



# Binding Commitments

## The Future of Blockchain Governance and Distributed Organizations

As we push headfirst into a world of collaboration at unprecedented scales, blockchain technology will bind our individual commitments together to form new distributed organizations.

A Cambrian explosion of models for coordinating people and machines will emerge from local experiments in blockchain-based governance and incorporation. Marginalized communities and powerful entities will use these protocols to enforce their own code-based rules of conduct. Dissenting groups will tear themselves away from mainstream states, mutating existing governmental DNA to construct new ways of thriving together. Each new system will be a glimpse into the future of human relationships, providing a learning opportunity for making communities more responsive, transparent, and resilient.

Governance-as-a-service models will reduce the cost of collaboration between groups of people by establishing shared rules and goals on an ad-hoc, opt-in basis. Automation will manage efforts across massive groups, protecting common resources through unbreakable coded instructions supported with consensus decision-making. In time, institutions weighed down by bureaucratic inertia will become upgradable, adaptable, and agile through the use of these technologies.

Present forms of governance are marred by human tendencies toward corruption and inaction.

Blockchain technology stands to bridge gaps of trust in and across existing institutions, and can even autonomously generate entirely new institutions when necessary. By making intentions visible and actions swift, human civilizations will elucidate new levers of power to change governance structures that have remained stagnant for ages.

As architects of blockchain-administered organizations, executives and politicians of the future will develop new ways to encode their influence, establishing leadership within leaderless networks. They will use crypto-economic incentives and harness network effects to shepherd masses into their networks and toward shared goals.

With the potential to transform business, government, activist, criminal, and community structures, blockchain-based distributed organizations and governance will keep us true to our word.



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# How We Decide

## Expert Voices on Blockchain-Powered Governance

The largest governments and the smallest non-profits both need to make hundreds, if not thousands, of decisions every year. How are budgets made? How are disputes settled? How are obligations enforced? How are benefits distributed? Many of these tasks lend themselves well to the decentralized, consensus-based, immutable nature of the blockchain. We spoke to three experts about the role of blockchain technology in the future of corporate and public governance.



**William Mougayar** is a Toronto-based investor, researcher, blogger, and author of *The Business Blockchain* (Wiley, 2016). He is a direct participant in the crypto-technology market, and an advisor or board member to some of the world's leading blockchain organizations, including Ethereum, OpenBazaar, Coin Center, and Bloq. He blogs regularly about the present and future of blockchains at Startup Management.



**Josh Stark** is a consultant and head of operations & legal at **Ledger Labs**, where he focuses on the intersections of law, governance, and blockchain technology. Previously, Josh worked in corporate law before moving full-time into the blockchain industry in early 2015. He holds a law degree from the University of Toronto ('13) and a B.A. from McGill University ('09).



**Susanne Tarkowski Tempelhof** is a founder of **Bitnation**, a decentralized borderless voluntary nation that uses blockchain technology to provide services such as identification, dispute resolution, insurance, and security. In 2015, Bitnation developed a public notary solution for Estonia, which allows anyone to digitally notarize documents on the Blockchain.

### Q How can the blockchain play a role in organizational governance?

**Stark:** A lot of this depends on how closely you can integrate the things that are being governed with a blockchain governance structure. So for instance, they could be very useful in a situation where what you're governing is some sort of digital asset that can be totally represented on a blockchain. This would allow your governance structure to control that asset without depending on off-chain processes to effect the results of a decision.

An example of that would be a vote to send money to pay for something or to make an investment. That can be done entirely on a blockchain, it's very efficient. It might be less useful if your governance system is being used to make decisions about assets with physical properties that can't be represented digitally. If the effect of the decision is to sell a car the company owns, someone still has to go sell the car and transfer the car into possession of the new owner.

### Q How can the blockchain improve the delivery of public services?

**Mougayar:** We should think of the blockchain as an enabler for the next generation of e-services that progressive governments have been already providing since the Internet came along, like filing taxes, applying for licenses, or filling out claims. Generically, there can be 4 categories of activity: 1) Verification: Licenses, proofs of records, transactions, processes, or events. Did this event take place? Was this service performed on this piece of equipment? Does this person have the right permit? 2) Movement of assets: Transferring money from one person/entity to another. Enabling direct payments, once a work condition has been performed. 3) Ownerships: Land registries, property titles, and any type of real estate ownership. The blockchain is a perfect keeper of the chain of custody for any physical asset. 4) Identities: Government and cities could issue blockchain e-identities to its citizens, enabling them to securely use services like voting. An e-identity could become similar to a passport, allowing its holder access to a variety of services and rights.

