INTEGRATED TRAIN PATH MANAGEMENT AND PLANNING ON THE HUNGARIAN RAILWAY NETWORK

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Summary: This paper presents the current processes and systems related to train path management on the Hungarian railway network. From the beginning of 2007, the Hungarian Railway Capacity Allocation Office (VPE) accepts train path orders only through a web-based application, via internet. The Hungarian infrastructure operators use an integrated system for viewing and maintaining the accepted orders and designing the corresponding train paths. The paper describes the role of the Railway Capacity Allocation Office and the infrastructure operators in the planning process, the migration to the new system, and the possible ways of further development.

1. Introduction – the born of the Hungarian Railway Capacity Allocation Office

In line with the requirements of the First EU Railway Package, full liberalisation of the railway freight market must be achieved in all EU 28 countries by 2010. This requires that capacity allocation, network access and track charging is fair, transparent, non-discriminatory and fully separated from trains services in all EU countries. Moreover, all transport modes must pay infrastructure charges in a comprehensive way, on all national networks, for both passenger and freight transport [1].

To fulfil these requirements, the Hungarian Railway Capacity Allocation Office Ltd. (VPE Kft.) was founded by the Hungarian State Railways (MÁV Zrt.) and the Raaberbahn, in the beginning of 2004. Later the VPE was purchased by the Hungarian Privatization and State Holding Co., and became an independent body.

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2. The first year – the appearance of private railways

Just some weeks after VPE was founded, the National Transport Authority started to grant the operating permissions to the operators. The first private railway operator was approved on 17th of June, 2004.

At this time, the most urgent tasks of the VPE were to create and publish the network statement and provide connection between the operators and infrastructure railways. Due to the lack of time, the simplest method was chosen: train path ordering forms were created and published on the web site of the VPE. This way the operators could download the forms, fill them and send back to the VPE by the means of fax. Then, the administrators of the Allocation Office transferred the accepted orders to the infrastructure railway for creating the train paths. When a path was ready, the VPE calculated the track charges, and the working timetable was sent to the customer, usually by the means of fax (Fig. 1.)
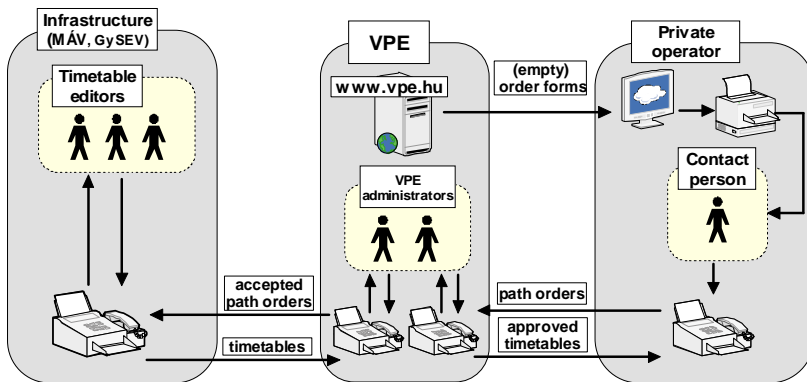

Fig.1. Capacity management process in 2004

In the first months, this process worked smoothly in most cases, since there were only a few private operators with a few path requests, and the majority of the capacity planning work was done by the infrastructure railways. Thus, VPE played only a minor role in the capacity management.

Meanwhile, a project was started to create a database and a web-based application for managing path orders. The aim was to build up a „web-shop", where the customers can „buy" paths on-line, via internet.

The first version of the new web based ordering system (called „MELINDA"), was put into service in the autumn of 2004 (can be reached via the VPE's homepage, with secure login at http://www.vpe.hu/melinda).

At that time, there were 9 approved operators, including the Hungarian State Railways' Cargo and Passenger Department.

3. The second year – beginning of the real capacity management

To be able to do real capacity management, the whole timetable editing process had to be reformed. Until 2006, timetable data was stored in simple text files. Only a daily „snapshot" of the current timetable files was available for the whole railway network. Therefore, it was very problematic to get past and future timetables for track charge calculation and capacity planning. As a temporary solution, VPE put its new, SQL based timetable editing system („TAKT") [3] into operation in 2005, with reduced functionality.

