

Blockchain – hype or gamechanger

How suitable is blockchain technology in STM publishing

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If anyone would ask me: is blockchain a hype or a gamechanger, my answer is: it is a technology. If combined with a strong business case plus a community eager to adopt it for something completely new, it turns into a game changer. Or if it draws the attention of gold diggers in the form of hungry investors smelling big money it can become a hype -- similar to the rise of Bitcoin but now perhaps for the use of a blockchain in any new realm. More likely, I could see current players adopting blockchain technology for their own system improvements, especially in the world of STM.

Believers in blockchain are convinced that it presents the next step comparable to the way worldwide web changed the use of internet twenty years ago, how mobile apps made the web ubiquitous ten years ago and to the way social media currently change our social behaviour. The rise of Bitcoin draws sufficient attraction to pioneers eager to find out what other business environments lend themselves for blockchain applications. Gartner describes a “slope of enlightenment” phase in their hype life-cycle, and we just may be on the cusp of that phase.

Recognizing the potential of Blockchain, [IEEE Spectrum Online](#) recently published a far-reaching overview of Blockchain, noting “Almost as soon as Bitcoin debuted, people began imagining what other kinds of applications you could run on a blockchain if you generalized the technology.”

In that context it is very timely and apt to wonder and imagine what blockchain may mean in scholarly communication and in STM publishing. The most intriguing facet of blockchain is its characteristic of a decentralized, encrypted peer-to-peer network of trust. For a better understanding of this, I recommend to read the book by William Mougayar, *The Blockchain Business*, 2016, Wiley. If you don't have time to read the book, try this ultra-short summary of it:

Basically a blockchain is a permanent and persistent ledger of encrypted records or ‘blocks’ of information and data. In that way it can establish authenticity, provenance, identity, transactions, ownership, credentials, in short: set in stone the state-of-things, with a time-stamp, in an unmanipulated, unalterable way. Without the interference of a clearing house, a supervisory authority or a governing party.

Wow. Pretty geeky also.

Those familiar with the STM world will immediately recognise key-elements of blockchain that play a crucial role in scholarly communication, as well as in science and research: timestamping ownership (for example of scientific claims), storing records and data in a peer-to-peer network (providing evidence and research data, facilitating reproducibility), authenticating identities, assertions, notarizing proof (certification and quality control), archiving information in an unalterable way with full provenance metadata (for future reference and citation).

It is almost identical to the 4 core functions of the scientific journal as it constituted itself over more than three centuries (M Mabe and M Ware, 2015 STM Industry report):

- Registration: third-party establishment by date-stamping of the author's precedence and ownership of an idea;
- Dissemination: communicating the findings to its intended audience usually via the

- brand identity of the journal;
- Certification: ensuring quality control through peer review and rewarding authors;
- Archival record: preserving a fixed version of the paper for future reference and citation.

So, what can blockchain technology help do better in the STM world; where could it change the game of the current eco-system. Is there a new opportunity to grasp or a pressing problem to solve with it?

Network of Trust

Let's first look into the aspect of blockchain as a network of trust. It goes without saying that the STM publishing world is suffering its own set of trust issues at present. Data manipulation, lack of reproducibility, publication bias, false claims, article retractions, the list can be even longer. STM publishers are investigating in what way trust can be embedded better in the centuries' old traditions of scholarly publishing, from more reliable and transparent peer review, to better checks of author identities, credentials and profiles, alongside automated checks for plagiarism and data manipulation.

Can blockchains do this better than the technologies and practices that make up the current scholarly publication system ? Even with its imperfections, the current system of academic publishing is strong and offers an efficient infrastructure that serves 10 to 20 million researchers and scientists worldwide on an almost daily basis; a huge community who conform themselves to its deeply embedded terms of engagement and codes of conduct, of academic individuals who join the worldwide system of mutual peer review, of duly referencing previous work, for communication, acknowledgment, rewards and recognition.

So what value would a blockchain add in a demonstrably better way than the current eco-system of journals, editors, publishers, libraries, digital platforms and digital archivists to justify the switching costs of moving over its current assets to a new system ? It poses the question: What does a new system really constitute – can it tempt a critical mass of players involved to jump ship and also: how can we know we can trust it? How strong is the claim of blockchain to offer a peer-to-peer network of trust?