**Tarkowski Tempelhof:** Instead of law enforcement you can have reputation scores to incentivize good behavior and punish bad behavior. And smart contract protocols like Ethereum and Rootstock are enabling smart contracts that could replace the whole legal system. For instance, if you buy a car from me and we put the money in escrow, that escrow isn't released until everything is verified. That could be viewed as digital law enforcement or coded law enforcement. This gives you the ability to write your own laws, to choose your own legal system.

### Q Which parts of the public and corporate sectors are low-hanging fruit for blockchain technology?

**Mougayar:** Given the early stage of blockchain technology, it is a lot easier to implement solutions at smaller scales first, in jurisdictions that have between 5,000 to 300,000 citizens, instead of larger cities of more than a million inhabitants. In the lowest hanging fruit category, I would place registries of all types starting with ones that have an ownership component. Also, the blockchain can help prevent fraud in services where fraud is prevalent. A useful starting point is the issuance of blockchain-backed identity credentials that are the basis for the applications and services.

**Tarkowski Tempelhof:** The easiest thing at the moment, technically, are records—land titles, medical records—because the technology for that is already quite mature. Smart contracts are still much more experimental at the moment.

**Q What steps need to be taken to start implementing blockchain technology for governance?**

**Mougayar:** Like any reengineering effort, start by documenting your current processes, then conduct simulations. Pick easier implementation projects, where you start by automating something related to your operations, e.g. voting, signature-based authorization workflows, or areas where you are dispensing rights to users. Autonomous operations might be easier to achieve initially, and it relates to automating via the blockchain some aspect of existing operations, via collaborative decision-making for example. To uncover use cases for this segment, think of the decisions that you currently make that require voting or participative voices from within your organization. You can integrate the recording and enactment of these actions with blockchain-based workflow capabilities. Be careful in implementing “blockchain autonomy” too quickly. It was that autonomous part that took down “The DAO” last June. Too much autonomy was entrusted into fledgeling smart contracts, and the process took a turn that was humanly unstoppable (except via a hardfork which is a non-natural blockchain act that happens on an exception basis). Autonomy seems to be a stubborn goal of autonomous organizations, because ambitious engineers want to give power to their smart contracts, just because money, business rules, responsibilities, and decision-making can now be programmed all together in a big mashup. So, take discrete and iterative steps.

**Q How would an NGO in 2027 use blockchain technology to fulfill their charter?**

**Stark:** Imagine having a charitable organization that has many, many participants. It not only has a board that has special permissions, but it also has many donors. When they donate a certain amount to the charity, they gain some fractional amount of voting interest over certain decisions that the organization makes. The charity can say, “Not only are you giving us money, but you have a direct say in how it’s used.” Maybe someday when those kind of transparency measures become common and practical enough, that can become an expectation of the market.

We can imagine votes being made on how to divide up a budget for the following year, and we can imagine that we have this larger pool of participants that are able to vote on new priorities for charitable work, as well as expert board members who have a greater proportion of the vote. When a vote is complete, the funds can be instantaneously transferred to the recipients defined in the proposal.

At the point where all of this is very fluid and liquid, we can also imagine that there is a continuous process of voting and decision making on how to distribute the funds that are coming into the organization. Maybe rather than working on a yearly budget cycle, it becomes possible for people who want to donate to the charity to vote on a daily basis on what the charity should be doing. Maybe that makes it possible

for the individual donor that has some voting rights to read a news article one day, be very moved by it, and register that vote with the charity they donate to, to move some amount of funds towards that cause.

Once we get to 10 years in the future, we can imagine very flexible systems being used that are not just analogues or imitations of existing governance structures but ones that really take advantage of the kind of flexibility and decentralization you can have with purely digital voting and financial systems.

