INDEPENDENT THOUGHT

Blockchain in the Healthcare & Life sciences sector

Confluences, influencers, convenors, and consortia

In this paper we examine some of the big shifts happening across all industries in the current COVID climate, how these relate to organisational and user needs in Healthcare & Life sciences specifically, and how different players are adapting to these changes. We look at how blockchain can be a positive force for responding to the industry's problems and opportunities; and in particular, what you can do next in *your* organisation in order to take advantage of this emergent technology.

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Top takeaways

1

Blockchain has a strong affinity with numerous specific use cases across the Healthcare & Life sciences sector

The technology enables company workflows to transcend corporate boundaries and execute autonomously via smart contracts. It provides a trusted, sharable, single source of truth upon which myriad distributed applications can be built that provide services in a decentralised manner. *Specifically*, there's strong affinity between blockchain and sector-wide problems around traceability and security of pharma supply chains, trusted proof of health status (e.g. vaccine passports), and facilitating the selective sharing of wider medical data to aid clinical research and multi-institution treatments.

2

Industry inertia is being exerted by influential players who see widespread transformation as a threat to their incumbent position – and who are still able to hold sway in key areas of the market

In many Healthcare & Life sciences scenarios, key stakeholders may well *say* that they can see blockchain's potential for business benefits; and indeed there are well-argued cases in specific areas. However, a general inertia is holding things back; as are specific concerns on the part of some stakeholders that blockchain-inspired change may not necessarily distribute sufficient benefits in *their* favour – even if the overall end-to-end service is improved. If a consortium is unable to coalesce naturally through collaborative overtures, then a "convenor" is needed; one with sufficient clout to call the market to order over a specific need to act collectively, and in a timely manner.

3

Healthcare & Life sciences blockchain consortia – embryonic, but evolving

The market conditions for blockchain consortia today in the Healthcare & Life science sector are much akin to the founder-led trailblazing examples across earlier-adopting industries a few years ago. We've seen there an evolution towards more equitable consortia configurations that embrace players from across a wider ecosystem – even in regulated industries. The same could follow here, if effectively coaxed and coached by influential third-party "convenors" and experienced trusted technology partners.

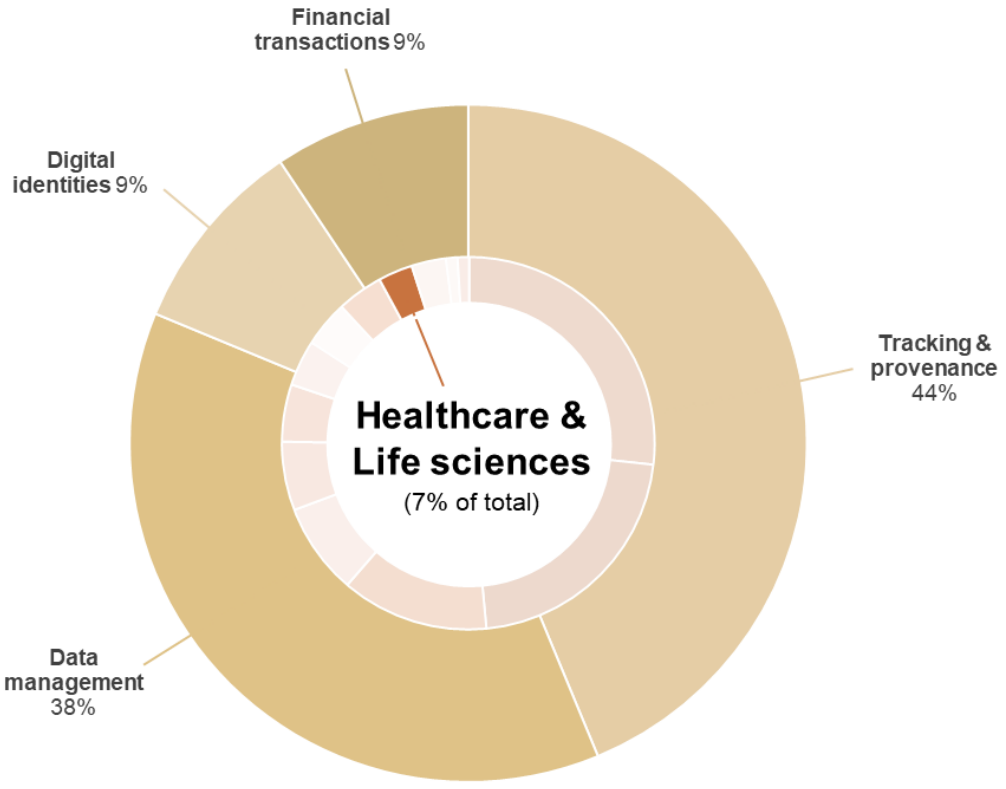
Setting the stage

There are a number of uses cases across the Healthcare and Life Sciences industries that show affinity for blockchain-enhancement. Many of these represent 'variants' of problems and opportunities found in other sectors, albeit replete with all the attendant regulation overheads you'd expect from healthcare and pharma contexts.

