# WHICH INDUSTRIES ARE THE BEST FIT FOR BLOCKCHAIN?

Whitepaper

## 1.1 Key Trends in the Blockchain Environment

Much of the initial interest in cryptocurrencies (decentralised currencies which are not backed by central banks) centred around their potential as alternatives to fiat currencies. Increasingly, however, attention has shifted to the potential of the technology that underpins them: blockchain.

### 1.1.1 Technology Players Move into the Blockchain Space

A clear indication of blockchain's increasing maturity is the extent to which an industry which was once the preserve of fintech start-ups is becoming crowded with Tier 1 technology platform providers, many of whom are developing their own offerings.

A number have been involved in colloborative ventures and consortia while at the same time developing their own solutions. For example, IBM unveiled BaaS (Blockchain as a Service) for Developers in February 2016 based on Hyperledger Fabric, one of the Hyperledger blockchain framework implementations hosted by The Linux Foundation.

The 'Big 4' consultancy firms (Deloitte, EY, KPMG and PwC) are all active in the space, with Deloitte the first mover with the release of its Rubix software platform in 2015.

### 1.1.2 Emergence of Consortia

One of the most pronounced trends in the sector has been the emergence of an array of consortia whose members are collaborating on the opportunities and challenges presented by the implementation of blockchain technologies in a given sector and to assess which particular technologies are most suitable for deployment.

One of the key benefits of this approach is that industry stakeholders are not working on the blockchain in isolation; they can receive feedback on what use cases are likely to be effective on an inter-, not just intra-corporate, basis.

### 1.1.3 Awareness of Blockchain is Increasing

It is clear that companies across the board have a significantly greater understanding of blockchain technology than was the case 12 months ago. This stems in part from a surge in R&D (research & development) both internally and in partnership with third parties, with a recognition that blockchain has the potential to be deployed in a variety of use cases. As the number of research projects has increased so, too, has awareness, both amongst the participants and elsewhere in their industries, with competitor companies in turn beginning to consider whether they, too, should seek to gain competitive advantage from deployment.

Indeed, a survey conducted by Infosys of more than 100 financial services professionals found that more than 80% expect to see the commercial adoption of the technology by 2020, with nearly half of the FIs (Financial Institutions) already investing or planning to invest during 2017.

More recently, in June 2017, Juniper Research conducted a survey of 369 executives, managers and IT professionals, which found that 39% of all companies, including 56% of companies with more than 20,000 employees, were either considering deploying, or were in the process of deploying, blockchain solutions.

The dramatic increase in awareness, with more than 4 out of 5 of those surveyed having ‘a little’ or ‘a good understanding’ of blockchain significantly reduces the scale of the initial challenge facing platform and technology providers. Brian Behlendorf from Hyperledger told us that: ‘We’re finding out that we have to do much less explaining around the differences between Bitcoin and blockchain, and more around, say, “How do we set up these systems for Proofs of Concept?”’[1]

**Figure 1: Juniper Blockchain Survey: Blockchain Awareness and Usefulness**

**15%**

Proportion of survey respondents who knew 'very little' about blockchain.

**76%**

Proportion of respondents believing that blockchain could be 'very useful' or 'quite useful' for their company.

*Source: Juniper Research*

Indeed, the initial discussions can now be pitched at the level of considerations of a particular blockchain, as Jill Carlson from Chain explained: ‘It’s evolved greately even in initial conversations from “What is blockchain?” Even in those initial conversations, it’s now much more geared to competing protocols, or the vetting of use cases.… The flipside is a lot of preconceived notions about the technology. It’s important to start with the fundamental building blocks around the technology, the terminology.’[2]

[1] Juniper Research interviewed Brian Behlendorf, Executive Director, Hyperledger Project, in April 2017
[2] Juniper Research interviewed Jill Carlson, Partner Lead, Chain, in April 2017

### 1.1.4 Blockchain Deployments are Gaining Traction

Not only are many companies now actively considering blockchain deployments, a significant proportion are anticipating integration of blockchain into their systems within the next 18 months.

