databroker dao

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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 organizations 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 the primary usage of the sensor owner or it is enhanced with value-added insights and resold.

Whether for primary usage or for enrichment and re-sale, the data remains grossly under-utilized and the utility for society locked away in organizational silos. By connecting data owners with 3rd party data consumers directly, DataBroker DAO provides a marketplace where IoT sensor data can be fully valorized 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.

In this paper, we also introduce the DATA Token, the utility token deployed in DataBroker DAO. The DATA Token is used by data consumers to purchase access to sensor data available on the DataBroker DAO platform.
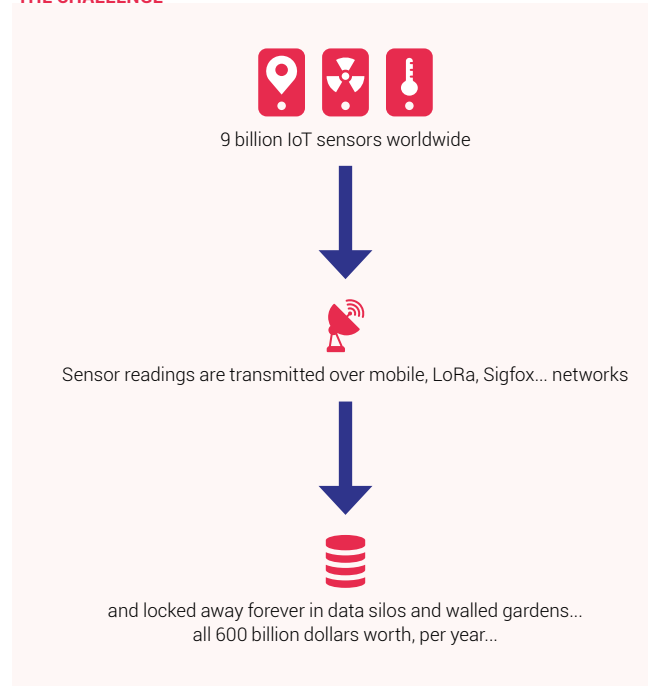
1. State of the Market: Internet of Things 2016, Verizon

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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 CHALLENGE

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...

CHALLENGE

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

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. These figures encompass 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].

Furthermore, whether for primary usage or enrichment and direct resale, the data remains grossly under-utilized and the utility for society locked away in closed organizational silos. Stifling innovation and holding back society as a whole.

2. State of the Market: Internet of Things 2016, Verizon

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, utilizing existing infrastructure from telecommunication providers operating sensor connectivity networks based on GSM, LoRa, and SigFox, or via a proprietary gateway of the sensor owner.

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.**

STAKEHOLDERS

There are a number of stakeholders in DataBroker DAO, including sensor owners, network 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 offer the data emitted from their sensors for sale via the DataBroker DAO platform. This is a diverse group that has 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. The scope of this purchase could be to use the data in its raw form, for their own purposes, or to transform/enrich 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 get accurate local readings, to the more complex, like purchasing data to train one's AI.

SOLUTION

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.

- 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 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, and 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.

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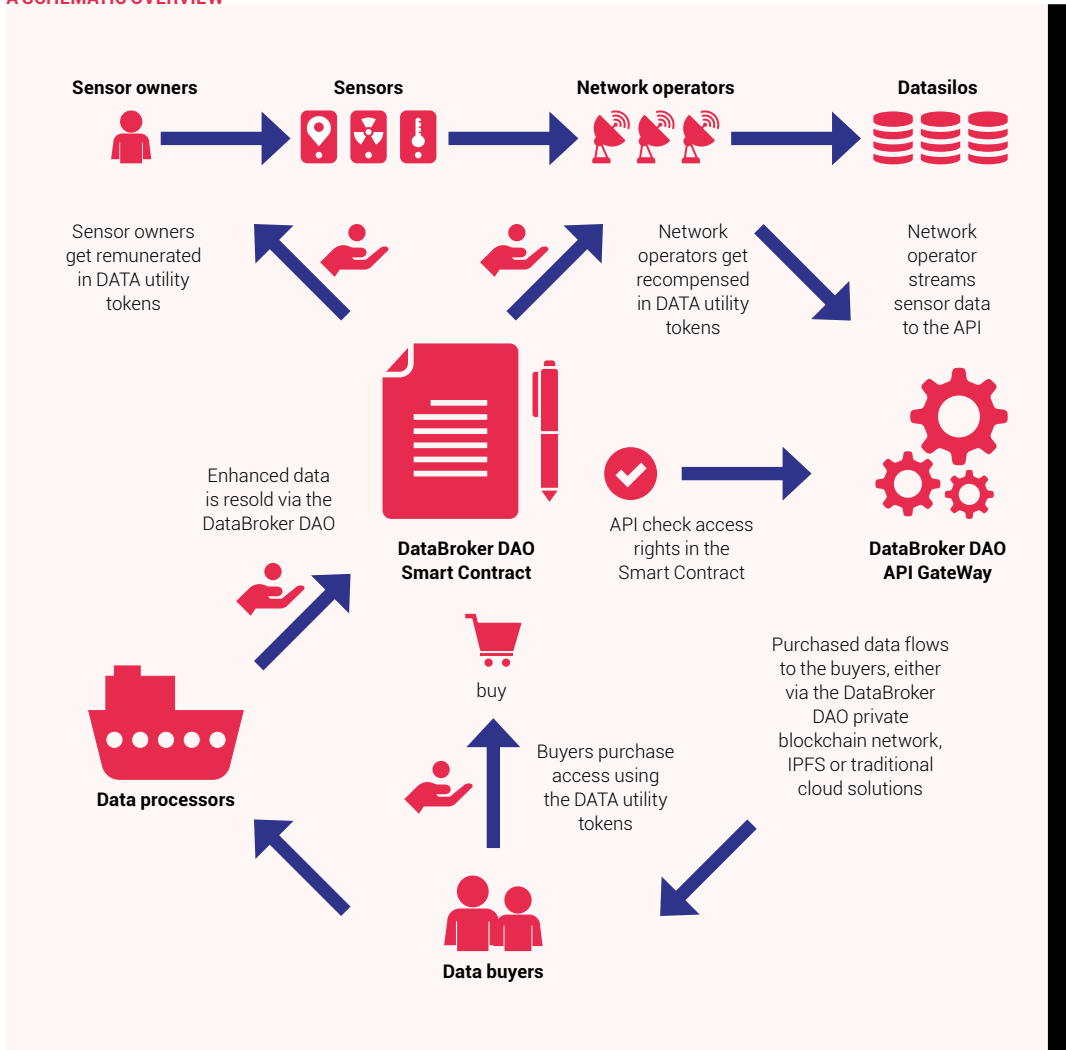
The key role of Network Operators in DataBroker DAO is to expose the gateway they operate to enable sensor owners to sell their data on the platform.

