Action Agenda

Dutch Blockchain Coalition

Version 2, June 2017

Dutch Blockchain Coalition

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Dutch Blockchain Coalition

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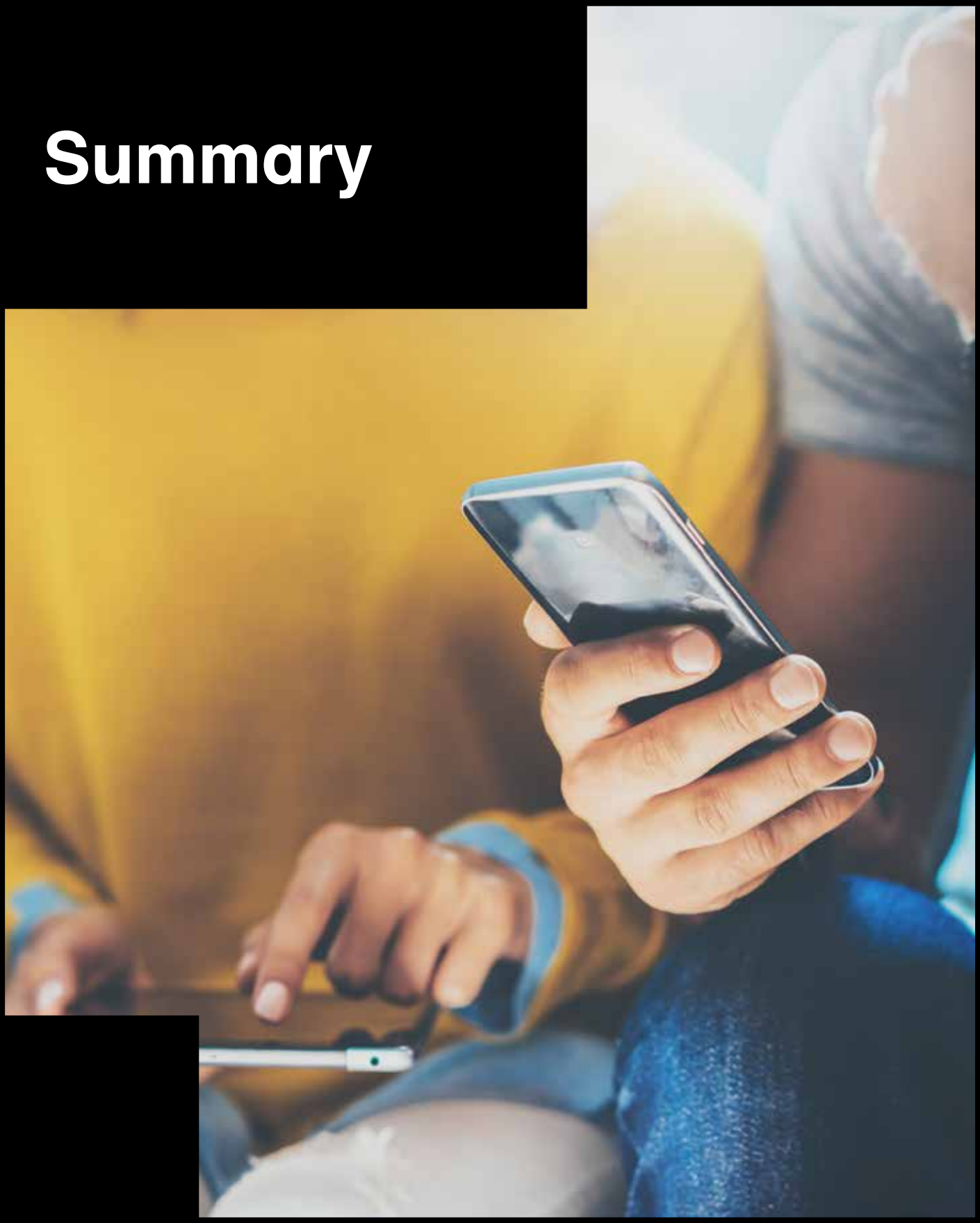
Summary



The need for a Dutch Blockchain Coalition

Blockchain is a young technology, which makes digital trust possible and establishes its own path on the hype cycle. We are in the initial phase and so we still need to discover where the actual possibilities lie and what the pitfalls are. The social, economic, technical and legal expertise in this area is still only present to a limited extent within specialised companies and at knowledge and research institutions. The importance of the best-known blockchain – Bitcoin – is, although conceptually brilliant, still relatively limited and there are currently no large-scale operational market implementations outside of the financial sector.

However, many exploratory initiatives are being realised in the Netherlands within industry, the government and knowledge institutions. Several initiatives are already approaching the prototype phase and are expected to be operational within several years. Both industry and government currently want and need to realise synergy between these initiatives, to facilitate the flexible use of these for more fundamental problems, and to consolidate and share the lessons learned. Among all parties we see a considerable willingness not only to collaborate on an intrasectoral and cross-sectoral basis and to further investigate such collaboration, but also to create coherency between policy, legislation, supervision, enforcement and implementation.

We are bringing these initiatives together in the Dutch Blockchain Coalition, a public-private initiative of Team ICT, initiated by the Dutch Ministry of Economic Affairs, under the programmatic label 'dutch digital delta'. Team ICT considers blockchain to be a potential source of trust, well-being, welfare and security for citizens, society and companies. The aim of the Dutch Blockchain Coalition is to create the conditions for reliable and socially acceptable blockchain applications.

The Dutch Blockchain Action Agenda

The Dutch Blockchain Action Agenda has been jointly developed by industry, government and knowledge institutions. Together they have assumed a leading role and joint responsibility for the success of the Action Agenda of the Dutch Blockchain Coalition. The coalition is permanently open for experts and stakeholders who want to make a contribution so that the coalition realises the maximum result. In this process, it will be continuously considered where the best match lies between the expertise offered and the interest of the programme, which should be viewed as a rolling agenda. The collaboration is for a period of several years, can assume different working practices, and in mutual consultation will be harmonised with the possibilities and needs of the partners involved.

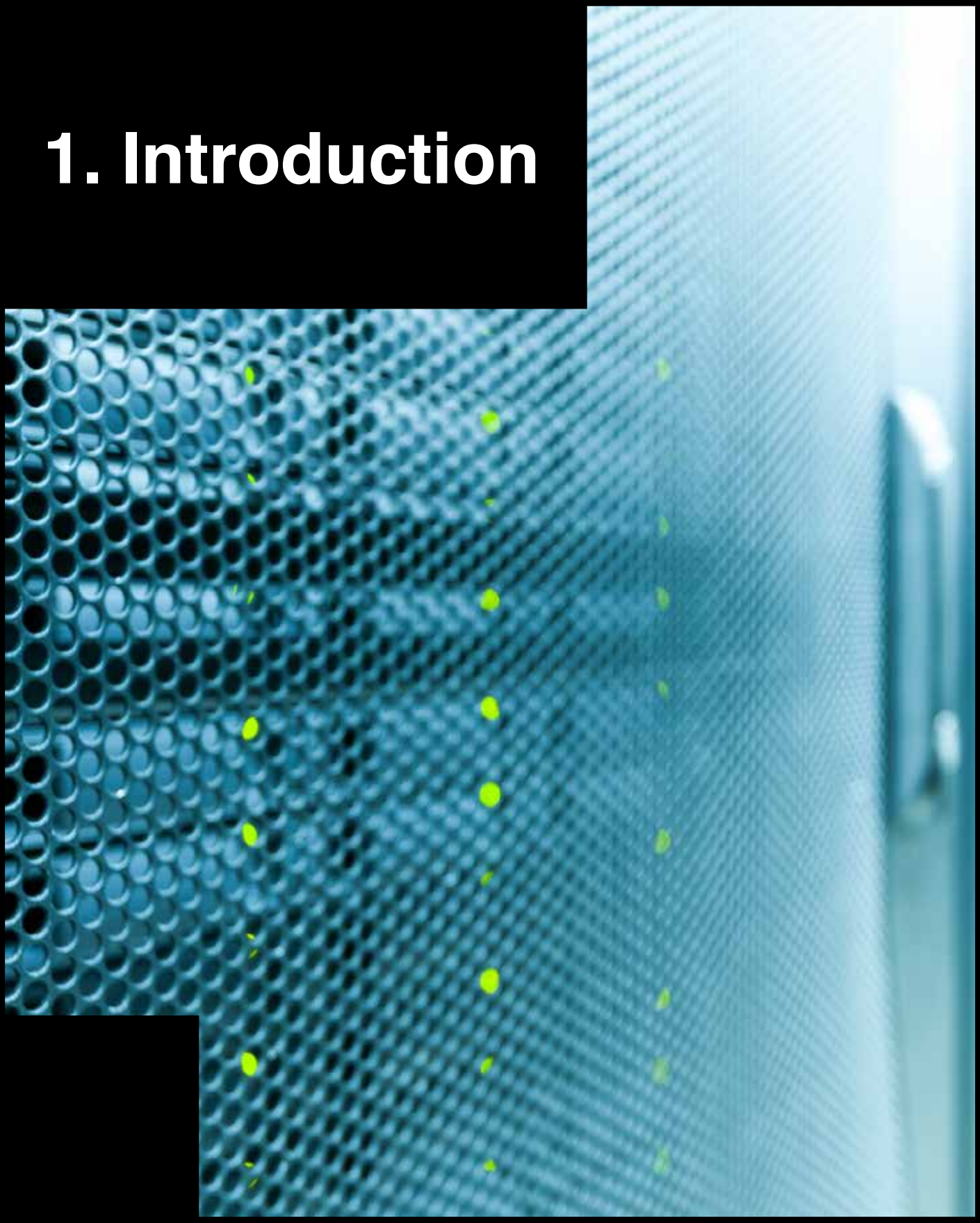
The Action Agenda focuses on the following lines of action:

