HUMAN COLOSSUS
FOUNDATION

Principles of a Dynamic Data Economy (DDE)

Version 1.0

The convergence of technology and data is propelling our society into an era of instant access to information. *Artificial Intelligence* (AI) continues to broaden the scope of our fascination with final frontier exploration, with *"Data"* being the fuel behind *Quality of Life* (QoL) advancements, bringing a deeper level of insight, knowledge, and value to civil society. In the wake of growing mistrust in current information technologies and systems, we are witnessing the birth of a technological decentralisation movement that will empower a data-agile economy where all global citizens can enjoy prosperity, freedom, fairness, and education.

We are heading into an era where controlled access to subsets of decentralised data will supersede siloed data ownership. The primary economic resource is not the data itself but accurate dataflows. In data dynamics, a stagnation point is a point in a flow field where the local velocity of the data is zero, which leads us to our citation,

"Data is like electricity. It has value when it flows; it is costly when it stagnates."

The *Principles of a Dynamic Data Economy* (DDE) extend foundational guiding principles that cover the core data domains of *Semantic*, *Inputs*, *Governance*, and *Economic*.

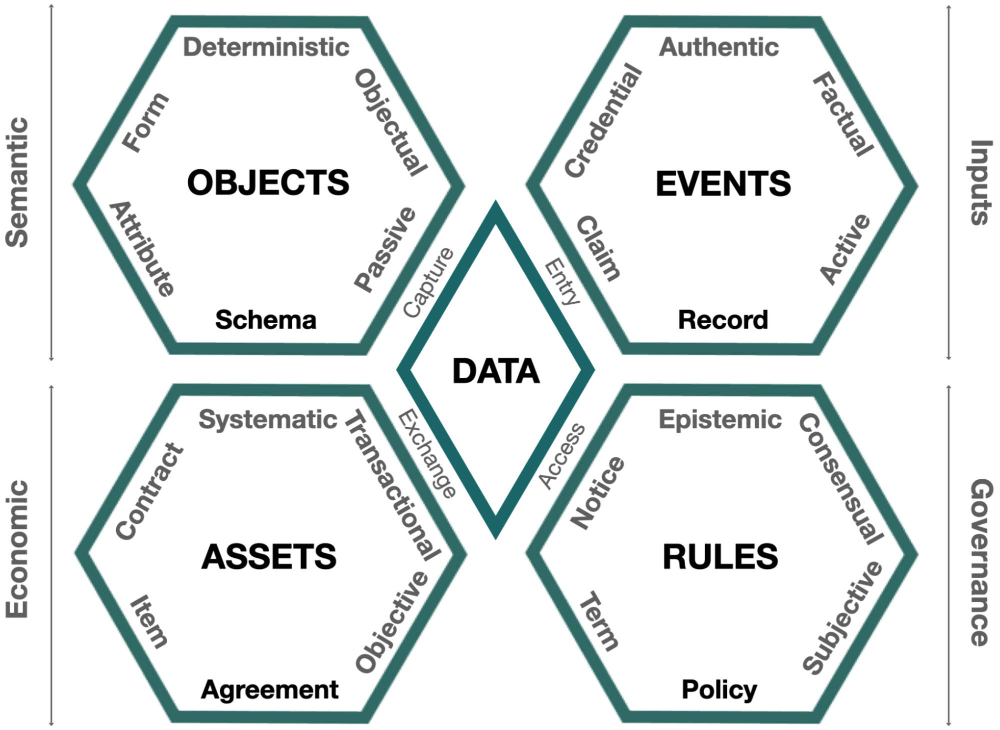

Figure 1. Model of Synergistic Data Domains

DDE principles for the Semantic domain

The core DDE principles for the *Semantic domain* are an extension of the FAIR Principles, a set of guidelines to improve the **F**indability, **A**ccessibility, **I**nteroperability, and **R**euse of digital objects.

