Financial Reporting

LAB

**Blockchain and the future of corporate reporting**

# How does it measure up?

June 2018

FRC  Financial Reporting Council

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## What is the Lab?

Over the last six years the Financial Reporting Lab has sought to improve the effectiveness of corporate reporting in the UK. We do this by working with companies, investors and others on topics that matter. Our reports explore innovative reporting solutions that better meet the needs of companies and investors. Lab reports do not form new reporting requirements, but do seek to highlight best-practice and thought leadership.

For more information about the difference the Lab makes to reporting watch our video:

**www.youtube.com/user/UKFRC**

All of our published reports can be found on the FRC's website: **www.frc.org.uk/Lab**

**Do you have suggestions or want to get involved?**

The Lab encourages readers of this report to provide comments on its content and get involved in upcoming Lab projects. To provide comments or get involved, please send us an email at:
**FinancialReportingLab@frc.org.uk**

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# Quick read

When we first planned this report not many had heard of blockchain. However, at some point in the last few months that has all changed. Not only is blockchain well known in the business world but it, and the digital currencies that are powered by it, have become front-page news. This report is not setting out to advocate for or against blockchain, but rather to explore some of the potential use-cases and impacts on corporate reporting.

## What is blockchain?

To put it simply, a blockchain (also called a distributed ledger) is a type of shared database which creates a permanent record of transactions. Because it is distributed across a number of participants in a network and therefore not under the control of a single participant, it is robust. This, combined with the fact that any changes made to the data are clear to all participants, ensures both the data and the network are resilient. Blockchain, therefore, is different from a traditional database because of the way it creates trust and resilience.

## When does it make sense to use blockchain?

The nature of blockchain means that it can outperform databases where specific criteria are met:

| Blockchains qualities: | Mean that blockchain can be useful when: | Which creates: |
|---|---|---|
| There is a single, shared and uneditable version of the truth. | i. There is limited trust between the multiple parties, and<br><br>ii. There is a need to know the current status of something (e.g. who owns a diamond) and some benefit to knowing its history (where did it come from), and | TRUST |
| Shared or accessible to a network of participants. | iii. There are multiple parties who are expected to (or could) update the status, and<br><br>iv. The current process is inefficient or needs a technological upgrade. | RESILIENCE |

Where these circumstances are met, the potential for blockchain to transform processes is significant, not withstanding the cost and complexity of delivering such solutions.

## Blockchain in action

Whilst there is currently a lot of interest and experimentation in blockchain, it should not be used just for the sake of it. Blockchain works best when it is solving real world problems. Promising applications of the blockchain include those focused on:

- Supply-chain and provenance: Guaranteeing the identity and provenance of high value items such as diamonds.

- Securities settlement: Using blockchain to speed up clearing and settlement processes.

- ID/Password and Know-Your-Client: Creating a verified ID on the blockchain to allow signatures and ID applications.

- Notarisation/Geolocation: Using blockchain to verify a document/file and track changes.

- Licensing/Rights: Using blockchain to record the right to access a service or asset (e.g. software).

## Blockchain and corporate reporting challenges

Corporate reporting is a mechanism to create trust in a company's financial position and performance. It does this through the rules, regulations, assurance requirements and communications practice which are focused on annual reports and other regulatory documents. While corporate reporting generally works well, challenges remain, including:

- The cost and complexity of recording and aggregating transactions across multiple entities,

- The difficulty of identifying a single source (for users) of credible, up-to-date/prompt company reporting across multiple companies and jurisdictions, and

- Making corporate reporting engaging and flexible in a multi-format and multi-stakeholder environment, whilst maintaining an assurance/regulatory boundary.

But is blockchain the answer? Using the Lab's framework of digital reporting which expresses the qualities that preparers, users and others value in digital reporting, we consider the case for blockchain in solving these corporate reporting challenges.

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# Quick read cont'd

## Blockchain in production, distribution and consumption

Blockchain is not the only possible answer (or even the best), but it does have the potential to solve some of the challenges of corporate reporting. Blockchain might also meet the wider characteristics desired for digital corporate reporting. Our conclusions on the potential of blockchain in the stages of corporate reporting are:
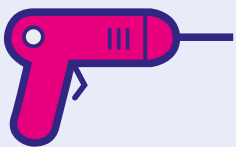
**Production** – Blockchain has the potential to improve the efficiency and timeliness of error/tamper-free records (across markets, industries and companies) and increase the speed of consolidation within groups, particularly where there are multiple participants. However, this depends on whether the issues of cost and interoperability are solved.

**Distribution** – The use of blockchain as a single source of credible, useable corporate data across Europe is a real possibility (and it is already being worked on by the European Commission), but ultimately its success is dependent upon any solutions being easy to use.

**Consumption** – Using blockchain to form an unalterable group of communications (to meet reporting requirements) across different formats and entities has some potential, and could lead to different ways to meet regulatory requirements, perhaps leading to more engaging reporting. However, the need for wider adoption may reduce the likelihood of its use.

Blockchain has the potential to change some aspects of accounting, reporting and auditing, but this is unlikely to be imminent or all-encompassing. Blockchain therefore merits consideration and experimentation by preparers, regulators and others involved in the corporate reporting ecosystem (in the right circumstances).

## Taking blockchain forward

Whilst there are specific steps that might be needed to facilitate the uses described in the report (if so desired), there are also a set of wider, more basic actions that are needed to take blockchain forward.

Blockchain development is at an early stage, especially for accounting and corporate reporting.

Overall, it needs to be nurtured if the opportunity it represents is to be fully realised. Actions from different parties that might support this overall goal include:

## Actions for the regulatory community

Cautious innovation and experimentation should be encouraged. That being said, the regulatory community, professional bodies, and the accounting industry need to monitor the developments and invest in their knowledge and skills. To facilitate this, we recommend a creation of a forum (perhaps led by the profession) where all those involved in corporate reporting can share and learn.

## Actions for the technology community

The adoption of technology by the mainstream business world requires a focus on integrating with other business systems and processes, as well as the continued development of live (valuable and efficient) real world implementations. However, there remains a real risk that expectations about the technology create a significant gap in the minds of business and the public. Further education, using straightforward and non-technical language, could mitigate this risk and help build the case for blockchain.

## Actions for preparers and users of corporate reporting

Blockchain provides many interesting properties that could provide value to both preparers and users of reporting. It is possible that it will become a key element of accounting and reporting infrastructure in the future, especially where its focus on trust and resilience is valued. However, it remains immature. Therefore preparers and users should focus on gaining a greater level of understanding and consider experimentation and cautious innovation when costs and benefits are balanced.

**Contribute to the discussion**

**Cautiously innovate**

**Understand**

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# Digital technology and corporate reporting

## Introduction

This report on blockchain is the second in a series of technology deep-dives. In this and each deep-dive report, we use our digital reporting framework to explore how different technologies might impact corporate reporting production, distribution and consumption.

## Why blockchain?

Whilst blockchain has recently become headline news, you may not have thought about it in connection with corporate reporting. However, the Lab undertook a survey in 2016 which asked what technologies would be important for the future of corporate reporting. Over 75% of respondents identified blockchain as important for the production of corporate reporting and 25% as important in its consumption. Although at the early stages of development, blockchain has the potential to impact some elements of the corporate reporting process and is therefore an important technology for the Lab to consider.

## Who should read this report?

Don't be put off by references to blockchain or distributed ledger; this is not a technology report. It is a report about how corporate reporting might be optimised and altered using technology. Given the significant changes coming, we think that this report will be useful to all participants in the corporate reporting community including regulators, boards, preparers, design agencies, auditors and investors.

## How should I read this report?

As with any report that is attempting to reach a diverse audience, this report strikes a balance between detail and the bigger picture. The report begins with some background on blockchain, what it is, and why everyone is talking about it. We then cover some of the potential use-cases that blockchain has for corporate reporting. For each potential use we consider if blockchain truly makes sense. We then recommend some actions to take blockchain forward. The report's appendices include consideration of blockchain using our framework of characteristics for digital reporting, provides some basic information on how blockchain works, and a glossary and links to useful material.

While this report is part of our series looking at how technology might impact corporate reporting, it can also be read as a standalone document providing an extrapolation of potential impacts and issues based on all the outreach and discussions undertaken throughout the wider project.

## Why is the FRC's Financial Reporting Lab looking at Digital reporting?

The FRC's mission is to 'promote transparency and integrity in business.' Core to demonstrating transparency and integrity is the communication between companies and the wider community. Successful communication is not just about what is communicated; it is also about ensuring that communication is disseminated in an easily accessible, timely and useable manner.

The Financial Reporting Lab's Digital Present project showed that technology provided new ways for companies to interact with their stakeholders, but that many of these new mechanisms were not delivering on their promise of transformative change. The Digital Future project continues these themes and aims to understand how new and developing technologies can be used to disseminate company communications in the most efficient manner. It seeks to balance the needs of all.

In May 2017, the Lab published its first report on this project which articulated a framework of 12 characteristics that sought to define the needs of those producing, distributing and consuming corporate information. We have used this framework as a basis to consider some of the emerging technologies and their impact on reporting. So far we have looked at XBRL and blockchain. Future reports will consider other technologies such as Artificial Intelligence and Augmented/Virtual Reality. The recommendations from this and the other reports will help inform the FRC's project on the Future of Reporting.

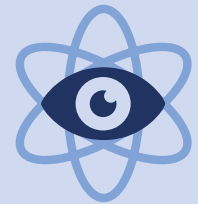**XBRL**    **Blockchain**    **Artificial Intelligence**    **Augmented and Virtual Reality**

We would specifically like to thank the ICAEW and ACCA, who both hosted roundtables for this project. The roundtables bought together technology experts, accounting, auditing, regulatory and other participants. The roundtables were used as a key input into this report, supplemented with further discussions.

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# Section 1

# Blockchain background

- What is blockchain?

- Blockchain in action

This section of the report covers at a high-level what blockchain is and provides an overview of how it is beginning to be deployed in the real world. Appendix 2 provides a more detailed explanation of the workings of blockchain for those who would like more information.

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# What is Blockchain?

