DECENTRALISED SUSTAINABILITY

**Dutch
Blockchain
Coalition**

connect and create

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INTRODUCTION

This magazine by the Dutch Blockchain Coalition is meant to communicate the progress around the theme of Energy and Sustainability. Starting from August 2022, 8 challenges were determined within the coalition. The first two, **Decentralised Energy Communities** and **Sustainable Supply Chains**, were selected as the focal point for Q1 2023.

During an event at The Hague Tech on the 26th of January 2023, **six workshops from coalition partners** were held for these themes, with many attendants from other partners and beyond. Sharing the results of those workshops is the main part of this magazine. Although we also would like to tell you a bit about **what's next** in Q2 of 2023!

WHAT'S NEXT?

Apart from further helping the coalition partners mentioned in this report. we would like to use Q2 of 2023 to start new activities around two other challenges mentioned by the coalition (link). namely Smart Grids and Carbon Credits (emission trading).

Reach out to yvo.hunink@dutchblockchaincoaliton.org if you want align your activities on these subjects with us and other coalition partners.

SMART GRIDS

CALL FOR MEMBERS

All coalition members and potential future collaboration partners that (want to) work on smart grids are requested to **reach out**. *We are interested to hear about use cases from* **energy management, and data access management to infrastructure maintenance protocols**.

