Permanent parts marking on aircraft components
Utilization in MRO-Processes and on OEM units manufactured by LH Technik

Product Divisions of the Lufthansa Technik Group to enhance the solutions for our customers

Aircraft Maintenance Services

Aircraft Component Services

Engine Services

Aircraft Base Maintenance

Landing Gear Services

VIP & Executive Jet Solutions

Six Product Divisions will offer:

➢ Competent service and support

➢ Around the clock and around the world

Agenda

How we started with RFID

How we selected the equipment with the best business case

Which technology we want to use

Which processes are we going to change

What does the pilot infrastructure look like

Project ‚RFID in the Lufthansa Technik Group'
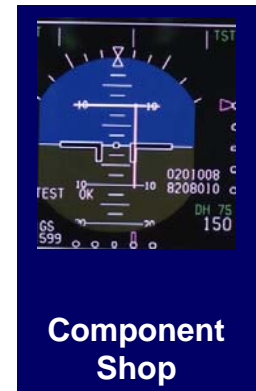
Project phase 1 (2005-2006)

➢ Inspection of environment in logistic- and MRO-processes

➢ Study of RFID-Applications with the potential of leading to practical benefits

➢ **Identification of components as the most promising application field**

Project phase 2 (2006-2007)

➢ Start Implementation project for components

➢ Feasibility study for permanent marking of components

➢ Detailed specification of hardware and software infrastructure

➢ **Pilot implementation**

➢ Roll out decision

Project phase 3 (2007…)

➢ Review of pilot results

➢ Wide rollout

Line Maintenance

Logistics

Component Shop

RFID in the Lufthansa Technik Group
Preparation of decision „RFID Roll-Out for components"

① Component and Process structure ✓

- Profile of types
- Description of processes
- Profiles of involved persons
- Quantities

② Certification ✓

- Approval process
- Feasibility study
- Recommendation

③ Tagging of Components ✓

- Target-process
- RFID-suitability of components
- Technology of connection

④ Evaluation of Technology ✓

- Comparison Requirements vs. Competitive profile
- Technical Tests
- IT-Rough concept

⑤ Prognosis of Technology ✓

- Development direction RFID
- Standardisation
- Recommendation for action

⑥ Economic Viability ✓

- Expenditure and benefit
- Roll-Out scenario and schedule
- Cost effective analysis

⑦ Comparison Barcode ✓

- Advantage and disadvantage of barcodes

RFID in the Lufthansa Technik Group
Preparation of decision „RFID Roll-Out for components"

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RFID in the MRO- and Logistic processes of LHT and LTL
First results of the portfolio analysis

Engines

Wheels

Flyaway stands

Avionic components

Basic conditions

1,00

0,50

0,00

Slides

Gearbox

Brakes

R&S

Landing gear

TW-parts

Compartments

Actuator, Hydr., Pneum.