The TAKT system is quick and efficient tool for designing timetables on an intuitive graphical user interface (Fig.2.) At the beginning, it was used only by the VPE, for capacity calculations. Timetable data files were transferred and converted into the database though a one-way interface from the MÁV Infrastructure Department daily.
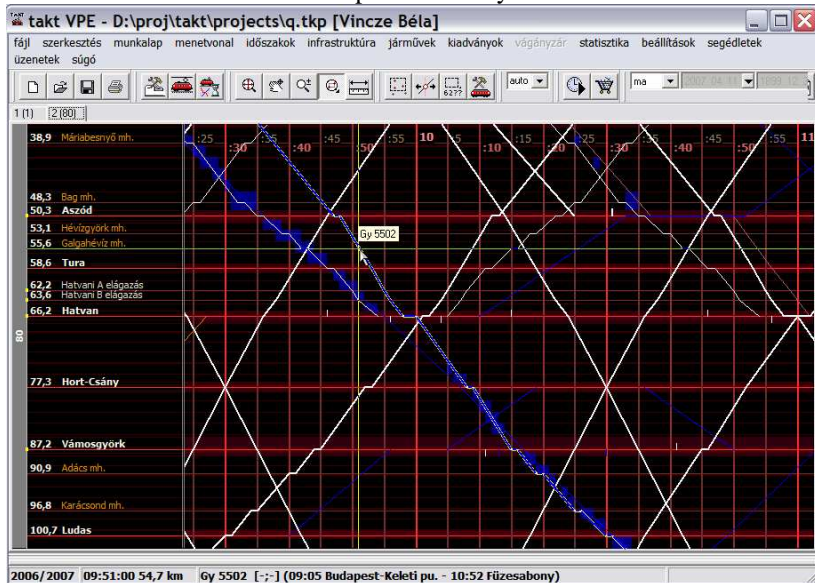

Fig.2. Graphical user interface of the TAKT system

Since the MELINDA system could be reached via internet and had many helper functions (like request copying), it quickly became very popular among the operators (Fig.3.) It also allowed the operators to monitor the status of their orders (accepted, under processing, ready,

allocated and refused) on-line. Path requests were still accepted by fax until the end of 2006, but they had to be entered manually into the system by VPE administrators.
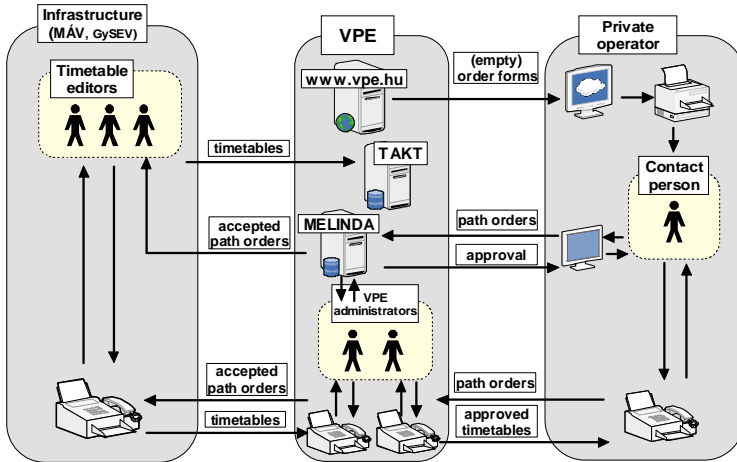