CARBON CREDITS

CALL FOR MEMBERS

All coalition members and potential future collaboration partners that (want to) work on carbon credits are requested to **reach out**. *We would like to speak to organisations interested in* **generating, issueing validating, verifying or buying carbon credits or other regenerative tokens**.
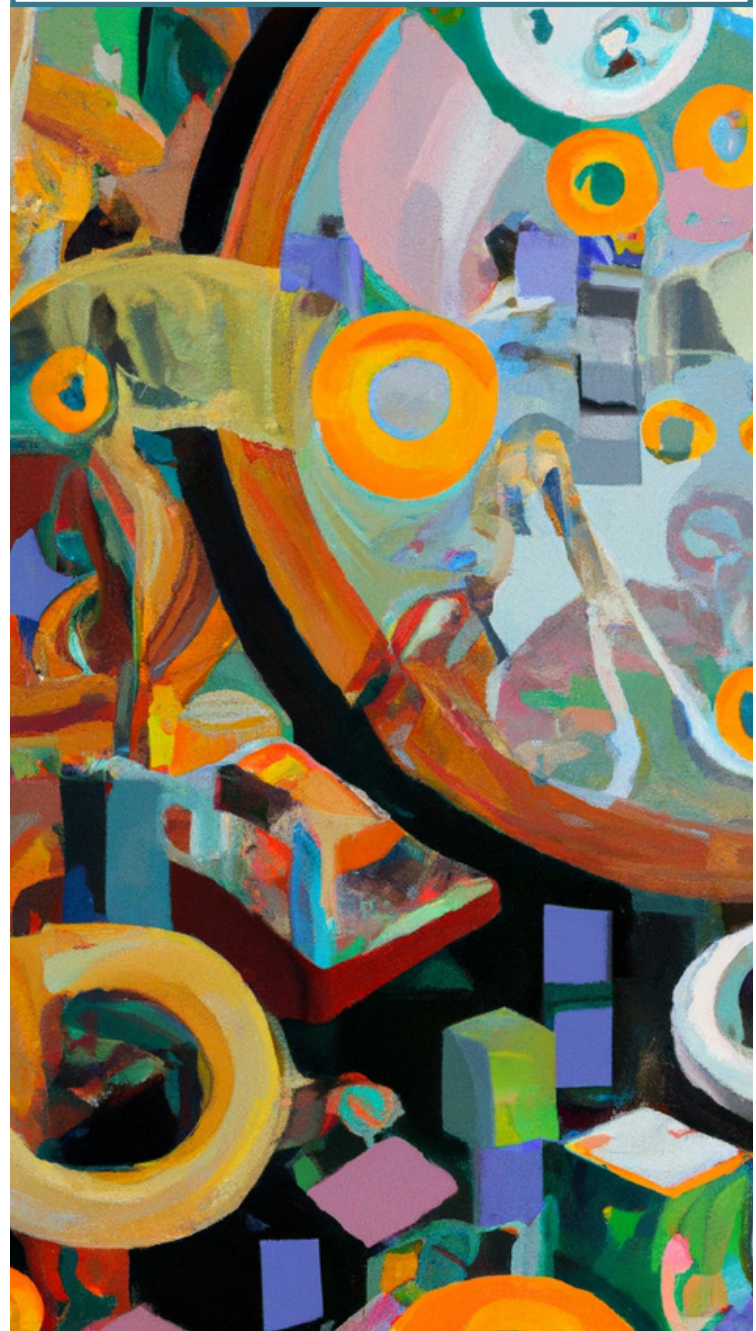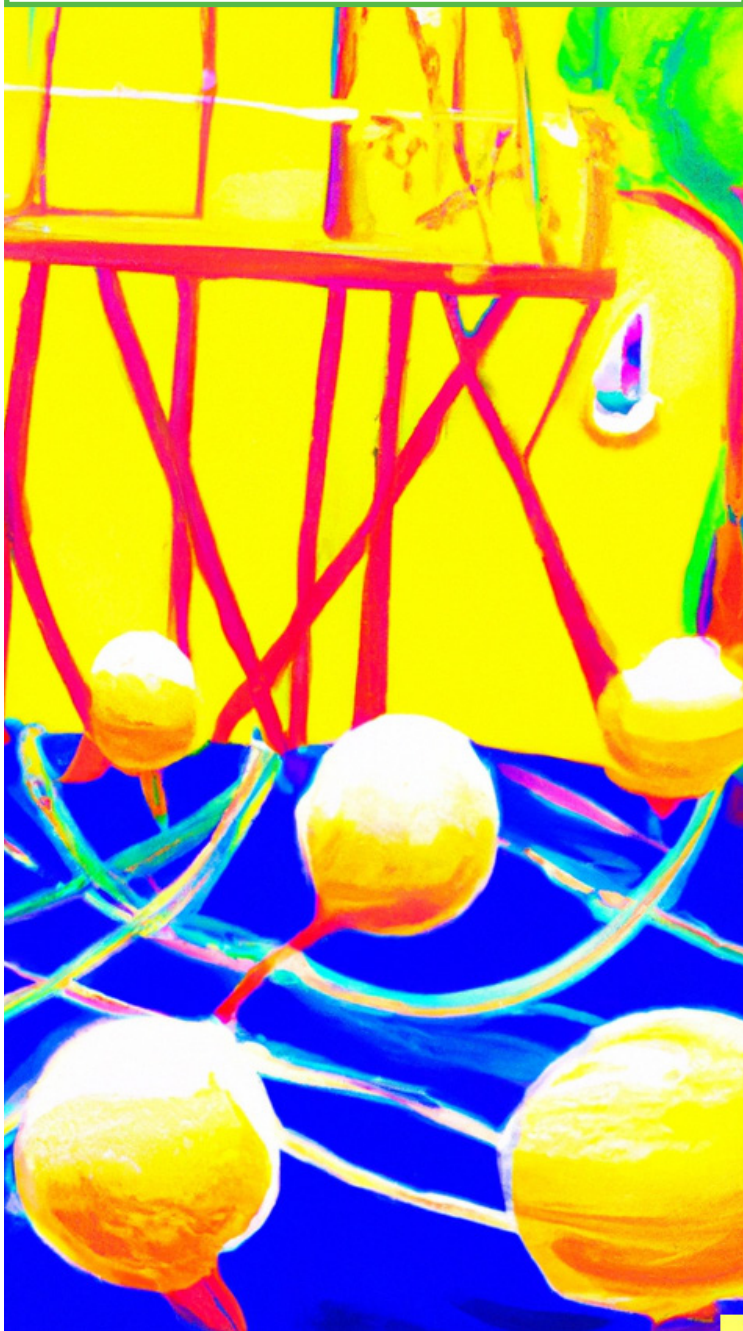
EVENT RESULTS

DECENTRALISED ENERGY COMMUNITIES

TOKENIZED ALGORITHMIC FAIRNESS

"The main takeaway of the event has been that despite the different perspectives that people might have on algorithmic fairness, certain constraints can be considered for the deployment of smart contracts that will help bring those different views closer together. And I met a lot of new people that are active in the same field."

