

# THE APPLICATION OF BLOCKCHAINS TO MINING

*The opportunities and challenges of blockchains.*

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**T**here is no doubt that the mining industry is facing a turning point in terms of its integrated value chains because the traditional management system can no longer continue to ignore the role of new technology. A technological revolution is underway, and the use of new methods will alter mining operations throughout the value chain, assisting companies to grow by offering innovative business models to deliver improved safety advancements, productivity and energy efficiency, and to reduce the final product cost. The use of novel technology is not an optional approach for the mining industry; it is essential for mining companies to use the latest technology to survive in a competitive global market.

Many large mining companies have reported significant cyber attacks recently. These attacks are designed to steal intellectual

property (IP) and other registered information, and they can be overwhelming for any company.<sup>1</sup> It is obvious that security is one of the biggest challenges for the mining industry. Blockchain technology can potentially assist mining companies to avoid falling prey to security breaches. The blockchain, as a distributed digital ledger, decreases the extent of hacking incidences throughout a company by limiting them solely to the affected block. Blockchains save a record of every transaction and safely encrypt that information without third-party intervention, thereby reducing the exposure of data to hackers.

Blockchains herald a global revolution and their remit will soon alter the most practical procedures of day-to-day life, particularly in the natural resources industry. Welcome, blockchains!

**BLOCKCHAINS**

A blockchain, or a distributed ledger, is a continually growing list of records, called blocks, which are linked and secured using cryptography. Each block typically contains a cryptographic hash pointer linking to a previous block, as well as a time stamp and transaction data (Figure 1).

Blockchains are designed using highly secure methods and are modelled on a distributed computing system with significant Byzantine fault tolerance. A decentralised consensus may, therefore, be achieved using a blockchain. This makes blockchains potentially suitable for the recording of events and other record-management activities, such as identity management, transaction processing, documenting provenance, food traceability and voting. By design, blockchains are inherently resistant to data modification. Data are replicated and synchronised across individuals and locations, and may be confirmed by anyone; however, they can be transformed only by agreement with the group contributing to the network. In

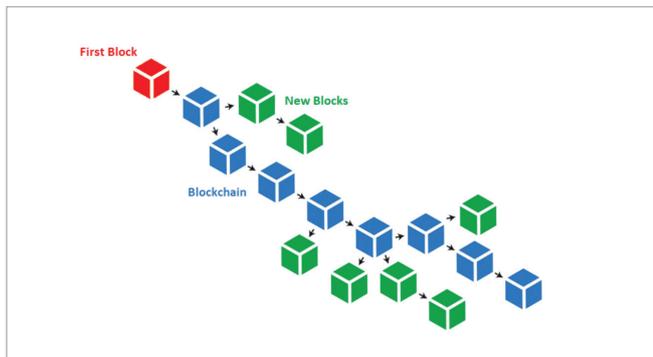


Figure 1. Blockchains

this network, all records are saved in the form of blocks, and each block references another block, creating a chain. Consequently, all distributed blocks must be hacked instantaneously for an attack to be successful, guaranteeing a high level of security. A blockchain forms a trusted, extensive record book of cryptographically linked entries that no-one owns and that no-one can quickly change, but that all agree on. With a blockchain, there are no more intermediaries to serve as trust intermediaries. There are many fields in which blockchains can aid mining companies, including the provision of improved cybersecurity, increased transparency with smart contracts and better visibility of the supply chain.

**THE APPLICATION OF BLOCKCHAINS IN MINING**

Presumably, a blockchain could be applied across the whole-of-mining value chain. Relevant questions include whether the blockchain might add unique capabilities and business value above and beyond existing processes, what solutions it may provide, and how it would be discriminated from the more general tools for program management in use today, such as configuration management or customer relationship management.

Extensive security and the ability to control complex, multi-player engagements make blockchains attractive for commercial applications; however, there is obviously a need to be careful not to make everything a blockchain problem. Some existing solutions would work correctly if the conditions for their effective use were present. These conditions may well be identical to the requirements for blockchains: for example, timely access to accurate operational and maintenance cost data.

