



Automated digital system

for vehicle components and
spare parts data acquisition





Vocabulary

2

Components and spare parts

vehicle details – shorten written version throughout this presentation – “SP”.

Assembly unit

the group of spare parts – shorten written version throughout this presentation – “AU”.

Digital passport

all information about spare parts for identification is in database. Shorten written version throughout this presentation – “DP”.

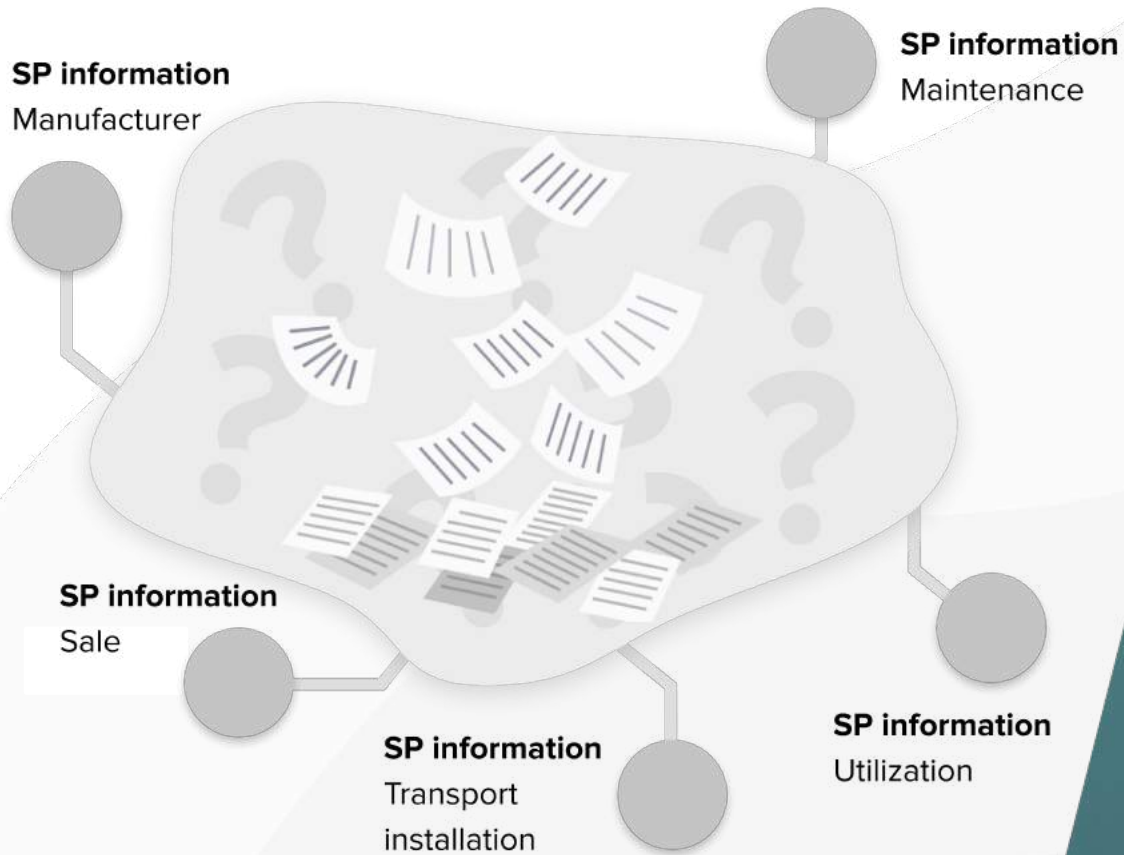
Spare parts data acquisition system

automated digital system for administering and managing labeling, locations and positioning of vehicle and its components.

Vehicle

railroad transport.

