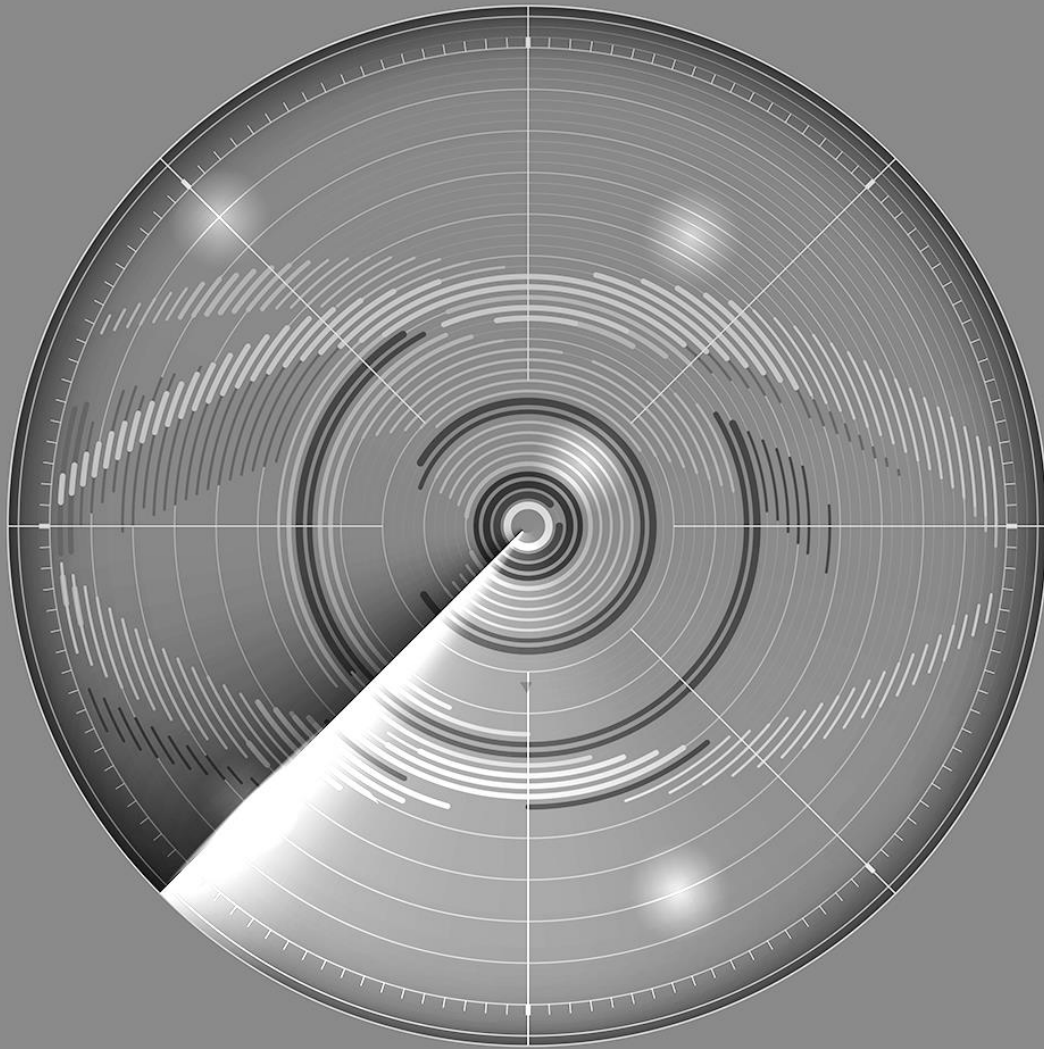


MARKUS KÜCKELHAUS

- Vice President Innovation & Trend research
- DHL Customer solutions & Innovation

The DHL Approach to Customer Centric Innovation





Powered by
DHL Trend Research

INNOVATION & THE FUTURE OF LOGISTICS

Dr. Markus Kückelhaus
September, 2019



... AND SO ARE OUR **SUPPLY CHAINS**

Digital Freight Shipping



Sensors & Asset Tagging



Inventory Management



Blockchain



Food Supply Chain



Supply Chain & Logistics Analytics



Trucking Marketplace & Fleet Management



Warehousing



Enterprise Resource Planning



E-Commerce Logistics



Autonomous Trucking



Last-Mile AV & Drones



Last-Mile Delivery Services



Source: CB Insights 2018



THE DIGITAL **OPPORTUNITY** IS HUGE...

TECHNOLOGY



40%

Of all data generated
by **2020** will come from
connected sensor

Frost & Sullivan

**25
Billion**

Connected ,Things‘
will be used in **2020**

Gartner

VALUE



**\$1.7
Trillion**

**Worldwide
IoT Market**
by **2020**

IDC

**\$10-
\$15
Trillion**

Added to the global GDP
by the **,Industrial
Internet‘** market within
the next **20** years

GE

OPPORTUNITY



**25%
Reduction**

in **maintenance
costs** through IoT

U.S. Department of Energy

**Savings of
\$90
Billion**

Generated by **connected
industrial machinery** to
make oil & gas
exploration **1%**
more efficient

