

Decentralised Autonomous Management of an Association Through Smart Contracts According to German Legislation

Matthias Pohl^a, Rene Degenkolbe, Daniel Gunnar Staegemann^b and Klaus Turowski
MRCC VLBA, Faculty of Computer Science, Otto von Guericke University, Magdeburg, Germany
{firstname.lastname}@ovgu.de

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Abstract: A new emerging form of organisation, the decentralised autonomous organisation (DAO), built on blockchain technology and smart contracts, offers the potential for transforming social interaction. The basic regulations for running an association under German law indicate that transforming the traditional form of an association into a decentralised autonomous organisation is feasible. The main advantage comes from the automated execution of standard association management processes as well as the decentralised provision of IT infrastructure through a blockchain network. The advantages of the partially automated and decentralised administrative processes of an association are contrasted with further challenges of the social system of the future.

1 INTRODUCTION


Associations are a central part of the structure of society, but also an integral part of the lives of several million people in Germany (VuMA,). According to a study, about 40% of the population participates in an association (Simonson et al., 2017) and the association is the most represented form of society in Germany with 600,000 groupings. People come together in associations and usually pursue a non-profit purpose in sport, culture, politics or other areas of society. The associations are largely supported by volunteer members, who in over 50% of cases are employed or in over 25% are formerly employed pensioners (VuMA, ; VuMa, 2021).


The management of associations is accompanied by many administrative processes. In addition to legal compliance (BMJV, 2021a), which includes founding and admission processes as well as general meetings, there are also fiscal requirements to be met, which involve the accounting management of association income and expenditure, otherwise there is a risk of losing the legal status as an association. Depending on the area of society in which the association operates or the purpose that an association pursues, further organisational processes (e.g. coordination in the association) or activities (e.g. events) must be taken into account, but these have an individual process struc-

ture and depend on the constellation of the association. The effort required to manage the association is already very high in the legally basic organisation and can increase as the complexity of the association structures increases. The time required for the organisation must be borne by the voluntary members, whose free time is usually limited by their occupation, on their own responsibility, although suitable professional training is often not available (VuMA,).

Operational information systems (Scheer, 2013) fulfil, among other things, the purpose of supporting the secondary processes of the organisation (Schmidt, 2013). However, the use of IT systems and software that support the management of the association involves further effort (e.g. maintenance of hardware and software, training) or costs (e.g. IT services). The actual use of the support system may also be too much for some users.

Over the last decade, blockchain technology has evolved as a decentralised infrastructure and serves as a failsafe basis in many use cases. The challenge of reducing the effort caused by the general organisational processes of association management is to be countered with an approach of automation in this paper. The concept of the decentralised autonomous organisation (DAO) (Wang et al., 2019a) is adapted for association management and the central structures of an association are mapped with it. The decentralised infrastructure of a blockchain network makes it possible to avoid the additional effort of administering information systems. With the support of smart

^a  <https://orcid.org/0000-0002-6241-7675>

^b  <https://orcid.org/0000-0001-9957-1003>

contracts, all internal organisational processes of the association can be handled. Accounting can be automated through the transaction management of the blockchain.

In general, the question arises: *How can the general organisational processes of an association be suitably supported by blockchain technology under German legislation?*

This paper first sets out the legal basis for association management under German law (BGB (BMJV, 2021a)) and the basic concepts of blockchain, smart contract and DAO (section 2). The first approach of a decentralised association structure as a DAO is then presented and reference is made to the first steps of the evaluation (section 3). In the overall context, the design science approach (Hevner et al., 2008; Sonnenberg and Vom Brocke, 2012) will be followed. The legal requirements presented in this paper are to be supplemented in the future with the results of a requirements analysis from associations. The verification of the legal regulations as well as a proof-of-concept of the existing artefact are presented as first evaluation steps. The artefact of a decentralised autonomous association is to be further developed in the future with the ongoing state of the art of blockchain technologies.

