

A MAGAZINE FOR AIRLINE EXECUTIVES

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EXTREME AIRLINE MANAGEMENT

A conversation with ...

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CEO,
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Getting Back on Track

Researchers have developed new solutions to help airlines recover from off-schedule operations.

■ By Michael D. Clarke | *Ascend* Contributor

There is seemingly no end to the factors that can adversely affect an airline's schedule: inclement weather, mechanicals, labor actions, excessive passenger volumes, air traffic control issues. With so many potential areas for disruption, it's amazing that only a small portion — 10 percent in some regions — of an airline's scheduled revenue flights are affected by irregularities.

When disruptions occur, the meter starts running as airlines incur costs for lost revenue, crew overtime and passenger hospitality, not to mention the impact of disgruntled passengers. When the financial impact of disruptions on the daily operations of a major U.S. network carrier can exceed US\$400 million a year, it is vital that airlines return to the normal schedule as quickly and cost-effectively as possible. Of equal importance is the impact on the carrier's brand and customer goodwill, both of which are quite difficult to measure.

According to a recent study by the George Washington University Aviation Institute and Flight Safety Technologies, airlines can benefit significantly by reducing the impact of disruptions. For an airline with operational costs of US\$70 per minute with 1,500 flights per day, cutting one minute of delay per flight per day can save US\$38 million a year, the study showed. Further, if an airline can avoid one diversion per week, it could save from US\$1.1 million to

US\$4.6 million a year.

In the aftermath of irregularities, the schedule recovery process at many airlines consists primarily of assigning spare operational aircraft to scheduled flights in order to reduce or eliminate disruption with the briefest delay. These operational spares are an expensive proposition as their utilization is low given their requirement to remain in standby mode at the appropriate hub or predominant airport. When faced with schedule disruptions, many airlines still tackle the situation manually or at best, through a semi-automated process using basic rules devised by the experienced scheduler. Recent advances in mathematical programming and computer processing speed now enable users to deploy decision-support tools to solve real-time problems that are time sensitive such as schedule recovery.

Solutions on the Horizon

Although progress has been made in the area of schedule recovery, airlines have been slow to embrace optimization-based decision-support systems designed to assist with real-time planning. The resistance stems from a variety of factors ranging from the complexity of the underlying problem to the intricacies necessary to recover from the disruption. Airlines have traditionally been divided into functional groups based on a particular resource such as aircraft,

crewmembers and passenger services. In the past, decision-support systems have been designed to handle one resource, concentrating exclusively on that area without considering auxiliary factors during decision making. Because they have not been able to consider all factors, such systems have been unable to deliver a truly optimum solution, causing operations control center personnel to shy away from relying on them to help recover from schedule interruptions.

Researchers believe an integrated approach that transcends the typical airline's traditional organizational structure provides the most effective way to handle schedule recovery. This is based on the premise that optimizing in a holistic fashion yields greater results than optimizing smaller subsets and subsequently trying to integrate the sub-optimal solutions. In essence, an airline really is a collection of inter-related networks — aircraft, crew, passengers, freight — all connected by scheduled flights that reside at the core. Events in one network will impact the others, thus the solution can only be truly optimized by addressing the impact of each individual planning problem on other areas. During the last 15 years, airlines have identified the need to become more integrated, sharing information and decision making across the organization. It has become evident to airlines that



Through an integrated airline schedule recovery system, passengers can be automatically notified when they are affected by delays or cancellations, saving them from having to search for their new itinerary.



an integrated approach is not only beneficial during tactical planning but also during strategic planning. Based on this, airlines have started to explore dynamic scheduling concepts that leverage revenue management information for near-term fleet assignment decisions, such as demand driven dispatch.

Airline Integrated Recovery

The research group supporting Sabre Airline Solutions has developed a decision-support framework that

addresses schedule recovery both in the context of an individual carrier and a global alliance. The airline integrated recovery concept incorporates aircraft maintenance routing, crew rescheduling and the impact of schedule changes on passenger flow. Integrated recovery consists of the schedule recovery model to suggest necessary flight cancellations and delays, the aircraft recovery model to assign new aircraft routings, the crew recovery model to assign new crew pairings and the passenger flow model to evaluate the impact on passengers. These models have been developed to be compatible with Sabre Airline Solutions' existing portfolio of flight operations and crew management products. The research group, using advanced mathematics, has formulated airline integrated recovery to obtain near real-time performance for reasonably sized problems.

Taking Care of the Passenger

Re-accommodating passengers during schedule irregularities is critical for an individual airline, as well as a global airline alliance. An alliance's system network consists of multiple

hub airports that allow individual airlines to offer passengers alternative itineraries on their partner carriers. Journey management is based on concepts from the passenger flow model. The output of the passenger flow model is used to assign alternative itineraries to disrupted passengers based on a priority list determined by the airline. In practice, airlines may need to offer a passenger an alternative other than the one that benefits it the most. When a flight is cancelled, the re-accommodation tool will retrieve passenger name record data from a reservations system, such as the Sabre® Passenger Reservation System, as well as information on available inventory in replacement flights. The re-accommodation system prioritizes passengers, gives them a revised itinerary, updates their PNRs in the Passenger Reservation System or another global distribution system, and then electronically notifies passengers of their new schedule using the notification tools of the reservations system. The system would actively monitor the status of each scheduled flight to ensure that passengers were not assigned to later flights that were

THE HIGH LEVEL
view

News Briefs from Around the Globe

Who

Atlantic Coast Airlines

What

Selected the Sabre CrewClass training schedule system, a module within the Sabre® Flight Control suite for small-, medium-sized and low-cost airlines, to meet its pilot training requirements.