GE

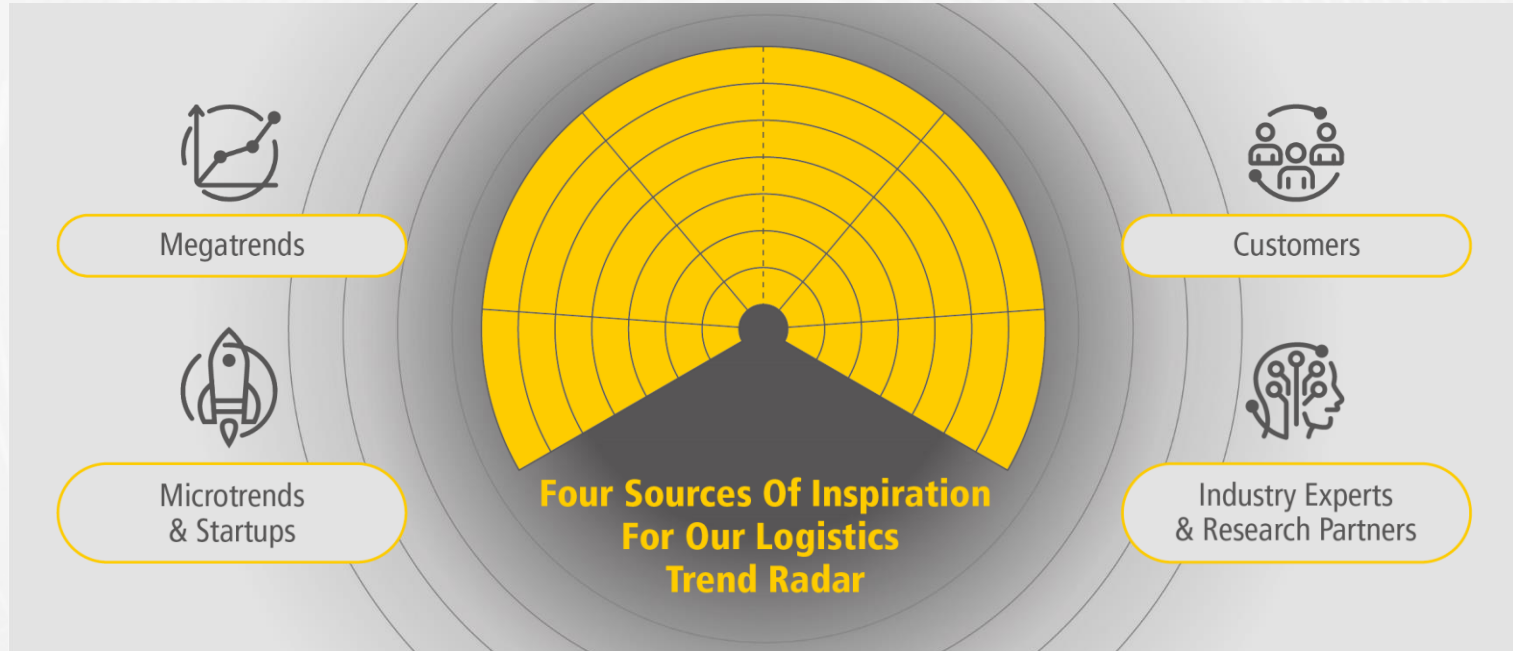
...BUT WHAT ABOUT **SUPPLY CHAINS?**

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

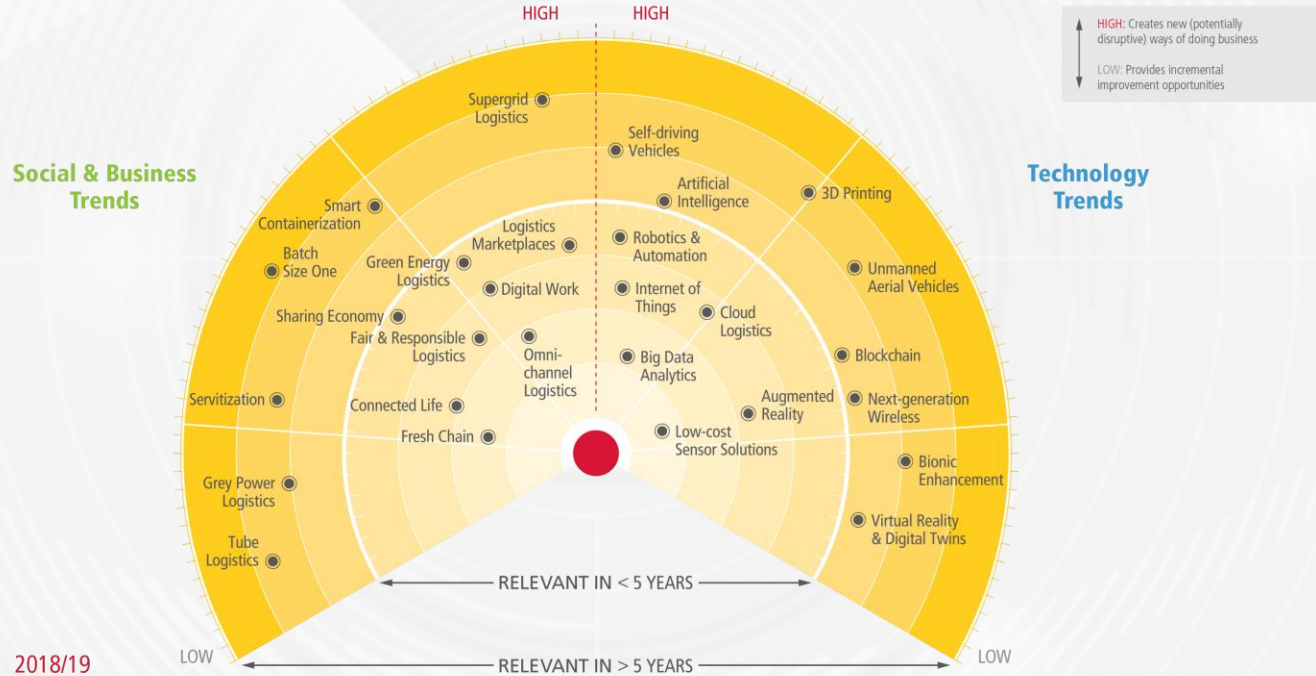
McKinsey



