RESEARCH PROGRESS UPDATE
DIGITAL DATA MARKETPLACES

Trusted, fair and economic data sharing enabling value creation for the aerospace industry

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INTERNET HISTORY EUROPE
AMSTERDAM SCIENCE PARK

1988: The Internet landed in Europe at CWI

1994: The Amsterdam Internet Exchange housed at NIKHEF

Now > 60 datacenters emerged around the Amsterdam Internet Exchange creating 12,500 jobs*

Digital Reality (3.0B$ >175 DCs)  
Equinix (4.4 B$ >200 DCs)

University of Amsterdam  
Faculty of Science  
located right in the middle

* Source 2019 report datacenters and employment, Dutch Datacenter Association
WHAT IS IT ABOUT?
A DIGITAL DATA MARKET PLACE:

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

• Is created and governed by an industry consortium as a means to reduce risk, ensuring competition, fairness and trust.

• Supply members advertise their assets, contracts arrange asset access and usage by other members.

• To prevent data asset exposure, members can use a consortium governed infrastructure to execute data science scenario’s

• Allows consortia to implement (digitally) enforceable contracts, whilst supporting dispute resolution by immutable logging.
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 using data to predict maintenance need & optimize planning

Research efforts also consider use-cases in Healthcare, Agriculture, Smart Cities, Public Safety, Cybersecurity, ..
RESEARCH QUESTION
CONTEXT: DATA SCIENCE ALGORITHM DEVELOPMENT

Taking into consideration:
1) The value creation potential of data sharing to increase algorithm accuracy
2) Disproportionate value generation by data platforms creating monopolies

Research question: How can (big) data assets be shared between data suppliers and algorithms developers in
1) A fair and economic way,
2) whilst providing adequate means to reduce risk?
RESEARCHING DATA SHARING SOLUTIONS:
A DIGITAL DATA MARKETPLACE GOVERNED BY A MEMBERSHIP CONSORTIUM

- Data supplied by other organizations
- Own Organization Data
- Historic (Big) Data
- Periodic storage: raw or with enhanced quality
- Enabling access and use
- Algorithm Developers
  - Own or third party
- Competitive
  - Domain knowledge
- Computer science
- Data science
- Math and statistics
- Decision Support Systems
  - Planning, Prediction, Prevention, Effectiveness, Efficiency, etc.
  - (Near) Real Time Operational Data
  - Competitive Algorithm Choice

Own Organization

- Algorithm Developers
  - Own or third party

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

- Own Organization Data
- Data supplied by other organizations
- Periodic storage: raw or with enhanced quality
- Enabling access and use
- Scope

AIRFRANCE KLM
NOTE: KNOWLEDGE SHARING IN OTHER PHASES (4,7,9,10) MAY ALSO BE A GOALS OF COLLABORATION IN A MARKETPLACE COMMUNITY.
Imagine if data scientist can use historic data from 747 aircraft operated by multiple airlines.

The Bleed Air System regulates pressure and temperature of air from a turbine engine needed by other aircraft systems taking care of:
- cabin pressure
- de-icing
- water pressure
- and more..

Flight Deck Effects indicate system functionality decreases and may trigger maintenance actions.

The more Flight Deck Effect occurrences are available, the more likely that a prognostic relation can be learnt.

Data stored in 3 places: KLM, UvA, EQX-SV

Near Real Time Data

Data Science

Decision Support System

Will a Flight Deck Event occur within the next 10 flights?
Training Strategies

Centralized

Raw data transferred from dispersed data zones to a central repository for analysis

Federated

Raw data stays in place. Model trained through orchestration of local (at each data-zone) and global computations
DIGITAL DATA MARKETPLACE GOVERNANCE
A FOUR STEP APPROACH

ExchangeWell

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
Research operationalization of Digital Data Marketplace concepts.

DEMO
INTRODUCTION

• Organized by SAE ITC, ExchangeWell brings data owners and algorithm developers together in a digital data marketplace that provides the required trust for mutual engagement.

• It enables members to share their data assets in a fair and economic way whilst providing an adequate means to reduce risk.

• Sharing data enables digital transformation of the industry and business value creation.

Objective: Help answer key question:

• Will ExchangeWell as proposed provide value to our industry?
EXCHANGEWELL™
A Program of SAE ITC

A consortium program to provide the means for industry leaders to access industry experts, develop practical experience from pilots, collaborate on pre-competitive research and establish a strategic path forward to effectively implement data management strategies which positively impact and benefit industry.
Stakeholders
- Regulatory
- Airline/Operator
- Airframer/Integrator
- OEM
- Sub Assembly Manufacturer
- Distributor
- Component/Part Manufacturer
- Standards Organization
- Industry Review Body
- Auditor/Mandated Body
- SAE ITC
- Registrar
- Maintenance
- Training Provider
- IT System and Software Tools Provider
- Data Aggregators and Analyzers
- Insurers
- Legal
- Access Authorizing Agent
- Research/Academics

INTEGRATED PRODUCT CYCLE

- Design/Development
- Recycle/Sunset
- Manufacture/Inspect
- Integrate
- Maintenance/Repair
- Operations
We’re here!
ExchangeWell

IDEA
EXPLORATORY CONVERSATION
CHAMPIONS
SUFFICIENT INTEREST
DISCUSSION OR STEERING GROUP
SITUATION – TARGET - PROPOSAL
ROI / VALUE EQUATION
CONSORTIUM AGREEMENT for STRATEGY GROUP

We’re here!
ARINC IA
DIGITAL DATA MARKETPLACE ARCHITECTURE

RESEARCHING IMPLEMENTATION OF ESSENTIAL ELEMENTS

National Law & Regulations

Market rules

Member admission

Digital Data Marketplace Membership Organization

Agreement

Registry

Data Exchange Infrastructure

Infrastructure Archetype

Centralized Distributed Federated

Data Science Transaction

Research Testbed

Global Digital Data Market Infrastructure

Algorithm Developer

Accounting & Auditing

Data supplier(s)