



Concept of Blockchain Technology Implementation on the Railways

German Sukonnikov

Deputy Head

Corporate IT Department

RZD

MAJOR ADVANTAGES OF BLOCKCHAIN

- Allows for instant creation and verification of transactions enabling the user to optimise business processes, save money, and mitigate the fraud risk
- Provides control and full transparency to the participants in the system
- Supports dissemination of information in a distributed environment without a single operator, a trusted third party, and external regulation
- Starts execution of smart contracts with regard to moving objects (use of Internet of Things)
- Guarantees an ultra-high degree of database security and system stability under cyber attacks

ADVANTAGES OF BLOCKCHAIN BY FIELDS OF USE:

SMART CONTRACTS

- Reducing risks of mistrust between contracting parties
- Reducing intermediaries costs
- Enhancing transparency of transactions

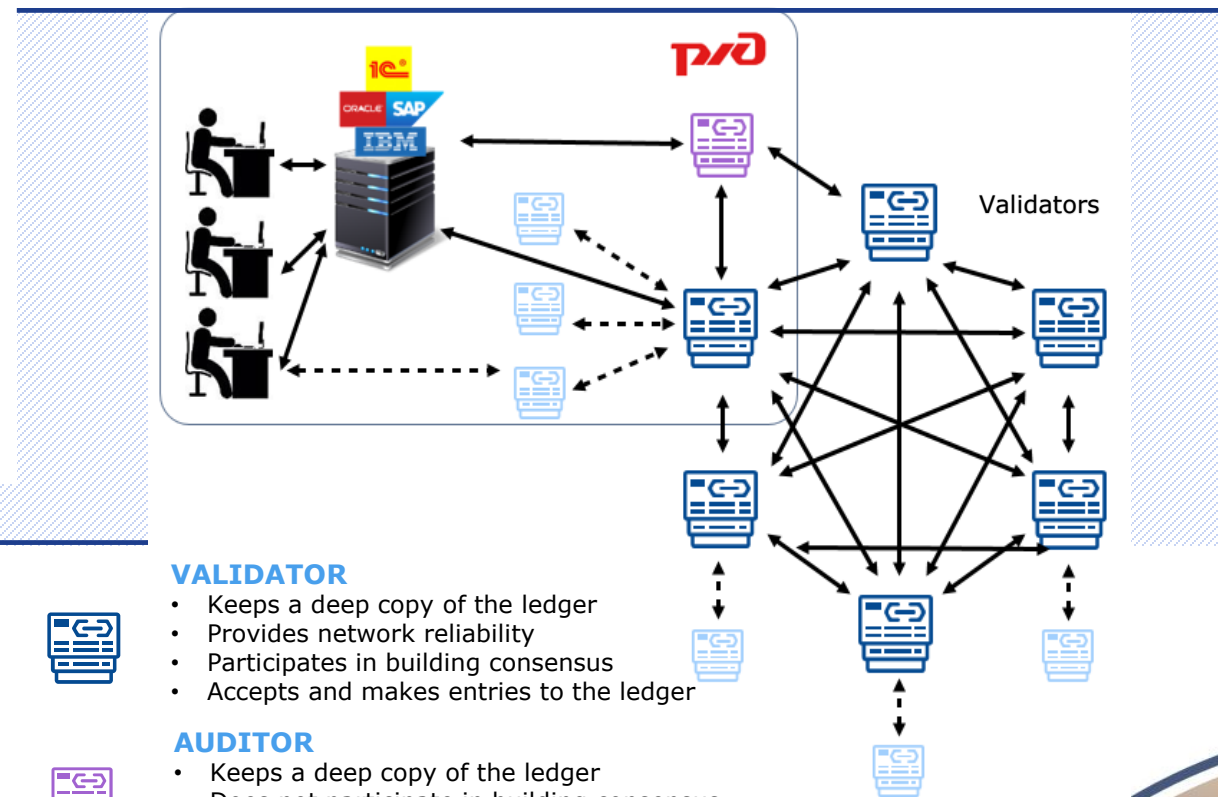
SIMPLIFIED VALUE CREATION

- Reducing the overhead costs of value data settlement
- Eliminating intermediaries in the records settlement chain

