White Paper

DWINITY

Document Version 3.8

White paper of crypto-assets, other than asset-referenced tokens or e-money tokens under MiCAR

(Annex I, Art. 5 MiCAR)

Date of notification: n.a.

Last updated: June 3rd, 2024

This crypto-asset white paper has not been approved by any competent authority in any Member State of the European Union. The offeror of the crypto-assets is solely responsible for the content of this crypto-asset white paper.

THE STATEMENT OF THE MANAGEMENT BODY OF THE OFFEROR

The white paper strives to comply with the requirements of the Title II MiCAR and to the best knowledge of the management body, the information presented in the white paper is in accordance with the facts. The white paper makes no omission likely to affect its import.

SUMMARY

DWIN is an ARC20 token released on the *Avalanche* blockchain. It is the heart of the Dwinity ecosystem and is used to participate in and handle operations.

DWIN tokens are used within our ecosystem to allocate data storage, use various data refinement services, and participate in data marketplaces. The DWIN token is designed to allow complete use of the ecosystem as it will stand at the end of the development. This could include:

- Creation of data storages/vaults
- Data storage/data transfer
- Participation in the Dwinity marketplaces
- Utilization of Dwinity data services
- Processing of Dwinity Data Cash and interacting with decentralized applications (dApps)
- Processing decentral artificial intelligence (dAI) operations (information extraction, data enrichment, compute, inference etc.)
- And further services to be determined

GENERAL TERMS	
Token name	Dwinity
Token symbol	DWIN
Blockchain	Avalanche
Standard	ARC20
Max supply	1.200.000.000 DWIN
Released supply	600.000.000 DWIN

PRIVATE SALE	
Dates	January 16th 2024 – March 15th 2024, option to extend two times by 30 days
Hard cap in DWIN	24.000.000 DWIN
Minimum investment	5.000$
Lock Up and Vesting	12 months lock up.
Price	0,125 $
Goal	$3,000,000 – closing/ soft cap at $500,000, else refund of sold tokens

WARNING

- Provided summary should be read as an introduction to the white paper;
- The potential holder should base any decision to purchase a DWIN token on the content of the whole Dwinity white paper;
- The offer of the DWIN token does not constitute an offer or solicitation to purchase financial instruments and any such offer or solicitation to purchase financial instruments can be made only by means of a prospectus or other offering documents pursuant to national laws;
- The DWIN white paper does not constitute a prospectus as referred to in Regulation (EU) 2017/112933 or another offering document pursuant to Union legislation or national laws.

Table of content

PART A: INFORMATION ABOUT THE OFFEROR

1. Dwinity IP GmbH

   1a. German GmbH

   1b. Am Haag 8/ 2 / 82166 Gräfelfing / Germany

2. Founded July 3rd 2023, Registergericht: AG München HRB 286675

   2a. contact@dwinity.com

   2b. Steuernummer: 143/131/79983, USt ID: DE363918512

3. Dwinity IP GmbH is represented by its managing director Peter Koenig

4. The offeror is a freshly incorporated GmbH under the laws of Germany. The business activity and planned business activity is exhaustively described in this whitepaper.

PART B: INFORMATION ABOUT THE CRYPTO-ASSET PROJECT

1 EXECUTIVE SUMMARY

a) WARM UP

Let's tell a story: Consider how Uber and Airbnb disrupted traditional industries, reshaping the landscape of transportation and accommodation.

Once, the taxi transportation market was monopolistic internationally. These monopolies imposed artificial regulations, from dictating cab colors, fares, to the technical requirements of taximeters. Often, the questions arose "Were consumers getting fair prices, clean cabs, friendly drivers, and fast transportation? Were people who wanted to provide their transport services able to do so? Similarly, before the era of Airbnb, could individuals conveniently rent out their well-maintained homes to global travelers?

Today's massive data economy is in a similar situation, with similar shortcomings. Consumers are not getting what they need: speedy, transparent, and secure storage and usage—let alone ways to get compensation when they want to trade their property (which in this case would be data, not their homes). They get only what giant quasi-monopolies decide to offer—and that is only a very small part of the data treasure that consumers own. The outdated, huge monopolies which are based on legacy technology keep new interested parties out of the market. Data is only available from Google, Facebook, Apple, and the like at low quality and high centralized prices. Furthermore, the market is completely closed to sensitive/highly confidential data.

But what if we could take this vision even further? Imagine a future where not only is everyone's data storage decentralized, but everyone has their own personalized AI assistant in their pocket. This AI, powered by the promises of Web3 and the user's own data, would unlock unprecedented value and possibilities. It would be a world where people have true control and sovereignty over their digital lives, with AI agents that are customized to their unique needs and preferences.

To reach this decentralized AI (dAI) future, we must first lay the groundwork by building a robust, decentralized Web3 infrastructure. This will enable increased data control for users, giving them the power to decide how their information is used and shared. As the ecosystem evolves, it will gradually transform into a more sovereign, AI-based, and personal data-infused future.

Dwinity is paving the way for this exciting new era. By providing a platform where everyone can decide how to use their data—from keeping it secure and private to trading it with interested parties in a fair and secure way—Dwinity is opening a world of possibilities. Companies of all kinds will have fast and professional access to this international data treasure, including all of today's confidential personal data. This is just the beginning of a journey toward a future where AI and decentralization work hand in hand to empower individuals and revolutionize the way we interact with technology.

b) DWINITY ON ONE PAGE

The current centralized data economy is limited by the interests of monopolistic players. Users have security concerns and no incentives to share sensitive personal data. Meanwhile, consumers (data owners) everywhere are sitting on huge untapped potential.

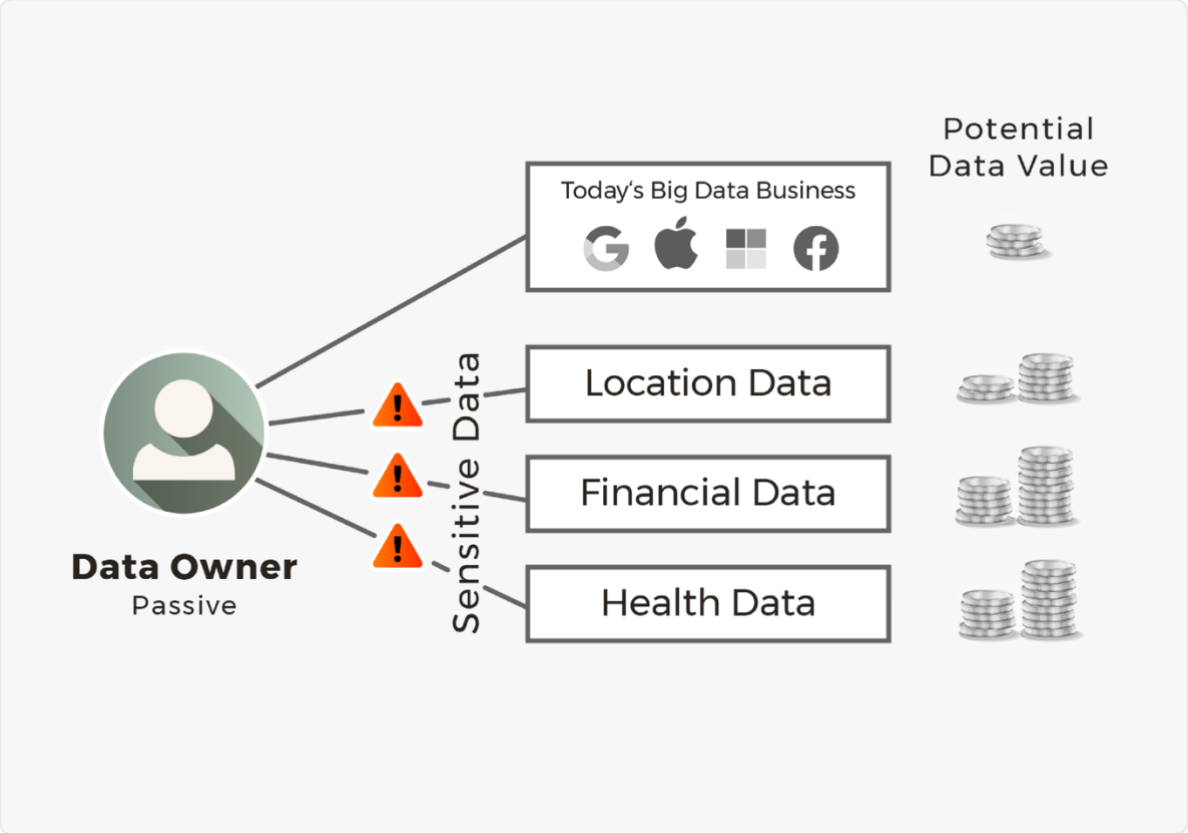

Figure 1.1 Passive Data Owner with untapped potential

Information about how people think, act, and move daily, ultimately reflects their identity. Utilizing an extensive array of data points, it is now feasible to construct a highly accurate digital representation of an individual's life and persona. This digital construct, often referred to as a "digital twin," embodies a comprehensive collection of data mirroring an individual's attributes and information.

Today, consumers, in other words, data owners cannot store their data securely, do not know the commercial value of the shared data, and are not compensated for sharing them. This becomes even more prevalent in a world where AI and AI-based services are increasingly integrated in our everyday lives.

Data owners often experience a sense of exploitation regarding the use of their information. They receive little to no incentives to engage with the system, much less to relinquish further personal data. This lack of motivation is even more pronounced when it comes to sharing high-quality, sensitive information, such as health or financial records. When using AI-based services, they often allow a training on their searches and questions asked. Data buyers are dependent on existing data brokers, which often exhibit shortcomings such as inadequate data management, subpar data quality, an opaque value proposition, elevated costs, and challenges in deriving economic value.

The merging of sensitive personal data within decentralized and secure data domains has the potential to unlock significant and currently untapped value. Dwinity enables users ‘control and data safety and introduces a fair data market. This will enable us to unlock the full scale of potential that sensitive personal data can offer, even more so in a AI-infused world of the future.

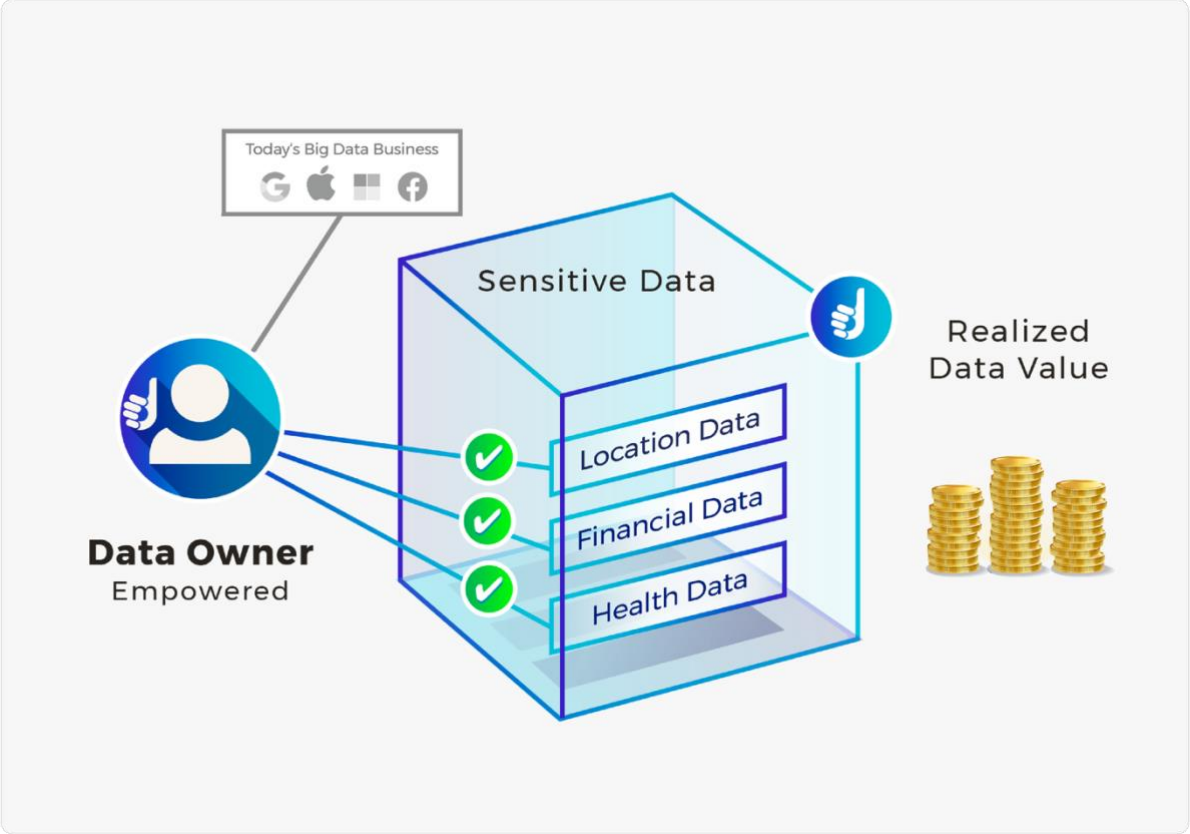

Figure 1.2 “All the while, data owners around the globe are sitting on a huge treasure!”

c) DWINITY'S ECOSYSTEM BRINGING THE DATA ECONOMY TO THE NEXT LEVEL

Dwinity's mission is to give power back to data owners and to create a thriving data economy in which informational asymmetries are finally removed. Dwinity creates a full-fledged and data-ownership-driven ecosystem for storage, analysis, computation and monetization of sensitive personal data.

Dwinity unlocks unseen value potential for everyone involved in the global data economy. Dwinity will flourish from license fees, delivering software- and analysis-as-a-service. Dwinity will additionally profit from commissions garnered from transactions within the data marketplace.

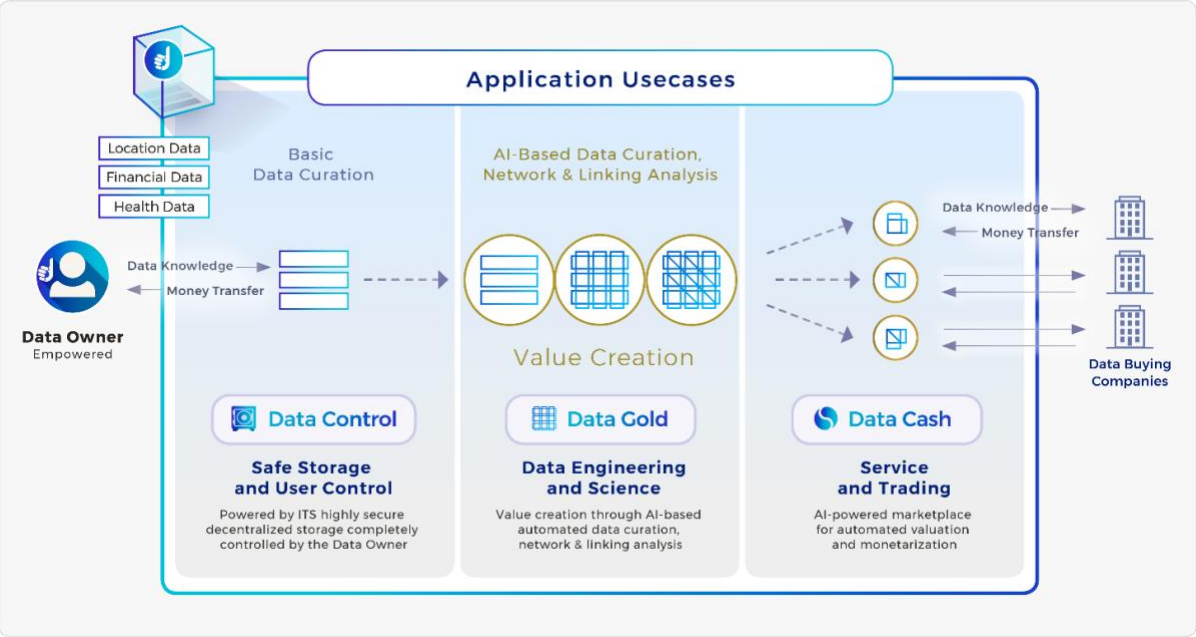

Figure 1.3 Dwinity´s Ecosystem

Dwinity is a decentralized, data-based, Web3 value-creation-ecosystem implemented using the latest ITS- (information-theoretic security) and blockchain technologies. It enables a fair economy for data owners and data buyers in the form of a Platform as a Service (PaaS) or a Software as a Service (SaaS).

Dwinity provides protected data spaces for a new data economy between data owners and data buyers, especially for sensitive data.

Dwinity's three main components are:

- Data Control: a decentralized data storage which provides true data sovereignty and enables users to decide with whom data is shared.
- Data Gold: AI tools have the capability to unlock the full potential of data via sophisticated analysis. This yields significant value augmentation for data owners.
- Data Cash: A fair marketplace with automated data value analysis, allowing for tangible income for data owners based on their data. Companies get high-quality data directly from data owners at lower costs.

Leveraging these three components, Dwinity establishes a new value-generation opportunity for data owners, users, and buyers.

Dwinity's mission is to give power back to the data owners and to create a thriving data economy where informational asymmetries are essentially removed. By creating a full-fledged ecosystem for storage, analysis, computation and monetization of sensitive personal data, Dwinity unlocks unseen value potential for everyone involved in the global data economy.

d) DWINITY WILL PLAY A LEADING ROLE IN THE SKY-ROCKETING GLOBAL DATA MARKET

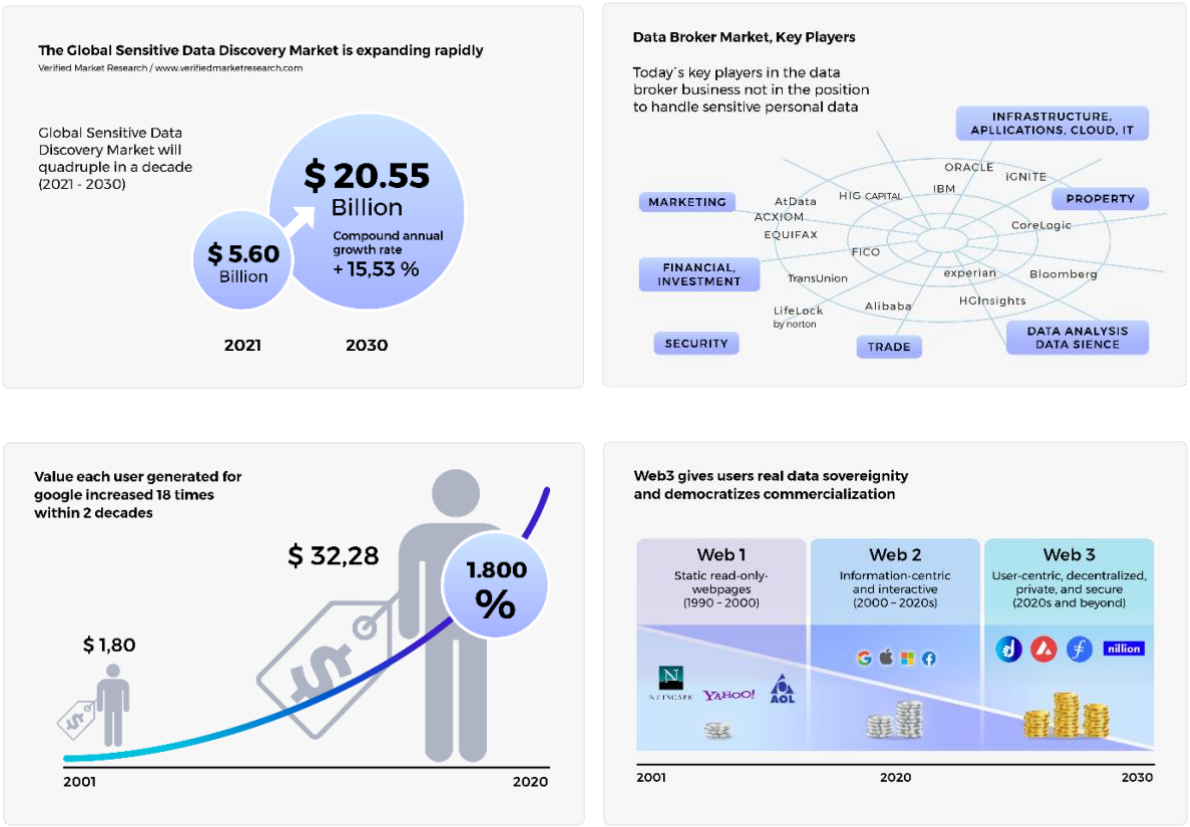

Figure 1.4 Data Market

e) DWINITIY'S COMMITMENT TO CORPORATE SOCIAL RESPONSIBILITY (CSR)

Dwinity is committed to solve inherent and significant issues in the field of data management and AI for both private individuals and corporations. To achieve our mission, Dwinity will be commercially active and successful. Nevertheless, the common good will have priority over commercial advantages of Dwinity's stakeholders. Our CSR program comprises giving back one third of gross profits to the community as rewards, supporting charities and donations with commercially attractive access to our services and contributing to ecological sustainability by most efficient use of blockchain services via e.g. decentralized computing.

2 THE SOLUTION

Dwinity creates a decentralized, data-based, Web3 value creation ecosystem based on the latest blockchain – and ITS technology that supports a fair economy for data owners and data buyers. Focusing on sensitive personal data, Dwinity empowers the genuine data owner who generates it, bestowing them with complete control over their information, and addresses the existing challenges posed by centralized intermediaries in the management of digital information. At the same time, the project allows companies to get high-quality data directly from data owners at lower costs. Dwinity's goal is to unlock the full scale of possibilities that sensitive personal data can offer and to harness the in-depth knowledge it holds through its unique technical infrastructure and three-pillar construct for storage, analysis, and transfer and extend this added value even to innovative use of AI and a dAI driven future.

Dwinity operates as a Platform as a Service (PaaS) and Software as a Service (SaaS), functioning as a data value network. Utilizing the three Dwinity tools, the project creates protected decentralized data spaces allowing for new value creation potentials for data owners (i.e., individual consumers), users, and buyers of data. The Dwinity functional library is based on structures that ensure data security such as fragmented data storage and a quantum safe key management integrating latest ITS (information-theoretic security) technology. Through our comprehensive APIs and SDK based on the "keep it simple and smart" (KISS) promise, we allow developers to easily create different applications tailored to a nearly infinite number of use-cases anchored in our communities' digital lives.

The Dwinity ecosystem comprises three principal product components, which unlock the untapped and unprecedented potential of sensitive personal data. The three building blocks of Dwinity create the foundations for a fully functional personal data economy.

1. Dwinity Data Control – the fragmented storage completely controlled by the data owner.
2. Dwinity Data Gold – the AI-based, automated data structuring that creates a substantial added value by unlocking the full potential of data.
3. Dwinity Data Cash – the AI-powered marketplace for automated valuation and monetization of data, facilitating the generation of tangible income.

a) DWINITY CREATES A DIGITAL WEB3 ECOSYSTEM

Dwinity creates a digital Web3 Ecosystem empowering people to control and get the real value of their sensitive Data by becoming a part of the global data value chain.

