



# A fundamentally different perspective on government issues.

## Blockchain: a new way of thinking

Blockchain is the new ICT promise: every day, a conference is being dedicated to or an article is being written about this technology. But what exactly is a blockchain and what can the Dutch government achieve with it?

Blockchain technology is taking its first steps. There are (so far) hardly any examples of large-scale blockchain applications, other than organising the digital currency called bitcoin. However, blockchain appears to offer a solution for several tricky issues, for instance, issues regarding data and privacy ownership. For blockchain is not merely that new technology behind bitcoin, it also inspires many related technologies, a different way of organising and even a new way of thinking. It has a vast impact on organisations and society. This whitepaper expounds why that is the case and how it works. We shall explain what blockchain can mean for the services of the Dutch government, what it should focus on and how ICTU can help.



## Blockchain: a concise explanation

Blockchain is the name for the technology underlying the digital currency called bitcoin as described by Satoshi Nakamoto <sup>1</sup>. It is a specific database technology. In essence, it works as follows:

- Automated registration of transactions in a log;
- This log can no longer be altered following this registration;
- Registration does not take place in a centralised system, but is distributed across a variety of computers belonging to different owners and/or administrators.

Thus, it constitutes a so-called distributed autonomous ledger system. This technology works according to principles that differ from most systems logging data or transactions. And that is what makes blockchain interesting, for not only does it imply a different technology, but also a different way of organising. That explains why so much attention is being paid to blockchain, so much so, that it has become a hype. It is seen as the next disruptive technology. The rise of blockchain is considered to be as disruptive as the rise of the Internet <sup>2</sup>. What's more: the foundations for distributed computing, of which the blockchain is a variety, were laid in the early days of the Internet <sup>3</sup>. The arrival of blockchain is actually consid-

ered to be more disruptive than the rise of the Internet, since it will eventually pave the way for entirely new types of organisations and economy <sup>4,5</sup>. For instance, network organisations with distributed governance or a crypto-economy.

### A worldwide trend

By now, the term blockchain is also used for the trend that includes various other new types of technology. Such as smart contracts, distributed applications or distributed autonomous organisations (DAOs). Sometimes, you cannot even refer to blocks nor chains any longer <sup>6,7</sup>.

Therefore, this technology is often called distributed ledger technology, which is a more general concept than blockchain. In this context, it is important to note that this concerns a system that is not only distributed, but autonomous as well. This system cannot be altered or brought to a halt. That is an essential feature of blockchain technology.

The term is not used exclusively for ledgers, but also for applications in general <sup>8</sup>, databases <sup>9</sup>, organisations <sup>10</sup> and even life forms <sup>11</sup>. In all these cases, the term relates to more or less autonomous software systems that are hosted by various organisations. Logically, it is perceived as one system which is organisationally decentralised <sup>12</sup>. At any rate, the term blockchain can be identified as a worldwide trend. A trend as well as a

1 <https://bitcoin.org/en/bitcoin-paper>

2 <http://nos.nl/nieuwsuur/artikel/2119126-blockchain-technologie-is-grootste-innovatie-sinds-internet.html>

3 <http://ibestuur.nl/weblog/blockchain-verandert-de-wereld>

4 Disrupting Governance: The New Institutional Economics of Distributed Ledger Technology. J. Potts, 2016, [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2811995](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2811995)

5 Swan, M. (2015) Blockchain: Blueprint for a new economy. "O'Reilly Media, Inc."

6 <https://cointelegraph.com/news/the-internet-of-things-block-chain-less-token-iota-launched-interview-with-co-founder>

7 <http://www.swirls.com/downloads/SWIRLDS-TR-2016-01.pdf>

8 <http://dapps.ethercasts.com>

9 <https://ipdb.foundation>

10 [https://en.wikipedia.org/wiki/The\\_DAO\\_\(organization\)](https://en.wikipedia.org/wiki/The_DAO_(organization))

11 <http://www.slideshare.net/OuiShare/primavera-de-filippi-plantoid-daos-blockchain-based-life-forms>

12 <http://continuations.com/post/105272022635/bitcoin-clarifying-the-foundational-innovation-of>



hype, although Gartner has noted it is already waning<sup>13</sup>. It has been predicted (among others by Deloitte, Morgan Stanley and Forrester<sup>14</sup>) that blockchain will have a vast and lasting impact and will be on the up and up for the next five to ten years<sup>15</sup>. The World Economic Forum is expecting 10 percent of global GDP to be stored on a blockchain by 2015<sup>16</sup>. Therefore, most authorities and businesses have entered the subject on their agendas, and vast sums of money are being invested in blockchain technology<sup>17</sup>.

