CONFERENCE OMAINTEC 2024 EXHIBITION

THE 21ST INTERNATIONAL OPERATIONS & MAINTENANCE CONFERENCE IN THE ARAB COUNTRIES

Effective Spare Parts Management

Tomas Hladik, Logio

#OmaintecConf

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OMAINTEC
المجلس العربي للتشغيل والصيانة
Arab Operations & Maintenance Council

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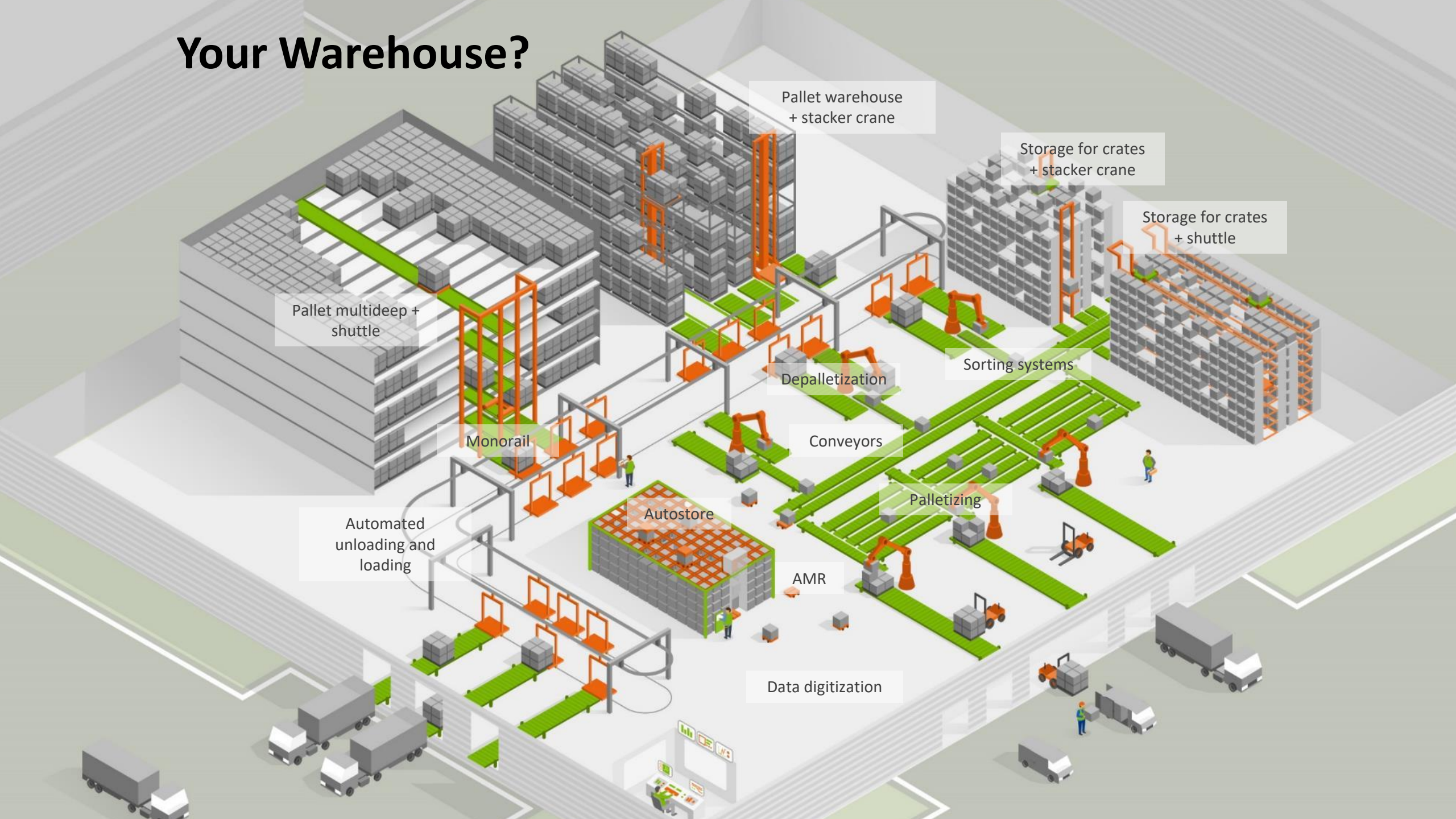
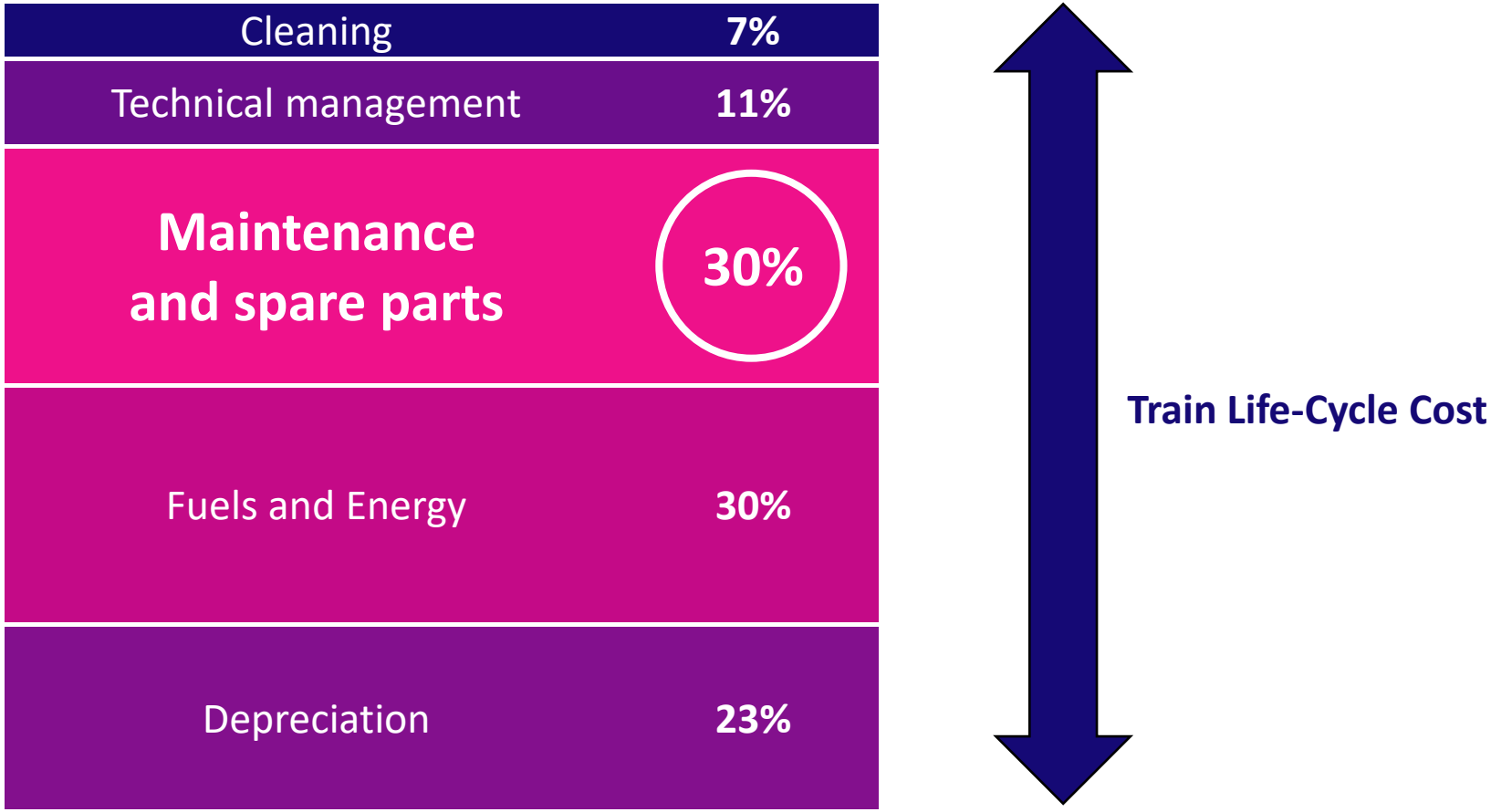
Your Warehouse?



What I have to say?

- Introduction
- Four global trends in maintenance and why we should care
- Digitalization and beyond
- Service BoMs, Spares catalogues and Digital Twins
- Spare Part and Asset Life-cycle
- Inventory management and forecasting intermittend demand
- Eight recommendations for effective spare parts management

SPARE PARTS IN ROLLING STOCK LCC



Source: Oliver Wyman/www.railway-technical.com.

