June, 2018

Logistics

A shipper’s perspective
Ericsson – global logistics Challenge

1 BUSD per annum on outbound freight and logistics

550,000 m³ of equipment shipped as 100,000 individual pieces

Equivalent to 28,000 TEU, enough to fill 6 Panamax carriers

Migrated from 20% to >80% sea freight in 6 years

Local supply chain network:
- More than 1400 warehouses
- More than 470 different Service Providers
Internally high visibility
Track & Trace in OWN IT systems in place

Ability to locate units to specific radio site and slot in racks.

Ability to trace components from a specific supplier batch.
Externally No visibility
Data Sharing Between Companies Not in place

Ericsson Air-freight reality

- Information traveling on paper at the same speed as the cargo
- Paper/document flow a major issue
- Actors not connected digitally - low visibility

Shipments from Sweden to Germany (1000 km) by air took as much time as biking (biking 8 hours a day)

The volume of paper shipped by Ericsson each year fills a 747 freighter
Core components of a solution:

- **Common shared data pool**
  - Information sharing between all actors
  - Automation of administration and manual work
  - Optimization of logistics across end to end chains
  - Participation within seconds, all actors
- **Real-time monitoring**
  - IoT device, data mgt for logistics
  - Integrated with common data share across the chain

Who benefits?

Consignees feels problem, Shippers pays and feels the pressure from the consignees, **all will benefit**

- Shippers/Senders
- Freight Forwarders
- Ports & Terminals
- Carriers
- Authorities
- Logistic Service Providers
- Consignee/Receiver

* Figures highlighted in the notes of this slide.
Digitization Logistics - Ericsson
In-bound Logistics to Radio Sites

Main Use Cases:
› Where are all the deliveries for my Base Station?
› When will they arrive?
› Can I deliver when I need it?
› Can I automate my handling events?
› Manage deviations, events, alarms, information etc.

• QR code - Unique Identifiers on all objects
• As URI – anyone can participate, get info.

Requirements on Airfreight
› Seamless digital multi-mode
  › Enables real-time monitoring
  › Supporting floating inventory
  › Paperless and adaptable while in transport
› Re-routing made easy
› Air-freight premium needs to have end-2-end gain

Show issues in user friendly way
Real-time Monitoring, linked to installation projects
Details documentation and other information
i.e. Information, pictures, report damages...
Using connected pallets
Knowing what is on each pallet
Proof of delivery through app – can be used by any partner
In order to prove business value and ensure 5G meets real industry requirements, Ericsson factories are fast-tracking the introduction of a new generation of smart manufacturing.

Developing and implementing the first 5G and Industrial IoT systems in a real manufacturing environment allows this new wave of tech enablers to reach maturity more rapidly.

The digital factory
More information

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IOT Logistics

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[http://www.ericsson.com/thinkingahead/innovation](http://www.ericsson.com/thinkingahead/innovation)
Think Data - Become Digital

June 19\textsuperscript{th}, 2018, IATA Aviation Data Symposium
Boris Hueske, Head of Digital Transformation
Digitalisation is...

data  connectivity  customer  speed  platform
Technology will transform the way we do air freight
From paper to data - eFreight is one pre-requisite to unleash digitalisation potential in airfreight
The resource data needs to be managed

central master data management

entreprise wide data glossary

data governance, lifecycle management
Exploitation of data drives value – software is a production factor.
APIs connect

Standards accelerate
Think Data – Become Digital!

1. Drive paperless transport. Sell online.
2. Value data. Generate value with software.
Artificial Intelligence program

IATA ADS Berlin June 19th 2018
314 destinations in more than 116 countries

80 595 people

552 aircrafts

2 000 Aircrafts (E&M)

25.8 Billions € in 2017

98.7 millions of passengers in 2017

200 Airlines are customers worldwide
AI program: an IT initiative
Lead by CIO Office and OR/DS dept

**Ambition**

- Reinforce AFKL value proposition by offering cognitive services to customers and employees
- Impact AFKL profitability substantially by optimizing processes and transform organizations

**Objectives**

- Create awareness on AI through use cases
- Coordinated different organization around similar initiatives
- Reinforce internal capabilities
Introduction to Repair

Remaining capacity after passengers is allocated to cargo

Sometimes, shipments cannot go in their associated flight: Repaired bookings

Multiple causes:
• Late shipment
• Cancelled flight, strike, ...
• Wrong overbooking
• Priority bookings or previous repairs

Repairs must then be reallocated to new flights: Time consuming task, no previously existing process

