SWISS FEDERAL RAILWAYS GETS NEXT-GENERATION DISPATCHING SYSTEM

You learn a few things when you operate Europe's densest and most intensively used railroad network. Switzerland's Federal Railways (SBB) was ready to build a new rail dispatching system in 2005, and knew exactly what it wanted. SBB chose CSC to harness innovative technologies and deliver that next-generation system, which would serve the country well into the future.

SBB manages the daily flow of 7,000 passenger trains and 2,000 freight trains that ride Switzerland's rail lines. To ensure the trains reach their destinations safely, punctually and economically, the agency oversees 160 million track-kilometers a year — a number they estimate will grow an additional 5.5 percent by 2014.

"With expected growth, we needed a system that could handle today and tomorrow's needs," says Marcus Voelcker, CIO of Infrastructure for SBB and former head of Project Rail Control System (RCS).

Replacing an outgrown system

Before RCS, SBB's dispatchers and operators relied on two different dispatching systems that covered only part of the country and supported fewer than 60 users. SBB wanted a system that would help evaluate forecasts and current multiple traffic situations, as well as recognize conflicts and help resolve them.

CSC provided systems and application architecture development, software and systems integration, and installation and testing for a near-real-time dispatching solution. Today, the new system serves more than 400 concurrent dispatchers and operators who manage and control all rail traffic on the country's entire railway network.

Every second, RCS processes several hundred messages from peripheral systems, such as train-position sensors, calculates train-journey forecasts and delivers the resulting changes to railway dispatchers and customer systems. Dispatchers can see all logical and physical railway elements in one model, which also shows rail network availability. The system also provides different views for planned, current and future network usage, as well as any conflicts in near real time.

"If a conflict occurs, the system provides dispatchers with a forecast model, giving them the critical information they need to resolve conflicts and rapidly recover the original operation plan," explains Martin Kaufmann, a senior consultant with CSC's Swiss Transportation Management Systems practice. "Since we introduced RCS, passenger train punctuality rose from 92 percent to 94 percent, placing Switzerland's railways at the top of international statistics."

Managing a complex network

Today, SBB controls the dispatching of trains via four regional operations control centers responsible for daily control of all trains, networkwide. Dispatchers are spread across the country in about 40 regional control centers and larger stations.

CSC developed a highly precise and continually self-updating system that generates prognoses for every existing combination of train and station or signal location. That meant building a system that could simultaneously calculate 900 to 2,000 trains in parallel, creating 300,000 possible events and 500,000 constraints that would have to be solved in a set of 500,000 linear equations a second. Because of performance requirements, calculations could not last more than two seconds and would have to be implemented as a continuous asynchronous process.

"To help dispatchers make decisions, we incorporated a highly efficient procedure to calculate the networkwide impacts of delays and connection postponements," says Kaufmann. "This is the only dispatching system today that successfully uses such a forecasting method outside of a lab environment."

Because SBB can now more accurately forecast rail traffic, it allows higher network loads and delivers more efficient communication between train staff and dispatchers. ■