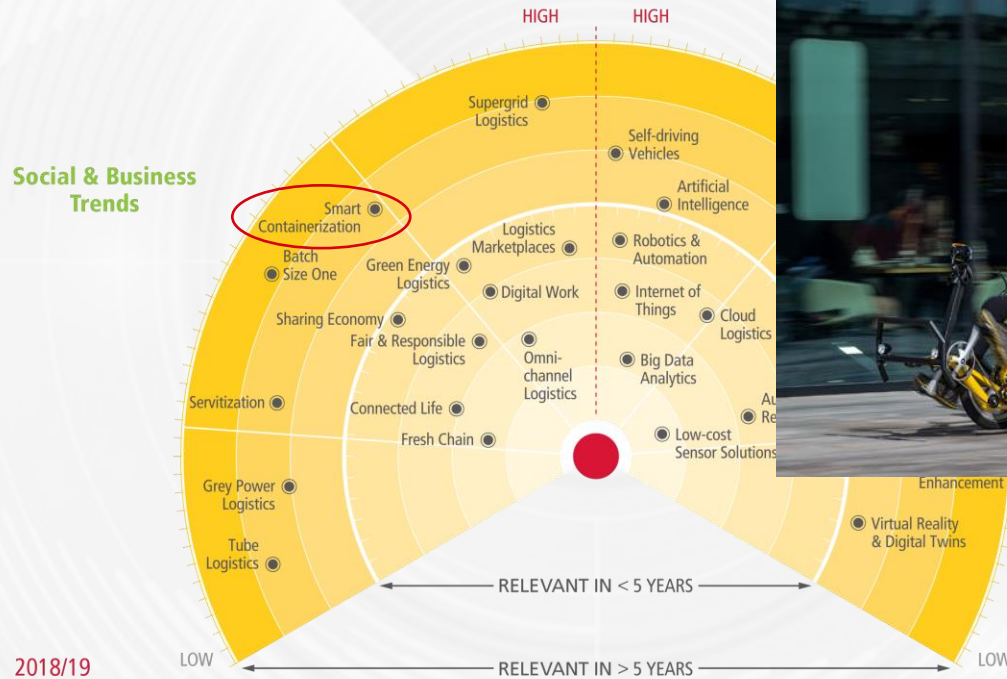
HOW WE IDENTIFY TRENDS AND DIGITAL OPPORTUNITIES?



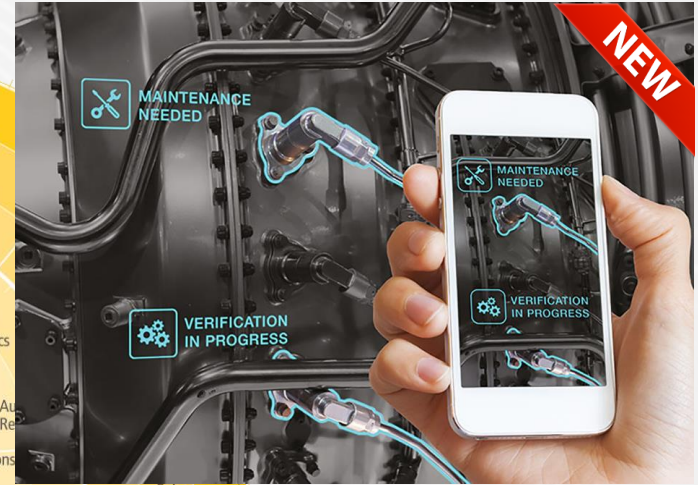
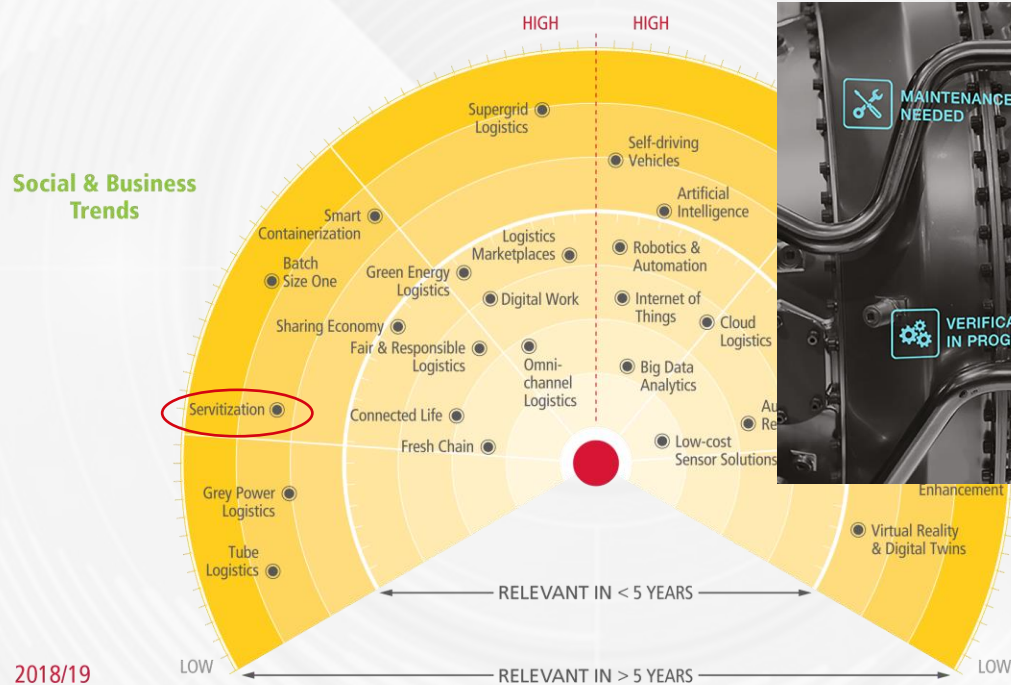
THE DHL LOGISTICS TREND RADAR 4.0



