LEADING EDGE FORUM

Position Paper

If Blockchain is the Answer, what is the Question?

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At the time of writing, blockchain is probably at peak hype. Blockchain-based currencies, startup projects and more recently Initial Coin Offerings (ICOs – cryptocurrency fundraisings) are attracting billions of dollars. In November 2016, the World Economic Forum met to discuss blockchain governance models. Many public- and private-sector organizations are experimenting with using blockchain, including the Swedish Land Registry, Visa and Nasdaq; and of course many technology and advisory companies (including IBM and Samsung) are providing products and services to help them. The country of Estonia, in particular, has been very bullish in exploring a wide variety of blockchain-centric approaches to government services.

Meanwhile the marketplace in general seems to be at peak confusion, asking: *What exactly is blockchain? Is it the same as bitcoin? What is Ethereum?* and so on. And the 'blockchain explaining' sub-industry is also maxing out at the moment, with hundreds of primers, perspectives, courses and books available.

Despite the hype, the opportunity is genuinely very exciting. The challenge is that blockchain is both rather complex to understand from a technical point of view, and rather abstract from a business point of view – it could be used for a wide variety of things.

In this short Position Paper, we set out LEF's current perspective on the blockchain universe. Influenced by Clayton Christensen's recent work on 'jobs to be done', we aim to answer the question: *What jobs can blockchain do for you?*

The majority of this short note discusses the questions blockchain can answer for a 'normal' company or government agency. By 'normal' we mean an organization that is not in the blockchain or a related industry, but makes shoes, builds cars, administers pensions, provides haircuts, etc., and is considering whether/how it can use blockchain as a way of making its business more successful.

We have strongly resisted the desire to be yet another organization trying to explain the mechanics of blockchain, or document the history of it. However, here we provide a 'minimum viable explanation' of what a business leader needs to understand about blockchain in order to consider what jobs it can/should/will do for you.

Minimum viable explanation of blockchain for a business leader

- From a conceptual perspective, blockchain adds a missing layer of trust to the internet, so important stuff can happen with systemic assurance built in. LEF sees blockchain as an important addition to *the Matrix* of outside-in capabilities that a firm can leverage.
- Practically, blockchain-based approaches let you make transactions (such as payments) securely without relying on any middleman (like a bank).
- The transactions are recorded in a way that is very hard to falsify or destroy for two reasons: first, because they are encrypted; and second, because they are stored across many servers, requiring consensus across those servers to make a change – there is no one centre to attack.
- As well as recording transactions, blockchain-based architectures can include smart contracts, which allow a transaction to kick off some actions (for example, sending a warning if a transaction size is unusually high, or triggering a settlement process when a trade is executed).
- Blockchain-based approaches can be used for many things, not just currencies and payments.
- There isn't one blockchain. Blockchain is an approach of which there are many instances and approaches. Bitcoin is one implementation of blockchain, most commonly a currency and payment mechanism. Ethereum is a blockchain-based applications ecosystem that includes a currency (Ether). Hyperledger is an open source consortium for blockchain business applications. The list of blockchains and blockchain-related initiatives is growing fast.
- A bit like cloud computing, some blockchain architectures are more public (called *permissionless*) and others are more private/closed (*permissioned*). Some feel that permissioned blockchain approaches often severely limit the benefits of the distributed nature of blockchain.

- Just like any other physical or electronic approach, blockchain-based approaches can never be 100 percent secure, and attackers and tools get smarter all the time. Each blockchain-based approach has its own specific security context. The emergence of quantum computing is a concern for all electronic security.

Six sources of value from blockchain

Before listing the jobs that blockchain can do, let's itemize the sources of value that a blockchain-based approach brings:

1. **Trustworthiness** of data/transactions, including proof of ownership, secure transactions and reliable audit trails, without a central authority or middleman.
2. Potential for **reduced/zero transaction costs** because there is no central authority or middleman.
3. Potential for **reduced corruption and fraud**. The International Monetary Fund (IMF) has stated that blockchain could be a significant step in reducing 'moral hazard'[1]. As an illustration, there is a possibly apocryphal story that when soldiers in one war-torn country started getting paid in an electronic currency a few years ago, they all thought they'd had a pay rise, because nobody was able to skim money off the top.
4. **Large-scale coordination** and **resilience** provided by a highly distributed network with no central point of failure.
5. The ability to suppor**t persistent digital identities** and **personas**.
6. The ability to **overcome the problem that digital assets are fundamentally infinitely replicable** for almost no marginal cost.