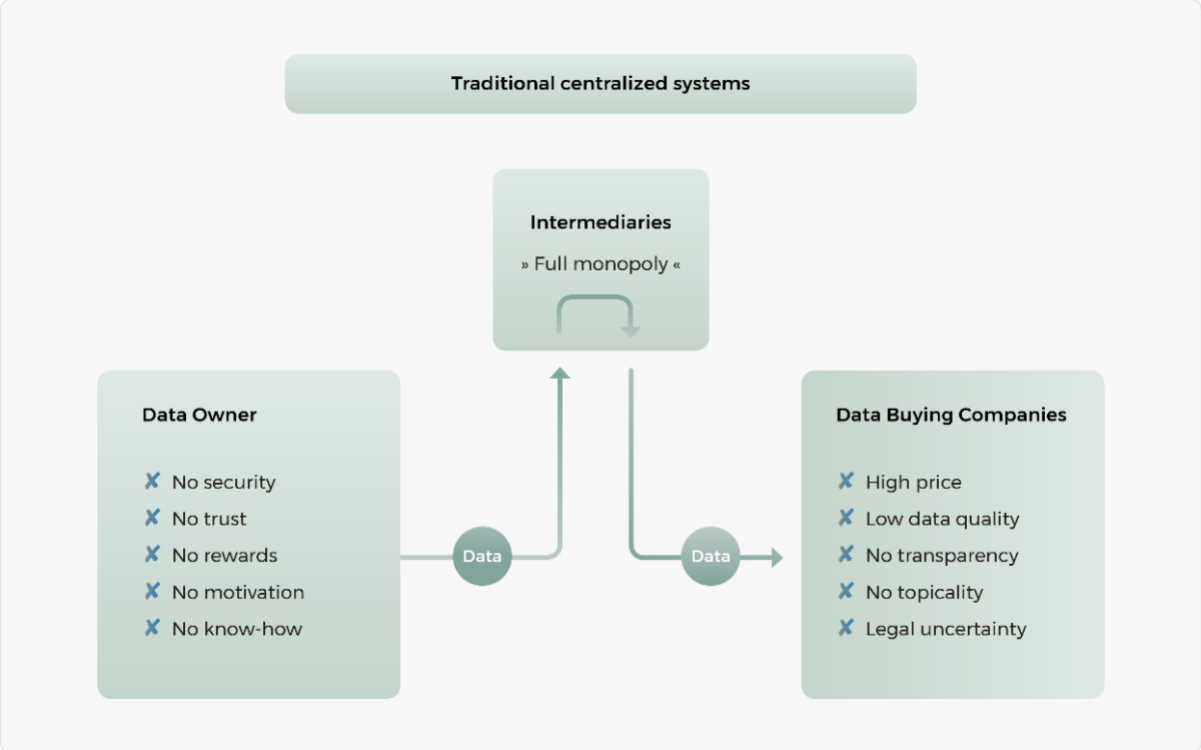

Figure 2.1 Traditional centralized systems

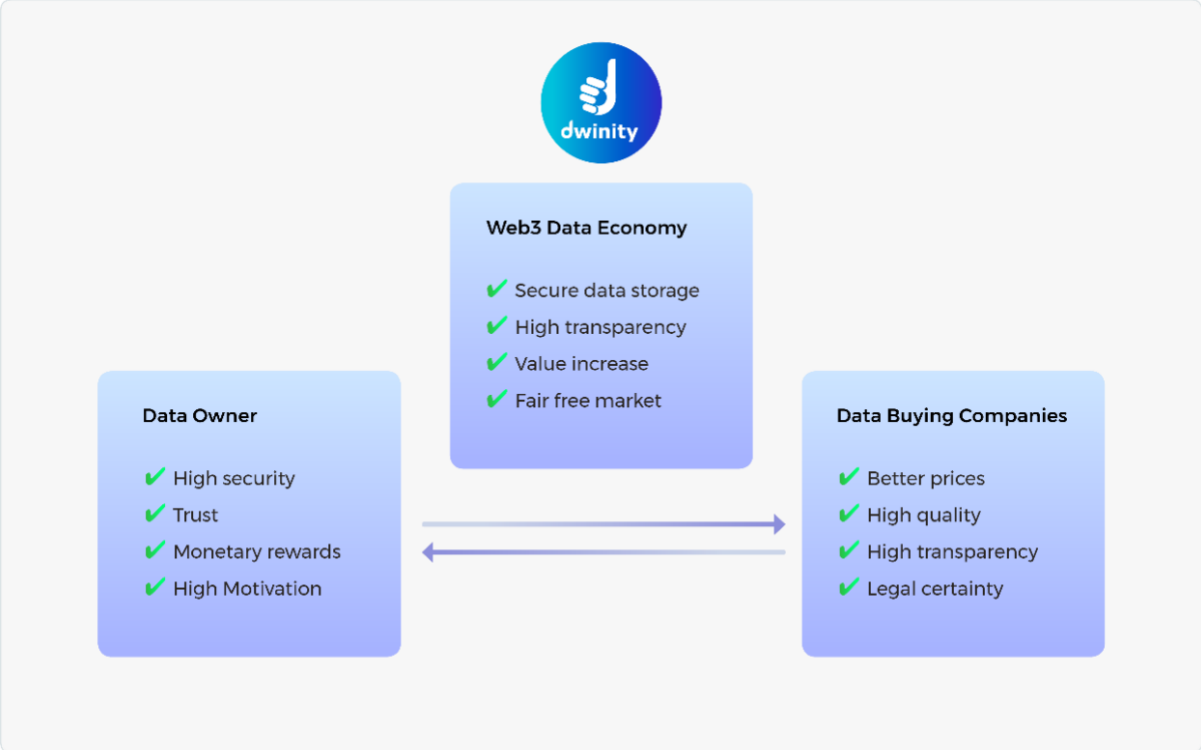

Figure 2.2 Dwinity´s Web3 Data Economy

a) HOW DWINITY WORKS

Dwinity establishes a direct peer-to-peer link between the data owner and the data buyer, forging a highly secure and shielded decentralized data domain between the two entities. This paves the way for an innovative data economy centered on sensitive data. By implementing this approach, Dwinity effectively streamlines the value chain between data owners and buyers within its decentralized ecosystem.

On the one hand, the Dwinity ecosystem supports data-poor companies through a decentralized primary data market. On the other hand, it releases gigantic value potential through a decentralized secondary data market.

Dwinity is a revolutionary redefinition and redesign of the data economy. Up to this point, data owners have merely been passive observers in a multi-billion-dollar industry, shrouded in opacity and monopolized by a select few entities. This trend continues in the dawning era of AI, where monopolistic players train their models with massive amount of data and refine them through a procedure called reinforcement learning by their users behavior. Dwinity is committed to shift this paradigm by positioning the data owner at the core of the marketplace.

To fully realize the proactive role of the data owner, instill trust in the security of their data, and extract value from it, Dwinity leverages the decentralized technologies intrinsic to the Web-3 paradigm. Unlike the Web 2.0 model, where data is aggregated and processed centrally by a handful of major corporations, the Web 3.0 framework fosters an open, trustless network.

In our ecosystem, tasks historically performed by intermediaries in the Web 2.0 realm—such as data silos, data brokers, data engineers, and data scientists—are getting automated by the use of AI, all under the purview and control of the data owner.

Dwinity creates awareness of the value of personal data and sensitive personal data for data owners through motivations such as trust, added value, and reward.

The Dwinity marketplace provides users with the choice to either release their valuable data for marketing and research purposes via Dwinity or to restrict it. Dwinity classifies each individual user according to the data shared. The higher the classification, the higher the bonus. Using integrated dashboards, users have real-time insights into the value of their data and the associated rewards. Furthermore, they are presented with information indicating which data can elevate their status, thereby enhancing the value of their data or increasing their rewards. Users are also given the option to input data in a structured and guided manner.

Once data owners recognize that personal and sensitive personal data is the most valuable asset for innovation and progress, its inherent potential becomes tangible for ordinary users.

Data users, irrespective of their industry affiliation, require precise data about their target groups to conduct insightful analyses. Whether self-generated or acquired, data typically necessitates time-intensive and costly preprocessing prior to the execution of the desired analysis.

The exponential growth of data on a global scale, coupled with advancements in storage on the one hand and neural network-based AI computation, on the other, has empowered companies to identify untapped data sources. Consequently, new business models centered around data leverage have emerged. Undoubtedly, in the digital era, data has solidified its role as an indispensable strategic resource. They have become the oil to the digital revolution.

Data users endeavor to collect this information through various channels, such as free applications, extensive data from social media, and more. To obtain personalized data knowledge, for instance, to craft personalized advertising or offers, the data user must expend substantial funds. However, these

investments seldom yield the genuine, sensitive data essential for discerning an individual's personality. Such data is the gold of every individual. Dwinity offers each person the opportunity to disclose this gold without revealing their identity, ultimately benefiting from the value of their data at a fair price. For data users, these sensitive details have become a strategic asset, enabling them to efficiently navigate their markets.

Data users can derive superior, and thereby more valuable, knowledge data directly from the domains of the Dwinity system. This is because the higher-quality sensitive data originates directly from the data owner—the individual. Intermediaries, which previously held the lion's share of the value chain, are not part of this ecosystem for sensitive data. This shift fundamentally alters the cost structure for data users who receive improved quality. The direct and swifter access to global domains presents entirely new avenues for data users.

Dwinity increases the value creation potential of the general data economy by providing cryptographically protected decentralized data spaces for personal data and sensitive personal data. In the Dwinity ecosystem, personal data and sensitive data are no longer considered commodities, but digital assets.

> Dwinity: *"Imagine controlling your personal data in a secure vault, earning from its use, while also having a personalized AI assistant. This is our vision for a world where you truly govern your digital life, revolutionizing your interaction with technology."*

To create value from personal data and sensitive personal data, a protected space must be created between the data producer and the data buyer. This strengthens the data sovereignty, trust, and motivation of the data producer. If a data owner can enhance their life by extracting additional value of their shared data and, furthermore, is introduced to unexplored monetization opportunities, their willingness to release better and more sensitive data will significantly increase. As the need for intermediaries is eliminated, the data buyer obtains higher-quality data at a reduced cost directly from the data creator.

b) THE DWINITY ECOSYSTEM

To harness the potential of personal data and sensitive personal information, Dwinity combines three product components that resolve the five primary issues previously identified in the current data economy **(loss of value within the data chain, low quality data, lack of security, lack of data control for users, and lack of a fair data market).**

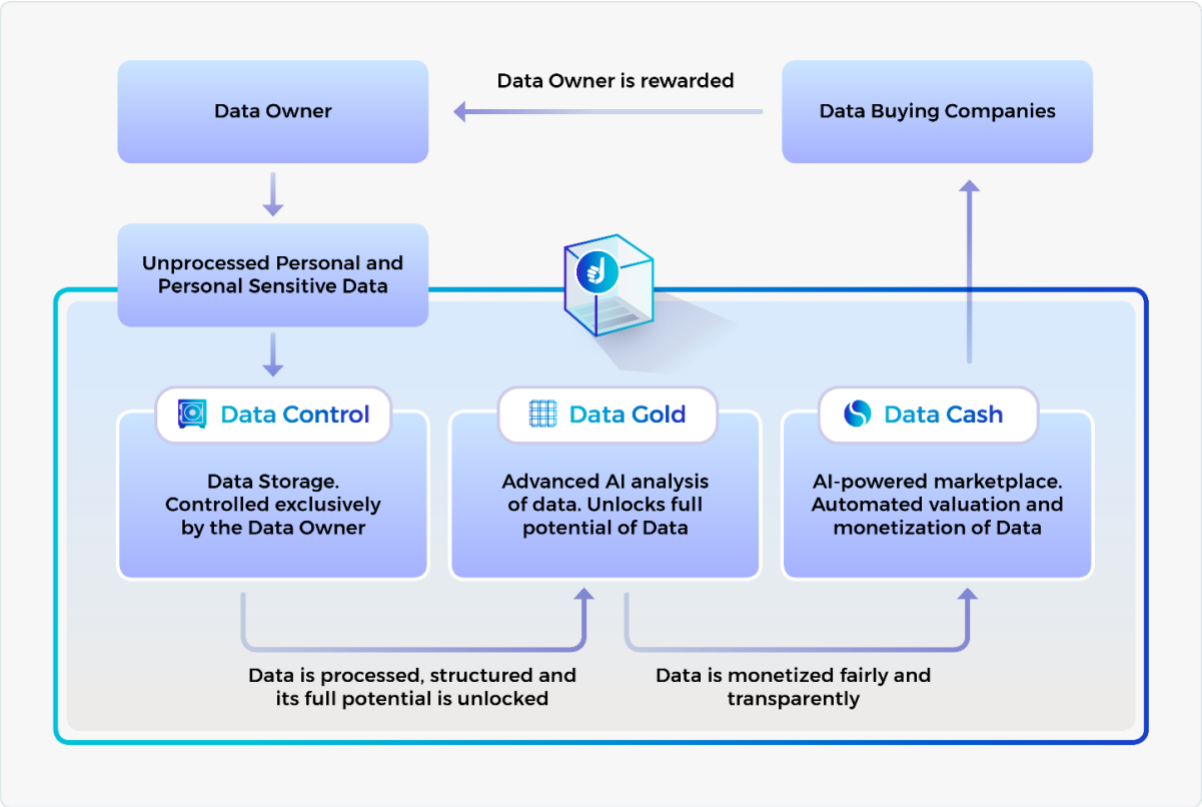

Figure 2.3 Dwinity´s three product components

Data Control

Dwinity Data Control is a highly secure decentralized storage system, entirely controlled by the data owner, encompassing microservices for data management.

- Includes event driven microservices to control, curate, categorize, and format data automatically.
- It enables the data owner to maintain sovereignty over their data by storing it in fragmented pieces within the decentralized data vault.
- Through the ITS technology, the data owner securely retains the digital key.
- The vault, which allows the data owner to connect to Data Gold or Data Cash, creates a protected decentralized data space.
- The data owner thus becomes an integral part of tomorrow’s data economy.
- By storing the data with the owner, the application saves on local storage costs and overcomes legal obstacles.
- Dwinity Data Control uses a multi-party blockchain ledger, which is used to track transactions in a highly confidential way due to its transparency and immutability.

- Includes microservices basic functions and quality filters to format data into a uniform global syntax/structure.

Data Gold

Data Gold is an AI-based automated data structuring and value creation module.

- Data owners can have their data automatically structured, certified, and related to other data using advanced NLP for Data management and Data Control. We integrate a bespoke AI model which we call the Dwinity Platform AI to enable a multitude of additional decentralized AI operations (dAI). Additionally, enabling access to data via NLP, common query languages, such as SQL, are part of the user experience. Data will be curated, and further analysis will be suggested. Data owners will be empowered to increase value of their data by using cutting-edge data science and engineering.
- In the Dwinity ecosystem, data owners can use their data in a wide variety of application areas. Through the analytics offered by AI, data owners can understand correlations from their data and gain valuable data insights and benefit from innovative AI-based apps.
- Data owners are motivated by this added value generated from their data to provide high quality personal data and sensitive personal data for Dwinity applications.

Data Cash

Data Cash is an AI-powered marketplace for automated valuation and monetization of data, allowing for the emergence of new, data-based business models.

- Data owners can either put their data on the marketplace themselves or give the application permission to sell data on their behalf.
- Data owners can automatically determine and monetize the value of their data.
- Data owners are motivated by this added value generated from their data to provide their valuable and sensitive personal data to Dwinity applications (dApps), enabling a fair and efficient data exchange.
- Data owners will have a state-of-the-art user interface and customer experience. In a gamified experience, the potential value of data is displayed, and projects are offered that compensate for participation. The owner will always be aware of the value of their data. There will be awards (such as blue, silver, gold), participant interaction (sharing and “liking” projects), and all types of interactive, AI-driven features that users expect from a Web3 platform.
- Data buyers can reduce the cost of data acquisition without an intermediary.
- Data buyers will receive certified personal and sensitive personal data with high quality and diversity.
- Data Cash is accessible via an AI-powered UI, which allow for easy access and recommendation-driven data leverage.

c) DWINITY'S UNIQUE TECHNICAL INFRASTRUCTURE

Data mesh approach

Data mesh is a new approach to data management based on a distributed architecture, which gains essential attention in Web3. The basic idea is to improve availability of data by directly connecting data owners, data producers, and data users in a peer-to-peer way.

Data mesh primarily introduces the product idea for data. In other words, data should be viewed as a product that has tasks to fulfill and should be described accordingly. Tasks may include providing companies with higher quality data for faster and better decision making or enabling data owners to improve their lives by analyzing the data, for example.

From a technological perspective, the Dwinity data mesh approach basically envisions the following focus areas for the data-driven architecture:

1. Provision of data such as data collection, data events, and data analytics.
2. Distributed, decentralized data architectures that help organizations which want to move away from monolithic architectures to multi-cloud and hybrid cloud computing, or that need to be globally decentralized.
3. Data in motion for businesses that cannot solely rely on centralized, static, batch-oriented data and are instead transitioning to event-driven data ledgers and streaming-centric pipelines for real-time data events, facilitating swifter analyses.
4. Providing decentralized sensitive data using decentralized and fragmented storage that is under the full control of the data owner.
5. Distributed, decentralized data architectures that create opportunities for data owners to make their data available for large corporations, researchers or apps to train AI models or execute AI operations. This can be done anonymously or with certain granted rights, but always highly encrypted.
6. Self-service tools that allow data users to formulate their requests with the simplest of phrases. Especially by using advanced AI solutions, integrated via chat interfaces, recommendations or automated functionalities.
7. Global data governance for uniform guidelines on a global level regarding data processing.

The data mesh approach is a paradigm shift towards viewing data as a product. A data mesh aims to connect data producers or data owners directly with data users, thus removing the data broker or intermediary from projects and processes.

Dwinity provides a platform that meets these new technological requirements and applies them specifically to high-value personalized and sensitive data. These are primarily the three main product components of Dwinity: Data Control, Data Gold, and Data Cash. Based on fully decentralized data distribution, we start with secure storage (Data Control) and expand the classic Data Mesh approach to data owners and their vaults. This leads to interconnected marketplaces where data owners can share data anonymously and users can access global data directly. Furthermore, the uniform structuring of the data within the framework of data control is achieved using microservices. These essentially comprise the central element of the Dwinity data architecture and are essential for the global processing of data. The fundamental views of Zhamak Dehghani, the developer of the data mesh theory is considered in the modeling of the Dwinity data mesh. (Link to the original report by Zhamak Dehghani: https://martinfowler.com/articles/data-monolith-to-mesh.html)

Advantages of the data mesh

- Highest availability of the data through the data pipelines provided by means of microservices.
- Direct access to data results in a significant increase in the innovation cycle for data users by eliminating manual or batch-based legacy processing methods.
- Significant cost savings for data users by eliminating basic data engineering related to data preparation, which accounted for much of the cost in the old view of monolithic data silos.
- Substantial increase in data values in the individual data domains (vaults and marketplaces) through a complete unification of data structures, as well as cleansing of data with the help of microservices located in Data Control.
- Additional cost savings are achieved by reducing data engineering from the perspective of data users thanks to the self-service data pipeline features in Dwinity Data Cash.
- No storage costs for data users.
- Availability of data sets for personalized AI services, federated learning and other dAI use cases.

Monolithic data architectures, modern data lakes, or data warehouses are cumbersome, costly, and inflexible. Most of the time and money is spent on digital business platforms and applications for analytics, integration efforts, and data brokers for example.

Data mesh strategies are designed to solve some of the most pressing and unaddressed modernization goals for data-driven business initiatives.

Some of the technology trends that have led to the emergence of data mesh as a solution include:

- >70% of enterprise digital transformations fail (https://www.bcg.com/publications/2020/increasing-odds-of-success-in-digital-transformation)
- Operational data failure costs are rising (https://www.nextgov.com/ideas/2021/03/commercial-cloud-outages-are-wake-call/172731/)
- Cloud lock-in is real and could become more costly (https://a16z.com/the-cost-of-cloud-a-trillion-dollar-paradox/) – data security, even with current cloud solutions, is inadequate and prevents high-value data from being handed off due to lack of trust
- Data lakes are rarely successful and focus only on analytics (https://www.datanami.com/2021/05/07/drowning-in-a-data-lake-gartner-analyst-offers-a-life-preserver/)
- The rise of distributed data forces a more secure, effective, efficient, and economical architecture.
- Organizational silos exacerbate data sharing problems.
- Data is the catalyst for competitive advantage and must be well managed.

Dwinity data mesh

The decentralized strategy approach in the Dwinity system is to treat data as a product, prepare it, accordingly, present it, and make it globally accessible to business users easily and cost-effectively utilizing the self-service data infrastructure.

The key points are:

Data product thinking

- Shifting the mindset to the perspective of the data consumer
- Involvement of data owners in value creation.

Alignment for operations and analytics

- Global unified data structures and analysis semantics.
- Minimization of data engineering effort

Prepare data

- Capture data events from data systems (such as apps), store them decentralized, prepare them, unify them, and make them available using self-service pipelines.
- An essential capability to enable decentralized data and source-oriented data products.
- Designed to handle all types, formats, and complexities of data.

Decentralized architecture

- An architecture for decentralized data, globally distributed data domains (vaults, marketplaces)

Self-services, regulated secure ecosystem

- Designed to connect data consumers directly with data producers
- By means of microservices or self-services, a strong simplification of data engineering is achieved and thus a significant cost reduction for data users
- Integrated security (ITS), validation, origin, and transparency of data
- Self-service functionalities as applications or APIs
- Central access point for data queries or analyses

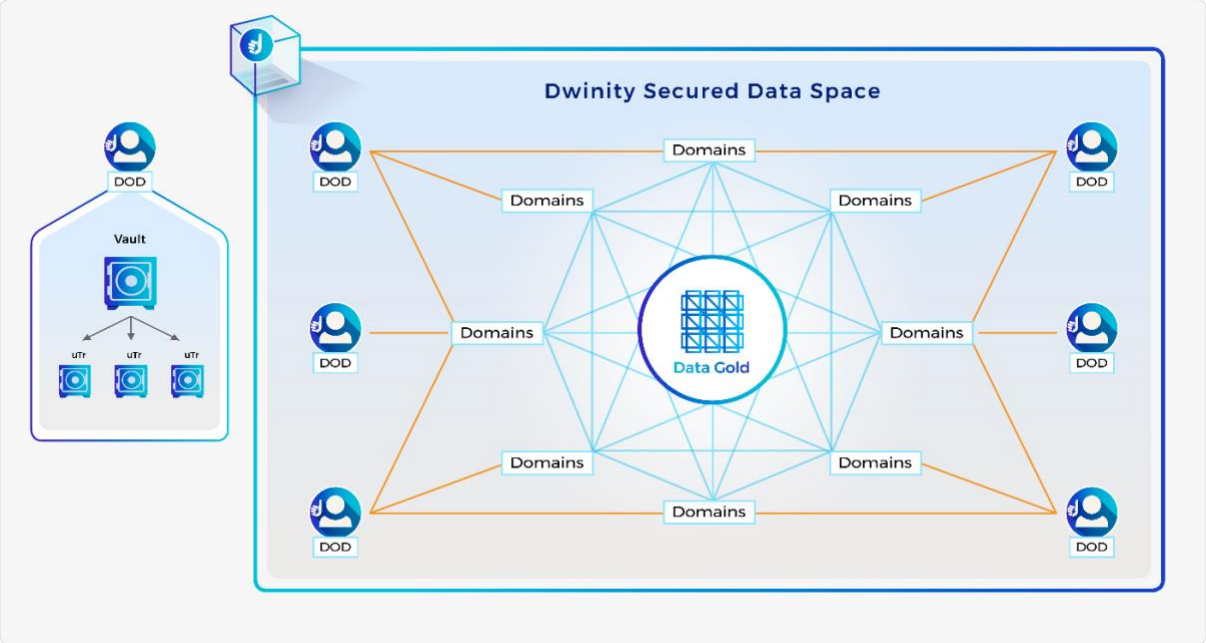

Figure 2.4 Dwinity Secure Data Space

Domain and DOD (Data Owner Domain)

A data domain is a logical category defined by an explicit reference to the data meaning. These data domain categories are used to group related data artifacts. In contrast, a DOD (Data Owner Domain) refers to a specific vault where data is amassed and, based on settings uniquely determined by the data owner, can be further processed. The usable vaults facilitate anonymous transmission of this data to domains.

Data domains can contain data from many or even all DODs.

Domains can be created and managed by anyone. There is no limit to the number of domains. For example, a retailer may have multiple data domains, such as inventory and purchasing, but the data units in these domains may include multiple DODs for the data. Each of the DOD's corresponds to a different physical location in its IT infrastructure, for example, and may be associated with different data lifecycles or quality levels. Data domains are logical groupings used to organize and group data of the same type. The data formats are globally uniform and are generated and checked via the data control microservices. Despite the data belonging to the different DODs, the meaning of the data belongs to the domain.

Each company and project have its own requirements for the type of zones needed. Some companies will give top priority to security controls, while others will focus on rapid development and iteration of their data products. Dwinity ensures that the data contained in the DODs is of the highest quality and security. Dwinity offers additional services to verify the data.

Basic functions and quality filters are applied in this area to filter and format data in a consistent global syntax/structure.

Basically, the data in the DODs or domains is already stored in a curated state and in global format. The microservices of the data control process the data automatically on an event basis.

The Technology Behind Dwinity

Dwinity is developing a comprehensive ecosystem for personal and sensitive personal data, functioning as a decentralized data management system. This platform enables external developers to create innovative use cases using APIs and software development kits (SDKs) across various development environments. Adhering to the principle of "keep it simple and smart" (KISS), developers can seamlessly build applications for a vast array of everyday use cases, thereby amplifying the reach and utility of the Dwinity ecosystem.

