

Data Economy

Technical enablers for Data economy

12.2.2019



≡ **Agenda**

1. Data economy

2. Business architecture

3. Technical architecture

1. Case SOLID

2. Case IHAN

Data based business models

There are three main categories of business models for organizations seeking to increase their revenue with data

Differentiation

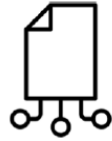


1. Product innovators improve the products and services with data



2. Integrators combine various services with data to provide better service for their customers

Brokering



3. Data distributors collect and sell raw data without adding to it's value

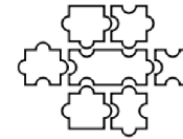


4. Data brokers collect, combine and process data using analytics and sell the analysis results

Networks



5. Value chain integrators share data between each other to form a common strategic advantage

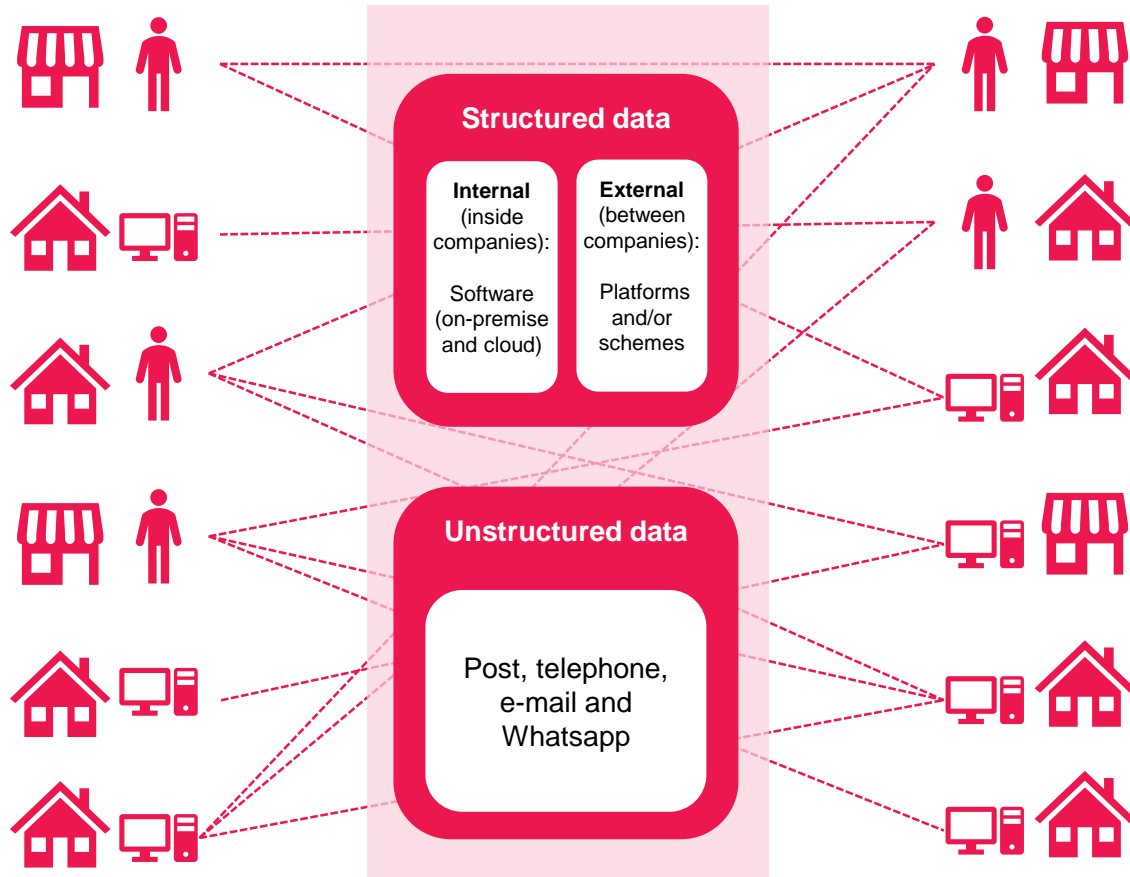


6. Value network partners work together (often in a digital environment) building sales opportunities for each other







Source: Harvard Business Review, Harbor Research

Persons and machines share different datatypes through different channels

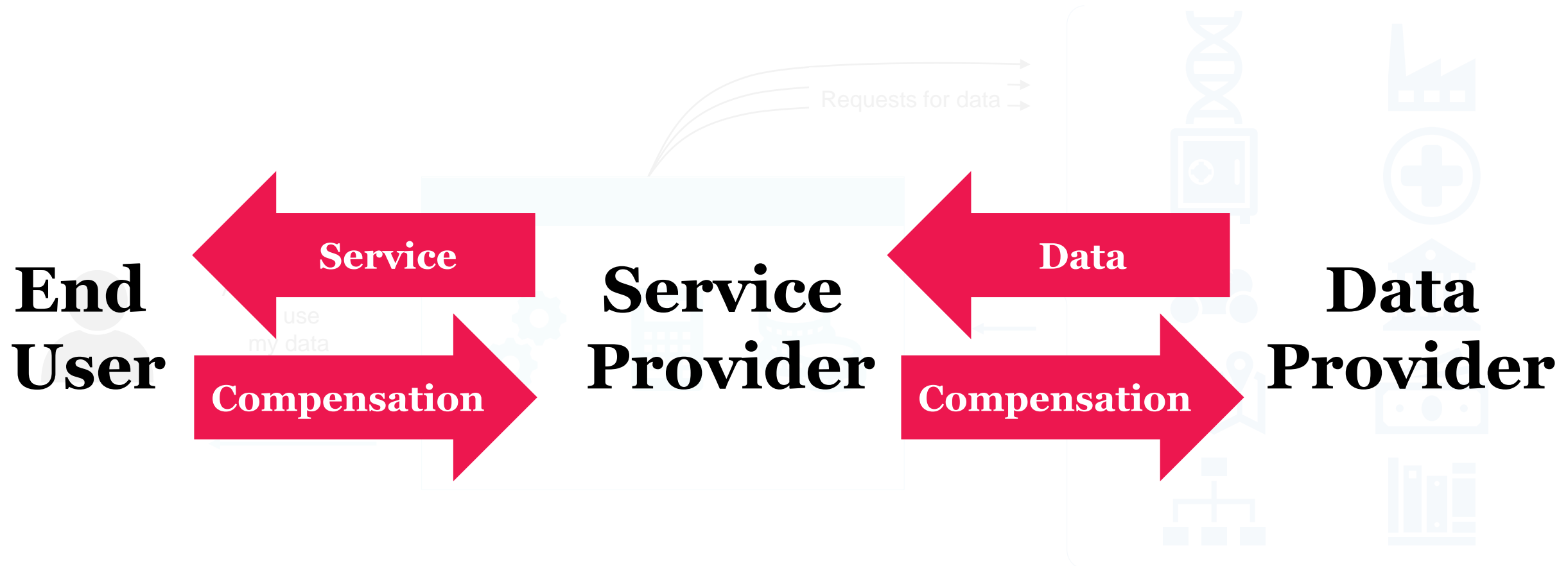
Playing field of data economy



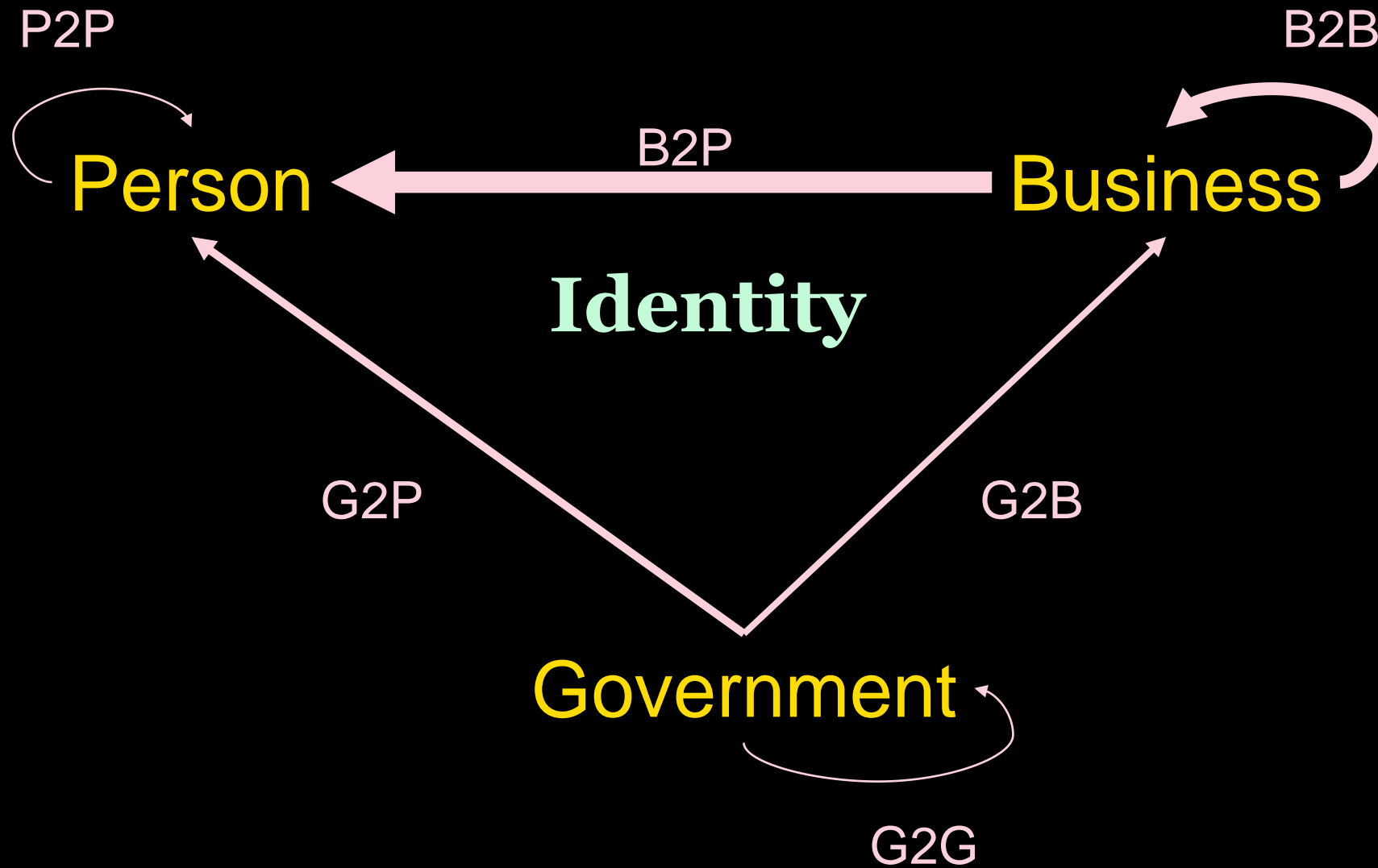
Six datatypes

#	Categories	Explanation
1	 Personal data	Data about persons and clients, e.g. name, website behavior, purchase history
2	 Company data	Non-public data from a company, e.g. balance information, number of employees, water and energy consumption
3	 Order data and logistic data	Data about specifications of proposals, orders and logistical data regarding orders, e.g. RfPs, order cost, status of transfer and delivery
4	 Invoice and payments data	Data about payments, debts, and invoice status, e.g. amount due, invoice status, credit score
5	 Contract data	Data about a legal agreement between two or more parties, e.g. contracting parties, conditions, terms
6	 Product data	Data about products and services, e.g. product size, material, service levels and sensor measures of machines and buildings (IoT data)