Valentin Robu
Researcher at Netherlands National Research Institute for Mathematics and Computer Science
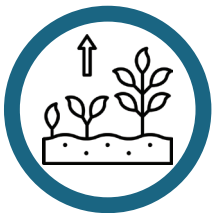
SCALABLE GOVERNANCE PLATFORM

The event has been great for fostering new connections in the field around energy communities, between European, national and local programs, inititiatives and ecosystems. The insights in open challenges that the community are facing have given important insights in aligning local initiatives with European climate neutrality ambitions. Energy communities can be instrumental in reaching those goals.

Jacobine de Zwaan
Senior Advisor Climate Neutral and Smart Cities – Netherlands Enterprise Agency (RVO)

Rijksdienst voor Ondernemend Nederland

INCENTIVISED INCLUSIVE PARTICIPATION

De Knip is ready for implementation for stimulating participation of citizens. After many succesful trials, we are now aiming to come up with a list of potential use cases with a municipality and a province'. The workshop was used to discover some use cases around inclusive participation in energy communities. Before summer, we will choose the most interesting use cases to continue with!

Adri Wischmann
Co-founder – Blockchain Lab Drenthe

DRENTHE LAB BLOCKCHAIN

SUSTAINABLE SUPPLY CHAINS

DIGITAL PRODUCT PASSPORTS

"We talked about a lot of different subjects, but one thing became clear to me. We largely think along the same lines. This is positive and means that we are moving in a direction of consensus in the Dutch ecosystem around digital product passports. Still, many challenges, especially around trust, have to be overcome. The rest of the year we will spent in diving deeper into the five main problem areas, as well as setting up concrete implementations of passports in several key product groups."

Sjoerd Rongen
Consultant Smart Industry – TNO

DATA SPACES IN AGRIFOOD

I noticed that there was a lot of knowledge in the room during the event and a lot of people that are already working on building blocks. We have looked together at the building blocks that are already available. People need to be open to work together instead of reinventing the wheel constantly. However, our agenda's sometimes seem too full to be able to pause and take in all the information about what is already out there.

Lan van Wassenaer
Chief Data Economist – Wageningen University & Research
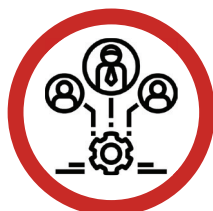
ECOSYSTEM ADOPTION

The workshop made it even more clear to me that the question is not so much a technical challenge anymore.. We have to separate our technical activities and organisational governance discussions, and create a framework where they can come back together again. Digital Product Passports, as I learned now, might be such a framework that we can organise around. We would like to work in the future on creating standards in the sectors that we work with for a sustainable supply chain.

Helen Nieuweboer
Strategic Explorations – Directorate General for Public Works and Water Management

FUTURE VISION

DECENTRALISED ENERGY COMMUNITIES

Tokenised Algorithmic Fairness, Scalable Governance and Inclusive Participation

What if we would be able to organise our energy needs locally while generating and distributing it in such a way that all people can have affordable and abundant access to sustainable energy. We would need to deal with fairness in our model of sharing energy, we would need to scale the democratic organisation of local communities and we would need to ensure that all layers of society can participate.

TOKENIZED ALGORITHMIC FAIRNESS

The Netherlands National Research Institute for Mathematics and Computer Science has researched local energy systems, blockchain and algorithmic fairness extensively, resulting in a **proof of concept of an energy distribution model**. To ensure fairness, the model incorporates smart contracts, as well as a novel calculation of an approximation of the Shapley value, which is an approach from game theory for equal distribution of gains in a network. Normally this method would be too computationally intensive to be suitable for small energy communities. CWI is now looking to build a consortium around a concrete use case that can continue from their proof-of-concept.