1. Development of blockchain building blocks: Digital Identities
2. Realisation of conditions for the use of blockchain
3. Development and realisation of the Human Capital Agenda

"If the Netherlands seizes the opportunities in this pioneering stage then we can become a world leader in the area of blockchain.

René Penning de Vries,
Chairman Team ICT

1. Introduction



The Dutch Blockchain Coalition: Creating opportunities for the *next level* economy and society

Blockchain is basically a technology that makes digital trust possible. It therefore has the potential to make operational processes more efficient and reliable. Experts also expect, however, that this new technology could have a large disruptive effect comparable to the impact of the Internet. It has the potential to create new revenue models and to transform entire business sectors and markets.

Blockchain offers possibilities for new social processes, can bring the circular economy a step closer, can make the sharing economy possible, increase transparency, facilitate the provision of information about carbon footprints and the origin of materials, can strengthen the autonomy and privacy of citizens, increase cyber security, and can lead to revolutionary forms of enterprise planning and control. Ultimately, the use of blockchain could even lead to a self-driving economy that is more efficient, secure, compliant and climate friendly than we could ever conceive now.

Blockchain creates new boundary conditions for economic growth. The ever-increasing complexity of our economic processes requires a satisfactory set of instruments for facilitating this complexity. Blockchain offers ICT solutions for realising trust between parties in environments that are not fully known or not perse trusted. Consequently in a large-scale network where no central authority exists or could successfully operate, the trust needed for economic transactions to take place can nevertheless be realised.

However, several questions arise: Where will the first applications be? Will this concern applications that lead to improvements in efficiency or quality? And where can the disruption of the existing economy be expected? Will trusted third parties still have a role to play? Is supervision needed in the new constellation and if so, how? Which role should the government or financial institutions fulfil? Are the current legal frameworks suitable for a blockchain-driven economy? Is there sufficient bandwidth and computer capacity if a blockchain network receives millions of participants and must be able to deal with tens of thousands of transactions per second? Are the technology and standards robust enough? However, there are also questions concerning the impact on the employment market and the disappearance of jobs that blockchain will possibly cause. These types of challenges need to be considered in greater detail when blockchain is rolled out on a large scale.

> *It is, however, clear that future – and still largely unknown – changes as a result of blockchain will only take place if the entire network of stakeholders in various sectors work together on widely supported solutions and reach an agreement about the standards. That requires a coordinated approach towards cross-sectoral challenges by all parties involved.*
>
> René Penning de Vries, Chairman Team ICT

2. Action Agenda Dutch Blockchain Coalition

Action Agenda: Dutch Blockchain Coalition

The Action Agenda contains three main lines to boost blockchain expertise and the deployability of blockchain technology in the Netherlands. These are:

- Line of action 1: Development of blockchain building blocks: Digital Identities
- Line of action 2: Realisation of conditions for the use of blockchain
- Line of action 3: Development and realisation of the Human Capital Agenda

Line of action 1:
Development of blockchain building blocks: Digital Identities

Reliable identification and authentication are basic conditions for virtually all applications of blockchain. Blockchain solutions for the identification of persons, legal entities and objects is therefore the first thing that needs to be worked on. Identification processes are needed to make blockchain applications possible but at the same time these processes can be strengthened by blockchain. Working on identification processes requires a focus on both interoperability and standardisation and requires the will to work federatively, which already exists or is under development in various Dutch and international government bodies and industries.

Various issues play a role In the construction of identity processes, such as the impact of strengthening the control of the citizen, the international standardisation and interoperability, the reuse of existing protocols for identification, and how the governance of these processes is organised. Issues concerning key management and the right to be forgotten still remain as well.

The development of these other blockchain applications will require scientific research and development.

The scientific agendas and roadmaps concerned need to be elaborated with all parties involved. Based on the use cases already developed in field labs, scientific questions about the following themes arise:

- Technology: scale, performance, energy use, multiple aspects of blockchain cyber security and quantum proofness and the required software quality;
- Legal: contract law, competition law, consumer protection, privacy guidelines, liabilities of smart contracts, resolving conflicts, arbitration and possibilities for the restoration of damage;
- Economic: market regulation, new business models, competition law and solving the talent gap;
- Interoperability: standards and APIs;
- Implementation: principles of blockchain implementation strategies and change management;
- Ethics: meaning, technology & ethics, public acceptance and communication.

Actions 2017:

- Realising a draft specification for digital identities and a proposal for experiments and research;
- Determining commitment and approach for the Dutch effort in the area of international standardisation for digital identities and blockchain;
- Creating clarity about the relationship with and the speed of rollout for all government organisations that are considering the options of using blockchain to award identities to make better use of government registers such as the Rijksdienst van Identiteitsgegevens, Dutch Chamber of Commerce as well as the basic registrations of the Police and the Ministry of Security and Justice, with specific attention for guidelines concerning privacy legislation;
- Clarity about legal frameworks and synergy with other current processes in the area of digital identification and authentication (Idensys, eHerkenning);

- Increasing and where necessary strengthening all current initiatives such as the workgroup *Smart Contracts*;
- Working on cyber security issues that are associated with immutability, governance, consensus mechanisms and quantum adversaries;
- Further exploration and consolidation of other scientific research programmes and roadmaps by research themes from the field labs.

Line of action 2: Realisation of conditions for the use of blockchain

As we get closer to transformative applications of blockchain, the need for the social, legal and economic spaces to accommodate these becomes increasingly important. There is a need to create widespread support for and awareness of the use of blockchain applications. Large-scale blockchain applications can only be realised if all relevant players are in the right mode. A level playing field needs to be created in the political, administrative, legal, economic and social arenas.

The coalition therefore intends to work on the right conditions under which blockchain can be used. Accordingly the coalition wants to offer an independent, cross-sectoral platform and alliance to relevant stakeholders from government bodies, industry, public organisations and researchers.

This will also require the intense involvement of researchers from the humanities, social sciences and natural sciences. Research questions will emerge concerning the extent to which citizens and companies accept and trust how blockchain works. Which expectations will citizens, clients, companies, policymakers, financiers and shareholders have concerning the transparency that blockchain can provide? What does it mean for these parties if end users are given a more direct role for the purpose of their own privacy and security? Research is also needed into the building of the extremely secure software required for smart contracts; into how the liabilities of poor smart contracts can be settled and into which new market roles and other roles will arise. It also concerns the management of the changes that will lead to innovations for complete markets and to new systems and regulations that are sufficiently future-proof.

The role of governments, regulators and interest groups with respect to blockchain also comes into view. This concerns aspects such as regulations and the creation of markets, legal liabilities, the protection of privacy, consumer protection, conflict mediation and arbitration, contract law, new roles of trusted third parties, roles of identifying and certifying parties, how smart contracts work, the right to be forgotten, and new possibilities and roles for compliance and audit functions.

Actions 2017:

- Identifying and elaborating possible showstoppers for the large-scale rolling out of blockchain applications (inspired by but beyond the boundaries of field labs);
- Clarifying relevant legal frameworks, and identifying and analysing possible legislative obstacles and then putting these on the agenda;
- Timely involvement of relevant stakeholders within and outside of government in the development of blockchain;
- The development of suitable science communication;
- Developing insight into the dissemination and implementation of blockchain applications in markets and societies;
- Proactively sharing of the knowledge developed.

Line of action 3: Development and realisation of the Human Capital Agenda

At the start of a technology cycle little expertise or talent is available. This also applies to blockchain.

