The DHL Approach to Customer Centric Innovation
INNOVATION & THE FUTURE OF LOGISTICS

Dr. Markus Kückelhaus
September, 2019
... AND SO ARE OUR SUPPLY CHAINS

Source: CB Insights 2018
THE DIGITAL OPPORTUNITY IS HUGE...

TECHNOLOGY
- 40% Of all data generated by 2020 will come from connected sensor
  (Frost & Sullivan)

VALUE
- $1.7 Trillion Worldwide IoT Market by 2020
  (IDC)

OPPORTUNITY
- 25% Reduction in maintenance costs through IoT
  (U.S. Department of Energy)
- 25 Billion Connected ‘Things’ will be used in 2020
  (Gartner)
- $10-$15 Trillion Added to the global GDP by the ‘Industrial Internet’ market within the next 20 years
  (GE)
- Savings of $90 Billion Generated by connected industrial machinery to make oil & gas exploration 1% more efficient
  (GE)

Innovation & the Future of Logistics | Istanbul | October 2019
...BUT WHAT ABOUT SUPPLY CHAINS?

The biggest future impact on revenue and EBIT growth is set to occur through the digitization of Supply Chains.

Adoption of e-AWB (Electronic Air Waybill) 46%

Share of manually operated warehouses 80%

Transportation and logistics companies with no digital strategy 25%

→ Through digitization of Supply Chains
HOW WE IDENTIFY TRENDS AND DIGITAL OPPORTUNITIES?

Four Sources Of Inspiration For Our Logistics Trend Radar

- Megatrends
- Customers
- Microtrends & Startups
- Industry Experts & Research Partners
NEW TRENDS – SMART CONTAINERIZATION
NEW TRENDS – SERVITIZATION
NEW TRENDS – NEXT-GENERATION WIRELESS
NEW TRENDS – VIRTUAL REALITY & DIGITAL TWINS

DHL

Innovation & the Future of Logistics | Istanbul | October 2019

11
EXPLORING TRENDS – ROBOTICS & AUTOMATION

2018/19

RELEVANT IN < 5 YEARS

ROBOTICS & AUTOMATION

RELEVANT IN > 5 YEARS

HIGH

LOW

Technology Trends

HIGH: Creates new (potentially disruptive) ways of doing business
LOW: Provides incremental improvement opportunities

Logistics Marketplaces
Energy Logistics
Supply Chain
Omnichannel Logistics
Life
Productivity
Self-driving Vehicles
Artificial Intelligence
Internet of Things
Cloud Logistics
Big Data Analytics
Augmented Reality
Low-cost Sensor Solutions
3D Printing
Unmanned Aerial Vehicles
Blockchain
Next-generation Wireless
Bionic Enhancement
Virtual Reality & Digital Twins

DHL

Innovation & the Future of Logistics | Istanbul | October 2019
NEAR FUTURE – EXAMPLES IN LOGISTICS

- Autonomous Cleaning
- Autonomous Identification
- Follow me Robots
- Task to Person Robots
- Collaborative Picking Robots
- Mobile Piece Picking
NEW ACCELERATOR – INTERNET OF THINGS
NEW DATA-DRIVEN SERVICES

Evolution of IoT Technologies

- New data-driven services
- Semi-active Sensors
- Real-time Solutions
- Sensor-Network

IoT Solutions @ DPDHL
- DHL Ocean Thermomet: GSM
- Agheera GPS Solar: GSM
- DHL Air Thermomet: NFC/RFID
- Pharma Express: NFC/RFID
- DHL-MyID: RFID
FROM 2G TO 3G TO FUTURE SENSOR NETWORKS

- Tampering
- Shock
- Pressure
- Rechargeable Battery
- Motion
- GPS/UMTS/HSPA
- Temperature
- Humidity
- Light
- Airplane mode
- Real-time location

Humidity
Light
Temperature
Airplane mode
Real-time location

Innovation & the Future of Logistics | Istanbul | October 2019
USE CASE: SHOCK MONITORING FOR AUTOMOTIVE PARTS

General Information
- Use Case: Shock Monitoring for Automotive Parts
- Objective: Detect Shock Hotspots
- Technologies: Smart Sensor

Details
- Objectives: Shock Monitoring to avoid deformations and damages, reducing shock impact on rack
- Notifications/alerts: Waypoints, Shock thresholds
- Special features: Identification of critical shock hotspots
# PROMISING

## LOW-POWER-WIDE-AREA-NETWORKS

### Overview

<table>
<thead>
<tr>
<th>Energy Efficiency</th>
<th>Cost-Efficiency</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>$$$</td>
<td>GPS</td>
</tr>
<tr>
<td>Medium</td>
<td>$$</td>
<td>WiFi</td>
</tr>
<tr>
<td>High</td>
<td>$</td>
<td>LP-WAN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NB-IoT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LoRa</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NB-IoT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bluetooth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RFID</td>
</tr>
</tbody>
</table>