**Q What are the challenges of implementing blockchain technology for governance?**

**Mougayar:** Trying to do too much at once. You can’t automate something that you haven’t had experience in running previously. It takes a lot of faith in trusting that blockchain technology can be a supporting technology (instead of databases) for verifying, enforcing, or recording trust related activities. Therefore, running parallel systems initially is a good practice, as it helps at two levels: a) prove that the technology is reliable, b) offer a level of mental trust.

**Q What is the end goal of blockchain governance?**

**Tarkowski Tempelhof:** I want to make governments irrelevant, by providing better, cheaper, and more secure services. I don’t like nation-states conceptually, because people can’t choose their own government. Regardless of where they are born or what passport they have, people should be able to choose what kind of government they want, how much they want to pay for it, and what services they want to subscribe to. I decided to start Bitnation with the help of blockchain technology, because it is possible to cut costs and provide a framework for it.

If you look at what a government is supposed to provide to its citizens, if you strip it down to its very minimum, it’s really security and jurisdiction. It’s about protecting people’s assets and private property, including the physical person. What we are focusing on right now at Bitnation is building Pangaea, which is the world’s first blockchain jurisdiction, where people can choose their own codes of law, their own arbitrators, arbitration methods, etc.

**Q To me it seems like this kind of thing would be more applicable for civil law than criminal law. Could you envision it being used for criminal law?**

**Tarkowski Tempelhof:** I used to live in Afghanistan. In one village, there would be some people following Sharia law, others following Pashtunwali. In every village there were like five competing codes of law and they all had their own courts, etc. People got along in relative harmony, much better than now, in fact, where there is one centralized code of law from Kabul that they are trying to impose on everyone. Essentially, I think a poly-legal system works better. I know it sounds unrealistic, but I actually think a centralized code of law is unrealistic. It works in harmony as long as [groups] can follow their own principles. I can’t see why it can’t be applied to criminal law as well as civil law.



# BUILDING BLOCKS



The following are four building blocks for understanding how blockchains will be used to create and govern distributed organizations. Once communities **INCORPORATE**, they will **DECIDE** on shared rules and obligations, **ENFORCING** commands through real-world action and digital shifts in power while ensuring the ability to **AUDIT** performance and compliance. These building blocks will help us mutually succeed in environments of mistrust.

## INCORPORATE

Distributed entities will incorporate according to bylaws stored and enforced through blockchains.

Organizations achieve what informal networks cannot. They are formed when groups agree to collaborate and share assets under set terms. Until now, these terms were enforced through trust and legal recourse. Blockchain technology enables incorporation and organizational management without a human controller, relying on software to coordinate peers and punish bad actors.

Blockchains are decentralized organizations. They set guidelines for how peers can sequentially store and synchronize digital records together. The software protocol defines how records are formatted and submitted and how peers, known as miners, validate and organize records in “blocks” in exchange for fees. Each participant has a role in handling records, and their interactions are designed to support each other while preventing cheating.

Newer blockchain systems like Ethereum allow users to specify complex instructions for handling payments and data, known as “smart contracts.” A smart contract’s code is stored like a conventional blockchain record, so any miner can trigger the

contract, and no one can change the cryptographically-sealed contract code or prevent its resulting actions from occurring. As smart contracts stack, they act like autonomous CEOs or prime ministers following an explicit charter. The charter dictates how participants engage with each other, earn power, how the system itself changes, and more.

In “DAOs, DACs, DAs and More: An Incomplete Terminology Guide,” Ethereum founder Vitalik Buterin outlines the possibility of creating leaderless “decentralized autonomous organizations” and “decentralized autonomous corporations” designed to generate profit. Others have defined “distributed cooperative organizations,” allowing voting on rules and sharing of equity. Some decentralized organizations will replace existing organizational and governmental functions. Others will act as a third party to help facilitate trade or governance between organizations. Still others will act independently from other institutions, searching for profitable opportunity and enticing participants to join them on an ad-hoc basis.

## DECIDE

Members of distributed organizations will decide whether to settle disputes through blockchain voting systems or defect to alternative organizations.

In a perfect world, engineers would create flawless decentralized organizations that suit the current and future needs of all members. In practice, participants’ needs will evolve, resulting in disagreements about the preferred course of collective action. Since decentralized organizations rely upon unbreakable cryptographic rules, there are two courses of action. Participants can include an explicit voting mechanism in the organization’s software, or leave the rules unchangeable and let dissenters leave the organization. Each method and implementation is a statement about the role of trust and human opinion in collective groups. Lessons learned from mediating disputes in blockchain-based distributed organizations will inform the way we govern shared commons of all kinds for decades.

