



UNIVERSITEIT VAN AMSTERDAM



# EXPLORING DIGITAL DATA MARKETPLACES

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**Researching data sharing principles in aviation maintenance context  
An outline**

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# EXAMPLE EPIC

## UNLOCKING VALUE THAT I CAN NOT CREATE ON MY OWN

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- As Airline MRO\*, I must be able to use Aircraft Health Monitoring data from as many aircraft as possible;
- so that I can develop the most valuable and competitive algorithms, which I cannot develop if I use only data from the fleet I operate.
- The goal is to **create value together.**



\*An airline that also performs **M**aintenance, **R**epair & **O**verhaul as a business.

# RESEARCH QUESTION

RECOGNIZING DATA IS AN ECONOMIC ASSET THAT CAN BE TRADED

Given a common benefit:

How can Aircraft Health Monitoring data be shared amongst Airline Operators and Algorithm Developers in a 1) **FAIR** and **ECONOMIC** way, whilst providing adequate 2) means to **REDUCE RISK**?



INTERNATIONAL™

*Common benefit:*




Allow a **Maintenance Credit** to determine maintenance need.

# 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 monopolism. Open marketplace mechanisms will enable trade, innovation and fair competition

Oil Economy	Concept	Data Economy
Crude Oil	Resource	Raw Data
Land / well owner	Ownership	Operator of data generator ?
Oil price	Value	Data price ?
Barrel, rail, pipeline, tanker ..	Transport	Future Internet ?
<del>Oil market</del>	Trade	<del>Data Market ?</del>
Petrochemical industry	Value Creation	Data science algorithms
Fuel, lubricants, plastics, detergents,..	Products	Efficiency, predictions, planning, recognition, behavior,..





# DIGITAL DATA MARKETPLACE CONCEPTS

## AREA CONSIDERED BY OUR RESEARCH EFFORT

Concept	Data Economy
Resource	Raw Data
Ownership	Operator of data generator ?
Value	Data price ?
Transport	<b>Future Internet ?</b>
Trade	Data Market ?
Value Creation	Data science algorithms
Products	Efficiency, predictions, planning, recognition, behavior,..

## 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  
economic  
board

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

***Can it house a Data Exchange that facilitates Data Marketplaces (AMS-DX)?***

AIRFRANCE **KLM**

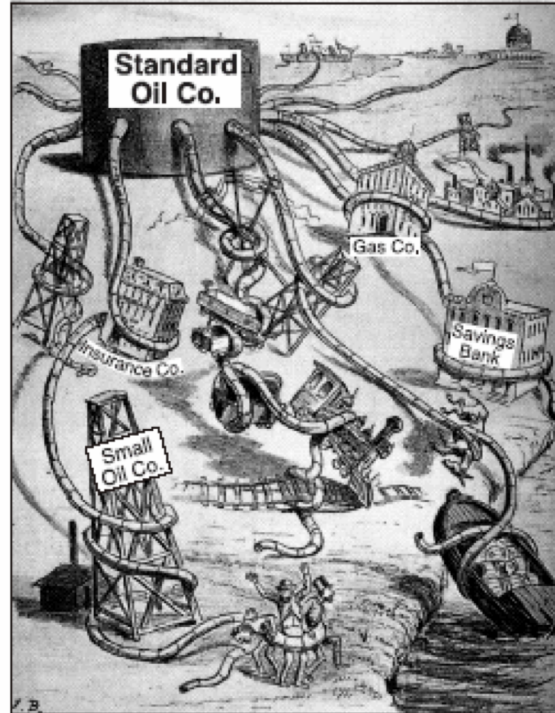
# CONSEQUENCES OF MAINTAINING A MONOPOLY

## SOCIETY WILL OBJECT DISPROPORTIONATE VALUE CREATION AND ENTANGLEMENT

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)



Source: Herman Viola, *Why We Remember: United States History*, Scott Foresman-Addison Wesley Publishing Co. (adapted)

### 8 Principles for Managing a Commons

1. Define clear **group boundaries**
2. **Rules** aligned with local needs
3. Users affected by the rules can **participate** in governance
4. **Rule-making** rights of community members are **respected** by outside authorities.
5. Develop a system, carried out by community members, for **monitoring** members' behavior.
6. Use graduated **sanctions** for rule violators.
7. Provide accessible, low-cost means for **dispute resolution**.
8. Build responsibility for **governing** the common resource in **nested tiers** from the lowest level up to the entire interconnected system