To put it simply, a blockchain (also called a distributed ledger) is a type of shared database which creates a permanent record of transactions. Because it is distributed across a number of participants in a network, and therefore not under the control of a single participant, it is robust. This, combined with the fact that any changes made to the data are clear to all participants, ensures both the data and the network are resilient. Blockchain, therefore, is different from a traditional database because of the way it creates trust and resilience. It can be used to record transactions and information related to assets as well as their location. Whilst the data on the blockchain is digital it can represent physical assets (such as diamonds) or non-physical (such as crypto currencies). Even when related to non-physical assets, the blockchain does not contain the asset itself, just the record related to the asset.

## Why was it invented?

TRUST  RESILIENCE

The development of the internet led to a significant increase in digital transactions, commerce and exchange, but this raised problems around the creation of trust. In order to transact effectively both parties need some level of trust in the other. This is easier in physical transactions where the parties can meet and exchange in person, but creating this trust online is more difficult. A common way of doing this is transacting through a trusted third party/middle-man. For example, a buyer might purchase something through an online auction site. The site acts as the middleman connecting the seller and buyer. The system provides the buyer with comfort that the seller is trusted and the seller with comfort that they will get paid. The issue with this approach is that there is reliance on the trusted third party. They may generate a fee for connecting the buyer and seller and they have the power to stop, change or amend transactions or even change the rules of interaction. If the third party systems disappear, so does the whole function of the network.

Blockchain was developed as an alternative way of creating trust between parties. Blockchain sought to solve the issue of a trusted third party by replacing it, using the network and mathematical proof. With blockchain in its purest form, there no longer needs to be a central trusted party controlling the process. This, in theory, reduces costs, increases trust in the transactions (because they can't be amended by the central authority) and enhances resilience.
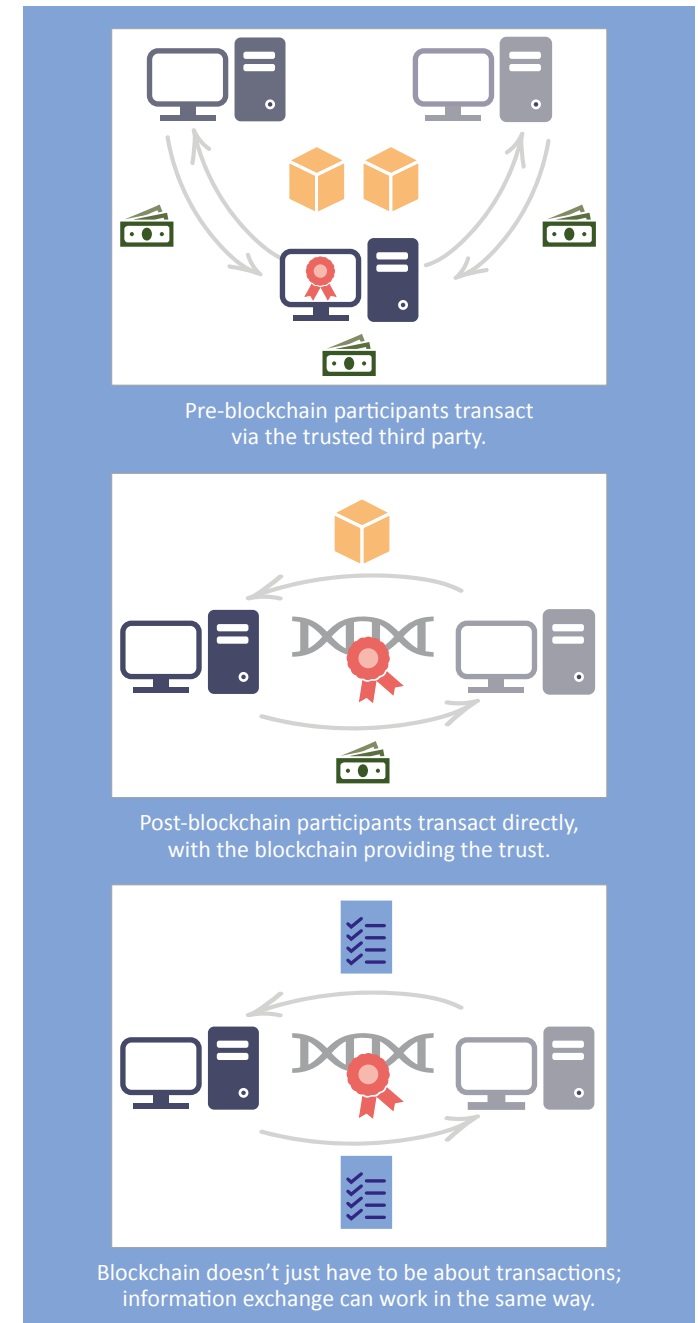
## Why is blockchain important?

We should care about blockchain because the removal of a central authority and use of smart contracts (codable contracts/business actions) empowers different types of business models, processes and industries by potentially removing a whole layer of administration from the system. It is not just about commercial transactions; information exchange could also happen in the same way.

The diagram shows one example of the difference that a blockchain can make.

**KEY POINT:** Use of a blockchain does not change the outcome of the transaction, it simply changes the transaction process and the way that information is regarded as trusted.

Pre-blockchain participants transact via the trusted third party.

Post-blockchain participants transact directly, with the blockchain providing the trust.

Blockchain doesn't just have to be about transactions; information exchange can work in the same way.

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# Blockchain in action: around the world

Where is blockchain being used? Many of the well publicised blockchains are not live applications, but are proofs-of-concept and test beds. However, there are a number of large-scale chains in operation. The most well known blockchains are those powering cryptocurrency networks such as Bitcoin. As of May 2017 Bitcoin had 7,000 participants (nodes) and processed around 200,000 transactions a day.

But blockchain's potential extends far beyond cryptocurrencies:

*"Cryptocurrencies like Bitcoin get all the attention (and notoriety), but it is the underlying Blockchain technology that will revolutionise global business. In our view, it has the potential to be as significant for industry in general as the internet was for society."*

*(David Knutson, Tom Cha & Chris Tams from Schroders)*

## Apart from cryptocurrency what else can it do?

One way to think about blockchain is like an operating system such as Android or Windows, and Bitcoin as just an application. Other applications of the blockchain include those focused on:

- Supply chain and provenance: Guaranteeing the identity and provenance of high value items such as diamonds.
- Securities settlement: Using the blockchain to speed up clearing and settlement processes.
- ID/Password and Know-Your-Client: Creating a verified identity on the blockchain to allow signatures and ID applications.
- Notarisation/Geolocation: Using blockchain to verify a document/file and track changes.
- Licensing/rights: Using the blockchain to record the right to access a service or asset (e.g. software).

While the above are in no way a comprehensive list of examples, they do show how blockchain is being thought about across industries, from small start-ups to large multi-nationals, exchanges and governments.

## Blockchain in the real world

Insurance is one industry that has always had multi-party information sharing at its core. An insurance contract will often involve a client, an insurance broker, an agent, insurer (possibly multiple) and one or more reinsurers. All of these parties need up-to-date information in order to record transactions appropriately and reflect the risks that they are exposed to.

Traditionally, much of the exchange of information in the insurance industry has been via paper or electronic documents, which are then exchanged between participants. This can be a costly, slow and time consuming process that may also give rise to disputes between different parties.

In 2016 fifteen insurance market participants (including Aegon, Allianz, Generali and Swiss Re) formed the Blockchain Insurance Industry Initiative (B3i), a collaborative group designed to explore the potential of using distributed ledgers across the insurance value chain. The initiative quickly grew and now represents a significant proportion of global insurers, reinsurers and brokers.

In 2017, B3i built a test blockchain to handle property-catastrophe risks. Testing involved 38 participants and over 800 contracts. Overall, the test case demonstrated that blockchain could support the functional requirements of the industry, by creating a shared ledger that was robust enough for real world transactions.

Now that the test is complete, B3i are focusing on reinsurance in the short term, but have identified more than 60 use-cases across the industry. Overall B3i consider that the use of blockchain will lead to significant efficiencies and customer service improvements. Blockchain has acted as the catalyst for participants to collaborate.

*"We expect financial transactions will settle faster, cheaper, more transparently and with less operational risk. The benefits of using blockchain could come through enabling more efficient business processes across multiple stakeholders without "full trust" in each other."*

*(B3i.tech)*

For more details about B3i see their website. **https://b3i.tech/home.html**

**KEY POINT:** Blockchain is here, its uses are growing and therefore it is too important to ignore.

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## When does it make sense to use blockchain?

Whilst blockchains are being developed for many applications, they are not suited to many uses. The nature of blockchain means that it can outperform databases where specific criteria are met:

| Common Blockchains qualities: | Mean that blockchain can be useful when: | Which creates: |
|---|---|---|
| There is a single, shared and uneditable version of the truth. | i. There is limited trust between the multiple parties, and<br><br>ii. There is a need to know the current status of something (e.g. who owns a diamond) and some benefit to knowing its history (where did it come from), and | TRUST |
| Shared or accessible to a network of participants. | iii. There are multiple parties who are expected to (or could) update the status, and<br><br>iv. The current process is inefficient or needs a technological upgrade. | RESILIENCE |

Where these circumstances are met, the potential for blockchain to transform processes is significant, notwithstanding the cost and complexity of developing such solutions.

**KEY POINT:** Blockchain is not the best solution for many uses. Companies should be clear that blockchain is the most appropriate solution before embarking on a blockchain project.

### Myth-buster: all blockchains are the same

There are many different flavours of blockchain in the same way that there are many different types and structures of databases. While many of the well known blockchain iterations (such as Bitcoin) are undertaken on public ledgers, this is not the only way. Businesses or consortiums using blockchain will generally use a private, permissioned chain and many will have some form of mechanism to provide greater levels of confidentiality such as split or segregated ledgers. Understanding the structure of each blockchain is important when considering if it is appropriate for a proposed use.

### Myth-buster: just because something is on a blockchain it is correct

Whilst there might be some specific use-cases where the blockchain can provide transactional assurance, much will depend on the exact design and operation of the chain. There is a risk that the overpowering narrative of blockchain creates expectations around trust and accuracy that it is not able to meet.