How to reallocate the repairs?
Introduction to Repair

Today:
- Analysts are doing it manually
- Time consuming (10-15% of their time)
- Not efficient (multiple application to dig into)
- Solution not optimal

Opportunities:
- Let analysts focus on added value tasks
- Time saving
- Good quality of solution
- Better quality of service
Reinforcement Learning

Reinforcement Learning allows machines and software agents to automatically determine the ideal behavior within a specific context, in order to maximize its performance.
Cargo Smart Repair

Historical data

First idea was to look at historical data to apply Machine Learning algorithms; but it was not usable regarding the disparity in the process
• We needed to explore a new domain : simulations

Simulations

• Create fictive flights
• Create fictive bookings/events
• Environment representation :
  • **State:** Booking configurations and available capacities of flights
  • **Actions:** Remove booking of the category volume and put it in a backlog
  • **Rewards:** Penalty corresponding to the removed booking category
Timeline & Results

Timeline

• First discussions in Oct 2017 to define the use case
• Historical data exploration in Nov-Dec 2017
• Modelisation and simulations 3 months Jan to March 2018
• Proposal in April 2018

Nexts steps

• More training, tuning of the model, modelisation
• Run a pilot this summer on selected flights
• Implement the solution to give an advise to analyst before the end of the year: real time data + integration
Connecting the air freight industry to increase its value proposition

Henk Mulder
Head, Digital Cargo

IATA Aviation Data Symposium & AI Lab
Berlin, 19-21 June
Internet of Logistics

International Air Transport Association

Henk Mulder, mulderh@iata.org
ONE Record :: ubiquitous data access

International Air Transport Association

Henk Mulder, mulderh@iata.org
ONE Record :: simplicity of the web

https://onerecord.anyserver.com/airline/123-1234567/awb
ONE Record :: power of the web

Add your Facebook Page URL
https://facebook.com/wix
### ONE Record :: data sharing standard

<table>
<thead>
<tr>
<th>Data standard: <strong>what</strong> we exchange</th>
<th>API standard: <strong>how</strong> we exchange</th>
<th>Trust Network: <strong>who</strong> can exchange</th>
</tr>
</thead>
<tbody>
<tr>
<td>In a global transport and logistics environment there can be no single common data standards; there are many. Using ontologies (digital dictionaries) we can automatically interpret and translate data between parties.</td>
<td>Web based data exchange is as old as the web (1991). Today the typical web API’s are RESTful and sophisticated token based security like OAuth is easily implemented.</td>
<td>Access to the Internet of Logistics will be managed through distributed trust networks that will be managed by accredited governance entities.</td>
</tr>
</tbody>
</table>

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International Air Transport Association

Henk Mulder, mulderh@iata.org
### Develop

IATA’s **ONE Record Task Force** is developing the ontologies (schema and vocabulary) and API standard as well as the governance and specification of trust networks.

First draft → end 2018

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### Test

In cooperation with the Digital Cargo Forum (DCF), we are testing the data sharing concept with ontologies and API’s in a real supply chain setting.

Test exchanges → live already

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### Implement

Building on the test environment, new parties are being added to the network and the functional scope is being expanded.

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**development, testing and implementation are done in parallel → speed is essential**
Connecting the air freight industry to increase its value proposition

Henk Mulder
Head, Digital Cargo

IATA Aviation Data Symposium & AI Lab
Berlin, 19-21 June
Digital Disruption of the Supply Chain
A digital transformation journey with Blockchain and IoT

Mario Louca – Executive Director
Industry & Global Blockchain Leader
IBM Global Travel & Transportation Industry
PIL, PSA, IBM Conclude Blockchain Trial from Chongqing to Singapore

Shipping company Pacific International Lines (PIL), port group PSA International (PSA) and technology company IBM Singapore (IBM) have completed a blockchain-based supply chain platform trial.

As informed, the companies worked on a proof of concept (POC) exercise, built on IBM Blockchain Platform, applying and then testing the platform to track and trace cargo movement from Chongqing to Singapore via the Southern Transport Corridor.

Dnata Taps IBM for Air Cargo Blockchain Pilot

Dnata, provider of air and travel services in the Middle East, has announced the completion of a proof of concept examining blockchain's potential in the Middle East cargo industry.
So, what are we disrupting?
Trade logistics is overly complex and fragmented

Operating Layer
End to end trade is facilitated by different data standards through the process of moving freight.