Elinor Ostrom, Nobel Prize Economic Sciences 2009

# MANAGING RISK AT DATA MARKETPLACE

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



### 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

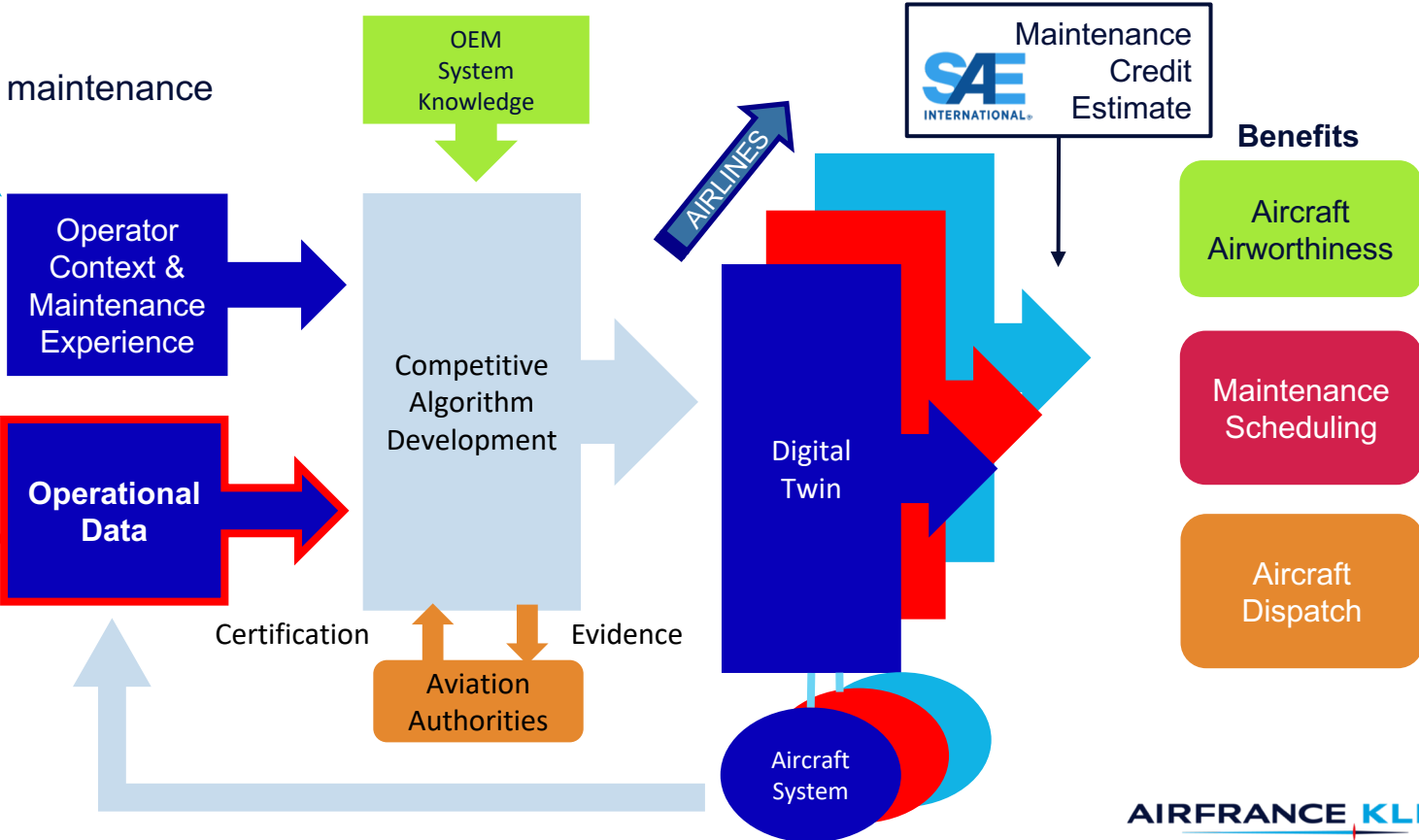
Research operationalization of **Digital Data Marketplace & Data Exchange** concepts