**KEY POINT:** Just because something is called a blockchain doesn't mean that it is secure and has sufficient controls and processes to be acceptable for business transactions. Companies proposing to join or use blockchains should ensure that they are designed and configured appropriately and processes are supported by their own internal controls.

**Further information:** If you would like more on blockchain see **Appendix 2** for information on how blocks are created, how they are chained together, hashing, and immutability.

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# Section 2

# Blockchain and corporate reporting

- Challenges in corporate reporting
- Production
- Distribution
- Consumption

This section of the report discusses how corporate reporting is currently structured and considers some potential use-cases of how blockchain technology could improve the production, distribution and consumption of company information.

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# Challenges in corporate reporting

Corporate reporting is a mechanism to create trust and (measured) transparency in a company's financial position and performance. It does this through rules, regulations, assurance requirements and communications practice which are focused on the annual report and other regulatory documents. While the current system of corporate reporting generally works well, there are certain challenges which we consider in this report that are relevant to certain attributes of blockchain:

- The cost and complexity of recording and aggregating transactions across multiple entities,

- The difficulty of identifying a single source from which users can obtain credible, up-to-date/prompt company reporting across multiple-jurisdictions and companies, and

- Making corporate reporting engaging and flexible in a multi-format and multi-stakeholder environment, whilst maintaining an assurance/regulatory boundary.

But is blockchain the answer? The following section describes at a high-level how blockchain might be used in the various stages of reporting to answer the specific challenges identified.

## Measuring up

Blockchain and other such technologies don't operate in a vacuum. The most successful developments are those that, not only solve specific issues, but also align with wider demands from preparers, users and others. The Lab's earlier work on technology and reporting led to the development of a digital framework of characteristics that express a number of key attributes that digital corporate reporting should embody. It is by considering both the ability to solve problems and the degree to which the characteristics are (or could be) met that a full picture of the potential for blockchain in corporate reporting emerges.

**Appendix 1** provides further details about the characteristics. The diagram above highlights the characteristics.

## Characteristics of Future Digital Reporting



**KEY POINT**: Simply solving a specific reporting issue is not enough. Reporting processes and systems are complex, and blockchain therefore needs to fit into the overall framework of demands of preparers and others if it is truly to be useful.

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# Blockchain and reporting production

## What problems might blockchain solve?

Business processes are complex with multiple entities interacting and transacting. Recording of the resulting accounting information and consolidating that into a set of financial statements can also be complex. It often requires confirmation and validation of transactions and records with multiple parties. The process can be time consuming, costly and potentially prone to error and manipulation. Overall, companies need a process that is **easy** to operate and generates error/tamper-free entries, is **cost-efficient**, produces **timely** results and is **compatible** with a number of systems and processes.

| COMPATIBLE | EASY | COST-EFFICIENT | TIMELY |
|---|---|---|---|

Two places that blockchain might be used to help solve problems in the production of accounting records (ultimately supporting external reporting) are in the recording and processing of external transactions and consolidation.

## External transactions

Whilst there are some public blockchains, such as Bitcoin, that companies might interact with, they may not be the most common use of the technology for business. Blockchains are finding many proponents who are looking at opportunities to exchange data and transact within consortiums or small industry groups (where creating trusted, resilient records shared by all participants is of significant value). Often this involves the kind of data and transactions that have always been undertaken; blockchain, therefore, provides a way of digitally re-engineering the process to improve **timeliness** and (eventually) **cost-efficiency**. Because there is a shared ledger which is free from tampering or error, the necessary level of central validation and confirmation (or audit and assurance from multiple parties) might be reduced, and therefore the cost and timeliness involved in these activities might be improved.

Depending on the industry, a blockchain solution might be a single industry standard chain or might be one of several that a company must interact with (for example, a supplier might need to interact with a different chain for each major group of customers). However, multiple chains cause issues for those seeking compatibility between the blockchains and their accounting systems and may limit any cost savings. Furthermore, because blockchain would replace just part of the process, the potential to remove assurance validation activities is also reduced.

## How blockchain might interact with a company's accounting system

**TRANSACTION LAYER**

1) Transactions and information are processed on a variety of blockchains and traditional systems. Multiple blockchains reduce cost savings and make compatibility more difficult.
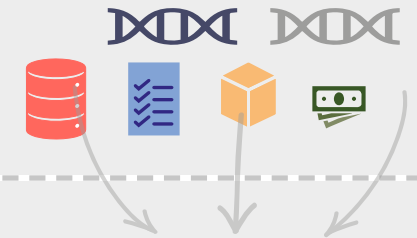
**GENERAL ACCOUNTING LAYER**

2) Information is transferred to a traditional accounting system, where it is subject to normal assurance and validation processes.

**KEY POINT**: Interaction between blockchain systems and business systems reduces impact. For companies, the future will potentially see the records of some assets, transactions or liabilities residing on a public or semi-public blockchain. Blockchain won't necessarily be the accounting record, but will provide the underlying transaction evidence.

## Does it make sense to use blockchain?

Potentially, blockchain might improve the **cost** and **timeliness** of error/tamper-free records because trust comes from the chain rather than through third party validation. This is particularly the case in business processes where there are multiple participants and the level of trust between the participants may well be low. However, there might be more effective ways of achieving these overall objectives.

## Consolidation

The process of creating and reporting corporate information can be complex. The single annual report of a PLC, which presents a unified story of how a group has progressed within a year, might represent the results of several hundred independent legal entities operating in different jurisdictions. Whilst ideally they would share a single unified accounting system, each entity may have their own auditors and year-ends. Consolidating all reporting entities is a difficult task, and removing the effect of inter-group transactions often complicates it even further. The common way of solving these issues is through a repetitive process of reporting up to a consolidation team, who then match-off transactions and make adjustments to reflect the overall group position.

Blockchain is being seen by some as a potential answer to these issues. A shared and constantly updated version of the 'true' position is potentially very valuable, especially when different company structures are involved (such as with joint-ventures or associates). Such a system would circumnavigate **compatibility** issues and likely improve **timeliness**. However, the cost of using a blockchain to sit on top of current accounting/reporting systems needs to be carefully assessed against the cost of implementing a single traditional accounting system.

## Does it make sense to use blockchain?

Potentially, in consolidations between group reporting entities where there are multiple participants (and systems) that contribute data. Generally, the history and current state of the data is useful to know, i.e. did they make changes to their numbers. Removing the need for multiple iterations of consolidation would enhance **timeliness** and potentially improve **cost efficiency**. However, blockchain might not improve the level of trust as usually the level of trust between reporting entities is relatively high (although less so with joint ventures and new acquisitions).

## What needs to happen to makes these uses a reality?

Currently there is no standardised blockchain. Different chains are set up and operate differently. Whilst experimentation helps drive innovation, it limits compatibility. A future where companies are using several blockchains creates the need to interact with a variety of traditional business IT systems.

Standardisation work (such as that proposed by the International Standards Organisation) needs to continue and be widely accepted before blockchains become part of the mainstream accounting and reporting IT architecture.

Companies must be comfortable that their systems are robust and provide acceptable forms of evidence for their internal and external assurance needs. Therefore:
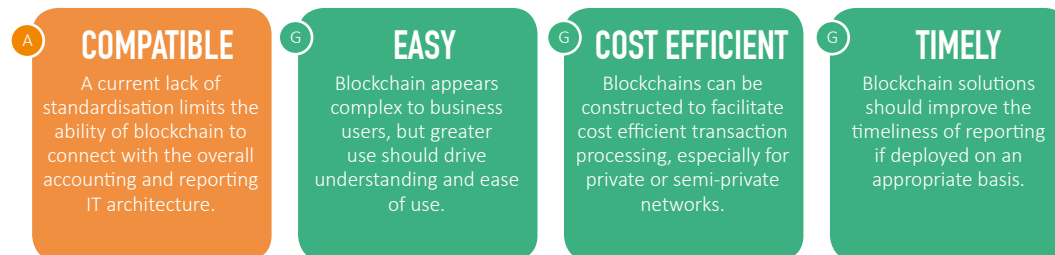
- For any blockchain, implementation boards need to fully understand the design of the chain and ensure that sufficient controls are in place.
- Regulators, auditors, companies and the technology community need to work together to educate each other and seek solutions to assurance requirements.

## What is the time scale?

Imminent but not widespread (for now). A number of industries and companies are already exploring blockchain solutions for transactions and information exchange. Whilst much of the exploration is resulting in proofs-of-concept rather than production ready systems, it is only a matter of time before such production blockchains are in place.

## How production use-cases express the digital characteristics

| **(A) COMPATIBLE** | **(G) EASY** | **(G) COST EFFICIENT** | **(G) TIMELY** |
|---|---|---|---|
| A current lack of standardisation limits the ability of blockchain to connect with the overall accounting and reporting IT architecture. | Blockchain appears complex to business users, but greater use should drive understanding and ease of use. | Blockchains can be constructed to facilitate cost efficient transaction processing, especially for private or semi-private networks. | Blockchain solutions should improve the timeliness of reporting if deployed on an appropriate basis. |

For full RAG rating see **Appendix 1**.

