Abstract 2

What is Data Marketplace 2

Business Impact 4

Challenges 5

Use Blockchain to Mitigate Security and Compliance Risks 6

Key considerations for a Data Marketplace 6

Technical Deep Dive 7

Our Point of View 9

How CSPs can be benefitted by providing Data Marketplace 10

Subscriber Data Monetization 10

IoT Data Monetization 10

Final Thoughts 11

References 12

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Abstract

The value and importance of data in today's times cannot be overstated. Some of the most valuable companies in the world rely extensively on data, treating it like a commodity, which they trade and earn revenue off. Data marketplaces have been developed to make this trade easier. However, the current data markets are not sufficiently equipped to meet all of a potential client's requirements, including; fairness, efficiency, security, privacy, and regulatory compliance. In this document, examine the data marketplace: how it affects business, why it's important, what kinds of solutions are available, what kinds of problems it can solve, and how. We outline the design, show how to design such a system, and discuss the difficulties in constructing a comprehensive data marketplace.

Organizations and businesses are starting to supplement their own data sets with external data, which is promoting market expansion. Data Marketplace is a technique for facilitating these data transfers in a secure and efficient manner that is supported by numerous data-sharing models and aids in meeting the needs of different data sets and clients. Additionally, it enables companies to share data through platforms for data marketplaces, fostering data-driven innovation and integrating third-party suppliers into these marketplaces. It can also help enhance small and medium-sized businesses' competitiveness.

A Data Marketplace embraces Data Sharing and Data Democratization, or in other words, provides a simple and controlled way of putting data in users' hands. Accessing data must be simple and should be allowed to occur in one place -reducing data movement as much as possible while keeping a very controlled governance of the data and the security, both from an access and privacy perspective.

What is Data Marketplace

A Data Marketplace is an online platform where organizations can buy and sell data. Broadly speaking, a data marketplace is a multi-sided platform that connects data providers and buyers.It provides a centralized location for organizations to access and trade various types of data, such as demographic, financial, and market information. The platform facilitates transactions between data providers and data consumers, enabling the exchange of data in a secure, efficient, and transparent manner. By encouraging data-driven innovation, enhancing the competitiveness of SMEs, and expanding job markets, business data sharing via data marketplaces may support general economic growth

An architecture that enables data exchange and monetization is referred to as a data marketplace. A data marketplace is an online transactional area or store that makes it easy to purchase and sell data. Big data, whether it be first-party data within an organization or third-party data like that from Google Analytics, is growing rapidly in amount, variety, and velocity. A data marketplace can also serve as an internal platform that supports cost-saving business process improvement and the creation of new income streams.

A data marketplace can be thought of as a knowledge-sharing platform that aligns data consumer and data owner incentives better than current data-sourcing methods.

The idea of a data marketplace is relatively new in the world of data management, and it was inspired by traditional online marketplaces and e-commerce websites. A data marketplace's goal is to enable the controlled exchange of data between data producers and consumers. The purpose of a data marketplace is to make the process of exchanging data as secure and effective as feasible while removing barriers that stand in the way of buyers and sellers carrying out their tasks.

Data marketplaces are anticipated to be essential in the data economy of the future. The creation of new products and services is made possible by the commercialization of such markets. It is especially useful for businesses without exclusive access to the necessary data. Additionally, commercialization can encourage the incorporation of outside suppliers into data markets, allowing them to expand marketplace offers by supplying complemenary products and services.

There are several different types of data marketplaces, each with its unique characteristics and target audiences. Some examples include:

- **Public data marketplaces**: These are open marketplaces that allow anyone to access and use the data for free or for a nominal fee. Public data marketplaces typically host a wide range of data sets, including government, weather, and social data.
- **Personal/Private data marketplaces**: These are closed marketplaces that are typically only accessible to specific groups of people, such as employees of a company or members of a specific organization. Private data marketplaces may host proprietary data sets, such as internal company data or data that is subject to non-disclosure agreements.
- **Industry-specific data marketplaces**: Cater to a specific industry or sector, such as healthcare, finance, or retail. Industry-specific data marketplaces may host data sets that are relevant to that industry and may also include data sets from industry-specific sources./
- **Vertical-specific data marketplaces**: Provide a specific type of data, such as satellite imagery, weather data, or social media data. Vertical-specific data marketplaces may host a wide range of data sets from multiple sources that are relevant to that specific vertical.
- **B2B data marketplaces**: Focus on providing data to businesses, rather than to individual consumers. B2B data marketplaces may host a wide range of data sets, including industry-specific, vertical-specific, and company-specific data sets.
- **B2C data marketplaces**: These are marketplaces that focus on providing data to individual consumers, rather than to businesses. B2C data marketplaces may host a wide range of data sets, such as personal data, weather data, or social media data.