Blockchains were designed from the get-go to reduce the risk of human tampering with messages and code. To take advantage of this security affordance, most decentralized organizations will be built with static, unchanging rules. Users who disagree with particular rules will abandon organizations for new ones that better suit their needs. New systems may be nearly exact copies of old ones, with only minor code changes.

The process of migrating to a modified version of an old system is known in software development as “forking.” Dissenters will fork existing codes for society, governance, and business to make them more efficient or customized. They will campaign for their new systems through off-chain channels, building alliances with miners and users to garner the political weight

necessary for a blockchain exodus. Forking can be undesirable for blockchain systems that depend on network effects, especially for the core protocol rules of underlying blockchains themselves. Forking splits the rules, community and resources of an organization. Two co-existent chains or smart contracts will thus compete for value and prolong conflicting rulesets that can be manipulated for a hacker’s gain. Despite the pains associated with forking, ongoing mutations in code will be a digital form of natural selection, letting the best code bases win as weaker ones die off. As blockchain-based decentralized organizations work their way into government IT systems, the concepts of forking and voluntary exit will be extended to existing governance and society.

With foresight, however, voting will be implemented directly into decentralized collaborative organizations to allow for straightforward decision-making. Users will voice their opinion by signing ballot messages with their unique cryptographic member address, or moving resources within the network to express their position. Government agencies will adopt these solutions to create lightweight digital voting systems, relying upon cryptographic security from the ground up. Decentralized corporation board appointments and business decisions will follow suit, allowing for clear and transparent strategy development between distributed workers. All voting systems will face the threat of “sybil attacks,” where a dishonest actor creates multiple accounts to inflate vote counts. Identity research and verification will help alleviate these concerns, bolstering confidence in the foundations of hive-mind strategy.

## ENFORCE

Decentralized organizations will use crypto-economic incentives, member exclusion, robotic controls, and traditional legal recourse to enforce smart contracts.

A law is only as good as its enforcement. Through a combination of economic levers and physical-world actuation, distributed organizations will faithfully carry out smart contract terms. The resilience of distributed enforcement will bolster executive ability in consensual agreements but limit ways to counter coordinated nefarious actions.

Cryptocurrency protocols elegantly enforce their own rules by controlling access to the cryptocurrency itself. The protocols reward pro-network behavior, like validating transaction blocks, by minting more of the cryptocurrency for the user. They punish anti-network behavior, like altering or deleting records, by limiting the fungibility of a cheater’s cryptocurrency as they struggle to build longer false chains than others’ honest chains. Furthermore, application-specific coins create a means of crowdfunding support in exchange for access to a blockchain application’s functions. Like symbolic paper money in today’s world, token-based drivers will function only to the extent that people believe in their future usefulness. Decentralized organizations will offer these economic bounties to community supporters to solicit labor and maintenance, disincentivize hacking, and reward asset contributions to the shared commons. Though innovators at the margins of society will push the concepts of distributed enforcement forward initially, large corporations will quickly follow suit to maintain agility. Beginning with non-core departments, they will experiment with deconstructing workforces and deploying global gig workers at a moment’s notice to satisfy hungry markets. Equally nimble unions will meet these new conditions by

organizing distributed strikes and boycotts, updating activist’s shopping preferences instantly.

Though blockchains can only directly control digital systems built on top of them, companies will develop hardware and software to track blockchain events, triggering actions when important conditions are met. Ownership in blockchain collectives will define who can own and build on web domains and virtual reality spaces at a given time. With the rise of robotics, businesses will kickstart manufacturing lines, release cargo crates, and deploy human resources based on demand information conveyed by consumer organizations. Regulatory agencies will grant access to electromagnetic spectrums depending on ongoing blockchain regulatory limits. Connected civic infrastructure will ensure urban facilities are engaged to help vulnerable populations in proportion to reported need. Value-neutral blockchain protocols will create tensions when societal architects enforce rules upon defenseless subjects. Relentless and uncensorable criminal contracts will prey on vulnerable populations, while implicit prejudice creeps into the fabric of stratified nations. Grass-root reactionary enforcement efforts will work to gather support, but struggle to pinpoint the myriad obscured contracts that orchestrate their lives.