At the event, the workshop of CWI delivered several insights. Firstly, there are many issues around trust in data sharing around energy. The triangle of autonomy, collaboration and consensus is where trust can be fostered. For example consensus on what fairness is, despite it being a subjective matter. Could we use digital governance platforms for issues such as voting on policy changes in the community, for example. Decentralised Autonomous Organisations (link) is the web3 concept that lends itself for this kind of community management. However, community decision-making is more complicated than majority voting, which can be quite black-and-white. The complixity of community decision-making can endanger adoptability of community governance.

> *CALL TO ACTION:*
> **Let's join forces to build a prototype** *from CWI's proof-of-concept of fair energy distribution and let's join forces with an energy community that is willing to test it out in a real-life experiment.*

Open Challenges

Fairness
- How can you define 'flexibility injustice' or 'fairness' in local energy systems?
- What are the elements within a local energy system that can lead to unfair situation?
- How can we reach consensus on what is fair to a community?
- How can we facilitate equal access to affordable assets?
- How can you divide pains in the system and how does it help fairness?
- How can DAOs help to increase fairness?
- What if I don't like the decisions around values orfairness of the community in my neighbourhood?
- How can we prevent the price of energy becoming too high?

Technical
- How can we run the Shapley value approximation locally?
- How can we use tokens to represent and distribute value to individuals through smart contracts?
- How do we deal with limited energy availability?
- How can we optimize the energy consumption for individual ánd collective values?
- How can we build to reuse?

CWI
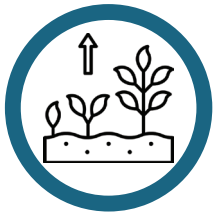
SCALABLE GOVERNANCE PLATFORM

The Dutch Enterprise Agency (RVO) is executing an assignment from the Ministry of Interior Affairs to **set up a national program to support the Dutch cities from the EU Mission "100 Climate Neutral and Smart Cities by 2030"**. From the perspective of RVO, energy communities can play an important role in the energy transition, not only by reducing emissions directly, but also by being a vehicle through which the complexity of the challenge can be managed more integrally with attention for the social implications of this transition.

One of the challenges facing energy communities is the challenge of scaling up energy cooperatives. Web3 technologies and concepts can help in building such a platform, learning from things like Decentralised Autonomous Organisations (DAOs) (link), Self Sovereign Identity (SSI) (link) and smart contracts (link).

CALL TO ACTION
Help RVO **align local energy communities with EU-initiatives** *around solving the nation-wide challenges for scaling up energy cooperatives with the help of knowledge and tooling from the Web3 community, for example in monitoring climate neutrality goals.*

Open challenges

Governance
o   How do you communicate between different stakeholders?
o   How to share and collaborate around implicit knowledge?
o   How do you create trust digitally?
o   How do you organise (shared) ownership of physical and digital assets?
o   Everybody is reinventing the wheel, how do we stop that and learn from other (European) initiatives?
o   How can we deal with trust issues around sharing data?
o   How can we effectively share technology between different projects?
o   What autonomy should individuals and communities get over physical and digital infrastructure?
o   What is an effective rule-making process for local communities?
o   What is being optimized? What goal are we optimizing for? (Economic, natural or social value)
o   How do you balance dissatisfaction in microcompetition?
o   What benefits does quadratic voting have and how can we introduce it into the community governance?
◉   How can you solve problems that individuals in the community are not interested in participating in but which are fundamental for effective operation?

Regulation
o   How do we get national regulation and policies more in line with European ones?
o   How can we focus the result of regulation more on climate neutrality rather than economic activity?
◉   Sharing revenue needs to be easier since now it requires KvK registration for a P2P community

Technical
o   How do you get to an open network, without any bottlenecks for distribution companies?
◉   How can you leverage digital solutions to contribute digitally to a community?
o•   Which technical changes do we need in local grids so that sharing and optimisations become viable?
o•   How do we get trusted data oracles?

