Digital Data Marketplaces

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Complex Cyber Infrastructure / University of Amsterdam

Ideas and concepts developed by Cees de Laat, Leon Gommans, Tom van Engers, Paola Grosso and others

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Our goal:
Enabling secure, trustworthy data exchange for public (e.g. science, healthcare)
and private interests (e.g. improved services, efficiency, compliance) in which parties
retain control over their assets (sovereignty) and regulations are enforced

A European strategy for data, EU commission, COM(2020) 66 final:
The aim is to create a single European data space – a genuine single market for data,
open to data from across the world – where personal as well as non-personal data,
*including sensitive business data are secure …*

Observations:
- EU strives for a digital single market (evidenced by EU data strategy and funding priorities)
- EU strives for the digital sovereignty of its citizens (GDPR for privacy protection, regulations on AI)
- Tension between the above when personal data is used or when data is used by autonomous systems
- Data exchange considered high-risk: lack of trust between organizations, compliance concerns

Data Logistics 4 Logistics Data – DL4LD
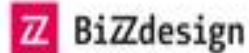
SSPDDP - Secure Scalable Policy-enforced Distributed Data Processing

Enabling Personalized Interventions

Amsterdam Data Exchange (AMdEX)

DATA SHARING COALITION	Consortium development	Data Market

COMMON BENEFIT
Define and agree **common benefit**
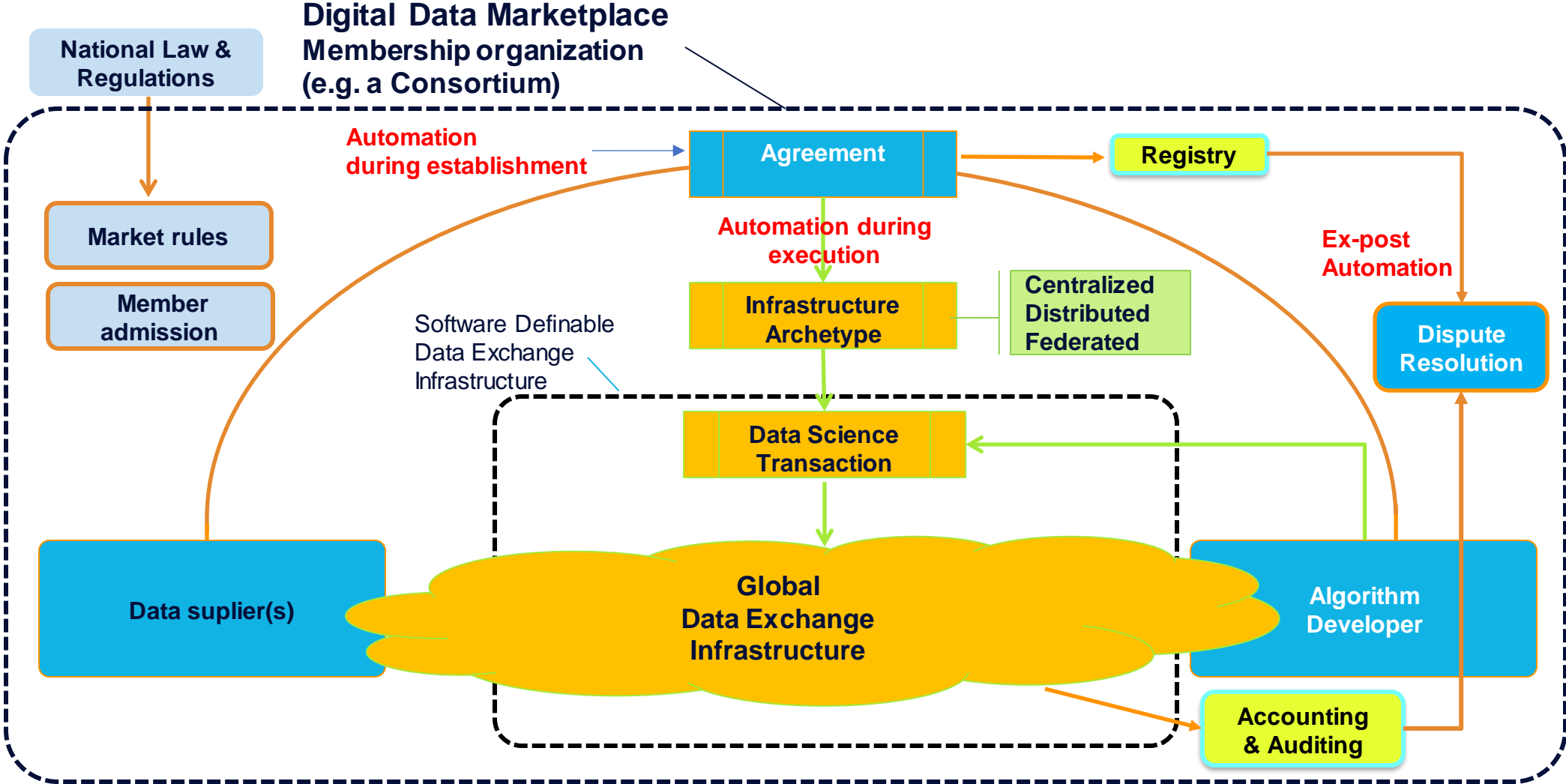
GROUP RULES
Define **consortium rules**

