

## **How Blockchains Will Change Your Way to Collaborate**

### **The challenges of collaboration**

Collaboration is at the heart of business life. To build a successful product, managers need to work closely with engineers, designers, customers, and suppliers. Think of how many hours you have spent on Zoom over the last few months meeting with colleagues, talking with clients, or negotiating with suppliers. Effective managers have to collaborate in almost every aspect of their job.

However, successful collaboration does not come easily. On the one hand, your partners may lack commitment—they may even lie, steal, or cheat. For instance, suppliers may try to hide quality flaws, and clients may ask for price renegotiations despite of what you had initially agreed on. On the other hand, communication, information sharing, and coordinating the actions of multiple parties is hard. Especially when a collaborative task requires multiple parties to share knowledge, such as when keeping track of a delivery or co-developing products with partners in your business ecosystem, it is challenging to ensure the information recorded by different entities is consistent. The fact that information exchange sometimes still happens through massive paperwork (which isn't searchable and can easily get lost) or droves of emails (which are a pain to keep organized) exacerbates these challenges.

The increasing shift to working online, accelerated by the ongoing pandemic, has made these problems only worse. For collaborations to work out, you need to ensure each party behaves as agreed upon and activities are well coordinated, but the legal contracts and social mechanisms people use to reach those ends are harder to apply through the added layers of virtual communication we now rely on. As we have all experienced, the lag, the glitchy image, and the bizarre background are often not conducive to agreeing upon legal remedies or building trust with your collaboration partner.

There is, however, one tool that may fundamentally change things once added to your collaborative toolkit: blockchains.

### **Blockchains as a new way for organizing collaborations**

Blockchains may radically transform many facets of business life, but they're a tool particularly well suited for collaborations. Put simply, blockchains are digital ledgers where several people have joint control over the shared information. The technical design of blockchains makes it virtually impossible anyone to change the contents of the ledger without approval from the other parties. Many blockchains are paired with smart contracts, which are essentially programmed codes that are automatically executed once certain conditions are met. In recent years, they have been successfully applied to organize collaborations in fields as varied as logistics, energy, healthcare, entertainment, art, insurance, and finance.

To appreciate the ways in which blockchains can support complex collaborations, consider the task of shipping perishable goods across borders — a feat that requires effective coordination among suppliers, buyers, carriers, customs, and inspectors, among others. When the parties pass the cargo to another, a flood of information is transferred with it. Each party keeps their own record and tends to communicate with one partner at a time, which often leads to inconsistent knowledge across participants, shipping delays, and even counterfeit documentations or products. The buyer expects the goods to be constantly cooled throughout the shipping process, and if temperatures exceed agreed thresholds, a dispute is likely to occur among the buyer, the supplier, and the carrier, which can devolve into lengthy wrangling. The carrier may haggle over the liability to lower the compensation, arguing that customs delaying the transportation or the inspectors who improperly operated with the cargo are the ones to blame. The buyer will ask the supplier for remedy, who in turn needs to negotiate with the carrier. And so on.

Problems like these can manifest in any collaboration that requires cumbersome information sharing among partners and may involve disputes in the process. While partners usually sign contracts specifying the conditions of their collaboration, along with legal remedies, disputes can open the door to a long, costly, and uncertain legal process. Alternatively, parties can exert social sanctions, such as ceasing all future collaborations and sharing the negative experience with other firms. But, there are limits to both of these approaches, especially when parties expect no future interactions with one another or are not particularly concerned about their reputation.

Blockchains offer a third solution to collaboration problems: they enabled quasi-automatic enforcement of even very complex transactions. For instance, Maersk, the world's leading logistic company, initiated the TradeLens blockchain, which uses smart contracts to automate a variety of tasks in the shipping process. Using electronic devices to monitor the environment inside the shipping containers, TradeLens can trigger immediate actions — such as the shipment of new products for replacement — as soon as the cargo environment deviates from the trading agreement. Note that the execution of the replacement action can be entirely automated, such that there is no room for disputes or opportunistic haggling over the penalties or liabilities of remedies, saving time and hassle.

In practice, TradeLens increases efficiency in several ways. Because the execution is automated, the enforcement of the shipping agreement relies on neither the court nor social sanctions, but rather on a set of protocols representing a self-contained and autonomous system of rules. Moreover, with a blockchain, all participants access a single version of information about the shipping status. This removes the need for reconciliation across independent systems of the customs, ports, carriers, and cargo owners. Information becomes secure, immutable, transparent, and traceable when stored and processed on the blockchain. With a much higher level of accuracy and authentication, the parties have less concern about possible collaboration failures.

### **How blockchains transform the collaboration process**

Blockchains fundamentally alter each phase of a collaboration, including (1) partner selection, (2) agreement formation, and (3) execution.

