Federal Ministry for Economic Affairs and Energy

Federal Ministry of Finance

The Federal Government’s Blockchain Strategy

We are setting the Course for the Token-Economy

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The Blockchain Technology is a Building Block for the Internet of the Future

The blockchain technology[1] is one of the most discussed innovations of the digital transformation of economy and society. With features such as decentralization, reliability and counterfeiting protection, it opens up a wide range of innovative application possibilities and new forms of cooperation. In the ten years since the publication of the blockchain-whitepaper[2], a substantial technological and economic development has taken place. Via blockchain technology all conceivable values, rights and obligations in material and immaterial goods can be represented through tokens and potentially simplify their tradability and exchangeability. The impacts this development will have worldwide still remains open. This applies particularly to their potential to convey trust in digital spaces. In order to clarify and tap the potential of blockchain technology and to prevent abuse the action of the Federal Government is required. In particular, with a view to climate protection and the sustainability goals of the Federal Government, it is necessary to carefully weigh the potentials and risks. For this reason, the Federal Government hereby presents a comprehensive blockchain strategy that takes account of blockchain technology's relevance.

With this strategy, the framework is set for innovations based on blockchain technology. Due to the dynamic development of such technology, it is necessary to constantly review the framework conditions with regard to their current relevance.

This strategy maps a holistic view of the Federal Government to blockchain technology, outlines the Federal Government's goals and principles in connection with blockchain technology and presents concrete measures in five fields of action. A broad consultation process[3] in spring 2019 formed the essential basis for the strategy's development. 158 experts as well as representatives of organizations submitted opinions. In total 6,261 responses were received to the 31 questions asked.

[1] In this strategy, the term blockchain is used synonymously for distributed ledger technologies. The Federal Government defines distributed ledger technologies as generally decentralized information technology systems, such as registers or account books, in which values (e.g. currencies or information) can be exchanged directly between participants. Verification is usually performed by system-wide decentralized processes (consensus protocols) and not by a central instance. The systems enable all participants to access the status and a verifiable history of the transactions carried out, provided with a time stamp. A participant does not have to be an active part of the system (node). The special feature of blockchain technology is that the transactions are combined into blocks and these are linked to each other.

[2] https://bitcoin.org/bitcoin.pdf

[3] The goal of the online consultation was to identify the most pressing challenges for experts, users and developers that the Federal Government should address in connection with the blockchain technology. The outcome of the online consultation will be published under www.blockchain-strategie.de.

Beyond Bitcoin – On the Way to Token Economy?

The blockchain technology was developed based on the vision of a decentralized system that would replace central institutions and enable transactions directly between the participants of the network.

The most famous – but by far not the only – application is the crypto currency Bitcoin. With the sharp price increase of crypto currencies and the new financing form known as Initial Coin Offerings (ICOs), public interest in blockchain technology grew. At the same time, power consumption grew massively with Bitcoin trading. Recently, cases beyond crypto currencies have come more and more into focus. A dynamic ecosystem of developers and providers of blockchain-based services has emerged in Germany. This gives Germany a promising basis for the development of a token economy. With tokens of all imaginable values, rights and obligations of material and immaterial goods could be represented and their marketability simplified. However, reliable assessments of the climate-relevant effects of upscaling blockchain technology are lacking and there is still a great need for research in this area.

We want to expand Germany's leading Position

The Federal Government sets itself the goal to take the opportunities offered by blockchain technology and mobilize its potential for the digital transformation. The young and innovative blockchain ecosystem in Germany should be preserved and continue to grow. Germany should be an attractive location for the development and scaling of blockchain applications and investments. At the same time, large companies, SMEs and start-ups as well as the public sector, the federal states, civil society organizations and citizens should be enabled to make informed decisions about the use of the technology.

To achieve this goal, we are striving to ensure the compatibility of applications based on blockchain technology with applicable law and to prevent misuse. We want to create an investment and growth-oriented regulatory framework in which market processes function without governmental intervention and in which the principle of sustainability is guaranteed. Where blockchain applications offer added value over existing solutions, especially in terms of usability for citizens and companies, public administration will act as a lead user in individual cases, provided that it is ensured that trust in secure and reliable action is not damaged. The setup of competences in this basic technology contributes to the digital sovereignty of Germany and Europe.

Our Principles for the Implementation of the Strategy

With this strategy, we are pursuing a regulatory policy that creates incentives for investment, releases innovative forces, ensures stability and thus contributes to inclusive growth that is compatible with the Federal Government's sustainability goals. The following principles guide our actions:

- **Promoting innovations:** The Federal Government promotes digital innovations in order to strengthen the competitiveness of Germany and Europe. Only with entrepreneurial innovations the German economy can maintain its leading position in the future and only with digital innovations the public sector can fulfil its function in the digital age. The use of blockchain technology unleashes economic potential and further innovative forces.

- **Initiate investments:** Clear and stable framework conditions create an attractive and secure investment environment. The Federal Government thus ensures investment security in digital technologies.

- **Guarantee stability:** In terms of economic policy, the Federal Government pursues the overriding goal of maintaining macroeconomic balance and preserving the stability of the financial system.

- **Strengthening sustainability:** The use of blockchain applications must be in line with the Federal Government's sustainability and climate protection goals. The Federal Government recognizes the potential as well as risks of certain blockchain solutions to achieve these goals.

- **Enable fair competition:** It is a central concern of the Federal Government to create a level playing field for all technologies. Technology neutrality shall be the leading principle. Existing obstacles to the development and application of technologies will be removed to the extent that this can be reconciled with the fundamental objectives of existing legislation.

- **Strengthening the digital single market:** Developments in Germany are inextricably linked to developments throughout the European Union. Only with a completed digital single market Germany will remain globally competitive in the long term.

- **Expand international cooperation:** We work closely with our European partners, the European Commission and other international bodies such as the OECD in the field of blockchain technology.

- **Involving stakeholders:** The integration of the knowledge of developers and users for the governmental framework is fundamental for a comprehensive strategy development. By conducting the online consultation, the Federal Government has involved experts, companies and civil society organizations in the development of the strategy and will continue to do so.

- **Guarantee IT security and data protection:** Only if blockchain applications meet the IT security and legal requirements for data protection recommended by experts, risks can be minimized, misuse prevented and a high level of acceptance achieved.

- **Provide for adjustments:** Due to the high speed of technological development, further action by the Federal Government may become necessary in the future. Against this background the Federal Government's blockchain strategy is to be reviewed and further developed regularly as a learning strategy.

In addition, all measures of this strategy will be conducted from the existing approaches of the affected sections or counter-financed within the affected sections. The budgetary provisions of the coalition agreement apply to any additional financing requirements for the implementation of the strategy.

The Federal Government's Blockchain Agenda

Until the end of 2021, the Federal Government will take measures in the following five fields of action in order to take the opportunities offered by blockchain technology and mobilize its potential. The priority measures in the respective fields of action are as follows:

1. Ensuring Stability and stimulating Innovation: Blockchain in the Financial Sector

- The Federal Government wants to liberalize German law in order to facilitate electronic securities.