ORGANIZE TRUST
Organize trust as a **means to reduce risk**

IMPLEMENT
Operationalization of **Digital Data Marketplace**

DIGITAL DATA MARKETPLACE RESEARCH

## NORMATIVE SYSTEM BASED AUTOMATION TO CONTROL A S/W DEFINABLE DATA EXCHANGE INFRASTRUCTURE

Scientific impact

- Network and infrastructure
  - Distributed data processing pipelines (*Baranowski et al. 2020, Cushing et al. 2020*)
  - Multi-domain networking and auditability (*Zhou and Cushing et al. 2020*)
  - Profiling ML applications (*Zhang et al. 2021*)
  - Programmable infrastructure (*Alsayed Kassem et al. 2020*)

- Normative control in distributed and autonomous systems
  - Formal representation of laws and regulations (*Van Doesburg et al. 2019, Van Binsbergen et al. 2020*)
  - Monitoring and enforcement (*Sileno et al. 2020, Van Binsbergen et al. 2021*)
 - Digital enforceable contracts (*Liu et al. 2020*)

*Building towards **programmable network infrastructures** that provide the communication, monitoring, and enforcement capabilities **to execute data exchange transactions** compliant with **laws, regulations and agreements** (such as contracts and consortium agreements) and offering **transparency** and **accountability***

Impact

Digital Data
Marketplaces (DDMs)
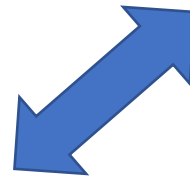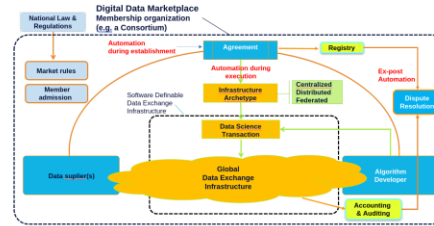
The Nokia Data
Marketplace Solution
at Equinix

https://www.nokia.com/networks/services/nokia-data-marketplace/
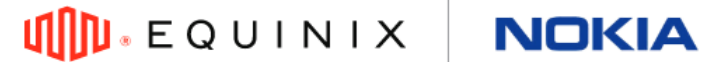
Special Section proposal

- Discuss the **ambitions of the EU** regarding data economy (EU strategy for data, 2020), the tension with **existing and novel regulations** (GDPR 2016/2018, forthcoming regulations on AI), and other (technological and organizational) **challenges** towards the realization of **data sharing consortia**

- Detail our **vision** on **digital data marketplaces**, discussing how it addresses the aforementioned challenges and the (scientific) **impact** of the concept

- Describe **research directions** preparing data exchange systems **for a future with** increased integration of **AI/autonomous components** and **additional regulations** across jurisdictions

