Bringing Data to Market: Data Properties as Economic Goods

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From FAIR Principles to STREAM Properties

(Leveraging FAIR data principles for Data commoditisation)

FAIR Principles in Research Data Management

Findable – Accessible – Interoperable – Reusable

STREAM Data Properties as Economic goods

[S]overeign – [T]rusted – [R]eusable – [E]xchangeable – [A]ctionable – [M]easurable

Sovereignty: Data sovereignty allows companies, data owners to remain control over their data. It is important for business to enter the data market with their proprietary business data

Trusted: Using data in decision making or in the processes control requires that data is trusted and verifiable. Trust in data is achieved by the whole process of data collection and by using verified models of the processes.

Reusability: Data reusability allow multiple uses of data, even if not for original purposes data created. Data re-suability can create multiple opportunities for data economy actors

Exchangeability: Data exchangeability ensures that data can be exchanged between data producer and data consumer in general and be used for target applications or intended purposes.

Actionability: Data must serve the business purposes and contain necessary information to derive actionable decisions about operations or processes optimisations

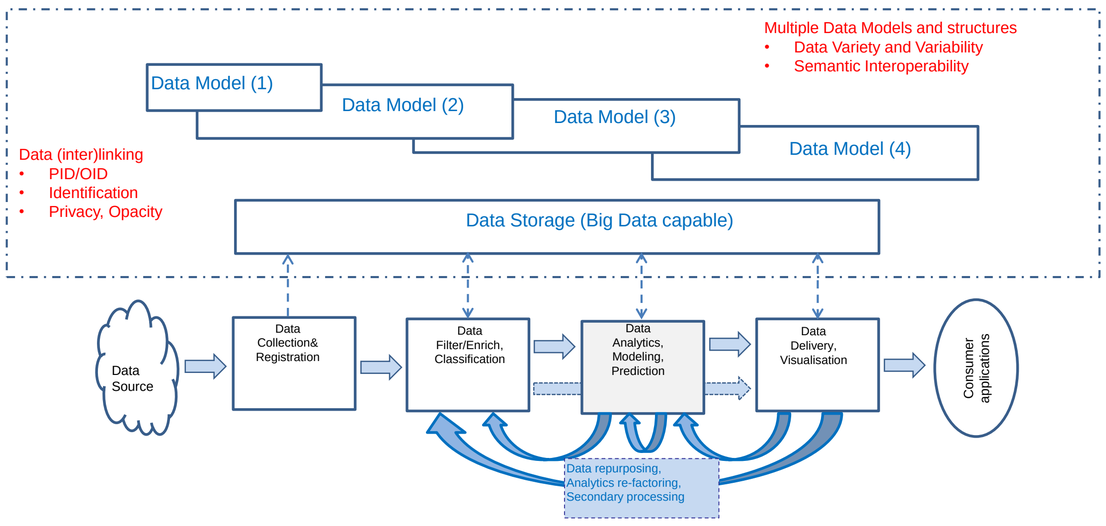
Measurability: Data measurability is used for data valuation and exchange as economic goods, and a part of data handling on the data infrastructure platforms.

Other properties for data commoditisation, trading, and exchange:

- **Quality, Value, Auditability/Trackability, Branding, Authenticity**, as well as original FAI(R) properties Findability, Accessibility, Interoperability.
- **Data ownership and IPR**: Special features that must be managed in all data transfer and tracked along all data transformation.
- **Not-Rivalry** - data property originated from its digital form of existence: data is not depleted because of sharing and exchange (copying and distribution), however impact data sensitivity, ownership and IPR

Data Lifecycle Workflow and Data Exchange Protocols

Data Reusability, Data Models Variability, Data staging and continuous storage (Data Lakes), Distributed infrastructure



Data exchange protocols provided as a part of the Data Exchange infrastructure and use layered model

- Based on reliable, secure and efficient underlying modern **Internet protocols**
- **Data exchange protocols** defined as upper layer protocols
- Mechanisms for effective and consistent data exchange and applications: Persistent data Identifiers (PID), Data Factories, Metadata and data types registry, data annotation and data discovery mechanisms

Data exchange infrastructure leverages modern network and cloud virtualisation technologies employing