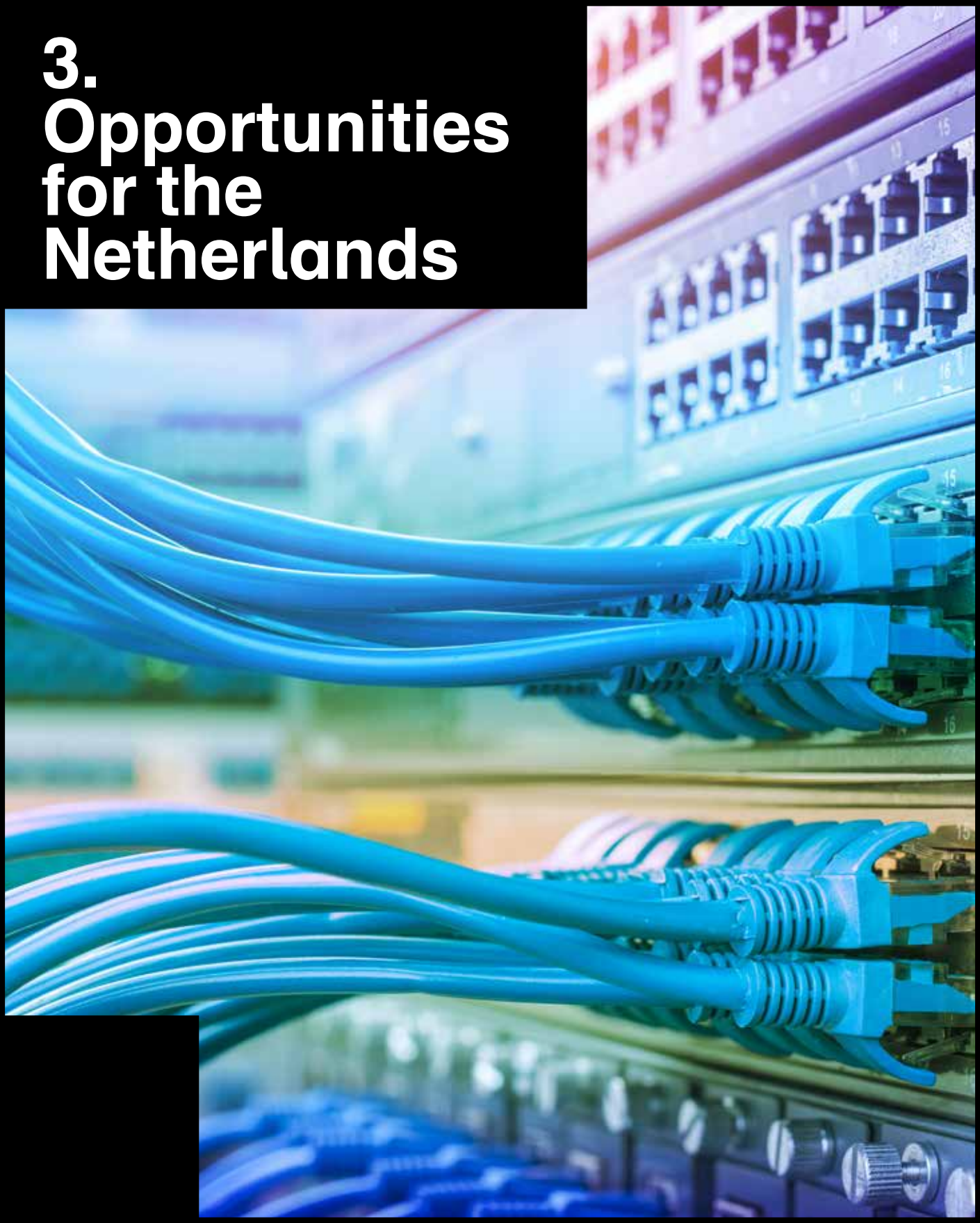
There is a scarcity of knowledge and expertise about blockchain within the ICT, sociological, economic, legal, ethical and business themes. Knowledge and ambition need to be created at various levels within organisations so that speed and impact can be realised. Within ambitious organisations a critical mass of people is needed who can dream, direct, design, build and manage in blockchain. This existing talent gap will play a role in the international competitive struggle for blockchain technology.

Within the Human Capital Agenda line of action an effort will be made to disseminate the available knowledge as efficiently and quickly as possible. We will probably also have to look for knowledge and expertise that the coalition partners currently lack. It will also be investigated which knowledge, skills and behavioural competencies are definitely needed in the various domains that are relevant for the implementation of blockchain applications. The target groups for this are managers, organisation strategists, enterprise IT architects, software developers, business managers and professionals from the disciplines human resources, finance, auditing, logistics, quality assurance and compliance. Together with universities, universities of applied sciences, further education colleges and other training institutions the Human Capital Agenda line of action will put together training and professionalisation programmes that meet the needs of companies. For this a wide range of teaching methods and learning environments will be used for blended learning and learning by doing. The development of more formal training and qualification programmes has also been initiated such as minors at the further and higher education levels.

Actions 2017:

- Setting up a workspace (online and offline) within the coalition where private and public knowledge and expertise can be shared and deployed in the appropriate manner;
- Identifying and supporting the need for knowledge and expertise for blockchain among the founding partners;
- Developing formal and informal possibilities for professionalisation and training;
- Realising an exploratory study of the labour market and the possibilities for (re)training programmes in further and higher education;
- Realising a 'Blockchain in a day' training module for directors and regulators, among others;
- Investigating the knowledge, skills and behavioural competencies required in the various domains for the implementation of blockchain applications.

3. Opportunities for the Netherlands



Opportunities for the Netherlands

Unlike in the initial days of the Internet, company directors, organisation strategists and policymakers already need to be aware of the impact that blockchain can have on economic, technical, commercial and cultural opportunities. Although the technological power and quality of blockchain worldwide is still being tried and tested, early adopters among scientists and application experts are calling upon government and businesses to invest in the economic and societal possibilities of blockchain.

Within the Netherlands, the use of blockchain technology offers huge possibilities for improving services, better management of production processes, cost savings, reducing fraud sensitivity and diminishing cyber risks. As a knowledge economy, the Netherlands has a vested interest in the use of blockchain, especially in a number of vital economic sectors such as the chemical industry, the harbours, agrofood, the manufacturing industry, the financial sector, the energy sector and government. Dutch industry wants to quickly realise the first practical applications, which, insofar as this is possible, will be constructed in a technology-agnostic and interoperable manner.

There is strong international competition. In China, Japan, Singapore and the US big investments are already being made in blockchain applications, also in sectors that are critical for the Netherlands such as logistics and food supply. Some top directors in the US are putting their money where their mouths are and are accepting key positions within blockchain businesses. The governments of Estonia, Israel, South Korea, New Zealand and the United Kingdom are connecting, guiding and investing in blockchain. In the United Kingdom, the government already realised back in 2015[1] that blockchain is not a hype and that a versatile approach with flexible measures is needed. Within the technology world, consortia are being formed around platforms such as Hyperledger and Enterprise Ethereum.

In the Netherlands, there is a strong digital capability in academia and industry and there is a government that wants to realise digital transactions. Delft University of Technology, CWI and TNO have a lot of technological knowledge and there are many market parties who are interested in contributing to the development of blockchain applications.

The Netherlands has a strong international image with respect to the quality of its legal system, impartiality, security and reliability. A Dutch blockchain service in the area of logistics or taxation would be more quickly trusted worldwide than similar services from other countries. That provides opportunities for Dutch companies and government bodies to implement blockchain applications worldwide for specific themes. In this respect, the Netherlands can follow the example of Estonia, which has successfully built up a portfolio of internationally deployable government services for citizens.

Why a National Coalition?

Usually a fundamental change in technology has an initial effect on relatively simple business cases or use case scenarios and existing solutions are first replaced within relatively limited environments: the 'single use case'. Subsequently, although still for relatively non-complex business cases and use case scenarios, new applications arise that did not or scarcely exist previously: the 'localized case'.

[1] UK Government to invest £10 million in Blockchain research, 15 October 2015 (https://ibsintelligence.com/ibs-journal/ibs-news/uk-government-to-invest-10m-in-blockchain-research/)

Only then does the new technology have a full impact in business and use cases that require a high degree of complexity and coordination between actors in the ecosystem. Two situations are distinguished here: the substitution of existing business and use cases by the new technology ('substitution case') and ultimately the introduction of business and use cases that did not previously exist ('transformation case').