Fig.3. Capacity management process in 2005

The dispatcher staff and the timetable editors were also registered as MELINDA users in 2005. This way they became able to check on-line if a private operator's train has the sufficient approvals.
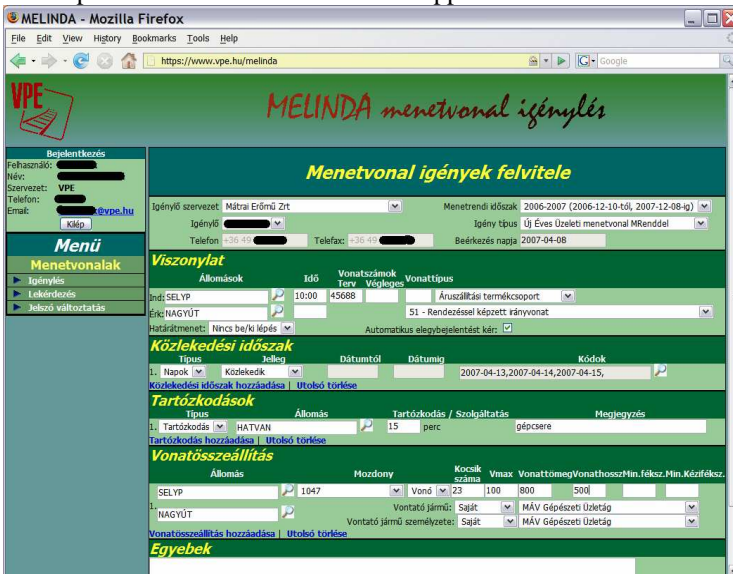

Fig.4. Ordering a path with MELINDA the system on the internet

At the end of 2005, all occasional (non-annual) tailor-made and ad-hoc paths of private operators were supervised by the VPE in the MELINDA system. However, there was no question that all operators and the whole timetable planning must be urgently integrated into capacity management process to be able to cope with increasing number of operators (Fig. 5) and path requests.
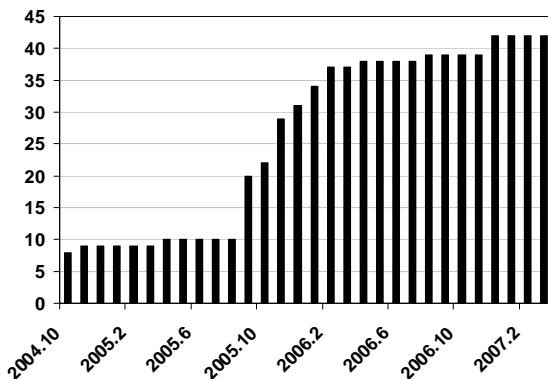

Fig.5. Number of registered operators from 2004 October to 2007 March

4. The third year – towards full integration

The aim of the VPE for 2006 was to increase the coverage of the MELINDA system to 100%. This practically means that every train running on the network must have the approval from the VPE, including

- trains operated by MÁV Passenger Department, including empty and charter trains (~4000 annual paths and occasional paths)
- locomotive trains
- trains operated by MÁV Cargo
- special trains, including e.g. occasional track maintenance trains
- private freight trains

The VPE had to prepare for this task, expecting the number of registered users and path requests to significantly increase. Later this proved to be true (Fig.6. and Fig.7.)
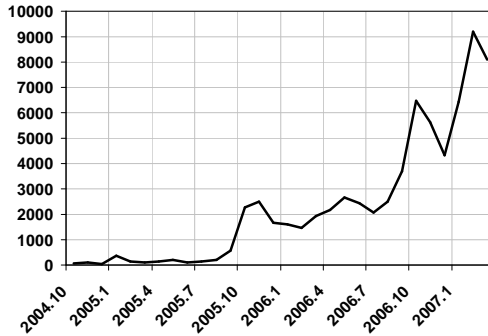
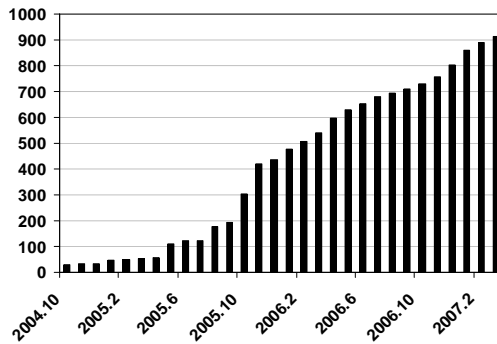Fig.6. Allocated paths/month in the MELINDA system from 2004 October

Fig.7. Number of registered MELINDA users from 2004 October

To reduce manual work, a standardised ordering interface had to be created between the MÁV Passenger Department's custom resource planning tool and the MELINDA system.

