LOGISTICS FORUM:
INNOVATION IN PRACTICE
SEPTEMBER 6-7, 2023 | TROISDORF, DE

Agenda – Day 1

Time	Topics	Presenter
12:00 – 01:00 pm	Arrival & Lunch	
01:00 – 01:15 pm	**Welcome & Introduction**	Eamon Mcmahon
01:15 – 01:45 pm	**Keynote Accelerated Digitalization**	Bastiaan Snaterse
01:45 – 02:15 pm	**Warehouse Automation Solutions (1/2)**	Robin van Osta & Kieran Roberts
02:15 – 02:30 pm	Coffee Break (short)	
02:30 – 03:30 pm	**Warehouse Automation Solutions (2/2)**	Mohamed Fouda, Kim Jacobs, Kieran Roberts & David Loughlin
03:30 – 04:00 pm	Coffee Break (long)	
04:00 – 05:00 pm	**Transport & Visibility Forum:** 1) IoT Shipment Tracking & Platform 2) IoT Solutions 3) IoT Future Outlook	1) Tina Ziemek & Federico Zuliani 2) Tehzib Saikia 3) Jordan Racek
05:00 – 05:30 pm	**Innovation Plenum Session**	Adrien Dedieu, Shay Dorgan & Alexander Gunde
05:30 – 06:00 pm	Networking & Drinks	
06:00 – 10:00 pm	Dinner	

Agenda – Day 2

Time	Topics	Presenter
08:30 – 09:00 am	Arrival, Coffee & Snacks	
09:00 – 10:00 am	**Supply Chain Orchestration**	Thorsten Roggenbuck & Elspeth O'Neill
10:00 – 10:30 am	**Supply Chain Innovation @ Bosch**	Iris Socher Lelong
10:30 – 11:00 am	Coffee Break	
11:00 – 11:30 am	**Innovation in Practice Workshop**	1) Joan-Eva Sainte Claire 2) Peter Rolfes 3) Benjamin Schwalm 4) Sebastian Lamberts
11:30 – 12:00 pm	**Look into the Future:** Trend Radar 6.0	Klaus Dohrmann
12:00 – 12:10 pm	**Closing Remarks & Picture**	Eamon Mcmahon
12:10 – 01:00 pm	Lunch & Farewell	

DHL SUPPLY CHAIN
ACCELERATED DIGITALIZATION

INNOVATION IN PRACTICE @ DHL INNOVATION CENTERS

TROISDORF AND CHICAGO

DHL Group

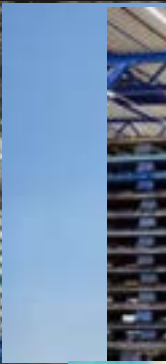Post & Paket Deutschland
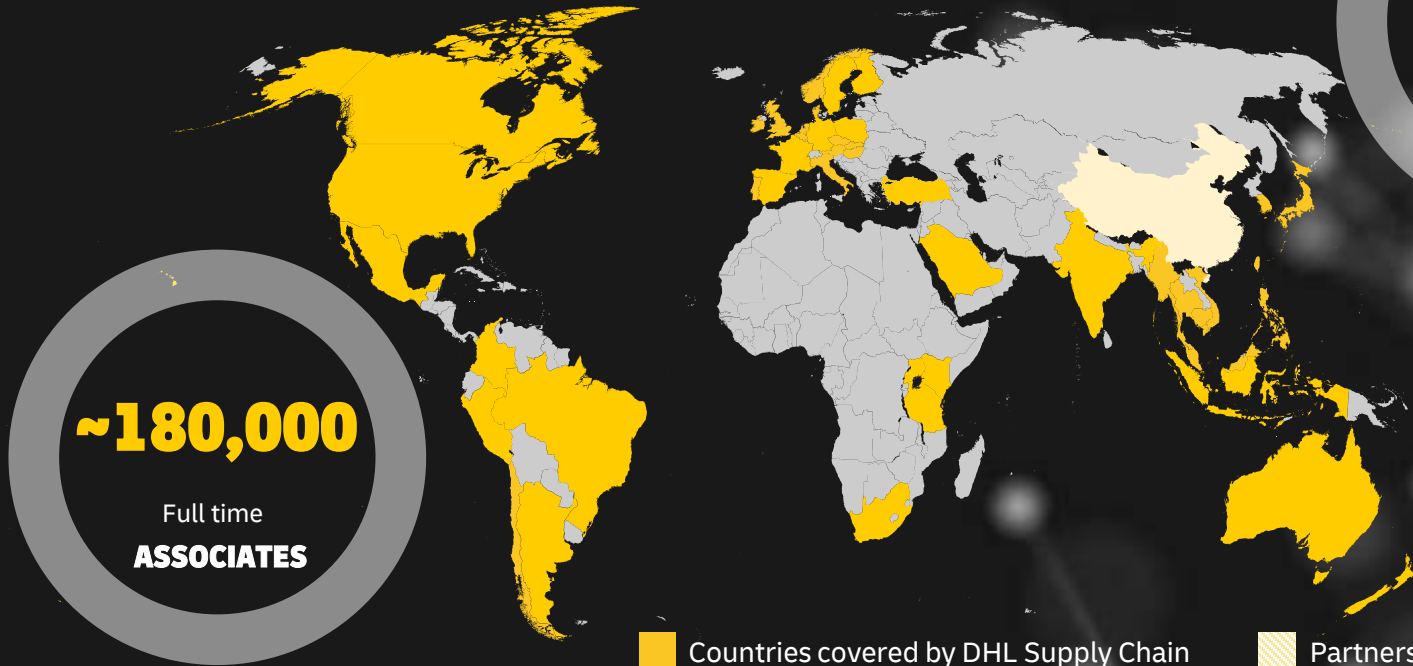
Express

Global Forwarding, Freight

eCommerce Solutions

Supply Chain

DHL Supply Chain is the #1 contract logistics player
Operating >1,500 locations in 50+ countries

Services in every major country

50+

Countries covered worldwide

~180,000

Full time
ASSOCIATES

Warehouses in all commercial centers

2,000

Warehouses and locations

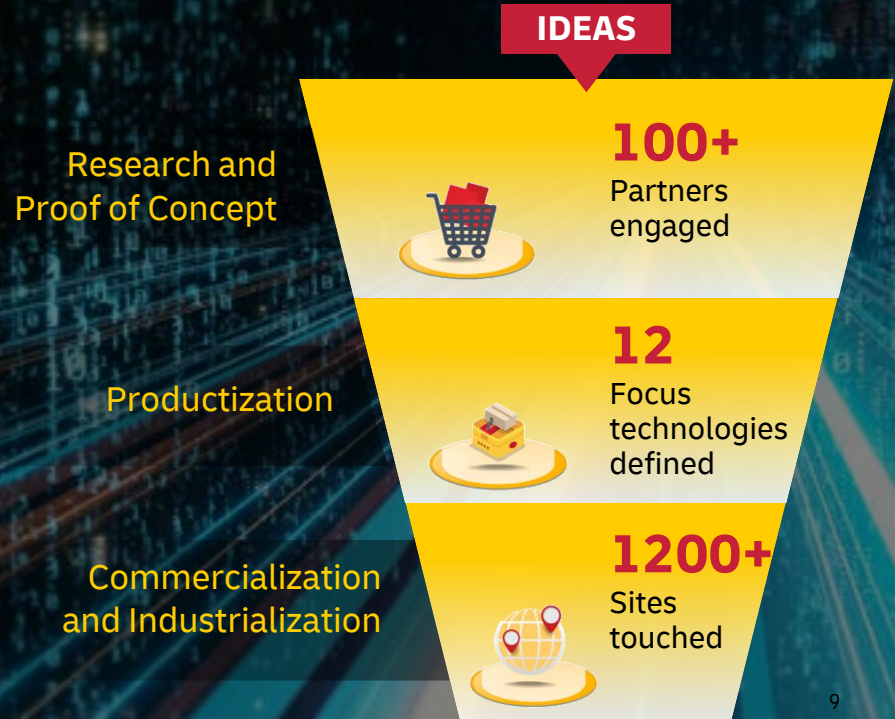■ Countries covered by DHL Supply Chain   ▨ Partnership

Ever-increasing customer expectations

Tightening labor markets

Accelerating technology pace

OUR ACCELERATED DIGITALIZATION JOURNEY STARTED YEARS AGO, IS FAR ADVANCED AND INDUSTRY-LEADING

We bring key operational technologies to a wider number of operations through our focused funnel approach

IDEAS

Research and Proof of Concept

100+
Partners engaged

Productization

12
Focus technologies defined

Commercialization and Industrialization

1200+
Sites touched

9

We work with a clear focus on technologies that make a difference; #togetherunstoppable with a team across all functions

12 **Focus technologies**
identified along entire logistics process

Assisted Picking Robots	(un)Loading Technologies	Intelligent Process Automation
Goods-to-Person Robots	AI & Data Analytics	Sortation Technologies
Packing Technologies	Smart Operations	Supporting Robots
Indoor Robotic Transport	Wearable Devices	Asset Tracking & Monitoring

Large scale automation including ASRS, mechanized sortation, packing/ labeling automation and more
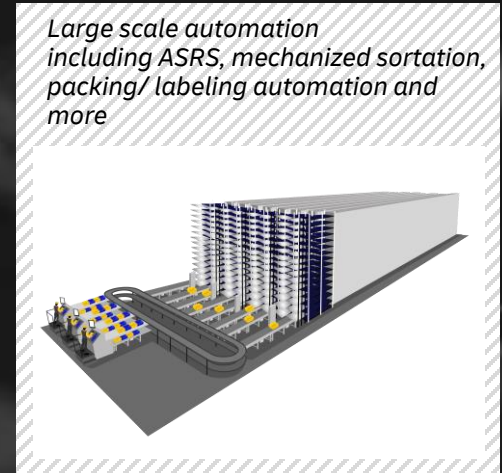
Investment of choice
Productivity and utilization increase, cost reduction

Provider of choice
Customer satisfaction increase

Employer of choice
Employee attraction and retention, overall satisfaction

We work with focus and consistence across all regions – to rapidly identify and replicate best practices...

...and leverage our collective expertise to create off-the-shelve deployable solutions to get your business ready for the future

Project 1

Project 2

Custom

| Co-branded technology |
| RFID sensors | Custom document creation & storage |
| Integration with legacy packaging automation | Custom pick face /shelving setup |

Standard

- Industry-leading **value creation**
- **Performance** and effective continuous improvement from **day one**
- Effective **safety, IT security** and **service** models
- Fast and most effective **deployment**
- Rapid **integration** into IT landscape
- Optimal **technology and partner** selection

12

We have scaled our technology deployments across all geographies; we know what works where – and also where we don't see a payback yet

Real innovation is when you implement at large scale...

... otherwise, it's just a nice idea.

projects deployed end of year, cumulative

2019	2020	2021	2022	Today
600	2,000	3,700	5,300	6,900

13
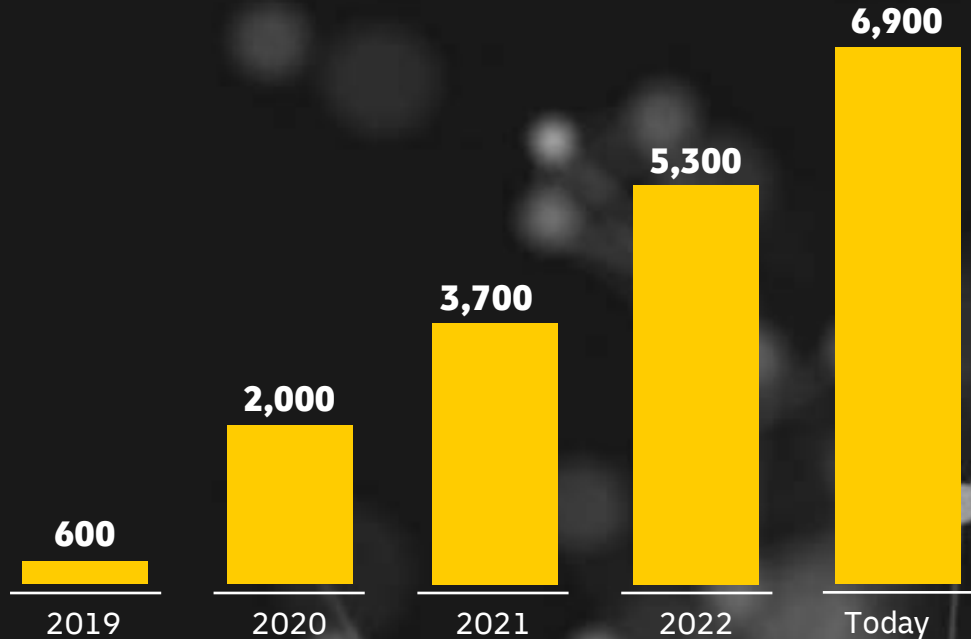
We apply our funnel approach also for data analytics/ AI to maximize the impact of our scale advantage – for our customers, employees and investors

2,000+
facilities worldwide

1
Unique logistics **data pool**

~180,000
Associates across all geographies

Warehousing and transport safety

Inventory accuracy

Generative AI for back-office tasks (and much more)

Gen AI

Vision & sensing technology for robots

14

...and much more to come

We are best in **ORCHESTRATING** multiple vendors of IT solutions, robotics and analytics

180k+ associates

Logistics assets and expertise

Strategic software vendors for integration and analytics

BlueYonder

Manhattan Associates.

50+ countries

DHL Supply Chain

~44M m² of operating space

Not exhaustive

Robotics vendors for solutions and analytics

LOCUS

Boston Dynamics

AT Addverb Technologies

Rocla

PACKSIZE

6 RIVER SYSTEMS

15
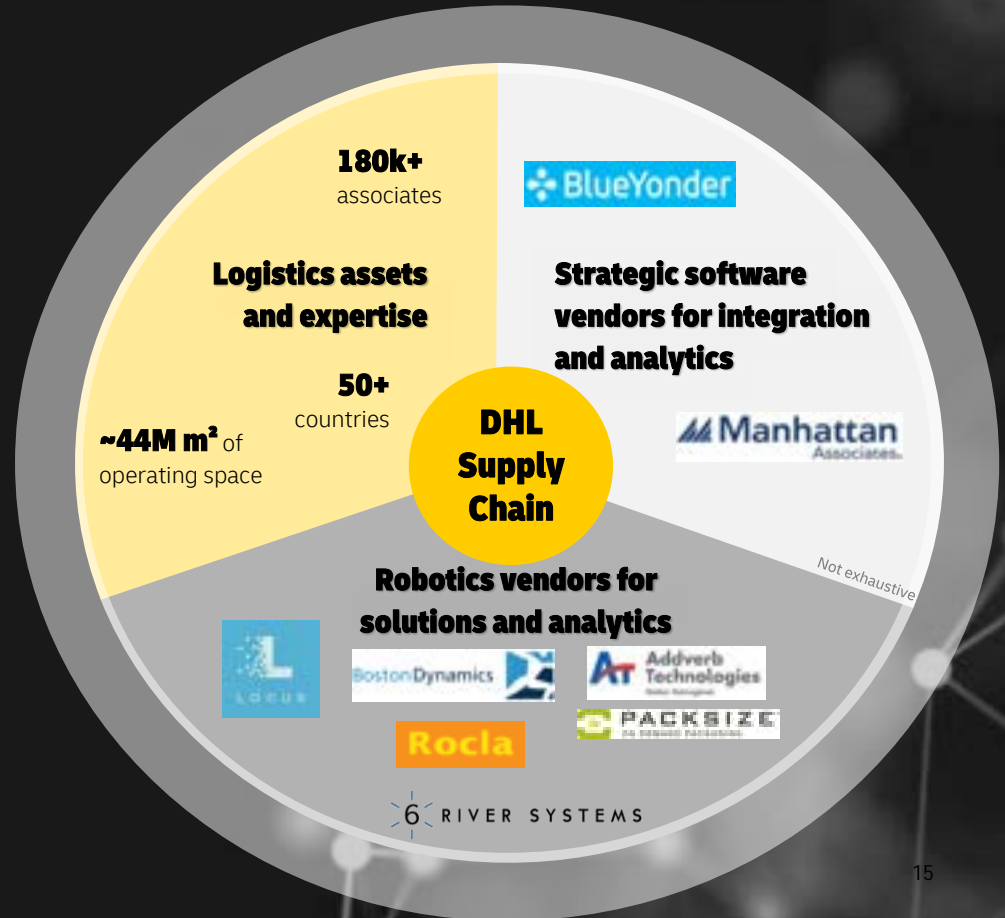
OUR PEOPLE –
**YOUR ULTIMATE
SIDEKICKS**

What's next?

