

ICONIS™ Movement Planner

Integrated railroad traffic planning and decision support system, based on interactions and dialogs among users, optimization procedures, and railroad agents.

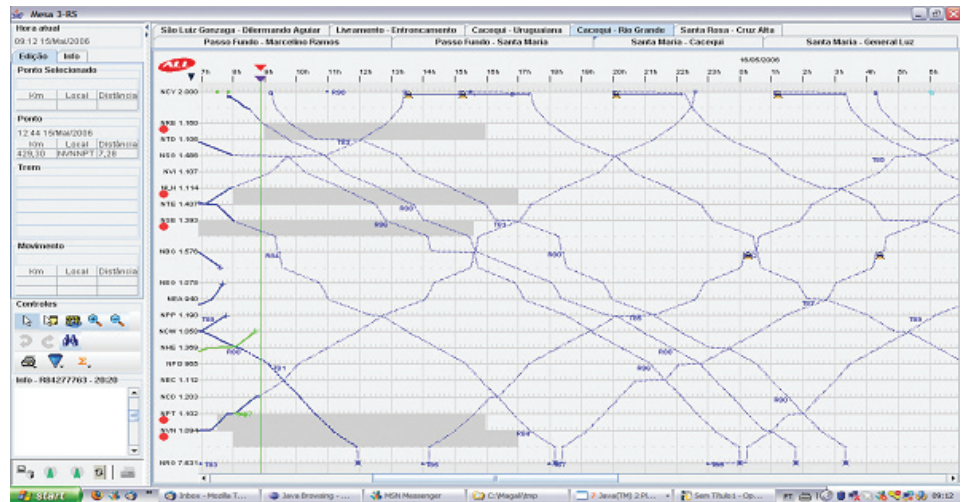
Overview

ALSTOM's ICONIS™ Movement Planner provides a comprehensive tool for circulation planning and dispatching. Optimal circulation solutions are developed interactively involving optimization algorithms, computational agents, and railroad personnel. A preferred, feasible solution is dynamically generated as a result of trade-offs among multiple prioritized objectives.

The Movement Planner runs in rail dispatch control centers, producing circulation plans using Local Optimizers to solve conflicts, restrictions, and resource constraints in real-time. Heavy Duty, global optimization procedures can also be run in higher time scales to produce optimized train circulation for longer planning horizons. Global optimization looks for preferred solutions of scenarios in which objectives are selected based on transportation demands and management policies.

Alternatives such as different track maintenance schedules, train priorities, and dispatch strategies can also be evaluated in real-time using current operational state information.

The Movement Planner provides for interactive "what-if" evaluations (simulations) of different scenarios, with no interference in the actual dispatching planning and operation.



Benefits

- Improves operation consistency and planning quality.
- Allows easy and quick reaction to scenario modifications and unforeseen disturbances.
- Introduces a cleaner and more professional operation.
- Readily provides railroad information and performance data.
- Planning information and forecasts easily flow through operation areas, improving technical discussions and decision-making processes through the organization.
- Plans consider operational expert knowledge and management policies.
- Produces quantitative, objective information for managers, planners, and dispatchers.
- Gathers, integrates, summarizes and displays information available in different information management systems, avoiding unnecessary / redundant efforts.
- Optimized utilization of railroad resources.
- Reductions in train delays and fuel consumption.

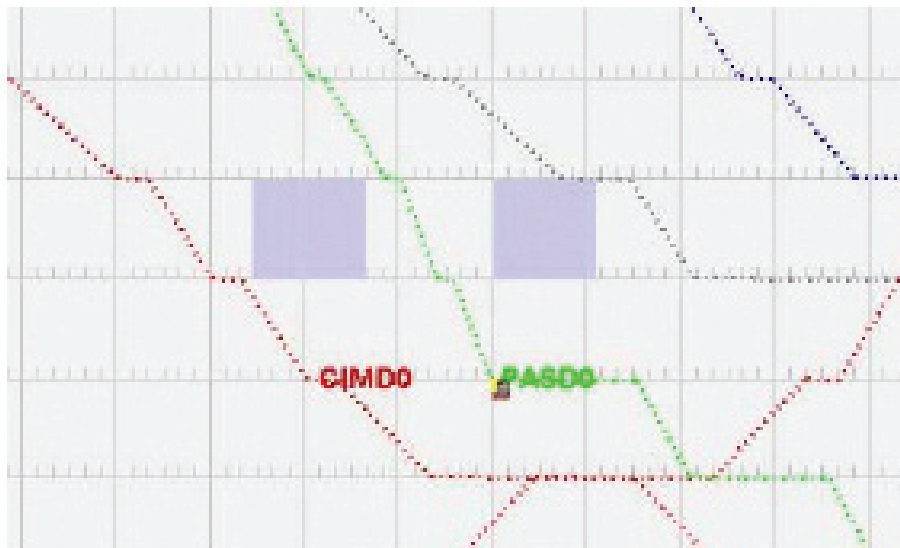
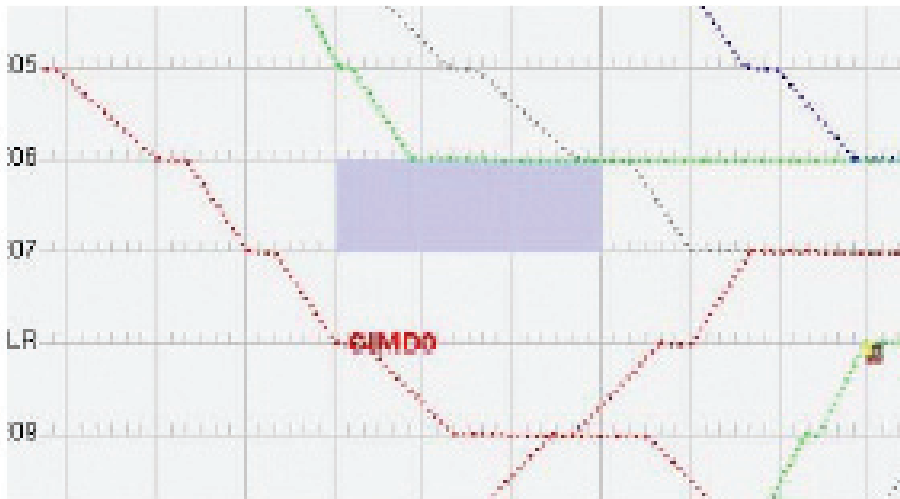
ICONIS™ Movement Planner

Approach

The Movement Planner is a result of 8 years of research and development. It applies optimization algorithms to minimize train delays, fuel consumption, etc., but it is not just an optimization tool. It is a player in a multi-agent environment. The Movement Planner was carefully designed to amplify human intelligence, not to replace it.

Example

What is better? A straight 3 hours track maintenance period or two 1 hour periods with another hour in between? The following figures illustrate the answer.



How it works

The Movement Planner is designed to promote and enhance interaction and dialog between computational and human agents. It provides a common language, a medium, and intelligence to fulfill its purpose:

Common language

- Visual language:
 - Dynamic Train Graph display
- Dialog: User interactions with the Train Graph

Medium

- Version control mechanism, Data flow coordinator, Data concentrator, Information democratization Intelligence
- Optimization agents: Local Optimizer, Heavy Duty Optimization

The more effective the interaction among agents, the better the result.

Train dispatchers, circulation planners, and management communicate transportation system objectives and constraints using the Train Graph, an intuitive graphical user interface. This interface presents, collects, and maintains all relevant information from the ICONIS dispatch system. Due to the simulation and optimization architecture designed into the Movement Planner, this Train Graph interface provides a realistic dialog between computational and human agents.