Operating Layer
- Prepare export shipments
- Transfer shipments to carrier domain
- Prepare freight for transport
- Shipments for flight, load and depart
- Distribute information
- Arrive shipment
- Handover freight to forwarder
- Arrive shipment at forwarder hub
- Transfer shipment to forwarder branch facility
- Load truck and produce run sheet
- Deliver, obtain POD & conclude cycle

Messaging Layer
- IATA CARGO-XML
- One Record
- UN/EDIFACT
- EDI ELECTRONIC DATA INTERCHANGE
Documentation process being carried out in air cargo is manual and overly complex.
Documentation process being carried out in air cargo is manual and overly complex

Although data standards and protocols exist, they are fragmented along the supply chain

- No single participant has full visibility into the shipment life cycle

Although some documents are digitized, from 30 to 200 documents are still been processed per shipment manually

- More error-prone
- Duplication of messages

Leading to more Invoice Disputes and High Transaction and Settlement Fees

- Dispute resolution for shipment delays and damaged or lost goods caused cargo losses of $55B in 2015

Resulting with an average end-to-end shipping of 6 days for air and much longer for container shipping
Our vision

To eliminate physical paper from the supply chain by digitizing end to end trade lanes, enabling the synchronous flows of physical good with associated documents and messages in real time.

Creating a single secure event driven and document exchange cloud-based platform supporting the global supply chain.
Our toolbox of assets

- Shipment Tracking & Monitoring
  At Piece Level
- Digitalizing Documents & Workflows
- Global Trade Digitization
  Container Shipping
- GHA SLA Management
- Multi Modal Platform
- Multi Data Standard Unification
- Dispute Resolution
- Customs Clearance
- Watson Trade Compliance
- Customs Declarations
IBM is working with a number of airlines, shippers, airports and logistics providers to leverage Blockchain & Watson AI

Tracking and monitoring shipments at piece level in real time – **Major Asian Airline**

- Track shipments of perishables from a supplier to the Consignee
- Utilizes QR code and temperature monitoring devices to log real time status through the shipment.
- Participants included Shipper, Freight Forwarder and the Consignee.

**Document digitalization across the supply chain**

- Digitizing documents for faster movement of shipments along trade lanes.
- Earlier pre-clearance of documents and goods and automating the works flows for improving border inspection clearance procedures.

**Improve Ground Handling SLAs and Claim Management – **Major European Airline**

- Digitizing key ground handling events including the capture of FSU messages in real time (as events)
- This allows for the analyse of the FSU message to track and monitor service levels.
- Smart contracts are now used to automate the dispute management workflow.

**Accelerating trade and removing barriers to trade in container shipping**

- Digitizing all events and documents for real time tracking, monitoring and automating workflows along trade lanes
- Sharing a single trusted view with all parties of events & associated documents
Utilizing Blockchain to track and monitor shipments at piece level in real time

The Business challenge
- Transportation of perishable goods need to be maintained within a specific temperature range for quality control purposes
- Tracking shipments along trade lanes is not sufficient, monitoring in real time is also essential

The Solution
- Use the Blockchain to track a shipment of perishables from a supplier to the Consignee (a restaurant chain)
- Utilize QR code and temperature monitoring devices to log QR code data and temperature data to the Blockchain in real time through the shipment life cycle
- Participants included, Shipper, Freight Forwarder, Consignee

The Participating Parties
- Shipper & Consignee
- The airline
- Freight Forwarder
Utilizing Blockchain to improve document sharing across the supply chain

The Business Problem

• Over 30 documents are still been processed per shipment manually
  ✓ More error-prone
  ✓ Impacting Customs Clearance with an average end-to-end shipping is 6 days

• Many of the data elements involved in the booking process and the shipment documentation are repeated

The Solution

• Build a blockchain solution for managing shipment documents and capturing critical events throughout the life cycle of a shipment

• Eliminate original paper forms and communicate with authorities digitally

• Automating the work flows for improving Lead time of procedures such as border inspection clearance

The Participants

• Shipper & Consignee
• The airline
• Freight Forwarder
• 3 x Customs Authorities
The paperwork and processes vital to global trade are also one of its biggest burdens. Maersk has digitized this costly paper trail by partnership with IBM.

Significantly reducing the cost of transportation while increasing clearance times.

Business problem
- Paper based processes add cost and complexity to trades in the end to end ecosystem of the Maersk business and customers. Large volumes of administration and documentation create billions of dollars in costs.