TODAY	BEYOND TODAY
Deep dive into selected technologies by process	**Reach out to your DHL Supply Chain Account Managers to pull in the team of experts**
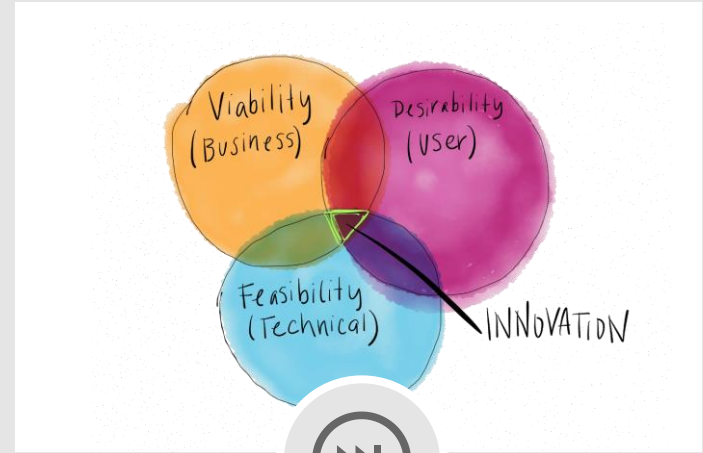
(Un)loading

(un)Loading – How yesterday looked like

Our unloading technologies are in the Productization phase – we are looking at unloading of loose and palletized loads
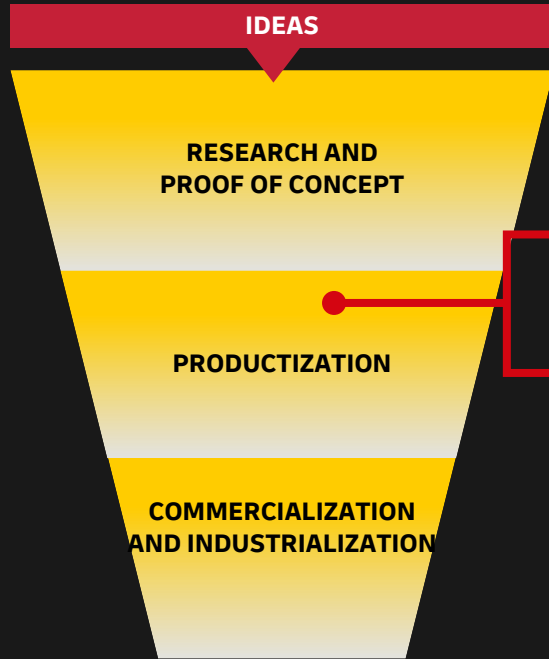
IDEAS

RESEARCH AND PROOF OF CONCEPT

PRODUCTIZATION

COMMERCIALIZATION AND INDUSTRIALIZATION

(Un)Loading Technologies - Pallets

(Un)Loading Technologies – Cases

~25
Pallets per hour unloading rate

~30
units live so far

~500
cases per hour unloading rate

>500k
cases unloaded to date

Trailer Unloading- Fox Robotics
DHL continues to deploy units throughout its North America region.

➤ No IT or WMS integration required

  • Uses 4G or WIFI connection for data transmission

➤ Setup time takes ~30 minutes per dock door

➤ Detects pallet load patterns on the fly

➤ Improves safety on the inbound dock, and reduces load damage

➤ Unload rates of 25-35 pallets per hour, depending on load quality and complexity

Trailer Unloading- Boston Dynamics
DHL has entered into a $15M, multi-year agreement with Boston Dynamics to commercial the Stretch® robot.

➢ Collaborative relationship with DHL since 2018

➢ First mobile unit with fully autonomous manipulation

➢ No WMS integration required

➢ Additional use cases are being explored with DHL

Footprint
40x48 inches

Max Payload
50 pounds

Battery Runtime
full shift

Vertical reach
10.5 ft

Horizontal reach
6.4 ft
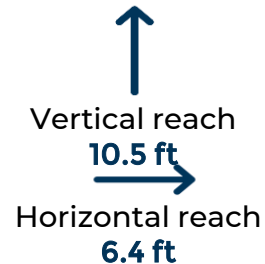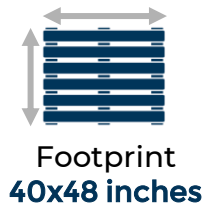
Put-away

Inventory Movement – How yesterday looked like
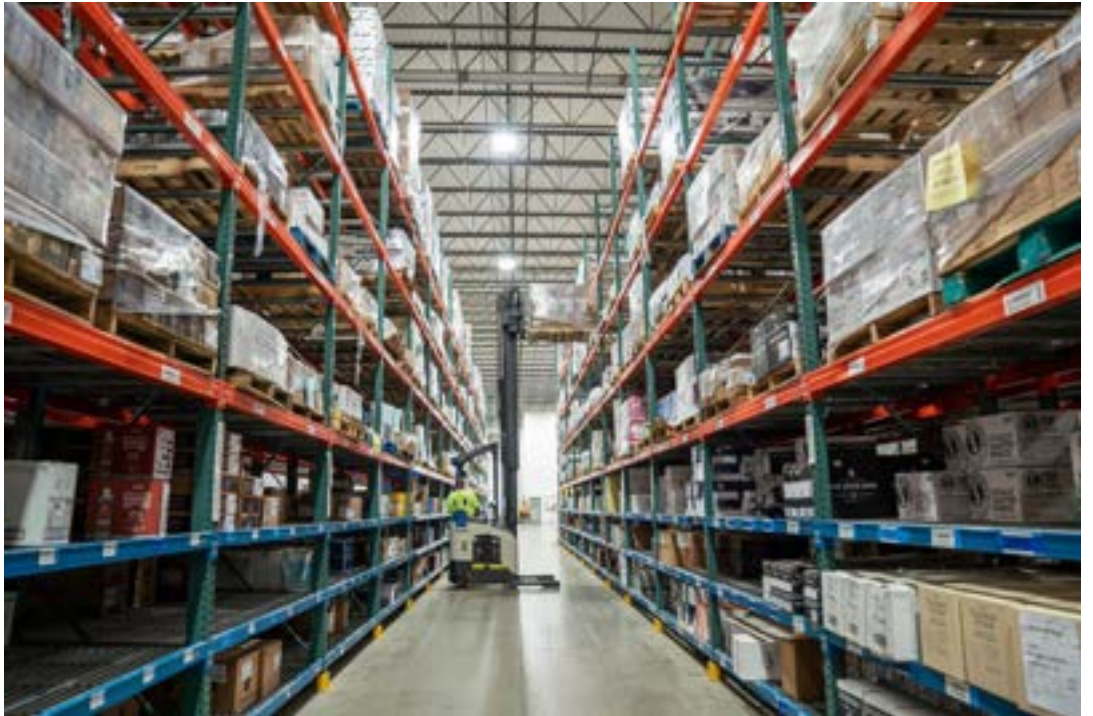
Indoor Robotic Transport carry out fully automated inventory movement

IDEAS

RESEARCH AND PROOF OF CONCEPT

PRODUCTIZATION

COMMERCIALIZATION AND INDUSTRIALIZATION
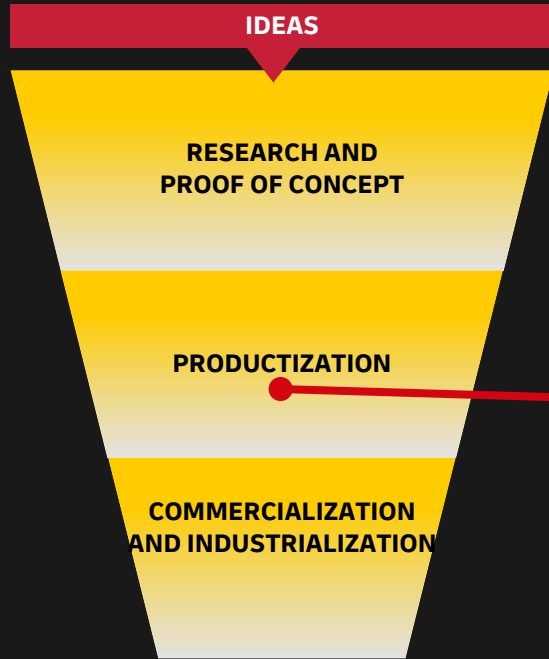
Indoor Robotic Transport

20%
increase in efficiency

>98%
reliability

200+
robots live so far

Indoor Robotic Transport

Ongoing labor concerns continue driving customer demand for autonomous reach trucks. DHL's partnerships with key technology companies helps prioritize the solutions that will provide maximum benefits.

➢ 20% efficiency gains with faster pick and putaway tasks

➢ 98% truck reliability as lifts cycle in/out of work

➢ Additional benefits beyond labor (ex: inventory accuracy, improved work environment)

BEST. CO-WORKER. EVER.

"My job has become a lot easier working with the AGVs."

"I love working with autonomous forklifts. Their accountability and reliability are amazing!"

"These robots simplify the job."

Indoor Robotic Transport – Next Steps
As AVGs are increasingly deployed, DHL is uniquely positioned to optimize solutions.

➢ As labor constraints continue- customers are eager to expand automated fleet

➢ Reimagine warehouse layout and fleet management

➢ Trouble shooting and prioritizing improvement areas

➢ Optimize surrounding processes to maximize benefits of automation

➢ Identify opportunities to scale- strategic evaluation of customer demand and site profiles

Dimensioning Tools ensure that we know the exact shape and weight of the goods we store – a crucial enabler for all material handlings robotics

IDEAS

RESEARCH AND PROOF OF CONCEPT

PRODUCTIZATION

COMMERCIALIZATION AND INDUSTRIALIZATION
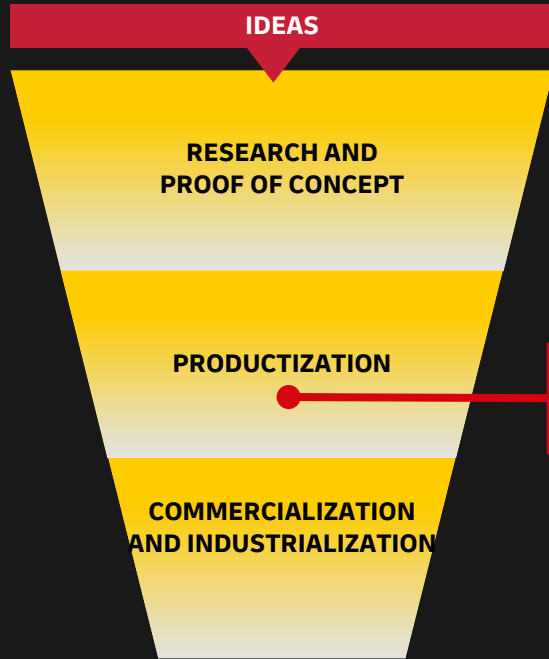
Dimensioning Solutions

~3x

Faster product recording

~5mm

Product recording accuracy

20+

Systems live

Picking & Storage

PICKING – How yesterday looked like

Our picking technologies manage rising order volumes and improve efficiency by eliminating unproductive walking

IDEAS

RESEARCH AND PROOF OF CONCEPT

PRODUCTIZATION

COMMERCIALIZATION AND INDUSTRIALIZATION

Goods-to-Person Robots

Data Analytics

Wearables

Assisted Picking Robots
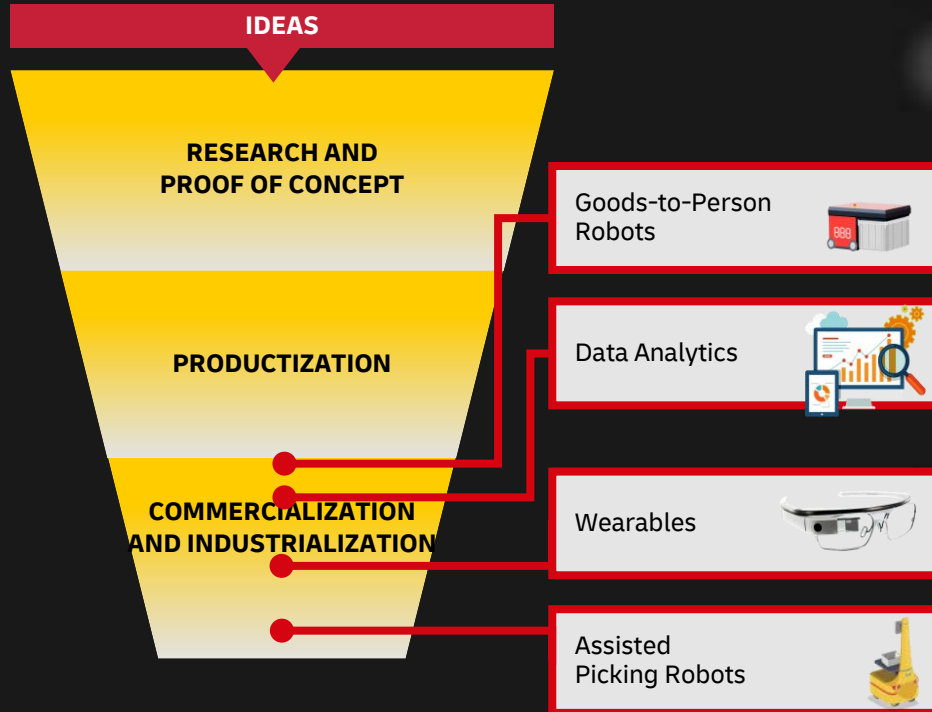
1.5x - 4x
improved productivity

12-15 miles
of walking saved every day

3000+
units live so far

Wearable Devices: Vison Pick provides up to 15% productivity improvement over conventional RF picking

- ➢ Picker wears **Smart Glasses** for picking, location identification, item scanning, Counting Back, and Alternative handling
  - Picking-to-Pallet will be **highlighted on Smart Glasses screen**, together with picking item, picking quantities, and picking from location
  - Totes/ Cartons will be highlighted on Smart Glasses screen, and **match picking cart configuration**, to increase accuracy rate and productivity
- ➢ Preferred language by user profile

Benefits:

- ➢ 7% – 10% picking productivity increase for unit pick
- ➢ 10% – 15% picking productivity increase for case pick
- ➢ 50% training time reduction

Assisted picking robots provide up to 70% productivity improvement over manual cart picking

