

Blockchain applications

Fact sheet for innovation fields

Chained data blocks as a new solution for digital transactions

- Blockchain is a digital technology used to record transactions between business partners – similar to bank statements – or to store data. Each blockchain consists of a series of data blocks holding one or more transactions. New blocks are generated in number-crunching processes and distributed to all participants over a network. The blocks are chained together; hence the term blockchain. Every change is recorded exactly. Changes cannot be tampered with by third parties, and are transparent for everyone involved or must be verified by them. Blockchain technology was invented as a distributed list or registry for the digital currency named Bitcoin. When Bitcoin payments are made, there is no need to reveal information such as card numbers, names or addresses; in addition, there are no charges.
- Many companies are now considering how they can use and enhance blockchain technology for their processes. In December 2015, a group of 42 banks founded the company R3 CEV to develop the next generation of technologies for global financial services on the basis of blockchain. The Nasdaq Stock Market in the United States, the Australian Stock Exchange and Credit Suisse Group have also gathered initial experience with blockchain, as have energy companies such as RWE in Germany. The advantage is that smart contracts (computer programs relating to contracts) can be built into it very easily.
- In a blockchain, it is possible to organize auctions in which inpayments, outpayments and repayments are handled automatically.. In addition, crowdfunding concepts can be set up to allow electronic votes on the use of funds.
- At Siemens, experts are considering whether and how blockchain technology can be used for industry.
 - Implementation of blockchain in devices is an interesting but as yet fully untested area. All kinds of applications are conceivable. For instance, the tokens often used in washing machines in apartment buildings could be replaced by Siemens controllers connected with a blockchain to account for electricity costs or to define and log times of use.
 - Blockchain technology could secure direct interaction between autonomously operating machines. Shared vehicles could manage their availability and charge for their services, for example.
- Another application area is energy trading, where blockchain technology could ensure safe, cheap and fast exchanges between producers and consumers. In addition, transactions can be stored and settled as RWE has already shown with a microgrid of six private households in Mülheim an der Ruhr, Germany. In the New York borough of Brooklyn, TransActive Grid (a joint venture founded by Lo3 Energy and Bitcoin developer ConsenSys) has set up a local electricity microgrid that is managed on the basis of a blockchain. This microgrid receives power from the solar systems of five residential buildings. The buildings sell the solar power they do not use themselves to buildings on the same street, thus implementing the concept of peer-to-peer electricity on the smallest level. This is profitable because the blockchain entails very little management effort.

- Blockchain technology could also play a key role in the Internet of Things. As the strategy behind Industrie 4.0 is based on networking distributed, automated manufacturing and logistics processes and – increasingly – allowing such processes to organize themselves, associated machines must be monitored on a higher-level. Blockchain technology is ideal for monitoring whether machines are operating within their defined scope of action.

The next revolution?

- Many experts see blockchain as a technology with disruptive potential. Initial experiences with it as a data transfer method for all transactions with Bitcoin have encouraged many start-ups to examine new potential applications.
- New applications are currently focused on financial and legal transactions. Siemens is following these developments with great interest.
- In the future, blockchain could make many processes simpler or more secure wherever data needs to be recorded. This aspect is highly significant for Siemens in many respects. Energy trading between producers and consumers can be managed quickly, cheaply and securely.
- Many digital-based services could also be managed more easily with a blockchain.
- Siemens wants to be part of this revolution and is therefore taking a two-track approach. On the one hand, Siemens experts are perpetually looking for interesting application areas in this very young market and, on the other hand, the group wants to come up with disruptive innovations together with start-ups, for example:
 - Solutions designed to address rapidly increasing data volumes
 - Software for open source communities
 - Solutions for new forms of Internet trading
 - Digital solutions for financial transactions