much smaller than indicated by the quantitative research which showed 16% of DLT companies were pursuing ICOs. The regulatory uncertainty in this space may explain why these companies were reluctant to engage with our qualitative research. Surprisingly, 25% of companies

Figure 6: Sample companies' sources of funds to begin company

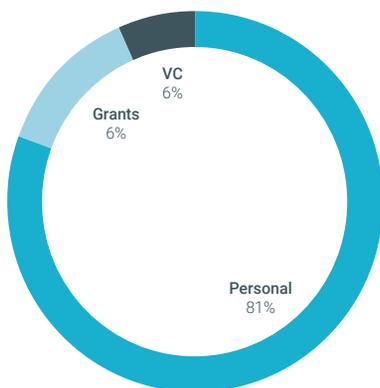


Figure 6: Sample companies' sources of funds to begin company

| | |
|----------|-----|
| Personal | 81% |
| Grants | 13% |
| VC | 6% |

were not seeking funding at all, which highlights the fact that companies have potentially reached a stage where they have enough clientele to run their businesses solely on revenue. Alternatively, the companies from the sample could have secured funding from other business endeavours, which feeds into the possibility that they have established themselves as mature business leaders in other industries prior to entering the DLT sector.

Figure 6 highlights that despite the nascence of the DLT sector, 81% of companies surveyed had used the founder's own personal income to start up. Many of the interviewees had come across DLT while working in other industries and saw its potential for transforming traditional business practices before developing their new businesses around it.

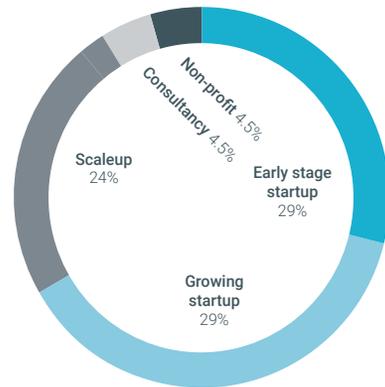
Outside the challenges surrounding investment, DLT companies face financial difficulties when potential clients desire experimentation with DLT prior to committing to an engagement. Companies expressed that this experimentation is expensive and does not always lead to further commitment or sales. Significant resources are therefore being invested into the creation of multiple proofs-of-concept across the many companies in this sector, brought on by the curiosity of the larger corporate clients as to what DLT can do for them. There is a clear lack of education and few visible implementations to demonstrate the potential of DLT to industries outside of financial services.

GROWTH

Figure 7: Sample companies by classification

| | |
|-----------------------|------|
| ● Early stage startup | 29% |
| ● Growing startup | 38% |
| ● Scaleup | 24% |
| ● Consultancy | 4.5% |
| ● Non-profit | 4.5% |

Figure 7: Sample companies by classification



The majority of businesses we interviewed are operating a Product as a Service (PAAS) or Software as a Service (SAAS) business model. Approximately one third were additionally providing consulting alongside their product and/or service offering. Establishing a viable and sustainable long term business model is often a challenge for advanced digital technology companies. This challenge is exacerbated in the DLT sector by the burden on companies to educate potential clients in order to overcome their apprehensions. It was clear from conversations that the consultancy element still plays an integral part to securing even the possibility of sales. Furthermore, despite seeing significant progress in the development of the technology, we are at a juncture where DLT companies are struggling to turn minimum viable products (MVPs) into genuine deployments at scale. Given the nascence of the technology, even companies that are more established in this space have not yet widely deployed their solutions to corporate clients. There are a combination of fundamental technological reasons, as well as governance and regulatory reasons, as to why at-scale uptake of DLT has yet to happen.