4Ds: GLOBAL CHALLENGES IN MAINTENANCE

1 DIGITALIZATION
2 DEALING WITH AGING ASSETS
3 DEMOGRAPHICS
4 DECARBONIZATION

4Ds: GLOBAL CHALLENGES IN MAINTENANCE

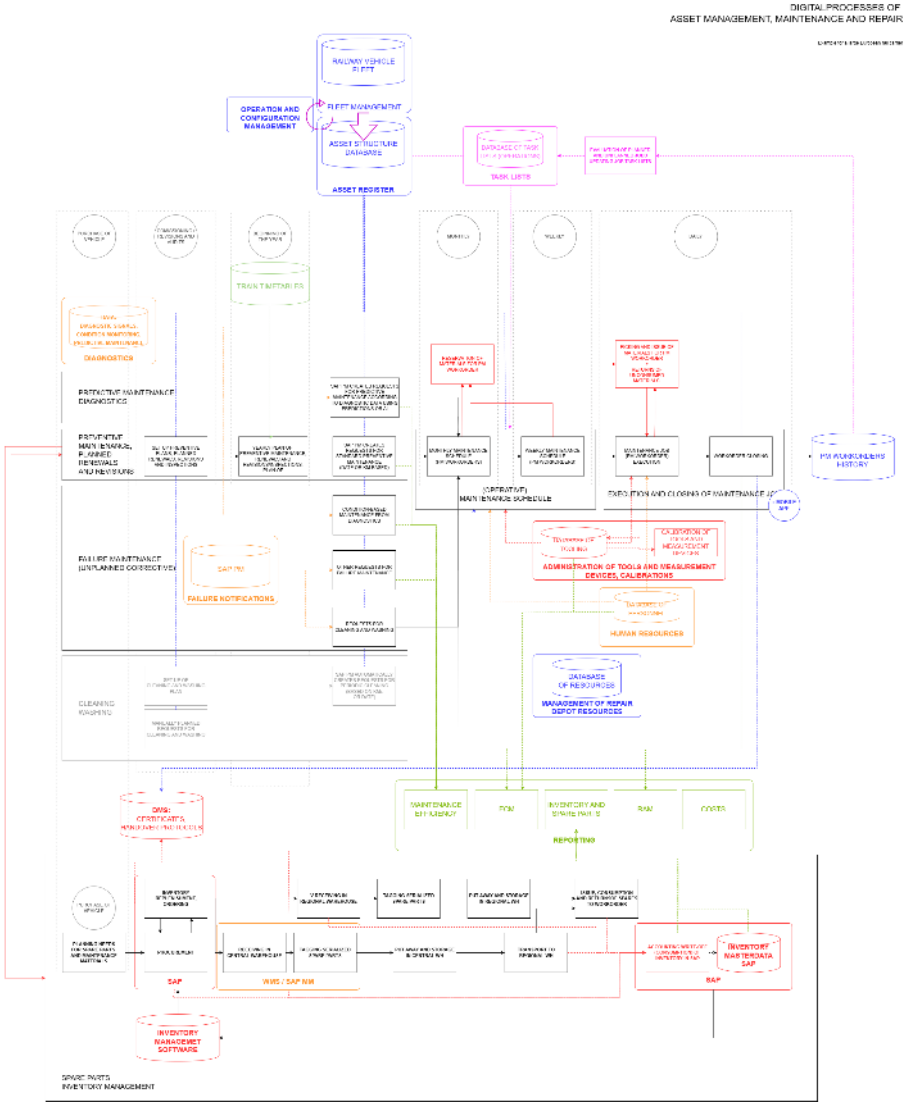
1 DIGITALIZATION

2 DEALING WITH AGING ASSETS

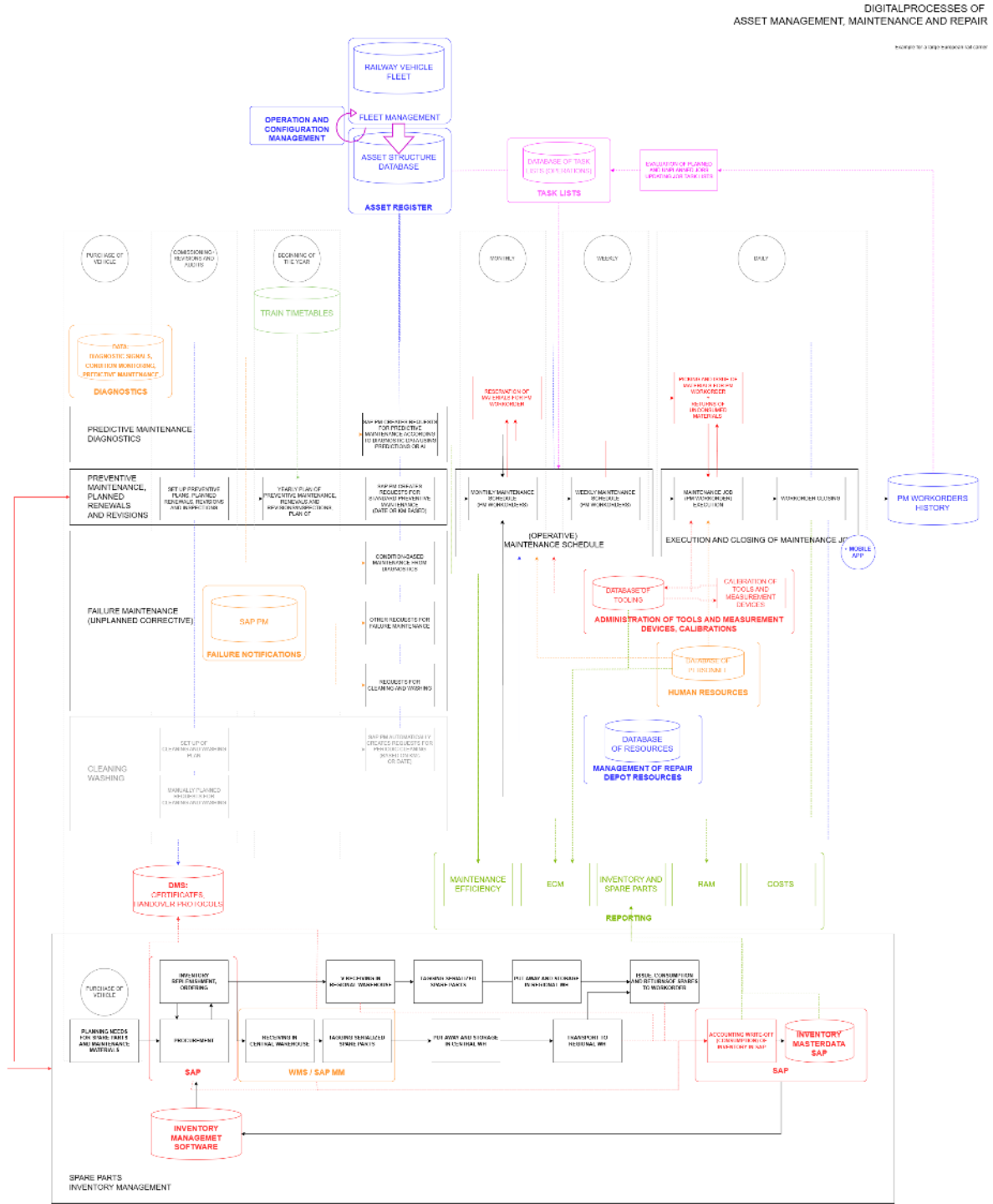
3 DEMOGRAPHICS

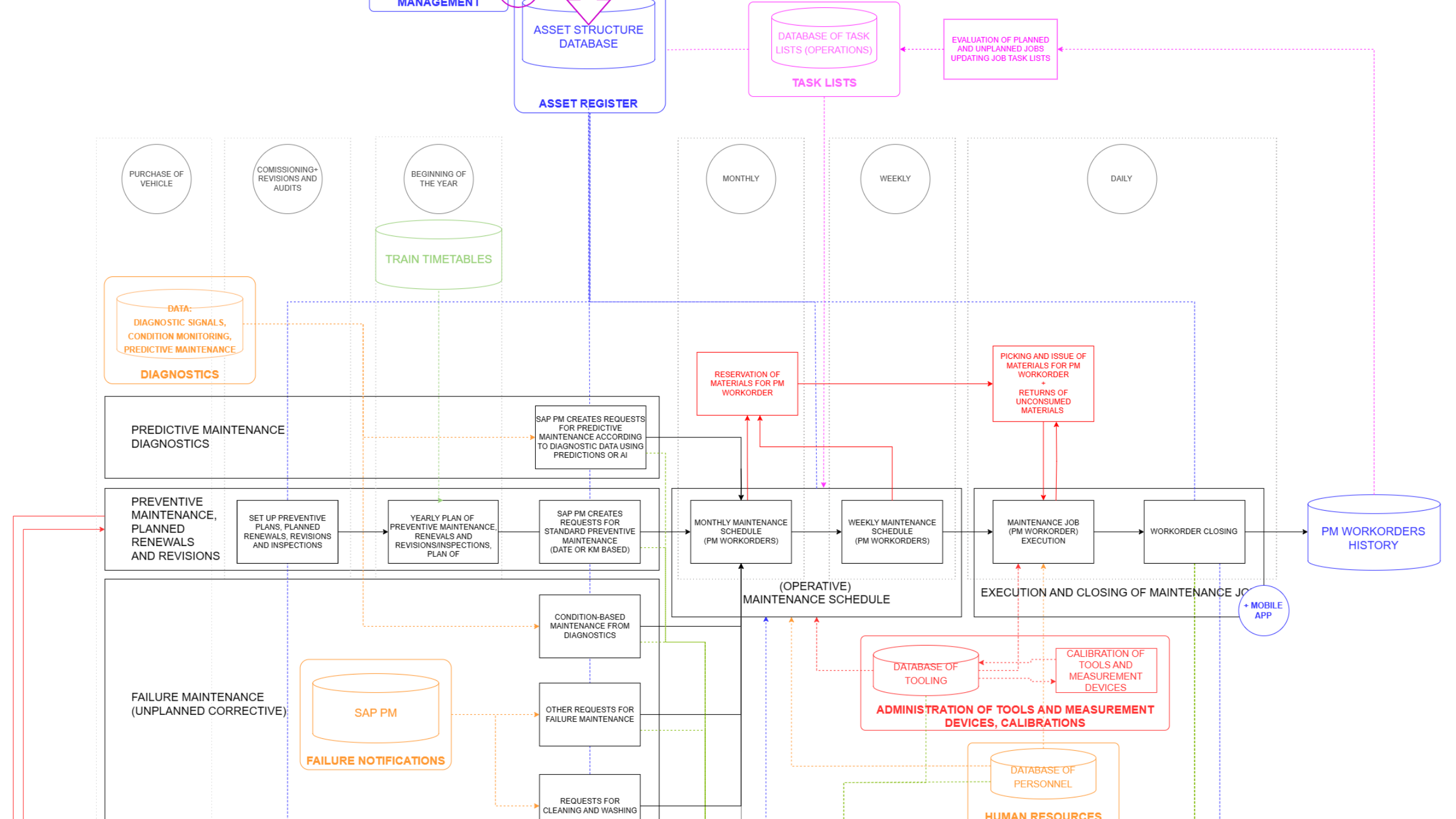
4 DECARBONIZATION

DIGITALIZATION

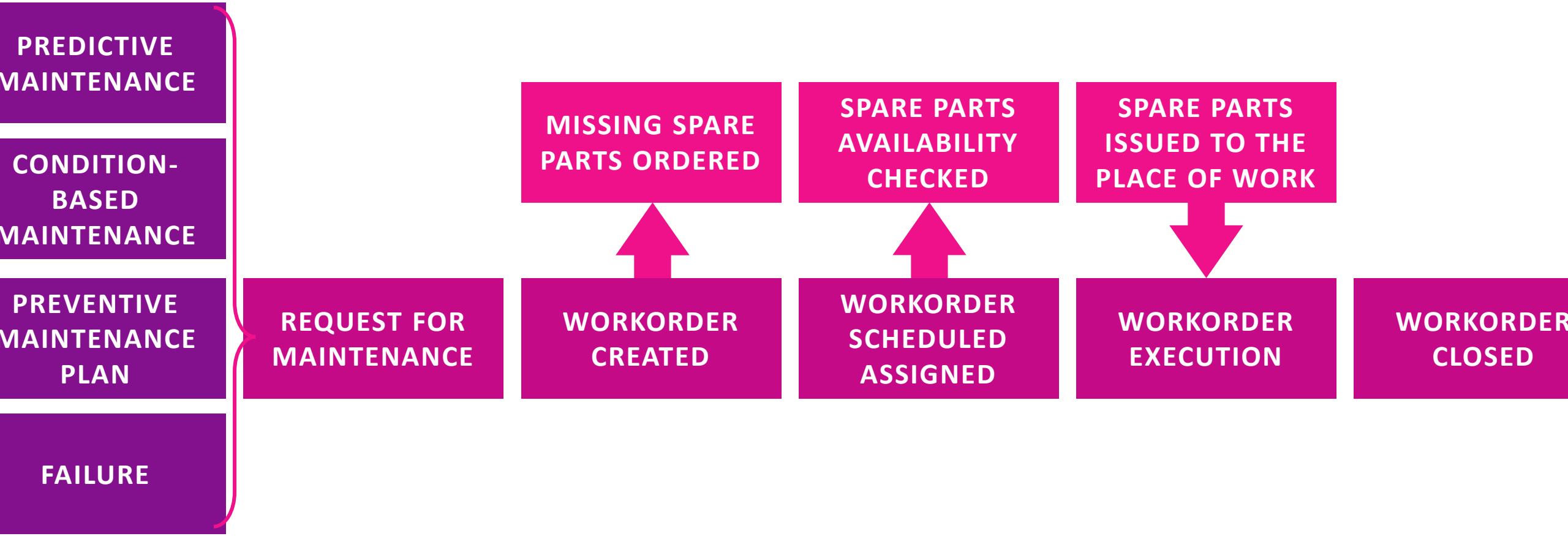


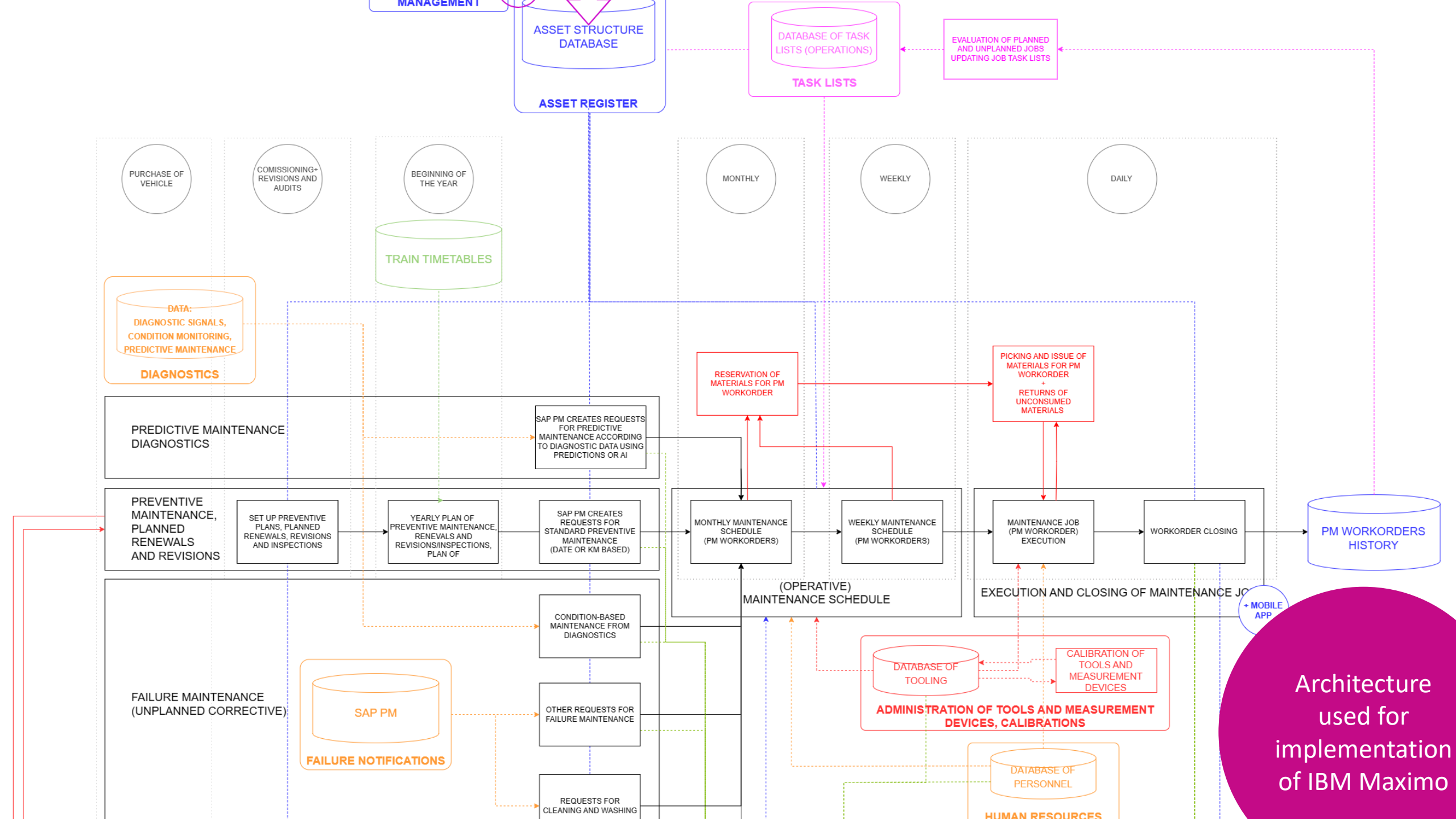
An example of digital maintenance architecture in a railway operator




MANAGEMENT
ASSET STRUCTURE DATABASE
ASSET REGISTER
DATABASE OF TASK LISTS (OPERATIONS)
TASK LISTS
EVALUATION OF PLANNED AND UNPLANNED JOBS UPDATING JOB TASK LISTS
PURCHASE OF VEHICLE
COMISSIONING+ REVISIONS AND AUDITS
BEGINNING OF THE YEAR
MONTHLY
WEEKLY
DAILY
TRAIN TIMETABLES
DATA: DIAGNOSTIC SIGNALS, CONDITION MONITORING, PREDICTIVE MAINTENANCE
DIAGNOSTICS
RESERVATION OF MATERIALS FOR PM WORKORDER
PICKING AND ISSUE OF MATERIALS FOR PM WORKORDER + RETURNS OF UNCONSUMED MATERIALS
PREDICTIVE MAINTENANCE DIAGNOSTICS
SAP PM CREATES REQUESTS FOR PREDICTIVE MAINTENANCE ACCORDING TO DIAGNOSTIC DATA USING PREDICTIONS OR AI
PREVENTIVE MAINTENANCE, PLANNED RENEWALS AND REVISIONS
SET UP PREVENTIVE PLANS, PLANNED RENEWALS, REVISIONS AND INSPECTIONS
YEARLY PLAN OF PREVENTIVE MAINTENANCE, RENEVALS AND REVISIONS/INSPECTIONS, PLAN OF
SAP PM CREATES REQUESTS FOR STANDARD PREVENTIVE MAINTENANCE (DATE OR KM BASED)
MONTHLY MAINTENANCE SCHEDULE (PM WORKORDERS)
WEEKLY MAINTENANCE SCHEDULE (PM WORKORDERS)
MAINTENANCE JOB (PM WORKORDER) EXECUTION
WORKORDER CLOSING
PM WORKORDERS HISTORY
(OPERATIVE) MAINTENANCE SCHEDULE
EXECUTION AND CLOSING OF MAINTENANCE JO
+ MOBILE APP
CONDITION-BASED MAINTENANCE FROM DIAGNOSTICS
FAILURE MAINTENANCE (UNPLANNED CORRECTIVE)
SAP PM
FAILURE NOTIFICATIONS
OTHER REQUESTS FOR FAILURE MAINTENANCE
REQUESTS FOR CLEANING AND WASHING
DATABASE OF TOOLING
CALIBRATION OF TOOLS AND MEASUREMENT DEVICES
ADMINISTRATION OF TOOLS AND MEASUREMENT DEVICES, CALIBRATIONS
DATABASE OF PERSONNEL
HUMAN RESOURCES

DIGITAL MAINTENANCE PROCESS





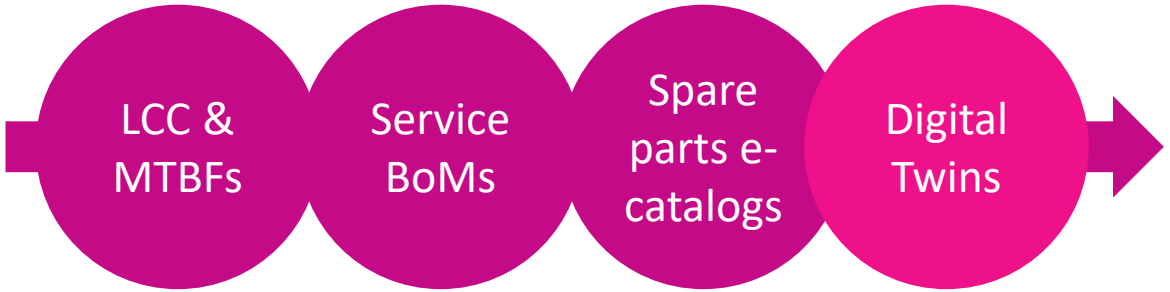
Architecture used for implementation of IBM Maximo

DIGITALIZATION

Coping with *digitalization* ***debt****?*

Creating ***added value*** *through digitalization?*

DIGITALIZATION BEYOND LIMITS OF OUR ORGANIZATION



DIGITAL TWIN AS PRESENTED BY PAUL DAUGALIS

WORKSHOP

Digital Twins Unveiled: Simulating Asset Performance for Optimal Management

Eng. Paul Daugalis
Managing Director
Assetcorexl
United Arab Emirates

Biography:

Paul Daugalis has worked in the fields of Engineering, Construction and Maintenance for the past 30 years throughout Australia, Europe and the Middle East. He has worked heavily in oil and gas, mining, utilities, rail and more recently the building industries and considered an expert in Asset Management (ISO 55000).

He is currently the owner of Pro Reliability Management Consultancy LLC in Dubai, UAE of which he led the development of AssetCoreXL a state of the art, online reliability engineering platform that encompasses RCM, RAM modelling, data analytics and RCFA.

Workshop Objectives:

In this workshop, we will delve into advanced methodologies of constructing a Reliability Block Diagram (RBD), using it as a foundation for predicting asset health and performance. Leveraging Monte-Carlo simulations, we will analyze the entirety of a plant or its specific sub-systems to extrapolate key performance indicators such as reliability, availability, maintainability, risk, and production throughput efficiency that identify process bottlenecks.

Read more...