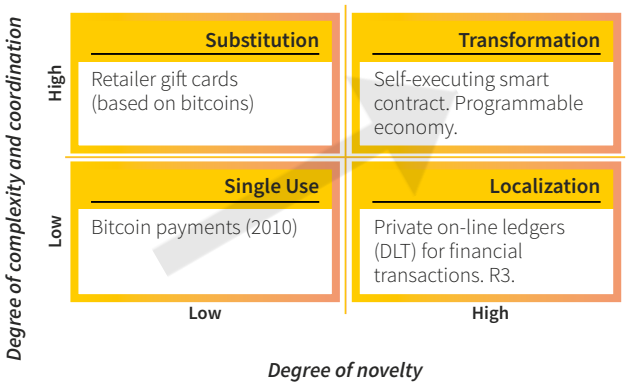


Figure 1.
Effect of fundamentally new technology [HBR 2016]

Both Bitcoin and the new R3 Corda platform are mainly suitable for financial transactions and settlement. Both fit within the regulatory and supervisory frameworks of the financial industry. That is why Corda was specifically developed for this localised application. Substitution can, for example, take place in the domain of planning and control if the costing and the budgets are completely managed via programmed coloured coins that can only be spent for a single cost centre and extensive smart contracts are sued.

An example of a transformative case is an autonomously operating and potentially self-riding taxi that in the market of transport demand behaves as an independent business. This transport service can participate in the economic sector as an entirely self-executing unit. Based on the complete availability of mobility information and inbuilt algorithms this taxi makes its own market and turnover expectations, receives and performs its own payments, makes its own maintenance planning, et cetera.

If the Netherlands is to play an internationally significant role then it must develop substituting or transformative applications (the top two quadrants in Figure 2.1). The ambition of the Dutch Blockchain Coalition is also centred on this domain.

The ability to monetarise such blockchain opportunities requires the presence of congruent 'accommodating conditions' between policy, legislation, and realisation as well as the supervision and enforcement of these. The economic region (EU/US/ Far East) that is the first to have this congruency and 'accommodating conditions' available will acquire a worldwide competitive advantage. The case of Estonia demonstrates that in practice. Estonia saw the opportunity to attract new economic activities from abroad with a newly developed legislative framework and the provision of services around eresidency.

The need for coalition forming is further strengthened by the current phase of the development in which the technology finds itself:

- the development of Blockchain is still experimental and will therefore need to progress iteratively between the parties involved as well;
- the expertise within all areas is still scarce and must be optimally shared for the purpose of achieving the result;
- although every sectoral context requires its own operationalisation there are certainly common challenges as well;
- there is a new world and at the same time an old world to maintain which means that the coordination of coherent transitions is required.

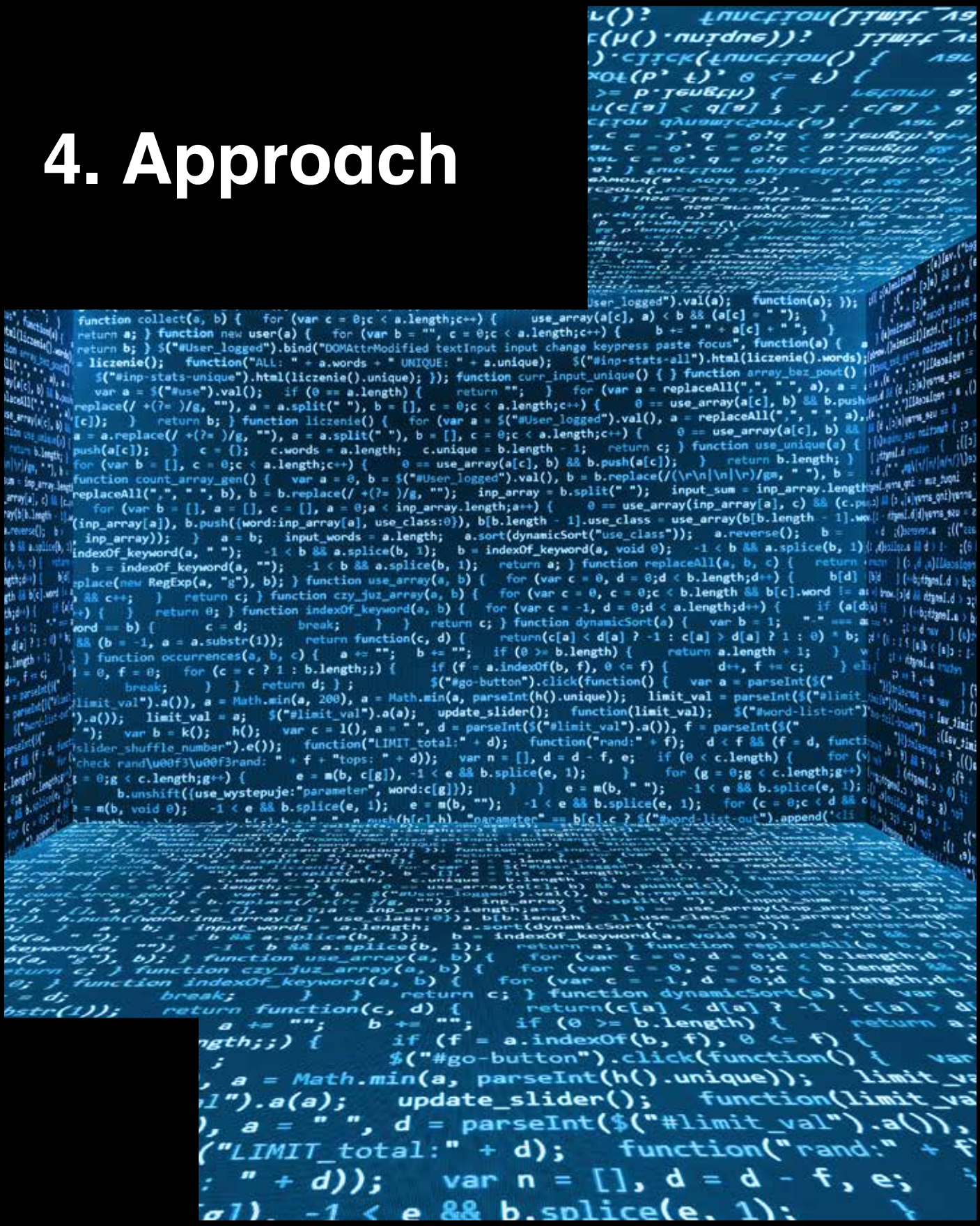
The development of sufficient congruence requires the careful organisation of mutual harmonisation. With this the Dutch Blockchain Coalition must shape its efforts from/on both a multidisciplinary (economic, technical, legal, ethical and social) and multifunctional (building of congruence between government policy, legislation, realisation, supervision, inspection, security and enforcement) perspective.

3. Opportunities for the Netherlands

This is the type of multipolar collaboration and harmonisation between government, industry, academia, software companies, start-ups, investors and various interest groups with which the Netherlands can make advances. Various successful alliances and projects demonstrate that the Netherlands is capable of doing this. Furthermore, ambitions such as those of VNO-NCW NL Next Level, the Smart Industry Action Programme and other projects provide additional energy and context.

The Dutch Blockchain Coalition partners from industry want to realise practical applications as quickly as possible. The keywords for this are: interoperability and where necessary technological opportunism. However market and system failures can hinder the adoption of innovations such as blockchain. This could concern the lack of knowledge dissemination, standardisation and chain collaboration, imbalanced distribution of costs and benefits, or the role of legislation. In such cases an actively guiding and investing role of the government is legitimate. In addition, the government can be a first user of innovative applications that arise within the coalition.

4. Approach



Mission

The mission of the Dutch Blockchain Coalition is to realise fully reliable and socially accepted blockchain applications, to create the best possible conditions to allow blockchain applications to arise, and to facilitate the use of blockchain as a source of trust, well-being, prosperity and security for citizens, companies, institutions and government bodies.

The coalition works from the viewpoint that responsible innovation must contribute to value creation for a wide range of target groups and applications. From this perspective, representatives of public interest groups of citizens as well as companies can provide input to the work of the coalition.

Vision

The Dutch Blockchain Coalition works on the basis of the vision of connect and create. In the case of blockchain, joint challenges will also need to be tackled if we are to compete in the international arena. A collective purpose must arise between parties from different economic sectors, the government in an active role as promoter and as a stakeholder, and the organisations from the knowledge infrastructure (universities and institutes such as CWI, TNO and NWO).

Working method

The Dutch Blockchain Coalition executes the lines of action in this plan. Consequently the Dutch Blockchain Coalition mainly focuses on activities and often works on precompetitive solutions, which can be tested for technical as well as socioeconomic, legal and ethical feasibility and quality. The results must elicit discussion, amazement and the desire for deeper consideration within the sectors, within government and the research field. After all, this is what may be expected if parties make acquaintance with a foundational technology.

With its approach the coalition also intends to connect with the current initiatives and infrastructures so as to prevent or reduce fragmentation. The coalition will focus on applications with a high degree of complexity and inventiveness. In several cases, single use and localised solutions can be developed within the context of existing business models and frameworks. That also happens through individual businesses or businesses in homogenous sectoral alliances. An example of this is the international consortium of banks R3, which is not so much developing a blockchain as new standards for payment transactions. The same applies to the consortium of reinsurers B3i. Such single use cases and application areas have little to no need for a coordinating role from the coalition but nevertheless they may, if they so desire, join the Dutch Blockchain Coalition for other reasons.

