

*interoperability, TSI,  
IT systems for PKP, systems' integration*

Włodzimierz Jerzy ŚMIGIERA<sup>1</sup>

## **PKP INFORMATION TECHNOLOGY LTD SYSTEMS WITH REFERENCE TO THE TECHNICAL INTEROPERABILITY SPECIFICATIONS**

Nowadays undertakings of PKP Group face task of working out plans of IT application within the scope of interoperability requirements defined in the UE directives.

In these plans, on the basis of analysis of current state, aims and priorities of undertakings' areas where IT will have application in and way of implementation specific solutions must be defined.

The best effects will be gained, if it will be performed in the trouble areas of activity.

## **SYSTEMY INFORMATYCZNE SPÓŁKI PKP INFORMATYKA W ODNIESIENIU DO TECHNICZNYCH SPECYFIKACJI INTEROPERACYJNOŚCI**

Obecnie poszczególne spółki grupy PKP stoją przed zadaniem opracowania planów informatyzacji w aspekcie wymogów interoperacyjności określonych w dyrektywach UE.

W planach tych na podstawie analizy stanu obecnego, celów i priorytetów spółek należy określić obszary podlegające informatyzacji oraz sposób wdrożenia określonych rozwiązań.

Największe efekty uzyska się, jeśli to zostanie wykonane w newralgicznych dla firm obszarach działania.

### **1. INTRODUCTION**

Joining the UE by Poland for the railway undertakings, especially for PKP PLK (infrastructure), PKP CARGO (freight transport) and PKP Intercity (passenger transport), means necessity of adaptation of their field activity systems to requirements specified in the EU directives.

One of these requirements is to meet interoperability requirements, i.e. application of general technical standards, which will allow RUs' (Railway Undertaking) and IMs' (Infrastructure Manager) systems to cooperate. Those standards are in the form of "Technical Specification for Interoperability of the conventional Trans-European rail system" and are drawn up by the European Association for Railway Interoperability (AEIF), which acts as the joint representative body bringing together representatives of the infrastructure managers, railway undertakings and industry, and as well from PKP.

<sup>1</sup> President of PKP Information Technology, Ltd, Al. Jerozolimskie 140, 02-305 Warszawa, Poland, wlodzimierz.smigiera@pkpik.pl

Adoption of field activity system should encompass areas of creating timetable on the basis of operators' orders, tracking trains, customers' settlement and fares establishing.

Customers' settlement system (clearing system) should take into account services that have been executed, customers' complains and penalties levied on an operator if he caused disruption in traffic. It is obvious that such a system should cooperate both with tracking trains system and ERP system. Supporting price list establishing system should rely on the data getting from ERP system.

## 2. IT SYSTEMS FOR UNDERTAKINGS OF PKP

In the basic scope of undertakings of PKP activity, the following business processes can be mentioned:

- orders and agreements passenger and freight operators service,
- timetable creating,
- trains tracking,
- customer settlements for using line,
- rates establishing.

Communications connection between these processes shows following figure:

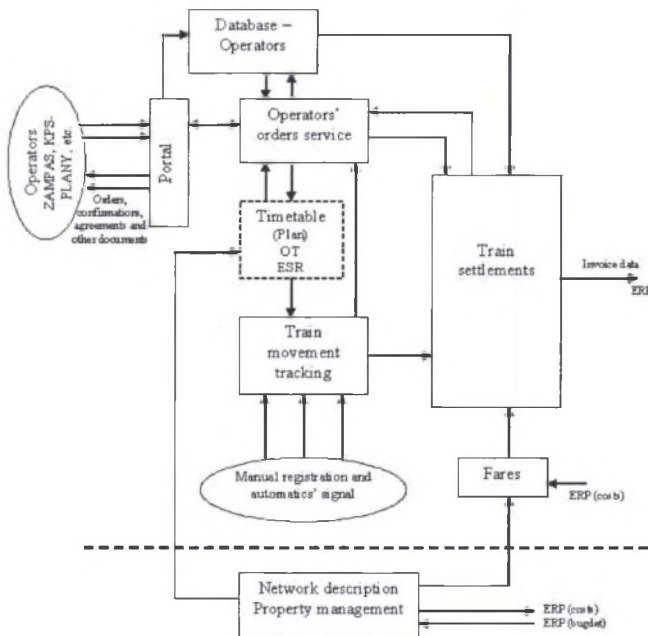


Fig.1. Communications connection between business processes

## 2.1. OPERATORS' ORDERS AND AGREEMENTS SERVICE

Presently, in this scope of activity there is no full IT support. Existing application enables operators' orders service and exchange of documents between operators and PKP PLK.

System's basic functions:

1. operator's application for access to infrastructure service; it encompasses: applications registration, checking the data correctness in accordance with the regulations, checking correctness of given connection, checking access to line on given connection and date (through Timetable module),
2. preparing and managing of the agreements with operators,
3. passing different information and documents on to operator,
4. operator database maintenance,
5. passing data on to timetable creating module.

Application should be fitted with functions and interfaces that enables operator to make orders and negotiate agreement with making use of the ERP system applications, without necessity of using paper documents. The one exception, at least on the beginning, will be an agreement send in the paper form to sign.

## 2.2. TIMETABLE CREATING

Package of applications for creating timetable cooperate with systems, which enable operators enter their orders for trains (ZAMPAS for passenger transport and KPS-PLANY for freight transport).

Timetable creating process currently is supported by system consisted of:

1. **KWR** (Traffic Graph Design) – delivers designers graphic interface in the form of Traffic Graph which enables drawing trains on the specific section according to orders. This application gives designers number of tools which speed up construction process. Simultaneously the application OT (Traction calculation) is used to calculate train movement time.
2. **OT** (Traction calculation) – this application can work separately or its function can be activated from KWR. The application calculates train's movement time with taking into consideration lines' parameters (track plan, track profile, speed limits etc.) and train parameters (predicted gross, train type, etc.) – currently traction calculations are kept by PKP CARGO.
3. **ESR** (Working Timetable Editing) – is used to create timetable publications.

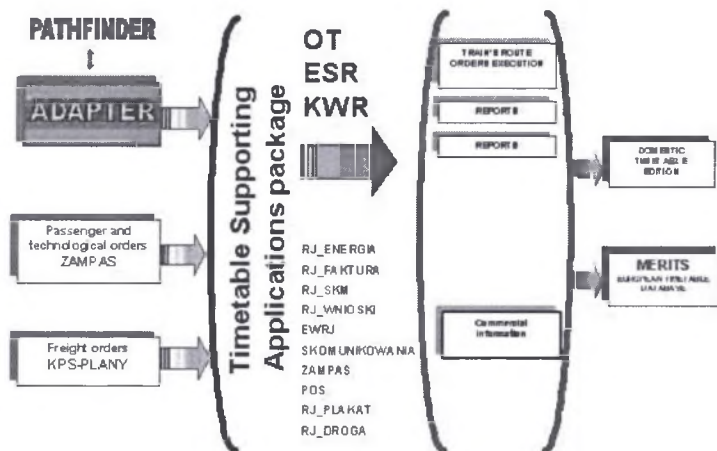


Fig.2. The pattern of timetable creating

Significant extension of scope of these applications is further integration with international systems. First of all it is necessary to integrate these applications with PATHFINDER system. PATHFINDER system is used for rout establishing in international timetables. Integration can be achieved trough creating suitable interface to PATHFINDER. It is being realized in the MERITS project.

