



DPK *Railways*®



Timetable design

Rolling stock circulation optimisation

Train driver and train attendant crew optimisation

Work schedule optimisation

Operation cost settlement

Maintenance facilities



costs



IT system for **railway operators**

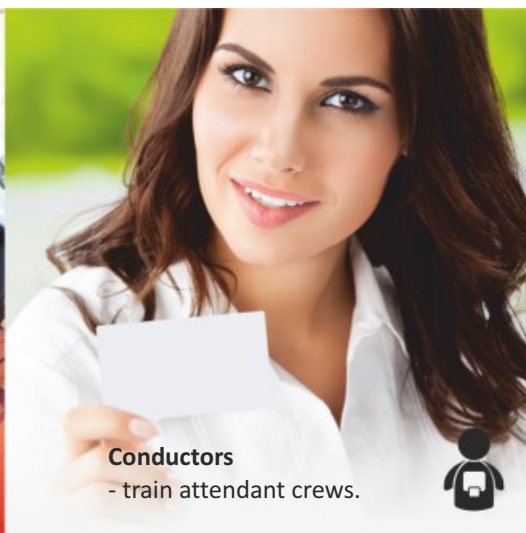


Operational areas served by DPK Railways

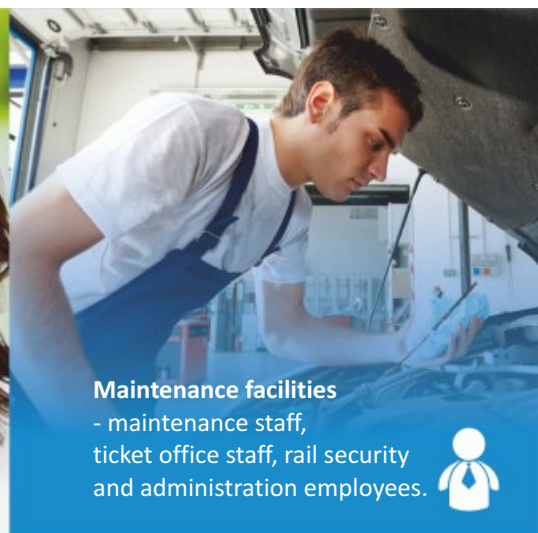
Supporting operations for three primary groups of employees in a railway company.



Train drivers
- train driver crews.



Conductors
- train attendant crews.



Maintenance facilities
- maintenance staff,
ticket office staff, rail security
and administration employees.



Business benefits



More efficient carriage through transport process optimisation.



Reduction of costs associated with managing work schedules and servicing carriages.



Legal security - the system verifies the correctness of employment in relation to all current labor law provisions and other internal conditions in the organization.



Advanced analytics, full range and scope of data and indicators at the Management's fingertips.



Increased labour market competitiveness through access to modern work tools (mobile application, worker's portal).

Planning

- Timetable changes.
- Rolling stock circulation optimisation.
- Planning transport tasks.
- Planning absences and other events in the long run.
- Staff schedules built on the basis of an optimisation module.

Operations

- Verification of employee assignments on an on-going basis, reactions to unexpected events (absences, breakdowns, etc.).
- Optimised matching of employee and vehicle to a given task where changes take place.
- Communication through a mobile device (tablets, smartphones, mobile tills).
- Train team monitoring.
- Visualisation of trains of a railroad map.

Settlements

- Checking actual work done against schedules.
- Employee time sheets.
- Calculating carriage and empty runs.
- Statistics, reporting, analytics.





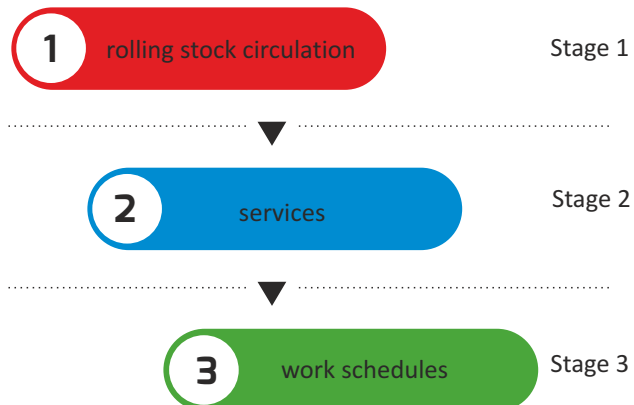
Optimisation

Optimisation tools are the most important element of the DPK Railways system.