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

3. - 4. - 5. Moore, S. (2016, June 8). *How to Choose a Data Broker.*

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.

A SCHEMATIC OVERVIEW

Sensor owners

Sensors

Network operators

Datasilos

Sensor owners get remunerated in DATA utility tokens

Network operators get recompensed in DATA utility tokens

Network operator streams sensor data to the API

Enhanced data is resold via the DataBroker DAO

DataBroker DAO Smart Contract

API check access rights in the Smart Contract

DataBroker DAO API GateWay

Data processors

buy

Buyers purchase access using the DATA utility tokens

Purchased data flows to the buyers, either via the DataBroker DAO private blockchain network, IPFS or traditional cloud solutions

Data buyers

WHO "WINS" IN THIS STORY?

- **Sensor owners** (data providers) are able to directly monetize their data to generate passive income that will turn a sunk cost into a potential money maker, or at least the opportunity to recoup some of their investments in IoT sensors (purchase, installation, maintenance, and software licenses to interpret the sensor data). A sensor owner will earn between 80-89% 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 they 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.

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

The DAO takes the remaining 1-10% of all funds received on the platform, depending on market conditions, to cover operating costs.

REVENUE DISTRIBUTION

Platform
10,0%

Network operator
10,0%

Sensor owner
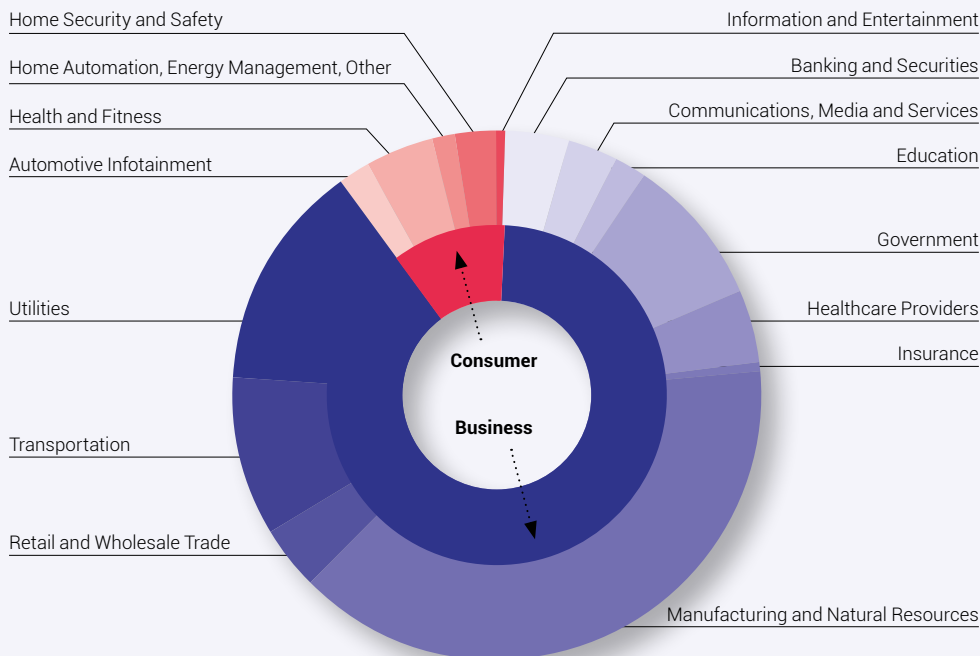**80,0%**
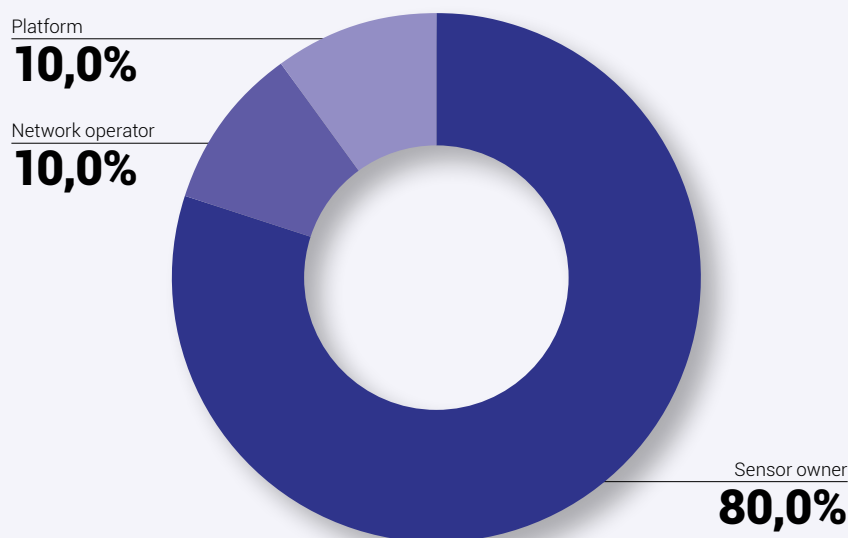
WHO "LOSES" IN THIS STORY?

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

A number of data sellers have been 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 one. It is clear that the business group is the main global driving force in sensor deployment.

DATA SELLERS

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 of selling selected data that will not reveal to competitors specifics of said companies' manufacturing process.

- **Transportation:** the data for transportation consists of both traffic and vehicle-specific data. Traffic data encompasses congestion as well as data for shipping goods such as that gathered by 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 CO2 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 to air quality monitoring and 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 for it to be meaningful. The DataBroker DAO platform provides a means to turn what today is a sunk cost and a perpetual maintenance expense into an investment with a 2-3 year payback period and a continuous income stream thereafter.

- **Agricultural Sector:** in Belgium today, 10% of farmers are "techie". They have a drone flying around, 5-20 sensors deployed, and other automation also in place. The sensors include wind, temperature, barometric pressure, humidity, and PH level in the soil. They use these to manage their farm and spend between 10-50k Euros 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 commercialize 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; remarkably, the data gathered is more accurate and granular than that of the national weather service. They are a potential buyer, as are TV and radio stations, which 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, fertilizer 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, thus turning the expense into an investment with a 2–3 year payback period and a continuous income stream thereafter.

- 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 an understanding of 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, or at least have the opportunity to recoup some of their investments in IoT sensors.

