DataBroker DAO

A global market for local data.

WHITE PAPER

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ABSTRACT

This paper introduces DataBroker DAO, a peer to peer marketplace created to provide IoT sensor owners with a clear path to data monetization and data consumers with a decentralized market to buy IoT sensor data.

With DataBroker DAO, we aspire to unleash long-tail creativity with the use of sensor data to facilitate the conversion of incredible ideas into value adding services. By providing a distributed foundational layer for the buying and selling of IoT sensor data, we expect that unimagined uses of data that exist in the hearts and minds of entrepreneurs, researchers and organisations around the world, will emerge to create incredible value adding services that enrich the quality of life in our cities and our societies as a whole.

The global market for IoT sensors has surpassed 600 billion USD per year[1] including the purchase, installation and maintenance of sensors and the acquisition of software packages to interpret and enrich the data. The data resulting from this investment is for prima
usage by the sensor owner or enhanced with value-added insights and resold.

Whether for primary usage or for enrichment and re-sale, the data remains grossly underutilized and the utility for society locked away in organisational silos. By connecting data owners with 3rd party data consumers directly, DataBroker DAO provides a marketplace where IoT sensor data can be fully valorised outside of the primary silos in which it is locked today.

In this sense, DataBroker DAO can be likened to a "secondary market" for IoT sensor data and has been referred to as an "eBay" or "Amazon" for IoT sensor data.

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[1] State of the Market: Internet of Things 2016, Verizon

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"The intersection of IoT and blockchain is enormously promising. For sensor- owning organizations, the ability to use an immutable ledger to store data, ensure its integrity, and provide a clear path to data monetization, is a stellar example of the promise of blockchain. The value of the IoT sensor market is greater than USD 600 billion per year, and is expected to double in the next three years, simply for primary usage of the data by the sensor owner! The magnitude and potential value of a marketplace for data-hungry third parties is staggering.

I believe that what online retailers like Overstock.com have done for making physical goods accessible online, DataBroker DAO will do for sensor data."

Patrick M. Byrne
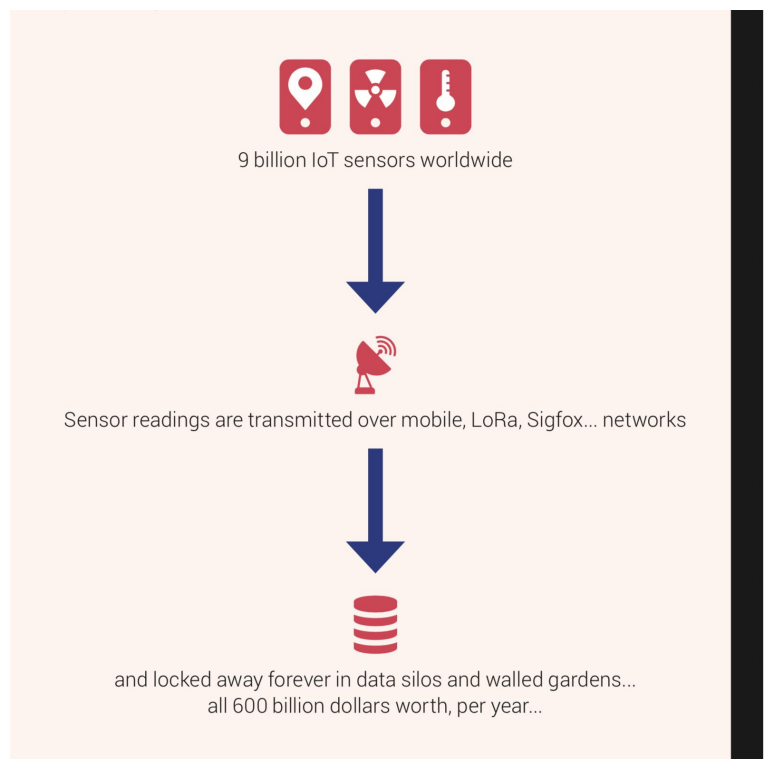CEO and Founder of Overstock.com

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THE CHALLENGE

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Individuals, companies, researchers and governments are spending hundreds of billions each year on buying and maintaining IoT sensors. The growth of the investment and applications in IoT is truly staggering and the high operation costs are a huge entry barrier. And yet, all data captured by these devices is locked up in silos and walled gardens.

The amount of money spent on IoT is truly staggering as is the number of devices already deployed. By 2016, the global market for IoT sensors surpassed 600 billion USD per year, which is expected to grow to 1.2 trillion USD per year by 2019. This include the purchase, installation and maintenance of sensors and the software packages to interpret and enrich the data. By 2016, there were no fewer than 9 billion sensors deployed globally, which is expected to grow to 33 billion by 2019[2].

9 billion IoT sensors worldwide

Sensor readings are transmitted over mobile, LoRa, Sigfox... networks

and locked away forever in data silos and walled gardens...
all 600 billion dollars worth, per year...

By 2016, there were no fewer than 9 billion sensors deployed globally, which is expected to grow to 33 billion by 2019.

And, whether for primary usage or enrichment and direct resale, the data remains grossly underutilized and the utility for society locked away in closed organisational silos. Stifling innovation and holding back society as a whole.

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[2] State of the Market: Internet of Things 2016, Verizon

OUR SOLUTION

DataBroker DAO unleashes the potential of currently inaccessible, low value data into the creation of new transversal Value Added Services. It prevents people with powerful ideas to rely on people with powerful operational resources, in a phased, pay-as-you-grow, MVP model. As with the financial markets, where the importance and value of company data have been apparent for decades, giving rise to Bloomberg Market Data, Thomson Reuters, FactSet and a lot of vendors, the same opportunity will emerge for IoT sensor data.

Doing so with a distributed foundational layer for the buying and selling of IoT sensor data we expect that unimagined uses of the data will emerge to create incredible value adding services that enrich the quality of life in our cities and our societies as a whole.

DataBroker DAO is the first marketplace for IoT Sensor data that will connect sensor owners with purchasers of the data directly, utilising existing infrastructure from telecommunication providers operating sensor connectivity networks based on GSM, LoRa, SigFox or via a proprietary gateway of the sensor owner.

In a sense, the DataBroker DAO can be likened to a "secondary market" for IoT sensor data and has been referred to as an "eBay" or "Amazon" for IoT sensor data.

Stakeholders

There are a number of stakeholders in the DataBroker DAO including sensor owners, gateway operators, data processors and data buyers. Below is a definition of each of these stakeholders.

Sensor Owners

Sensor owners are the stakeholders who have purchased IoT sensors and make the data emitted from their sensors available for sale via the DataBroker DAO platform. This is a diverse group who have generally purchased sensors in order to improve the efficiency of their operations.

The key role of Sensor Owners in DataBroker DAO is to sell the data from their sensors on the platform.

Data Buyers

Data Buyers are those stakeholders who will purchase data on the platform. This purchase may be to use the data in its raw form for their own purposes or to purchase the data with the intention of transforming/enriching the raw data to be resold with added value via DataBroker DAO (see Data Processor below).

The use of the data purchased by Data Buyers can be quite straightforward, for instance, purchasing temperature and rainfall data provisioned by a neighboring office building to have accurate local readings to the more complex, like purchasing data to train one's AI.

Data Processors

Data Processors are those Data Buyers who purchase data with the explicit intention of enriching the data and either reselling it or handling it for their clients. The enrichment may take many forms and Data Processors can be categorized by the level of insight provided[3]:

- Simple data services are the most common. Data brokers collect data from multiple sources and offer it in collected and conditioned form — data which would otherwise be fragmented, conflicted and sometimes unreliable.
- Smart data services provide conditioned and calculated data, with analytical rules and calculations applied to derive further insight from the collected data and aid the decision-making process. (e.g. Artificial Intelligence)
- Adaptive data services apply analysis to a customer's request-specific data combined with data in a context store. This is a more advanced form of service.

It is estimated that there are more than 5,000 data processing companies worldwide relying on a vast array of open datasets published by government

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[3] Moore, S. (2016, June 8). *How to Choose a Data Broker.*

agencies and non-governmental organizations[4] (Moore, 2016) in combination with their proprietary datasets and algorithms to enrich publicly available data.

These range from specialized boutiques, such as CB Insights, Fico, Intelius, etc. to large global consultancies such as McKinsey, Deloitte, PWC. It is estimated that 75 percent of analytics solutions will incorporate at least ten or more data sources from second-party partners or third-party providers by 2019[5].

It is expected that Data Processors will make up the majority of Data Buyers on the DataBroker DAO platform.

Gateway Operators

The data emitted by the billions of devices deployed globally flow across a wireless sensor network (WSN) operated generally (but not exclusively) by large telecommunications companies in each country. This may be a traditional GSM network, a LORA network or an alternative such as SigFox.

The key role of Gateway Operators in DataBroker DAO is to expose the gateway they operate to enable sensor owners to sell their data on the platform.

The diagram below demonstrates how these stakeholders interact in DataBroker DAO.

In a sense, DataBroker DAO can be likened to a "secondary market" for IoT sensor data and has been referred to as an "eBay" or "Amazon" for IoT sensor data.