- The Federal Government will publish a bill to regulate the public offering of certain crypto tokens.

2. Maturing Innovations: Promotion of Projects and Reality Laboratories

- The Federal Government is piloting a blockchain-based energy plant connection to a public database.

- The Federal Government supports the testing of blockchain-based verification of higher education certificates.

- The Federal Government will make sustainability-related requirements an important decision-making criterion in the implementation of state-sponsored or initiated projects in the field of blockchain technology.

3. Enabling Investments: Clear, reliable Framework Conditions

- The Federal Government will hold a round table on the topics of blockchain and data protection.

4. Apply Technology: Digital Administration Services

- The Federal Government is piloting blockchain-based digital identities and evaluates other suitable applications.

5. Disseminate Information: Knowledge, Networking and Cooperation

- The Federal Government will conduct a series of dialogues on blockchain technology.

1. Ensuring Stability and Stimulating Innovation: Blockchain in the Financial Sector

Blockchain technology found its first practical application with crypto currency Bitcoin[4] in the financial sector. As mentioned above, blockchain technology makes it possible to issue, transfer, store and trade digital (value) units (crypto tokens).

The legal situation in Germany does not yet provide for civil law securities to be issued on a blockchain. For their creation, a right must be embodied in a (paper) deed. The online consultation has shown that many participants regard the tokenization of assets and in particular securities as one of the central blockchain applications in future. By issuing securities on a

[4] Crypto currencies are a special case of crypto tokens. These crypto tokens can be associated with a wide variety of rights, depending on the contractual arrangement, insofar as this is permitted by the legal system (tokenization). Crypto currencies are not state currencies. They are not issued by any central bank or public authority and are generally not tied to a national currency. Nevertheless, they are partly accepted by natural or legal persons as means of exchange.

blockchain – through a reduction of intermediaries required – the execution and processing of securities transactions could be carried out faster and more cost-effectively than before.

Additionally, there are tokens, though no securities, that are used for investment and financing purposes. As part of the new blockchain-based form of financing that has been developing since about 2015 with so-called initial coin offerings (ICOs), tokens have been issued worldwide so far which are no securities, do not represent participation rights and do not include any participation in the corporate development of the issuer in the form of interest or dividends. Rather, the majority of investors received so-called utility tokens or crypto currencies within these ICOs.

Utility tokens grant access to the digital platforms to be developed by project carriers or to the rights and services offered there, respectively. Thereby, many investors do not focus on the prospective later use, but on an expected increase in the value of the token.

During the online consultation, the suitability of these tokens for financing companies and projects was partially questioned. At the same time, a high potential for these tokens was seen over the next five years. The creation of a secure legal framework, in particular to also protect investors, is seen as a prerequisite for a positive development. Such framework shall particularly create legal certainty and ensure that the legal consequences associated with a specific token form are clearly recognizable.

1.1. The Federal Government wants to liberalize German law in order to facilitate Electronic Securities

The Federal Government is aiming to liberalize German law for electronic securities. The current mandatory requirement of deed embodiment of securities (i.e. paper form) shall no longer apply. The regulation of electronic securities shall occur technology-neutral, so that electronic securities can also be issued on a blockchain in the future. The planned liberalization shall first be limited to electronic bonds. The introduction of the electronic share and electronic investment fund units will only be examined in the next step. On 7 March 2019, the Federal Government initiated a consultation process in this regard by publishing a guideline paper. It aims to publish a bill before the end of this year [2019].

1.2. The Federal Government will publish a Bill to regulate the Public Offering of certain Crypto Tokens

As part of the “Guidelines for the regulatory treatment of electronic securities and crypto tokens” published on 7 March 2019, the Federal Government has also submitted for consultation the regulation of the public offering of certain tokens that do not constitute securities within the meaning of the directive on markets for financial instruments[5] or investments. The outcome of the consultation is that the parties involved predominantly prefer a European regulation. At the same time, a timely regulation is considered necessary. Thus, there is a broad consensus in favor of a national regulation as a transitional solution.

Against this background, the Federal Government aims to publish a bill regulating the public offering of certain crypto tokens until the end of this year [2019]. This could legally ensure that a public offering of certain, yet to be defined crypto tokens may only be made if the offeror has previously published an information sheet in accordance with legal requirements and the publication of which has been permitted by the Federal Financial Supervisory Authority (*BaFin*). With this measure, the Federal Government will ensure a high level of investor protection. At the same time, legal certainty regarding the legal consequences associated with certain token forms will be established.

1.3. The Federal Government will create legal Certainty for Trading Platforms and Crypto Depositories

During the consultation process, various stakeholders noted that regulatory measures should strengthen investor protection and include anti-money laundering measures.

In early December 2018, the G20 agreed[6] to regulate crypto tokens for the purposes of combating money laundering and terrorist financing. The amending directive to the Fourth EU Money Laundering Directive[7] also takes into account this objective. For combating money laundering and terrorist financing, offerors of crypto depositary services and services in connection with special crypto values shall also become subject to anti-money laundering law in the future.

In Germany, service providers that offer the conversion of crypto currencies into state currencies and vice versa, as well as into other crypto currencies, already usually require as financial service providers a BaFin permit. They are also obliged to comply with anti-money

[5] Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets for financial instruments and for the amendment of directive 2002/92/EC and directive 2011/61/EU.
[6] https://g20.argentina.gob.ar/en/documents.
[7] Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 for the amendment of directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering and terrorist financing, and for amendment of directives 2009/138/EC and 2013/36/EU.

laundering regulations. With the bill issued by the Federal Cabinet on 31 July 2019 to implement the amending directive to the Fourth EU Money Laundering Directive, the obligation to obtain a permit shall be extended to financial services with crypto values which serve investments as well as to wallet providers which store, administer or secure private cryptographic keys for other crypto values. The envisaged regulation not only serves to effectively combat money laundering and terrorist financing. Moreover, it will also create the necessary level of customer protection in the area of crypto values due to the market entry of large technology companies.

1.4. The Federal Government will stand for at European and International Level to ensure that Stablecoins do not become an Alternative to State Currencies

An essential prerequisite for the development of blockchain as an efficient technology for the creation, transfer and trading of tokenized rights is the possibility to carry out legal transactions concurrently (delivery versus payment). This requires value-stable means of payment in a blockchain environment. Most of the classic crypto currencies do not meet this requirement due to their high volatility. Some of the participants in the online consultation considered so-called stablecoins as a possible solution. With these stablecoins, the stability of the crypto currencies is ensured by a mechanism, e.g. the bonding to state currencies or liquid assets. In addition, some participants have also discussed the introduction of a digital central bank money on a blockchain.

With the Directive on Electronic Money[8] a regulatory regime for stablecoins is generally set in the European Union. The Federal Government with stand for at European and international level to ensure that stablecoins will not become an alternative to state currencies. At the same time, the Federal Government will continue to expand the existing dialogue with the German Federal Bank (*Deutsche Bundesbank*) on digital central bank money to sound the current state of developments.

[8] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32009L0110.