The foundational quality that underpins the following subset of DDE principles is *"objectual integrity"*, the overall accuracy, completeness, and consistency of objects and their relationships.

OBJECTUAL INTEGRITY - *"What is it?"*

Data integrity is the overall accuracy, completeness, and consistency of data.

1.1. **Rich contextual metadata**: The captured context and meaning (the *"metadata"*) for all payloads MUST be rich enough to ensure complete comprehension by all interacting actors, regardless of written language.

1.2. **Structured data forms**: Data governance administrations MUST publish structured data capture forms, specifications, and standards, driven by member consensus for a common purpose or goal that will ultimately benefit the global citizens and legal entities they serve.

1.3. **Harmonised data payloads:** There are two areas of distinction to consider. Data harmonisation involves transforming datasets to fit together in a common structure. Semantic harmonisation ensures that the meaning and context of data remain uniformly understood by all interacting actors, regardless of how it was collected initially. Harmonised payloads are a MUST for multi-source observational data to ensure that the data is in a usable format for machine learning and Artificial Intelligence.

1.4. **Deterministic object identifiers**: If the result and final state of any operation depend solely on the initial state and the operation's arguments, the object is deterministic. All object identifiers MUST be resolvable via the object's digest to be deemed deterministic.

DDE principles for the Inputs domain

The core DDE principles for the *Inputs domain* are an extension of Kim Cameron's Laws of Identity, a set of guidelines intended to bring the highest level of cryptographic assurance to recorded events in digital authentication systems to protect trust and foster a sense of safety and security among end-users.

The foundational quality that underpins the following subset of DDE principles is *"factual authenticity"*, the overall accuracy, completeness, and consistency of the data origin, what happens to it and where it moves over time.

FACTUAL AUTHENTICITY - *"Where does it come from?"*

Data can be assumed to be authentic if it is provable that it has remained incorrupt since its creation.

2.1. **Authentic data events**: All recorded events MUST be associated with at least one public/private key pair to be considered authentic. Public/private key pairs provide the underpinning for all digital signatures, a mathematical scheme for certifying that event log entries are authentic.

2.2. **Verifiable event identifiers**: Data provenance provides a historical record (an *"event log"*) of the data and its origins. All event identifiers MUST be cryptographically verifiable to ensure data provenance, which is necessary for addressing validation and debugging challenges.

DDE principles for the Governance domain

We designed the core DDE principles for the Governance domain to strongly bind data governances with existing human governances set by communities. As a result, they are an extension of the European Data Governance Act, a legislative proposal of the European Commission that aims to create a rules framework to facilitate data-sharing.

The foundational quality that underpins this subset of DDE principles is “consensual veracity”. A term coined to capture the overall truthfulness and accuracy of shared data, including its quality and how trustworthy the data source, type, and processing are.

The ultimate goal of the DDE governance principles is to provide better decision-making in an increasingly digitised world.

CONSENSUAL VERACITY - *"Is it trustworthy?"*

Data veracity is how accurate or truthful the data is, including data quality and how trustworthy the data source, type, and processing are. In the case of any multistakeholder distributed data governance administration, a majority consensus of authorised votes drives ecosystem policy.

3.1 **Reputable data actors**: Data governance administrations MUST exercise vigilance to ensure that all ecosystem participants involved in digital interactions under their administrative control are reliable and trustworthy.

3.2 **Accountable data governance**: Data governance administrations MUST assume responsibility for the veracity of epistemic rules for safe and secure data sharing on behalf of the global citizens and legal entities they serve.

3.3 **Searchable distributed databases**: Data governance administrations MUST house at least one distributed database that insights-based service providers can utilise for structured criteria searches and data requests.

3.4 **Monitored data requests**: Data governance administrations MUST ensure that domain experts constantly monitor dynamic search engine targets under their administrative control to protect members against unethical or sensitive incoming data requests.

3.5 **Consensual policy**: Privacy rights, data governance policy, and licences MUST provide the legal basis for safe and secure data sharing within and between sectoral or jurisdictional ecosystems for a particular purpose.

