

# **Jumping on the Blockchain Bandwagon: Lessons of the Past and Outlook to the Future**

*Panel*

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## **Abstract**

*The panel focuses on blockchain, the technology behind Bitcoin and Ethereum. The topic has drawn much attention recently in both business and academic circles. The blockchain is a distributed, immutable digital record system that is shared among many independent parties and can be updated only by their consensus. If unbiased and incorruptible blockchain-based information systems become prevalent repositories of our records, trusting other humans with constructing and maintaining key records to define the resources at our disposal could become unnecessary. In principle, blockchain could provide a decentralized information infrastructure that no one fully controls, thereby no one has absolute power and no one can distort past or current records. The full potential let alone implications of blockchain is still unknown. The panel explores blockchain challenges and opportunities from the IS research perspective.*

**Keywords:** Blockchain Technology, Distributed Ledger, Smart Contract, Decentralized Organization, Sharing Economy, IS Research

## Introduction

The panel is about blockchain, the concept behind Bitcoin and other cyber-currencies. The topic has been discussed in the mass media almost on a daily basis, and has drawn much attention in business and academic circles. A blockchain is a distributed digital record system that is maintained and governed by a consensus mechanism. It is essentially a distributed and immutable record or ledger of digital events that is shared by independent parties, and updated only by a consensus of a majority of the participants in the system.

The implications of blockchain might be significant because it offers an alternative logic to record keeping which is part and parcel of the human enterprise. With the proliferation of blockchain-based information systems, individuals and organizations might not need to trust entities outside their control to keep the record straight in their respective environments. In contrast, at this time, there is no viable alternative and we still need banks to construct and maintain financial records, hospitals to construct and maintain health records, and universities to construct and maintain education records. This is “natural” and people have virtually no choice but to trust others to construct and maintain records that define credentials and resources. This inherent vulnerability of modernity could be mitigated in part through reliance on unbiased and incorruptible blockchain-based digital agents.

The financial sector is currently leading the way in using blockchain, but other industries including shipping, transportation, healthcare, and entertainment are following quickly. If blockchain lives up to its potential, it could deliver a new level of objectivity and ironclad trust that even the most reputable trustees in the physical world cannot match. It could provide a decentralized global information infrastructure where no one has full control or absolute power. If no one can distort or lie about past or current events things would indeed change. The blockchain vision is nascent, but as more people jump on the bandwagon, the entities that currently hold socio-economic power are alarmed. They can be expected to gear up, fight back and defend their turf.

The emerging blockchain ecosystem enables new forms of organizing and human cooperation. In principle, blockchain might allow new heights of liberty, equality, and fraternity. The panel explores the IS research perspective provided by the blockchain phenomenon, and its potential consequences for organizational practices, economic imperatives, and social order.

## Positions and Exploration

Building on the inherent dialectics and mixed feelings toward blockchain technology that range from excitement to disregard in business organizations and government institutions, the panel explores and debates the potential prospects of the blockchain, possible effects on the economy and social order, how information technology might enable new forms of business and organizational model and evolve in response to the market and the social forces that drive the emerging ecosystem. We provide a framework to help future examination and development of blockchain-based applications that might become part of the infrastructure and mainstream economy.

Following an introduction, the panel will discuss the blockchain phenomenon and explore related economic, social, and technological implications that will be consolidated into the trajectory of information systems research. Building on research experience and expertise, each of the panelists will approach the underlying discussion from a unique reference point. *John King* will highlight the implications of the blockchain to the institutional and technological infrastructures; *Matti Rossi* will highlight the radical openness characteristic of the blockchain and its implication to innovation and organization; *Roman Beck* will highlight the implications of the blockchain to economic theories and subsequently to the financial sector and financial markets; *Robin Teigland* will highlight the role of blockchain in reframing the next generation of sharing economy business models and its implications to the labor markets; *Michel Avital* will moderate the panel and serve as devil’s advocate.