INCENTIVISED INCLUSIVE PARTICIPATION

Most sustainability projects are top down organised and not everyone is intrinsically motivated to join the climate fight. With a new solution from Blockchain Lab Drenthe (BCLD) we can turn this around using financial incentives to stimulate active participation. **De Knip is a privacy-by-design tool and method to motivate people with a financial reward, using purpose bound tokens together with a distributed ledger** to create an ecosystem of inclusivenes and fair distribution of resources without gigantic administrative overhead. It has been succesfully deployed in various contexts, such as the distribution of home isolation subsidies. De Knip can be useful in the context of energy communities, as a tool that local governments and civil society organisations can use to activate citizens in local efforts. Imagine handing out fractions of ownership in solar panels on communal buildings, for example.

During the workshop we used the Business Model Canvas tool to discover new opportunities in the context of energy communities and inclusive participation. Apart from inclusiveness, which is a collective value, also some individual values were determined, such as potential lower energy bills and voting rights in the cooperative. Interesting participants for energy communities are large asset owners, who could support participants that do not own flexible assets. For the communication strategy, community centers and local energy coaches are viewed as a potential channel. A case was discussed for Amsterdam, for the community surrounding the Johan Cruijt Arena. The Arena is a large asset owners, whose battery could support flexibility on the community scale. Also visitors with electric vehicles are potential flexibility providers.

The next step for BCLD is the ideation phase with a province and municipality, to come up with a broad range of use cases that have citizen participation as a central challenge and where De Knip could be deployed. With the DBC we would like to focus that effort on the use case of energy communities and specifically with the goal to stimulate inclusive participation.

CALL TO ACTION
Join BCLD's effort and **help design use case around participation in the local energy transition**. *We would love to work with communities, cooperatives, companies and governments in supporting active participation of a target community.*

Open challenges

Participation
- Which problem does a local energy community solve for people?
- How do you deal with the knowledge gap of people versus tech savvy citizens?
- How can we incentivize sharing when needed?
- How can we reach a sense of community within cooperatives by organizing around a common goal?
- What could be the percentage wide contribution of energy communities to the energy transition?
- How could citizens with no flexible assets be contacted through VVEs to receive communal benefits?

Technical
- What elements of de Knip's toolbox can be re-used in the context of energy communities? •
- How can shares in ownership of shared assets be represented as tokens and distributed?
- How can engaged citizens be onboarded by connecting with a digital governance platform?

