Technology and Corporate Governance
Blockchain, Crypto, and Artificial Intelligence

By: Mark Fenwick and Erik P.M. Vermeulen[1]

Over recent decades, the on-going "digital revolution" has transformed many aspects of everyday life. Think of the increased power and shrinking size of personal computers and smartphones; the global expansion of the Internet and the new forms of social interaction that have been created; and, the ready availability of massive amounts of cloud-based information ("Big Data"), which is processed by automated algorithms for use in multiple settings.

But, how has the digital transformation affected the organization and operation of business, and what does this mean for current regulatory frameworks, particularly those related to corporate governance? And, how are current and near-future technological developments - think distributed ledger technologies, "smarter" forms of automation and artificial intelligence - likely to disrupt the current corporate governance discussion? This paper explores these questions and concludes that current corporate governance approaches need to adapt to these technological and business developments in order to remain relevant.

"Go Digital!"

#goingdigital. This was the hashtag used at a blockchain event organized by the Organization for Economic Cooperation and Development (*OECD*) in Paris in mid-September 2018.[2] It captures perfectly the challenge facing both individuals and organizations today. We *all* need to "go digital." Clearly, there are huge opportunities created by emerging technologies. But, the speed and scale of current change means that we often struggle to understand and adapt. Knowing *what* to do is difficult when operating under conditions of cognitive uncertainty about the meaning and effects of rapid technological change.

This combination of excitement and anxiety explains why the Paris *OECD* event attracted close to a thousand participants. No doubt there is enormous interest in *#goingdigital*. Similar events are being held all over the world and they generate a great deal of attention. Moreover, this interest cuts across diverse groups with very different "stakes" in digitalization. On one side are the "old school" regulators and other policymakers struggling to make sense of new realities and what it means for current rules and regulations.[3] On the other are the "visionary" founders of start-ups who (often) see their business-building as a mission to change the world.[4]

Corporate governance, in particular, is a key site for this discussion and debate. Not least, because it highlights both the importance and confusion created by recent technological developments. There is a lot of interest in emerging technologies. But, what also seems clear, is that the various different stakeholders in the corporate governance space are moving at different speeds and in different directions. Everyone is aware that something important is happening. However, there is much less agreement on what the digital transformation means

---

[1] Mark Fenwick is Professor of International Business Law, Kyushu University, Japan, and Erik P.M. Vermeulen is Professor of Business and Financial Law, Tilburg University, The Netherlands.

[2] OECD BLOCKCHAIN POLICY FORUM, http://www.oecd.org/finance/oecd-blockchain-policy-forum-2018.htm (last visited Mar. 18, 2019).

[3] *See generally,* MICHEL CALLON ET AL., ACTING IN AN UNCERTAIN WORLD: AN ESSAY ON TECHNICAL DEMOCRACY, (Wiebe E. Bijkeyet al. eds., Graham Burchell trans., The MIT Press) (2009).

[4] Jessica Powell, *The Big Disruption*, MEDIUM (Oct. 2, 2018), https://medium.com/s/the-big-disruption/the-big-disruption-36fbed0268cf.

for the future of business models and organization, as well as corporate governance and other relevant regulatory frameworks.

Some commentators believe that there is no urgent need to put digital technologies (such as blockchain and artificial intelligence) on the regulatory agenda. According to this view, the discourse and practice of corporate governance will not be disrupted by new technologies. The organization, products and services of companies will certainly need to adapt to these changes as a result of shifts in the demands and expectations of consumers and workers. However, the key concepts and features of regulatory models need not change. On this account, traditional regulatory models are robust enough to deal with the effects of technological change on business models and organization.

But, is this view correct? Or is it a naïve stance that will be detrimental to the future of business, the economy *and* society? An alternative view is that business models and organizations will be radically transformed by the digital transformation. Although there is much less agreement on *how* this will happen and in what direction it will take us, there is an emerging view that extant regulatory models of corporate governance will struggle and need to be re-examined in light of the profound disruption to business caused by emerging technologies.[5]

This paper examines this discussion. Our intention is to highlight a number of key issues and neglected themes that we believe are important. Four connected issues are highlighted that seem particularly relevant to any discussion on the impact of new technology on corporate governance and business regulation.

First, contemporary technological change – the on-going digital transformation – is characterized by "*amplification effects*" as multiple technologies "accelerate" each other. Whereas previous technological revolutions were sequential (new technology following new technology), the "Digital Revolution" involves multiple simultaneous technological developments that impact each other in unexpected and important ways. This fact has profound implications when considering the potential effects of technological change on business and society. Not least, we all now live under conditions of radical cognitive and normative uncertainty.

Second, recent technological changes are disrupting the "old corporate world" of centralized authorities, hierarchies and "proper" procedures and processes. *How* business is organized is changing, as a result of technology. Crucially, the emerging "new world" is characterized by the *"decentralization and disintermediation"* of business organizations that disrupts traditional hierarchical forms of organization.

Third, "*retrofitting*" – the "adding" of digital solutions to older systems or models in the belief that this will future proof an organization – may work in some contexts but needs to be treated with caution, particularly when looking for medium- to long-term solutions. More radical approaches are often required, most obviously when new technology is genuinely disruptive of existing ways of thinking and working.

Finally, new technologies continue to facilitate and drive more dispersed forms of corporate organization – what we call "*community-driven corporate organization and*

---

[5] Tim M. Zagar, *A New Chapter for ICONOMI: Transformation of Corporate Governance and Issuance of Equity Tokens*, Medium (Sept. 27, 2018), https://medium.com/iconominet/a-new-chapter-for-iconomi-transformation-of-corporate-governance-and-issuance-of-equity-tokens-dc603df2272b.

governance." In particular, systems of organizational governance have developed in which authoritative decisions are reached by a community of users in the absence of a centrally designated authority that makes and enforces those decisions.