Optimal use of resources and cost control are immensely at every stage of managing transports and building a carriage schedule. Use optimisation tools based on advanced mathematical methods to achieve the best possible result at every stage of the transport process.

Costs are significantly reduced and kept at the lowest possible levels through the application of three step optimisation.

Optimisation



Rolling stock circulation optimisation

The use of mathematical optimisation algorithms means the system schedules vehicle circulation which makes the most efficient use of their carriage capacity and maximises rolling stock performance within a defined set of conditions and parameters.



Services

Establishing services - building tasks for train teams on the basis of circulation. Maximum use of employee working time, minimisation of breaks and surplus journeys subject to editable parameters and legal terms.



Work schedule optimisation

- editing long-term schedules. Assigning given employees to certain tasks, manning all services with the best possible use of the available employees subject to all applicable legal conditions.



Up to 13 % more efficient use of vehicles*



Reduction of waiting time and ineffective journey costs*



Reduction of overtime costs*

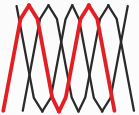
* Average results achieved by rail operators using the DPK Railways system



Line Designer



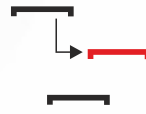
Determination of train routes and journey times on the basis of a topographic railway network overview.



Presentation in the form of a progress chart over configurable sections of the railway network.



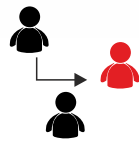
Optimising module which combines trains into circulations acc. to defined parameters, cost functions and boundary conditions.



Graphical presentation of circulations in the form of flat or 3D circulations with an option to correct them using "drag and drop" method and an export to Excel.



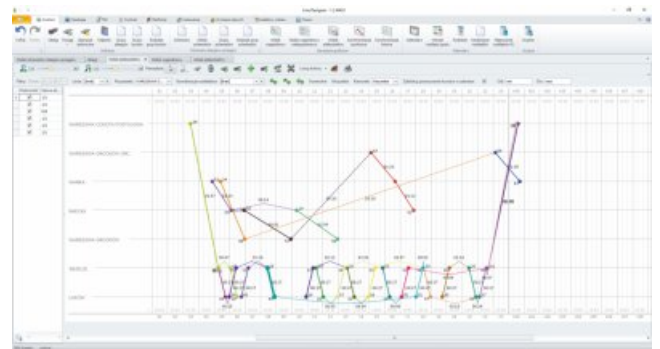
Automatic circulations and operational changes updates following timetable changes (updates).



Operational changes supported with optimisation module which schedules services on the basis of vehicle circulations taking into account definable criteria, cost functions and boundary conditions.

Timetable scheduling

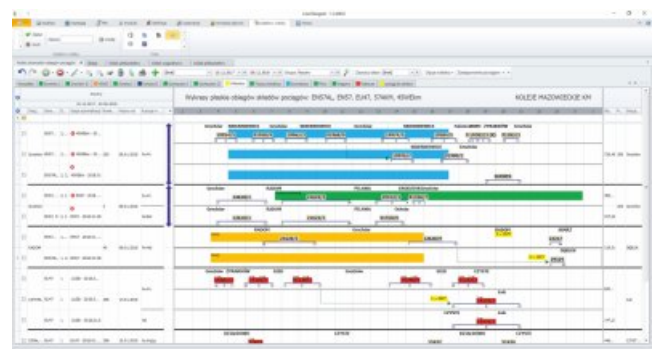
A tool for designing a train schedules/timetables on the basis of the current Timetable Construction System and sending in the form of requests to the Infrastructure Master.



Train/vehicle circulation

Modern IT tools to build optimal train circulation. The module makes it possible to create circulations for any time periods with an option to combine trains for various types of timetable and working day with smooth transitions between these periods.