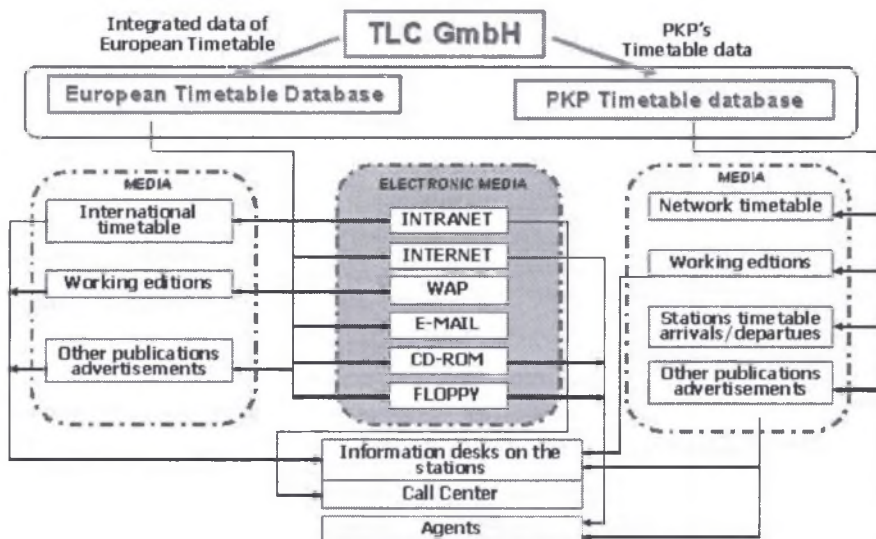


Fig.3. Outline of the conception of use database MERITS in PKP

## 2.3. TRAINS TRACKING

Within the operators service system there is an application for tracking train movements (SRP). Its connections with environment are shown on the following figure:

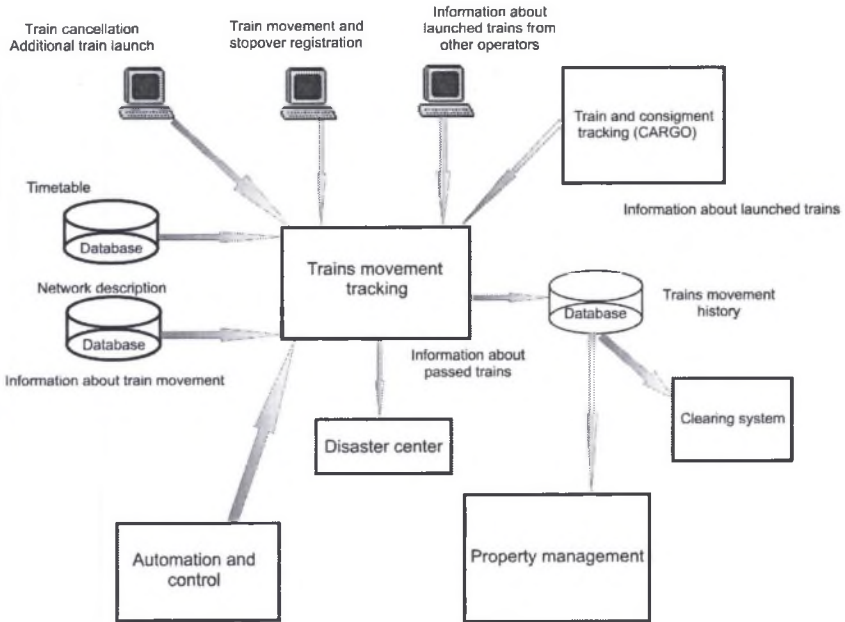


Fig.4. SRP connections with environment

The system supports planning (efficient modification of the timetable), register trains movements, register unusual events (accidents, breakdowns) and ensure graphic monitoring of train movement. Trains tracking system must use information delivered by outside systems (among other things from automatic and control devices, tracking train systems operated by operators). It is significant that most of those functions are executed by SEPE, already in use, but which must be subject to further evolution and integration with operators systems.

SRP system executes following functions:

- planning (efficient modification of the timetable),
- train movement register,
- unusual events register (accidents, breakdowns),
- graphic monitoring of train movement.