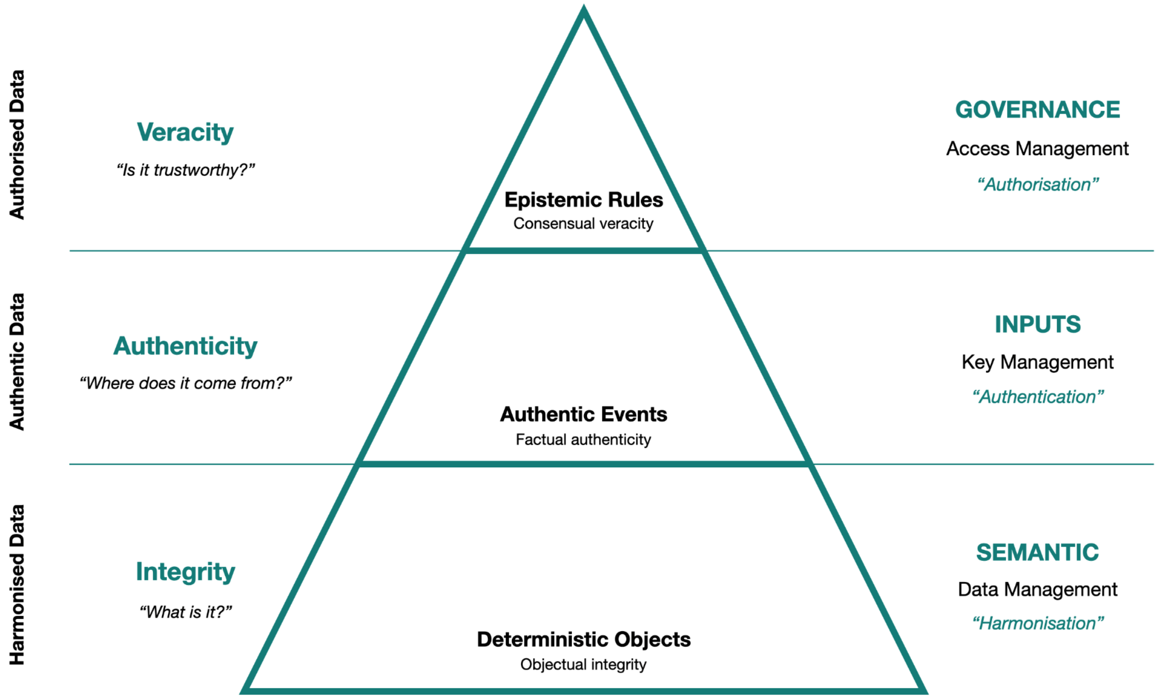

Figure 2. The Accurate Data Pyramid

DDE principles for the Economic domain

The foundational quality that underpins the following DDE principle is *"transactional sovereignty"*, the supreme power or authority of informational exchange or interaction between two active entities. It aims to restore in the digital space the governed peer-to-peer aspect of economic transactions we are used to in the physical world.

TRANSACTIONAL SOVEREIGNTY - *"Who am I dealing with?"*

Data sovereignty refers to the control an active entity can assert over data usage because its location is under self-governed authority. Data sovereignty is an essential term for regulatory and data security purposes.

4.1 **Encrypted data channels**: To avoid man-in-the-middle attacks, all digital transactions, bilateral agreements, and online communication between counterparties MUST be via secure, encrypted pairwise (peer-to-peer) communication channels.

The DDE principles are a set of guiding principles to underpin any distributed data ecosystem and include those for *objectual integrity* (Semantic domain), *factual authenticity* (Inputs domain), *consensual veracity* (Governance domain), and *transactional sovereignty* (Economic domain). As a collective, the principles provide cornerstone guidelines for communities to build safe and secure data-sharing ecosystems, regardless of sectoral or jurisdictional boundaries, enabling the formation of a new Dynamic Data Economy - the DDE.