EXPLORING DIGITAL DATA MARKETPLACES

Researching data sharing principles in aviation context
An outline

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RESEARCH CONTEXT
PROVIDING ADDITIONAL DATA TO IMPROVE DATA SCIENCE ALGORITHM DEVELOPMENT

Primary Research Scope
Digital Data Marketplace

Algorithm Developers
(own or third party)

- Computer science
- Data science
- Math and statistics
- Domain knowledge

Own Organization
Planning, Prediction, Prevention, Effectiveness, Efficiency, etc.

Data supplied by other organizations

Own Organization Data

Historic (Big) Data

Decision Support Systems

(Near) Real Time Operational Data

Periodic storage

Algorithms
RESEARCH CONTEXT
PROVIDING ADDITIONAL DATA TO IMPROVE DECISION TAKING

Secondary Research Scope
Digital Data Marketplace

Data Suppliers

(Near) Real Time Data

Own Organization

Decision Support Systems
Planning, Prediction, Prevention, Effectiveness, Efficiency, etc.

(Near) Real Time Operational Data
EXAMPLES OF DATA SHARING RELEVANT TO OUR INDUSTRY

Improve **passenger experience** at airports

Improve **efficiencies** across multi modal logistic chains

Increase **fleet availability** by improving maintenance scheduling by estimating maintenance credits from aircraft data.

Research efforts also consider use-cases in Healthcare, Agriculture, Smart Cities, Public Safety, Cybersecurity, ..
PRIMARY RESEARCH QUESTION
RECOGNIZING DATA IS AN ECONOMIC ASSET THAT CAN BE TRADED

Given a common benefit:
How can (big) data be shared amongst Data Suppliers and Algorithm Developers in a 1) FAIR and ECONOMIC way, whilst providing adequate 2) means to REDUCE RISK?
PROBLEM WITH MARKET DEVELOPMENT

1) FAIR AND ECONOMIC WAY: MONOPOLISM VS OPEN MARKET DEVELOPMENT

As in seen in the beginning of the oil industry: control of the transport platform enabled monopoly. Open marketplace mechanisms will enable trade, innovation and fair competition.

<table>
<thead>
<tr>
<th>Oil Economy</th>
<th>Concept</th>
<th>Data Economy</th>
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<tbody>
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<td>Crude Oil</td>
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<td>Land / well owner</td>
<td>Ownership</td>
<td>Operator of data generator ?</td>
</tr>
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<td>Oil price</td>
<td>Value</td>
<td>Data price ?</td>
</tr>
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<td>Barrel, rail, pipeline, tanker ..</td>
<td>Transport</td>
<td>Future Internet ?</td>
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<td>Oil market</td>
<td>Trade</td>
<td>Data Market ?</td>
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<tr>
<td>Petrochemical industry</td>
<td>Value Creation</td>
<td>Data science algorithms</td>
</tr>
<tr>
<td>Fuel, lubricants, plastics, detergents, ..</td>
<td>Products</td>
<td>Efficiency, predictions, planning, recognition, behavior, ..</td>
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## DIGITAL DATA MARKETPLACE CONCEPTS
### AREA CONSIDERED BY OUR RESEARCH EFFORT

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### FLAGSHIP RESEARCH EFFORT

Amsterdam Economic Board and University of Amsterdam coordinate a multi-disciplinary research effort, involving multiple disciplines:

- Law,
- Computer Science,
- Business School,
- Economics,
- Social Sciences

Amsterdam houses one of the largest Internet Exchanges (AMS-IX):

*Can it house a Data Exchange that facilitates Data Marketplaces (AMS-DX)?*
Standard Oil got named *The Octopus*, with many of its tentacles in society.

US government created antitrust law *to protect the public from the failure of the market* where *unfair conduct* tends to destroy competition itself.

(Sherman Act - 1890)
### MANAGING RISK AT DATA MARKETPLACE

#### 2) MEANS TO REDUCE RISK: REQUIRES STEPS AT DIFFERENT LEVELS

<table>
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<th>COMMON BENEFIT</th>
<th>GROUP RULES</th>
<th>ORGANIZE TRUST</th>
<th>IMPLEMENT INFRASTRUCTURE</th>
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<td>Define and agree common benefit no single organization can achieve on its own.</td>
<td>Define consortium rules considering data use, access and benefit sharing.</td>
<td>Organize power and trust as a means to reduce risk for participating members.</td>
<td>Research operationalization of Digital Data Marketplace &amp; Data Exchange concepts.</td>
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DIGITAL DATA MARKETPLACE ARCHITECTURE

ENABLING COMPETITIVE ALGORITHM DEVELOPMENT

Future Internet Capabilities:
Software Definable - No Bandwidth Limitations, On demand, transaction based

Data suppliers

Algorithm Developers

Registry

Dispute Resolution

Accounting & Auditing

Digital Data Marketplace Membership Organization

Agreement

Infrastructure Patterns

Deployment Specification

Data Exchange Infrastructure

Data suppliers

Algorithm Developers

Registry

Dispute Resolution

Accounting & Auditing

Digital Data Marketplace Membership Organization

Agreement

Infrastructure Patterns

Deployment Specification

Data Exchange Infrastructure

Business & Legal Research
Computer Science Research
Blockchain/Finance Research

National Law & Regulations
Market rules
Member admission
INFRASTRUCTURE PATTERN
RESEARCH

Traditional Model
(raising data owner concerns)
INFRASTRUCTURE PATTERN
RESEARCH:
One of several examples

Digital Marketplace (DMP) infrastructure supports creation of (temporary) slice across data centers, implementing a data science workflow based on a contract between customer and suppliers of data and algorithm.

Generic Infrastructure is supported by a Data Exchange
RESEARCH INFRASTRUCTURE
INTERNATIONAL RESEARCH WORKING ALONGSIDE IT INDUSTRY

NETWORK RESEARCH INFRASTRUCTURES

Data Sharing Infrastructure Model
Research using Future Internet capabilities

COMMERCIAL DATACENTER INFRASTRUCTURE AS NEUTRAL GROUND

Goal: How to create a Digital Marketplace Ecosystem

AM3 and AM4 Datacenters
Science Park Amsterdam

SV10 Datacenter
Silicon Valley

Data Transfer Node at KLM fieldlab with 100 gb/s link to enable SDMP research thanks to UvA, SURFnet and Ciena
CONCLUSION

A DIGITAL MARKET PLACE:

- **Is created and governed by an industry membership organization as a means to reduce risk.**

- **Serves a common benefit no single organization can achieve on its own.**

- **Connects data suppliers and algorithm developers via a software definable, membership organization owned, infrastructure.**

- **Arranges processing as an on-demand infrastructure transactions, where the infrastructure is guaranteed to be cleaned up after execution.**

- **Infrastructure itself is delivered by neutral Data Exchanges across the world, in the same way neutral Internet Exchanges interconnect Internet Service Providers.**
THANK YOU

Want to help our research?

Email me:
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