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Supporting communication and cooperation in the asylum procedure with Blockchain technology

A proof of concept by the Federal Office for Migration and Refugees

Informationstechnologie

Supporting communication and cooperation in the asylum procedure with Blockchain technology

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Whitepaper by the Project Group Business & Information Systems Engineering of the Fraunhofer Institute for Applied Information Technology FIT

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Abstract

Digital technologies are changing our society in many ways. Yet, apart from significant increases in productivity and new forms of value creation, rapid digital advances are also bringing a number of political and social challenges. While the digitalisation of the public sector in Germany still faces numerous challenges, other countries have already taken significant steps. For example, Estonia has already largely digitalised its administration. The federal government is looking to similarly advance Germany with a targeted digitalisation strategy and strengthen the public administration using digital technologies. One of the technologies the government is focusing on is Blockchain. Blockchain is a decentralised database technology that stores data in cryptographically linked blocks forming a highly tamper-resistant chain. The key idea behind Blockchain technology is to manage and store data by a network of participants rather than a central entity. New Blockchain technologies also facilitate the automation of cross-organisational process management.

Blockchain technology provides promising opportunities to coordinate federal structures, as required, for instance, by the German asylum procedure. Beyond the primary administrative body, the Federal Office for Migration and Refugees, various other authorities at the municipal, state and national level are involved in the asylum procedure. For example, preliminary reception centres and immigration authorities report to the federal states or are part of the local municipal government. This entails a range of different procedures, heterogeneous IT infrastructures and an incomplete exchange of digital information. An important step forward was therefore taken with the introduction a joint data source, the Central Register of Foreign Nationals (AZR). The AZR covers various personal data, which may be recorded and stored by competent authorities in accordance with applicable legislation – particularly, the Central Register of Foreign Nationals Act (AZRG). However, there is still a need for IT-based support with regard to cross-organisational communication and cooperation.

The Federal Office for Migration and Refugees has thus evaluated to what extent Blockchain can help address these issues and support the establishment of digital identities in the asylum context as well as cross-organisational communication and cooperation. The crucial baseline for this evaluation was a proof of concept project during the first half of 2018. This project commenced with the selection of a use case (“simplified

asylum procedure") and a preliminary evaluation of the suitability of Blockchain technology. Following a positive preliminary evaluation, a mixed team comprised of the Federal Office, the Project Group Business & Information Systems Engineering of the Fraunhofer FIT and a technology partner developed a tailored Blockchain solution. The solution was then assessed based on a Blockchain-specific evaluation framework focusing on technical and functional aspects as well as privacy issues.

The proof of concept showed that the use of Blockchain technology could support cross-organisational communication and cooperation in the asylum procedure. In addition, Blockchain could provide an important foundation for the establishment of digital identities and allow an asylum seeker's procedure to be tracked based on this identity. Admittedly, not all applicable data protection regulations were fully implemented in the proof of concept. However, the findings gained as part of the project provide a promising basis for the development of a Blockchain-based solution for the asylum procedure that complies with data protection requirements. Moreover, the developed concept could scale beyond Germany's borders. Blockchain-based, transnational management of asylum procedures could therefore become a joint project of the European member states to strengthen cooperation while safeguarding federal structures. This means that Blockchain technology could be the start of digital federalism in Europe (including the asylum procedure).

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1. Motivation

Digital technologies are changing our society at many levels (Gimpel & Röglinger, 2015; Kühl, 2018). Yet, apart from significant increases in productivity and new forms of value creation, the rapid digital advances are also bringing a number of political and social challenges (Röglinger & Urbach, 2016). The federal government is therefore looking to frame these advances with a targeted digitalisation strategy and further strengthen the public administration through use of digital technologies (Koalitionsvertrag der Großen Koalition, 2018). One of the digital technologies to have received special attention in this context is Blockchain.

Blockchain is a type of decentralised database structure in which data can be stored in cryptographically linked blocks forming a highly tamper-resistant chain (Christidis & Devetsikiotis, 2016; Nakamoto, 2008). The main idea behind Blockchain technology is to manage and store data by a network of participants rather than a central entity (Underwood, 2016). New Blockchain technologies also make it possible to automate aspects of cross-organisational process management (Buterin, 2014; Fridgen, Radszuwill, Urbach, & Utz, 2018).