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# Blockchain and distribution

## What problems might blockchain solve?

Companies must meet specific regulatory filing requirements for their regular corporate reporting to make them **accessible** to the public. For listed companies, there are reporting requirements embedded within domestic and European law which require certain documents and communications to be submitted to the Official Appointed Mechanism (OAM). However, the multiple differing filing mechanisms across Europe make it difficult for users to find a single source of corporate filings which they can be sure is up-to-date and matches the official version. Often users will go to individual company websites or will use a (potentially costly) third party source. Whilst many would welcome a more transparent and useable public source of company information, a solution also needs to be able to distribute **promptly** and in a way that is **compliant** with all requirements. Users also want to be able to access the distributed information **freely.**

| ACCESSIBLE | COMPLIANT | PROMPT | FREE |
|:---:|:---:|:---:|:---:|
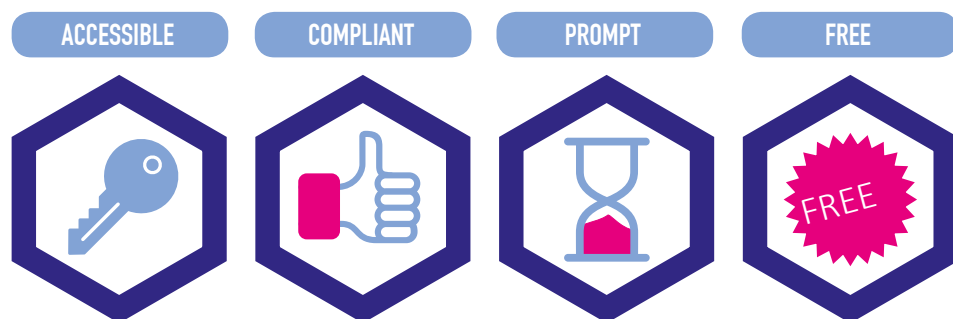
Blockchain could help solve problems in the distribution of reporting at a national and international level.
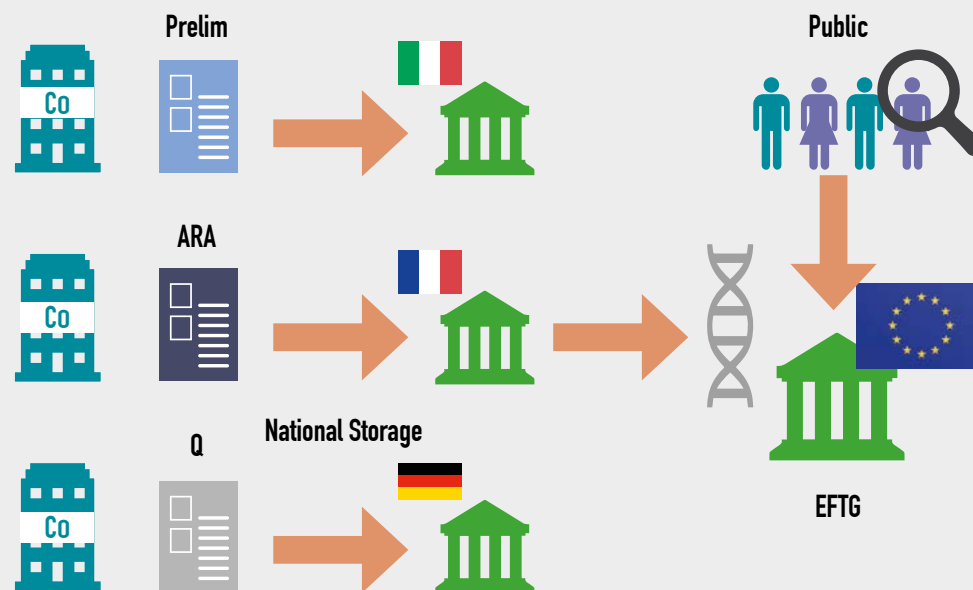
## National storage blockchain

The OAMs are in effect large databases of official reported information. Users must log on and search for the relevant information and download the items as required. Some have suggested that blockchain would be an ideal way to enhance the OAMs, on a country by country basis. In fact, the European Commission is working on a proof-of-concept to this effect called the **European Financial Transparency Gateway** (EFTG). This approach would use blockchain as a discovery layer, creating a single location for European company reporting. Using this approach, listed companies' information (that is required to be lodged publicly) would reside on the OAM, but also be accessible via the EFTG. Potentially this

greatly increases the **accessibility** of **free** up-to-date official information. The nature of the blockchain also means that the information being accessed could be trusted to be the 'official' version and would be resilient.

While many consider that a database would serve this need adequately, the EFTG seeks to join 27 OAMs in different countries, all with different legal and statutory underpinnings. In this situation, replacing all the legal, regulatory and technical infrastructure with a single agreed database that works for all could be challenging and expensive. Therefore, the use of blockchain to augment the local filing system, rather than replace it, might be preferable, as participants would remain in **compliance** with local rules. It could also be attractive to use similar technology at a local country level. Companies could file the location of various regulatory filings (annual reports, business register documents, gender pay reporting etc.) that are traditionally released publicly to different bodies into a single public blockchain, greatly enhancing the effectiveness of access.

### How blockchain might work for distribution via the European Financial Transparency Gateway

Companies report to their national mechanism which then connect via the EFTG blockchain across Europe. The public discover the desired information via the EFTG.



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Potentially. Companies have to file information to multiple parties within and across different countries. Having a single structured location would enhance **accessibility.** Blockchain could also enable the **prompt** filing of multiple requirements. If the EFTG sat over the national mechanisms, it would also not impact **compliance**. Although trust in national mechanisms is already high, and therefore would not necessarily be enhanced by blockchain, the gathering together of trusted sources would provide benefit to users.

## What needs to happen to makes this a reality?

Company reporting across Europe is a mixture of EU-wide regulations, local company law, requirements of various exchanges and regulators and some market norms. To be of real value, there needs to be consistency in both the types, contents and nomenclature of different reporting frameworks.

- Regulators need to continue to work with industry and initiatives such as XBRL, Legal Entity Identifier and Schema.org to develop consistent naming, taxonomy and identification for companies and company filings.

- Government, regulators and others should consider the alignment of reporting and filing requirements where appropriate.
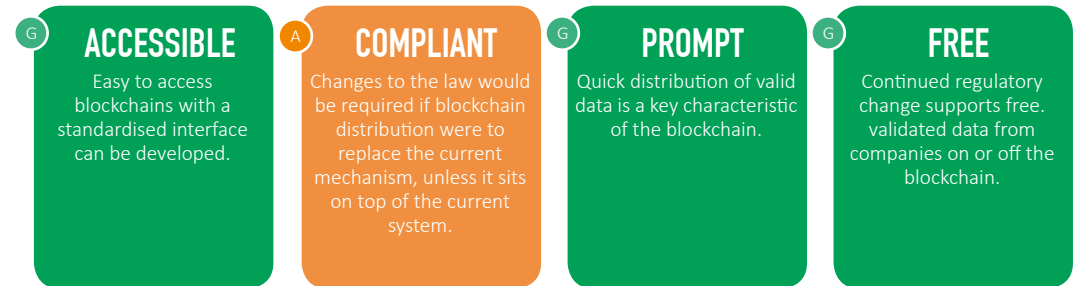
**KEY POINT**: Blockchain, by its nature, supports the distribution and discovery of information and could work for the distribution of corporate reporting, especially alongside wider capital market evolution. However, reform and standardisation of the current system could ultimately be more beneficial.

## What is the time scale?

Medium/long term. Whilst the European Commission is progressing with a proof-of-concept, EFTG remains at an early stage. However, the commission is beginning to discuss and consult on the relevant steps required to make the EFTG operational. A key step towards a single gateway has been announced (requiring access to basic free company data across the EU) and has a five year implementation timeline.

## How distribution cases express the digital characteristics

| G **ACCESSIBLE** | A **COMPLIANT** | G **PROMPT** | G **FREE** |
|---|---|---|---|
| Easy to access blockchains with a standardised interface can be developed. | Changes to the law would be required if blockchain distribution were to replace the current mechanism, unless it sits on top of the current system. | Quick distribution of valid data is a key characteristic of the blockchain. | Continued regulatory change supports free. validated data from companies on or off the blockchain. |

For full RAG rating see **Appendix 1**.

# Blockchain and consumption of reporting

## What problem might blockchain solve?

We live in a world of more and more data. For preparers, it is important that their reports stand out against an increasing tide of third-party derived company information. To achieve this, preparers seek to make their reports **engaging** communications which provide **context** about the position, performance and character of the organisation. For users, corporate communications need to be **useful** for their analysis and understanding. They also want it to be a **credible** source of information which has a clear level of assurance attached to it. Having a boundary around information is important for investors as it provides context and adds to credibility. For example, an annual report is a boundary that is related to a set of specific reported information with appropriate assurance attached to it. However, historically these boundaries have been established by the physical boundaries of a specific document. As demands for more information grow, it can limit the ability of preparers, industries and others to use different mediums and different communications to meet regulatory requirements.



| ENGAGING | CONTEXTUAL | USEABLE | CREDIBLE |
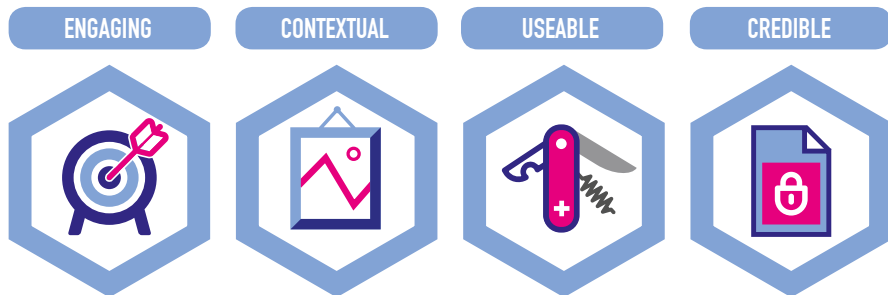
Two places that blockchain could be used to help solve problems in the consumption of reporting are when considering reporting across an entity and across an industry.
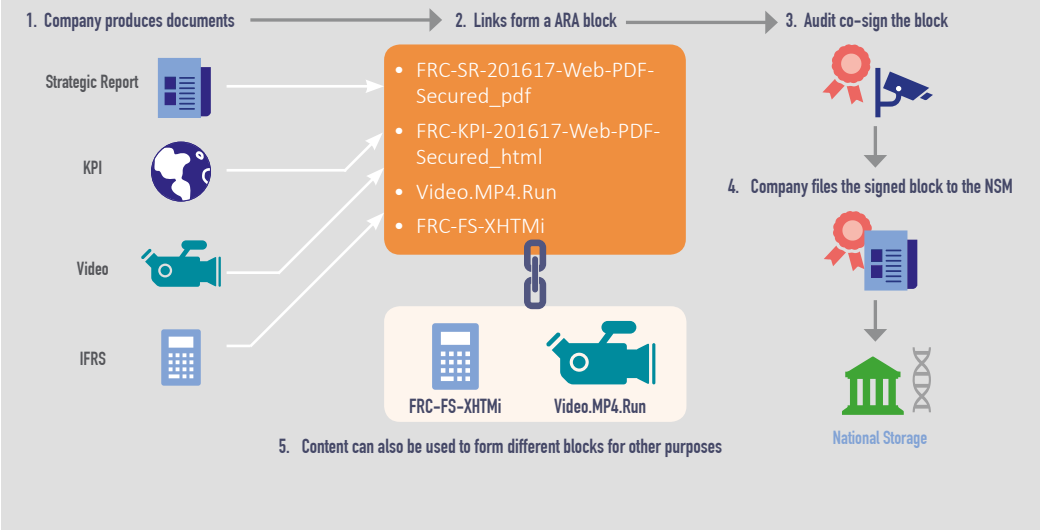
## Disclosurechain

The Lab's earlier work on digital reporting identified that the boundary of reporting was important, but that it does not necessarily need to be physical. An entity-specific blockchain, not of reports, but of individual disclosures, either in traditional documents or using new mediums, might be a more **engaging** solution to the boundary issue. By providing a chain of links to disclosed information this 'Disclosurechain' would allow an up-to-date picture of a company's position to be communicated as well as the relevant **credibility**/assurance and **context** around it (i.e. users could trust that it had not changed since it was issued and assured). Furthermore, by providing the full history (chain) of disclosures, changes over time could also be understood.