### Availability

- **Sigfox**
  - Industrialized nations
  - and (Air)Ports

- **LORA**
  - Industrialized and emerging markets

- **NB-IoT**
  - Europe, China and South Africa

- **2G/3G/LTE/4G**
  - Global

1) Standard for local and metropolitan area networks
USE CASE: SMART BUILDING AND TEMPERATURE MONITORING

General Information
• Location: DHL Asia Pacific Innovation Center, Singapore
• Use case: Warehouse Temperature

Objectives
• Reporting intervals of 10min; Battery lifetime of 1-1.5 years
• Live heatmap with configurable temperature scale as well as automated alerts

Particularities
• Reduced manual workload in monitoring indoor conditions
• Automated storage of indoor conditions data for future investigations
USE CASE: ASSET TRACKING FOR ROLLERCAGES

General Information
- Use Case: Low Cost Asset Tracking for Rollercages in Europe
- Objective: Get visibility of assets europewide
- Technologies: Sigfox

Details
- TBM property of DHL, but in continuous exchange (internal and external)
- High cost due to loss of roller cages
- Flow visualization and resource tracking
- Improvement of relocation and utilization rates
NEW TRENDS – BLOCKCHAIN
WHY IS BLOCKCHAIN BEING DISCUSSED IN THE LOGISTICS INDUSTRY?

- **Industry fragmentation** is driving low levels of supply chain transparency, unstandardized processes that today are often very manual (e.g. paper-based documentation for import/export), data silos and diverse levels of technology adoption.

- In the US alone, there are over 500,000 individual trucking companies demonstrating the potential value blockchain can bring to connect and streamline the logistics industry.
USE CASE: ENHANCING PARTS VISIBILITY FOR CAR DEALERS

Challenge
• Fragmentation in IT systems language/translation across different partners leads to lack of end to end visibility in order status for the dealers. Dealers have no one place to track status of all their orders.

Objectives
• To bring OEM system, PDC, DHL and AU dealers on a private blockchain platform
• Include business logic on matching data to eliminate all manual reconciliations (smart contract)
• Seamlessly integrate exiting systems with blockchain without introducing new identifiers/app
• Provide a mobile app for dealers to have full visibility
NEW FOCUS TOPIC – ARTIFICIAL INTELLIGENCE

Robotics & Automation

Technology Trends

HIGH

Self-driving Vehicles
AI

HIGH

Supergird Logistics

Artificial Intelligence

Low: Provides incremental improvement opportunities

Medium: Has emerging trends and opportunities

High: Creates new (potentially disruptive) ways of doing business

RELEVANT IN < 5 YEARS

Grey Power Logistics
Tube Logistics

RELEVANT IN > 5 YEARS

Blockchain
Next-generation Wireless

2018/19

Innovation & the Future of Logistics | Istanbul | October 2019
PREDICTING, SENSING, AUTONOMOUS LOGISTICS

**Prediction**
- Global Trade Flows
- Route Optimization
- Maintenance

Enable predictive, self-learning networks

**Sensing**
- Dimensioning
- Identification
- Inspection

See and understand the world in new ways

**Autonomous Transport**
- Autonomous Robots
- Line-Haul Platooning
- Last-Mile Delivery

Improve operational efficiency & safety

Innovation & the Future of Logistics | Istanbul | October 2019
AI IN LOGISTICS: PREDICTIVE LOGISTICS

DHL Global Trade Barometer

DGF Air Freight Delay Prediction

Predictive Maintenance

DHL Global Trade Barometer – World 2013 - present

January 2018 index: predicting Jan’18 - Mar’18 trade development

Shaded area indicates -5% to 5% trade growth

Innovation & the Future of Logistics | Istanbul | October 2019
AI IN LOGISTICS:
SEEING, SPEAKING, & THINKING

Conversational WMS

Vision-Based Sorting

Visual Quality Control
**AI IN LOGISTICS: AUTONOMOUS LOGISTICS**

**Yard Logistics**
AGV’s on the rise

**Line-Haul**
Truck Platooning & driver assistance

**Last Mile**
from follow-me to full autonomy
EXPLORING TRENDS – UNMANNED AERIAL VEHICLES
USE CASE:
INVENTORY & CYCLE COUNTING
USE CASE:
DRONES FOR SURVEILLANCE IN MEXICO

RESILIENCE
USE CASE:
DRONES FOR URGENT DOCUMENT DELIVERY
INNOVATION APPROACH

ALL OUR TREND REPORTS ARE AVAILABLE FOR DOWNLOAD: WWW.DHL.COM/INNOVATION
We are looking forward to welcoming you

DHL Europe Innovation Center
Junkersring 55
53844 Troisdorf-Spich
Germany
eMail: innovationcenter@dhl.com
Phone: +49 (0)2241 1203 490

DHL Asia Pacific Innovation Center
No. 150 Beach Rd
Singapore 189720
Singapore
eMail: apic@dhl.com

DHL Americas Innovation Center
Chicago, USA
Opens in Q3 2019
eMail: amic@dhl.com
INNOVATION CENTER 360 GIVES YOU A FIRST IMPRESSION
SHAPING TOMORROW
TOGETHER TODAY