Enforcement on the blockchain will be swift and secure, but complex and difficult to undo. Standardized ethical design practices and fallback safeguards will help protect sovereign communities from distributed harm.

Distributed organizations will track activities and flag anomalies on an ongoing basis through shared, immutable blockchain ledgers

Blockchains are commonly known as “distributed ledgers,” drawing parallels to traditional accounting ledgers used for auditing organizations. Despite criticism about the lack of formal identity requirements for using them, blockchains tie all payments and actions back to pseudonymous cryptographic keys. If a group or individual is associated with that key publicly, their payments and actions can be seen by anyone with a copy of the blockchain. Further, even the most basic blockchain systems include message space with every transaction. These messages include contextual payment information, or records of documents that exist off-chain through a hash, which is a cryptographic fingerprint of document data ensuring its completeness and integrity.

Blockchain ledgers will bring a step-change in transparency for organizations willing to commit to distributed scrutiny. Donors will track their money as it makes its way through philanthropic blockchain funds and middlemen, down to fractions of a token. Government spending will influence voting prospects as data visualization tools point out wasteful investments. Corporations will force business units and business partners to spend money through surveilled pathways to prevent abuse of company funds and ensure measurable returns on investment. Regulators will let auditing bots loose to scour live ledgers in search of fraudulent claims, replicating evidence to prevent scrubbing.

Organizations will reduce the need for regular audits by voluntarily routing their revenue and expenditures through

regulation-compliant smart contract tax validators. Government agencies will establish tax policy as a provable set of specifications, allowing any application developer to develop compliant reporting tools. Reporting tools will rely on cryptographic zero-knowledge proofs, which can prove valid data exists without revealing the data itself, to ensure privacy is preserved while allowing for ongoing checks. Traditional banks and decentralized financial cooperatives will prove their solvency through the same process. In the case of an error in any proof, organizations can selectively reveal the data in question to resolve issues without divulging other information. Universal government surveillance may prove feasible without compromising innocent citizens’ security. They may audit records to check for fraudulent or criminal activity transparently, with publicly available logs whenever a warranted source data revelation is required.

Distributed autonomous organizations will reduce the need for audits by invalidating incompatible actions. Still, disputes arising between members of a decentralized group may require a mutually appointed, impartial arbitrator selected from a global market. They will provide their best assessment of complex systems and physical-world conditions in exchange for cryptocurrency payments or enhanced reputation.

Cryptographic proofs held by distributed witnesses will help organizations of all kinds stay on track and accountable for their actions.

**E-Estonia** is a program extending Estonian residency to international individuals. They provide *blockchain* notarization services through Bitnation. [bitcoinnmagazine.com](#)

### Government-as-a-Service

Despite global efforts to define and provide universal human rights, marginalized people are still being left without reliable and incorruptible access to essential government services within their geographic borders. Blockchains will offer digital means to store identity credentials, establish asset ownership rights, mint money, finance public goods, mediate disputes, and more. Collectively, blockchain-based government services will amount to an incorporated, opt-in pseudo-government without explicit geographic or political borders.

Since anyone with an Internet connection can theoretically access these functions, disenfranchised populations will migrate parts of their lives to these digital governments. Digitally unconnected populations will use trusted local community centers as interfaces to their digital citizenship.

Existing nations will clash with blockchain polities, fighting over the resources and power that they can no longer control. Like a hydra, alternative blockchain nations will emerge as old ones are vanquished.

**FollowMyVote** creates tools for blockchain-based voting and attempted to support a “Parallel [U.S.] Presidential Election 2016.” [followmyvote.com](#)

### Liquid Democracy

Blockchain voting systems allow people to democratically shift power in real-time, rather than at periodic election intervals. Early voting systems will replicate existing vote-counting mechanisms, providing a transparent and cryptographically secure way to measure popular opinion. Voters participate in elections from mobile devices using strong blockchain identities, increasing turnout from time-starved voters. Blockchains dramatically cut the cost of running an election, making it feasible to run elections more frequently than analog systems allow.