Pack Station

Benefits		
	UPH increase 1.5X-2.5X	Cycle time reduction by 50%
Employee satisfaction	Reduction of walking time	Training time reduction by 80%
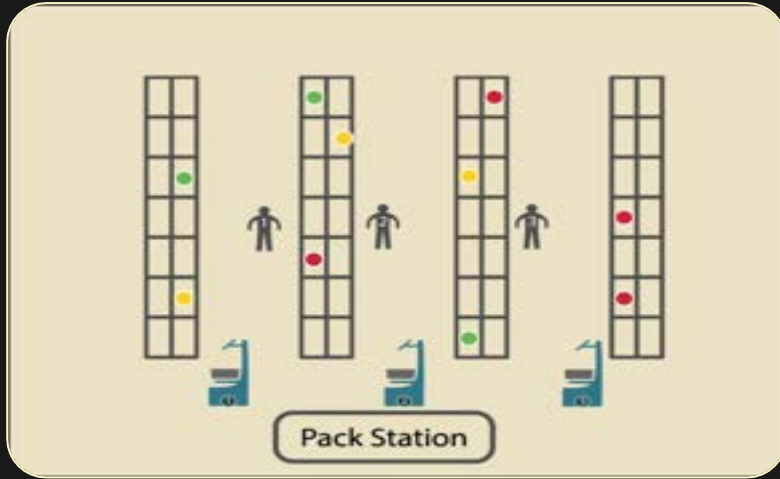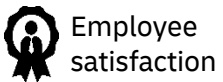
Goods to person system automatically transports racks or bins (totes) containing products to a pick station via robots, improving productivities and space utilization

- ➤ Variety of GTP solution to fit different product sizes and throughput requirements
- ➤ Improve picking productivity through elimination of travel and ergonomic pick stations
- ➤ Standardize process reduces order errors
- ➤ Faster implementation timeline compared to mechanized solutions
- ➤ Scalable capacity by adding robots and workstations
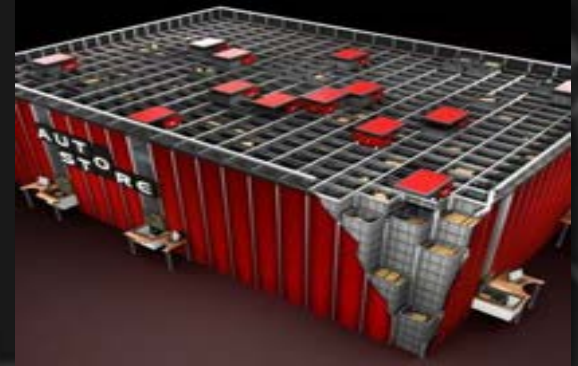
Goods to Person: Shelf to Person Robots

2 Shelves / Racks

3 Picking /Put-away Stations

1 Robots

Sortation

SORTATION – How yesterday looked like

Sortation technologies

IDEAS

RESEARCH AND
PROOF OF CONCEPT

PRODUCTIZATION

COMMERCIALIZATION
AND INDUSTRIALIZATION

(un)Loading

Sortation
Technologies
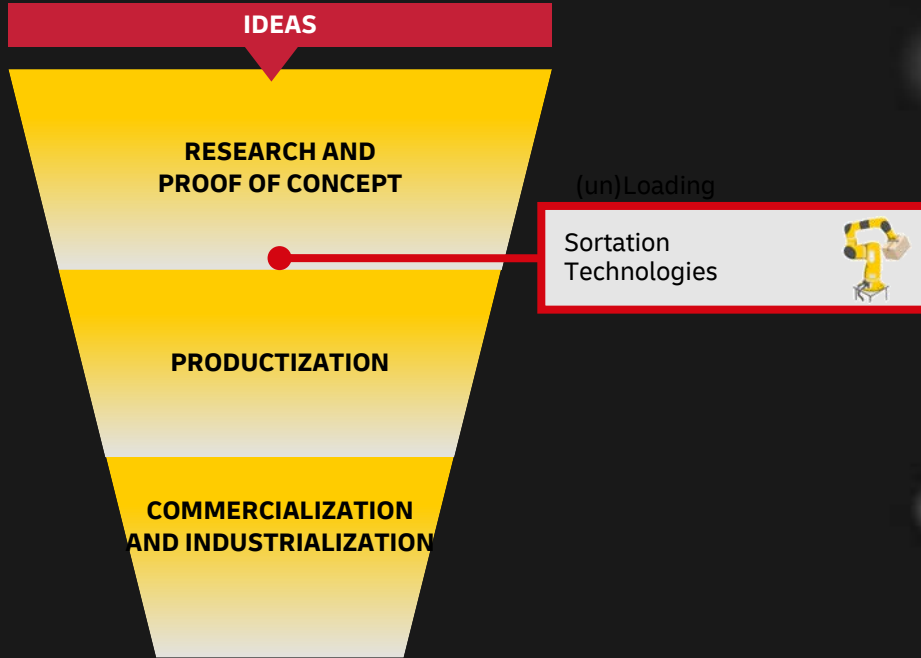
Up to 2x

Improved
productivity

Higher

Sorting
accuracy vs.
manual

110+

Robots live so far

DHL introduced a first-of-its-kind robotic sorter solution to the business. This solution addresses the void for sorting solution with medium volume ranges & many sorting destinations

➢ Mitigate the risk of a single point of failure

➢ Easily adapt to changing sorting requirements

Packaging

In-DC Packaging Operations
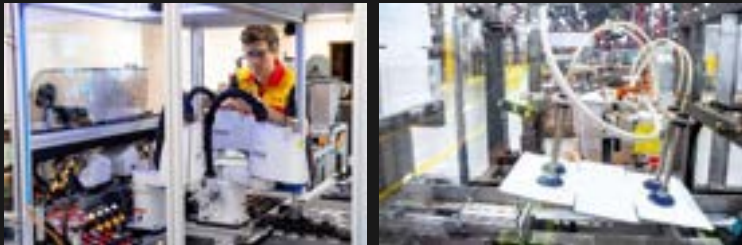
1. Materials Management

Planning, Sourcing, and Purchasing of all Packaging materials by leveraging a preferred supplier network to aggregate spend and drive savings.

2. Contract Packaging

Primary, Secondary, and Specialty Packaging services performed In-DC to drive time and cost efficiencies.

A TRUE PARTNER WITH SIZE, SCALE AND KNOWHOW TO MANAGE AND EXECUTE PACKAGING OPERATIONS

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DHL Supply Chain Packaging Solutions – Size and scale contract packaging

A TRUE PARTNER WITH SIZE, SCALE AND KNOWHOW TO MANAGE AND EXECUTE PACKAGING OPERATIONS

241+
Sites with packaging Operations

376
Customers that DHL supply chain contract pack for globally

7300+
Colleagues working in packaging operations

Barbie and Ken
to personal care to home care to medical devices to aftermarket parts to confectionary

All Sectors
Packing in all sectors : Automobility, Consumer, Retail, E&M, E&C, LSH

900m €
in consumable material spend across the DHL group

Sustainability
Focused sustainable options within our processes

All Regions
Present in all our regions with DHL supply chain

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Technologies and application – Contract Packing operations

Mechanisation and Automation

Simple mechanisation or automation can be a key differentiator. Simple conveyors, case closers, labellers

Traditional

We refer to current technologies as traditional technologies that are already applied within our current businesses :

- Multihead Weighers
- Bagging Equipment
- Shrinksleeving
- Shrinkwrapping
- Overwrapping
- Coldwrapping
- Flowrapping
- Cartoning
- Blistering
- Case Packing and Closing
- Labelling and printing
- Auto-palletisation

Innovation

By constantly innovating and bringing in practical concepts .

Trending

We use this term when discussing trending practical technologies that have grown over the past few years and are innovative for our business

- Pick and place collaboration robots
- Collaboration Robot Palletisers
- Sustainability driven technologies
- VR and simulations
- Bag on Demand
- Smartmailers
- Box on Demand
- Paperpack machines
- Wrapping robots

Materials Management

Materials Management Services Include

Plan	Source	Purchase
• Forecasting & Demand Planning • BOM / Part Rationalization • Inventory Management	• Preferred Supplier Network • Supplier Relationship Management (SRM) • Aggregated Spend Mgt/Buy Strategies	• Purchasing (MOQs, Tiered Pricing) • PO Change Management • 900m € in material spend across the DHL Group

Materials-neutral design support and coordination lowers total cost of ownership (average 10%-30% savings) and increases speed to market

Buying strategies analyze, aggregate, standardize, and competitively bid across our preferred supplier network to deliver a stronger, more resilient network with shorter lead times and reduced spend

Manage material flow to have the right products on hand while minimizing materials obsolescence

- **E2E management** w/client, design partners, suppliers & DHL to optimize designs, line setup, communication, and ongoing value while giving you full inventory visibility throughout the packaging process
- **Fully integrated proprietary system** for transparency, data analytics, quality tools, real-time tracking, and more

Contract Packaging

Contract Packaging Services Include

Primary	Secondary	Tertiary
• Bagging, form fill, seal, pouching, cartoning, sealing, etc.	• Co-packing, repack, postponement, customization, kitting, assembly, labeling, display building, etc.	• Palletizing, strapping, wrapping, crating, stretch wrapping, etc. • Pallet optimization, racking optimization, etc.

Key Contract Packaging Stats in North America

600+ Packaging lines

8,000+ Packaging employees

PRODUCE >1 MILLION pallets a year

OPERATIONAL EXCELLENCE 99+% on time in full

+70% OF PRODUCTION LINES include **automation** (and increasing)

AGILITY IN ACTION **non-forecasted projects make up 30%** of our Packaging projects

All Regions
Packaging operations in all our regions with DHL supply chain

376+
Customers that DHL supply chain contract packages for globally

Sustainability
Focused sustainable options within our operations

All Sectors
Packaging activities across all sectors: in all sectors : AEMCE, Tech, Consumer, Retail, LSHC

241+
Global sites with packaging Operations

Technologies and Automation

Simple Automation

In place in > 70% of DHL's existing packaging sites

Cartoners, Blister / Clamshell Solutions	Robotics, transport, AGVs
Auto Wrappers	Bagging/ pouching

Auto Trash Removal System

Packaging on Demand

End of Line Palletizers

Advanced Automation

For more complex and high-volume operations to minimize labor, increase throughput & maximize capacity

As technologies evolve, DHL deploys advanced solutions to further optimize all site operations

As an example, we are piloting Humanoid robots to perform tasks on the packaging lines

Robotics:

Eliminated 60+ m manual handling instances in the past two years

Digital Twin:

Simulations to drive continuous improvements and to design new lines

Automated Picking Assistance Bots:

>2,000 bots assist with 200 million picks

**These are just *some* examples of the automation solutions in DHL's packaging innovation funnel
Our team of subject matter experts continually identifies & implements technologies which are best fit for each client**

Technologies and application – Packing operations from Picking

1. Smartmailers

2. Paper packing

3. Opti-carton

4. Void reduction
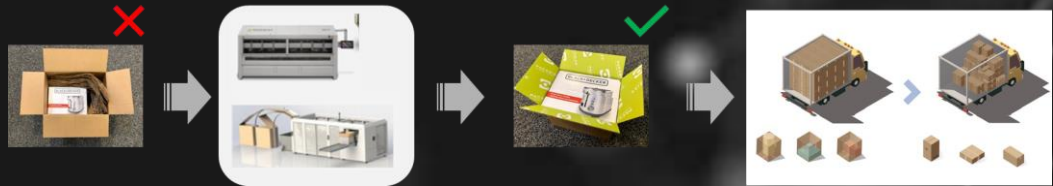
5. Box on Demand

Palletizing in practice

Packing technologies

IDEAS

RESEARCH AND PROOF OF CONCEPT

PRODUCTIZATION

Packaging on Demand

COMMERCIALIZATION AND INDUSTRIALIZATION
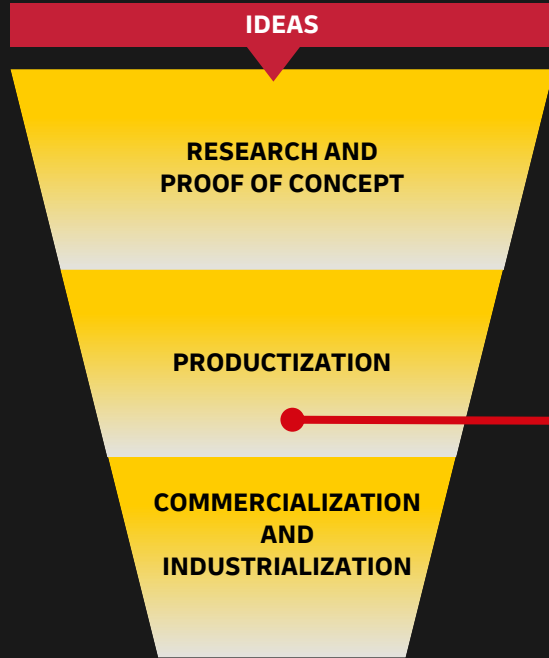
Reduce
On-Hand Inventory / Space Requirements

8+ Week
Reduction in Lead Times

$1+m
Annual Cost Savings

What's next?

TODO

Deep dive into selected technologies by process

BEYOND TODAY
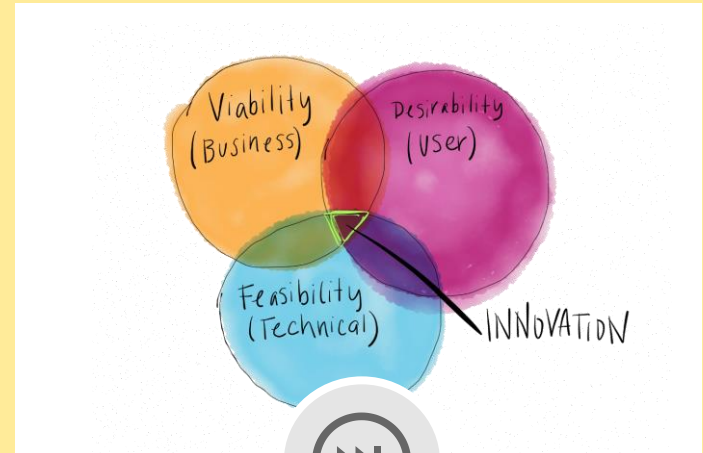
Reach out to your DHL Supply Chain Account Managers to pull in the team of experts