The prompt distribution and tamper-resistant storage of data allows Blockchain to provide consistent and persistent information. At the same time, Blockchain allows decentralised structures to be retained, which in turn makes it possible for sensitive data to remain in its respective source systems, while metadata can be shared via the Blockchain. Blockchain thus opens new avenues for digital coordination in federal structures (Bonneau et al., 2015; Christidis & Devetsikiotis, 2016).

> **Blockchain allows decentralised structures to be retained so that sensitive data can remain in its source systems, while exclusively allowing metadata to be shared via the Blockchain.**

In short, the German asylum procedure is a promising application for Blockchain. Beyond the Federal Office for Migration and Refugees (BAMF), numerous other authorities at the municipal, state and national level are involved in the asylum procedure. For example, preliminary reception centres (responsible for asylum-seeker registration and accommodation, etc.) and immigration authorities (responsible for residency- and passport-related measures and decisions made in accordance with the Residency Act (AufenthG)) report to their respective federal states or are

subject to rules and regulations of their respective municipal governments. This complexity creates different procedures in each state, heterogeneous IT infrastructures and, in some cases, incomplete information exchange. The competent authority stores progress data on the asylum procedure (e.g. information on the completion of a step in the procedure) locally. However, authorities do not always share information on the status of the procedure between each other, what creates information gaps. This is primarily due to the necessary data often not being saved in the Central Register of Foreign Nationals (AZR). At present, an (additional) source of information with clears digital procedure data, which could be used for advanced cross-organisational management of the asylum procedure, does not exist.

This whitepaper examines the extent to which Blockchain is able to resolve these challenges and support the establishment of digital identities in the asylum context as well as cross-organisational communication and cooperation. A key point of reference in this respect is a proof of concept (PoC) project, which the Federal Office for Migration and Refugees undertook in the first half of 2018.

The whitepaper describes the basic concepts and the asylum procedure in Germany vis-à-vis a detailed examination of Blockchain technology and the principle of digital identities. This is followed by a description of the approach taken to develop the use case as well as a description of the evaluation. Subsequently, the results of the PoC evaluation are presented and relevant design principles of Blockchain technology in the asylum context are explained. The conclusion discusses the findings of the PoC.

2. The asylum procedure in Germany

According to the UN Refugee Agency UNHCR, approximately 68.5 million people fled their home country in 2017 (United Nations High Commissioner for Refugees, 2018). Most of these people fled from Syria (6.3 million), Afghanistan (2.6 million), South Sudan (2.4 million) and Myanmar (1.2 million) (United Nations High Commissioner for Refugees, 2018). Meanwhile, Germany has seen a large increase in asylum applications in recent years. For instance, a record number of more than 745,000 refugees sought asylum in Germany for the first time in 2016 and approximately 200,000 did so in 2017 (Bundesamt für Migration und Flüchtlinge, 2018). These large numbers as well as the high standards of asylum procedures pose a challenge for all concerned authorities.

The German Constitution guarantees anyone persecuted on political grounds the right to asylum (Grundgesetz, 2017). This right pertains to all those fleeing from violence, war or terrorism in other parts of the world. Upon arrival in Germany, all asylum seekers, i.e. persons intending to seek asylum in Germany, are obliged by law to immediately report to a government body (border services agency, police or immigration authority or reception centre) and lodge an asylum application. In Germany, the Federal Office for Migration and Refugees is responsible for managing the asylum procedure in compliance with various responsibilities and strict legal stipulations. Figure 1 shows a diagram of the key steps of the general asylum procedure, which was used for the PoC.

Dublin Regulation

The purpose of the Dublin Regulation is to ensure that the content of any asylum application lodged in the Dublin region is only checked by one state. The Dublin region includes the member states of the European Union, Norway, Iceland, Switzerland and Liechtenstein. The granting of asylum protection in one Dublin state makes any further review of the asylum application in Germany impossible.

After their arrival at a preliminary reception centre (PRC), asylum seekers are processed and registered for identification purposes (registration). This is followed by an assignment to a specific reception centre in which the asylum seekers are initially accommodated and fed and where they receive access to medical services. As evidence of arrival at the respective reception centre, asylum seekers receive a proof of arrival (PoA). After