2. Mature Innovations: Promotion of Projects and Reality Laboratories

(a) Project Promotion and Reality Laboratories

Even outside the financial sector, blockchain-based solutions are increasingly being used in the private sector, civil society and public sector. The Federal Government aims to accompany and support these developments without disadvantaging competing technologies. The Federal Government sees the outcome of the online consultation as confirmation that it should systematically establish reality laboratories as an economic and innovation policy instrument in Germany. Pilot projects and reality laboratories offer an ideal opportunity to test the use of the technology in practice as well as regulatory approaches, especially for new technologies, such as blockchain. Thus, knowledge about the chances, risks and effects of the technology as well as about the legal boundaries and the need for adaptation can be determined. As part of its reality laboratory strategy, the Federal Government will launch still this year an innovation-open competition on reality laboratories as test rooms for innovation and regulation, which will take up and support concrete ideas and projects from practice. We will also continue to push further activities to connect, inform and strengthen reality laboratories.

2.1. The Federal Government promotes practice-oriented Research, Development and Demonstration of Blockchain Technology in the Energy Industry

The online consultation showed that in the energy industry there are various application cases for blockchain technologies for which the technology adds value. This ranges from pricing models and supplier change to the configuration of prosumer roles. Overall, the consultation participants consider the potential of blockchain technology for energy system transformation to be significant. At the same time, overall efficiency, and thus energy efficiency in particular, must be taken into account, especially in the context of energy economic applications. Widespread blockchain technology can lead to considerable additional electricity and resource consumption. It must therefore be ensured that any positive effects of an extension of the application cases with regard to transparency and process efficiency will not be offset by significant negative effects on climate and resource protection. So far, however, there is a lack of comprehensive experience on the market to assess whether the existing legal framework enables the use of the technology and what negative consequences this would have. In this regulated environment, no generally valid statements can be made. Rather, it is important to learn from individual application cases. The Federal Government will continue

to promote projects. The chances of blockchain technology for the energy system transformation are currently being investigated in various projects of the Federal Government:

- In the 7th Energy Research Program of the Federal Government, the energy relevant aspects of digitalization are examined. This will facilitate the participation of start-ups in the program.

- Within the Smart Service World II, it is learned from blockchain application cases in the energy industry in practice. The application cases range from blockchain-based virtual large storage for PV system operators to energy trading through blockchain technology to peer-to-peer trading on the basis of blockchains.

- In the "SINTEG display windows for intelligent energy" promotion program, sample solutions for a digitalized energy industry are being tested in five large display windows.

- The Kopernikus project "ENSURE – New Network Structures" also investigates the opportunities of blockchain technology for energy system transformation.

The results of these projects will be evaluated in terms of their positive and negative effects and the resulting regulatory obstacles will be addressed.

2.2. The Federal Government pilots a Blockchain-based Connection of Energy Plants to a Public Database

In May 2019, the Federal Government commissioned the feasibility study "Blockchain-based recording and control of energy systems using the Smart Meter Gateway". The results will be published at the end of this year [2019]. Supported by the recently received positive interim report, preparations have already begun for piloting a blockchain-based energy plant connection to a public database. The project phase is expected to begin in 2020, subject to a positive final feasibility assessment. On this basis, first valid findings, from which recommendations for action can be derived, are to be obtained.

2.3. The Federal Government will establish a Cross-Technology Pilot Laboratory for the Energy Sector

The next step towards the implementation of blockchain technology in the energy industry is the testing of concrete applications under real conditions. In conjunction with existing pro-

moting measures and projects, the Federal Government is beginning to set up a cross-technology pilot laboratory for the energy sector. Together with stakeholders from the energy industry, society and public authorities, systematic efficiency gains shall be investigated on the basis of selected application cases and technology impact assessments shall be carried out. Special attention should also be paid to any negative effects, e.g. with regard to energy efficiency, in order to carry out a holistic assessment. In particular, synergies with other new technologies, such as Artificial Intelligence or Big Data, will be focused in this new technology lab in order to particularly examine their economic, socially, regulatory and social effects and challenges.

2.4. The Federal Government supports the Setup of a Test Environment for the Development and Application of secure digital Business Processes

The Federal Government promotes an “Industry 4.0 Law Testbed”. A test environment is being set up to enable companies to develop and extensively test secure digital business processes. The focus is on legal aspects of the negotiation and execution of contracts between machines via so-called Smart Contracts. The areas of logistics and production are envisaged as exemplary applications. Blockchain technologies will in particular be used for the technical implementation. The first results of the four-year project should be available at the Digital Summit 2020 and will subsequently be presented directly to companies and published at relevant events, e.g. the industry 4.0 platform and at fairs. Furthermore, from February 2020 onwards, the Federal Government will promote the development and application of platform-based secure digital business processes with its support measure “Internet-based services for complex products, production processes and plants”, inter alia within the “SealedServices” project. The goal is to develop and test innovative services and business models that emerge from the consistent networking of the entire value chain. An infrastructure yet to be developed on the basis of blockchain technologies, which ensures the trustworthy transaction of information, a dynamic networking of companies shall be guaranteed while at the same time ensuring data security, integrity and sovereignty.

2.5. The Federal Government supports innovative Blockchain Solutions in Developing Countries

The society for international cooperation’s (*Gesellschaft für Internationale Zusammenarbeit GmbH*) blockchain-lab, founded in 2018, develops the transformative potential of blockchain and related technologies for the implementation of the Agenda 2030 for sustainable development. The Federal Government is striving to expand the lab approach in order to create framework conditions for the use of blockchain in developing countries and to support innovative blockchain solutions, e.g. as part of pilot projects. Pilot projects are developed in close

cooperation with the private economy sector as well as the responsible regulatory authorities and departments. With the lab approach, support can be provided from the proof-of-concept and a first pilot phase to scaling with the develoPPP program. It provides a test laboratory for policy makers as well as for local talents and the private economy sector to work together on solutions.

(b) Promotion of Sustainable Projects

The blockchain technology is often associated with a significant consumption of energy and raw materials. The decisive factor here is the proof-of-work consensus mechanism, which actually requires enormous computing capacity. The online consultation confirmed the inefficiency of the process and showed that there are a number of more efficient consensus mechanisms. It was requested that the Federal State takes the criterion of sustainability into account when applying and promoting blockchain technology.

2.6. The Federal Government will make Sustainability-related Requirements an important Decision-making Criterion in the Implementation of State-sponsored or initiated Projects in the Field of Blockchain Technology

The Federal Government will support the use and further development of sustainable, energy-saving blockchain applications, particularly with a view to climate protection targets. Before implementing state-sponsored or initiated projects in the field of blockchain technology, the Federal Government will therefore make sustainability related requirements an important criterion in its decisions. With the involvement of experts, the Federal Government will examine which aspects need to be taken into account and to what extent a simple, flexible and transparent evaluation methodology can be realized. Corresponding criteria can also serve as a model beyond Germany.

2.7. The Federal Government investigates the State Promotion of ecologically sustainable Blockchain Applications

Until mid-2020, the Federal Government will be investigating possibilities in which ecologically sustainable blockchain applications and blockchain applications that contribute to environmental, climate and nature conservation could be supported by the Federal State in accordance with European subsidies law.

