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IN THE BLACK

A conversation with ...

Joe Leonard, CEO and Chairman, AirTran Airways

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On Schedule to Maintain Revenue

By using technology to assist with network planning, an airline can better understand its customers' preferences and competitors' responses leading to a more lucrative network.

By Khaled Al-Eisawi | *Ascend* Contributor

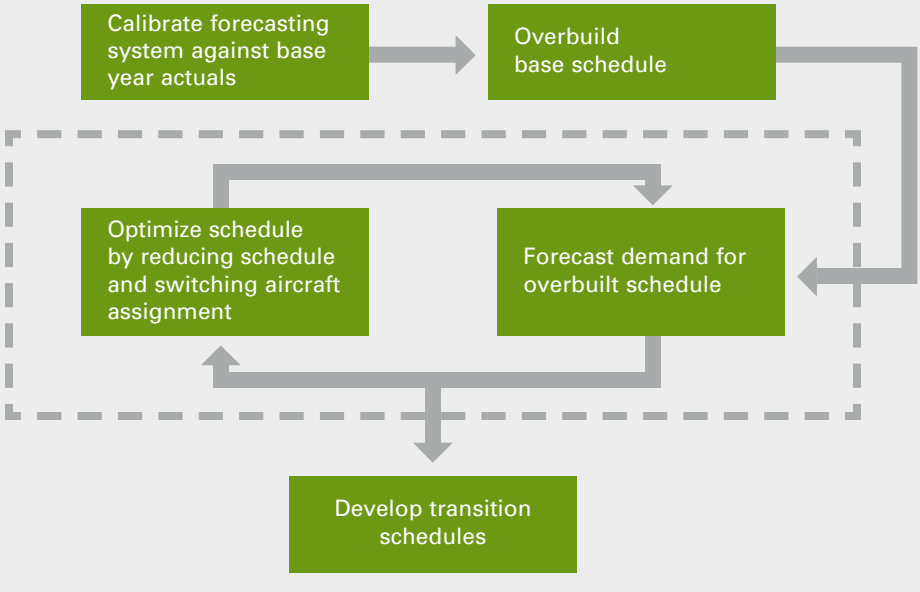
Companies that are more technologically savvy tend to perform significantly better, especially in harsh economic conditions. Technology can help companies become more efficient in their operations, more dynamic and responsive in their decision making, and more agile in their execution, all of which ultimately leads to better financial performance. For example, Wal-Mart took bar code technology to new levels by using information stored in the bar code to optimize the efficiency of its entire supply chain. The bar code enabled Wal-Mart to track sales of every single item by month, week, day or even hour and shift the pricing power to the retailer. As a result, Wal-Mart can stock its shelves with the right products at the right time and at the right price.

Another example closer to the airline industry is FedEx, which was founded in 1973 and delivered 186 overnight packages to 25 cities. Fred Smith, founder and chief executive officer of FedEx, grew the company to a US$25 billion business by 2004. To maintain its efficiency and the fundamentals of its core business, FedEx expanded the use of bar code technology and wireless scanners and is currently operating the largest civilian radio network in the world. In 1987, before the age of the Internet, FedEx allowed its customers to monitor their shipments using a private network. FedEx developed its own software that enables dispatchers to track its planes and vehicles in real time. It also developed software that enabled customers to anticipate how many parcels they will receive the next day — something that can be extremely valuable for customers with time-sensitive goods such as medical samples.

The success of these companies is not attributed to technology only. However, it is evident that technology played a key role in their success.

Technology obviously impacts the airline industry in similar ways. The potential of technology stems from its ability to impact both revenues and costs and, therefore, the bottom line. Technology infrastructure carries costs, but the returns commonly outweigh them. Although technology spans all business areas in an airline — strategic planning, fleet acquisition, schedule development, pricing and revenue management, maintenance and engineering, crew scheduling, training, customer service, passenger check in, and flight operations — technology applications in network planning and scheduling hold particular promise for revenue maintenance.

Planning the Fleet



During a typical fleet planning exercise using an integrated suite of airline planning and scheduling software, a specific order must be followed to achieve optimal results. First, the forecast system must be calibrated and the base schedule must be overbuilt and forecast. The schedule optimization system is then ready to drop unprofitable flying and optimize aircraft assignment. Several iterations between the forecasting system and the optimization system can be undertaken until the desired aircraft count is achieved.

