Why You Should Care about Blockchain: The Groundbreaking Impact on Business Models, Whole Organizations, and the Basic Principle of the Entire Economy

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Editorial

The crypto currency Bitcoin as one of the first applications of blockchain technology has experienced a worldwide increase of attention since 2017 (Bovaird, 2017). The temporary rise in the price of one Bitcoin unit up to 20,000 US dollars made the Bitcoin currency as well as the underlying blockchain technology famous around the world. Whereas crypto currencies are gradually reaching their limits due to technical limitations, blockchain technology is increasingly regarded as the real innovation (Rosenberger, 2018; Schütte, et al., 2017).

By definition, a blockchain is a distributed database structure that is managed by the members of a network (Seenbacher & Schürtiz, 2017). In a blockchain, time-stamped transaction data are securely encrypted in blocks, using public key cryptography. The subsequent chaining of the blocks ensures that the data cannot be changed, manipulated, or deleted. Thus, all data in a blockchain is stored securely and comprehensibly (Gatteschi, Lamberti, Demartini, Pranteda, & Santamaría, 2018; Hackius & Petersen, 2017; Lin & Liao, 2017; Zheng, Xie, Dai, Chen, & Wang, 2017). The immutability of the data leads to trustworthy transactions, monitored processes, and the avoidance of central structures, which eliminates the need for intermediaries (e.g., banks, consultancies, tax agencies) when executing transactions (Meitinger, 2017). In this way, the technology overcomes the previous need for trust in the intermediary for traceability. This makes blockchain a valuable technology for companies (Weber, et al., 2016) as it may have huge effects on how companies deal with electronic networks in the future. In the industrial context, the need for such a reliable and secure technology is highly evident. In particular, considering the ongoing digitalization and increasing amount of data, the central administration of databases and processes poses many risks, such as performance bottlenecks, error security, and authenticity (Prinz, Rose, Osterland, & Putschli, 2018).

Organizations and researchers around the world have started to think about the opportunities, threats, potential applications, and further development potential of this new technology. Accordingly, various academic publications on this technology are already available (Cusumano, 2014; Van Alsytne, 2014). Most of the early scientific publications have focused on the cryptographic and technical aspects of Bitcoin and other crypto currencies. This changed in 2015, when the first scientific publications were published that detached blockchain from crypto currencies. Several authors explored broader opportunities for the technology in their work, such as effective identity management (e.g., Angrish, Craver, Hasan, & Starly, 2018; Preuveneers, Joosen, & Ilie-Zudor, 2017; Reyna, Martín, Chen, Soler, & Díaz, 2018), increased trust management (e.g., Li, Barenji, & Huang, 2018; Preuveneers et al., 2017; Reyna et al., 2018), and increased system security (e.g., Kouicem, Bouabdallah, & Lakhlef, 2018; Li et al., 2018; Mattila, 2016). Moreover, research has investigated obstacles to the implementation of blockchain, such as data protection (e.g., Reyna et al., 2018), energy demand (e.g., Abadi, Ellul, & Azzopardi, 2018), and scalability (e.g., Kumar & Mallick, 2018), and identified initial application examples from industry. Madhwal and Panfilov (2017), for example, investigated how supply chains' security in the aerospace industry can be improved by using blockchain. They found that blockchain enables traceability of the entire production and quality process in case of complaints and/or damage claims. Other examples of blockchain applications identified in the literature include the pharmaceutical industry (Bocek, Rodrigues, Strasser, & Stiller, 2017), emissions trading (Jackson, Lloyd, Macinante, & Hüwener, 2018), and a system for ensuring copyright in additive manufacturing (Holland, Nigischer, & Stjepandic, 2017).

In business practice, global blockchain spending will reach 12.4 billion US dollars by 2022, according to a report from the International Data Corporation (IDC) (Mearian, 2019b). Allied Business Intelligence (ABI) research (2018) lists similar values. In the same vein, major banks, such as J.P. Morgan, are about to start their own cryptocurrencies similar to Bitcoin (Mearian, 2019a). The German federal government published a strategy on blockchain along with different offers of publicly funded research projects in September 2019 (BMWi, 2019). Furthermore, more than 100 new start-ups around blockchain technology are already developing (Del Castillo, 2019).

According to these numbers, blockchain may become a key technology, like the Internet was and still is (Tapscott & Tapscott, 2016). However, there are only a few functioning use cases for the new technology available. Schütte et al. (2017) and Walport (2016), for example, attribute this to the existence of unclear legal, economic, and scientific requirements and the complexity of the technology required for implementation. Companies, therefore, need to constantly monitor the development of the new technology

and take initial precautions by developing guidelines and decision-making processes for the implementation of blockchain applications. In doing so, it is necessary to not only observe the blockchain development outside one's own organization; companies need to question their own processes, examine initial use cases, and test blockchain applications in order to build up relevant knowledge. Furthermore, it requires blockchain activities beyond company borders to facilitate acceptance, unlock synergy effects, and establish networks.