- **Crowdsourced data marketplaces**: They gather data from a large number of people through online platforms, to build a data set that can be used by various stakeholders in the marketplace.
- **Hybrid data marketplaces**: These are marketplaces that combine elements of multiple types of data marketplaces, such as public and private data, industry-specific and vertical-specific data, or B2B and B2C data.

Business Impact

In Slush 2022 – the world's leading startup event, there were a lot of innovations for the future linked to ecosystems, data economy, Web 3.0, and Metaverse. The most common thread across the event was about our journey towards a data-driven future by extracting maximum value from data. But to tap the potential of data, there is a strong need for a data marketplace that should provide the required data and address the challenges limiting its secure exchange.

A data marketplace can have a significant impact on business by providing a central platform for data providers to share and monetize their data, and for data, users to easily discover, access, and utilize data for a wide range of purposes.

Data marketplace can provide access to high-quality, relevant data, which can be used to improve decision-making, drive innovation, and create new revenue streams in healthcare, finance, trading, and other verticals. Data Marketplace by providing access to high-quality, relevant data can improve decision-making, drive innovation, and create new revenue streams.

Snowflake Data Marketplace, offers a rich ecosystem of partners with highly integrated capabilities to meet different data needs. With the help of Snowflake Data Marketplace, businesses may create a private data hub and grant access to their employees, business units, partners, clients, and others. Snowflake’s platform makes it generally unnecessary to move, copy, or transfer any data. Businesses can use Snowflake Data Marketplace's public data sets in conjunction with their own to create custom data hubs that they can analyze and perhaps distribute.

Incorporating external data into data strategies and business models gives organizations today a competitive advantage. Access to a range of huge data sources is made possible via data marketplaces. Verified data marketplaces improve financial security by permitting high-value transactions and requiring all users to comply with applicable KYC and security criteria. Commercial datasets can be quite expensive; as a result, companies must make sure the platform is reliable. Data markets offer a wide range of choices, including hosting many vendors and purchasers on one platform.

Enriching proprietary data with outside insights allows businesses to make more confident decisions, optimize their predictive models, boost productivity, and increase ROI.

Some of the business impacts include

- **Increased data-driven insights**: By providing access to a wide range of high-quality data, a data marketplace can help businesses gain new insights and make more informed decisions.
- **Improved competitiveness**: Provide businesses with access to data that they would not have otherwise had, which can help them stay competitive in their industry. To satisfy client expectations, insurance companies use insights from external data. To more precisely price auto insurance, other data can also be employed.
- **New revenue streams**: Provide data providers with new revenue streams by allowing them to monetize their data. This can also help data providers to monetize their data in a way that they would not have otherwise.
- **Cost savings**: Provide data users with cost-effective access to high-quality data, which can help businesses save money in the long run.
- **Access to niche data**: Provide businesses with access to niche data that they might not have otherwise been able to find, which can be useful for businesses that operate in specific industries or markets.
- **Access to experts and new partners**: Provide businesses with access to experts and new partners, who can help them to better understand and utilize the data they are accessing.
- **Compliance and security**: Help businesses to ensure data is shared and used in compliance with data protection regulations, and also provide robust security measures to protect sensitive information. External data is used in financial services as part of ID verification procedures for locating and avoiding fraudulent transactions. Companies that operate marketplaces use external data to uphold confidence and enhance the onboarding processes for new vendors. Additionally, geolocation information can offer a thorough picture of corporate clients.
- **Community building**: This can foster a community of data providers, users, and developers who can share knowledge, collaborate and contribute to the growth and development of the marketplace.
- **Innovation**: Provide businesses with new opportunities to innovate by allowing them to access and combine data sets in new and innovative ways, fostering the development of new products and services.

Challenges

Confidence in data sharing is lacking globally, and people are not inspired to participate in the data-driven economy. However, there are opportunities to build trust in the data-sharing ecosystem – one of these is data marketplaces.

Even though data marketplaces have been there for a while, we need to understand why data marketplaces are the missing backbone of the data economy, here are some fundamental roadblocks which are holding back their full potential outlined.