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[4] *How to Choose a Data Broker*. Moore, S. (2016, June 8).
[5] *How to Choose a Data Broker*. Moore, S. (2016, June 8).
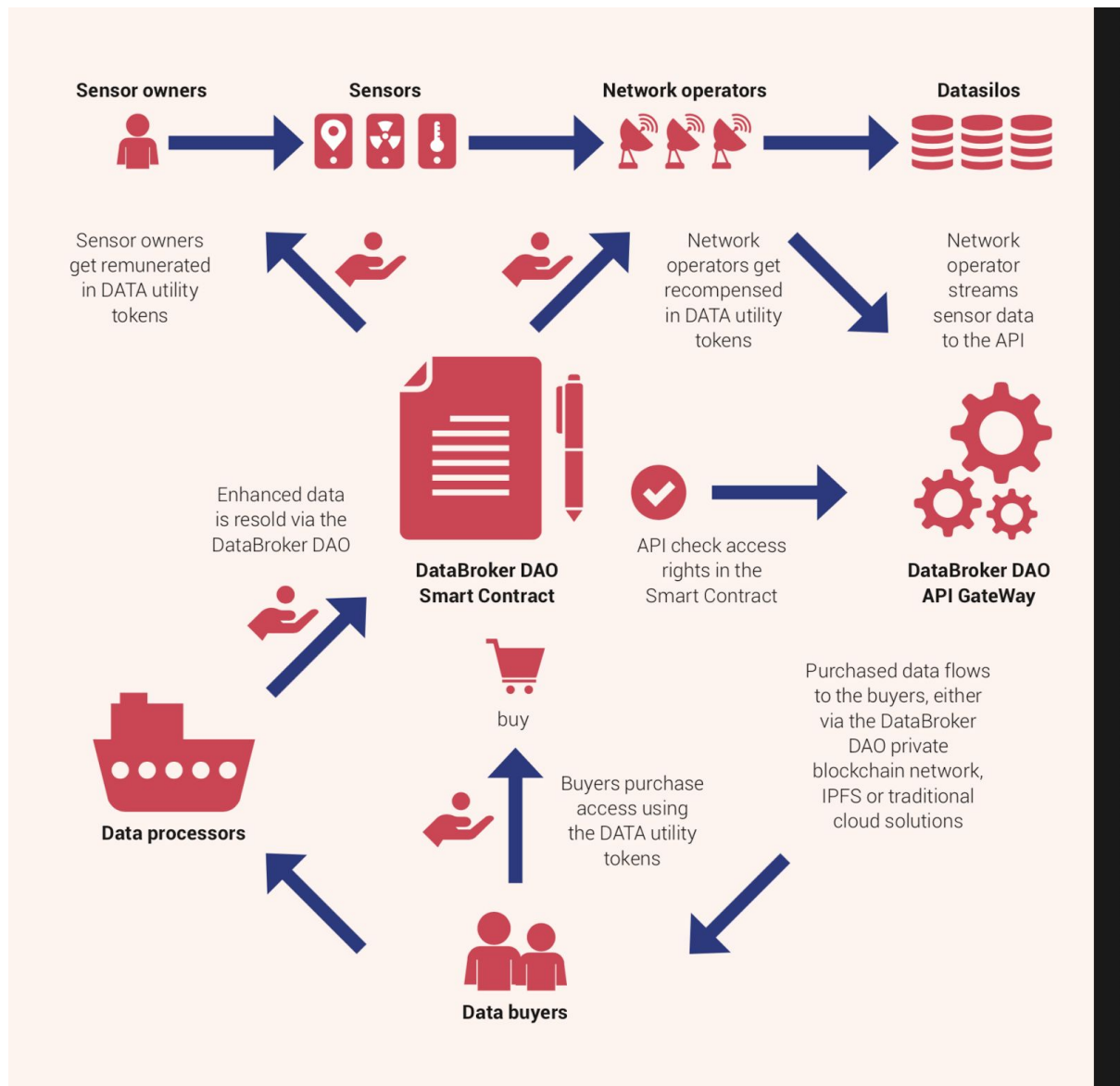
Who "wins" in this story?

Sensor owners (data providers) are able to directly monetise their data to generate passive income that will turn a sunk cost into a potential money maker and at least the opportunity to recoup some of their investments in IoT sensors (purchase, installation, maintenance, software licenses to interpret the sensor data). A sensor owner will earn 80% of the amounts received and pay a small recurring fee for putting the sensor on the platform.

Data buyers and data processors get data as a service so do not need to make the upfront investment in hardware to get the data they require. Another advantage for both buyer types is that DataBroker DAO provides access to data that would otherwise be trapped in the data silos of sensor owners.

Gateway providers: gain scale and speed in the adoption of their network/devices as the partner connected to DataBroker DAO can present a win-back to their enterprise accounts, a clear USP. These gateway operators are the gateway through which the data flows to the DAO, and as such, they are also paid out immediately for each sale in the platform and will receive 10% of the fee.

The DAO takes the remaining 10% of all funds, depending on market conditions, received on the platform to cover operating costs.

Revenue distribution

DataBroker DAO
10.0%

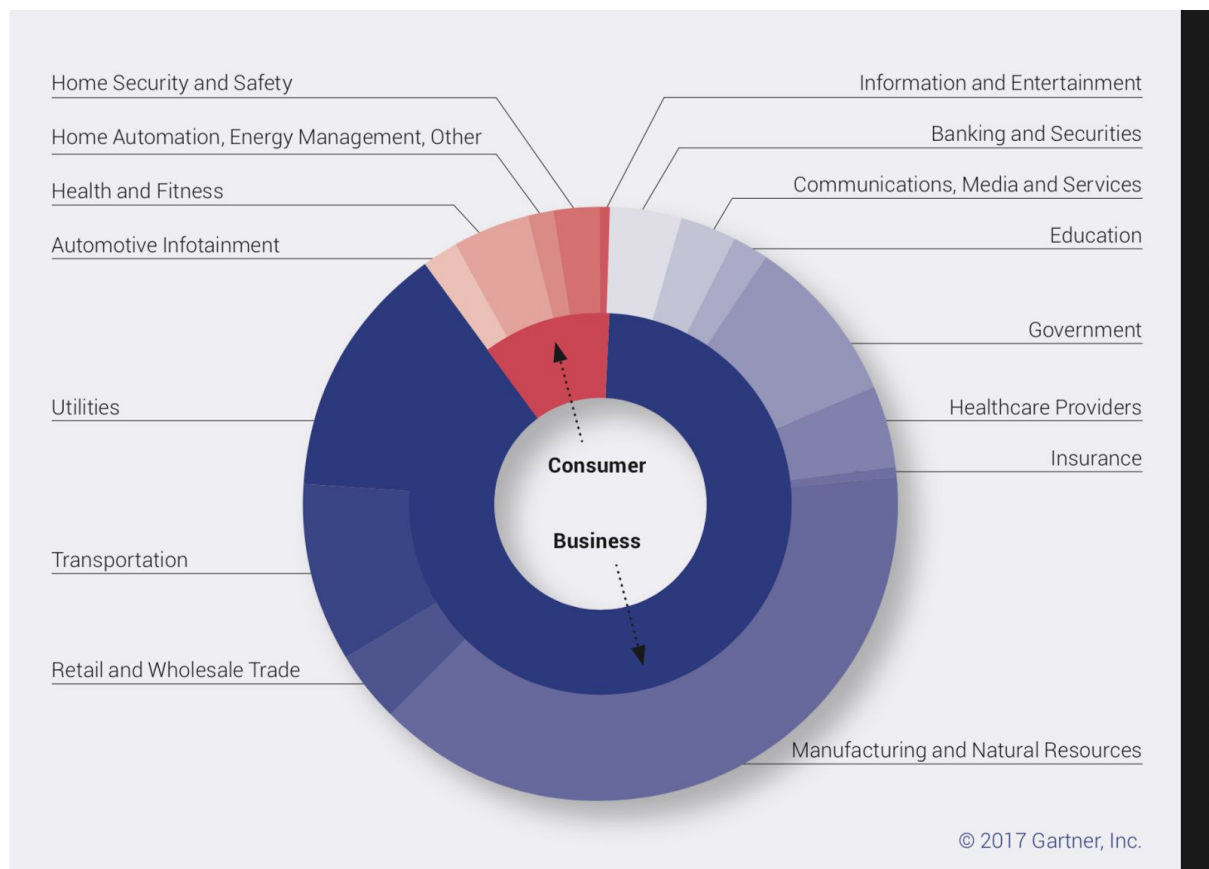Gateway operator
10.0%

Sensor owner
80.0%
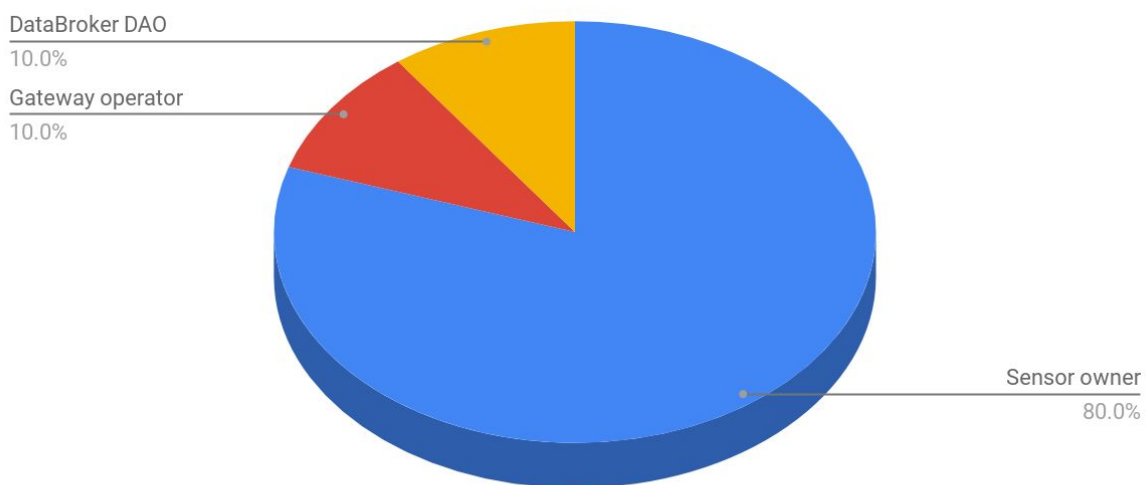
Who "loses" in this story?

Sensor manufacturers: While manufacturers will increase sales in the short run due to the higher profitability of IoT projects. However, on the longer term, "sharing" sensors may reduce their day-to-day sales. This can be balanced by higher replacements due to the higher amount of sensors in the field.

However, hardware margins are in a "race to the bottom" and are already razor thin. Sensor providers already make most of their money via software and services. From this perspective, the producer can pull resources and capital out of unprofitable hardware manufacturing and allocate these to successful SaaS offerings. From our discussions with manufacturers, they are very enthusiastic about this prospect.

Who will sell data?

There are a number of data sellers identified and the overview of the sectors already investing in sensors from Gartner highlights the key potential sellers of data for the years to come. The diagram below identifies the 2 groups (business, consumer) and the sub- groups that constitute each. It is clear that the business group is the main driving force in sensor deployment globally.