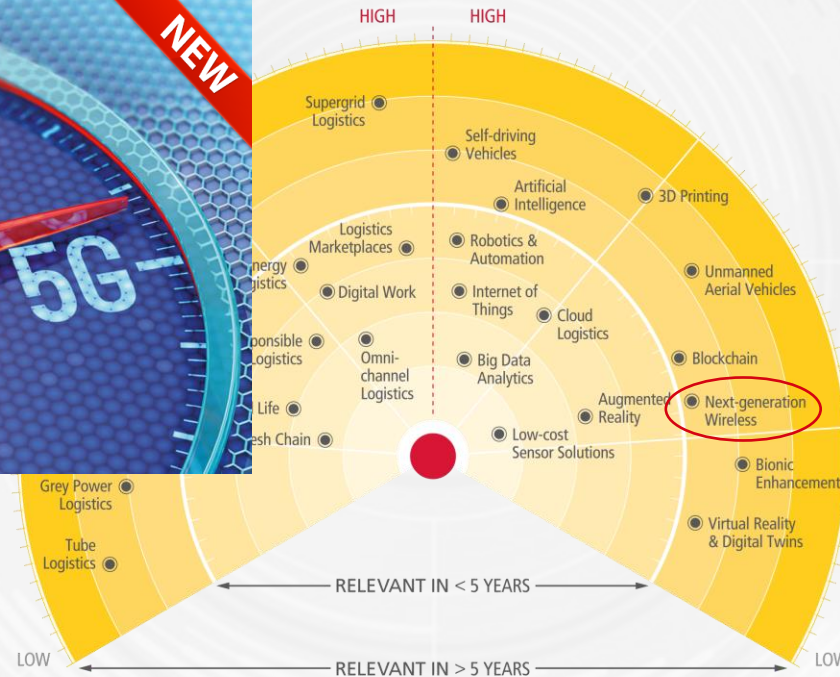
NEW TRENDS – SMART CONTAINERIZATION

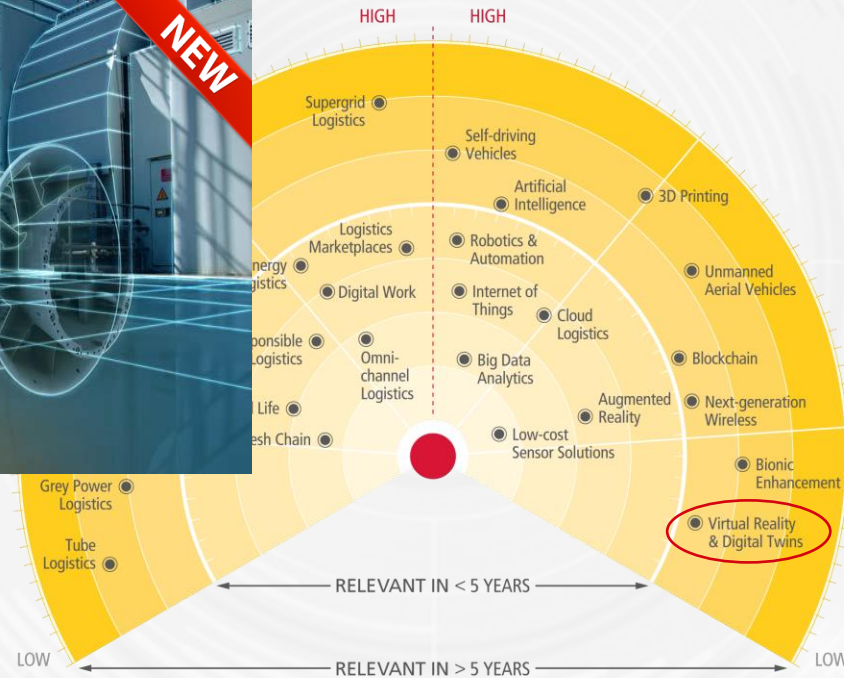


NEW TRENDS – SERVITIZATION



NEW TRENDS – NEXT-GENERATION WIRELESS





INNOVATION VALUE CHAIN

1

Trend Radar



2

Trend Report



3

Innovation Center Exhibit



4

Proof of Concept



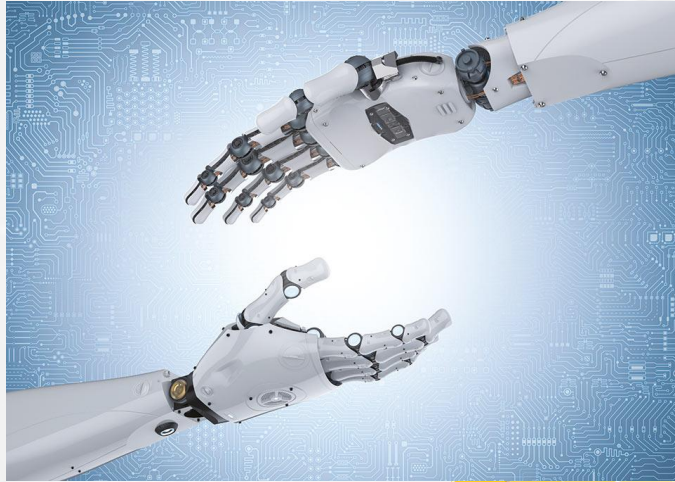
Commercialization



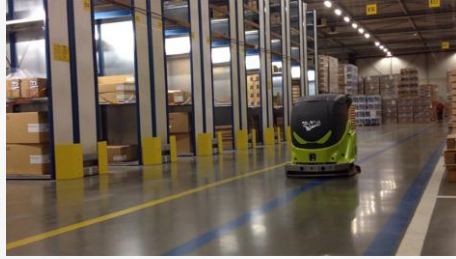
Initiate Global Accelerators



EXPLORING TRENDS – ROBOTICS & AUTOMATION



NEAR FUTURE – EXAMPLES IN LOGISTICS