(c) Promotion of Projects in further Fields of Application

The consultation process showed a number of application fields in which blockchain-based solutions have a high potential. Energy, logistics and supply chains were frequently mentioned, but also, for example, health care or the verification of education certificates. In the context of a blockchain ideas competition of the Federal Government, possible applications in the health care sector were awarded prizes. Possible further steps are investigated with the winners.

The principles of sustainability, accessibility and transparency of the technological solutions play a decisive role in the selection of projects to be promoted by the Federal Government. This is intended to influence the development of this still new technology in terms of social value. In addition, preference should be given to solutions that allow networking and knowledge transfer between the private economic sector, civil society and public stakeholders.

2.8. The Federal Government is investigating whether and how the Use of Blockchain Technology can contribute to Transparency in Supply and Value Chains

The blockchain technology enables the increase of transparency, efficiency and security along value chains in many aspects. The Federal Government has set itself the task of promoting the possibilities of blockchain technology for supply and value chains. In particular, projects to prove the sustainability of products are to be promoted and standards developed. The Federal Government is examining how blockchain technology can be used and promoted to ensure ecologically and socially sustainable, efficient and secure supply chains and how it can contribute to closing product cycles.

The supporting measure “Industry 4.0 – Collaborations in Dynamic Value Creation Networks” investigates the significance and applicability of blockchain-based approaches in the industrial environment. The focus will be on enterprise cooperation (Smart Contracts) and process data transfer. Blockchain technologies are used in the joint projects “Platform for the Integrated Management of Collaborations in Value Creation Networks” and “Collaborative Smart Contracting Platform for Digital Value Creation Networks”.

As part of the supporting measure “Resource-efficient recycling management – innovative product cycles”, the DIBICHAIN joint project will investigate the application of blockchain technology for the digital mapping of product cycles for an application in aircraft construction.

In a pilot project, the Federal Government is evaluating how blockchain applications can facilitate sustainable consumption decisions through transparent, complete and trustworthy information along the supply chain and to contribute to safety, e.g. in the food chain. The Federal Government will also examine how certificates of proof can contribute to higher yields for producers at the beginning of product cycles in global value chains.

2.9. The Federal Government promotes the Research and Development of effective Governance Structures for the Application of Blockchain Technologies in the Logistics Industry

As part of the program “Innovations for tomorrow’s production, services and work” with the current supporting measure “Service innovations through digitization”, the research and development of effective governance structures are being promoted. In particular, the blockchain applications in connection with process flows and Smart Contract approaches are being put to practical use in maritime logistics (project “Sofia”).

Based on the findings of the fundamental report “Opportunities and Challenges of DLT (Blockchain) in Mobility and Logistics”, the Federal Government supports the increasingly complete digital mapping of goods flows and freight documents. Furthermore, the Federal Government supports the joint project “Blockchain-based administration framework for transparent, efficient and trustworthy value creation chains of unregulated products”. A blockchain-based supply chain transparency and quality assurance system is being developed to completely monitor and prove the process status, location and condition of products.

The joint project “Risk avoidance in temperature-controlled supply chains through blockchain technology” will develop a supply chain risk management approach that uses a blockchain to improve the proactive management of risks in temperature-controlled logistics.

The joint project “Blockchain-based decentralized energy trading platform” develops an approach for a blockchain-based supported energy market platform.

2.10. The Federal Government will develop and promote Blockchain Applications that contribute to Consumer Protection

The Federal Government also sees the potential of blockchain technology in the field of consumer protection. Due to transparency, it is possible to determine whether legal regulations (e.g. regarding transport conditions of products) have been complied with. Due to decentralization, users can become more independent of central platforms, which can strengthen user sovereignty. On the other hand, consumer protection is challenged by applications based on

blockchain technology (e.g. sale of tokens, enforcement of rights without a central authority, compliance with the General Data Protection Regulation). It is the Federal Government's aim that blockchain-based procedures should also contribute to the implementation and safeguarding of legally guaranteed consumer rights. To achieve this goal, the Federal Government will develop and promote blockchain applications that contribute to consumer protection, for example in the food chain.

2.11. The Federal Government promotes the Testing of Blockchain-based Verification of Higher Education Certificates

As part of its initiative "Secure Digital Educational Spaces", the Federal Government, together with the Federal States (*Bundesländer*) and the umbrella organizations of the chambers, will examine the use of blockchain solutions for verifying certificates of competence (certificates, ECTS), first in the context of international student mobility, and will examine, and if necessary promote, vocational certificates of completion and continuing education.

In addition, in the current Europass II project of the EU Commission, completely digitally verified competence certificates and job references ("digital credentials") are to be tested and developed until spring 2020.

3. Enabling Investments: Clear, reliable Framework Conditions

The Federal Government's aim is to create the framework conditions in such a way that they offer sufficient investment security. Reliable framework conditions allow companies and organizations to assess whether investments in blockchain technology are worthwhile. Reliable framework conditions include a clear and technology-neutral legal framework. At the technical level, reliable framework conditions are created through the development of standards, the possibility of certification and compliance with IT security requirements. Their evaluation and further development must always take place under the aspect of ecological sustainability. The Federal Government accompanies and supports this.

(a) Legal Framework Conditions

In the interests of technology neutrality, the legal framework should not discriminate or favor blockchain technology over other technologies. In addition to capital market law issues, the consultation process primarily addressed issues of corporate law, consumer protection and data protection. In particular, the compability of blockchain technology with the General Data Protection Regulation (GDPR) is a recurring topic. From the Federal Government's point of

view, there is currently no need for any changes to the GDPR as a result of blockchain technology. Rather, the blockchain technology must be developed and applied in compliance with data protection regulations. Any uncertainties among developers and users of blockchain solutions should be addressed in order to promote the development of consumer and data protection-compliant solutions. Existing technical solutions (e.g., use of hash values, pseudonymization, zero knowledge proof) and the principles of privacy-by-design and privacy-by-default should be applied. In addition to questions of consumer and data protection, questions of corporate law were addressed in the consultation process. Above all, the enforceability of law was addressed in blockchain structures, especially when these cross national borders.

3.1. The Federal Government will hold a Round Table on Blockchain and Data Protection

The round table for implementing the requirements of the General Data Protection Regulation has become an established dialogue format for the exchange of information between business and data protection supervisory authorities. In the first half of 2020, one of the round table sessions will therefore be dedicated to data protection issues in connection with blockchain technology. Thereby, the round table shall be expanded to include representatives of the user side and civil society organizations, in particular from the field of internet policy. The purpose of this round table is to review the current situation in the fields of blockchain and data protection. In this format both the positive characteristics of blockchain from a data protection point of view can be examined and data protection requirements in connection with blockchain application cases can be clarified. The following questions should be addresses in this context: Which data stored on a blockchain represent personal data? How is the right to deletion guaranteed when using blockchain technology? How is the right to access own data guaranteed by a central agency?