At the moment



Ununified systems

Different processes

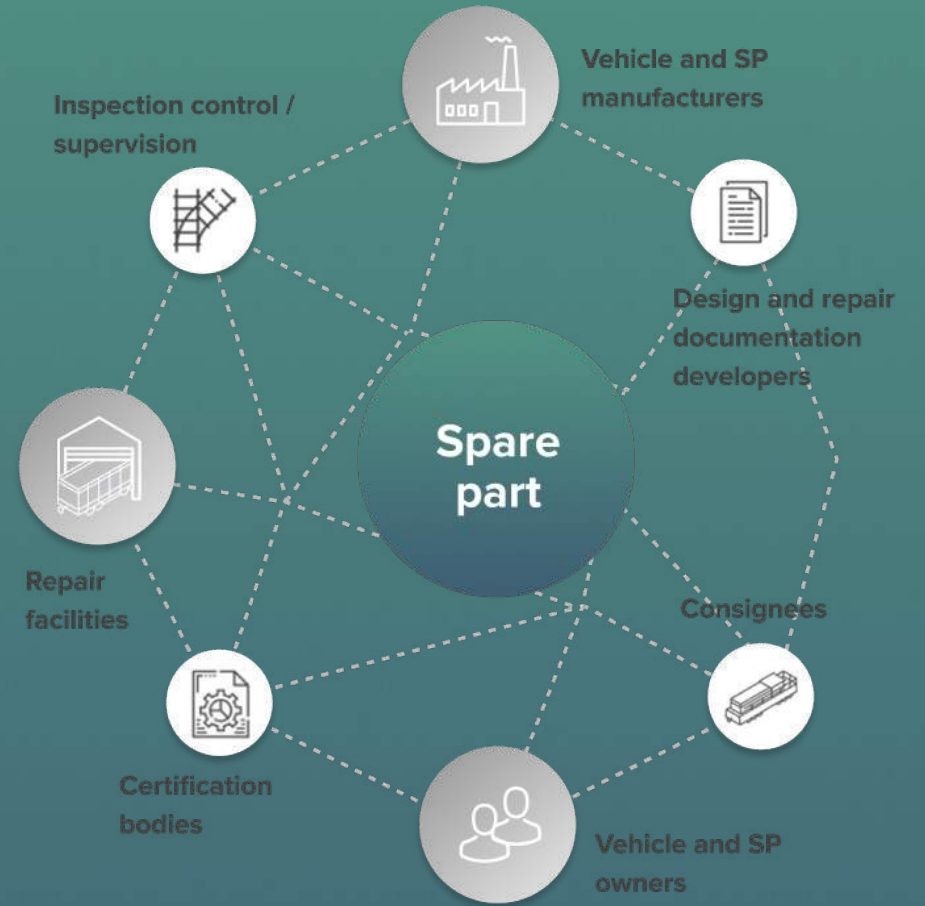
Paper-based workflow

Poor data quality

Software expenditure



After the change



Distributed storage

Automatization and identification

Integrity and information credibility

Legally binding digital workflow

One system – all processes



Solution

whole lifecycle in one system

SP registration on production stage

Assembling into units