Figure 8: Sample companies with a demonstrable product

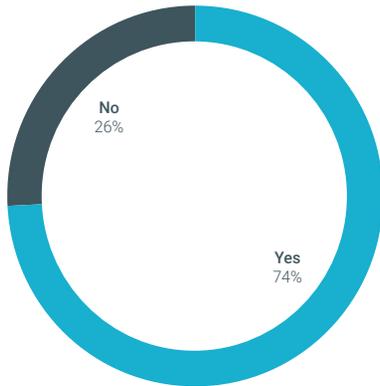


Figure 8:
Sample companies with a demonstrable product

- Yes 74%
- No 26%

As always, finding quality talent in an ever evolving technology landscape presents a pressing challenge. If we are defining quality talent as developers who have previously worked on DLT proofs-of-concept, are familiar with Ethereum, Hyperledger Fabric, Sawtooth, Corda, Quorum, or any other software stack that a DLT company might be using, then the expense is significant. However, many of the companies consulted made it clear that these skills could be taught through training over time. Experience with DLT was not necessarily required to be hired as a developer. As minimum viable products (MVP) turn to deployments, the projects and demands on technologists will increase. Given the expense of developers, 71% of companies consulted had employees operating remotely all over the world, which could be the future of this type of work. Countries referenced included Romania, Ukraine, India, China, Netherlands, Brazil, the US, Japan and Argentina. There are also now two UK-based recruitment agencies specialising solely in providing developer talent for DLT projects, reflecting the market appetite for these skills.

Figure 9: Sample companies by number of employees

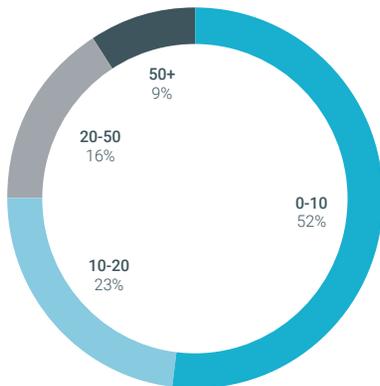


Figure 9:
Sample companies by number of employees

- 0-10 52%
- 10-20 23%
- 20-50 16%
- 50+ 9%

Figure 10: Proportion of sample companies who are publicly visible or private

Figure 10
Proportion of sample companies who are public or visible

- Publicly visible 84%
- Private 16%

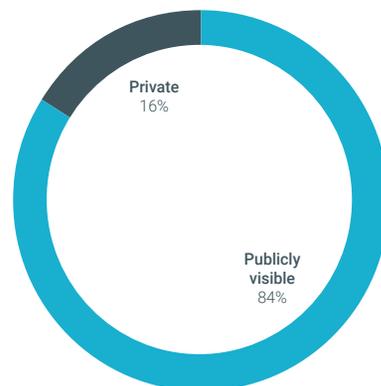


Figure 11: Proportion of sample companies who could do with more business development, sales, or marketing advice

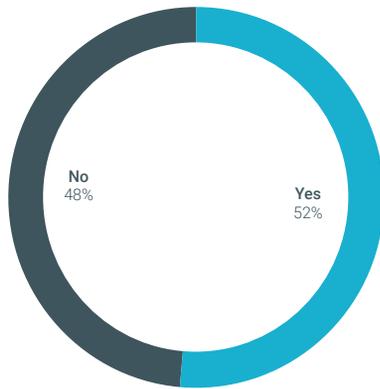


Figure 11 shows that due to the number of experienced business people in this field, business development, sales or marketing advice are not currently pressing challenges. Legal, banking and regulatory concerns feature more prominently on lists of challenges at this time.

LEGAL, BANKING, AND REGULATION

Legal issues were a key source of concern for many of the participants in our interviews. Figure 12 demonstrates some 45% of companies consulted desired additional specialist legal advice. Their concerns were partially related to the costs and lack of any visibility of lawyers specialising in DLT issues, in addition to the lack of assurance around the validity of the counsel they received. Many were concerned that lawyers did not seem to understand the intricacies of the technology.