IOT SOLUTIONS IN LOGISTICS

INNOVATION IN PRACTICE
DHL INNOVATION CENTER - TROISDORF

Tehzib Saikia
IoT Operations & Cust. Success

Agenda
How to navigate IoT Solutions in Logistics

IoT – In logistics and supply chain

Key things to consider when choosing an IoT solution

Case study from our operations

DHL
INNOVATION
CENTER

World of Logistics
Range of use cases

DHL INNOVATION CENTER

TRUCK

FACILITY

LABORATORY & HOSPITAL

BUILDING

AIRPLANE

RAIL

WAREHOUSE

VESSEL
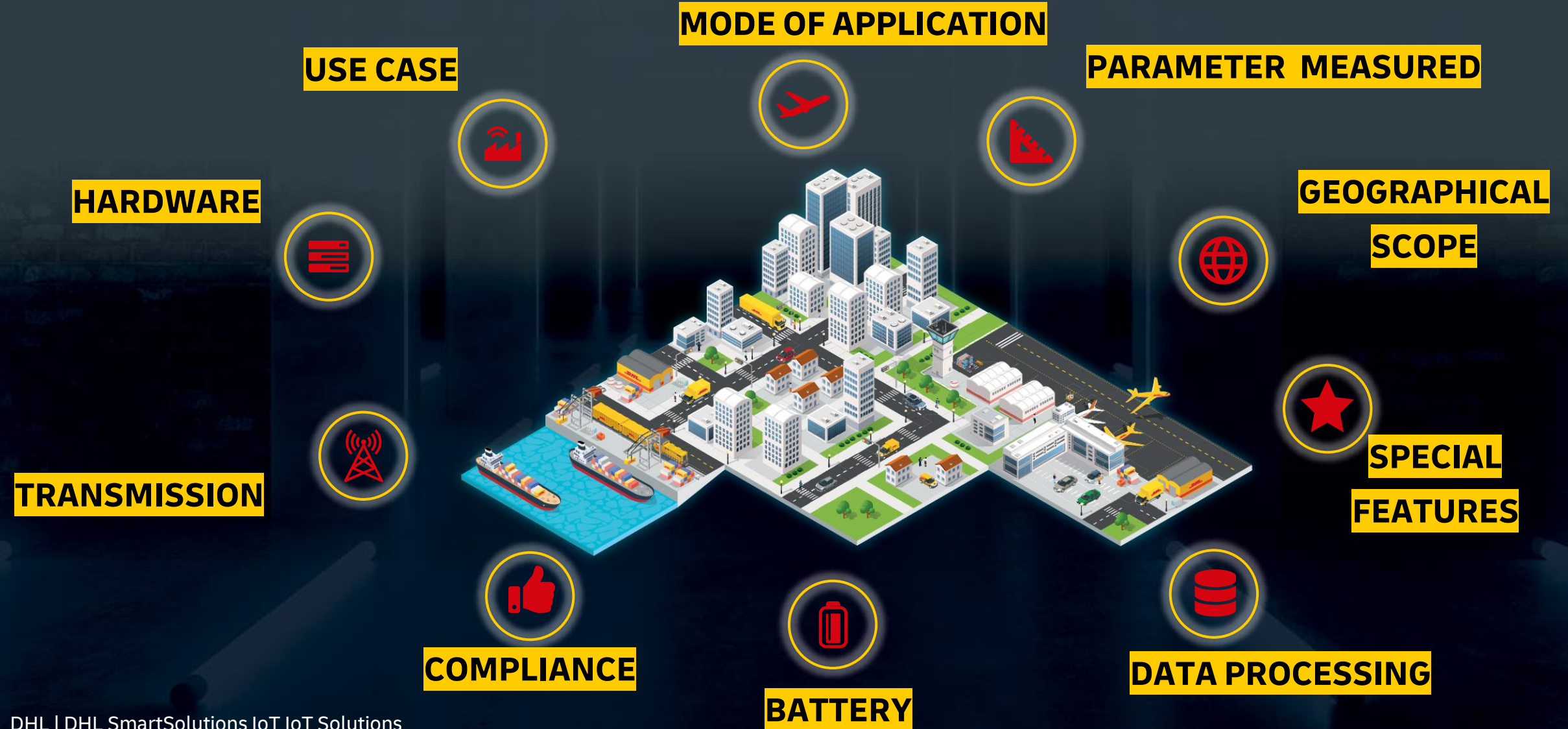
IoT Solution Categories
Use cases – where IoT can make a difference

ASSET TRACKING

- Location Tracking
- Resource Optimization
- Loss Prevention

SHIPMENT MONITORING

- Multimodal Shipment Tracking
- High Value Goods Monitoring
- Shipment Safety & Security

CONDITION MONITORING

- Pharmaceutical Cold Chain Monitoring
- Goods Quality Monitoring
- CO_2 & Air quality

INVENTORY TRACKING

- Automatic Inventory
- Real-time Localization System
- Equipment monitoring

Location tracking of EV return battery to pinpoint shipping bottleneck

Shipment monitoring

STATUS	PRODUCTIZED
CUSTOMER	DSC | Europe | International OEM
TECHNOLOGY	**Customer Portal:** DPDHL IoT Platform
	Transmission: Cellular network | **Hardware:** Kizy

CHALLENGE
- Long return time of the used EV batteries from repair shops around Europe
- Lack of visibility of the shipment
- Unclear transportation bottlenecks

SOLUTION
- No infrastructure setup
- Non-invasive movement based tracker
- Transmission via cellular trackers with 15 mins pinning interval

BENEFITS
- Additional layer of real-time visibility
- Less manual efforts to track down the batter
- Visibility helps operational efficiency

Shipment tracking via Kizy web portal

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THANK YOU
Q&A

DHL GROUP IOT IN ACTION – LOGISTICS FORUM: INNOVATION IN PRACTICE

September 06th 2023

Corporate Development, IoT Center of Excellence

DHL Group IoT CoE - Presenting today

Federico Zuliani

Product Owner
Condition Monitoring

Tina Ziemek

Strategy, Product &
Partner Management
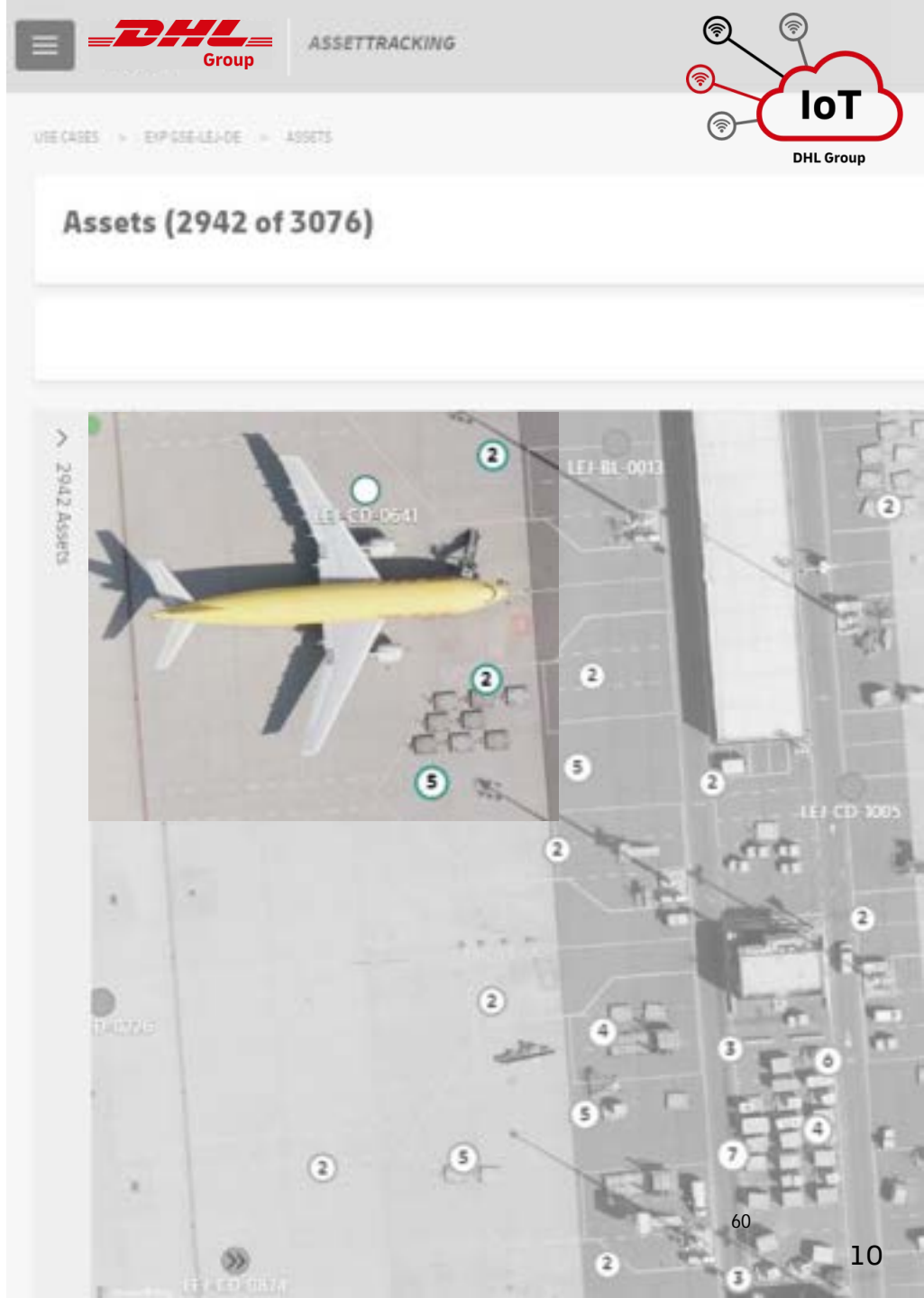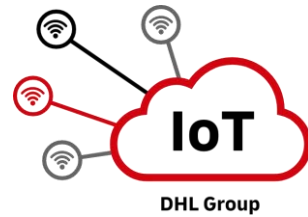
DHL Group IoT platform – secure, scalable, and reusable
One stop real time insights for DHL customers & operations

SENSOR DATA

OCEANFREIGHT TRACKING

CO2, TEMPERATURE & HUMIDITY

LOAD UNIT TRACKING

AIRFREIGHT TRACKING

VEHICLE TRACKING

INDOOR INVENTORY & LOCATIONS

PREDICTIVE MAINTENANCE

EQUIPMENT TRACKING

API

IOT PLATFORM

Azure

Live tracking

Real-time alerts

KPIs & analytics

Message routing

Maps & dashboards

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Source: IoT CoE
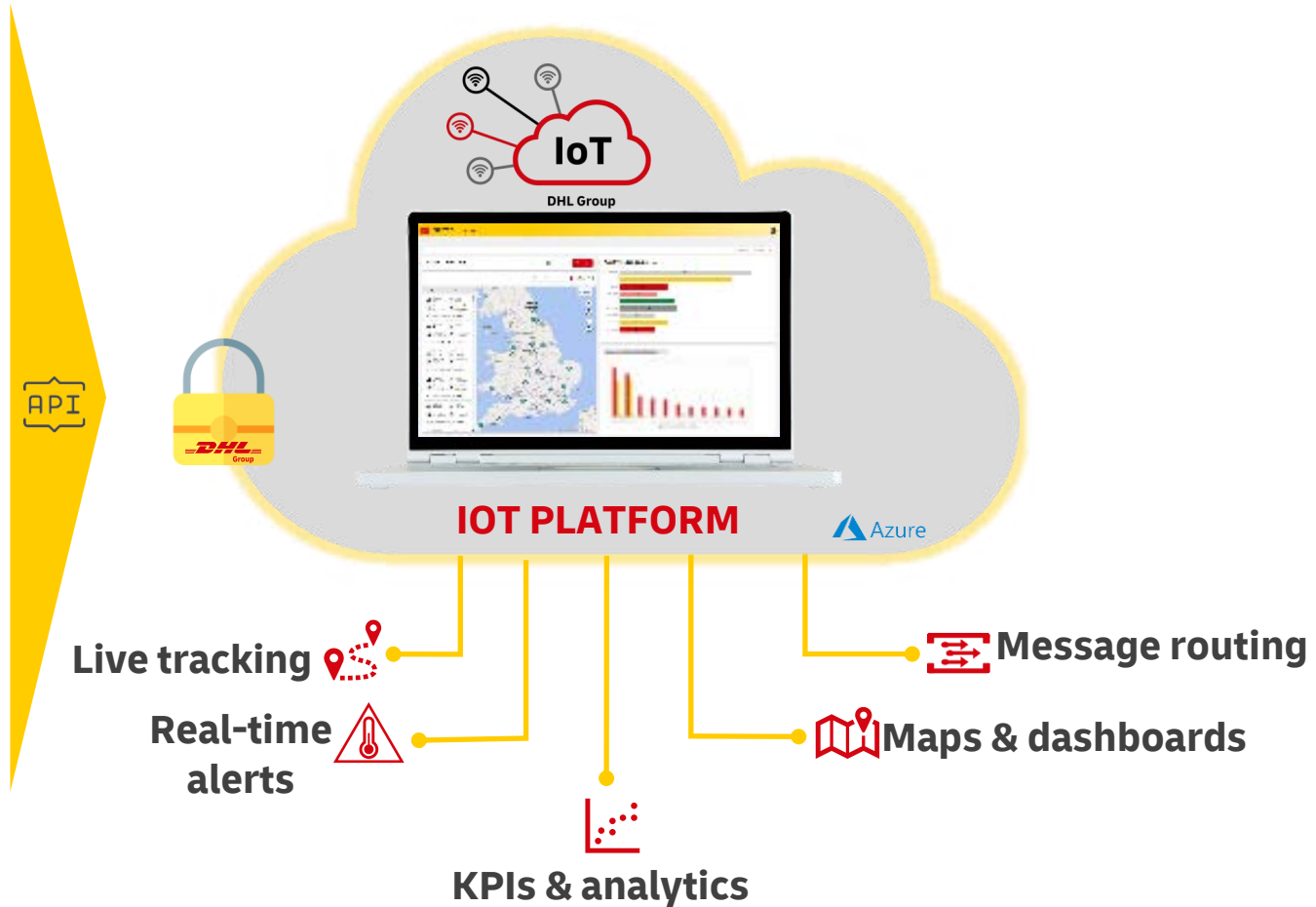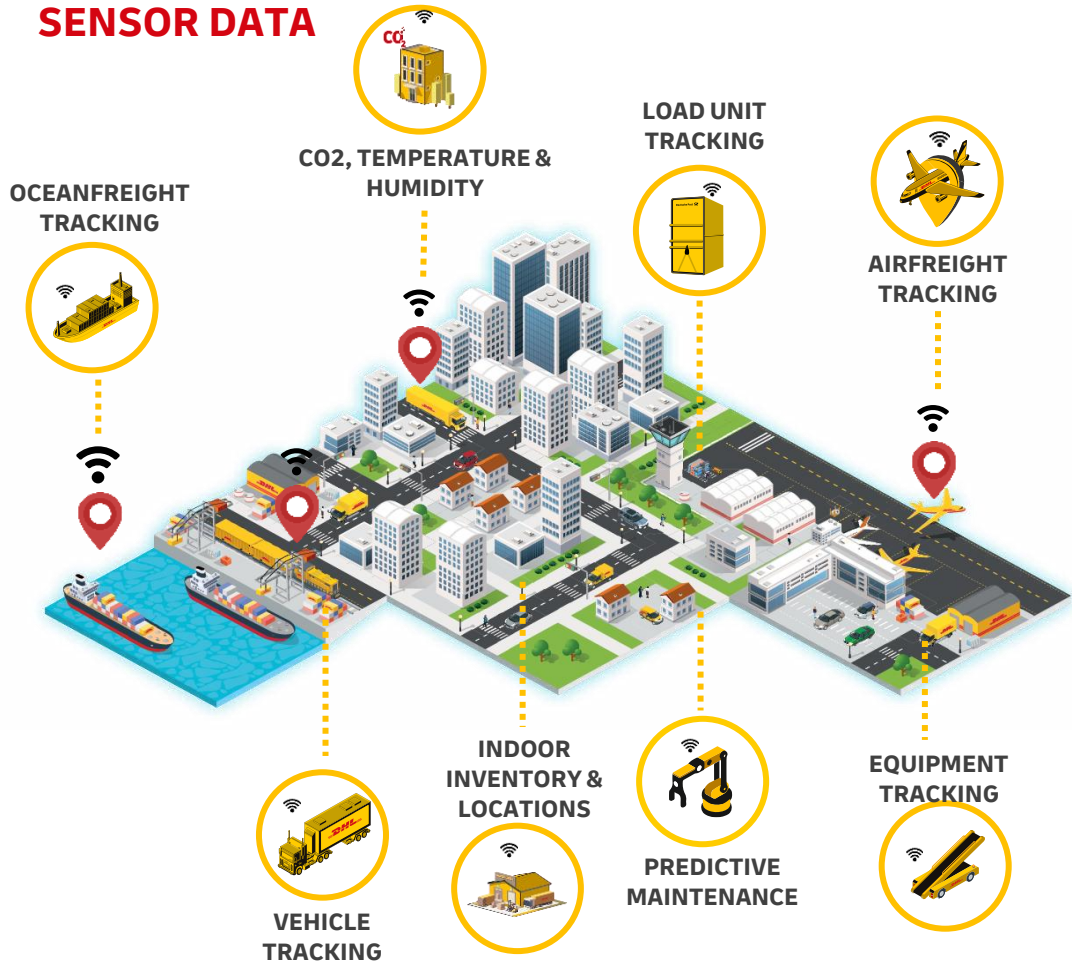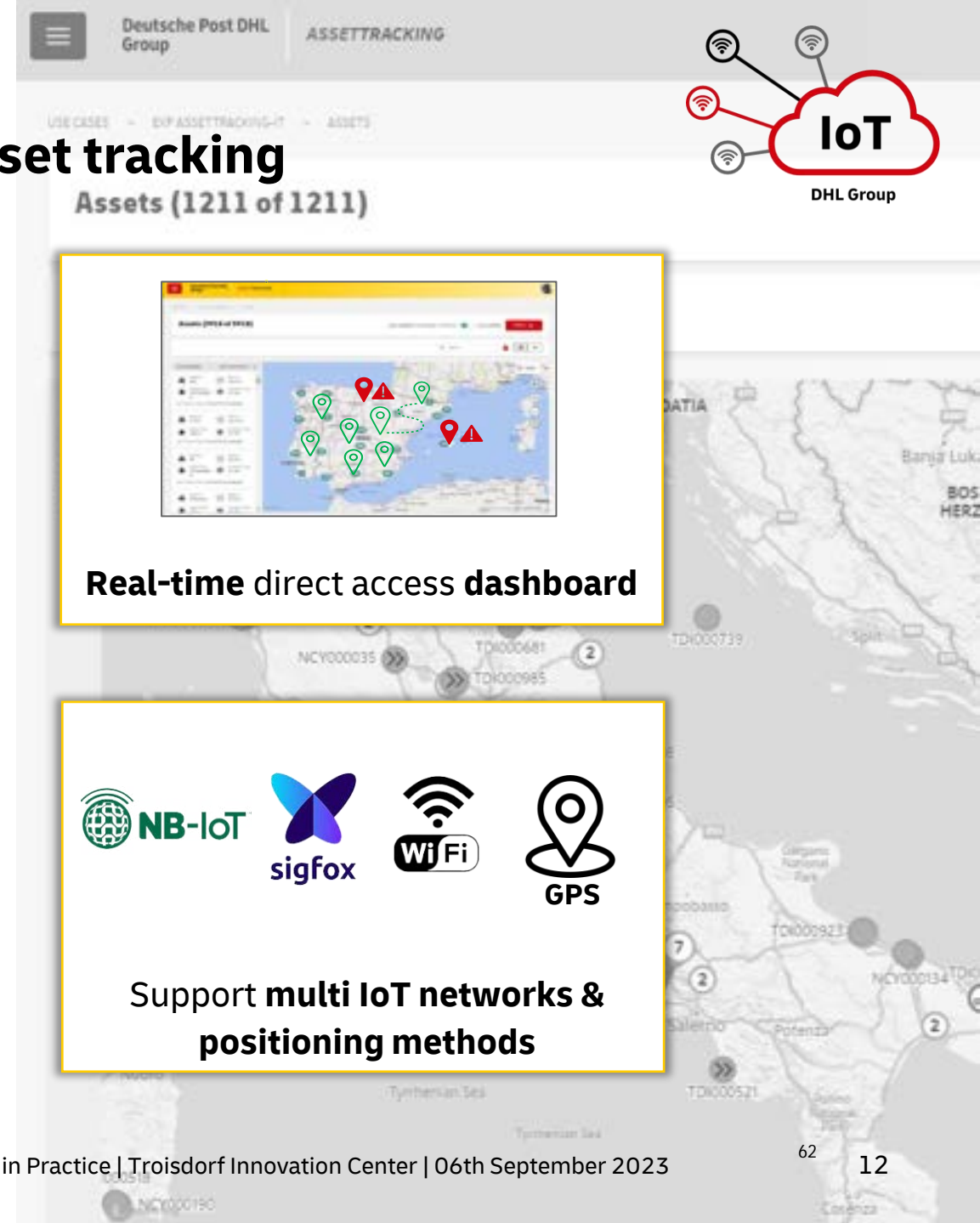
DHL Group IoT platform – asset tracking