Autonomous Cleaning



Autonomous Identification



Follow me Robots



Task to Person Robots

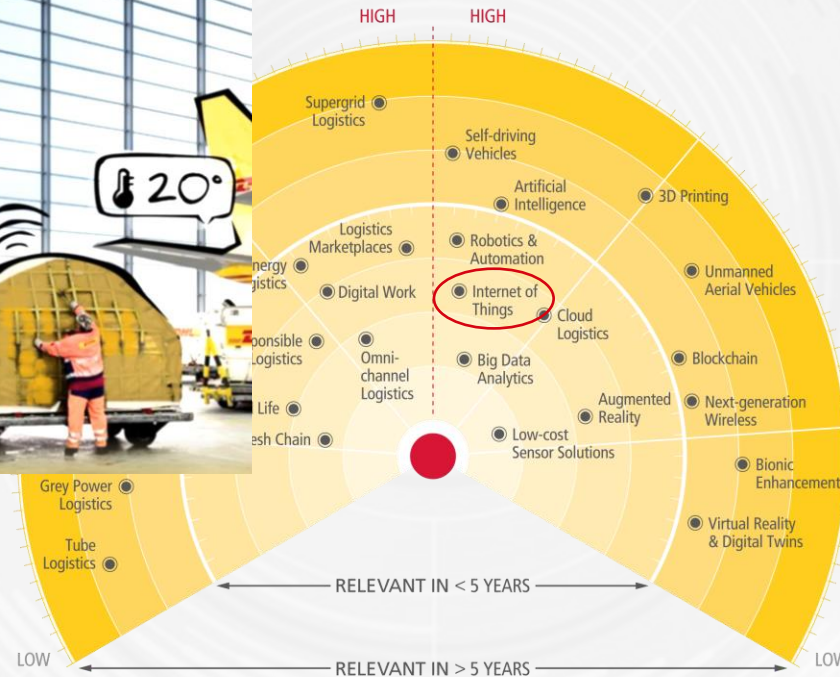


Collaborative Picking Robots



Mobile Piece Picking

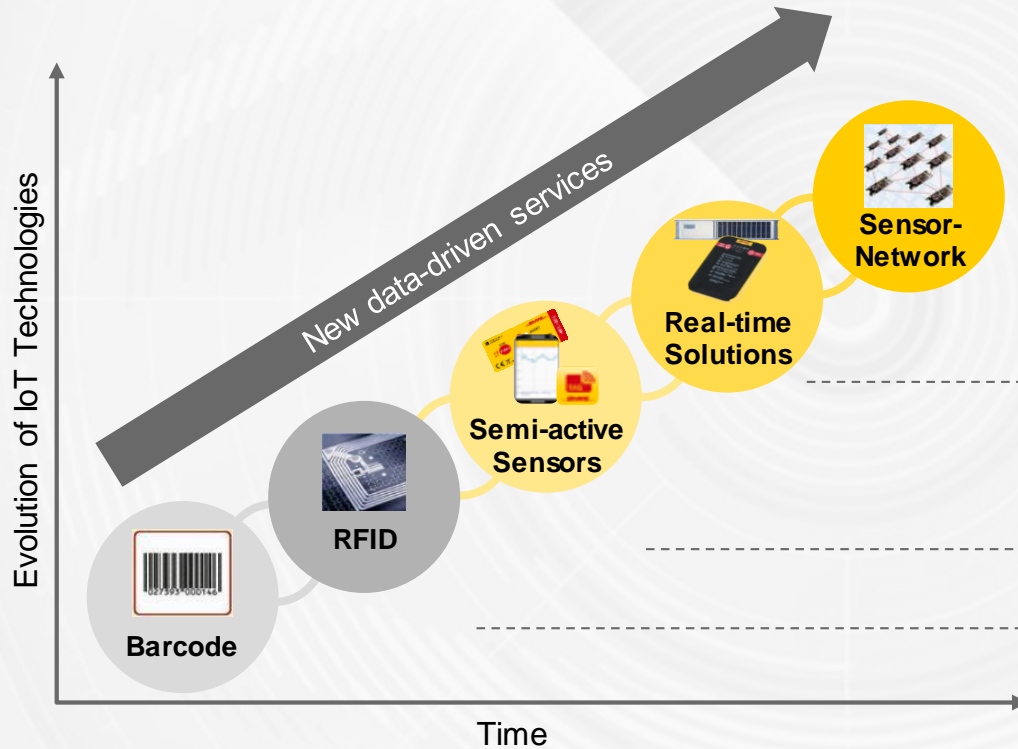
NEW ACCELERATOR – INTERNET OF THINGS



Technology Trends

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

NEW DATA-DRIVEN SERVICES



IoT Solutions @ DPDHL

- DHL Ocean Thermonet: GSM
- Agheera GPS Solar: GSM
- DHL Air Thermonet: NFC/RFID
- Pharma Express: NFC/RFID
- DHL-MyiD: RFID