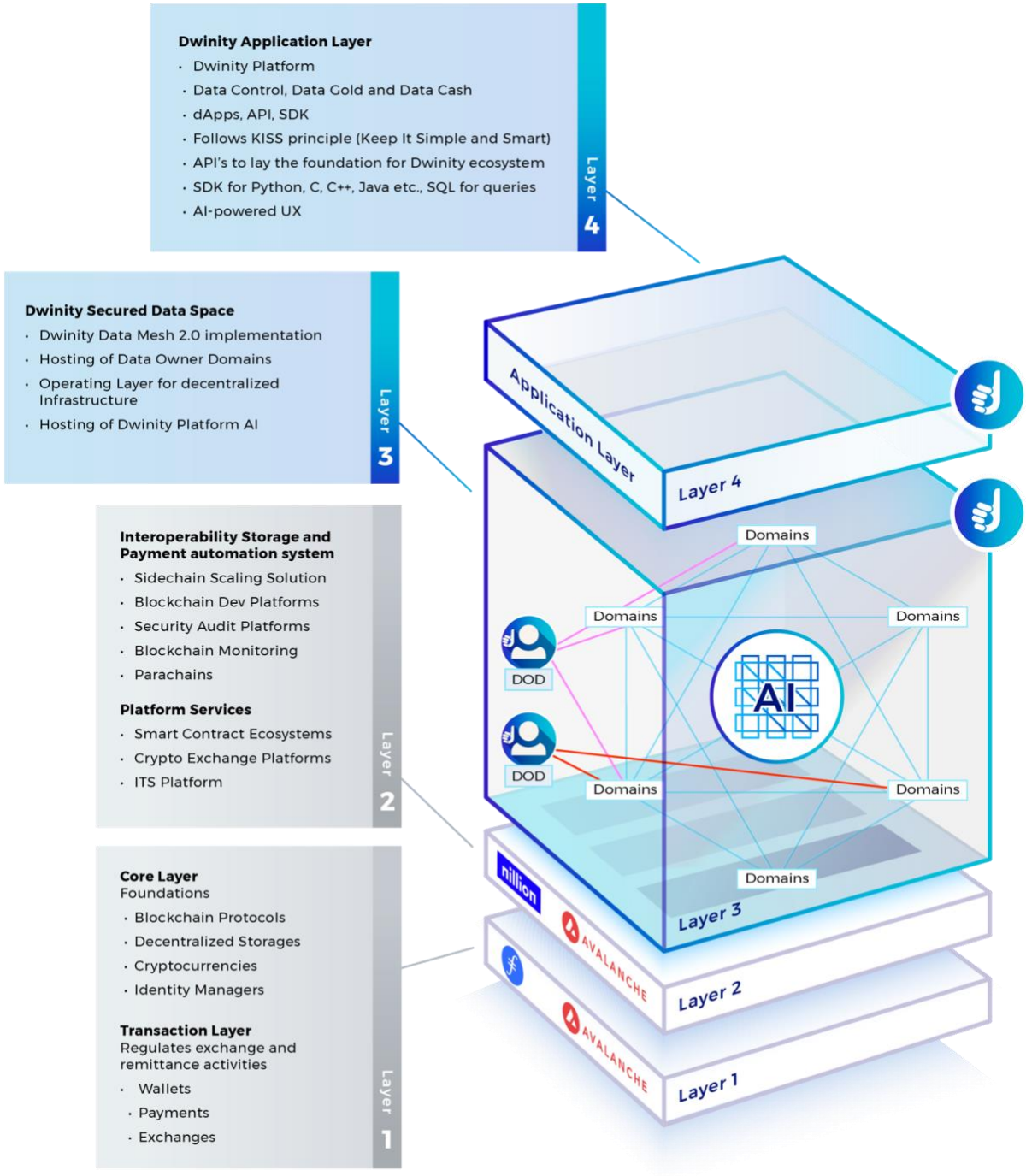

Figure 2.5 Technology behind Dwinity

Empowering Developers

Developers leveraging APIs and SDKs can create diverse applications that fully utilize the potential of personal and sensitive data. The Dwinity ecosystem enhances this potential through:

- **Integrated Value Creation**: Combining all value creation components into a unified system.
- **Ecosystem Expansion**: Encouraging contributions from a wide range of developers with unique visions.
- **Collaborative Synergies**: Fostering interaction among multiple Dwinity applications to amplify overall ecosystem value.

Trust and Governance

- **Dwinity Trust Symbol**: Every application within the Dwinity ecosystem features this symbol, guaranteeing adherence to Dwinity's principles and ensuring that data owners and buyers operate within a secure, decentralized data space.
- **Data Governance Framework**: Addressing big data challenges, regulatory compliance, and new digital services, Dwinity's governance framework covers:
    - Security
    - Compliance
    - Responsibilities
    - Processes
    - Technological architecture
    - Token-based reward systems

Developer Incentives

Key incentives for developers include:

- **Cost Savings**: Decentralized storage solutions like Filecoin drastically cut costs compared to traditional cloud storage. For instance, 1TB of storage costs $4 per month at AWS, whereas with Filecoin, it costs only $0.19. The greater the storage requirement, the more noticeable the cost difference becomes.
- **Enhanced Security and Compliance**: SDKs and APIs offer high security and compliance without requiring extensive developer expertise. Dwinity provides the highest level of security, and developers no longer need to worry about data protection regulations. Only metadata without personal reference is shared through Dwinity, and transaction tracking is stored on the blockchain for permanent traceability.
- **Data Sovereignty**: Ensuring customer control over their data increases trust.
- **Access to High-Quality Data**: Applications benefit from access to premium personal and sensitive data.
- **Lawful Monetization**: Developers can monetize data lawfully through data owner consent.

Simplified Development
Dwinity's function library empowers developers to build Web 3 applications without needing blockchain knowledge, opening the Web 3 market to many who previously lacked the required expertise. This inclusivity boosts the ecosystem's appeal and creates a positive feedback loop between developers and users.

Community Collaboration
Dwinity cultivates a collaborative network of data owners, applications, and data buyers, promoting fair value creation and compensation for all participants. This Web 3 community is characterized by flat hierarchies and equitable power dynamics, with contributions and participation recognized and rewarded through a token system.

Quantum-Proof Security
Dwinity uses quantum-proof encryption (ITS) to securely manage private data on public networks. By fragmenting and transforming data with a masking function, Dwinity ensures that no information is leaked, thus complying with GDPR regulations. This advanced encryption surpasses traditional hash functions by providing mathematically verifiable security against any computational power. Unlike hash functions, the converted data processed with ITS does not have a pseudonymous identifier that reveals information, ensuring that no computing power can reveal the underlying data.

Advanced Metadata Management
Efficient metadata management is crucial for data discovery, integration, governance, and monetization. Dwinity's sophisticated metadata handling supports DataOps use cases and ensures that only essential metadata is shared externally, maintaining high data security and compliance. A common and shared metadata model for data products is key to implementing solid AI within a decentralized ecosystem. Metadata management enhances data quality, simplifies regulatory compliance, and supports data monetization.

Application Layer and API Integration
The Dwinity ecosystem features a robust application layer that supports multiple development pathways:

- **dApps**: Decentralized applications within the Dwinity ecosystem.
- **APIs**: Standard interfaces that facilitate seamless integration and functionality.
- **SDKs**: Tools for developers to create Web3 applications easily.

Figure 2.6 Dwinity ecosystem features

Offering a comprehensive API alongside SDKs ensures developers can choose the most appropriate method for their projects, thereby expanding the ecosystem's innovation potential. The Dwinity ecosystem's expansion hinges on motivating external developers to contribute. Dwinity offers a complete, cost-effective, secure, and compliant solution, allowing developers to innovate without the complexities of data storage and protection. With this approach, we are set to transform the management and utilization of personal and sensitive data through its secure, decentralized, and developer-friendly platform. By integrating APIs, SDKs, and cutting-edge encryption technologies, we are committing to a collaborative and compliant environment, ensuring fair value creation for all stakeholders.

d) DWINITY'S SOLUTIONS TO PRESENT ISSUES IN THE DATA ECONOMY

Many problems exist in this sector, the most important of which are the loss of value within the data chain, the poor quality of the data, the lack of security, the lack of data control for users, and the lack of a fair data market.

The degree and variety of challenges vary between the different stakeholders in the industry, meaning that some challenges are perceived more by some than others and vice versa.

Issue 1: Loss of value within the data chain

The current centralized data economy is restricted by interests of monopolized intermediaries and creates inefficient value chains. The primary data market is dominated by data rich companies, which have little or no interest in a secondary data market.

For companies lacking in data, the problems lie with centralized data brokers, local data silos, and exploited data buyers.

As a result, only a fraction of the possible value creation potential from personal data can currently be utilized.

Data buyers must accept the prices of intermediaries as value creation monopolies and therefore pay high prices for data.

Dwinity Solution through decentralization: With its 3-component self-reinforcing construct, as well as its underlying technology built around transparency and efficiency, Dwinity is created specifically to support a thriving data economy. Dwinity solves the problems of stakeholders which are poor in data such as centralized intermediaries, passive data holders, and exploited data buyers. We allow data owners to be rewarded properly and even the scales which are currently tipped off in the favor of data rich companies. With Dwinity's AI tools, users can exploit the full potential of their data and create significant added value.

Issue 2: Low quality data

There is an apparent lack of data quality and data variety with strong informative value. Data buyers often do not get the desired data variety or data quality from personal data.

The difficulty in accessing high-quality data stems from the data owner's lack of trust. This uncertainty is caused by the lack of transparency in how their data is handled and passed along the value chain without their knowledge. Passive data holders/owners.

Dwinity Solution though protected data space: High Quality data directly from the data owner through a protected space between the data producer and the data buyer. Dwinity creates great incentives for data owners to generate more data, especially high-quality data.

Issue 3: Security of data

Nowadays, our lives and our economic values are intertwined with the digital world. This also exponentially increases the incentives for anonymous hacks.

Never has there been so much at stake. The range and variety of exploitable, valuable digital data and assets are substantial. This includes the storage of private keys, sensitive information such as financial records, intellectual capital/corporate secrets, health data, and customer databases. Unscrupulous entities and even nation-states are archiving hashed or encrypted data with the intention of decrypting it later when the necessary hardware, such as quantum computers, becomes available.

To make matters worse, current systems rely on centralized storage of data (clouds) and access to digital assets. These often fail to provide adequate protection against digital hacks and exploits, which have become commonplace, as can be observed in the media almost weekly. Advances in hacking techniques and computational power have significantly increased the capabilities and incentives for malicious actors to access information protected by even the most advanced security and encryption systems.

Dwinity Solution through ITS: Dwinity makes use of the latest technologies when it comes to security. We use quantum computer secure encryption methods (ITS) in combination with fragmented storage and NMC technology (NIL Message Computing), which is a new form of SMPC (Secure Multi Party Computing), but with almost latency-free processing speed.

Information Theoretic Security, or ITS, refers to the level of security achieved by a cryptographic system that is mathematically proven to be unbreakable, even by an attacker with unlimited computing power and resources.

In information-theoretic security, the security of a cryptographic system is measured by its ability to hide information being transmitted or stored in such a way that it is not only difficult, but impossible for unauthorized parties to decrypt or access it. This means that information is protected with information-theoretic security even if the attacker has unlimited resources to decrypt it.

In practice, this means that a cryptographic system that provides information-theoretic security is constructed in such a way that even if the entire cryptographic system (including the key) is known, an attacker will not be able to decrypt or access the protected information.

Information-theoretic security assumes that an attacker cannot obtain any information that is not already contained in the encrypted message. This means that the protected information is encrypted so that it looks like noise and has no patterns or structures that would indicate the content.

Data owners can rest assured that even highly sensitive data is safe now.

Issue 4: Lack of data control for users

Nowadays, the exploitation of data is mainly the responsibility of global players such as Google, Facebook, Amazon, Apple, and others. However, most apps also collect and analyze data in the background when they are used. Data is collected without restraint under the guise of "improving the applications". The application usually comes with a declaration of consent for the use of data, which is set out in the general terms and conditions of the company offering the app.

In many cases, they are not visible at all. However, the more specific the data, the more valuable it is for third parties. The app providers are aware of this and utilize the opportunity to make additional capital from the sale of this data.

The big providers will do everything they can to get the data of their users. With today's latest technology, including AI and sophisticated algorithms for image and speech analysis, the availability of data provides the opportunity to learn things about individuals that they themselves do not even perceive. Through their behavior on the Internet, users provide a never-ending source of dedicated data to improve the algorithms and even better evaluations to increase the data values. Yet, this potential is barely utilized to a fraction of its fullest capabilities.

As a result, data owners can easily feel exploited for their data and may have no real incentive to participate in the system, let alone to give away any more of their data. They have even less motivation to share sensitive data.

Dwinity Solution through decentralized data storage: Dwinity Data Control provides data owners with true data sovereignty and enables them to decide with whom they share their data. The user can prevent the data from being passed on and thus secure the data from further access.

Issue 5: Lack of a fair data market

In today's data economy, data owners tend to be "seduced" into sharing their assets (data). In many occasions users have to consent or opt in to share unspecified data as a barter to access popular social

media platforms, market places, search engines, and even singular ecommerce shops, for example. The owner does not know the true value of his or her data and is not compensated for it. In such an environment, each consumer will try to share as little as possible data. Revenue created by the current data economy is not distributed fairly but concentrated with a few monopolistic data aggregators and data brokers. Furthermore, data buyers are locked out from direct interaction with data owners and thus must use and buy what the monopolists offer.

Dwinity solution based on automated data value analysis: As a solution, Dwinity creates a value network that enables each individual data owner to freely monetize the value of his data. Dwinity provides a data marketplace that, in addition to secure data collection, includes the entire value chain of data preparation. Decentralized marketplaces implementing automated data value analysis, allow to generate tangible income based on data. Companies can use the data for a fee via appropriate interfaces. There are various options for data selection, data quality, and much more.

Data brokers who sell the data will become obsolete, and their billion-dollar business will benefit the original data owners and data buyers. Of the fees paid, a small portion will remain within the ecosystem to operate the marketplace. The rest will be distributed in full to the data owners.

Data users also benefit from the WIN-WIN effect Dwinity creates. Because of the functionalities for data evaluation in the Dwinity ecosystem and the elimination of brokers, data buyers receive higher quality data for a fraction of the cost directly from data owners.

e) DWINITY SILVER BULLETS IN COMPARISON TO EXISTING INITIATIVES

Many initiatives on the market focus on specific topics or business models. Dwinity's ecosystem follows a holistic approach. This means that it will be open to offer services to or collaborate with other players on the market to always deliver the best available solution.

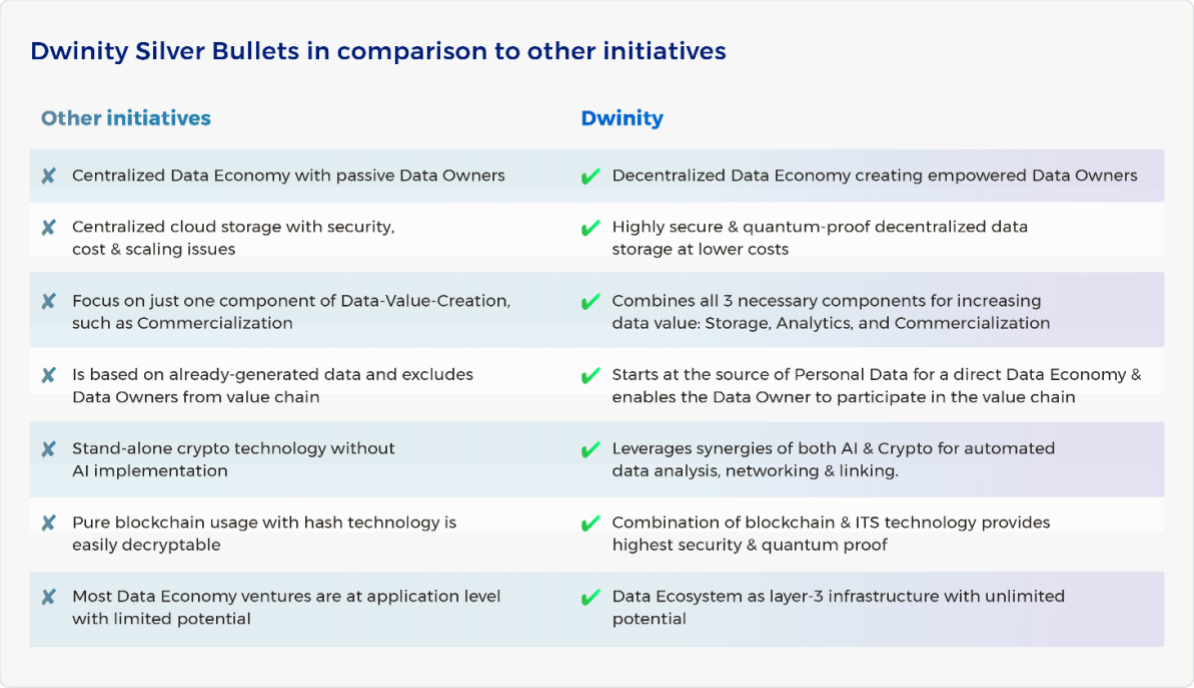

Figure 2.7 Dwinity Silver Bullets

Dwinity decentralizes the sensitive personal data economy and creates empowered consumers as data owners.

- Dwinity builds on highly secure and quantum-proof decentralized data storage technology at lower costs and scaling on demand.
- Dwinity combines all three necessary components (storage, analytics, and commercialization) to increase the value of sensitive personal data from a single source.
- Dwinity starts with the most important player, the source of personal data creation—the consumer as data owner. This enables a direct data economy and allows data owners to participate in the value chain.
- Dwinity leverages synergies of both technologies in one ecosystem—AI and crypto for automated data analysis, inference and additional AI operations with data and other enrichment.
- Dwinity offers a data economy ecosystem as a three-layer infrastructure, which generates much more growth potential through diverse application development.

f) AI IN DWINITY'S USER EXPERIENCE

At Dwinity, we are committed to simplifying user onboarding, interactions, and data management. AI plays a transformative role in building our advanced Web3 platform. In this section, we will evaluate

our specific, customer-centric approach, with a focus on AI-supported features and seamless interactions.

High-Level UX and Customer Journey

On a high-level, user experience (UX) and customer journey for of Dwinity Platform and Dwinity Apps can be summarized as follows:

- **User Onboarding** Users create an account on the Dwinity platform, providing basic information and setting up their DATA Control.
- **Data Management** Users manage their data using AI-backed features, such as intelligent data categorization and advanced data privacy controls.
- **Data Sharing** Users share their data with dApps, receiving context-aware data suggestions from AI-based recommendations.
- **AI-Powered Assistance** Users receive personalized assistance from the AI-powered bot, answering questions and providing guidance on various aspects of the Dwinity ecosystem.
- **Seamless Interactions** Users interact with their data using NLP-powered search functionalities and benefit from common language-based data management.

Simplifying User Onboarding and Interactions

Dwinity simplifies user onboarding and interactions by providing easy access to decentralized applications (dApps) using DATA Control. DATA Control serves as the foundation for user management, enabling users to securely store, manage, and share their data with dApps. Dwinity extends its data management capabilities by making the following AI-backed features available:

- **Intelligent Data Categorization** AI algorithms automatically categorize user data, making it easier for users to locate and manage specific data types.
- **Context-Aware Data Suggestions** AI-powered recommendation engines provide users with context-aware data suggestions, enabling them to make more informed decisions regarding data sharing and usage.
- **Secure Data Sharing** AI-backed encryption techniques ensure that user data remains secure during transfer, protecting sensitive information from unauthorized access or misuse.
- **Advanced Data Privacy Controls** AI-powered privacy controls enable users to fine-tune their data privacy settings, providing them with granular control over their data.

AI-Powered Assistance and Educational Resources

Understanding the need to effectively utilize dAI tools, Dwinity will take an extra effort to ensure that users have access to several educational resources. This includes an AI-powered bot as well as standard elements such as course materials and Frequently Asked Questions (FAQs).

The **AI-powered Dwinity Bot** offers users personalized assistance in real-time. This bot is capable of answering a broad spectrum of questions and providing detailed guidance on various aspects of the Dwinity ecosystem. This feature delivers not only an enhanced user experience but also fosters an environment of trust within the system.

On the other hand **FAQs and course materials** are designed to equip users with the necessary knowledge base, serving as a foundational bedrock for understanding the nuances of the Dwinity ecosystem.

Users can be sure that they have access to reliable and efficient assistance whenever they need it. This stakeholder-centric approach reinforces our commitment to all types of users and enables a richer experience of the platform.

Seamless Interactions Backed by Natural Language Processing

Dwinity utilizes the advanced NLP to guide interactions within the platform, leading to substantial improvements in both the management of data and control for users. The emergence and subsequent rise of AI tools, such as OpenAI's ChatGPT, has underscored the significant potential for advancing accessibility to complex tasks and huge amounts of data whilst allowing a more natural user experience.

By integrating common language into its UX, Dwinity allows users to interact with data intuitively and efficiently. User-data interaction will be improved like never before. One key feature to be included from the start is an AI-powered search, designed to help users find the most relevant data quickly and accurately. This represents a significant advancement by addressing the common problem of time-consuming, and sometimes impossible, searches across the data silos of today's quasi-monopolies.

Furthermore, the application of NLP extends to automating the process of data organization and categorization. This feature lends itself to further streamlining the management of data for users, eliminating the need for complicated data management. Automating such processes allows users to focus more on core tasks, leading to increased productivity and efficiency.

Overall, the integration of Dwinity AI and decentralized AI (dAI) in Dwinity elevates user experience to a new level. It provides all stakeholders with a major upgrade in managing and interacting with their data. Dwinity's mission and AI roadmap covers the following key aspects:

- **Addressing Data Privacy Concerns**
  Dwinity will always prioritize user privacy by implementing solid AI governance frameworks and employing advanced encryption techniques. Our system design always ensures user data protection.
- **Ensuring AI Provenance and Transparency**
  Dwinity is committed to maintaining transparency in its Model Use. We recognize the potential for biases and inequalities in decision-making processes and aim to minimize them through clear AI governance.
- **Utilizing AI Advancements**
  Dwinity will continuously monitor advancements in best practices around AI, in particular on model developments. We will do our best to stay at the forefront of decentralized AI development and are dedicated to actively driving our ecosystem. This ensures that users benefit from the latest innovations in AI-powered data management and user control.

Despite being faced with various challenges and the need for constant technical advancements, we are deeply committed to leveraging the true transformative power of the interplay of AI and Web3. We are dedicated to creating a cutting-edge user experience that is backed by the most advanced AI technology available. Our main objective is to offer a reliable, user-friendly platform that integrates the latest AI advancements and lives up to user expectations. We believe that this will lead to better user adoption and promote broader acceptance of such a new type of Web3 service. Our optimistic outlook on the future is paired with a realistic roadmap. We recognize the potential challenges ahead but are confident to have the right team and means to gradually overcome them.

g) AI AT DWINITY DATA GOLD

Combining a decentralized and secure data storage of Data Control with state-of-the-art AI creates a sweet spot of the future Web3 ecosystem. At Dwinity, we aim to be at the forefront to shape this new era. Our Data Gold product alludes to the fairy tale of a pot of gold at the end of a rainbow. AI plays a transformative role in data management due to its previously described inherent features of analyzing, predicting and matching data. It paves new routes for Data Control while ensuring secure data management across the platform.

This chapter dives one step deeper into the role of AI within Dwinity products.

We will start by focusing on four key areas:

1. The application of AI for enhancing accessibility and enriching the user experience
2. … of AI for enhancing our platform's internal processes
3. … of AI for optimizing the way Dwinity leverages data control
4. … of AI in data management from the perspective of the end-user

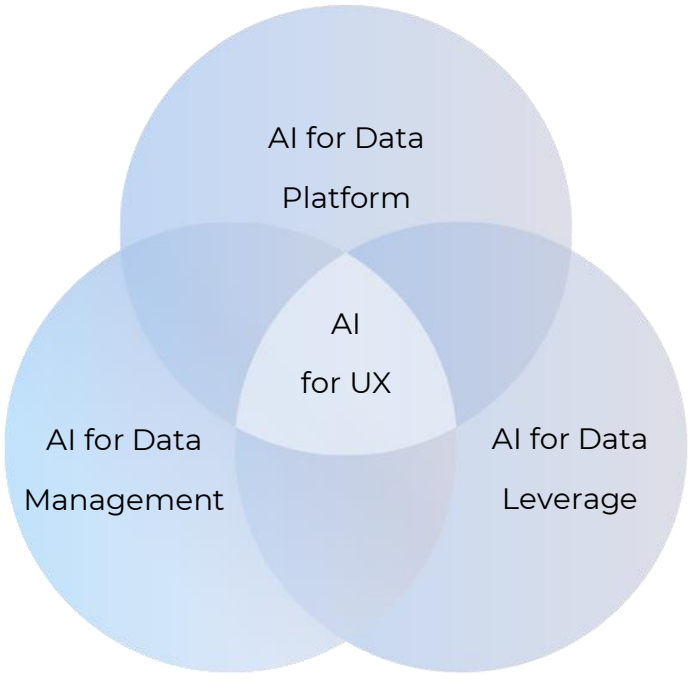

Figure 2.8 AI across Dwinity Ecosystem (planned)

AI for Accessibility and User Experience

AI significantly optimizes user accessibility and User Experience (UX) within the Dwinity ecosystem. It achieves this by analyzing and organizing various forms of data, ranging from user-generated content and transaction data to the code embedded within smart contracts. By harnessing the capabilities of AI for the User interface as well as for data analysis and enrichment we increase its accessibility. As a result, users find it significantly easier to locate and manage their data.

