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*Blockchain and Smart Contracts in German Public Administration**

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ABSTRACT The article describes the current status of the use of blockchain and smart contracts in German public administration and discusses the legal challenges of using blockchain by public authorities in the European and German law. In conclusion the authors recommend to the German legislators that they should be open-minded about new technologies and push forward with the digitalization of public administration in Germany.

1. *Introduction*

In addition to the private sector, digitalisation is also increasingly extending to public administration. New technologies are intended to simplify processes and procedures by means of technical innovation and to process information in a reliable and secure manner. For these purposes, the use of blockchains and smart contracts is conceivable. Blockchain solutions can offer a high degree of transparency and confidentiality, which makes it attractive for public administration purposes. Especially in the public sector, public institutions act as intermediaries and keep registers, for example to document property and secure property transfers.

The German Federal Government has further announced the implementation of digital administrative services as part of its blockchain strategy[1]. Whether the use of these technologies can also be considered for the German public administration and which opportunities and risks result from this, will be explained in this article.

2. *Technical aspects*

In order to create a basic technical understanding, the terms blockchain and smart contract will first be distinguished from each other.

2.1. *Blockchain*

A blockchain is basically a decentralised database[2]. This means that the blockchain is not only held on a single server. Instead, the blockchain is stored on many interconnected computers, each has a copy of the entire data set. The database is available to the participants several times over a peer-to-peer network[3]. It is protected against changes by cryptographic procedures.

2.2. *Smart Contract*

In comparison to the blockchain, smart contracts simply provide a special area of application for the blockchain[4]. In a smart contract, a digitally verifiable event is processed by a programme code and leads to a legally relevant action[5]. At least according to the German understanding, the smart contract is not a contract in the sense of civil law[6]. Instead, it is a form of contract drafting. Special challenges arise when the smart contract must be supplied with external information. So-called oracle services can be used for this purpose[7]. However, this

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[1] Bundesregierung, *Blockchain-Strategie der Bundesregierung*, p. 6, available at: www.bmwi.de /Redaktion/DE/Publikationen/Digitale-Welt/blockchain-strategie.pdf.

[2] D-K. Kipker, P. Birreck, M. Niewöhner, and T. Schnorr, *Rechtliche und technische Rahmenbedingungen der "Smart Contracts"*, in *Multimedia und Recht*, 2020, 509.

[3] D. Kochheim, *Cybercrime und Strafrecht in der Informations und Kommunikationstechnik*, vol. 2, 2018, Munich, C.H. Beck, 386.

[4] N. Guggenberger, *Smart Contracts, ICOs und Datenschutz*, in *Handbuch Multimedia-Recht*, vol. 56, 2021, recital 99; D-K. Kipker, P. Birreck, M. Niewöhner, and T. Schnorr, *Rechtliche und technische Rahmenbedingungen der "Smart Contracts"*, 509.

[5] D-K. Kipker, P. Birreck, M. Niewöhner and T. Schnorr, *Rechtliche und technische Rahmenbedingungen der "Smart Contracts"*, 509.

[6] Sections 145 ff. BGB (German Civil Code).

[7] K. Potel and S. Hessel, *Rechtsprobleme von Smart*

circumstance results in a dependency of the smart contract from the oracle service, which is contrary to an automated contract implementation[8].

3. *Possible applications in public administration*

Blockchain and smart contracts offer a variety of possible applications. They can be used not only in civil law[9], but also in public law, especially in public administration. Their application can range from public registers, property management, proof of origin, verification and confirmation services, digital identity mapping to securing electronic elections or digital currencies. Among the best-known applications of the blockchain is Bitcoin as a crypto currency. Not least the rising rates of the Bitcoin have triggered public interest in blockchains. In the following, the use of blockchain in public registers and as a currency will be discussed in more detail.

3.1. *Registers*

Countries such as Georgia have already started using blockchain technology in pilot projects to keep public registers[10]. Their ability to document transactions verifiable, transparent and unchangeable, comes very close to the requirements of classical registry management systems (for example land registers)[11]. The reasons for using blockchain technology in the public sector can be many and varied. However, they are particularly suitable for regions where traditional state structures for register management or trust in these structures are lacking[12].