Seven jobs that blockchain can do for you

So, if a meal's main jobs are to entertain your tastebuds and give you nutrition, and a library's to help you find and consume information, what are the jobs that blockchain can do for your organization? There is no definitive list – new uses may, and probably will, be thought of in future. But here are some key examples:

- **Provide currencies and payment mechanisms.** There are many cryptocurrencies, often based on blockchain architectures. At the time of writing (14 July 2017), coinmarketcap.com lists 973 cryptocurrencies, with a total market capitalization of $83 billion. Bitcoin and Ethereum's currencies make up 70 percent of that, at $39 billion and $19 billion respectively. (All these figures are extremely volatile.) More and more companies and organizations are accepting and using bitcoin as a currency and payment channel. In Kenya, one in three people own a bitcoin wallet, but cannot all easily acquire credit cards. At the time of writing, Lewis Richards, LEF's most 21st Century Human, is experimenting to discover what he can do with bitcoin.
- **Automate transactions.** There is the potential to generate significant efficiencies by using blockchain to make all manner of transactions happen reliably and automatically. Examples include invoices being paid automatically when goods arrive, and share certificates automatically sending dividends to shareholders based on profit levels.
- **Provide an asset/rights register.** There is potential for transactions to be faster and more reliable if a blockchain-based asset register is used. The countries of Georgia, Sweden and Ukraine are all looking at blockchain-based land asset registries.
- **Provide identity management.** The ability to hold immutable personal records with guaranteed provenance is extremely powerful in many public- and private-sector contexts.
- **Power the sharing economy.** Because there is no need for a central authority, blockchain lends itself well to sharing economy initiatives, such as sharing power generated by rooftop solar panels without utility company involvement.
- **Underpin platform businesses.** Platform businesses, which bring multiple groups together, are an increasingly exciting class of business models. (iTunes is an iconic example.) Blockchain is a great candidate for providing the trust to underpin platform ecosystems.

1. *IMF Discussion Note*, ISBN 9781513552972, International Monetary Fund, 2016 (p23)

- **Automate the internet of things (IoT)** and so create a smarter world. One of the less obvious, but most exciting, potential uses of blockchain is to support the internet of things. The combination of trusted transactions and smart contracts means that IoT + blockchain could be the formula for an automatically self-optimizing world. A simple example is the shift from time-based maintenance to condition-based maintenance: instead of checking every set of railway points every month, the railway points request maintenance when they need it. This has been achieved without blockchain already in some cases, but blockchain can make it industrial-strength, reliable, auditable and scalable without bottlenecks. (Note that this approach is not trivial, and requires a significant amount of thought and care if pursued.)

Risks related to blockchain

Like all new things (and in fact all things in general), blockchain-related initiatives have inherent risks. The types and levels of risk are specific to the implementation: what you are using it for, what blockchain/approach you are using, the value at risk, and so on. But it is worth noting a few general blockchain-related risks:

- Tax and regulatory risks. Right now, much of the blockchain world is a little like the Wild West, and hard to police. To some extent, that is built in to the blockchain approach. But national tax bodies and regulatory authorities are likely to start imposing rules, some of which might impact whether or not a blockchain initiative can succeed, and which approach you will take. Cynics amongst us will frame this as government and banking incumbents wanting their piece of the pie; others will see it as ensuring safety and fairness in the blockchain economy.
- Betting too much on the wrong horse. New blockchains and blockchain-based approaches are appearing all the time. Bitcoin and other blockchain-based ecosystems are becoming victims of their own success, with adaptation needed as their use scales up. Those who bet too heavily on one approach now may experience 'buyer's remorse' later. On the other hand, if there is a clear 'job to be done' and a known blockchain approach will do that job, it may be better to move fast.
- Cyber attack. Despite the inherent security of blockchain-based approaches described earlier, any particular implementation may be vulnerable to attack. There have been a number of high-profile, successful, well-documented hacks[2]. Blockchain is another 'attack surface' that new and unexpected attack vectors could exploit.
- Skills. The skills needed to build, maintain and improve blockchain-based solutions may be thin on the ground and hard to attract in the next few years. Some of that may be mitigated by using partners and platforms. It is important to consider this as part of your blockchain strategy.

What should you do now as CIO?

Hype notwithstanding, blockchain and blockchain-like architectures will be important in the world, in lots of different ways. That doesn't mean everyone must bet the farm on it now, and certainly not bet the farm on any one implementation of it. But there are four 'no-regrets' moves to be taken by every organization, which the CIO can help with:

1. **Educate** yourself and your team about blockchain and related areas. Ironically, in terms of blockchain education, our situation could be described as "Water, water, everywhere, nor any drop to drink". There is a veritable tsunami of blockchain-related content coming at us (extra-ironically, including this paper), but much of it is about the geeky innards of blockchain; lots of it is rooted in the now rather than what blockchain architectures could evolve to in the future; some of it is biased towards a particular vendor's view; none of it is contextualized to your organization; and some of it is just plain wrong. As with all gold rushes, the blockchain one is attracting plenty of snake-oil salespeople. The only solution is to build and diffuse an ever-deepening understanding of the blockchain world and its relevance to your organization by drawing on multiple sources, and experimenting.

2. See, for example, the list of some well-known cryptohacks here: https://www.deepdotweb.com/2016/10/06/cryptocurrency-hacks-biggest-heists-blockchain-history/

2. **Work to build board/ExCo clarity around blockchain.** As much as possible, educate your senior leaders, and elevate the level of conversation about what might be possible, and what the opportunities, challenges and risks really are.
3. **Identify and prioritize use cases for your organization.** Consider the list above of 'jobs that blockchain can do for you', consider others that you can imagine in your context, and prioritize which ones (if any) might be worth experimenting with right now. Then commission those experiments.
4. **Engage your ecosystem.** Look at what your customers, partners, competitors and other stakeholders are doing with blockchain. Consider whether to create, lead, participate in, compete with or stay away from blockchain initiatives in your ecosystem.

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