Supporting **load unit, equipment, and vehicle tracking**

(the highest use cases in DHL Group; >600k trackers)

Real-time direct access **dashboard**
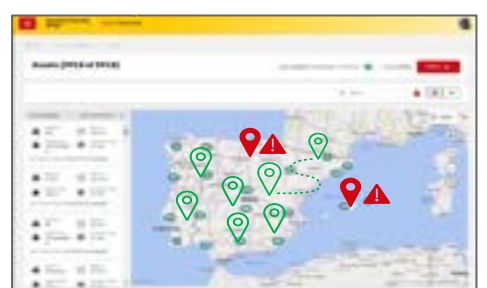
Using **low-cost** with **long lasting battery** devices (7-10 years)

Support **multi IoT networks & positioning methods**

Source: IoT CoE
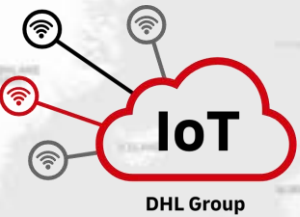
DHL Group IoT platform - shipment tracking

SMARTSOLUTIONSIoT
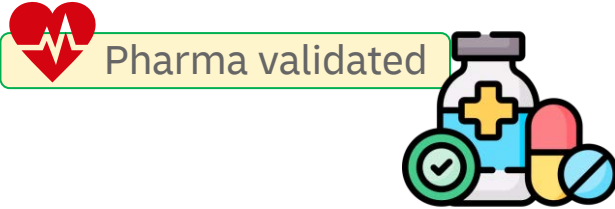
Large choice of **devices** covering **all transport modes** (**device agnostic**)

Real-time direct access **dashboard** or via DHL portals (e.g., mySC)

Speedy new **customer onboarding** (**within days**)

Pharma validated

Operates as **GxP compliant** validated **IT system**

DHL Group | DHL Group IoT Update to Supply Chain eCommerce Forum | Teams | 06th September 2023
Source: IoT CoE, CSI SmartSolution IoT

63   13

SHIPMENT TRACKING DEMO

iot.dhl.com
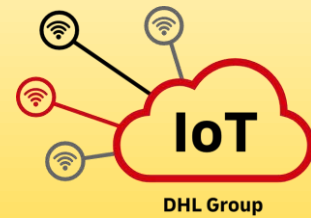
Thank You

FUTURE OUTLOOK & IOT TRENDS

INNOVATION IN PRACTICE
DHL INNOVATION CENTER - TROISDORF

Jordan Racek
IoT BD & Innovation Manager,
Global

IT'S DIFFICULT TO PREDICT THE FUTURE

THERE ARE SOME ANSWERS

IOT TREND CLUSTER OUTLOOK

SMARTIFICATION

EVERYTHING AS A SERVICE

PHYSICAL INTERNET

BIG-DATA ANALYTICS

DIGITAL TWINS

NEXT-GEN. PACKAGING

NEXT-GEN. WIRELESS

SMART LABELS

WEARABLE SENSORS

SMART LABELS
CLOSER LOOK - EVOLUTION

BARCODE

RFID TAG

NB-IoT SMART LABEL

SMART LABELS
CLOSER LOOK – WHERE ARE WE TODAY?

USE CASES / REASONS

- Trend to **monitor smaller things**, down to **single unit level**
- **Quality monitoring** of shipments/ goods
- Tracking of **high value goods**
- Monitoring of **consigned inventory**
- New features / new information on **shipment status** (shipment opening, tampering)
- Bringing **innovation / new things** to customers
- On site printing of labels

WHAT IT IS

- ✓ Thinnest shipment tracker, new form factor
- ✓ Measurement of Temperature, Motion, Tamper

WHAT IT IS NOT (YET)

- 100% AFR ready - not all airlines approved
- Tamper-proof - missing security additional stripes
- Infinite life – 300 messages
- Use globally – NorAm, EU, Singapore first
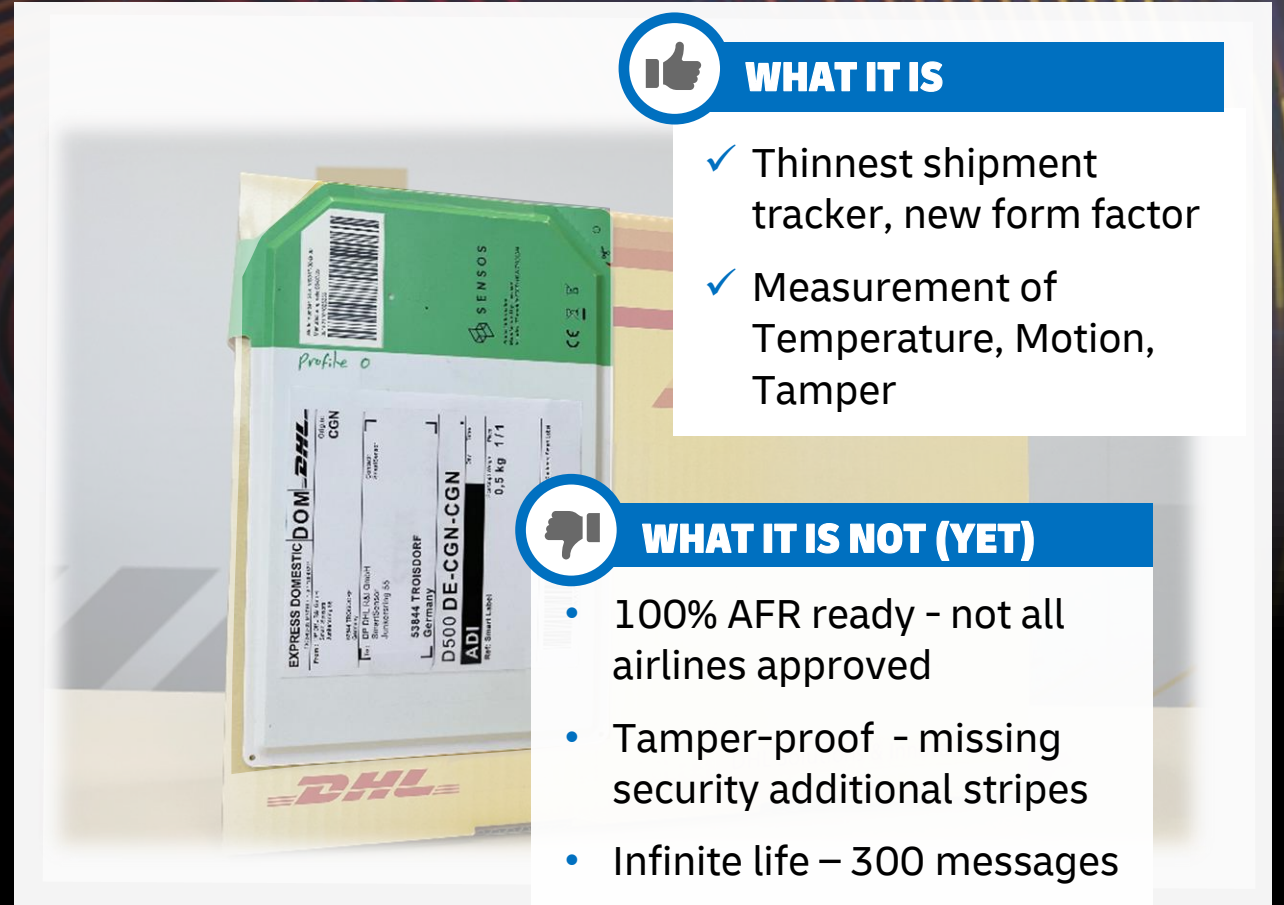
SMART LABELS

...refers to the use of printed paper, plastic, or fabric labels upgraded with special intelligent inlay technology that can digitally capture and communicate more information than is printed on the physical label.

Use-Cases

- End-to-End Visibility
- Combatting Counterfeit
- Perishable Goods Quality Control
- No Labels

Outlook
This trend should be **PASSIVELY monitored,**

with applications still mostly being developed or explored.

Example

DHL's SmartSensor team offerings include smart labels that provide end-to-end visibility for shipment tracking, as well as condition monitoring throughout a parcels journey from shipper to consignee. Already widely scaled out, these labels enable customers and consumers to have seamless quality control of fresh-chain and perishable goods, especially relevant to the Life Sciences & Healthcare sector.

Impact:	Realization:
MODERATE	< 5 YEARS

Focus Areas:

Customer Experience	Physical & Digital Security
Visibility & Resilience	

Trend Clusters:

Internet of Things	Packaging & Containers

Sectors:

Auto-Mobility	Energy	Engineering & Manufacturing
Life Sciences & Healthcare	Technology	
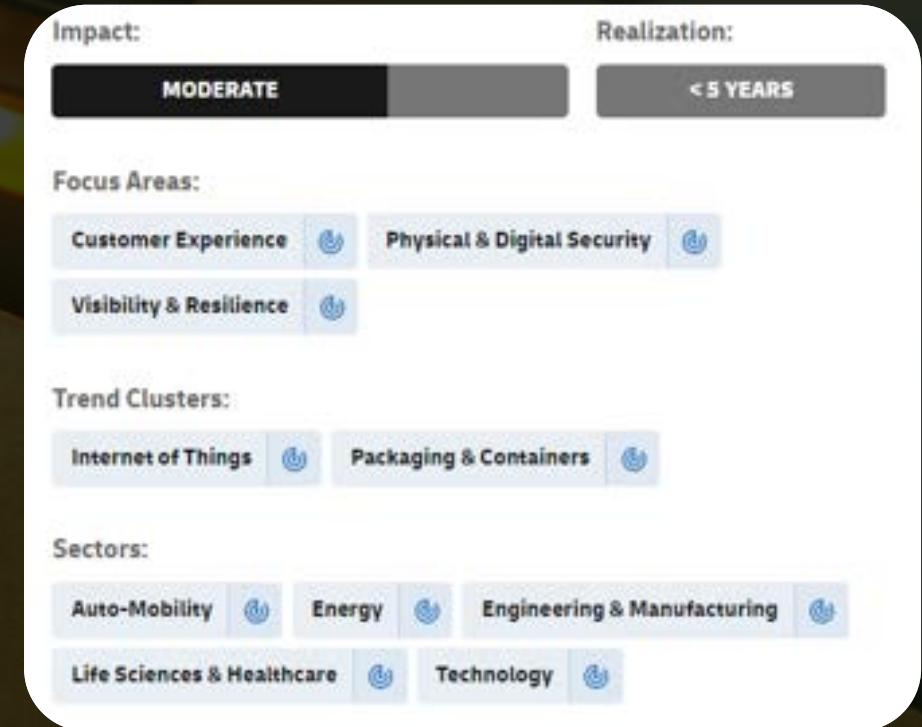
DHL LLP – SUPPLY CHAIN ORCHESTRATION

CSI INNOVATION IN PRACTICE

DHL Supply Chain – Excellence. Simply delivered.

THORSTEN ROGGENBUCK

Global Head of LLP

BETH O'NEILL

**Head of Business Development
EMEA & UKI**

DHL LLP - ONE GLOBAL PARTNER

Legend:
- LLP Centres of Excellence
- LLP Operations

>25 years of operating
EXPERIENCE TO MINIMISE RISK

>90 customer accounts
DIVERSIFICATION & LEARNINGS FROM ALL SECTORS

>Global operations
FOLLOW THE SUN PRINCIPAL AND LOCAL RELATIONSHIPS

>5.7BN spend under management
ECONOMIES OF SCALE AND PROCUREMENT POWER

A proven track record in value creation
TANGIBLE COST SAVINGS AND LOGISTICS COST MANAGEMENT

WE BELIEVE YOUR NEEDS ARE CHANGING...