Electronic components

IFE&ERI

Life vests

ARC

Seats

ARC-Container

Synthetic parts

Consumables

big Engine parts

small

0,00

0,50

1,00

Benefits

RFID in the MRO- and Logistic processes of LHT and LTL
Conclusion: tagging of all components in the marked area
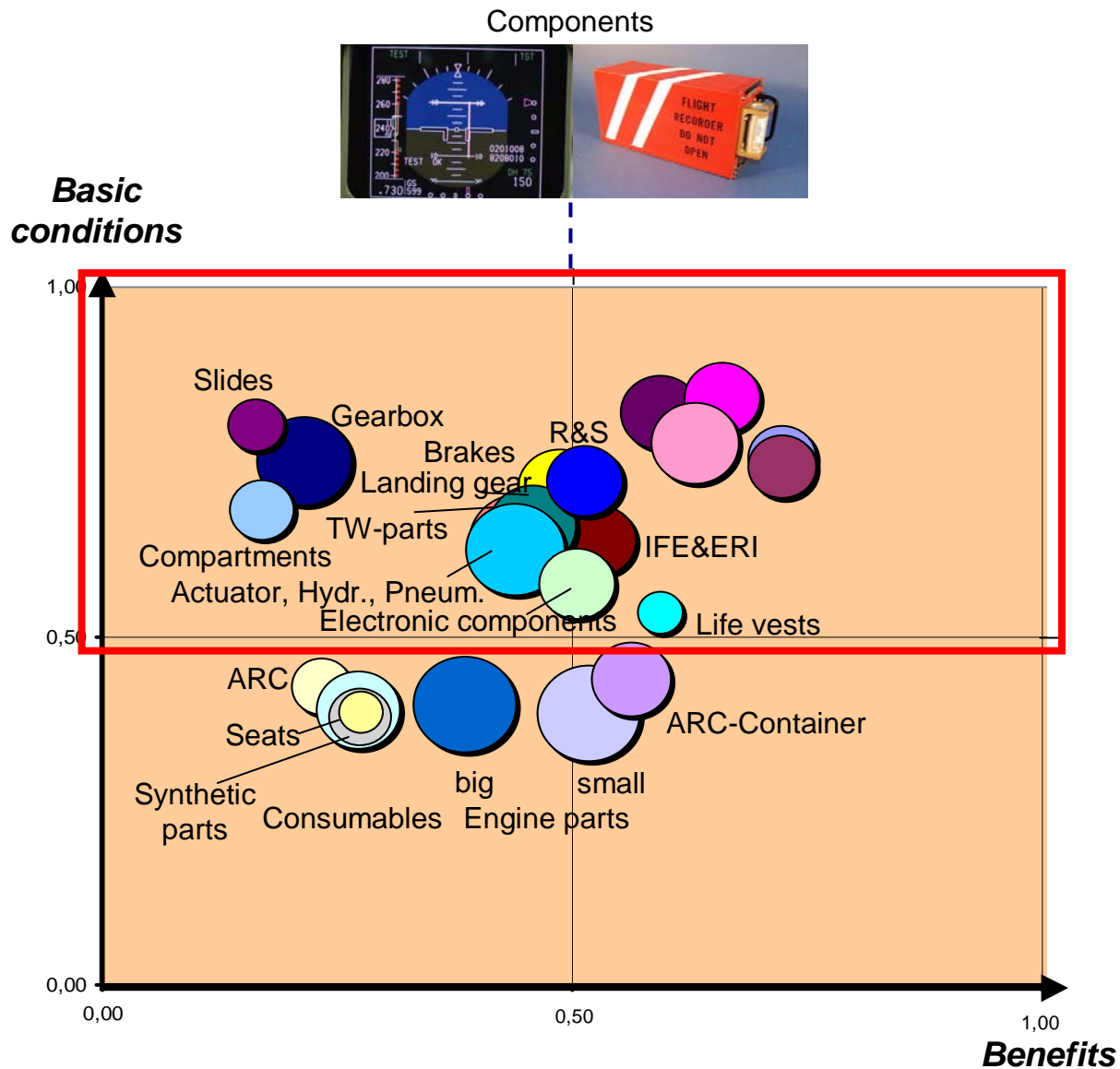
Potential benefits "Permanent parts marking"
MRO-logistics & Asset-Management (Extract)

Aircraft Configuration Management

➢ Improvement of data quality and currentness

➢ Traceability and authenticity of aircraft parts

➢ Aircraft Configuration Control

➢ Simplification of transition checks at aircraft purchase and sale

Accelerated receiving-process at the logistic hubs

➢ Paperless processes / avoidance of media-breaks

➢ Simplification of identity-checks (part vs. documentation)

