Massachusetts Institute of Technology

Blockchain+AI+Human: Whitepaper and Invitation

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CONTEXT

We find ourselves at a unique point in history, a moment in time when new technologies are emerging at an unprecedented pace. Specifically, artificial intelligence, machine learning, robots, and Internet of Things (IoT) are combining to create a new wave of change as they begin to take advantage of cryptocurrencies, ICOs, virtual assets, the blockchain and the tokenization of everything. The result of this collision of technologies and human organizations is hand-wringing about job loss, fear of robot overlords, and worries about Armageddon.

But it is easy to get caught up in the hype of the moment, to get swept up by what the media and technorati are saying about what is happening - who it will impact, what the impact will be and what winners and losers will emerge. While there is certainly potential for tremendous change, both good and bad, 90% of what is being written about blockchain and artificial intelligence today is hype or unrealistic, overinflated postulation. What is really going on?

We have seen these types of massive societal changes before. These "supercycles" have been caused by various technological innovations and resulted in things like the industrial revolution and the Internet era. The last supercycle occurred beginning with the introduction of the Internet, which allowed a new level of global communication. In the early days of the Internet, you only dealt with friends so identity and security were not an issue. As the Internet grew, however you often didn't know who you were dealing with, so people engineered "hacks" such as passwords and firewalls to make it work quickly and pretty reliably.

But now that we are beginning to run our entire society on it, these hacks are insufficient. It has to almost *never* fail and it has to be consensus driven, auditable and transparent. The world has discovered rather painfully that today's business systems are in fact hackable and gameable. Moreover, it is getting worse: the recent attacks tied to election meddling and attempts to disrupt the power grid make it clear that our entire society is vulnerable.

The current tidal wave of new technologies and social disruption are symptoms of a much bigger change: the very Internet itself is being transformed, evolving from a loosely structured communications medium to a trusted execution medium. Blockchain and AI have the potential to finally allow both companies and citizens to safely and securely do business with each other - to let each party know who they are dealing with, confirm the interaction is not fraudulent, the outcomes guaranteed.

With this perspective the emergence of blockchain and AI is not unexpected. , They are a consequence of the limitations of the internet and a logical extension of the technology evolution we have been witnessing for the past 50 years, certainly since the first personal computers were invented and the early days of the ARPANET. The people who built the ARPANET designed it as a way to keep military communication safe in case of a nuclear attack. The system was later extended to keep municipalities and universities connected as well as protect important information. But it failed to provide adequate security and auditability, and so has never developed the trusted systems we need in order to run our society.

Which is where blockchain and AI can help. At a macro level, they can provide a level of transparency, accountability and analytics that never existed before in the digital world. We have the ability to bring a new level of trustworthiness to the global economic system as well as society writ large.   As a consequence, Blockchain and AI are becoming the next supercycle and are the core of a really major societal transformation.

Blockchain, at its most basic, allows humans to reach consensus on a shared digital history without a middleman. AI allows humans to find answers in vast amounts of data more efficiently than ever before.   Together they can provide robust business and government processes that are both trustworthy and transparent, rather than trying to manage a hodgepodge of loosely connected entities and processes that were created through historical accident. The implications for society and business are huge.

Today, we see blockchain and AI poised to provide a solution for a set of very real 21st century challenges: the deluge of Big Data, the growth of the IoT, increasing automation and robotics deployment, use of the cloud, various threats to cybersecurity, mobile computing, and the growth of cryptoassets. We have now arrived at a seminal moment where blockchain and AI are the right tools to help humans address these challenges and in fact, take advantage of this next supercycle by providing both transparency and powerful analytics.

The previous supercycle occurred when the Internet became commercialized and the development of the Web browser allowed instant albeit unmonitored global communication. There have been many smaller cycles - the move to portable computers, development of smartphones and use of mobile technologies, growth of social media. But this evolution from a communication tool to a trusted medium for transactions, data sharing and, analytics is a sea change.

As a consequence, now is the time to focus on blockchain and AI, just like we had to focus on the Internet back when it first appeared. Simply put - blockchain represents a new way to conduct secure transactions and AI provides exponentially more powerful analytic capabilities. The timing is clear. Carpe deum - and we can.