Installation on the vehicle

Repair and maintenance services

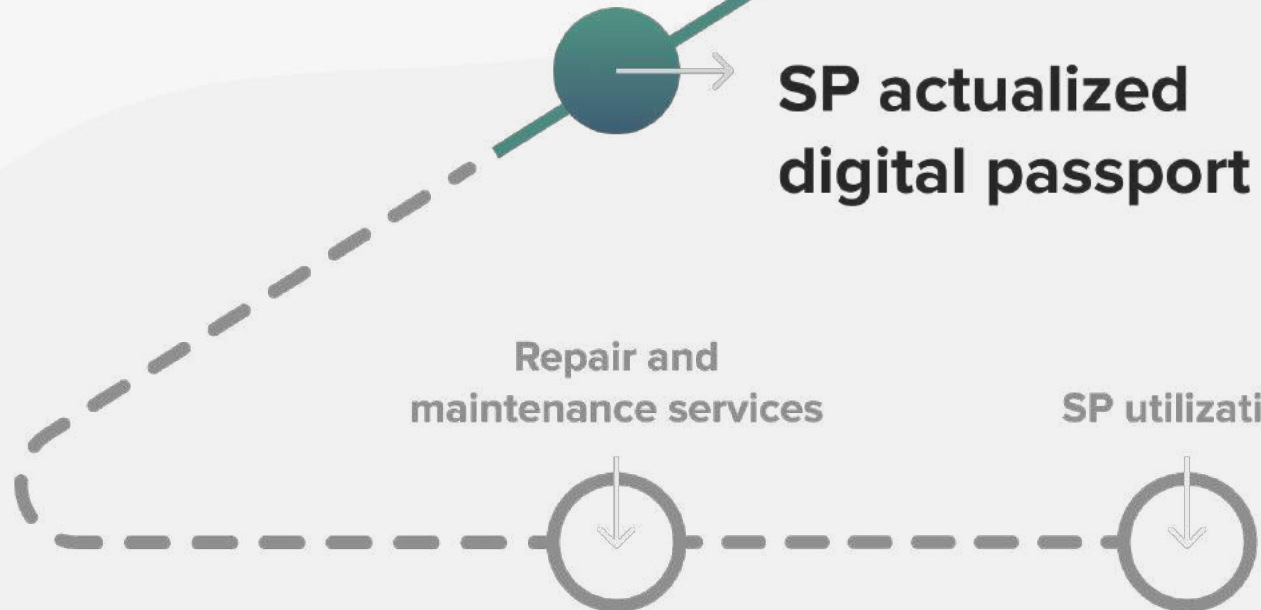


Transparent and distributed digital database

SP actualized digital passport

Repair and maintenance services

SP utilization

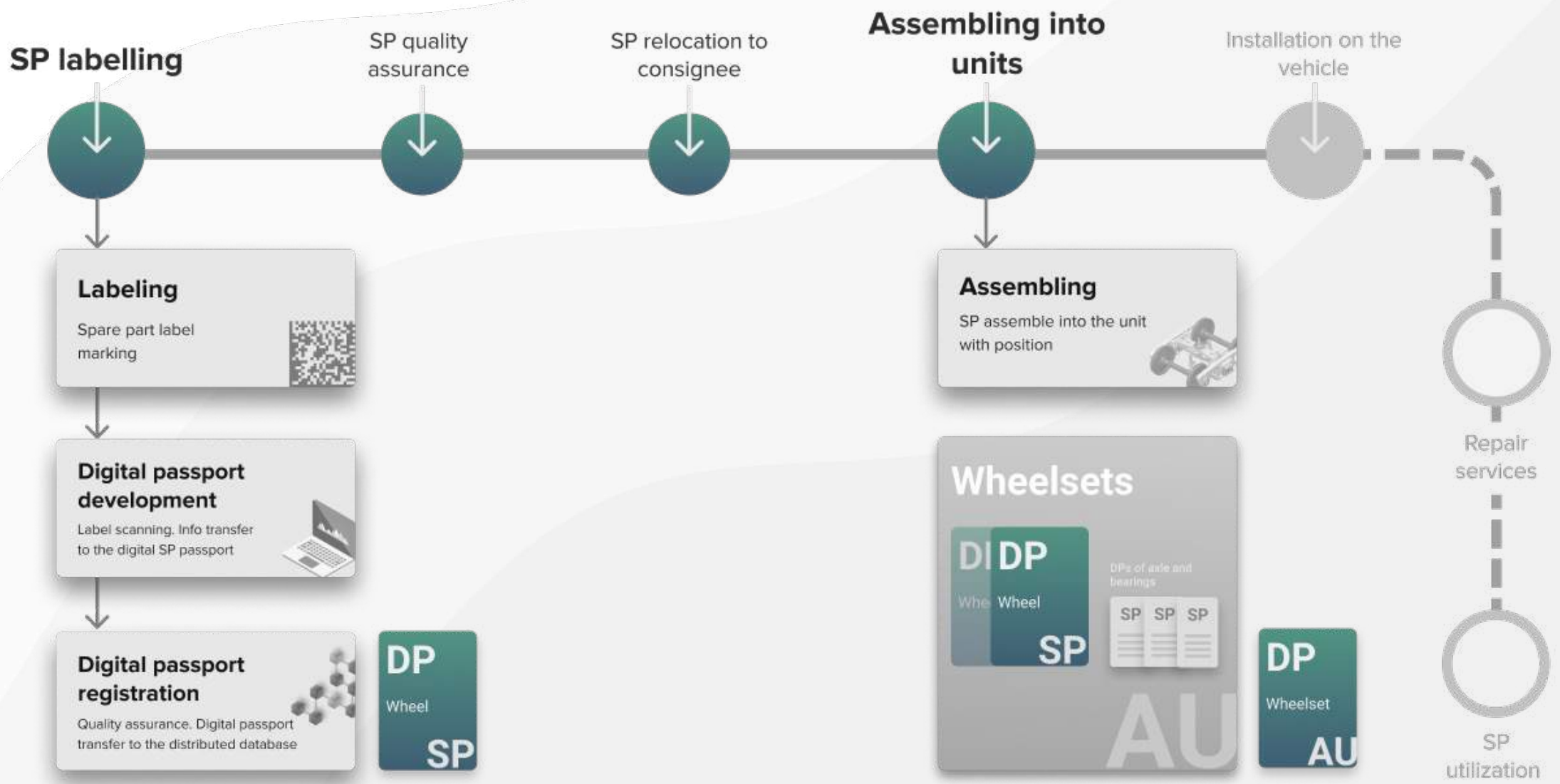




Production lifecycle

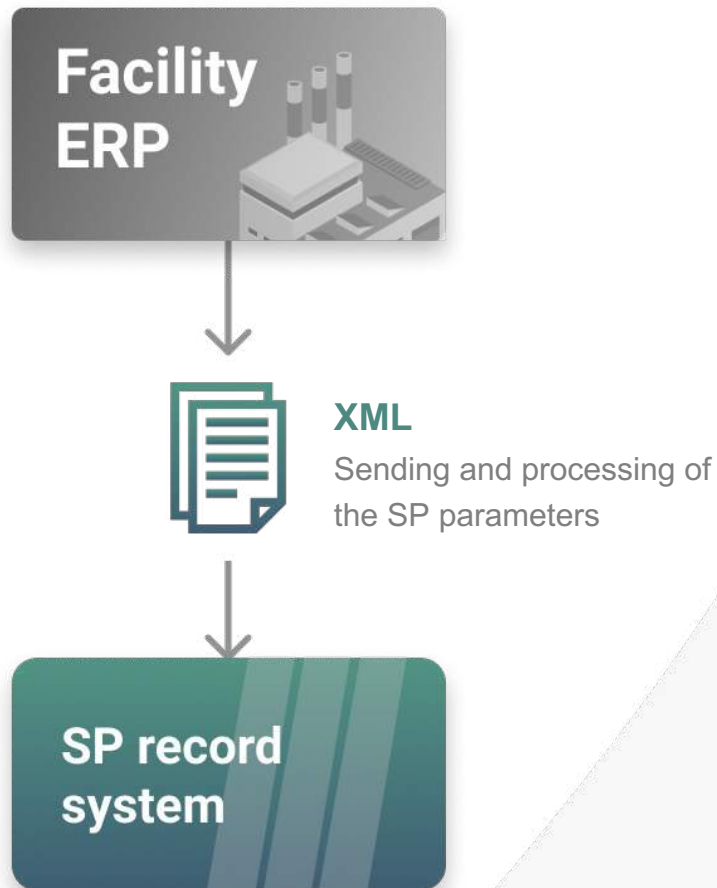
i.e. railway rolling stock

Spare parts data acquisition system



Integration function

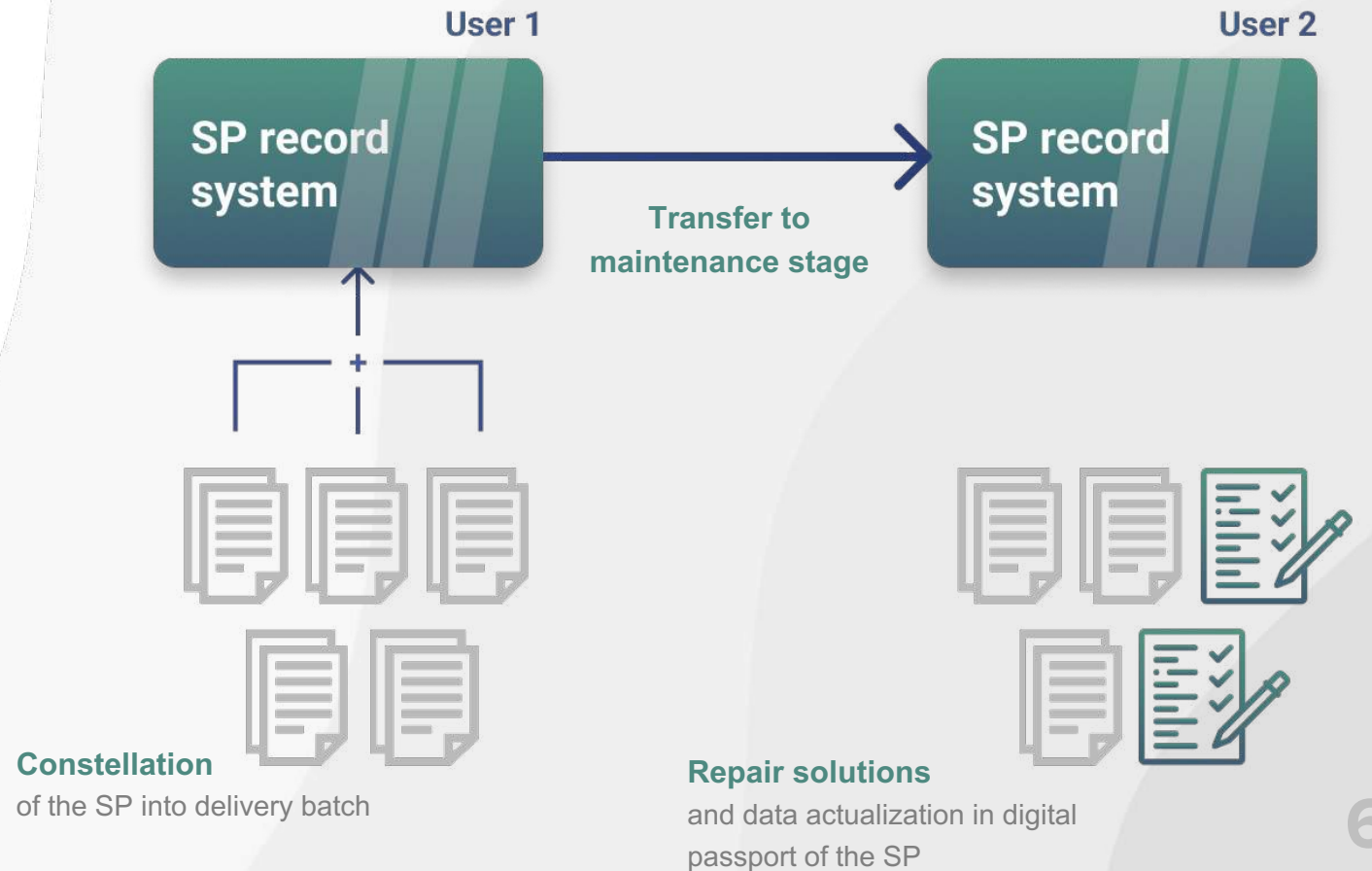
- SP registration process speed up
- Automated data exchange with enterprise ERP systems
- Automated SP data entry into the registry



Item establishment and maintenance

(i.e. SP, locomotive, component, vehicle, railcar)

- Item establishment and maintenance
- Delivery batch preparation
- Repair events and data entry to the digital passport



UIN and labeling

- ✓ SPs are marked by Data Matrix system
- ✓ UIN is created automatically in the system