2 BACKGROUND

2.1 Associations Under German Law

The legal provisions relating to associations are laid down in the Civil Code (BGB) §21 to §79a (BMJV, 2021a). A distinction is made between two types of associations, economic and idealistic. Economic associations according to §22 BGB act with the intention of making a profit, may, for example, employ staff or rent premises and have legal capacity as legal persons. A prerequisite, however, is registration in the competent register of associations according to §55 BGB and approval by the federal state (Zimmer, 2007). Before official registration, members of non-profit associations (e.g. from sport, culture, politics) are also personally liable for decisions and liabilities of the association according to §21 BGB. Furthermore, it is the elected board and not the association as an organisation that has legal capacity (§54 BGB). The non-profit purpose is paramount in these associations and all profits must be reinvested, as profit orientation is prohibited (Zimmer, 2007).

An association as a partnership can already consist of 2 members, but a minimum of 7 members is required for entry in the register of associations (§56

Table 1: Overview of legal requirements.

Entities	Processes
Association	Foundation of an association
Member	Liquidation of an association
Meeting	Membership admission
Statute	Membership exclusion
	Convention of a General meeting
	Execution of a General meeting
	Voting procedure
	Registration process

BGB). Furthermore, a statute of the association must be established which, in addition to the name and registered office of the association (§57 BGB), also determines the formalities of entry and withdrawal of members, membership fees, the composition of the board and the conduct of general meetings and resolutions (§58 BGB). According to §32 BGB, general meetings are the decision-making body of the association. The right to vote can be restricted (§34 BGB) if, for example, membership fees have not been paid. The type of decision-making (e.g. majority decision by 75% of votes) as well as the convening of extraordinary general meetings (§36-37 BGB) can be specified separately in the statutes. At a founding meeting the statutes must be signed by at least 7 members and the dated minutes of the meeting must be deposited with the official registration (§66 BGB). The members of the association must appoint an executive committee to represent the association in business and in court (§26-27 BGB). Changes to the statutes (§71 BGB) or the composition of the executive board (§69 BGB) must be reported to the registration authority. There is also an obligation to provide information on the number of members (§72 BGB). The formalities for membership, which is not transferable (§38 BGB), and the withdrawal of a member from the association (§39 BGB) can be specified with the statutes. Insofar as the number of members falls below 3, a withdrawal of legal capacity by the authorities is possible after hearing the board (§73 BGB). A withdrawal of legal capacity as well as a dissolution of the association must be entered in the register of associations (§74 BGB). The dissolution of the association can be effected by the general meeting (§74 BGB) or as a result of insolvency (§42 BGB). The winding up of the association is regulated in §76-78 BGB. Insolvency and the associated withdrawal of legal capacity must also be entered in the register of associations (§75 BGB). In general, the inspection of the deposited information on an association in the official register of associations can be viewed by any interested party (§79 BGB).

2.2 Blockchain and Smart Contracts

The concept of blockchain has been widely analysed after the initial publication (Nakamoto, 2008) and the main aspects of blockchain-based transaction storage (Tasca and Tessone, 2018; Yaga et al., 2018), the consensus protocols (Baliga, 2017; Cachin and Vukolić, 2017), network topographies (Decker and Wattenhofer, 2013) or general security aspects (Wang et al., 2018; Raikwar et al., 2019) explored. Due to the intended public access in blockchain networks, the consideration of access restrictions and usage rights has been integrated in extended concepts (e.g. public, private and consortium blockchain) and controversially discussed (Oliveira et al., 2018; Buterin, 2015; Wüst and Gervais, 2018). The integration of complex code constructs, smart contracts (Szabo, 1997), which can be used to control and manage transactions in a blockchain network, enables the implementation of accounting processes (Wang et al., 2019b; Wood, 2019; DuPont, 2017). In this context, the idea of decentralised autonomous organisation has emerged. The decentralised transaction management or accounting as well as the decentralised execution of payment orders make it possible to automatically execute the basic administrative processes of an organisation without central control units (Daft, 2010; Hage, 1965). All regulations must be formalised throughout so that a basic autonomous order of such an organisation can be achieved. The idea of decentralised autonomous organisations includes the concept of an averted central authoritarian control unit in a social structure of equal members (D). Furthermore, all basic administrative processes are to be carried out automatically and autonomously by a blockchain network through fully formalised processes (A). All rules, responsibilities, rewards and punishments are stored in smart contracts, which fully regulates the order of the organisation (O).