Fair Data Economy is about delivering services and getting compensated for that

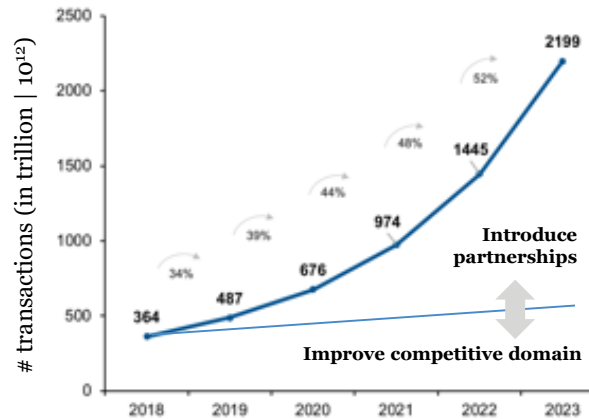


Data economy **entities**, services and foundation

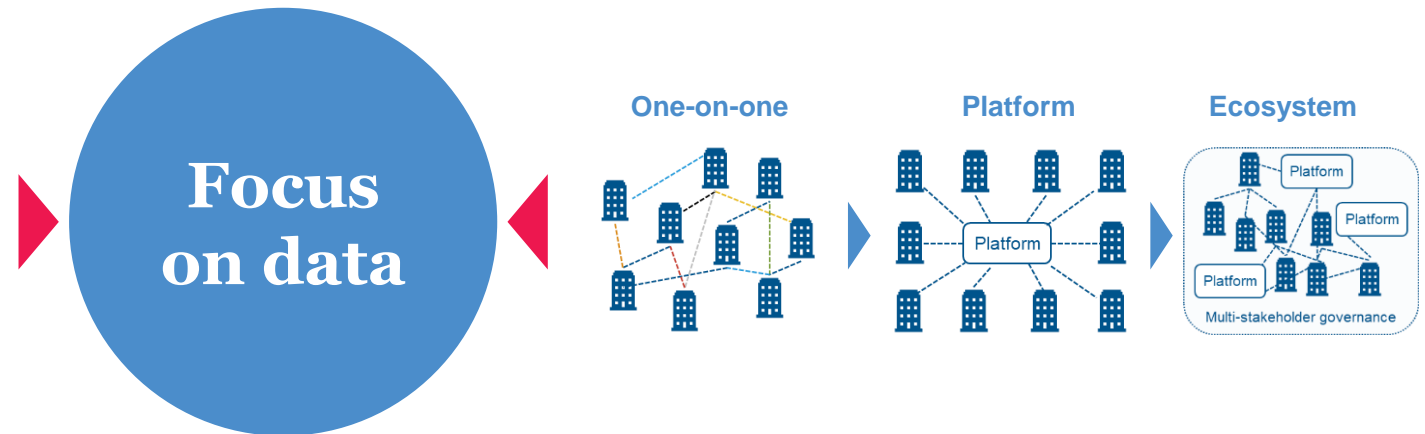


In B2B context efficiency gains and business model choice are driving companies towards open digital ecosystems

Companies in all industries are in constant need to improve efficiency



Business model determines whether to compete or collaborate on standards

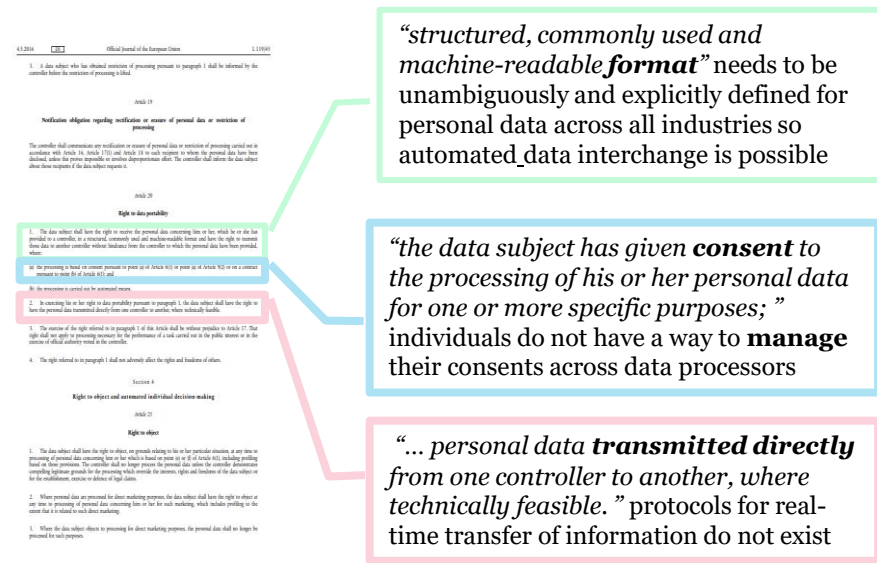


By working together and sharing data companies can increase **speed** in physical supply chain by increasing speed in digital supply chain. New data based **business models** have emerged and continue to evolve

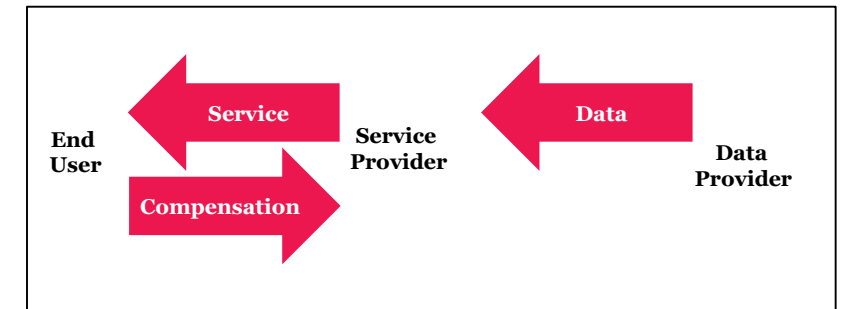
If there is **no governing model** there will be lack of confidence and infrastructure for sharing data. In platform model the platform maintains **central control** over the data. By implementing collaborative standards more parties can offer services within the same network and compete on the merits of their own service

