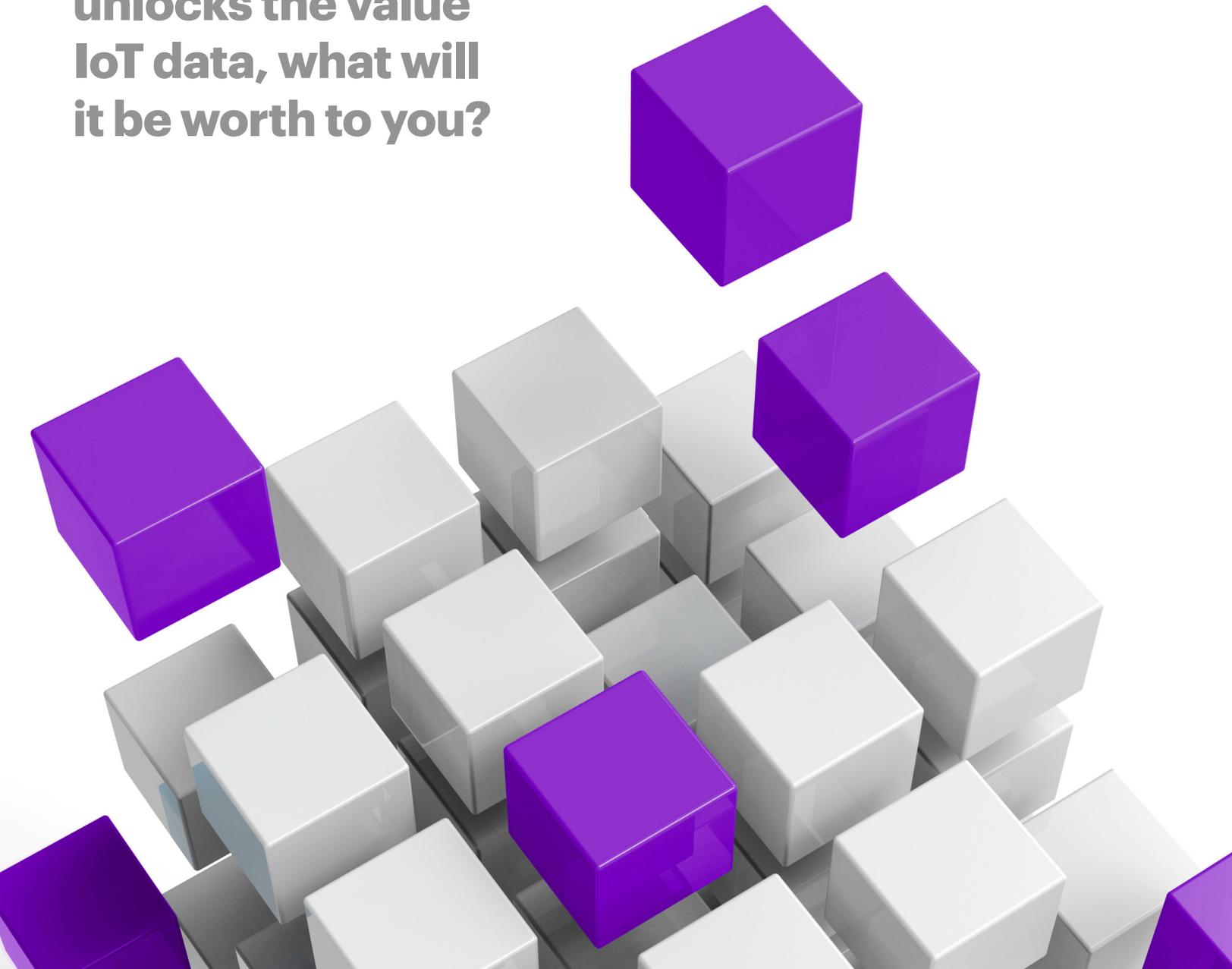Western Digital.