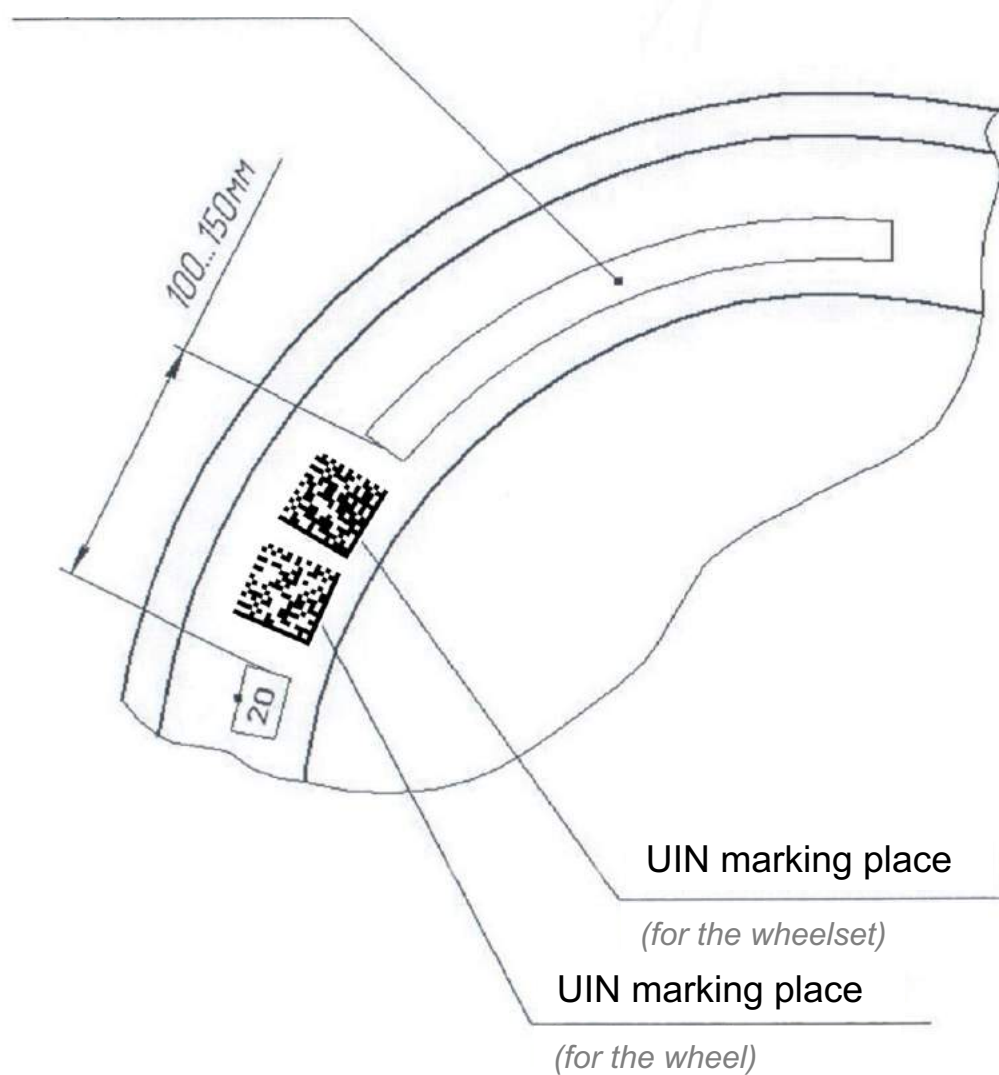
Data Matrix labeling options:

- Glue sticker
- Punch engraving
- Inkjet
- Laser engraving



In the case of the label damage or partial loss – the spare part is identified according to the vehicle label positioning system.

Actual wheel label



Digital passport

- ✓ Digital duplicate of the vehicle
- ✓ Full registry – information, details, parameters
- ✓ Passport validity confirmation by System Arbitrage

The screenshot displays the 'Spare parts registry' interface. The left sidebar contains a 'MENU' with options: Digital passports, UINs, Integrations, Design and production documentation, Wagons, and Spare parts. The main content area shows 'Spare parts registry' with tabs for 'Common info' and 'Spare parts history'. Below the tabs are 'Save and close' and 'Close' buttons. The 'Common parameters' section lists: UIN (828KH0CP8MC5), Type of marking (Sticker), and a 'Datamatrix picture' (QR code). The 'Marking info' section includes 'Type of coding' (Data Matrix) and 'Datamatrix files' (a table with columns '№' and 'File name'). The 'After registration parameters' section shows 'Number of certificate' (15.11.2021/1016) and 'Certificate of packing'.