SUSTAINABLE SUPPLY CHAINS

Digital Product Passports, Data Spaces and Ecosystem Adoption

What if we could always from anywhere get access to reliable lifecycle information of any product of our choosing. It would allow us as consumers to take better choices. It could help businesses and governments better in their procurements. It would allow civil society to better monitor our effects on our planet and our fellow people. It will allow us to become a species that is regenerative rather than destructive.
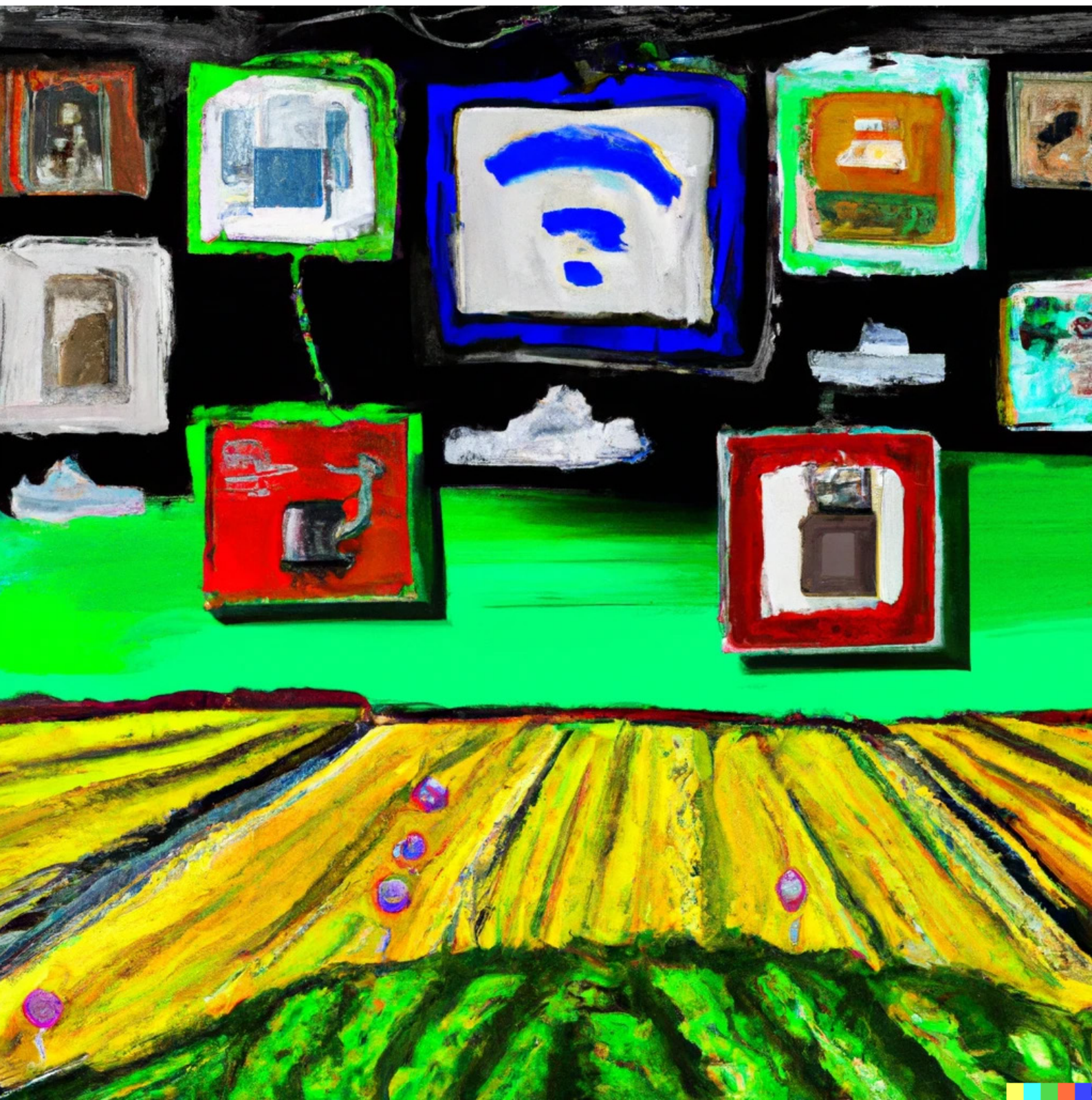
DIGITAL PRODUCT PASSPORTS

TNO has taken up the role to sketch the roadmap and the required research and development for **adoption in the Dutch ecosystem of Digital Product Passports** (DPP), a recent concept that is being stimulated by European regulation, focusing on a number of domains such as batteries, textiles and chemicals. The ambition is that in 2023, the activities in these, and other domains, lead to implementations of new standards and solutions for tracking information around products. TNO is leading the way in setting the standards and bringing together the ecosystem around DPP, and has defined 5 problem areas that we need to work on, namely data, value chain analysis, and semantic, organisational and technical interoperability.

The Dutch Blockchain Coalition and its partners are expected to play an important role in those activities, be it through bringing in use cases, or co-working on standards. TNO especially wants to broaden its perspective to more organisations, for example those that work on product groups that are beyond the scope of European regulation. This is why TNO co-hosted the workshop since it is doing a research for DBC to see how DPPs can be used in the current use cases.

During the workshop, a diverse group of stakeholders came together that truly had expert insight in the subject. The take-away was that most of them have problems and solution directions for digital product passports. One of the big challenges discussed was that of trust in data, for which several partners offer technical solutions, but for which auditing processes are still required. Digital product passports could, however, next to being an output of the auditing process, also be a tool for auditors to back up claims or point them in the direction of likely misconduct. Finally, part of the discussion has been about the business case of digital product passports, where it was determined that there is already a sizable demand for this kind of solution in traceability.