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VALUE OF DATA
THE DAWN OF THE DATA MARKETPLACE

When blockchain
unlocks the value
IoT data, what will
it be worth to you?

Although blockchain is the buzzword du jour thanks to the current media frenzy over cryptocurrencies, there are many other applications for blockchain beyond bitcoin. One that is uniquely suited to the technology: a marketplace for the sale of Internet of Things (IoT) data. There is a strong and growing momentum to bring this blockchain application into production, with several large organizations and smart city initiatives engaged in proofs of concept. Thanks to blockchain, by 2030, established marketplaces will effectively create a "data gold rush" for IoT adopters that will determine, in a free market, the value of the IoT data assets generated. This paper explores what these marketplaces could look like and how blockchain will allow stakeholders to unlock the value from their data.

Imagine logging into your Amazon account—but instead of buying a book, movie, or new Kindle, you're able to purchase data generated by an IoT device (or collection of devices) somewhere in the world. It could be from sensors on an oil rig in the North Sea bought by government agencies to create better predictive weather models; or from a major airline's jet engines for researchers to train better machine learning algorithms; or from air-conditioning units in a major office tower in Dubai bought by real estate developers trying to gain a competitive advantage over their competitors when designing new projects.

This is the concept of an IoT data marketplace, and it's not far from becoming a reality.

THE CASE FOR THE IOT DATA MARKETPLACE

Any type of machine or business activity can generate sellable data. However, IoT data represents a massive opportunity given the explosion in IoT device deployments.

According to Vodafone, the number of companies with at least 50,000 IoT devices has doubled since 2016,[1] and Gartner estimates organizations will invest $3.9 trillion in IoT hardware by 2021.[2] With more devices up and running, these large organizations are the ones with the greatest incentive to find a way to squeeze more return out of their investment by taking advantage of the nascent IoT marketplaces.
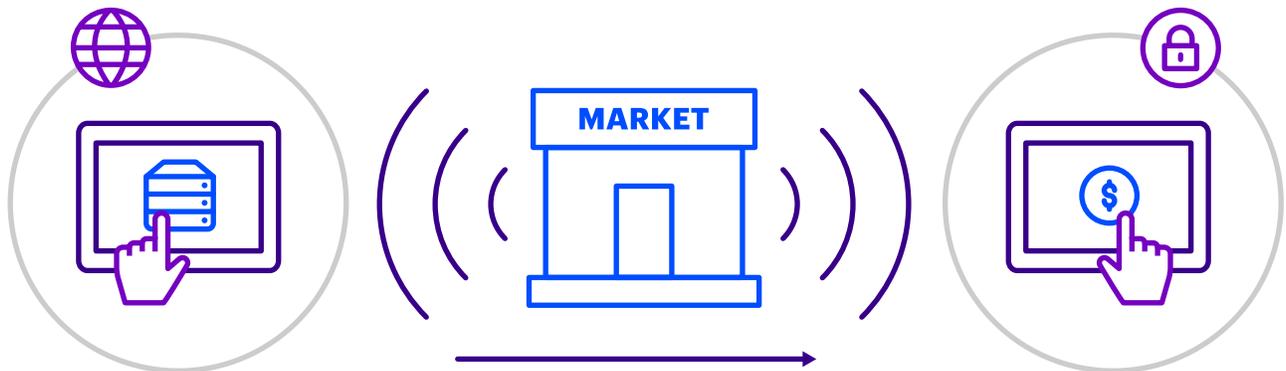
But are those marketplaces really needed? After all, there are already established channels through which companies can buy and sell data. The "data-as-a-service" (DaaS) industry—in which organizations purchase external third-party data from aggregators to augment their own internal data sets—is poised to become a $10.4 billion market by 2021, according to IDC.[3]

However, IoT data is not easily sold in this way. The gross of the data transacted in the DaaS industry consists of metadata from specific organizational content (anonymized customer data, utilization data, etc) that can be easily aggregated and packaged. On the other hand, IoT data streams are much more difficult to handle as they come from devices that control critical processes, infrastructure, and sensitive information. This makes IoT data a particularly good target for hackers. Recent data suggest DDoS attacks on IoT devices have increased 91 percent in 2017 alone.[4] In fact, security concerns are the number-one inhibitor of IoT adoption. The issues of trust and security are two big obstacles that impact organizations' willingness to sell and buy IoT data.