# EXAMPLE AIRCRAFT MAINTENANCE USE CASE

## DEVELOP A DIGITAL TWIN TO ESTIMATE MAINTENANCE CREDITS

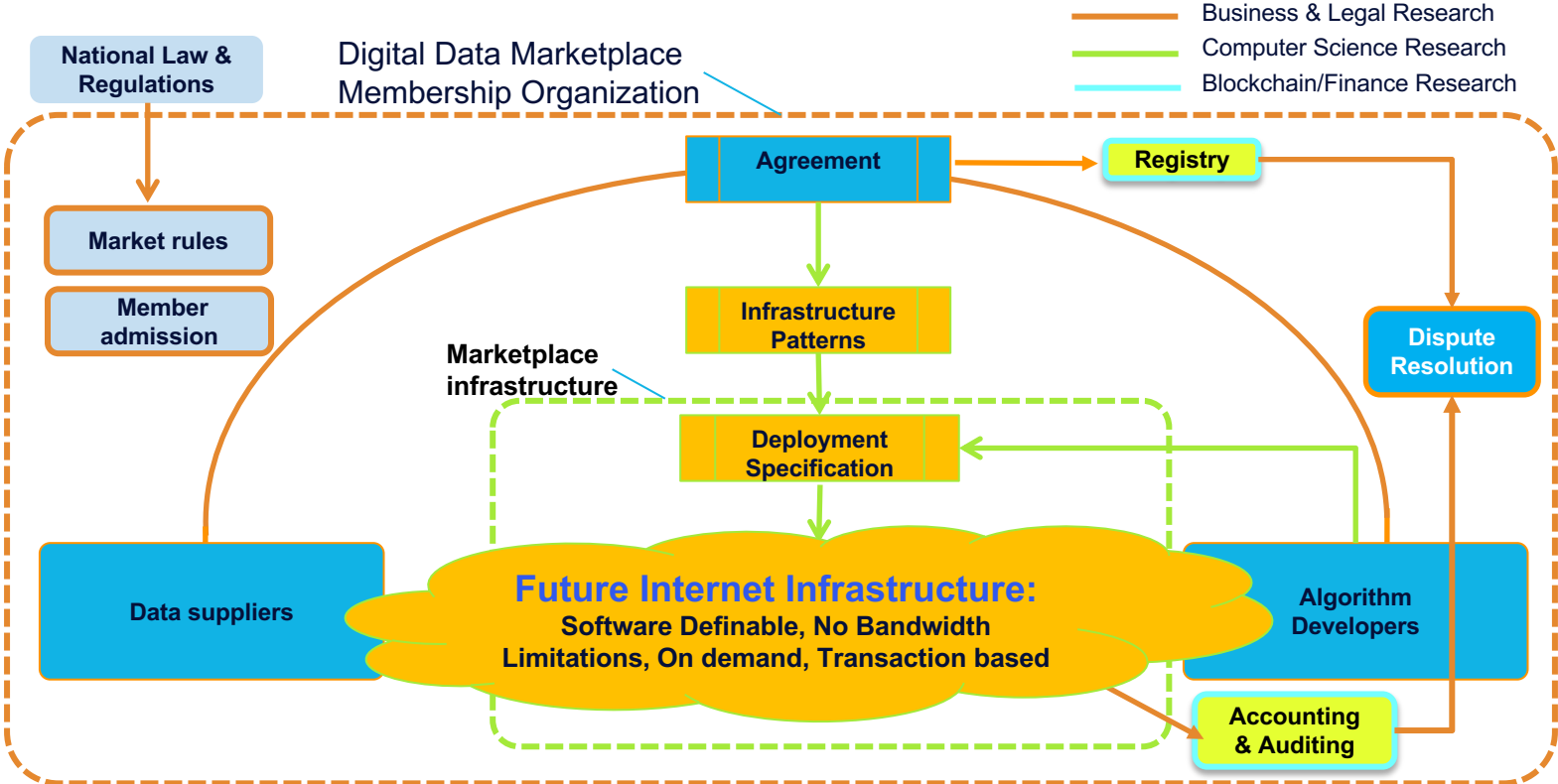
Competitiveness enabled by specific maintenance knowledge

**RESEARCH USE CASE:**  
How can Aircraft Health Monitoring data be shared amongst Airline Operators and Algorithm Developers in a fair and economic way, whilst providing adequate means to reduce risk allowing competition