The round table offers an exchange format to investigate frequently occurring practical case constellations and to point out possible solutions. The work results will be communicated with the aim of applying data protection supervisory authorities' existing guidelines for practice in the blockchain context and, if necessary, making proposals for additional data protection supervisory authorities' guidelines. The independent data protection supervisory authorities are solely responsible for the data protection supervision of the implementation and application of these recommendations. In addition, the round table should give participating experts the opportunity to discuss further solution approaches when dealing with data protection issues in blockchain practice, such as the development of data protection standards or certifications.

Open questions regarding the data protection requirements for blockchain applications are to be resolved as soon as possible by attempting to clear any ambiguities in interpretation through cooperation with the responsible data protection supervisory authorities in order to make blockchain applications compliant with data protection law.

3.2. The Federal Government examines the Use of Blockchain Technologies in Connection with Proof of Evidence

The Federal Government will examine whether or to what extent irreversibility and the proof of non-changeability in the storage of data and documents with hash values can be recognized in the proof of evidence. Furthermore, the Federal Government is examining the recognition of the mapping of information and documents by applications based on blockchain technology. The Federal Government is examining how data that has been secured in applications based on blockchain technology can be transferred to the courts or any auditing authorities for verification purposes and thus the legally required tradability can be guaranteed. Therewith, in particular concepts must be available that can guarantee the long-term security of the data even after the security suitability of the originally used cryptographic algorithms has expired.

3.3. The Federal Government will monitor and test Blockchain Applications in the Creative Industries

The research and development of blockchain-based solution concepts for the administration of copyright content offers potential. Blockchain-based methods can also contribute to the enforcement of copyrights and the remuneration of exploitations, taking into account the legally regulated freedom of use. This applies especially to complex works with many contributors, such as films, but also to the music industry. Against this background, the Federal Government will monitor and examine blockchain applications with regard to copyright content. In particular, the Federal Government will examine whether and to what extent blockchain-based methods can contribute to simplifying the legally permitted freedom of use in the application.

3.4. Until the end of 2020, the Federal Government will investigate possible Applications of Blockchain Technology in Corporate and Cooperative Companies Law

It is conceivable that the use and application of blockchain technology in the field of corporate law will bring considerable simplifications, e.g. in share management (share processing, exercise of share rights, etc.). This could also apply to the exercise of membership rights in cooperative companies. There are still a large number of unresolved and open questions, especially with regard to the necessary technical prerequisites and the concrete application possibilities. Therefore, the application of blockchain technology in corporate law will be examined as part of an external expert opinion mandate.

3.5. The Federal Government will deal with the Legal Framework Conditions for new Forms of Cooperation

The online consultation highlighted that blockchain technology enables new forms of cooperation, also between competitors. Networks based on blockchain technology are usually formed by the merger of different companies or organizations. Furthermore, blockchain technology and Smart Contracts enable new forms of cooperation, which are characterized by the lack of a central responsible body and Smart Contract-based decision-making processes (DAO – Decentralized Autonomous Organizations). The Federal Government supports the development of such digital innovations and will address the legal framework conditions of such structures.

3.6. The Federal Government examines the Suitability, Feasibility and Potential of an International Arbitration Body

Cross-border blockchain networks can bring new legal challenges, such as the determination of the applicable law. In the field of blockchain technology, where the contracting parties usually do not know each other, a traditional negotiation on an amicable solution to a dispute is complicated and may not be in line with their interests.

3.7. The Federal Government is considering an Adaption of the Proof of Identification in the Approval System

Blockchain technologies can only fully take effect if it is possible to map processes completely digitally. For example, personal appearance is necessary for the identification of natural or legal persons in the approval system. The Federal Government is examining whether it would be justifiable, despite the high safety requirements to be met by the procedure for registering motor vehicles for road traffic, to reduce the level of identification in the registration system from ‘high’ to ‘substantial’.

(b) Standards and Certifications

The results of the online consultation have shown that standards, certifications and information obligations in the field of blockchain technology are highly desired. If standardized interfaces are available, it will be easier for companies to enter the market and investment security will be increased. This effect is even greater if the norms and standards are applied at European and international level. Interoperable standards are required for orientation, as they form the basis for linking different blockchain applications. Especially Smart Contracts, which trigger automated transactions and are highly complex, require additional transparency. The technical lay person cannot comprehend what the Smart Contract actually technically implements. This leads to the request that Smart Contracts should be combined with an obligation to provide information. Information about the content of the Smart Contract should be easily understandable for users and can thus form the basis for further acceptance and dissemination of the technology. The online consultation also called for Smart Contracts to be certified by an official body. Traceability of the technology is guaranteed in particular by open source solutions. Publicly documented standards and interfaces ensure that the various applications and IT systems are interoperable and thus reduce dependence on providers whose software uses proprietary interfaces and formats. Open source solutions thus contribute to promoting digital sovereignty.

3.8. The Federal Government starts establishing a Smart Contract Register in the Energy Industry

In the energy industry in particular, Smart Contracts have a great potential for automation and increased efficiency. This makes the transformation of contractual relationships into digital language or digital code even more important. The Federal Government will therefore begin to establish a register listing contractual matters relating to the energy industry soon, thus enabling the recording and systematization of Smart Contracts. Together with the German Energy Agency (dena) and representatives from science, economy and society, we will take in a first step an exchange on which matters can be transferred to Smart Contracts regardless of the code used. The aim is to set up a public platform with the help of dena that is freely accessible and whose contents are permanently reviewed, evaluated, discussed and commented on. In this way, the register can support users and developers in the formation of Smart Contracts, as similar use cases can be applied. The Smart Contract register in the energy industry should be exemplary for other economic sectors and serve as a basis for the formation and development of further registers.

3.9. The Federal Government will investigate Possibilities for Introducing of Accredited Certification Procedures for Smart Contracts

Certificates of conformity that confirm that a Smart Contract actually maps the content technically as promised by the provider can increase the general acceptance of and trust in Smart Contracts. Especially for users who do not have a specific technical background, it is difficult to verify the actual content of a Smart Contract with the displayed content. So far, there are no specific certification procedures in the field of blockchain/Smart Contracts. The Federal Government will investigate possibilities for introducing accredited certification procedures that can be used on a voluntary basis by manufacturers/providers to increase trust in blockchain technology and the use of Smart Contracts.

3.10. The Federal Government plans to tender a Study that will provide an Overview on Technical Procedures for the Digital Identification, Authentication and Verification of Devices

To unleash the full potential of blockchain technology in the context of the Internet of Things, it is necessary to be able to clearly identify devices. In order for principles and requirements such as confidentiality, integrity and availability to be realized in the formation of secure digital identities of devices, a consistent, interoperable and secure formation of procedures is required. In particular, this can be provided by standardization. The Federal Government sees it in particular as the industry's task to develop technological solutions in this area. To support this, the Federal Government is planning to tender a study containing an overview on a large number of technical procedures for digital identification, authentication and verification and assigning these to specific applications in practice in an understandable overview. In particular, blockchain, embedded SIM/embedded universal integrated circuit card, multi-factor authentication and further hardware and software procedures shall be considered thereby. It will also be examined to what extent sufficient open source software and open hardware (especially with regard to crypto chips) are already available on the market or being developed and where there is a need for further development in the market. Furthermore, the use of secure elements for the realization of secure identities in the field of consumer IoT and Industry 4.0 should be considered. The cryptographic functions of secure elements could be used in connection with blockchain applications. The results of the study yet to be published should serve well-established companies and market entrants as a guide to secure digital identities. It should also prepare the ground for standardization.