28 JAN 2024 | 09:30 - 10:30

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RESHAPING EDUCATION AND TRAINING TO MEET FUTURE MAINTENANCE NEEDS

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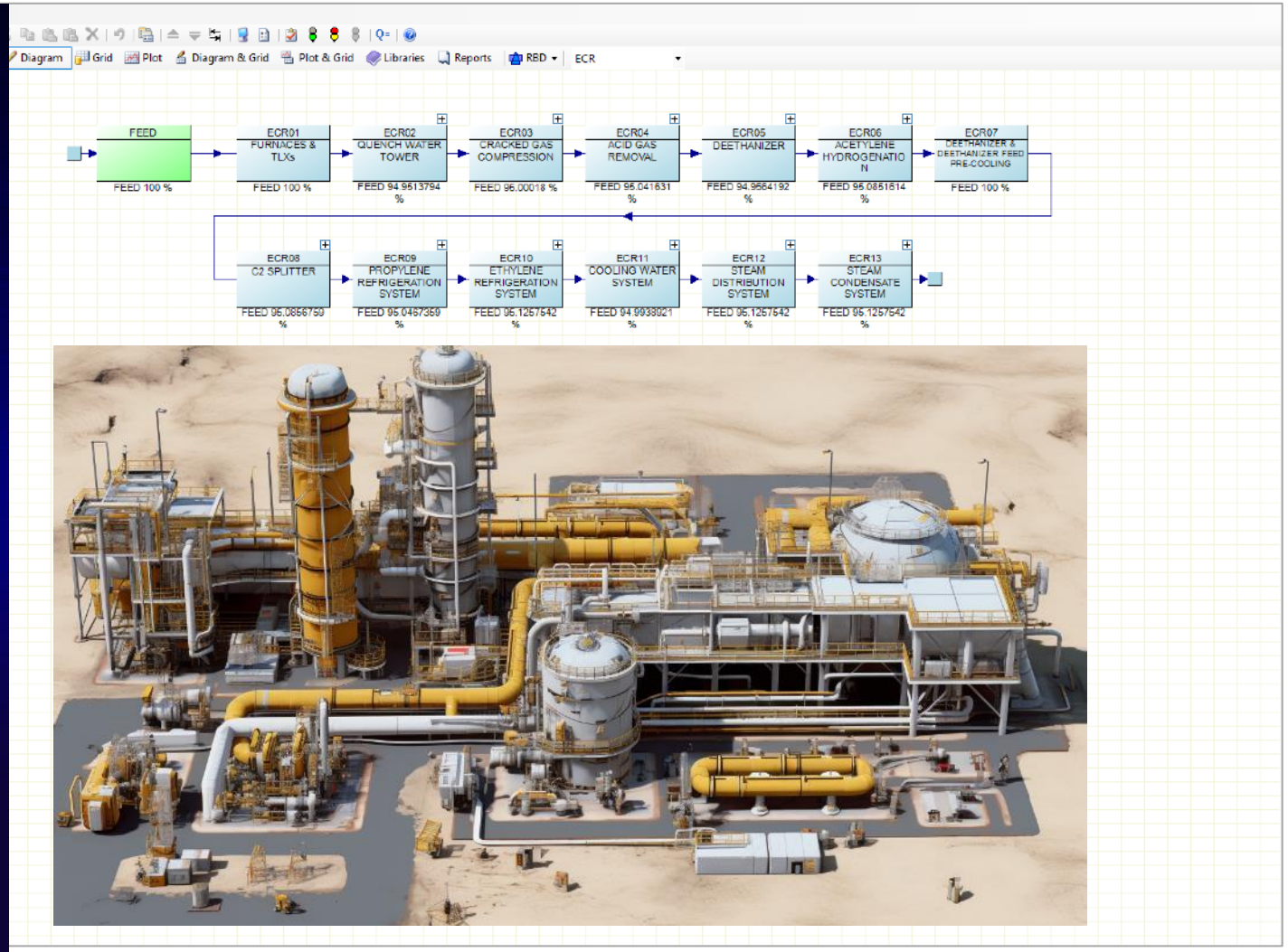
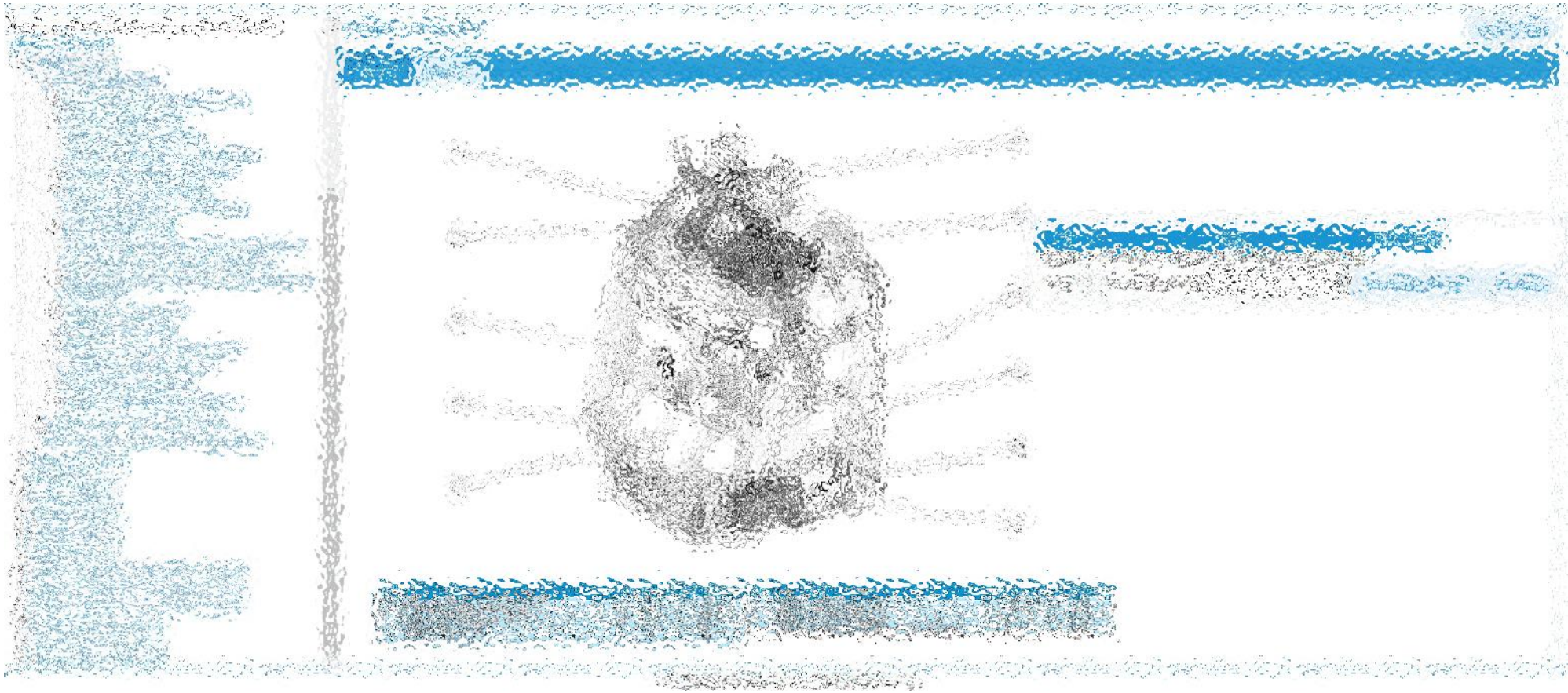
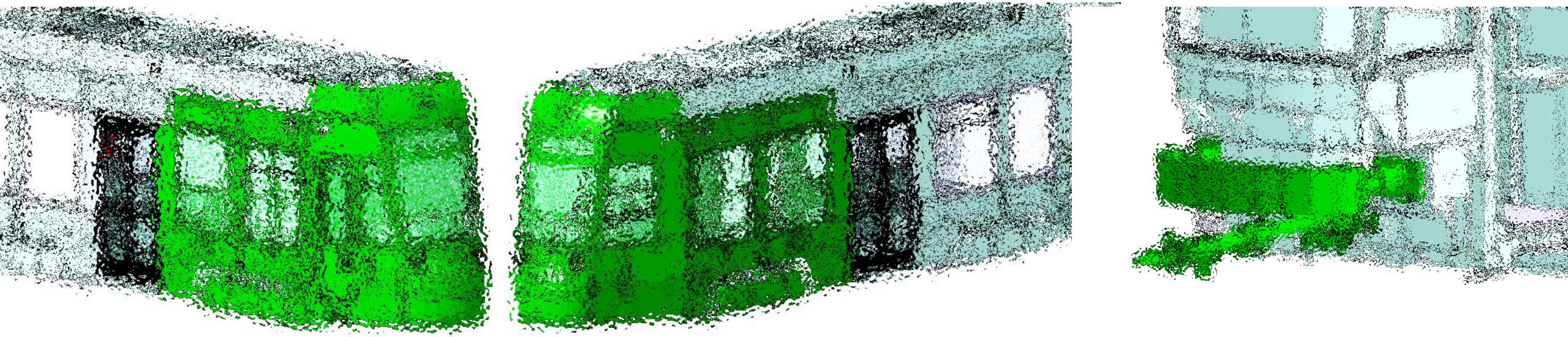


3D SPARE PARTS CATALOGUE



3D SPARE PARTS CATALOGUE = E-SHOP FOR SPARES

CRASH PARTS IN 3D SPARE PARTS CATALOGUE



High risk of crash

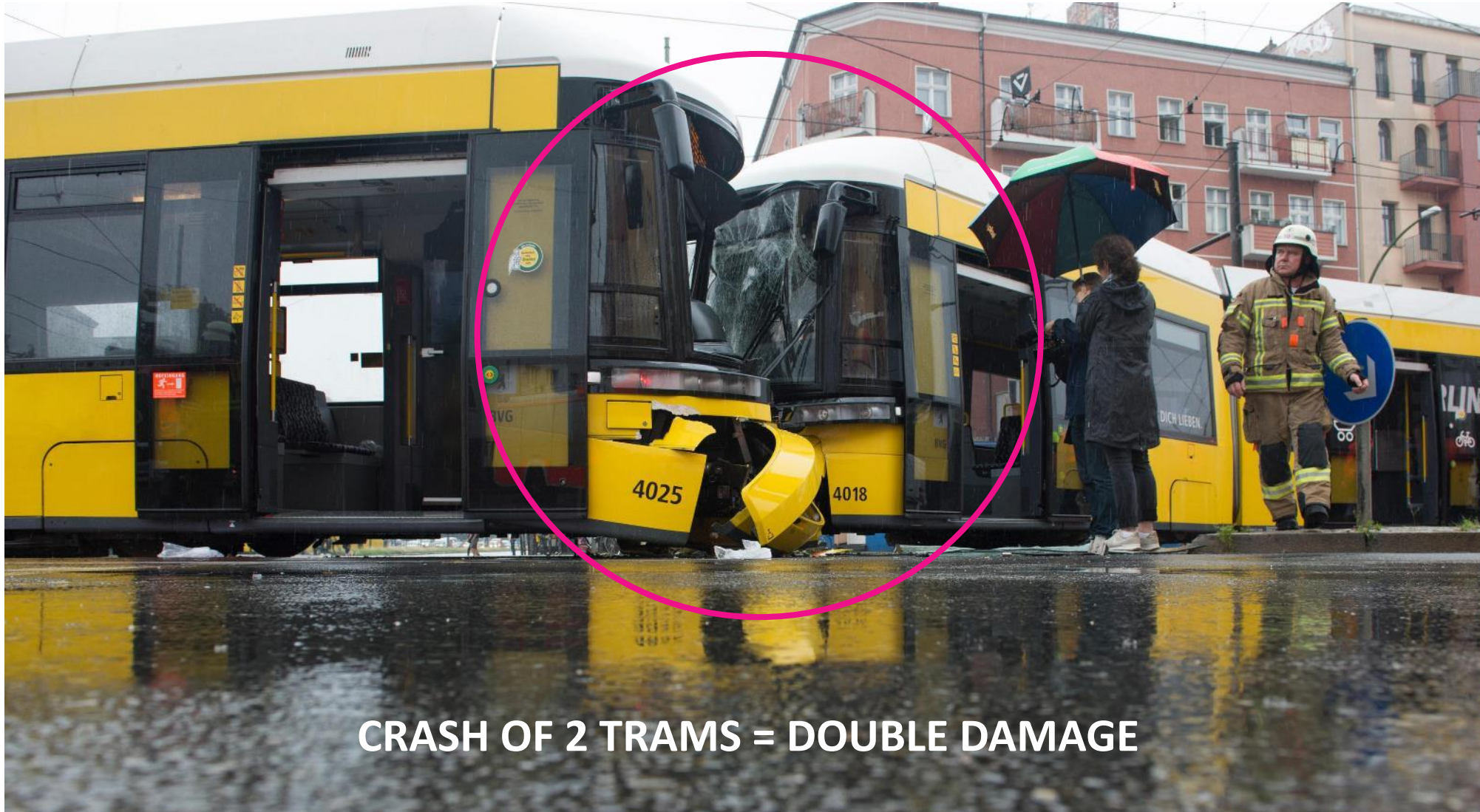
Unpredictable?

Large parts, tricky to store

→

Critical parts

TRAM CRASH PARTS: BAD THINGS COME IN TWO



CRASH OF 2 TRAMS = DOUBLE DAMAGE

TRAMS WITH ANTI-COLLISION SYSTEMS

Škoda ForCity Plus 52T

LiDAR + HD-camera + precise localisation

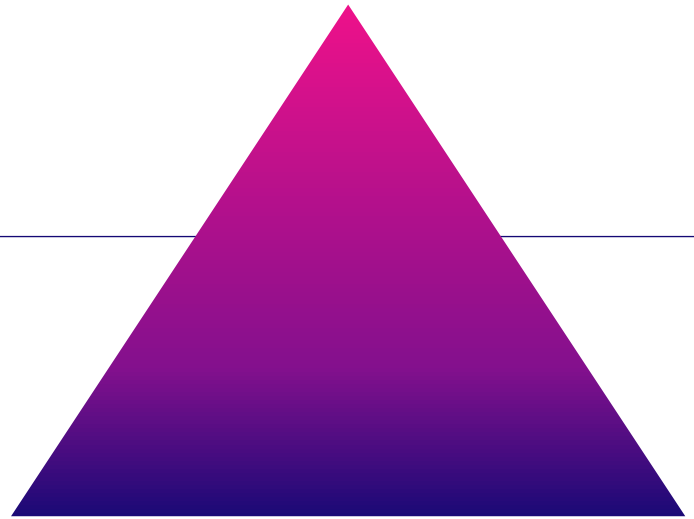
ASSET MANAGEMENT BALANCE

COST

MAINTENANCE SUPPORT

ORGANIZATION PROVIDING MAINTENANCE
OWNER
OPERATOR

PHYSICAL ASSET
DESIGN
MANUFACTURER



RELIABILITY

COST

MTBF

MAINTAINABILITY

COST

MTTR

SPARE PARTS IN ROLLING STOCK LCC

Cleaning	7%
Technical management	11%
Maintenance and spare parts	**30%**
Fuels and Energy	30%
Depreciation	11%

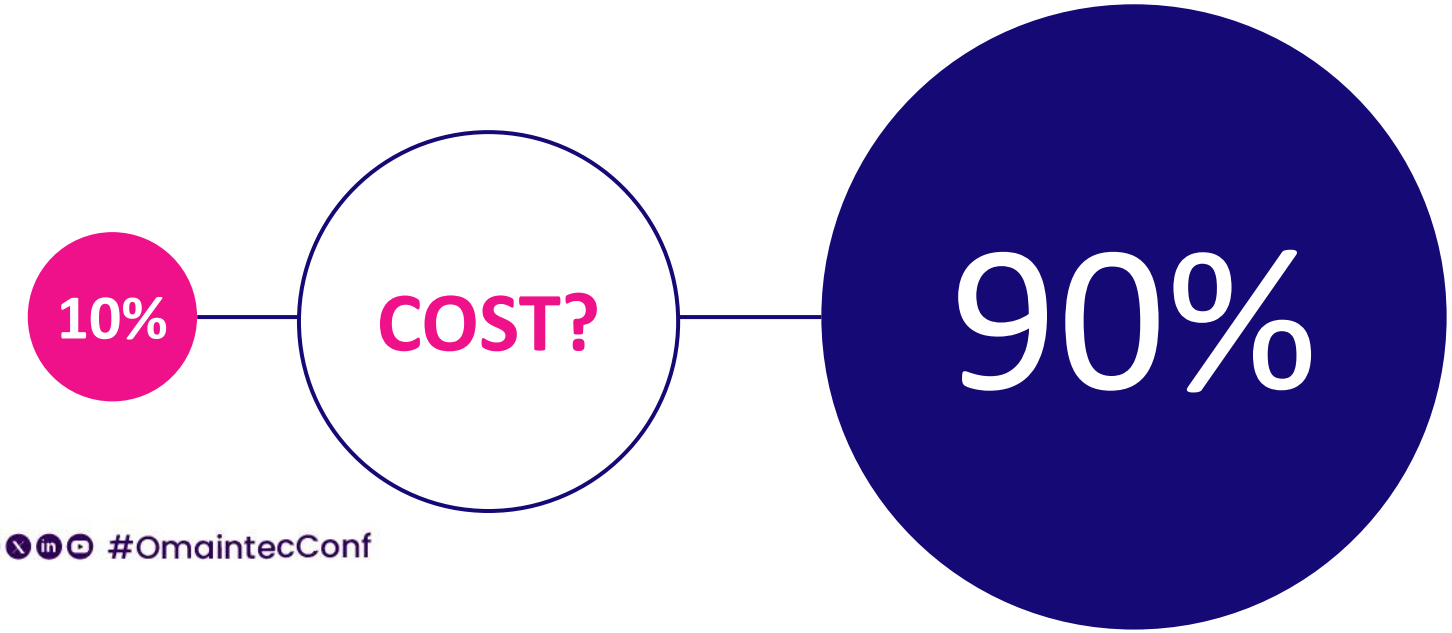
Train Life-Cycle Cost

Source: Oliver Wyman/www.railway-technical.com.