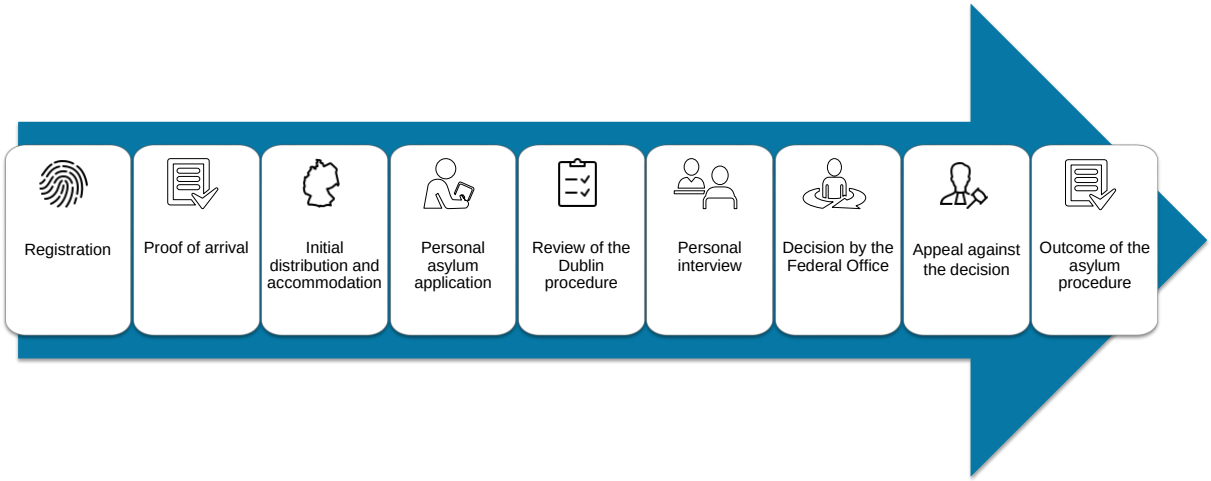

Figure 1 Diagram of the asylum process in Germany

they have received accommodation, asylum seekers apply for asylum. The Federal Office then checks the application for asylum in accordance with the Dublin Regulation.

In the event of a lawful application in Germany, the Federal Office initiates the next step, which involves a personal interview. Based on the interview and all submitted documents, the Federal Office makes a final decision on the application for asylum. The decision by the Federal Office is then justified in writing and presented to all participants. The application for asylum is only rejected if none of the four possible forms of protection, eligibility for asylum, refugee protection, subsidiary protection or the principle of non-refoulment applies. Eligibility for asylum is ruled out in the event of entry via a safe third country (incl. member states of the EU as well as Norway and Switzerland). If the application for asylum is rejected, the Federal Office may lodge a legal appeal against the decision. In the event of a positive outcome to the application for asylum, the person receives a residency permit. In the event of a negative outcome, the competent immigration authority repatriates the person. A more detailed description of the German asylum procedure can be found in “The stages of the German asylum procedure – an overview of the individual procedural steps and the legal basis” brochure by the Federal Office for Migration and Refugees (2016).

3. Blockchain

3.1. Principles of the Blockchain technology

Blockchain is based on the idea of managing and storing data via a network rather than by a central authority. In 2008, Nakamato developed Blockchain as a register for bitcoin transactions (Beck, Müller-Bloch, & Leslie King, 2018; Nakamoto, 2008; Schlatt, Schweizer, Urbach, & Fridgen, 2016). Since then, Blockchain has been examined and evaluated in various areas of application. For instance, modern Blockchain solutions could support supply chain management (Korpela, Hallikas, & Dahlberg, 2017), security and privacy in the context of the internet of things (Dorri, Kanhere, Jurdak, & Gauravaram, 2017) as well as energy trading (Munsing, Mather, & Moura, 2017).

Blockchain is a transparent, transactional, distributed database structure that saves data in a decentralised peer-to-peer network (Glaser, 2017). It groups data in blocks and links these in a chronological, structured order using cryptography. As a result of cryptographic linking, each block contains a reference to the previous block (Schweizer, Schlatt, Urbach, & Fridgen, 2017). A consensus mechanism allows the network to jointly determine the correct sequence of transactions (in blocks) as well as the correct sequence of these blocks (in the "chain"). Cryptography and consensus mechanisms ensure reliability, validity and trust (Christidis & Devetsikiotis, 2016; Porru, Pinna, Marchesi, & Tonelli, 2017). Moreover, the tamper-resistance leads to

Distributed ledger technology

Distributed ledger technologies (DLT) open up new possibilities in social, political and economic areas. DLT enables secure and tamper-resistant data storage, which allows transactions to be performed faster, more cost-effectively and securely in a distributed register. DLT is based on mathematical and game-theoretical concepts and is used to verify and secure data to ensure its integrity. To date, the most well-known type of DLT is Blockchain technology. DLT enables the transfer of various digital rights.