As elections are held more frequently, governments may do away with elections at intervals, instead implementing real-time liquid democracy. People move their allocated political power on a daily basis. Bureaucratic representatives give way to direct policy vetting. Beyond policy, citizens will move their taxes and communal resources toward systems that work for them, whether global or national, creating a free market for effective governance. Businesses and activist groups will follow suit. These organizations will struggle to balance direct opinion with the need for informed decision-making, especially in the face of neurally-optimized propaganda and information overload.

**Ethereum** lists a code example on its website showing “How to Build a Democracy on the Blockchain” through customized smart contracts. [ethereum.org](#)

### Competitive Polities

Every person in a given jurisdiction is expected to follow one set of laws. And it makes sense—if anyone didn’t adhere to the same rules, it would result in conflict and confusion. But most places on earth actually do have overlapping rules and codes of conduct—think of religious codes, ethnic customs, neighborhood covenants, and private club rules. Using blockchain technology to allow subsets of people to voluntarily form their own legal systems will lead to stateless legal systems that would allow for in-group compliance as well as inter-group respect and cooperation through smart contracts, value transfer, and public service provision.

A blockchain-based polycentric legal network would do away with the traditional “one-size-fits-all” form of governance of Western liberal democracies. Instead, different legal systems within the same geographical location would compete with one another for citizens. It could be possible for an individual to have dozens of citizenships.

**The Silk Road** was a decentralized marketplace where anonymous customers could buy illegal goods using a Bitcoin escrow system for financial protection. [silkroaddrugs.org](#), [reddit.com](#)

**CrowdJury** mediates disputes without legal institutions, storing evidence on blockchains and paying jurors and crime reporters in cryptocurrency. [themerkle.com](#), [crowdjury.org](#)

### Mutually-Assured Bankruptcy

The world’s superpowers are dissuaded from nuclear aggression through the threat of mutually assured destruction. Smart contracts could codify the same game theory-based incentive in a way that prevents two or more parties from violating the terms of non-disclosure agreements. All parties would place an amount of cryptocurrency into escrow. (The amount each party puts into escrow doesn’t have to be the same, as long as all the parties agree to the amounts put in.) If an off-chain oracle detects that the confidential information was leaked before the NDA expires, all the parties’ cryptocurrency is burned, making it unrecoverable. Self-executing smart contracts will allow for the creation of a number of different game theory based enforcement methods that would be difficult to otherwise implement. The common problem of the Prisoners’ Dilemma, for instance, could be avoided by writing a smart contract that triggers a betrayal condition against any party that betrays another party in the agreement, thus making non-betrayal the only rational course of action.

### Embedded Civil Law

Geographical locations and jurisdictional boundaries are not important in smart contracts, because they contain their own set of rules (or they can link to a set of rules that all parties agree to) as well as built-in enforcement mechanisms. As a result, the cost and size of the civil justice system will decrease as inexpensive blockchain-enabled smart contracts limit the need for lawyers, courtrooms, court staff, and other roles on maintaining a civil justice system. As the cost of creating smart contracts drops, they will become increasingly common in everyday transactions. If coconut water you buy is guaranteed to be cheaper than competitors, but is found for eleven cents less at another store, the difference will be automatically credited to your account. Your Fitbit will send your exercise log to your insurance company to defend your eligibility for low-cost benefits. Every minute beyond the scheduled departure time of your flight will trigger a one percent refund of your ticket price. If your rideshare driver gets into an accident, an app will permanently log the incident and pay a restitution.

**Skry** uses graph analytics to detect fraud, illicit activities, and other anomalies on blockchains. [skry.tech](#)

**Storj** a decentralized cloud storage app, ensures “proof of retrievability” for files. [bitcoinist.com](#), [storj.io](#)

### High-Frequency Incorporation

Blockchain incorporation tools will cause distributed organizations to proliferate. They will be spun up whenever an ongoing relationship with rigid rules is necessary to share resources, labor, and data according to pre-determined collaboration preferences.