- Network 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 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 eco-system to sell their services to the right people.
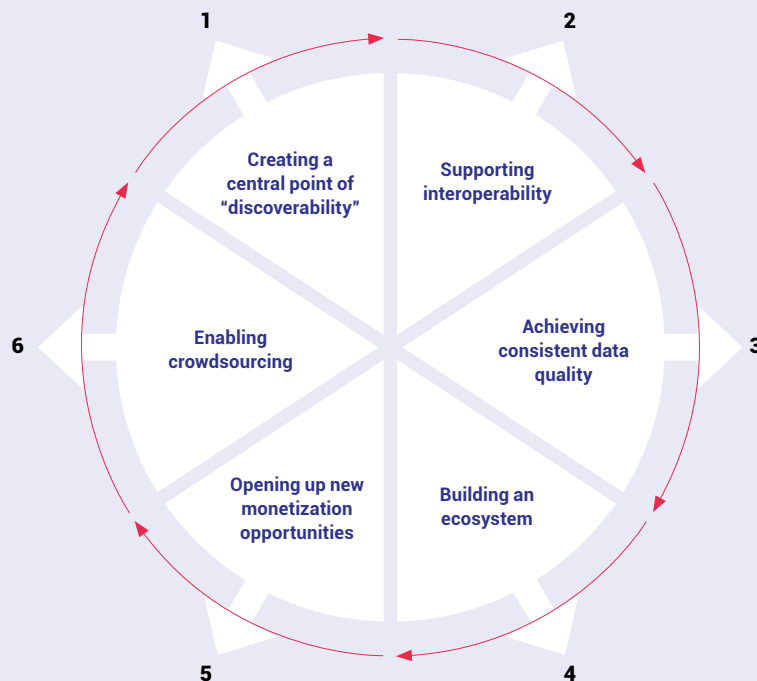
"Data is the most important asset class of our generation."
Don Tapscott

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The biggest obstacle to the success of DataBroker DAO and the full valorization 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), incentivizing them to provide access to their proprietary data.

COMPLETENESS OF DATABROKER DAO

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

6 KEY PILLARS OF AN IOT SENSOR DATA MARKETPLACE

1. Creating a central point of "discoverability"
2. Supporting interoperability
3. Achieving consistent data quality
4. Building an ecosystem
5. Opening up new monetization opportunities
6. Enabling crowdsourcing

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

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

SUCCESS

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

1. **Creating a central point of "discoverability":** the DAO pulls together data that is otherwise locked in organizational silos controlled by the sensor owners.

2. **Supporting interoperability:** the DAO defines standard meta formats for data descriptions and will integrate several processes to bring actual data into standardized formats in the next iteration of the platform.

3. **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.

4. **Building an ecosystem:** the DAO brings the stakeholders in the IoT sensor data market together. It is the foundational layer of the ecosystem.

5. **Opening up new monetization opportunities:** Sensor owners are incentivized through direct remuneration from data buyers. In a future iteration, the platform will introduce additional data enrichment and display options that service providers can monetize through the platform. The roadmap includes graphical packages from mapping to charts.

6. **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 financial ecosystem, with a 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.

From a decentralized 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.

7. http://ethgasstation.info/

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Blokchain is the perfect technology from a marketplace, decentralised network and ecosystem perspective. Utility token ties them all together in an efficient manner.

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 Databroker DAO is a great add-on for many of these projects – the missing link in the ecosystem.

A prominent new project in that space is IOTA[8]. We see the potential as a blockchain-based network operator where the sensor owners have the opportunity to bypass some of the network operators. Besides data 'in' the system, we also see an opportunity for data "out" to buyers and to data processors. Integrating with IOTA is planned in the technical roadmap as soon as they reach a somewhat stable version.

8. https://iota.org/

IDENTITY MANAGEMENT

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. Again, these sensors are owned by a very large number of owners. These owners have contracted a network operators to transport the data generated by their sensors to a (mainly internet) gateway for consumption.

IDENTITY DELEGATION

sensors

sensor owner
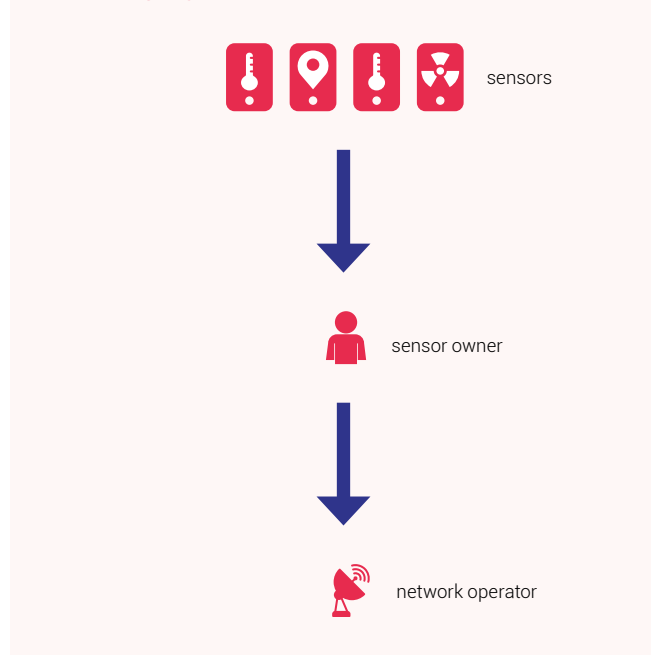
network operator

The network operator takes up the role of gatekeeper for 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 guarding their network against unauthorized use. Also in most regions, network operators do not hold a monopoly, resulting in a large number of potential partners, which is still significantly small compared to the number of owners or sensors.

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

ARCHITECTURE

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

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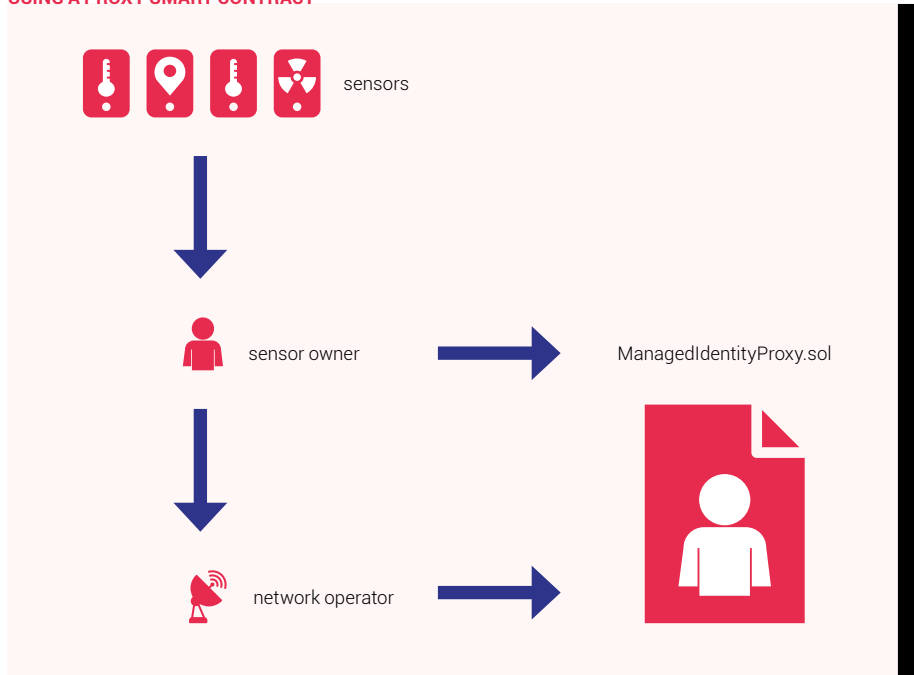
This has a consequence for managing the identities of the sensors, owners, and operators in the platform. Building on the work of end user identity management projects like uPort, the platform works with "Managed Identity Proxy" contracts. These proxy contracts contain the link to the sensor owner's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