Discussion will cover the following main themes in the current blockchain discourse:

### ***Theme 1 – Blockchain as Accelerating Force of Innovation***

Alternative blockchain solutions, such as Ethereum or Hyperledger, illustrate the growing interest in the underlying technology. They underscore the economically efficient concept of smart contracts and new organizational forms (e.g., distributed autonomous organizations, or DAOs) that enable the development of cryptocurrencies and novel payment systems as well as transfer of property rights through a programmable execution logic on the blockchain. These blockchain solutions encourage the development of new business models in the context of e-commerce and the sharing economy. They also could “revolutionize” industries. The financial services industry has already started investing heavily in blockchain technology, with many banks starting in-house prototyping on private ledger solutions that experiment with the technology for corporate bond management, over the counter derivatives trading, and trading of non-listed shares. These are incremental changes, but more radical infrastructural blockchain solutions are being developed for intra- and inter-bank transaction systems. The driving vision of R3 CEV, a consortium of global financial institutions, will develop a blockchain-based infrastructure to manage industry-wide financial reference and financial instruments data cooperatively, and develop new financial applications and services that are not now possible. It is no wonder that blockchain is also making considerable waves in government circles at national and international levels. The EU hopes to increase transparency and reduce fraud and corruption while enabling borderless economic transactions. Estonia is innovating in this space by developing blockchain solutions for public notary services and healthcare records, as part of its efforts in e-residency. Blockchain might reduce transaction costs by removing third party intermediaries, and reduce risk as trust becomes more process-based than characteristic or institutional-based. This could enable one-off transactions between parties regardless of physical location. As blockchain is developed and implemented, research opportunities are emerging in IT-enabled network effects, IT-enabled organizations, IT-enabled value creation and competitive advantage, global e-business and collaboration, information security, data privacy, the digitalization of trust, the role of IS in policymaking, and the degree to which digital trust and blockchain technology benefits societal wealth production.

### ***Theme 2 –Radical Openness of Dynamic Repositories on a Global Scale***

Blockchain can be used for legal and public records like titles, birth certificates, voting polls, and court records. It can be used to create “smart property” in which blockchain performs inventory, tracking, and buy-sell functions for hard assets like diamonds or cars. Blockchain can be useful for sharing digital content in a controlled way. Blockchain is a transactional mechanism for that can allow peerless, trusted networks. It can guarantee transactions while providing anonymity for the parties involved. In an emerging programmable world, where physical things become programmable and get connected, more digital goods are reused and sold.

That said, not all is simplified. Systems such as Bitcoin are vulnerable to speculation and misinformation (Brezo & Bringas, 2012), and the lack of coordination from a central bank can be both a strength and a weakness for the decentralized payment and trust infrastructure. Trust on the platform can erode if forks appear, as currently demonstrated in Bitcoin. True openness is a design feature related to the ledger itself. Openness can nurture information exchange and trust within the developer communities, and without transparency and openness, collapse or bank runs are likely. Blockchain is new. Its full effects probably will not be apparent for some time. The most hyperbolic claims of blockchain are probably exaggerated. Blockchain is unlikely to do away with central banking authorities or other intermediaries. Disintermediation involving IT is almost always reintermediation. Current intermediaries remain because they are in a good position to ensure that they are beneficiaries of the new intermediation. Elements of the current financial system are likely to appropriate blockchain and apply it to their own interests, and “corner” solutions in which blockchain replaces traditional intermediaries are less likely than “intermediate” solutions in which traditional intermediaries retain power by taking on roles within the blockchain innovation. A particularly important element of this is the concept of “openness,” that usually translates into “transparency.” Contrary to popular belief, the current financial system is not particularly transparent, and it is likely that full transparency would cripple future financial systems. This needs to be thought through in the discussion of blockchain implications.