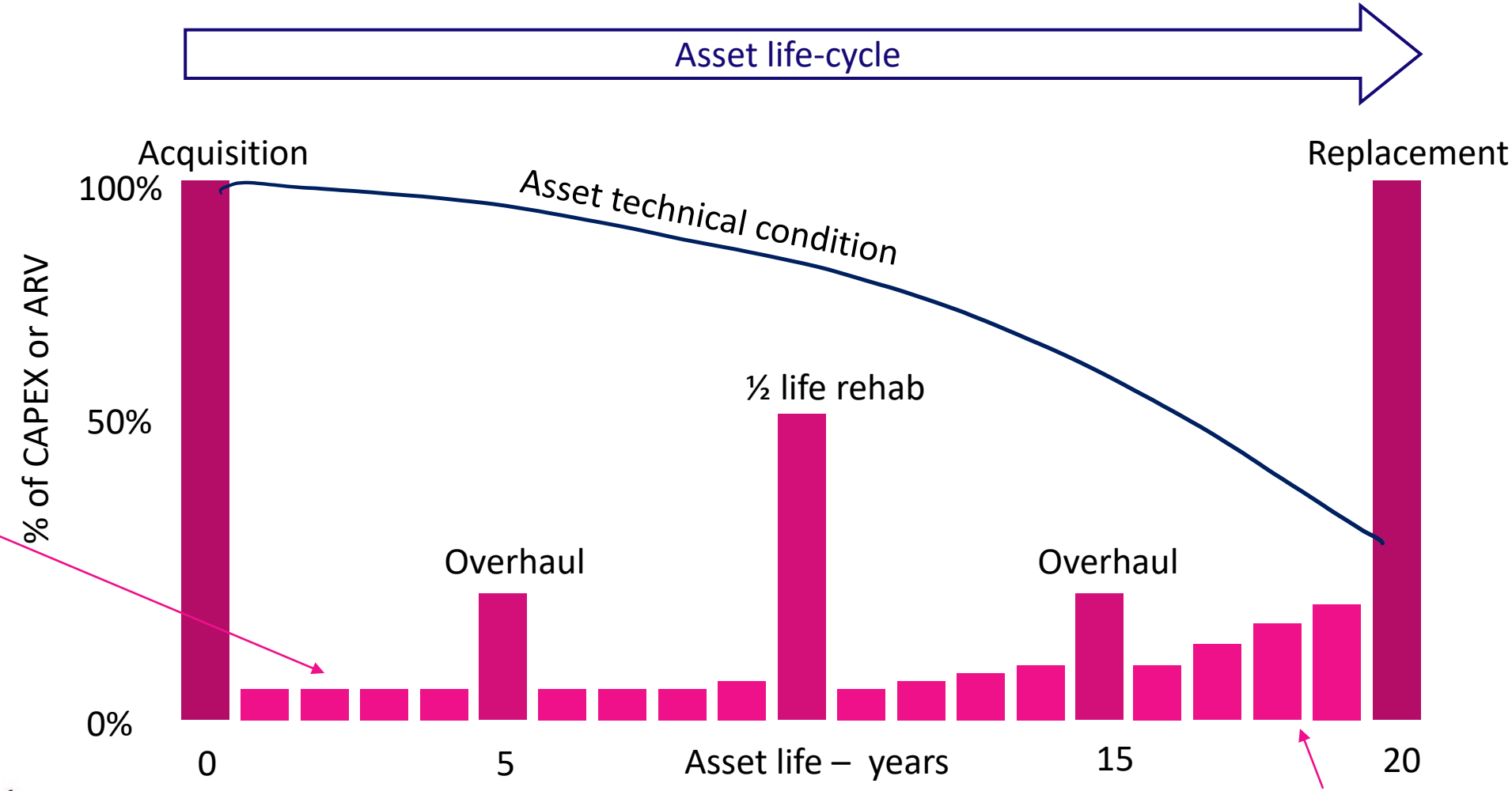
LIFE-CYCLE COSTS

ACQUISITION

OPERATION



MAINTENANCE COSTS DURING ASSET LIFE-CYCLE



Cost of maintenance **1% - 3%** of CAPEX yearly?

Spare parts inventory **1-3%** of CAPEX

Expect increasing maintenance cost as the asset is aging

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DEALING WITH AGING ASSETS

75 % of production equipment
in Pharma industry is ***older than 20 years***

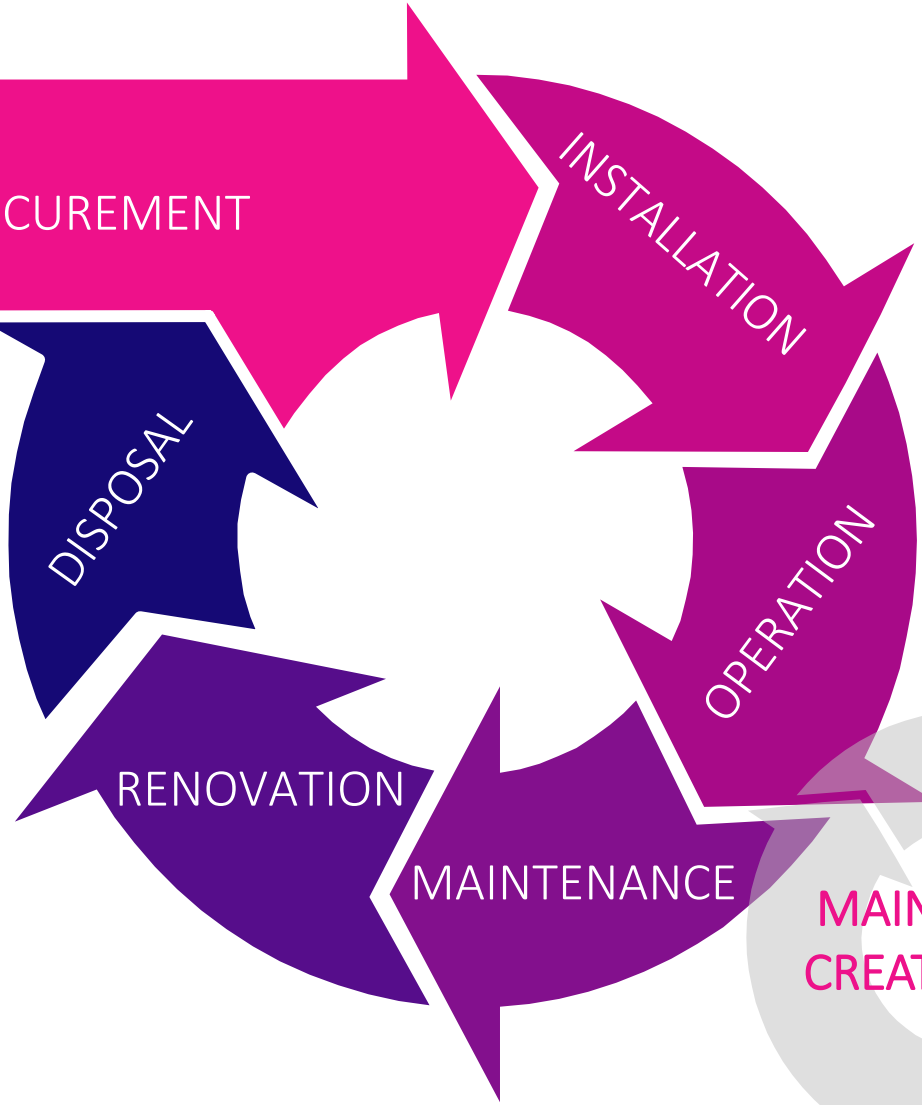
45 % of assets *in Dutch oil and gas sector has RUL (Remaining Useful Life)* ***shorter than 10 years***

26B CZK will be spent *in Prague on reconstruction of water distribution infrastructure in the following* ***5 years***

ASSET LIFE CYCLE

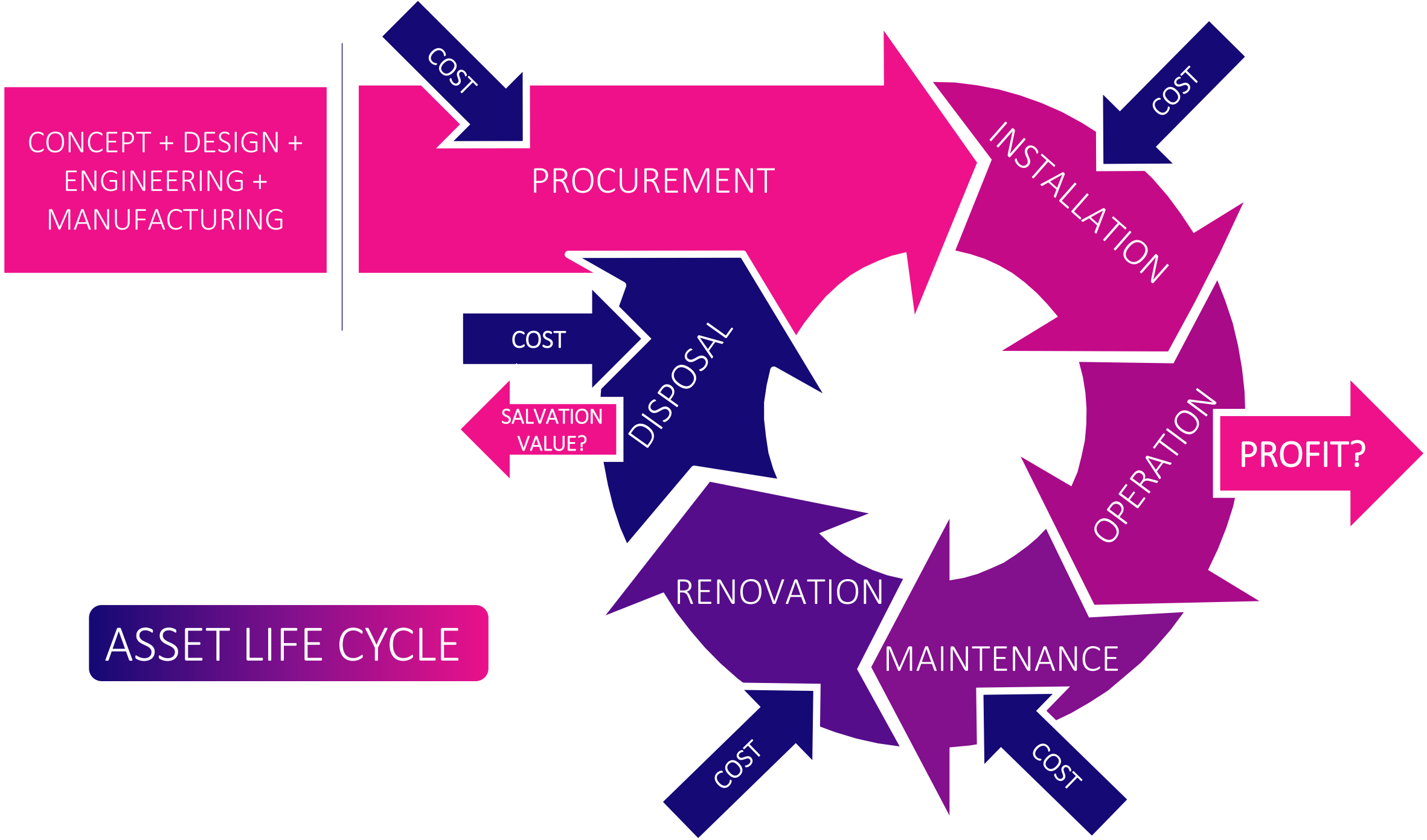
CONCEPT + DESIGN + ENGINEERING + MANUFACTURING

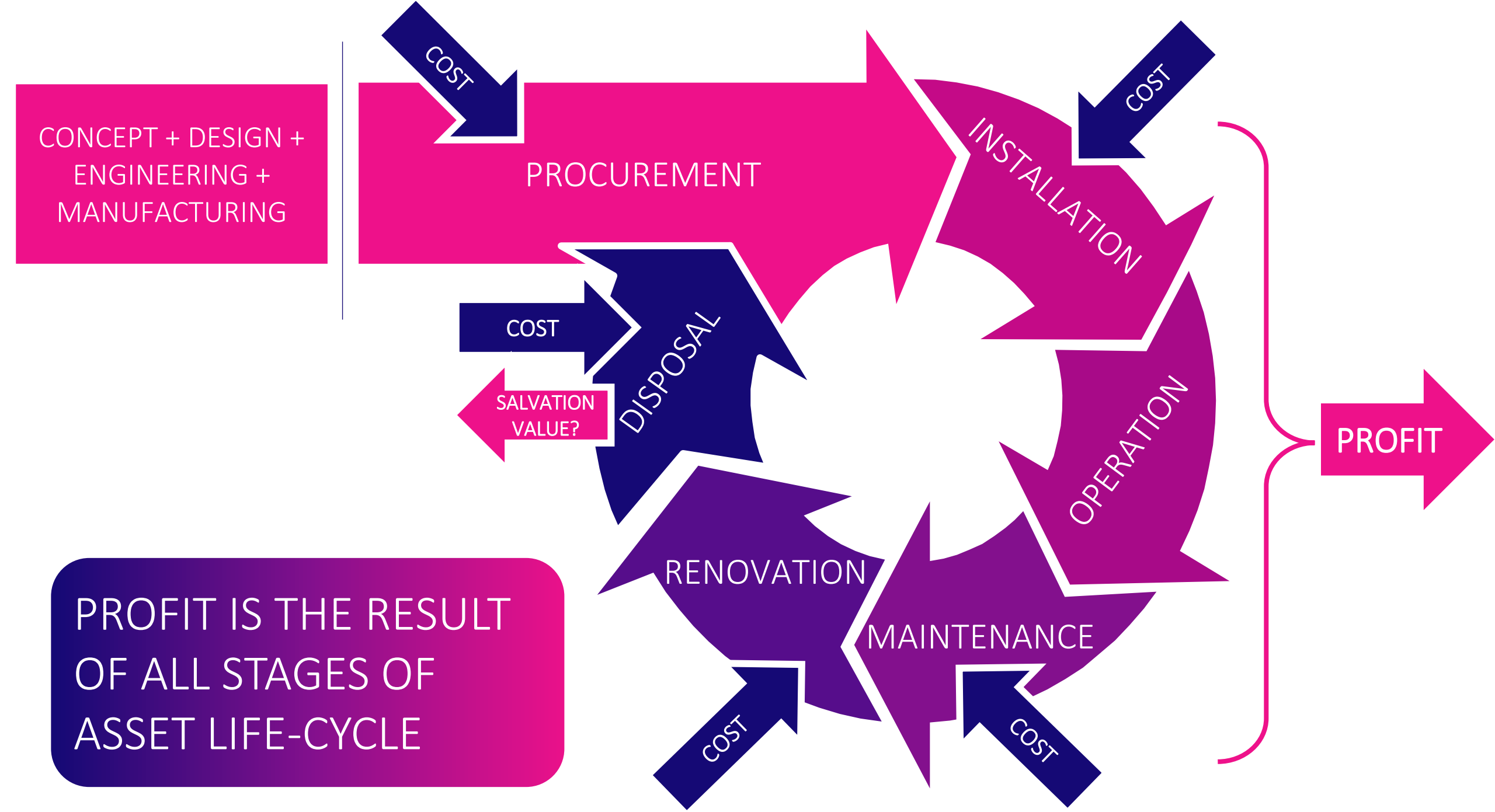
PROCUREMENT



ASSET LIFE CYCLE

MAINTENANCE CREATES VALUE!