Spare parts registry

Common info | Installation on a wagon | Assembly units | Spare parts history

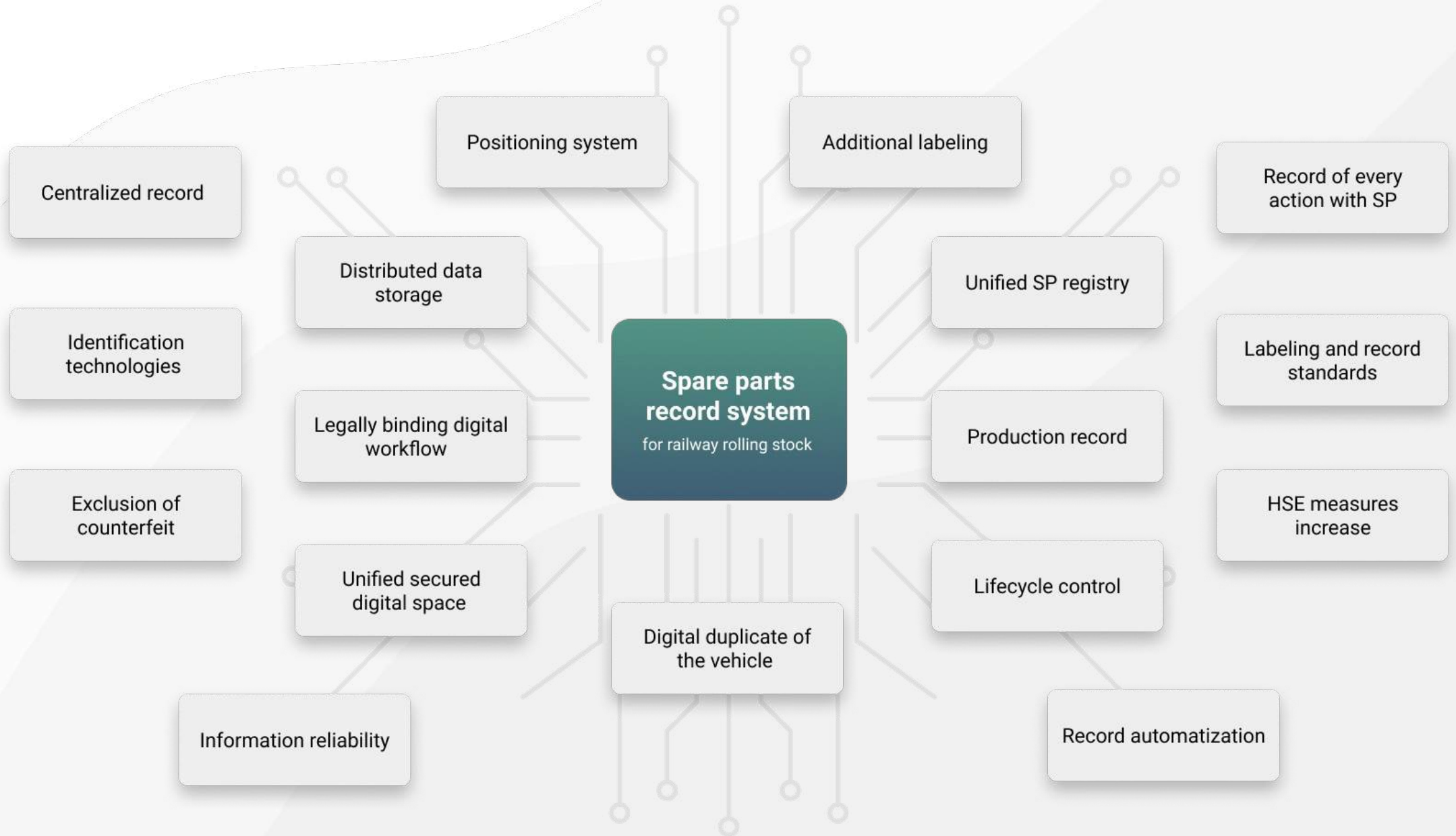
Installed on a wagon

Search

UIN	Name of part	Status	Type of marking	Type of coding	Manufact...	Position	Number	Registration date	Record type	Installation type
Q	(all)	Q	(all)	(all)	(all)	Q	Q	Q	(all)	(all)
KP2ATH64O08A	Wheel pair	Detached	Sticker		1378	1		30.06.2020, 15:47:28		
9A345EBP5MM7	Wheel pair	Detached	Sticker		1378	2		30.06.2020, 15:16:08		
M32XOK9T1E06	Wheel pair	Detached	Sticker		1378	3		30.06.2020, 15:15:21		
AK3O63XBE7EK	Wheel pair	Detached	Sticker		1378	4		30.06.2020, 15:13:37		
9HC2M1H8C5X8	Side frame	Detached	Drip jet		0012	L1	2365	30.06.2020, 15:12:35		
3AK46D4H1B5X	Spring part	Detached	Drip Jet	Data Matrix	0012	L9	2352	30.06.2020, 15:07:47		
XO4KOM73E5A1	Spring part	Detached	Sticker	Data Matrix	0012	R3	23651	30.06.2020, 15:06:43		
6361D7O77AP0	Air distributor	On board	Sticker	Data Matrix	1153	1	2365	30.06.2020, 15:05:07		
O4CCE06HAE2K	Side frame	On board	Sticker	Data Matrix	0012	L2		30.06.2020, 15:03:55		
4XHEGE1CS4HT	Side frame	Detached	Sticker	Data Matrix	0012	R4	456-480	04.06.2020, 12:03:56		