- The majority of data is in an unprocessed, unstructured state, and it can be difficult to transform it into the structured data required by software.
- No established guidelines for effective data exchange and pricing.
- Protecting sensitive information and ensuring compliance with data privacy laws
- Ensuring that data is consistent and in a format that is usable by buyers
- Building trust between buyers and sellers in an online marketplace when it comes to sensitive or confidential data
- Making sure that data is easily discoverable and searchable on the marketplace
- Ensuring that the data being sold on the marketplace is accurate, up-to-date, and relevant

Use Blockchain to Mitigate Security and Compliance Risks

Some of the challenges like security, transparency, and reliability of the data can be solved using Blockchain Technology in the solution. Here are some of the benefits of using Blockchain Technology

- Creation of decentralized marketplaces where data is stored on a distributed ledger rather than on centralized servers. This can help to increase the security and reliability of the data.
- Transparent and tamper-proof record of all transactions on the marketplace, which can be useful for ensuring data quality and governance.
- Data stored on a blockchain is immutable, meaning it cannot be changed or deleted, providing a permanent record of data transactions. This can be useful for maintaining the integrity of data over time.
- Use of smart contracts, which can automate the process of data sharing, licensing, and payments. This can help to streamline the process of monetizing data and ensure that data providers are fairly compensated.
- Identity management provided by Blockchain will ensure that only authorized users have access to the data.
- Maintain the data lineage, data lineage, and provenance of the data, which can help to ensure the data quality and integrity.
- Provides interoperability between different data sets and different data marketplaces, which can be useful for creating a more seamless data-sharing experience.
- Compliance with data protection regulations, such as GDPR and CCPA.

Key considerations for a Data Marketplace

For an organization building an ecosystem of data providers and consumers, a platform strategy is appropriate. This is where producers and consumers should have a common value proposition that should be shared by the platform.

Data democratization changes how organizations manage data access, usability, data ownership, and data culture. Making data available to non-data specialists and removing

barriers to data access not only expedites decision-making but also uncovers opportunities for the organization. Although different data marketplaces have varied properties depending on their specific use case, in general, the data marketplace paradigm should consider the following key considerations

- **Data Governance**: Must have robust data governance and security protocols in place to protect sensitive information and ensure compliance with data protection regulations, such as GDPR and CCPA. This includes data quality, data lineage, data lineage, and data security.
- **Data Quality**: The data must be high-quality, accurate, and relevant to the needs of the data users. This includes having a way to curate and validate the data and making sure the data is up-to-date.
- **Data Pricing**: A clear and transparent pricing model is necessary to allow users to understand the cost of accessing and using different data sets. This includes subscription-based, pay-per-use, and data-set-specific pricing plans.
- **User Experience**: A user-friendly interface and easy-to-use tools are necessary for searching, accessing, and integrating data. This includes data visualization and exploration capabilities, data catalogs, and APIs.
- **Community Building**: Creating a community of data providers, users, and developers who can share knowledge, collaborate, and contribute to the growth and development of the marketplace is crucial. This includes having a way to connect and communicate with the community, and having a support system in place.
- **Reliable Data delivery**: Automated and reliable delivery of data assets through supported mechanisms - FTP, SFTP, APIs, JMS, etc.
- **Technical Infrastructure**: A reliable and robust technical infrastructure is necessary to support data storage, processing, and delivery. This includes data storage, data processing, and data delivery capabilities such as data lakes, data pipelines, and APIs.
- **Marketing and Promotion**: Good marketing and promotion are necessary to attract potential data providers and users to the marketplace. This includes targeted advertising, SEO, and content marketing.
- **Understanding of the Target Market**: A good understanding of the target market, their needs, and their pain points are necessary to better curate and develop the marketplace. This includes market research, customer profiling, and user feedback mechanisms.