FROM 2G TO 3G TO FUTURE SENSOR NETWORKS



USE CASE: SHOCK MONITORING FOR AUTOMOTIVE PARTS



General Information

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



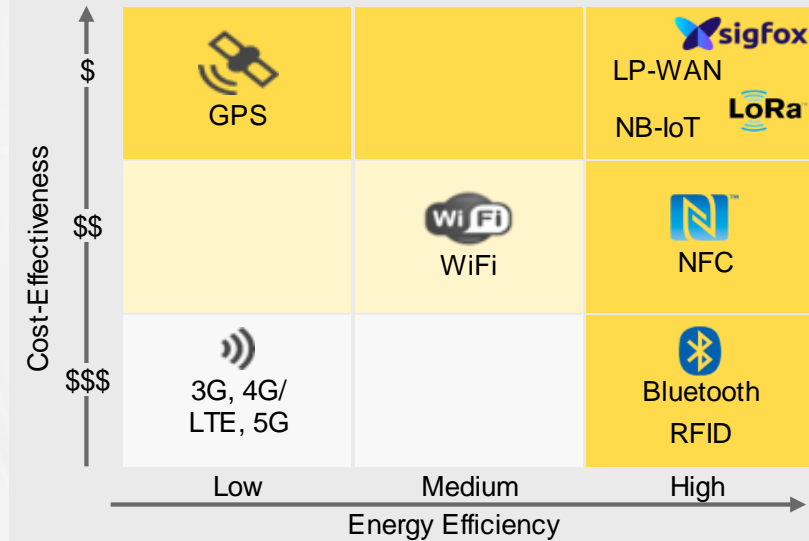
Details

- 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



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**



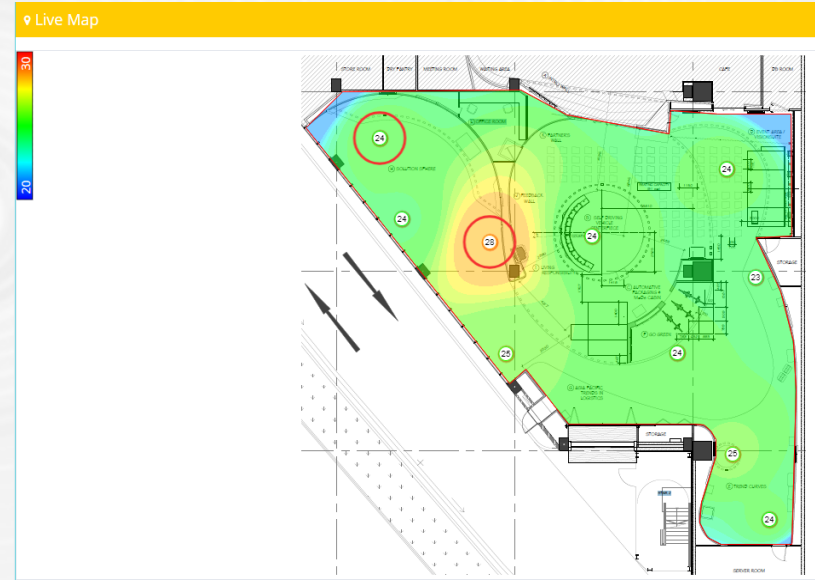
Objectives

- 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**

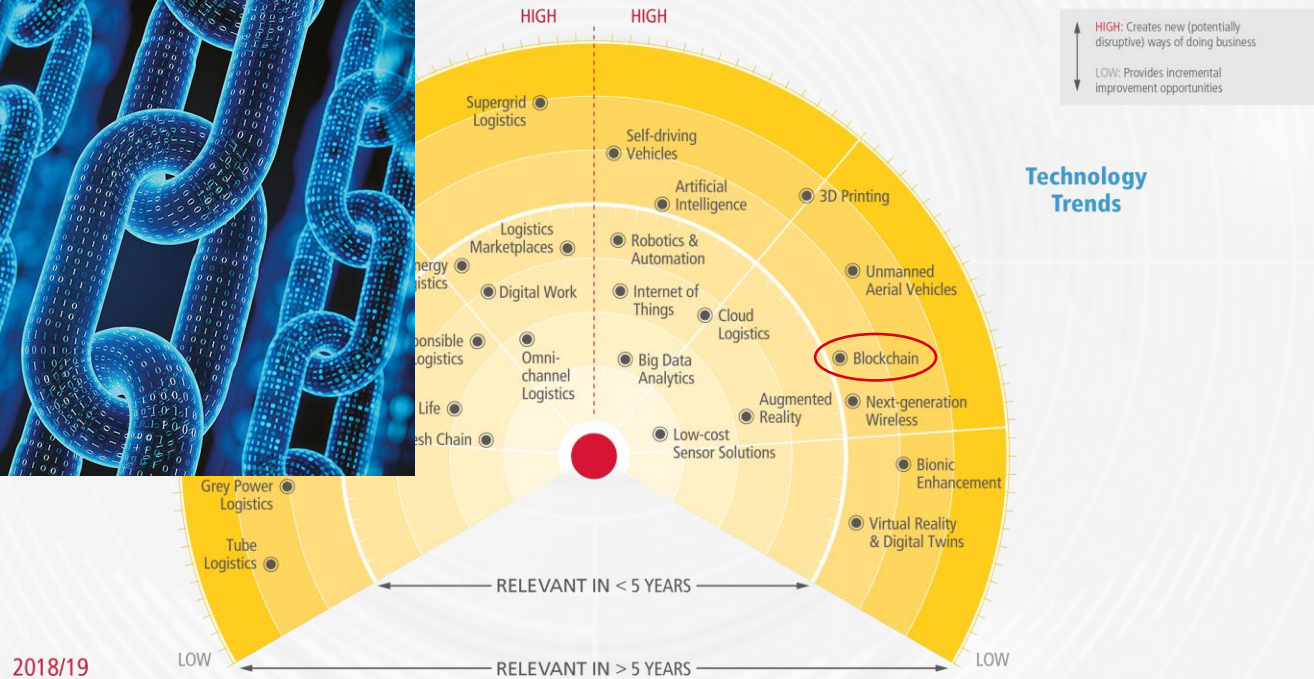


Details

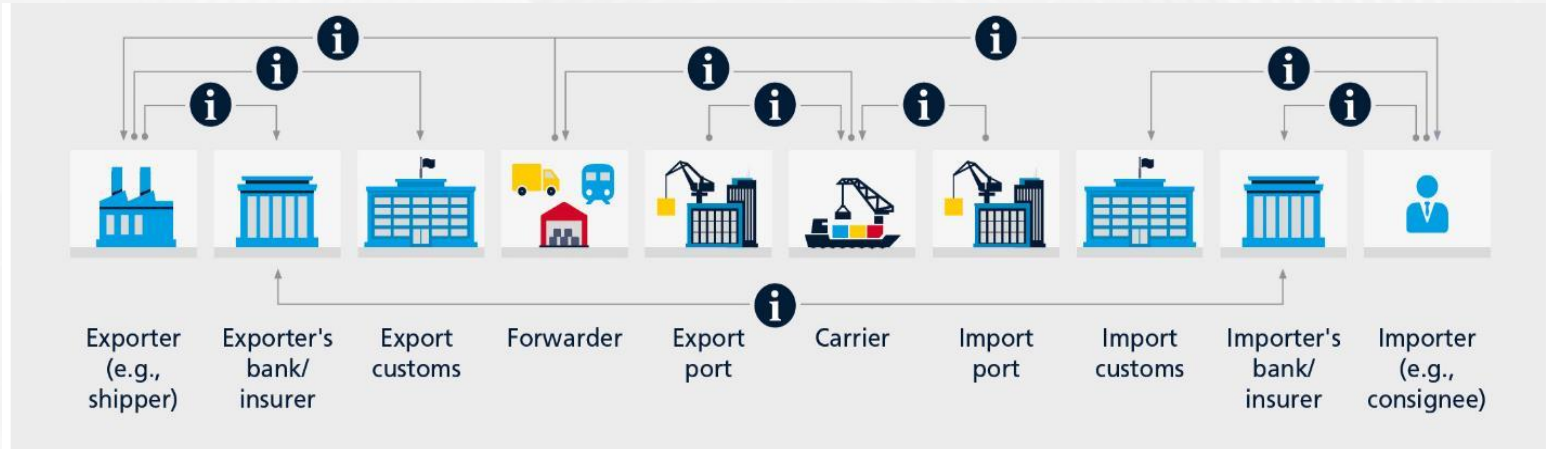
- TBM property of DHL, but in continuous exchange (internal and external)
- High cost due to loss of roller cages
- Flow visualization and resource tracking
- Improvement of relocation and utilization rates