### ***Theme 3 – Capitalism and Trust***

Capitalism depends on free and rapid flow of capital, usually in the form of funds. This underlies the concept of “liquidity.” This is dependent on complicated trust structures, often involving third parties beyond the minimal party and counterparty. The establishment of trust is not well understood, even in the existing financial structure. Blockchain might represent a new way of establishing and maintaining trust. If blockchain is like other consequences of sociotechnical change, it might open new opportunities for exploration of trust and the role it plays in capitalism. At least two opportunities for IS research appear related to blockchain. The first concerns the incremental and supplementary application of blockchain to financial and other applications. Research should go well beyond blockchain substituting for something (e.g., that blockchain will allow for substitution of “cashless” mechanisms for cash, something predicted many times that has never occurred). If blockchain is like other sociotechnical phenomena, it will supplement existing ways of doing things, not substitute for them. The second is the nature of trust, an issue that people agree is important but that has not been carefully studied.

### ***Theme 4 –Blockchain in IS and New Economic Models***

Blockchain might give rise to a new form of economy, which some refer to as cryptographic economic systems: collaborative, Internet-based environments for decentralized autonomous organizations, that can operate trust-free by completing transactions on the basis of self-enforcing rules. If so, economic agents might reduce transaction costs related to trust or reputation. For the sake of the argument, imagine that blockchain allows for trust-free or trust-less transactions. If so, transaction cost theory and principal-agent theory are challenged (Beck et al., 2016). Both theories assume lack of trust and examine economic consequences of this. When Ronald Coase formulated transaction cost theory, he legitimized firms as the locus of value generation, and the market as the place where generated values could then be traded or sourced. He elaborated on properties and ownership, and his successors examined hybrid forms between market and hierarchy that generated value, but where properties, responsibilities and so on were less clearly distributed. New organizational forms were introduced beyond hierarchically organized and well-defined firms. Coase argued that firms only exist to avoid costs of using the market and its price mechanisms (e.g., costs for searching, negotiating, monitoring, and enforcing) that occur when goods or services are transferred between independent organizations. Other economic systems can be imagined with hybrid forms of sourcing that contain elements of markets and hierarchies, with decentralized decision making and rule-based action. Such organizations could have all kinds of shapes and appearances. They could be joint ventures, collaborations, alliances and so on. Blockchain could enable collaborative decentralized sourcing forms that incorporate elements of hierarchy and markets, secured through blockchain. Trust costs could be reduced or disappear, along with costs for monitoring and enforcing of contracts.

Similarly, with principle-agent theory the dilemma occurs when an agent acting on behalf of a principal cannot directly seen by the principal, and the principal cannot influence the behavior of the agent. The principal could be a customer, superior or shareholder. When the principal contracts with an agent, (provider, employee or manager), the agent might not want to act the best interests of the principle. If the agent seeks to maximize his own utility, a moral hazard exists. This is a problem of trust: the principal does not trust the agent to act in his or her best interest. Now assume that the task in question is coded as smart contract on the blockchain so each step of the transaction can be executed with certainty. Conditions relevant to the principal could be put into the smart contract. An investor funding a startup, might be willing to invest more if the startup is moving into a promising direction, so, an investment plan could be formulated as smart contract, automatically releasing money to the startup once certain predefined goals are reached. The investor could be more certain that the startup is growing and each round of funding is secured once the startup reaches its goals. The principle agent dilemma might be reduced through blockchain solutions, but might require experts like “coding economists.” Information systems researchers with economic understanding should develop the systems and theories to support them, serving as boundary spanners and driving forces.

## **Discussion Format**

The panel is likely to stimulate engaging discussion and appeal to a broad audience. The team of five seasoned panelists bring diverse perspectives and strong convictions about the significant potential of blockchain technology to business and society as well as to IS research. Overall, the panel is structured so that about a third of the panel time will remain for the audience participation, posing questions and engaging in debate. The panel will follow a roundtable discussion format with two rounds of questions. Building on the main themes in the current blockchain discourse that we have explored earlier, the panelists will draw on their rich experience and their knowledge of various flavors of the blockchain to answer three initial questions, as follows:

- What is blockchain and what are its key affordances?
- What economic and social rewards and risks might arise from blockchain?
- Does blockchain represent radical or incremental innovation?

