Concept of Blockchain Technology Implementation on the Railways

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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

REGULATORY AUTHORITIES

PARTICIPANTS

- PORTS
- CUSTOMS AUTHORITIES
- WAREHOUSES
- ETC.

TRANSPORTATION OF FREIGHT

SUPPLY CHAINS MANAGEMENT

CUSTOMERS

TRANSACTION VOLUME

(Logistics) V1 < V2 (Russian Railways infrastructure)

RUSSIAN RAILWAYS INFRASTRUCTURE

- TRANSPORTATION OF FREIGHT ELECTRONIC TRADING PLATFORM
- CURRENT UNCOUPLING REPAIR MANAGEMENT SUBSYSTEM BASED ON ECONOMIC CRITERIA
- CAR PARKS INFORMATION STORAGE

INFRASTRUCTURE SERVICES

- CAR/LCOMOTIVE LIFECYCLE MANAGEMENT
- CURRENT DIRECTIONS OF INTERACTION BETWEEN OBJECTS
- CONTENT OF BLOCKCHAIN LEDGER

PARTICIPANTS

- CUSTOMERS
- ROLLING STOCK OWNERS
- PRODUCTION PLANTS, ETC.
- REPAIR FACILITIES

 objet INTERACTING WITH BLOCKCHAIN LEDGER

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CONTENT OF BLOCKCHAIN LEDGER

TRANSPORTATION OF FREIGHT

INFRASTRUCTURE SERVICES

CAR/LOCOMOTIVE LIFECYCLE MANAGEMENT

TRANSPORTATION OF FREIGHT ELECTRONIC TRADING PLATFORM

CURRENT UNCOUPLING REPAIR MANAGEMENT SUBSYSTEM BASED ON ECONOMIC CRITERIA

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DISTRIBUTED DATA LEDGER SINGLE PLATFORM BASED ON BLOCKCHAIN TECHNOLOGY

**TARGET PROJECT No. 1.**
**SUPPLY CHAIN MANAGEMENT**

- PILOT PROJECT 1
  - Planning cargo delivery

**TARGET PROJECT No. 2.**
**DIGITAL MARKETPLACE FOR ROLLING STOCK NUMBERED PARTS AND ASSEMBLIES**

- PILOT PROJECT 1
  - Wheel set lifecycle control service

**TARGET PROJECT No. 3.**
**CAR LIFECYCLE CONTROL SERVICE**

- PILOT PROJECT 1

**TARGET PROJECT No. 4.**
**FINANCIAL SERVICES**

- PILOT PROJECT 1
  - Provision of loans by external partners to freight forwarders

**DISTRIBUTED DATA LEDGER BLOCKCHAIN PLATFORM**

**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.
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.
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).