### What makes blockchain disruptive?

But what makes blockchain as disruptive as the rise of, say, the Internet? The key to that answer lies in the decentralised character of blockchain. Many parties contribute to it, without the need of a third-party mediator. As a result, it can make various intermediaries – such as banks, accountants, solicitors, trust offices, IT suppliers and even governments – redundant when it comes to registration. Once we start storing data by means of blockchain technology, central registers will no longer be needed. Thus, the blockchain trend could result in a commons-based economy<sup>18</sup>, sharing economy<sup>19</sup>, robot economy<sup>20</sup>, zero margin cost society<sup>21</sup>, economy of abundance<sup>22</sup>, improved market functioning without monopolies due to platform or net-

work effects<sup>23</sup>, or at least, a bright future. That is, if we make the right choices. For it is clear that, like the Internet, blockchain is a comprehensive technology that is not only about ICT, but also (perhaps rather) about organisation, economy, society and politics. Among other things, it provides opportunities for government services. Governments cannot afford to lean back, but will need to actively scout out this new technology, in order to improve their own services and to explore how this technology will impact on our society.

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| <p>13 <a href="http://www.coindesk.com/gartner-blockchain-hits-hype-cycle-peak">http://www.coindesk.com/gartner-blockchain-hits-hype-cycle-peak</a></p> <p>14 "approach the technology as a lab project with a five- to 10-year time frame.", Q&amp;A: Forrester's Top Five Questions About Blockchain, Forrester Research, Inc., 20-04-2016</p> <p>15 <a href="https://www.accountant.nl/nieuws/2016/4/deloitte-en-morgan-stanley-blockchain-opmars-vanaf-2020">https://www.accountant.nl/nieuws/2016/4/deloitte-en-morgan-stanley-blockchain-opmars-vanaf-2020</a></p> <p>16 <a href="http://www.coindesk.com/world-economic-forum-governments-blockchain">http://www.coindesk.com/world-economic-forum-governments-blockchain</a></p> <p>17 <a href="https://www.greenwich.com/press-release/wall-street-blockchain-investments-top-1billion-annually-0">https://www.greenwich.com/press-release/wall-street-blockchain-investments-top-1billion-annually-0</a></p> <p>18 Disrupting Governance: The New Institutional Economics of Distributed Ledger Technology. J. Potts , 2016, <a href="https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2811995">https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2811995</a></p> | <p>19 The Sharing Economy, The End of Employment and the Rise of Crowd-Based Capitalism, By Arun Sundararajan, 2016, MIT Press</p> <p>20 <a href="https://www.sogeti.nl/updates/nieuws/technologie-achter-bitcoin-maakt-robotconomie-mogelijk-vint-rapport">https://www.sogeti.nl/updates/nieuws/technologie-achter-bitcoin-maakt-robotconomie-mogelijk-vint-rapport</a></p> <p>21 The Zero Marginal Cost Society, Jeremy Rifkin, 2014</p> <p>22 Swan, M. (2015).Blockchain: Blueprint for a New Economy. O'ReillyMedia.Chart revised: 091115, <a href="http://www.the-blockchain.com/docs/Melanie%20Swan%20Network%20Economies%20of%20Abundance.pdf">http://www.the-blockchain.com/docs/Melanie%20Swan%20Network%20Economies%20of%20Abundance.pdf</a></p> <p>23 Blockchaintechnologie kan voorkomen dat platform- en netwerkeffecten tot monopolies leiden. <a href="https://medium.com/bitcoinevangelist/hoede-blockchain-de-vrije-markt-kan-redden-3ba944dffed0#.43vvnyggo">https://medium.com/bitcoinevangelist/hoede-blockchain-de-vrije-markt-kan-redden-3ba944dffed0#.43vvnyggo</a></p> |
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## Network Economies of Abundance