This allows us to have full ownership by the sensor owner, combined with the ability of the network 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,
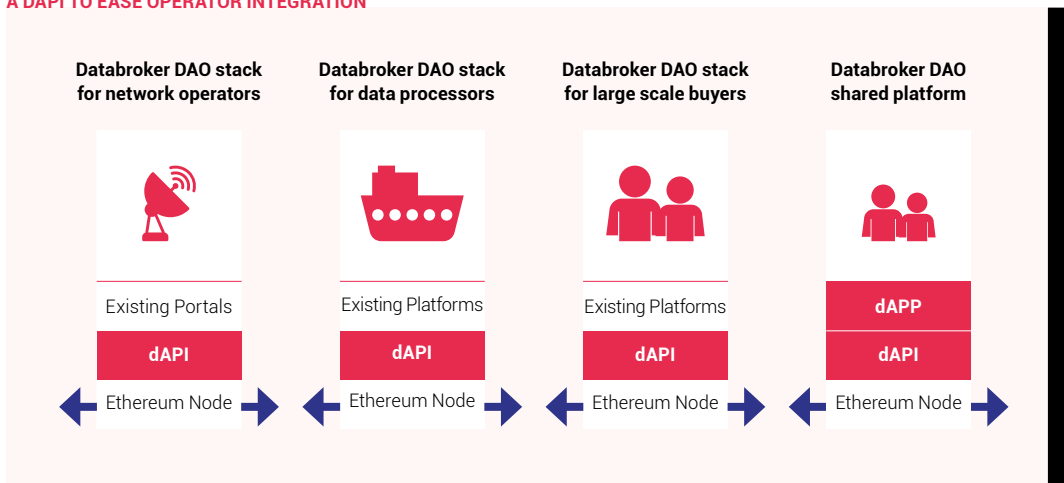
these applications are running on remote shared nodes like the ones Infura[9] provides. While this is the only way to create user-friendly end-user peer-to-peer applications, it has serious drawbacks for some of our use cases:

- **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.

A DAPI TO EASE OPERATOR INTEGRATION

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

9. https://infura.io/

Primary usage of this dAPI is on the network operator, data processor, and large-scale data buyer sides, and not with the sensor owner or small-scale buyers. They will use the (existing) interfaces provided by the network operators or the Databroker DAO dAPP.

DATA DISTRIBUTION AND STORAGE

Billions of sensors generate huge amounts of data. And any company using IoT sensor data has its own systems for processing it and is most likely not inclined to replace that system. This means that 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 big data storage vendors, leaving the buyer the choice on where their data needs to be sent.

Now there is a valid use-case for blockchain in the storage of the data. The immutability and timestamping capabilities are worth something. On the one hand we allow batches of data sent to non blockchain repositories to be anchored on the Ethereum mainnet (using the Chainpoint spec[10]).

As an extra offering, there are connectors to put the data directly in a hosted and shared Multichain (1500tx/s[11]) and BigchainDB (going up to 1mio tx/s[12]) network. The current beta uses the Multichain connector exclusively to store the data.

ON THE ROADMAP

DISCOVERY, REPUTATION, AND CURATION

Another important role of the dAPP is the discovery and curation of data feeds. In the same way that the Apple app store needs top lists and curated content due to the large number of applications offered, the marketplace will have to perform similar functions.

Having billions of sensors on a platform is great from a supply perspective, but it makes discoverability of the specific sensors you need difficult. Tagging, categorization, filtering, and search capabilities fit right into the dAPP and where appropriate in the dAPI.

The quality of the data is a similar challenge. Using a combination of statistical and reputation tools combined with human curation, the network operators, data processors, and other buyers, the data feeds will be evaluated and scored on the trustworthiness of the data, in a peer-to-peer and trustless fashion.

10. https://chainpoint.org/
11. https://www.multichain.com/blog/2017/06/multichain-1-beta-2-roadmap/
12. https://www.bigchaindb.com/features/

NETWORK OPERATOR INTEGRATIONS

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

We will be working on both common standards and libraries to ease integration and perform the initial integrations for the first operators to join.

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 to provide valuable services based on the raw data, by providing libraries and integrations for commonly used tools. Integration with AI tools (like those provided by the large cloud providers or Tensorflow) comes to mind.

DataBroker DAO has been built to be production-ready in 2017. Since its inception in early 2017, there has been a flood of interesting new and distributed projects that we all hope come into fruition the next few years.

THE DISTRIBUTED STACK

DataBroker DAO has been built to be production-ready in 2017. Since its inception in early 2017, there has been a flood of interesting new and distributed projects that we all hope come into fruition the next few years.

As a best practice, the team is constantly evaluating these solutions, and we plan to integrate the ones that help DataBroker move forward or provide some sort of network effect that enhances the current offering.

A non-exhaustive list of these potential integrations are the governance tools of Aragon, IOTA, and Acorn as network operators, and direct integrations with traditional (Shapeshift) and distributed token exchanges like Omega One.

At the same time, several competing standards for identity management are in development (e.g. uPort), but none of them have enough market share or adoption yet to make it feasible to use them.
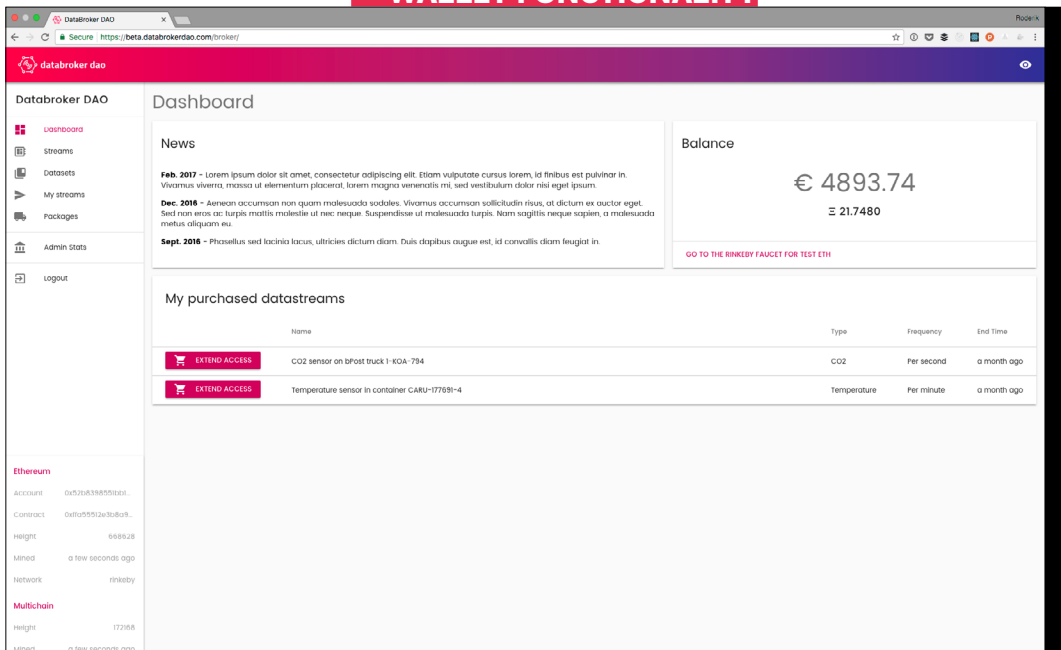
Check out the beta version at ***https://beta.databrokerdao.com***
    Over the past few months, the team has been hard at work to build the working platform. Leading up to the token sale, we will open-source more and more of the code underlying the platform.