The Juniper survey found that:

- Amongst the largest companies (those with 20,000 of more employees) that were considering deploying or were in the process of deploying blockchain, more than half (54%) had reached the PoC (Proof of Concept) stage, with a further 16% involved in trial deployments.
- Amongst all companies that have reached the PoC stage, two-thirds (66%) expected blockchain to be integrated into their systems by the end of 2018.
- Integration was expected to take progressively longer as companies got larger amongst the smaller companies surveyed (those with less than 1,000 employees), 81% expected integration to be completed by the end of 2018, compared with 57% of companies with over 20,000 employees.

## Case Study

### i. Case Study: Hyperledger

HYPERLEDGER
BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

*Juniper Research interviewed Brian Behlendorf, Executive Director, Hyperledger, in April 2017*

Hyperledger was initiated in December 2015 by The Linux Foundation. An open source initiative, Hyperledger aims 'to bring blockchain technologies forward to mainstream commercial adoption.' At the outset, Hyperledger had 2 code bases called Fabric and Sawtooth. Hyperledger Fabric was initially contributed by Digital Asset and IBM and Hyperledger Sawtooth was initially contributed by Intel. Today, there are 8 projects under the Hyperledger umbrella of business blockchain technologies.

Hyperledger now incubates and promotes a range of business blockchain technologies, including distributed ledger frameworks, smart contract engines, client libraries, graphical interfaces, utility libraries and sample apps.

Among others, Hyperledger frameworks include:

- Hyperledger Sawtooth - a modular platform for building, deploying and running distributed ledgers;
- Hyperledger Iroha - a business blockchain framework designed to facilitate the incorporation of DLT into infrastructural projects;
- Hyperledger Fabric - a foundation for developing applications or solutions with a modular architecture.

At the time of writing, Hyperledger Sawtooth and Hyperledger Iroha were classified as in incubation. Hyperledger Fabric was upgraded to 'active' in March 2017 after Hyperledger's Technical Steering Committee decided that it had met the project's previously defined Incubation Exit criteria.

In addition to the frameworks, Hyperledger is also the incubator for a variety of other blockchain-based tools. In May 2017, Hyperledger announced Hyperledger Composer and Indy. Hyperledger Composer (developed by a team drawn from IBM and blockchain start-up Oxchain).is a collaboration tool for building blockchain business networks, while Hyperledger Indy provides tools, libraries, and reusable components for providing digital identities rooted on blockchains.

In terms of the status of Hyperledger projects, Behlendorf said that his organsation only had a relatively low level of involvement in, and visibility on, the projects in question. Code development is driven by the community.

Member companies include banks, exchanges, consultancy firms, electronics companies, analytics companies and fintech firms. These range from Accenture, American Express, Daimler, Digital Asset, Fujitsu, Hitachi, IBM, Intel, JP Morgan, R3 to SAP.

## 1.2 Key Challenges in the Blockchain Journey

### 1.2.1 Lack of Developers

For blockchain technology to gain traction, it will require more developers to acquire the skills to be able to work with the technology. Even assuming 20,000 developers have worked with blockchain in some form or another, this is less than 1 in 1,000 developers worldwide.

While this small number of developers will stand to benefit enormously in the short term, it will be essential for training programmes to be developed, both by academia and in-house via the leading technology providers, so that the skills base is widened and that supply increases to meet demand. In the interim, a number of blockchain 'boot camps' have offered developers an introduction to the technology, including an 8 week course provided by New York's Byte Academy costing $10,000.

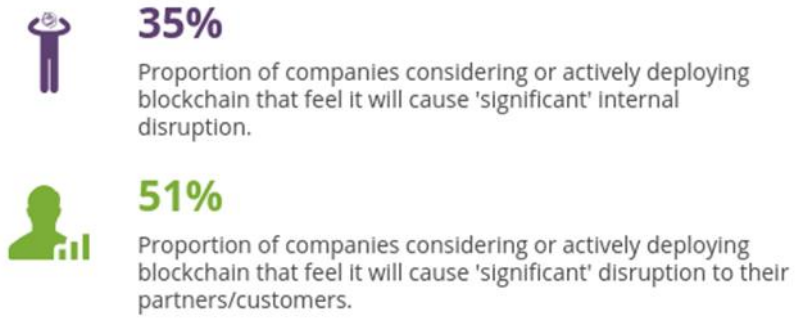
### 1.2.2 Disruption – Internal & External

A pressing concern for many companies is the extent to which the implementation of blockchain technologies might disrupt both the internal systems and, potentially, their relationships with customers.