Why

The module helps optimize pilot training scheduling to maximize utilization of training resources while minimizing the time that pilots are unavailable for productive flying assignments.

Atlantic Coast, a fast-growing regional airline based at Dulles, Virginia, has experienced rapid growth while at the same time introducing new

regional jet aircraft to its fleet. The PC-based CrewClass module, which integrates seamlessly with other modules of the Flight Control suite, has greatly streamlined the training scheduling process. [a](#)

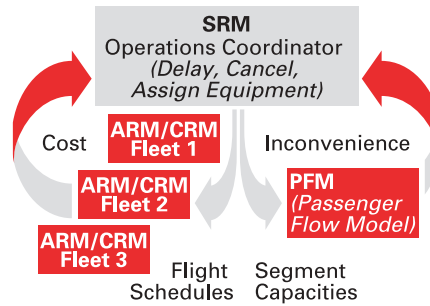
already cancelled. Based on centralized planning and decision making, while leveraging the benefits of local, decentralized action, the integrated recovery method brings together the best of both worlds. In effect, decisions made at the airport would be driven by the centralized airline operations control center such that a global approach is taken to re-accommodate passengers.

The Tools for the Job

The Sabre Airline Solutions product development teams in conjunction with the research group have been working closely together to develop the fully integrated schedule recovery system. As a precursor to the final integrated recovery product, decision-support functionality has been incorporated into several products, including the *Sabre® AirOps™ Control* suite, the *Sabre® Flight Control* suite for small-, medium-sized and low-cost airlines and the *Sabre® AirCrews™* crew management system. The *AirOps* and *Flight Control* suites include a real-time flight operations management and movement control system designed to monitor an airline's operations and provide alerts for potential maintenance and operating constraint violations. The *AirCrews* system includes a day-of-operations module designed to assist crew trackers with managing the impact of schedule changes and disruptions on crew scheduling. Sabre Airline Solutions has introduced the *Sabre® AirOps™ Decision Manager* — a decision-support tool that incorporates the schedule recovery, aircraft recovery and passenger flow models. The system helps airlines find new aircraft assignments that have the least impact on the current schedule and are maintenance feasible. It is available as a supplemental product for *Sabre® AirOps™ Movement Manager* as well as the *Sabre® FliteTrac* system and can be seamlessly integrated with

both the *AirOps* suite and the *Flight Control* suite.

The *Sabre® AirOps™* Reaccommodation Manager optimally re-assigns passengers whose flights have been disrupted. The system




The airline integrated recovery model incorporates various departments within an airline to develop a more optimal solution to recover from schedule disruptions.

values each passenger according to user-defined criteria such as frequent flyer status, fare paid or class of travel, prioritizing the passenger list based on calculated values to create alternative itineraries. The system's automated alert process notifies passengers of their new itinerary. Because the system simplifies the process of moving misplaced passengers and minimizes schedule changes, customer service and loyalty is enhanced. And automating the re-accommodation process also reduces costs. At the core of Sabre Airline Solutions' suite of passenger re-accommodation tools is the *Passenger Reservation System*. The system provides the necessary flexibility to accommodate passengers by flight leg or origin and destination. This enables airlines to take the passenger's entire itinerary into consideration when selecting alternative flights for re-accommodation. The automated process is entirely table-driven and

user-defined, taking into consideration variables such as booking class (high-versus low-yield), down-line connections, passenger profile (unaccompanied minors), frequent-flyer-tier level, ticketing status, boarding pass status or others depending on the airline's preference.

Pushing Technology Forward

Most technology solutions in schedule recovery focus mainly on optimizing the disrupted schedule by minimizing operational disruption. Although helpful, this approach seldom considers the commercial variables in formulating the optimized solution. An optimized solution considers factors such as passenger mix (high- versus low-yield passengers) on re-directed flights, degree of competition on the route (passengers' choice of airlines) and route and flight profitability. As these new scheduling concepts are embraced by decision-support vendors and subsequently airlines, they will improve the existing business processes and practices. Schedule disruptions cannot be eliminated, but they can be optimally managed. As researchers continue to push technology, airlines will have more sophisticated tools to minimize the effects — and costs — associated with irregular operations. The future mission of the airline operations research community will be to deliver next-generation scheduling and planning tools that meet the prevailing needs of the industry and offer further opportunities for improved efficiencies, enhanced productivity and increased attention to the impact on the airline's passengers. 

Michael Clarke is a research and development lead in the research group supporting Sabre Airline Solutions.