3 MODEL OF A DECENTRALISED AUTONOMOUS ASSOCIATION (DAA)

In the following, the concept of decentralised autonomous association management is explained as a model. The idea of the DAO is adapted to the requirements of an association according to the BGB (see section 2.1).

3.1 Entities

The **structure** of a decentralised association within a blockchain network is sufficiently covered by the objects "Association", "Meeting" as well as "Member" and "Statute" (see Figure 1). In the network, "Association" and "Meeting" are represented as *smart contracts* and "Member" as a simple *wallet* address. The association-related "Statutes" as well as further information about a "Member" are held as a struct element within the smart contract "Association".

3.2 Processes

The **foundation** of the contract leading the association is triggered with an instantiation of the smart contract "Association" by several wallet addresses ("Member") and is constituted after confirmation by at least 7 participating wallets. The board members to be determined in accordance with the BGB are additionally deposited as "BoardMembers". The admission of a **membership** is effected by the payment of the membership fee to the contract leading the association and approval of the **membership meeting**, which can also vote on the exclusion of members. For the execution, corresponding functions are stored in the smart contract "Association". A **general meeting** is an instance of the smart contract "Meeting". These meetings can be called or initiated by members at least once a year in accordance with the law for individual decision-making situations. The process of an initiation of a meeting and the related voting procedure is shown in Figure 2. The **dissolution** of an association leading contract can also be done by member vote. The extent to which dissolution may be necessary for insolvency reasons depends on the selected blockchain network and its transaction management. The publication of the association's contract in a public blockchain network can be considered as registration and enables the viewing of association-related information.

3.3 Implementation

After verifying the legal requirements, an exemplary scenario was implemented as a proof-of-concept in the Ethereum test network. The smart contracts "Association" and "Meeting" were developed with the programming language Solidity (version 0.8.3) and 8 network addresses were created. The Remix IDE¹, an open source web and desktop application, was used for the development. MetaMask², which implements