The working method within the coalition will adjust to the speed and working style of the founding partners. This means working on the basis of experiments, with minimal viable products, fail fast, agile and scrum as the modern methods for innovation and realisation. More strategic planning will be realised through quarterly and half-yearly plans with the approval of the founding partners. In general, a rolling agenda will be set up in October in which the generic plans for a subsequent year will be approved.

Open innovation and growth model

The Dutch Blockchain Coalition has chosen to realise its development through an open growth model. Parties that join the coalition later are, in principle, welcome and do not have to be distinguished from the founding partners in terms of their contribution and importance. There are no specific intellectual property rights for any of the participants.

The growth model also means that the coalition will make efforts to start up initially small, but scalable projects within the lines of action formulated. The projects will be flexible and will be staffed just in time on the basis of concrete activities. For this, participating companies, government bodies, TNO, CWI and higher education institutions, will provide their experts and professionals. These experts and professionals will work together for at least three days per week in the Dutch Blockchain Coalition physical home base to benefit the required strong combination of proximity and heterogeneity. The location of the home base has yet to be determined.

Each of the partners will be committed to making at least one person available for a longer period of time. The availability of more than one person will be highly valued (and this is also in the interest of the partner's learning curve). Depending on the issues concerned, the scientific knowledge will have to be developed and therefore scientists will be directly involved in constructing solutions as team members at the home base.

The Dutch Blockchain Coalition is complementary to other initiatives in the blockchain ecosystem that already exist in the Netherlands. The Dutch Blockchain Coalition and the initiatives described below will work together on strengthening the development and articulation of questions concerning blockchain innovations, clarifying the required development of legislation, and providing kick-start environments for certain sectoral use cases, proof of concepts and prototypes.

In the Netherlands several sectoral field labs such as those within Smart Industry, Agrofood, and Port of Rotterdam are already up and running. These field labs are working together on the joint themes contained in the Dutch Blockchain Coalition agenda. Several of these field labs are coordinated and represented by various experts from TNO. TNO is also one of the founding partners of the Dutch Blockchain Coalition. The collaboration with other field labs and alliances (for example Holland Fintech, StartupDelta, the Hague Security Delta, EIT Digital) is actively sought and will be further elaborated.

The Dutch Blockchain Coalition is already working with the initiative **Dutch Blockchain Hackathon** (from now on DBH), and the Brightlands Smart Services Campus. DBH is a multisectoral grassroots movement of more than 1500 international members from the largest open blockchain innovation programme in the world. In DBH, 500 participants from 12 countries, 55 teams and 35 public and private partners are participating, such as ING, Exact, Microsoft, IBM, APG, Blockchain.com, Hyperledger, the Ministry of Economic Affairs, the Dutch Blockchain Coalition and StartupDelta. In and around the teams are companies, government organisations, investors, knowledge institutions, NGOs, start-ups, scale-ups, SMES and students. DBH works intensively with StartupDelta.

The Dutch Blockchain Coalition and DBH community can strengthen each other on several fronts in the following ways:

1. 1. In the context of the DBH Innovation Programme. This has the phases preparation, momentum and acceleration;
2. The Dutch Blockchain Coalition can introduce the hackathon teams to relevant parties from policy legislation and involve them in the co-design space of the Dutch Blockchain Coalition;

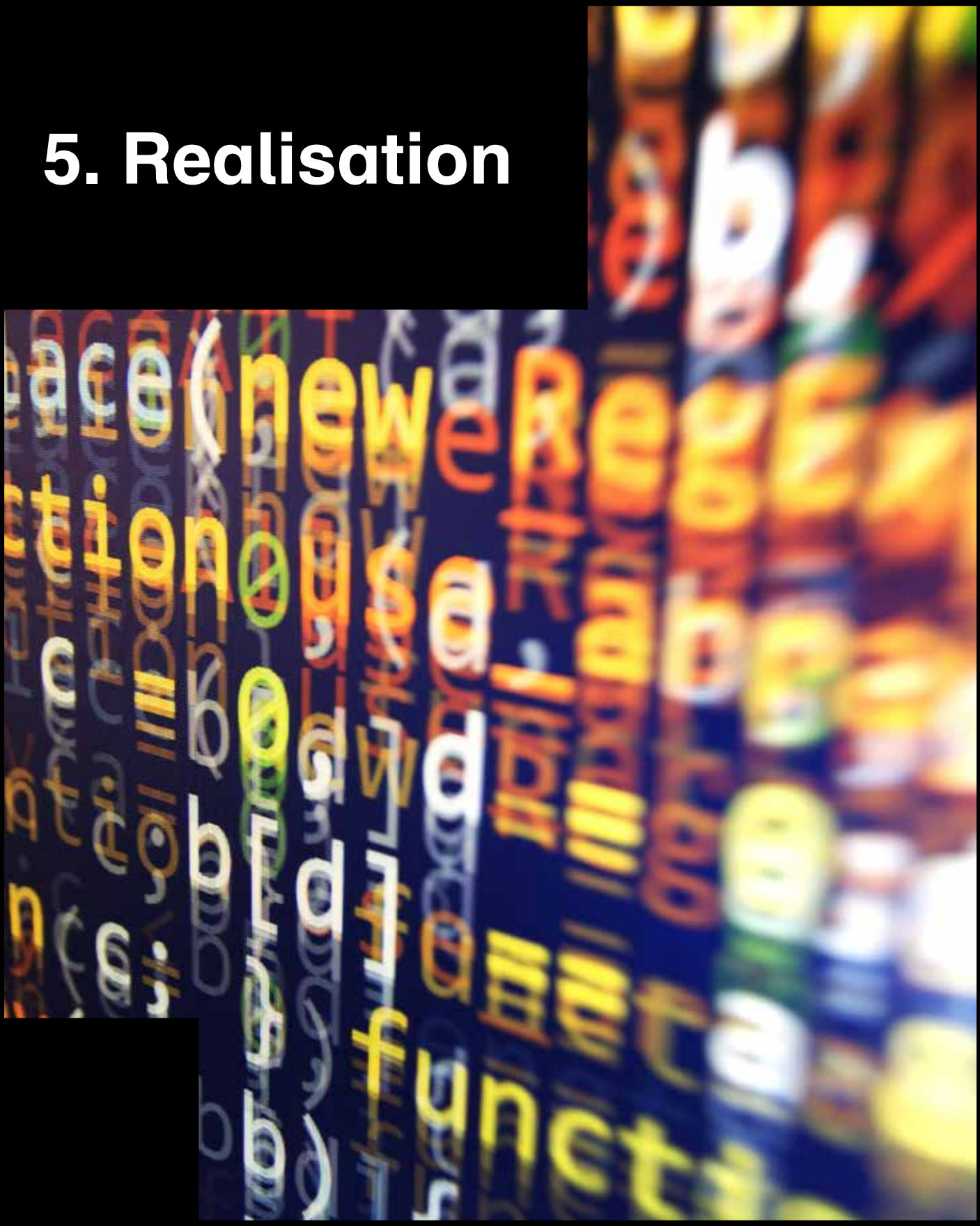
3. DBH can supply challenging prototypes that can be inspiring and directional for the ambition of theDutch Blockchain Coalition partners;
4. DBH and the Dutch Blockchain Coalition can link launching customers from companies and government bodies with available start-ups and scale-ups;
5. Due to its experience with SMEs, DBH can assess the effectiveness of government regulations such as purchasing policy, SBIR et cetera;
6. The developers from the DBH network can be involved in the redesigning of courses.

Within the broader Brightlands community, the **Brightlands Smart Services Campus** (BSSC) facilitates an ecosystem that now has about 40 large and small companies and institutions, start-ups, students and scientists to develop new smart services by dealing more smartly with the combination, analysis and visualisation of data. The BSSC slogan is: “from data to smart services to improve the quality of life”, and focuses mainly on services in the context of long-term decisions for the individual: health, sustainability, living, finance/pension and education. Brightlands offers the Dutch Blockchain Coalition input from its Techruption field lab for the further development of policy and legislation, a test and development environment for private blockchain services with relevant in-depth knowledge, and the connection with the local knowledge institutions Zuyd University of Applied Sciences, the Open University and Maastricht University, as equally the universities of Aachen and Leuven. TNO is the lead party for the blockchain programme at Brightlands. The Dutch Blockchain Coalition can offer knowledge, instruments and, insofar as this is needed, relevant relations among government bodies and regulators.