In part, this is due to fears around interoperability; that customer systems may no longer integrate with/be compatible with their upgraded systems and that they will lose business as a result. Nearly half (45%) of the largest (20,000+ employees) companies surveyed claimed that this would be a challenge, while this figure rises to 59% amongst all companies that are either considering or actually deploying blockchain.

The survey also found that 42% of companies deploying or considering deploying blockchain were concerned that the reluctance or refusal of their clients or partners to deploy blockchain technologies might cause them difficulties, compared with 25% of all companies surveyed. This suggests that increased awareness of blockchain's capabilities, garnered through internal meetings and PoC, in turn leads to a greater understanding of the scale of potential hurdles.

**Figure 2: Juniper Blockchain Survey: Enterprise Disruption**




*Source: Juniper Research*

## 1.3 Blockchain & Bitcoin Movers & Shakers

Perianne Boring

Chamber of Digital Commercer

Founder

Perianne Boring founded the Chamber of Digital Commerce in July 2014 and is currently it's President, overseeing the Chamber's operations, government affairs and public policy initiatives. She previously worked in network broadcast news and as a Forbes contributor.

She began her career as a legislative analyst in the US House of Representatives, advising on finance, economics, tax and healthcare policy.

Brian Behlendorf

Hyperledger

Executive Director

Brian is Executive Director of Hyperledger, a collaborative technology initiative hosted by The Linux Foundation.

Previously, he was CTO of the World Economic Forum. Brian also founded and served as CTO of CollabNet, a company focused on bringing open source collaborative software development tools and methodologies into enterprise environments.

Brian also serves on the boards of the Mozilla Foundation and Benetech and is Chairman of the Board at the Electronic Frontier Foundation.

Blythe Masters

Digital Asset

CEO

Blythe Masters, currently CEO OF Digital Asset, spent a total of 27 years at JP Morgan Chase, rising to Managing Director at the age of 28. She has served in numerous senior positions at the firm including Head of Global Commodities, CFO of JP Morgan Investment Bank, Head of Global Credit Portfolio and Credit Policy and Strategy, in addition to other senior roles.

Blythe is currently on the board of The Breast Cancer Research Foundation and the Global Fund for Women. She is also Group Senior Advisor on Blockchain for Banco Santander and chair of the Hyperledger governing board.

Iliana Oris Valiente

ColliderX

Founder

Iliana co-founded and led the Rubix by Deloitte's blockchain practice, a team founded in 2015 which provides advisory services and building decentralised applications across multiple technology platforms.

At Rubix, Iliana oversaw projects to conceptualise and build DLT use cases in finance, healthcare, supply chain and public sector.

In May 2017, Iliana resigned from her position at Rubix to pursue her own blockchain initiative, the tokenised research lab ColliderX.

Chris Larsen

Ripple

Co-Founder & CEO

Chris Larsen is CEO and co-founder of Ripple and Chairman of the Board of Directors. Prior to Ripple, Chris co-founded and was CEO of Prosper, a P2P lending marketplace and E-LOAN, a publicly traded online lender. During his tenure at E-LOAN, he pioneered the open access to credit scores movement by making E-LOAN the first company to show consumers their FICO scores.

Chris serves at the Board and Advisory levels at numerous companies and organisations including, Betable, CreditKarma and Electronic Privacy Information Center.

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Catheryne Nicholson

BlockCypher

Co-Founder & CEO

Catheryne co-founded BlockCypher in January 2014. Previously, she co-founded MommaZoo, a company providing a mobile web app for parents and teachers to build parent communities around their children's schools.

Prior to MommaZoo, Catheryne worked as a strategy consultant, building software platforms for tactical air mission planning, CRM and energy management. She is also a former US naval officer.

Catheryne received a BS in Aerospace Engineering at the US Naval Academy and has an MBA from City University and an MSc in Environment Engineering from Stamford University.

## 1.4 Identifying the Blockchain Opportunity

Blockchain technology is not a panacea for all ills. In many cases the problems which businesses are hoping to solve may be organisational: they could be resolved at lower cost by implementing structural, rather than technological, changes.

Industries and use cases which will stand to benefit most from blockchain technology typically feature some, or all, of the following characteristics:

- A need for transparency and clarity in (trans)actions;
- A current dependence on paper-based legacy storage systems;
- A high volume of transmitted information.