In B2C context GDPR has set the grounds and PSD2 is a first attempt for consent-based personal data economy

GDPR is a good start and its Article 20 - Right to data portability - is the key



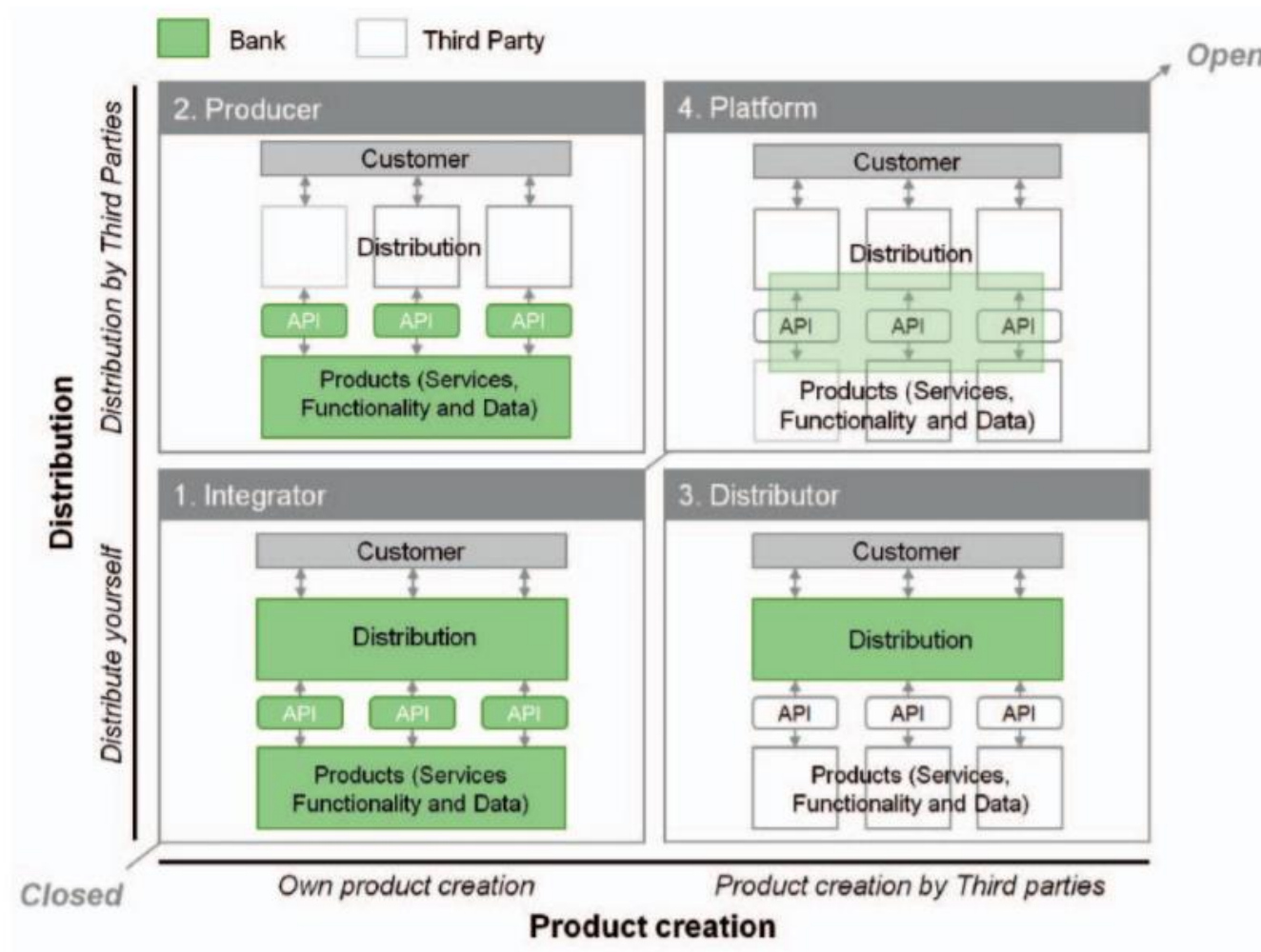
PSD2 is directly unfair to banks, but can provide indirect benefits



Individuals have no way to enforce their rights as **GDPR does not define** the format, governance nor method for consent-based personal data sharing

The missing **compensation** component causes many banks to treat PSD2 as necessary evil and creating just bare bones APIs to be compliant.