Figure 11: Proportion of sample companies who could do with more business development, sales, or marketing advice

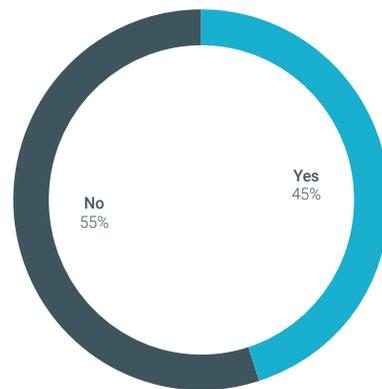
● Yes 52%
● No 48%

Figure 12: Proportion of sample companies who could do with more legal advice

● Yes 45%
● No 55%

In addition, many companies believed they had received poor advice early on around ICOs and intellectual property protection, but had no mechanism for help and support with these concerns. The expense of legal advice was also raised by a number of companies, while those who were not concerned about legal issues were typically the larger and more established organisations who could afford to pay more for this advice.

Figure 12: Proportion of sample companies who could do with more legal advice



74% of companies raised 'regulatory issues' as their key concern. As can be expected, there is often a lack of industry standards and certifications as a new advanced digital technology is being adopted. This can lead to a lack of clarity for companies which, coupled with an ever-evolving technological landscape, increases uncertainty around the regulatory landscape. These concerns appear to have become more pressing than access to legal, business, or technical expertise.

There were two significant regulatory challenges raised by the companies interviewed.

Firstly

Europe's General Data Protection (GDPR) (EU) 2016/679 was raised as a major concern by companies consulted, as they referred to the irreconcilability of DLT and GDPR. GDPR came into effect in May 2018 and unifies the regulatory landscape across Europe to give EU citizens more control over the use and storage of their personal data. This legislation raised concerns for companies using permissionless, public blockchains, which are open to anyone regardless of location, and where full copies of the database are replicated across all of the nodes participating in the network, making it impossible to selectively limit where the data goes. This comes into conflict with one of the key premises of the GDPR, which allows citizens to the 'right to erasure' and to withdraw their personal data from a company's database at any point. The irrevocability of data is a fundamental feature of DLT on a permissionless, public blockchain. Given that GDPR was drafted in 2016, prior to DLT becoming such a fast-growing and influential technological development, reconciling GDPR and DLT poses a concern for lawmakers and companies alike until there is further regulatory guidance released. Some of the decisions made by lawmakers regarding the definition of 'anonymous' versus 'pseudonymous' data with respect to one-way hash functions remain confusing for the technical community, and occasionally at odds with current understandings of cryptography. For example, hashed personal data is still regarded as 'personally identifiable', even if the original data can never be recovered from the numerical digest.

Secondly

Many companies expressed concerns around creating economic systems relying on the transfer of value between parties over a distributed ledger, and the use of crypto-tokens to raise funds via public Initial Coin Offerings (ICOs). Proponents of the digital tokenisation of economic activity and direct peer-to-peer value exchange believe it to present new ways of incentivising socially beneficial behaviours through distributed systems, such as encouraging fairer revenue shares for creative works, increasing the use of green energy sources, collaboration for AI training, verifiable service delivery by charities, and many other proposed use cases.

More companies within the sample felt that the regulatory uncertainty around the use of tokenisation, and raising funds by issuing tokens through ICOs, created greater ambiguity than GDPR. As previously mentioned, ICOs significantly increased and raised more than US\$100M for UK companies in Q4 of 2017. Globally, ICOs have now raised more than US\$20bn in 2018 alone. ICO deals and funding are increasing at a far quicker rate than traditional equity investment. The UK has seen the second greatest number of ICOs launched to date after the United States, with 10% and 20% of ICOs respectively. Switzerland has had the largest total value of funding comprising 25% of money generated from ICOs with Zug's 'Crypto Valley' home to 400 members, with complimentary tax laws for businesses including a 14% corporation tax rate. This, coupled with both the Bitcoin Suisse and Ethereum foundations being located in the country, has created a welcoming infrastructure for those pursuing ICOs. There are also other jurisdictions vying for dominance in this new-found global economy, including Malta and

Singapore. Despite the reluctance of the City of London to engage with tokens, ICOs and cryptocurrencies, multiple British Overseas Territories and Crown Dependencies are far more permissive, facilitating multi billions of pounds worth of business, including Jersey, Gibraltar and the Cayman Islands.