3.11. The Federal Government is actively involved in the Development of Standards at the international Level and promotes the Use of Open Interfaces

Harmonized norms and standards are essential for the compatibility of different blockchain applications. Together with the widespread use of open source licenses in the field of blockchain applications, this can create transparent and trust in applications and increase investment security. Various committees are working at an international level to develop common standards for blockchain technology. As a national standards organization and representative of the Federal Republic of Germany, DIN works in various ISO working groups in ISO/TC 307 “Blockchain and distributed ledger technologies” on topics such as interoperability and IT security of blockchain applications, as well as in the working group on “Smart Contracts and their application” for the verification of contractual parties and the enforcement of Smart Contracts. With a view to ecological sustainability in the blockchain sector, the Federal Government will evaluate the development and establishment of European or international sustainability standards and certification procedures.

The Federal Government appreciates the participation opportunities made possible by blockchain for young and small enterprises, civil society initiatives and organizations (e.g. within the framework of Citizen Science/CivicTech) and developers. To ensure that these opportunities for participation remain open, the Federal Government promotes that application solutions for blockchain have open and interoperable interfaces for linking with other (blockchain) applications, as far as this is possible without impairing data protection and data security. In connection with the application for research and development projects, the provision of interoperable interfaces and the use of free software and hardware licenses should be assessed positively where appropriate.

3.12. The Federal Government is intensively pursuing Measures to open up the Interfaces in the Healthcare System

In general, the interfaces used in healthcare system are also open to possible future technologies (such as blockchain). The use of future technologies – in line with the data and IT security requirements for health data – is therefore continuously being considered. The Federal Government is also enabling for innovative healthcare applications to gain access to the telematics infrastructure.

(c) Security

The Federal Government always stipulates technological neutrality when it comes to the design of information security regulations and requirements. It sees “information security” as a cross-sectional task that must permeate all aspects of the technology’s entire life cycle from the outset (“security by design”). In the online consultation it was requested that information security requirements also apply to applications based in blockchain technology. The Federal Government will take this into account in the further design of information security regulations and requirements. In May 2019, the German Federal Office for Information Security (BSI) presented the document “Designing Blockchain safely. Concepts, Requirements, Evaluations”[9], an analysis of blockchain technology from the information security’s point of view. Aspects such as data security, long-term security and known attacks are covered. In addition, legal requirements that influence the design of blockchain applications are discussed.

3.13. The Federal Government analyzes the Blockchain Technology with regard to its Information Security

The BSI supports the safe development and operation of blockchain technology with its technical expertise. Basic safety aspects are already described in the document “Designing Blockchain safely. Concepts, Requirements, Evaluations”. Developers and potential users are thus put in a position to assess the opportunities and risks of blockchain solutions in a well-founded manner and to consider information security from the outset (”security by design”). The Federal Government will take these recommendations into account when implementing measures. The BSI will continue its analyses in company of the dynamic further development of blockchain technology.

3.14. The Federal Government promotes the Development of Innovative Cryptographic Algorithms and Protocols

In the research framework program for information security “Self-determined and secure in the digital world”, the Federal Government promotes the development of innovative cryptographic algorithms and protocols in the field of post-quantum cryptography as well as procedures for the simple exchange of cryptography (cryptoagility), which can also be applied in the field of blockchain technology if necessary. Cryptoagility is also of great importance for blockchain applications.

[9] www.bsi.bund.de/blockchain.

4. Apply Technology: Digital Administration Services

(a) Digital Identities of Individuals

State-of-the-art digital identities of individuals are an important basis for digital networking because they enable communication, data exchange and transactions. When designing digital identities, different goals must be taken into account, such as practicability and user-friendliness, but also data protection, prevention of misuse and guarantee of international self-determination.

The consultation process has shown that blockchain technology offers potential for the further development of digital identities. Private players claim to use blockchain technology to offer digital identities. At the same time, functioning digital identities are a prerequisite for many blockchain applications. However, in the consultation process, it has also become clear that the state is seen as the central organizer or regulator of digital identities of individuals. It is obliged to guarantee security and data protection in regulatory terms. An assessment of the suitability of blockchain-based procedures for keeping registers of civil status, registration, passports and ID cards as well as for foreigners requires an evaluation.

4.1. The Federal Government provides public digital Identities and evaluates the Link to Blockchain Applications

The Federal Government provides public identification means and constantly develops them, both in terms of user-friendliness and to ensure the high level of security (e.g. eID function of the new identity card). In addition, it checks in various administrative procedures whether and to what extent derived digital identities of the private sector can also be recognized for administrative procedures or certain legal transactions.

4.2. The Federal Government pilots Blockchain-based digital Identities and evaluates other suitable Applications

The Federal Government pilots blockchain-based digital identities. It will examine whether these blockchain-based digital identities promise clear added value compared to existing solutions and whether they can be designed in such a way that they comply with data protection regulations. Suitable further applications will also be evaluated. In general, the principles of identity security and technology neutrality are represented for the implementation and further development of digital identities.

4.3. The Federal Government will test the Interoperability of secure digital Identities for People in a sponsored Project

Solutions for digital identities have been available on the market for some time. None of the solutions were able to establish themselves across the board. With the self-sufficient digital identities on blockchain basis, another solution is now in development. In an innovation competition on secure digital identities, the Federal Government plans to test the interoperability of different technologies (centralized/decentralized) and providers in regional display windows.

(b) Trust Services

The eIDAS Regulation[10] introduced uniform electronic trust services throughout Europe. This enables cost-effective and trustworthy electronic transactions to be carried out across national borders. The online consultation acknowledged that the eIDAS Regulation had created trust in digital business processes and made it possible to deal with authorities. At the same time, it was demanded that eIDAS infrastructures should be linked with concepts of self-sufficient identity. The central operator envisaged by the eIDAS Regulation is seen as an obstacle to blockchain technology.

4.4. The Federal Government considers the Test Operation of a Blockchain for the permanent Provision of Information on electronic Trust Services

The Federal Government pursues the goal of technically following the offer of trust services on a blockchain. This could be made possible by test runs. In the course of such an operation, further areas of application may arise within the authorities.

The Federal Government is also pursuing the goal of increasing the awareness of authorities, citizens and companies of the largely unknown electronic trust services. To this end, a website is to be set up that shows how analog processes that require a trustworthy transaction can be transformed into digital processes without media discontinuity.

[10] Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

At the European level, the Federal Government is participating in the considerations on the design of a self-sufficient digital identity within the framework of the European Blockchain Partnership. The eIDAS Directive plays a central role here.