¹Remix Project - <https://remix-project.org>

²Metamask - <https://metamask.io>

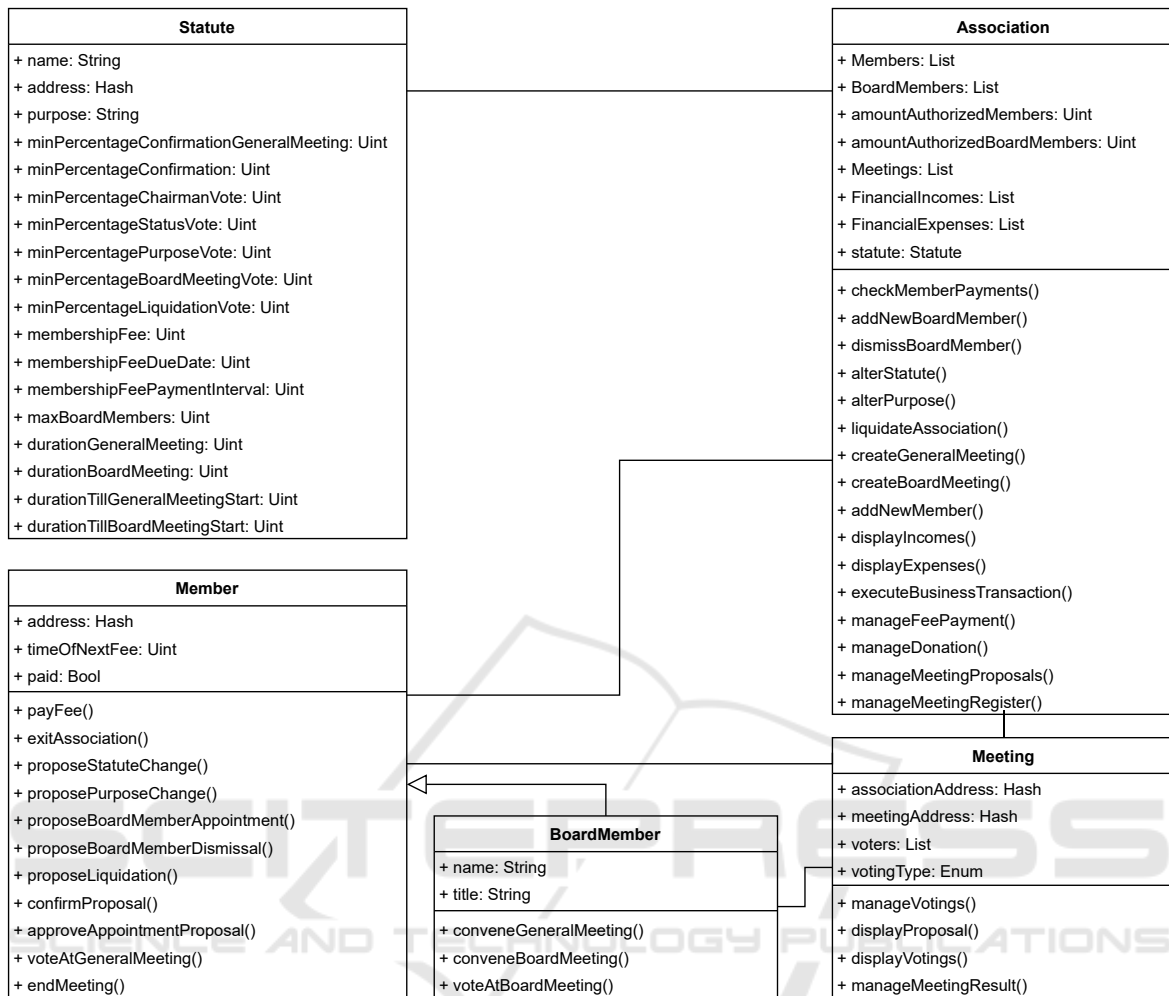


Figure 1: Diagram of the structural model of a DAA.

web3, was used to deploy the smart contracts and create the Ethereum address accounts. Web3 applications make it possible to interact with smart contracts in the connected network and send transactions. In this constellation, all the processes, *initiation* of an association-managing contract, *member admission*, *member exclusion*, *board election*, *member meeting* and *dissolution* of the contract were performed demonstratively. All code will be made available in a public Github repository.

4 CONCLUSION

The Decentralised Autonomous Association approach demonstrates the application of the DAO concept to a legally defined form of society, the association. Whether the DAA will be recognised as a legally representative form of society is an open dis-

ussion, as either legal regulations must be enacted or regulatory systems capable of integration must be provided. Furthermore, associations with DAA are limited to activities, contractual partners as well as members that accept transactions in the blockchain ecosystem. However, fintech solutions (e.g. Blockonomics) can support the bridging of different currency systems. Overall, besides the DAA, other examples such as the Hutten DAO (Kux et al., 2017), e-Gov (Diallo et al., 2018) as well as general concepts such as the DAOstack (DAO, 2018) or MakerDAO (DAO,) have shown that an implementation of a private company on a public network is feasible, but further interfaces to the economic system are needed. However, without the use of a public blockchain network, no general public trust can be established.

