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EDITORIAL
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Editorial: Emerging Technologies and Blockchain in Action: Applications in Supply Chain Management and Energy

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Editorial on the Research Topic

Emerging Technologies and Blockchain in Action: Applications in Supply Chain Management and Energy

INTRODUCTION

Blockchain technology established itself as a research subject in various scientific disciplines and as an enabling technology in various indiustries. In supply chain management and energy, blockchain applications establish trustful and traceable relations between multiple organizations (Guerpinar et al., 2020a; Düdder et al.). By securing data in a unique way, organizations are enabled to come to a consensus without any central authority involved. Furthermore, processes and transactions are executed in a trustful, transparent manner and automatized by the utilization of blockchain-based smart contracts (Jakob et al., 2018; Guerpinar et al., 2020b). Still, enterprises only recently begin to adopt the technology and scholars yet see a lot of open research questions in multiple disciplines (Gürpinar et al., 2019; Grosse et al., 2021). While enterprises profit from initiatives like Blockchain Europe that built communities, connect players in the blockchain space and offer open source solutions, we encourage academic scholars to submit their ideas for articles to our research topic and take forward blockchain research in supply chain management and energy together with our team of reviewers and editors.

The article series that was recently published in our research topic offers insights into how blockchain technology improves both the supply chain management and energy sector. The first part of the series starts with an overarching analysis of blockchain projects covering the years from 2010 to 2020 and sheds light on the interdisciplinary character of the technology that can be observed from multiple perspectives. The second part continues with a focus on concrete blockchain applications. Here, the use of intelligent smart contracts is explained and illustrates the necessitiy of various enterprise functions to successfully utilize the technology as outlined in the first part. The series concludes by introducing two more applications: a framework for supply chain provenance and a multi-stakeholder approach for transactive energy systems.

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AN ANALYSIS OF BLOCKCHAIN ADOPTION IN SUPPLY CHAINS AND A CONSIDERATION OF VARIOUS PERSPECTIVES

The first part of the article series start of an original research article by Vadgama and Tasca on the Analysis of Blockchain Adoption in Supply Chains Between 2010 and 2020. In the article, the evolution of blockchain applied to supply chains is mapped from the inception of the technology until June 2020, utilizing primarily public data sources. The authors analyzed 271 blockchain projects on parameters such as their inception dates, types of blockchain, status, sectors applied to and type of organization that found the projects. The article indentifies a research need in going deeper into the reasons why supply chain projects succeed or fail. This need is addressed by Düdder et al. and their perspective article on Interdisciplinary Blockchain Education: Utilizing Blockchain Technology From Various Perspectives. The authors argue that the cooperation of different enterprise functions and scientific disciplines involved in blockchain projects are responsible for project success. In the article, a state of the art and a collection of research questions is gathered for the relevant scientific disciplines: supply chain management; management, economics and finance; computer science and security engineering. The article also presents methods for combining relevant disciplines and enterprise functions in a supply chain framework and promotes certain methods to be considered in blockchain education.

INTELLIGENT SMART CONTRACTS, BLOCKCHAIN PROVENANCE AND MULTI-STAKEHOLDER ENERGY SYSTEMS

In the second part of the article series, Bottoni et al. start with an original research article on concrete blockchain applications: Intelligent Smart Contracts for Innovative Supply Chain Management. Here, the authors propose a smart contract architecture as enabler for an innovative type of supply chain management. They aim at achieving higher levels of collaboration between the participating stakeholders, which in turn pays in the form of higher levels of profitability and economic health. They introduce a type of smart contract that enhances trust and automatizes coordination processes. This way, costs are reduced as a compensation for potential risks the members of the blockchain system face when integrating their solution. Another original research article on Blockchain Enabled Supply Chain Provenance Framework for Energy Delivery Systems by Bandara et al. goes even deeper into the topic of risk management and focuses Enterprise-level Delivery Systems (EDS) that are crucial to ensure knowledge about the vulnerabilities in software and hardware components. The paper shows the need to realize a cyber supply chain risk management for Industrial Control Systems hardware, software, computing and networking services. It further proposes a blockchain-based cyber supply chain provenance platform ("Vind") for EDS to realize data provenance in a cyber supply chain ecosystem. Finally another original research article on The Role of Blockchains in Multi-Stakeholder Transactive Energy Systems by Eisele et al. also links to the energy sector and focuses power grids that currently undergo major changes due to rapid growth in renewable energy and improvements in battery technology. Prompted by the increasing complexity of power systems, decentralized solutions are emerging that arrange local communities into transactive microgrids. The paper addresses the problem of implementing transactive energy mechanisms in a distributed setting, providing both privacy and safety.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.