CONCEPT + DESIGN + ENGINEERING + MANUFACTURING
COST
PROCUREMENT
COST
INSTALLATION
OPERATION
PROFIT?
DISPOSAL
COST
SALVATION VALUE?
RENOVATION
MAINTENANCE
COST
COST
ASSET LIFE CYCLE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COST
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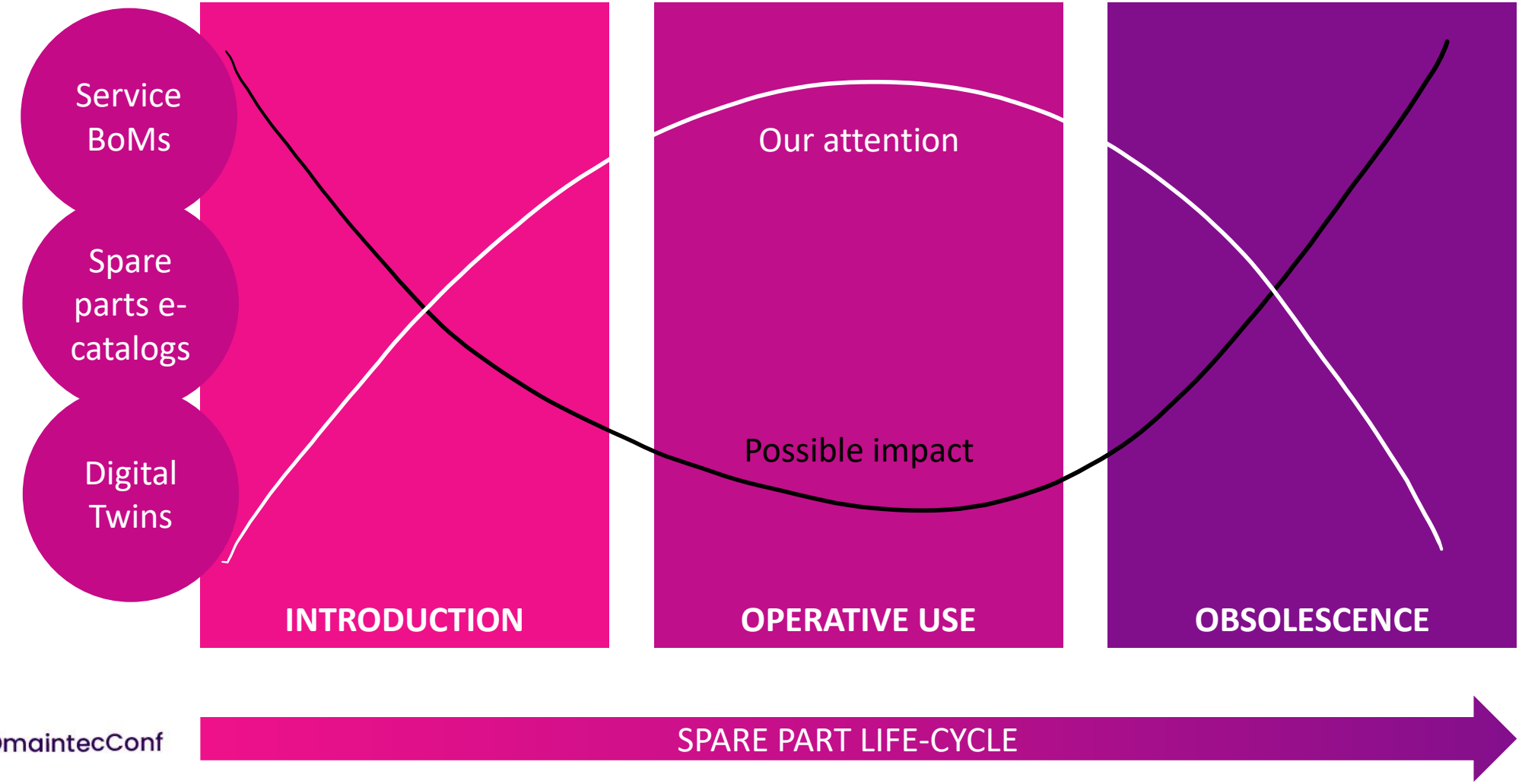
INSTALLATION
OPERATION
MAINTENANCE
COST
RENOVATION
COST
DISPOSAL
COST
SALVATION VALUE?
PROFIT
PROFIT IS THE RESULT OF ALL STAGES OF ASSET LIFE-CYCLE

SPARE PARTS LIFE-CYCLE

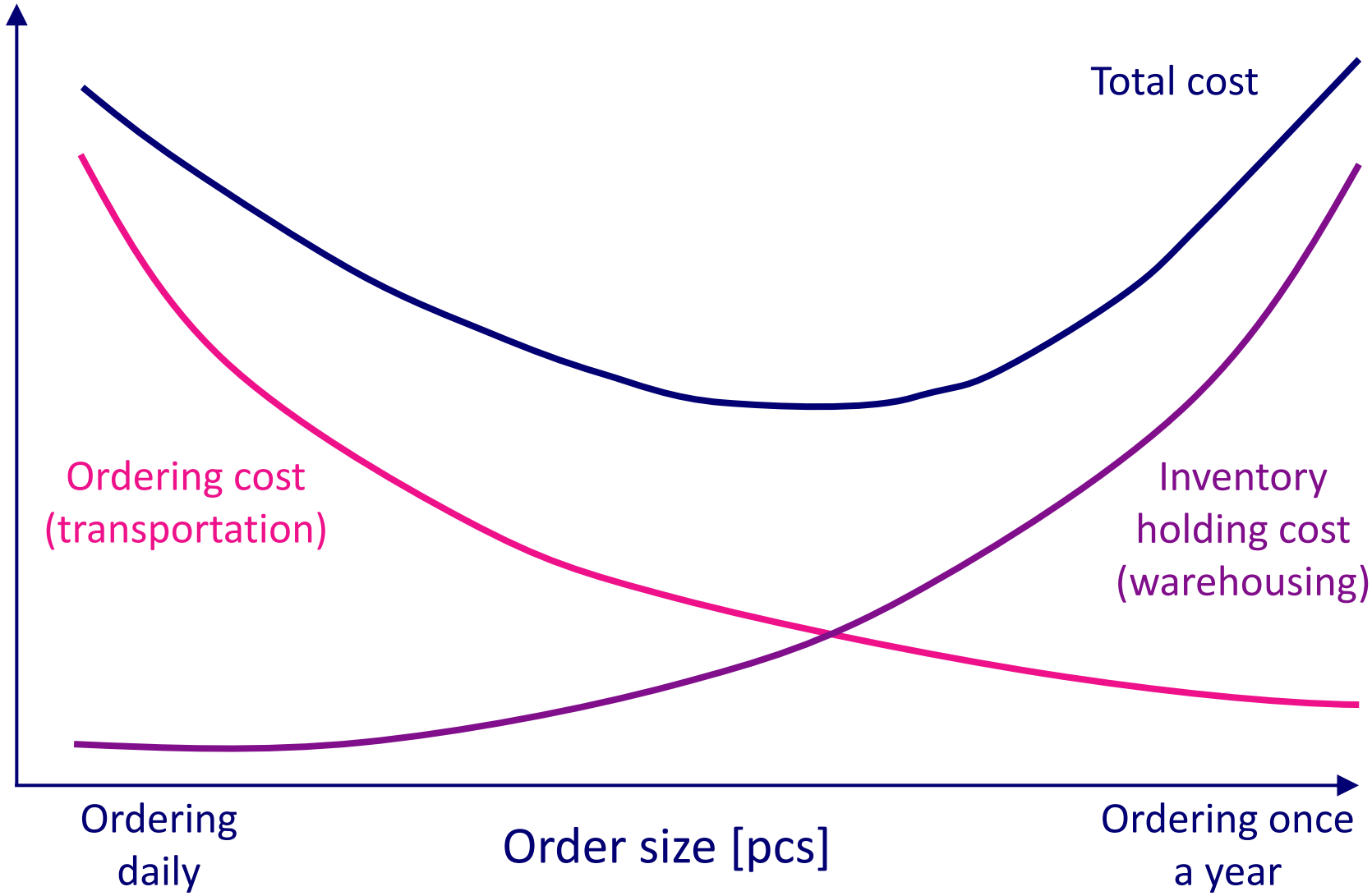


MANAGING STOCK AND REPLENISHMENT

No impact to risk!

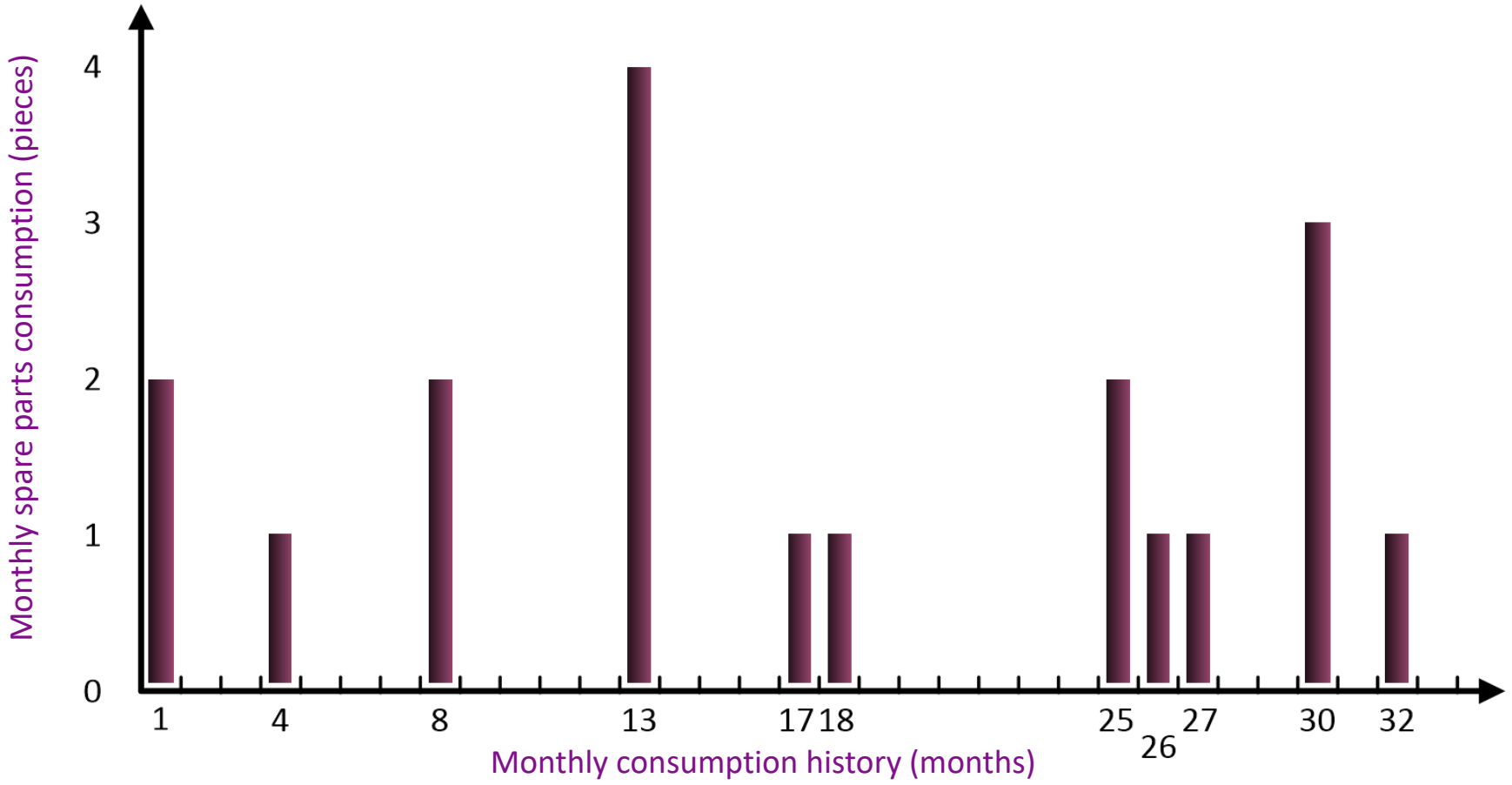
Balance stock levels with frequency of ordering

ECONOMIC ORDER QUANTITY



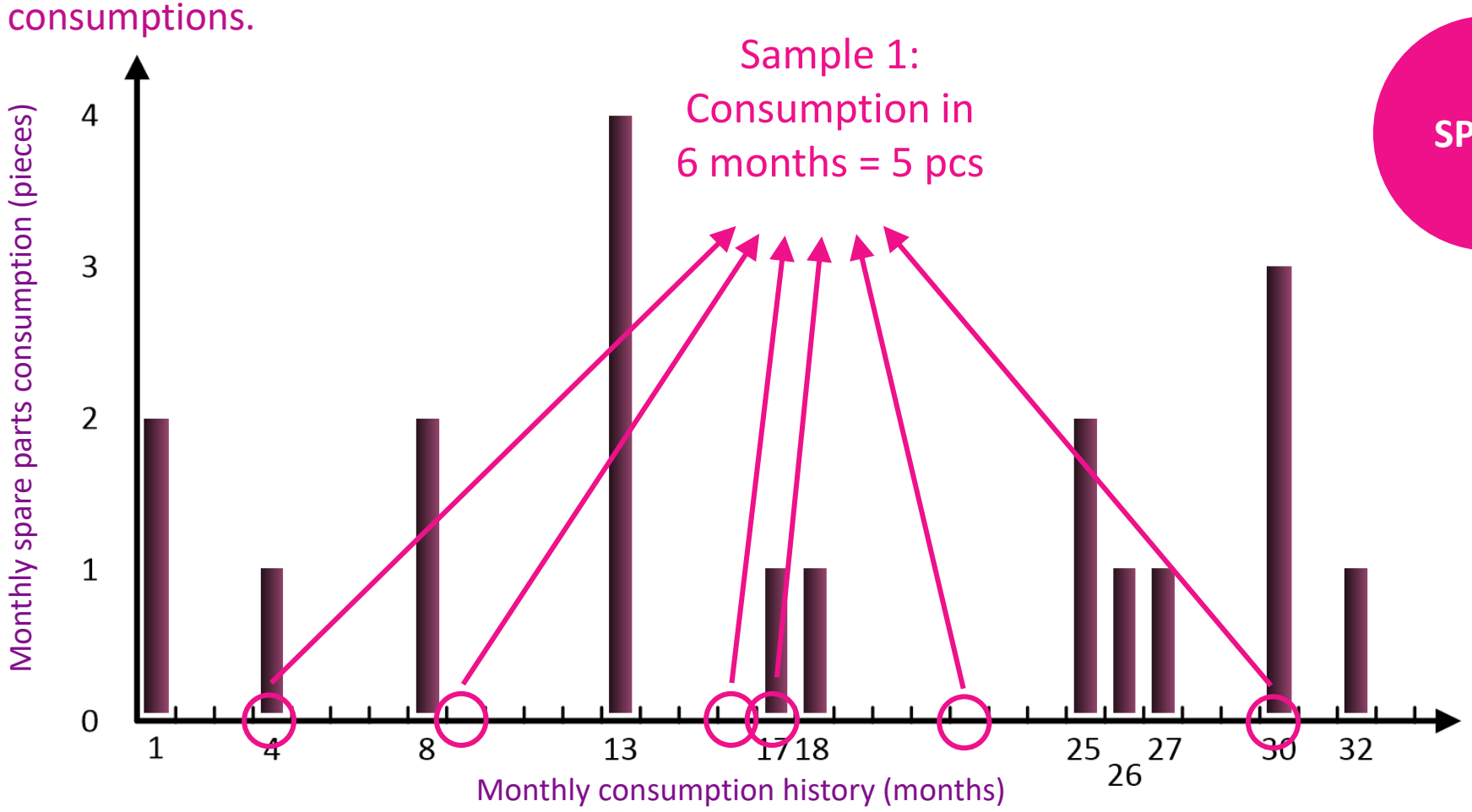
SPARE PARTS WITH INTERMITTENT DEMAND

What reorder level should be set in order to ensure **required availability** of this spare?



BOOTSTRAPPING: SAMPLING FROM HISTORY

Bootstrapping = Spare consumption for lead-time period is randomly sampled from the history of consumptions.