There are multiple options for organizations in data economy – example from banking industry



Data economy needs to follow the three basic principles to work

Organise trust within infrastructure



- Typical **trust questions** focus on who is the receiver, purpose, the other party's competitive advantage, access management and whom to contact for data abuse
- Trust combined with standardisation is addressed in many sectors by **large digital platforms** (Google, Amazon, Alibaba), who facilitate this when parties agree with their **set of agreements**.

Keep data at the source



- To create value from different datasets, data is currently often **combined** and stored and analysed **centrally**
- New technologies allow **access to data at the source**, where **no data is copied**.
- Data analysis is brought to the source data, so that actors **retain control over their own data** and the data is **always up-to-date**

Clear metadata for findability

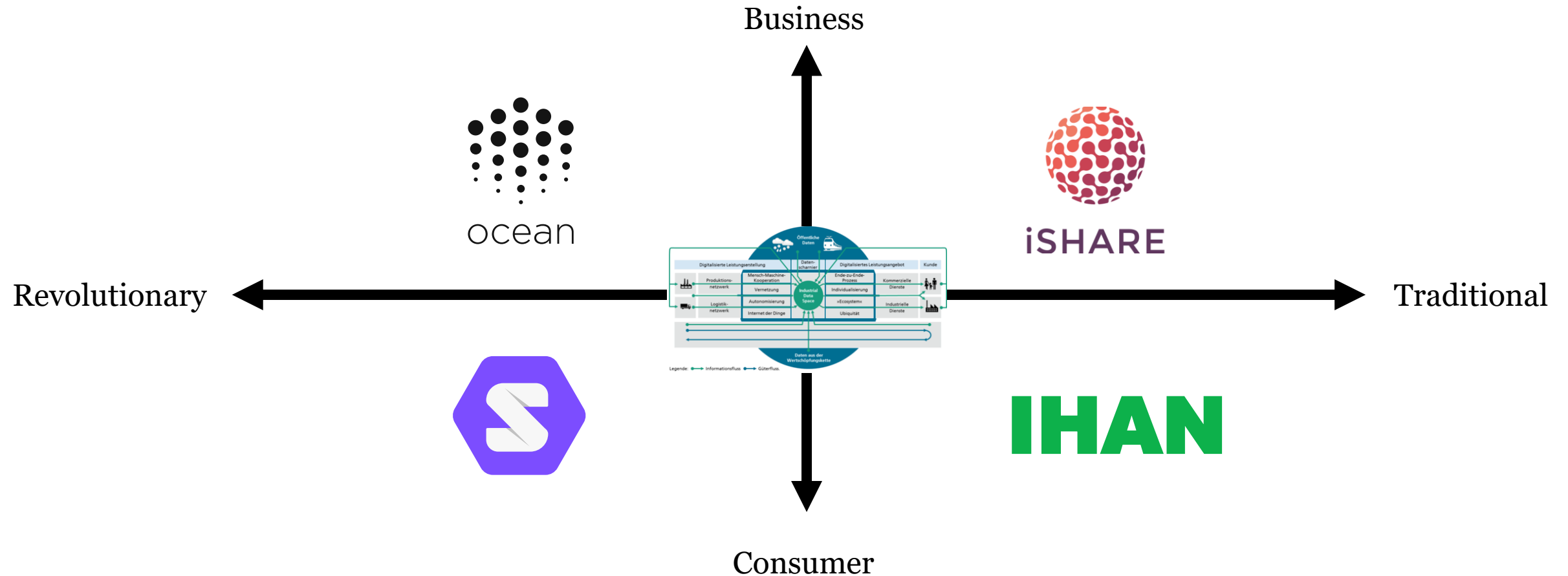


- **Interoperability** of different datasets and tools is a **fundamental building block**
- For machines it is currently difficult to **find data** (using metadata) due to the large diversity of data types and lack of standards
- Services that 'translate' data formats to other formats will appear
- **Metadata** is fairly **universal** across types of data, so **agreements** can be made on them

Three data economy cornerstone enablers

- 1 (multi) Identity management
- 2 Consent (lifecycle) management
- 3 Data transfer (and interoperability) management

Data can be shared in many different ways



Case IHAN (Fair Data Economy)