Correlating our research with publicly available datasets (ICOrating, ICObench, Etherscan) reveals that UK-based companies have raised a total of US\$410m through ICOs. However, only two have beaten the general downward trend in the Ethereum price since December 2017.

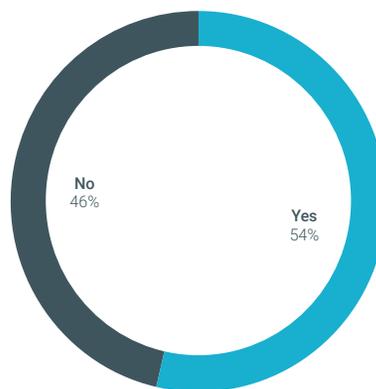
In April 2018, the UK Financial Conduct Authority (FCA) declared that it would be regulating cryptocurrencies or tokens issued through an Initial Coin Offering with respect to cryptocurrency futures, cryptocurrency contracts for differences (CFDs), or cryptocurrency options. However, as of the date of publication, the FCA has not issued any formal guidance in this field. The FCA has so far proposed a case-by-case analysis to determine whether a particular ICO falls under its regulatory purview. The FCA also states that they regulate the 'outcome rather than process' of cryptocurrencies in general. This uncertainty was raised many times by the companies consulted, as they were unsure whether they should conduct an ICO in the UK or allow UK citizens to participate given the current regulatory landscape.

These two regulatory uncertainties combined are already allowing other jurisdictions who have clarified their stances on cryptocurrencies, tokens and ICOs to compete in terms of innovation within a regulatory framework as the most reliable environments for crypto economy and digital assets. This was exemplified at Blockshow 2018, where a study ranking the top ten places to be a DLT company out of a sample of 48 European companies saw the UK coming in fourth after Switzerland, Gibraltar and Malta.

▶ **Figure 13:**
Proportion of sample companies who have difficulty opening a bank account

● Yes 54%
● No 46%

Figure 13:
Proportion of sample companies who have difficulty opening a bank account



DLT will have a profound impact on the way that banks and financial institutions work in the future, as the technology can greatly streamline the process of manual intervention in financial supply chains. Not only will smart contracts and digitised processes benefit and reduce the reliance on paperwork and intermediaries, increased transparency will also reduce the overall risk of illegal transactions.

Despite this, Digital Catapult's market research brought to light many challenges for DLT companies' interactions with banks. As demonstrated by Figure 13, 54% of companies consulted have had difficulties opening a traditional bank account. There are three subsets of DLT companies that had varying levels of difficulty with banks. The first group comprised companies focusing on a particular industry but using DLT as an enabling technology. These companies faced the fewest barriers. These companies did however generally avoid explicitly mentioning to their banks that DLT formed an integral part of their company's offering.

The second group were companies offering consulting advice or creating DLT-based proof-of-concepts for corporates. This group struggled more with banks, as DLT was integral to their business model. They would often find themselves outright rejected or with their accounts closed at short notice.

Finally, the third group, which could overlap with the previous two subsets, were those who dealt with cryptocurrencies or crypto-tokens in any capacity, across any industry. These companies found it most difficult to find a banking partner. It is also particularly difficult for companies that have raised funds in crypto-assets to get a traditional bank account even if they had undertaken all necessary KYC/AML checks on investors.

The companies consulted referenced a range of difficulties experienced with banks. The length of time required to open a bank account presented the first barrier, as companies relayed that it could take a number of months to even begin conversations with banks. Some of the companies consulted also mentioned using five or more banks all over the world, as one might refuse their services at any time without warning, so they had to plan for contingency options. This option could only be exercised by those more established businesses who had more resources and time to expend on securing global banking options. Several of the companies consulted had already had their bank accounts closed without warning or explanation.