Solution
- IBM’s blockchain and Internet of Things technology is used to create a Global Trade Digitisation (GTD) solution providing transparency and to enable all relevant and approved parties in the supply chain access to the information they need and the ability to act on it.

https://www.youtube.com/watch?v=dcddYatMCGQ
The ecosystem will include the network members, clients, and offering providers

Provide and gain access to end-to-end supply chain information
- Ocean carriers
- Ports and terminals
- Government authorities
- Inland transportation
- 3rd party data providers

Offer value added services to the ecosystem through a platform marketplace

Primary consumers and beneficiaries of the platform
- Shippers (BCOs, retailers, manufacturers, etc.)
- Freight forwarders, customs brokers, 3PL
- Network Members
- Financial institutions

- Shipping Information Pipeline and Paperless Trade
- Offerings from third party ISVs
- Offerings from Network Members and Clients
Final use case - Unifying the data standards

One connection provides access to all trading partners regardless of data protocols, formats or standards.

A platform to solve the pain points in the supply chain
Thank you!
BLOCKCHAIN
Nicolas Kozakiewicz
BLOCKCHAIN is the NEW MULTI-MARKET TRUST-ACEABLE PROTOCOL FOR END 2 END DIGITAL SERVICES
EXAMPLE: BITCOIN

Authentication of all « »
Trace of all
Immutability of information
TRACEABILITY IN MANUFACTURING
ORIGIN: RETURN OF EXPERIENCE

CONSUMER FACING TRACEABILITY CLAIM

DIGITAL PROOF-BASED TRUST – BLOCKCHAIN TECHNOLOGY
Market needs

- Trust
- Transparency
- Information
- Supply chain
- Value
- Control
- Real time follow-up
Our value proposition

Scan me to know my story

The first food traceability label that provides consumers with proofs of product history
An history carried by the product itself

Blockchain recreates the digital copy of the physical path taken by a product

Producer
Processor
Retailer
Consumer

Physical path
What the solution does bring

For consumer

Knowledge

Proofs

Trust
What the solution does bring

For blockchain participants

- No double data entry
- Visibility
- Confidentiality
- Security
- Audit & control
Pay-per-use model

1. **Production**
2. **Transport**
3. **Processing**
4. **Retail**

- **Consortium Governance**
- **Business rules**
- **Technological Backbone**

Transaction fee

**Information**

powered by **Worldline**
Blockchain solution: Let’s go into the detail
Technological choice: Worldline

**DESIGN**
- Use case specification close to the customer
- Blockchain sourcing choice
- Governance formalization

**DEVELOPMENT**
- Blockchain set-up (& customization if needed)
- Legacy IT development: GUI, gateway, .. & blockchain API
- Test & iterative validation

**OPERATING**
- Cloud infrastructure hosting & document storage
- Processing
- Maintenance & evolution
- Governance
Technological choice: MoBlo

Go through the 4 categories, ask an expert if required

Population map
- Simple Node
- Main Node
- Origin Node
- Admin
- Activator

Architectural elements
- BlockChain
- Software on device
- External Services
- Link between software and concerning node

Unit definition
- Closed Asset
- Opened Asset

Transactions
- \(\text{A} \rightarrow \#b\{ A_{1} \{ d_{1} \} \} \rightarrow \text{B} \)
- \(\text{A} \rightarrow \#t_{2}\{ 10A_{1} + 6A_{2} \} \rightarrow \text{C} \)
Technological choice: Multichain blockchain

Robustness
Private blockchain - bitcoin fork

Trust
Fine-grained management of access rights and enrolment - Pseudoanonymization

Integrity
Proof Of Work – mining done by various actors
Multi-sector solution: Only one blockchain for any usage
Fine-grained management of data confidentiality

**Open**
Data accessible to *every participant and consumer.*

**Restricted**
Data accessible only to the participant that wrote it.

**Controlled**
Data accessible to a group of participants.

**Homomorphic**
Possible controls on encrypted values.
Transshipment user has access to several data from fisher:

- Fishing area
- Fishing date
- Quantity and species
End consumers can scan a product and get access to its full history:

- Provenance (one or more fishing)
- Fishing area
- Transformation location
THE INTERNET OF THINGS

Sources: IDC, MC/EDC: The Digital Universe of Opportunities, Goldman Sachs, IMS Research

50 Billion Devices
212 Billion Sensors

THINGS

NETWORK SERVERS

CLOUD

In the past 10 years...