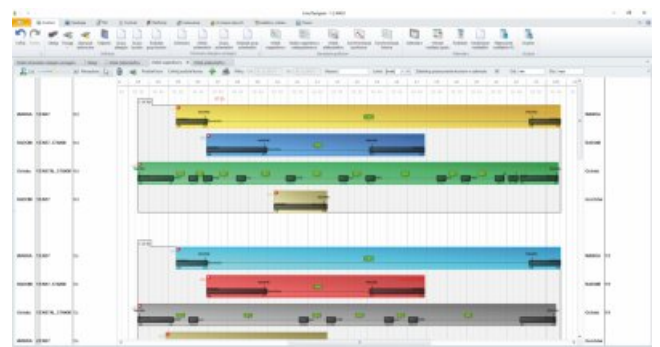
The circulation optimisation module ensures maximum use of the available rolling stock subject to the minimum possible operational costs and satisfaction of carriage performance conditions.



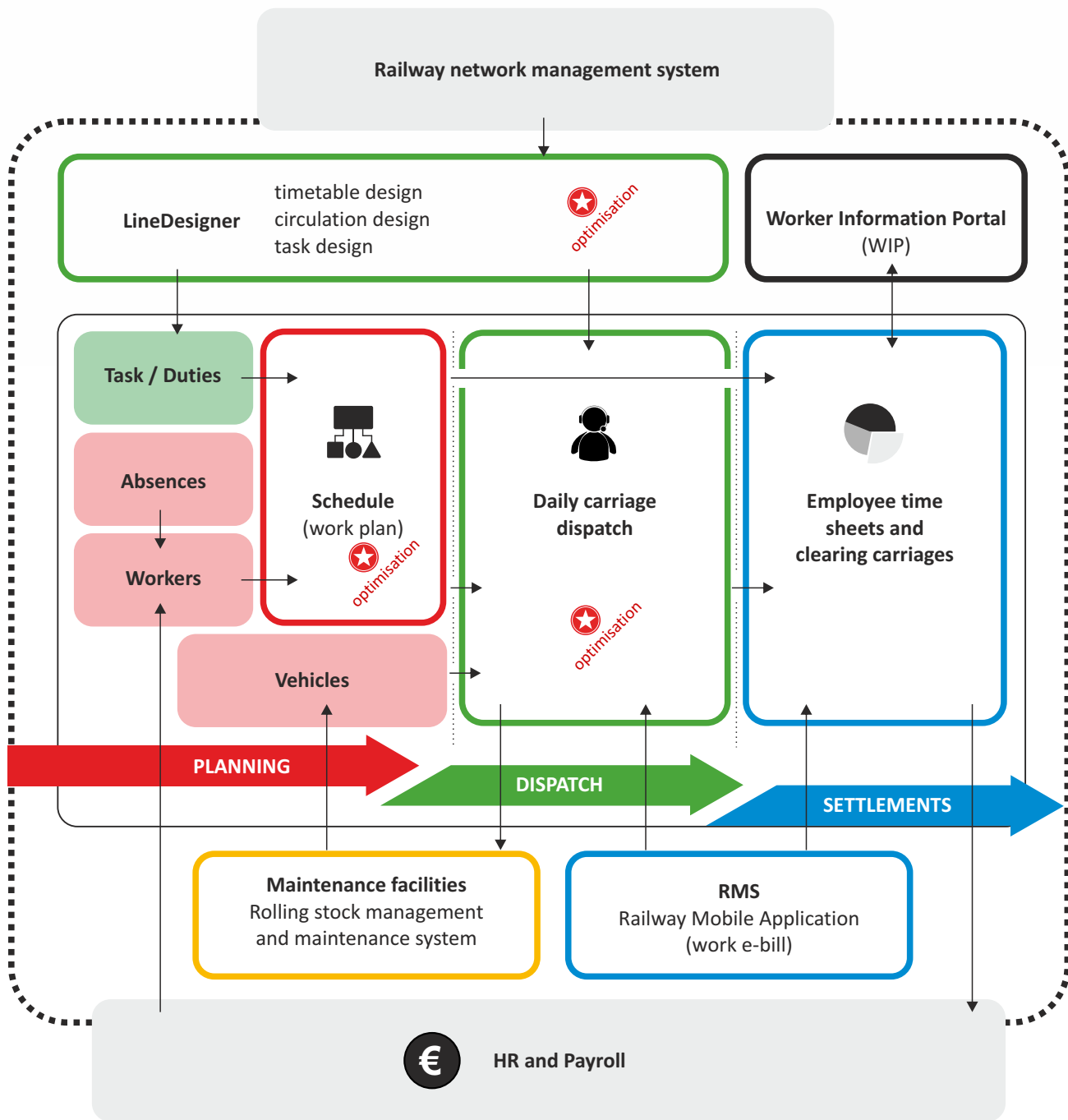
Creating personnel duties

Using optimisation tools, the system makes it possible to design operational duties most effective for employees. Optimisation takes into account the timetable and vehicle circulation.

Personnel duties can be constructed taking into account all types of on and off train activities comprising the train driver's and conductor's work.



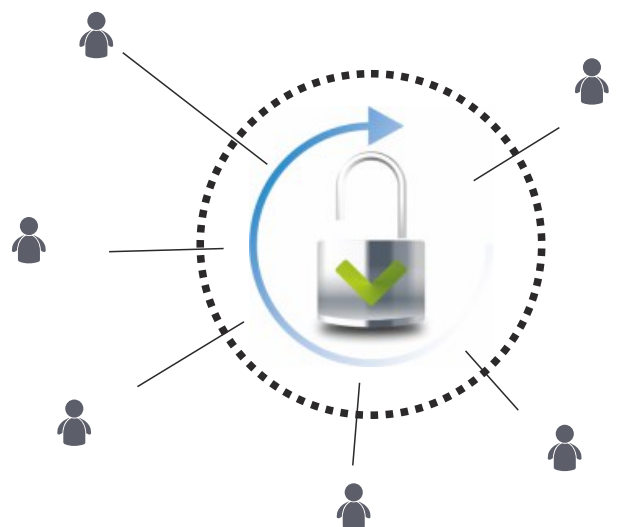
DPK Railways system process execution and logic



System structure

Rail companies operate in a multi-tier, hierarchical structure across large geographical areas which extend beyond regional and even national boundaries. The system is constructed to operate effectively, safely and efficiently in a dispersed environment. The system will match the carrier's organizational structure.

A central license server manages user access to application servers and the database, the database server manages data ensuring constant access to all users and at the same time ensures save consistency and information security.



General data

The task of the General Data module is to collect a set of data used by the system for correct functioning of given tools and necessities for correct data processing and calculations.

Worker data

This module is used for worker administration within the scope of operational and settlement data. Provides an opportunity to integrate with the company's HR system. Provides a facility for worker data management, planning regular training sessions and assigning and updating permissions (route, rolling stock).

Vehicle Data

A module used to collect information about vehicles used by the company and to monitor rolling stock condition, arrange maintenance inspections, repairs and create maintenance schedules.