Against this background, there is pressing need for a better understanding of (1) blockchain technology itself, (2) application fields for blockchain, and (3) already existing blockchain use cases in companies. Therefore, we compiled a JTIM Special Issue out of current articles on the influence of blockchain technologies in industrial applications. We included five articles that demonstrate the breadth and diversity of perspectives for approaching this contemporary and interesting topic. All articles present fictitious use cases from the perspective of a software service company and intermediaries for tax consultants, auditors, lawyers and medium-sized companies. At this point it is explicitly pointed out that the ideas presented here are of a purely conceptual nature and represent only general considerations that have arisen in research projects and have no relation to a specific company or corporate strategy.

In the following, we would like to provide a brief overview of the included articles. Julian Roser and Lisa Rauch provide an article titled "Blockchain Technology—Short-term Hype or Foundation for Revolutionary Business Models?," which includes scientific and non-scientific literature. In their article, they show that blockchain has the potential to fundamentally change the role of diverse intermediaries in different industries, such as auditing, tax consultancy, legal advice, and accounting. In these industries, trust building between two parties is of great importance, which is why these industries are currently faced with developments that are difficult to assess. Blockchain applications could ensure a high degree of auditability in these industries. Introducing a blockchain-based currency, for example, could cause a considerable reduction in expenditure in these industries due to the subsequent unchangeability of the transaction records and the constant availability of all data. As a result, significant parts of the value chain of companies in these industries could become automated or obsolete in the future. Consequently, these professional groups and industries are facing major challenges. In this context, the authors provide three solutions for the use of crypto currencies in different business areas using a German software service company as an example. Moreover, the solutions are discussed in terms of their technical feasibility. Finally, the authors give recommendations for action and discuss further areas of blockchain applications.

In the second article, "Blockchain 2.0—The Impact of Smart Contracts on Intermediaries," authors Hanna Herrmann, Thu-An Nguyen, Serafina Pauler, and Dominik Zink show how digital processes within a company can be improved through the use of blockchain and smart contracts. By analyzing the literature on blockchain, smart contracts, and the German software service companys' existing product and service portfolio, they developed three use cases for smart contracts. The authors show how the role of the intermediary changes by using smart contracts. In particular, the authors investigate the optimization of the signing process in a document management system, automated licensing, and the development of a smart contract toolkit.

In the article titled "Blockchain Meets Democracy 2.0," Fabian Brechtel, Timo Ender, Julian Hertzler, and Lukasz Pankowski describe the suitability of blockchain for e-voting as an enabler of Democracy 2.0. For this purpose, they evaluate use cases from several countries and derive findings for a German software service company. In their study, they focus on the tax consultant market, which is said to be disrupted by the digital change. Based on the findings of the use cases, the authors provide a business model idea for the software service company. Moreover, they show that using this technology is equal to traditional solutions in terms of security, privacy, and transparency while at the same time providing more flexibility in elections. Finally, the authors show how efficiency and cost savings can be realized through electronic elections using blockchains.

In the article titled "The Decentralized Autonomous Organization Breaks up Economic Boundaries—New Organizational Possibilities through Blockchain Innovation," by Sascha Käller, Nina Kuhnt, and Amelie Löffler, the authors deal with issues related to blockchain and decentralized autonomous organizations (DAOs). More specifically, they identify DAOs as an alternative to existing legal forms that open up new opportunities for cooperation. The authors describe their findings through the lens of social contract theory, principal-agent theory, and transaction cost theory. By analyzing a DAO use case for a German software service company, they show what new opportunities this blockchain-based technology offers for the business model of established companies. Finally, implications and initial recommendations for the use of DAOs in companies are presented.

In the last article, "A Thief's End—Potentials of Blockchain as Anti-fraud Protection Using a German Software Service Company as an Example," authors Christian Döberlein, Mirko Ahmad, Marina Bühler, and Klaus Dehmel highlight the importance of secure data management systems in times of increasing data volumes. Traditional data management systems are reaching their limits, which is why blockchain-based solutions are increasingly providing protection against fraud. In their article, the authors provide three blockchain-based solutions they developed for a German software service company and show how these solutions can be successfully established in companies. They synthesize their solutions into a platform-based approach and give recommendations for action on how companies can succeed in protecting existing platforms, databases, and systems against fraud using blockchain technology.

We want to express our profound gratitude for the efforts that paved the way for this Special Issue. We thank all the authors for their valuable contributions and hope that the present articles not only promote interest in this important field but also help to encourage further research on blockchain and its applications.

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