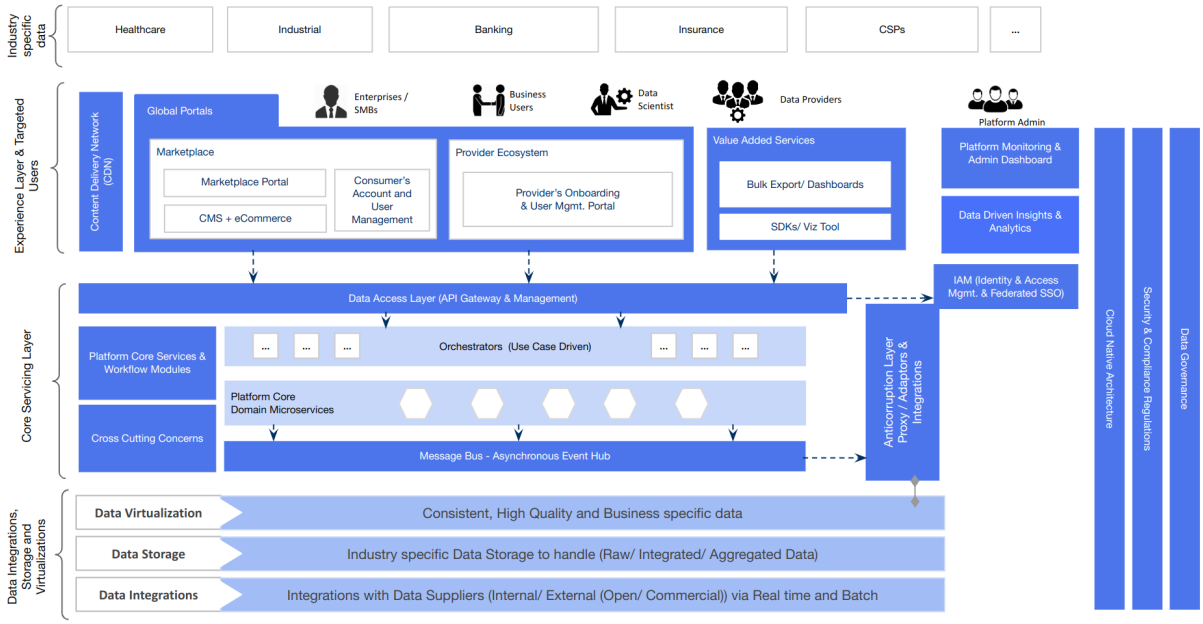
Technical Deep Dive

The first and most important aspect of a Data Marketplace is to abstract data governance from the underlying technologies used for data capture, integration, storage, processing, and exploitation.

The most crucial factors taken into account when designing these technologies are often performance, integration capabilities, processing capabilities, data quantities, fault tolerance,

high availability, etc. But many of them fail to consider interoperability, metadata management, or data governance from a more practical standpoint.

As per our understanding here are the logical blocks needed in a data marketplace



Platform Logical Architecture

- **Data Management**: This block is responsible for managing the data sets available on the marketplace, including curating, validating, and maintaining the quality of the data. It also includes data integration, data lineage, data lineage management, data governance, and security.
- **Data Access Layer**: This block provides the tools and APIs needed for users to access and integrate the data sets into their systems and applications.
- **Data Integrations**: This block provides the system for data providers to monetize their data, such as through data licensing or data-as-a-service models. It also includes the management of data pricing, billing, and invoicing.
- **User Management**: This block is responsible for managing user access, authentication and authorization to the data sets on the marketplace.
- **Cloud Infrastructure**: This block is responsible for providing a reliable and robust technical infrastructure to support data storage, processing, and delivery, such as data lakes, data pipelines, and APIs.
- **Data-Driven Insights and Analytics**: This block provides data analytics capabilities to analyze the data in the marketplace, such as data visualization and exploration, data catalogs, and APIs.

- **Workflow Module:** Workflows for data providers and data consumers for publishing and consuming data, providing ratings, etc.
- **Compliance and Security**: This block is responsible for ensuring the marketplace is compliant with data protection regulations and providing robust security measures to protect sensitive information.
- **Content Management System and eCommerce**: A headless content management system that includes CPQ, billing, settlement, inventory, and workflow engine capabilities to enable rich digital experiences

Our Point of View

A marketplace is a dynamic model that will constantly evolve. Thus, the Data Marketplace platform should be built on an open architecture that is easy to customize in the future with in-house DevOps practice. Even more critically the solution provider and Domains must share the same vision for building and supporting such solutions over the long term. There must be a common belief in openness and knowledge sharing to eliminate any potential vendor lock-in and provide self-reliance for the Domains.

The data marketplace platform should also have an alignment with future-proof MACH design principles (microservices, API-first, cloud-native, and headless) which are critical to providing modular services, and statelessness for web-scale, storage, and agile experience creation.

The marketplace expects expertise from the vendor on building platforms and requires a consistent inflow of development, QA, and DevOps resources and delivering on time with an agile-based sprint development methodology.