Planning



Optimisation

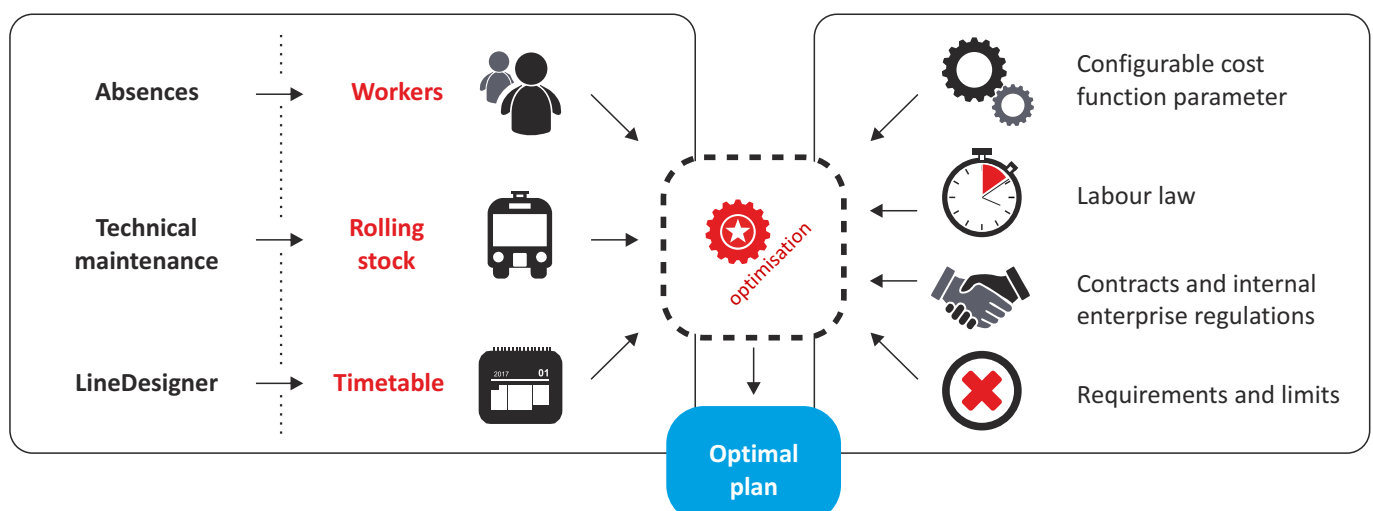


Absences

The functions of this module facilitate planning long term absences over the scope of a calendar year as well as recording current planned and settled absences as well as on-going monitoring of planned absences.

Task / Duties

The module facilitates operational changes for different time periods, defining reserves and absences. A database of trains means operational changes can comprise on and off train tasks. Includes a tool for automating construction of operational changes.





Modules

Optigraf

A module used to prepare worker schedules using mathematical optimization algorithms and on-going verification of work assignments.

Personnel rosters are prepared quickly and accurately using advanced planning tools both in the basic, shift and equivalent working time systems.

Dispatcher

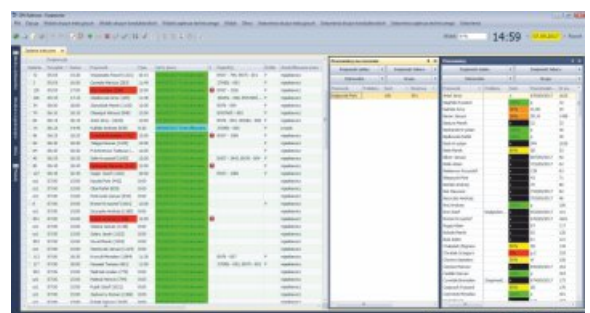
A module for daily management of vehicles and workers, facilitating smooth transition of trains into operation. Contains a series of screens for the dispatcher to be able to make decisions associated with engaging workers and assigning vehicles only train driver crews.

The module uses information directly from the workers module and the generated dispatch data constitute basis for approving worker time sheets and vehicle journeys in the Verification module.



Verification / settlement

The system has a facility for comprehensive settling of worker time sheets, rail vehicle journeys, fuel consumption and other consumables. The system covers all transport processes for quick and comprehensive settlements and the use of a central database makes it possible to report data in any scope and range.



Dispatcher

Worker

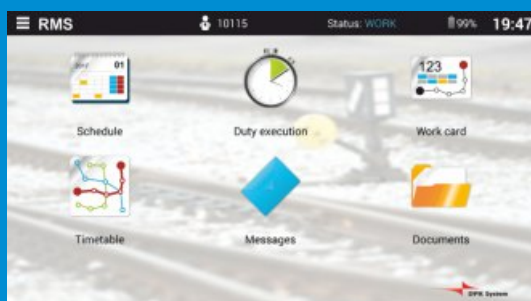
RMS

(Railways Mobile System)

In the first place modern, mobile technologies are to support the work of train crews and improve their communication with the dispatcher.

Such a solution means it is possible to do away with paper based time sheets where workers had to make note of their work, as the application registers and verifies the performance of scheduled work.

This solution is based on Android tablets with GPS systems and packet communication (e.g.: GPRS, Edge,3G).