Supporting activities

Besides the support that is offered to the specific lines of action, the Dutch Blockchain Coalition also carries out flanking activities. Examples are: engaging sources of funding, organising efforts to influence public opinion through seminars and free publicity, and the organisation of various types of events with the intention of creating the right conditions for blockchain applications. The coalition also supports any calls published for scientific research and action-based research, and takes care of the registration and introduction of new coalition partners.

5. Realisation



Start conference Identities

The first project is the design, building, testing and operationalisation of the system for identifying people, legal entities and objects. In the second quarter of 2017, the coalition with the founding partners (companies, academia and government) and all other relevant stakeholders (policy, legislation, supervision and enforcement) will organise a start conference during which the roadmap of this Identity Project will be elaborated. During the preparations for the start conference, maximum use will be made of the information position and the previously established expertise of the partners. A professional facilitator will chair the conference and this person will at least be familiar with the working methods of the agile scrum arsenal.

At the same time, the Dutch Blockchain Coalition programme office will elaborate a more generic projects portfolio and research roadmap. This will form the basis for the rolling agenda with concrete activities and deliverables for a following period (six months). This agenda will also contain an outline of the plans for the period following that.

Collectivity in the approach

Many of the parties in the coalition are already active in the field labs. Various experiments in the area of blockchain are being carried out In these labs and some of these concern Identity. Through formulating the joint ambition with respect to the identity of entities, connections will develop between the initiatives of the various parties. The collectivity in the approach is illustrated in Figure 2 and in the section 'Working method' (Chapter 4, Approach).

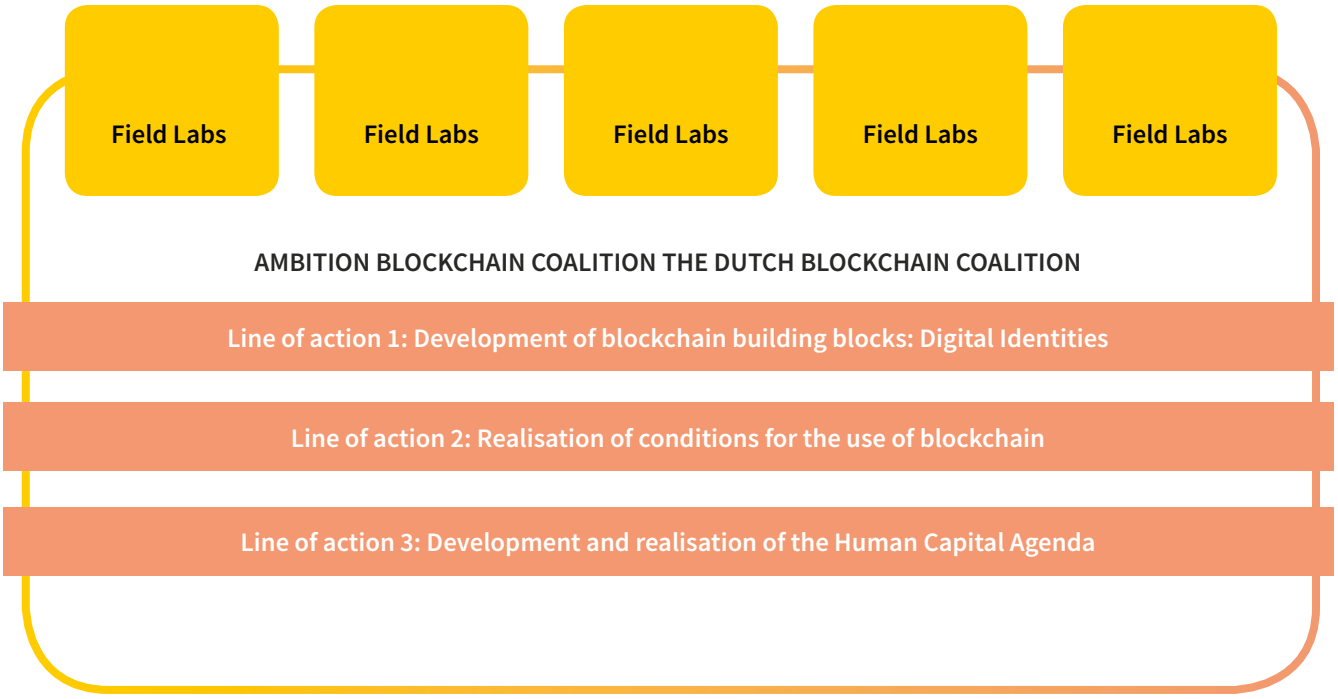


Figure 2
Collectivity in the approach

Programme office

The size of the lines of action and the concrete activities to be developed will be determined by the founding partners together with the programme office and stakeholders from the field on the basis of an activities agenda. A small programme office ensures that the lines of action proceed well, that there is enough project support, that somebody is responsible for the programme lines, that there is coordination about the lines of action, that new parties can find their way to the lines of action, and that the lines of action are noted by and represented in relevant bodies. The coalition is a legal entity or is represented by a legal entity that is mainly used for the back-office processes.

Governance

The programme office also provides support for a strategy team, which is made up of members from the existing partners and the chair of Team ICT. This reporting takes place through the leader of the programme office. The office also supports the development of the plans and gives account for what emerges from these. The strategy team is responsible for a satisfactory portfolio allocation.

Companies, government, and knowledge and education institutions all contribute to the joint definition of the programmatic content of the lines of action and at the same time they jointly assume a leading role and responsibility for the success of the coalition. The Dutch Blockchain Coalition is open for input from experts and stakeholders who can make a contribution towards realising the result desired. At the same time it is always considered where the best match lies between the expertise offered and the interests of the programme. Consequently the collaboration can assume various forms and through a process ofmutual consultation it can be matched with the possibilities and needs.

Funding

Public and private partners are contributing the funding required for the realisation of the action agenda.

The joint start-up funding from the founding partners is € 700,000 (end March), of which € 200,000 has been contributed by companies and € 500,000 by government bodies.

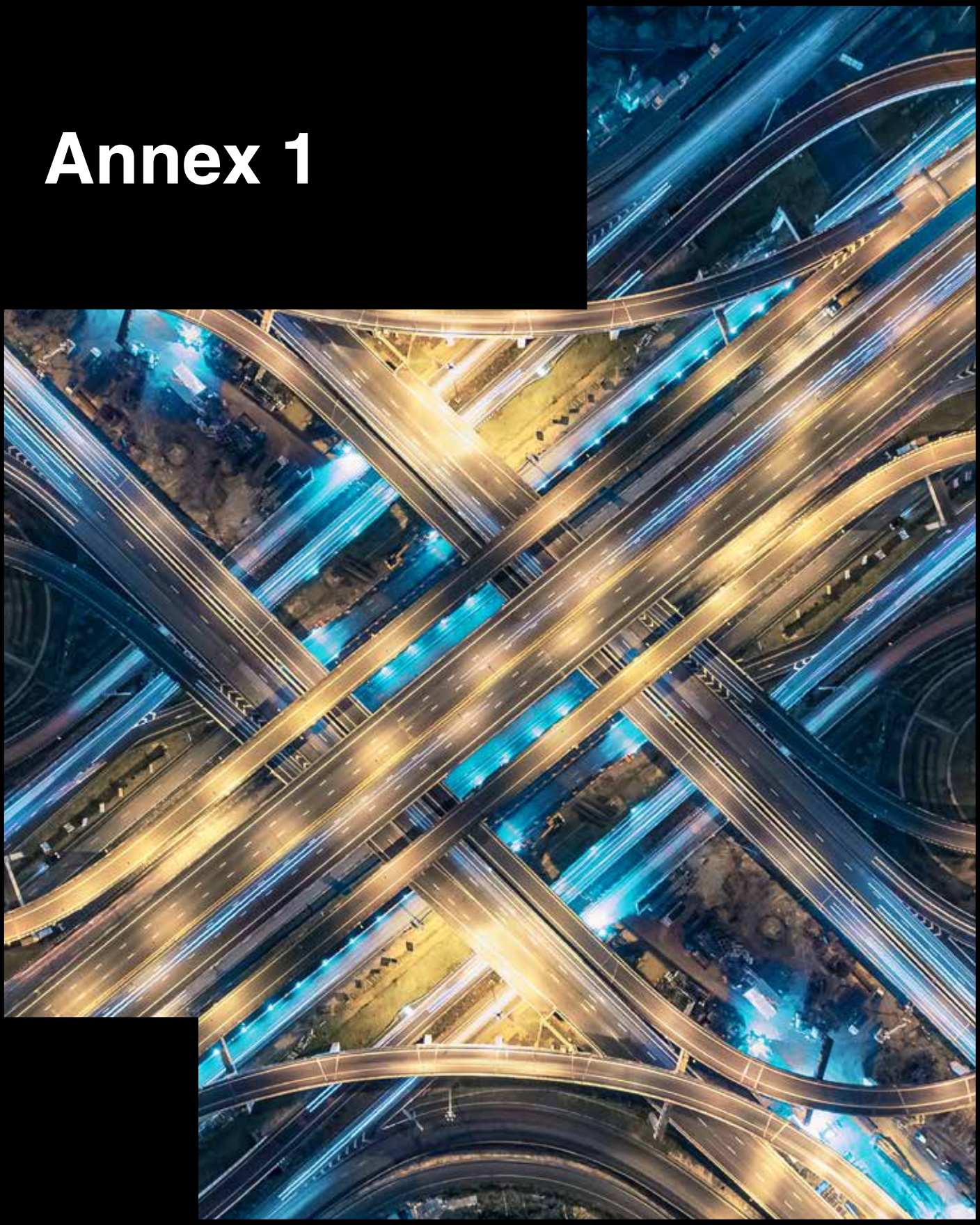
In addition, the founding partners (industry, knowledge, government) are making a considerable contribution to the realisation of this agenda in terms of manpower.