AI-powered search functionalities can be integrated into the system, enabling users to locate and retrieve relevant data in a swift and accurate manner. This not only improves overall UX but also fosters a sense of trust in the system, as users are reassured that their data is being handled efficiently and reliably. By understanding and interacting with human language the user experience facilitates seamless communication between users and the Dwinity system.

AI for Data Management

From the view point of an end-user, AI greatly enhances the way data is managed within Dwinity. It enables a more insightful and efficient handling of data. By using the capabilities of AI, users can analyze their data more effectively, identifying patterns, trends, and anomalies that would otherwise be difficult or even impossible for humans to detect. This not only improves decision-making but also enables users to gain a better understanding of the value and potential applications of their data.

AI can be applied to automate organization and categorization of data, thereby making it easier for users to assess and manage data value. This automation reduces the time and effort users need to invest for their data management, giving them more time for other activities along their journey.

Moreover, integrating AI-powered analytics can give users a deeper understanding of their data. This allows them to make more informed decisions about data sharing and usage. By understanding the value and potential of their data, users can better manage their digital presence.

AI for Dwinity

From Dwinity's internal perspective, AI is used to identify anonymized patterns of historical data and metadata. For instance, by employing AI-powered analytics, Dwinity can optimize resource allocation, improve service delivery, and enhance the overall user experience. The use of AI in these areas leads to significant improvements in efficiency and effectiveness, contributing to the overall success of the Dwinity project.

Moreover, AI can play a pivotal role in supporting user decision-making by suggesting options through recommendation engines. This not only enriches the customer journey but also fosters a sense of trust in the system, as users are reassured that their data is being handled in a relevant and reliable manner.

AI for Optimizing Dwinity Data Leverage

In the Dwinity ecosystem, decentralized apps (dApps) utilize AI for better data management and analysis. This equips users with the knowledge needed to make informed decisions concerning data sharing and usage, granting them increased control over their data. Additionally, AI enhances data security and privacy within the Dwinity ecosystem through advanced encryption techniques and anonymization methods.

These protective measures safeguard sensitive user data from unauthorized access or misuse. By utilizing AI capabilities, users can interact with their data more intuitively and efficiently. They can

also gain deeper insights into their data and better understand its value and potential applications. This not only enhances decision-making but also builds trust in the system. Users feel reassured that their data is managed reliably, efficiently, and securely.

As part of our overall strategy, we will leverage AI to add value in various aspects.

Analyzing data Natural Language Processing can analyze and organize textual data like user-generated content, transaction data, and smart contract code to uncover valuable insights in a very natural, accessible way.

Identifying patterns Machine learning (ML) can identify patterns in historical data to make predictions and assist in decision-making.

Predicting trends AI techniques like predictive modeling can analyze data to forecast future trends and optimize processes, enabling proactive, data-driven decision-making.

Assisting decision-making AI-powered recommendation engines can provide personalized suggestions to users, thereby aiding in their decision-making processes.

Enhancing data management Decentralized apps (dApps) can leverage AI for improved data management and analysis to aid users in their decision-making processes.

We believe the integration of AI into Dwinity's data management and user control systems holds massive potential. It enables users to interact with their data more intuitively and efficiently, provides deeper insights, and promotes a better understanding of the data's value and potential applications. This not only improves decision-making processes but also builds trust in the system. Using Data Gold, users can be assured that their data is being managed to the best extent. We consider this to be a truly transformative step forward with potential to redefine how we handle and interact with data.

h) AI AT DWINITY'S MARKETPLACE AND DAPPS

Building upon the Web3 integration, open collaboration model, and Data Cash marketplace outlined previously, Dwinity's innovative approach to creating a dApp marketplace helps to unlock the real value of decentralized data usage and will drive the data economy across various industries. This chapter, delves into the innovation factor of Web3-style dApps powered by AI, focusing on data monetization and user control, dApp technology, innovative AI and blockchain applications, guardrails set by stakeholders, and future trends in the field.

Decentralized Inference and Open-Source AI Models

A core focus is enabling decentralized inference of open-source AI models to enhance privacy and censorship resistance. Rather than relying on centralized services of cloud incumbents with their frontier models, Dwinity aims to facilitate running inference in a peer-to-peer fashion across the Data mesh. Ritual, Ollama and Edgellama (t.me/edgellama), a decentralized platform that allows users to run open-source AI models on their own devices and share compute in a peer-to-peer fashion, provide examples how users will in future run AI models directly on their devices while sharing compute resources in a decentralized manner. This privacy-preserving approach complements the envisioned dAI marketplace perfectly.

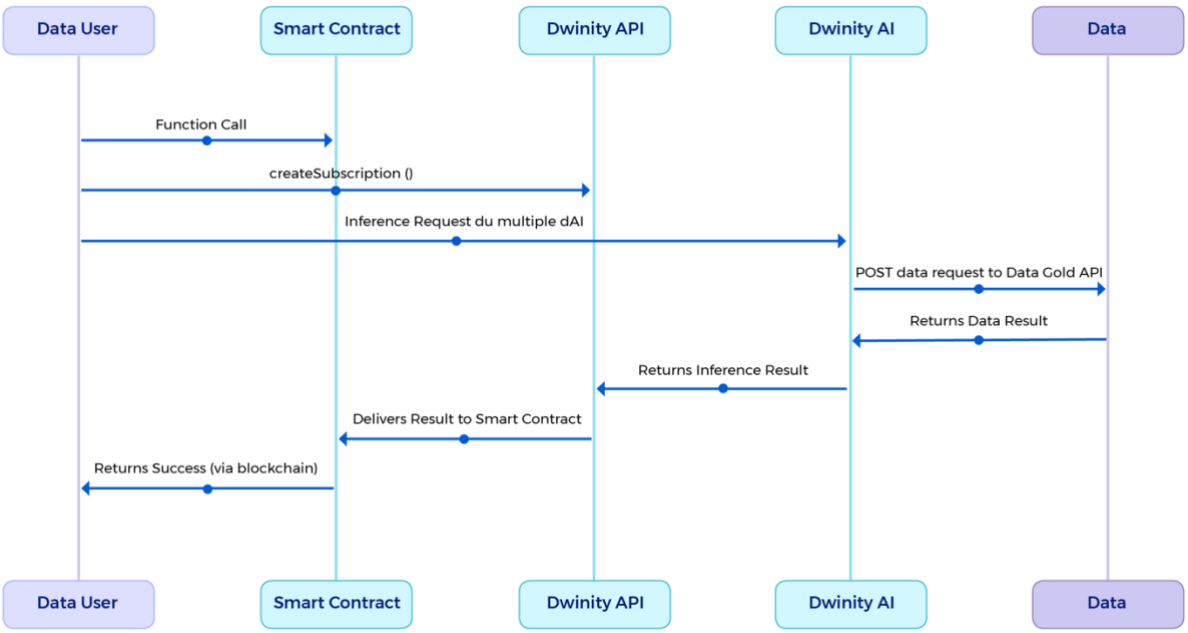

Figure 2.9 Inference on Dwinity AI Platform

The diagram shows how Data Users access Dwinity services using Smart Contracts on the Avalanche blockchain.

The shift towards smaller, specialized language models (SLMs) is a noteworthy trend that provides a substantial opportunity for more focused and specialized applications. These SLMs, often leaner and more efficient, can be tailored to specific tasks or industries, thus potentially offering more precise and useful results compared to their larger counterparts.

On our decentralized Web3 infrastructure we will gain significantly from this trend. By using SLMs we can offer more precise, efficient, and potentially cost-effective AI solutions.

Today's trillion-parameter models by hyperscalers appear powerful. However, they require significant resources and counteract decentralization. Rather than attempting to decentralize these large models, the platform will emphasize smaller, more manageable models. This approach could expedite the usage of decentralized AI, providing users with the benefits without the complex and resource-intensive demands of today.

Incentivized Collaboration, Federated Learning and Efficient Model Deployment

Open collaboration will be crucial to catalyzing data leverage and a win-win for all parties on Dwinity’s Data Cash. Token-based rewards for contributing resources, expertise, and solutions will foster an innovative ecosystem.

Federated learning describes an approach to machine learning where a shared model is trained across multiple decentralized devices or servers while maintaining data privacy. This method ensures data privacy across the distributed network, allowing Dwinity to utilize its crowdsourced computational resources without compromising security or data ownership.

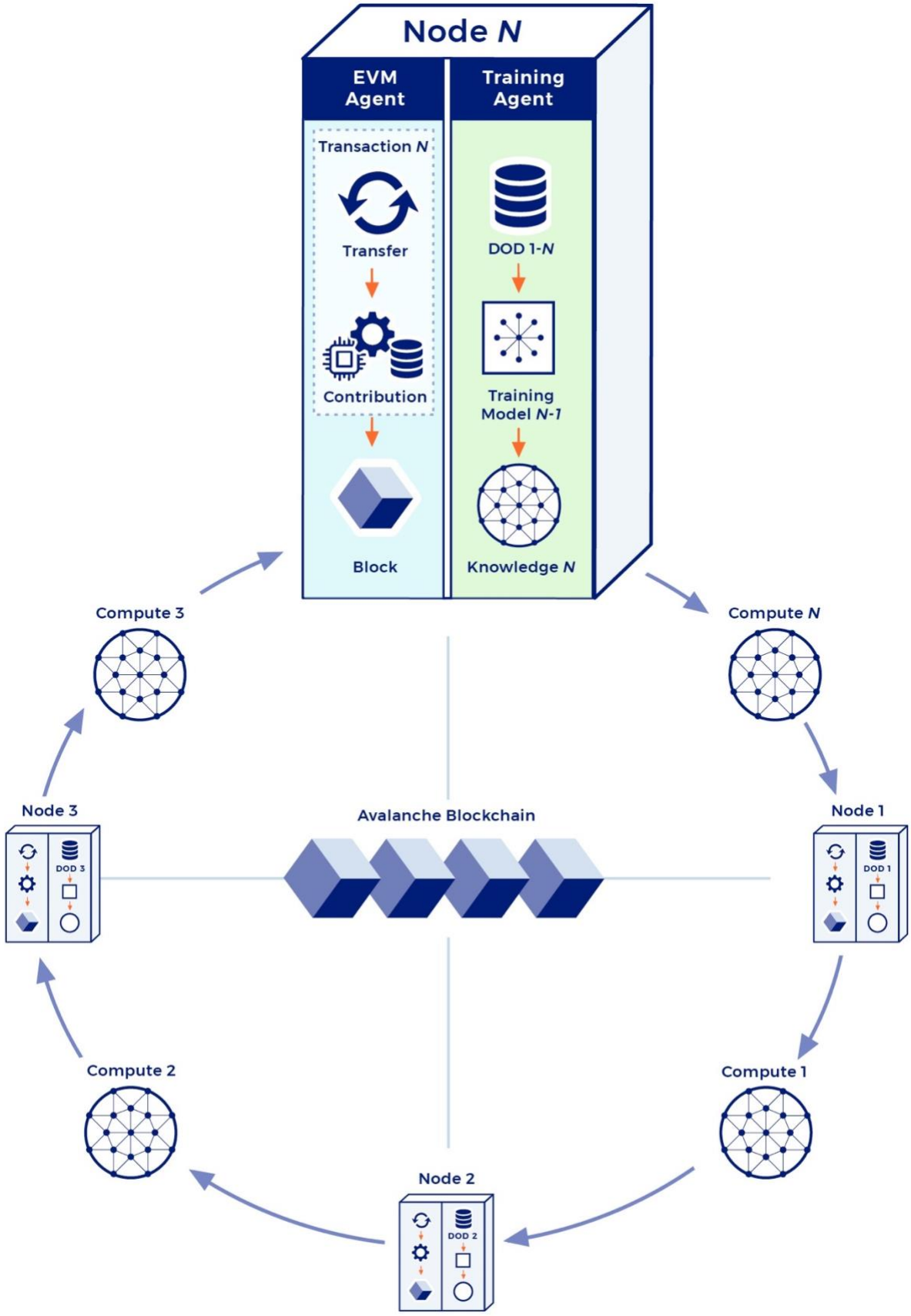

Figure 2.10 Incentivized Collaboration and Federated Learning Process

To enhance deployment efficiency as previously mentioned we plan to build on infrastructure and tools by AI market leader Nvidia. The Nvidia inference manager (NIM) simplifies the process of encapsulating AI models with efficient inference engines into modular microservices. Nvidia's NVFlare allows a comprehensive federated learning environment. Our partner Nillion, on the other hand, incorporates privacy-enhancing technologies into the infrastructure to ensure the storage and computation of sensitive data adheres to the quantum-proof cryptographic security standards. These deployments will be particularly beneficial for dApps and provide a cornerstone to strengthen our Data Gold capabilities.

In a next phase, our Data Cash will create a next-generation decentralized marketplace where AI capabilities can be rented or traded peer-to-peer using the native DWIN token. This approach will efficiently crowdsource compute power across the network for training and inference workloads.

Use Cases for Data Cash

Here are some other examples of future use cases covered by our marketplace:

- **Healthcare:** Decentralized nodes for AI Agents (DNA) technology can be used to create localized AI agents analyzing patient data and providing personalized treatment plans, even securely integrating cross-sector data from the patient's nutrition for comprehensive risk modeling.
- **Sustainability Profiling**: Enable decentralized AI inferencing for energy analytics, carbon emission reduction, and supply chain tracking. This approach reduces ecological footprints by promoting more efficient distributed modeling compared to centralized infrastructure.
- **Open Finance**: Deploy on-chain AI agents to automate blockchain-based lending processes with transparency, leveraging federated learning to continuously improve models without exposing raw data.

Through this convergence of decentralized technologies like open AI inference, federated learning, efficient deployment pipelines and incentivized crowdsourced compute, DATA Cash will lay the foundation of Dwinity's future ecosystem.

Guardrails and Ethical AI on Dwinity

Dwinity is dedicated to the ethical development and deployment of AI systems, rigorously adhering to advanced ethical guidelines and international regulatory standards, including the EU's Digital Markets Act (DMA) and the U.S. American Data and Algorithmic Transparency Act (ADAT). We address crucial ethical issues such as data privacy, algorithmic bias, and transparency to meet global compliance requirements. By proactively tackling these challenges, Dwinity builds trust in our AI systems, enabling all users to make informed decisions about their interactions with AI technologies on our platform.

Dwinity is committed to integrating AI systems that meet the highest standards of algorithmic transparency and explainability. As AI models become increasingly complex, it is crucial to ensure that their decision-making processes are transparent, traceable, and understandable. Therefore we select models that demonstrate clear provenance and traceability, enabling users to understand and critically assess the decisions made by these systems.

Needless to say, we adhere to stringent data privacy regulations, such as GDPR and HIPAA, by employing advanced encryption techniques and decentralized data storage solutions. This not only protects users' data but also allows the creation of AI agents that adhere to data privacy regulations.

Future Evolution of Hybrid AI Solutions

The future of hybrid AI solutions points towards more efficient and adaptable AI subsystems, also to be seen in the current trend around increasingly proficient centralized AI setups. Moving away from the 'one model fits all' approach of the generic AI frontier model world, we will see the emergence of versatile AI subsystems, each tailored to specific industries and use cases within our ecosystem. For example, in the realm of sustainability, hybrid AI solutions can be used to create AI agents that analyze user preferences, identify trends in energy consumption, and provide personalized recommendations.

The strategy mentioned above of using both large and small models for better solutions applies here too. For example, in finance, hybrid AI can be utilized to develop AI agents. Merging the precision of large models with the efficiency of smaller ones can improve financial analysis and decision-making. This is comparable to the trend towards Multi-Agent Models in today's AI applications. Moreover, we can expect to see the emergence of smart contracts or dAI agents that operate across multiple sectors, sharing data and insights to develop more accurate and efficient AI solutions.

In conclusion, dAI and will unlock great potential for Data Cash. It paves the way to a new kind of data economy through improved data monetization, operational efficiency, and innovative business models. Hybrid AI solutions are developed using above described DNA technology, dAI and dApps, guided by ethical parameters, ensuring a secure, transparent, and trustworthy AI ecosystem. This stimulates innovation across various industries.

i) SOLVING THE DAI CONUNDRUM

The Paradox of Decentralization in AI

In the rapidly evolving landscape of artificial intelligence, a paradox has emerged that challenges the very foundations of decentralized AI (dAI) systems. As the demand for advanced AI applications continues to grow, so too does the need for powerful computing capabilities. However, this pursuit of high-performance computing often leads to the centralization of resources and infrastructure, which stands in direct opposition to the core principles of dAI – transparency, security, and community-driven development.

The dAI conundrum arises from this inherent tension between the benefits of decentralization and the limitations of distributed computing resources. Traditional AI systems, with their reliance on centralized data storage and processing, are vulnerable to breaches, compromise sensitive information, and concentrate control in the hands of a few entities. This centralization not only poses security risks but also stifles innovation and limits accessibility, undermining the very essence of decentralized systems.

Our long-term Vision: Enabling Performant Decentralized AI

Recognizing the significance of this conundrum, Dwinity has embarked on a mission to provide a groundbreaking solution – a decentralized platform that enables high-performance computing while preserving the core benefits of decentralization. By leveraging cutting-edge technologies like zero-knowledge messaging, immutable storage, and distributed ledger technologies, Dwinity creates a transparent, secure, and collaborative environment for AI development, allowing developers and researchers to innovate without compromising performance, security, or privacy.

Ensuring Data Privacy, Ownership, and Provenance

At the heart of Dwinity's approach lies a deep commitment to data privacy, ownership, and provenance. In the realm of dAI, these principles are paramount, as they safeguard the rights and interests of individuals and organizations contributing to the ecosystem. Dwinity addresses these concerns by implementing robust encryption and decentralized data storage and compute solutions, empowering users with unparalleled control over their data.

By storing data in a distributed manner across the Dwinity data mesh, we ensure that sensitive information remains protected from unauthorized access and tampering, addressing a significant vulnerability in traditional AI systems. Moreover, the platform implements robust data and model provenance mechanisms, enabling the tracking and documentation of data sources and AI model updates throughout their lifecycle. This immutable ledger and its audit trail enhance transparency, accountability, and trust in the AI systems developed on the platform.

Enhancing Accessibility and User-Friendliness

While the potential of dAI is vast, its adoption has been hindered by the complexity and technical barriers associated with current technologies. At Dwinity we recognize that widespread adoption hinges on user-friendliness and accessibility. The platform focuses on designing intuitive interfaces and clear onboarding processes, ensuring that dAI is accessible to a wider audience, including non-technical users and organizations.

By lowering the barriers to entry, Dwinity aims to democratize AI development, fostering an inclusive and collaborative ecosystem where individuals and organizations from diverse backgrounds can contribute their expertise, ideas, and resources.

Key Technologies and Approaches

To tackle the dAI conundrum we follow a multi-faceted approach, leveraging several cutting-edge technologies and methodologies. Here are some further details complementing the earlier described approach on how decentralized inference, open-source AI models, incentivized collaboration, federated learning, and efficient model deployment integrate with Web3 technologies and advanced collaboration frameworks. This section will provide a more comprehensive understanding of these interconnected elements.

j) WEB3 INTEGRATION AND SMART CONTRACTS

As we are built natively on Web3 technologies such as blockchain and smart contracts, our foundation inherently enables data security, transparency, and trust among participants. Smart contracts provide a tamper-proof and verifiable means of executing transactions and agreements, reducing the need for intermediaries, and ensuring trust among participants. This integration also enables the creation of decentralized applications (dApps) within the Dwinity ecosystem, further strengthening its decentralized nature.

Incentivized Open Collaboration and Innovation

Open collaboration among stakeholders (Data Owners and Data Buyers) is essential for driving innovation and addressing regulatory hurdles within the dAI ecosystem. Our architecture fosters an open and collaborative environment, encouraging developers, researchers, industry partners, and data

owners to contribute their expertise, ideas, and resources. This collaborative approach promotes sharing of diverse knowledge and finding innovative solutions to complex challenges.

Participation and contribution will additionally be sparked through token-incentivized applications and machine learning operations (MLOps). In a later phase, AI capabilities can be rented (or sold) in a peer-to-peer network, using DWIN incentives. Crowdsourcing compute resources across a network of contributors improves efficiency and reduces costs. This also allows building a decentralized marketplace for AI capabilities, where - in future - AIs can rent or sell their capabilities through a peer-to-peer network, utilizing token incentives.

By embracing incentivized participation and open collaboration, Dwinity taps into the collective intelligence of its community, fostering a culture of continuous learning and iterative improvement. This approach not only accelerates the development of cutting-edge AI solutions but also ensures that the platform remains responsive to the evolving needs and challenges of the dAI landscape.

Decentralized Inference of Open-Source AI Models

As discussed above, decentralized inference of open-source AI models will play a crucial role in resolving the dAI conundrum by enhancing privacy and censorship resistance. Running inference in a decentralized manner can provide an alternative to centralized services, which often raise concerns about data privacy and ownership.

The trend towards Small Language Models (SLMs) can make foundation models more practical to run on decentralized Web3 infrastructure. Adapting these models to be smaller and more specialized is key to making dAI feasible in the near term, as opposed to trying to decentralize massive trillion parameter models.

It's also worth noting that most initial use cases of dAI will likely focus on running model operations rather than training them, which is much more computationally intensive. One example of this approach is the afore mentioned Edgellama that runs open-source AI models and shared compute across their network. Such implementation enables privacy-preserving inference and complements ideally to our envisioned dAI marketplace.

Federated Learning

By using leveraging federated learning, Dwinity can efficiently utilize distributed computing resources without compromising data security or privacy. This approach aligns with the platform's commitment to data privacy and ownership, ensuring that sensitive information remains protected throughout the AI training process.

Nvidia’s NIM additionally helps to simplify the deployment of AI models into production environments. NIM encapsulates AI models with an optimized inferencing engine into containerized microservices to streamline the deployment process.

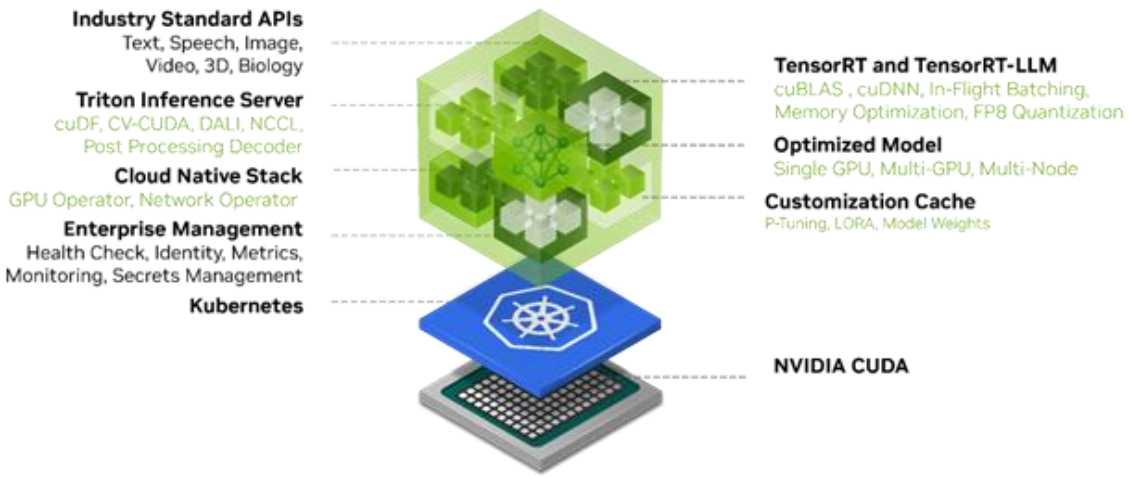

Figure 2.11 Nvidia's NIM Architecture, Source: Nvidia

Integration of Nillion's Nil Message Compute (NMC)
Nillion has gained significant traction due to creating a generational leap in secure multi-party computation (MPC) technology with their Nil Message Compute (NMC). NMC allows for efficient computation of fragmented and dispersed data, surpassing the limitations of traditional MPC that require communication between nodes. Nillion's NMC plays a crucial role in verifying the integrity and accuracy of AI models deployed on-chain within our ecosystem. This approach ensures the storage and computation of sensitive data by applying quantum-proof cryptographic security standards. The verifiable nature of AI model outputs enhances reliability and credibility of the platform.