Home Security and Safety
Home Automation, Energy Management, Other
Health and Fitness
Automotive Infotainment
Utilities
Transportation
Retail and Wholesale Trade

Information and Entertainment
Banking and Securities
Communications, Media and Services
Education
Government
Healthcare Providers
Insurance
Manufacturing and Natural Resources

Consumer

Business

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The business group is led by the following sectors:

Manufacturing and Natural Resources: the so-called industrial IoT consists of companies that are deploying sensors in order to improve operations. Their primary purpose for deploying sensors is to improve the efficiency of operations to reduce their cost base. DataBroker DAO presents the opportunity to sell selected data that will not reveal to competitors specifics of their manufacturing process.

Transportation: the data for transportation consists of both traffic and vehicle specific data. Traffic data includes for instance congestion and for instance data for shipping of goods like temperature sensors in food shipping containers. This also includes sensors for managing public transportation such as trains and busses. Vehicle specific data includes a wide array of sensors in cars and trucks both personally owned vehicles and fleets measuring everything from CO_2 emissions to speed to preventive maintenance.

Utilities and Government: Utility providers deploy sensors for "smart" utilities en-masse to deliver more efficient utility services to their clients including smart grids and smart meters primarily for electricity and water. Government sensors are also wide ranging including everything from water level sensors to detect flooding, air quality monitoring to smart street lights.

In addition to these sellers which represent the bulk of currently deployed sensors, we identify at least 2 additional growth areas in the coming years:

Smart City Initiatives: a roadblock for getting smart city initiatives off the ground is the upfront cost of populating the town with sufficient sensors to be meaningful. The DataBroker DAO platform provides a means to turn what is today a sunk cost and a perpetual maintenance expense into an investment with a 2-3 year payback period and a continuous income stream after that.

Agricultural sector: in Belgium today, 10% of farmers are "techie". They have a drone flying around and 5-20 sensors deployed and some other automation in place. The sensors include for instance wind, temperature, barometric pressure, humidity, PH level in the soil. They use these to manage their farm and spend between 10-50k euro per year, and DataBroker DAO will provide the possibility to recoup some of this cost.

Who will buy data?

Aside from the data processors in the ecosystem, any company looking to commercialise a product that is data driven is provided with the opportunity to develop the product without having to invest in the hardware. The potential buyers are extremely broad.

- From the agricultural example above, two potential buyers jump out with > 1000 temperature sensors from nearly all regions of the country, the data is more accurate and granular than the **national weather service**. They are a potential buyer as are tv and radio stations who, by buying data directly on the marketplace, cut out the national weather service in their purchase from the farmers.

- With >1000 PH level sensors covering most parts of the country, **fertiliser companies** would view this as a "honeypot" for their sales people.

- **Smart City Initiatives** can limit the upfront cost of populating the town with sufficient sensors and turn the expense into an investment with a 2–3 year payback period and a continuous income stream after that.

- **Academics** get access to the data from thousands of sensors and can buy data directly on the marketplace. This will result in a boost in the number of potential spin outs from academia as projects no longer have as high startup costs associated with buying and deploying a network of sensors.

- **Public Transport** data can be sold to entrepreneurs who can help to create applications such as mobile apps to help the general public find the perfect routes to their desired destination, this introduces an extra revenue source for local governments while improving the infrastructure around the public transportation systems.

- **Self-driving technology companies** could buy car sensor data to create the perfect self-driving AI and license this back to various car manufacturers.

- **Environmental agencies** can gather data from millions of sensors around the world, such as PH water sensors, to get insights into environmental change, impact of their programs and understand where to act.

- **Energy corporations** can purchase wind, weather & consumption data to plan new green energy initiatives and understand where to best place new wind or solar farms.

In short

The stakeholders in the IoT space have a lot to gain:

- Sensor owners can monetize their data and turn a sunk cost into a potential money maker and at least the opportunity to recoup some of their investments in IoT sensors.
- Network operators acting as gateway operators gain scale and speed in the adoption of their network as connected telcos can present a win-back to their enterprise accounts, a clear USP.
- Sensor manufacturers acting as gateway operators can stop the "race to the bottom" for production and pull resources and capital out of manufacturing and allocate these to more successful SaaS offerings.
- New types of buyers have unprecedented access to data and options to monetize their own data, in this category we see the entire booming and vibrant startup scene.
- Data processors have an ecosystem to sell their services to the right people.

The DataBroker DAO Alliance

In the future we envision, the world where the DataBroker DAO platform will be an integral part of the "IoT data"-fabric, there will be, more than ever, a need for collaboration between the stakeholders in this ecosystem. These parties will need to find ways to work together to further their collective businesses and use-cases.

We formed the DataBroker DAO alliance to help facilitate this collaborative ecosystem. Apart from gaining essential insights into the requirements of the platform, we feel that guiding the stakeholders through this foundational change in doing business together will be the linchpin in the further development of the platform.

"We are happy to cross paths with SettleMint and to engage with blockchain technology over DataBroker DAO. The integration was smooth and successful due to technical excellence. In a next step on our roadmap we intend to include a DataBroker DAO "sell my data" option into our portfolio, as we realise this is a new monetisation opportunity for both sensor owners, data consumers and vendors", said mr. Rajeev Jha - CEO of Yuktix

At this time there are 7 companies that have formally joined the alliance. They include players in each of the stakeholder groups and are a good cross section of the ecosystem.
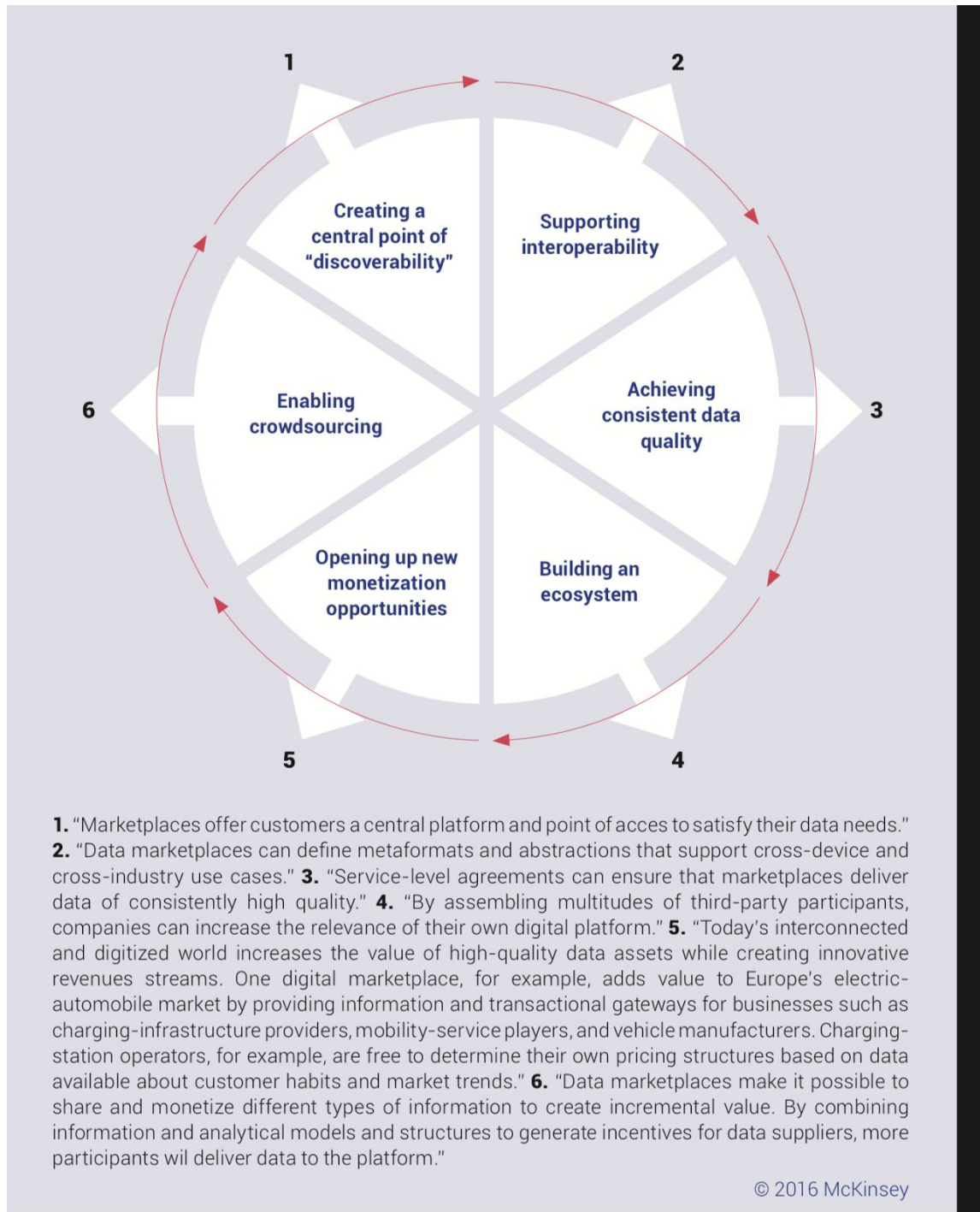
OBSTACLE TO SUCCESS

The biggest obstacle to the success of DataBroker DAO and the full valorisation of IoT sensor data is on the supply side of the equation. That is the adoption of the marketplace by data sensor owners who are generating data. DataBroker DAO enables sensor owners to sell their data directly to interested 3rd party data consumers and are thus provided with the opportunity to recoup their sunk costs for IoT sensor hardware and software (>600 billion USD today) incentivising them to provide access to their proprietary data.

To overcome this obstacle, one of the first priorities will be hiring an experienced team of enterprise sales profiles. Their focus will be to guide the gateway operators through the sales cycle, onboard them into the DataBroker DAO Alliance and push for the integration of the dAPI into their systems.

COMPLETENESS

In its 2016 report[6], McKinsey identifies 6 key pillars to the construction of an IoT sensor data marketplace.