Reduction of incorrect deliveries

➢ Additional (automatic) tracking points

➢ Real-time feedback on handling-errors

Agenda

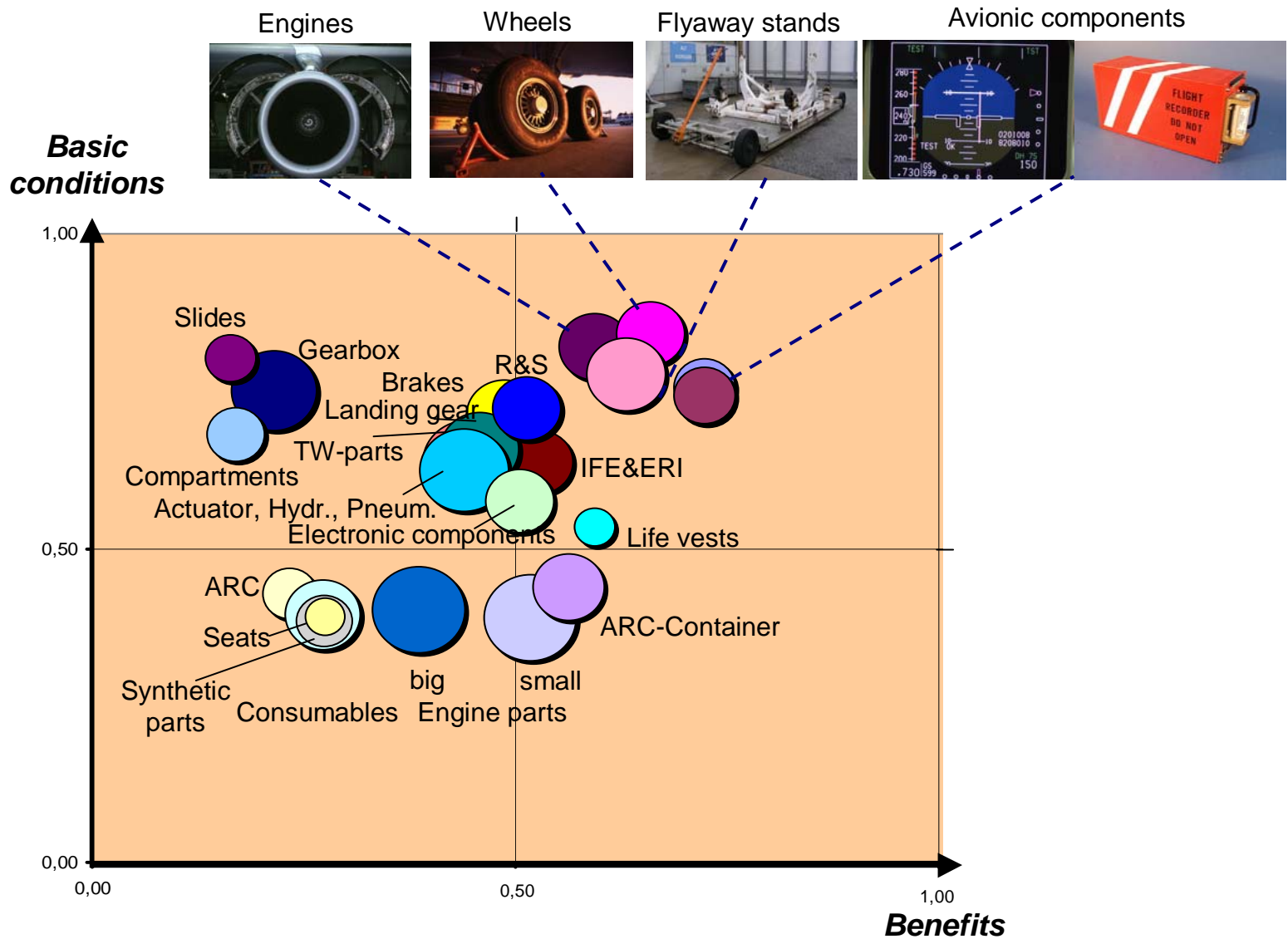How we started with RFID

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LHT specification equivalent to Boeing requirements
Results of research and deeper analysis

Requirements	Manageable?	Remarks
Passive, reader talk first protocol	✓	Part of the standard
860 - 960 MHz frequency range	✓	= EPC, Class 1, Gen2
Readrange between 1 and 2 meters	✓	Tested in simulations
Read/write secure memory (64 kBit)	✓	Mechanism basically available, but no chip
Complies with ATA SPEC 2000 Chapter 9	✓	-/-
Environmental tests per DO 160E requirements	✓	Proved with existing materials
Resistance against environmental conditions of maintenance	✓	Proved with existing materials
Air Interface in acc. with ISO 18000-6C	✓	Identical with EPC, Class 1, Gen 2
Metal mount, surface insensitive packaging	✓	Transponders avail-able, not enough mem
10 year service life	✓	10-20 years typical
Complies with FAA policy dated 13.05.05	✓	-/-