*A transformational philosophy of economics*



### 1) Paradigms

|                                 | Traditional Economies      | Network Economies of Abundance                                 |
|---------------------------------|----------------------------|--|
| <i>Organizing parameters:</i>   | Scarcity, control          | Abundance, access, availability, <i>yes-and</i> collaboration  |
| <i>Measurement:</i>             | GDP                        | Fulfillment (actualization, connection, purpose, meaning)      |
| <i>Definition of Economics:</i> | Production and consumption | Discovery and exchange, interaction, acknowledgement, creation |

### 2) Evolving Positions in Network Economies of Abundance

| Features:              | Network economy   | Resource grid economy  | Crypto-economy   | Needs-based economy   |
|------------------------|---|--|--|---|
|                        | Information flows<br>Access not ownership<br>Interactable content<br><br>Peer-produced commons goods<br>Gift economy, Sharing economy<br>(Uber, Airbnb), crowdsourcing,<br>eLance, time banks, freemium, <a href="#">QS</a> | Ubiquitous on-demand<br>resource grids (URGs):<br><br>communications, logistics, energy, water,<br>roads, convenience stores, delivery,<br>digital goods (Etsy), transportation (Uber),<br><a href="#">fresh produce</a> , micro-coaching ( <a href="#">Piano+</a> ),<br>social interaction (Meetup), dating/sex<br>(Tinder), emotional support (empathy<br>buddies), oxytocin flows (healing touch) | Post-scarcity<br>Basic Income<br>Automation<br>Emergent <a href="#">self-determined economies</a><br>Community token<br>Personal cryptocurrencies<br><i>Demurrage</i> programmable<br>redistributable currencies<br>Smart property, smart<br>assets, smart contracts<br>Dapps, DAOs, DACs, <a href="#">datt.co</a><br>Smartnetwork consensus | All persons matter<br>All needs matter<br>Needs freely met<br>through willingness<br><br>Universal <a href="#">needs</a> :<br>connection, contribution,<br>understanding, mattering<br><br>Human-technology entity<br>collaboration in<br>blockchain-based<br>smartnetwork cloudminds |
| <i>Trust based on:</i> | Identity  | Reputation   |  | Capacity  |
| <i>Proponents:</i>     | <ul style="list-style-type: none"> <li>• Yochai Benkler</li> <li>• Don Tapscott</li> <li>• Elinor Ostrom</li> </ul>   | <ul style="list-style-type: none"> <li>• Kevin Kelly</li> <li>• Jeremy Rifkin</li> <li>• Paul Mason</li> </ul>   | <ul style="list-style-type: none"> <li>• Friedrich Hayek</li> <li>• Jacques Derrida</li> <li>• Rika Preiser</li> </ul>   | <ul style="list-style-type: none"> <li>• Miki Kashtan</li> <li>• John Kinyon</li> <li>• Gandhi/Buddha</li> </ul>  |
|                        | Multi-currency society:<br>reputation, authority, attention,<br>intention, time, ideas, creativity,<br>health, presence, empathy  | Economic model plurality:<br>hierarchical, decentralized, hybrid<br>Automation economy<br>Big data era (Hadoop, R)   | Smart property, smart<br>assets, smart contracts<br>Dapps, DAOs, DACs, <a href="#">datt.co</a><br>Smartnetwork consensus   | Human-technology entity<br>collaboration in<br>blockchain-based<br>smartnetwork cloudminds  |

The 'network economies of abundance' (Swan, N., 2015) effectively depicts the fundamental renewal inherent to blockchain technology.

## Blockchain is an answer to many questions

Promising as blockchain may sound, it is as yet hardly used at any large scale except for organising bitcoins. So, to what extent is the promise realistic? And what exactly does it solve? The simple answer is: the blockchain trend aims for a holistic solution to hard-to-solve issues<sup>24</sup> regarding trust and productivity. And thus, it can develop the solution to issues that are by now well-known within the Dutch government, such as:

- 1) How can the government structurally realise access and correction rights?
- 2) How can the government focus more attention on the user?
- 3) How can the government structurally assure data privacy in accordance with current and future legislation (GDPR)?
- 4) How can the government link data more easily, where needed?
- 5) How does the government structurally ensure one-time storage, multiple requests and how can it put a stop to copying and circulating data?