Blockchain is a database structure that enables the immutable, chronological, and decentralised storage of data in a network.

higher data integrity and security (Fridgen, Radszuwill, Urbach et al., 2018; Swan, 2015). Finally, the tamper-resistance and decentrality of Blockchain solutions make them compatible with federal structures (Lockl, Rieger, Fridgen, Röglinger, & Urbach, 2018; Risius & Spohrer, 2017). The use of smart contracts also increases the efficiency of procedures, their transparency and the identification of procedural deviations. Smart contracts are program code stored on the Blockchain, which automatically run predefined procedure logic under certain conditions (Buterin, 2014).

3.2. Applications of Blockchain in the private and public sector

In contrast to the private sector, public sector applications are still limited (Fridgen, Guggenmos, Lockl, & Rieger, 2018). However, as part of the coalition agreement, the new federal government has identified Blockchain as a key focus of research (Koalitionsvertrag der Großen Koalition, 2018, p. 41) and resolved "to trial innovative technologies such as distributed ledger (Blockchain) so that a legal framework can be created based on these experiences" (Koalitionsvertrag der Großen Koalition, 2018, p. 45).

At an international level, initial applications of Blockchain-based solutions already exist for managing digital identities in the area of migration policy. The ID2020 Alliance is aiming to use a Blockchain-based digital identity in order to improve the lives of people worldwide and especially the lives of migrants with no official identity (ID2020 Alliance, 2018). A similar use case has already been implemented in a refugee camp in Jordan. In this case, refugees have their iris scanned upon arrival and the scan is subsequently used for the Blockchain-based identification and payment system when issuing food or making purchases (United Nations High Commissioner for Refugees, 2015; World Food Programme, 2017). This type of system makes aid difficult to misuse, while also increasing its efficiency, as the high fees charged by payment service providers no longer have to be paid. The Finnish government is also looking to combat these problems by replacing cash with prepaid payment cards connected to a Blockchain-based system and issued upon arrival. The card can subsequently be used like a bank account to which wages can be transferred (Orcutt, 2017). Similar use cases are conceivable for the Federal Office for Migration and Refugees in Germany. For instance, refugees who arrive without identification documents could be clearly identified based on biometric features, which are already collected upon initial registration, at least for adults, and they could then be assigned

a digital identity. These identities could provide considerable added value in the further course of a Blockchain-supported asylum procedure, as the clear identification of every person can be ensured across organisations. This also applies to refugees who apply for asylum multiple times, for example, because they return after deportation.

Blockchain could be an appropriate infrastructural element for improving cooperation across authorities or even national boundaries (Fridgen, Guggenmos, Lockl, & Rieger, 2018; Lindman, Tuunainen, & Rossi, 2017). As no mediator or intermediary is required, Blockchain-based systems offer unique characteristics for optimising the exchange of information as part of cross-organisational procedures and the creation of digital identities (Avital, Beck, King, Rossi, & Teigland, 2016; Subramanian, 2017).

4. Cross-organisational tracking of the asylum procedure

4.1. Objectives of the proof of concept

After a positive preliminary evaluation, in February 2018 the Federal Office launched a project to evaluate the opportunities, risks and possibilities of the use of Blockchain technology. The project was focussed on supporting cross-organisational communication and cooperation in the asylum procedure (cf. Koalitionsvertrag der Großen Koalition, 2018) and included the structured execution of a proof of concept as well as a scientifically substantiated evaluation at the functional, technical and legal level (Fridgen, Guggenmos, Lockl, Schweizer, & Urbach, 2018). Specifically, the PoC analysed the feasibility of a Blockchain solution for supporting a simplified version of the asylum procedure.