By aggregating permanent links to various documents and mediums within a single disclosure block, a preparer could meet a set of requirements (e.g. an annual report) in a much more flexible way (using mediums such as video), than the current system. The disclosure block could be counter-signed by the company's auditors (where appropriate) making a strong link between what is assured and what is filed, or potentially by the national storage mechanism to show it was the official version.

## How blockchain might replace the boundary of reporting

A preparer creates an annual reporting block from a number of engaging documents and mediums. The block becomes the boundary. The preparer can then file this block to the national storage mechanism. The annual report block is co-signed by the auditor, enhancing credibility.



1. Company produces documents → 2. Links form a ARA block → 3. Audit co-sign the block

- Strategic Report
- KPI
- Video
- IFRS

- FRC-SR-201617-Web-PDF-Secured_pdf
- FRC-KPI-201617-Web-PDF-Secured_html
- Video.MP4.Run
- FRC-FS-XHTMi

FRC-FS-XHTMi        Video.MP4.Run

4. Company files the signed block to the NSM

National Storage

5. Content can also be used to form different blocks for other purposes

## Does it make sense to use blockchain?

Unclear. A single entity blockchain would generally not be seen as useful (because there are not multiple parties). However, if the system was set up to connect with audit and regulatory users it could communicate assurance and therefore build trust. If such a system could enhance the use of **engaging** mediums, whilst also maintaining **credibility** and **context**, it could be welcomed. But there is no benefit in such a system unless it is adopted very widely. Investors and other users do not want to access multiple different systems that work differently. This is a significant limiting factor to its use.

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# System performance reporting

Corporate reporting is fundamentally an entity-based concept. Generally, the boundary of what is being reported is the performance and position of a single company or group. Whilst this makes sense for those seeking to invest in a company, it makes less sense for other stakeholders. Other stakeholders may need information that is wider than a single entity/group. For example, customers might be interested in information about a full supply chain, regulators might be interested in the impact of an entire industry, and other civil society bodies could be interested in specific aspects and impacts. If there is a desire for people to engage with company information, then reporting at a level which is of more value to them might be a necessary step.

Traditionally, where there has been a demand for aggregate systems or thematic reporting, this has been done by simply requiring additional, specific reporting by aggregating participants' reporting information to create a single report (for example Lloyds' market participants report on the overall performance of the market). But this is often because regulation or specific demand by a stakeholder requires one participant to take responsibility to report. Blockchain potentially provides an alternative.

Supply chain monitoring/reporting using a blockchain is being considered by a number of different organisations as it fits well with the need to have variegated access to the information, and allows transactions to be fully traceable.

Environmental impact reporting, either at an industry or project level on the blockchain, has also been considered by some. Given the large number of participants contributing to a project, and possibly low levels of trust between participants, having a way to contribute overall information to a single trusted source would be attractive. Control and validation would not need to be the responsibility (or cost) of a single participant, but a by-product of the process. Notwithstanding potential issues with consistency and standardisation, it might allow the various forms of assurance over elements of the process/data by different providers to be drawn together to provide an element of aggregate confidence over what is reported.

Both of the specific cases above are not focused on reporting to the public, but they could be altered to provide **credible**, **useful** and **engaging** information in a public context. Potentially, systems such as these could see a company contributing information to multiple chains on specific areas of interest.

This is a different way to conceptualise reporting, free of the entity-based constraints of the current system.

## Does it make sense to use blockchain?

Possibly. Demands from stakeholders for more information beyond entity-only information are increasing, and little infrastructure currently exists. Having a system that supports the gathering of historic and current state data (and possibly assurance), in an environment where there are many actors and trust is limited, would potentially provide value. Whilst blockchain is not the only way to achieve this, its characteristics would suggest that it may be suitable.

## What needs to happen to make this a reality?

The disclosurechain is unlikely to happen in the short term. However, companies and service providers should consider experimentation with blockchain to communicate company information. Systems performance is potentially more achievable. However, it would need to be supported by guidance, standards and possibly by regulation.
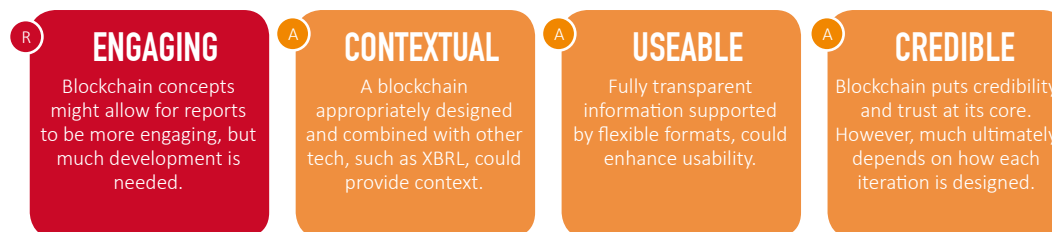
## What is the time scale?

Longer term. The development of blockchain has been focused so far on it being a mechanism for transacting and recording interactions. Potential reporting uses have received little attention. That being said, there are elements of blockchain that may work for reporting. However, much further development is needed.

**KEY POINT**: Blockchain could allow a rethink of what we consider to be the boundary of reporting. This may be far in the future but raises fundamental questions about the notion of the 'entity' in reporting, moving from a firm to a nexus of participants.

## How consumption cases express the digital characteristics

| R ENGAGING | A CONTEXTUAL | A USEABLE | A CREDIBLE |
|---|---|---|---|
| Blockchain concepts might allow for reports to be more engaging, but much development is needed. | A blockchain appropriately designed and combined with other tech, such as XBRL, could provide context. | Fully transparent information supported by flexible formats, could enhance usability. | Blockchain puts credibility and trust at its core. However, much ultimately depends on how each iteration is designed. |

For full RAG rating see **Appendix 1**.

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# Section 3

# Conclusions and actions

- Conclusions on blockchain and corporate reporting

- Actions

- Next steps

This section highlights some of the actions that different parties might need to take if we are collectively going to make the most of the opportunity that blockchain presents.

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# Conclusions on blockchain and corporate reporting

Corporate reporting has evolved to enable the recording, aggregation and analysis of trusted, credible information allowing judgements to be made about company performance and position. But challenges remain: reporting can be costly, inefficient and open to error and manipulation, the output is not always engaging and can be difficult to locate and use.

Blockchain has the potential to assist in some of these challenges. It also meets some of the wider characteristics desired for digital corporate reporting production, distribution and consumption:
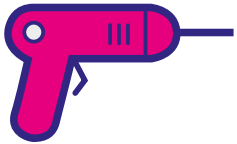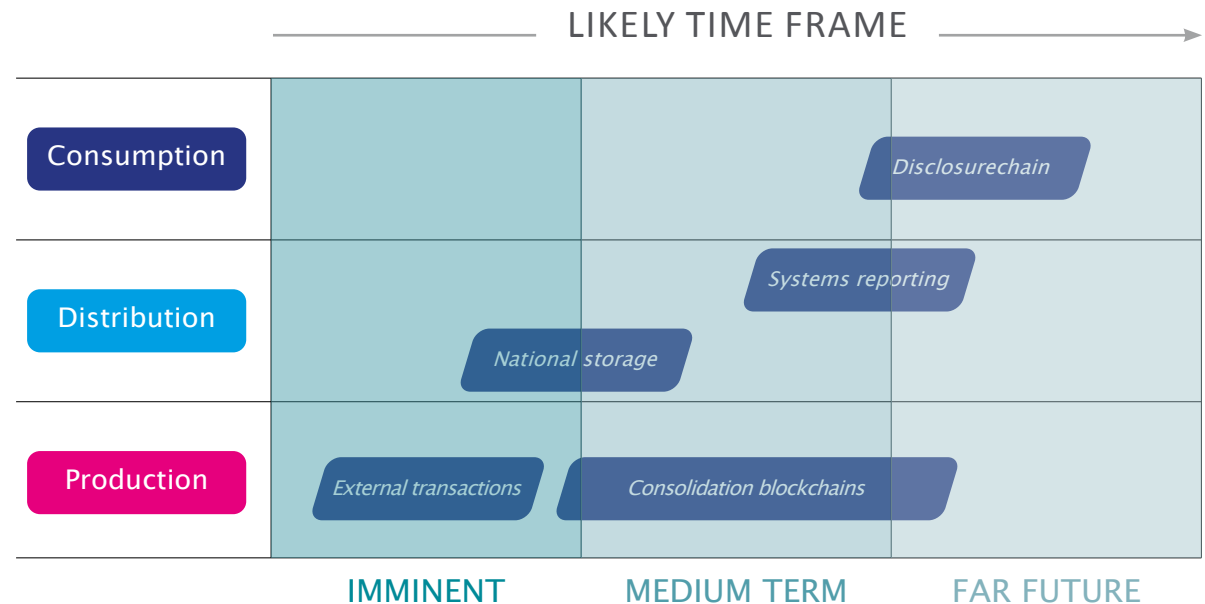
Production – Blockchain has the potential to improve the efficiency and timeliness of error/tamper-free records (across markets, industries and companies) and increase the speed of consolidation within groups, particularly where there are multiple participants. However, this depends on whether issues around cost and interoperability can be solved.