EFFECTIVE SUPPLY CHAINS

- Building global production processes
- Increase the speed of interaction between participants
- Eliminating confusion in business processes within the units
- Representation of the actual situation for each participant at any time

INTERWORKING CONFIGURATION ROLE MODEL:



VALIDATOR

- Keeps a deep copy of the ledger
- Provides network reliability
- Participates in building consensus
- Accepts and makes entries to the ledger

AUDITOR

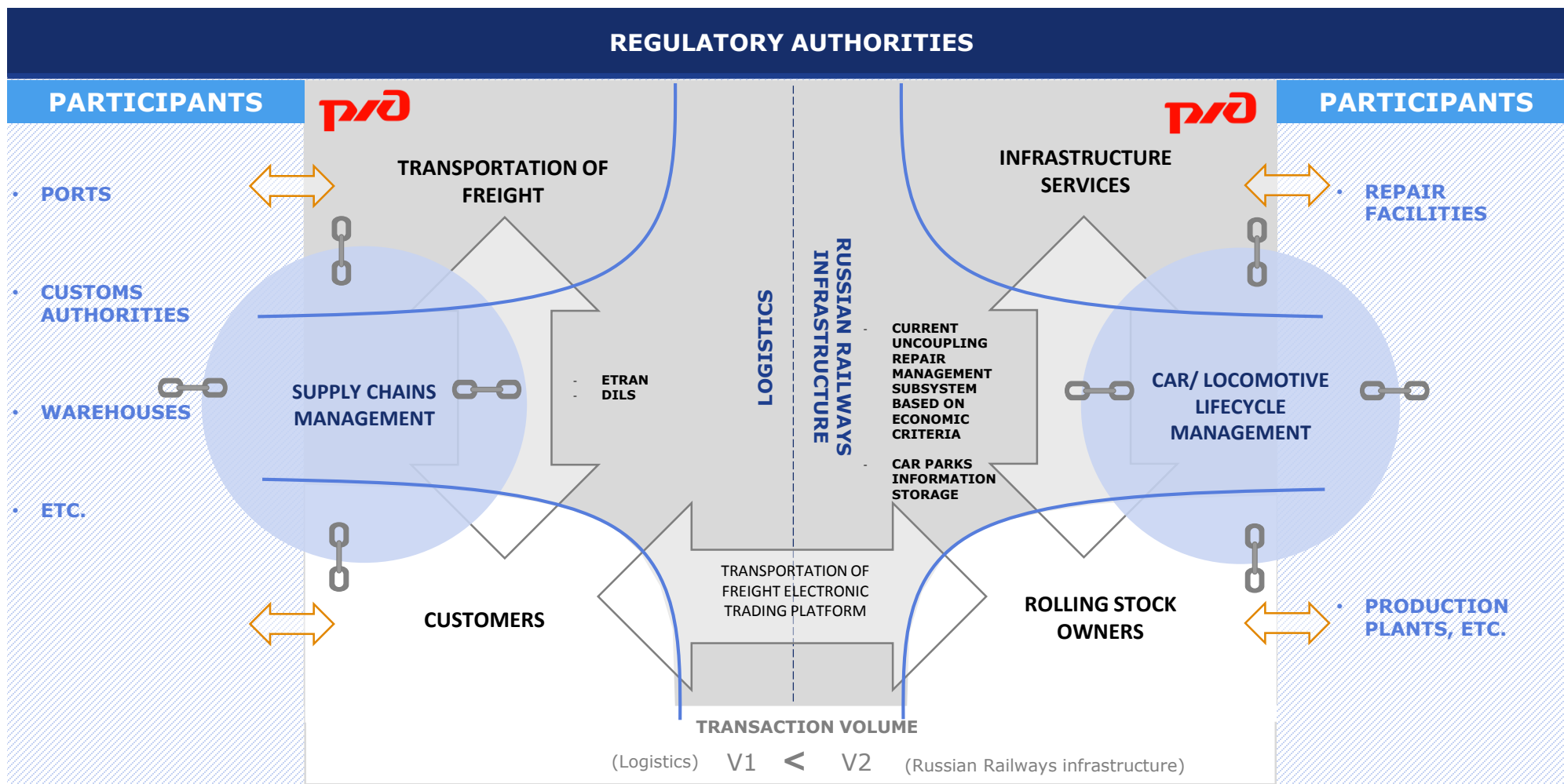
- Keeps a deep copy of the ledger
- Does not participate in building consensus
- Verifies the data accuracy completely