THE BIG QUESTIONS

Given this new technological landscape, what are we really going to do with these innovations? How do we want to live, based on the potential of blockchain and AI to impact and influence global culture and business? How can they help us pay for and build stuff, and not just for market-driven businesses but to further the "human business"? How are we going to use these disruptive technologies to build a better society?

AI and blockchain are part of a set of evolving global economic structures that are better suited for a connected world. We are entering an era where things cannot fail and we have to know that data is secure. Imagine being able to monitor transactions from anywhere on the planet and be confident that they are secure, that the data left where it was stored and got to where it was supposed to go quickly and safely. That the data we share is only viewed by the people who are supposed to see it and used only as we expect. The power of blockchain and AI can contribute to making these systems irrefutable and to keeping data safe.

Businesses have the opportunity to get in on the proverbial ground floor and take advantage of this exciting convergence with implications that include new levels of secure authentication, immutable audit trails, more robust fraud detection. These technologies address a key issue facing businesses: how can I take contentious processes that are complicated and inefficient and manage them in a trustworthy and efficient manner?

As an open, immutable, and incorruptible record keeping system, blockchain has the potential to transform every fiduciary and record-keeping industry from healthcare to

legal to banking. More broadly, it requires us to rethink how value is represented, recorded and, exchanged.

We are not there yet. But we are starting to head down the road. Not to say there aren't pros and cons to this evolutionary phase. Scenarios range from dark and pessimistic - "the corporate robots will take over and then destroy the world as we know it" - to Pollyanna-ish - "no one will have to work again, all jobs will become automated and we'll all get to lounge around, read the classics and paint in oils. Or go sailing and play golf. Or whatever you fancy doing."

WHAT WE ARE DOING

The time is now to convene stakeholders to move this convergence forward in a way consistent with our common aspirations and the deep nature of our values as humans. It is imperative that we convene not the people who will control these technologies but rather the ones who will actually be using them. This is the time to build pilots and establish standards and tease out best practices and key learnings - to accelerate the impact of the core technologies of AI and blockchain, and expand the positive impact of the next supercycle.

AI has the ability to deliver a level of analytics unavailable before - tools that can capture and analyze the yottabyes of data humans and machines are creating, quickly pulling out actionable data from the tsunami of information. AI instances are also able to learn, teaching themselves how to improve to reach desired outcomes and sharing those learnings with other AIs as well as with humans.

But as we begin having real-time actionable systems including robotics and civic processes run by analytics (AI), we have to be sure they do the right thing, even if the current law is silent on the matter. The recent demonizing of Facebook demonstrates this. They are getting hung because people are waking up to the fact that critical systems are gameable.

Similar concerns apply to blockchain. For example, despite the hype, there is not going to be one central blockchain. Legal firms and healthcare payers are already building private blockchains behind Enterprise firewalls to limit access to sensitive information. There will probably be a couple common commercial ones but many private ones as well. How can we maintain interoperability and security, let alone transparency and accountability, with such a welter of different systems?

At MIT, our passion has always been to identify committed stakeholders with whom to

partner. We are excited about building pilots as a way to quickly see what works and then use these learnings to help establish standards.

Four large-scale projects we currently have underway are:
- Transportation incubator pilot in Israel
- Governance pilot in Columbia and Senegal
- Data Sharing pilots in Beijing and Hong Kong
- Open Music Initiative for royalty sharing across the music industry

Our goal is to establish best practices within these new technology-enabled environments by piloting "beta" versions of blockchain+AI systems in partnership with a wide variety of stakeholders.

NEXT STEPS

It's not just about blockchain. It's not just about AI. It's about how these things fit together in a human fabric. So now that we run our entire society on various technologies, they can't fail and have to be auditable and transparent.

We should not build a future world based on Adam Smith-styled greedy individuals who don't cooperate with each other. We need to promote, encourage and, exploit the power of transparency.

Will this new ecology feel like a human place to live? All this development is driven by human hunger for better civic systems. But will these systems be safe, fair, available to everyone, and perhaps most importantly, stable?

Something good will ultimately come from tools that provide greater accountability and transparency. When lots of people can unleash their creativity using technologies that are inclusive, it will give us a much more stable and innovative society. If we live in a society where everyone gets a voice, we will get solutions that are good for everyone.

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