Corporations will form micro-consortia with other entities to take custody of physical and data resources. Cryptographic tools like homomorphic encryption will protect sensitive information from either party while allowing outsiders to use and improve on information resources. These structures will disappear when goals change or resources are expended. Criminal enterprises will break down into constituent parts and join cross-syndicate attack networks to gain new money and influence. Swarms of blockchain front businesses will mask the sources of criminal wealth and influence in an improved form of money laundering. Civic leaders will need to learn how to starve these entities of their valuable inputs in order to stop them. The flow of incorporated entities will challenge attempts at traditional analysis and legal enforcement, but expand the terms of trade to enable a rich cooperative ecosystem.

**WingsDAO** creates decentralized organizations without requiring users to have programming ability and allows interaction through SMS chatbots. [photos1.meetupstatic.com](#)

### Ledger Forensics

One of the unique aspects of a public blockchain is that everybody has access to its ledger, anybody can inspect the entries, but no one can alter the records. The combination of transparency and immutability goes a long way in establishing trustworthiness in a trustless system. In the Bitcoin blockchain everyone has a pseudonym, which is simply the address to which bitcoin is sent. But in a public governance blockchain, it will often be advantageous to link addresses to the identities of the entities (people, organizations, bots, IoT devices, etc.) for the purpose of conducting audits and performing data analyses. With completely open books, crimes like corruption, collusion, and embezzlement will be harder to commit. Increasingly, analysis tasks will be taken on by bots, which will scour blockchains for salient patterns and file reports on a metablockchain, available, of course, for meta-analysis by bots.

### Auditable Crowd Computing

Technology pioneers are using blockchains to decentralize cloud computing and the Internet. Computer files can be divided up between peers on a network in a process called “sharding,” with each piece tracked and summoned upon request through a blockchain. Computational tasks and Internet services can be provided in a similarly distributed fashion. One issue with these schemes is the ability to verify that a computation was performed correctly, and that a user’s files are stored in at least one place at a given time.

Developers are working on ways to verify the existence of data and the validity of computations through systematic blockchain-managed audits. At a random point in time, file hosts will prove they are actually storing the data with a cryptographic hash, receiving funds only upon receipt of a valid proof of file existence. Abstract computation models will be built into smart contracts to ensure the work being done by others is an acceptable result. This will help computers share hard jobs, but ensure the job is done right.

# Implications

## From hierarchical institutions to leaderless cooperatives

Blockchains will enable fluid collaboration across flat organizational structures, challenging rigid command-and-control internal governance. Distributed worker will swarm on opportunities faster than traditional business units can. These flat blockchain cooperatives will algorithmically distribute equity and control to keep collaborators accountable and motivated.

- How might businesses interact with external decentralized blockchain cooperatives?
- How might organizations redesign their internal units to function more like leaderless cooperatives?
- How might you algorithmically distribute economic incentives to encourage participation on projects?

## From elections to liquid democracy

Real-time direct voting on blockchain systems will set a precedent for government responsiveness and limits to power. Organizations of all kinds will use smart contract voting to directly influence asset allocations and strategic directives.

- How might you gather popular opinion using provable blockchain voting applications?
- How might democratic nations with low institutional trust benefit from stronger voting infrastructure?
- How might organizations create a link between continuous polling and direct action?

## From opt-out government to opt-in governance

Until now, citizenship has been granted either by birth or through naturalization processes. Now, blockchain technology can offer citizenship services under cryptographically provable terms, making them available to digitally connected people worldwide.

- How might national governments expand the benefits of governance to individuals abroad through opt-in blockchain systems?
- How might global citizenship affect power dynamics between states?
- How might your organization utilize decentralized government services?

## From periodic auditing to continuous verification

Blockchain systems will track and verify that records are valid and complete in real time, then broadcast results so they cannot be changed. Blockchain activity will be monitored using advanced analytics or voluntary disclosure in cases where regulatory compliance is necessary.

- What steps would your organization have to take to make its processes openly auditable on a blockchain?
- How might cryptography help secure your data while selectively proving facts?
- How might continuous blockchain audits help reveal hidden patterns in business operations?

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### BLOCKCHAIN FUTURES LAB

IFFT's Blockchain Futures Lab connects industry leaders with practical visionaries and domain experts to identify long-term opportunities and design considerations for blockchain technology. The Blockchain Futures Lab provides a community forum to discuss paths towards a more efficient, transparent, and equitable world using the full potential of distributed systems. [www.iff.org/blockchainfutureslab](http://www.iff.org/blockchainfutureslab)