That's where blockchain comes in. Because of its unique capabilities, blockchain solutions are ideally suited to close the trust and security gap, thus motivating stakeholders to take the leap to monetize their IoT data.

A sense of urgency... and an opportunity

The $3.9 trillion investment expected in IoT over the next three years creates a strong sense of urgency for companies to extract more value out of each IoT device deployed and the data they collectively generate.

Platforms addressing the need to monetize IoT devices will give birth to IoT data marketplaces. Enabled by blockchain, these marketplaces will facilitate the exchange of IoT data between buyers and sellers, potentially unlocking more than $3.6 trillion in value by 2030.

By design, blockchain builds trust into every transaction via attributes not available in standard database models. With blockchain, traditional independent transactions are cryptographically validated by the ecosystem participants using mathematical models and the entire transaction history is available for all to see, in either public or private ledgers within each ecosystem.

Every time someone buys or sells data from an IoT device or devices, it's securely recorded in the blockchain in a way that lets anyone know who sold a particular data set, who bought it, and for what purpose. The existence of a perpetual, encrypted and validated record of transactions via blockchain increases confidence in buyers and sellers to exchange their sensitive IoT data assets, effectively 'unlocking' the intrinsic value of data that would otherwise be too risky to monetize.

Blockchain acts as an enabler of trusted transactions at a time in which the tailwinds from IoT adoption are increasingly powerful. Blockchain is critical to data marketplaces' ability to promote and facilitate trusted exchanges that unlock the value of the data IoT generates.

Blockchain rises to the challenge

Identity management/ data access

Ensure that data sellers and buyers are authorized to conduct transactions with the data assets in question

Cryptographic security of transactions

Highly secure mechanism to ensure transaction integrity

Traceability and oversight of all activity

Distributed ledger that enables all parties to track the transactions of all data sets

HOW AN IOT MARKETPLACE DRIVES VALUE

Currently, blockchain-based IoT data marketplaces are still in the conceptual phase. However, momentum is building as a growing number of entities make progress in moving their applications forward.

The emerging initiatives are building an ecosystem of hundreds of partner-organizations that are helping to create proof-of-concept marketplaces that can subsequently be scaled.

These organizations are creating the conditions within their marketplaces that allow "data traders" to maximize their data asset value. Three initiatives are especially important:

Custom platform technologies: Blockchain technology is evolving, continually being refined for specific use cases. Organizations developing IoT data marketplaces are devising their own "flavor" of blockchain to ensure smart contracts can be efficiently generated, encrypted, and stored in a scalable way. Either by adhering to established platforms (like Ethereum[5]) or creating custom architectures (like IoTA's "Tangle"[6]), these initiatives will result in lower cost and time per data transaction, creating a multiplier effect that allows billions of data points to be feasibly transacted.

Dedicated services: Marketplace developers are also creating ancillary services to promote data readiness across their technology stack. Commonly found services include data normalization and analytics, both of which are needed to enhance the value of the data to be transacted by making it a better "fit" for third parties.

Target customer base: The myriad of devices available and their unique connectivity, signal streams, and function encourage solution providers to create dedicated environments for specific industries and common groups. For instance, emerging IoT data marketplaces like Terbine specialize in IIoT data,[7] while Streamr[8] is focused on the consumer IoT space.

Broader adoption of blockchain-based IoT data marketplaces will begin around 2020, when the first beta projects go live.

WHO'S BUYING AND WHO'S SELLING?