International

One of the programme office's tasks is to follow international developments, often in consultation with the partners. The Blockchain Coalition is in contact with international parties such as EIT Digital as well as several international institutes via TNO. NWO offers the perspective for participating in international scientific programmes. Initiatives established by company consortia and governments will be continuously monitored via the media established for this purpose, but also via the Netherlands Enterprise Agency and the Ministry of Foreign Affairs.

The Dutch Blockchain Coalition can contribute to standardisation and to activities at the EU level. Information obtained will be communicated with all partners. Equally, the coalition will try to give international visibility to the Netherlands and to the Dutch Blockchain Coalition. Dutch blockchain solutions can be viewed as an expert product, and the Netherlands can be profiled as an attractive ecosystem for the development of blockchain applications. International talent can recognise the Netherlands as an ideal location for personal development and/or starting new commercial activities.

Annex 1



Annex 1: Explanation blockchain technology

Blockchain is the term that we use for several different emerging techniques with respect to information sciences, sensors, bandwidth, speed of data transmission, storage capacity, cryptography, calculating power and algorithms. A better – but less catchy – term is distributed ledger technology (DLT).

Blockchains are decentralised databases that allow parties to achieve consensus about the existence, status and changes of a collection of shared facts. An example of this is the ownership of real estate. All parties must agree that there is an owner, who the owner is and how the ownership can instantaneously change after a transaction. In the traditional situation, this information is recorded by a trusted party such as a solicitor. Blockchains make it possible to unequivocally record and share that information without the need for a trusted party and without a single party being able to make unilateral changes to this deliberately or otherwise.

In a blockchain, a chain of digital files – the blocks with facts and transactions – are linked together over the course of time. The entire chain is in turn a digital file. A blockchain is never finished as participants in a blockchain can always attach new links to the chain. However once added, links can never be removed again. Linking the blocks with the so-called consensus algorithm makes it impossible for a party to make unilateral make changes, in other words the blockchain is 'immutable'.

In the first large-scale implementation – the Bitcoin – blocks contain financial transaction information. In principle, however, a blockchain can contain anything; a contract, a patent, a deed of ownership, or a piece of software. More complex forms of a blockchain or DLT that contain autonomous operations by means of software, for example, are often referred to as smart contracts. A possible future step is to make organisations entirely autonomous. This would lead to distributed autonomous organisations (DAOs). For the sake of simplicity, in this action agenda we have chosen to let the term blockchain cover blockchains, DLTs, smart contracts and DAOs.

Blockchain is now fully under development and new applications are continuously being devised. Efforts are being made to establish mutual settlement platforms within smart grids, where thousands of energy-generating and energy-consuming citizens jointly form a new type of energy company. It can also offer very precise trade finance solutions for worldwide logistics processes. Or it could concern the permanent dynamic determination of the economic balance value of goods because sensors store the verified damage in blockchain and communicate that to the accounts department. It can also concern determining with extreme precision the origin, production and physical logistics history of tea or roses from Kenya, for example. That would enable a supermarket to provide very detailed product information to the consumer. However it could also concern cadastral determinations, the issuing of travel documents, or the complete power of consent of the patient over his or her own patient information.

It seems that blockchain will not only contribute to a great efficiency and an improved management of complexity, but also to the construction of the circular economy, the strengthening of privacy and cyber security, the reduction of fraud and evasion, and the increase of confidence in the origin of goods and services.

Which of these possibilities will become a reality is still an open question. Just as with the development of the Internet protocol in the 1970s, the effect of fundamental technological developments such as blockchain on business models and society can be described on the basis of the diagram in Figure 1 (page 14).

The Bitcoin is an obvious example of a single use case. Examples from recent years that fall within the 'localised case' are the more reliable and quicker settling of superfast share transactions for a large stock market fund or the recording of bids at an online auction. The transaction platform Corda developed by the R3 consortium was specifically built for the financial industry in a localised manner. However, the function of blockchain can be spread over decades and can equally be used to safeguard the integrity of cadastral information or notarial acts just like a solicitor can now.

The promise of blockchain is that the economy can develop further into a programmable and subsequently self-driving economy.

Digital money – Bitcoin is the best known – makes use of a blockchain to ensure that the digital coin cannot be stolen or used twice by the same owner. In this case, the ink from the blockchain consists of financial transactions, for example. However digital money requires more than just a blockchain. Participants cannot be allowed to randomly add links to the chain, as then the chain would acquire branches and consensus about what the real blockchain is would no longer exist. Each time a participant adds a new link, the network of participants must first of all verify that the chain is still intact and only a single unique version exists. This also guarantees that the current version of the blockchain is still known to all participants. At the moment that the new link is added, a new unique version of the blockchain is formed.

Technique	Characteristic	Impact
Distributed ledger	Everybody shares the same set of facts	Higher efficiency, lower costs
Blockchain	Alle transactions in are recorded in a chain after consensus	No trusted party needed
Smart contracts	Each contract is programmed	Contract is implemented if all conditions have been satistief: the programmable economy
DAO: distributed autono-mous organisations	All coherent contracts are autonomously carried out	Everything is done for us: the "self-driving economy"

Figure 3

Emerging techniques included in the term "blockchain" (after Gartner).

Annex

A network without central authority

The cryptographic security of a blockchain is usually subtle and complicated. Everyday 'blockchains' without this complicated security also exist, however, and many people use these on a daily basis. One such example is a group of people who each email with all members of the group in the cc. As senders cannot change emails in retrospect, everything is recorded in an unequivocal and transparent manner also with respect to the chronology.

In an email you can request a confirmation of receipt from the recipient. If everybody first of all has to send a confirmation before a following email is allowed in the group then at any moment in time there is formal consensus about the entire email exchange. There is, however, a fundamental difference with a real blockchain: the participants are dependent on a central authority, namely the email provider. If such an email group discusses something important they must trust the provider will not 'listen in' or change or delete messages.

The cryptographic security of a real blockchain ensures that no central authority is needed. All participants check each other with digital 'DNA profiles' of files and digital signatures as a result of which mutual trust arises in the integrity of the blockchain.

How does Bitcoin make use of blockchain?

Bitcoin makes use of a blockchain to prevent somebody from spending the same Bitcoin twice (double spending). Each payment with Bitcoins must first of all be approved by the network of users. The total number of Bitcoin transactions since the coin was introduced is linked to the blockchain. This is comparable to a complete list of transactions for a normal bank account except that this list is jointly used and managed by all Bitcoin owners. This complete file is continuously growing and is now already dozens of gigabytes in size.

An unusual characteristic of Bitcoin is the mining of new Bitcoins. This takes place in blocks of 25 Bitcoins. Obviously the code number of a Bitcoin block cannot be a random series of 64 letters and numbers, as then everybody could mine unlimited number of Bitcoins. That would effectively give rise to hyperinflation.

Valid code numbers satisfy a special characteristic and accordingly form the solution for a complex cryptographic puzzle. There is no efficient way to solve these puzzles: computers simply need to try out and check billions and billions of random code numbers until one of them solves the puzzle. If a person's computer finds a valid code number then this is evidence that he or she has used a considerable amount of computing power ('proof of work'). The finder is therefore rewarded the right to issue 25 new Bitcoins.

Just like other currencies, the value of a Bitcoin is volatile and in the recent past it has also shown considerable fluctuations. Furthermore, in 2014 hundreds of thousands of Bitcoins were stolen from a large Bitcoin fair in Japan, Mt. Gox. Partly as a result of this, the future of Bitcoin and other digital coins is uncertain.

Blockchain technology, however, is in no way dependent on digital money. The doubts concerning Bitcoin do not have any consequences for the broad applicability and security of blockchain technology.