➢ Availability of chips with user memory greater than 1kbit still outstanding but important to meet future ATA standards

➢ Most of the remaining requirements matched by the market with several products

➢ Smart labels exist that fit concerning a large number of the requirements

Summary:

➢ **Currently no suitable RFID tag available in the market – in depth discussion with chip, antenna and housing producers needed**

RFID in the Lufthansa Technik Group
Permanent parts marking in MRO-Processes

Permanent parts marking of components

➢ Line Replaceable Units (LRU) & Emergency Equipment

➢ Passive RFID-Tags

➢ UHF-Technology (860 to 960 MHz)

➢ metal mount

➢ Storing data: static data, like serial number, manufacturer, part number etc.*)

➢ Housing: Resistant against several influences from the MRO-Processes, like hydraulic oil, X-rays, substances from cleaning processes etc.

*) dynamic data, like repair histories, routing information
   will be stored in central databases in first step

Number of units (Pool material):

➢ Installed   965.000 EA

➢ Workshop, warehouse   95.000 EA

➢ Total   1.060.000 EA

Agenda

How we started with RFID

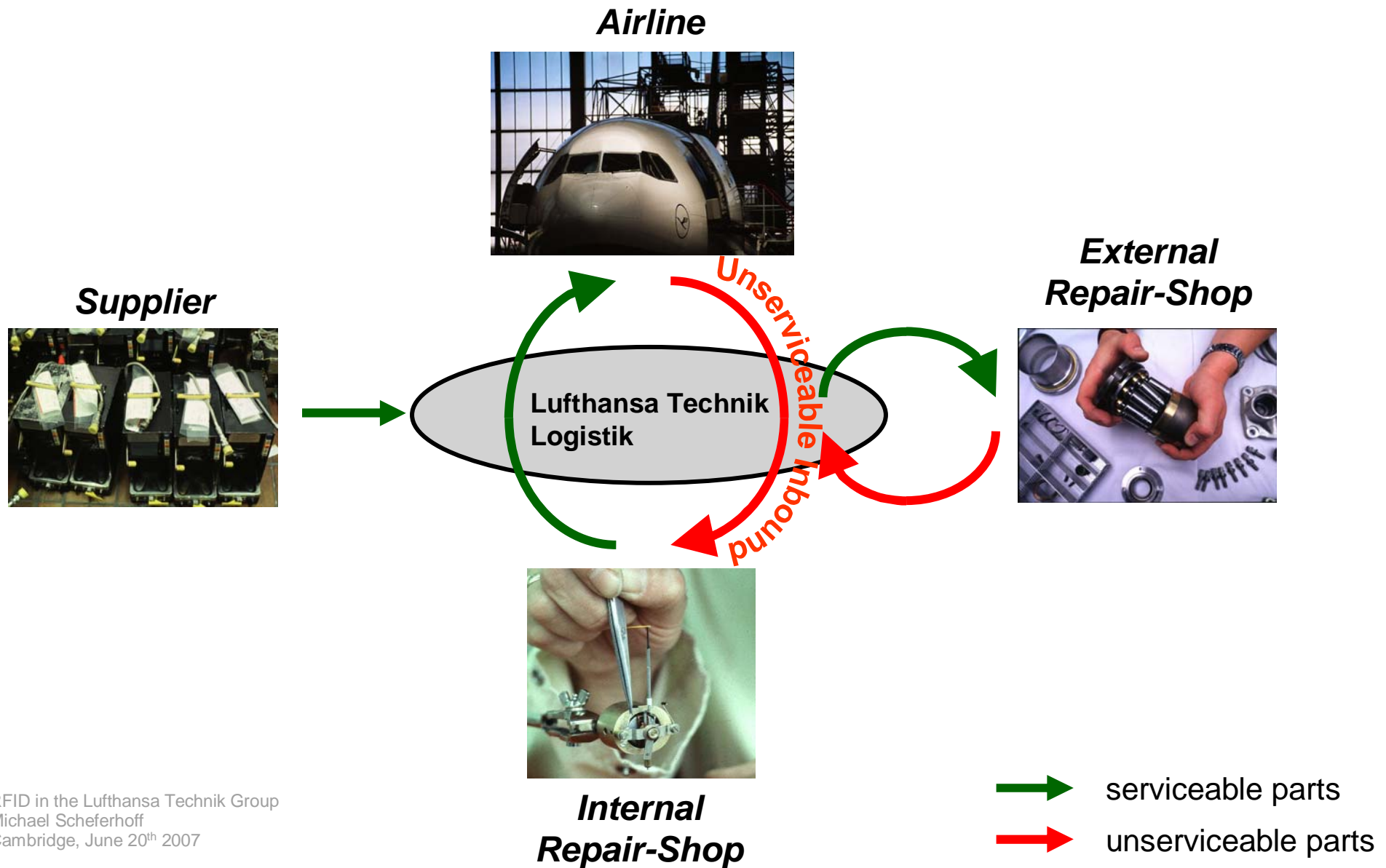How we selected the equipment with the best business case