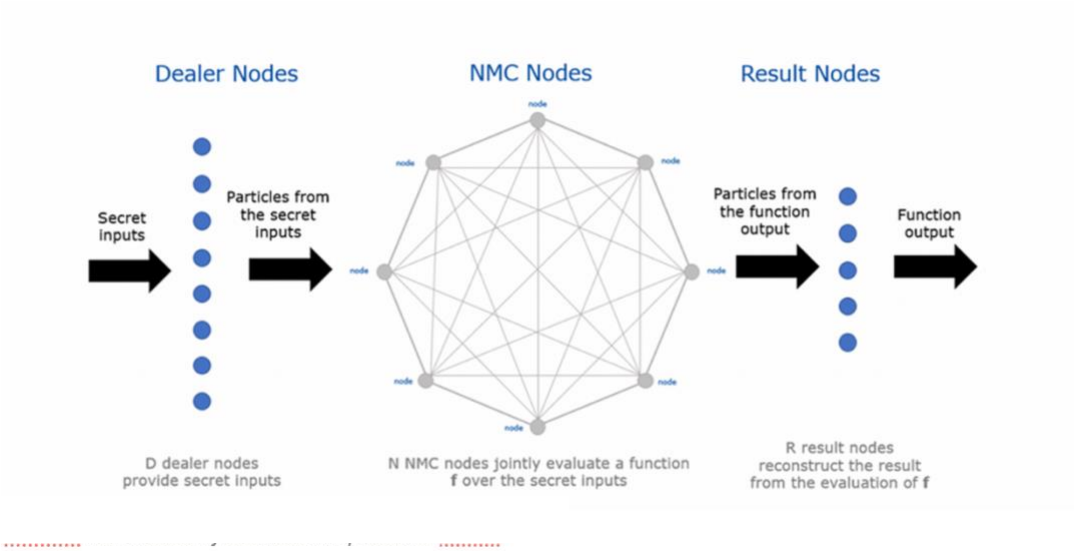

Figure 2.12 Nillion's NMC Security Architecture, Source: Nillion

By leveraging this and other, currently negotiated top-tier partnerships, our ecosystem will seamlessly connect to the broader cryptoverse. Such integrations not only promote transparency and trust but also open new possibilities for the creation of innovative applications and use cases that leverage the strengths of both AI and blockchain technologies.

Whilst we recognize the inherent trade-offs between decentralization and performance, our dAI strategy is committed to striking a balanced approach that leverages the strengths of both sides, while mitigating their respective limitations. To achieve this ambitious goal, we will adopt a phased, lean

approach, prioritizing our core competencies of a solid Web3 infrastructure roll-out and high-value data leverage.

As the ecosystem matures, our roadmap gradually introduces additional components of the dAI domain, ensuring the platform remains agile and able to adapt to the rapidly evolving marketplace. This iterative process will be guided by continuous learning, collaboration, and a commitment to unlocking the full potential of decentralized AI for the benefit of all stakeholders.

In summary, with our robust architecture and innovative approach, we empower developers, organizations, and communities to unlock the full potential of dAI, driving progress and innovation in a secure, transparent, and democratized manner, while directly addressing some of the most challenging building blocks to resolve the dAI conundrum.

k) USE CASES OF DWINITY – IMPROVED LIVES OF DATA OWNERS AND DATA BUYERS

The Dwinity use cases represent opportunities for app development within the Dwinity ecosystem. All use cases or apps involve the three Dwinity components: Data Control, Data Gold, and Data Cash. This structure enables the creation of value from personal and sensitive data across various aspects of life.

In addition to the community for app development and data analysis, etc., two parties benefit from the Dwinity ecosystem and its use cases: the consumer, private individual, data owner (you and me) and the company (data buyer). Both parties' "lives" are changed with Dwinity.

The data owner enjoys:

- Self-sovereign identity
- Personal data under personal control
- Hyper personalized services and products
- New lifestyle and higher quality of life
- Privacy, transparency, security, and trust
- Income from data sharing and status in the community

The data buyer enjoys:

- Unbiased market research and market sizing, lower costs of R&D, shorter time to market
- Design of sustainable products and services (ESG compliant), reduced risks of wrong product designs, reduced investment risks
- Improved customer relations, reduced risks of missed market trends
- Reduced costs for managing sensitive data
- Responsible AI foundations with rich personal data
- Access to PII-data, more and better data because the data owner is now willing to share

In addition to the use cases described below, there are multiple further use cases in various industries like financial services, insurance, health care, pharmaceuticals, logistics/transportation, tourism, media and advertising, 3D printing, retail, and lifestyle/fitness.

Use case: asthma medical data

Bronchial asthma is a chronic inflammatory disease of the airways that causes recurrent symptoms of shortness of breath, coughing, wheezing, and chest tightness.

More than 500 million people worldwide are estimated to suffer from bronchial asthma. The prevalence of the disease varies by region and population group. Asthma is widespread in many industrialized countries and affects both children and adults. The exact reasons for the increasing prevalence of asthma are not fully understood, but a combination of genetic predisposition and environmental factors is thought to play a role. Treatment of asthma is based on symptom control and avoidance of triggers, as well as the use of medications such as inhaled corticosteroids, bronchodilators, and other anti-inflammatory drugs. Timely diagnosis and appropriate treatment can help control symptoms and improve the quality of life of those affected. High-quality documentation and further medical development about asthma are urgently needed.

Dwinity's solution

The Dwinity ecosystem can provide the ideal building block for securely collecting, processing, and analyzing necessary data such as personal health records, time-dependent location data, and food preferences through Data Control. With the use of advanced AI, valuable insights can be extracted (Data Gold). Throughout this process, the data owner never loses sovereignty over their data and can utilize the results in various beneficial ways. Besides the medical benefits for the individual, the outcomes may include better diagnostics, behavioral recommendations, and ultimately, the monetization of their data through the Data Cash functionality of the Dwinity ecosystem.

Imagine you suffer from bronchial asthma—a disease with regular shortness of breath and choking attacks that can even lead to death. A corresponding asthma app allows you to document the data of your disease such as frequency, intensity, diet, possible triggers, and your medication consumption for them. Of course, you do not want to store this highly sensitive data centrally on a regular cloud, which is too insecure and greatly depends on an unknown operator.

With Data Control, it is possible to store this sensitive data securely, decentralized, and in encrypted form. The data is already optimized during storage so that it later provides you with the best possible information and is optimized for further processing in Data Gold and Data Cash. A major advantage is that you can also make the asthma data collected via Dwinity available to your physician, who can use it to optimize your therapy. For instance, your physician can use the documented times to see whether you have taken your medication at the right time, which is extremely important for asthma. By processing the data via Data Gold, they can adjust the dosage of the individual medications and sprays precisely to their requirement profile and reduce the dose of cortisone, etc. This significantly reduces the number of seizures and their risk, as well as the negative consequences of side effects. Of course, the data is only transferred to your physician with your authorization via Data Control. Utilizing Data Gold's capabilities, the data you have stored is enriched and analyzed by AI. This includes correlating with weather data, pollen counts, medical standards, the location where you reside or are currently staying, and more, along with your current medical treatments and behaviors.

By identifying triggers, environmental factors and, for example, dietary aspects, problems that may cause asthma can be found more quickly. By using such applications based on the Dwinity ecosystem, the quality of the data is also significantly improved and possible information can be forwarded to your app individually for you. This may provide useful information for the patient's daily behavior, but also for emergency situations.

The artificial intelligence utilized within Data Gold processes data in a manner that increasingly enhances its significance for the pharmaceutical industry and medical research. The precise data and

information provided through the app, when processed and interconnected by AI, significantly improves data quality. This enables the refinement of existing medications and the development of new drugs. Consequently, both medical researchers and the pharmaceutical industry have a substantial interest in these data. As the owner of the data, you have the option to sell this information and the additional insights derived from it through Data Cash. A corresponding good data set, which possibly covers a long-term documentation period, can be sold here for several hundreds of dollars. Since there is not only one company interested in the data, but also great potential for data owners to generate a good second income. They only must manage their data via Dwinity. Asthma patients, as the data owners, can thus only benefit from the concept. In addition, the knowledge about the causes of bronchial asthma will expand considerably and possibly new ways of successful asthma therapy will emerge.

Use case: health insurance data

Health insurance is mandatory in Germany. Most Germans belong to a statutory health insurance fund. Employees who earn above the annual income threshold, self-employed or freelance workers and students can also join private health insurance.

Insurance companies require highly sensitive health data of prospective customers for admission to private health insurance (in some cases also for supplementary health insurance), which is mandatory and covers a period of up to 10 years retrospectively. Depending on the state of health, an insurance company decides whether to accept or reject the interested party after checking this data and, if necessary, carrying out an extended review. In the event of acceptance, there is the option of a special exclusion of benefits for certain health risks or risk surcharges that consider the increased benefit entitlements.

The economic goal of insurers in this case is to generate a collective of young and healthy premium payers who (except for preventive medical checkups) avoid going to the doctor. This target group is urgently needed to offset the costs of those who use many of the insurer's services. At the same time, it is important for young and healthy people to pay a reasonable premium for their health insurance, which should be as low as possible, since they hardly claim any benefits.

Anyone interested in comprehensive health insurance currently must go through a complicated and very costly application process. As part of this procedure, the insurer collects all documented medical diagnoses, treatments, illnesses, and medication taken. The potential customer is often asked to release the treating physicians from their duty of confidentiality. This often results in unpleasant surprises, since diagnoses are often billed for that were never used. In the event of a rejection, the interested party has greater difficulties in being accepted by other insurers. After a rejection, all subsequent insurers usually also reject the application.

Dwinity's solution

How can Dwinity simplify the review process for applicants and give them their own data sovereignty?

Prospective applicants for comprehensive health insurance use a Dwinity-certified app to disclose their highly sensitive risk data, which insurers need to assess the application. This collected data is qualitatively evaluated by the AI and shown as a score at the end. The better the prospective customer's score, the lower the risk for an insurer.

In this way, Dwinity offers the opportunity to introduce a user-centered, user-friendly, and voluntary method of maintaining health information. This creates transparency for interested parties from the outset on whether it is even worth applying to the insurer. In addition, it replaces the time-consuming application checks by insurers, which were previously carried out manually, with certified scores.

Since insurers are desperate for prospective customers with a good score, they can use the pool of prospective customers to make direct inquiries and offer health insurance cover, like matching. The insurer cannot see the actual risk data stored in the inquiry status but knows that the applicant meets the “requirements” based on the score assessed. If an applicant has a low score and can see the factors on which the rating depends, they can actively improve the score by taking preventive measures.

Since the scoring system considers the same parameters for every applicant, it simplifies the process considerably, especially for foreign applicants, as foreign medical reports are often not accepted during manual reviews. Scoring presents the data in a consistent and uniform manner, which eliminates the need to pass on information to insurance brokers. Potential clients frequently feel uncomfortable discussing their various treatments with a stranger, and this step is also removed by the scoring process. If an applicant is accepted by a health insurer and agrees to the company's offer, the data owner or the application can be rewarded for this “match.”

The insurance company is saved intermediary and administrative costs, which amounts to at least €1.000 per health insurance contract. For high-value health insurance contracts, it can be up to €5.000 per contract. This way, insurers can accelerate their line of business growth and increase their market share.

Another way to use the data marketplace is to sell medical health data to research institutes. This way, Dwinity also offers policyholders with a bad score a possibility to use their medical data.

l) FROM DATA ANALYTICS AND GENAI TO A DECENTRALIZED AI VISION

The shift from monolithic AI of the present to a decentralized future is closely linked with the broader transition towards Web3 and decentralized data ownership models. Currently, huge monopolies of incumbent cloud providers like Google, Amazon, and Microsoft are swiftly adopting blockchain technology and decentralization strategies to secure their market positions. Their goal is to counteract Web3's disruptive potential and uphold their market dominance. This last chapter explores how the Dwinity ecosystem, encompassing Data Control, Data Cash, and Data Gold, could become an integral part of this decentralized AI future.

At the start, Dwinity’s ecosystem is rooted in decentralized data management, AI-driven data enrichment, and data monetization. To deepen this alignment, Dwinity will gradually integrate comprehensive blockchain functionalities as smart contracts to automate transactions and interactions within its ecosystem. This would enhance data transaction security, auditability, and efficiency, core features that are attractive to enterprises and individual users alike.

Dwinity Gold, with its AI and natural language processing capabilities, will promote the use of data enrichment and specialized AI operations within our ecosystem. We are also developing strategic partnerships with key players in both infrastructure and application technology. Integrations with Blockchain-as-a-Service (BaaS) will allow us to scale effectively while maintaining security and decentralization.

In addition to our partnerships, we will gradually open to more community-driven governance principles. Dwinity plans to further tokenize and give users and stakeholders direct influence on the ecosystem's extension, promoting a decentralized approach to decision-making and embodying the ethos of Web3. As our ecosystem evolves, addressing ethical considerations regarding data privacy, ownership, and AI algorithm transparency will become vital, particularly in ensuring the transparency and reliability of previously described dAI operations and dApp orchestration.

dAI Vision

Looking forward, the integration of Dwinity's capabilities with AI and Web3 technologies promises a decentralized AI landscape. This landscape will merge data analytics, machine learning, and data monetization into a single, decentralized framework. Dwinity is committed to curating and cultivating a symbiotic ecosystem at the forefront of transformation. This change will not only redefine data management but also establish new benchmarks for deploying and using AI across various industries.

In summary, the journey from an initial Minimum Viable Product (MVP) and platform-wide Dwinity AI to a fully functional, decentralized AI future entails technological integration, strategic partnerships, and a steadfast commitment to dedicating top-tier resources to overcome existing limitations of current technologies. This strategic shift involves not just adopting new technologies, but also fundamentally rethinking how data and AI services are delivered and consumed in an increasingly decentralized digital world.

3 DWINITY'S WINDOW OF OPPORTUNITY

Timing a wave: The success of projects depends largely on the right timing.

Figure 3.1 Why now?

- **Bull market ahead:** The new bull market is approaching: In the coming bull market, the projects that will be most successful will be those that can solve real everyday problems through Web3 technologies, such as Dwinity. This will go a long way in advancing the use of crypto technology.
- **Favorable regulation:** The current regulation of the crypto market in Europe, known as MiCa (Markets in Crypto-Assets), provides a legally secure framework for emerging Web3 companies and their investors, promoting widespread market acceptance. Dwinity, as a European Web3 startup, can thus take full advantage of all the legal benefits available.
- **Data protection:** Recent years have demonstrated that data protection regulations often inhibit potential more than they assist; in many cases, they are not even compatible with current technologies. The proper path forward, therefore, lies in innovative technologies that enable effective data protection without hindering potential. Technological empowerment of data sovereignty for data owners surpasses any data protection regulation.
- **Digital sovereignty:** Self-determination and self-development are important issues for people worldwide in the analog world and are promoted in a wide variety of areas. In contrast, things look different when it comes to opportunities for self-determination and self-development of

identity data (digital twin). The need of people for solutions to maintain sovereignty even in the digital world is great because everyone realizes that the current system only exploits people.

- **Data growth:** Globally, data volumes and the diversity of data structures are increasing at an exponential rate. Every day, the world generates 2.5 billion bytes of data. Approximately 90% of all current data has been created in just the last two years alone. It is anticipated that the volume of data will double every two years in the future. To tap into and utilize this data as a source of value, it is essential to establish trustworthy and fair structures or value chains.
- **Data-driven business models:** The quality of data is a key competitive factor. Opportunities to generate more information and knowledge from data are in considerable demand. Artificial intelligence, 3D printing, and virtual reality are technologies that will significantly advance humanity in terms of medicine, sustainability, and coexistence. The basic prerequisite for success, however, is access to and use of authentic data about people's lives. The decisive factor here is the involvement of people as valuable data generators, through trust and motivation.

4 BUSINESS MODEL/COMMERCIALIZATION

a) REVENUE GENERATION

Dwinity is creating an entire ecosystem in which consumers, developers, entrepreneurs, and large corporations will participate. Data owners pay for the secure storage of their data and are compensated for sharing their valuable data, while data buyers pay fair prices for access and analysis. Application providers and researchers will engage with their services within the ecosystem. The opportunities are comparable to those offered to participants in the Amazon or Apple ecosystems. Specifically, Dwinity's business activities will generate four streams of revenue.

- Participation and storage fee for Data Control
  It is predicted that the storage market will double in size over the next 8 years. Dwinity is ideally positioned to capitalize on this volume and growth, as the CONTROL storage solution overcomes many of the shortcomings of existing solutions. The global next-generation data storage market will grow from $58.35 billion in 2022 to $123.66 billion in 2032, at a compound annual growth rate (CAGR) of 7.8% during the forecast period.[1]
- Dwinity Data Gold will be available for a service fee
  The database value creation, data mining and cleansing is a SaaS business. Commercial research enterprises will conduct studies on this infrastructure and take advantage of Dwinity's supreme AI for data structuring and processing. To put the potential in perspective: the market for research and studies based on sensitive consumer data is growing even faster than the storage market. The global clinical trials market was estimated to be worth $38.7 billion in terms of revenue in 2021 and is poised to reach $52.0 billion by 2026, growing at a CAGR of 6.1% from 2021 to 2026.[2]

[1] Source: https://www.globenewswire.com/en/news-release/2023/06/29/2696852/

[2] https://www.globenewswire.com/en/news-release/2023/07/07/2701067/0/en/Clinical-Trials-Market-is-Expected-to-Reach-52-0-billion-MarketsandMarkets.html

- Dwinity Data Cash is a marketplace model, where commissions are earned on the volume and value of the data traded (comparable to eBay or Amazon fees). So how will this work? Users will "sell" their respective dataset for a specific amount, say 10 euros, to a data user. Dwinity will then reserve a commission for the data CONTROL and data GOLD feature and the respective storage cost. The remaining income is credited directly to the user's wallet.
- The Dwinity ecosystem will be accessible via a multitude of industries or purpose specific apps. This creates an ecosystem of its own for app developers, data traders, researchers, and consumers. Comparable to the app stores on the market, sign-up, usage/rev share, and license fees will be earned. The market for "APPS" and the connected ecosystem is huge and rapidly growing. The global mobile application market size was valued at $206.85 billion in 2022 and is expected to grow at a compound annual growth rate (CAGR) of 13.8% from 2023 to 2030. Dwinity will supply open-source SDKs and offer all interested parties the opportunity to access the data CONTROL and GOLD features over individualized front ends and apps.

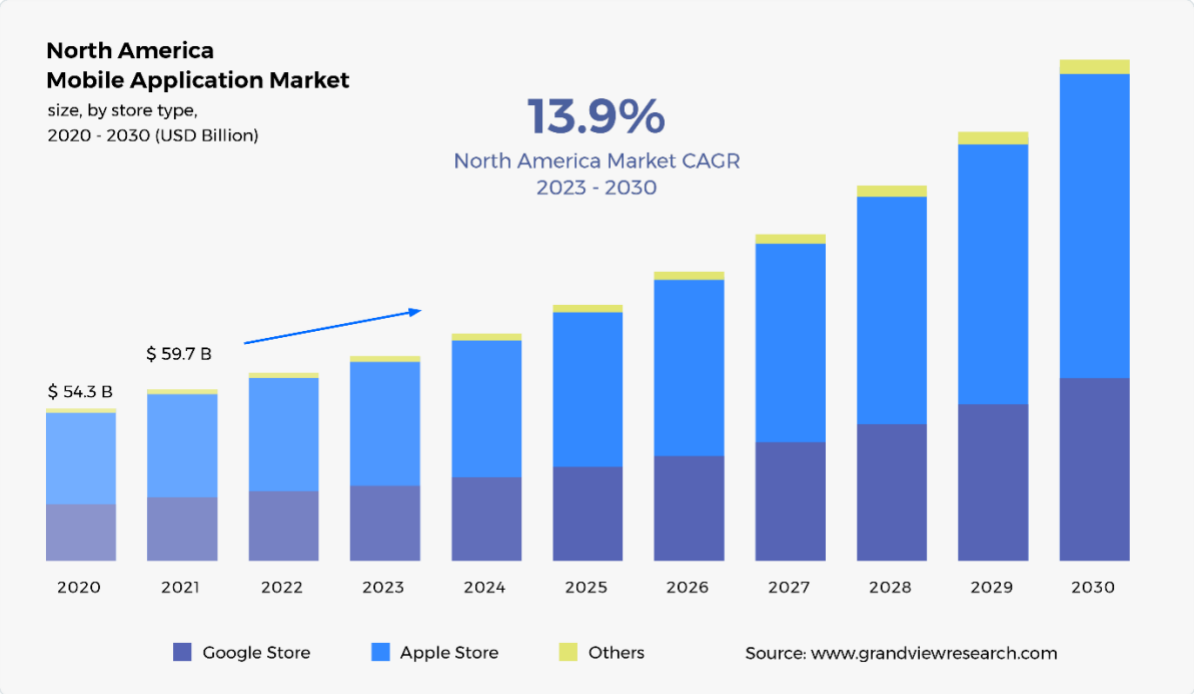

Figure 4.1 North America Mobile Application Market, Source: grandviewresearch.com

b) GO-TO-MARKET / B2B2C APPROACH

The market launch of Dwinity follows an efficient Business-to-Business-to-Consumer (B2B2C) model. As a result, the costs and efforts associated with customer acquisition are primarily borne by Dwinity's corporate clients (data buyers). For instance, professional data buyers such as pharmaceutical researchers will conduct their studies within the Dwinity ecosystem. To facilitate this, they organize the necessary frontend/app infrastructure. Using this infrastructure, they promote the study and recruit participation among the relevant end-users (data owners).

End-users must register with Dwinity to participate in the study and receive the corresponding rewards.

Members of the Dwinity ecosystem, data owners get knowledge and access to all the possibilities offered after the registration. These are mainly two features: a state-of-the-art data storage, CONTROL, and the data commercialization cockpit, DATA CASH. The DATA CASH cockpit contains the wallet for all the rewards. Additionally, users can explore additional commercialization options for their data through an extremely attractive and engaging user experience (UX). Examples of experiences within the daily user journey include:

- Where do I rank with my data quality compared to my peers in the ecosystem?
- What is the current market value of my data if I choose to sell it?
- App store: which projects are presently offering rewards for which type of data?
- What is my current amount of earned rewards in DWIN tokens, and what is their equivalent value in fiat currency?

The use cases are powered by compelling dAPPS which connect data owners and buyers in a fair and transparent peer-to-peer relationship.

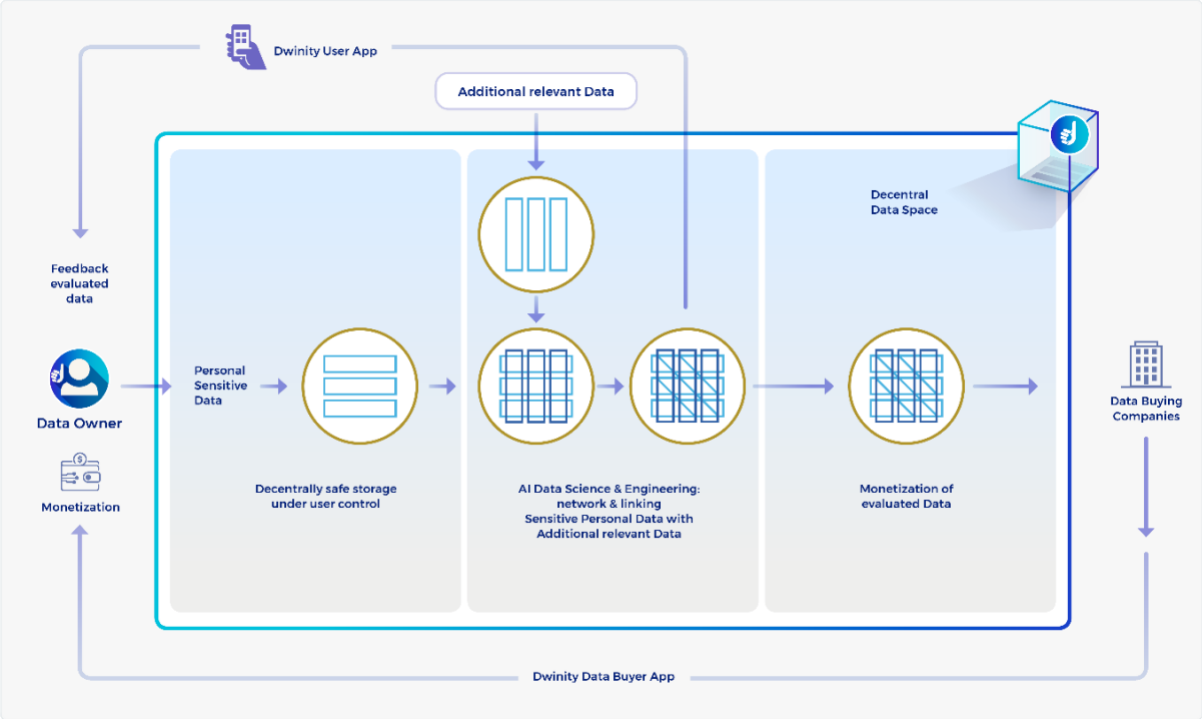

Figure 4.2 dAPPS connects Data owners and Buyers

c) FULL ROLL-OUT OF THE ECOSYSTEM AND DAPPS ON DWINITY MARKETPLACE

In the Dwinity ecosystem consumers finally unleash the commercial potential of their sensitive data in a secure and lucrative way. Dwinity Marketplace offers a secure environment to interact with approved dApps, exchange data. It is also the place where users find their wallet where all rewards are stored and displayed with their real time value. In summary, the Marketplace is a central element of the ecosystem where all fees for usage of the DATA GOLD are collected and distributed.