Example:
SP lead time is 6 months

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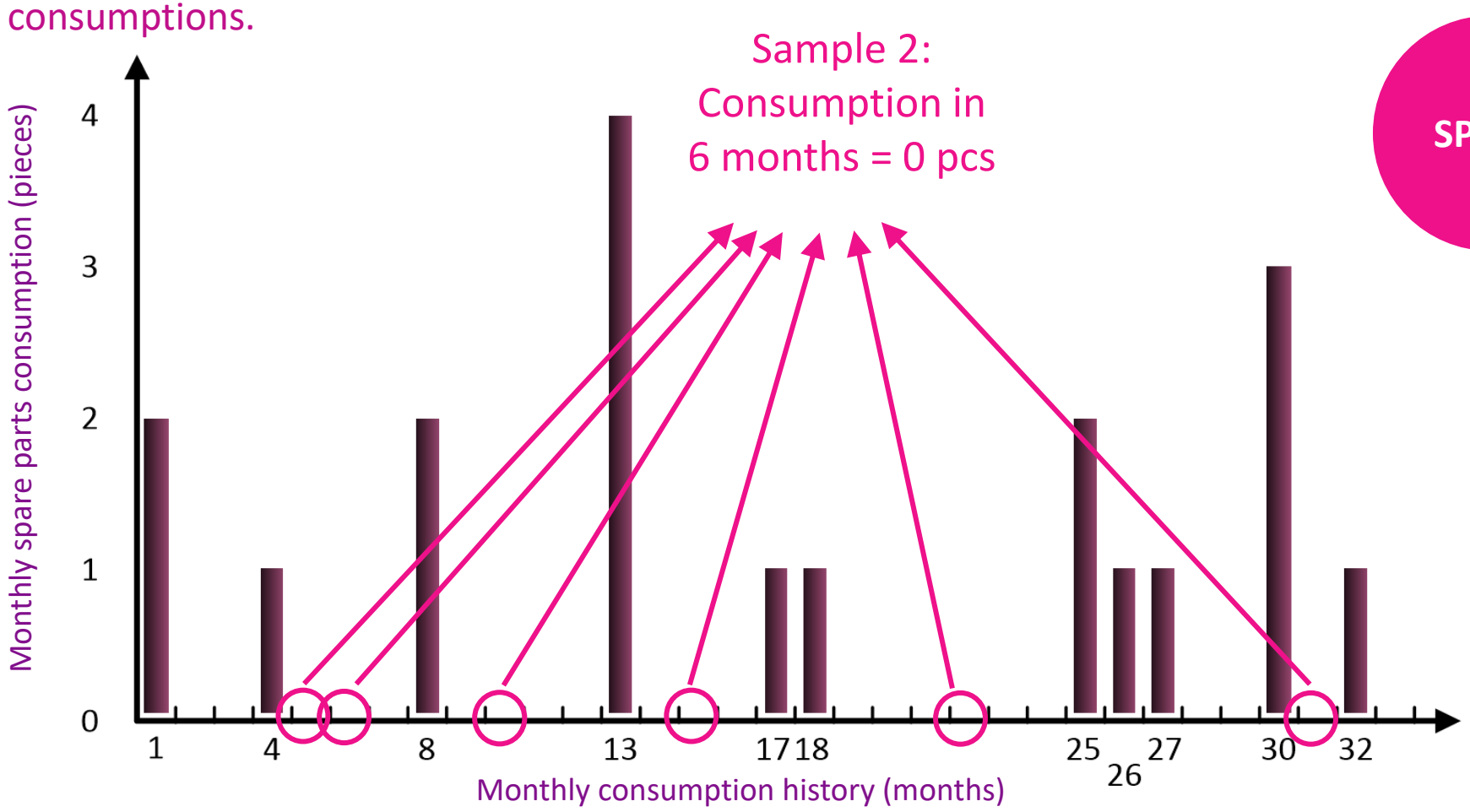

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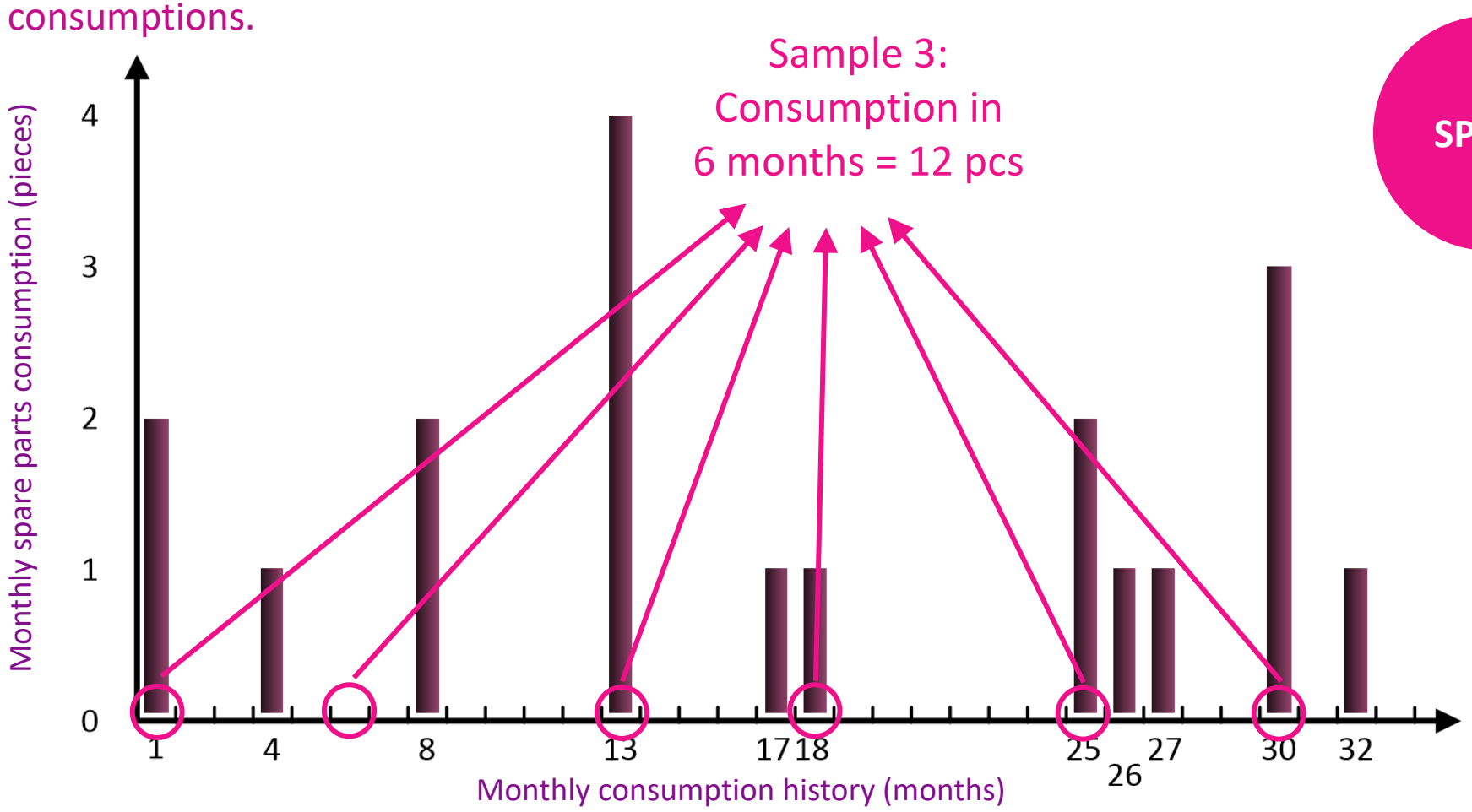

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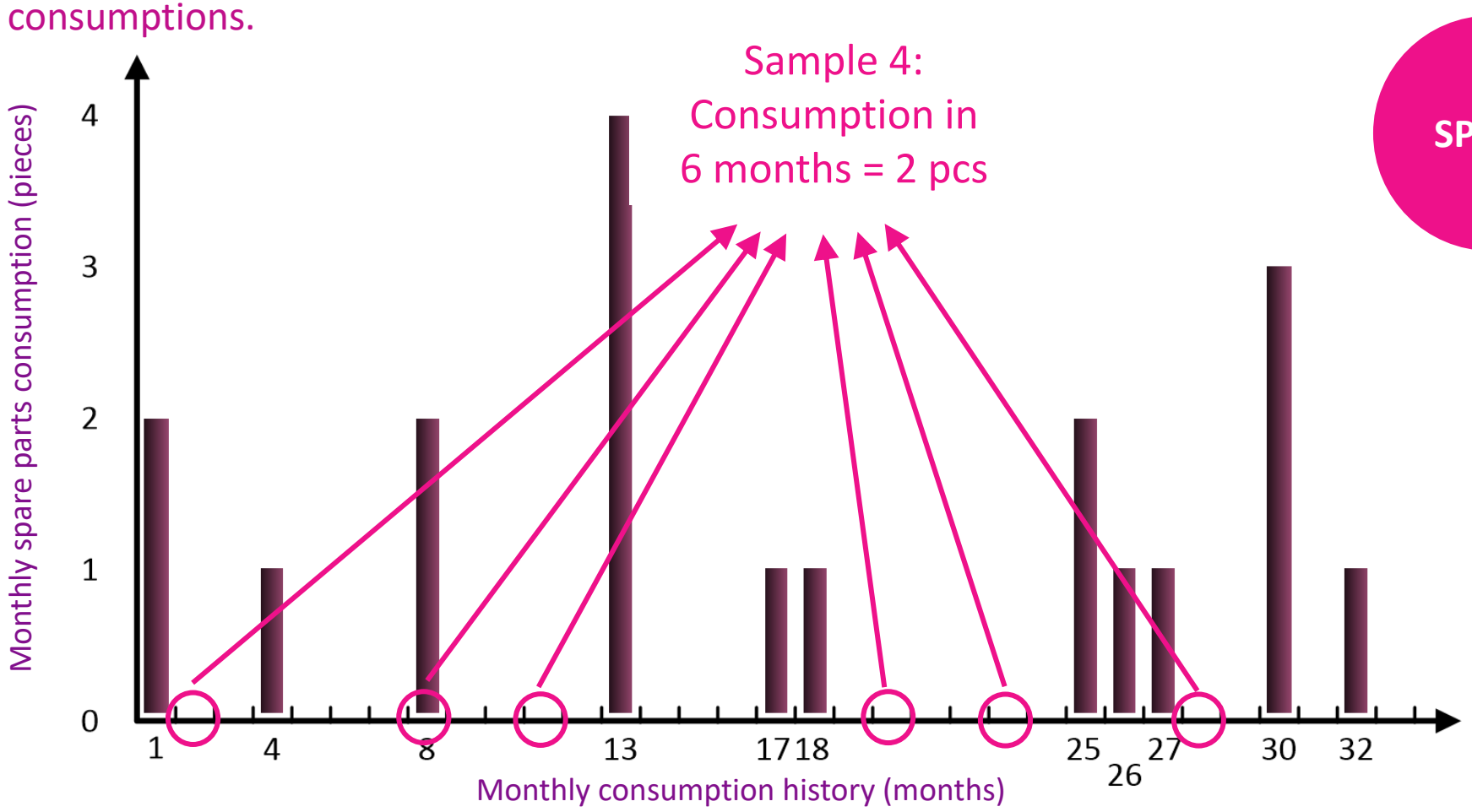
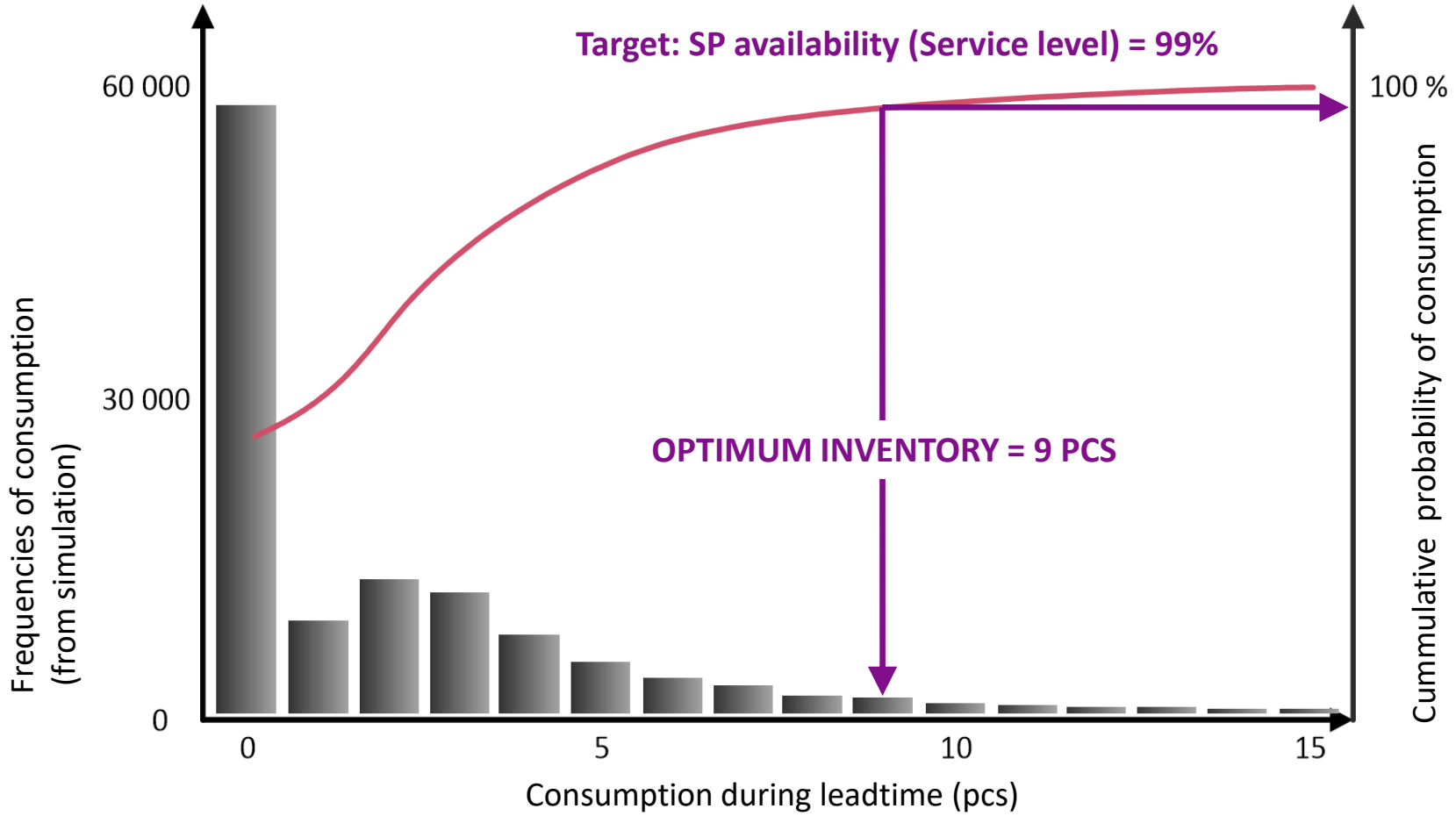


Example:
SP lead time is 6 months

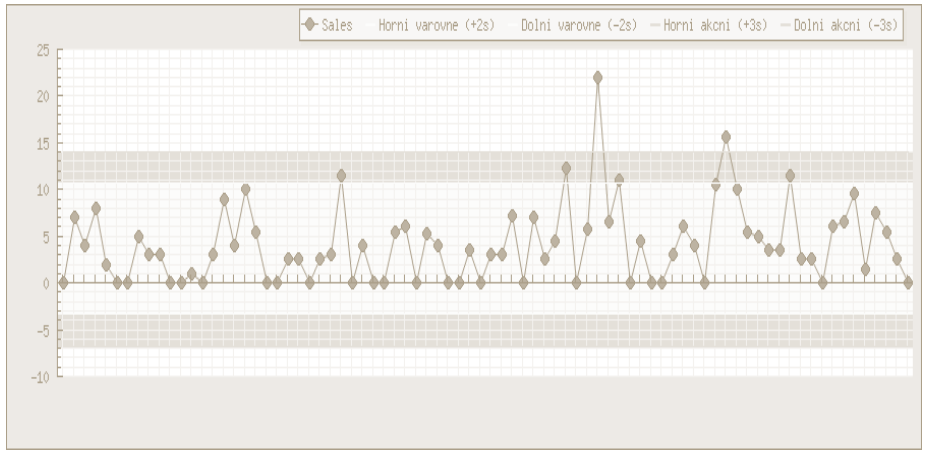
RESULT OF 100 000 SIMULATIONS OF CONSUMPTION