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RFID in the Lufthansa Technik Group
Overall MRO-Logistic processes

Airline

Supplier

External Repair-Shop

Lufthansa Technik Logistik

Unserviceable Inbound

Internal Repair-Shop

serviceable parts

unserviceable parts

Unserviceable Inbound: Removal from A/C => Internal Repair-Shop
Current Return-process

Maintenance

Logistics

Repair

Hangar

Internal Transport
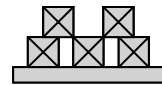
Logistic hub

Internal Transport

Workshop

manual booking of part change

Transportation Service

Transportation Service

LHT-Mechanic

Unserviceable Inbound: Removal from A/C => Internal Repair-Shop
Target Return-process

Maintenance		**Logistics**		**Repair**

Maintenance

Hangar

Internal Transport

LHT-Mechanic

Logistics

Internal Transport

Logistic hub

automatic register and booking of part change
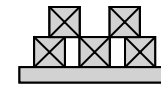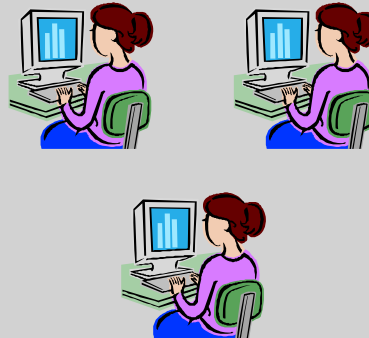
Transportation Service