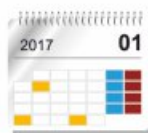
Duty No.:	From	Start point	Activities	To	End point	Vehicle
32A	15:45	Łódź Fabryczna	Supervision	16:20	Łódź Fabryczna	
	16:20	Łódź Fabryczna	91103	17:56	Warszawa Wschodnia	
	17:56	Warszawa Wschodnia	Supervision	18:39	Warszawa Wschodnia	
	18:39	Warszawa Wschodnia	19108	20:14	Łódź Fabryczna	
	20:14	Łódź Fabryczna	Supervision	22:30	Łódź Fabryczna	

DAY	DUTY	FROM-TO	JOB	START LOCATION	VEHICLE	CHART
01.02.2018	DD	07:00-07:00	00:00			Empty No.
02.02.2018	54	13:15-01:15	12:00	Łódź Fabryczna		45/02/2018
03.02.2018	32A	15:45-03:15	11:30	Łódź Fabryczna		82/02/2018
04.02.2018	DD	07:00-07:00	00:00			Empty No.
05.02.2018	DD	07:00-07:00	00:00			Empty No.
06.02.2018	34	15:45-02:25	10:40	Łódź Włoczek		177/02/2018
07.02.2018	33	16:30-03:40	11:10	Koluszki		216/02/2018
08.02.2018	DD	07:00-07:00	00:00			Empty No.
09.02.2018	33	16:30-03:40	11:10	Koluszki		285/02/2018
10.02.2018	35A	05:15-19:35	08:20	Łódź Włoczek		326/02/2018



Service performance

Tasks to be performed during a shift are displayed.



TNA

Always up-to-date schedule (with changes) is displayed.



Documents

List of documents and orders with an option to confirm receipt.



Messages

Constant communication of the train crew with the dispatcher. Preparation of messages templates.



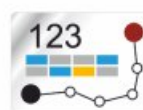
Location / Work status

Constant GPS monitoring of the crew / train and work status determination.



Reports

Creating reports in the event of faults / accidents backed up by photographs



Time sheet

Electronic time sheets successfully replace their paper equivalents.



Timetable

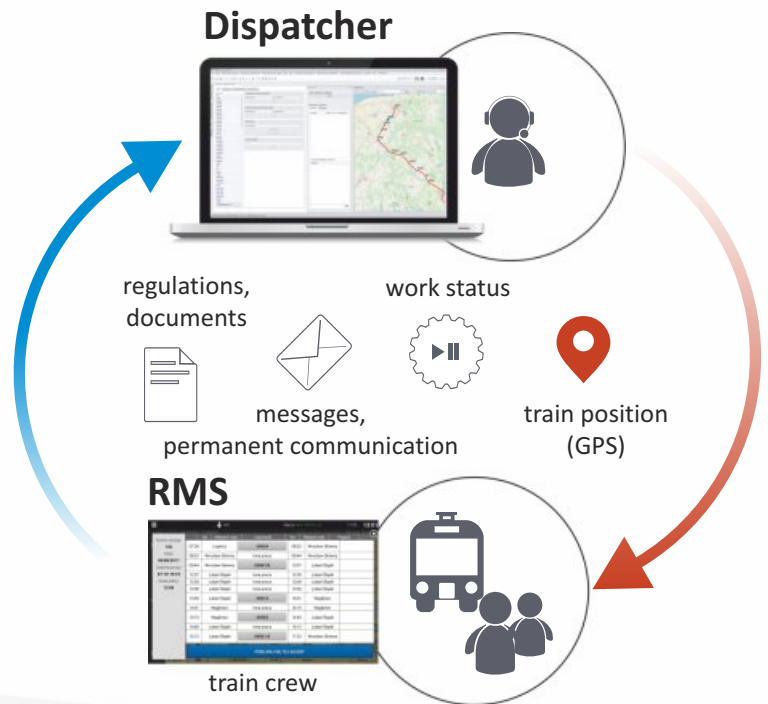
Always up to date timetable displayed.

Dispatcher

Full graphic, multi-user dispatch panel with automatic generation of dispatching waybills. Equipped with a module suggesting optimal instructions and numerous dispatcher tools.