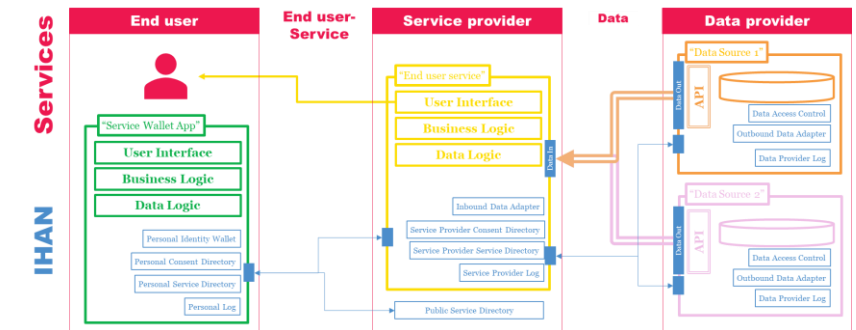
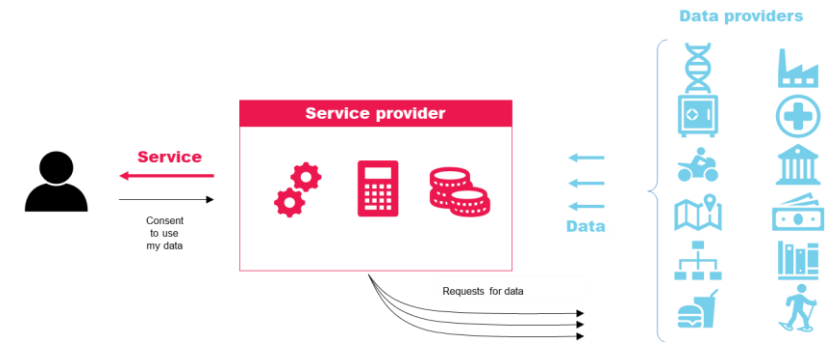


- **Paradigm shift:** PSD2 for all data in all industries
- **Organization:** Currently project at Sitra. Started 2018
- **Mission:** Our aim is to build the foundation for a *fair and functioning data economy*

The main objectives are to *create a method for data exchange and to set up European-level rules and guidelines for the fair use of data*

IHAN[®] is founded upon *European values* and based on trust

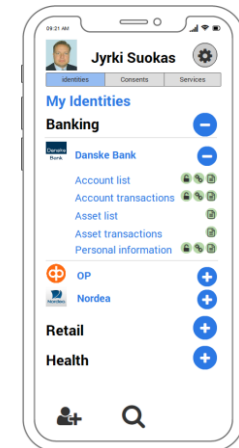
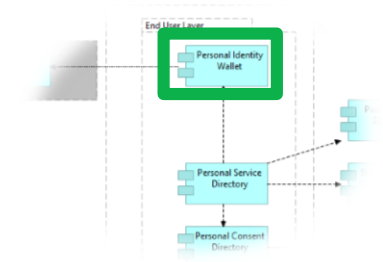
- **Difference** Common components to securely transfer data so service providers can create new services by combining existing data



Identity management

- In IHAN world, identity is a **unique** identifier to an individual or data/service provider.
- Identity needs to be based on a trustworthy **external** system where it can be achieved via an interface.
- Identities might be **verified** by a third party.
- A digital identity means a digital **representation** of person's identity which he or she has decided to use.
- There can be **unlimited** amount of different digital identities for one person, each of which is used for none to many services and data sources.
- All data is **attached** to some identity

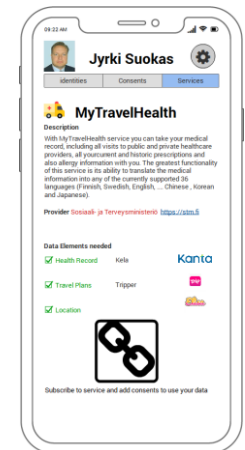
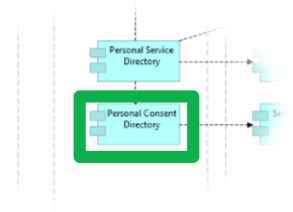
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Consent management

- For a Service Provider to be able to provide Services the Service Provider and End User enter into an agreement between each other – this **agreement** is the Consent.
- A consent is the key component that implements the authority of the **usage** of a data element.
- Without consent there can be no **interchange** of data between the Service and Data Providers.

IHAN



SITRA



Interested?