3.2. *Digital Currency*

Currencies can also be mapped on a blockchain – as confirmed by the practical example of Bitcoin. Sweden started a pilot project with blockchain as the basis for a digital currency in 2016[13]. In contrast to other crypto currencies, the value of the so-called "e-krona" is guaranteed by the state[14]. China also introduced the "e-yuan" just in the middle of this year[15]. In order to increase the use of the digital currency, China put a significant amount of the digital currency into circulation via digital lotteries[16]. Generally, a trend towards cashless payment transactions can be seen in many countries. The pandemic has also driven the use of digital payments. However, cash is still one of the official forms of payment.

Through their transparency, blockchain-based crypto currencies can contribute to the fight against tax evasion, corruption and terrorist financing[17]. However, they also offer a high potential for state surveillance, because every flow of money is precisely documented.

4. *Status of the current discussion in Germany*

Like all technological innovations, the application of blockchain and smart contracts in public administration offers opportunities and risks.

In many cases, public sector actors now act as intermediaries. The public administration keeps registers, such as the land register, to document property relationships. Property relations are secured by notaries, who enjoy a special position of trust. They therefore act as intermediaries in the acquisition of property. Using blockchain technology, their activity could no longer be necessary.

Dispensing with intermediaries can lead to a reduction in costs. However, the German

Contracts – Automatisierte Abwicklung von Verträgen, in *Juris Die Monatszeitschrift*, vol. 10, 2020, 354.

[8] K. Potel and S. Hessel, *Rechtsprobleme von Smart Contracts – Automatisierte Abwicklung von Verträgen*, 354.

[9] K. Potel and S. Hessel, *Rechtsprobleme von Smart Contracts – Automatisierte Abwicklung von Verträgen*, 354-359.

[10] C.-M. Leeb and T. Asatiani, *Georgiens Grundbuch auf der Blockchain: Funktionsweise und erste Erfahrungen*, 2019, available at: https://legal-teverzeichnis.de/fachartikel/georgiens-grundbuch-auf-der-blockchain-funktionsweise-und-erste-erfahrungen.

[11] J. Schrey and T. Thalhofer, *Rechtliche Aspekte der Blockchain*, in *Neue Juristische Wochenschrift*, 2017, 1431.

[12] W. Prinz and A. T. Schulte, *Blockchain und Smart Contracts – Technologien, Forschungsfragen und Anwendungen*, p. 31, available at: www.sit.fraunhofer.de/fileadmin/dokumente/studien_und_technical_reports/Fraunhofer-PositionspapierBlockchain-und-Smart-Contracts.pdf.

[13] H. Steuer, *Schweden verlängert sein Pilotprojekt, E-Krone*, in *Handelsblatt*, available at: www.handelsblatt.com.

[14] H. Steuer, *Schweden verlängert sein Pilotprojekt, E-Krone*.

[15] F. Kretschmer, "*E-YUAN" – China hat neue staatliche Digitalwährung – mit deutlichen Vorteilen für die Regierung*, in *Frankfurter Rundschau*, 13 June 2021, available at: www.fr.de.

[16] F. Kretschmer, *"E-YUAN" – China hat neue staatliche Digitalwährung – mit deutlichen Vorteilen für die Regierung*.

[17] F. Kretschmer, *"E-YUAN" – China hat neue staatliche Digitalwährung – mit deutlichen Vorteilen für die Regierung*.

Federal Government does not see it as an end in itself to replace functioning administrative processes and existing public registers with blockchain-based solutions[18]. Instead, the need and usefulness of implementing administrative processes using blockchain technologies should be examined on a case-by-case basis[19]. A requirement is therefore not seen in particular for publicly kept registers that require further legal checks, for example the land register[20]. The situation is different, however, for databases that are held for the storage of original documents, such as deeds or certificates[21].