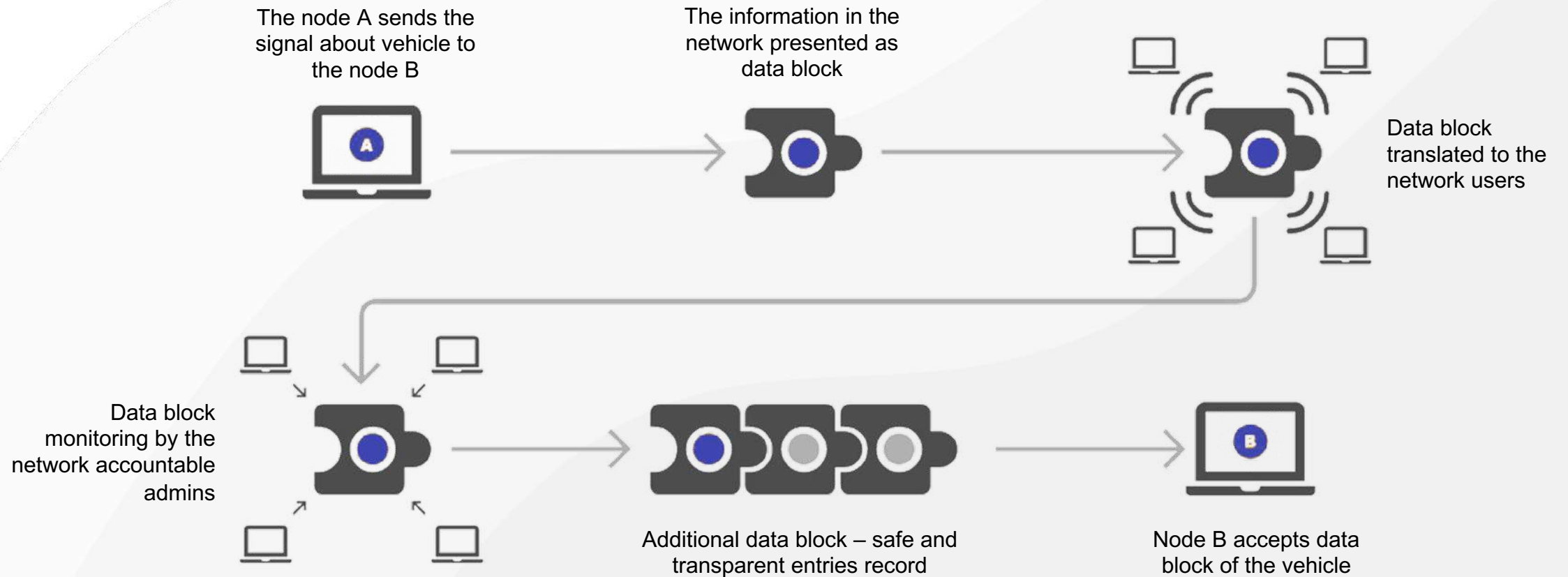


System concept



Unique technologies of distributed storage

Decentralized SP registry and in-house development smart-contract = the guarantee of authenticity and data consistency.



In-house platform and smart-contracts

C++, Lua, Poco

Players actions

Manufacturers

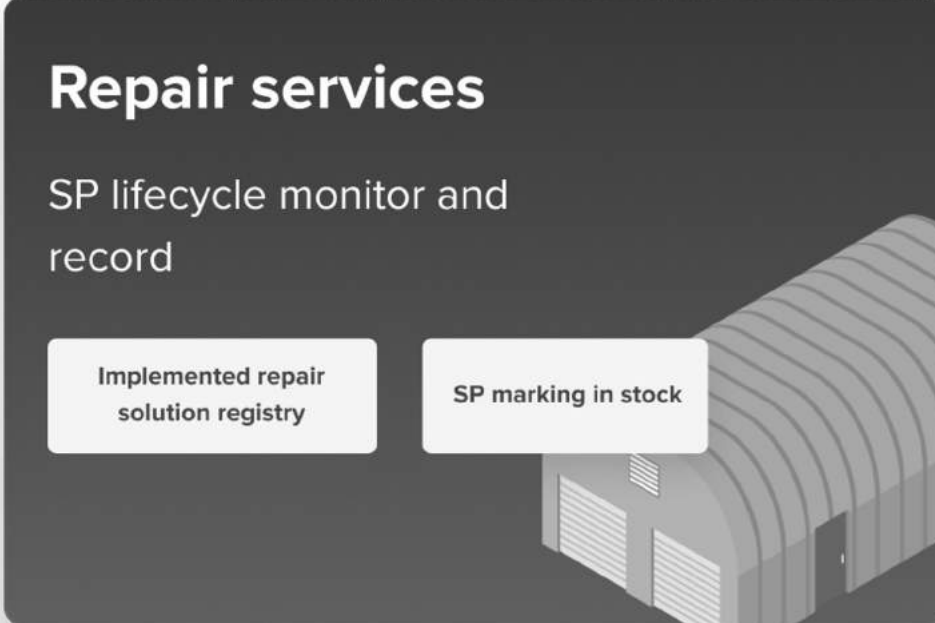
SP production, vehicle and aggregates assembly

A diagram for Manufacturers showing three white boxes: 'Labeling', 'Passport creation', and 'Vehicle assembly and manufacture'. The background features a stylized factory building and three vertical bars of increasing height.