IHAN

<https://www.sitra.fi/en/topics/fair-data-economy/>

<https://www.sitra.fi/en/articles/lets-develop-ihan-technical-requirements-together/>



Case Solid (SOcial Linked Data)

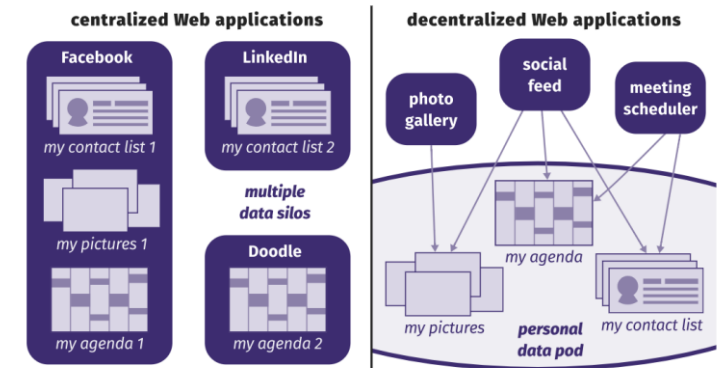


- **Paradigm shift:** (Re)-de-centralization of the web
- **Organization:** Inrupt – company founded by Tim Berners-Lee. Founded 2017
- **Mission:** “The Solid ecosystem enables you to use the apps you need, while storing your data wherever you want.

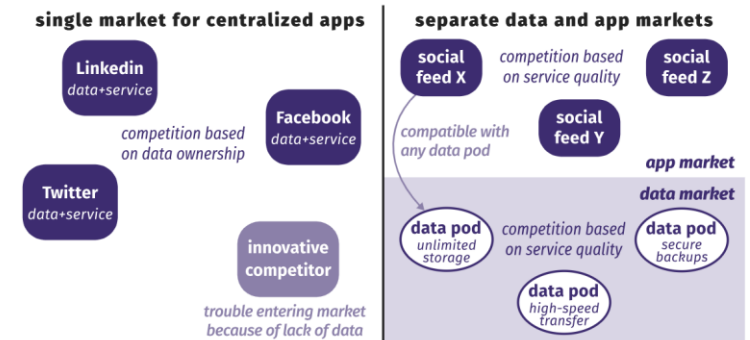
You own your data, and share it with the apps and people you choose.”

- **Difference** Utilization of web standards (HTTP, URL, RDF, LDP, LDN, ...) re-uses current web content

You can grant apps and people access to very specific parts of your data.



Separating app and storage competition drives permissionless innovation.



Identity management



- “Your **SOLID POD** provides your identity”
- In order to prove ownership of your data, you need a way to identify yourself. Rather than relying on a third party, you can use your Solid POD to say who you are. So no more “Log in with X” or “Log in with Y” on the Web — just “**Log in with your own Solid POD**”.
- For permissions it is essential to have a concept of identity, for which the **WebID Identity spec** is used. This is a minimalistic identity spec, which allows a URI to denote a user, and return back machine readable data.
- Authentication of that identity is provided using WebID-TLS and WebID-OIDC right now, but other strategies, such as key fobs, or two factor authentication, could be added to depending on system needs.



Consent management



Solid clients are browser or native apps that read from or write to your data pod.

You give apps permission to parts of your pod.

You can choose very precisely what they can access.

Friends give you permission to parts of their pod.

They can choose very precisely what you can access.

Apps build a unified experience with all that data.

Browse your friends' pictures along with yours.

Through URLs and RDF, every piece of data can link to any other piece of data.

```
PREFIX as: <https://www.w3.org/ns/activitystreams#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
<#ruben-likes-iswc2018> a as:Like;
  as:actor <https://ruben.verborgh.org/profile/#me>;
  as:object <http://iswc2018.semanticweb.org/#this>;
  as:published "2018-10-08T21:00:00Z"^^xsd:dateTime.
```

Link following is crucial to make this work.



Data transfer



Decentralized Linked Data for people activates many options for research.

data transformation, modeling, and reasoning

getting RDF out of existing applications, on-the-fly
conversion between ontologies, ...

query evaluation

traversal-based querying, large-scale federation, ...

policies and licenses

access rights for people and apps, ...

The Resource Description Framework is a model for data interchange on the Web.

RDF is a standardized way to represent Linked Data.

The RDF model defines RDF datasets.

An RDF dataset has a *default graph* and ≥ 0 *named graphs*.

An RDF graph is a set of RDF triples.

An RDF triple consists of a subject, predicate, and object.

RDF has different concrete syntaxes.

triple-based, JSON-based, XML-based



Interested?



<https://solid.inrupt.com/>

<https://rubenverborgh.github.io/Solid-Lecture-2018/#>