This involved a collaboration between the Federal Office for Migration and Refugees, the Project Group Business & Information Systems Engineering of the Fraunhofer FIT and a technology partner. While the Federal Office represented the business side, provided the infrastructure and cooperated in the development, the technology partner carried out the majority of the software development. The Project Group Business & Information Systems Engineering of the Fraunhofer FIT supervised the project from a scientific perspective and ensured the objective and neutral examination of the PoC. The project was divided into five phases: development of the use cases (Fridgen, Lockl et al., 2018), development of the system architecture, development of the prototype and the necessary user systems, the implementation of the prototype, and the final evaluation (see figure 2). The objective of the PoC was to gain new insights into handling a novel, disruptive technology as well as numerous points of reference for supporting the asylum procedure. Special attention was paid to the following aspects:

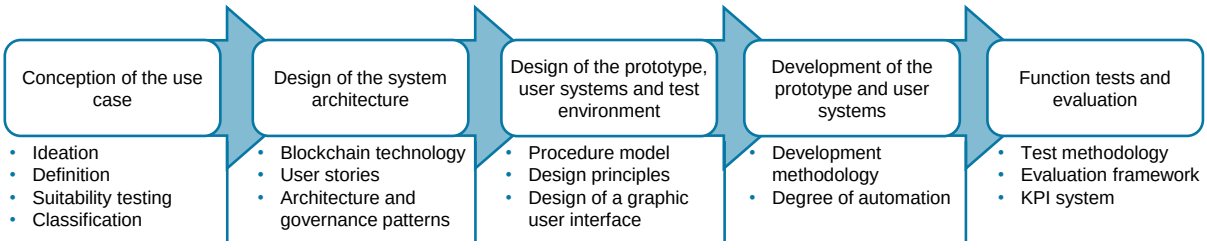

Figure 2 The five phases of the proof-of-concept

- **Integrity:**
  Procedure logic (Smart Contracts) on the Blockchain can help avoid and/or transparently document procedure errors.
- **Security:**
  Blockchain ensures persistence of documented status changes and affords privacy-enhancing and decentralised data storage.
- **Speed:**
  The constantly updated knowledge of the status of an asylum seeker's procedure minimises waiting times between cross-organisational steps of the procedure, so the entire procedure is accelerated significantly.
- **Transparency:**
  Every authority involved in the Blockchain network receives the same status on the selected asylum procedure virtually in real-time.

4.2. Architecture of the proof of concept

The initial architectural requirements were derived from the use case of cross-organisational cooperation in the asylum procedure. On the one hand, the Blockchain solution must meet all applicable legal requirements and, in particular, data protection requirements. On the other hand, the solution developed in the PoC must be easily extendable to additional locations and authorities and yet still provide the greatest possible security against unauthorised access and manipulation.

Technical interfaces

REpresentational State Transfer (REST) is a programming interface based on the paradigms and behaviour of the World Wide Web (WWW). It describes an approach for the communication between client and server in networks. In practice, the REST paradigm is preferably implemented via HTTP/S. This means that services are accessed via URL/URI. In this case, the HTTP methods (GET, POST, PUT, etc.) indicate the operation to be performed by a service.

Web3j is a lightweight and reactive Java and Android library for interacting with the Ethereum Blockchain.

For the PoC, the Federal Office decided to use a Blockchain based on Ethereum, with restricted read and write permissions (private and permissioned). Proof of authority was used as the consensus algorithm (Wood, 2015). A new block is created roughly every five seconds, which makes it highly difficult to compromise the Blockchain. This also ensures the prompt transmission of status updates to other network participants.

The simulated existing systems

MARiS is a workflow and document management system for handling the asylum and Dublin procedure. The development was primarily focussed on the complete processing of records in the electronic system and on relieving the strain on users through the extensive automation of routine activities. Recently, qualified digital signatures and a virtual mailroom features have been added.

PIK stations (personalisation infrastructure component) are where all persons seeking asylum in the Federal Republic of Germany are registered. This is performed by the federal or state police, staff at the Federal Office for Migration and Refugees in the branch offices and arrival centres or state employees in reception centres, immigration authorities and arrival centres. This is where personal data, a photograph and fingerprints are collected and centrally stored. All public bodies that require the data for their specific areas of activity can subsequently access this data.

These decisions served as the basis for the development of an architecture consisting of three layers. The first layer describes the Blockchain itself, the second layer describes an adapter level and the third layer describes the various source systems (e.g. the BAMF-internal MARiS system) to be connected to the Blockchain. Communication between the individual layers takes place via standardised REST or web3j interfaces. Since no real data was to be used as part of the PoC and no live systems were to be interfered with, the source systems of the three involved types of authorities (reception centres, immigration authorities, BAMF) were replicated and simulated using mock-ups. The central existing systems were “PIK” in the reception centres, “MARiS” in the Federal Office for Migration and Refugees and an application, which cannot be specified, to represent the immigration authority.