There are a number of possible reasons for the hesitancy of European banks to engage with DLT companies. Unfortunately, there still remains a general conflation of Bitcoin, blockchain, DLT and cryptocurrency/tokens/assets. This has tainted many otherwise legitimate modern businesses with the common belief dating

back to 2013/14 that the sole purpose of bitcoin was to enable illegal activity. There remains a lack of awareness of other applications of DLT beyond Bitcoin and cryptocurrencies, and even the enabling or transformative powers of these data transparency and/or direct value transfer systems for legitimate economic purposes.

It is however true that exchanges may serve as methods for obfuscating the transfer of fiat currency into cryptocurrencies and vice versa to permit money laundering or evasion of capital controls (ostensibly the reason why the Chinese government banned all exchanges and ICO activity in late 2017). While many of these points of entry into the crypto-economy have improved their KYC/AML practices (particularly those located within Western nations, South Korea, and Japan), there remains a concern that existing funds have not have been properly vetted and therefore any and all ICO activity may be tainted with illegal money.

However, given the recent multi-billion dollar scandals around HSBC laundering drug money for Mexican cartels, and the decades-long money laundering of Russian money by Danske bank in Estonia, which dwarf the value of all ICO funding in history by an order of magnitude, it seems somewhat at odds to claim that uncensorable, permanently traceable and verifiable blockchain-based economic systems should be denied banking for solely hypothetical criminal activity.

There is a further concern that ICO companies are not properly vetted, do not offer value for money, and that they may simply disappear with all committed funds. Each of these are valid concerns, and while outside the remit of this report, are being addressed by the community at large. There is an opportunity for dialogue between traditional regulators and members of



Did you know?

Asset Tokens: these tokens represent assets such as a debt or equity claim on the issuer.

Initial Coin Offering (ICO): an innovative form of crowdfunding. In an ICO, or token sale, a company sells digital tokens that are issued through DLT.

Token: digital assets issued in connection with an application that uses an existing blockchain and can take a variety of different forms.

the DLT community in order to navigate these issues and determine best practices to provide the UK with an advantage in this field.

This report has therefore attempted to focus on the wide-range of use cases and legitimate business activity enabled by this technology, justifying a pragmatic approach to enabling this sector to grow within the UK.

On a final note, it is worth addressing some fringe concerns of conspiracies within the banking sector to actively prevent DLT activity within the UK. The enablement of direct peer-to-peer transfer of economic value, total financial transparency and accounting for the quantity of circulating money, and the inability to hypothecate assets or inflate the amount of circulating currency, is believed to directly undermine the business models of retail banks that profit from remittances, loans, and mortgages. Bitcoin was indeed invented to provide direct competition to the powers of 'too big to fail' banks over the global economy, and this 'cyber-libertarian' spirit remains strong within the community. However, given that banks themselves are exploring the potential value of increased transparency within large consortia such as R3 (the inventors of the 'Corda' DLT platform), or with smaller UK companies such as Clearmatics (in experimentation with the Bank of England for real-time gross settlement), the likelihood of widespread global collusion to close the accounts of DLT businesses and limit the growth of this sector are at best unproven. In other developments, despite a current lack of clarity around regulation, the FCA announced 'Cohort Four' of their regulatory sandbox on third July 2018 containing 29 firms, of whom some 40% are proposing to use DLT-based systems to enable their businesses. This, alongside the 2018 launch of a UK government taskforce to examine cryptocurrencies, and the ongoing

All Party Parliamentary Group's inquiries into the technology, point to the UK government's active engagement with the technology and the possibility of more guidance being provided in the near future.