1. "Marketplaces offer customers a central platform and point of acces to satisfy their data needs."
2. "Data marketplaces can define metaformats and abstractions that support cross-device and cross-industry use cases." **3.** "Service-level agreements can ensure that marketplaces deliver data of consistently high quality." **4.** "By assembling multitudes of third-party participants, companies can increase the relevance of their own digital platform." **5.** "Today's interconnected and digitized world increases the value of high-quality data assets while creating innovative revenues streams. One digital marketplace, for example, adds value to Europe's electric-automobile market by providing information and transactional gateways for businesses such as charging-infrastructure providers, mobility-service players, and vehicle manufacturers. Charging-station operators, for example, are free to determine their own pricing structures based on data available about customer habits and market trends." **6.** "Data marketplaces make it possible to share and monetize different types of information to create incremental value. By combining information and analytical models and structures to generate incentives for data suppliers, more participants wil deliver data to the platform."

© 2016 McKinsey

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[6] Johannes Deichmann, K. H. (2016, October). *Creating a successful Internet of Things data marketplace.*

Below is an assessment of the current beta version of DataBroker DAO based on these 6 pillars:

- Creating a central point of "discoverability": the DAO pulls together data that is otherwise locked in organisational silos controlled by the sensor owners.
- Supporting interoperability: the DAO defines standard metaformats for data descriptions and will integrate several processes to bring actual data into standardised formats in the next iteration of the platform.
- Achieving consistent data quality: data streams come directly from the gateway so there is no point in the process that is open to manipulation of data. In the next iteration of the platform, a reputation system that allows data buyers to provide feedback on data quality will be added to further enhance the controls on data quality.
- Building an ecosystem: the DAO brings the stakeholders in the IoT sensor data market together. It is the foundational layer of the ecosystem.
- Opening up new monetization opportunities: Sensor owners are incentivised through direct remuneration from data buyers. In a future iteration, the platform will introduce additional data enrichment and display options that service providers can monetise through the platform. The roadmap includes graphical packages from mapping to charts.
- Enabling crowdsourcing: Sensor data is crowd-sourced directly from sensor owners.

WHY USE BLOCKCHAIN?

From a marketplace perspective using the public Ethereum chain enables the use of a fully built out financial ecosystem, with minimum of fees. Traditional fiat payment processors charge between 1 and 3% for money in and money out, while a purchase using the utility token costs around 0.003 USD[7] in fees for purchases of any size.

Using a utility token over fiat currency also brings the advantage of 18 decimals. Combine the possibility to use extremely small fractions of the token with very low fees, and real microtransactions become possible.

While these actions will ease adoption, there will be a learning curve for these enterprises. Every project in the blockchain space is working hard to try and solve some of these issues and it is only a matter of time before the skillset of the users and de technical capabilities meet in the middle.

From a decentralised network perspective it is also a perfect fit. Very large numbers of participants, in a trustless environment, transacting with each other is the definition of a perfect use-case.

From an ecosystem perspective we notice a lot of activity in the IoT sphere, solving a lot of hard problems for the future. And we are avid fans of these trailblazers knowing that the Databroker DAO is a great addon for many of these project, the missing link in the ecosystem.

We are not blind to the usability issue in using separate tokens on a public blockchain for any type of user. We are working on several solutions to ease adoption:

- We will facilitate corporations to purchase tokens from DataBroker DAO directly. These tokens will come out of the reserved platform fund and will be sold for fiat currency with full invoicing, just like any other digital good. We will not buy back tokens or issue more.

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[7] http://ethgasstation.info/

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- We are planning on implementing the GasStation[8] concept presented by Swarm.city on DevCon 3 to overcome the "gas" hump when onboarding new users of the platform.
- We are working actively with leading wallet providers to include our tokens by default, easing the setup and management of these tokens for an enterprise.

A COMPETITIVE ANALYSIS OF IOT BLOCKCHAIN PROJECTS

There are 3 commonly named projects that live in the same sphere: Streamr[9], IOTA[10] and OceanProtocol[11].

Streamr is taking their traditional data transfer platform and will attempt to "blockhainize" it. While we will not go into a deep technical analysis of these projects the conclusion can be drawn from reading the whitepaper that the goal is to replace the entire IoT stack, from top to bottom, with the Streamr solution. A monumental challenge if you keep in mind that if they are operational in 2 years, they will have to replace an industry with 30 billion deployed sensors.

IOTA's plan is similar. But they go even further, aside from replacing the entire IoT ecosystem, they also replace any underlying blockchain base with a new and untested network, using a concept called a "tangle". Double down on the challenges.

Both Streamr and IOTA describe a data marketplace. A marketplace for data on the the Streamr or IOTA platform/network. Of, at some point in time, one of them has replaced the IoT ecosystem, the winner would indeed be a real competitor for DataBroker DAO to break down data silos and facilitate the easy transfer of data, regardless of the underlying network.

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[8] https://github.com/swarmcity/SCLabs-gasstation-service/blob/master/README.md
[9] https://www.streamr.com/
[10] https://iota.org/
[11] https://oceanprotocol.com/

OceanProtocol is a different story. Their focus is a new kind of BigchainDB-based network specifically for buying and selling AI datasets. While not a lot is known at this point, the roadmap specifies several years before their solution will be ready and the underlying technology is less decentralised/open compared to an Ethereum based solution.

DataBroker DAO takes a radically different approach:

- It is built to go into production this year. This ensures we both need to use proven technology, and a first movers advantage over these other players.

- It is built to interface with the large players in the ecosystem (manufacturers and gateway operators) in a non invasive way. We are not replacing anything or anyone, ensuring a low friction environment. The only way to get market scale fast enough.

- It focuses on being a complementary component in the current and future ecosystem, meaning that in the future DataBroker DAO can co-exist, integrate and complement IOTA, Streamr and OceanProtocol.

We wish each and every one of these projects all the success in the world, and we will happily integrate them into the ecosystem upon reaching critical mass.

THE ARCHITECTURE

A token curated registry for reputation, quality and curation.

The core component of the platform is the registry of sensors and data steams/files offered in the platform. In the DataStreamRegistry we will store all data providing sources that stream sensor data. Streaming data can be live data coming from an IoT sensor. This data is sold per timespan. The DataSetRegistry will hold 'files' of data that can be bought; these are sold per download.

To list a stream/set in these registries, the owner has to stake (to stake means commit/sent/lockup in this context) a certain amount of DTX tokens. These tokens are locked as a guarantee for good behavior by the data seller.

There will be a minimum stake required to be listed in the registry at all. Data sellers can stake more DTX tokens if they want to. Staking more allows these streams/sets to appear more prominently in the listings (e.g., sorting, or additional badges in the interface) improving the chances of being bought, and at the same increase the guarantees a buyer has that the data is of good quality and contains the advertised information.

A data buyer that is unhappy with the quality of data can challenge an entry in the registry by staking some DTX tokens. This challenge will be represented in the UI to all potential buyers as a negative reputation score. In itself, it does not have any effect on selling of the data.

Upon reaching a certain threshold of challenges, a check of the data provider will be performed by a DataBroker DAO administrator. Upon finding issues with the advertised data, it's stake is distributed equally over all challengers and the DataBroker DAO platform wallet. The entry is removed from the registry. If it is deemed that the data is sound, the staked tokens by the challengers get distributed to the data seller and the platform.

- This incentivizes data sellers to maintain a good standing and delivering data as advertised.

- Data buyers are encouraged to report bad data to recoup the lost funds due to bad data. Data buyers are discouraged from reporting false challenges, and the seller can reduce lost funds due to unfair bad reputation.
- The DataBroker DAO platform and its administrators are encouraged to handle these disputes quickly and efficiently and are rewarded for their time and effort.

Identity management for a billion sensor owners

Databroker DAO is a peer-to-peer marketplace of IoT sensor data. This data is created by sensors, and we are talking about billions of sensors. These sensors are owned by again a very large number of owners. These owners have contracted a network operator (which might be a telco, or a manufacturer) to transport the data generated by their sensors to a (mainly internet-) gateway for consumption.

The network operator takes up the role of gatekeeper in regards to the data flowing through their gateway. They have performed all required KYC procedures on the sensor owners and they have identified and validated the sensors themselves. They are also garding their network against unauthorised use. And in most regions, network operators do not have a monopoly resulting in a large amount of potential partners, but significantly reduced compared to the amount of owners or sensors.

For Databroker DAO partnering with these gateway operators is quite an advantageous scenario. By controlling and verifying the gateway operators, the platform has a way to manage and control the gigantic amount of sensors and owners by proxy.

This has a consequence for managing the identities of the sensors, owners and operators in the platform. Building on the work of end user identity management projects like uPort, the platform works with "Managed Identity Proxy" contracts. These proxy contracts contain the link to the sensor owner's wallet and identity. Different from the end user solutions, these proxy contracts are also linked to the identity of the owner at the gateway operator and can be controlled by that gateway operator.

This allows us to have full ownership by the sensor owner, combined with the ability of the gateway operator to control/automate their interaction with the system, and even handle end-user private keys until proper key management has become widespread and commonplace. This system will be open-sourced before the main token sale.
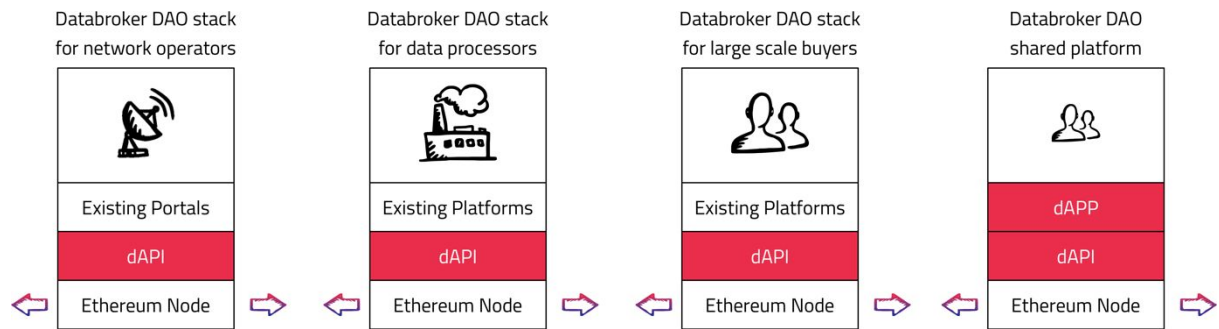
dAPP and dAPI

In the blockchain world, a large number of projects are building distributed applications or dAPPs. These client side applications interact directly with Ethereum or other blockchains. In many cases, for the sake of user experience, these applications are running on remote shared nodes like the ones Infura[12] provides. While this is the only way to create user friendly end-user peer-to-peer applications, it has serious drawbacks for some of our use cases:

- Single point of failure. During some of the recent token sales, the client side applications coupled with high demand have brought these shared nodes to a halt. Not for the lack of trying or skill, but due to the sheer amount of RPC calls needed to perform certain functions on Ethereum smart contracts. In a high stakes sector, such failures are not an option.
- Web interfaces and apps are nice, but the real value is in APIs. In the current SaaS and cloud boom this is almost a given. You have no real product unless you also have an API for it. Slack, Zapier, Github, CRM and ERP systems, they all attribute parts of their success to their commitment to APIs.
- More apps, more problems. Adding an extra interface only makes it harder to use for the average user. The sensor owners already have an account with the operators. They have figured out how to work with them and are happy (and if not, they switch operators).