The only real large-scale application of blockchain is Bitcoin. Although more advanced platforms such as Ripple, Triblr, Hyperlegder and Multichain have emerged, Bitocoin exhibits more external complexity than any other application available in 2017.

That could, for example, be smart contracts, which under certain conditions perform automatic payments, deliveries or orders. In such a contract it can be arranged that multiple participants must give permission for a certain transaction. Every group of participants that wants to achieve verifiable mutual trust without a central authority can, in principle, benefit from a blockchain. In trade financing and physical logistics there are good examples of where trust and verified transactions arise between a multiplicity of parties, from financial institutions to producers of goods, from haulage companies to wholesale traders, and from client to the tax authorities.

Why is it impossible to falsify a blockchain?
Blockchains are made secure using several cryptography techniques. The most important of these is a technique that calculates a 'DNA profile' for each digital file. This is a unique code consisting of 78 figures and is called the hash (or hashcode). A hash is digital file that is added to another digital file. Each file receives its own unique hash so that it is impossible to create another file with an identical hash. The hash itself, however, says nothing about what that file contains. Each hash has the same length and therefore even the difference between an email of a few words or a database of many gigabytes cannot be deduced from the hash.

This forms the backbone of the blockchain principle: calculating the hash for each file, adding that link to the blockchain, calculating the hash of the entire chain up until that moment and adding that to the chain as well. With this approach, each new link added to the chain is 'digitally welded on' so that an unbreakable chain of files is created.

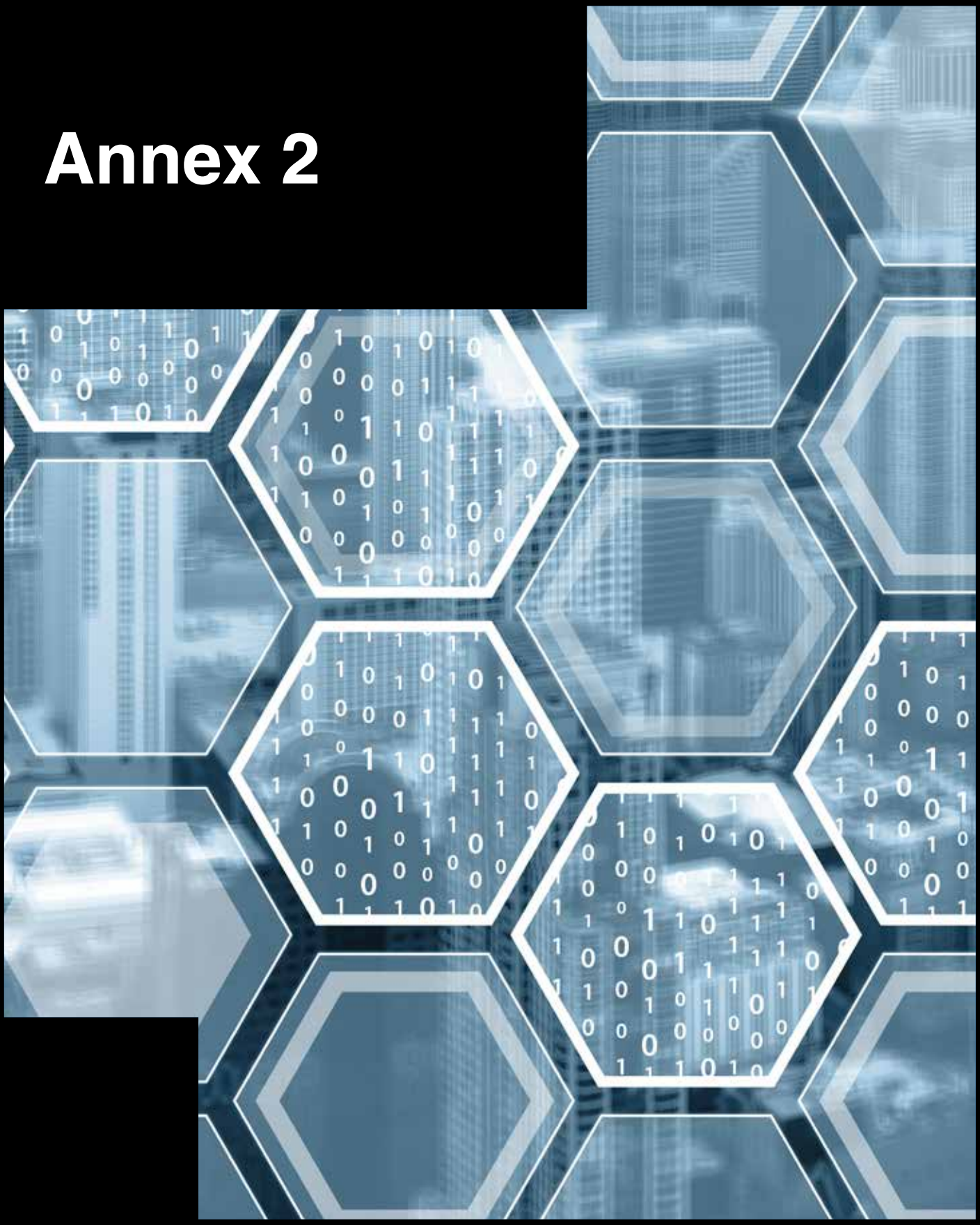
The following concrete example illustrates the usefulness of this. Imagine that a client has deposited her will with a solicitor but she does not want the heirs to learn about the will's contents before her death. She is therefore dependent on the solicitor's integrity. Unfortunately, one of her grandchildren is a friend of the solicitor. Who can guarantee that the solicitor will not secretly change the will in favour of that grandchild?
The other heirs know nothing about the situation and once the will is opened the client's protest is futile.

The solution is to calculate the hash for the will and to send this to all of the heirs. The hash does not disclose anything about the content of the will. As soon as the solicitor announces the will then everybody can calculate the hash of this. If this is not exactly the same then the solicitor has changed the will. The client can change the will as much as she wants as long as she sends the new hash to all of the heirs after each change. This is how the solicitor could set up a blockchain with all of his clients: after each change in a will, they receive a new hash so that later no doubts about a will can arise.

Subsequently, a coherent entity of smart contracts can lead to a DAO (distributed autonomous organisation) a self-governing organisation that without any human intervention or adjustment moves in the economic traffic, invests in itself, pays taxes and maintains itself.

In the more futuristic applications, people no longer necessarily play an implementing role. Blockchain enthusiasts speculate that blockchains will play a key role in the internet of things, the world of interconnected equipment that will operate with increasing independency from people. The 'transformation case' is the most uncertain in this scenario. However, it is quite conceivable what successful business and use cases shall be if we are able to connect the cyber world to the physical world. It is similar to the situation in the 1970s, when we could never have predicted what the modern day Internet society with all of its pros and cons would have looked like based on the relatively simple but ever so fundamental internet protocol (IP).

Annex 2



Annex 2: Founding partners and supporting organisations

Founding partners

- ABN AMRO
- Alliander
- Brightlands
- CWI
- ECP | Platform voor de InformatieSamenleving
- Enexis
- Havenbedrijf Rotterdam (Port of Rotterdam)
- ING
- Royal Dutch Association of Civil-law Notaries (KNB)
- Dutch Chamber of Commerce (KvK)
- Ministry of Economic Affairs
- Ministry of Infrastructure and the Environment
- Ministry of Security and Justice
- Nationale Nederlanden
- Netherlands Organisation for Scientific Research (NWO)
- PWC
- Rabobank
- Radboud University
- Rijksdienst voor Identiteitsgegevens (RvIG)
- Delft University of Technology
- Tilburg University
- TNO
- Volksbank

Supporting organisations

- Dutch Authority for the Financial Markets (AFM)
- Dutch Payments Association
- De Nederlandsche Bank (DNB)
- DutchChain
- Dutch Banking Association (NVB)
- SIVI
- StartupDelta
- Dutch Association of Insurers

Dutch
Blockchain
Coalition

connect and create

Dutch Blockchain Coalition

connect and create

Founding partners

ABN·AMRO

alliander

Brightlands

CWI Centrum Wiskunde & Informatica

ECP Platform voor de InformatieSamenleving

ENEXIS NETBEHEER

Port of Rotterdam

ING

KNB Koninklijke Notariële Beroepsorganisatie

kamer van koophandel

Ministerie van Economische Zaken

Ministerie van Infrastructuur en Milieu

Ministerie van Veiligheid en Justitie

nationale nederlanden

NWO Nederlandse Organisatie voor Wetenschappelijk Onderzoek

Radboud Universiteit

Rabobank

Rijksdienst voor Identiteitsgegevens
Ministerie van Binnenlandse Zaken en Koninkrijksrelaties

TU Delft

Tilburg University

TNO innovation for life

de volksbank

pwc

www.dutchdigitaldelta.nl