After this discussion, the panel will focus on the implications of advances in blockchain to IS research. Questions for this portion of the panel discussion include:

- What IS research questions arise for blockchain?
- What potential does blockchain have to inspire long-term research in grand challenges?

The panel will use roundtable discussion. Michel Avital will serve as the moderator of the panel discussion, taking 5 minutes to outline the motivation for and objectives of the panel, and to introduce the panelists. The panelists will then take about 20 minutes to address the three initial questions. The audience will then be invited to spend 20 minutes responding to the panelists' remarks or question them about the topics. Many in the crowd are expected to contribute to the discussion given the popularity of the topic. The panel will then spend 20 minutes in the forward-looking phase of the discussion, exploring link between blockchain and IS research. Questions from the audience will be solicited for the final 20-25 minutes, and the moderator will conclude the panel with a summary of the main points.

Overall, the panel seeks to evoke provocative ideas and generative thinking about IS research on blockchain. It should also contribute to the general discourse and stimulate new insights about blockchain and the role of information systems in its development.

## **Participants**

**Michel Avital** is Microsoft Chair and Professor of IT Management in Copenhagen Business School. Digital innovation is the leitmotif of Michel's work that focuses on examining the crossroads of information, technology, and people. Building on positive modalities of inquiry, his research focuses on information and organization with an emphasis on the social aspects of information technologies. He has published over 100 articles on topics such as sharing economy, open big data, open design, generative systems design, creativity, innovation, green IT and sustainable value. He is an editorial board member of seven leading IS journals and has served in various organizing capacities in major international conferences such as ICIS, AOM, ECIS and other topical conferences. Michel is an advocate of openness and an avid proponent of cross-boundaries exchange and collaboration.

**Roman Beck** is Professor at the IT University of Copenhagen and Head of the Information Management Section as well as Head of Research Group. His research focuses on the role of IT on the changing nature of work and digitization of services on organizational level. Most of his research projects focus on generating value through social media analytics and blockchain solutions. He is interested in institutional logics, organizational mindfulness, and organizational awareness. Currently, he serves as Senior Editor for the DATA BASE journal and as Associate Editor for BISE and the Journal of Business Economics. He has published over 30 journal and 80 peer-reviewed conference articles in outlets such as MISQ, JIT, JSIS, ICIS, among others. Roman is currently serving at the AIS council as the region 2 representative.

**John Leslie King** is W.W. Bishop Professor at the University of Michigan School of Information. His research is on the relationship between change in information and communication technologies and change in highly institutionalized production sectors (common carrier communication, logistics,

education, health care). Lately he has been studying the highly institutionalized production sector of global finance.

**Matti Rossi** is Professor of Information Systems at Aalto University School of Business. He has been the principal investigator in several major research projects funded by the technological development center of Finland and Academy of Finland. He was the winner of the 2013 Millennium Distinction Award of Technology Academy of Finland for open source and data research. His research papers have appeared in journals such as *MIS Quarterly*, *Journal of AIS*, *Information and Management* and *Information Systems*. He has been a senior editor of *JAIS* and *Database*, and he is a past editor in chief of *Communications of the Association for Information Systems*.

**Robin Teigland** is Professor of Business Administration at the Stockholm School of Economics. Robin's research interests reside at the intersection of strategy, technology, innovation, and entrepreneurship. In particular, she focuses on how the internet, social media, virtual worlds and other emerging technologies, such as 3D printing, enable self-organizing communities to create value outside of a firm's traditional boundaries as well as challenge long-standing institutional structures. Some of her current research focuses on how peer-to-peer information technologies, e.g., crowdfunding platforms, the blockchain, are enabling innovation within the finance industry as well as under the greater umbrella of the sharing economy. In 2013 and 2014 she was nominated one of the Global Top 50 Business Professors on Twitter. Her research is published in international journals and she is also a frequent public speaker with clients such as Ericsson, Microsoft, Google, H&M, and various Swedish ministries.

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