Our conclusion? Regulatory models need to adapt to these developments in order to be effective and remain relevant. In particular, more dynamic, experimental and polycentric regulatory forms need to be developed that are sensitive and responsive to constant change. The risk for regulators and other policymakers is that by failing to act, other more creative jurisdictions will gain a competitive advantage in attracting the best new businesses and the most creative "talent."

"Amplification Effects"

Much of our world is now built on the zeros and ones of computer code. Code is the invisible architecture structuring our everyday life. [6] After, all the development and proliferation of code is the essence of the digital transformation. Or, as Marc Andreessen dramatically puts it, "software is eating the world."[7]

In the 1990s, for instance, digital technologies (the *hypertext transfer protocol—http*) profoundly transformed how we communicate. The *World Wide Web* brought the world to us and changed how we produce, share and consume information. Currently, we are experimenting with blockchain, artificial intelligence (AI), robotics, sensors, and multiple other new digital technologies. And, we often read how "this technology" or "that technology" – be it automation, AI or something else – has the potential to change the world on the same scale as the Internet.

But one reason to believe that the economic, cultural and social impact of "new" digital technologies will be much greater than we have experienced before is that new technologies increasingly "amplify" each other.

We shouldn't look at any one technology in isolation but, rather at how technologies interact with each other and create synergies that greatly increases their social impact and effects. Of course, each "individual" technology, such as distributed ledgers, artificial intelligence or robotics, can have an enormous impact on society. But to understand what "going digital" really means for the future, it is necessary to think about what the *combination* of emerging technologies can do.

At the core of this convergence of technological disruption is the proliferation of Big Data, advanced analytics, and human-machine interfacing. For example, consider the convergence between robotics and computer sciences. Recent developments in robotics, for instance are made possible by online connectivity, more sophisticated statistical and probabilistic techniques, the availability of huge amounts of data, the shrinking size of massive computational power, and the transformation of places and spaces into IT-friendly environments, e.g., smart cities. Of particular significance in this regard is the convergence between robotics and AI-related research in computer science.[8] Although spanning several

---

[6] *See generally* LAWRENCE LESSIG, CODE: AND OTHER LAWS OF CYBERSPACE, (2d rev. ed., Basic Books, 2006) (1999); WILLIAM J. MITCHELL, *City of Bits: Space, Place and the Infobahn,* (1995).

[7] Marc Andreessen, *Why Software is Eating the World*, WALL ST. J., (Aug. 20, 2011), https://www.wsj.com/articles/SB10001424053111903480904576512250915629460.

[8] Jacques Bughin et al., *Artificial Intelligence: The Next Digital Frontier?,* MCKINSEY GLOBAL INSTITUTE, (June 2017), https://www.mckinsey.com/~/media/McKinsey/Industries/Advanced%20Electronics/Our%20Insights/How%20

disciplines, such as physics and mathematics, electronics and mechanics, neuroscience and biology, the field of robotics is increasingly intertwined with advancements of AI. The synergies between these independently developing yet deeply connected fields are providing multiple new opportunities for further technological developments.

As such, the real significant of digital technologies is how they "accelerate" and "reinforce" each other. It is these amplification effects that are driving an *exponential growth of multiple technologies* (see *Figure 1*.) It is these amplification effects that will create new opportunities, as well as disrupt existing business models, forms of organization, and regulatory models.

Figure 1: The Exponential Growth of Technology
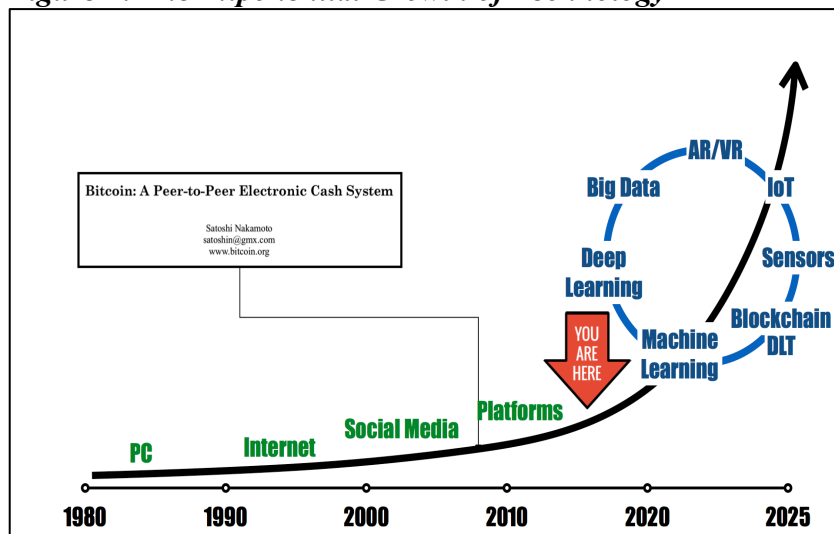
This development has a number of implications, most obviously the degree and quality of uncertainty that characterizes possible future technological developments and their social effects. A paradox of new technologies is that they make our lives easier, but they also make the world harder – perhaps even, impossible – to understand or predict. The digital world is a world of *risk* – of identifiable and measurable dangers – but, more significantly, it is also a world of radical *uncertainty* in which we can no longer "know" with any degree of certainty the current state of technology or the likely direction of future developments. All of us – government, the scientific community, business and the general public – now live under conditions of radical cognitive and normative uncertainty.