<sup>24</sup> Blockchain Gives eBusiness Pros A New Paradigm To Fix Age-Old Challenges, Forrester, 7-6-2016



- 6) How may citizens have confidence in the digital government?
- 7) How can the government be structurally transparent and sincere about how digital services are organised and are proceeding?
- 8) How does the government translate legislation into viable policies supported by automation without (semi-)automatic decision-making?
- 9) How can the government host its services systems more efficiently?
- 10) How can the government develop ICT solutions more easily?

And this list is far from complete. Many of these questions mainly come under three of four incentives: Purpose, Privacy, Productivity and Power <sup>25</sup>. The blockchain trend impacts on all these incentives:

## Privacy

As owners, citizens and governments can be structurally in control of their own data, including their own identities. This is called self-sovereign identity <sup>26</sup>. Data does not even need to be structurally copied or transferred, but may be used in a transparent manner, provided the owner agrees. This takes place within a system of distributed and secure data processing, at those points where the data is (logically) stored once. Thus, it becomes easier to structurally

comply with access and correction right, one-time storage – multiple use and new GDPR legislation <sup>27</sup>. Users are literally pivotal to this set-up and can rely on their privacy being optimally safeguarded.

## Productivity

Services can be organised more simply with relatively little source code. So-called ‘plumbing’ (links between data silos and services) can be realised almost automatically within the potentially worldwide platform, together with any desirable characteristics. Therefore, no more expensive and complicated electronic messaging standards (‘Digikoppelingen’ in Dutch), let alone continuously developed data service layers or other costly infrastructure. Moreover, within such a platform, linked data <sup>28</sup> and REST APIs <sup>29</sup> could be put to good use. Two subjects that happen to attract a fair deal of attention in relation to the NORA\*; including for privacy-sensitive data. By means of ‘legal engineering’ <sup>30</sup> with smart contracts <sup>31</sup> policy implementations can be connected more closely with legislation, and can be more easily connected with and supported by other policies or legislation. Platform hosting and administration as well as application management are completely mutually independent, and as a result, they can be far less complex. Less trust is required in the hosting party as an organisation, since the system itself safeguards that trust. All this can render the information worker’s job far more effective.

\* NORA is the acronym for the Dutch Government Reference Architecture

25 <https://sites.google.com/site/weconomicsbook/communicatie/workshop/ibd>

26 <http://www.coindesk.com/path-self-sovereign-identity>

27 <https://www.rijksoverheid.nl/documenten/rapporten/2016/01/07/tk-bijlage-1-council-of-the-european-union>

28 [http://www.pilod.nl/wiki/Platform\\_Linked\\_Data\\_Nederland](http://www.pilod.nl/wiki/Platform_Linked_Data_Nederland)

29 [https://www.logius.nl/fileadmin/os/Vergaderstukken/FS\\_160315.4A\\_Discussie\\_document\\_RESTful\\_APIs\\_versie\\_1.0.pdf](https://www.logius.nl/fileadmin/os/Vergaderstukken/FS_160315.4A_Discussie_document_RESTful_APIs_versie_1.0.pdf)

30 <https://monax.io/2016/08/18/enforcing-legal-smart-contracts/>

31 [https://en.wikipedia.org/wiki/Smart\\_contract](https://en.wikipedia.org/wiki/Smart_contract)



## Power

The platform itself and the services on it can – provided they have been built using open source software – can be maintained and managed by open communities and be independently monitored by other communities. The hosting of the platform on which the services are running is to be carried out by sufficiently diverse independent organisations that themselves have an interest in an honestly operating platform. Within the government, the hosting could be carried out by the joint municipalities and, for instance, by the implementing organisations. Both the technical hosting and the governance must be distributed; this is crucial for the security of (and thus the trust in) the system <sup>32</sup>.