That is why we add in, what we call, a dAPI. Just like a dAPP, it's an API application that is deployed at each node. Primary usage of this dAPI is at the gateway operator, data processor and large scale data buyer sides, and not at the sensor owner or small scale buyers. They will use the (existing) interfaces provided by the gateway operators or the Databroker DAO dAPP.

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[12] https://infura.io/

Databroker DAO stack for network operators	Databroker DAO stack for data processors	Databroker DAO stack for large scale buyers	Databroker DAO shared platform
Existing Portals	Existing Platforms	Existing Platforms	dAPP
dAPI	dAPI	dAPI	dAPI
Ethereum Node	Ethereum Node	Ethereum Node	Ethereum Node

Data distribution and storage

Billions of sensors generate huge amounts of data. And any company using IoT sensor data has their systems for processing it and is most likely not inclined to replace that system. This means we cannot enforce a new data storage system on them. Even more important, it is not the goal of the platform to store all IoT sensor data for eternity.

Built in the dAPI, there are connectors to integrate with the leading IoT and bigdata storage vendors, leaving the buyer the choice on where their data needs to be sent.

Now there is a valid use-case for blockchain anchoring of this data. The immutability and timestamping capabilities are worth something. To benefit from these capabilities the dAPI will anchor batches of data on the Ethereum mainnet (using the Chainpoint spec[13]).

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[13] https://chainpoint.org/

ON THE ROADMAP...

Setup and onboarding of an extended team

One of the larger challenges for DataBroker DAO will be scaling the team fast enough to cope with market demands. Onboarding a new sales team and additional developers is a daunting task. Since September this has been an active focus and this will be the case for the years to come. In Q2 2018 this will be priority number one.

Gateway operator integrations

The main road to mass adoption is integrating with gateway operators that enable the onboarding of millions of sensors in one go. The DataBroker DAO platform will be integrated with the gateways of these gateway operators.

We will be working on both common standards and libraries to ease integration, and perform the initial integrations for the first operators in the DataBroker DAO Alliance. Integration with these initial gateways is planned for Q2 2018.

Private and whitelisted sales

Working with our alliance members has taught us a lot. Including the fact that there is a large set of data in the market that companies want to sell to either anyone except a competitor, or to just a whitelisted group of companies. As such this capability will be integrated in the smart contracts from the start, and work in the frontend side will continue into Q4 2018.

Improving the (white labeled) frontend interface

On the one hand is the focus of DataBroker DAO mostly on the dAPI. This is where the data streams will flow over, and combined with the smart contracts the core value of the platform. We expect quite a few gateway operators to use the dAPI to build a marketplace in their existing platforms. There will however be quite a few that do not have an integrated approach, or no existing systems to integrate with.

That is the reason we will build a DataBroker DAO marketplace frontend and offer this frontend in a white labeled form to gateway operators. When first launching the platform this interface will be a basic one, and will require a diverse set of skills (information architecture, design, web and mobile development) over in the first two years to build a tier one frontend. This will be a heavy focus for Q3 of 2018 to reach the next guideline.

Data enhancement integrations

Having easy access to large amounts of data opens up a wealth of options for many startups across the globe. Enhancement and aggregation will provide even more valuable data than the raw data itself.

The team will look for, and work with partners in the Alliance to provide valuable services based on the raw data by providing libraries and integrations for commonly used tools. Integration with AI tools (like provided by the large cloud providers, or Tensorflow) come to mind. Initial integrations will be made with the dataprocessors in our Alliance in Q1 2019.

THE PROOF IS IN THE PUDDING

The past few months the team has been hard at work to build the working platform. Leading up to the token sale we will open-source more and more of the code underlying the platform. Check out the beta version at https://beta.databrokerdao.com

The core features of the beta version of the platform are:

Wallet functionality
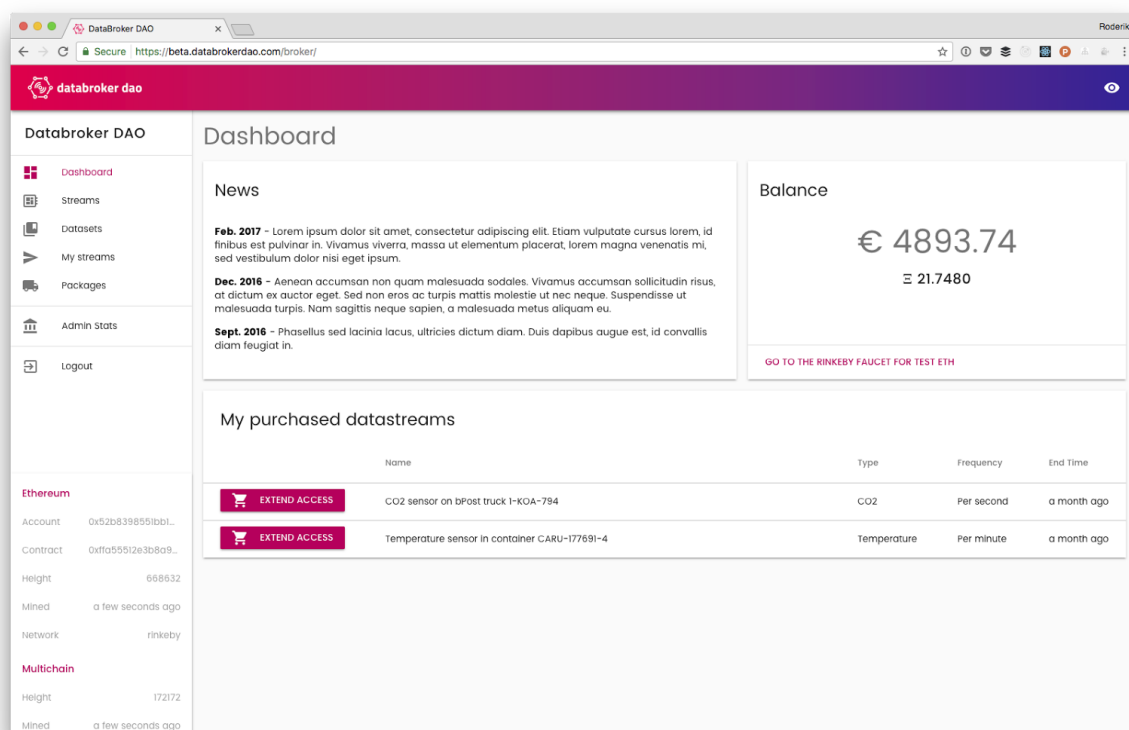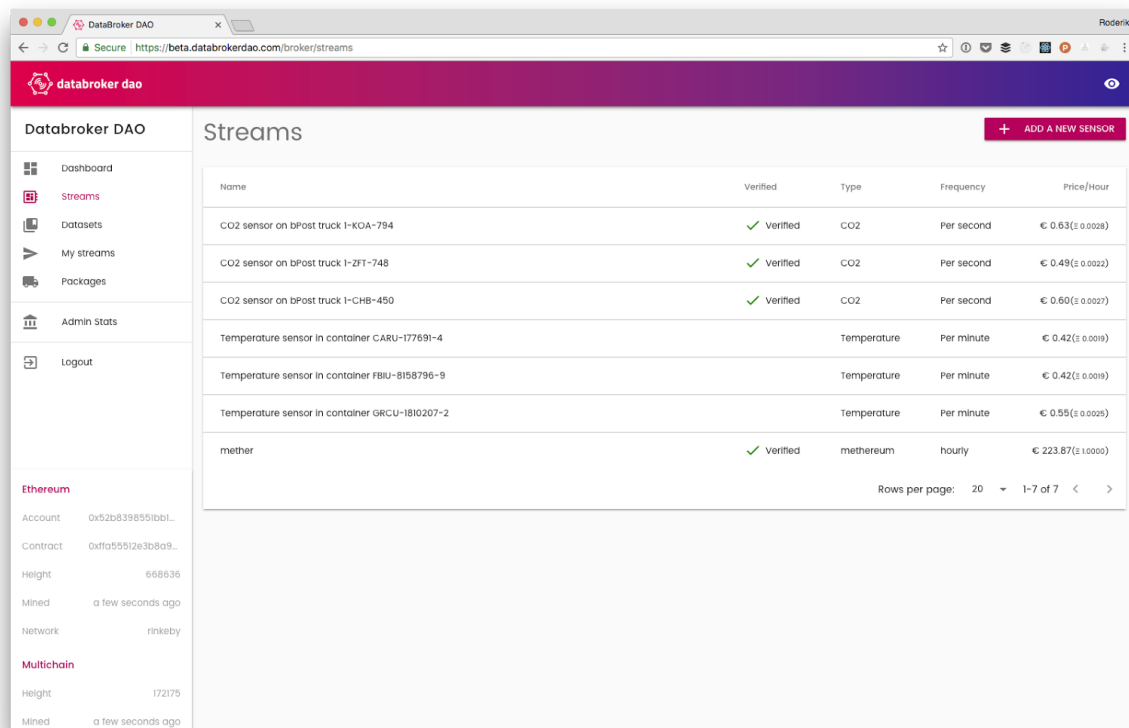
The platform will interact with normal Ethereum addresses and MultiSig contracts for its core functionalities. Currently we do not integrate with any services, but for a public network deploy we would integrate with services like Shapeshift and exchanges to make the flow from fiat/crypto currencies to and from the DTX token as easy as possible.