SRP uses information delivered by outside systems:

- automatic and control devices (information about train movement),
- tracking train systems operated by other operators (information about launched trains).



Currently exploited SEPE operates most of those functions already. Nevertheless, its integration with outside systems through introducing suitable interfaces which will enable automatically passing on data from operators' systems is necessary.

#### 2.4. CUSTOMER SETTLEMENTS

In the area of orders and operators' agreements PLK still hasn't a complete IT support. Application supporting this area should enable operator's application for access to infrastructure service (applications registration, checking the data correctness in accordance with the regulations, checking correctness of given connection, checking possibility of access to line on given connection and date), preparing and managing agreements with operators, passing different information and documents on to operator, operator database maintenance and passing data on to timetable creating module. Such system should be fitted with functions and interfaces that enable operator to make orders and negotiate agreement with making use of the ERP system applications, without necessity of using paper documents.

The module's main function is preparing customer settlement for taking access to the line, which takes into consideration services that have been executed, customers' complaints and penalties levied on an operator if he caused disruption in traffic. The module compares executed train movements (data from Tracking Train Movement module) with planned, encompassed in timetable or in Individual timetable. On the basis of R-7 form or other document passed on by operator, gross of activated trains is specified.

After specifying the real train movements of a operator, differences between planned movements and reasons of these differences, this information is passed on to the operator to do verification.

After agreeing with the operator all the data, settlement follows through specifying execute fee with taking into consideration marked-up and discounts following from the regulation of access to infrastructure.

Data needed for invoice are being passed on to ERP system.

#### 2.5. RATES ESTABLISHING

The module is designed for creating the price list for operators for access to the infrastructure and access to the price list and fares' rules, included in the regulations of granting and using the routes for the transport executed within timetable.

The price list includes basis of rates of access to the infrastructure for passenger, freight and other trains (working, economic and locomotive loose)

The timetable creating basis is the description of the network located in the Property Managing system and costs data from ERP or other system exploited by PKP PLK.

Fares module, beside function for PKP PLK, will execute specific functions for operator ordering routes. Among the functions there will be one which will present data from price list and costs of orders specific trains prognosis.

### 3. SUMMARY

Within the confines of working out „Technical Specification for Interoperability of trans-European rail system” the documentation for the freight transport (TAF TSI), which describes rules and standards of electronic data exchange between RU (railways undertakings) and IM (Infrastructure Managers). Detailed descriptions of electronic data exchange between different systems of participants of the transport process in Europe are sufficient material to start to conform polish systems in the transport domain to UE conditions.

The passenger undertakings of PKP should join the international network HERMES VPN, ensuring application, which exchanges data with other systems of European railways and offers conditions which can make KURS'90 (seat reservation system) work online.

PKP PLK' mission is to assure – fulfilling transport market requirements – technical standard of network, what guarantee safety traffic organization and carrying out train traffic and enables access to infrastructure for operators with taking into account market's conditions. Pursuing this mission, PKP PLK currently faces necessity of modernization and develop of existing systems and implementation of new solutions in the areas devoid so far IT support.

It is obvious that in the area widely comprehended management of operator, undertakings and PKP PLK should use ERP system. The first stage of implementation should encompass finances (in the scope of financial transactions registration) and logistic. In the next step system could encompass repairs management and investments issue.

Application of ERP system delivers to the operators efficient tools to work out and check budgets, to cost management, financial resources management and cash-flow or property management.

Future ERP system will have to cooperate with field activity applications, supporting business processes. Furthermore, field activity applications data connected with ERP system data can supply data warehouse (or any Business Intelligence system), enabling making varied reports for analysis and management aims.

However, field activity systems should support basic business processes in the company: orders and operators' agreements service, timetable creating, train movement tracking, customer settlement for using lines and working out fares.

Reviewer: Ph. D. Andrzej Białoń