*Partner selection.* Each collaboration starts with the selection of an appropriate partner, and the use of blockchain can dramatically simplify this step. Managers traditionally rely on trustworthiness cues stemming from their past experience with the prospective partner or its public reputation. However, prior experience is not always present and public reputation is sometimes not trackable, especially for small firms.

With blockchains sharing identical information to all parties and smart contracts automatically ensuring the execution of agreements, there is little room for collaborators to cheat. There is also a deterrence effect — knowing that there will be little room for shirking or reneging, dishonest or incompetent partners will refrain from entering agreements supported by blockchains. All of this facilitates the selection of partners, even when collaborators do not know much about their counterpart. For example, as the MediLedger blockchain in the pharmaceutical industry provides reassurance that all prescription medicine meets the new regulations in the Drug Supply Chain Security Act of 2019, buyers do not necessarily require detailed knowledge about the drug supplier's reputation to judge the quality of their products.

*Agreement formation.* Although it has always been central to collaborations, the negotiation phase is gaining even greater relevance when using blockchains. This is because blockchain protocols cannot be easily altered once put in place. To take full advantage of blockchains, specific protocols forming the fundamental infrastructure of the blockchain need to be defined *ex ante*. Negotiating the setup of the blockchain is now a collective task involving multiple players in the blockchain network rather than a traditional two-party interaction. All of this calls for managers to be extra careful in the negotiation phase when using blockchains.

*Execution.* A significant benefit of using blockchains in the execution phase is the automated enforcement of agreements and the resulting decrease in dishonest behaviors. In addition, blockchains also speed up the process and reduce the costs of settlement by enabling a single truth for all participants. For example, in the used car industry, traditionally every stakeholder (e.g., dealers, insurance companies, and importers) keeps their own private records of the cars, and information is shared from one to another, which often creates inconsistencies.

The Cardossier blockchain promises to solve this issue by enabling organizations to transact directly with each other and providing a single version of truth that is shared across the network. Similar blockchains are in the making in many other sectors, from insurance to diamond origins tracking. In addition to enhancing consistency, blockchains also allow for information to be confirmed in real-time rather than only after the fact. This allows collaborators to be much more responsive during the execution phase.

## **What you need to know about blockchain adoption**

Blockchains will no doubt find their way into a variety of business collaborations. Several departments will have to work hand in hand to find optimal blockchain solutions for different purposes. Throughout this process, they need to keep several important things in mind in order to make the adoption process a successful one.

*Blockchains are not a magic bullet.* Blockchains work much better in some situations than others, making it critical to understand the conditions under which they will be most useful. Generally speaking, blockchains are most effective whenever the agreement can be written in clear computer language and its outcomes are verifiable. For example, in the TradeLens blockchain, the environmental conditions of the shipping of containers can be objectively measured by sensors. In this case, the blockchain can accurately identify whether the conditions of the agreement are met. In contrast, for services whose quality of delivery cannot be precisely defined but require subjective assessment, traditional contracting or social mechanisms will likely continue to be more appropriate, as they allow human interpretation of the intended meaning of the agreements.

*Joint use of different solutions.* Given that blockchains, at least in their current stage of development, have notable shortcomings, using them alone is often not enough. For example, sometimes it is not only more efficient but maybe necessary to keep parties' rights and obligations more open-ended using natural language. It is thus advisable to consider a joint use of blockchains and legal contracts to let them complement each other. In the TradeLens case, while the successful transportation and delivery of cargo can be significantly improved by blockchains, the carrier and cargo owner may nonetheless need to sign traditional legal contracts, which are more flexible and open to human interpretation, in order to stipulate the scope and boundaries of their collaboration.

*New challenges for companies in a blockchain economy.* Unlike human language, blockchains are based on machine language that non-technical employees may find hard to comprehend. Given the unique aspects of blockchain-based collaboration, firms need to develop different sets of capabilities to fully capture the benefits of blockchains. For example, besides legal personnel that are critical with the use of contracts, firms need to hire professional computer scientists or engineers that can read and understand the specific programming language in smart contracts. Smooth coordination between the business team and technicians will be critical for the success of applying blockchains to managing collaborations.

Blockchains have moved way beyond their earlier buzzword status; our research shows that they have arrived in numerous organizations and are used for a variety of collaborative purposes. In today's increasingly virtual environment, savvy managers can leverage blockchains to their advantage, and the importance of this technology will only continue to grow over the years to come.

FABRICE LUMINEAU is professor of strategic management in the Faculty of Business and Economics at the University of Hong Kong.

WENQIAN WANG is a PhD student of strategic management in the Krannert School of Management at Purdue University.

OLIVER SCHILKE is an associate professor of management and organizations and director of the Center for Trust Studies in the Eller College of Management at the University of Arizona.

LAURA HUANG is an associate professor in the organizational behavior unit at Harvard Business School and the author of *Edge: Turning Adversity into Advantage* (Penguin Press, 2020).