Digital technologies & new market provider choices

Desire for **more integrated & connected services**

Needing **global simplification, consistency & operational resilience**

Valuing **easier access to the wider DHL** Logistics Marketplace

Agility and Resilience In a VUCA World

DHL

WE BUILT OUR SOLUTION AROUND OUR CUSTOMERS NEEDS

Resilience

Greener

M&A/ Divesture

Quality/ Compliance

Growth acceleration/ New market entries

CUSTOMER NEEDS

Cost efficiency

Visibility

DHL
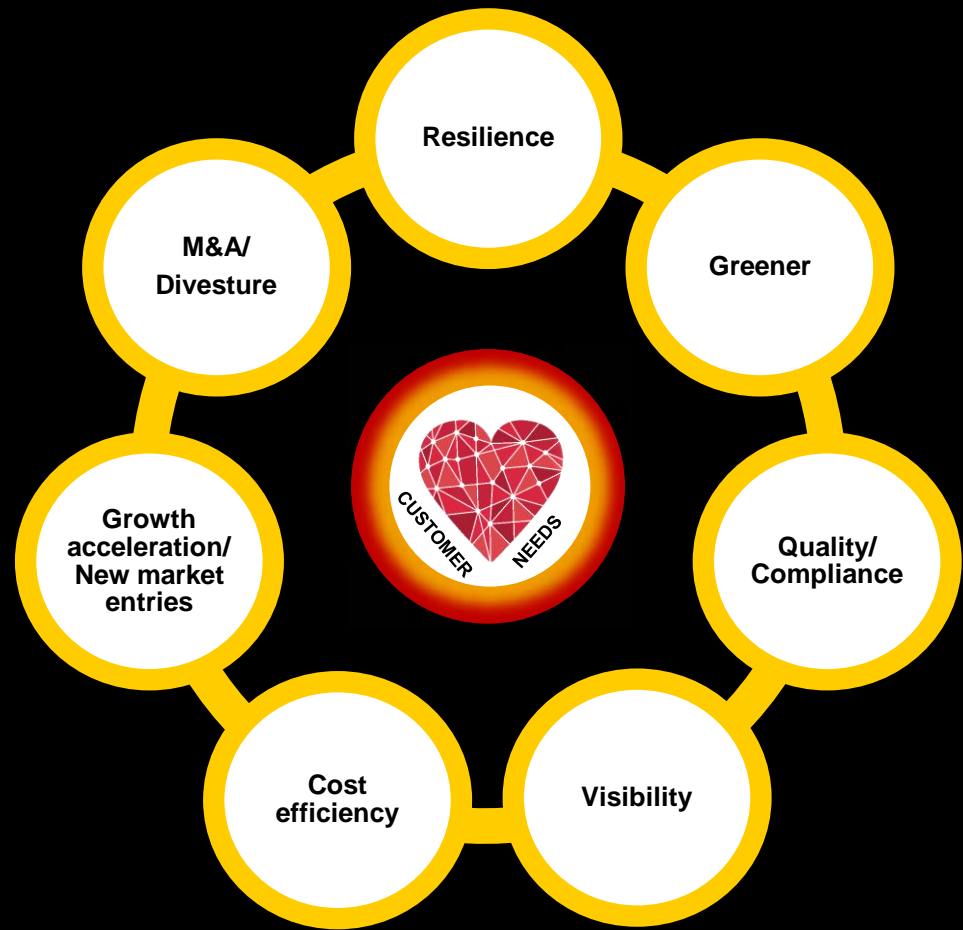
Why consider an LLP solution?

Addressing multiple challenges

Requiring better visibility
Requiring new systems and technology to drive visibility along the E2E supply chain

Cost Management
Delivering direct cost savings across the end-to-end supply chain

Seeking highest ESG standards
Providing best-in-class services without compromising quality, sustainability, and compliance

Increasing resilience and agility
Managing risk and meeting customer expectations in volatile markets

Deliver value through advanced analytics
Driving supply chain to next level through advanced data analytics and insights

Supporting business transformation
Supporting company's strategic business objectives by strategic value, e.g. e-commerce growth, CO_2 efficiency, M&A/divestments

DHL LLP Value Proposition

Across our customers' supply chains and beyond – why LLP is the change catalyst you need

Better Visibility

- Full end-to-end visibility using DHL's own mySupplyChain visibility platform
- Near real-time visibility of shipment locations, inventory levels, performance KPIs for transport, warehousing, packaging

+

Cost Management

- System-/ algorithm-based optimization of network, routes, load optimization
- Capturing of process inefficiencies through robotics process optimization, etc.
- Strategic cost savings initiatives tapping into state-of-the-art tools and value creation resources

+

High ESG Standards

- Highest Environmental, Social and Governance standards (sustainability, organization mindset & behavior, processes & policies)
- Safety at the heart of everything we do, across the supply chain

+

Resilience and agility

- 24/7 end-to-end monitoring and visibility via a single point, to allow informed and timely decisions in ever evolving markets
- Real-time risk monitoring, multi-tier supply chain mapping, and supplier risk assessment (everstream Analytics)
- Baselining, reviews and continuous improvement whilst saving costs

+

Value through Advanced Analytics

- Data-driven decision-making based on digital-twin supply chain simulation
- Holistic value generation using intelligent supply chain value creation methodology (e.g., process waste, CO_2 efficiency, inventory levels, working capital optimization, time-to-market, flexibility/agility)

+

Supporting Business Transformation

- Strategic account management, strategic resources and expertise supporting you with achieving your strategic business objectives, e.g. E-commerce growth, new market entries, flexibly scaling up/down, M&A/ divestments, Go-Green

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WE IDENTIFY YOUR CHALLENGES & CONTINOUSLY IMPROVE YOUR SUPPLY CHAIN

Providing you with End to End Visibility

| Track & Trace | Inventory | Operational Performance | Operational Reporting | Business Analytics | Documents |

Design

Advanced Analytics Continuous Improvement

- Dedicated fleet assessment and design
- Supply chain network design
- Center of gravity-based design
- Inventory Deployment design
- Cost-to-serve analysis
- Process Improvement
- Warehouse sizing and layout design

Manage

- LSP strategic procurement
- LSP strategic management
- Quality management
- Freight term conversion support
- Supplier onboarding
- Supplier training and compliance reporting
- Program management and governance

Our control towers monitor and co-ordinate your

Operate

- Shipment event management
- Track and trace
- Inbound materials management
- Risk incident monitoring and management
- Customer service

Raw Material | Supply Warehouse | Trucking (Domestics) | Factory | Trucking (Domestics) | Custom | Origin Port | Ocean Freight (Intl') | Destination Port | Custom | Trucking (Domestics) | 3PL DC / Warehouse | Trucking (Domestics) | Delivery to End Customer

Business intelligence and analytics

Total logistics cost management Value creation

Digitalization and innovation

Our Customers' Perfect Partner

As an organization we offer our customers…

Experienced	**Global Scale**	**Innovative**	**Security**	**Sustainability**
We have been operating LLP relationships for over 25 years, across the widest range of industry sectors in the 4PL market.	We operate from 22 countries globally, with Centers of Excellence on all Continents. Managing more than 6 million shipments per year, equating to billions of euros worth of logistics spend under management.	With more than 5,000 live projects live across 1,200 global facilities for more than 750 customers, we continue heavy investment into delivering digital supply chain orchestration capabilities.	State-of-the-art datacenters to support our customers 24 hours a day, 365 days a year. Alongside a 24/7 Cyber Defense Center operation with close to real time incident monitoring and threat hunting.	We consider ourselves the industry leader for sustainability, with clean, green and safe solutions for customers that , protect brand integrity with transparent and compliant business practices.

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Supply Chain Innovation @ Bosch

The path of digitalization in logistics:
From standalone solutions towards sustainable connectivity

Iris Socher-Lelong, Robert Bosch GmbH – Powertrain Solutions

07.09.2023

Who we are

BOSCH

Who we are – Bosch 2022
Our company in figures

In 2022

88.2
billion euros
sales revenue

3.8
billion euros EBIT
from operations

421,338
Bosch associates
worldwide at year-end
(approx.)

468
subsidiaries and regional
companies in more than 60
countries

Who we are – Bosch
Our business sectors

Mobility Solutions

Industrial Technology

Energy and Building Technology

Consumer Goods

Who we are – Bosch Powertrain Solutions
Overview

Key figures

~ 80.000 employees

> 50 production sites

> 50 R&D locations

Market segments

Electric vehicles

Passenger car & light commercial vehicles*

Commercial vehicles & Off-Highway*

*incl. hybrid

Products (selection)

Spark plug

Connectors

Engine control unit

Injection pump

Fuel cell power modul

Modular eAxle
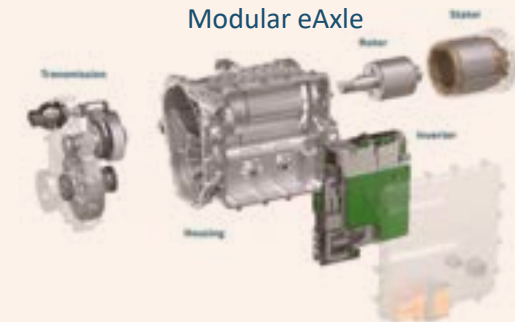
Who we are – Bosch Powertrain Solutions

Our Vision & Mission

Our Vision

#logisticspower solutions

Best in class
logistics solutions
and services

Our Mission

For our powertrain customers,
based on their stakeholder expectations,
we design, enable and steer
lean, **flexible**, **digitalized**
and **sustainable processes**
along the entire supply chain.

Who we are – Bosch Powertrain Solutions
Our organizational Setup at PS/LOI

Agile Global Teams – Think global, act local

6 countries

26 employees

+ Empowerment of the regions
+ Close to value streams in the regions
+ Close collaboration with plants
+ Fostering innovation in the regions
+ Standardization in focus

Germany · US · Mexico · Brazil · India · China

PS/LOI

E2E Process Ownership | Regionalization

Source | Make | Deliver | IN | AM | AP

Collaboration through Agile Global Teams

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Supply Chain Innovation @ Bosch

The path of digitalization in logistics:
From standalone solutions towards sustainable connectivity

BOSCH

Supply Chain Innovation @ Bosch Powertrain Solutions
PS Plant of the Future – How it started
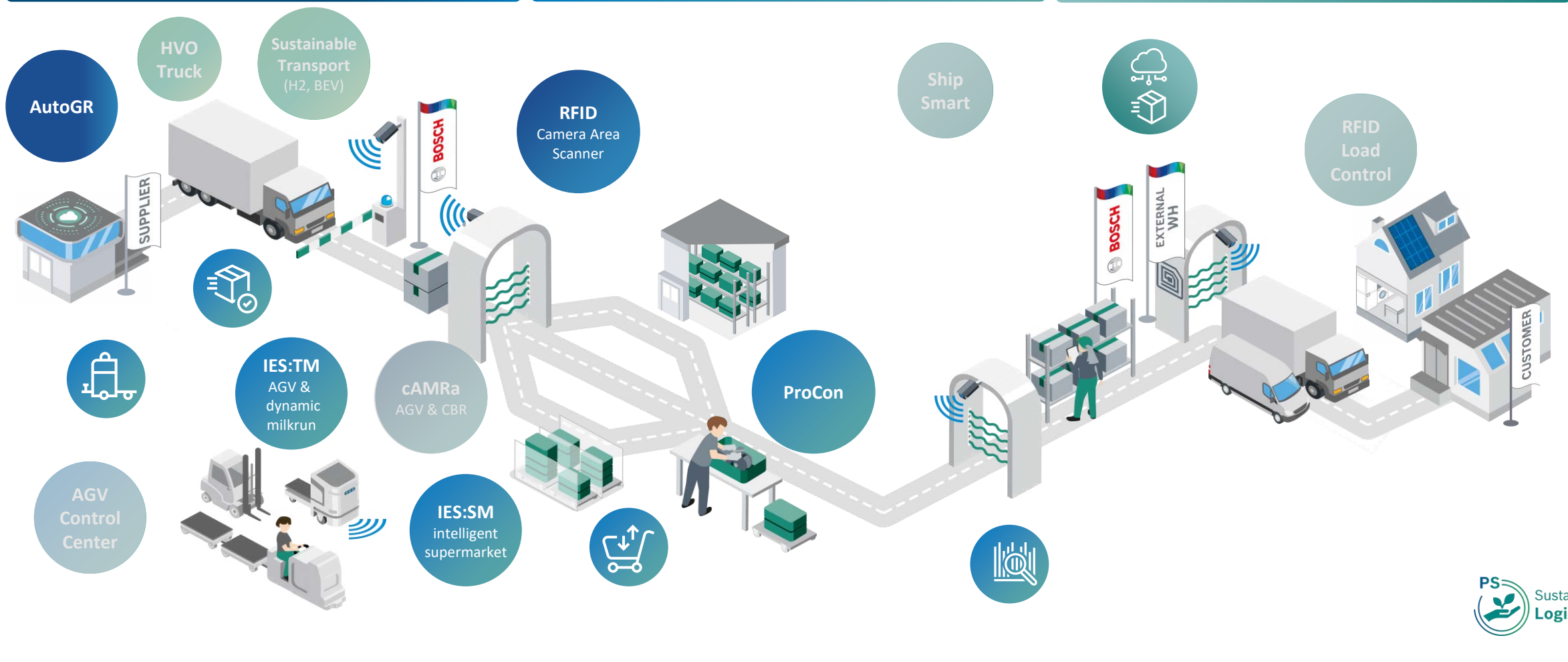
Supply Chain Innovation @ Bosch Powertrain Solutions
PS Plant of the Future – Today

#logisticspower solutions

SOURCE

MAKE

DELIVER

AutoGR

HVO Truck

Sustainable Transport (H2, BEV)

RFID Camera Area Scanner

Ship Smart

RFID Load Control

SUPPLIER

BOSCH

Packaging & Circularity

BOSCH

EXTERNAL WH

CUSTOMER

IES:TM AGV & dynamic milkrun

cAMRa AGV & CBR

ProCon

AGV Control Center

IES:SM intelligent supermarket

FROM STANDALONE SOLUTIONS TO SUSTAINABLE CONNECTIVITY

PS Sustainable Logistics
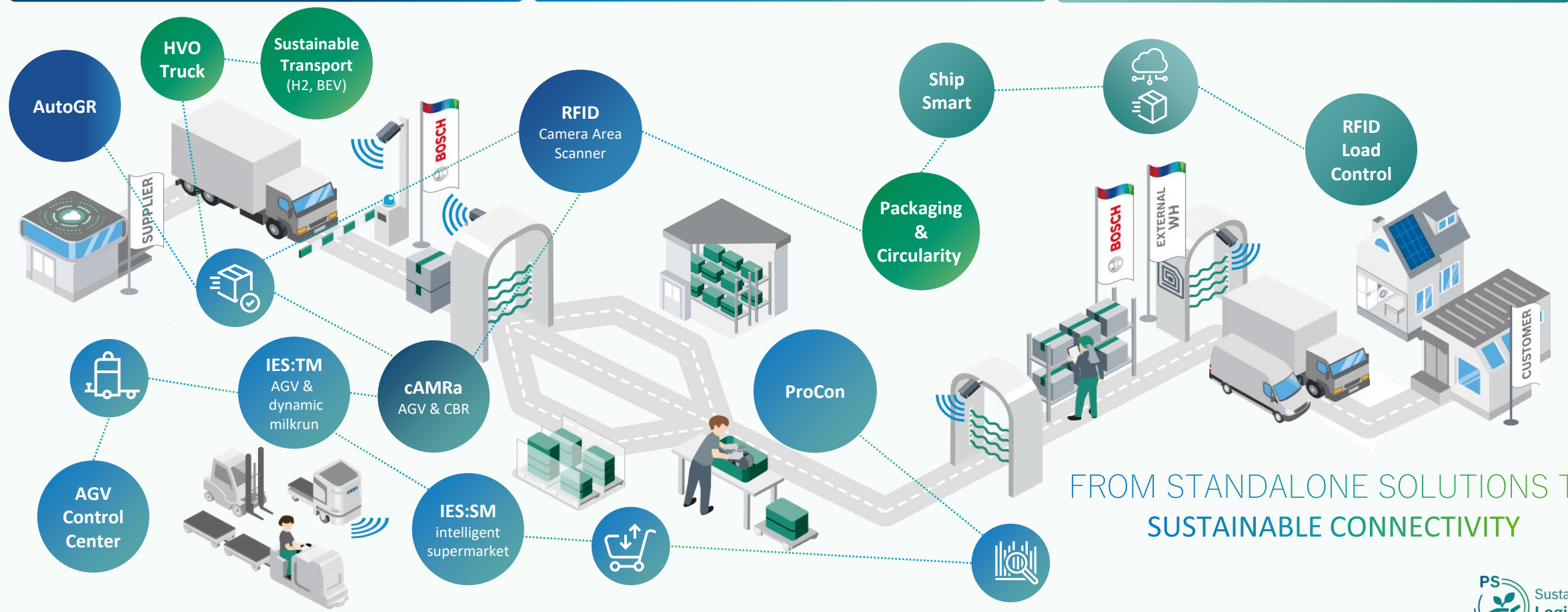
SUSTAINABILITY

Supply Chain Innovation @ Bosch Powertrain Solutions
Key enabler

E2E PROCESS THINKING	**COOPERATION**	**BENCHMARKING**
STANDARDIZATION	**AGILE GLOBAL TEAMS**	**SUSTAINABILITY**

FROM STANDALONE SOLUTIONS TO SUSTAINABLE CONNECTIVITY

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Supply Chain Innovation @ Bosch Powertrain Solutions
Key enabler