Distribution – The use of blockchain as a single source of credible, useable corporate data across Europe is a real possibility (and it is already being worked on by the European Commission), but ultimately success is dependent upon any solution being easy to use.

Consumption – Using blockchain to form an unalterable group of communications (to meet reporting requirements) across different formats and entities has some potential, and could lead to different ways to meet regulatory requirements, perhaps leading to more engaging reports. However, the need for wider adoption may reduce the likelihood of its use.

LIKELY TIME FRAME

| | IMMINENT | MEDIUM TERM | FAR FUTURE |
|---|---|---|---|
| Consumption | | | Disclosurechain |
| Distribution | | National storage | Systems reporting |
| Production | External transactions | Consolidation blockchains | |

Blockchain has the potential to change some aspects of corporate reporting, but this is unlikely to be imminent or all-encompassing. However, as a source of disruption to the current financial process, blockchain merits consideration and cautious experimentation by preparers, regulators and others involved in the corporate reporting ecosystem.

**KEY POINT:** Blockchain is not going away, but its growth in corporate reporting is likely to be gradual and restricted to certain use-cases.

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# Actions

This report considers how blockchain may eventually impact different aspects of reporting.

It identifies some specific steps that could be undertaken if the use-cases discussed are to be taken forward. However, we are at an early stage with blockchain and some more basic actions would also be welcomed.

## Actions for the regulatory community, professional bodies and the accounting industry

Cautious innovation and experimentation should be encouraged. The regulatory community, professional bodies and the accounting industry need to monitor the developments and invest in their knowledge and skills. To facilitate this, we recommend the creation of a forum (perhaps led by the profession) where all those involved in corporate reporting can share and learn. This 'Reporting, Accounting and Auditing on the blockchain forum' could be UK-focused or might work across Europe. The forum would:

- Provide a space to discuss ideas, risks and opportunities,
- Support education and learning on blockchain across participants,
- Form a focal point for relevant opinion and help support governments or other appropriate consultation activity,
- Encourage innovation and experimentation, and
- Support standardisation efforts, where relevant.

## Actions for the technology community

The adoption of technology by the mainstream business world requires a focus on integrating with other business systems and processes, and development of live, valuable and efficient real world implementations. However, there remains a real risk that expectations about the technology may create a significant expectation gap in the minds of business and the public. This could be mitigated by continuing to:

- Support the efforts to educate business and boards in a way that is relevant and understandable,
- Facilitate discussions with regulators and others about both the opportunities and risks that moves to blockchain solutions might involve,
- Interact with auditors and audit standard setters to explore how blockchain might fit into the assurance environment, and
- Continue to support standardisation efforts (such as ISO/TC 307), where relevant and effective.

## Actions for preparers and users of corporate reporting

Blockchain has many interesting properties that could provide value to both preparers and users of reporting. It is possible that it will become a key element of accounting and reporting infrastructure in the future, especially where its focus on trust and resilience is valued. However, the use-cases of blockchain remain immature. Therefore preparers and users should focus on gaining a greater level of understanding and consider experimentation and cautious innovation when costs and benefits are balanced. Preparers and users should:

- Be open to sharing views, perspectives and ideas with others,
- Understand the impact and opportunities of blockchain and how it drives change in business processes. Whilst much of this will not relate to corporate reporting, the interaction with finance, accounting and reporting should be considered for each blockchain implementation,
- Interact with government, regulators and others to ensure concerns, issues and opportunities are fully understood, and

Adoption of blockchains don't remove the need to have robust controls and processes over data. Before adopting a blockchain, users should ensure that they are comfortable with the design of the chain, as well as inbuilt and supplementary controls.

**Contribute to the discussion**

**Cautiously innovate**

**Understand**

# Next steps

In 2016, the Lab launched the Digital Future project, an initiative to investigate the impact of technology on corporate reporting communications.

As part of this project, we have already:

- Released a framework of characteristics that are important for a system of digital reporting, **https://www.frc.org.uk/getattachment/fd3054ee-b0f3-4968-8b20-d5bb262c4c54/Digital-Future_final.pdf**

- Released a deep dive report on how XBRL fits into corporate reporting, **https://www.frc.org.uk/getattachment/9279091c-a4e9-4389-bdd6-d8dc5563b14a/DigFutureXBRLDec.pdf**, and

- Explored the possibilities of blockchain in the corporate reporting process.

We are now looking to investigate how Artificial Intelligence (AI) and related technologies are, and will be, used in the production and consumption of corporate reporting. Anyone who is interested in discussing AI, Augmented Reality and Virtual Reality for the production, distribution or consumption of corporate reporting should contact the Lab: **FinancialReportingLab@frc.org.uk**

Once all the relevant technologies have been reviewed, we will feed into the FRC's project on the future of corporate reporting.

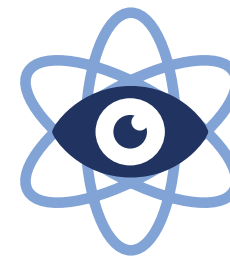If you would like to keep up to date with the work of the Lab you can do so by **subscribing** to News from the FRC.
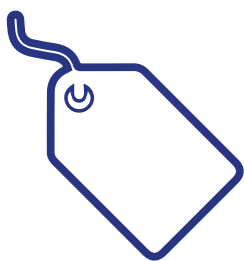
XBRL          Blockchain          Artificial Intelligence          Augmented and Virtual Reality

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- Appendix 1 – Assessing blockchain

  - Production characteristics
  - Distribution characteristics
  - Consumption characteristics

- Appendix 2 - Blockchain background

  - What is blockchain
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  - Links

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# Appendix 1 – Assessing blockchain

In May 2017, the Lab published a framework for digital reporting. Through extensive engagement with companies, investors and other relevant stakeholders, the Lab identified 12 characteristics that were commonly held by project participants to be critical for a successful digital reporting framework. We grouped these 12 characteristics into three categories: Production, Distribution and Consumption.

Some of the characteristics are embodied in today's paper-based system of reporting (although not necessarily as well as they could be). In other cases the characteristics represent a desired quality that technology is expected to fulfil.

This framework was not intended to represent a checklist or rigid set of criteria. Instead, it was created to provide a structure through which to explore whether existing and future technologies might work effectively and to ascertain how they might complement each other. It is in this spirit that we use the framework to assess the potential that blockchain affords.

We have assessed blockchain and related activities against the 12 characteristics of the Lab's reporting framework. A Red, Amber, Green (RAG) score was determined by the Lab team following a series of interviews and roundtables. It represents the degree to which blockchain currently, or in the future, might meet each characteristic in relation to potential corporate reporting use-cases.

**Production**

COST EFFICIENT　EASY　COMPATIBLE　TIMELY

**Distribution**

FREE　PROMPT　COMPLIANT　ACCESSIBLE

**Consumption**

CONTEXTUAL　USEABLE　CREDIBLE　ENGAGING

**Production** – This stage is focused on the collation, amalgamation, packaging and presentation of underlying financial and non-financial information from within a company or organisation with the express intention that it will be released externally. Production characteristics were of most interest to companies, and those supporting them.

**Distribution** – This stage is focused on the dissemination of the packaged information, both to meet regulatory requirements (e.g. National Storage Mechanism) and to communicate with external stakeholders. Distribution characteristics are of interest to both companies and those consuming the information.

**Consumption** – This stage is focused on the analysis and use of the distributed, packaged information. Consumption characteristics are of most interest to those utilising the information. These characteristics might attach equally to any individual piece of data, disclosure or document being used.

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# Production characteristics

## COMPATIBLE

**A** A current lack of standardisation limits the ability of blockchain to connect with the overall accounting and reporting IT architecture.

Blockchains are technologies designed to record and share data (be that data as information or data as value), so any process that is data driven should be compatible with a blockchain-based solution.

### Rating drivers

**A** Companies use a variety of internal and external data and IT systems during reporting and accounting processes. This is unlikely to change soon with blockchain-based systems simply being part of the ecosystem, rather than replacing them fullscale, blockchain-based solutions that have the ability to connect with, process, update and output to a very wide range of other reporting systems, would thus be critical. There is also likely to be a need for blockchains to interact with each other (forming multi-chains).

Currently there is no standardised blockchain. Different chains are set up and operate differently. Whilst this experimentation helps drive innovation, it limits current compatibility. Standards may need to be developed before blockchains are part of mainstream accounting and reporting IT architecture.

## EASY

**A** Blockchain appears complex to business users.

**G** Greater use should drive understanding and ease of use.

At its heart, the concept of a blockchain is relatively straight forward.

### Rating drivers

**A** Blockchain technology has its own distinct nomenclature which acts somewhat as a barrier to the traditional business user. This, combined with specifics of the technology (and links to cryptography), make many of the concepts and elements within blockchain sound overly complex and therefore not 'easy' or accessible.

There has also been a recent growth in companies providing services, consultancy and solutions to companies and consortiums in the blockchain arena. Overall, this adds to the noise surrounding the technology.

**G** However, many of the underlying concepts of a blockchain should be familiar to accountants and finance specialists. Greater use of blockchain in real world situations by business users is needed. This is likely to drive calls for user-friendly solutions as well as a better understanding of the risks and opportunities that these technologies offer. This knowledge and understanding will be needed throughout the reporting community, from the board down.

## COST-EFFICIENT

**R** Many of the public chains are not cost-efficient due to specific design features.

**G** Blockchains overall can be constructed to facilitate cost-efficient transaction processing, especially for private or semi-private networks.

The cost-efficiency of blockchain technology is dependent on how a solution is implemented.

### Rating drivers

**R** Much has been written about the enormous amounts of energy that the Bitcoin blockchain uses; often a comparative is made to a country like Ireland or Iceland. Whilst there is some truth in this assertion (although actual numbers are unclear), this is not something inherent to all blockchains, but rather relates to how Bitcoin transactions are validated through a competitive process called 'proof-of-work'.

**G** Like databases, blockchains can be set up with many different structures and the way that the chain is set up will determine the overall cost and other features of the particular iteration. Blockchains don't have to be expensive. However, current interest in the technology is likely to impact both the cost and availability of physical hardware (such as graphical processing units) and expertise, although it is also creating easier funding paths for some potential blockchain projects. Blockchain solutions that are cheap and scalable are needed if wide adoption for accounting is to occur.