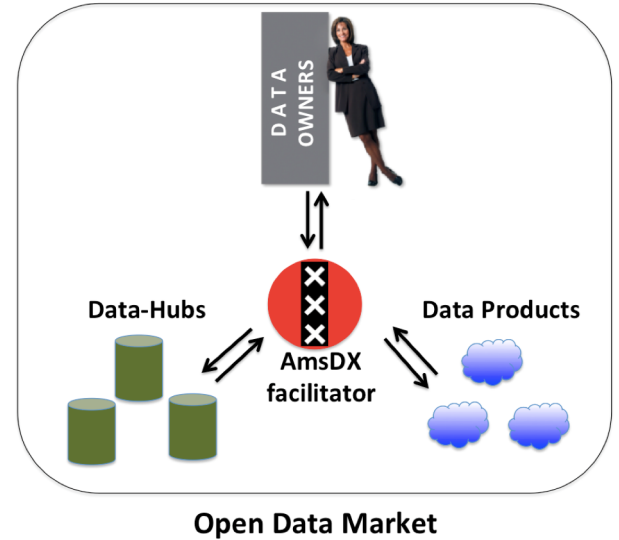
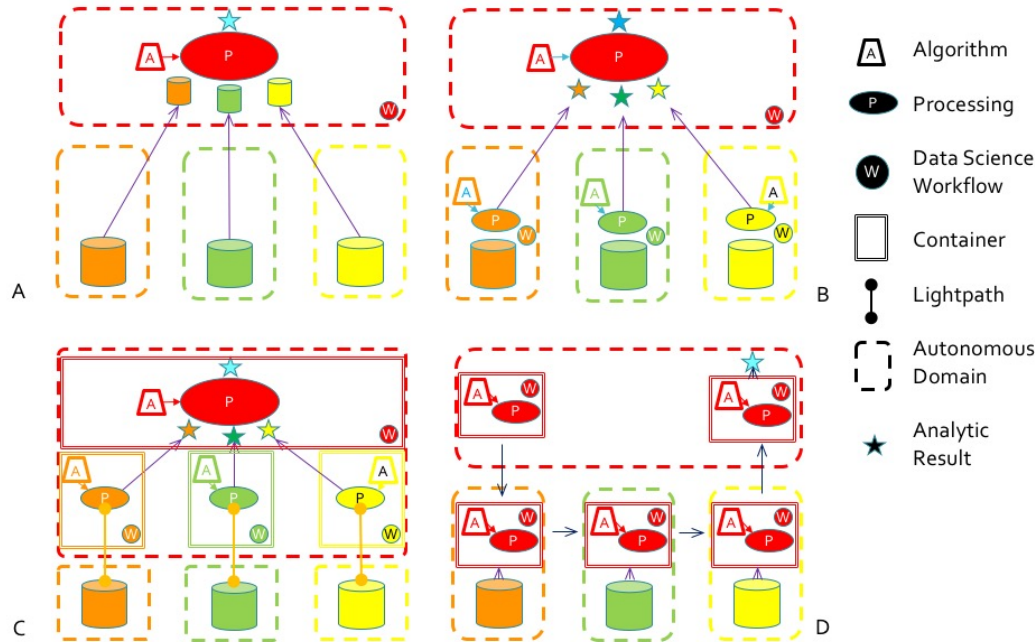
# DIGITAL DATA MARKETPLACE ARCHITECTURE

## ENABLING COMPETITIVE ALGORITHM DEVELOPMENT



# INFRASTRUCTURE PATTERN EXAMPLES

OFFERED BY A DATA EXCHANGE TO MARKETPLACES TO CHOOSE FROM

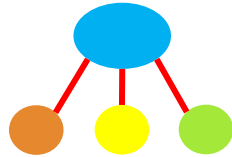


# RESEARCH INFRASTRUCTURE

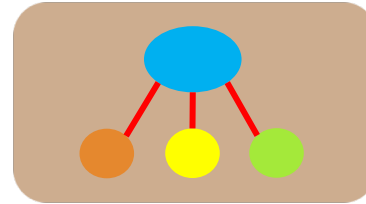
## RESEARCH WORKING ALONGSIDE IT INDUSTRY

### NETWORK RESEARCH INFRASTRUCTURES

Data Sharing Infrastructure Model  
Research using Future Internet capabilities



### COMMERCIAL DATACENTER INFRASTRUCTURE AS NEUTRAL GROUND

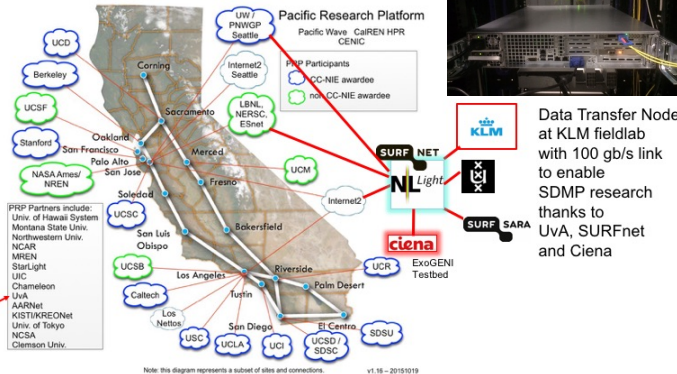


Goal: How to create a Digital Marketplace Ecosystem



prp.ucsd.edu

As foundation of the National Research Platform



Note: this diagram represents a subset of sites and connections. v1.10 - 2015/10/19



AM3 and AM4  
Datacenters  
Science Park  
Amsterdam  
SV10  
Datacenter  
Silicon Valley



# CONCLUSION

## A DIGITAL MARKET PLACE:

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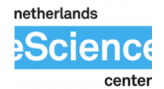
- **Is created and governed by an industry membership organization as a means to reduce risk.**
- **Serves a common benefit no single organization can achieve on its own.**
- **Connects data suppliers and algorithm developers via a software definable, membership organization owned, infrastructure.**
- **Arranges processing as 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



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