A tool for dynamic management of a rail company's resources, improves carriage safety and discipline, facilitates dispatch work. The Optimization module minimises on-going operational costs.

Cooperates with onboard vehicle computers, tablets and mobile conductor tills (GPS). Communicates with vehicles (GPRS).



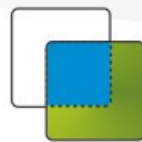
DPK Railways Dispatcher - RMS working in unison

- Workers always know their current timetable - all dispatcher changes are sent to tablets.
- Electric work instructions - workers receive a ready time sheet from the dispatcher.
- Using a console built into the dispatcher module, a dispatcher may communicate with workers via text messages and the communication is recorded.
- Efficient document distribution - workers receive electronic documents to their tablets (instructions, resolutions, list of permanent warnings, technical regulations) and once read, confirmation is also sent electronically.
- Monitoring the crew - the dispatcher can always see the workers' status and knows who is preparing for work, who is working and who has finished.
- Following trains - a dispatcher can follow the progress of trains on an on-going basis through the use of GPS technology.
- A dispatcher can see all work performed (time sheets), together with information regarding any possible deviations from the plan.



Intelligent dispatcher decision support

The programme automatically signals absences and shortages in train crews in advance (defined advance period warning) and supports the dispatcher in making optimal choices if changes have to be made.



Integration

Integrated with:
Technical maintenance, GPS, RMS
- mobile applications (tablets / onboard computers in vehicles), MS Gate.



Ergonomics

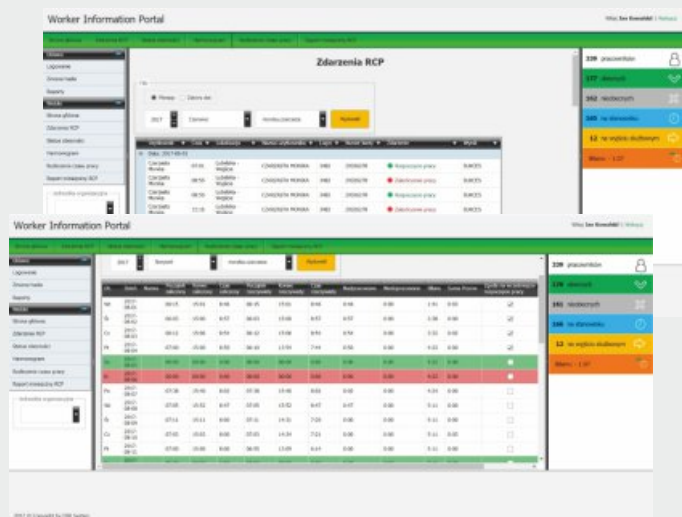
Multi user work - simultaneous work of a number of dispatchers, configuration of events and conflicts screens, intuitive icons defining the current work performance progress.



Worker Information Portal (WIP)

The WIP - Worker Information Portal is a tool available to each worker via an internet browser. The tool provides schedule data and facility to submit time sheets. Workers can also use it to submit leave requests, overtime requests and requests to change next month's schedules.

Together with TNA devices it facilitates on-going verification by superiors of workers' work start and end times, lateness, worker presence and working times outside of the working hours.



Example of available data

- List of business and well as private entries and exits, together with time stamps.
- Schedule for a chosen month.
- Settling working time for chosen month.
- Working time summary.
- Worker presence status.
- Any report, e.g. list of lateness.