## TIMELY
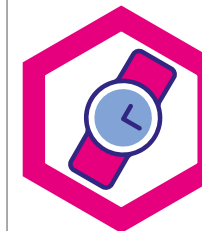
**G** Blockchain solutions should improve timeliness of reporting if deployed on an appropriate basis.

The timeliness of a blockchain-based solution would ultimately depend upon both the specific architecture of the chain and its overall purpose and use. However, if one considers an actively used public or semi-public chain it should be highly timely in its ability to record transactions.

### Rating drivers

**G** For underlying transactions, the very nature of incorporation into blocks, recording and validating the transactions, adds them to the chain. This usually happens on a very timely basis, for example, Etherium blockchain transactions take around 14 seconds. This is much quicker than recording and validating multi-party transactions in the current environment.

As we look through company processes, to accounting and reporting, the use of multiple blockchains as components or sources of evidence in a consolidation and reporting process adds significant complexity. However, as for the current reporting process, it is not the technology that is the limiting factor for timeliness of reporting, it is often the exercise of judgement and oversight. Whilst blockchain solutions might reduce this (i.e. through removing the need to reconcile), they will not remove it completely.

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# Distribution characteristics

**ACCESSIBLE**

G Public distribution blockchain would need to be easy to access by design.

A Quality services to access the chain would be key. Additional standardisation efforts may be required.

**COMPLIANT**

*If replaces current*

A (UK) Would need changes to the law.

R (EU) Would need changes to the law.

*If adds to current*

G Could sit on top of the current requirements and legal framework.

**PROMPT**

G Given the distributed nature of any blockchain solution. digital documents would be quickly distributed.

**FREE**

G Provision of free company level data supported by regulation.

A A robust validation mechanism would be required to support the free nature of the system.

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As a distributed ledger, blockchain is by its nature widely distributed, the full ledger is often accessible to all participants.

**Rating drivers**

G When thinking about the distribution of reporting data (rather than accounting or transactional), it is important that this information is fully public. A public blockchain solution would therefore remove some of the issues about access to information.

A However, whilst all transactions/data are accessible to the participant, finding what is specifically being looked for might be more complex. Any use-case for reporting distribution would need a high quality useable front-end for data consumers. The ability to locate specific company filings would also be greatly facilitated by standardisation of company identifiers such as **Legal Entity Identifiers** (LEIs), and the content and form of reporting itself.

Companies are subject to complex rules and requirements around the distribution of information, which is often different in different countries. Using blockchain is not likely to change these requirements.

**Rating drivers**

Using a blockchain for the distribution of regulated information would either be as a replacement to current systems or as a addendum to current requirements.

A If blockchain replaces the current system of distribution, changes to laws, regulations, and requirements would be needed.

R Significant complexity would be added if such an approach was to cover multiple jurisdictions (such as all EU members) where reporting interacts with different company and security laws. This may prove difficult to agree.

G If a blockchain is simply an addendum to current requirements (e.g. sits over current systems), and therefore acts more like a portal or consolidator of the data, this should be easier as it would be unlikely to require any changes to law or regulation. However, whilst it might be simpler, it would not reduce complexity or cost.

Blockchain as a technology, by its nature, supports prompt distribution.

**Rating drivers**

G In a blockchain-based solution, the act of adding the record to the blockchain, such as the transaction data, document, or more likely, the location of the document, would act as the distribution.

Because of the distributed nature of the chain, every participant that had an up-to-date version of the blockchain would quickly receive that information. This would require the participant to host a copy of the full chain, including all transactions from the inception of the chain, which can take a significant amount of time, especially on first download. Whilst this may work for readers of lots of data, more casual readers of reported data/documents would need a system to find and access only the transaction/document that they were interested in.

For some of the cryptocurrency networks, these types of programs are called block explorers. These explorers are often web-based and sit on top of the public blockchain, and report the transactions and details. Something similar would be needed for a national storage blockchain.

The ability to aggregate and distribute company data/documents is dependent on the legal and regulatory framework in place.

**Rating drivers**

G Listed company annual reports and other information are required to be freely available and filed within an appointed market reporting mechanism (such as Edgar in the US, or the National Storage Mechanism in the UK) and/or through publication on a company's own website. If a blockchain solution sat on top of such infrastructure it might not add any additional access costs.

A However, some of the potential benefits of blockchain relate to the validation of transactions; in many iterations this validation has some kind of cost. For any type of national or multi-national storage, some non-monetary mechanism to incentivise the various participants to validate the transactions would be required.

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# Consumption characteristics

## ENGAGING

A | Blockchain concepts might allow for reports to be more engaging.

R | Complex technology would need to be developed to support such a concept.

Transactional data recorded in a blockchain is unlikely to be engaging. However, more radical concepts such as the 'Disclosurechain' could be, but are highly disruptive to the current approach to corporate reporting.

### Rating drivers

A The current structure of financial reporting is heavily document based. However, often these documents are not sufficient to tell the full story. To truly understand a company, users consume lots of different information that companies disclose, from sustainability reports, through videos, to individual group entity reports or regulatory filings. Providing a better way to link these multiple sources of company-owned public reporting, both by subject and across time, might provide a better and more engaging way to understand a company.

R The ability to access and understand an overall flow of information from a 'Disclosurechain' would require sophisticated search and viewing tools, which do not currently exist. Furthermore, users want some level of consistency in the presentation and accessibility of corporate information, a radically different concept of reporting would unlikely be well regarded, unless widely adopted.

## CONTEXTUAL

A | A blockchain appropriately designed combined with other tech such as XBRL could provide context.

Blockchain could be used to record and distribute data/transactions, or perhaps even disclosures and full documents (or simply their location). However, any movement away from a document based system of reporting would need to ensure that the context of reporting remained.

### Rating drivers

A Blockchain on its own is not sufficient to provide all of the relevant context needed by users. However, the system itself, if so designed, could provide some key elements such as company, status of the item, time stamp, audit or assurance status. For example, a company might sign a transaction which represents the location of its report, with the other signatory party being the auditor, thus indicating audit status.

Much of the detailed context surrounding corporate reporting is within the documents/disclosures/data. Blockchain, combined with other developments such as the use of XBRL accounting or reporting taxonomies to identify and categorise transactions and documents, might further enhance the users' ability to understand context.

## USEABLE

A | Fully transparent information supported by useable formats such as XBRL would enhance useability.
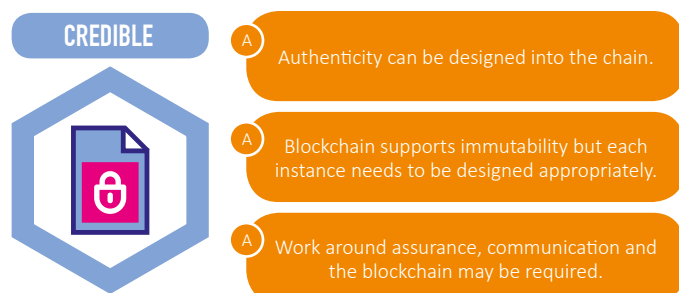
Corporate reporting is only valuable if it is useable by stakeholders. Whilst transactional blockchains could provide some informational content, the sheer volume of information limits use. A system which was more akin to current reporting such as a 'National Storage Chain' (see previous section) or a 'Disclosurechain' might provide more useable information.

### Rating drivers

A The useability of blockchain reporting would depend both on the intuitiveness and useability of the platform that accesses the chain, as well as the information that was included in the chain.

Regulators and others around the world have identified the need for corporate reporting to be both machine and human-readable. The use of technologies such as XBRL support this overall goal. Structured data (XBRL) plus structured location (blockchain) could greatly enhance the potential to make free corporate information useable.

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# Consumption characteristics cont'd

**CREDIBLE**

A Authenticity can be designed into the chain.

A Blockchain supports immutability but each instance needs to be designed appropriately.

A Work around assurance, communication and the blockchain may be required.

Reporting needs to engender trust by being immutable, assured and authentic.

**Rating drivers**

### Authentic

A The whole purpose of all iterations of blockchain is to create a trust network either with or without a trusted party participating. It does this by authenticating transactions or records through some kind of validation mechanism. These validation mechanisms vary widely in nature and complexity. Any corporate reporting blockchain would need to devise a mechanism to ensure that a record was authored by the appropriate party, which could take the form of some kind of development of the LEI concept to include public and private keys.

### Communicate Assurance

A The ability to identify the appropriate level of assurance attaching to an item is crucial for users of corporate reporting. But assurance is not just about agreeing a value. Whilst a transactional blockchain might provide evidence on valuation and existence of a transaction, it is unlikely to provide information about any attaching rights, obligations or information about the correct classification or accounting for the transaction.

Understanding and interpreting transactions is complex, and most users are interested in the position and performance of a company in aggregate, not on each transaction. This is why ultimately audit assurance attaches, not to transactions, but to an aggregation point, being the financial statements within the annual report. On this basis, a system which retained assurance over audited aggregation points, be they document based (e.g. annual report) or collections, or blocks of linked disclosures, would likely be beneficial. In a National Storage Chain this might be maintained through the continuation of an audit report. In more radical

'Disclosurechain' scenarios perhaps the audit firm would be a participant/node and would validate the record containing the audited/assured information. The status of assurance would need to be clearly communicated to those accessing the information.

Audit firms consider that there is much work on standards, assurance procedures and disclosure needed if blockchain is to form a key element of audit evidence. Working through the impact of new technology is something that global audit standard setters have always done. However, the process might take longer than the market needs.

### Immutable/Secure

A Of all the aspects of blockchain, immutability is the characteristic that it most clearly provides. Immutability is guaranteed by blockchain's distributed nature and the process of hashing. However, the specific design of storage and disclosure chains are not clear. Having and incentivising sufficient numbers of independent nodes to ensure that a consensus verdict was not controllable by a single actor (or group of actors) would need to be guaranteed. Potentially having audit firms, stock exchanges, and regulators operating nodes might be an answer.