"Decentralization" & "Disintermediation"

The Internet is full of discussion about the possible future uses and benefits of digital technologies. One of the perceived benefits of such technologies is that they enable more direct and "flatter" forms of interaction and transaction. The consensus is that this will drive a societal shift away from a "centralized world" to more *decentralized* and *disintermediated* alternatives.

The world has long been dominated by centralized organizations characterized by a combination of formal and informal hierarchies, and "proper" procedures and processes. Of course, pre-defined structures supported by "correct" procedures have often been necessary to

artificial%20intelligence%20can%20deliver%20real%20value%20to%20companies/MGI-Artificial-Intelligence-Discussion-paper.ashx.

"get things done" and to generate trust. And technological revolutions have often led to an increase in such structures and procedures, as we come to terms with the impact of these new technologies. As such, economic, social and political modernization has been driven by the success of centralized hierarchical structures and organizations.

But we now seem to be at a crossroads in which digital technologies are introducing a shift in our economy, culture and society. Not least, because technology can reveal the shortcomings of centralized, hierarchical and proceduralized forms of organization, and new technology can provide us with more satisfying alternatives.

Many of the most innovative technology firms today, for example, are now characterized by a "best-idea-wins" culture in which more collective forms of decision-making are fostered. This type of open and inclusive work environment has been described as a "flat-hierarchy."

In order to succeed, a flat-hierarchy depends on the active participation of everyone inside the firm. Without the cooperation and input of employees this approach will not succeed. As such, an additional advantage of such an open working culture is that it provides greater opportunities for personal expression and this ensures that the company remains relevant. In this way, a flat hierarchy works to retain the relevancy of the firm for the employees and other company insiders, as well as the consumers who benefit from the higher quality products or services that such a "flat" corporate culture can deliver.

There are currently many variations on flat-hierarchy organizations discussed in social media. One example of this operating space has recently been referred to as a "holacracy" and such organizational structure emphasizes the importance of making everyone a leader by disseminating decision-making power to autonomous and multi-disciplinary teams within an organization. Such teams work "cheek-by-jowl" to identify relevant solutions to particular problems and by making innovative problem-solving – "improving things" – the basis of staff bonuses. In this way, a healthy internally competitive firm culture can be facilitated. Another example is the comparison between leadership in business organizations with leadership in sports teams (where team members are inspired through short meetings or "huddles") or leadership in military operations (where leadership is often channeled through other responsible key persons who help re-iterate the firm's vision).

This development reflects a more general realization that "old world" organizations make decision-making slow, cumbersome and costly. On a daily basis, we can see how "digital technologies" lead to better and more satisfying solutions. For consumers, this starts with the simple conveniences of new "platform" style companies like *Uber* or *Airbnb* that employ automated algorithms to match "users" with independent service providers.[9] Stated bluntly, there is little room for maneuver in a highly centralized world and decentralized alternatives offer a degree of independence that resonates with more and more people.

Digitalization has diminished information asymmetries and changed our expectations. Consumers, for instance, have become "smarter," better connected, and more demanding in what they expect of products and services. We love the "speed," "convenience" and opportunities offered by digital technologies and we are not willing to give them up. In an age of social media, the "voice" of the end-consumer has become more powerful than ever before.

---

[9] Mark Fenwick et al., *The End of 'Corporate' Governance: Hello 'Platform' Governance* (Lex Research Topics in Corporate Law & Economics Working Paper No. 2018-5, 2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3232663.

As a result, the relationship between consumers and business has changed dramatically. Even companies operating in a business-to-business environment need to take consumer views more seriously.[10]

Digitization empowers people in other ways too. For instance, digital technologies help people become more aware of their health.[11] Individuals can now monitor their activities and health in real time (think of recent developments with smartwatches). Sensors, Big Data, and algorithms provide information that can help medical doctors make more effective diagnoses. But, these technologies also make people more knowledgeable about their own health condition. As such, the traditional hierarchical doctor-patient relationship is disrupted. In many contexts, digitalization transforms traditional relationships creating flatter and more dynamic interactions.

Another important feature of this technology-driven transformation that is worth emphasizing are the "disintermediation" effects. In the old world of highly centralized organizations, a crucial role was played by various intermediaries who were able to generate trust between various parties in business relationships.

In the context of the digital revolution, *who*, *what, when,* and *how* people "trust" is changing. [12] We tend to think of "trust" and "trusting" as a feeling or emotion but as contemporary commentators on trust have observed it may be better to think of trust as a *type of decision that is intimately connected with risk*.[13] We "trust" when we *decide* to take some kind of risk, i.e., to voluntarily expose ourselves to some kind of danger. We "trust" the local supermarket to sell us healthy and safe food. We "trust" our doctor to provide effective medical treatment. We "trust" the baby sitter to take care of our kids.

In each case, "trusting" involves a decision to expose ourselves to a danger of some kind (unhealthy food, poor medical care, harm to my kids etc.). We "decide" to place our fate in another person or organization. "Trust" involves the triumph of hope over fear. We overcome our natural aversion to risk in anticipation of a better future (a tasty meal, good health, a night away from our children). Every day, all of us make multiple different decisions to trust. Together, these choices define who we are and what matters to us.

But *who*, *what*, *when* and *how* we trust is changing. There are multiple reasons for this change, but technology is a big part of this shift. Most obviously, we are much less trusting of organizations, authorities or procedures, but instead place our trust in machines or algorithms. On the one hand, we seem to have become much less trusting of other people and traditional centralized organizations (politicians, experts, companies etc.). On the other hand, we seem very willing to place our trust in machines.

In one sense, the digital transformation has created a new experience of trust. "Digital trust" is the future and the "unprepared" (people, organizations, and societies) will certainly lose out. Whereas in the past, people relied heavily on intermediaries and other third parties to

[10] Geoff Colvin, *Why Every Aspect of Your Business is About to Change*, FORTUNE (Oct. 22, 2015), http://fortune.com/2015/10/22/the-21st-century-corporation-new-business-models/.