Network planning and scheduling in an airline spans a long horizon. It starts with developing a strategic plan that can be three to five years out or even longer. The strategic plan defines the type of network the airline desires, the markets and customers it intends to serve, the nature of its fleet, and its strategic partnerships. A strategic plan includes several aspects, such as:

- Type of network — Hub and spoke, point-to-point or a combination,
- Targeted markets and passengers — Business or leisure,
- Fleet mix — Wide bodies, narrow bodies, regional jets and turbo props,
- Partnerships with other carriers — Codeshares, frequent flyer relationships and alliance membership,
- Relationships with suppliers,
- Distribution strategy.

> "… strategic plans are set at the executive level with input from middle management and, therefore, tend to define the overall shape of the airline."

In general, strategic plans are set at the executive level with input from middle management and, therefore, tend to define the overall shape of the airline. Strategic errors are extremely costly and recovery may be difficult. Information is a key to making sound strategic decisions and avoiding costly errors.

The strategic plan provides guidelines for the service plan, which is established six to 18 months from day of departure. It is during this part of the planning cycle that the schedule starts to take shape, and flight timings, frequencies, aircraft assignments and aircraft flow are determined. As time gets closer to the day of operation, the service plan gets refined and the schedule becomes more operational. Schedules are now checked for feasibility such as ground time violations, imbalances, curfews and maintenance constraints. At this point, schedules are also communicated with other departments such as crew and maintenance for planning purposes. Finally, the schedule is published and short-term changes may be applied based on booking levels or other short-term events.

Once the schedule is flown, collected data is fed back into the planning cycle and used for developing and enhancing future plans.

Obviously, an airline's schedule planning effort is massive and lends itself to technology applications. Without software tools, the process would be manual, highly labor intensive and prone to costly human errors. Software tools continue to be enhanced to automate a large part of the schedule planning and development process and shift the focus from the manual labor of creating and validating a schedule to the analytical effort of understanding passenger preferences, competitive responsiveness, fleet rationalization and overall network optimization. Several scientific disciplines drive these tools, primarily operations research and statistics. Without software tools, analysts can try a handful of scenarios and pick the best among those without having any idea how close they are to the optimal network. By automating the manual part of the planning effort, analysts can now test hundreds of different scenarios and, in many cases, achieve the optimal network solution. Not only do these tools provide the analyst

Build, Operate, Transfer:
A Quick Way to Realize New Technology Benefits

By Karen Dielman | *Ascend* Contributor

When airlines implement new technology, they do it with the desire to quickly realize business benefits. This is especially true when the technology's key benefits target top-line revenue. Examples of areas technology tools can help improve a carrier's revenue include pricing, network planning, scheduling, revenue management, and sales and distribution.

Although airline executives expect to experience benefits soon after the technology is implemented, they quickly learn that their current staff and business processes may hinder the ability to effectively use the new tool to significantly improve their revenue position. Additionally, analysts do not generally have the immediate experience and knowledge needed to quickly master or take advantage of the new technology.

In fact, basic requirements that should be addressed when implementing a new technology system are often overlooked, keeping the carrier from realizing the technology's full benefits from the beginning.

Although there are many issues airlines should address when implementing new technology, at the very least, they should focus on several key factors, including:

- Technology impact on all current business processes and procedures,
- Ability to develop and implement new business processes and procedures to support the new technology,
- Skilled resources available to manage new technology within and across departments,
- Knowledge and training needed to effectively use the new technology.

All carriers, regardless of size, need to address these areas when implementing new technology if they want to receive a quick return on their investment. Without a thorough review of the current business and a clear business transformation plan, the majority of carriers will not receive the return on their technology investment as rapidly or as fully — missing clear revenue opportunities.

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with the attainable capability of achieving optimality, they open new horizons for the planners' imagination and provide the dynamism to respond to changes in the marketplace in a quick and efficient manner.