Mining contracts that apply a blockchain improve transparency between buyers and sellers, as goods are tracked in real time from their origins, removing the possibility of fraud, guaranteeing

MINING INDUSTRY					
Function area	Compliance	Trading	Exploration and production	Logistics	Health, safety and security
Business value	<ul style="list-style-type: none"> <li>eliminate law suits</li> <li>avoid losses to fake buyers</li> <li>reduce need of governance</li> <li>reduce operating risks</li> <li>clearance of contracts</li> </ul>	<ul style="list-style-type: none"> <li>create new services</li> <li>eliminate broker fees</li> <li>simplify payments</li> <li>reduce cost of ownership</li> <li>accelerate information processing and real-time trading</li> <li>reduce risk management</li> </ul>	<ul style="list-style-type: none"> <li>IoT integration to track history of each device and act in critical situations</li> <li>streamlining processes</li> <li>reduce cost of ownership in complex contracts do not need audit each other</li> </ul>	<ul style="list-style-type: none"> <li>reduce demurrage and lay times</li> <li>accelerated processes</li> </ul>	<ul style="list-style-type: none"> <li>enhanced transition security</li> <li>high transparency to all stakeholders</li> </ul>

Table 1. Business value of blockchain application in mining industry<sup>2</sup>

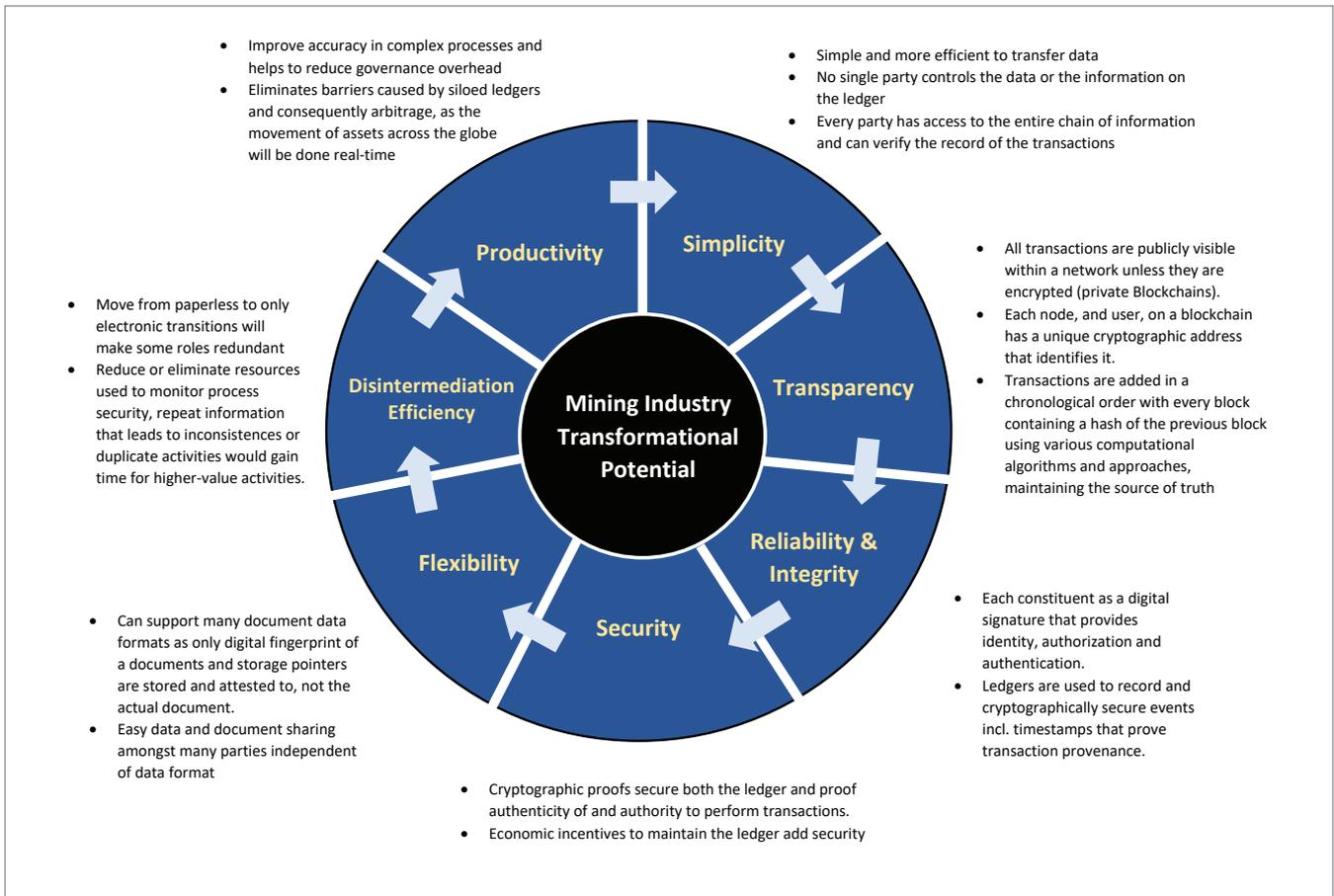


Figure 2. Blockchain application in mining industry?

trackability, and improving logistics, visibility, transparency and supply chain quality. Blockchains offer more insight into the supply chain, making procurement and delivery simpler, more reliable and more accurate. The digital ledger includes data from all suppliers and vendors in the network, providing a comprehensive image of the supply chain in actual time.

There is copious evidence of cyber attacks on mining companies with the purpose of obtaining private information and hijacking IP. Newly published reports show that mining is at the top of the list of industries receiving spam emails.<sup>1</sup> Despite the fact that there is little difference in the frequency of spam attempts between mining and other industries, the mining industry should be concerned as approximately one-third of emails contain viruses. This is not a list at the top of which mining wants to find itself. For this reason, the mining community is turning to the use of blockchains. Blockchains remove the need for any intermediaries, affording less time to hackers trying to steal data. In addition to adding a further layer of security, blockchains could drive productivity on the Internet of Things, create cost reduction, improve tracking and streamline contracts.