The wallet views encourage people to keep their funds in DTX tokens if they expect to use them any time soon and not incur the transaction fees from converting. While this seems a non issue for experiences crypto traders, the

target audience for the token are people and organisations that are currently embedded in a fiat world. Liquidity is a good thing, but value stored in the token itself is important as well.

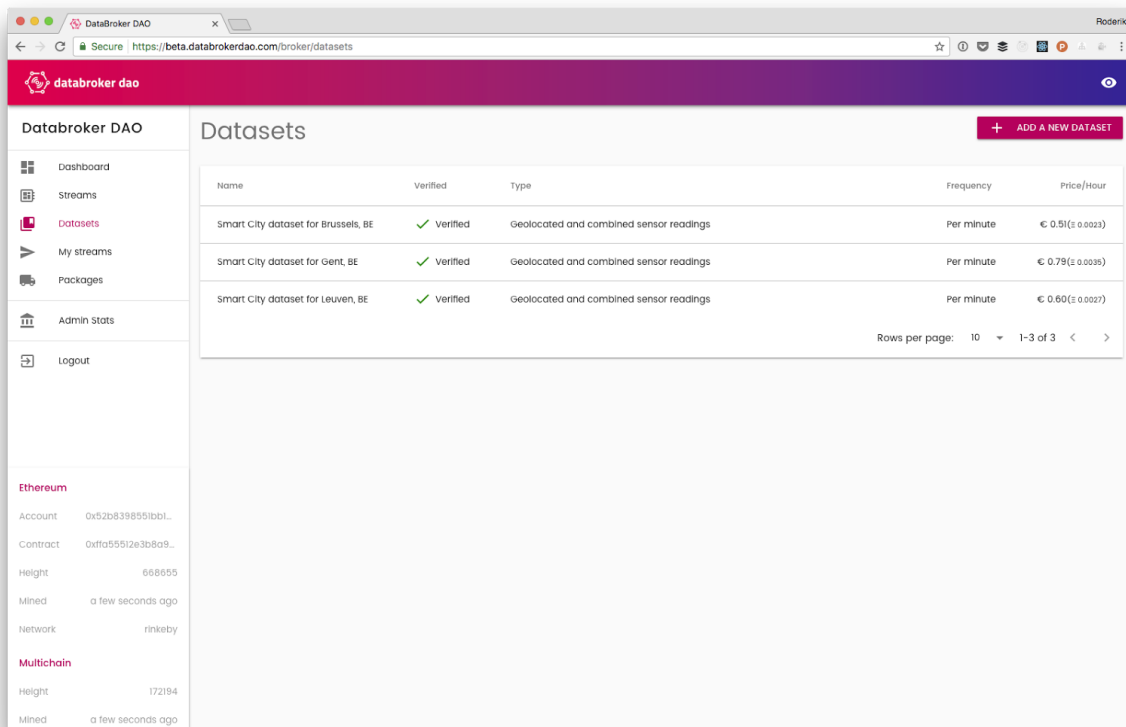## Sensor data stream listings

Sensors are being listed in the application for discovery of data. The current implementation is by design rudimentary and not built for billions of sensors. We were focussing on proving the platform and the implementation of discoverability, curation and reputation on a scale of billions of sensors is a monumental feat (e.g. the iOS app store). In the roadmap we have set aside time to build on this base and develop a solution at scale.

Sensor details
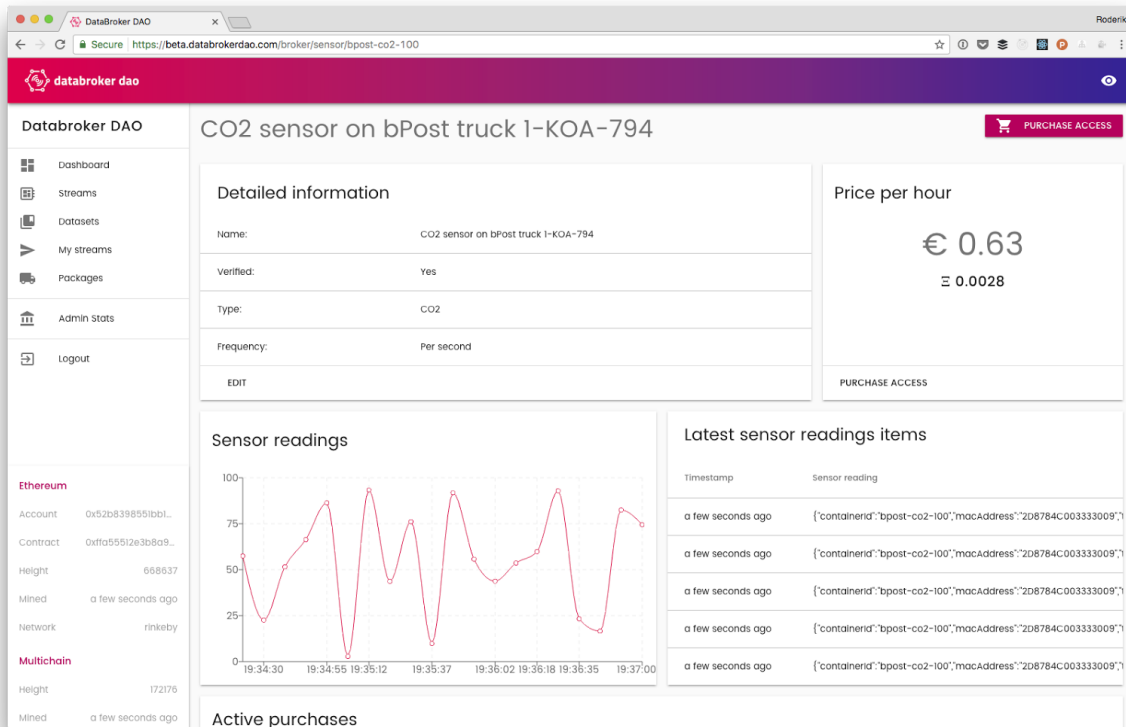
The main object in this ecosystem in the sensor itself. The detail pages give all information needed to determine if a sensor is what the buyer is looking for. Depending on the type of sensor these pages might be extended with cards containing geolocation information, reputation scoring, comments, similar sensors and more.

Dataset listings

A lot of the added value in sensors only comes after analysing, aggregating and enhancing the data streams from sensors. The datasets in the platform function like a tertiary market where sensor buyers can do all kinds of smart things with the data, and resell them in easily consumed datasets.

GOVERNANCE

The "DAO" in the DataBroker DAO name is not a marketing ploy. We believe that a platform at such a crucial crossroads between IoT and blockchain, with a global and wide variety of involved parties, will need a non-traditional governance model.

Though the community has learned a lot since initial DAO governance experiments, there is still a long way to go. Especially since a lot of the partners in this ecosystem are more enterprise minded at this time.

Since agility and flexibility are crucial in the early stages we decided that, since best practices and adoption of this model are still a moving target, Databroker DAO will be run using a traditional company structure, until such a time we, in active collaboration with the community and industry, can determine a governance model that works for all parties involved.

THE DTX TOKEN (DaTa eXchange)

The DTX token is a utility token in the Databroker DAO platform[14]. The DTX token is a ERC20 compliant token with 18 decimals. The token will serve as the credits to buy and sell sensor data within the platform.

The MiniMe token

Apart from the initial use in the platform, the token is based upon the MiniMe[15] standard.

A MiniMe token is easy to clone. This means it allows us to create new tokens with an initial distribution identical to the original token at a specified block, either to upgrade the token contract, or to create spin of tokens for e.g. governance.

The token Solidity code is available at https://github.com/DataBrokerDAO

Size of the market

To determine the market potential and future worth of the token we need to look deeper at the potential market for IoT data.

The market size of the primary market for IoT sensors grew from a 600 billion euro in 2015, to a staggering 900 billion in 2017. The market is projected to reach 1.3 trillion in 2020[16] and up to 1.6 trillion in 2024.
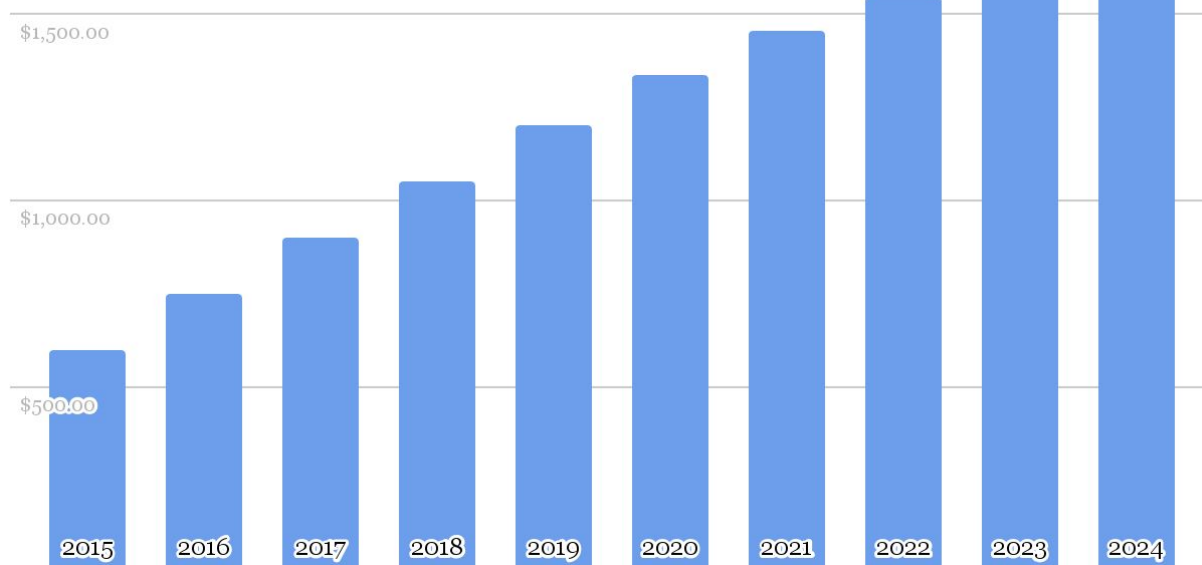
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[14] Originally the token was named DATA, but due to a naming conflict we changed it to DTX
[15] https://github.com/Giveth/minime
[16] State of the Market: Internet of Things 2016, Verizon