Cost of Sensors 2X ↓
Cost of Bandwidth 40X ↓
Cost of Processing 60X ↓

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Device Agnostic Approach
Leading Innovation

Youtube – Honeywell Cargo Signal

Honeywell
Sensor-Based Logistics Platform

Market-leading Sensors

Real-Time Data
- Location
- Temperature
- Humidity
- Shock
- Tilt
- Light

Cargo

Smartphone

Fleet

CARGOSIGNAL™

Layers
- Traffic
- Weather

Intelligence
- Risk Zones
- Disruptions

Business Rules and Experienced Judgment

Innovative Service Offerings

Visibility

Quality

Security

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Visibility
 Harness the power of IoT achieving new levels of speed and accuracy

Quality
 Analyze and act upon sensor data with location to improve processes

Security
 Protect your brand and gain global control of your cargo
Sensor Readings and Location Combined
Case Study 1

Active Temperature Monitoring

1. $150,000 USD of Controlled Substances (Narcotics)
2. Shipping from Barcelona, Spain to Chicago, Illinois
3. Temperature Controlled 15-25°C
Active Temperature Monitoring

We spoke with [airline A] and they said they are in the process of breaking down the plane. They know the temperature requirements and assured us it will be stored in a cool area within the range provided.

We will keep a close eye on the temperature to ensure the requirements are met.
Active Temperature Monitoring

Shipment Status Notification

<table>
<thead>
<tr>
<th>Shipment</th>
<th>4470082394</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Stationary</td>
</tr>
<tr>
<td>Location</td>
<td>ORD</td>
</tr>
<tr>
<td>Temperature</td>
<td>14.6C (Range +15/+25 Degrees Celsius)</td>
</tr>
</tbody>
</table>

They are going to move to different area as soon as possible. We are actively monitoring the temp, and will give them a call if we do not see corrective action being taken.

Spoke with [airline A], and they said it is in an area that is being cooled to 2-8C, I let them know that is unacceptable and the MAWB clearly states 15-25.
**Active Temperature Monitoring**

**Shipment Status Notification**

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</tr>
<tr>
<td>Temperature</td>
<td>20.8 C (Range +15/+25 Degrees Celsius)</td>
</tr>
</tbody>
</table>

The shipment has been secured in [airline A] temperature controlled area. We have confirmed the readings are back within range.

This is on USDA hold.

Battery is at 73%, so we should be good for at least 5 additional days.
Case Study 2

Valuable Semi-Conductor Prototype

1. High value, time sensitive – next day delivery
2. Critical element to the success of electronics manufacturer’s project
3. Shipping from Taipei, Taiwan to US
4. On-site engineers ready to receive shipment
Our Command Center confirmed that the shipment arrived successfully at the Taipei airport and was waiting to be loaded onto the aircraft.
After confirming flight take-off, our team noted that the sensor on the cargo was still actively reporting its current location on the tarmac at TPE airport.

The branch contacted the airline which confirmed not once, but twice, that the cargo was aboard the scheduled flight.
AVOIDING FLIGHT DELAY

The Command Center and branch teams persisted, and in the third conversation, presented with a precise screenshot of the sensor’s current reporting location, the airline confirmed that it had failed to load the shipment onto the flight.
Fortunately, the airline was able to re-load it onto the very next direct flight and arrival was delayed by only a few short hours.
The “Noise” In Today’s Supply Chain

ASSUMING:

- System integration between all parties
- Sub-contracted carriers understand requirements
- Driver provides accurate updates
- Cargo placed on correct conveyance
- Cargo stays with driver

YOUR LOCATION UPDATE

NOISY SIGNAL

NOISE

CLEAR SIGNAL

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Enabling Real Time Decisions
Challenges & Considerations

- **Airline Compliance**
  - Airline approval process
  - DG rules on lithium batteries

- **Customs Compliance**
  - Different countries = different rules.....

- **Meticulous T&I set up required**
  - Loading / managing / returning the tracking device
  - Routing plans
  - Business rules: permitted temperature excursions, shock limits etc
Challenges & Considerations

• Integration with all supply chain partners
  ✓ Need to know who will touch the freight
  ✓ Subcontractor selection and management
  ✓ 24/7 contact information eg, driver details

• Reaction speed
  ✓ Ability to predict issues before they happen
  ✓ Immediate responses required from stakeholders
  ✓ No time to investigate who to contact!
Innovative sensor-based logistics across a customer’s supply chain

Digital services powered through the Company’s proprietary, cloud based operating system

Enhanced shipment visibility, integrity and security

All services offered whether Expeditors is the carrier or not

Lease hardware with software or on per shipment basis