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 DATA token as easy as possible.
    The wallet views encourage people to keep their funds in DATA 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 experienced crypto traders, the target audience for the token are people and organizations that are currently embedded in a fiat world. Liquidity is a good thing, but value stored in the token itself is important as well.
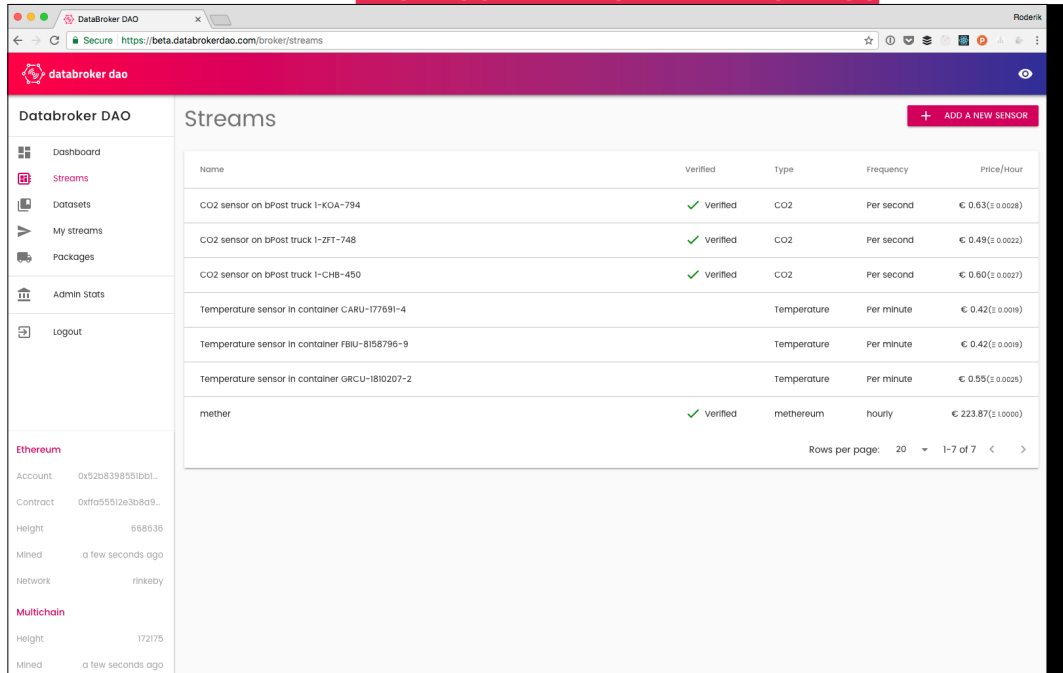
PROOF

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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. Our focus 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.

The proof is in the pudding, check out the fully functional beta version at
https://beta.databrokerdao.com
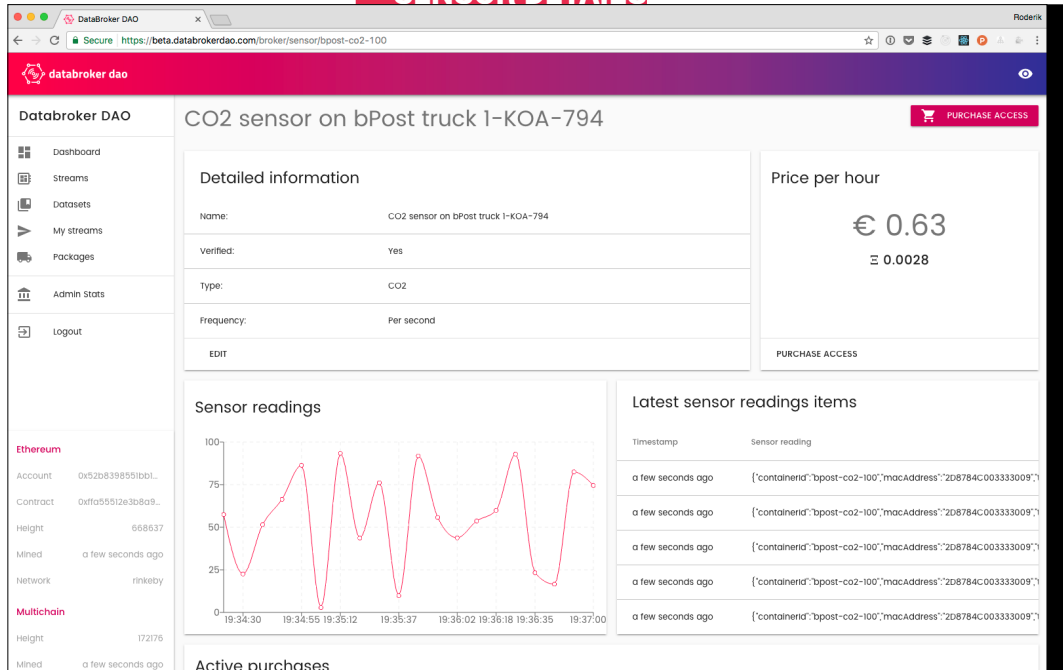
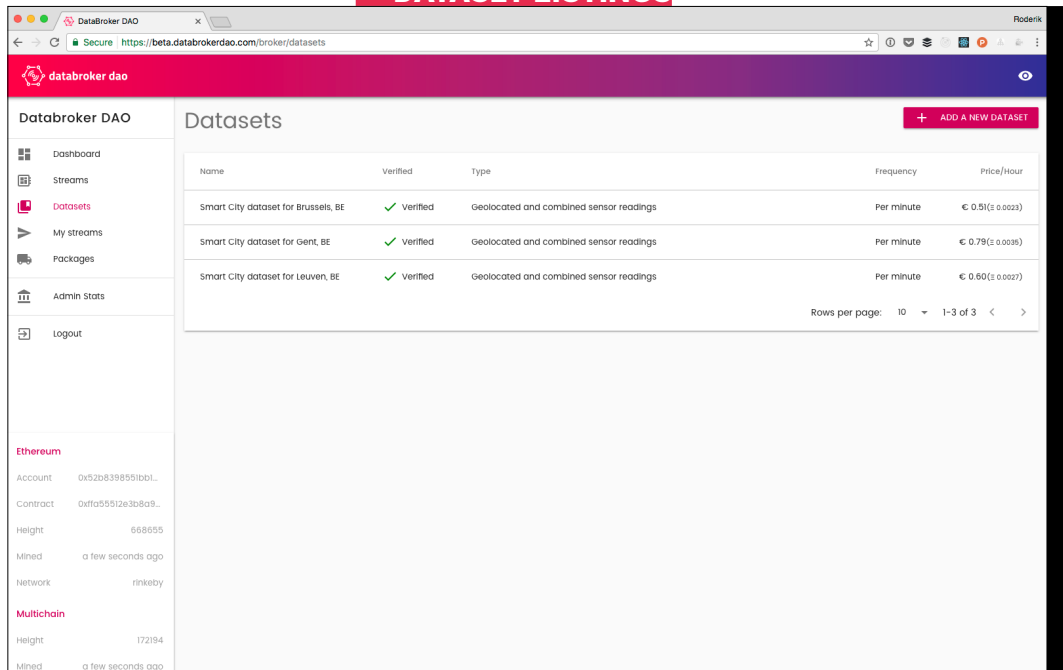