E2E PROCESS THINKING
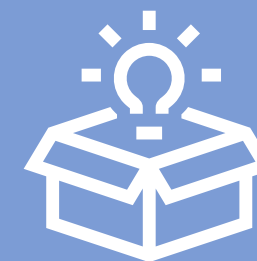
COOPERATION

BENCHMARKING

STANDARDIZATION

AGILE GLOBAL TEAMS

SUSTAINABILITY

FROM STANDALONE SOLUTIONS TO SUSTAINABLE CONNECTIVITY

Supply Chain Innovation @ Bosch Powertrain Solutions
Cooperation with **start-ups** | cAMRa

SUPPLIER

Camera-based Recognition

AUTOMATED GOODS RECEIPT

AGV

AUTONOMOUS TRANSPORTATION AND PUT-AWAY

SUSTAINABLE & AUTONOMOUS TRUCKS

AUTOMATED UNLOADING

Schutzrechtsanmeldungen.
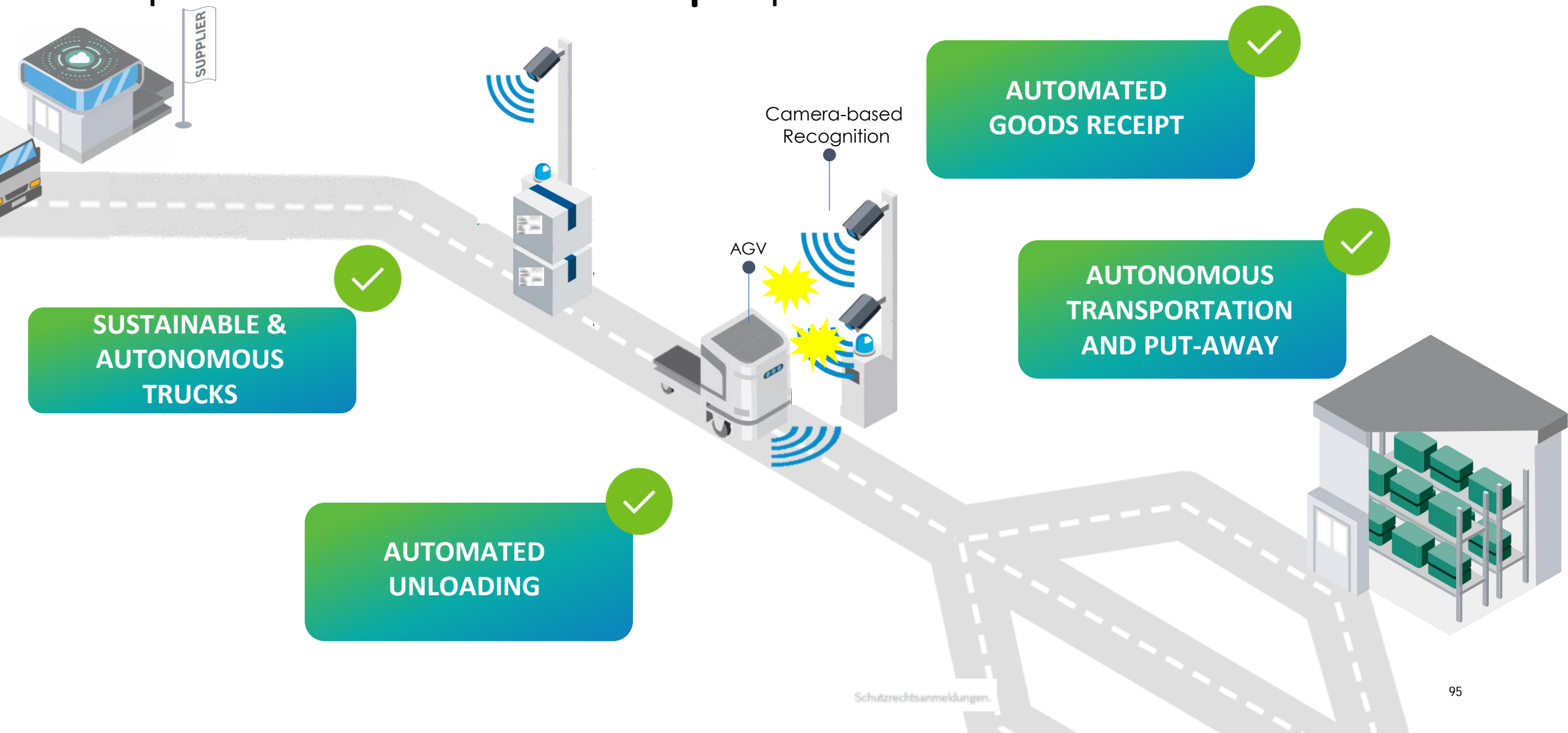
Supply Chain Innovation @ Bosch Powertrain Solutions
Cooperation with **start-ups** | cAMRa

First time in Bosch history - unloading and loading of truck with AGV

Another step towards full automation of the Goods Receipt process

Cooperation between Bosch Powertrain Solutions, Open Bosch & Start-Up

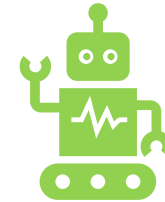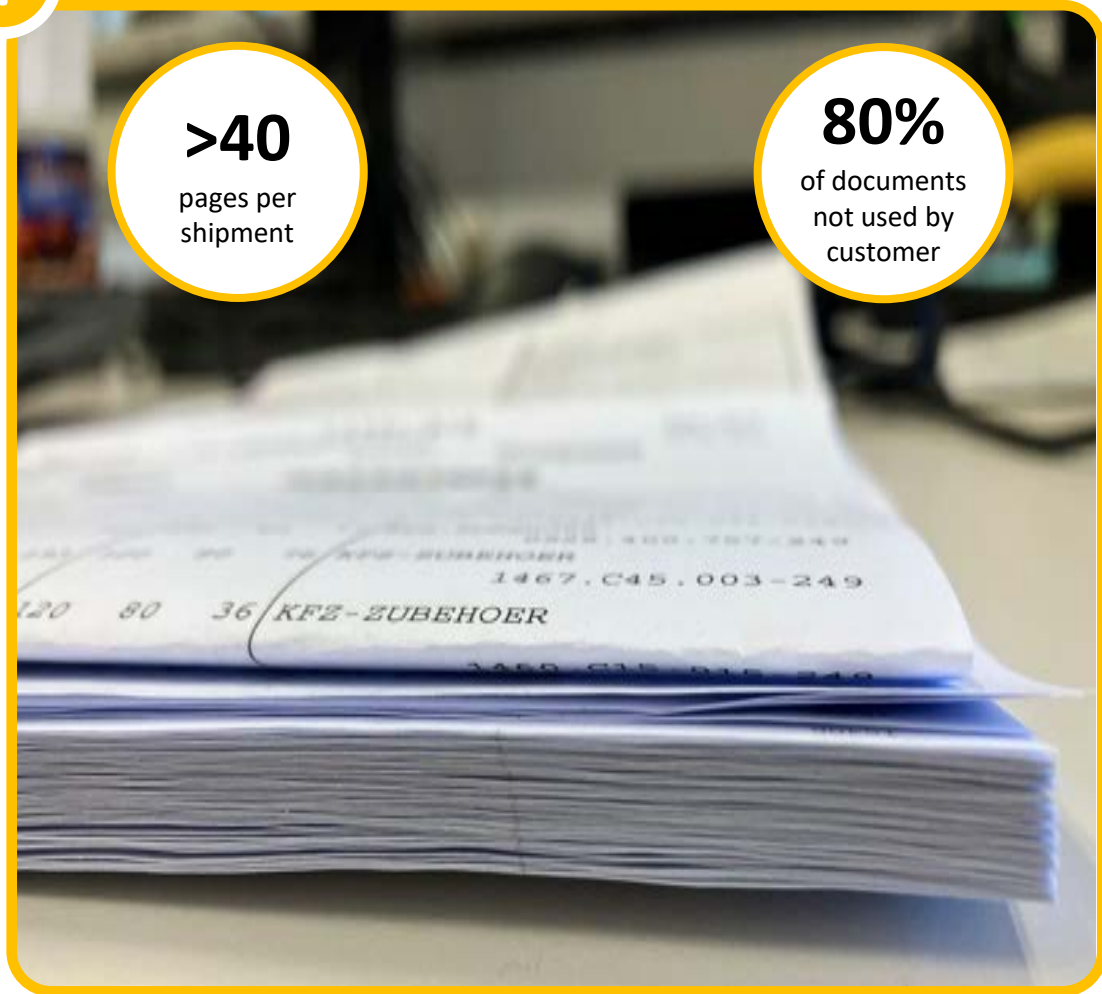# Supply Chain Innovation @ Bosch Powertrain Solutions
Cooperation with **customer** | Paperless shipping

Current state

!

>40
pages per shipment

80%
of documents not used by customer

Target state

Pilot with internal customer

Only transport relevant documents will be printed

Recipient relevant documents will be provided **digitally**

Reduce printed paper by 90% from >40 to 4 pages

Reduce paper handling time **by 75%** from 20 to 5 min

Pilot with external customer

Extend initiative & **awareness of sustainability & digitalization**

Enable digital & cost-efficient logistics processes on **both sides**

sustainable   digital   efficient   secure   beneficial
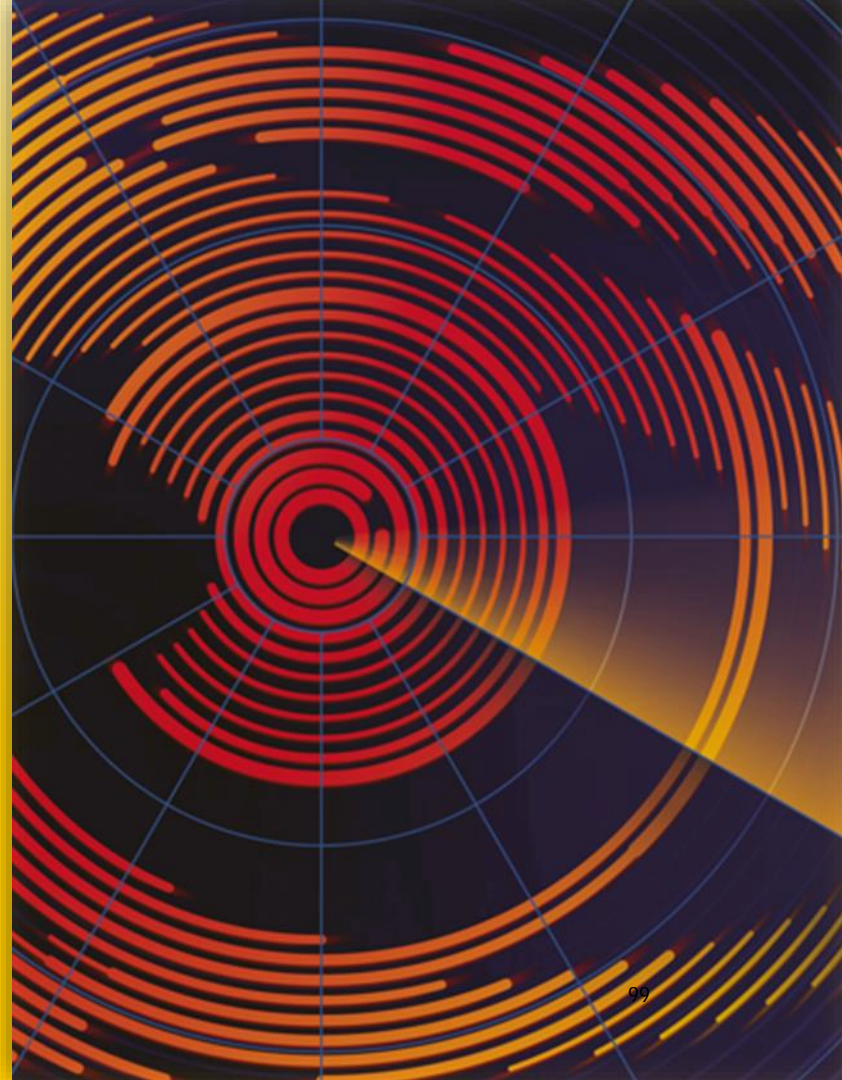
THANK YOU

Questions?

LOOK INTO THE FUTURE

POWERED BY INSIGHTS FROM THE LOGISTICS TREND RADAR 6.0

Dr. Klaus Dohrmann
Vice President
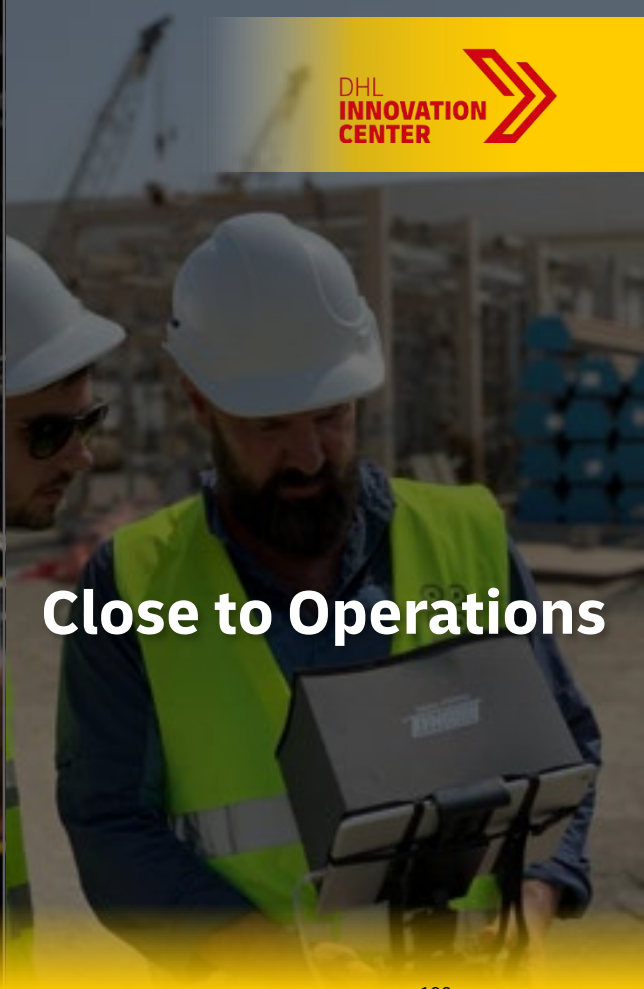Head of Innovation & Trend Research

Troisdorf, September 2023

DHL

WHAT WE BELIEVE IN...