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# Appendix 2 – Blockchain background

## What is blockchain?

The seeds for blockchain were sown in the early 1990s when some parties considered how to create a system for date stamping documents using a form of online notary. However, like many innovations, it initially was ignored until the idea resurfaced as the underpinning of Bitcoin, an electronic currency supported by cryptographic technology.

## Block and Base

To put it simply, a blockchain (also called a distributed ledger) is a type of shared database which creates a permanent record of transactions. Because it is distributed (rather than central) across a number of participants in the network, it is robust, and any changes are clear to all members (making both the data and the network itself resilient). It can be used to record the location of, and/or transactions and information related to, assets. Whilst the data on the blockchain is digital it can represent physical assets (such as diamonds) or non-physical (such as cryptocurrencies). Even when related to non-physical assets the blockchain does not contain the asset itself, just the record related to the asset.

## Why is blockchain different from a traditional database?

While the process for recording and validating transactions in a blockchain is different in operation to many databases, it is not that different in overall concept. Databases need to record transactions, and these are written to the database by an authorised party.

TRUST

RESILIENCE

## What gets recorded in a blockchain?

A block is a set of data (for example, transactions or other information) that has been gathered together to form a record; these transactions do not need to be from the same party, they can all be independent. Transactions might represent any number of things, a traditional purchase or sale of an asset, a time stamp or perhaps a file or file location. Overall, the only requirements are that there needs to be a subject of a transaction and transacting parties (even if just a system). These blocks of data transactions are what is added to the blockchain.

## Components of a block

Each block is made up of three things:

1 The transaction information

2 A unique digital fingerprint (hash) made from that information

3 A link to the previous set of transactions (in the form of the hash from the previous block)

These three elements are combined and a digital fingerprint (hash) is then made from this combination. Because the fingerprint is a combination of the data in the block, plus the previous block's fingerprint, it is linked to the previous block of transactions. In this way, every block is connected to the previous block, and therefore they form a chain of transactions from the origination of the block (thus block chain).

## How do new blocks get created?



a. Lets assume we want to add the following transaction details.

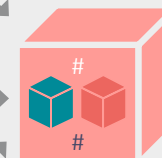b. Each block contains three things:

1. The hash of the previous block

2. The data/transactions

3. The hash of the data

c. These are validated and added together and become the new block.
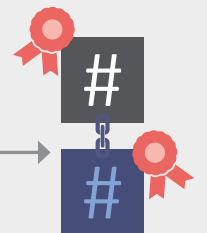
d. The new block is then subject to hashing.

e. And the new hash of the block is used in the next new block.

f. In that way all the blocks are connected together.

SARAH BUYS A PINK BOX FROM BOB.

DAVE BUYS A TEAL BOX FROM SIMON.

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## Why is the blockchain said to be trusted and resilient?

Part of the way that blockchain creates trust comes from the fact that the records are tamper-resistant. This tamper-resistance comes from the process of hashing (fingerprinting), supported by the distributed nature of the blockchain. Any change to hashed data changes the hash and, because each block contains the hash of the previous block, and the records are distributed, any adjustment changes the whole chain and thus flags that a change has been made.

The distributed nature of the blockchain is helpful; the blockchain relies on a process often called consensus. When a block is validated and added to the chain it communicates the changes to other participants it knows within the chain, who compare it to their records. If it looks like a valid block, it will be added and passed to other blocks it knows, and in this way the whole chain will eventually be updated. If the block conflicts with another on the chain, the block which has been validated by the majority of participants will be retained. This consensus mechanism therefore makes it very difficult to 'game' the blockchain. The immutability of records makes the blockchain especially useful for applications such as notarisation.

## How do you know the blockchain hasn't changed?

The immutability of the blockchain stems from two things, the fact it is distributed and because it is hashed.

For example, even a very small change would change the block:



The series of data/transaction    The hash of the data    The new block

The series of data/transaction    The hash of the data    The new block

Because it is hashed, any tampering of the transactions/data would change the hash, which would change the block.
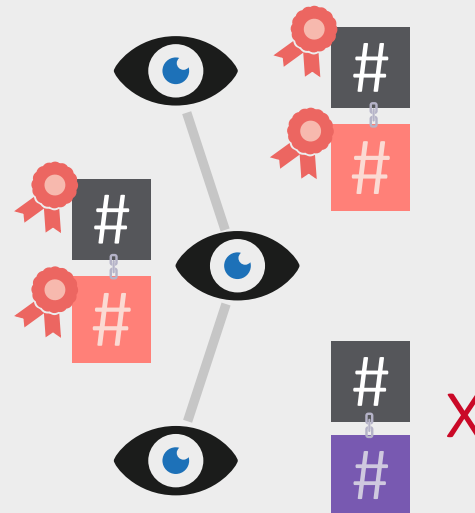
Because every participant holds a copy of the blockchain any differences can be identified. Where differences exist the majority verdict is the winner.

## How are blocks ordered

Because the blockchain is a network, there may be multiple transactions all happening at once; this creates an issue around the order in which transactions are added to the chain. There are different ways of handling this issue. Many private blockchains will have their own unique system, but many public blockchains have added a process called validation to manage this. Often this process needs some of the participants in the network (nodes) to act as block aggregators. Aggregators will operate a system of priority for aggregating blocks. In some public blockchain networks, the priority is determined by a competitive process revolving around a race to complete a specific task. The reward for completing the task is the ability to add a block of (valid) transactions to the blockchain for which there might (or might not) be a payment (in the Bitcoin blockchain this is known as mining).

Private blockchains may have different processes to decide the priority of block aggregators (or even just a single aggregator or committer). Fundamentally, the only certainty is that someone must aggregate transactions into blocks.

### Different flavour blockchains

Much of the press about blockchain relates to the cryptocurrency networks like Bitcoin. These are a very specific flavour of public blockchain, whereby anyone may have a copy of the chain and write new transactions to it. However, whilst a public chain has some benefit for those seeking to limit any form of control, public chains are not the most likely use for business-focused blockchains.

Business applications are instead looking at either permissioned or private chains. In permissioned chains, the overall chain is often viewable to anyone, but those who can write transactions are limited, in private chains both viewing and writing are likely to be subject to restriction.

# Glossary

**DLT**

Distributed Ledger Technology = DLT is another name for the technology of the blockchain. Blockchain is a shared ledger, distributed across a number of participants that records transactions immutably in a way that chronologically connects all the transactions and therefore guards against tampering.

**Block**

A block is a package of transactions/entries that are ready to be appended to the blockchain. The transactions/entries can represent locations, accounting entries, cryptocurrency transactions or anything that can be referenced electronically.

**Hash**

Hash or Hashing is a way to mathematically transform some data into a string of letters and numbers that uniquely represent that data. Hashing forms a key element in blockchain. A hash, like a fingerprint, is unique and is dependent upon the characteristics of the underlying data. Any changes to the underlying data would have resulted in a different hash, therefore any alteration is easy to identify.

**Proof-of-Work**

Proof-of-Work is a process used in some blockchains to decide prioritisation of who will write to the block. The concept often revolves around some form of puzzle or other small task which must be accomplished before one can undertake the next part of the process. In some blockchains this operates as a form of competition with a reward (sometimes called mining).

**Cryptocurrency**

Crypto / Digital currencies are electronic tokens that represent and transfer some form of value. The most popular such currencies are Bitcoin, Ether and litecoin (although there are many thousands). Unlike traditional currency, they are generally not backed by assets or guaranteed by a country. The valuation of the currency is therefore a simple function of the market.

**Token**

Tokens or Tokenisation of assets is the process whereby an asset, whether a coin, a physical asset such as gold, a share of a company or even a promise of future service, is represented by a digital token. Once a token has been created it can be subject to recording and transacting on a blockchain.

**Participant / Node**

Participants or nodes are names often ascribed to individuals who are participating in the blockchain network. Often nodes will need to have a copy of the blockchain on their system, and they may also be those who process and write blocks.

**Smart contracts**

Smart contracts can be described as an execution layer that sit on top of the blockchain data. They have a number of uses that can be used to execute a business process (such as a paying a dividend) based on a trigger event that will be recorded on the blockchain (such as a vote to pay dividends). They can also be used to operate specific operations of the blockchain, such as allowing access, notification of transactions and permissions.

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# Links

## More on blockchain basics:

A more technical glossary of block-related terms can be found on the blockgeeks website. **https://blockgeeks.com/guides/blockchain-glossary-from-a-z/**

A decision tree for when to use a blockchain from the World Economic Forum **http://www3.weforum.org/docs/48423_Whether_Blockchain_WP.pdf**

A detailed report on Smart contracts and their potential by the Open Data Institute **https://docs.google.com/document/d/17pL6gKxqeUWX5Vf0Ww5-2O9RIFPqljFuh_bLm2XXMOA/edit#heading=h.k37plgy7sg7u**

## Government and blockchain

Like the rest of the world, blockchain is very much in the experimentation phase in the UK. However, it has been widely identified as a key technology for the future.

The UK Government's Chief Scientific Officer published a detailed overview of the potential for **Blockchain in 2016** and recommended experimentation by the government.

There has continued to be interest from government and parliament. A House of Lords report released in 2017 **"Distributed Ledger Technology for the Public Good: leadership, collaboration and innovation"** concluded that DLT can play a valuable part in enhancing the delivery of government services to the citizens of the UK and in securing the UK's competitive position as a global leader in technology based innovation.

## Blockchain, Accounting and Audit

A paper considering the impact of blockchain on the accounting profession **https://www.icaew.com/-/media/corporate/files/technical/information-technology/technology/blockchain-and-the-future-of-accountancy.ashx**

An accountants' guide to the blockchain **http://www.accaglobal.com/content/dam/ACCA_Global/Technical/Future/Divided%20we%20fall%2c%20distributed%20we%20stand%20-%20The%20professional%20accountant%E2%80%99s%20guide%20to%20distributed%20ledgers%20and%20blockchain.pdf**

Auditing and mutual distributed ledger **http://www.zyen.com/privacy-policy/65-publications/1749-auditing-mutual-distributed-ledgers-aka-blockchains-a-foray-into-distributed-governance-forensics.html**

## Blockchain live

Watch bitcoin transactions live **https://bitbonkers.com/**

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