In the context of trust, the central issue is probably whether blockchains can restore trust where it got lost or where we might be losing it. If the general public loses its trust in central authorities, traditional business and governing organisations, perhaps even in publishers and published information, can it replace its trust in an anonymous, decentralised system that claims to handle matters in a secure and encrypted way ? I am not sure, why would I be convinced. Why would we trust an anonymous network better than people and organisations, including publishers.

If I seek trust, I think of accountability and I want to be able to see someone in the eye; literally or figuratively. Who gets blamed in a blockchain world if things still go wrong? Does the network correct itself ? Who is behind the network, who is behind the machine? Even if the network runs in an autonomous way, who is behind its start, who pushes the button to get it going? I could imagine that non-geeks (like me) would want a bit more explanation on these elements before embracing blockchain technology.

In addition to this general technology caution, combined with a certain trepidation for the limitless power of autonomous networks, I have never been a true believer in drastic overhauls of current systems, certainly not if they run generally well despite their own imperfections here and there. I am simply not a revolutionist. Besides, the experts who know the insides-out of blockchain technology,

point at a long list of still unsolved technical issues in blockchain technology that might impede widespread adoption in the very short term, ranging from the required volume in computer power to the capacity restrictions of the transactions metadata.

Adopting blockchain

Nevertheless and in the conviction that technical hurdles can always be solved, I can imagine that current players start adopting blockchain technology to make certain parts of the current system run better and more secure. So perhaps not yet creating a Shangri-la of decentralised environments for research information, data, software, available to all, without a central power and possibly leading to disintermediation of libraries, publishers, journals, editors and so forth.

Rather, I could see current players adopting and creating bits of blockchain infrastructure where they can really make a difference – probably internal blockchains first, private and permissioned, mostly embracing new opportunities for hitherto unknown capabilities. Or supplied by new start-ups who are clever in fixing something by using blockchains. And if it all runs well, these initiatives might scale, they may go public to invite more parties in and standards will evolve and be set.

Some possibilities for the STM world spring to mind.

Let's look at peer-to-peer rewards, perhaps even literally in the STM context: it would be interesting if a blockchain could be set up for a virtual currency that rewards referees for their peer reviewing which coins could then be used for –just as an example—publishing services like paying APC's or even personal subscriptions and document downloads. Simple enough, one would say. If enough players jump aboard, it could even become a recognized currency across publishers, libraries, social networks.

Similarly, citations could be expressed in points or coins of cryptocurrencies, same for support ('likes') for research proposals – enough points or coins could create research funding. Next to these virtual currencies that blockchains can support, the idea of smart contracts established in blockchains is also attractive. If enough positive reviews are added to a manuscript, it gets automatically published. If enough business support exists for a research proposal, it gets funded.

Other examples are mentioned in a recent report by Joris van Rossum, published for [Digital Science](#). In his report several areas are elaborated: blockchains could serve as the better tools for rights management, micro-payments to authors as rightsholders, identity management, subscription entitlements, patent registries, assertions of scientific breakthroughs, endorsement management, and much more. On [The Scholarly Kitchen](#), Phill Davis suggests blockchain applications for access entitlements and usage accounting.

To a large extent, blockchain looks to me like an infrastructure technology. That means that most of us may not even notice if and how fast it gets implemented in the near future. We know about Bitcoin, but how many know or truly understand how blockchains underpin that. Applications of blockchain in the STM world may follow a similar path. Digital archives might well run much better and offer more secure preservation using a blockchain. Preprint servers and collaboration networks may empower themselves with blockchains. Peer review may become easier if author identities and credentials can be checked in a blockchain, altmetrics may work better if secured by blockchains, but we may not even realise.

It may prove to be a gamechanger as much as a hype, but much of it may go unnoticed to us non-geeks. Because basically it is just an enabling technology, a powerful technology that could very well

give fuel to potentially disruptive start-ups, or become the new enabler of the traditional pillars of scholarly publishing. Full of promises.

Eefke Smit, October 2017

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