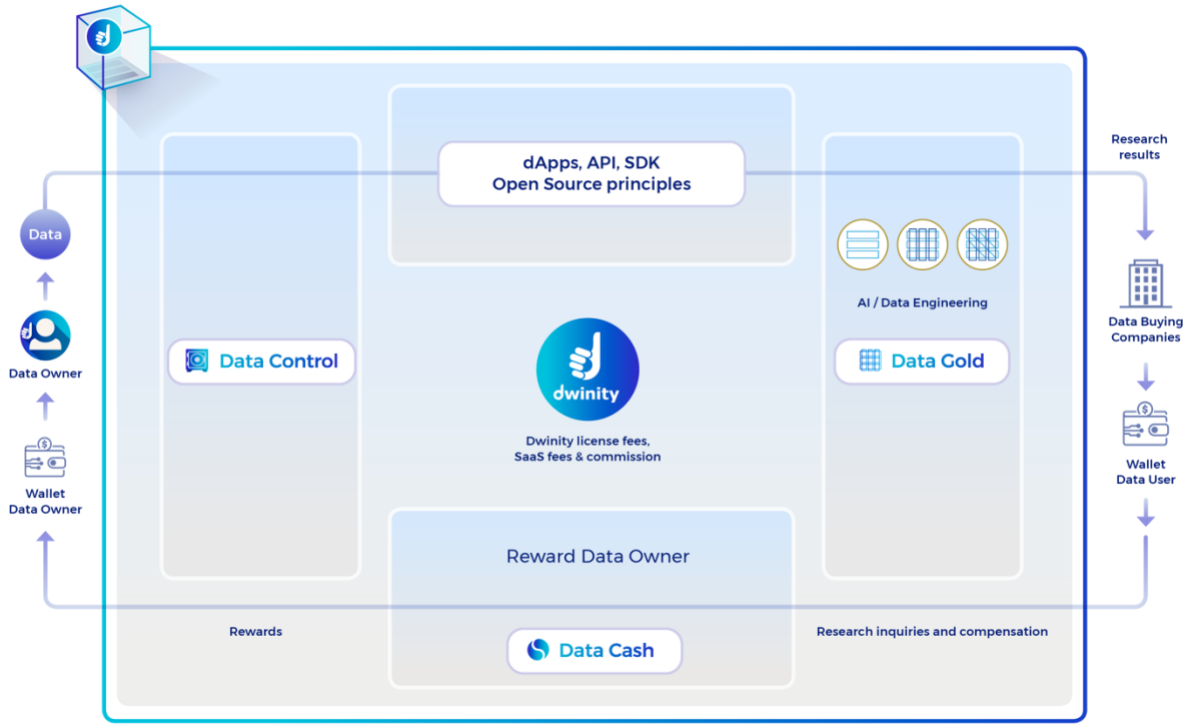

Figure 4.3 Dwinity Marketplace

Dwinity's internal currency is the DWIN token, which consumers, companies, developers, and all other participants in the ecosystem use to trade data and intellectual property.

d) DWINITIY'S COMMITMENT TO THE COMMON GOOD AND CSR

Dwinity is committed to solve inherent and significant issues in the field of data management and AI for both private individuals and corporations. To achieve our mission, Dwinity will be commercially active and successful. Nevertheless, the common good will have priority over commercial advantages of Dwinity's stakeholders. Dwinity's CSR program consists of the following main pillars:

- **Distribution of profits to the community**
  30% of Dwinity's gross profit (total revenue minus direct cost as storage cost, processing cost and rewarding/ staking for e.g. node operators and validators) will be re-distributed to the participants of the ecosystem. By this principle, e.g. individual users will be remunerated for the sharing of their data (get the real value out of your data) based on the degree of their activity.
- **Supporting charities and donations**
  Dwinity will support market participants who equally serve the common good with e.g. commercially attractive access to our services. When selecting suppliers, we will consider their commitment to inclusion and diversity as a decision criterion.
- **Ecological sustainability**
  Our mission is to use blockchain technology in the most ecologically sustainable way. Decentral storage, decentral computation and decentral AI are mitigating present inefficiencies and reducing today's enormous energy consumption in innovative ways.

5 TEAM

Person	Role
	**Peter Koenig** CO- FOUNDER & CEO Peter is a successful entrepreneur and investor who has been working on developing his own businesses over the last 30 years. One of his biggest B2B businesses was successfully sold to Conrad Electronic Group in 2013. He has been working in the crypto industry since 2016 and started to build mining and investment companies. Peter is a gifted networker and the visionary of the Dwinity team.
	**Christian Mangold** CO- FOUNDER & CFO Christian is a seasoned executive who successfully scaled SOFORT before its acquisition by KLARNA, where he served as Managing Director for the DACH region. Christian's unique management style has enabled companies to scale rapidly in highly competitive environments. Christian's leadership engagements involve Commerzbank, Deutsche Bank, SOFORTÜberweisung, KLARNA, and NET1 with Liechtenstein's crypto bank BANK FRICK.
	**Dipl. Ing. Andreas Thum** CO- FOUNDER & CTO Andreas has over 25 years of experience in data technology, development of data protocols, and software development. Among other things, he was entrusted with the development of data communication between flight computers (FlyByWire flight control) and data transmission in medical engineering. At Dwinity, Andreas is responsible for the entire technology development.

	**Dr. Robin Basu** CO- FOUNDER & COO Robin has a PhD in social anthropology. He is an expert on data sovereignty and was a researcher on sovereign identities at Munich University (LMU) for over 15 years. As a crypto enthusiast, he is focused on innovative concepts about decentralized identity and contributing his knowledge to make Dwinity a success.
	**Marko Reikovic** CO-FOUNDER & BUSINESS DEVELOPMENT Marko is a specialist in bringing different ecosystems together and creating gigantic potential from them. In the past few years, he has brought several Web2 applications onto the market and now takes care of all partnerships and business strategies for Dwinity.
	**Heiko Wunderlich** CO-FOUNDER & LEGAL Heiko is an experienced attorney (Partner at SKW Schwarz) specialized in tax law, corporate law, and inheritance law. He specializes in the structuring of companies and investments, including start-ups. Heiko is experienced in the legal side of Industry 4.0 &, Internet of Things, and FinTech. He takes care of all legal aspects for the Dwinity project.
	**Benedikt Koenig** CO-FOUNDER & ORGANIZATION As a real crypto native, Benedikt has more than 7 years of experience in cryptocurrency mining and a very solid understanding of building Web3 projects. As a managing director of a mining farm in Romania, he is now structuring Dwinity's knowledge management.

	**Dr. Dirk Polonius** CO-FOUNDER & MEDICAL DATA SPECIALIST Dirk is a passionate doctor. He used his marketing skills to set up two of his own medical centers and a company for medical products. At Dwinity, he is responsible for all medical data use cases and therefore oversees all applications for medical data and more.
	**Dinu Constantinescu** CO-FOUNDER & HARDWARE SPECIALIST Dinu is a hardware specialist and an expert in data storage systems. He has several years of experience in running crypto mining hardware/software and associated infrastructures. At Dwinity, he is responsible for purchasing goods and services.
	**Dipl. Inf. Michael Schumacher** TECHNOLOGY DEVELOPMENT Michael has over 20 years of experience as an independent IT business consultant in process optimization (SAP consultant and developer for internationally renowned automotive manufacturers). Furthermore, he has detailed knowledge and extensive experience in various programming techniques. He has been involved with blockchain technology and Web3 for over 5 years. His tasks at Dwinity are project management and technology consulting in general.
	**Prof. Dr. Josef Arweck** COMMUNICATIONS Josef has been Global Head Communications at Porsche AG till 2019. Before that, the trained journalist and doctorate in political science was press officer at McKinsey & Company. Josef takes care of internal and external communication for Dwinity.

	**Dario Hadzic** SOCIAL MEDIA Dario, has a degree in Social Media Management and oversees all social media channels, tools, and presentations for Dwinity.

6 ADVISORY BOARD

Person	Role
	**Marco Wutzer** WEB3 SPECIALIST Marco Wutzer is a speculator and pioneering investor in bitcoin and other cryptocurrencies. He has over 12 years of experience in the crypto market and is a true expert in blockchain technology. Marco is also co-founder and Head of Investment Strategy of Second Renaissance Investments, one the world's fastest-growing and best-performing crypto hedge funds. He consults Dwinity in all technical and strategic questions around Web 3.
	**Victor Schlegel** DATA SPECIALIST A senior data expert with over 20 years of experience in developing, communicating, and implementing transformational digital strategies and award-winning data driven service innovations. Passionate about enabling business to be competitive and disruptive in the marketplace through innovative use of data whilst helping them to navigate successfully through multiple waves of technology change
	**Manuel Holler** MARKETING STRATEGIST Manuel is a proven marketing expert with 15 years of experience in strategic and operational marketing. With a degree in business informatics, he has a strong technical understanding and an affinity for data-driven products as well as innovative technologies. He brings digital products to life and has been helping companies establish even complex topics on the market for years.

The DWIN will grant access to Dwinity's products and services. Furthermore, all participants in the ecosystem as e.g. App developers or providers will be remunerated in DWIN.

7 ROADMAP

Timeline	Milestones
Q1 2024 (Jan)	• Private sale
Q1/2 2024 (Feb – June)	• Starting MVP development
Q3 2024 (July – Sept)	• Pre-release of data control DOD • SDK data control
Q4 2024 (Oct – Dec)	• Release data control DOD • Pre-release of data control domains and internal AI
Q2 2025 (April – June)	• Release of data control domains • Pre-release AI for UX
Q3 2025 (July – Sept)	• Release of Data Gold step 1 • SDK Data Gold step 1
Q2 2026 (April – June)	• Release of Data Cash (dApps) • SDK with LLM and NLP
Q3 2026 (July – Sept)	• Full Release of Data Gold (dAI) • Release of final version

8 PLANNED USE OF ANY FUNDS OR OTHER CRYPTO-ASSETS COLLECTED

Funds will mainly be used for the development of the infrastructure and IP. First 6 months will result in the pre-release of Data Control. User can be onboarded and use the system for personal and corporate data storage. Main usage:

- Building Program Environment (Server systems, Jira, ect.)
- Development Concepts (Data Models, AI)
- Partner Selection
- Basic Development Decentralized Storage System (Filecoin)
- Basic Development Blockchain Management (Avalanche)
- Basic Development Vault including vault management
- Concept & Basic development Data curation

The second largest area is setting up operations and governance of a company soon to serve millions of users and prepared of a public sale of tokens.

A successful ICO will require significant infrastructure and marketing spent.

More than 10% of fund will be directly channeled into the ecosystem by marketing and brand building activities.

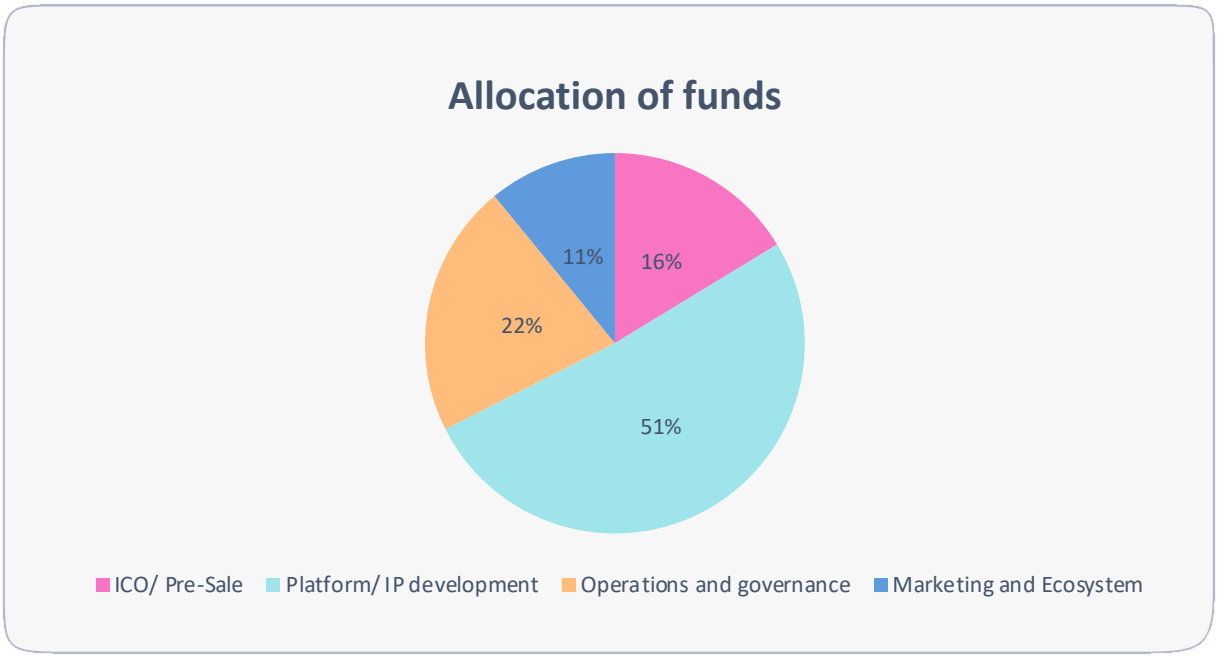

Figure 8.1 Allocation of funds

PART C: INFORMATION ABOUT THE PRIVATE OFFERING

1. The whitepaper does not concern an offer of crypto-assets to the public or an admission of crypto-assets to trading on a trading platform for crypto-assets

8a. Arrangements to safeguard funds or other crypto-assets as referred to in Article 9 during the time-limited offer or during the withdrawal period:

All funds or assets will be held in a smart contract (as agreed in the Token sale contract/ smart contract), allocated to the respective wallet addresses and not be available for the company's operations until

- The expiry of the purchase's withdrawal period and
- the successful transfer of the purchased tokens to the indicated wallet of the buyer

2. The DWIN can be purchased by USD Coin (USDC) on Avalanche Network with Token contract address 0xB97EF9Ef8734C71904D8002F8b6Bc66Dd9c48a6E. The DWIN is notated in USD and any fees of transfer or exchange for the purchase will be deducted from the allocation of DWIN to the purchaser. Where purchasers are entitled to be reimbursed the same means of payment as in the purchase will be applied. The reimbursement will not be surcharged with extra cost besides applicable transfer or exchange fees.

3. Right of withdrawal as referred to in Article 12: purchases can be withdrawn in any means of communication within 14 days after contract signature. Details are agreed in the Token purchase contract.

4. Information on the manner and time schedule of transferring the purchased crypto assets to the holders:

The tokens are transferred immediately after

- Acceptance of the token purchase contract and expiry of the withdrawal period (earliest 14 days after signature) and
- Complete transfer of the purchase price
- By definition the tokens are locked for 1 year in the token sale contract, only after this time they will be visible in the purchasers wallet.
- To log in, he only needs the valid wallet address.

5. Information about technical requirements the purchaser must fulfil to hold the cryptoassets

- Investor has to setup an AVAX Wallet or an ARC20 compatible wallet
- DWIN Token is defined on the Avalanche C-Chain
- With an ARC20 wallet he has to add the avalanche network C-Chain
- To add Avalanche Network to a wallet, one usually needs the following chain RPC information.
    - **Network Name:** Avalanche Network
    - **New RPC URL:** https://api.avax.network/ext/bc/C/rpc
    - **ChainID:** 43114

    - **Symbol:** AVAX
    - **Explorer:** https://snowtrace.io/ (Note: the video still uses the previous value; Please be assured that snowtrace.io is the correct value).
- To see the DWIN Token on the wallet you have to add the DWIN Token to your wallet on Avalanche Network settings. For adding you need the Token contract address. You can copy it from https://snowtrace.io/ searching for the Dwinity Token or from below.
- DWIN Token contract address: **0x13E906C1c0288B5224d145A256eC36f452D613ED**
- For receiving Tokens, he has to copy the ARC20 Wallet address to the Token Sender or sale dashboard
- For investing in DWIN Tokens a minimum value of 1.0 AVAX Token must be transferred to the wallet.

6 The law applicable to any business relationship with Dwinity IP GmbH is the law of the Federal Republic of Germany, court is the legal court of the domicile or the issuer.

PART CA: INFORMATION ABOUT THE CRYPTO-ASSETS

As a "hybrid" token, the DWIN will have the following properties:

- "Voucher function": a DWIN could be exchanged for data or services in the ecosystem vis-à-vis the issuer.
- "Currency function": the DWIN could be exchanged again crypto assets or FIAT on a crypto trading platform once the DWIN fulfills the respective requirements.
- No voting rights or dividend entitlements: The DWIN does not represent any shareholding under company law and will not embody any voting rights or rights to a dividend or other profit participation.
- The DWIN will not be redeemed by the issuer. A redemption against payment of fiat money is not intended.

PART D: RIGHTS AND OBLIGATIONS ATTACHED TO CRYPTO-ASSETS

The DWIN is a hybrid utility token which has no voting rights or obligations attached.

The released token supply of 600,000,000 DWIN will be distributed as follows:

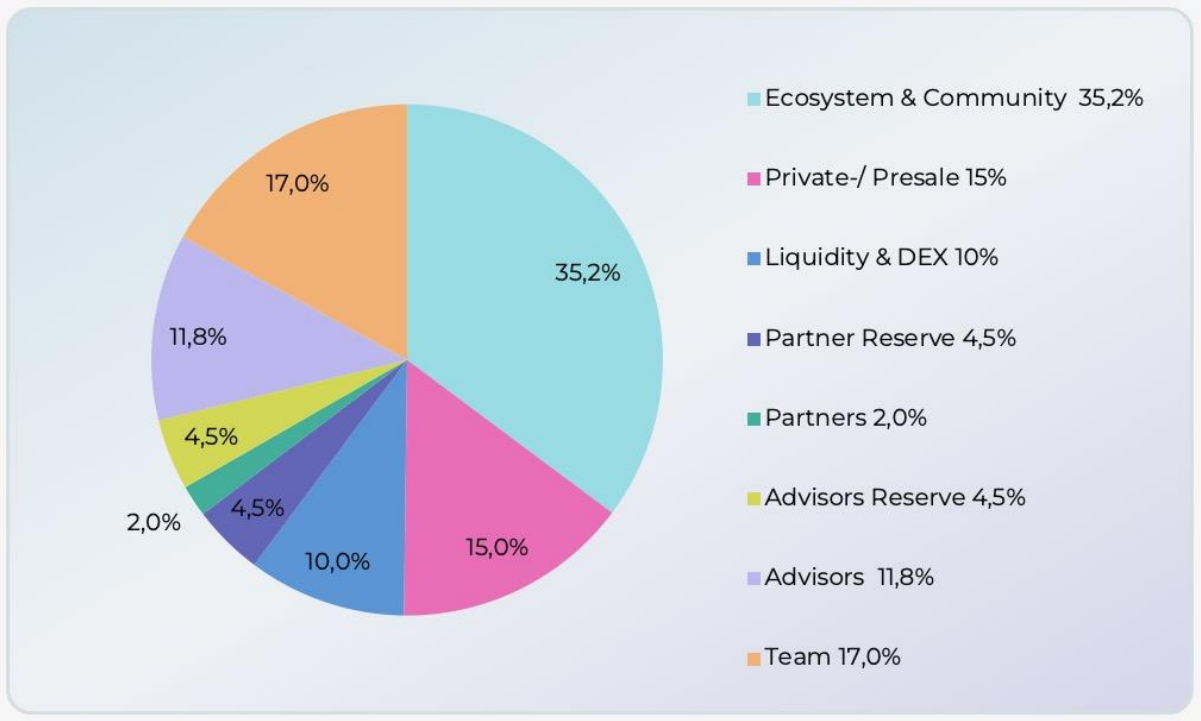

Figure 8.1 Token distribution of DWIN

Team: The team receives 17% of the circulating tokens. These are locked for 12 months. After that, the tokens are vested in monthly steps over 3 years.

- **Advisors:** Advisors receive 11,8% of the circulating tokens. These are locked for 12 months. After that, the tokens are vested in monthly steps over 3 years.
- **Advisors reserve:** The advisors reserve is 4,5% of the circulating tokens. These are kept free for future advisors and issued case-dependently. The issued tokens are subject to the rules for advisors.
- **Partners:** Partners receive 2% of the circulating tokens. These are locked for 12 months. After that, the tokens are vested in monthly steps over 2 years.
- **Partner reserve:** The partner reserve constitutes 4.5% of the circulating tokens. These are held for future advisors and distributed on a case-by-case basis. The tokens issued are subject to the partner regulation.
- **Liquidity/DEX:** The liquidity reserve is 10% of the circulating tokens. These are intended as collateral for liquidity pools, DEX listing, and for handling operations, for example.
- **Private/presale:** Fifteen percent of the circulating tokens are designated for the private and presale phases (4% for private sale and 11% for presale). Investors can buy DWIN tokens at any time before an increase in price. The private sale tokens are blocked for 12 months.

Ecosystem/community: The remaining 35,2% of the circulating tokens are allocated for ongoing operations following the Initial Coin Offering (ICO). This includes rewards for staking, developers, node operators, service providers, development programs, additional token sales, among others.

The law applicable for the services and token use is the law of the Federal Republic of Germany, court is the legal court of the domicile or the issuer.

PART E: INFORMATION ON THE UNDERLYING TECHNOLOGY

1. Information on the technology used, including distributed ledger technology, protocols and technical standards used

Avalanche (Distributed Ledger/Blockchain): Blockchain used for Token Distribution and Data transaction logging

Filecoin (Distributed Ledger/Decentralized Storage): Used for decentralized fragmented data storage.

Nillion (Decentralized Node Network): Quantum computer secured data encryption network based on Information Theoretic Security (ITS) with data storage for highly secured data like Private keys, password, biometric data etc.

Platform and decentralized AI for:

- Data Analytics
- Information Extraction
- Text Classification & Labelling
- Decentralized Storage
- Decentralized Compute
- Tokenization of AI Assets
- Privacy-Preserving Computation
- Image Analysis
- Text Simplification
- Data Value Assessment

2. Incentive mechanisms to secure transactions and any fees applicable

Avalanche Consensus (Quelle Avalanche)

Consensus is the task of getting a group of computers (a.k.a. nodes) to come to an agreement on a decision. In blockchain, this means that all the participants in a network must agree on the changes made to the shared ledger. This agreement is reached through a specific process, a consensus protocol, that ensures that everyone sees the same information and that the information is accurate and trustworthy.

Avalanche Consensus is a consensus protocol that is scalable, robust, and decentralized. It combines features of both classical and Nakamoto consensus mechanisms to achieve high throughput, fast finality, and energy efficiency. For the whitepaper, see here.

Key Features Include:

- Speed: Avalanche consensus provides sub-second, immutable finality, ensuring that transactions are quickly confirmed and irreversible.
- Scalability: Avalanche consensus enables high network throughput while ensuring low latency.

- Energy Efficiency: Unlike other popular consensus protocols, participation in Avalanche consensus is neither computationally intensive nor expensive.
- Adaptive Security: Avalanche consensus is designed to resist various attacks, including sybil attacks, distributed denial-of-service (DDoS) attacks, and collusion attacks. Its probabilistic nature ensures that the consensus outcome converges to the desired state, even when the network is under attack.