EASY CLIENT

- Does not keep a copy of the ledger
- Makes entries to the ledger and uploads data through access to validators
- Can verify the evidence of actual storage of the entry in the ledger



PLACE OF BLOCKCHAIN TECHNOLOGY IN THE INFORMATION ENVIRONMENT OF RUSSIAN RAILWAYS



CURRENT DIRECTIONS OF INTERACTION BETWEEN OBJECTS



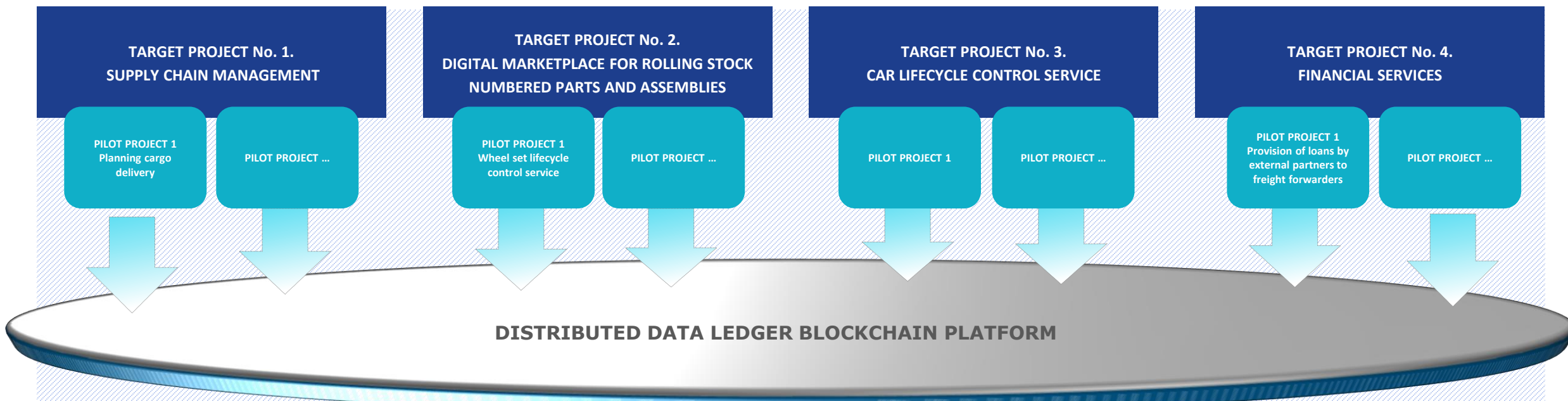
OBJECTS INTERACTING WITH BLOCKCHAIN LEDGER

XX

CONTENT OF BLOCKCHAIN LEDGER



DISTRIBUTED DATA LEDGER SINGLE PLATFORM BASED ON BLOCKCHAIN TECHNOLOGY



DDR BLOCKCHAIN PLATFORM is:

- ✓ **a trusted environment for storing and exchanging correct data** (with audit as one of Russian Railways functions) for all business process participants;
- ✓ **unified principles and approaches to implementing solutions** based on blockchain technology;
- ✓ **unified principles of information exchange** with automated systems of the process participants.