- A            Send as our default post to the net (communicate);
- A+B        Search as our default portal on the net (algorithmic);
- A+B+C     Social (media) as our default persona on the net (network);
- A+B+C+D   Sovereignty as our default privacy on the net (sovereignty).

“The natural analytical geometry of the universe is based on arrays of tetrahedra” – Buckminster Fuller <sup>30</sup>

The blockchain technology provides opportunities to build an infrastructure that also offers scope for other new applications. For instance, applications following from the Internet of Things, artificial intelligence and big data, in which privacy and trust play a major role. That is why introducing the principle of the self-sovereign identity is so important, as it safeguards ownership of data and privacy. This is a self-unfolding development (see image). <sup>33</sup>

This, in brief, is the promise of blockchain. It is a promise that cannot now be redeemed directly, since the above-mentioned still falls slightly short of being technically feasible. At the moment, scalability and privacy, for instance, still constitute blockchain issues. But this can change rapidly. It looks as if technology will provide solutions for the big challenges of this age, such as privacy and trust. Therefore, it is important – for the Dutch government as well – to monitor and understand these developments.

## Blockchain in the year 2016

What is already happening? Where and by whom is blockchain technology being used, other than for bitcoins? There are various blockchain platforms that are, as stated above, mostly struggling with aspects regarding privacy and scalability. Possible solutions have actually been devised for these issues, some of which follow from decades of scientific research <sup>34</sup>.

32 <http://startupmanagement.org/2016/08/08/blockchain-security-is-multi-layered-here-are-the-6-most-important-levels>

33 <https://briangrimmerblog.wordpress.com/2013/12/19/the-fourth-order-effect-or-how-the-next-big-wave-of-the-net-will-work-out-and-why/>

34 [http://enigma.media.mit.edu/enigma\\_full.pdf](http://enigma.media.mit.edu/enigma_full.pdf)



Further solutions are currently being developed<sup>35 36</sup>. As a result, the consensus is that a scalable and privacy-assuring public blockchain platform is within reach.

### Wide range of initiatives

Many people are aware of the potential of blockchain, and various organisations are launching themselves into this technology. This has resulted in a wide range of start-ups that are based on the bitcoin blockchain or on Ethereum, which is viewed as the second-generation bitcoin blockchain technology<sup>37</sup>. Moreover, there are various other platforms using a variant of this technology, such as Razormind, HydraChain and IOTAtoken. Too many to mention. In this technology, standardisation is still a long way off, although attempts are being made in Australia to develop an ISO standard. However, this standard appears to be mainly focused on connecting blockchains to the existing banking infrastructure.

Microsoft is trying to build a sort of meta-platform – Bletchley –, under which various current and future blockchain solutions can be placed. However, they strongly focus on Ethereum. Another initiative is the Hyperledger project, an open source project started by the Linux Foundation, in which, among others, the so-called R3 consortium participates, consisting mainly

of banks. Obviously, the question is whether the decentralised character of blockchain remains unaffected by large organisations developing platforms for this technology. While the Hyperledger project is working with an open community, Intel, among others, is supplying the requisite chips with Trusted Execution Environments (TEEs), and one can only assume they are trustworthy.

### Standardisation

Many initiatives mainly focus on cryptocurrency, such as bitcoin. Obviously, cryptocurrencies are interesting to the financial sector. However, blockchain enables us to store much more than financial transactions, which makes the technology equally valuable to other sectors. W3C, which recently announced a Blockchain Community Group, is aware of this as well<sup>38</sup>. Trust in this technology will only work if a community openly supports it through one or more open standards and if anyone can implement it independently and transparently.

The Dutch Focafet Foundation<sup>39</sup> comprehends this and is well on its way to developing a global open standard called UETP. This standard superimposes an extra layer of entities on the so-called OSI model, which standardises an unambiguous economic vocabulary that is effective and is understood across the world. Moreover, the DENARS foundation utilises a privately distributed independent global entity register based on a blockchain database, which serves to immutably capture UETP transactions. It would go too far to explain its exact workings. This year, the first official specifications of UETP and DENARS will be published on the Focafet website. Subsequently, UETP will be presented to the Dutch Standardisation Forum ('Forum Standaardisatie').

