CONSORTIUM DRIVEN DATA EXCHANGES

Leading to consortium governed data market- and part data exchange solutions

Leon Gommans, PhD
Air France KLM Group, Science Officer
University of Amsterdam, prof. Data Exchange Systems
Co-founder IDCA

Mark Roboff
CEO Skythread
Co-founder IDCA
Data Exchange Research Update – Leon

- Scope: Platform Archetypes
- A Development Framework for Consortia
- Consortium building examples: SAE-ITC ExchangeWell and IDCA
- Data exchange infrastructure concept validation & demonstration: AMdEX fieldlab
  - What is the AMdEX Fieldlab?
  - Data Exchange Archetypes
  - Federated ML Data Marketplace use-case

Consortium driven part data exchange – Mark Roboff

- Independent Data Consortium for Aviation (IDCA)
- Part Data Exchange solution: SkyThread
## SCOPE: COMMON INTEREST DRIVEN PLATFORM ARCHETYPES (WIP)

Differentiated by different ways to drive a platform.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Trust</th>
<th>Platform Archetype</th>
<th>Strategic Goal</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self interest</td>
<td>Trust established by a Single Party</td>
<td>Existing enterprise</td>
<td>Be the best in your environment</td>
<td>GE Predix</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Investors in new enterprise</td>
<td>Create shareholder value (typically at the expense of the existing environment at high investment cost)</td>
<td>Uber, airbnb</td>
</tr>
<tr>
<td>Common interest</td>
<td>Collaboration Organized Trust</td>
<td>Investors in new enterprise</td>
<td>Enlarge reach for supply parties and a more diverse product offering to demand parties</td>
<td>SkyTeam</td>
</tr>
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<td></td>
<td></td>
<td>Centralized Platform</td>
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Current

- Business Ecosystem
- Dataspaces (GAIA-X)

Exploring for future

- Federation (with holistic benefit)
- Support competition by enabling collaborative business models with the environment

归属的平台架构类型被不同驱动方式所差异化。
A FRAMEWORK TO ORGANIZE & IMPLEMENT TRUST DRIVEN BY A CONSORTIUM

COMMON BENEFIT
Define and agree common benefit no single organization can achieve on its own.

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
Operationalize a Data Exchange infrastructure with solution supply members.
RESULT: SAE-ITC EXCHANGEWELL
ORGANIZING TRUST VIA A CONSORTIUM BUILDING PROGRAM

ExchangeWell is on the leading edge of research developing models to help data owners and algorithm developers collaborate to define and form private or public blockchain-based digital data marketplaces enabling members to design and operate in the model that fits their community developed vision.

There are many aspects required to establish a successful data sharing consortium and among the most important is to develop an appropriate governance model that includes these critical elements.
The IDCA Mission Statement:

IDCA will bring together aviation industry stakeholders to identify and leverage value chains, develop data standards, and establish consensus-driven governance of data exchange mechanisms. These processes will allow the industry to achieve gains in sustainability, safety, compliance, value creation, cost reduction and innovation at a scale that no single organization could achieve on its own.

IDCA’s vision:

Enable aviation stakeholders to collaborate seamlessly in value chains based on the exchange of data in a trustworthy, fair, and efficient manner to benefit themselves and the industry.
Start with PoC/ MVP involving a few visionary members that like to provide a proof of value. This value is expected to attract new members and add new business as a consortium grows.