To satisfy legal requirements, especially data protection, and minimise the necessary level of integration into existing application systems, the prototype did not store any personal data of asylum seekers on the Blockchain. The right to erasure, anchored in the General Data Protection Regulation, posed a particular challenge, since data which has been stored on the Blockchain can no longer be erased. As a result, the prototype merely stored the current status of the asylum seeker’s procedure, a time stamp and the abbreviation of the processing authority on the Blockchain. The prototype also added a resource locator. This refers to the sensitive data stored exclusively in the relevant source system, or the authority that executed the step of the procedure. This allowed

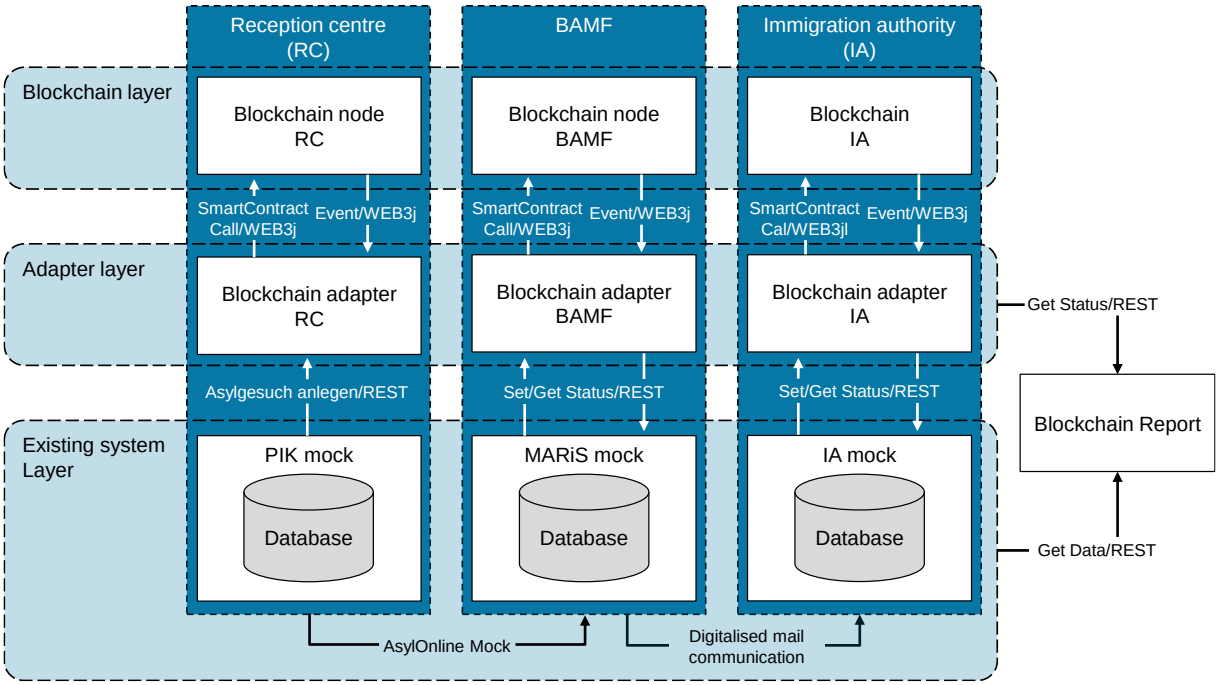

Figure 3 Diagram of the system architecture

the information to be found – with read permission – if it had not been erased in the existing system. If the data has been erased in the source system, the reference is empty.

The simulated source systems were connected directly to the adapter. This adapter contains a rights and roles concept and controls the data uploaded to the Blockchain as well as the data that can be read from the Blockchain via resource locators. All authorities participating in the Blockchain network continue to operate with their existing systems. The adapter responds to certain actions in the existing systems and communicates these data/status changes to the Blockchain as events. This is where the events are entered as a transaction and “blocked”. At the same time, certain transactions by the Blockchain trigger actions by smart contracts, which report these to the adapters. The adapters then report the action to the relevant existing system, which processes the action accordingly. For example, one outcome may be the request to perform a certain step of the procedure. The smart contract thus virtually eliminates the time between steps of the procedure.

A graphic user interface was developed to visualise the status of the asylum seeker’s procedure, which represents the request front-end. This user interface, in turn, is linked to the adapter via the REST interfaces on one side and the existing systems on the other. This allows the status of the procedure to be read from the Blockchain via the adapter and the associated real data (whose references are stored in the Blockchain as resource locators) to be loaded directly from the

source systems according to the
authorisations stored in the adapter.