35 <https://z.cash/blog/zksnarks-in-ethereum.html>, <https://bitcoinmagazine.com/articles/zcash-creator-on-the-upcoming-zcash-launch-privacy-and-the-unfinished-internet-revolution-1472568389>, [enigma.mit.edu](http://enigma.mit.edu),

36 <https://blog.ethereum.org/2016/01/15/privacy-on-the-blockchain/>

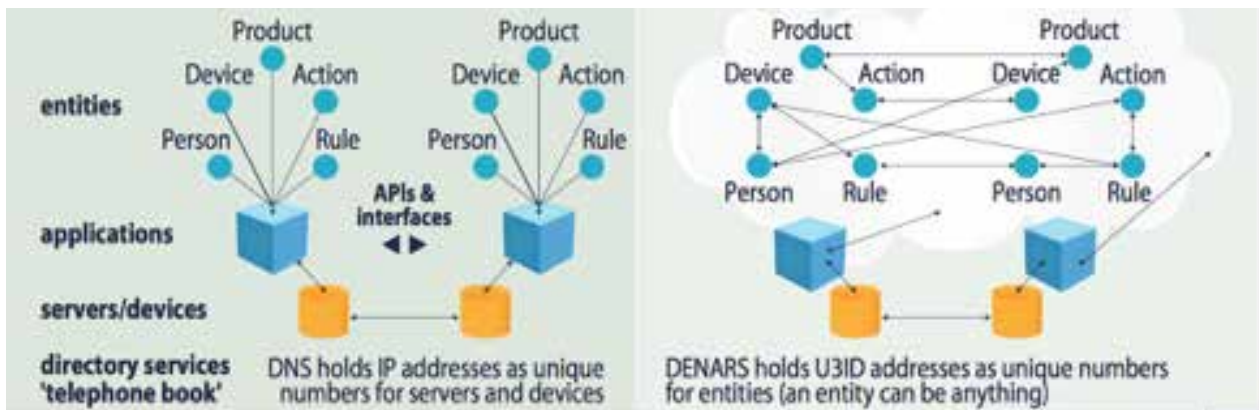
37 <https://www.linkedin.com/pulse/crypto-20-musings-privacy-confidentiality-alex-batlin>

38 <https://www.w3.org/community/blockchain>

39 <http://www.focafet.org>







By means of UETP and DENARS, a substantial reduction of the use of APIs and interfaces can be realised, creating a much greater potential for worldwide connections.

Various ministries and quangos within the Dutch government are currently conducting UETP pilots. Another relevant movement is the development of the ISO standards 29115 and 29003, and the promotion of a so-called global ROLO (Register Of Legal Organisations). Many multinationals, particularly pharmaceuticals and the aviation sector, as well as governments across the world are taking part in this. A ROLO effectively combats financial and identity fraud, which is substantial nowadays, and enhances trust between countries with regard to trade. In this context, blockchain likewise plays an important role.

## Blockchain is on the agendas across the Dutch government

The Dutch government is fully participating in blockchain. It is studying various technology platforms and technologies. Under the supervision of Marloes Pomp, the Ministry of internal Affairs has initiated an umbrella project, under which various pilots are being developed. **These pilots will be presented early in November 2016**

and, at a later date, may be developed into a **hackathon 40 to be organised by DutchChain.**

Meanwhile, the Dutch Ministry of Economic Affairs is setting up various activities <sup>41</sup>.

### Long-term care

Some of these pilots warrant critical comments. They do conceive (partial) blockchain solutions, but due to workarounds for limitations of current blockchain platforms or to time-old centralised thinking, they initially include solutions that, for now, continue to promote that data is being copied and pumped around. This is completely unnecessary. For instance, a pilot of the Dutch National Health Care Institute, with the support of, among others, ICTU and Tagologic, is developing a proof of concept for long-term care. This serves to gain insight in the opportunities blockchain can offer the care sector. In this use case, all parties involved with a client (care providers, family and others from the client's social network) jointly keep a (digital) log. In the case of a client emergency it is immediately clear (for all who need to know) who is involved with the client in question, and when the parties involved did what for the client. It is a fairly simple case,