There's a strong interest in the application of blockchain to aid the tracking and tracing of both physical and digital (data) assets. For example, its use across the supply chains for drugs and tissue; and also in helping the management and provenance assurance of data in clinical trials (and wider medical research).

Independent Thought's *Blockchain Index* research, which looks at the spread of blockchain use cases across industries over time, logged that 44% of Healthcare & Life sciences projects that had "changed state" across the first nine months of 2021 deployed blockchain in that way – see *Figure 1*, below.

Figure 1: Blockchain project activity in Healthcare & Life sciences, Q1-Q3 / 2021



Source: Independent Thought (Blockchain index)

Healthcare & Life science's showing in the *Blockchain Index* was actually relatively high (amongst other industries) around the start of the year. It was a period which saw the launch of various new COVID test result and vaccine passport services, plus heightened concern about guaranteeing the authenticity of vaccine delivery amidst the threat of compromised supply chains.

However this level of interest hasn't been sustained relative to growth in other industries as the year's worn on. Looking at 2021 to-date, Healthcare & Life sciences use cases represent 7% of total blockchain project activity in the *Index*. This *is* quite far behind more (consistently) blockchain-friendly industries like Finance and insurance, Manufacturing & construction, and even Arts, entertainment & leisure – the last of these currently surfing something of a 'metaverse boom' in NFT interest. Nevertheless there *are* still strong reasons to look to the sector as a potential growth area for blockchain adoption because of the technology's particular enabling characteristics, and their affinity for addressing thorny healthcare / pharma problems. And to that end we see peer-community consortia and top-down conveners continue to provide the impetus and encouragement for change.

COVID as a catalyst; blockchain as an enabler

Across many industries the COVID-19 pandemic has become a catalyst for change. It's accelerated the roll-out of digital transformation programmes as organisations the world over race to modernise their operations in an effort to survive and thrive in an age of new normals. We're seeing this particularly as companies seek to increase the reach and sophistication of automation initiatives, driving wholesale change in business operations.

They're turning to blockchain-related technologies that enable autonomous cross-boundary workflows, enhance trust around multi-party transactions, and provide irrefutable proofs of provenance. They're also leveraging its inherent characteristics around immutable shared sources of truth, consensus mechanisms, and so on.

So if blockchain is delivering provable business value *elsewhere*… why the relative sluggishness to embrace wider shifts in business models across health and pharma? It's surely not *solely* the burden of regulation *per se*? After all, regulated manufacturing sectors are more blockchain-curious. And there are veritable waves of innovation in the banking and insurance sectors, driven by crypto and Decentralised Finance (DeFi), which are continuing to push until regulators say "no". So what's different about the story *here*?

Challenging reality

Healthcare & life Sciences are traditionally slow-moving industries when it comes to (technology-inspired) changes to long-established ways of working. Companies *are* still looking for differentiation, but it can be a challenging "sell" to persuade people to donate on behalf of a greater benefit to an overall ecosystem when the corresponding benefits to the *individual* organisation aren't yet clearly articulated. Or if they appear to be too long in coming.

Change at that level might well produce a return, but somebody (or bodies) need to invest up-front in order to get there. And whilst many of the interested parties may well agree that it's a good idea in principle, concerns that blockchain-inspired change may not necessarily distribute sufficient benefits in *their* favour can hold things back. Even if it's well-enough understood that the end-to-end service would be improved overall.

However, we *are* now starting to see a gradual return of the sorts of blockchain-related endeavours that had risked becoming consigned to realms of the esoteric fringe (certainly in other industries). They're now buoyed-up by consistent interest in mainstream use cases (finance, supply chain, etc.), and often piggy-backing on pockets of successful blockchain implementation elsewhere in an organisation.

So, as we wait for post-COVID new normality to settle across more naturally conservative industries (like Healthcare and Life sciences), there's an expectation that they too will find themselves looking to re-start those similarly transformative initiatives currently in abeyance. And do so at ecosystem scale, albeit at a slower pace.