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Money spent on sensor purchases

■ Primary market (in billion)

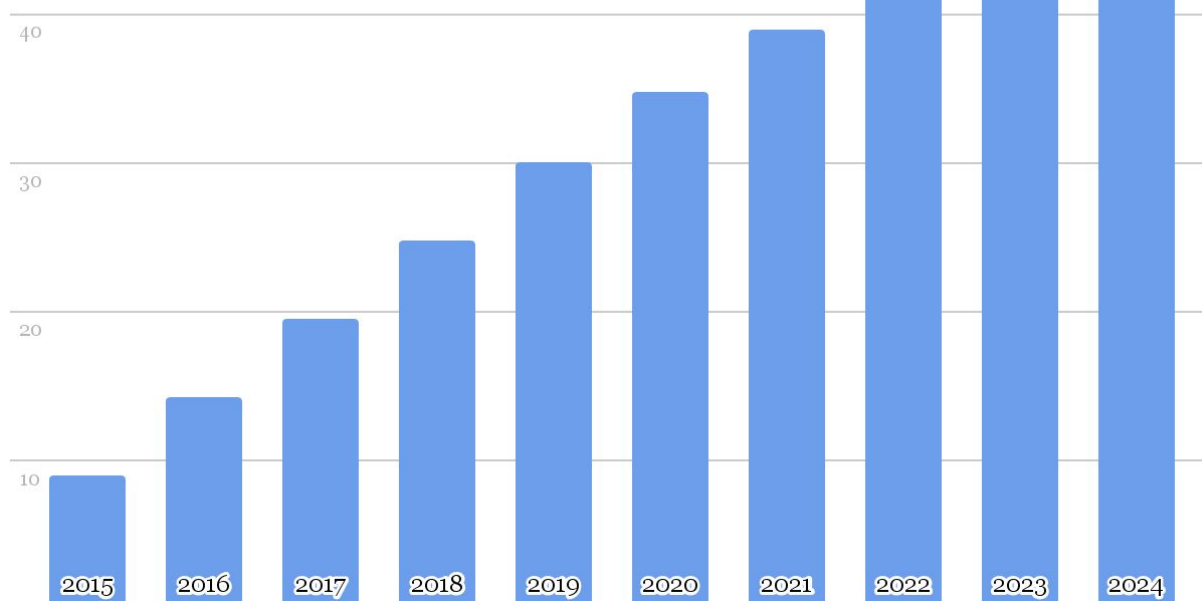| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |

These numbers translate to 9 billion sensors in 2015, to 19 billion in 2017, 34 billion in 2020[17] up to 45 billion in 2024. A staggering amount.

Amount of sensors transmitting data

■ Number of sensors (in billion)

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |

[17] State of the Market: Internet of Things 2016, Verizon

An important distinction about DataBroker DAO's potential market size is that we are not looking for the size of the sensor market itself, but the market for the data they emit. Sensor owners purchase sensors for primary usage because they believe that what they can do with the data is more valuable than the cost of acquiring, deploying and maintaining the sensors.

The market for sensors does however provide a clear indication of the amount of data that is available for sale today and in the years to come. Estimating the market size for the data is then a function of estimating the demand for the available data.

We are cautious with our estimates of the potential market size for this data. In our economic models, we use the assumption that the value of the IoT data market is only 30% of the primary market value. This assumption translates into a market potential in 2017 of 270 billion USD, growing to 500 billion USD in 2024. To err on the side of caution, we factor in an adoption rate of DataBroker DAO by Sensor Owners of 0.5 percent in 2024. Half a percent of the 45 billion sensors in 2024 amounts to 225 million sensors connected to DataBroker DAO generating 2.5 billion USD in yearly transactions on the platform.

Another valuation method could be to look at the market size of IoT platforms like IBM Watson IoT and Amazon Web Services IoT, that generate a 1-2 billion USD of revenue and are expected to grow 35% year over year. Reaching a total revenue of 18 billion by 2024. Cornering 10% of this market amounts to a similar revenue.

To put the 2.5 billion USD value into context, the Data Processing and Brokering market is estimated to generate 150 billion USD today in revenues[18] and is expected to double in the next 4 years. DataBroker DAO will provide a new source of data supporting the further growth of this market with previously inaccessible and/or costly data.

We can draw a useful parallel comparison to the financial sector where publicly traded companies produce their annual statements for statutory reporting to regulators and shareholders (primary purpose). On the back of the pile of data

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[18] Committee on commerce, science and transportation. (2013, December 18). *a review of the data broker industry: collection, use, and sale of consumer data for marketing purposes*.

generated, a whole host of companies, like Thomson-Reuters, FactSet and Interactive Data emerged to aggregate the data adding a layer of professional and consulting services on top. In doing so, they leverage the data produced for primary purposes (reporting to regulators and shareholders) to create an entirely new business and a host of value added services by leveraging the data.

Initial value of the DTX token

The goal is to have 1 DTX token to cover the average value of the data from a sensor for one week. This allows us enough granularity (at 18 decimals) to work with micropayments, even after significant growth and price increases.

We determine the corresponding price per token by looking at the market predictions in the previous section for 2024. At that time we project to have 2.5 billion USD flowing through the platform for 225 million sensors.

$$\frac{2,500,000,000 \ USD/year}{225,000,000 \ sensors/year} = 11.11 \ USD/sensor/year$$

The average sensor has a value of ~12 USD per year, ~1 USD per month, or 0,25 USD per week and as such the value of 1 DTX token should equate initially to this number. At an ETH price of 1000 USD / ETH, 1ETH will get you 4000 DTX tokens.

We determine the maximum number of tokens issued to be 225 million, the amount of sensors on the platform in 2024.

5% is reserved for team incentives over the coming 4 years. The majority of this team fund will be distributed to team members joining the project and will be vested in stages over 3 years, and the unvested tokens return to the fund in case the team member leaves the team. The rest is distributed to current team members and advisors.

An additional 10% is reserved for the platform fund. The majority of these tokens will be used to allow enterprise users to buy tokens using fiat currency to ease adoption of these crucial users. This will happen if no other solution via exchanges can be found, and gradually over the next 4 years as not to influence the market.

Our earliest supporters, those who purchased the old DATA token, will get an equivalent of their original ETH investment at current prices in DTX tokens at a bonus rate of 60% to reward them for their trust in the project. This amounts to 6,5% in total.

30% or 67.500.000 tokens will be locked up until January 1st, 2021. Effectively decreasing the available supply significantly for the foreseeable future.

0,5% of the tokens is reserved for the bounty campaign.

The rest, 108.000.000 tokens (48%) will be sold in to this sale event

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Token distribution

Team incentives
5.0%
Platform
10.0%
Early supporters
6.5%

Sale
48.0%

Lock-up
30.0%

Bounty
0.5%
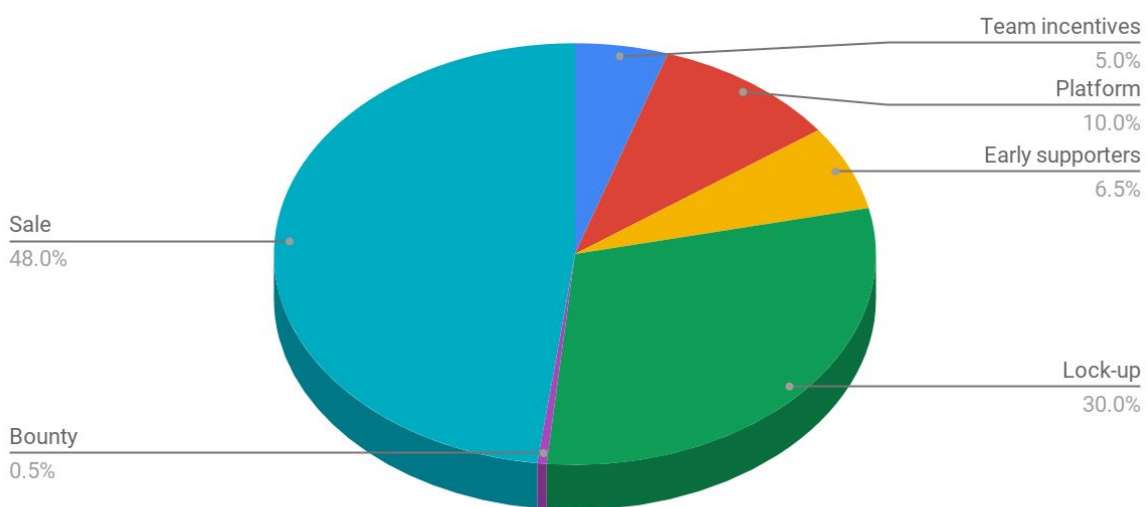
TOKEN SALE

The token sale will accept purchases in ETH. The tokens will be delivered the week after the sale completes.

Pre-sale starts March 19th, 2018 4PM CET

The presale phase of this token sale event starts on March 19th, 2018 at 4PM CET. During this presale a 50% token bonus applies (6000 DTX/ETH) and the minimum purchase amount during this period is 10 ETH.

Main sale starts March 26th, 2018 4PM CET

The main sale will start March 26th, 2018 at 4PM CET.

The sale will run for 4 week. The rate for this phase is 4000 DTX per ETH. () Only on the first day a 10% bonus will be awarded.

Before and during the token sale, a referral system is in effect. Contributions via a referral link will result in a bonus of 5% of the tokens sold via a referral link. These tokens are part of the locked reserve and do not increase or affect the total amount of tokens, nor the maximum amount of tokens offered.