CALL TO ACTION

*All coalition partners that work with or want to **work with product passports** are invited to share information and participate in the conversations around the **main problems** of product passports they see, or those identified by TNO, namely **trust in data, value chain analysis, semantic interoperability, organisational interoperability, and technical interoperability**. Our goal is to work towards practical use cases and standardisation.*

Open challenges

- How can we increase the trust in datasets related to products by deploying product passports?
- How can we use the same terminology and language around product passport?
- How do we maintain technical interoperability between the solutions to product passports?
- How do we make sure that organisations can collaborate around product passports?
- What use cases in which sectors do we see where product passports can deliver a big impact?
- How do supply chain audits and digital product passports relate to each other?

TNO innovation for life

DATA SPACES IN AGRIFOOD

How can we make the Agrifood sector more sustainable with the help of digitalization? That is the challenge that Wageningen University and Research (WUR) has taken up. WUR wants to **explore the opportunities provided by the data economy, to support sustainable food production and consumption**, policy making and monitoring and evaluation of area processes. Throughout the years a lot of research surrounding blockchain applications has been done, mainly with the perspective of creating transparent supply chains. A long read has been prepared to dive deeper into Blockchain for Agrifood. (link) Most recently, however, the insights from those projects have moved the WUR to focus on data spaces as the conceptual framework through which stakeholders could be brought together.

This is why the WUR decided to collaborate with DBC in this workshop, figuring out how such data spaces can be built and how the web3 space of technologies can help construct a viable implementation of such a data space. The insight is that there are open questions around data governance, data quality, data security, data infrastructure, data culture, data ethics and data regulation. The urgent potential use cases are clear, not just looking at sustainability information and greenhouse gas emissions in supply chains, but also the current nitrogen discussion in the Netherlands.

> ## CALL TO ACTION
> *We have to make time for finding each other and share knowledge. Everybody is busy with their own urgent questions and we run around trying to solve them. We should first stop and look around, both internally in our own sector, as well as outside of it. So* **reach out if you have something to share to solve our challenges** *in building a data space for agrifood.*

Open challenges

o How do we move the governance discussion away from the more operational governance to the next level of supporting knowledge, strategy and policy-making.

o How do we create an environment of digital twins that can operate autonomously within organisations or products chains, whilst also being able to interact and share information and data with other digital twins, without compromising privacy and competition?

o How do we encourage the use of standard messaging, interfaces between different systems and crop registration systems?

o How can we reduce certification costs (audit, inspection, data accreditation and validation) for growers and other parties in agri-food chains by using AI for data validation?

o How can we demonstrate how blockchain-based data spaces would work (playgrounds) and identity obstacles for farmers and other parties in their digital transition to the data economy?

o How do we prevent ethical key problems by ensuring strong governance agreements?

o How do we develop an accreditation and validation system for blockchain data (oracle)?

o How might we integrate the conceptual framework of digital product passports into the data space?

o How could a blockchain-based data space assist the creation of public registry around nitrogen information that could help project developers self-assess the viability of an envisioned projects?

WAGENINGEN
UNIVERSITY & RESEARCH

ECOSYSTEM ADOPTION

For several years, the Rijkswaterstaat (RWS), the Dutch Directorate General for Public Works and Water Management, has investigated the use of blockchain. This has resulted in two pilots, both focused on **access to governmental information around and monitoring of transportation and storage** of salt and of soil. Furthermore, a research programme by Tilburg University has done an analysis from the perspective of constitional law and the use of blockchain in these pilots. The research delivered 10 practical design considerations for blockchain systems used by the government.

What's next? That was the main question for the workshop. The prepared empathy mapping tool was found to come too soon. Instead, the conversation was moved to sketching possible strategic pathways for RWS to continue. For example, the two pilots can to be compared to each other in a more thorough way, as well as a bundling of activities, with seperate governance, technical and business model tracks. It was noted that digital passports are a useful framing of the problem that would allow such conversations to come together eventually and an easy to understand concept for people whose core activity lies in the execution and maintenance of supply chains.