SENSOR DETAILS

The main object in this ecosystem is the sensor itself. The detail pages provide 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 analyzing, 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.

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.

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

GOVERNANCE

The DATA token is a utility token in the Databroker DAO platform. The DATA token is a ERC20 compliant token with 18 decimals. The token will serve as the credit to buy and sell sensor data within the platform.

WHY USE A TOKEN?

Choosing to use a token over fiat or ETH allows us to use the divisibility that is needed to operate micro transactions in a market with over half a trillion individual devices that produce data in the range of every second.

Having this abstraction layer on top of ETH also prevents the token to be subject to the large fluctuations of the ETH price. The volatility of the DATA token will be more limited and can be controlled in a limited fashion, with some market making using reserved funds and tokens.

THE MINIME TOKEN

Apart from the initial use in the platform, the token is based upon the MiniMe[13] 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 will be released on Github[14] before the early token sale.

DATA TOKEN

The DATA token is a utility token in the Databroker DAO platform. The DATA token is a ERC20 compliant token with 18 decimals. The token will serve as the credit to buy and sell sensor data within the platform.

SIZE OF THE MARKET

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

The market size of the primary market for IoT sensors grew from 600 billion Euros in 2015, to a staggering 900 billion in 2017. The market is projected to reach 1.3 trillion in 2020[15] and up to 1.6 trillion in 2024.

13. https://github.com/Giveth/minime
14. https://github.com/DataBrokerDAO
15. State of the Market: Internet of Things 2016, Verizon

MONEY SPENT ON SENSOR PURCHASES

■ Primary market (in billion)

§1,500.00									
§1,000.00									
§500.00									
2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
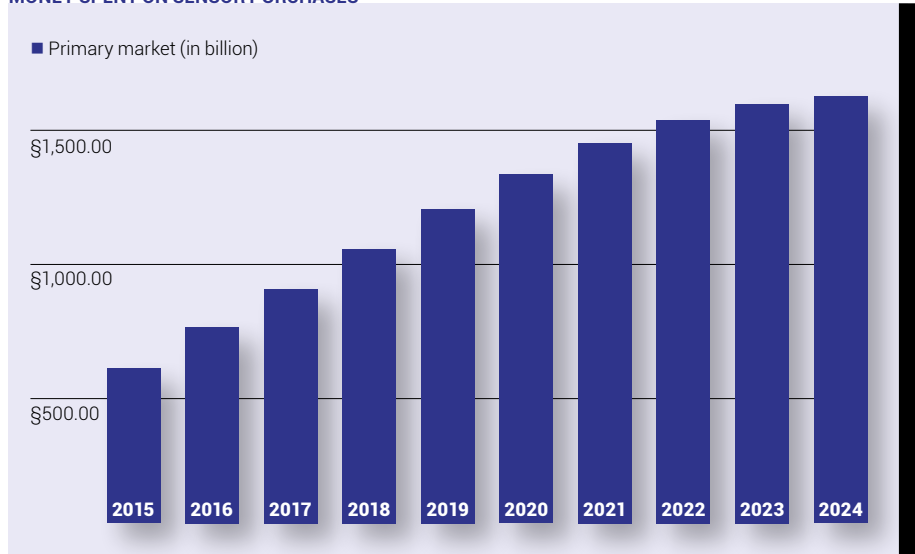
These numbers translate to 9 billion sensors in 2015, 19 billion in 2017, 34 billion in 2020[16], and up to 45 billion in 2024. A staggering amount.

AMOUNT OF SENSORS TRANSMITTING DATA

■ Number of sensors (in billion)

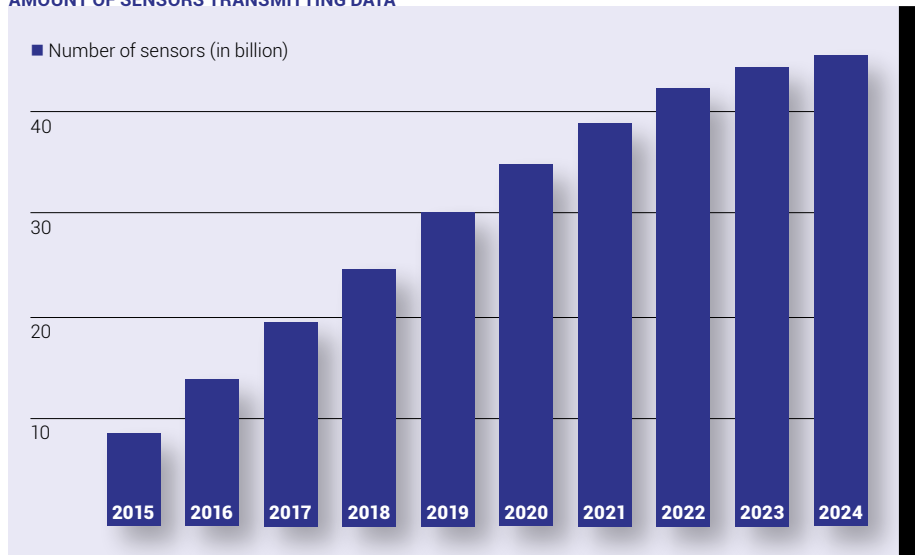|									
40									
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2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**

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.

16. State of the Market: Internet of Things 2016, Verizon

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. In 2017, this assumption translates into a market potential of 270 billion USD, projected to grow to 500 billion USD in 2024.

Again, 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.