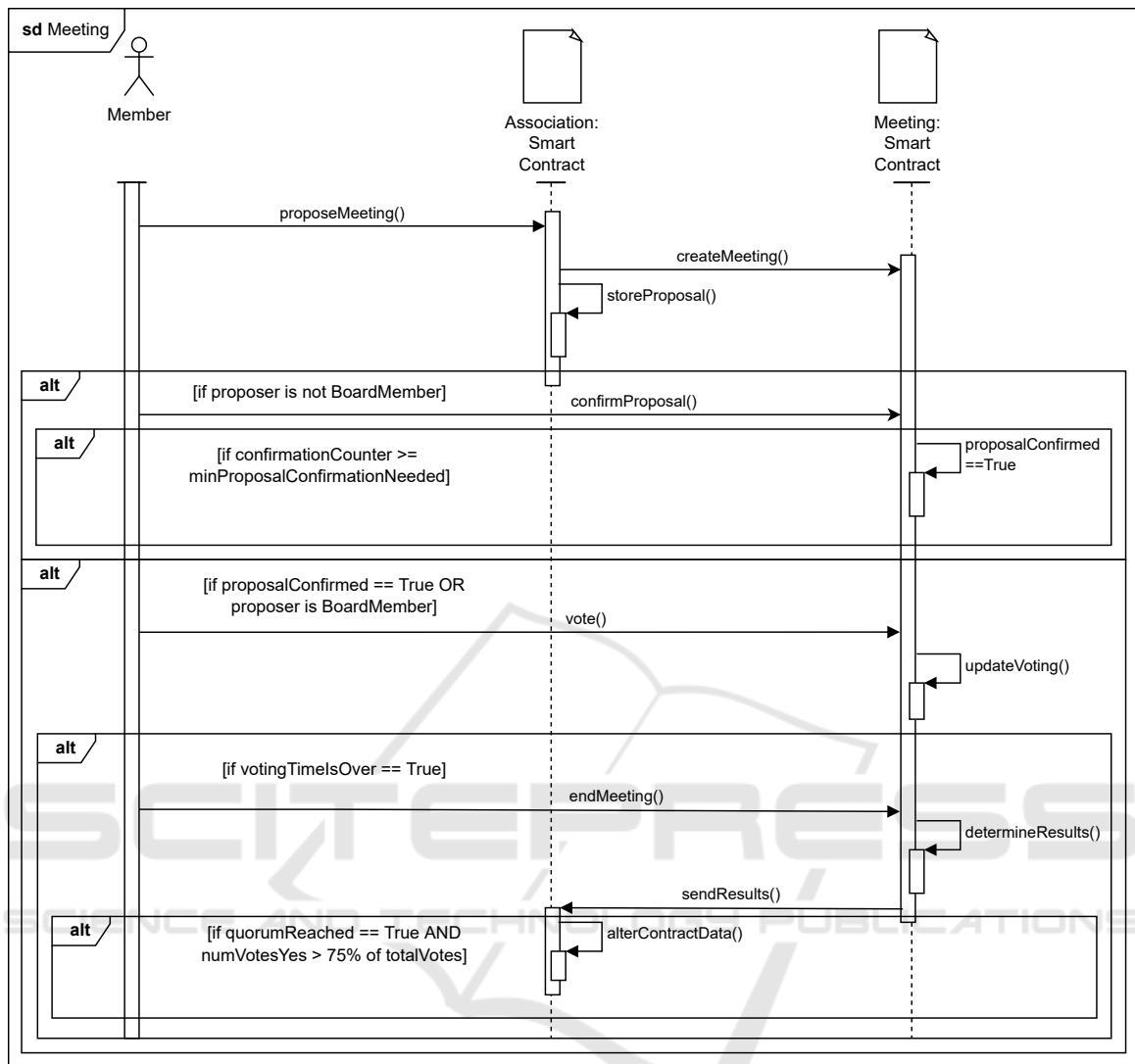


Figure 2: Diagram of the process of a meeting proposal.