Within an IoT data marketplace, like in many commercial transactions, there will be buyers, sellers, and brokers that extract economic value from their assets—which, in this case, is IoT data.

Data sellers: In addition to the growing investment in IoT devices outlined above, Gartner predicts 80 percent of organizations fail to monetize their IoT data.[9] This can amount to more than 6 billion devices, a significant opportunity for organizations of all sizes to generate additional sources of revenue. The scenario is especially concerning for companies driving the growth of IoT devices: Industrial devices (24.4 percent CAGR), Medical Devices (20.8 percent CAGR) and Automotive/Transportation devices (21.4 percent CAGR).[10] These industries will have the greatest need—and potential—to monetize and, thus, will likely be the first adopters of IoT data marketplaces.

By monetizing the data collected, these organizations can create new revenue streams with only an incremental additional investment. And with the projected significant growth in the number of IoT devices companies are deploying over the next several years—IHS Markit estimates over 100 billion devices will be in operation by 2030[11]— the amount of data that could be monetized this way grows exponentially.

> By 2020, organizations will fail to monetize more than 6 billion IoT devices. That's a lot of money to leave on the table.

Sellers can benefit from this exploding marketplace in two ways: direct monetization or data-for-data exchange.

The most obvious benefit is the opportunity to transact data creates recurring revenue models that an organization can consider when making IoT investments. This benefit can not only increase the ROI of ongoing IoT projects, but also make viable IoT deployments that would otherwise be unfeasible. In fact, IoT data monetization can create entirely new business models in which companies decide to produce IoT data because they know there is a market for it. Once marketplaces mature, the establishment of market value for specific data types can motivate organizations to further boost their IoT use. For example, a farmer could be convinced to increase adoption of drones in his farming operations to provide live temperature, soil quality,[12] and wind data. Agricultural or chemical companies could buy that data through either data licensing or direct data stream sales for specific time periods, and use it as an input for their R&D efforts.

Selling IoT data also opens the opportunity to trade data assets with a new set of stakeholders in a way that benefits all parties. For instance, cities with similar population sizes or other relevant characteristics (such as traffic patterns, amount of waste produced, or pollution) can barter their IoT data to train AI or Machine Learning models that optimize the cities' resources. The combined data sets benefit the smart city initiatives in both locales without the tedious governance process that a formal partnership would entail.

> Organizations making significant investments in IoT (Industrial Devices, Medical Devices, Automotive) will look to monetize IoT data and create new business models.

Data buyers: For their part, users (buyers) get on-demand access to data they've never had before that they can use in a variety of ways. Here's one example: A company planning to undertake a major capital expense on a 100,000-square-foot building can buy data from IoT devices deployed in similar structures elsewhere in the world. This data allows the company to save project costs on its new facility by accurately predicting, for example, HVAC costs, light usage, or services utilization before they invest in these systems.

Many organizations may also find that even capturing all the data produced in their own operations will not be enough to develop the capabilities they need to compete in the global economy. In fact, according to a recent survey by Forrester, 70 percent of companies consider their internal data assets insufficient to helping them remain competitive.[13] This is especially true of AI and Machine Learning algorithms which, by default, are only as good as the quantity and quality of data that's used to "train" them. A retailer, for example, would find it valuable to augment its own data with anonymized smart city and smart fleet data to help its AI and Machine Learning systems more effectively identify ideal locations for new stores or even target their ads better.

Regardless of the use case, buyers want assurances that the data obtained is accurate and useful. Blockchain eliminates those questions because the underlying technology ensures that the "right" entities are buying and selling: the parties are comfortable that the transaction is encrypted and the sellers and buyers are reputable, all of which enables savings.

Internal company data is not enough for companies to maintain a competitive edge. External data sources help feed AI algorithms and create new business models, which will motivate organizations to acquire IoT data.