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 revenue[17] 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 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 so doing, they leveraged the data produced for primary purposes (reporting to regulators and shareholders) to create an entirely new business and a host of value-added services.

INITIAL VALUE OF THE DATA TOKEN

The goal is to have 1 DATA token covering 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 DATA token should initially equate to this number.

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

17. 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.

The token sale is split up in three phases. These phases include realistic targets to build and, more importantly, grow the platform over the next years.

The baseline as described above is a platform with a built functional beta version, which has been market tested across the globe during the last few months, and with significant interest from both suppliers and consumers of data.

EARLY TOKEN SALE

The goal of this early token sale is to bring the platform up to v1.0 readiness and, more importantly, onboard a sizeable group of consumers and suppliers of data.

The proceeds of the early token sale will be spent on growing the team to 8-10 people, including business developers, community and development profiles. Additional spending will be allocated to operational costs like infrastructure, office space, marketing, and legal expenses.

PLANNED USAGE

Marketing
15,0%

Platform development
30,0%

Operating expenses
5,0%

Business development
50,0%
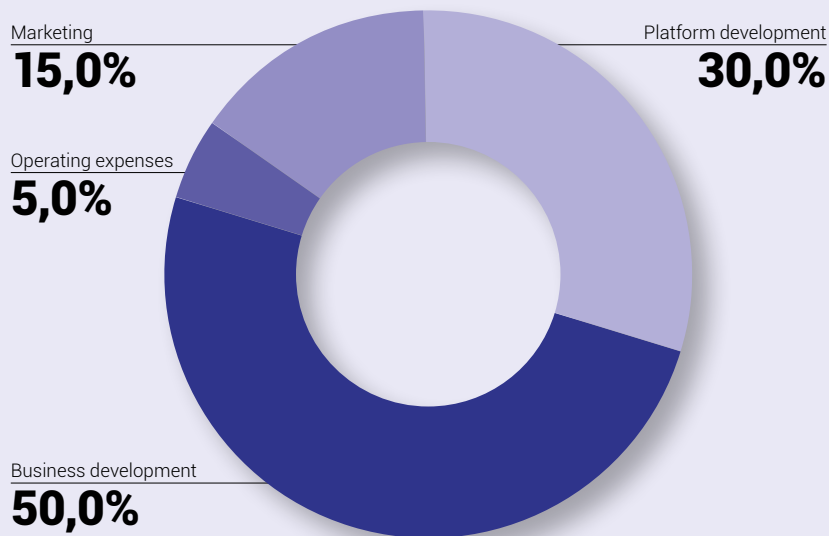
TOKEN SALE

During this early token sale, we will be offering 5% of the tokens (11,250,000) at a rate of 1,200 tokens per ETH (a 20% bonus compared to the main sale). We will allow overfunding of this goal to a maximum 15% of the tokens, allowing Databroker DAO to grow faster in preparation of the main token sale.

The early token sale starts on September 18, 2017 at 5PM CET and will run for 4 weeks unless the 15% hard cap is reached.

Unsold tokens will be sold in the main token sale.

During the early 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 platforms reserve and do not increase or affect the total amount of tokens nor the maximum number of tokens offered.

MAIN TOKEN SALE

The next phase for the platform will be global expansion and additional service offerings. Most of the funds will go into business development so as to onboard the estimated number of sensors, network operators, and consumers.

During the main token sale, we will be offering a maximum of 60% of the tokens (minus the overfunded token percentage sold in the early token sale) at a rate of 1,000 tokens per ETH. Again, the referral system will be in effect.

While the timeframe is flexible, we estimate moving into this phase some 6 to 8 months after the early token sale closes. During this period, we will monitor the token sale space closely to fine-tune the main token sale to the latest best practices concerning technical, regulatory, and organizational aspects.

RESERVED TOKENS AND ETH

The platform will retain 25% of all tokens, minus all tokens needed for the referral scheme, plus all unsold tokens.

The purpose of these tokens is twofold. On the one hand, a reserve of tokens allows for follow-up sales to accelerate growth and allows the platform to do some limited market making. This is crucial since the liquidity of a utility token is paramount in the functioning of the platform. At the same time, some of the raised ETH will also be kept in reserve for these market-making purposes.

An additional 10 percent of the tokens are reserved for the team fund. The majority of the team fund will be distributed to team members joining the platform and will be vested in stages over 3 years. The unvested tokens will be returned to the fund in case the team member leaves the team. The rest will be distributed to current team members and advisors.

TOKEN DISTRIBUTION AT MAXIMUM REFERRAL LEVELS

31

Maximum Referral
5,0%

Team
10,0%

Platform
20,0%

Early token sale
5,0%

Main token sale
60,0%
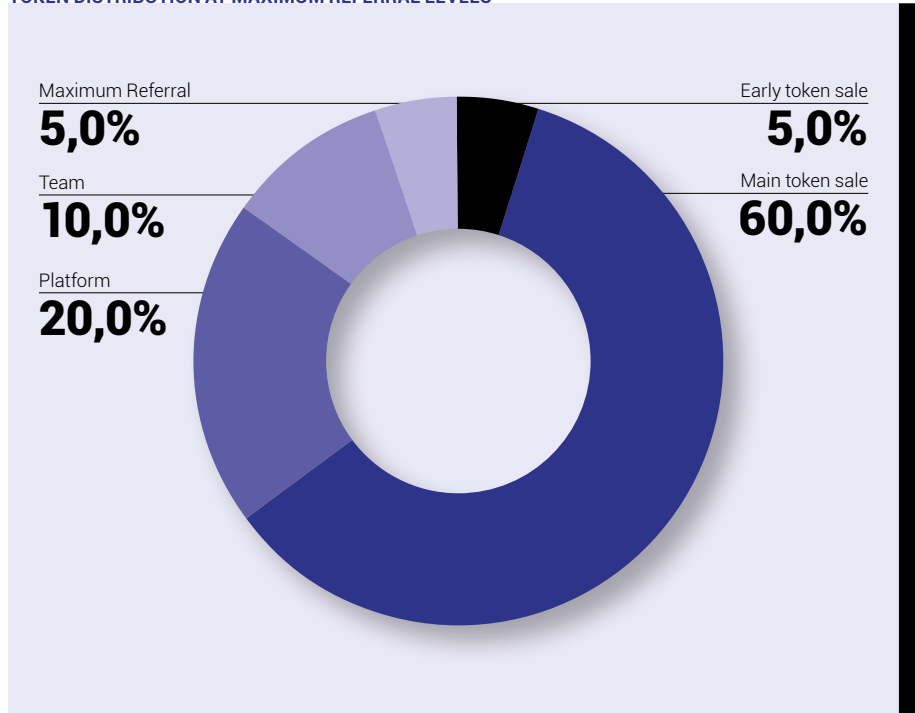
ETH PRICE FLUCTUATIONS

All numbers in this white paper will be recalculated with a market value of ETH before the start of each sale period.