As can be expected with novel technological developments, particularly one so interwoven with human economic activity and dreams of beneficial systemic transformation through radical transparency, there is often a disconnect or lag between regulatory bodies and companies innovating in the area. However, the complex and unique challenges experienced by DLT companies across a range of legal, regulatory, and banking issues are underpinned by a perceived lack of legitimacy of the sector by lawyers, regulators, and banks. This perceived lack of legitimacy could be a result of the historic link between cryptocurrency and the dark web, the first widely known use case of DLT. Similarly, there is still a general degree of confusion as to the difference between DLT, blockchain, Bitcoin, tokens, and between projects aiming to legitimately improve people's lives and society, and the unfortunate but inevitable abuses of blockchain hype such as scams or money laundering. There are still, as of yet, very few visible applications and use cases of DLT being demonstrated outside of cryptocurrencies. However, as we have seen by the range of DLT activity in the UK, the potential for DLT extends far beyond cryptocurrencies.

CONCLUSIONS AND FUTURE INQUIRY

There are many opportunities presented by DLT in the UK. Some of these opportunities include streamlining processes, improving supply chain traceability, and the revolutionising of citizen and corporate relationships with centralised or traditional authorities.

The UK is well-placed to take advantage of these opportunities, given the strength of the UK's financial and business sectors, our historic connections to a range of global jurisdictions actively experimenting with the technology, our widespread legal influence through Common Law courts, and the large number of DLT companies that are already generating revenues in the UK despite the infancy of the industry.

However, these opportunities are contingent on the resolution of some of the unique challenges experienced by DLT companies in the UK and globally, which are primarily regulatory and banking-related. These challenges are underpinned by a perceived lack of legitimacy for DLT on the part of regulators, lawyers and banks, exacerbated by a lack of clarity when it comes to defining the terms and use cases of DLT, blockchain, tokens, and Bitcoin. The fact that Bitcoin was associated with the dark web for much of its early life, and that there have not yet been many use cases outside of cryptocurrencies showcased on the global stage, causes real challenges for DLT companies in the UK.

DLT companies in reality are often led by mature business leaders, who have invested their own personal funds to found new DLT companies. The majority of the companies surveyed were not looking for business development, marketing, sales or legal guidance, but instead were looking for legitimacy and validation from banks, regulators and corporate partners, and permission to operate. These companies are looking ahead at the opportunities of the technology beyond cryptocurrencies and the financial sector, although financial services are still their largest client-base at present.

Based on our research and engagement with the DLT ecosystem in the UK there are certain key areas for consideration to enable the success and growth of the technology in the UK:

FOR POLICYMAKERS:

More guidance on regulation around GDPR and the use of tokens (including ICOs)

In order to ensure that the UK retains and builds on over 200 DLT companies headquartered here, there needs to be more guidance published from the Financial Conduct Authority and Information Commissioner's Office. Many companies referenced Malta, Gibraltar and Switzerland's more favourable regulatory environments for DLT. It is crucial that innovation in this space is not thwarted by a lack of clarity from regulatory bodies.

More cooperation between banks and DLT companies

In order for DLT companies to succeed in the UK, they must be permitted to open UK-based bank accounts and not be forced to rely on a disparate collection of expensive international banks that could decline their services at any given moment.

FOR CORPORATES:

Increased visibility of DLT's potential beyond cryptocurrencies and for industries outside of the financial sector

The majority of DLT companies in the UK do not class themselves as FinTech companies, although financial services presently comprise their main vertical market and client base.

Conclusions and Future Inquiry *cont.*

Other industries need to realise the potential that the technology presents across all verticals and begin to embrace working with DLT companies to unlock new use cases and opportunities arise for both the UK economy and the DLT ecosystem.

Collaboration is key

DLT is fundamentally about transforming the behaviours and interactions of networks of participants. One-off proofs-of-concept or single-owner systems are just databases with a new name. To appreciate the true transformative power of DLT, networks of willing participants must come together, trust the mathematics behind the technology to manage access to their data silos, and begin to exchange and collaborate on issues of common interest for the first time.