DHL
**INNOVATION
CENTER**

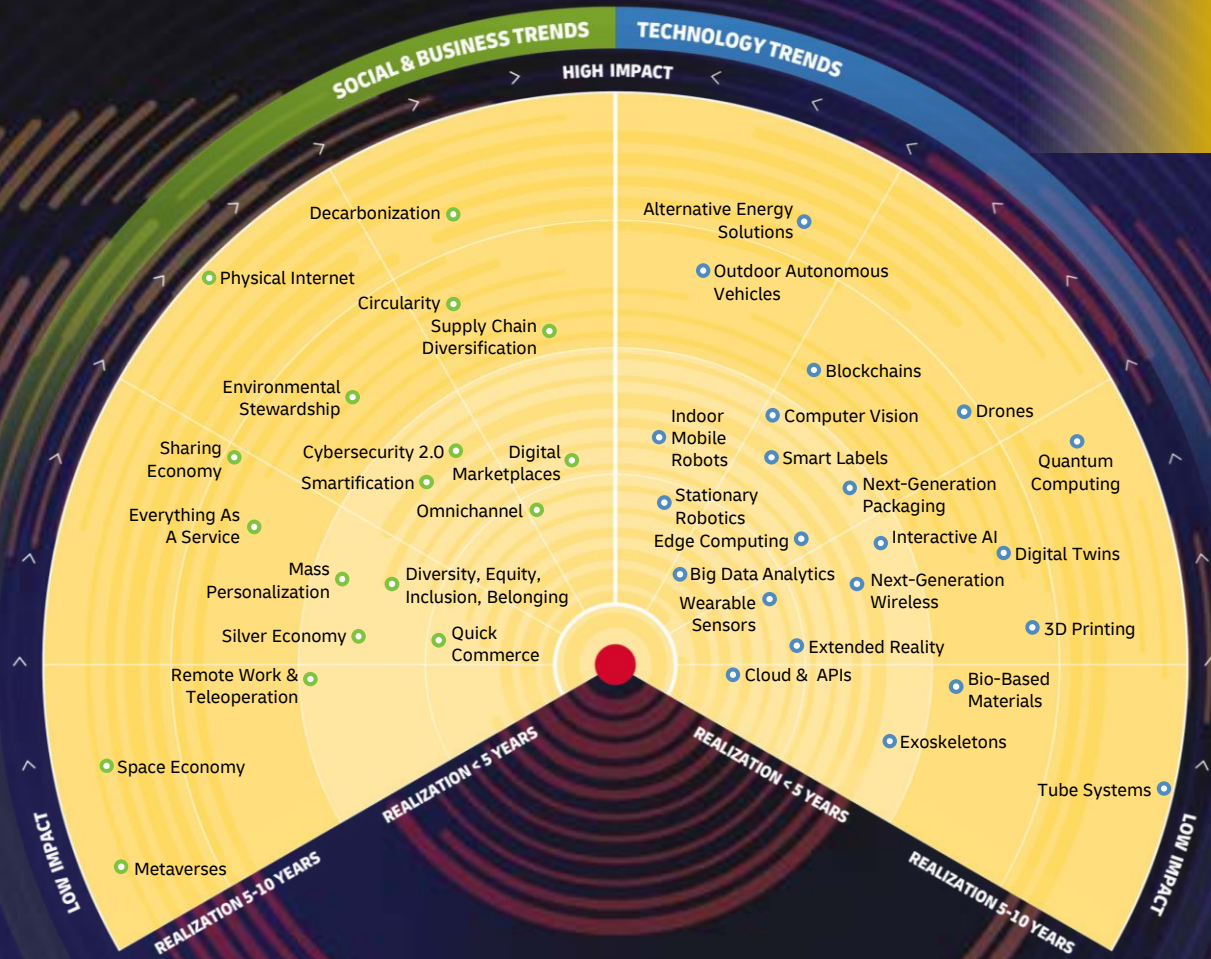**Close to Customers**   **Close to Technology**   **Close to Operations**

DHL Innovation Ecosystem

THE LOGISTICS TREND RADAR 6.0

Delivering insight today, creating value tomorrow.

DHL INNOVATION CENTER

SOCIAL & BUSINESS TRENDS | **TECHNOLOGY TRENDS**

HIGH IMPACT

High Impact
Revolutionary applications that are potentially disruptive.

Low Impact
Evolutionary changes with incremental improvements.

Realization
The common way of operating and doing business in logistics.

Decarbonization

Physical Internet

Circularity

Supply Chain Diversification

Environmental Stewardship

Sharing Economy

Cybersecurity 2.0

Smartification

Digital Marketplaces

Everything As A Service

Omnichannel

Mass Personalization

Diversity, Equity, Inclusion, Belonging

Silver Economy

Quick Commerce

Remote Work & Teleoperation

Space Economy

Metaverses

Alternative Energy Solutions

Outdoor Autonomous Vehicles

Blockchains

Computer Vision

Drones

Indoor Mobile Robots

Smart Labels

Quantum Computing

Next-Generation Packaging

Stationary Robotics

Edge Computing

Interactive AI

Digital Twins

Big Data Analytics

Next-Generation Wireless

3D Printing

Wearable Sensors

Extended Reality

Cloud & APIs

Bio-Based Materials

Exoskeletons

Tube Systems

LOW IMPACT

REALIZATION < 5 YEARS

REALIZATION < 5 YEARS

REALIZATION 5-10 YEARS

REALIZATION 5-10 YEARS

LOW IMPACT

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5

ATTRIBUTES DEFINING

SUPPLY CHAINS OF THE FUTURE

CUSTOMER-CENTRIC

AUTOMATED

CONNECTED

DATA-DRIVEN

SUSTAINABLE

CONNECTED & DATA-DRIVEN
Capturing data to generate actionable insights

PHYSICAL WORLD

INTEGRATION LAYER

INSIGHTS

DATA CAPTURING

SMART ASSETS

NEXT GENERATION WIRELESS

SMARTIFICATION

OTHER ASSETS

SMART LABELS

NEXT GENERATION WIRELESS

COMPUTER VISION

IoT

CLOUD & APIS

DIGITAL TWIN

QUANTUM COMPUTING

AI

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BIG DATA ANALYTICS
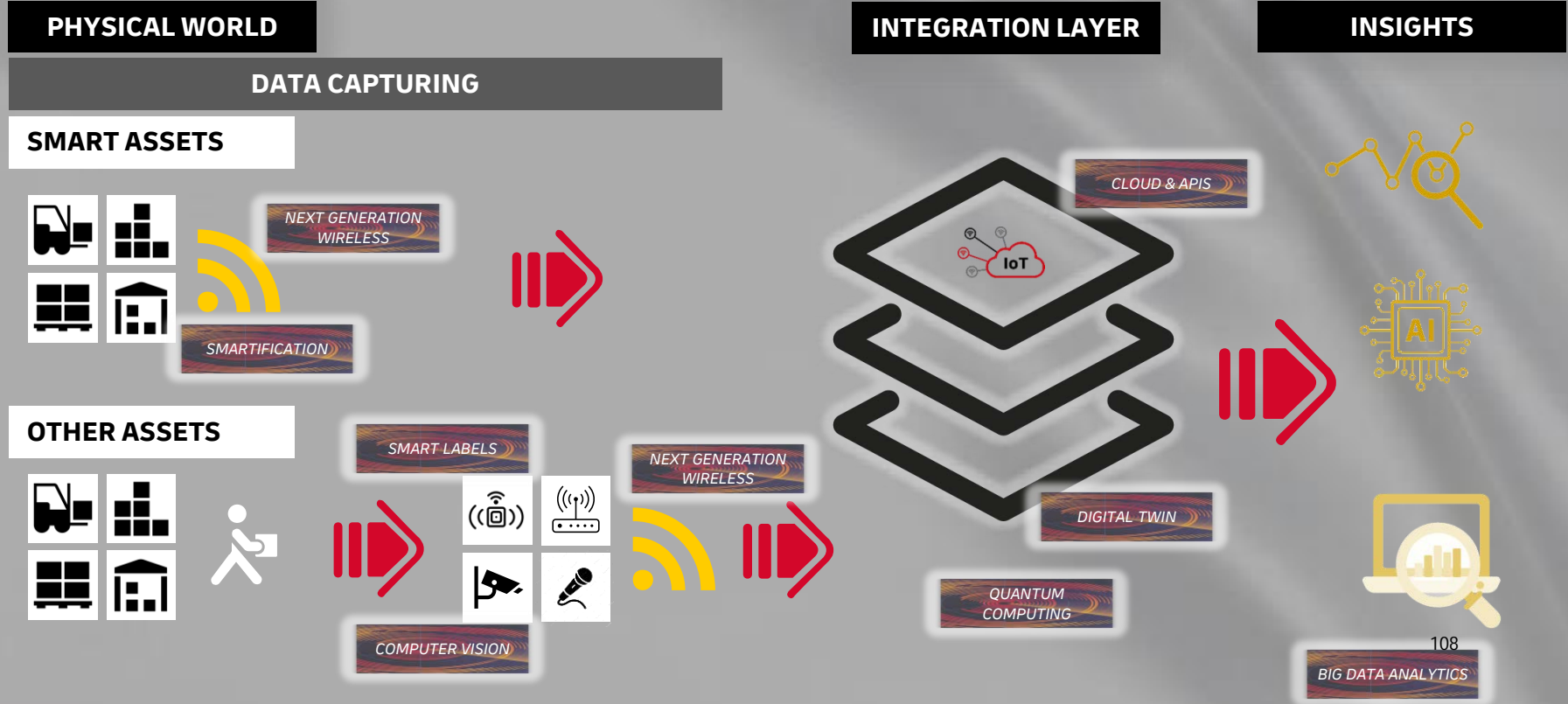
DATA-DRIVEN

IoT Sensor Outlook

Smart Labels

- Thin shipment tracker with printed battery
- Measurement of Temperature, Humidity, Motion, Tamper
- Tracking of high value goods
- Monitoring of consigned inventory
- Getting new information on shipment status (open / close)

No Labels

- Unique code generation using natural paper structure (referred to as its 'fingerprint') as identifier
- Patent pending technology to track parcels without labeling
- Return shipments without paper & labeling for e-commerce customers

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DATA-DRIVEN

Computer Vision Safety in the Workplace

Artificial Intelligence Proof of Concept

- Computer vision solution to build safety rules and define the parameters around it

- Processing historical footage as well as real-time streams of video data to rapidly identify anomalous events

- Create analytics to capture evidence for transparency, improvement, and training

- Dashboard output enables H&S management to make data driven decisions

- No Hardware, no sensors, no installation- compatible with 90% of IP cameras

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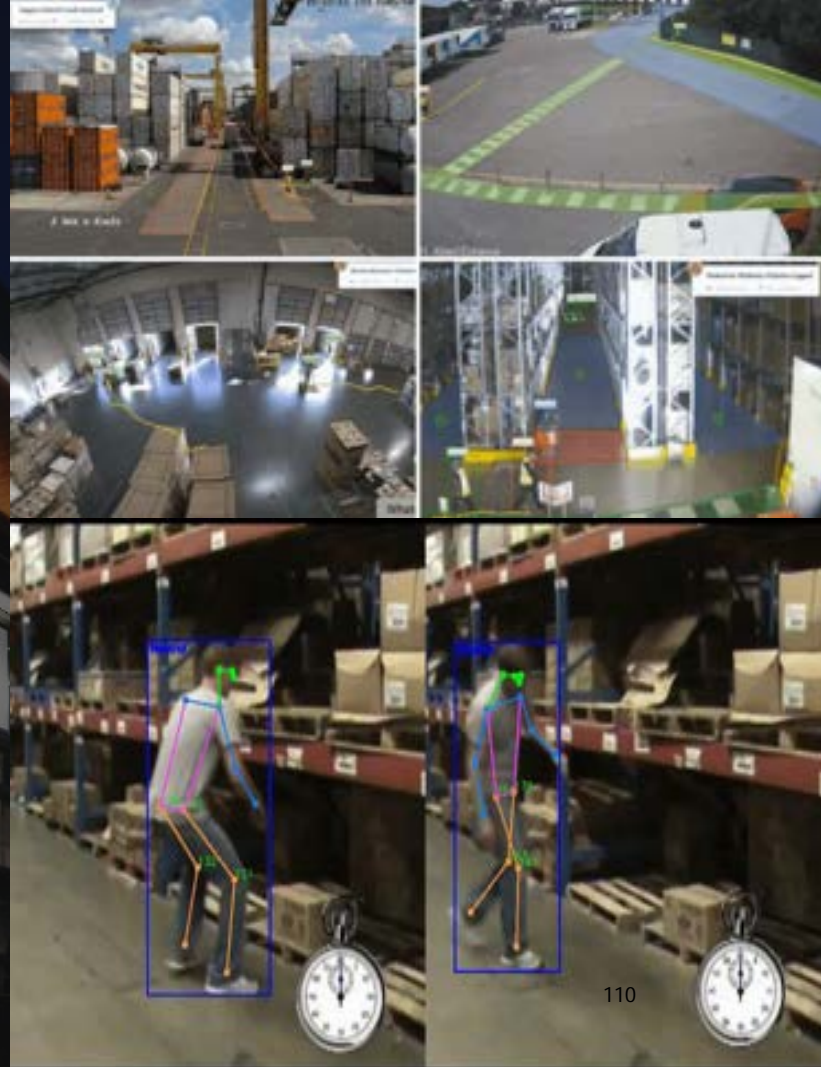
DATA-DRIVEN
Sound AI Predictive Maintenance

Artificial Intelligence Proof of Concept

- Prediction of mechanical failure-based sorter outages

- AI-enabled noise sensors identified to provide best correlation to maintenance needs

- Objectives: increase asset availability & reduce maintenance efforts

Learn

1. Listen	2. Collect	3. Assess	4. Monitor & Alert	5. Maintain

111
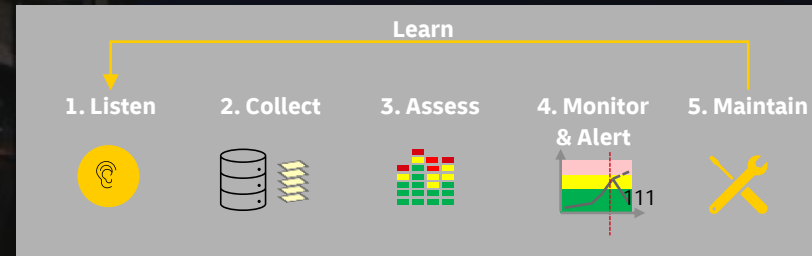
SUSTAINABLE
Leveraging the Innovation Ecosystem
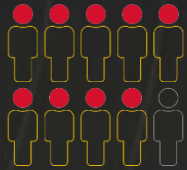
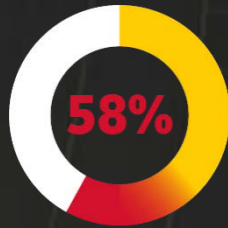# LOGISTICS IS A PEOPLE BUSINESS

DHL Future of Work Trend Report

9 in 10
... believe technology has been helpful to their role the past 5 years

58% Operations

52% Office

... believe new technological advancements are a threat to their job and career
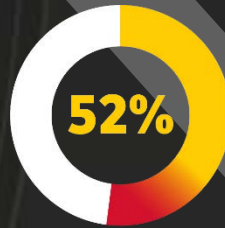
Leaders should **utilize the workforce's enthusiasm and readiness to learn new skills** to collaboratively transform and shape a Future of Work together.

Investment in human capital and workplace culture must come first, superseding efforts to create modern work environments.

Fulfilling the workforce's **varying expectations must be carefully and thoroughly considered**.

Future of Work in Logistics

DHL Trend Report – 2022

THE LOGISTICS
TREND
RADAR
6.0

Delivering insight today,
creating value tomorrow.

YOUR TOOL TO NAVIGATE THE FUTURE!

THANK YOU!

DHL INNOVATION CENTER