Are smart contracts really smart?

What actually is a contract? It is a written or spoken agreement which is intended to be enforceable by law. For example a sales contract in daily life[1].

But have you ever heard about smart contracts? The first word that comes to your mind when you think about "Smart" is probably your smartphone or smart tv. What links all of these developments are the technological advancements they deliver[2].

Now you probably assume that a smart contract is simply a digitally enhanced form of a traditional contract. At first you have to understand that smart contracts are actually agreements, written in a computer code based on the block chain technology. These trigger themselves when the specified conditions of two parties occur. These conditions are unchangeable recorded in the protocol code[3].

To put it in simple terms, the three essential features of a smart contract are[4]:

- Self-execution
- Immutability
- Digital performance.

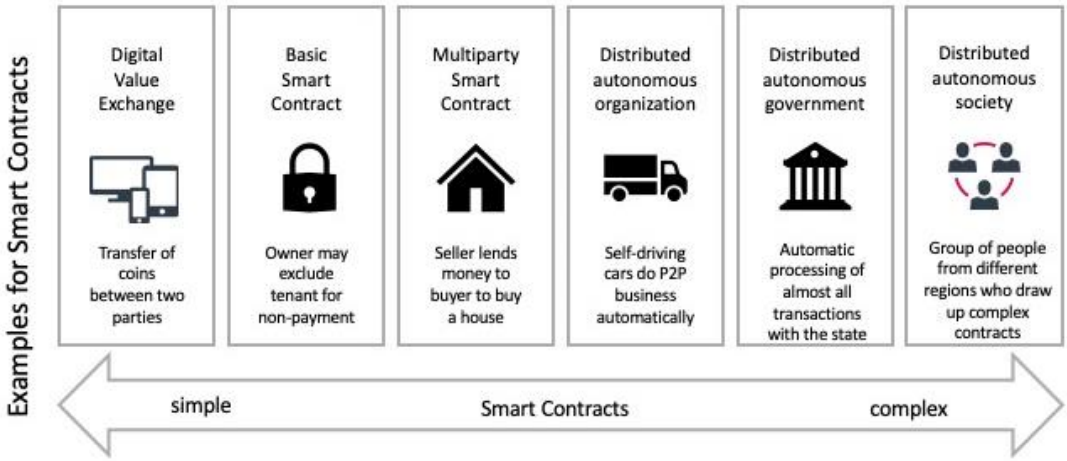

Figure 1: Development of Smart Contracts[5]

[1] Shilpa Karkeraa, *Unlocking Blockchain on Azure: Design and Develop Decentralized Applications* (Berkeley, CA: Apress, 2020), p.119, https://doi.org/10.1007/978-1-4842-5043-3.
[2] Maria Grazia Vigliotti und Haydn Jones, *The Executive Guide to Blockchain: Using Smart Contracts and Digital Currencies in Your Business* (Cham: Springer International Publishing, 2020), 133f., https://doi.org/10.1007/978-3-030-21107-3.
[3] Vigliotti und Jones, p.133f.
[4] Eva Kaili und Dimitrios Psarrakis, Hrsg., *Disintermediation Economics: The Impact of Blockchain on Markets and Policies* (Cham: Springer International Publishing, 2021), p.36, https://doi.org/10.1007/978-3-030-65781-9.
[5] Christian Million, „Crashkurs Blockchain", o. J., p.63.

So now you know what smart contracts are. Next, of course, you want to know which platform offers it. The most popular platform is called Ethereum. Ethereum is a decentralized platform that runs smart contracts: applications that run exactly as programmed without any possibility of downtime, censorship, fraud or third-party interference. These apps run on a custom built blockchain, an enormously powerful shared global infrastructure that can move value around and represent the ownership of property.' While the best-known application of blockchain technology is bitcoin which is a currency only, Ethereum is an open-source and distributed platform[6].
Basically, anything that can be clearly represented and verified digitally can be automated with the help of smart contracts. The potential has not yet been fully grasped and the need for the use of smart contracts will continue to grow as digitization progresses[7].

In supply chain management in particular, smart contracts offer several advantages in terms of security, transparency and speed. This ensures the integrity of data exchange between the individual value creation partners and allows ordering and payment processes to be automated. Furthermore, products can be monitored within the supply chain and compliance with transport conditions can be checked at the same time. If, for example, the cold chain is not maintained when transporting food or medicines, the smart contract would detect this and the acceptance or delivery of the order could be automatically prevented. Smart contracts could also check whether the requirements for insuring a transport segment have been met and, if an insured event occurs, initiate an automatic payment to the owner of the goods[8].

Imagine your house was destroyed by an earthquake. At this moment you are helpless, penniless and don't know what to do next. At this very moment you are already paid the contractually agreed amount of the insurance. With the help of smart contracts, it is not necessary to take care of the insurance company's affairs in such situations, because it pays based on fixed parameters, such as in this case the level of the earthquake on the Richter scale. In today's situation, intermediaries always have to

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[6] Gavin Zheng u. a., *Ethereum Smart Contract Development in Solidity* (Singapore: Springer Singapore, 2021),p.3, https://doi.org/10.1007/978-981-15-6218-1.
[7] Robert Wilkens und Richard Falk, *Smart Contracts: Grundlagen, Anwendungsfelder und rechtliche Aspekte*, essentials (Wiesbaden: Springer Fachmedien Wiesbaden, 2019), p.17, https://doi.org/10.1007/978-3-658-27963-9.
[8] Wilkens und Falk,p.24.

release payments. But due to the if-then logic, this step can be skipped and thus the payment can be initiated automatically[9].

Smart contracts based on blockchain, offer a number of advantages over traditional contracts. The biggest advantage is the reliability and accuracy. There is no longer any room for interpretation about the conditions once the smart contract has been fully programmed as code. In addition, the documents are no longer lost because the contract is saved in the blockchain and all parties can access it. Another advantage is the efficiency. Programming a smart contract takes significantly less time than the bureaucratic effort of a traditional contract. Therefore a lot of time and money can be saved[10].

As you can imagine, in addition to the advantages mentioned above, there are also some disadvantages of smart contracts. The biggest problem that can occur is faulty coding. Since the contracts do not write themselves, a third person is needed to program them. This can lead to errors in the program code. Those errors could then have negative consequences such as hacker attacks and incorrect data on the blockchain. Moreover, these types of errors could imply enormous financial losses.

Another disadvantage is that incorrectly concluded contracts remain incorrect for the time being, as the data is difficult to correct[11].

And do you now think that smart contracts are smart? We think that smart contracts are definitely an innovative evolution of traditional contracts. However, we first have to figure out how to make them interesting for the end user, since we are obviously not able to program a chain code. In addition, it remains to be seen how this innovation will be accepted by society.

We assume that the enormous potential of blockchain technology will be increased. This will then provide us with secure and powerful systems.

Smart contracts will go their way, albeit somewhat delayed and not as obviously as one might assume.

We (Johannes Stumpf and Jonas Pfister) hereby allow Carola Schulz to publish this article on her HHN webpage.

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[9] Million, „Crashkurs Blockchain“, p.64 cont.
[10] Million, p.67 cont.
[11] Million, p.67 cont.

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We hereby declare that the thesis submitted is my/our own unaided work. All direct or indirect sources used are acknowledged as references.

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