UNLOCKING THE INTRINSIC VALUE OF IOT DATA

Predicting the value generated by the nascent IoT data marketplaces isn't easy. For instance, it's difficult today to project the value of the actual data being bought and sold—what's a terabyte of oil rig IoT data worth?

In a free market setting, the seller and buyer ultimately set the price of that data based on supply and demand. According to ABI research, five key levers determine the market value of IoT data: the data's nature, structure, size, relevancy, and breadth.[14] Each of these levers will vary depending on the use case and organization providing the IoT data.

Easier is estimating the value of the marketplaces themselves using current benchmarks as a starting point. For example, the pricing models and revenue mix of traditional stock market and DaaS (Data-as-a-Service) exchanges are much the same as those an IoT data marketplace would employ. By combining these reference points with an estimated the number of companies with IoT data streams that would be interested in monetizing that data, we can begin to broadly determine the transaction fees and revenue for associated services the marketplaces would collectively generate. (Appendix A outlines a more detailed overview of our methodology, assumptions and sources.)

So, what's the potential? Based on initial projections, by 2030, blockchain-enabled IoT data marketplaces revenue could reach $4.4 billion. The market value of the data being transacted via these exchanges could rise to $3.6 trillion by 2030— by which time, more than 1 million organizations would be monetizing their IoT data assets and more than 12 exabytes of data would be transacted every day. That's an impressive figure the digital equivalent of 27,000 times the entire contents the U.S. Library of Congress stores.

However, even this monumental value might be just the tip of the iceberg. As blockchain-enabled IoT data marketplaces become more commonplace, consumers could find growing opportunities to monetize their own personal data. For instance, Streamr and Databroker DAO are exploring building a marketplace for the exchange of consumers' cell phone usage data, which companies could buy to help them understand consumers' behaviors and preferences and create more targeted offers. Similarly, consumers could sell their real-time connected car data to help power smart cities, or their fitness tracker or health data to get lower premiums from insurance companies.

Ultimately, we could see that the "buyers" and "sellers" of data don't even have to be humans or organizations. IoT devices themselves could buy and sell data streams for diverse purposes at the discretion of AI algorithms, effectively creating an "economy of things." With blockchain ensuring trust and transparency, the opportunities are virtually endless.

Embrace your data

100 percent of companies will purchase data by 2020. Begin preparing now to make your IoT data available to these organizations.
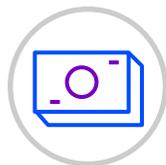
1 Complete a data audit

2 Understand the channels through which you can monetize your data

3 Determine specific monetization goals for your organization

4 Create a 12 to 24-month strategy

12 exabytes of data exchanged per day

27000X
the contents of the U.S. library of congress

Market value of IoT data transacted in marketplaces

$3.6
trillion

WHAT'S THE ROAD AHEAD? EMBRACE YOUR IOT DATA

Blockchain promises to accelerate the maturity of IoT and other data exchanges by reducing the barriers to accessing data. Doing so increases data's intrinsic value by allowing innovators to transform data sources from a discrete use (i.e., a single use or single owner) to a multi-use paradigm.

Therefore, it's not surprising that, according to IDC, by 2020 100 percent of large organizations will buy some type of external data sets to augment their internal data to help them remain competitive.[15] IoT data, accessible 24/7 with the tap of an app, will become yet another type of this "must-have" data as the next wave of IoT reinvents key industries and adds trillions of dollars to the global economy in the Industrial IoT realm alone, according to Accenture estimates.[16]

But should your organization be a seller of IoT data? Four key steps can aid decision making and begin preparing to capitalize on these marketplaces when they appear:

1. Complete a data audit to understand what data you need and which data you can share. This will help you begin to understand the potential revenue you could generate.

2. Conduct a study to understand the existing DaaS marketplace and the new blockchain offerings to determine what type of monetization (e.g., time access, licensing, or subscription to live or historical data) makes the most sense.

3. Determine specific goals that take advantage of your organization's capabilities.

4. Develop a data monetization strategy for the next 12 to 24 months that includes specific activities and key milestones.