Transportation Service
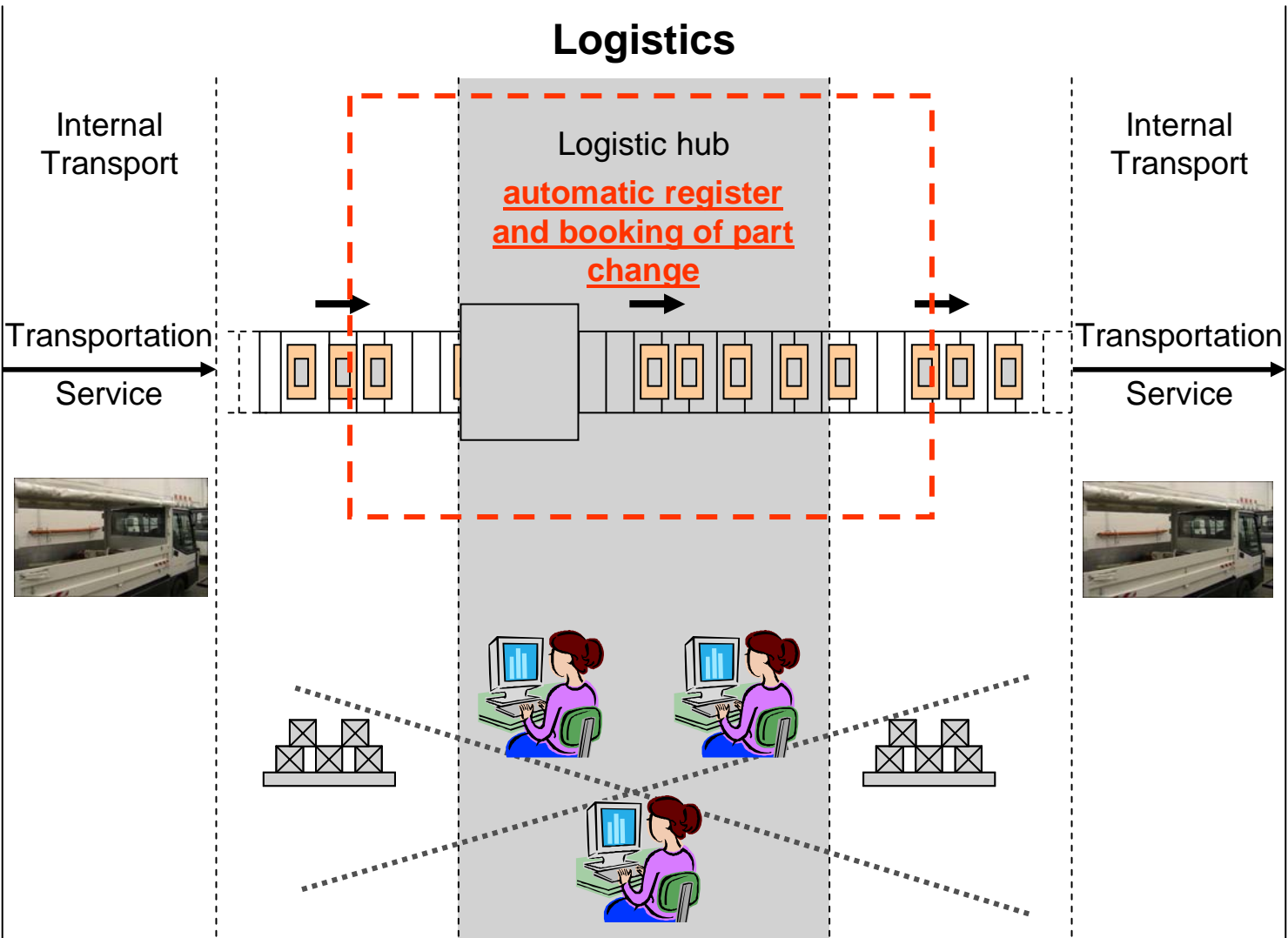
Repair

Workshop

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Current project results
Automatic identification of parts at LTL receiving area

Usage of handhelds and gates for

automatic equipment identification

➢ Setup of prototypes and execution of field tests („proof-of-technology")

➢ Comparison of currently available tags and readers

➢ Validation of the read quota for label tags on shipping documents

➢ Consideration of the test results in the tender for tags and readers

RFID / same day component logistic at LHT/ LTL
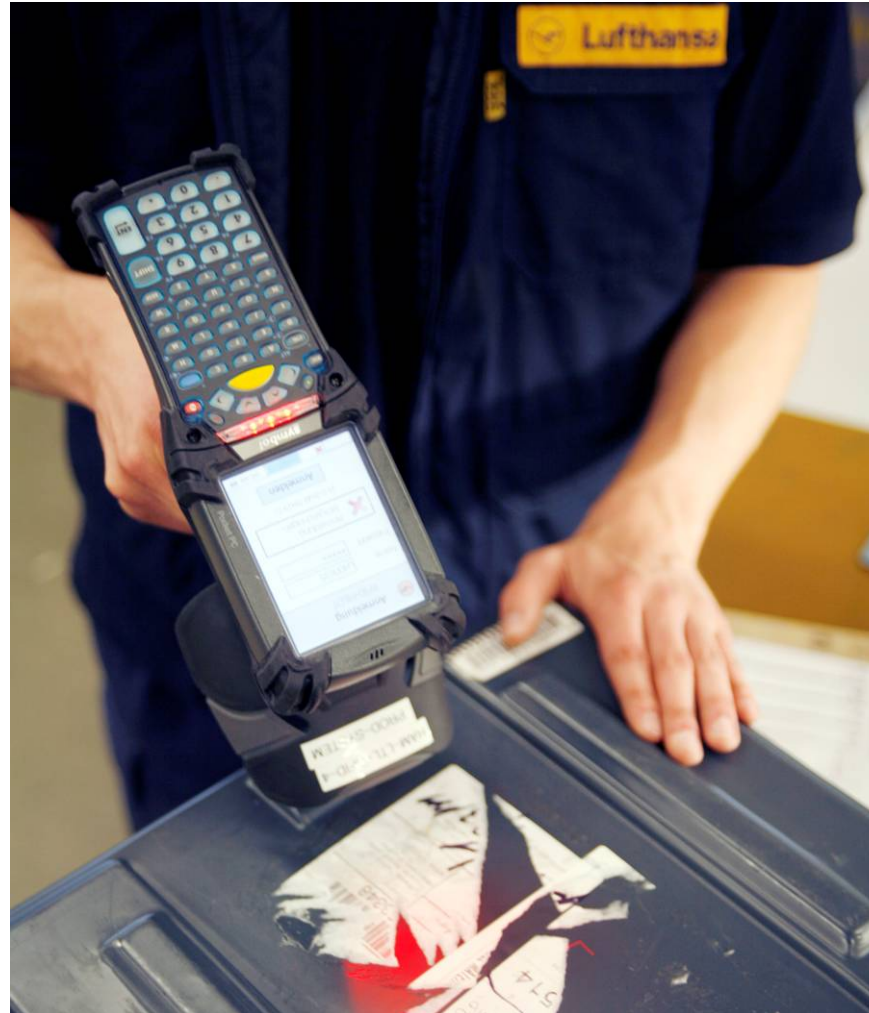## 1. phase: Pilot operation at the branch HAM