E.g. supply members, Data Exchange Fieldlab can facilitate the proof of value. Motivated the Amsterdam Data Exchange (AMdEX) Fieldlab

Membership fee required to e.g. to organize meetings & standards activities

Start with consortium building, defining working groups to work on creating value by designing solutions. Selecting new business & solutions as the consortium grows.
DATA EXCHANGE ARCHETYPES
RECOGNIZING THE VARIETY OF GENERIC EXCHANGE FUNCTIONS

Streaming Data
- e.g. authorized Stream Routing

Transactional Data
- e.g. High Performance Transaction Infrastructure

Big Data
- e.g. Federated ML digital data market Infrastructure

Data Tracking
- e.g. Blockchain Digital Thread Infrastructure

Generic Data Exchange Functions
AMdEX Fieldlab research

Leon
Mark

AMsIX
AIRFRANCE KLM GROUP
CONSORTIA USING EXCHANGE SERVICES
SERVING COMMON BENEFITS MAY REQUIRE MULTIPLE ARCHETYPES
WHAT IS THE AMSTERDAM INTERNET EXCHANGE?
AMS-IX is leading the **AMDEX FIELDLAB PROJECT** to implement a KLM use-case.
USE-CASE: THE 787 SUPPLEMENTARY COOLING UNIT
PREDICTIVE MAINTENANCE USE-CASE IN NEED OF MORE DATA FROM ADDITIONAL AIRLINE FLEETS.

Current situation:
Traditional methods outperform ML methods using KL SCU data only.
More data is needed.

Problem: How to enable access to SCU data from other airline fleets

Amsterdam Data Exchange Fieldlab use case: Enable data access to other airline fleet data via a consortium governed Digital Data Marketplace using a neutral Data Exchange Infrastructure supporting global federated machine learning.
RESEARCHING DATA SHARING SOLUTIONS FOR ML DEVELOPMENT

A DIGITAL DATA MARKETPLACE (DDM) GOVERNED BY A CONSORTIUM

Historic (Big) Data

Aircraft Operational Data (AOD)

Other Airline AOD Data

Own Airline AOD Data

Historic (Big) Data

ML Developer

Computer science

Data science

Math and statistics

Competitive Domain knowledge

Algorithm Choice

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

(Airline as algorithm user)

(On board) Decision Support Systems

(Near) Real Time Aircraft Operational Data

DDM Data Exchange Function

enabling access and use

CONSORTIUM

Consortium

AMdEX

AIRFRANCE KLM GROUP

Universiteit van Amsterdam
RESEARCHING DATA SHARING SOLUTIONS FOR ML DEVELOPMENT

NEW: A DDM USING OFF-CHAIN PART EVENT DATA (IDCA USE-CASE)

- Off-chain Historic (Big) Data
- (Near) Real Time Operational Data
- Decision Support Systems
- Planning, Prediction, Prevention, Effectiveness, Efficiency, etc.
- Airline as algorithm user
- Own Event Data
- Consortium Governed part data
- Block-chain DDM Data Exchange Function
- Consortium
- ML Developer
- Computer science
- Data science
- Math and statistics
- Competitive Domain knowledge
- Enabling access and use
- Competitive Algorithm Choice
- Consortium
- Consortilum
- Own Event Data
- Consortium
- Consortium
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DATA EXCHANGE LEVEL: ML ARCHETYPES
A CONSORTIUM MAY OFFER ONE OR MORE ARCHETYPES DELIVERED BY DATA EXCHANGE

Centralized Learning
Bring data to the algorithm

Distributed Learning
Bring algorithm to the data

Federated Learning
Via a consortium data exchange

Data Supply Party
Developer
Demand Party

Consortium
consolidate

Data Supply Party

Data Supply Party

Data Supply Party

AMdEX
AIRFRANCE KLM GROUP
TO CONCLUDE: AMDEX DEMO CONCEPT AND IMPLEMENTATION

Mitigate risk by organizing trust via a consortium

Rule making

Digital Data Marketplace

Dispute Resolution

Agreement

Neutral Data Exchange

Data Supply Parties

Data Demand Parties

Data Exchange Solution
Supply members (e.g. Federated ML, Digital Thread, Catalogue, etc.)

KLM E&M Big Data Team

Submit workflow

Receive trained network

Neutral Data Exchange Infrastructure

AF/KL Governed* Digital Data Marketplace

AF 787 SCU Data

KL 787 SCU Data

Souvereign Data Zones

*A consortium will be involved when scaling up
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