The fact is, blockchain-enabled IoT data marketplaces, while still in their infancy, are being built and will become viable within a few years. Companies need to start thinking strategically now about how and where they can use them.

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APPENDIX A: THE VALUE OF IOT DATA MARKETPLACES

ASSUMPTIONS

• IoT data marketplaces will have a business model comparable to current commodity or stock exchanges with similar revenue sources.

• Buying/selling dynamics are controlled by the free market and depend on data characteristics that determine its market value: the data's nature, structure, size, relevance, and breadth.

• IoT device growth and business adoption are the main drivers of how many organizations will participate in IoT data marketplaces, and thus drive the valuation.

• The market value of the data exchanged emerges as a multiplier of the revenue obtained by data marketplaces given that the selling entities, number of devices, and transactions are related to the ultimate value of the data purchased.

• Licensing fees, subscription, and recurring revenue models were not taken into consideration, as these revenue models will not necessarily be adopted by all marketplaces and were assumed as part of the "service revenue" portion of the valuation.

VALUATION APPROACH

Market Participants

Total number of IoT devices installed base	×	Percent of business devices in operation	×	Percent of average devices per company for three different adoption tiers

Fee Revenue for IoT Data Marketplaces

Listing Fees

Number of market participants	×	Percent market entrants	×	Listing fees	×	Adoption rate

Annual Fees

Number of market participants	×	Annual fees	×	Adoption rates

Transaction Fees

Number of market participants	×	Number of devices per participant (# of data streams)	×	Number of transactions per device stream per year	×	Fee per transaction

Service Revenue for IoT Data Marketplace

Services as a percentage of total revenue (based on mature asset exchange benchmarks)	×	Total fee revenue (1- Services as a percentage of total revenue)

LEARN MORE

To learn more about technologies impacting IoT, visit Data Makes Possible.[17]

To learn more on how to value your data, visit Accenture Strategy.

To learn more about blockchain smart contracts, visit Accenture's Biztech Bytes.

REFERENCES

[1] Vodafone IoT Barometer: http://www.vodafone.com/business/iot/iotbarometer

[2] Gartner: https://www.gartner.com/newsroom/id/3845563

[3] IDC Worldwide Data Providers, Brokers, and Marketplaces 2017: https://www.idc.com/getdoc.jsp?containerId=US42270117

[4] TechRepublic: https://www.techrepublic.com/article/ddos-attacks-increased-91-in-2017-thanks-to-iot/

[5] Streamr: https://s3.amazonaws.com/streamr-public/streamr-datacoin-whitepaper-2017-07-25-v1_0.pdf

[6] IoTA foundation: https://iota.org/IOTA_Whitepaper.pdf

[7] IBM: https://www.ibm.com/blogs/internet-of-things/monetizing-iot-data/

[8] Giotto de Filipi: https://medium.com/@giottodf/a-comparison-between-iota-and-streamr-343b3d9cd2ec

[9] Gartner: https://www.gooddata.com/blog/80-percent-of-companies-will-fail-to-monetize-iot-data-according-gartner

[10] IHS Markit: https://cdn.ihs.com/www/pdf/IoT-Trend-Watch-eBook.pdf

[11] IBID

[12] MIT Review: https://www.technologyreview.com/s/601935/six-ways-drones-are-revolutionizing-agriculture/

[13] Forrester/Pitney Bowes: https://www.pitneybowes.com/us/campaign/forrester-data.html

[14] ABI Research: https://www.abiresearch.com/press/iot-data-exchanges-services-set-transform-iot-land/.

[15] IDC: https://www.businesswire.com/news/home/20141211005981/en/IDC-Reveals-Worldwide-Big-Data-Analytics-Predictions

[16] Accenture: https://www.accenture.com/us-en/insight-industrial-internet-of-things

[17] Western Digital Corporation: https://www.datamakespossible.com/

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