



RTM (MARSEILLE TRANSIT AUTHORITY)

OPTIMIZE THE SCHEDULING OF DRIVERS FOR THE CITY PUBLIC TRANSIT SYSTEM



Objectives:

- Meet the expectations of drivers in terms of assignment while taking into account operating requirements
- Optimize the daily substitute driver schedule over several rolling weeks

Solution:

Sopra's Duty Roster software FDS, Eurodecision's LP-ShiftPlanner



Results:

- The time to process the daily schedule for the 80 substitute drivers was cut from 2 days to 1 hour in each depot.
- Increased productivity of personnel management centers.
- Greater employee satisfaction

"The involvement of users from the outset of the project was a key factor to success. The automation of the substitutes module enabled us to gain precious time for planners, but above all it highlighted the desire to equitably meet the expectations of all the drivers"
Bernard Métais: Service Roster Computerization Project Manager, RTM

Improving the management of bus and subway drivers and ensure labor transparency while complying with the operating constraints of a mass transit network explains the implementation of a new human resources information system at the Marseille Transit Authority (*Régie et Transports de Marseille - RTM*). The company operates 800 kilometers of network with 80 bus lines, 2 subway lines and one streetcar line. It counts 3,000 employees, 1,500 of which are drivers with an equivalent number of personnel assigned to maintenance, supervision, inspection and administration.

The management of drivers is decentralized and distributed in the 5 operations centers in the city of Marseille. Each depot is responsible for the daily scheduling of its drivers. This is a particularly complex task usually broken down into several steps. The crew scheduling operation that consists in generating driver work schedules while respecting labor conditions in effect is followed by the preparation of the duty rosters that enables the individual driver schedules to be drawn up each day. These operations were done until recently using a pencil and eraser!

Strong user involvement in the project

The work of the planners charged with managing the activity of drivers is particularly fastidious and repetitive. Each day they must manage nearly 300 drivers. While two thirds of the drivers have fairly regular schedules (rolling roster), the last third, about one hundred drivers called "substitutes" don't have a fixed forecast schedule, as they replace absent drivers or fill in for extra workload on the network related to occasional cultural or sports events like a semi-final football match for the city's team!

There are many constraints to be complied with to generate these schedules. Naturally, one has to balance the work time of each driver to reach the 35-hour weekly work week and take into account his/her skills, work system, maximum daily work time, minimum rest time, maximum number of consecutive work days etc. Occasional constraints can be defined for each driver, for example, no work on Wednesdays or complying with a specific time for the driver's starting or ending time, etc. And to make this even more complex, one must also take into account, and attempt to integrate fairly, driver preferences as regards lines and hours.

RTM was equipped with management IT resources whose technology and design were 15 years old. They had to be replaced. The decision to acquire an IT tool meeting the above needs was made in 1998. The team in charge of the project began by taking stock of the market situation by visiting other city transit systems – RATP (Paris), Strasbourg, Mulhouse, Bordeaux – which gave it a good idea of what was possible.

A work group was set up with a group of users that very clearly defined its requirements. With the specifications drawn up, the group selected the duty roster solution FDS distributed by software vendor Sopra. This solution was chosen because it met the very strong demand by users for finely-tuned optimization of personnel planning.

Schedules optimized in less than ten minutes

Finding and optimizing the right match between the skills required by the services to be covered and the skills offered by available drivers, while taking into account their preferences, is precisely what the LP-ShiftPlanner component has been designed for. This optimization module developed by Eurodecision is totally integrated into the FDS software. LP-ShiftPlanner is based on mathematical programming and column generation techniques and includes the ILOG Cplex solver. It allows coupling a generator of parts of schedules assignable to each driver with a selector that will choose among these schedule parts to obtain a solution that complies with all the requirements and constraints and optimizes the criterion selected.

LP-ShiftPlanner optimizes a schedule according to many criteria. The "collective labor" criterion favors work equality over the satisfaction of individual preferences, while the "individual labor" criterion first takes into account the satisfaction of individual preferences, then equality. Economic criteria allow favoring the credit/debit balance of hours worked.

After defining the optimization strategy, the service roster manager launches the "substitutes module" via FDS to obtain a proposed schedule meeting all the constraints in less than ten minutes. The manager can approve or reject the proposal. When it was done manually, this task required two days of work by a specialist planner. True detail work! In these conditions, the first schedule complying with all the constraints became the next day's duty roster, with no optimization of collective labor criteria or individual preferences.

High adoption rate by all personnel

Today the system has been enthusiastically accepted by users, once the use of the mouse and keyboard was mastered! Not only are the planners' work conditions considerably improved, less stress to produce the next duty roster in time, but it was also possible to reassign personnel to other jobs due to the efficiencies achieved by the system.

Sopra's FDS solution is being deployed to all RTM personnel, all 3,000 of them. The "substitutes module" is used for placing personnel whose work system is subject to constraints inherent to their assignments.