[11] DELOITTE CENTER FOR HEALTH SOLUTIONS, *Connected Health: How Digital Technology is Transforming Health & Social Care* (2015), https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/life-sciences-health-care/deloitte-uk-connected-health.pdf.

[12] Caroline Lee, *Why Millennials Don't Trust Your Brand*, MEDIUM (Aug. 22, 2017), https://blog.takumi.com/why-millennials-dont-trust-your-brand-b7ffce5c86c6.

[13] *See generally* IRIS BOHNET & R.J. ZECKHAUSER, *Trust, Risk and Betrayal,* 55 J. ECON. BEHAV. ORGAN. 467 (2004).

manage trust, we increasingly place our trust in digital systems and algorithms. In this respect, it appears that people have less and less confidence in "old world" institutions. Satoshi Nakamoto's paper setting out the key concepts of Bitcoin-blockchain is an illustration of this economic and cultural shift.[14]

The speedy development of distributed ledger technology (including blockchain), smart contracts and artificial intelligence will only further automate trust. As such, institutionalized trust is being replaced by digital trust. It is obvious that the automation of "trust," "faith," and "confidence" has a tremendous impact on worker-employer relationships, the meaning of leadership, and how management operates.

The opportunity to communicate and interact with peers directly (through social media and without the interference of third parties) spurs entrepreneurship and creates new opportunities to be creative (think *YouTube*, *Instagram*, etc.). Our "new" relationship with digital technology also makes it possible to have peer-to-peer connections, communications, interactions, and transactions. Algorithms and data-analytics help us find partners, assistants, sponsors, help, accommodation, etc.

Of course, these digital systems aren't always flawless, but the fact is that we increasingly rely on decentralized "peer-to-peer systems." The convenience of these new systems attracts us. The looser (digital) connections and interactions are so much faster and more comfortable than the old "formal" ways of making fixed appointments and ritualized meetings. And it doesn't stop there. We can also now "meet" and interact in online "virtual" spaces even if we are thousands of miles away from each other (think of developments in the gaming industry, for example).[15] Virtual reality and augmented reality will only add to this unparalleled consumer experience and the way we relate to each other.

"Retrofitting"

Although more and more people recognize that "going digital" is imperative for all business and that such change also has implications for regulators, it appears that many commentators regard #*goingdigital* as simply a question of "*retrofitting*." By retrofitting, we mean "adding" digital solutions to older systems, models, and organizations in the belief that this will "future proof" an existing approach and make it more efficient. Various reasons are often given for the retrofitting approach. "Cost" savings that result from cutting out intermediaries and creating more transparency are usually mentioned.

Many recent examples of such retrofitting refer to distributed ledger technologies, such as blockchain and other similar technologies. A blockchain is a database or "ledger", i.e., a continuously updated record of transactions (reflecting "who holds what" at a particular point in time). Once a transaction is verified and validated according to some predefined rules and protocols, a "block" is added to the chain with all previous records in linear and chronological order.

What makes the blockchain "immutable" is that the ledger or database is distributed to a countless number of participants ("nodes") around the world in public peer-to-peer networks (similar to the Internet) or private (or permissioned) peer-to-peer networks (similar to an Intranet). The distributed character of the ledger ensures that everyone trust the blockchain to

---

[14] *See generally* Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, Bitcoin (2009), https://bitcoin.org/bitcoin.pdf.
[15] *See, e.g.,* Keith Stuart, *Fortnite Is So Much More Than a Game*, Medium (Aug. 17, 2018), https://medium.com/s/greatescape/fortnite-is-so-much-more-than-a-game-3ca829f389f4.

be the truth forever. The use of cryptographic hashes makes tampering with blockchain records even more difficult, if not impossible. Cryptographic hashes comprise complex algorithms meaning that even a minuscule change to the blockchain will result in a different hash value, making manipulation instantly and readily detectable by anyone in possession of a copy of the ledger.

Digital signatures help establish the identity and authenticity of the parties involved in the transaction. These security measures make blockchain validation technologies more transparent and less prone to error and corruption than existing methods of verifying and validating transactions via third party intermediaries and centralized authorities.

Because of these characteristics, blockchain technology has the potential to solve some of the transparency and "principal-agent" issues that abound in the area of corporate governance. For instance, shareholders and other stakeholders would be able to check and verify the ownership structures and arrangements of companies (particularly, listed companies).

Moreover, increased transparency has the potential to protect investors. For example, blockchain technologies might prevent corruption and make it more difficult (or even impossible) to backdate stock options or enter into opportunistic related party transactions. What is also interesting is that blockchain technology could "remove" many of the financial intermediaries in the securities markets around the world. Disintermediation would simplify trade executions and settlement arrangements, which would increase liquidity.

Disintermediation would also help streamline voting in listed companies.[16] For example, it is often suggested that current voting systems are unsecure, unreliable, and costly. As an example, reference is made to the system in the United States. The estimated annual post-trade and security servicing fees is estimated at ~$100 billion. Issuers pay more than $200 million a year to communicate with stockholders alone, exclusive of printing and postage fees.