Consensus protocols in the Avalanche family operate through repeated sub-sampled voting. When a node is determining whether a transaction should be accepted, it asks a small, random subset of validator nodes for their preference. Each queried validator replies with the transaction that it prefers, or thinks should be accepted.

If a sufficient majority of the validators sampled reply with the same preferred transaction, this becomes the preferred choice of the validator that inquired.

In the future, this node will reply with the transaction preferred by the majority.

The node repeats this sampling process until the validators queried reply with the same answer for enough consecutive rounds.

The number of validators required to be considered a "sufficient majority" is referred to as "α" (alpha).

The number of consecutive rounds required to reach consensus, a.k.a. the "Confidence Threshold," is referred to as "β" (beta).

Both α and β are configurable.

When a transaction has no conflicts, finalization happens very quickly. When conflicts exist, honest validators quickly cluster around conflicting transactions, entering a positive feedback loop until all correct validators prefer that transaction. This leads to the acceptance of non-conflicting transactions and the rejection of conflicting transactions.

Avalanche Consensus guarantees that if any honest validator accepts a transaction, all honest validators will come to the same conclusion.

Validators (Quelle Avalanche)

If it were free to become a validator on the Avalanche network, that would be problematic because a malicious actor could start many, many nodes which would get queried very frequently. The malicious actor could make the node act badly and cause a safety or liveness failure. The validators, the nodes which are queried as part of consensus, have influence over the network. They must pay for that influence with real-world value in order to prevent this kind of ballot stuffing. This idea of using real-world value to buy influence over the network is called Proof of Stake.

To become a validator, a node must bond (stake) something valuable (AVAX). The more AVAX a node bonds, the more often that node is queried by other nodes. When a node samples the network it's not uniformly random. Rather, it's weighted by stake amount. Nodes are incentivized to be validators because they get a reward if, while they validate, they're sufficiently correct and responsive.

Avalanche doesn't have slashing. If a node doesn't behave well while validating, such as giving incorrect responses or perhaps not responding at all, its stake is still returned in whole, but with no reward. If a sufficient portion of the bonded AVAX is held by correct nodes, then the network is safe, and is live for virtuous transactions.

Where the crypto assets are issued, transferred and stored on a distributed ledger that is operated by the issuer, the offeror or a third-party acting on their behalf, a detailed description of the functioning of such distributed ledger

Avalanche

The DWIN Token is created as an ARC20 Token on the Avalange Network (ARC20).

Avalanche is a fast and scalable decentralized open source blockchain platform with low latency. This makes it ideal for applications where fast and reliable transaction processing is required.

The most outstanding advantages are:

- Fast transactions: Avalanche can process up to 67,000 transactions per second, making it one of the fastest blockchain platforms in the world. This makes it ideal for applications where fast and reliable transaction processing is required, such as DeFi, NFTs and gaming.
- Scalability: Avalanche is a scalable platform that can adapt to increasing transaction needs. This makes it ideal for applications that need to process many users and transactions.
- Security: Avalanche is a secure platform developed by a team of leading crypto scientists and engineers. The platform utilizes a unique consensus protocol called Snow White, which allows transactions to be processed with a final finality in a matter of seconds.

It offers three different blockchains:

- X-Chain: the X-Chain is responsible for the creation and transfer of assets.
- C-Chain: The C-Chain is responsible for the execution of smart contracts.
- P-Chain: The P-Chain is responsible for managing the network configuration and validators.

Avalanche uses the Snowball consensus protocol for fast and secure transactions.

- The latency times at Avalanche are extremely low. Thanks to an innovative consensus protocol called "Avalanche Consensus", transactions can be confirmed almost immediately. This enables the network to be highly scalable and efficient.
- The average latency time for transactions on Avalanche is 2 seconds and the maximum latency time for transactions is 30 seconds.
- Another strength of Avalanche is its extensions. The platform supports the implementation of smart contracts and decentralized applications (DApps) via the virtual machine called "Athereum". These extensions enable developers to create customized solutions on the blockchain.
- In addition, Avalanche offers subnetworks* that allow separate, customizable blockchains to be created within the Avalanche network.

These subnetworks can fulfil specific requirements and support different token ecosystems. They offer flexibility and scalability for different use cases and enable the integration of external data sources and oracles.

*Note on subnetworks:

A subnetwork in Avalanche is a separate, customizable blockchain that is created within the Avalanche network.

A subnetwork consists of a group of validators that verify transactions and achieve consensus within the subnetwork. These validators can have different roles, such as validator, staker or oracle, depending on the specific requirements of the subnetwork.

The subnetwork can also have its own rules for block formation, transaction confirmation and governance. For example, it may have specific reward mechanisms, voting procedures and governance structures defined by the participants within the subnetwork.

By using subnetworks, different token ecosystems can be built that can function independently of each other. They offer flexibility, scalability, and adaptability to meet the different requirements of applications and ensure interoperability between the subnetworks and the main Avalanche network.

Key features:

- Decentralized open-source blockchain platform with smart contract functionality
- Offers three different blockchains:
    - X-Chain: the X-Chain is responsible for the creation and transfer of assets.
    - C-Chain: The C-Chain is responsible for the execution of smart contracts.
    - P-Chain: The P-Chain is responsible for managing the network configuration and validators.
- Uses the Snow White consensus protocol for fast and secure transactions
- Very scalable and can process up to 67,000 transactions per second
- Supported by a growing community of developers and companies
- There are already a variety of DApps on the platform, including DeFi protocols, NFT marketplaces and games
- AVAX is the native token of Avalanche
- Used for payment of fees, provision of security and staking
- Can be traded on various exchanges
- One of the most popular DeFi tokens
- Fast, scalable, secure and has a growing community
- Has the potential to play an important role in the DeFi and blockchain industry

In summary, with its low latency, extensions via smart contracts and DApps, and subnetworks, Avalanche offers a powerful blockchain platform that is highly scalable, efficient, and customizable.

Filecoin and IPFS

Filecoin is a peer-to-peer network that stores files, with built-in economic incentives and cryptography to ensure files are stored reliably over time. In Filecoin, users pay to store their files on storage providers. Storage providers are computers responsible for storing files and proving they have stored them correctly over time. Anyone who wants to store their files or get paid for storing other users' files can join Filecoin. Available storage, and the price of that storage, are not controlled by any single company. Instead, Filecoin facilitates open markets for storing and retrieving files that anyone can participate in.

Filecoin is built on top of the same software powering IPFS protocol, which is a peer-to-peer distributed storage network that leverages content addressing to allow permanent references to the data and avoids relying on specific devices or cloud servers for addressing the content. Filecoin is

different from IPFS because it has an incentive layer on top to incentivize contents to be reliably stored and accessed.

For more information click to the Filecoin Documentation: https://docs.filecoin.io/basics/what-is-filecoin

PART F: RISKS

1. There are specific risks associated with the crypto-assets, here utility tokens.

    - The tokens may lose their value in part or in full;
    - The tokens may not always be transferable;
    - The tokens may not be liquid;
    - Utility tokens may not be exchangeable against the good or service promised in the crypto-asset white paper, especially in case of failure or discontinuation of the project;
    - The tokens are not covered by the investor compensation schemes in accordance with, Directive 97/9/EC of the European Parliament and of the Council;
    - The tokens are not covered by the deposit guarantee schemes established in accordance with Directive 2014/49/EU of the European Parliament and of the Council.

2. Even though the experienced team applies highest standards in the selection and supervision of the project's progress and the respective resources, implementation risk cannot be excluded. Typical risks which can materialize in delays, increased cost and total failure of the project are

    - Scoping issues: ambitious projects must address a magnitude of activities simultaneously. This bears the significant risk of over-scoping or, on the other hand, omission of critical factors.
    - Communication and collaboration failure: the project will be supported and delivered via and state of the art global delivery approach involving innovative supply concepts like crowd sourcing. This increases efficiency and cost-/resource maintenance but also bears the risk of mis- and non-communication on critical areas.
    - Insufficient testing and quality assurance: the project is acting in a zero-failure tolerance zone. If deficiencies appear delayed in the testing process this can cause serious setbacks to the project.
    - Unrealistic schedule and budget: timing and resource consumption will be strictly controlled whereas unforeseen circumstances can lead to deterioration from the initial plan. Re-arrangements of re-scoping can be the consequences.
    - Lack of user involvement and feedback: all (interim-) outcomes of the project will be reviewed and tested by sample users and advisors. Nevertheless, omissions of scope or functionality can never be totally excluded.
    - Inadequate risk management: all project risks will be professionally monitored, and the project progress will be reviewed in a professional manner. Nevertheless, insufficient risk management will be only identified ex-post with the respective risk in delays or other project risks.

3. Market and regulatory Risk

Risks of cyber attack

Hackers are focused on finding and exploiting potential weaknesses. Attacks also extend to the open source algorithms of smart contracts running on blockchains, which is why we must consider the risk of attempted hacking at any given time.

Risks of fluctuating gains

We caution you that we cannot guarantee the project will achieve the returns mentioned in this whitepaper.

Regulatory risks of blockchain industry

Governments of many countries are still in the process of studying blockchain technology, and some countries impose restrictions (for example, the United States, China, South Korea). New laws that might come into force in the future could significantly affect the activities of blockchain projects, including Dwinity. We caution you that such laws could significantly restrict, or even halt, project activity. We are not responsible for any adverse consequences associated with potential future regulation of the industry.

The new Markets in Crypto-Assets Regulation (MiCA) combines different legislative measures and is aimed at providing regulatory certainty and stronger protections for consumers in the crypto market, while supporting innovation. Part of the full framework was already introduced in 2023. The full framework will gradually unfold fully over the course of 2023 and 2024 and might impact the operation of Dwinity. Nevertheless, the DWIN token, as a utility token intended to provide digital access to a product or service available on DLT only accepted by the issuer of that token, is expected to fall under the categorization of a crypto asset that is not considered ARTs (asset-referenced tokens) or EMTs (electronic money tokens). As such, unlike security-type tokens, DWIN is not considered a financial instrument under the securities laws of many countries and is not expected to be negatively influenced by MiCA.

Risk of not being listed on exchanges

We do not guarantee that there will be an opportunity to exchange DWIN on exchanges. The decision ultimately resides within the exchange and whether they are willing to list DWIN or not.

Potential buyers and holders of crypto assets should consider the foreseeable ecological impacts

- Crypto-Assets Affect Electricity Usage and the Grid
- Crypto-Asset Mining Can Affect Electricity Consumers and the Grid
- Crypto-Assets Result in Greenhouse Gas Emissions and Other Environmental Impacts
- Emerging Digital Asset Technologies Could Support Climate Monitoring or Mitigation

Source and further material: https://www.whitehouse.gov/wp-content/uploads/2022/09/09-2022-Crypto-Assets-and-Climate-Report.pdf

TRADE MARKS

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APPENDIX:

1 INDUSTRY OVERVIEW

In this chapter, we will provide an overview of the global data economy and its huge market potential. To lay out the foundations necessary to understand how the industry works, we will give a short introduction of how data is categorized, acquired, processed, and monetized today.

a) AN INTRODUCTION INTO THE GLOBAL DATA ECONOMY

A data economy can be defined as a global digital ecosystem in which data is collected, organized, and shared through a collaboration of individuals, institutions, and companies to create economic value.

Data pipelines essentially describe all the steps that must be gone through when moving data from a source system to a target system.

In these processes, the data economy distinguishes between different levels of data processing through data science and data engineering:

Furthermore, the data economy distinguishes between three data categories:

Big data: Larger and more complex datasets, especially from new data sources, including information on online, search, and purchasing behavior, social web, and sensor measurement data. In big data, personal data is omnipresent alongside non-personal data. New insights can be derived from combining multiple large complex data sets to identify patterns and correlations between seemingly random events in the world.

Personal data: Any information that relates to an identified or identifiable living individual, such as name, address, email address, location data, or an IP address. Various pieces of information that, together, can lead to the identification of a specific individual also constitute personal data.

Sensitive personal data: Sensitive personal data is a special category of personal data of an extremely confidential nature. It can be defined as high-quality data. It is not only used to uniquely identify a natural person, but also contains particularly detailed information, such as identity data, health data, financial data, and other confidential data.

The three types of data differ in the potential of their value creation.

- Big data describes people relatively accurately through a variety of different data sources, but not in the depth of a specific area.
- Personal data describes people more accurately within a specific area of life.
- The enhancement to this is sensitive data, which contains sensitive detailed information about a person.

Primary and secondary markets for personal data describe two successive parts of a data pipeline from the data owner to the data buyer (industry or research, for example).

Primary markets divide into data rich and data poor players. Big players such as Google, Facebook, Amazon, etc., are data rich companies and collect big data and personal data as a kind of quid pro quo for free or discounted services. These players have broad access to user data, which represents a strategic resource for them and can establish a competitive advantage. They have no interest in

actively remarketing this data to brokers or other prospective buyers but use their collected data for their own ecosystems. Data mining, data science, and data engineering are performed internally.

Data poor companies collect personal data on a much smaller scale (not big data), usually only through their business model. They use personal data from their customers to optimize their own products or services and thus have average data quality and data diversity. Personal data is stored locally at their sites after collection, which in some cases creates unused data silos. Data from the silos that is intended for in-app analyses is either processed in the application backend, but mainly by external service providers (data mining, data science, data engineering) and then returned to the collecting companies.

Secondary data markets refer to the transfer of data via intermediaries such as data brokers. This market is primarily driven by data poor companies rather than the big players with big data. Data poor companies sell data from data silos, provided the legal basis for this exists. These collect, process, and sell the data to industry players. There are currently a total of around 4,000 data brokers around the world. As the Internet of Things (IoT) technology becomes more widely adopted, devices will produce exponentially more data globally in the next few years. This will further increase the demand for data brokers. According to a report by Cisco, IoT devices will generate data worth $8 trillion in 2022. Data brokers are companies that collect and sell data to businesses and other organizations. They play an important role in the data economy by making data more accessible and useful. The demand for data brokers is expected to grow as the amount of data generated by IoT devices continues to increase.

The global sensitive data discovery market is expanding rapidly.

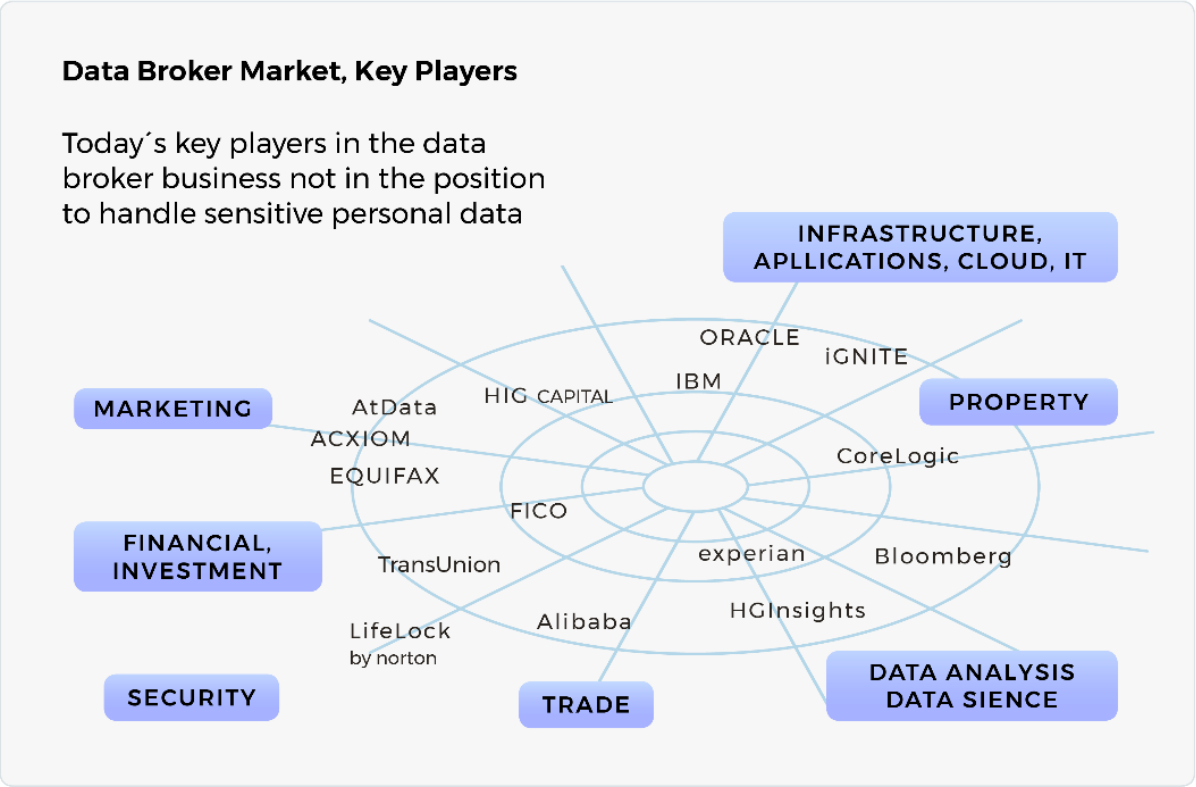

Figure 1.1 Data Broker Market, Source: maximizemarketresearch.com

b) HOW THE DATA ECONOMY CREATES VALUE FROM COLLECTED DATA

There are 5 main factors fundamental to successful value creation.

- **Data management:** Accessibility and availability of data. This factor is also determined by the requirements for transparency and the way in which data is shared and processed.
- **Data Quality:** The diversity and informativeness of the data. Factors include data certification to exclude fake data, ensuring data completeness, exclusivity, and authenticity of the data source, characterizing the data to eliminate ambiguity, the timeliness of the data, and data normalization.
- **Transparent utility value:** Degree of utility and usability of data. Factors include knowledge regarding money- and time savings, ROI, reduced risk, added value, and increase in value through data evaluation.
- Fees for data buyers: These include costs of data collection, data preparation (data science and data engineering) and costs for further processing and data porting.
- Data evaluation: Skills for managing unstructured data (such as text, audio), semi-structured data (XML, JSON), and structured data (such as databases). This includes different know-how ranging from data analysis (such as data engineering, data science, and knowledge generation) to artificial intelligence.

c) HOW BIG IS THE MARKET

Google has built one of the largest and most sophisticated data infrastructures in the world. They handle over 2.5 exabytes (2,500,000,000 gigabytes) of data every single day.[3]

In 2025, global data creation is projected to grow to more than 180 zettabytes (180 trillion gigabytes).[4]

[3] How Google Handles Over 40,000 Petabytes Of Data On A Daily Basis | Skill-Lync

[4] Total data volume worldwide 2010-2025 | Statista

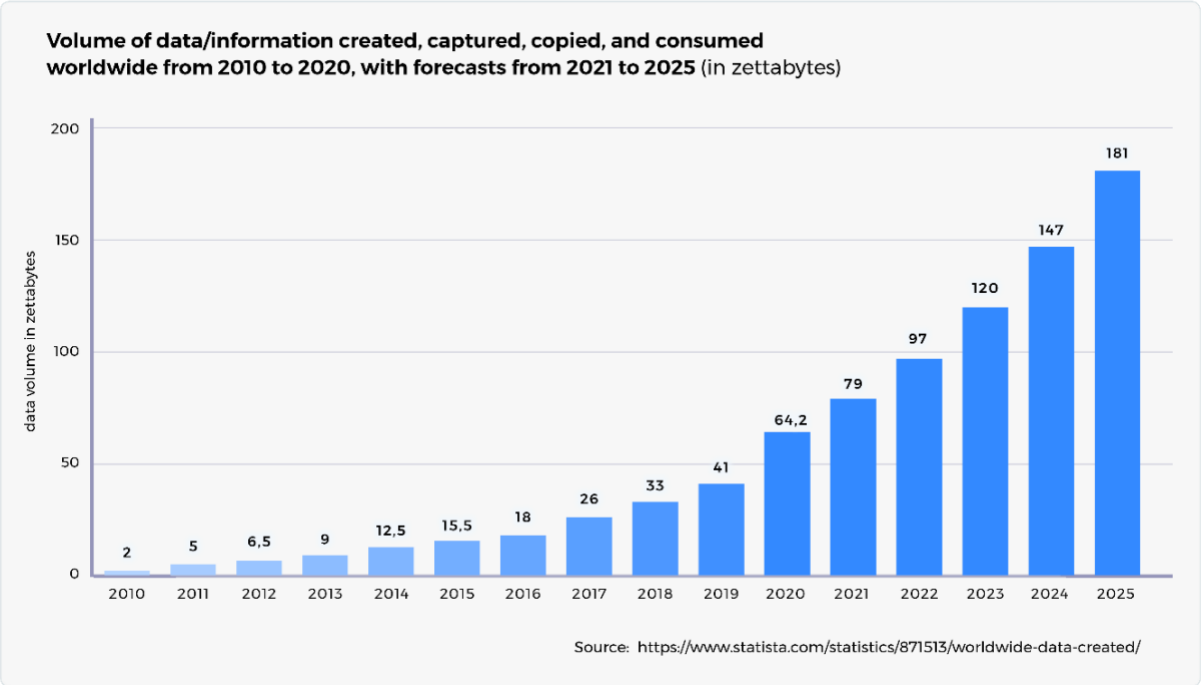

Figure 1.2 Volume of data/information created, captured, copied, and consumed worldwide from 2010 to 2020, with forecasts from 2021 to 2025 (in zettabytes)

The global data market is currently estimated to reach $670 billion in 2027.

According to a study by Roland Berger, the number of data generated per year will skyrocket from 47 zettabytes in 2020 to an expected 2,124 zettabytes in 2035; this corresponds to a 44-fold increase.[5]

The importance of data for the overall economy is expressed in the key figures of the data economy. In addition to revenues from data trade, it includes the value-added effects resulting from the use of data. For 2019, the EU estimated this value for its member states at €324 billion and expects it to rise to as much as €825 billion by 2025. This corresponds to an increase of 254%.

