

Data Marketplace— The Next IoT Frontier

Abstract

The IoT space is expected to witness significant action, with a host of niche service providers and technology start-ups entering the scene, and making way for market consolidation. Real differentiation will be achieved through the 'IoT Data-as-a-Service (DaaS)' business model—a concept primarily driven by an IoT marketplace ecosystem, where irrespective of who owns assets or data, a third party is willing to pay for this data to create niche services.

The Evolving Ecosystem of the IoT Data Marketplace

While IoT technologies continue to drive business process optimization, the next frontier is a data marketplace that allows secure and owner-controlled exchange of IoT data between entities that use it to create specialized services and deliver significant value to customers.

This entire business model revolves around utility, quality, and timeliness of IoT data. Since sensor data is estimated to represent 10% of the world's data, it is only a matter of time before useful, raw, or processed sensor data is sold to third parties for further use, resulting in the emergence of advanced business and financial models. Third parties can include brokers, intermediaries, and multiple vendors, and the data will be anonymized in most cases.

Usage Scenarios that Uncover Value from the IoT

An IoT marketplace would enable producers and consumers to share, curate, combine, and enhance IoT data.

For example:

- A heavy equipment manufacturer shares equipment usage and performance data with spare parts vendors and service organizations to cross-sell, reposition, and bundle after-market services.
- A retail store provides:
 - Anonymized consumer behavior data (demographics, social profile, age, gender, time spent at a product zone) to product manufacturers for personalized, contextual, and real-time marketing.
 - Real-time location data of customers to safety departments to improve evacuation procedures during emergencies.
- An environmental monitoring solution shares air quality and pollution data to:
 - Non-government organizations, citizens, or government agencies for better policy-making.
 - Manufacturers of environmental quality products, audit companies, and service providers.

According to an EMC report, 'The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things', the digital data created, replicated, and consumed annually doubles every two years and is poised to reach 44 trillion gigabytes by 2020.¹

Companies can choose to limit the amount of data they wish to share, using a secure data exchange platform.

- An aggregator combines weather or wind speed information from multiple sources and creates a wind speed forecasting estimate model, the insights from which can be used to improve windmill operations.
- A public data hub can be created with 'shareable' information, such as mobile numbers and email IDs of people who use these attributes to get free WiFi access at airports, coffee shops, and other locations. The IoT data marketplace is an extended concept where such public data hubs can collect tons of information without violating citizen privacy and device security.
- The marketplace can also become a part of the government's open data initiatives. For instance, in India, the Open Government Data (OGD) Platform aims to increase transparency in government functioning, and open avenues for innovative uses of government data.² Similar initiatives are underway in the United Kingdom (UK)³ and the United States (US)⁴, and one can already view different kinds of data sets being published on such platforms.

New Opportunities that Drive a Successful IoT Marketplace Strategy

In the IoT Data Marketplace, stakeholders include IoT data owners or producers, intermediate entities that act as brokers between buyers and sellers, and data consumers. There will be additional players that provide infrastructure, marketplace platform services, catalog services, and trade and transaction services. Intermediaries will play a key role in creating data mash-ups, conducting data aggregation and de-identification, and in some cases, enriching the data from one source and creating a relatively more value-added data product.

IoT Infrastructure

An IoT marketplace needs a scalable and secure platform for data sellers, subscribers, and buyers with these services or features.

Applications and users should be able to:

- Capture data and metadata of events and observations from real-world entities, physical phenomenon, sensors, or devices.
- Discover and catalog data to help buyers search for available data sets through either a directory service or search facility

While the majority of information will come from connected devices, it will invariably be supplemented by external data like weather, consumer preferences, or data from enterprise systems.

using a combination of asset, sensor, metadata, and quality and provenance information.