Creation of a single platform **ensures unchanged and trusted data storage**

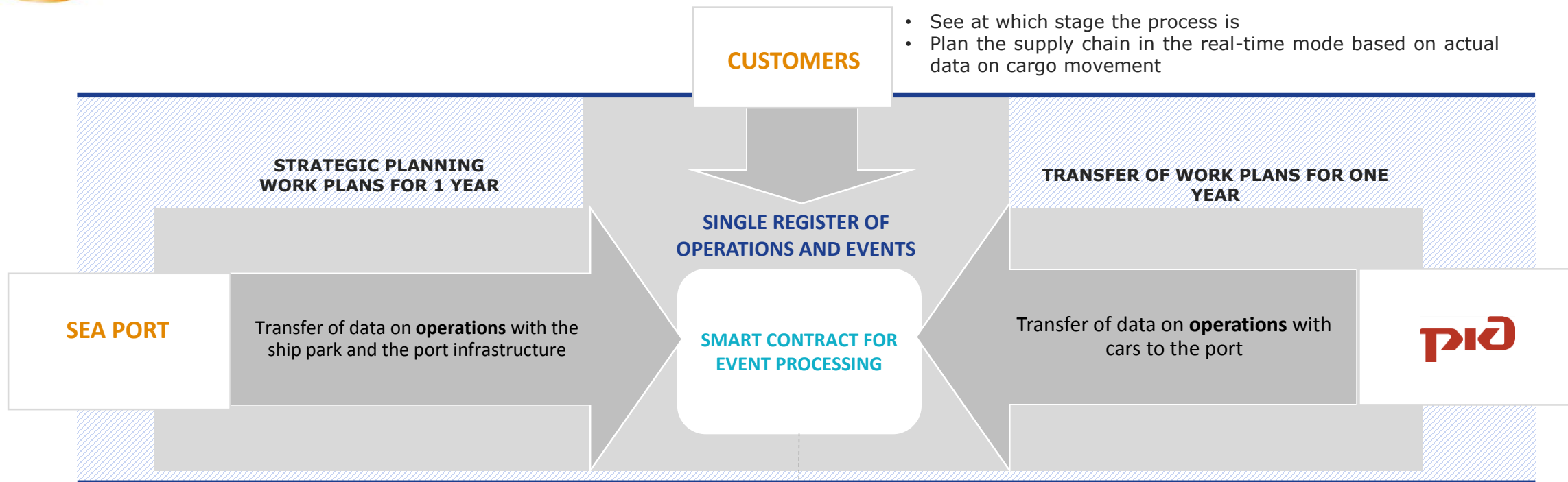
The functions of target and pilot business cases are deployed using a single DDR platform

26-28 June 2018, Genoa, Italy



TARGET PROJECT No. 1. SUPPLY CHAIN MANAGEMENT PILOT PROJECT

PLANNING CARGO DELIVERY (RAILWAY–PORT)



- Draft port operation plan for 7 days
- Railcar requirement forecast for up to 7 days
- Railcar delivery priority based on coal grades
- Forecast of unloading device technical availability
- Forecast of warehousing capacities
- Planned railcar delivery point and prompt notification of changes in marking
- Information on ship arrival
- Receiving data on railcar delivery orders