The turning point

Independent Thought's *Blockchain Index* data suggests that current blockchain activity in Healthcare & Life sciences is chiefly spread across a number of use case themes. And these are also prevalent also in other industry verticals; *viz*:

- **Tracking & provenance** – both of goods and data; including asset tracking, supply chain and logistics monitoring, proof of origin, integrity verification / counterfeit detection; and data provenance for AI models / use of personal data, etc.; and
- **Data management** – covering applications that control or audit the distribution of data and access to it; digital credentials; rights management governing the ownership of physical and digital assets;

with smaller showings for projects involved in:

- **Digital identities** – of both people and devices, including personal identity, anonymity, and personalisation; distributed device management for IoT; and
- **Financial transactions** – including cross-border payments and settlements; digital currencies, asset tokenisation and exchange; fractional ownership and micro-payments; payment tracking; in-ecosystem currencies; and DeFi marketplaces.

This tends to break down into projects that seek to protect the pharma supply chain; underpin digital passports that provide proof of COVID vaccination or negative test results; and support the selective data sharing needed to modernise clinical trials at the research stage, and facilitate seamless multi-institutional treatment at the care-giving stage.

Plus we're also seeing some more specific examples around genomic data research, drug treatment counter-indication management, IVF service delivery, and reconciliation of payments which could – in many cases – be thought of as closely related to some of the more general instances above.

IBM's own research, born of its extensive experience in enterprise blockchain engagements, concurs. The company cites three main areas where interest is keenest across the Healthcare & Life sciences sector. And these map onto many of those use cases highlighted in the *Index*, namely:

- **Chain of custody** – designed to reduce the risks of trading. Examples range from individually smaller entities bonding together in response to a large ecosystem threat or predatory disruptor; to the provision of a transparent and frictionless supply chain platform upon which to industrialise and scale the delivery of a service ecosystem (such as the cell and gene therapies supported by IBM Personalised Medicine Platform). These map on to the *Index's* Tracking & provenance and Data management use case taxonomies;
- **Chain of identity** – verifiably proving the authentication of digital credentials. For example, vaccine and test status proof for travel passports and in support of workplace vaccine mandates; test, track, and trace services designed to curb infections as population movement and mixing returns (variously provided by IBM

Digital Health Pass, and IBM Workplace Credentials, for example). These map to Data management and Digital identities;

- **Consent management** in the sharing of *health data* – with patients giving consent for their medical records to be shared across clinical trials; for example, to improve understanding of contra-indications. These map to Data management and Digital identities. And of *financial transactions* – to automate payment processes across care delivery and insurance stakeholders, etc. These map to Data management and Financial transactions.

The cases for these transformational initiatives can often be made both for individual participants (often the sticking point), as well as stacking up at the ecosystem level. However, that's still not always *enough* to trigger a green light from all the key players.

Enter the "irresistible influencer"

In an industry with a high degree of natural inertia to technology-inspired change, what's often needed is an irresistible outside force to jolt would-be participants into action and carry them along the journey. When COVID pressures on their own haven't been enough to trigger spontaneous industry transformation, a third party "convener" has often been able to punch through with a mandate for change… or a "strong encouragement" to do so.

During the pandemic we've seen governments of all ideologies increasingly prepared to take on this role. See, for example, the progress made through public-private partnership to accelerate the development and widespread delivery of COVID vaccines, tests, and treatments under the US Government's Operation Warp Speed programme.

A successful blockchain-supported innovation is most likely to get off the ground when a key actor (or actors) actively want to solve a problem or create a new opportunity – one that remained intractable or economically unviable before the advent of blockchain technology. And so, beyond the scenarios of government interventions in response to large-scale health emergencies, it's in the formation of consortia with common industry purpose where blockchain traction tends to run deep.

The evolving nature of consortia

In Healthcare & Life sciences circles though, the nature of the market is such that consortia are rarely the wide-ranging, industry-spanning *co-opetitive* bodies that have begun to coalesce around the most collaborative partners in mobility, energy, finance, etc. Rather, the trend is (thus far) for single-company focused, founder-led entities operating in their own ecosystem. These tend to be designed to solve problems on a smaller scale, for specific competitive advantage… there's little impetus for multi-corporation, industry-wide applications.

But while these might lack the scale and ambition to effect an industry transformation, they certainly benefit from the agility, strength of purpose, and speed of delivery that comes from having a much more bounded scope and smaller network size. They also tend to enjoy a unifying sense of direction, courtesy of the founder's North Star business metrics.

In this way, the Healthcare & Life science industries today are (from a blockchain perspective) much like those earlier-adopting sectors a few years ago. And, with the right demonstrations of success, they should edge along the continuum in much the same way – at least at the rate we've seen in other regulated industries, if not in more fluid markets.

Elsewhere we're already seeing that blockchain consortia have evolved from the early proliferation of founder-led, essentially *founders-first*, examples. There, the economic incentives in the short term clearly favoured those partners who first "put their skin in the game" early on, and who stumped up the resources for initial development and trials in order to more quickly offset their set-up costs.

Blockchain adopters in more mature industry settings, though, understand that longer-term success comes from sustainable scaling. And that requires sharing vision and value, along with risk. New members won't join a blockchain network consortium if they don't feel they'd get enough out of the venture themselves.