- Query data to retrieve stored master data, time series data and metadata. Join or link sensor or device data with other related information in order to provide a composite view.
- Check for data quality issues, identify anomalies, and automatically fix them. Specialized annotations and metadata may be tagged to the observation data to provide provenance information to ascertain the source and lineage.
- Mask and anonymize data points, in order to remove any Personally Identifiable Information (PII).
- Publish data: used by data publishers or sellers to package their data products in a way such that it is ready to be sold and consumed.

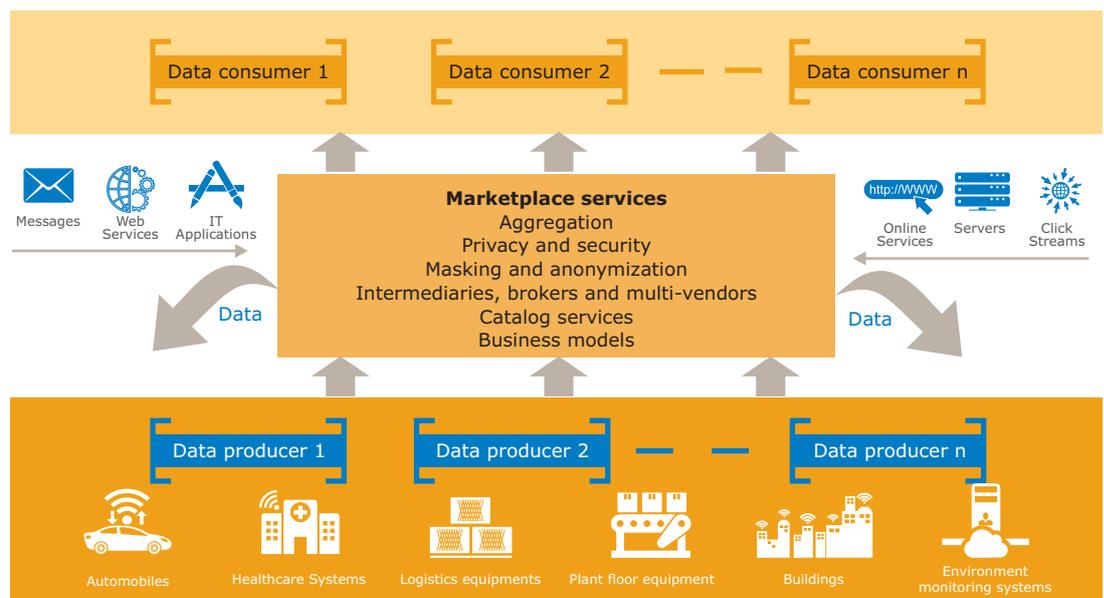


Figure 2: Representative Building Blocks of an IoT Data Marketplace

Security and Privacy

Widespread adoption of IoT can become possible only when data access, identity management, control, and privacy are ingrained into the design of an IoT data marketplace.

Both, during ingestion and publishing, the IoT platform:

- Needs to provide data masking, anonymization, and de-identification services to safeguard PII
- Should not be allowed to store any sensitive data

Ethereum is another protocol that is being used to develop smart contracts through peer-to-peer secured transactions.

Robust Transactional Model

To enable commercial transactions, payments, and settlements, the data marketplace should:

- Meet all regulatory requirements outlined for ecommerce platforms
- Be designed to ensure that transactions are secure, reliable, and scalable

A framework based on Blockchain facilitates smooth transaction processing and seamless coordination among interacting devices.⁵ Some companies have also started offering 'Blockchain-as-a-Service' for building distributed ledger applications.

Conclusion

As IoT technologies gain traction, enterprises, governments, and consumers realize the immense potential of connected things. The concept of an IoT data marketplace, while still in its infancy, will lead to incremental value creation and monetization across the value chain. The technology components of an IoT marketplace are gradually maturing and converging.

Data is poised to become the new currency or product, and enterprises and consumers need to be aware of the implications, including how the entire realm of IoT deployments is shaping up. Comprehending and grasping the opportunities that an IoT marketplace offers, and contextualizing them for business improvement, will help companies remain competitive and generate sustainable business benefits.

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