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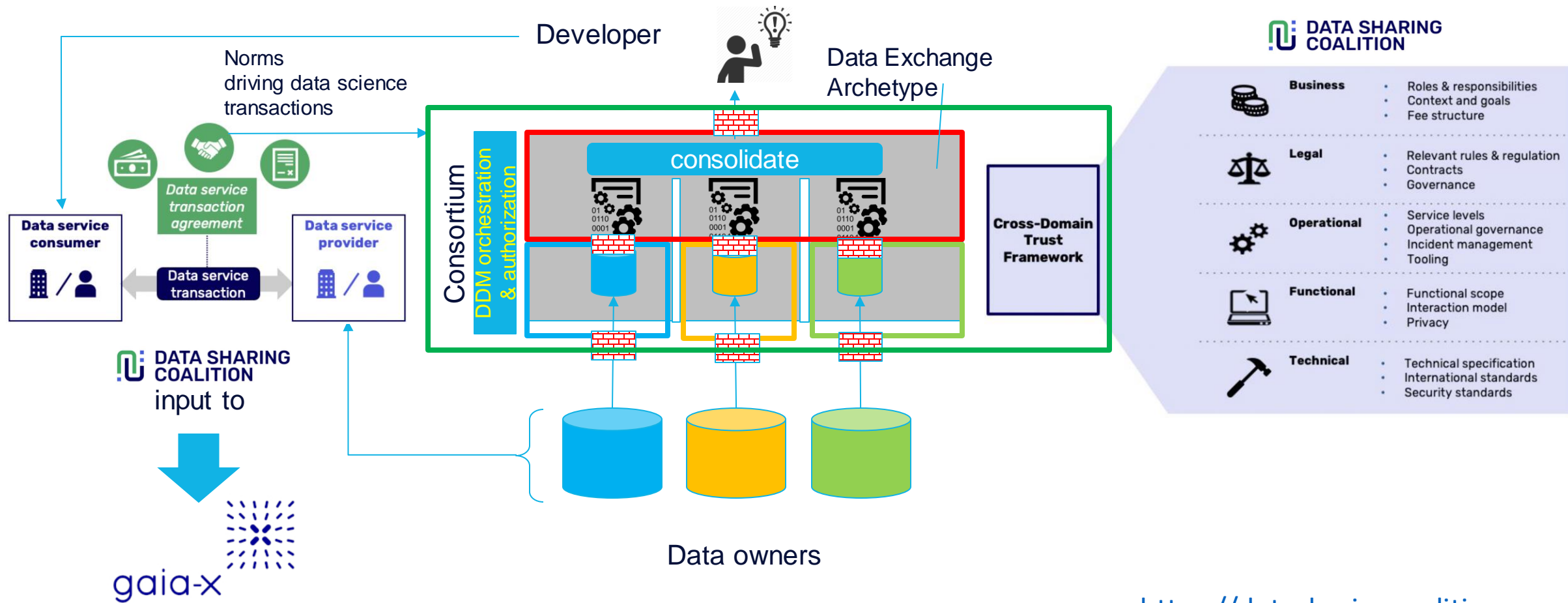Complex Cyber Infrastructure / University of Amsterdam

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EXAMPLE: FEDERATED LEARNING BASED DDM
CONSORTIUM NORM DEVELOPMENT USING DATA SHARING COALITION TRUST FRAMEWORK

https://dl4ld.nl

https://datasharingcoalition.eu

DIGITAL DATA MARKETPLACE GOVERNANCE

A FOUR STEP APPROACH

Consortium development | How norms can automate | Data Market

COMMON BENEFIT

Define and agree common benefit no single organization can achieve on its own and transcend self-interest.

GROUP RULES

Define consortium rules considering data use, access and benefit sharing.

ORGANIZE TRUST

Organize power and trust as a **means to reduce risk** for participating members

IMPLEMENT INFRASTRUCTURE

Research operationalization of **Digital Data Marketplace** & **Data Exchange** concepts