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# Blockchain : a global infrastructure for distributed governance and local manufacturing.<sup>1</sup>

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By Primavera De Filippi

in Diez, T. (Ed.) The Mass Distribution of Almost Everything. Institute for Advanced Architecture of Catalonia, Spain

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The arrival of the Internet and digital communication tools have led to the emergence of new “paper-less organizations” that operate without an office, schedule, or even employees. With the Internet, we can now work remotely, synchronously and asynchronously, without having to move from one place to another. We no longer need to live in the same place, or meet face to face, in order to collaborate on a common endeavour. We simply need to connect to the Internet network to find colleagues, partners or customers. The hope was that this global communication network would eventually lead to increased participation and greater opportunities for people all over the world to participate to the global economy. And to some extent, it did.

Yet, the shift was only a partial one. Over the past 20 years, we have progressively moved away from the traditional model of centralized organizations, where large operators (often with a dominant position) were responsible for providing a service to a group of passive consumers. Today, we are witnessing the emergence of new organizational structures in the digital domain, which are much more distributed in nature. These so-called “crowdsourced organizations” are responsible for aggregating the resources of multiple people to provide a service to a much more active group of consumers. Indeed, if we look at the modus operandi of today’s internet giants — such as Google, Facebook, Twitter, Uber, or Airbnb — we notice that they all have one thing in common: they rely on the contributions of users as a means to generate value within their own platforms. The problem with this model is that, in most cases, the value produced by the crowd is not equally re-distributed among all those who have contributed to the value creation. Most of the profits are instead captured by the large intermediaries who operate these platforms.

Conversely, in the physical domain, the development of new open source hardware and software tools during the last decades have been fostering new modes of learning, designing, manufacturing and collaborating that actually promote individual participation into an open ecosystem of value creation and re-distribution. Inspired by the Open Source movement in software, maker communities have been building new hardware-based

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<sup>1</sup> Edits from the article What Blockchain Means for the Sharing Economy?: <https://hbr.org/2017/03/what-blockchain-means-for-the-sharing-economy>

technologies and tools inside new fabrication spaces<sup>2</sup>. Today, millions of people are connected to the Internet using open source software, and employ digital fabrication tools (including 3d printing) to build the largest distributed design and manufacturing ecosystem in the world. This opens a new potential for a more equal redistribution of production means, both digitally and physically. And yet, as it happened with the Internet a few decades ago, the value generated by makers is likely to be captured by the upcoming manufacturing and distribution giants. How can these communities govern themselves without falling into the same centralized paradigm that has become so widespread in the context of the sharing economy?

Recently, a new technology has emerged that could contribute an answer to that question. Blockchain technology—the technology that underpins Bitcoin—facilitates the exchange of value in a secure and decentralized manner, without the need for an intermediary. As such, it enabled the emergence of virtual currencies and other distributed ledger technologies that are prone to disrupt existing intermediaries in the financial sector, and beyond.

But the most revolutionary aspect of blockchain technology is that it is also a means for individuals to coordinate common activities, to interact directly with one another, and to govern themselves in a more secure and decentralized manner. Indeed, modern blockchain-based networks make it possible for people not only to transact value between each other, but also to execute software in a secure and decentralized manner. With a blockchain, software applications no longer need to be deployed on a centralized server: they can be run on a peer-to-peer network that is not controlled by any single party. These blockchain-based applications can be used to coordinate the activities of a large number of individuals, who can organize themselves without the help of a third party.

There are already a few of such applications that have been deployed on a blockchain. For instance, Steemit, Sapien, and Akasha are distributed social networks and media platforms that operate without a centralized authority. Instead of the content being stored on a centralized server, operated by a centralized organization that can control and manage the content that is displayed to the public, these platforms store content on a decentralized network, using blockchain technology to coordinate individuals and manage the content they contribute to the platforms through a set of code-based protocols and rules.

Similarly, OpenBazaar is a decentralized marketplace, like eBay or Amazon, that operates independently of any intermediary operator. The platform relies the Bitcoin blockchain to ensure that buyers and sellers interact directly with one another, without passing through any centralized middleman. Anyone is free to offer a product for sale on the platform at a

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<sup>2</sup> See, for instance, the Fab Lab Network, which consists of over 1000 consolidated fab labs around the world, all sharing a common inventory and core values around collaborative and sustainable production, educational programs, and ongoing projects at a global scale.

given price. Once a buyer agrees to the price for that product, an escrow account is created on the blockchain requiring two out of three people (i.e., the buyer, the seller, and a potential third-party arbitrator) to agree for the funds to be released (a so-called multisignature account). Once the buyer has sent the payment to the escrow account, the seller ships the product, and after receiving the product, the buyer releases the funds from the escrow account. Only if an issue arises will the system require the intervention of a third party (e.g., an arbitrator) to decide whether to release the payment to the seller or whether to return the money to the buyer.