5. *Challenges of the German law*

5.1. *Data protection law*

5.1.1. *Processing of personal data*

Depending on the type and design of the blockchain application, information stored on it may have a personal element. According to Article 4 No. 1 General Data Protection Regulation (GDPR) personal data means any information relating to an identified or identifiable natural person ('data subject'). An identifiable natural person is one who can be identified, directly or indirectly, by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person. This applies in particular to applications that are not limited to virtual transactions and therefore require the identification of the natural participation (for example in the purchase of real estate). The controller is subject to special obligations under the GDPR where personal data are involved. The Controller means according to Article 4 No. 7 GDPR the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data. After that, parts of the public administration can be qualified as the controller as well. Therefore, they must comply with the principles of the GDPR when processing personal data. A special privilege does not exist in this case.

5.1.2. *Legal basis of the processing*

According to Article 6 GDPR the processing requires a legal basis. Due to the lack of the freely given consent of the data subject there is no legal basis for the processing based on Article 6 (1) sentence 1, point (a) GDPR. The processing of personal data by the public administration could be based on Article 6 (1) sentence 1, point(e)GDPR.

The processing therefore must be necessary for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller. The basis for the processing referred to in Article 6 (1) sentence 1, point (e)GDPR shall be laid down by Member State law to which the controller is subject. The purpose of the processing shall be according to Article 6 (3) sentence 2 GDPR determined in that legal basis or, as regards the processing referred to in point (e), shall be necessary for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller. Therefore, depending on the specific use of the blockchain, a legal basis for the processing is required.

5.1.3. *Rights of the data subject*

Conflicts between the blockchain approach and the GDPR may also arise regarding the rights of the data subject. The immutability of the blockchain could thereby contradict the implementation of the rights.

5.1.3.1. *Right to rectification*

According to Article 16 sentence 1 and 2 GDPR the data subject shall have the right to obtain from the controller without undue delay the rectification of inaccurate personal data concerning him or her. Taking into account the purposes of the processing, the data subject shall have the right to have incomplete personal data completed, including by means of providing a supplementary statement. This right is challenged by the immutability of the blockchain used. Reverse transaction could be considered to comply with the right[22]. This

[18] Bundesregierung, *Blockchain-Strategie der Bundesregierung*, 19, available at: www.bmwi.de/Redaktion/DE/Publikationen/Digitale-Welt/blockchain-strategie.pdf.

[19] Bundesregierung, *Blockchain-Strategie der Bundesregierung*, 19.

[20] Bundesregierung, *Blockchain-Strategie der Bundesregierung*, 19.

[21] Bundesregierung, *Blockchain-Strategie der Bundesregierung*, 19.

[22] J. Schrey and T. Thalhofer, *Rechtliche Aspekte der*

method artificially injects transactions into the blockchain until a corrected copy has been produced[23]. However, this method contradicts the principle of the blockchain.

5.1.3.2. *Right to be forgotten*

According to Article 17 (1) GDPR the data subject shall have the right to obtain from the controller the erasure of personal data concerning him or her without undue delay and the controller shall have the obligation to erase personal data without undue delay. In view of the immutability of the blockchain, it therefore seems impossible to implement this right of the data subject[24]. In principle, single blocks of a blockchain cannot be removed without technically breaking its structure.

Instead of erasure, one could also consider blocking the data[25]. Although blocking the data is possible from a technical point of view, but this procedure does not correspond to the purpose of the blockchain. In principle, the immutability of the blockchain could be kept, but another important feature of the blockchain, namely the transparency, cannot be kept up.

In some cases, it is possible to remove obsolete blocks from the blockchain if their underlying result has already become part of the current transaction and they are no longer necessary to maintain the structure of the blockchain[26]. This procedure is called pruning[27]. The information that a personal data was processed remains in the blockchain[28]. The personal data itself can be removed from the blockchain[29].

5.1.3.3. *Compatibility of the blockchain with the rights of the data subject*

In summary, it is difficult to make the principle of the blockchain compatible with rights of the data subject. In particular, subsequent changes and adjustments bring the use of blockchains to their limits. Technically possible approaches have so far run counter to the purpose of the blockchain. A stubborn use of the technology, on the other hand, has so far not complied with the rights of the data subject.