5. Evaluation

5.1. Development of the evaluation criteria

Evaluation criteria adapted to the public sector were developed to assess the PoC. Besides the initial derivation of criteria from the scientific literature (e.g. Akoka and Comyn-Wattiau (2017), Fridgen et al. (2018d), METI (2017), Smith and Dhillon (2017)) the Project Group Business & Information Systems Engineering of the Fraunhofer FIT also carried out an interview study. The interviewees included Blockchain experts from science and practice as well as experts from the departments and management staff of the Federal Office for Migration and Refugees. In total, more than 100 indicators were collected and consolidated in 16 categories. These can be broken down into technical criteria (technical design of the PoC), functional criteria (the impacts on the asylum procedure) and legal criteria (compatibility with existing legislation). The final evaluation criteria were also published and discussed at an academic conference (Fridgen et al. 2018a).

5.2. Evaluation of the proof of concept

The great benefit of a Blockchain solution lies in the creation of consistent and persistent information across organisations on the status of asylum procedures. The involved authorities can also track this status, and it cannot be manipulated. As a result, a Blockchain solution can help support the asylum procedure and improve the procedure's reliability. Smart contracts could automate selected aspects of cross-organisational procedures and therefore improve cooperation between the authorities. Another benefit lies in the speed with which the information is exchanged. For instance, Blockchain immediately informs an immigration authority that and when an interview has taken place. This information is essential to streamline parallel procedures and planning by the immigration authority. With the help of Blockchain, this information is distributed directly after the interview data is entered. Finally, the transparent and immutable documentation of completed steps of the procedure supports cross-organisational cooperation. Accordingly, the benefits of the

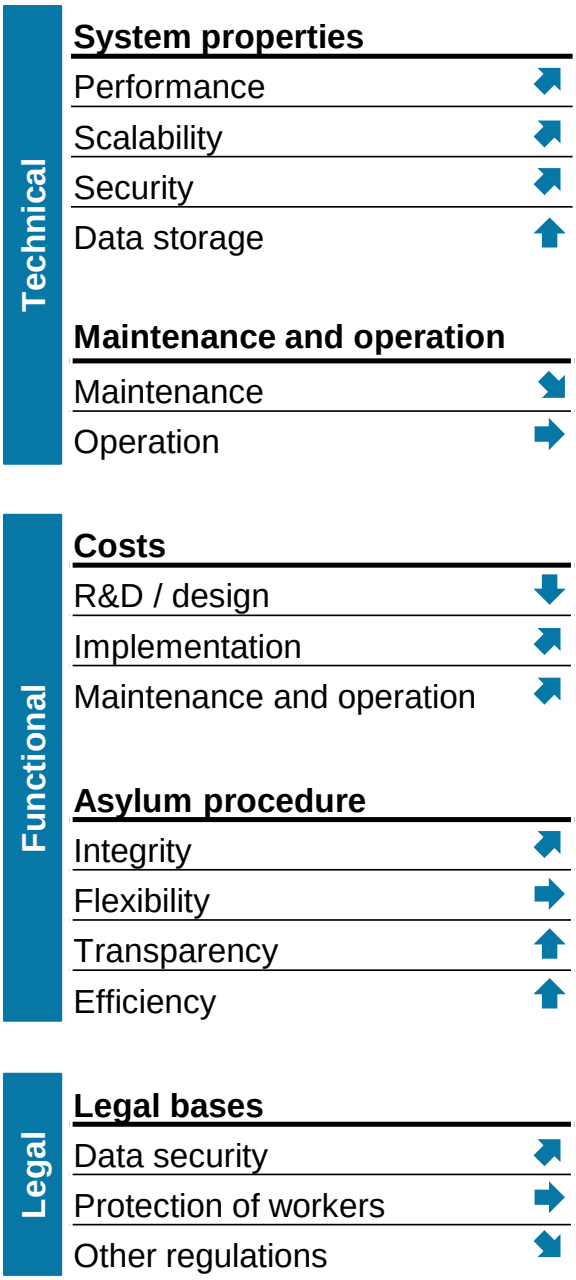

Figure 4 Results of the evaluation

Blockchain will be greater, the more authorities and organisations are involved in the system in the future.