- Programmable virtualised networks as part of **Virtual Private Clouds (VPC)**
- Support **containerized data applications** that produce and consume data
- Support data exchange internally inside secure VPC and with external parties
- Use **Trusted Computing Infrastructure Bootstrapping (TCIB)** protocol for establishing trusted virtual data exchange environment

Data Driven Economy and Data Markets

The establishment of the **Open Data Markets** is a necessary stage in making **Digital Single Market (DSM)** in Europe reality

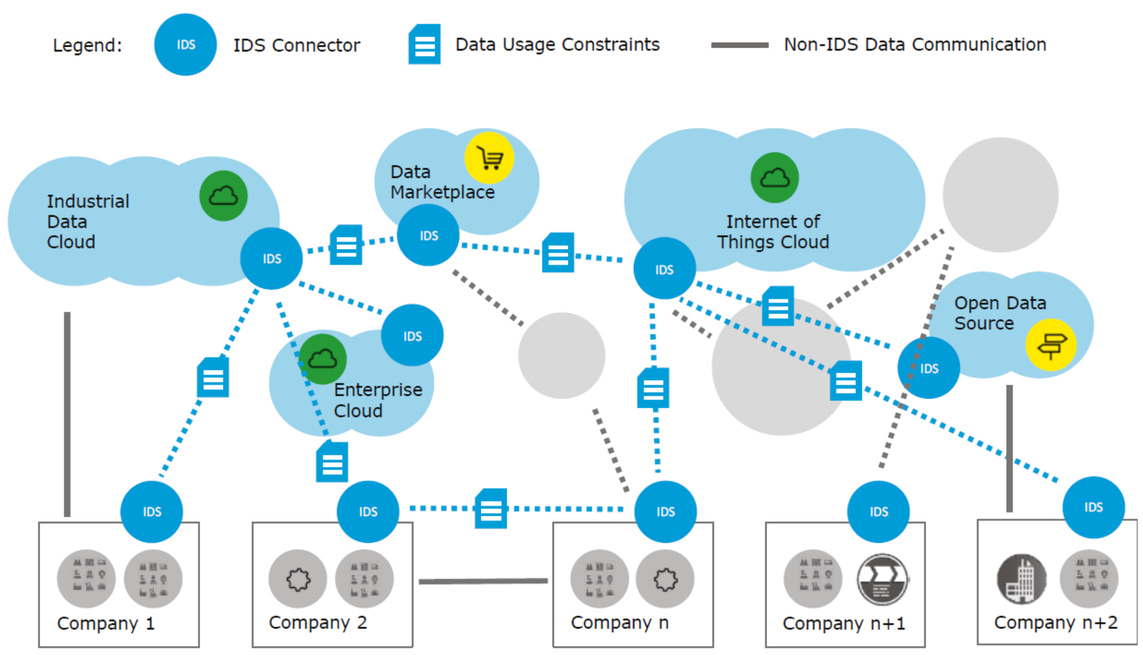
- Facilitate the digital transformation of European economy related to **Industry 4.0**
- **Open Data Markets** are built on well defined rules, processes and protocols, supported by open API to enable any join and operate their legal business

Factors facilitating Data Markets

- IoT sensor network and farms that continuously produce data that potentially may be used by different organisations and produce secondary data with added value
- Use of personal data for advanced market research and services development
- Earth exploration data collected over years (such as from mining or oil/gas companies) that can be offered on the market
- Existing data archives which value may increase if data traded in more flexible and measurable way
- Secondary data created from Open Data, social network data, observational data

Data Markets Architecture and Components

Industrial Data Space Architecture



Data Markets Infrastructure components

Data Exchange – Data Connectors – Catalog - Brokers - Trust

Infrastructure is a necessary component of any service architecture. The following are essential components of the Data Market infrastructure:

- Architecture and conceptual model of the Data Market space, including **technological, organisational, legal and commercial aspects**
- **Data Exchange(s)** as the main component for Data Market actors interaction and data exchange
- **Data Connectors** to enable sovereign end-to-end data provider and consumer connection
- **DataHubs** to support for generic services for data suppliers such as caching, streaming, containerised delivery
- **Federated Access Control and Trust Management** infrastructure to access and operate the Data Market
- Federated hybrid cloud based Big Data infrastructure to support data storage, processing and exchange in a secure and trusted way
- Support for on-demand connectivity and bandwidth provisioning between data handling services/hosts in the data lifecycle
- Gateway based and computationally enforcement of market policies and rules

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