It shouldn't come as a surprise, therefore, that we see more and more businesses and governments experimenting with blockchain technologies. For instance, Delaware amended its corporation law in the summer of 2017, allowing companies to use blockchain technology to maintain their stock ledgers and other corporate records. In July 2018, the fourth largest stock exchange, the *Shanghai Stock Exchange* (*SSE*), released plans to introduce distributed ledger technologies, including blockchain, in securities transactions. The *SSE* follows other initiatives. *Nasdaq* successfully tested blockchain technology in a proxy voting experiment on its exchange in Estonia. The *Australian Stock Exchange* has started to develop distributed ledger technology solutions for clearing and settlement activities. The *Japan Exchange Group* collaborates with *IBM* in investigating blockchain solutions in low-liquidity assets. And there are other examples.[17]

What is interesting is that artificial intelligence attracts less attention in the contemporary corporate governance discussion. Nevertheless, research studies suggest that machine learning algorithms can, in principle, be better equipped to select board members than

[16] J. Travis Laster, *The Blockchain Plunger: Using Technology to Clean Up Proxy Plumbing and Take Back the Vote*, COUNCIL OF INSTITUTIONAL INVESTORS (Sept. 29, 2016),
https://www.cii.org/files/09_29_16_laster_remarks.pdf.

[17] *See e.g.,* Blockchain DuDe, *The Collision of Stock Exchanges and Blockchain*, MEDIUM (June 26, 2018),
https://hackernoon.com/the-collision-of-stock-exchanges-and-blockchain-55d222b87a8.

a company's management and their "expert" advisors.[18] It all depends on the available data, but with more and more public information being available and the algorithms becoming more accurate in predicting future performance of directors, technology may soon offer a better alternative. Again, the result would be a reduction of the agency and monitoring costs of listed companies.

These examples show the potential advantages of retrofitting. Technology can provide solutions to many challenges in a business context. As such, retrofitting is undoubtedly tempting. But, it is clearly not without risk. Or, as one panelist put it at the *OECD* event: "Should we replace a slow and clumsy system that is known to work reasonably well, for a rapid and elegant system that relies on exciting but *unproven* technology?"[19]

Another – and different concern – with retrofitting is that it fails to understand the disruptive character of recent technological change. With digital technologies amplifying each other, the question is whether a "retrofitting" approach will provide a long-term option. New technologies might not – as discussed here – provide a new (tech-driven) solution to an old and already existing way of doing things, but rather they may offer a radically different way of approaching or thinking about the problem. It is in this context that the more radical, transformative potential of technologies becomes relevant. Technology should not be thought of a solution to an "old" problem but as the creator of new possibilities and opportunities.

The failure to recognize this feature of the relationship between technology and disruption might be catastrophic for a business. We have come across too many examples of how "just retrofitting" can quickly finish a business that is confronted by more tech-savvy competitors.

Take "brick and mortar" stores disrupted by new online platforms (such as *Amazon*) in the late 1990s and early 2000s. Many traditional retailers believed that competing against *Amazon* could be achieved by simply "selling goods online" (i.e., retrofitting). Such an approach, however, failed to understand the real disruption of *Amazon*. *Amazon* was offering much more than "just" an online retail platform. Instead, through sophisticated new systems such as algorithm-driven recommendations and online customer ratings and reviews, *Amazon* created a new type of consumer experience that was at the same time both highly personalized *and* communal. In some circumstances, therefore, retrofitting may not be the answer and more radical change is required.

"Community-Driven Corporate Governance"

The current consensus is that corporate governance is about people, transparency and accountability. The idea that corporate tasks might be automated is not given much credence in the existing discussion. But, this is where technology may be taking us and, as such, it is also important to consider these more radical possibilities.

For instance, the appointment of an "Artificial Intelligence", called Alicia T, as a member of the leadership team of Finnish software company *Tieto* in October 2016 was met with scepticism (and some amusement) by many commentators.[20] This reflects doubts about

---

[18] Isil Erel et al., *Research: Could Machine Learning Help Companies Select Better Board Directors?* HARV. BUS. REV. (April 9, 2018), https://hbr.org/2018/04/research-could-machine-learning-help-companies-select-better-board-directors.

[19] GEORGE S. GEIS, *Traceable Shares and Corporate Law*, 113 NW. U. L. REV. 227 (2018).

[20] *Tieto the First Nordic Company to Appoint Artificial Intelligence to the Leadership Team of the New Data-Driven Businesses Unit*, TIETO (Oct. 17, 2016), https://www.tieto.com/en/newsroom/all-news-and-

the current state of the technology and its capacity to make a serious contribution to the firm's business decisions. But. it also reflects the view that data-driven decision-making processes based on algorithms do not fit with the "people and accountability" model of corporate governance.

A second and better example is what we might think of as "peer-to-peer" or more "*community-driven forms of corporate organization and governance*." In this model, systems of organizational governance are being developed in which technology facilitates *authoritative decisions to be reached by a community of users in the absence of a centrally designated authority that makes and enforces those decisions.*

The *Decentralized Autonomous Organization (DAO)* is perhaps the best example of this radically different approach to firm governance.[21] This project was launched in 2016 in Germany by Christoph Jentzsch. The *DAO* intended to automate the governance of firm and was based on the idea that since "people" don't always follow the rules it might be safer and more efficient to use computer code to manage various aspect of firm organization and governance.

The idea was to set up a corporate-type organization using computer code without using conventional centralized, hierarchical structures. The *DAO* didn't have any directors, managers or employees. This "flatter" governance structure was built with "smart contracts" that ran on the blockchain platform, *Ethereum*.

In this context, a smart contract refers to a computer program code or protocol that automates the verification, execution and enforcement of certain terms and conditions of a "contractual" arrangement. Nick Szabo, the computer scientist and lawyer who first introduced the term in 1994, envisioned a smart contract as an important part of, for instance, a car loan.[22] If the borrower misses a payment (tracked via a blockchain-like technology), the contract would not allow the use and operation of the car ("enforced" via networked technologies, rather than a "repo man"). Clearly, such contracts will become more prevalent in the growing world of the Internet of Things. As more devices are connected to each other, the more "smart contracts" will be used to execute and enforce "legal transactions".