CALL TO ACTION
We need to take some time to pause and reflect on what the results tell us. **We are open to receive expertise in translating the views and thoughts of stakeholders into a common understanding.** *It is important to talk to the people in our organisation, and outside of it, that are supposed to run the operations of whatever system we are creating.*

Open challenges

- How can we connect *stakeholders such as IT-architects, security officers, privacy officers, supply chain partners, C-level management and maintenance* officers and use their insights for the next step?
- How can we facilitate seperate technical, business and governance work streams that operate separately but also combine around a common frame?
- How can we integrate the conceptual framework of a digital product passport into our projects?
- How can we show the added value of blockchain, like transparency, in a better way?
- How can we adopt cost-effective blockchain systems?
- How can we best save documents and validation, verification and qualifications about them on-chain?

Rijkswaterstaat
Ministerie van Infrastructuur en Milieu

INTERVIEW
Loes Knotter
on **Renewable Fuels**

This magazine would be incomplete with a status update on DBCs most progressed initiative within the Sustainability and Energy domain.

Loes Knotter has been leading the project from Q3 2022 until now and in this interview we dive into what has happened, share some key learning and how we would like to design the next phase of the project by building a prototype and a larger ecosystem.

What is the challenge your sector is facing?
The volumes of renewable fuels, in all of its shapes, are growing, which is necessary to reach climate goals. All those molecules need to be registered and verified. New regulation coming up with the European fit-for-55 package is expected to bring new responsibilities in data ownership for the owners of fuels. To be compliant, and prevent fraud like double spending of registrations, a whole-sector approach towards information systems is needed, from sourcing to end user. This also applies to other sectors such as certification and verification on the voluntary carbon markets.

How is the project solving this?
By providing an open decentralised system around which the ecosystem can build a single source of truth, that automates registrations and verifications as much as possible and improving end-user trust.

Who are involved?
The initiative started with a small group of DBC partners Dutch Emission Authority and Shell, and the Dutch Platform for Renewable Fuels. In this last phase a larger group of partners was onboarded like different parties throughout the chain and verification bodies, of which some helped to fund the last phase.

What did you work on these months?
Together with technology partner Kryha we worked on the functional requirements of a system that would cover the many verification points for the sustainability registration throughout a renewable fuel supply chain, including registration in the registry of the Dutch Emission Authority. We have also worked out how to best inform end-users about the climate reductions of the purchased renewable fuels for their carbon accounting.

Which new challenges are you seeing?

There are quite some benefits, just to mention more efficient verification for verification bodies can bring down costs of verification. And also end-users will benefit by this system because they will receive an independently verified proof of their use of renewable fuels. However, who is taking the lead to invest in a first decentral data platform? The challenge is the insight that a system like this only delivers full impact if it is widely used, so we welcome more partners that see value in this is a key focus for the future..

What is scheduled for the upcoming time?

We want to onboard new partners, and secure more funding, so we can build a first prototype for a part of the chain. Ideally we get enough funding to push further by building a MVP that covers the supply-chain from point of origin to end-use of renewable fuel volumes.

What is your vision for the future?

By building this system, we can provide a reliable information infrastructure for our sector with transparent and verifiable proofs-of-sustainability. It might however even change the way we do business. Right now we are working supply focused, but by tokenizing demand, we could foster demand side dynamics. The aviation fuel sector is already moving in that direction, where in the future you can expects customer to demand sustainable fuel for their part of the flight upon buying a ticket. Our system could support something like a tokenized sustainable fuel contract, which could be sold together with the engine. This is very relevant considering the decision to keep allowing new sales of combustion engines from 2035 provided they only drive on renewable fuels in the phasing out of combustion engines in road transport. Our system could actually be of very good use to proof this.

EXPLORE TOGETHER

Please reach out to us, if you are working within sustainability and/or energy in the context of Web3 technologies, and would you like to share your story, or build one togeher with us.

We are open to exploring new pathways leveraging potential opportunities for our members. Connect with yvo.hunink@dutchblockchaincoaliton.org.

COLOFON

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