➢ RFID-Gate at „central station" for internal logistic processes

RFID / same day component logistic at LHT/ LTL
1. phase: Pilot operation at the branch HAM

➢ Manual registration of components via Handheld

RFID / same day component logistic at LHT/ LTL
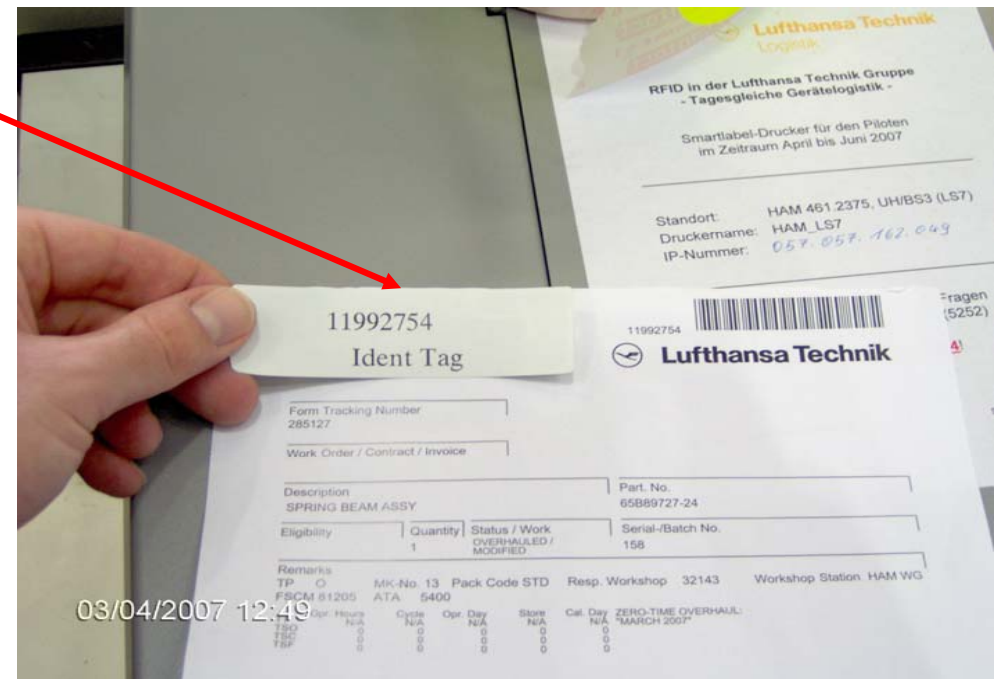## 1. phase: Pilot operation at the branch HAM

➢ Dispatch shelf and dispatch monitor / buffer area

RFID / same day component logistic at LHT/ LTL
1. phase: Pilot operation at the branch HAM

➤ RFID smart label initialization

If you have any questions

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Thank you very much