Unsold tokens will be kept by the platform. In case of a significant ETH rate (1000 USD/ETH) change leading up to the sale will cause a recalculation according to the same formula used above.

Trading starts April 30th, 2018

The tokens will be issued and be tradable 1 week after the sale ends (April 30th, 2018).

At this point in time we have a commitment to list the DTX token on Chankura.com at that time and are identifying one or two more exchanges to list it on, by that time

THE TEAM

Some history

The DataBroker DAO was conceptualised at SettleMint in late 2016. The dynamics of the market and the opportunities it brings immediately sparked the development of the first proof of concepts.

After the first beta was completed in February, it has been on the road to tradeshows, pitch competitions and blockchain challenges across the world to test its market viability. We have demoed the platform in London, Dublin, Berlin, Singapore, Dubai, Jeddah, Salt Lake City, New York, Paris and Tokyo. The result was astounding, people love the idea and the product, and interest from manufacturers and gateway operators has been encouraging.

In June, the decision was made that the project itself has too much potential to not run with a dedicated team and that a token sale was better suited to the project than traditional VC rounds.

To give all of our early community the chance to push the ecosystem forward, we opted to do an early token sale in September. With a very long lockup and significant risk to the buyers, they truly are our avid supporters. We raised a little over 960 ETH that has appreciated significantly since then.

During this early token sale we were asked by the Belgian regulator (FSMA) to give more context and to determine if this token sale was regulated by them. Assisted by Willem Van de Wiele, crypto expert and legal counsel at White & Case LLP we provided the regulator with a complete written and verbal overview of our project and plans. At that time there were no further questions nor actions required.

About SettleMint

SettleMint is a Belgian/Dubai based startup focussed on creating tools to make building blockchain applications easy by any IT team.

All the work and R&D is encapsulated in a distributed middleware called Mint which consists of 4 SDK. Notary, which deals with anything related to recording information on blockchain, but also IPFS and swarm. Provenance for supply chain tracking. Ballot box for voting and last but not least Marketplaces for functionality ranging from tokens to exchanges of digitally traded products. All the while supporting a wide range of public and private blockchain solutions like Ethereum, Bitcoin, Multichain, BigchainDB and the Hyperledger projects.

Mint is used in the DataBroker DAO. The marketplaces SDK and smart contract templates are used for the marketplace part of the project, while the Notary SDK is used in the archiving and sharing of the dat part of the project. A yearly licence fee will be payed out of the revenue of the platform as compensation.

DataBroker DAO is based out of the SettleMint Dubai office.

Team members

Matthew Van Niekerk
Co-Founder & CEO

Founded and exited two companies in Japan, then got his MBA in Belgium, after which he joined a large financial institution, performing a variety of roles ranging from COO of the consumer finance business line to head of platform innovation for the brokerage and crowdfunding platform. In 2016, he left the bank and co-founded SettleMint.

Roderik van der Veer
Co-Founder & CTO

After Roderik built one of the largest ecommerce computer store sites in Belgium in 1999, he worked in the IT development sector and as CTO grew a traditional marcom agency into a digital powerhouse. He exited this business to focus on blockchain technologies when he co-founded SettleMint in 2016.

Frank Van Geertruyden
MarCom Director

As a marketing and communication professional with almost 20 years experience in advertising, publishing, sales, automotive and ICT, Frank worked on both agency and advertising site before getting on-board at SettleMint.

Els Meyvaert
Project Manager

Els worked as account manager in various financial institutions until she moved back to her first love, communication. As account director, she handled communication for the largest FMCG group in Belgium before joining SettleMint.

Cassandre Vandeputte
Solution Analyst

Cassandre has earned her stripes in the blockchain innovation labs at Accenture before joining SettleMint this year.

Tom De Block
Blockchain Architect

A serial entrepreneur with active companies in Belgium, Spain and eastern Europe and a strong background in quality assurance in large financial institutions across Europe.

Silke Van den Broeck
Blockchain Developer

After working with cutting edge web and mobile technologies in multiple Belgian startups, Silke decided to use her experience as a full-stack developer to help lift the SettleMint tech to a higher level.

Veronica Murguia
Investment Advisor

Experienced Venture Development Consultant with a demonstrated history and track record of working in the early stage investment services and entrepreneurship industry. Veronica is an active connector, skilled business developer, known for strong people skills, resilience, energy, drive to pursue growth opportunities for blockchain and positively contribute to the MENA entrepreneurship ecosystem.

Magomet Tsanajev
Content Creator

Marketing and multimedia specialist, including videography, photography and animation.

Advisors

Patrick Byrne

CEO, Overstock.com

Julien Marlair

Innovation manager, Proximus

Jonathan Johnson

President, Medici Ventures

Richard Kastelein

Blockchain News Publisher Partner Cryptoassets Design Group

REFERENCES

Ann Bosche, D. C. (2016, April 27). Defining the Battlegrounds of the Internet of Things[19]. Babel, C. (2015, February 5). Tackling Privacy Concerns is Key to Expanding the IoT[20].

Columbus, L. (2016, November 27). Roundup of Internet Of Things Forecasts And Market Estimates, 2016[21].

Committee on commerce, science and transportation. (2013, December 18). a review of the data broker industry: collection, use, and sale of consumer data for marketing purposes[22].

Dixon, P. (2013). Congressional Testimony: What Information Do Data Brokers Have on Consumers? World Privacy Forum.

Edith Ramirez, J. B. (2014). Data Brokers, A call for transparency and accountability. FTC.

Ericsson. (2016, June). Ericsson Mobility Report - On the pulse of the networked society[23].

Federal Trade Commission. (2014, May 27). FTC Recommends Congress Require the Data Broker Industry to be More Transparent and Give Consumers Greater Control Over Their Personal Information[24].

Flavio Cirillo, M. B. (2016, December 13). IoT Broker[25].

Freyberg, A. (2016, June 14). Internet of Things - Why you should care... NOW[26].

Gamer, N. (2015, March 31). Your IoT device: How much data should it collect?[27]

General Electrics. (2016). The Industrial Internet Platform. Online: GE Digital.

[19] http://www.bain.com/publications/articles/defining-the-battlegrounds-of-the-internet-of- things.aspx
[20] http://insights.wired.com/profiles/blogs/addressing-consumer-privacy-concerns-is-key-to-expanding-the#axzz3Vc45EqPS
[21] https://www.forbes.com/sites/louiscolumbus/2016/11/27/roundup-of-internet-of-things-forecasts-and-market-estimates-2016/#71d4b45b292d
[22] https://www.commerce.senate.gov/public/_cache/files/0d2b3642-6221-4888-a631-08f2f255b577/AE5D72CBE7F44F5BFC846BECE22C875B.12.18.13-senate-commerce-committee-report- on-data-broker-industry.pdf
[23] https://www.ericsson.com/res/docs/2016/ericsson-mobility-report-2016.pdf
[24] https://www.ftc.gov/news-events/press-releases/2014/05/ftc-recommends-congress-require-data-broker-industry-be-more
[25] https://www.fiware.org/wp- content/uploads/2016/12/3-Day-13-Developers-IoTBroker.pdf
[26] http://gtdc.org/wp-content/uploads/2016/06/Internet-of-Things_ATKearney.pdf
[27] https://www.ecnmag.com/blog/2015/03/your-iot-device-how-much-data-should-it-collect

Gillett, M. P. (2016, January 14). The internet of things, Heat Map, 2016[28].

IoT Analytics. (2016, January). IoT platforms: market report 2015-2021[29].
IoT Solutions World Congress. (2016, September 23). IoT sensors market worth 38.41 billion USD by 2022[30]. Johannes Deichmann, K. H. (2016, October). Creating a successful Internet of Things data marketplace[31].
Kapko, M. (2014, March 27). Inside the Shadowy World of Data Brokers[32].
Lerouge, G. (2017, March 24). Go to market strategy for b2b saas companies[33].
Lynne Dunbrack, L. h. (2016, March). IoT and Digital Transformation: A Tale of Four Industries[34].   Marketing Manager Insider. (2017, March 22). What are data brokers, and what is your data worth?[35] .
Marketo. (2017, March 24). What is Lead Generation[36].
Moore, S. (2016, June 8). How to Choose a Data Broker[37].
Postscapes. (2017, March 22). IoT Technology Guidebook[38].
Privacy Rights Clearinghouse. (2010, October 4). Online Information Broker FAQ[39] .
Singer, N. (2012). Mapping, and Sharing, The Consumer Genome. NYTimes.
Smartcities, E. (2016, January 27). Roadmap 2016[40].
Tarrant. (2017, March 24). Developing a goto market strategy[41].
WordStream. (2017, March 24). The WordSTream Blog[42].

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[28] https://www.cloudera.com/content/dam/www/static/documents/analyst-reports/forrester-the-iot-heat-map.pdf
[29] http://files.shareholder.com/downloads/PMTC/0x0x907546/309A7969-7F29-4110-9763-012ED05CAF0C/IoT_Platform_Market_Report_2015-2021.pdf
[30] http://www.iotsworldcongress.com/iot-sensors-market-worth-38-41-billion- usd-by-2022/
[31] http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/creating-a-successful-internet-of-things-data-marketplace
[32] http://www.cio.com/article/2377591/data-management/inside-the-shadowy-world-of-data-brokers.html
[33] https://www.slideshare.net/GuillaumeLerouge1/go-tomarket-strategy-for-b2b-saas-companies
[34] http://digitalistmag.wpengine.netdna-cdn.com/files/2016/03/IDC_IoT_white_paper_Mar2016.pdf
[35] https://www.webpagefx.com/blog/general/what-are-data-brokers-and-what-is-your-data-worth- infographic/
[36] https://www.marketo.com/lead- generation/
[37] http://www.gartner.com/smarterwithgartner/how-to-choose-a-data-broker/
[38] https://www.postscapes.com/internet-of-things-technologies/
[39] https://www.privacyrights.org/blog/online-information-broker-faq
[40] https://eu-smartcities.eu/sites/all/files/Roadmap%20EIP_SCC_WEBSITE.pdf
[41] www.slideshare.net/mtarrant/developing-a-goto-market-strategy
[42] http://www.wordstream.com/blog/ws/2015/10/22/demand-generation