<sup>40</sup> <http://www.blockchainhackathon.eu/>

<sup>41</sup> <https://www.computable.nl/artikel/nieuws/security/5835608/250449/ez-peilt-behoefte-aan-expertisecentrum-blockchain.html>



exploring what blockchain has to offer where privacy-sensitive data is concerned. In this case, we are dealing with the limitations that (still) exist regarding the application of blockchain. For instance, the technology has only just started working on devices such as smartphones<sup>42</sup>. And the proper privacy assurance is being deliberately postponed, because the desired solution is not yet freely available. However, the blockchain market is not in stasis, and before long, breakthroughs in this field may be expected<sup>43,44</sup> that are also suitable for the care sector.

### Private blockchains

For any successful exploration of the opportunities of blockchain, it is important to focus on those issues that blockchain can provide a solution to. Still, the unique characteristics of blockchain must be preserved, for instance, decentralised distribution. Many cases may be conceived that feature a shared information position. In its ultimate form, each entity (a person, company, institution) has his or its own private data source, the sharing of which with those belonging to other entities can be controlled by the owner: so-called private data sources.

Since proper privacy assurance and scalability of any blockchain platform are (so far) lacking, so-called private blockchains are often used instead. These are hosted independently and are often combined with centralised systems. They are not freely available to just anybody to participate in. Because of all this, one can hardly call these systems sensible, as they do not comply with what makes blockchain unique and are not much better than the existing centralised systems.

It would make more sense if the government were to dedicate innovation to a public blockchain in which anyone can participate and which boasts proper privacy assurance (software should be made available shortly). A data utility as it were.

## What demands must blockchain solutions meet for a sound digital service provision?

Thanks to its unique character, blockchain appears to be able to offer the Dutch government a solution for several urgent issues in digital service provision. As stated before, not all requisite technology is available yet. However, it is worthwhile to start thinking about how blockchain technology may contribute to a solution. This technology must consist of a variety of elements, if it is to optimally contribute to service provision. Elements such as the following:

- Self-sovereign identity: a self-controlled digital identity, for anyone.
- Distributed private data sources: every citizen is the owner of his personal data and permits use by third parties.
- Distributed governance on each part and level of the solution: no single party controls the system, but instead the control and ownership are shared out among many parties.
- Data from private data sources can be easily combined for processing.
- Fully open source: the software source code must be made publicly accessible, and anyone who can make a sensible and desirable contribution must be able to participate.

<sup>42</sup> <https://github.com/ethereum/wiki/wiki/Light-client-protocol>

<sup>43</sup> Philips werkt samen met Gem voor globale healthcare oplossing op basis van Ethereum, <https://bitcoinmagazine.com/articles/the-blockchain-for-healthcare-gem-launches-gem-health-network-with-philips-blockchain-lab-1461674938>

<sup>44</sup> <https://bitcoinmagazine.com/articles/zcash-creator-on-the-upcoming-zcash-launch-privacy-and-the-unfinished-internet-revolution-1472568389>



- Security has been organised in such a way that hosting can be distributed to random computers and privacy is fully safeguarded. One can think, for instance, of distributed implementation of algorithms (secure multi-party computation).
- The platform is public and does not require permission: anyone can take part. Within the platform, private systems and systems requiring permission can still be realised. Thus, closed systems can exist within this platform.

Of all the solutions that are already available, Ethereum appears to support the most elements. That is probably the reason why the Ethereum platform is explored most at the moment. However, Ethereum does not yet seem to have a large data storage capacity. The MIT Enigma project seems to meet demands better (and can also work on the basis of Ethereum). BigChain-DB and the Interplanetary DataBase (IPDB) also appear to serve well as a basis, especially since these projects are more focused on data. However, these projects are only now taking their first steps and are lacking a number of aspects that Ethereum, for instance, does offer. Thus, each existing project has its strengths and weaknesses. As we stated before, the ultimate solution, in this case a minimally viable product, does not yet exist.