Worker presence status



access for managerial staff

WIP



SSL protocol

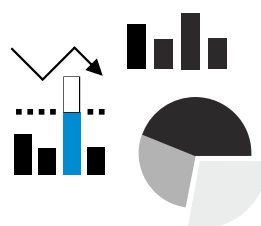


Integration with Active Directory

fast access via a web browser (login required)



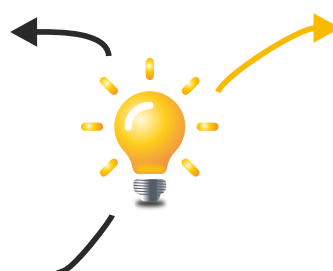
Ongoing access to data



data always up to date, reports in simple table and graphical (diagrams) formats



Convenient access to information



24h/7

undertaking conscious actions based on actual numbers



Rolling stock management
and maintenance system

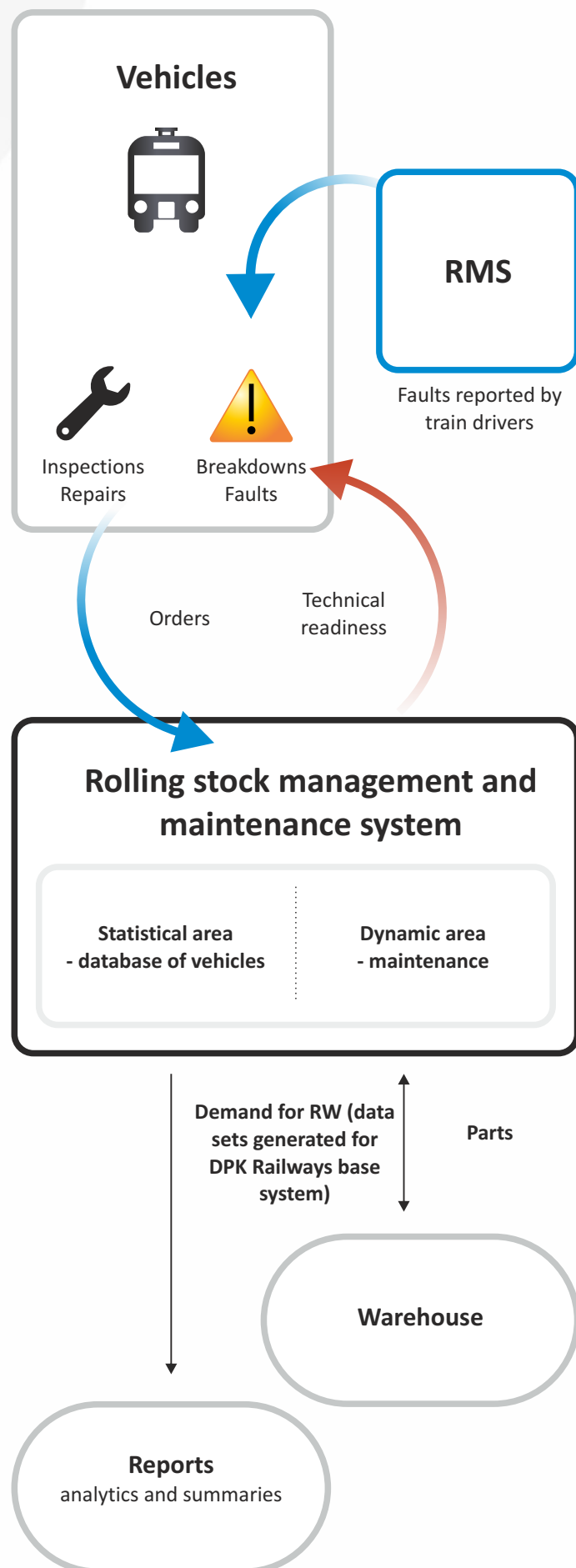
Technical maintenance

Static area - database and documentation of used vehicles.

- Vehicle registry - maintaining a rail vehicle register in accordance with the Regulation on the manner for maintaining a register and manner for marking rail vehicles.
- Documentation acc. to vehicle type - digitalised technical documentation.

Dynamic area

- Planning vehicle inspections.
- Planning and recording on-going and emergency repairs.
- Record of instructions with a detailed list of performed tasks and materials used.
- Reports - analytics and summaries.
- Creating lists of tasks for inspections and repairs.
- Collecting data on vehicle runs and operation times.
- Record of faults reported by train drivers.
- Management of guarantee agreements, complaints for new vehicles.
- Preparation of rolling stock "technical readiness" list.
- Maintaining a register of placing in service certificates and placing in service approvals.
- Maintaining a rolling stock modernisation register.



IT system for rail operators



DPK Railways

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