Also, organisations join for different reasons, with the intention of playing different roles depending on their aptitude for blockchain innovation and their overall business goals. Some will be more pre-disposed to building a blockchain network from scratch. Some will join with the commitment to become a driving force in its expansion. For others, it suits their needs better to join existing, much more well-established blockchain networks on a needs basis. This group tend to act as more of a "consumer" of blockchain-based services – perhaps from multiple blockchain networks – rather showing particular commitment to any one example.

Customer examples

There *are* numerous examples of breakout blockchain innovation in Healthcare & Life sciences. Many of these you wouldn't necessarily know were powered by blockchain technology at all unless you dug a little deeper to find out. Which is entirely how applications *should* appear to their end users. To them blockchain is "just another tool in the box".

New York's *Excelsior Pass* – digital credentialing in the COVID age

New York State's *Excelsior Pass*, for example, is a free, voluntary platform that provides secure, digital proof of COVID-19 vaccination or negative PCR / antigen (lateral flow) test result. Some 5 million passes have been issued to date, accessible either through a wallet app for smartphones or via a web portal.

The "convenor" in this case was the state governor's office, which pushed through the project (leveraging IBM's blockchain-based Digital Health Pass product) at speed in order to accelerate the opening-up of workplaces, travel hubs, hospitality and entertainment venues, etc. as measures improved to test for, and protect against, COVID-19.

The principle *Excelsior Pass* applies is blockchain-anchored digital credentialing. It's relevant in many use case scenarios beyond healthcare – anywhere, in fact, where a third party needs to verify the authenticity of an attestation made by an individual; and that individual would rather not share any more data than is strictly necessary in order to supply the proof.

IBM is also building blockchain-based solutions to support workplace vaccination mandates, leveraging the same blockchain principle. These are enabling employers to verify employee-submitted proofs of vaccination or negative test result, score according to organisational policies, and integrate with a variety of HR systems.

Solutions leveraging blockchain in this way are starting to make inroads in other areas, in other industries, such as the issuing of educational or vocational certificates (e.g. diplomas, transcripts, licences to practice, etc.). Here individuals make use of similar wallet apps to prove their level of academic or skills attainment to prospective employers and other institutions. This may be as a "function" of the raw data – for example, "I have been

vaccinated with an approved vaccine within an appropriate timeframe", without sharing precisely when, where, or what the vaccine was. The verifier can check the veracity of the attestation for as long as the issuer's chosen blockchain remains accessible. It's a faster, cheaper, and privacy-safer way for individuals to expose select personal information.

ivfOPEN – a single source of truth for IVF specimens

The ivfOPEN initiative was launched mid-2021, bringing together thought leaders from the IVF community, medical professionals, and technologists with the aim of reducing the misidentification of IVF specimens as the industry grows to meet demand. It's working towards a vision of digitised IVF specimen identity by developing a system that assigns and tracks unique identifiers across specimen lifecycle. And its engineers have turned to IBM's blockchain technology to provide it with a "leg-up", to get off the ground quickly – specifically, learning from solutions which provide unique specimen tagging, tracking, and tracing functionality in other industries (such as food safety).

ivfOPEN's intention is to improve operating efficiency and reduce the potential for errors every step of the way. To that end, it's working with doctors, service providers, device producers, etc. without *competing* with any of them. Rather it's providing a tool that improves and enhances *their* practice – levelling-up the industry for the benefit of the end-user.

As with the credentialing example of *Excelsior Pass* (above), the blockchain principles in play *here* are by no means unique or untested. IBM Food Trust, for instance, has been applying them to improve transparency and traceability the food supply chain since its launch over four years ago. They're just new to the IVF industry.

What's in it for you, and how to get started

Just as is the case in other settings (even in regulated industries), blockchain's characteristic capabilities help company workflows to transcend corporate boundaries and execute autonomously via smart contracts. The technology provides a trusted, sharable, single source of truth upon which myriad distributed applications can be built that provide new and improved services in a decentralised manner.

Specifically, there's strong affinity between blockchain and sector-wide problems around traceability and security of pharma supply chains, trusted proof of health status, and facilitating the selective sharing of wider medical data to aid clinical research and multi-institution treatments (to name but three). And these are all instances of well-established use cases seen elsewhere, in the blockchain activities that are sweeping across other industries.

Use case patterns are therefore your friends. As are trusted technology partners who can leverage the wealth of experience they've gained in deploying blockchain technology in multiple scenarios, across all industry sectors. They'll probably already have a good (enough) template to start with, which you can then tweak and twist to your own particular requirements as you go – sound in the knowledge that you're basing your iterative development on battle-hardened foundations.