An external legal evaluator reviewed the legal compliance of the architecture and confirmed it in principle. However, according to said opinion, it is advisable to reconsider the clear assignment of the status of the procedure to asylum seekers on the Blockchain, as this presents a privacy risk. The status of the procedure can also be assigned in a middleware (e.g. in the adapter), which ensures privacy. While this would deprive the Blockchain-based solution of part of the intended decentrality, the fundamental benefits remain unaffected. The targeted support of the asylum procedure would still be expected with this kind of design.

The evaluation points to the benefit of a Blockchain-based solution compared to the status quo in both the technical as well as the functional evaluation criteria. Clear benefits exist in the procedure reliability, transparency and efficiency categories. In addition, the evaluation of the legal aspects as well as the expert opinions show that this type of solution can comply with data protection requirements. Moreover, this improves the quality and integrity of the procedure while simultaneously minimising error sources. It also improves the efficiency of the asylum procedure, as it can be consistently digitalised and the management of individual steps of the procedure can even be automated.

In the future, services and procedures, such as the integration of refugees, could also be connected to the Blockchain infrastructure of the asylum procedure. Accordingly, the asylum procedure could be used as the central element for a public service ecosystem. On the other hand, the technology is not yet fully established, which creates

challenges in the robustness and the phases of development, maintenance and operation. Furthermore, new dependencies on third parties, changed governance structures (e.g. decentralised structures via the validator nodes the other authorities) and restrictions in the design of information flows must be considered.

Ultimately, however, the benefits in the support of cross-organisational communication and cooperation and thus the asylum procedure outweigh these challenges.

6. Outlook

Blockchain is a technology that supports cross-organisational cooperation. The greater the scope of the cross-organisational procedures, the more beneficial the use of Blockchain is. If the network is also opened to unknown participants (e.g. to every asylum seeker) in the future, the ability of Blockchain to create trust in shared information will become even more important. In the future, steps of the procedure could be broken down even further and new procedures could be connected to the system. Two fundamental possibilities exist in this respect. The obvious variant would be an extension of the current Blockchain with the necessary sub-procedures. However, this would quickly place a strain on the Blockchain due to the high transaction volume. In addition, different use cases generally have different requirements for system design, meaning that a "one-fits-all" solution would not be advisable. In the second variant, separate Blockchain-based systems would be established for the individual use cases (e.g. integration processes), which solely report elementary steps to the asylum procedure Blockchain. In these parallel systems, procedure management can also be mapped by smart contracts. As soon as multiple sub-procedures have been completed on the new Blockchain, the completion of these steps can be recorded in the cross-organisational asylum procedure Blockchain. This could create an "ecosystem" of various Blockchain-based systems, each of which forms an inherently independent system that regularly synchronises with the central asylum procedure Blockchain. In this case, the architecture or specific design of the Blockchain-based systems could also be adjusted to each specific use case.

> Digital identities are per se national agnostic and could support Europe's unity at a fundamental level.

The PoC carried out by the Federal Office for Migration and Refugees has shown that the asylum procedure in Germany and communication and cooperation in the asylum procedure can be supported with the help of Blockchain technology. This type of Blockchain-based platform could enable the management of the asylum procedure as well as the connection of additional services. Specifically, this kind of platform could provide digital identities for a decentralised system and improve the decentralised provision of government services. For instance, it is conceivable that asylum seekers will be able to independently supply information for selected steps of the

procedure with a mobile app and always view the status of their asylum procedure. In addition, similar to the existing uses in Finland and Jordan, a Blockchain could provide targeted support for the provision of food, money or provisional identification documents (analogue identities).

In the event that a Blockchain-based system were to be applied in the asylum procedure in Germany, the benefit of the new system would increase with the number of mapped cross-organisational procedures. However, the federal structures within Germany and Europe mean that this type of solution would have to be designed to ensure it can map the structure and the associated challenges with regard to responsibilities, variations in the procedure and the current legal situation. In this respect, Blockchain could be the "digital enabler" of European federalism in the asylum context.

This system would allow the EU member states to create a European platform for the decentralised management of asylum procedures. This platform would facilitate the one-off registration of asylum seekers upon arrival in Europe. This could also support pan-European procedures, such as the Dublin procedure, as it would enable the transparent storage of a person's place of initial registration. Particularly in a European context, a Blockchain provides even clearer benefits than at the national level. The creation of a European Blockchain-based identity platform could even constitute a further step towards a united Europe. Digital identities are per se nationally agnostic and could thus support Europe's unity at a fundamental level.

Blockchain could be the "digital enabler" of European federalism in the asylum context.

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