FOR DLT COMPANIES:

Safe spaces for de-risking experimentation with the technology

There need to be more opportunities for companies in all industries to trial proof-of-value solutions (one step beyond a proof-of-concept) with real data, and to deploy DLT-enabled systems outside of FinTech. Concepts such as Digital Catapult's DLT Field Labs, which bring together startups and scaleups and corporates to experiment with the technology over a twelve month period, present an excellent opportunity to showcase and de-risk the technology for the future. Digital Catapult, as a neutral convener across the UK economy and digital sector, is taking active steps to launch DLT Field Labs in multiple sectors for the wider benefit of the UK economy.

There are many avenues that can be taken to explore DLT's potential

Imagine a world in which each product had a real-time, verified chain of custody, guaranteeing authenticity, and providing live oversight and accountability? How would this transparency reduce the regulatory burdens associated with part certification, international shipment, and

tax collection? Imagine if this level of de-risking could transform each supply chain into a resilient supply meshwork of multiple capable peer organisations? What would procurement look like in this future? How much shorter would lead-times be? How much easier would it be for banks to finance growing businesses?

Imagine if digital objects could be shared seamlessly between businesses? Could future digital working be massively distributed? Imagine if IP rights could automatically accrue based upon contributions to the final work? How would this change human work patterns? Or inner-city pollution?

If you do not know what DLT is and how it can influence your business

Digital Catapult believes that almost every sector of the economy stands to benefit from improved access to shared data, and the Field Lab concept is one step along that journey.

Many modern business practices are distributed in nature, involving multiple groups interacting with each other digitally and or physically. If you currently use certification, documentation, and bureaucracy to formalise these trust relationships, DLT could streamline these processes, increase transparency and verification across a complex supply chain, defragment data collection and revolutionise relationships with centralised authority. Over the next year, Digital Catapult will be working to increase visibility of the potential of DLT outside FinTech.

If you are exploring DLT's potential, but are not sure what the return on investment would be for your business

There are already over 200 companies operating in the UK, 75% of which have raised funding, 71% are generating revenue and 74% of which have a demonstrable product in a wide-range of industries catering for many verticals. These companies are at the forefront of innovation in this nascent space. Digital Catapult has identified these companies and could help to facilitate collaboration and derisk experimentation.

INTRODUCING: DLT FIELD LABS

Despite the buzz around blockchain we've seen little in the way of its demonstration of practical application outside of cryptocurrency. Digital Catapult's DLT Field Labs offer an opportunity to cut through the hype and explore how this technology could be applied to the challenges businesses face.

To accelerate the understanding and adoption of DLT, Digital Catapult, the UK's leading advanced digital technology innovation centre, introduces DLT Field Labs.

Taking individual industry challenges and forming clusters of interested organisations, DLT Field Labs deploy and test the latest technology in real world (and close to real world) environments.

What are DLT Field Labs?

DLT Field Labs provide a collaborative process for companies and space to de-risk the practical experimentation and applications of DLT, putting real life experiments into action in new and much talked about applications.

What's involved?

Each DLT Field Lab will be framed around industry-specific topic of interest where DLT can be used to solve business problems, and/or present new opportunities.

They enable a range of commercial, research, and regulatory partners to collectively explore the full implications of DLT across multiple economic sectors and demonstrate the benefits it can offer to a wide range of stakeholders.

Bringing leading technology businesses together with industry partners, researchers and business experts, each DLT Field Lab will run in iterative, agile cycles to test and pivot around the key barriers and opportunities. All findings will be shared with sponsoring and observing organisations, including technical, business model, value proposition, legal and governmental challenges.

DLT Field Labs will help your business:

- Access Digital Catapult's industry leading DLT expertise
- Collaborate within an agreed legal framework and environment
- Access the broadest network of DLT innovators
- Develop and deploy DLT solutions for existing real-world challenges
- Demonstrate practical capabilities to attract partners and investors
- Reduce costs and improve efficiency

Digital Catapult is the UK's leading advanced digital technology innovation centre. It drives the early adoption of digital technologies to make UK businesses more competitive and productive to grow the country's economy.



Learn more: www.digicatapult.org.uk/projects/dlt-field-labs

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