5 OUTLOOK

Besides some improvements that can be implemented in the current version of the smart contracts, such as the use of programming patterns or standard smart contracts, there are other potential extensions.

Creating an access token that indicates membership or enables voting rights in polls, in the form of a utility token, will face challenges. Insofar as the first layer network (e.g., Ethereum) on which the smart contract of the DAA is executed is split up in a hard fork, a consensus problem arises for the association to the extent that the smart contract of the association is continued on both networks. An implementation that would allow cross-network automated continua-

tion of a smart contract or cross-network voting on association matters is not yet feasible without external trustees. In hard fork scenarios, a vote would have to be held by a general meeting, reducing the continuation to one network, or the association would have to split into two independent associations. Corresponding implementations have already been done in The DAO (Jentzsch, 2016) and in particular in the context of The DAO Hack (Siegel, 2016). Concepts of security tokens or utility tokens could still be applied in the realization of other corporate forms (e.g., cooperative or joint-stock companies), since the voting weight is regulated by the number of participation shares in these corporate forms. However, in associations, the issuance of so-called membership cards could be

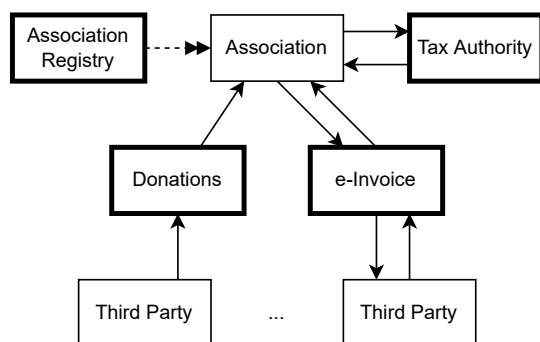


Figure 3: Overview of future extensions.

done via an implementation as a Non-Fungible Token (NFT) (Wang et al., 2021). Such a membership card NFT could be directly linked to the wallet that is part of the DAA. However, there is no need to issue an NFT as the membership can already be identified via the wallet. If a personal identification of the member has to be done from a legal perspective (e.g. founding members, board of directors), a NFT could be a solution approach. An automated evaluation of the association's own wallet can already be conducted via an analysis of the blockchain transactions, thus the tax-relevant turnover can be clearly identified via the DAA wallet. However, it would not be possible to distinguish whether revenue is generated from donations or services and whether expenses are incurred through the purchase of goods or taxes. Here, the introduction of smart contracts as e-invoices can take place, which on the one hand contain a list of goods and services, and on the other hand automatically generate a second layer token for value-added taxes (VAT). A VAT liability can arise accordingly if the turnover framework of the small business regulation (§19 UStG) (BMJV, 2021b) is exceeded by the association. The VAT token would be a network-dependent utility token, which on the one hand can be used again in e-invoices to pay VAT, or on the other hand can be converted back into a first layer token at the tax authority. Extensive VAT reporting would thus no longer be necessary, as VAT clearing can be done entirely via VAT token exchange. More complex tax obligations (e.g., tax returns) could also be handled via smart contracts, but further analysis and formalization of these processes is needed. State tax authorities could manage these smart contracts on-chain and it does not require untrusted off-chain applications (Fatz et al., 2020). Donations could also be made either as an e-invoice or via a separate donation smart contract that includes regular recurring donations. However, there are no taxes for the association, but there are tax advantages for the donor, so a separate smart contract would be suitable.

A central entity of the law of associations, the register of associations, according to the BGB has not yet been integrated explicitly. In the model presented, the register of associations can also be implemented as a smart contract that issues DAA smart contracts, a so-called factory smart contract. A decentralised association can thus be configured and created exclusively via the smart contract of the association register. Registration would take place automatically in this association register smart contract if the appropriate requirements are met. The legal obligations of registration would thus be fulfilled.

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