- Labeling
- Passport creation
- Vehicle assembly and manufacture

Repair services

SP lifecycle monitor and record

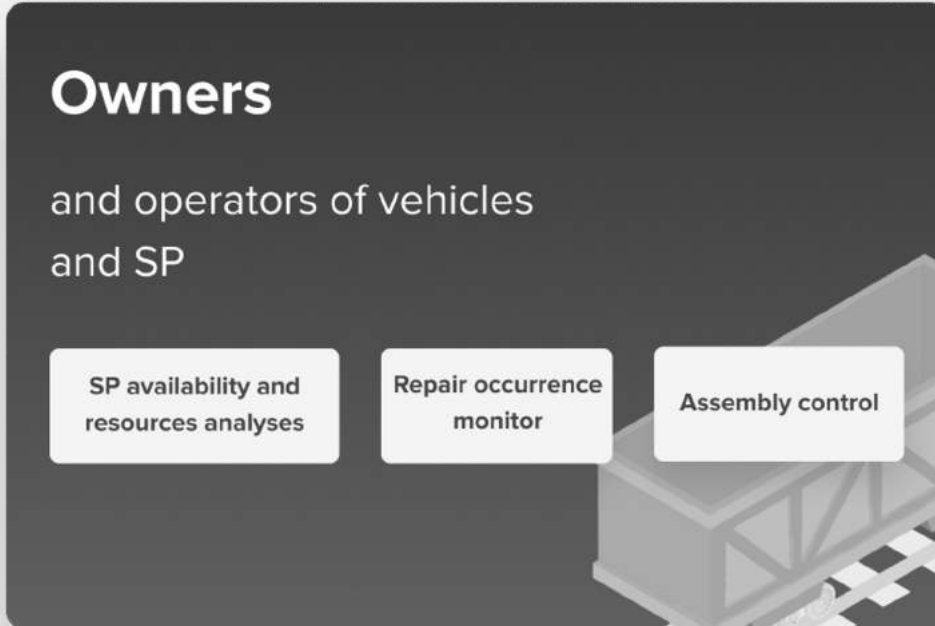
A diagram for Repair services showing two white boxes: 'Implemented repair solution registry' and 'SP marking in stock'. The background features a stylized warehouse building.

- Implemented repair solution registry
- SP marking in stock

Single space for the main industry participants

Owners

and operators of vehicles and SP


A diagram for Owners showing three white boxes: 'SP availability and resources analyses', 'Repair occurrence monitor', and 'Assembly control'. The background features a stylized industrial structure.

- SP availability and resources analyses
- Repair occurrence monitor
- Assembly control




System advantages


For SP manufacturers

- + Control of SP authenticity
 - + Expenditure decrease on warranty and validity
 - + Production capacity increase
 - + Trustworthy relationship between the main industry players
- 

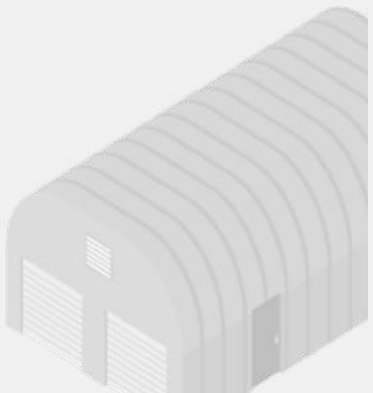
For vehicle manufacturers

- + Control of external suppliers
 - + Digital model of the vehicle
 - + Expenditure decrease on warranty
 - + Quality control of external suppliers
 - + Automatization of eligibility confirmation process and premises permits
 - + Automatization of vehicle registration process
- 

For service suppliers

- + Digital vehicle counterpart with actualized data on every detail
 - + Entries control and assets technical state
 - + Assets reliability evaluation
 - + Usage expenses decrease and out of control maintenance spending
 - + Real time SP location and tracking
 - + Automated management of vehicle lifecycle
 - + Predictive analysis of vehicle technical state and upcoming repair forecast
- 

For repair service providers

- + Digitalization of maintenance documentation
 - + Real time maintenance documentation actualization
 - + Automated control on SP usage
 - + Automated warehouse management
 - + Expenses exclusion due to the loss decrease
 - + HR decrease on data entry into CRM systems
 - + Paper workflow exclusion
- 



Offer

System installation and realization of

- ✓ The management of SP stock availability in warehouses and repair facilities
- ✓ The management of SP of railway rolling stock
- ✓ The automation of acceptance process when buying new SP
- ✓ Development of predictive modules analyzing and controlling the suppliers
- ✓ Development of the internal system which manages the process of SP creation

As a result

- ✓ Every SP will have UIN and digital passport
- ✓ Possibility to get full information on each SP at every point of time
- ✓ Creation of detailed digital tree showing the exact position of the SP on the railway rolling stock





Contact us

CEO

Ekaterina Shilova

E-mail info@numeral.su

www.numeral.su