There also have been some attempts at creating generic infrastructure for decentralized organizations, such as DAOstack and Aragon, which provide the basic building blocks for creating decentralized crowdsourcing organisations, administered without a centralized operator. These organizations are governed by the code deployed on a blockchain-based infrastructure, which is designed to govern peer-to-peer interactions between multiple actors.

Blockchain technology thus facilitates the emergence of new forms of decentralized organizations, which have no director or CEO, nor any sort of hierarchical structure. These organizations are administered, collectively, by all individuals interacting on a blockchain. As such, it is important not to confuse them with the traditional model of “crowdsourcing,” where people contribute to a platform but do not benefit from the success of that platform. To the contrary, blockchain technologies can support a much more cooperative form of crowdsourcing — sometimes referred to as “platform cooperativism”— where users qualify both as contributors and shareholders of the platforms to which they contribute. And since there is no intermediary operator, the value produced within these platforms can be more equally redistributed among those who have contributed to the value creation.

With this new opportunity for increased “cooperativism,” we’re moving toward a true sharing or collaborative economy — one that is not controlled by a few large intermediary operators, but that is governed by and for the people. Blockchain technology makes it possible to replace the model of top-down hierarchical organizations with a system of distributed, bottom-up cooperation. Ultimately, this shift could change the way wealth is distributed in the first place, enabling people to cooperate toward the creation of a common good, while ensuring that everyone will be duly compensated for their efforts and contributions.

While most of these blockchain-based organizations have been—thus far—developed mostly to facilitate the coordination of individuals in the digital world, the possibilities provided by these new organisational structures can also be found in the physical world. Cities, municipalities and local communities can leverage the power of blockchain technology in order to increase transparency and accountability in many sectors of activities, while providing new opportunities for anyone to engage and participate in the

local economy. Indeed, blockchain technology is currently being explored as a way to support local energy microgrids with a peer-to-peer exchange between neighbors (see, e.g. *Grid Singularity*) or to provide more transparency in the food supply chain (with projects such as *Provenance*, for instance) by recording information in the form of immutable cryptographic records on a distributed ledger.

Digital technologies create many new opportunities to increase the capacity of local production within communities, neighborhoods and cities with the use of urban farming technologies (aquaponics, aeroponics, synthetic biology), solar panels or wind turbines, and digital fabrication tools (from personal 3d printers to flexible factories). These technologies could contribute to great operational efficiencies by reducing the costs of production and unleashing new business opportunities for manufacturers worldwide. Yet, the question of governance remains a critical issue that still needs to be properly addressed. Indeed, in the physical world, commons-pool resources are subject to the "tragedy of the commons": without a proper governance structure or incentivization scheme, people are likely to free-ride, leading to an over-exploitation and/or under-contribution to these common-pool resources. In order to increase the chances that these new technologies contribute to the flourishing of a healthy ecosystem of local production, we need to identify the proper incentivization mechanisms that will encourage people to contribute resources, without being subject to the scrutiny of a centralized authority.

Enabling local processes of production to reduce the impact of the current industrial globalisation is crucial, but enabling mechanisms to incentivise, accelerate and scale this process is fundamental and urgent. This is where blockchain technology could come at hand by creating an open platform and decentralized incentivization scheme that can be articulated between multiple stakeholders. Local communities have been experimenting with local currencies for a long time, but because of the limited scope, these have never managed to reach a global audience. For instance, with a blockchain, multiple cities around the world could incentivize local communities to contribute to the commons and engage into productive and collaborative activities by rewarding these practices with a global social impact currency. This would enable local communities to coordinate, on a global level, in order to promote a paradigm shift in terms of recycling, reuse, relocalisation of supply chains, and other practices that reduce the impact of the linear economy.

The opportunities are huge, and yet, nothing should be taken for granted. The decentralized potential of blockchain technology does not necessarily mean that it will in fact be used in a decentralized manner. Just as the internet has evolved from a highly decentralized infrastructure into an increasingly centralized system controlled by only a few large online operators, there is always the risk that big giants will eventually form in the blockchain space. If we, as a society, really value the concept of a true sharing economy, where disparate groups of individuals can coordinate themselves and cooperate on a peer-to-peer basis, and those producing value are fairly rewarded for their efforts, it behooves us all to engage and experiment with this emerging technology, in order to

explore the new opportunities it provides and deploy large, successful, community-driven applications that enable us to achieve the promises of a true collaborative economy in the context of new productive cities.