In the *DAO*, this automated structure was intended to give participants ("investors") direct real-time control over decisions about how contributed funds would be distributed to start-up projects. Investors could participate by purchasing the *DAO* Tokens during a kind of crowdfunding campaign, an Initial Coin Offering.

Unfortunately, fundamental flaws in the *DAO* code made it possible for "hackers" to transfer one-third of the total contributed funds (USD 150 million) to a subsidiary account. This and other technological limitations meant the end of the initiative. The failure was seen by some as evidence that digital technologies will not easily solve corporate governance issues and it highlights the concerns that we mentioned above about "untried technologies."[23]

---

releases/corporate-news/2016/10/tieto-the-first-nordic-company-to-appoint-artificial-intelligence-to-the-leadership-team-of-the-new-data-driven-business/.

[21] Christoph Jentzsch, *Decentralized Autonomous Organization to Automate Governance,* SLOCK.IT, https://download.slock.it/public/DAO/WhitePaper.pdf.

[22] Nick Szabo, *Smart Contracts*, NICK SZABO'S ESSAYS, PAPERS, AND CONCISE TUTORIALS (1994), http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html.

[23] Julian Birkinshaw, *What's the Purpose of Companies in the Age of AI*, HARV. BUS. REV. (Aug. 13, 2018), https://hbr.org/2018/08/whats-the-purpose-of-companies-in-the-age-of-ai.

But, in the context of the digital transformation, such a sceptical view of the potential impact of technology seems naïve. As with any new technology, there will always be setbacks as glitches and flaws are sorted out. Nevertheless, the potential for digital technologies to profoundly disrupt how companies are organized should be taken seriously.

As mentioned above, we live in a world that has long been dominated by centralized organizations characterized by formal and informal hierarchies. Companies are a typical example, with traditional hierarchies between shareholders, directors, managers, and employees. Today, however, digital technologies are disrupting this model of organizational design.

For instance, many of the largest and most successful businesses today now operate as "platforms." Such platform companies leverage networked technologies to facilitate economic exchange, transfer information and connect people. Think *Amazon*, *Apple*, *Facebook*, *Alphabet* or *Alibaba*.

Crucially, however, there is something more to these platform companies than simply utilizing new technologies to enable economic or social interactions. What these platforms have in common is that they design their "internal" and "external" organizations in a flatter and a more inclusive way. These new models of organization facilitate experimentation, collaboration, and creativity amongst multiple stakeholders. These stakeholders include investors, but also other stakeholders such as employees, customers, and developers. By doing so, they maximize opportunities to deliver innovation in a platform's products, services, and other solutions. The best platforms use stakeholders' feedback to continuously improve their experience and engagement (see *Figure 2*).

More and more companies are recognizing the importance of organizing as a platform or integrating a platform into their business model. And, it is not only technology companies that are making this shift. Many "old world" companies now recognize that a platform is essential to their continued survival. And this is where digital technologies become essential and offer genuinely disruptive opportunities.

Figure 2: From Hierarchies to Platforms
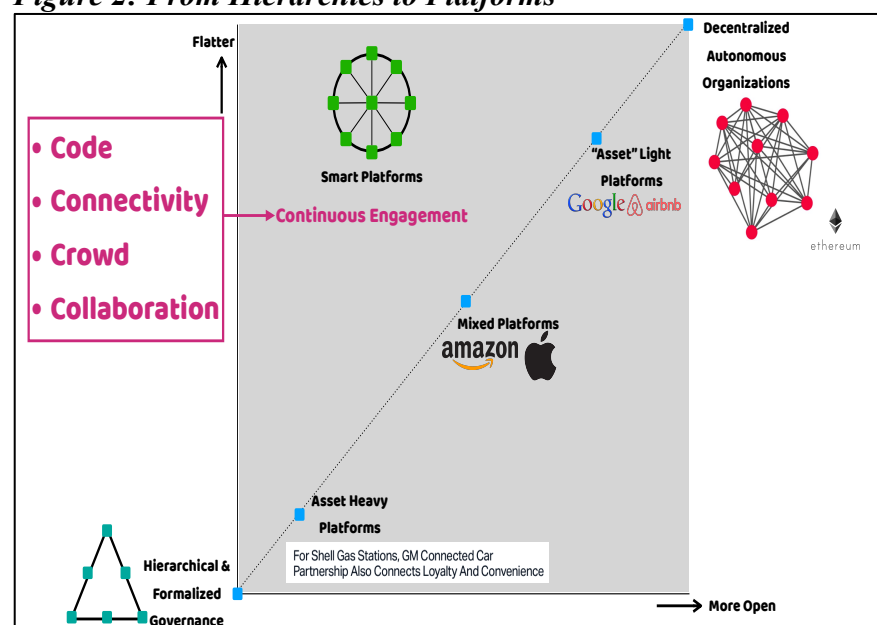
Of particular interest is how digital technologies might facilitate an emphasis on the "human" aspects of corporate governance. That is to say, technologies are well-placed to facilitate more "inclusive" and "communal" models of organization that empower more stakeholders. This may be what digital technologies are really about; they can help increase the engagement, involvement, and accountability of all stakeholders in a company. And, this is what will disrupt traditional corporate governance.

An example of how digital technologies are central to building more "human" forms of business organization and disrupting traditional corporate governance are blockchain based "coins" or "tokens." Think of them as company or industry-specific cryptocurrencies. Companies (or groups of companies or even industries) can issue their own tokens as an integral part of the platform operations. Currently, blockchain-related start-ups are the main issuers of the tokens through Initial Coin Offerings (ICOs) (see *Figure 3*). The ICO has become a creative, and often unregulated, way for startups to raise money while at the same time bypassing the traditional route of venture capital or financial institutions.[24] But, it is predicted that more start-ups and even big companies will join this trend soon.[25] The *KODAKCoin* is an example of this.