With this in mind, Juniper Research has conducted a comparative assessment of blockchain's potential across 9 key arenas, assessing which are the 'best fit' from a deployment perspective and which offer the greatest challenges to deployment. These analyses are summarised in a comparative matrix.

In seeking to gauge the 'best fit' verticals (ie, which vertical has the greatest opportunity for blockchain deployment), we scored each vertical against both the importance of blockchain's key benefits to that vertical and of the precise relevance of blockchain to the problems that industry faces.

### 1.4.1 Key Verticals Assessment Matrix

We can see from the Assessment Matrix that, in most cases, the more a vertical is suited to blockchain deployment, the greater the degree of implementation challenges. Deployments in verticals such as Utilities and Content Publishing do not pose the scale and variety of challenges involved in Financial Settlement, but arguably will not achieve the extent of gains, cost savings, efficiencies, risk reduction, that could result from an optimal deployment in the settlement industry.

**Figure 3: Key Verticals Assessment Matrix**


*Source: Juniper Research*

We would argue that, when challenges are measured against the scale of the opportunity, Automotive, Financial Settlement and Land Registry emerge as particularly interesting prospects, when one considers:

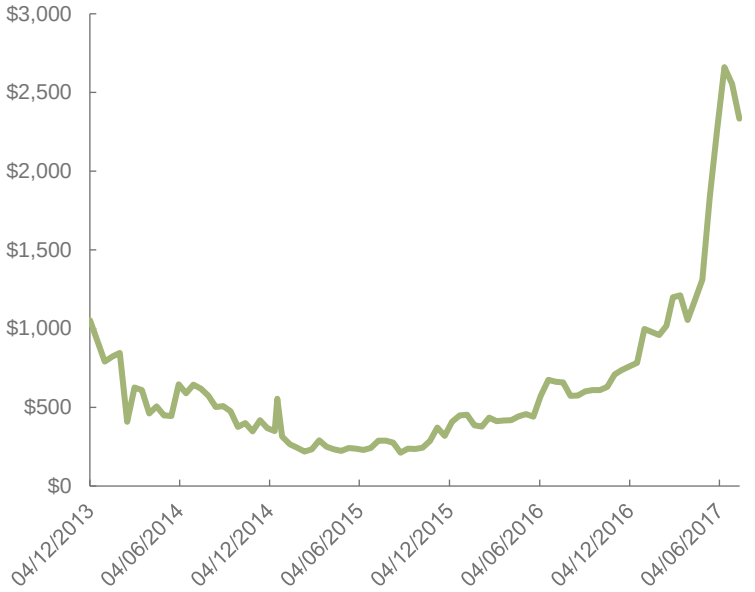
- The problems that these industries face versus the problems that blockchain can address;
- The innate characteristics of these verticals;
- The relative successes achieved in blockchain integration in these sectors thus far.

Conversely, while in many ways Healthcare is a 'Best Fit' vertical for blockchain, institutional caution may in many cases mitigate against early deployment.

## 1.5 The Market for Cryptocurrency

- Bitcoin is notoriously volatile. The value of the cryptocurrency peaked in late 2013 at approximately $1,300; it then endured a series of falls so that, by February 2015, it was trading at just under $220. Bitcoin then recovered gradually and between late December 2015 and May 2016 was largely trading in the $400-$450 range.
- However, between late May 2016 and mid June 2017, the value of Bitcoin underwent a period of sharp and almost uninterrupted growth. A 15% dip in late March 2017 that followed the refusal of the US SEC (Securities and Exchange Commission) to grant a Bitcoin Trust licence to Tyler and Cameron Winklevoss, was soon more than offset by further dramatic increases.
- The currency surpassed its previous peak in March 2017 and on 11th June, 2017, reached $2,897. It has since fluctuated dramatically across the $2,200-$2,700 range, a fluctuation which has in part been ascribed to uncertainty over the outcome of its future structure.