If architected and designed correctly, Data marketplaces can accelerate the responsible exchange and use of data to solve critical challenges and fuel innovation for society. With thoughtful applications of emerging technologies like blockchain and privacy-enhancing techniques, public and private-sector operators of data marketplaces can empower people to have more control over how their data is used.

For a data marketplace to work in practice, companies would need to establish an end-to-end process that is systematically applied to all their data. Additionally, all data must be cataloged so that profiling and other forms of analysis can create a full set of metadata that describes the data. Having all the data cataloged will also allow further analysis and exploitation of the data at any level of detail required. .

The full complement of metadata allows the creation of a comprehensive metadata catalog that supports expansive access and self-service. With a data marketplace, Organizations can create more effective ways to package and deliver data for better utilization. Crucially, by empowering

self-service, the data marketplace puts managed data into the hands of business users, which is a key way to drive change and accelerate innovations.

GlobalLogic has the expertise in building platforms that require a consistent inflow of development, QA, and DevOps resources, and in delivering on time with an agile-based sprint development methodology.

GlobalLogic can initiate a discussion with their Partners (Telcos, Healthcare, Insurance, Retail, etc.) on this business proposal to monetize the data. To begin with, we can monetize the data for their internal consumption, and later we can share this data with other verticals.

Considering our extensive working experience with Telecom partners, here is our proposal pitch for Telcos:

How CSPs can be benefitted by providing Data Marketplace

Understanding the wide variety of information needs, CSPs can develop a platform that can support vertical ecosystems, auditable transactions, and federated AI/machine learning with open APIs. The platform should support secure data exchanges and business transactions and uses AI models trained across distributed data sets to enable truly data-driven digital transformation in a whole range of sectors and industries.

Subscriber Data Monetization

Telcos handle huge amounts of data from millions of subscribers. Some of this data comes from voice calls or the browsing history of websites and apps on their networks. Moreover, telcos also manage location and mobility data at a very granular level since mobile phones are connected to telecom towers. They also handle payments for phone bills and top-ups that identify delinquency and spending behavior. Finally, many telcos also own digital services such as video streaming, e-wallets, or even advertising businesses whose data helps telcos get a complete user profile.

With this vast amount of data, many telcos have created an extremely granular 360-view of their customers. This customer information can be extremely useful in generating leads for insurance, credit card companies, e-commerce affiliate programs, and consumer products. Telcos can share subscriber data with companies like - Insurance, credit card companies, e-commerce affiliate programs, and consumer products to have hyper-targeted marketing reach via high-engagement channels.

IoT Data Monetization

Communication service providers, tower companies, and neutral hosts are gathering loads of data from the sensors or assets on the towers. This includes both weather and non-weather data, useful for sectors including agriculture, emergency services, insurance, smart cities,

marine operations, road route management, airport security, and delay management. Catering to these sectors, a blockchain-based marketplace can catalyze the exchange of data for monetization by providing a secure collaboration platform through which diverse types of data from multiple systems and IoT-enabled infrastructure – like pollution and environmental data and video feeds from camera systems – can be exchanged.

Given this enormous potential for the ecosystem of data exchange, **TM Forum** has already begun developing the Proof of Concept project - **Catalyst**. The project is intended to explore and evaluate a common framework, used for trusted data sharing and adapted for emergency management while operating inside the regional regulatory variations.

Final Thoughts

As industries need faster access to desired data to respond faster and more effectively in a competitive landscape, the Data Marketplace powered by technologies like blockchain and Open APIs can drive the development of diverse ecosystems and fuel the data economy.

The data marketplace will continue to grow with the industry and perhaps may even outpace it. As data providers generate more and more data, and the desire to become further data-driven increases in every organization, the value of a platform to facilitate this exchange will continue to grow.

Companies/Industries often search for healthcare marketplaces, enterprise marketplaces, and data science marketplaces, denoting specific sectors, but there are no separate data marketplaces for each of these; it’s just one common ground with different players.

It is likely that your business already uses external data collected from different places, such as social media platforms. Right now, most businesses use in-house solutions to make data-driven decisions. However, this is about to change as data marketplaces evolve and turn fresh data into an opportunity to take action.

Ecosystem-based enterprises will become the new norm and will endure. A robust platform enables direct and indirect monetization by allowing parties to trade data with improved privacy, trust, ethics, and security. Data Marketplaces will play an important role to enable new business models that will make data the core business asset. They will provide frictionless access to curated data that can be integrated into a data catalog. The future of the data marketplace is not just to share the data, but instead to also offer intelligence, insights, and competitive advantage.

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