(c) Public Blockchain Infrastructure

Blockchain technology is characterized by a decentralized infrastructure on which a wide variety of applications can be provided. Within the scope of the online consultation, the demand for a state infrastructure for blockchain applications arose. This blockchain infrastructure were to support companies or organizations in the development of specific applications. On the other hand, other participants, do not see the state as a suitable actor in setting up a blockchain infrastructure and consider it sufficient for the state to operate nodes. The state's infrastructure activities are associated with the hope of setting standards for interoperability and establishing governance structures for decentralized networks.

With regard to infrastructure, a further demand was made that the state should provide a decentralized public key infrastructure to enable the secure exchange of certificates.

The Federal Government appreciates the fact that first blockchain infrastructures are being set up at municipal level, thus laying the foundations for considering blockchain technology for the implementation of administrative services.

4.5. The Federal Government participates in the Development of the European Blockchain Services Infrastructure

The development of the European Blockchain Services Infrastructure (EBSI) is driven by the European Blockchain Partnership. Germany is a member of the partnership. The first use cases are to be mapped at EBSI at the beginning of 2020. These applications include the exchange of certificates and a blockchain-based register of the European Federal Audit Office (*Europäischer Rechnungshof*). In the future, the infrastructure should also be available for private sector players. The Federal Government will ensure that Germany actively participates in EBSI.

(d) Administrative Projects

In the consultation process, various possible applications of blockchain technology in public administration were mentioned. Potential efficiency gains were emphasized through the simplified exchange of data across horizontal and vertical levels of administration, the reduction of data duplication and the reduction of transaction costs. In addition, the potential of the technology with regard to the transparency, participation and traceability of administrative processes for citizens was described.

However, the Federal Government does not see it as an end in itself to replace functioning administrative processes and existing public registers with blockchain-based solutions. Instead, in individual cases, the need and sense of implementing administrative processes by means of blockchain technologies should be examined. For example, there does not seem to be any sense to implement blockchain-based solutions for public registers which also serve the purpose of content legal examination by public authorities (above all land registers, commercial registers and birth/marital registers). Promising areas of application include, for example, vehicle registration or the digitally supported verification of original documents, such as documents and certificates, which are often held in decentralized form.

Lighthouse projects in e-government can have a positive impact on Germany as a blockchain hub beyond the public sector and can also serve as role models for the development of private applications and provide empirical values. Close coordination of activities at the European, federal and state levels is ensured by coordinating support.

4.6. The Federal Government will promote Lighthouse Projects that use Blockchain Technologies as an Example in Administration, and support them with Publicity

In individual cases, the Federal Government will promote lighthouse projects that make use of blockchain technologies in public authorities in an exemplary manner and publicly support them. One option for accelerating the implementation of blockchain projects is the establishment of a competence center for blockchain applications in public authorities. The Federal Agency for Migration and Refugees (BAMF) is currently piloting a blockchain solution at the AnkER facility (Reception center for asylum seekers) in Dresden to support interagency communication and cooperation in the asylum process. The blockchain-based administration platform TruBudget, for example, is already being used in Burkina Faso and is being piloted in other developing countries. The open source application of the KfW (Kreditanstalt fuer Wiederaufbau – Germany’s Government-owned bank for reconstruction and development)

uses the features of the blockchain to enable transparent, secure and traceable control of the use of donor funds that has not been possible before.

4.7. The Federal Government investigates possible Use Cases in which it is possible to deviate from the conventional written Form Requirement

As part of the implementation of the Online Access Act, the Federal Government is investigating possible use cases at federal level with regard to administrative services in which the written form and personal appearance may be deviated from, provided this is not subject to sec. 3a para. 2 of the Administrative Procedure Act (VwVfG). The reduction of the requirement of a personal appearance is helpful to make blockchain technology usable for administrative proceedings. The Federal Government will promote the implementation of these use cases with alternative digital processes, such as the use of blockchain technology. The Federal Government will also work towards reducing written communication between and with public authorities (e.g. with the international student mobility platform for the international exchange of educational credits or educational qualifications already obtained). In order to enable fundamental trust in the security and confidentiality of communication, data and IT structures, even when blockchain technology is used, simple and secure solutions are to be used that are based on current standards, norms and interfaces or further develop them, and that are encrypted end-to-end.

4.8. The Federal Government evaluates and tests the Development, Promotion and Use of secure validity Tokens for relevant Areas of Application

The association of digital validity tokens with certificates ad public documents for their digital verification (e.g. for certificates, public educational institutions, birth certificates, or documents to be verified at the originator in general, such as job references and other “digital credentials”) offers great potential for the digitization, simplification and acceleration of administrative processes for both citizens and public authorities. The Federal Government will evaluate the development, promotion and use of secure validity tokens.

As part of its “Secure Digital Education Spaces” initiative, the Federal Government is working with selected partners from the education sector as part of the EU’s Europass project. This also includes the pilot testing of “Digitally Signed Credentials” for digitally verified competence certificates and job references (2019-2020). By using electronic seals, the origin and

confidentiality of the data can be guaranteed. Blockchain technology is regarded as a promising technical option whose viability is to be tested for the verification purpose outlined above.

4.9. The Federal Government carries out Pilot Projects for the Introduction of Blockchain-based Applications for a more efficient and transparent Customs Valuation of E-Commerce Transactions in third Countries

In cooperation with industry, the Federal Government examines the introduction of blockchain-based applications for a more efficient and transparent customs valuation of e-commerce transactions in third countries. An initial pilot project is already in the process in Africa, involving the customs authorities of a third country and key international players in trade supply chains.

4.10. The Federal Government will examine the Application of Blockchain Technology in Vehicle Ownership

The Federal Government is considering setting up a project to examine whether a blockchain-based system could contribute to linking systems containing vehicle data, in particular with regard to the administration of rights of disposal over motor vehicles. This project is planned for the next six years.

5. Disseminate Information: Knowledge, Networking and Cooperation

Blockchain technology is a relatively young but complex technology. For SMEs in particular, there are complex applications in which the technology can be used sensibly. The online consultation therefore demanded that the exchange between SMEs, start-ups, large companies and other relevant organizations should be promoted. Networking events should help to demonstrate knowledge about best practices and possible applications.

Extensive technological expertise is required to develop applications based on blockchain technology. The Federal Government is aware that the demand for experts in this field is high. Against this background, the Federal Government appreciates the objectives and fields of action adopted by the German States in their strategy “Education in the digitalized World”. The Federal Government is pressing ahead with the digitization-relevant qualification of vo-

cational training personnel and is thus also supporting the States" efforts to provide corresponding qualifications for teaching staff. Basic digital skills are the basis for obtaining more in-depth qualifications.

5.1. The Federal Government will conduct a Series of Dialogues on Blockchain Technology

The dialogue on blockchain technology between politics, business, civil society and experts, which was initiated through various workshops and online consultation, is to be continued in a series of dialogues. Within the dialogue series, specific issues related to blockchain technology will be discussed.

5.2. The Federal Government promotes the Exchange of Information within the Framework of the Digital Hub Initiative and through the 4.0 Competence Centers for SMEs

The Federal Government promotes the networking of start-ups with medium-sized and large companies as well as other players in the digital ecosystems within the framework of the Digital Hub Initiative. This also includes start-ups with a focus on the development and use of blockchain technology. Furthermore, the transfer of knowledge on innovative technologies and their possibilities in the use and development of SMEs is pursued by the SME 4.0 competence centers. The SME 4.0 competence centers have integrated blockchain into their offerings as a technological innovation and driver of new business processes and models.