5.2. *German Administration Law*

At the beginning of the year, the Federal Government passed its draft law on the implementation of the Digitalisation Directive (Gesetz zur Umsetzung der Digitalisierungsrichtlinie, DiRUG). This draft already provides for online formation of the limited liability company (Gesellschaft mit beschränkter Haftung, GmbH) as well as online procedures with regard to the filing and registration of deeds and information on the commercial register.

However, the structure of German administrative law does not preclude digitisation. According to Section 10 of the German Administrative Procedure Act (Verwaltungsverfahrensgesetz, VwVfG)[30], the administrative procedure is not bound to any form and thus reflects the openness to technology of the Rules of Procedure. Section 35a VwVfG provides for the fully automated issuing of administrative acts. In addition to savings in resources and personnel, automated decreeing of administrative acts offers a special degree of neutrality and objectivity[31]. With regard to the granting of the discretion, no discretion may be required, because this can only be exercised by a natural person. The use of Blockchain-based applications and Smart Contracts is therefore only thinkable in a strictly limited scope of application. In this context, the general procedural requirements must also be observed in the case of an automated decree. According to Sections 24 (1) sentence 1, 28 (2) point 4 VwVfG the facts on which the decision is based shall be ascertained and, if necessary, the person concerned shall be heard. These provisions serve individual justice and can, at least in the case of onerous administrative acts, conflict with an automated decree[32].

Blockchain, 1435.

[23] J. Schrey and T. Thalhofer, *Rechtliche Aspekte der Blockchain,* 1435.

[24] J. Schrey and T. Thalhofer, *Rechtliche Aspekte der Blockchain,* 1434.

[25] J. Schrey and T. Thalhofer, *Rechtliche Aspekte der Blockchain,* 1435.

[26] M. Martini and Q. Weinzierl, *Die Blockchain-Technologie und das Recht auf Vergessenwerden*, in *Neue Zeitschrift für Verwaltungsrecht*, 2017, 1255.

[27] M. Martini and Q. Weinzierl, *Die Blockchain-Technologie und das Recht auf Vergessenwerden*, 1255.

[28] M. Martini and Q. Weinzierl, *Die Blockchain-Technologie und das Recht auf Vergessenwerden*, 1255.

[29] M. Martini and Q. Weinzierl, *Die Blockchain-Technologie und das Recht auf Vergessenwerden*, 1255.

[30] German Administrative Procedures Act.

[31] L. Prell, *Section 35a VwVfG*, in J. Bader and M. Ronellenfitsch (eds.), *Beck'scher Online-Kommentar zum Verwaltungsverfahrensgesetz (VwVfG)*, vol. 54, 1 January 2022, marginal n. 20.

[32] T. Siegel, *Digitalisierung des Verwaltungsverfahrens in Berlin*, in *Landes- und Kommunalverwaltung*, 2020, 533.

5.3. *Risks of dispensing with intermediaries*

Due to its decentralised structure and the special trust to be placed in a blockchain, intermediaries such as notaries or banks could be dispensed with. However, this dispensing is not entirely risk-free. Although the blockchain is considered to be particularly manipulation-proof and can lead to cost savings by dispensing with intermediaries, this also means that state control and auditing options are being lost. So far, no successful hacker attacks on blockchain applications are known. Nevertheless, an increased use of the technology leads to an increased interest of potential attackers. If public registers or digital currencies are affected by attacks, they can lead to significant financial losses in the private and public sectors. This risk should therefore always be considered when using such technologies. Furthermore, public registers must also be organised on public servers. However, the blockchain itself can only be public to a limited extent.

6. *Conclusion*

Against the background of the specifics of German law described above, the use of blockchain and smart contracts is challenging. The requirements of data protection law in particular are complex and should not be underestimated. At the same time, however, there are also hurdles in German administrative law. Legal adjustments would therefore be necessary for the widespread use of blockchain and smart contracts. But German legislators should not close its doors to technical innovations, and work on possible implementations to harmonise law and technology. International pilot projects illustrate the growing interest. In order to maintain the economic attractiveness of Germany as a business location, work should be done on simple, timely and effective administrative processes, also with the help of blockchain applications.