All dispatchers were given rights to be able to record any changes in the daily timetable due to operative dispositions (e.g. a path is cancelled because of an engine breakdown.)

The integration of the timetable planning into the ordering system also started. In spring of 2006, an agreement was made that the MÁV Infrastructure Department will switch to the VPE's timetable planning system (TAKT), with a migration period of 9 months. For the 2006/2007 timetable season (starting from 10th of December 2006), the aims were:

- All paths must be ordered in the MELINDA system, via internet or the standardised interfaces (letters and faxes are not accepted anymore.)
- All non ad-hoc paths must be planned in the TAKT system.

The TAKT system was extended with a module for displaying and handling path requests in the MELINDA system to reduce manual work in path planning and approval. It can create a "draft" path from an order, based on the information that the customer entered in the MELINDA. This can be further edited by the assigned editor, according to the available track capacity. This greatly speeds up the process, since the editors do not have to enter every required parameter manually.

With the new integrated MELINDA-TAKT system, a new era has begun in capacity and timetable planning. The whole process became controlled and well documented, without paperwork. This resulted in improved quality of train paths and faster planning, thus, better resource utilisation. The whole process became simpler (Fig.8.)
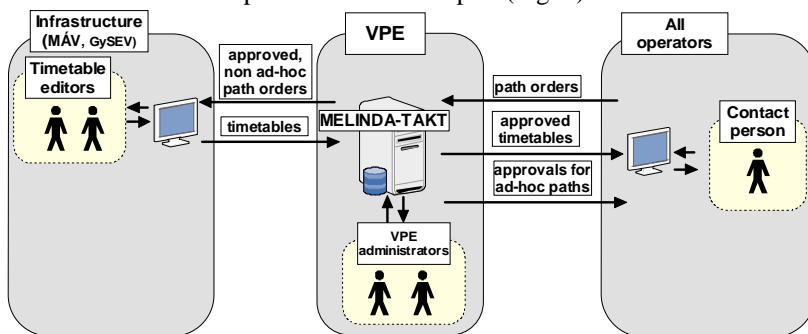

Fig.8. Capacity management process from 2006

The strictness of the system caused many problems in the first months. The procedures in the system were designed to ensure non-discriminatory operation, security and maximum data integrity. The problems were usually caused by the fact that the draft paths were generated from the data entered by the railway operators, and the working timetable of a train could not be printed and published until

- the assigned timetable editor set the path "ready";
- the path passed the compliance test (many parameters of the path are checked against the parameters of the order. E.g. in case the customer ordered a train from A to B, the first station of the path must be A, and the last must be B);
- a leader of the timetable editor group accepted the timetable;
- an administrator of the VPE accepted the timetable;
- and the operator accepted the timetable (from 2007).

This way each path must pass through various automatic tests, and at least four different persons have the chance to take a look at the final timetable. Of course, it always must be remembered that a faulty order always takes its toll in such an integrated system. The operators are forced to pay close attention to the correctness of their orders, since the quality of a path heavily depends on the quality of the originating order.

Now the migration period is over, and we can state that all operators got used to the new procedures. The VPE is able to easily deal with as much as 9000 path orders per month, with less problems than before.

5. Conclusions

In the past three years, the Hungarian railways took a big step towards the European Harmonisation. With the web-based path ordering system (MELINDA) and the integrated timetable editor tool (TAKT), the process of the railway capacity management and planning has been completely reformed. The time required for planning train paths significantly reduced, while the quality improved.

The role of the Hungarian Railway Capacity Allocation Office (VPE) and its systems in the capacity management process became more and more important. From the second half of 2006, the VPE had to decide between conflicting capacity requests in a few cases. Without up-to-date ordering and track capacity information, this task would have been inconvenient and very time consuming.

6. References

1. The First EU Railway Package, A joint review of EIM, ERFA, ERFCP, Brussels, 2006

2. RailNet Europe Newsletter, 2006 February, pp 3.

3. Vincze B., L. Kormányos, V. Borza: Methods and tools for designing modern timetable structures, ŽEL 2004, Zilina 2004