5.3. The Federal Government supports Application-oriented new Forms of Cooperation

Within the framework of funding programs, the Federal Government promotes cooperation between science and digital platforms as well as companies that use blockchain technology for specific applications. The Federal Government and the States continue the funding of application-related use of blockchain at non-university research institutions. This includes applications in science (international bloxberg cooperation of the Max Planck Society), partly in cooperation with companies (e.g. within the framework of Fraunhofer Blockchain Labs). With the mission "New Sources for New Knowledge" in the interdepartmental High-Tech Strategy 2025, the Federal Government is also working to ensure that the opportunities offered by open innovation are exploited more comprehensively. With increased funding, the Federal Government will significantly increase the number of new, more open forms of cooperation between companies and civil society players with scientific institutions.

5.4. The Federal Government will expand existing open Data Initiatives and improve the Possibilities for further Use of open Data

Blockchain solutions can offer considerable added value for legally secure aces to data and its further use. At the same time, their development depends on the availability of data. However, access to data is still difficult, especially for small businesses. The Federal Government will expand existing open data initiatives. Furthermore, the Federal Government will ensure the improvement of the re-use possibilities of open data and the re-use of public sector information. The Federal Government is also committed to the EU-wide provision of high-quality data sets, which will be defined in more detail in an implementing act.

The national research data infrastructure will enable better coordination and accessibility of research data; open access and open data are also part of the pact for research and innovation.

A large amount of data is generated in the energy sector. In particular, producer and consumption data are of special interest for use by third parties (research, industry and society). It will be examined whether GDPR-compliant additional data could be made available to third parties. A pilot project will be carried out to test a data platform and analyze the resulting business operations, which will visualize the origin and concentration of CO2 in an urban area.

5.5. The Federal Government is considering carrying out Technology Impact Assessments for new Applications on the Basis of Blockchain Technology

From the beginning of 2021, the Federal Government is considering carrying out accompanying and continuous technology impact assessments and scenario and feasibility studies for possible new applications (e.g. with regard to energy consumption and power shifts, sustainability targets within the framework of the UN agenda 2030) using blockchain technology.

Appendix: Table of Measures

Measure	Lead
The Federal Government wants to liberalize German law in order to facilitate electronic securities	Federal Ministry of Finance (FMF), Federal Ministry for Justice and Consumer Protection (FMJCP)
The Federal Government will publish a bill to regulate the public offering of certain crypto tokens	FMF, FMJCP
The Federal Government will create legal certainty for trading platforms and crypto depositories	FMF
The Federal Government will work at European and international level to ensure that stablecoins do not become an alternative to state currencies	FMF
The Federal Government promotes practice-oriented research, development and demonstration of blockchain technology in the energy industry	Federal Ministry of Economics and Energy (FMEE)
The Federal Government pilots a blockchain-based connection of energy plants to a public database	FMEE
The Federal Government will establish a cross-technology pilot laboratory for the energy sector	FMEE
The Federal Government supports the development of an experimental environment for the development and application of secure digital business processes	FMEE
The Federal Government supports innovative blockchain solutions in developing countries	Federal Ministry of Economic Cooperation and Development (FMECD)
The Federal Government will make sustainability-related requirements an important decision-making criterion in the implementation of state-sponsored or initiated projects in the field of blockchain technology	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (FME)
The Federal Government investigates the state funding of ecologically sustainable blockchain applications	FMF, FME
The Federal Government is investigating whether and how the use of blockchain technology can contribute to transparency in supply and value chains	Federal Ministry of Education and Research (FMER), FMECD, FME, Federal Ministry of Food and Agriculture (FMFA)
The Federal Government promotes the research and development of effective governance structures for the application of blockchain technologies in the logistics industry	Federal Ministry of Transport and Digital Infrastructure (FMTDI), FMER
The Federal Government will develop and promote blockchain applications that contribute to consumer protection	FMJCP, FMFA
The Federal Government promotes the testing of blockchain-based verification of higher education certificates	FMER
The Federal Government will hold a round table on blockchain and data protection	FMEE, Federal Ministry of the Interior, Building and Community (FMI)
The Federal Government examines the use of blockchain technologies within the framework of the demonstration of evidence	FMJCP, FMI
The Federal Government will monitor and test blockchain applications in the creative industries	FMJCP

By the end of 2020, the Federal Government will investigate possible applications of blockchain technology in corporate and cooperative companies law	FMJCP
The Federal Government will deal with the legal framework conditions for new forms of cooperation	FMJCP, FMEE
The Federal Government examines the suitability, feasibility and potential of an international arbitration body	FMJCP, FMEE
The Federal Government is considering an adaption of the proof of identification in the licensing system	FMTDI
The Federal Government starts establishing a smart contract register in the energy sector	FMEE
The Federal Government will explore possibilities for introducing accredited certification procedures for smart contracts	FMEE
The Federal Government plans to tender a study that will provide an overview of technical procedures for the digital identification, authentication and verification of devices	FMEE
The Federal Government is actively involved in the development of standards at the international level and advocates the use of open interfaces	FMEE
The Federal Government is intensively pursuing measures to open up the interfaces in the health care system	Federal Ministry of Health (FMH)
The Federal Government analyzes the blockchain technology with regard to its information security	FMI
The Federal Government promotes the development of innovative cryptographic algorithms and protocols	FMER, FMI
The Federal Government provides public digital identities and evaluates the link with blockchain applications	FMI
The Federal Government pilots blockchain-based digital identities and evaluates other suitable applications	FMI
The Federal Government will test the interoperability of secure digital identities for people in a sponsored project	FMEE
The Federal Government considers the test operation of a blockchain for the permanent provision of information on electronic trust services	FMEE
The Federal Government participates in the development of the European blockchain services infrastructure	FMEE, FMI, FMTDI
The Federal Government will promote lighthouse projects that use blockchain technologies as an example in administration, and support them with publicity	FMI, FMECD
The Federal Government investigates possible use cases in which it is possible to deviate from the conventional written form requirement	FMEE
The Federal Government evaluates and tests the development, promotion and use of secure validity tokens for relevant areas of application	FMI, FMER
The Federal Government carries out pilot projects for the introduction of blockchain-based applications for a more efficient and transparent customs valuation of e-commerce transactions in third countries	FMECD
The Federal Government will examine the application of blockchain technology in vehicle ownership	FMTDI
The Federal Government will conduct a series of dialogues on blockchain technology	FMEE, FMER

The Federal Government promotes the exchange of information within the framework of the Digital Hub Initiative and through the 4.0 competence centers for SMEs	FMEE
The Federal Government supports application-oriented new forms of cooperation	FMEE, FMER
The Federal Government will expand existing open data initiatives and improve the possibilities for further use of open data	FMI, FMEE
The Federal Government is considering carrying out technology impact assessments for new applications on the basis of blockchain technology	FMER