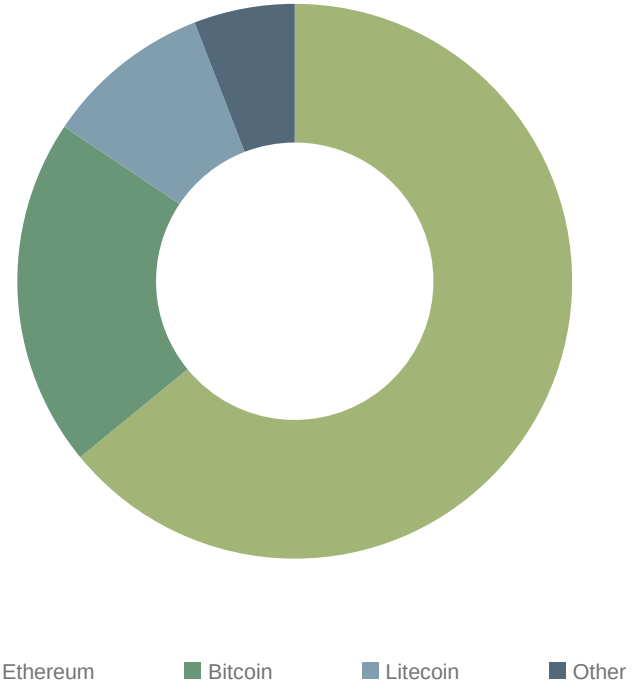
**Figure 4: Bitcoin Price vs Dollar, 2013-2017**




- *Source: Juniper Research*
- Meanwhile, as the altcoin space becomes ever more crowded, a significant number of these coins have experienced dizzying increases in value in recent months. The best known of these cryptocurrencies is Ethereum, which went live in July 2015.

- Between October 2016 and February 2017, the value of Ethereum was in the $7-12 range. However, it then began to rise sharply, peaking at $395 on 13th June, before falling back to just over $200 by mid July 2017.
- Ethereum was by no means the only altcoin to have experienced a dramatic rise in value during Q2 2017. Between the end of March and the end of June, the dollar value of Litecoin increased by nearly 500%, with Namecoin increasing by over 300%; several other leading cryptocurrencies more than doubled in value over the period, including Dash, Peercoin and Monero.
- Furthermore, although many altcoin values slipped back in early July 2017, their values still suggested that H2 2017 transaction values would be more than double those in H1. While this is largely the result of continued strong usage ($2 billion plus per day) of Ethereum, Litecoin's performance is also significant.
- In 2016, the combined value of Bitcoin and altcoin transactions fell by 83% to $71.5 billion. In large part, this was attributable to the dramatic rise in Bitcoin's value, which accounted for 81% of the total.
- We believe that 2017 will see cryptocurrency transaction values surpass $1 trillion for the first time, driven primarily by Ethereum.

**Figure 5: Cryptocurrency Transaction Value Forecast, 2017 ($1.12 trillion)**




*Source: Juniper Research*

## Order the Full Research

Juniper's new research, **The Future of Blockchain: Key Vertical Opportunities & Deployment Strategies 2017-2022**, strategic reports assessing how blockchain can succeed. This includes key market trends, highlighting leading applications by vertical industry and the movement to private blockchains.

### Key Features

- **Use Case Analysis:** Comprehensive and comparative analysis of 9 blockchain use cases, including 'best fit' by industry. Use cases include Settlement, Insurance, Land Registry and Healthcare.
- **Cryptocurrency Data & Forecasts:** Understand Bitcoin and altcoin user numbers, transaction volumes and transaction values.
- **Market Dynamics**: Get Juniper's strategic analysis of the major trends and key debates in blockchain, including public vs private blockchains; standardisation and interoperability; VC investment levels.
- **Interviews**: Unique insights from the leading players across the blockchain industry Chain, EdgeVerve, Gemalto and Hyperledger.
- **Vendor Profiles & Juniper Leaderboard**: Assessment and positioning of 12 key technology providers ranked by capabilities and capacity.

### What's in this Research?

1. **Executive Summary & Core Findings** – Top-level report summarising key trends, competitive analysis and market forecasts, allied to a series of key takeaways and strategic recommendations.
2. **Deep Dive Strategy & Competition** – Strategic analysis of blockchain evolution, market dynamics and 'best fit' verticals assessment and opportunities, together with vendor capability assessment and Leaderboard.
3. **Deep Dive Data & Forecasting** – Activity analysis and recent trends in the Bitcoin and altcoin space, together with 6 year forecasts for adoption, usage and transaction values.
4. **Interactive Forecast Excel** – Highly granular dataset comprising more than 2,300 datapoints, allied to What-If Analysis tool giving user the ability to manipulate Juniper's data.

### Publications Details

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