ETH raised is hedged over a basket of other crypto, fiat currencies, and traditional low-risk financial instruments to minimize the effect of price fluctuations. This hedging might occur even during the sale events.

TEAM

SOME HISTORY

DataBroker DAO was conceptualized 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 network 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.

ABOUT SETTLEMINT

SettleMint is a Belgian-based startup focused 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 it supports 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 data part of the project. A yearly license fee will be paid out of the revenue of the platform as compensation.

TEAMMEMBERS

Matthew Van Niekerk

Born and raised in Canada, Matthew moved to Japan after completing his economics degree. In Japan, he founded and subsequently exited two companies. Moving on to get an MBA in Belgium, 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

Roderik has always been fascinated by technology. After building 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 marketing agency into a digital powerhouse. He exited this business to focus on blockchain technologies when he co-founded SettleMint in 2016.

Els Meyvaert

As the only one born and raised Belgian and after getting adegree in communication, 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.

Dylan Damsma

Dylan has built up extensive experience in digital marketing and growth marketing while working as Marketing technologist at Mindvalley, Customer Success Manager at AutopilotHQ, as well as launching a successful crypto community named "Cryptominded".

databroker
dao

ADVISORS
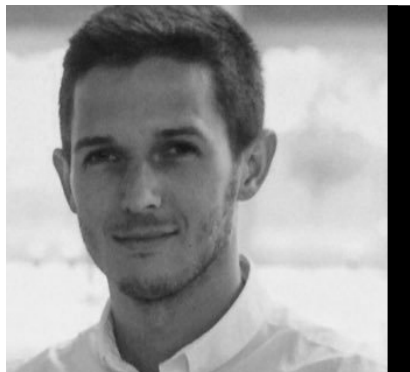
Jonathan Johnson
President, Medici Ventures, Inc.

Richard Kastelein
Blockchain News Publisher
Partner Cryptoassets
Design Group

Lawrence Pluym
Investment Banker & Crypto trader

Julien Marlair
Business Development and Innovation manager at Proximus

Ann Bosche, D. C. (2016, April 27). Defining the Battlegrounds of the Internet of Things[18]. Babel, C. (2015, February 5). Tackling Privacy Concerns is Key to Expanding the IoT[19]. Columbus, L. (2016, November 27). Roundup of Internet of Things Forecasts and Market Estimates, 2016[20]. 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[21]. 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[22]. 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[23]. Flavio Cirillo, M. B. (2016, December 13). IoT Broker[24]. Freyberg, A. (2016, June 14). Internet of Things - Why you should care... NOW[25]. Gamer, N. (2015, March 31). Your IoT device: How much data should it collect?[26] General Electrics. (2016). The Industrial Internet Platform. Online: GE Digital. Gillett, M. P. (2016, January 14). The internet of things, Heat Map, 2016[27]. IoT Analytics. (2016, January). IoT platforms: market report 2015-2021[28]. IoT Solutions World Congress. (2016, September 23). IoT sensors market worth 38.41 billion USD by 2022[29]. Johannes Deichmann, K. H. (2016, October). Creating a successful Internet of Things data marketplace[30]. Kapko, M. (2014, March 27). Inside the Shadowy World of Data Brokers[31]. Lerouge, G. (2017, March 24). Go to market strategy for b2b saas companies[32]. Lynne Dunbrack, L. h. (2016, March). IoT and Digital Transformation: A Tale of Four Industries[33]. Marketing Manager Insider. (2017, March 22). What are data brokers, and what is your data worth?[34] Marketo. (2017, March 24). What is Lead Generation[35]. Moore, S. (2016, June 8). How to Choose a Data Broker[36]. Postscapes. (2017, March 22). IoT Technology Guidebook[37]. Privacy Rights Clearinghouse. (2010, October 4). Online Information Broker FAQ[38]. Singer, N. (2012). Mapping, and Sharing, The Consumer Genome. NYTimes. Smartcities, E. (2016, January 27). Roadmap 2016[39]. Tarrant. (2017, March 24). Developing a goto market strategy[40]. WordStream. (2017, March 24). The WordSTream Blog[41].

18. http://www.bain.com/publications/articles/defining-the-battlegrounds-of-the-internet-of-things.aspx
19. http://insights.wired.com/profiles/blogs/addressing-consumer-privacy-concerns-is-key-to- expanding-the#axzz3Vc45EqPS
20. https://www.forbes.com/sites/louiscolumbus/2016/11/27/roundup-of-internet-of-things- forecasts-and-market-estimates-2016/#71d4b45b292d
21. https://www.commerce.senate.gov/public/_cache/files/0d2b3642-6221-4888-a631-08f2f255b577/AE5D72CBE7F44F5BFC846BE-CE22C875B.12.18.13-senate-commerce-committee-report- on-data-broker-industry.pdf
22. https://www.ericsson.com/res/docs/2016/ericsson-mobility-report-2016.pdf
23. https://www.ftc.gov/news-events/press-releases/2014/05/ftc-recommends- congress-require-data-broker-industry-be-more
24. https://www.fiware.org/wp- content/uploads/2016/12/3-Day-13-Developers-IoTBroker.pdf
25. http://gtdc.org/wp-content/uploads/2016/06/Internet-of-Things_ATKearney.pdf
26. https://www.ecnmag.com/blog/2015/03/your-iot-device-how-much-data-should-it-collect
27. https://www.cloudera.com/content/dam/www/static/documents/analyst-reports/forrester-the-iot-heat-map.pdf
28. http://files.shareholder.com/downloads/PMTC/0x0x907546/309A7969-7F29-4110-9763-012ED05CAF0C/IoT_Platform_Market_Report_2015-2021.pdf
29. http://www.iotsworldcongress.com/iot-sensors-market-worth-38-41-billion- usd-by-2022/
30. http://www.mckinsey.com/business-functions/digital-mckinsey/our- insights/creating-a-successful-internet-of-things-data-marketplace
31. http://www.cio.com/article/2377591/data-management/inside-the-shadowy-world-of-data-brokers.html
32. https://www.slideshare.net/GuillaumeLerouge1/go-tomarket-strategy-for-b2b-saas-companies
33. http://digitalistmag.wpengine.netdna-cdn.com/files/2016/03/IDC_IoT_white_paper_Mar2016.pdf
34. https://www.webpagefx.com/blog/general/what-are-data-brokers-and-what-is-your-data-worth- infographic/
35. https://www.marketo.com/lead- generation/
36. http://www.gartner.com/smarterwithgartner/how-to-choose-a-data-broker/
37. https://www.postscapes.com/internet-of-things-technologies/
38. https://www.privacyrights.org/blog/online-information-broker-faq
39. https://eu- smartcities.eu/sites/all/files/Roadmap%20EIP_SCC_WEBSITE.pdf
40. www.slideshare.net/mtarrant/developing-a-go-to-market-strategy
41. http://www.wordstream.com/blog/ws/2015/10/22/demand-generation

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