Figure 3: Early Stage Investments in "Blockchain-related" Start-ups
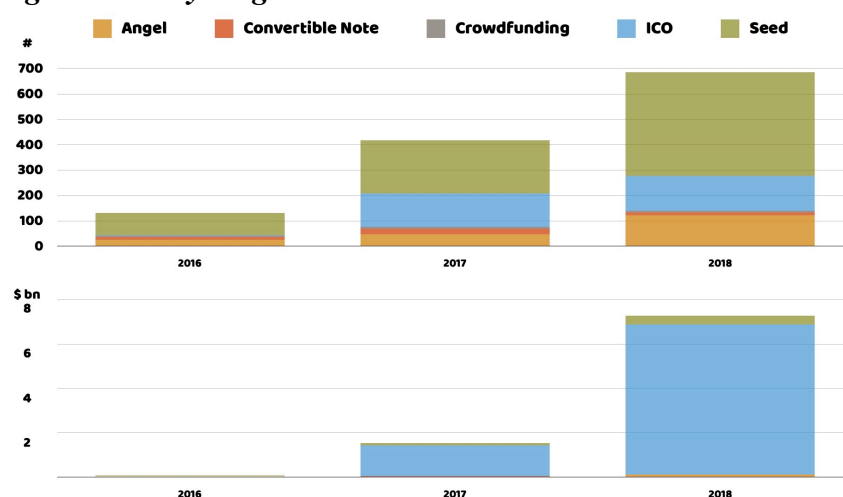
Source: Data from Crunchbase

These tokens perform a number of functions and bring multiple benefits:[26]

- **Perks**. The issuance of these coins or tokens can often be compared with a company's loyalty program. They provide access to products, services, discounts and other perks. This will help gather a community of participants such as developers, investors and consumers on the platform. They tie individuals into the platform's ecosystem facilitating network effects. This is what Kodak tries to do with the *KODAKCoin* and its new platform *KODAKOne.* The holders of *KODAKCoins* will be able to buy, sell and book products and

---

[24] *See* Wulf A. Kaal, *Initial Coin Offerings: The 25 Jurisdictions and their Comparative Regulatory Responses* (U of St. Thomas (Minn.) Legal Studies Research Paper No. 18-07, 2018)*,* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3117224.

[25] ANDREW ROMANS, MASTERS OF BLOCKCHAIN AND INITIAL COIN OFFERINGS: THE RISE OF BITCOIN, ETHEREUM, ICOS, CRYPTOCURRENCIES, TOKEN ECONOMIES AND WHAT THAT MEANS FOR STARTUPS, CORPORATIONS AND INVESTORS, (2018).

[26] Stylianos Kampakis, *Why Do We Need Tokenomics?,* THE JBBA (May 2, 2018), https://jbba.scholasticahq.com/article/3636-why-do-we-need-tokenomics.

services related to photography. Blockchain technology and smart contracts will allow photographers to be instantly and transparently rewarded.

- **Liquidity**. Unlike a mere loyalty program, these tokens have other benefits attached to them. Most importantly, they can offer liquidity. Platform stakeholders can transfer them to other interested parties on crypto exchanges or secondary markets. These parties could be the general public or a more restricted and pre-defined group of people. This integrates the token - and therefore the platform - into the mainstream economy.

- **Funding.** Because the owners of the tokens aren't locked into the platform, the issuance of tokens can be a means to attract funding for the platform (without issuing shares and dealing with negative effects of dilution).

The best companies could then be built around the idea of delivering constant innovation via an open, inclusive and constant process of co-creation. Technology will facilitate more community-driven and human forms of "corporate" organization. Multiple stakeholders, including investors, are crucial to a successful platform. Each group may have their unique capacities and capabilities. All stakeholders are aligned for the success of the platform. Crucially, this helps establish a community-owned and dynamic platform, which isn't based on traditional hierarchies between stakeholders.

Again though, we do need to remain cautious. There is a lot of hype around ICOs and stories about scams abound. Security breaches and a high failure rate (half of the ICOs of 2017 have already failed) have created attention-grabbing headlines. Yet, tech companies and investors are still using the "crypto-route" to raise money. Tokens can provide the right incentives to *all* stakeholders, bind them into the platform, facilitate connections to a community that matters to them, and help build a strong and open culture of involvement, engagement, and connectivity. In this model, traditional roles such as investors, executives, managers and consumers will become blurred, and information asymmetries – which much corporate governance regulation has been designed to overcome – will become much less significant. Traditional models of corporate governance will be less relevant for this new style organization.

More community-driven forms of organization can also exploit other digital technologies to disrupt other features of corporate governance as well. For example, data analytics and artificial intelligence can play a crucial role in improving a company's communication process. This allows for "continuous reporting," which instead of being defined as an annual report will be updated constantly and disseminated online.

In this way, continuous reporting will lead to a more human, engaged and responsive dialogue with investors and other stakeholders. Digital technologies will not interfere with accountability aspects of corporate governance. Instead, technology will make accountability stronger and reduce the temptation of acting opportunistically.

Regulatory Implications?