[5] Roland Berger: Promise of Big Data

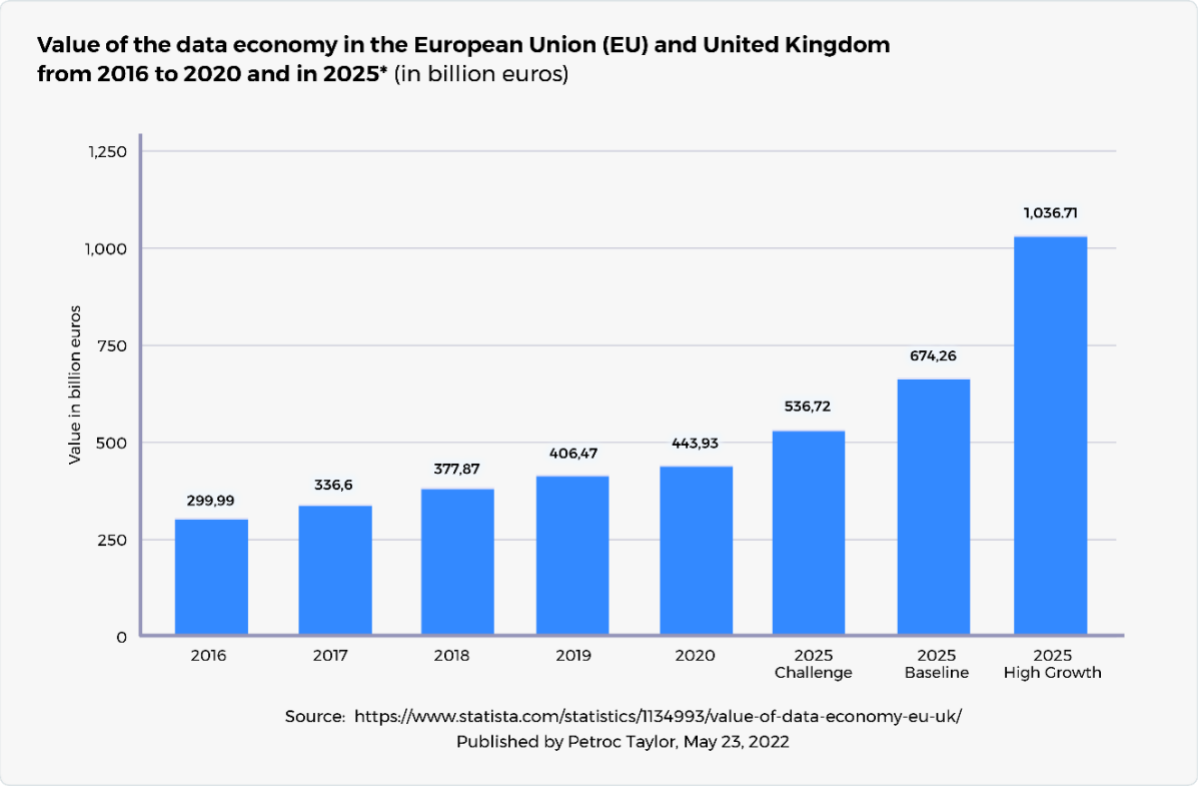

Figure 1.3 Value of the data economy in the European Union (EU) and United Kingdom from 2016 to 2020 and in 2025 (in billion euros). There are three different scenarios for 2025 (from pessimistic to optimistic)

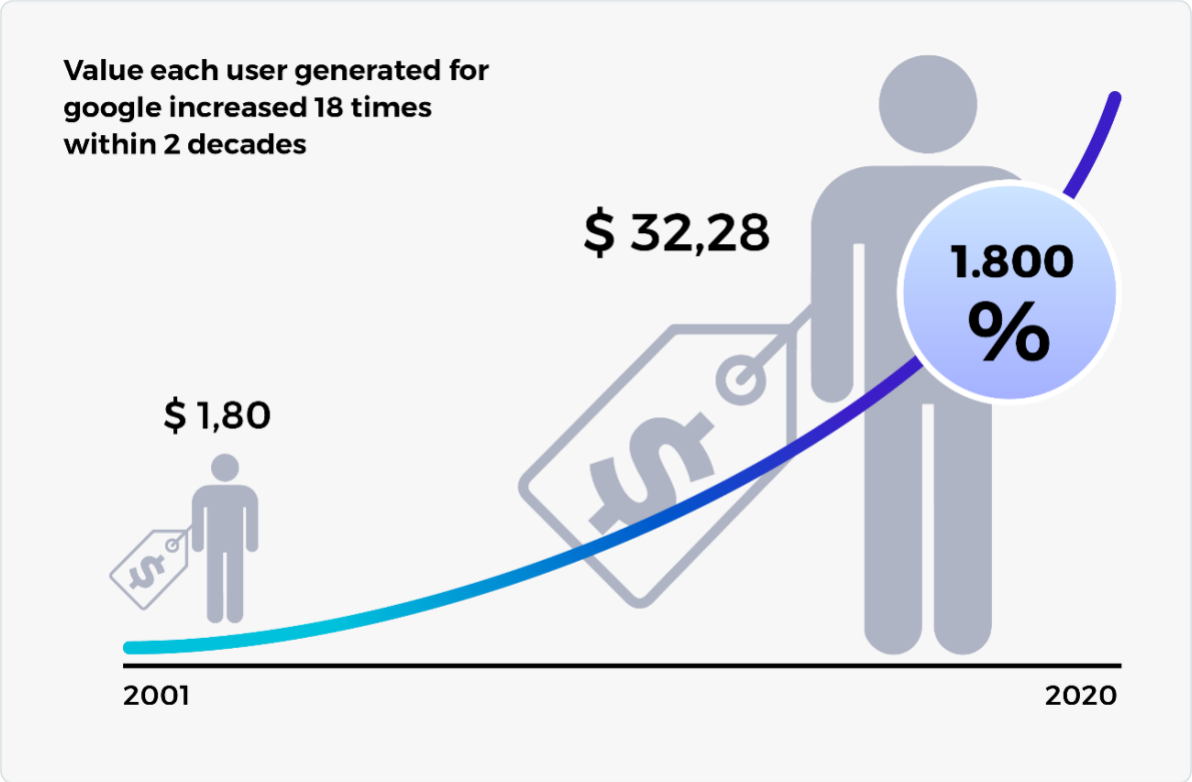

Figure 1.4 Google ad revenue is a good indicator of the value of personal data. Each user generated around £1.45 worth of ad revenue for Google back in 2001. Just under two decades later, this has increased to £26 per user – a staggering 1,800% increase. Source: https://www.wearemiq.com/blog/value-of-personal-data/

These markets are far from perfect. Instead, they are plagued by a variety of different inefficiencies that disadvantage several stakeholders.

Data-intensive companies have been showing tremendous financial growth over the last couple of years, offering an overall great investment opportunity.

The gains in market value of data-intensive companies have outperformed the average for companies in the S&P 500.[6]

The global sensitive data discovery market

The concept of sensitive personal data is much more complex and nuanced than Big Data, whose general purpose is to gather large volumes of information for trend identification. Sensitive personal data takes it a step further by enabling the generation of additional knowledge through in-depth information collection, which cannot be obtained in any other way. Then, this data is analyzed, which in turn creates a whole new world of possibilities when it comes to the potential value that can be generated from the data - both in terms of insights and tangible value. For example, in the healthcare industry, companies can only gain access to the profound knowledge they need to continuously improve the efficiency of certain products by collecting sensitive personal data and analyzing it.

As a result of its revolutionary character and unlimited potential, the global sensitive data discovery market is expanding rapidly—in fact, at even higher rates than the Big Data market.

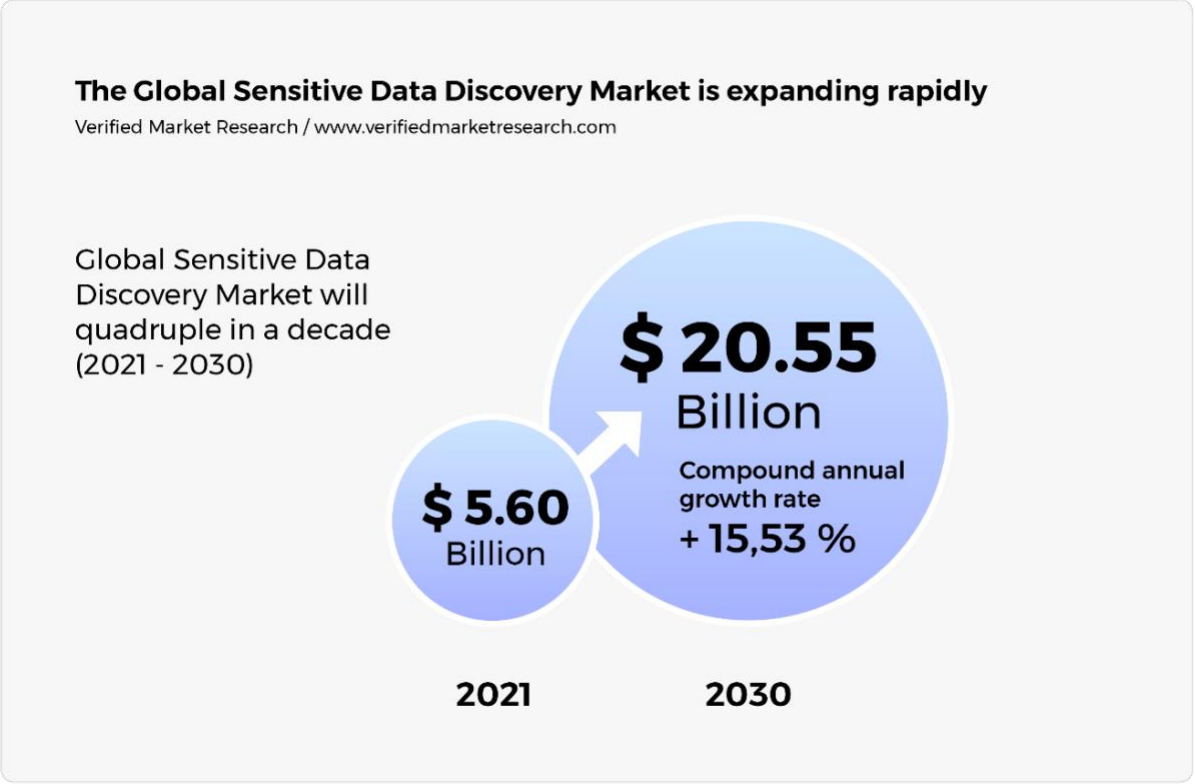

Figure 1.5 Graph: The sensitive data discovery market size was valued at $5.60 Billion in 2021 and is projected to reach $20.55 Billion by 2030, growing at a CAGR of 15.53% from 2022 to 2030[7]

[6] https://www.imf.org/en/Blogs/Articles/2019/09/23/the-economics-of-data

[7] Sensitive Data Discovery Market Size, Share, Opportunities & Forecast (verifiedmarketresearch.com)

Other sources forecast an even faster growth of the global sensitive data market. According to the report published by Allied Market Research, the global sensitive data discovery market generated $4.9 billion in 2020 and is estimated to reach $34.53 billion by 2030, witnessing a CAGR of 21.6% from 2021 to 2030. Leading players of the global sensitive data discovery market include AWS, Hitachi, Google, Micro Focus, IBM, Oracle, Microsoft, Solarwinds, Proofpoint, and Thales.[8]

d) THE ROLE OF PERSONAL DATA AND SENSITIVE PERSONAL DATA IN THE NEW DATA ECONOMY

Personal data and especially sensitive personal data are key drivers of innovation in the new data economy. Both types of data are a proverbial goldmine for businesses. They can achieve higher value creation through data-driven business activities and operate more profitably overall.

However, if we look at the processes of the current data economy for personal data, one will recognize many, many weak points, which lead to obstacles in the overall value creation. The potential of sensitive personal data is nowhere near fully tapped. All the unique knowledge that can be derived from it remains under lock and key. This type of data remains inaccessible due to several factors, which we will discuss further below, primarily because of the lack of efficient practices in handling this data, leading to a low incentive for the data owners.

- Data rich companies dominate the primary data market and have little or no interest in a secondary data market. As a result, only a fraction of the potential of personal data can currently be utilized. For companies with less data, the problems lie with centralized intermediaries, passive data holders, and exploited data.
- For data buyers, there is a clear lack of data management, poor data quality, an opaque value proposition for data owners, high costs, and difficulties in creating economic value.

e) RECENT FINDINGS SUPPORTING THE NEED FOR THE DWINITY ECOSYSTEM

- 81% of Americans think the potential risks of data collection by companies about them outweigh the benefits.[9]
- 79% of respondents said they are very or somewhat concerned about how companies are using the data they collect about them, while 64% say they have the same level of concern about government data collection. Pew Research Center
- 81% of respondents feel as if they have little or no control over the data collected. Pew Research Center
- 58% of European companies declared GDPR compliance as a top priority, whereas only 11% of U.S. respondents selected it as number one. IAPP

[8] https://www.einpresswire.com/article/654104208/sensitive-data-discovery-market-shows-magnificent-growth-and-future-demand-during-forecasting-period#:~:text=PORTLAND%2C%20PORTLAND%2C%20OR%2C%20UNITED,21.6%25%20from%202021%20to%202030.

[9] 100 Data Privacy and Data Security Statistics – Data Privacy Manager

- 56% of organizations named “locating unstructured personal data” as the most difficult issue in responding to data subject access requests (including access, deletion, and rectification requests).
- 79% of people have adjusted privacy-related settings on their social media accounts or reduced their social media usage. DuckDuckGo
- Facebook owns 80% of the market share of social media platforms and Google owns 90% of the market share of search engines. GDPR: The End of Google and Facebook or a New Paradigm in Data Privacy?
- The Cambridge Analytica scandal made more than 73% of the US users concerned about how their information is used on the Internet. 26% stated they are extremely concerned, 22% stated they are very concerned, and 25% stated they were somewhat concerned. Emarketer

Some of these issues arise across various industries, particularly in healthcare and more generally when dealing with medical data:

f) DATA ANALYTICS AND AI

From an economic perspective, data does not generate added value per se. The economic properties are only effective if the data is processed into information through targeted management and further processing. Going back to the sensitive data discovery market information we presented earlier, it is a concept which is intertwined with the whole data industry.

This is where data analytics comes in. The technologies used in this area are showing tremendous advancements and the market is expanding at very high rates.

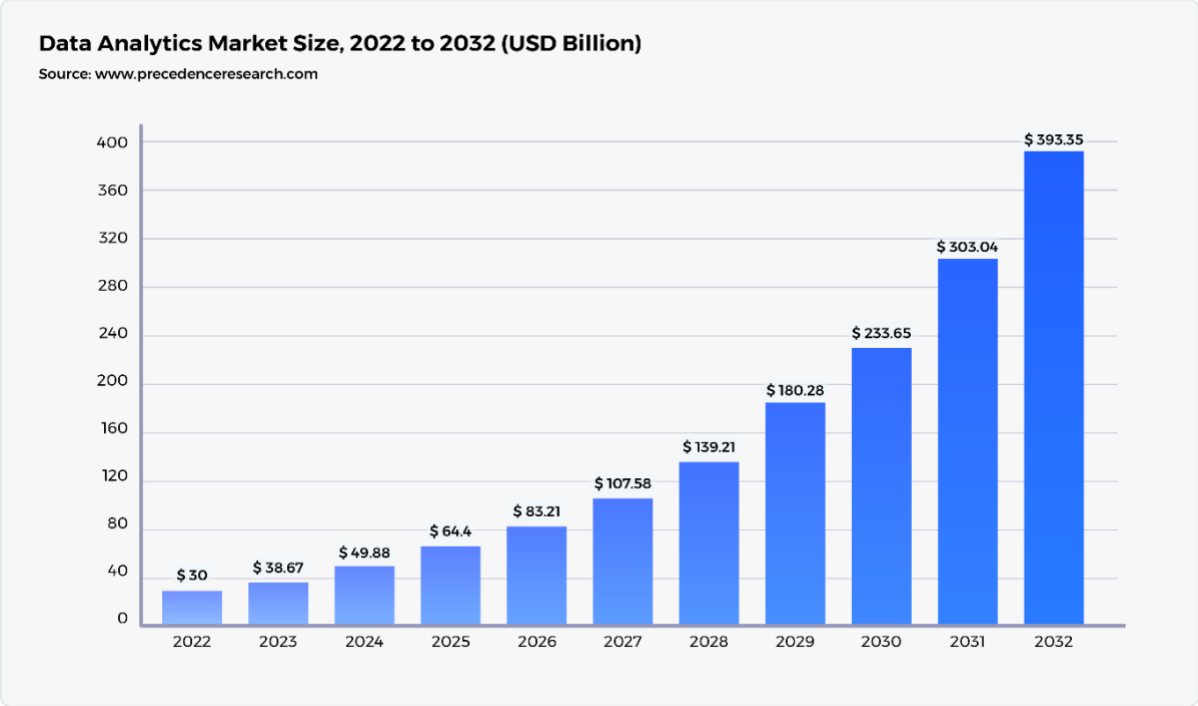

Figure 1.6 The size of the global data analytics market was valued at EMarketer $30 billion in 2022

and is projected to exceed around $393.35 billion by 2032 with a projected CAGR of 29.4% during the forecast period from 2023 to 2032.[10]

When it comes to data analytics, AI is considered one of the most revolutionary concepts that is already changing the rules of the game. Artificial Intelligence is also being used most precisely for data analysis - according to several studies, it is currently the top use case. AI seems unstoppable in the field of data analytics. Future trends toward content automation and communication support are clearly foreseeable.

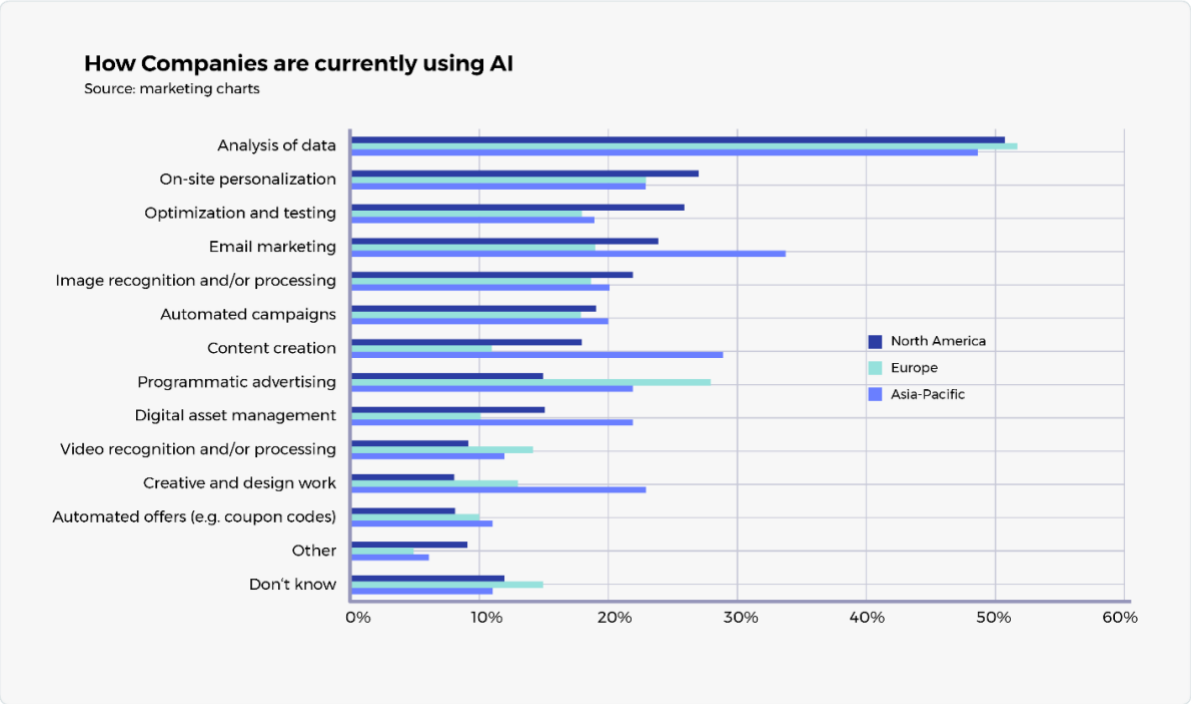

Figure 1.7 Among all the use cases of AI by companies across all regions, data analytics is gaining by far the most traction.[11] The study is based on a survey of almost 12,800 digital marketing and e-commerce professionals from the client side (60%) and supply side (40%).

AI has been all the rage lately with AI stocks surging to new heights even amidst market turmoil. Many investors (and especially retail) started to rush towards AI stocks with NVIDIA leading the race.

Investment in AI is on an all-time high with the US and China in the lead. It seems that the future of global leadership will be determined using AI.

[10] Data Analytics Market Size To Surpass $393.35 billion By 2032 (precedenceresearch.com)

[11] Marketers Are Using AI Primarily for Data Analysis - Marketing Charts

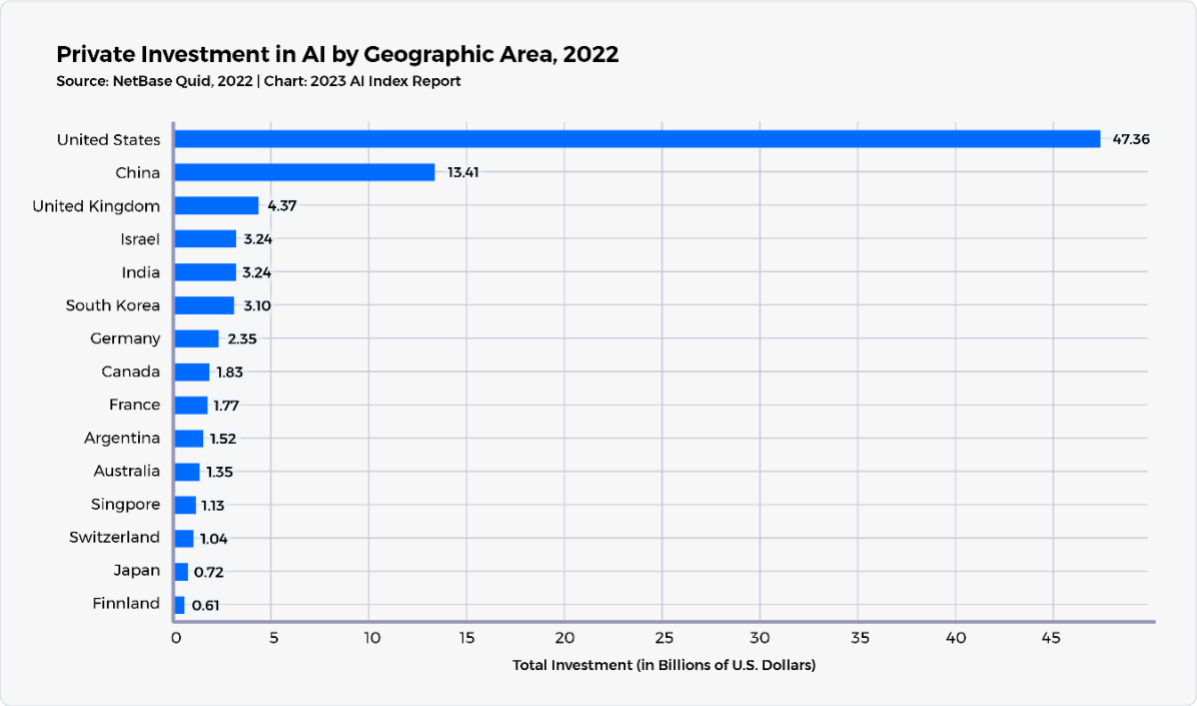

Figure 1.8 Private Investment in AI by Geographic Area, 2022

The USA is the global leader in terms of the total sum of private AI investments. In 2022, the $47.4 billion invested in the USA was about 3.5 times as much as the amount invested in the next largest country, China ($13.4 billion). The USA also continues to lead in the total number of newly funded AI companies, recording 1.9 times more than the European Union and the United Kingdom combined, and 3.4 times more than China.

It is evident that AI will continue to play a crucial role in data analysis going forward.

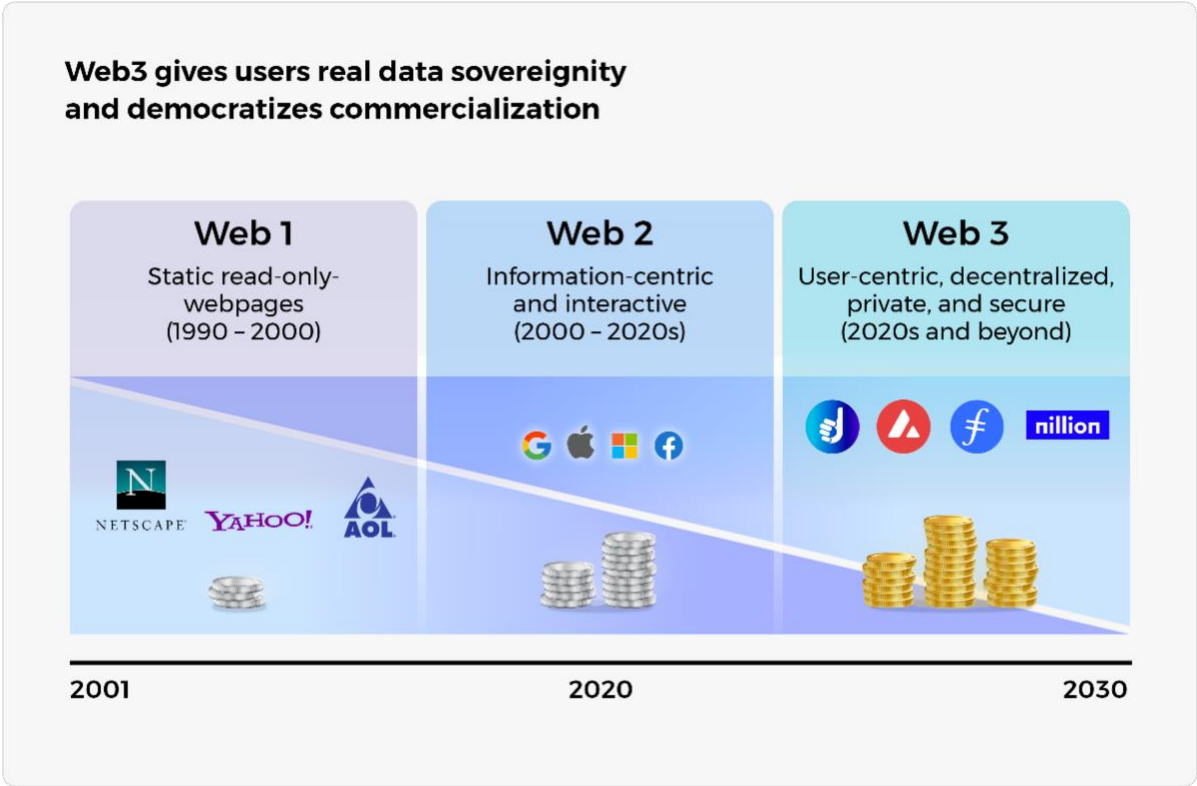

Figure 1.9 Web 1 to Web 3

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