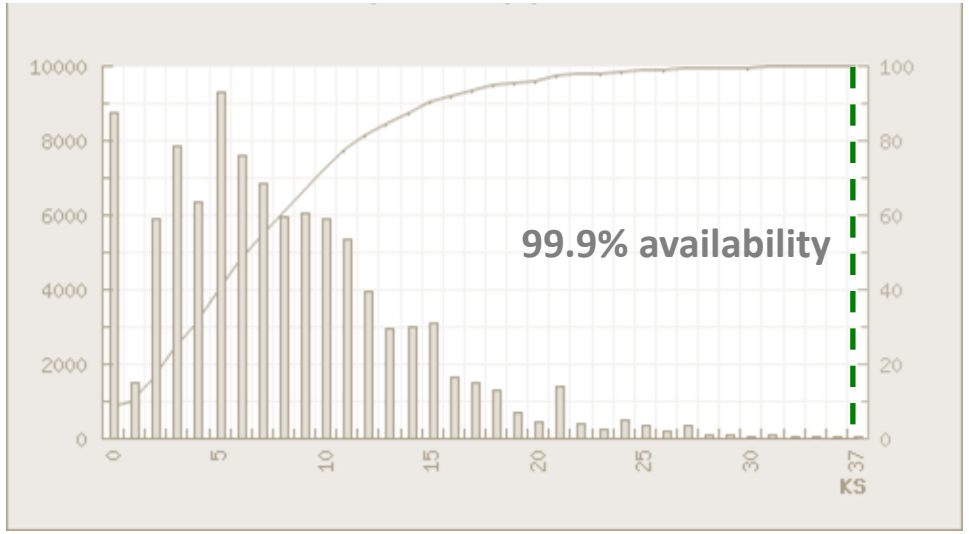


Bootstrapping application examples

Before: **17 000 EUR (49 pcs)**

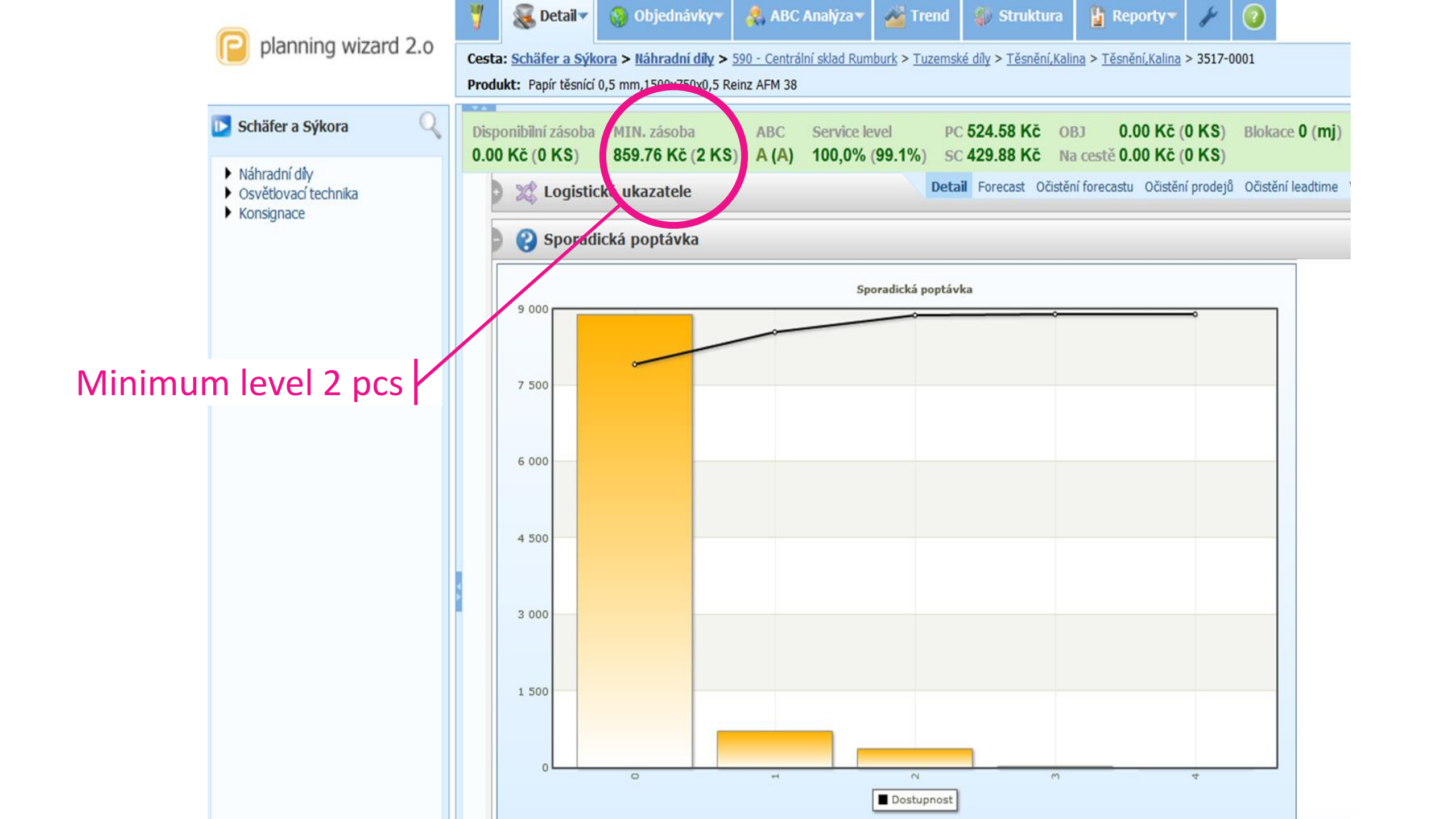
Spare part lead-time: 32 days



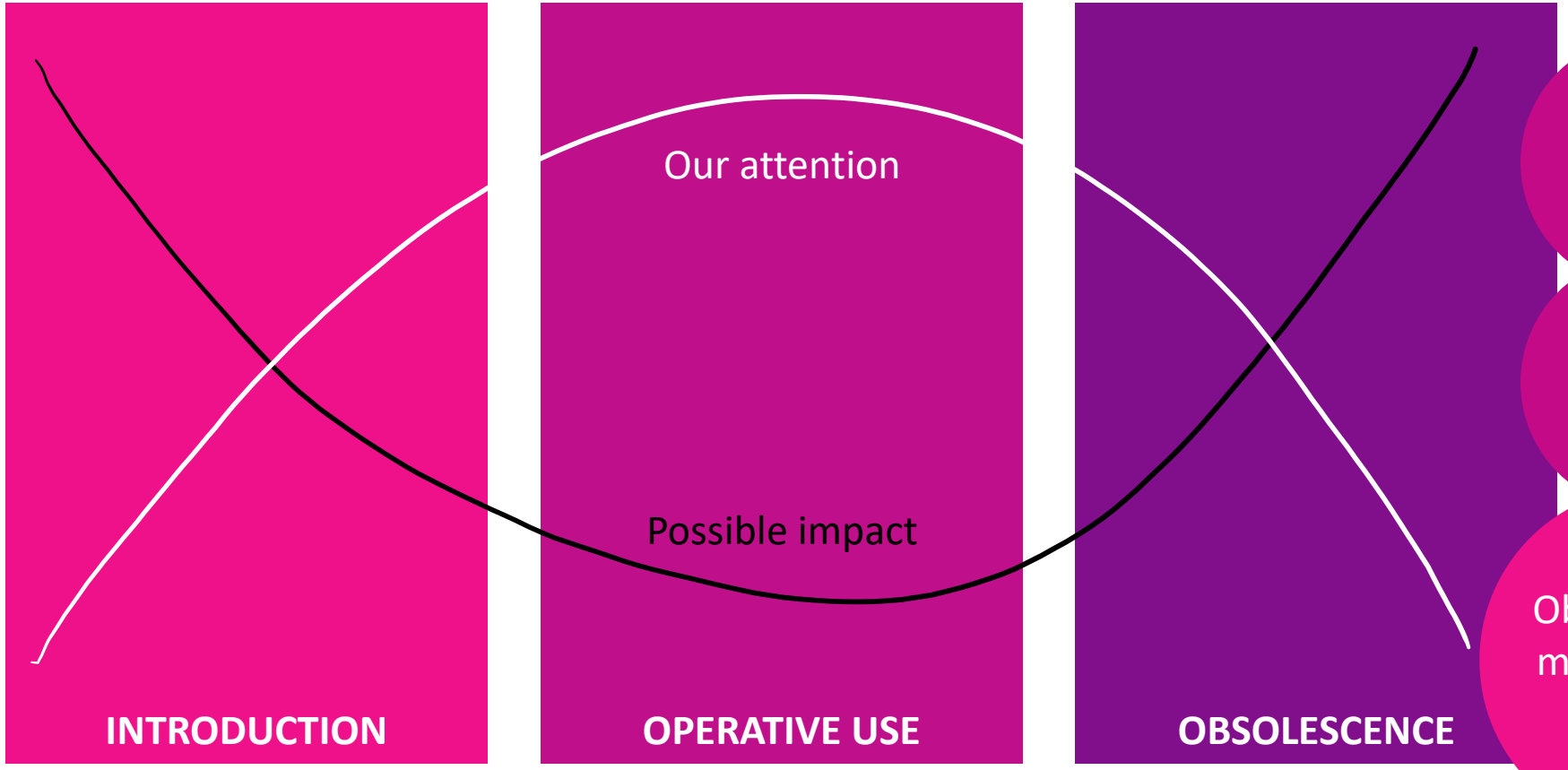


After: **10 000 EUR (29 pcs)**

Savings: **7 000 EUR**


planning wizard 2.o
Detail
Objednávky
ABC Analýza
Trend
Struktura
Reporty
Cesta: Schäfer a Sýkora > Náhradní díly > 590 - Centrální sklad Rumburk > Tuzemské díly > Těsnění,Kalina > Těsnění,Kalina > 3517-0001
Produkt: Papír těsnící 0,5 mm,1500x750x0,5 Reinz AFM 38
Schäfer a Sýkora
Náhradní díly
Osvětlovací technika
Konsignace
Disponibilní zásoba
0.00 Kč (0 KS)
MIN. zásoba
859.76 Kč (2 KS)
ABC
A (A)
Service level
100,0% (99.1%)
PC 524.58 Kč
SC 429.88 Kč
OBJ
0.00 Kč (0 KS)
Na cestě 0.00 Kč (0 KS)
Blokace 0 (mj)
Logistické ukazatele
Detail
Forecast
Očistění forecastu
Očistění prodejů
Očistění leadtime
Sporadická poptávka
Sporadická poptávka
9 000
7 500
6 000
4 500
3 000
1 500
0
0
1
2
3
4
Dostupnost
Minimum level 2 pcs

SPARE PARTS LIFE-CYCLE



Master data

Service BoMs

Obsolescence management process

SPARE PART LIFE-CYCLE

Eight elements of good Spare Parts Management

- More **preventive maintenance**!
- Sort out problems in **spare parts processes** and **life-cycles – digitalize!**
- Do proper **segmentation** of your **spare parts portfolio**
- Identify **critical spares:** Which spares are important?
- **Forecast future consumption** of your spares and set-up stock levels
- Use **bootstrapping** set levels of **intermittent demand** items
- Think in the context of **whole life cycle of your assets**
- **Digitalize maintenance and asset management** processes and make use of support from manufacturers

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THANK YOU!

Tomáš Hladík
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4Ds: GLOBAL CHALLENGES IN MAINTENANCE

4Ds

1 DIGITALIZATION
2 DE-AGING ASSETS
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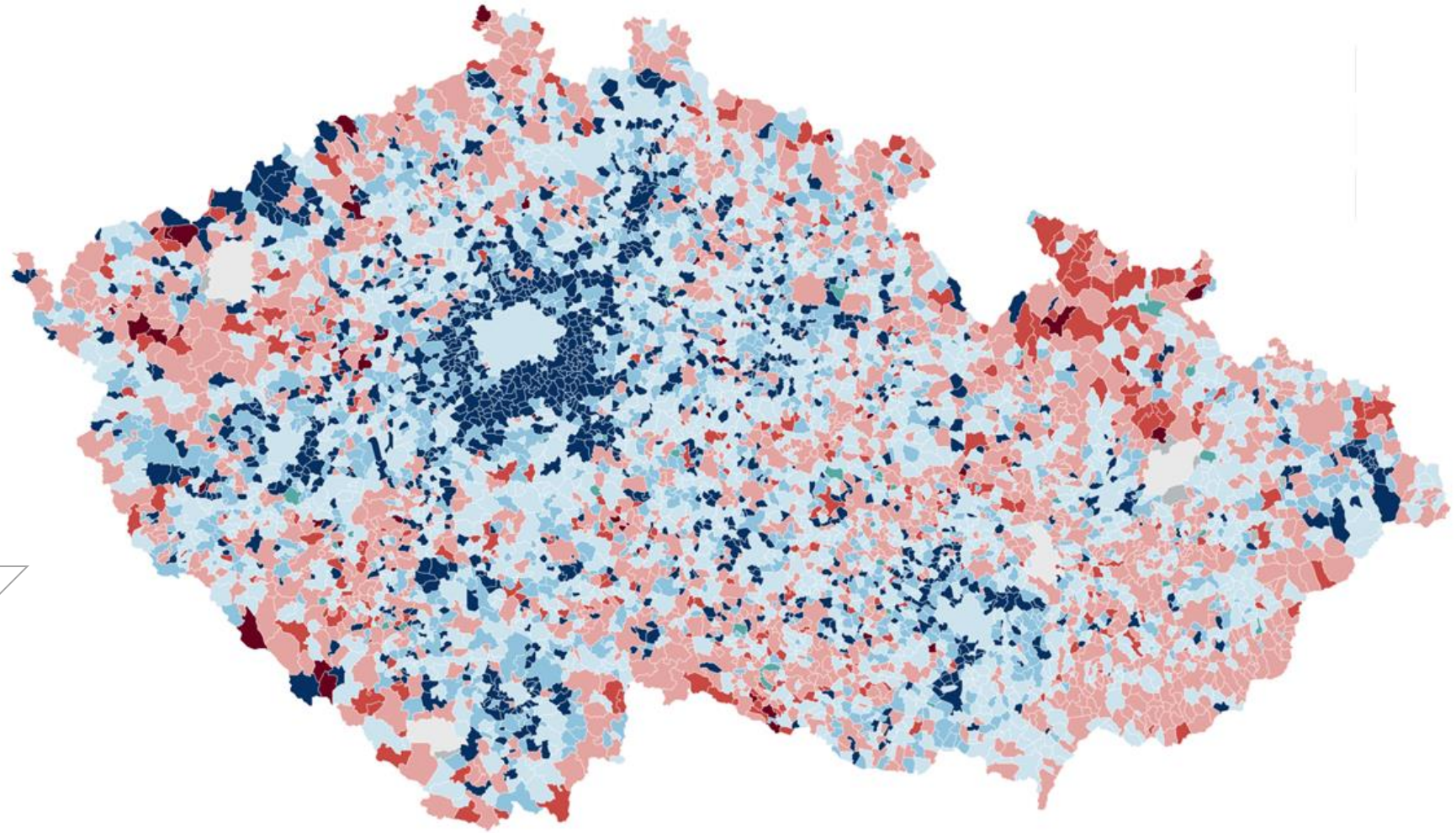
4 DECARBONIZATION

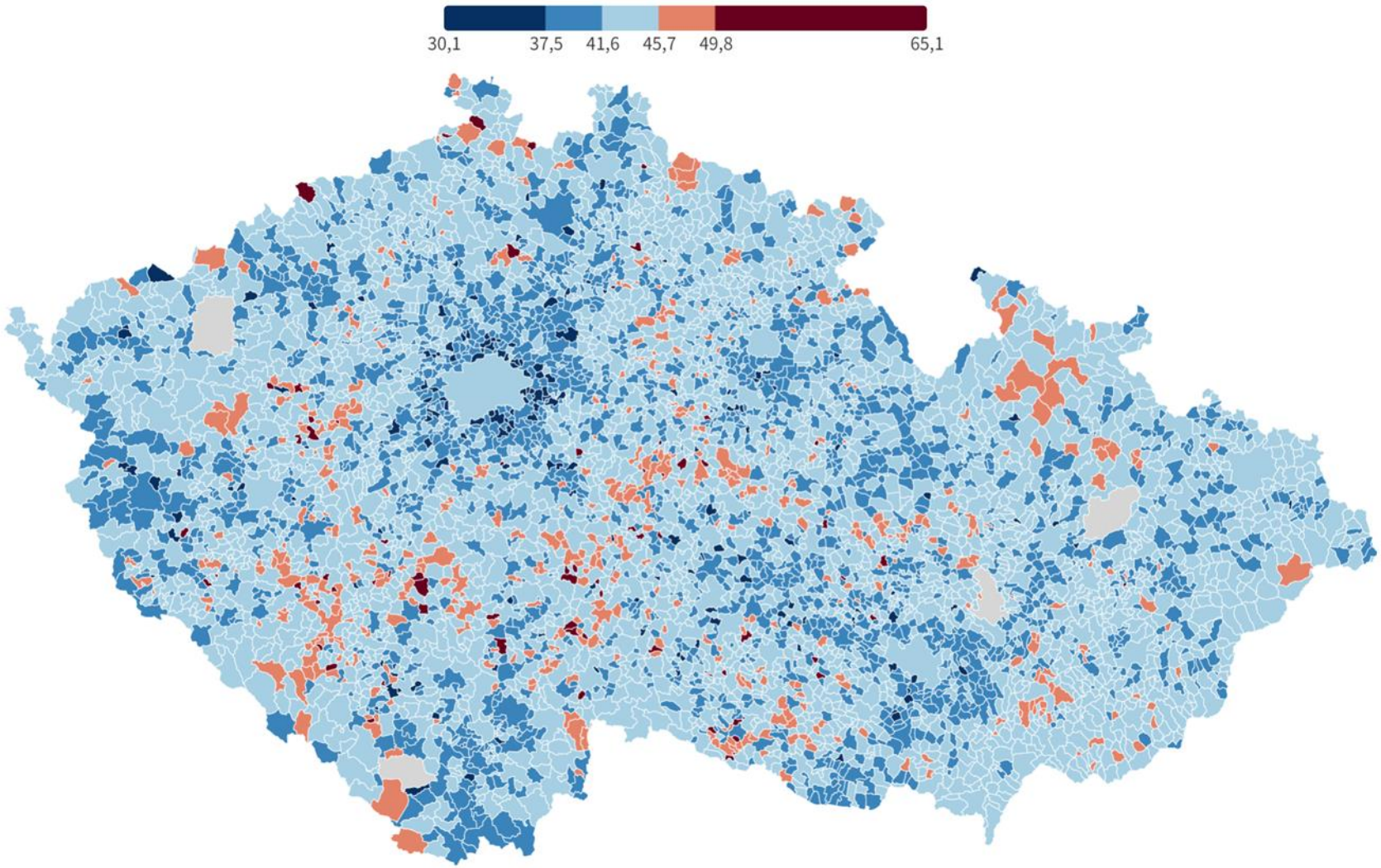
Demographics in CZ: How people move

People move from there

People want to live here



Demographics in CZ: Where are youngs?