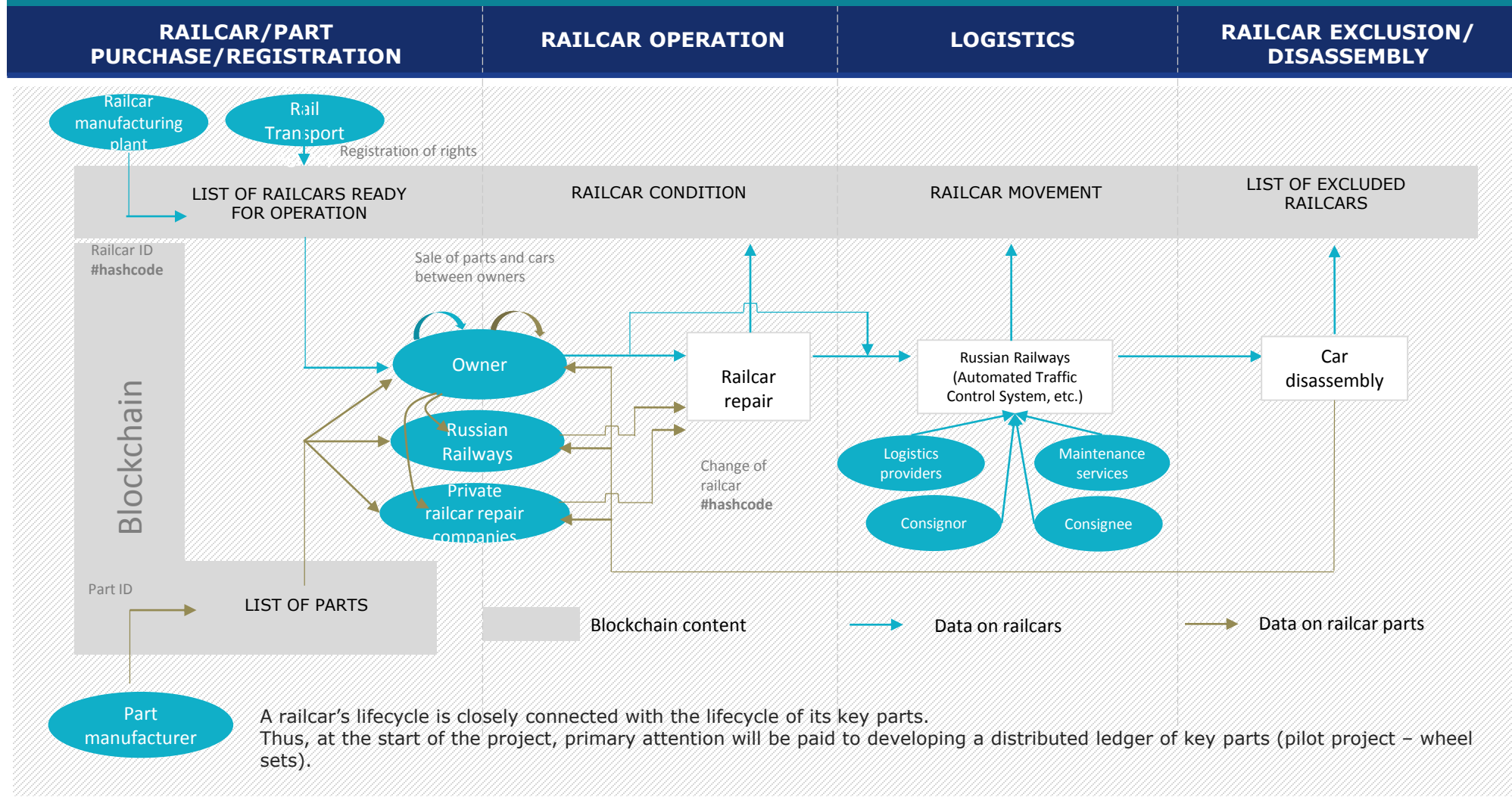
- Draft operation plan for 3 days
- Approved train delivery plan
- Transfer of data on:
 - railcar operations (at stations, location of railcars at the station);
 - bills of lading;
 - compliance with the train schedule;
 - closing of lines for engineering work;
 - train formation plan.

26-28 June 2018, Genoa, Italy



TARGET PROJECT No. 3. CAR LIFECYCLE CONTROL SERVICE

SUPPORTING A WAGON'S LIFECYCLE USING BLOCKCHAIN TECHNOLOGY



A railcar's lifecycle is closely connected with the lifecycle of its key parts. Thus, at the start of the project, primary attention will be paid to developing a distributed ledger of key parts (pilot project – wheel sets).

KEY INDICATORS

- 600 major owners
- 650,000 wagons
- 10M transactions per day
- 13 transactions per wagon per day
- 8,000 system participants