The new environment created by the above trends creates enormous challenges for regulators:

Emerging technologies such as nanotechnology, biotechnology, personalized medicine, synthetic biology, applied neuroscience, geoengineering, social media, surveillance technologies, regenerative medicine, robotics and artificial intelligence present complex

governance and oversight challenges. These technologies are characterized by a rapid pace of development, a multitude of applications, manifestations and actors, pervasive uncertainties about risks, benefits and future directions, and demands for oversight ranging from potential health and environmental risks to broader social and ethical concerns. Given this complexity, no single regulatory agency, or even group of agencies, can regulate any of these emerging technologies effectively and comprehensively.[27]

In an age of constant, complex and disruptive technological innovation, knowing *what*, *when,* and *how* to structure regulatory interventions has become much more difficult. Regulators can find themselves in a situation where they believe they must opt for either reckless action (regulation without sufficient facts) or paralysis (doing nothing). Inevitably in such a situation, caution tends to triumph over risk. But such caution merely functions to reinforce the status quo and the result is that new technologies may struggle to reach the market in a timely or efficient manner.

Of course, we should be careful not to overstate the newness of this issue. To some degree, these challenges have been around, at least since the rise of industrial capitalism and the acceleration in technological advancement that it facilitated. Joseph Schumpeter, for example, famously described, as early as the 1940s, the "*gales of creative destruction,*" unleashed by technology, that periodically sweep through industries and sink weak and outdated firms. For Schumpeter, this process was at the core of capitalism:

> The opening up of new markets, foreign or domestic, and the organizational development from the craft shop and factory to such concerns as *U.S. Steel* illustrate the process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in. . . . Every piece of business strategy acquires its true significance only against the background of that process and within the situation created by it. It must be seen in its role in the perennial gale of creative destruction; it cannot be understood irrespective of it or, in fact, on the hypothesis that there is a perennial lull.[28]

Nevertheless, the speed, scale and global character of contemporary technological change poses enormous challenges.

So, what is the solution? In short, law-making and regulatory design needs to become more dynamic, responsive and experimental.[29] So how can regulators actually achieve these goals? What can they do to promote innovation and offer better opportunities to people wanting to build a new business around a disruptive technology or simply enjoy the benefits of a disruptive new technology as a consumer? Regulators seem to understand that we have moved away from a model in which regulatory decision-making is fact-based and the task of regulatory design can be delegated to politicians and the traditional experts. In the context, of fast, complex disruption, such static models are no longer effective. In particular, in the context of a data-based regulatory environment, there is a clear need for measures that are built on more flexible and inclusive processes that involve start-ups and established companies, regulators, experts and the public. Such a polycentric regulatory approach is already being

---

[27] G. MARCHANT & W. WALLACH, THE GOVERNANCE OF EMERGING TECHNOLOGIES IN G. MARCHANT 136-152 (Edward Elgar, 2013).

[28] JOSEPH A. SCHUMPETER, CAPITALISM, SOCIALISM, AND DEMOCRACY 83 (Harper & Brothers, 3rd ed., 1950).

[29] Mark Fenwick et al., *Regulation Tomorrow: What Happens When Technology is Faster than the Law*, 6 AM. UNIV. BUS. L. REV. 561, 584 (2013), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3204119.

adopted in the financial industry, for example.[30] It is only to be expected that this trend will expand to other areas of innovation and technology, and that other fields of law and regulation will be similarly disrupted.[31]

A Final Note

We currently live in a fast-moving "space" between two co-existing realities: a centralized "old world" and an emerging (but nascent and uncertain) "decentralized reality." For sure, the centralized reality with its hierarchical organizations, rules, regulations, and institutions still prevails. It appears unlikely that we will say goodbye to our familiar, centralized procedures and organizations anytime soon. Mainly, since the "success" of decentralized procedures and organizations very much still depends on the goodwill and altruism of the parties involved.

Nevertheless, a more decentralized reality has already emerged. Aspects of *Facebook*, *Twitter*, *Uber*, *Airbnb*, and *Spotify* are early examples of this. We don't want to suggest that these companies are without flaws or that they represent simple examples of a new decentralized reality.[32] Clearly, that is not the case. However, they do offer clues as to a possible future direction for corporate governance. New platform companies do seem to offer "flatter" transactions with less reliance on intermediaries.

But with trust in these new tech companies already declining (due to the concentration of power, wealth and information), artificial intelligence and distributed ledger technologies, including blockchain, are increasingly viewed as offering a superior and more radical long-term alternative. These technologies have the potential to create a genuinely level playing field, transparency and "applications that run exactly as programmed without any possibility of downtime, censorship, fraud or third-party interference."

And, here's the key point. We have already passed the "tipping point" in our experiments with decentralized technologies. *There's simply no going back.*[33] So, instead of locking ourselves away in the traditional "centralized" world or remaining trapped in "limbo" between these two realities, it is surely better to understand and – where appropriate – embrace these new organizational developments. We would even argue that it is necessary to become actively involved in the further development of artificial intelligence, blockchain, smart contracts, and the "co-creation" of a decentralized and disintermediated world.

Only by encouraging greater participation and transparency in the construction of this new reality can we ensure that this decentralized world can reach its full potential and offer greater convenience, accountability, and trust. Incorporating multiple perspectives – disciplines as diverse as business, mathematics, and the law – will be essential to make sure that we make the right decisions in our journey towards a better decentralized future.

---

[30] DIRK A. ZETZSCHE ET AL., *Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation,* 31 FORDHAM J. OF CORP. & FIN. L. (2017).

[31] JULIA BLACK, *Proceduralisation & Polycentric Regulation*, 1 DIREITO GV L. REV. 99 (2005).

[32] W. Coldwell, *Airbnb's Legal Troubles: What are the Issues?*, THE GUARDIAN (July 8, 2014), https://www.theguardian.com/travel/2014/jul/08/airbnb-legal-troubles-what-are-the-issues/.

[33] Wulf A. Kaal, *Crypto Economics*, MEDIUM (Sept. 14, 2018), https://medium.com/@wulfkaal/crypto-economics-809b4d3f6d25.