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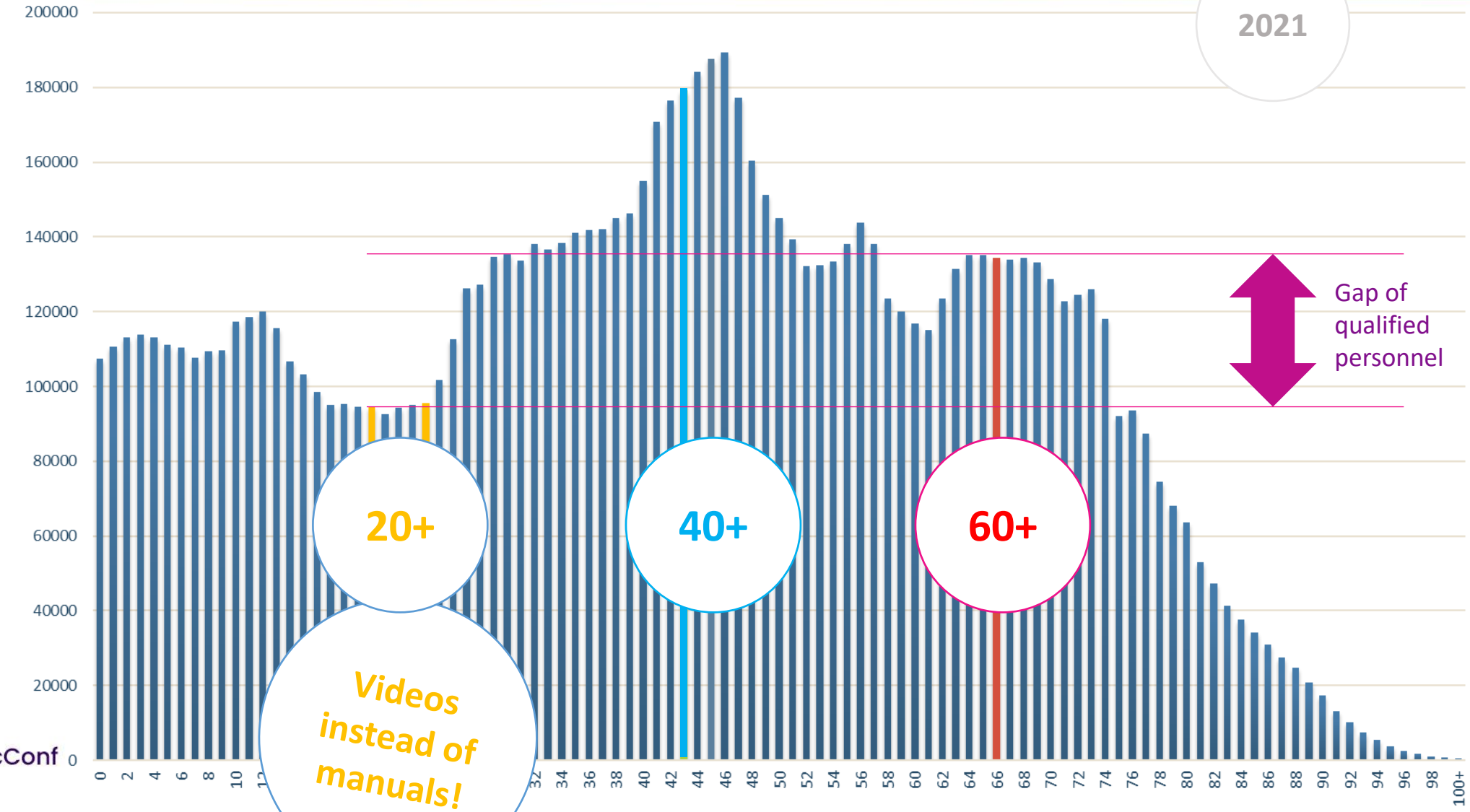

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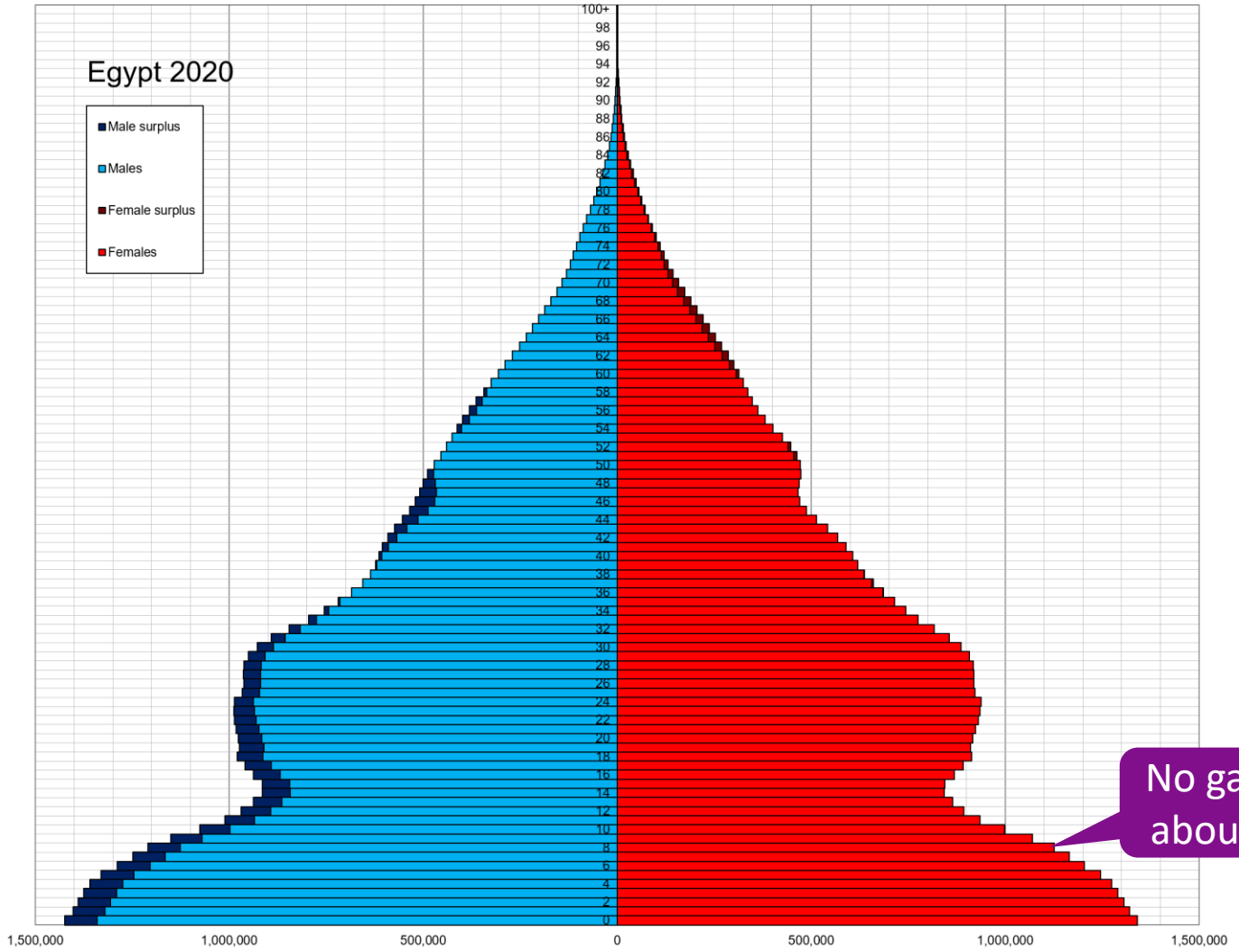
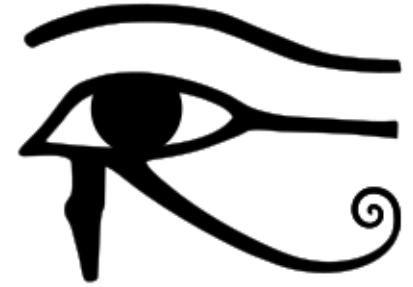
Demographics in Egypt





No gap of headcount, but what about skills and qualifications?

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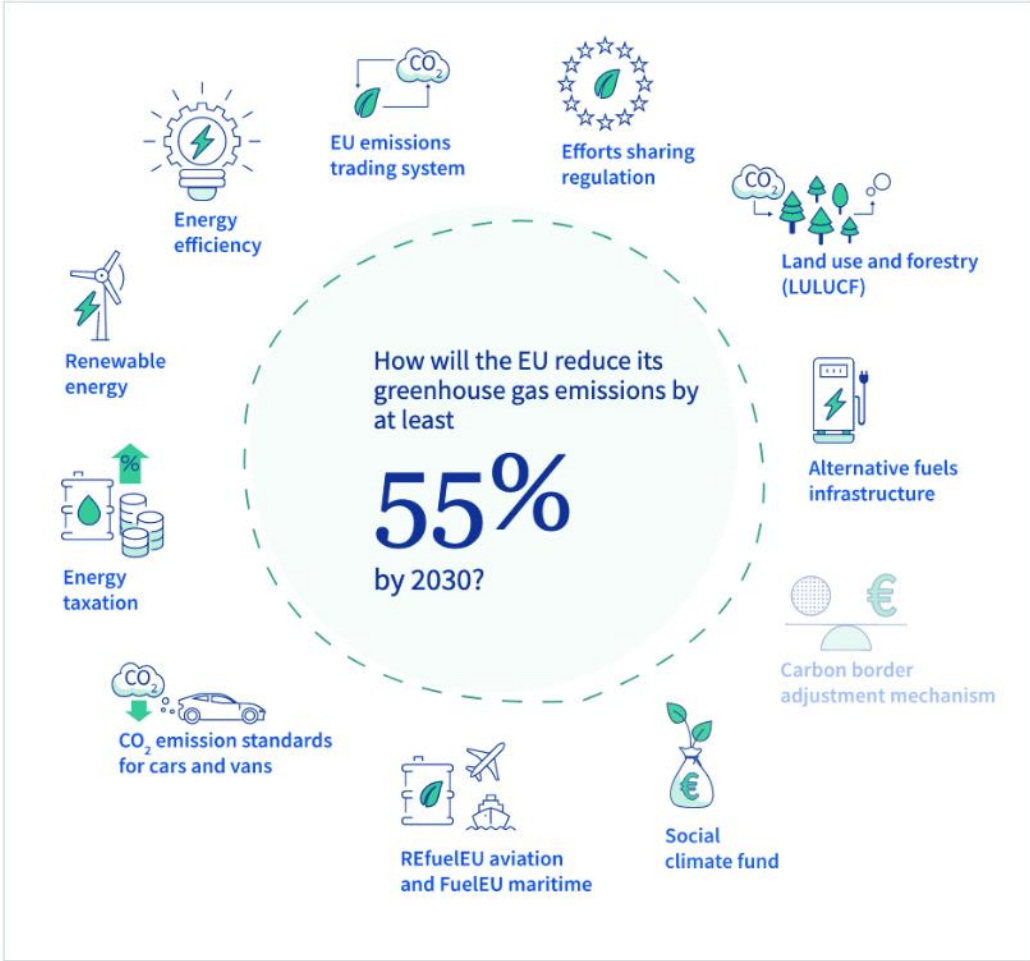
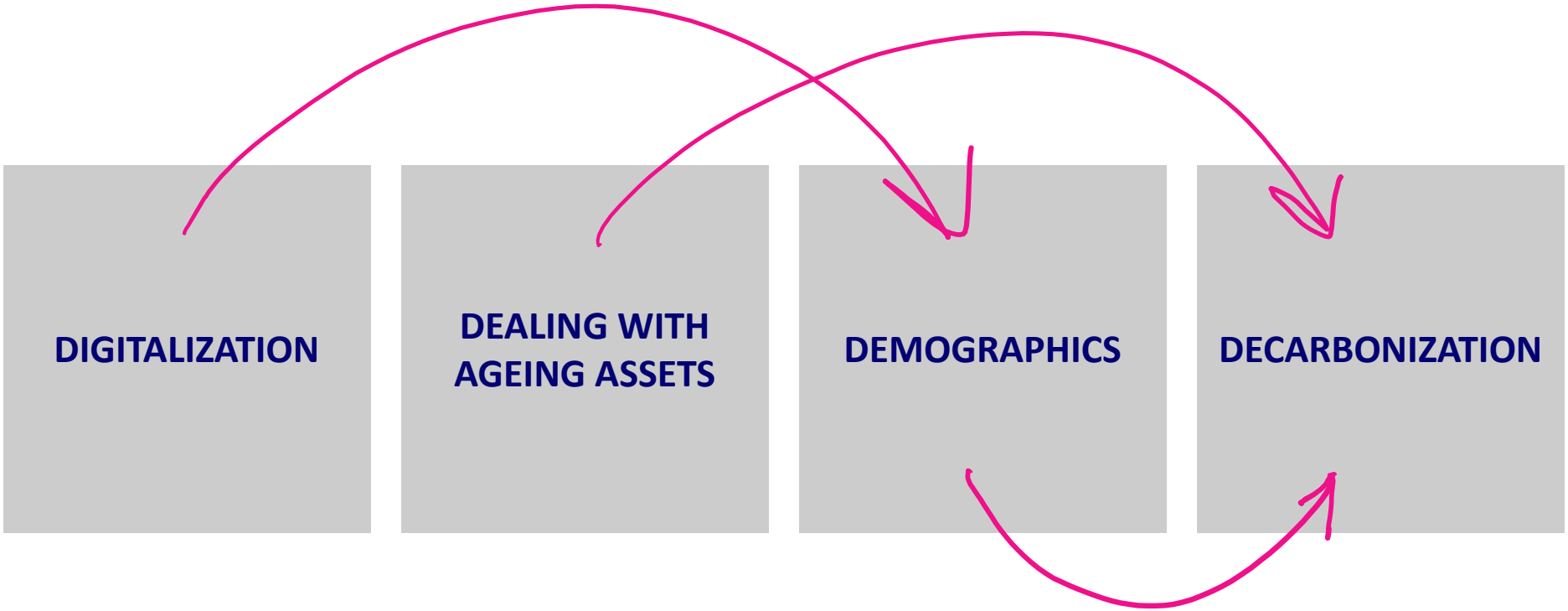
DECARBONIZATION



DECARBONIZATION



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THANK YOU!

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