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



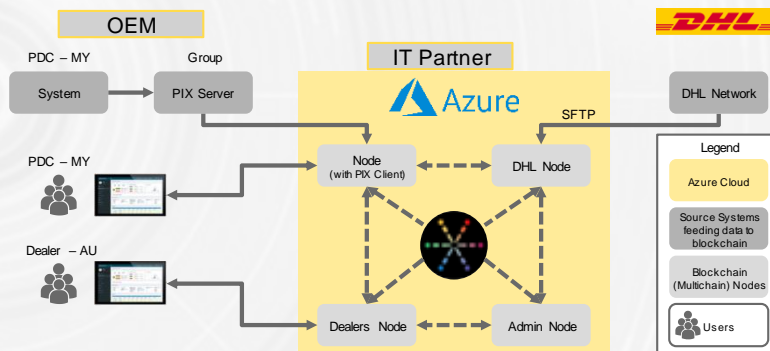
Challenge

- 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

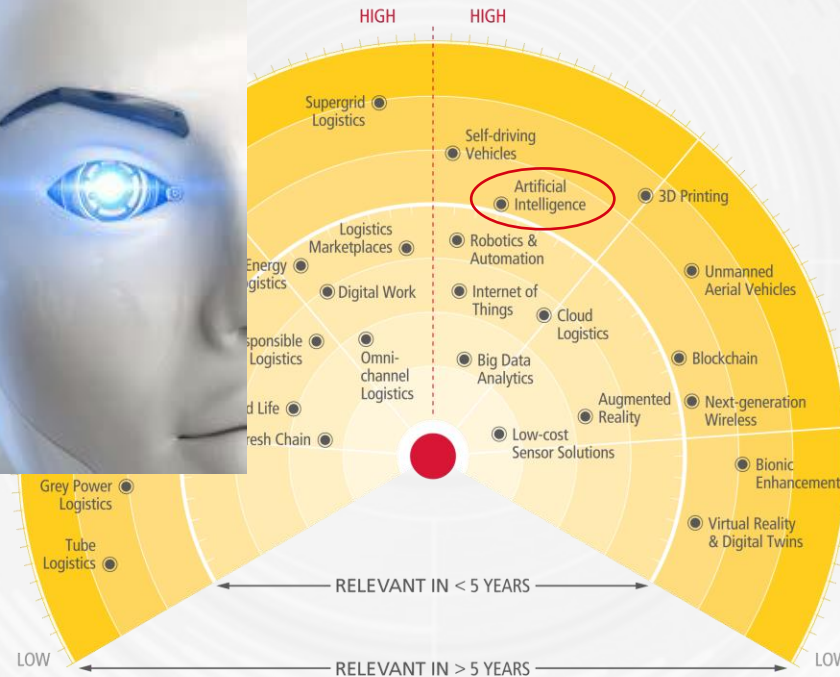
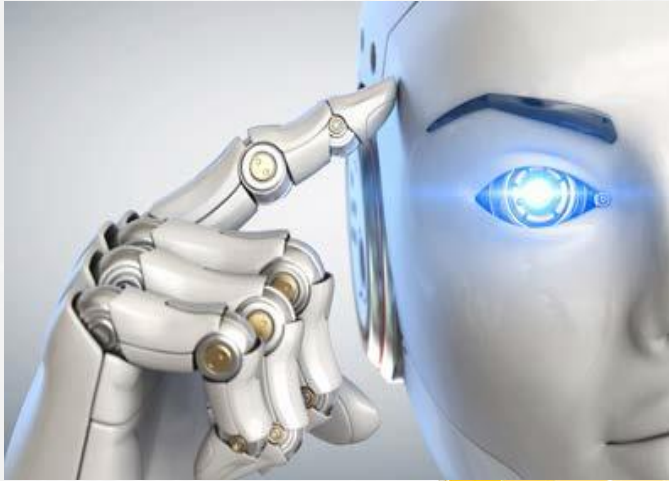


Objectives

- 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



2018/19

PREDICTING, SENSING, AUTONOMOUS LOGISTICS

Prediction



Enable predictive, self-learning networks

Sensing



See and understand the world in new ways

Autonomous Transport



Improve operational efficiency & safety

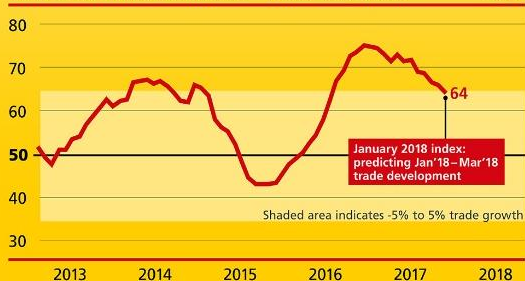
AI IN LOGISTICS:

PREDICTIVE LOGISTICS

DHL Global Trade Barometer



DHL Global Trade Barometer – World 2013–present



DGF Air Freight Delay Prediction

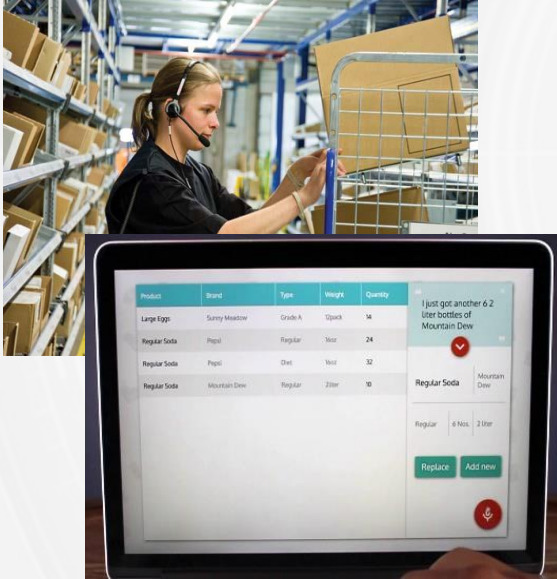


Predictive Maintenance



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

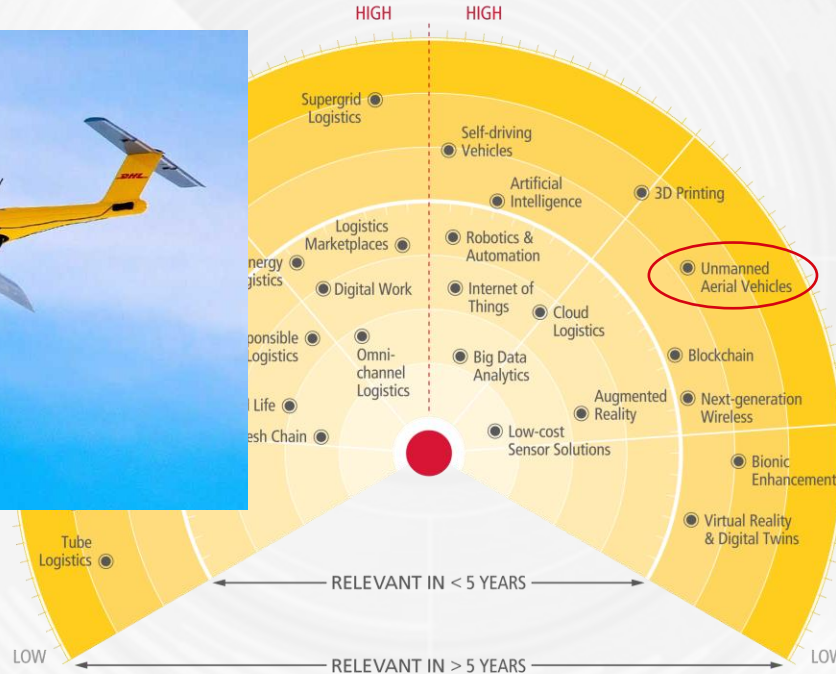


Last Mile

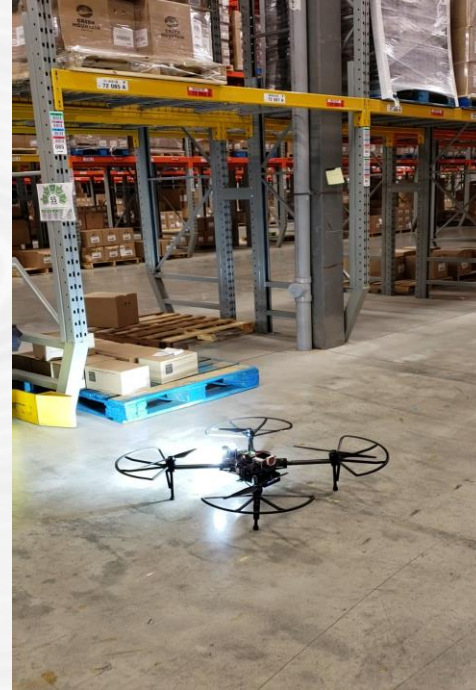
from follow-me to full autonomy



EXPLORING TRENDS – UNMANNED AERIAL VEHICLES



USE CASE: INVENTORY & CYCLE COUNTING



USE CASE: DRONES FOR SURVEILLANCE IN MEXICO



USE CASE: DRONES FOR URGENT DOCUMENT DELIVERY



OPEN INNOVATION APPROACH



ALL OUR TREND REPORTS ARE AVAILABLE FOR DOWNLOAD:
WWW.DHL.COM/INNOVATION

OUR INNOVATION CENTERS – GLOBAL PRESENCE

We are looking forward to welcoming you



DHL Europe Innovation Center
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53844 Troisdorf-Spich
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Phone: +49 (0)2241 1203 490



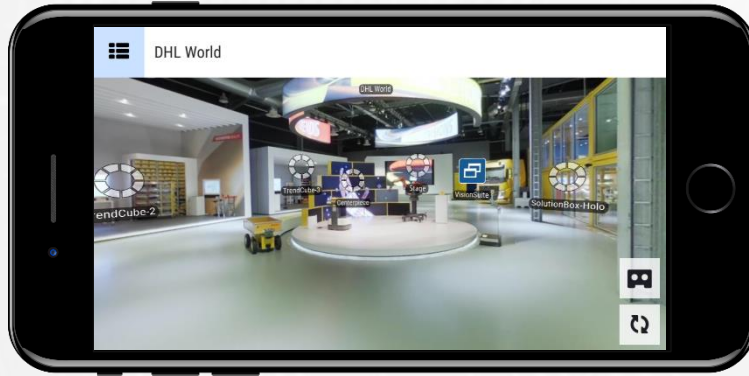
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INNOVATION CENTER 360 GIVES YOU A FIRST IMPRESSION



+





SHAPING TOMORROW

**TOGETHER
TODAY**