## What can the Dutch government do with blockchain?

If the Dutch government decides to work with blockchain, for one thing, the digital government architecture will change drastically. Firstly, it is important to define the goal, the dot on the horizon, and then to see how to purposefully work towards it together. Instruments such as

NORA can be eminently suitable, which is why ICTU promotes it proactively.

Subsequently, it is important to use this knowledge to undertake and experience things. The various pilot projects that are up and running within the Dutch government are already putting this in practice. But this is only the beginning. ICTU can support this type of initiatives, through Architecture. Moreover, the intention is to set up a laboratory for this type of initiatives at ICTU Software Realisation, where a wide range of prototypes can be developed.

## Data utility

It will be a not-to-be-missed opportunity if the Dutch government manages to create its own solution: a data utility. Earlier, Dutchchain and the Dutch National Commissioner for Digital Government (Digi-Commissioner) have made similar suggestions for such an initiative. This may require the various parallel projects within the Dutch government to collaborate more, in an agile, large-scale way (LeSS is more <sup>45</sup>). For example, projects, official bodies and programmes such as the Digi-Commissioner, the Interconnectivity Management Board, the Data Management Board, the Dutch public sector system ('Stelsel van overheidsgegevens') and the Platform Linked Data Nederland. This can be supported by collaboration with various universities (for instance, UL, CWI, Utwente, TUDelft, Tue, RUG all have relevant knowledge in their own field). But also with carefully selected market participants. There is no need to reinvent the wheel. The Netherlands is the one country that possesses all the knowledge and skills, as well as a good, unique mind-set to realise this by means of collaboration.

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<sup>45</sup> <http://less.works>



## Building the digital government of the future

Just suppose the Dutch government will develop a data utility in collaboration with other parties, its own 'blockchain platform'. Only then will building a digital government of the future really take off. Which services shall we provide on this platform? How is legislation being translated into policy? How shall we bring legislation into the Digital Age <sup>46</sup>? Where will the Dutch government find legal engineers <sup>47</sup>?

With regard to service provision, it then appears to be necessary to go back to square one; what interaction do citizens and organisations expect from their government, and what do they emphatically not expect? What can be automated more smartly, and what emphatically cannot? The DEMO modelling method developed in the Netherlands would appear to be eminently suitable for this. It offers vast opportunities to make a clean sweep, reduce the regulatory burden and really focus on the citizen. Including the prevention of digital inequality. All this will have a huge impact on organisations and on their rights and responsibilities within the government. As we stated before: implementing blockchain successfully is much more than technology.

## What is the blockchain trend really about?

The blockchain trend can be seen as a part of the third industrial revolution <sup>48</sup>, which will not adhere to national borders and will quickly develop into a fourth industrial revolution <sup>49</sup>. This will result in a different kind of society. A society in which a lot of jobs disappear, because robots will take over the work. This is a vision of a circular economy <sup>50</sup> automated by means of robots, in which goods such as heads of VVVVlettuce are produced practically automatically <sup>51</sup> and delivered as good as cost-free <sup>52</sup>, pizzas <sup>53</sup> come out of the 3D printer <sup>54</sup> and houses are no longer built of stone but printed from synthetic materials <sup>55</sup>. We may eventually go from capitalism to some form of an economy of abundance. Containing fewer working hours and more time to pursue other activities that make the human existence meaningful. As a government, let us aim to make this society one that will focus on the needs of people. Let us explore which digital government fits that aim. So that we can now start taking the necessary steps towards it. We still have many meaningful things to do. ICTU is happy to contribute.

45 <http://less.works>

46 <https://medium.com/@dazza/law-itself-is-the-killer-blockchain-app-5ccf7d86d8d8#.4uvk8y96c>

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48 Rifkin, Jeremy. "The zero-marginal cost society." J. Rifkin, *The Zero Marginal Cost Society* (2014): 356

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**“Dream big.  
Fail fast.  
But don’t  
ever stop  
trying.”<sup>56</sup>**

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**Design** Friends for Brands

56 [http://www.huffingtonpost.com/youthbiz/dream-big-fail-fast-but-d\\_b\\_2680554.html](http://www.huffingtonpost.com/youthbiz/dream-big-fail-fast-but-d_b_2680554.html)

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