The application of blockchain can significantly streamline the mining industry by potentially transforming it in seven different ways, including productivity, simplicity, transparency, reliability and integrity, security, flexibility, and disintermediation efficiency (Figure 2).

The application of blockchain in mining can be categorised based on their functions' areas, such as compliance, trading, exploration and production, logistics, health, safety, and security. Table 1 illustrates some business values of blockchain in each area separately.

## BLOCKCHAIN IS THE FUTURE

The move to distributed ledgers in the future is certain. Nonetheless, the mining industry must begin with the reliable identification of small, yet effective cases for their use that do not require the entire market to participate. Blockchain technology can fundamentally alter transactions by cutting costs to create leaner organisations and improved security. It is a game changer that offers three significant features: accountability, security and immutability. The blockchain is gradually but surely moving to fundamentally change mining paradigms. The benefits are clear: decreased operational and maintenance costs, reduced risk, the creation of new revenue opportunities and the reduction of the cost of capital. Its adoption is expected to increase over time, and it will move into production within the mining industry over the next few years; however, the question is not whether distributed ledgers will be able to disrupt significant parts of the mining sector, but whether existing, high-volume applications can be migrated to distributed ledger platforms through transformational programs fast enough to avoid loss of business or even full disintermediation. A lot depends on finding the best uses in the right context and running with them – not tomorrow, not today, but NOW! <sup>ARR&I</sup>

For more information, visit [www.soofastaei.net](http://www.soofastaei.net).

## References

1. *Blockchain technology in the mining industry*. (2017, Jan 21). *ICT Monitor Worldwide*.
2. *Six Answers to get Blockchain right in the Natural Resources sector*. (2017, May 10). Filip Mota da Silva. *LinkedIn*.