So, what are these software tools, and what do they do? There are three pillars of network planning and scheduling:

1. A schedule development system that provides an environment for schedule creation, validation and distribution.
2. A forecasting system that forecasts demand, traffic, revenue, cost and profitability of a proposed carrier's schedule. The system is based on a passenger preference model that rates all viable itineraries according to their appeal to different passengers.
3. An optimization system that uses the demand forecast from the forecasting system and optimizes fleet assignment based on network revenue and cost within the provided constraints — such as aircraft ranges, minimum required ground times, maintenance requirements and airport curfews. This process matches capacity to demand by minimizing spilled revenue and simultaneously minimizing empty capacity. Some of the more advanced optimization systems have the capability of dropping money-losing flights to achieve optimal network profitability. Other features of some of these systems include the capability to analyze the impact of ground-time shaving and flight retiming. These systems are highly automated and often produce complex solutions that are almost impossible to develop manually.

Other specialized tools exist for analyzing schedule dependability, optimizing aircraft routings, assigning through flight numbers, and managing codeshare relationships and slots at slot-restricted airports.

A central data repository sits at the center between all three systems and provides them with the data they need to produce meaningful results. Examples of the different data items include:

- Schedules for all carriers around the world,
- Origin and destination market sizes,
- Passenger preferences for different itinerary attributes,
- Market average fares,
- Advanced and flown bookings data from reservations systems,
- Actual passengers boarded,
- Revenue accounting data,
- Block-time database,
- Aircraft minimum ground times,
- Passenger minimum connection times.

The data is very important for the accuracy of the forecasting and optimization systems. The forecasting system in particular should be calibrated against the carrier's actual traffic and revenue data. This is a crucial step that ensures that forecasts of proposed future schedules are reliable, robust and can be trusted. Market-size data is a key to accurate forecasting. Market sizes are often difficult to estimate and require the consolidation and adjustment of multiple data sources. Marketing information data tapes, which include bookings data from major global distribution systems, is one of the key sources for market-size estimation. MIDT has many other applications. Since it contains O&D booking data for many airlines, it can be used to analyze historical market share of the different players in any market and relate that to their level of service. This can identify share gaps and probe investigation into markets where the carrier is

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Because most airlines can't address all of these issues with in-house resources, many are beginning to rely on the "build, operate and transfer" — or BOT — model when implementing technology. This model, developed by Sabre Airlines Solutions Consulting, ensures that carriers begin realizing product benefits immediately after product implementations and that their staff is proficient in using the tools quickly. In some cases, carriers have experienced positive results before the technology is in place — a direct result of the business assessment and quick-hit improvements identified early in the engagement.

The BOT model consists of a three-phase approach, including:

Build:

- Conduct current-state assessment,
- Present a gap analysis and recommendations based on thorough analysis,
- Build technology models,
- Develop the function or department to support new technology,
- Implement best practices for key departments,
- Develop key performance indicators,
- Begin training and knowledge transfer,
- Implement new technology.

Operate:

- Assign dedicated experts to operate the department,
- Implement key performance indicators,
- Build business cases, delivering product value using real data,
- Develop live scenarios, allowing for better and faster decision making,
- Continue training and knowledge transfer.

Transfer:

- Complete training and knowledge transfer,
- Mentor staff members in their new role,
- Measure performance and adjust resources and activities as needed.

By having product and industry experts working side by side with the technology end users and managers, carriers get their business practices in line and users up to speed quicker than if they implemented the new technology with only in-house resources.

The BOT model ensures that an airline is prepared for the new technology through improved business processes, policies and procedures. Furthermore, the staff is fully trained and equipped to use the tools effectively because of the extensive training, knowledge transfer and mentoring program available. It has been found that this model offers a faster return on investment and identifies revenue opportunities that are often overlooked.

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not getting its fair market share. MIDT data and market sizes can be used to identify potential new markets that a carrier can enter. MIDT has other valuable applications in sales and distribution, especially in studying agency activity and analyzing agency commissions in order to promote sales.

One of the fundamentals of such an integrated system is to be O&D based. For such tools to be effective, the emphasis should be on overall network performance rather than individual route performance. This is one of the key elements that distinguish a process based on software tools from a manual process. In a manual process, it would be extremely tedious to assess network performance for every proposed solution. However, network performance is the ultimate decisive factor in software tools, which have virtually unlimited applications in the entire network planning process starting from strategic planning through short-term planning.

Fleet Planning

Planning and scheduling software tools have many applications in fleet planning whether long term, intermediate or short term. Long-term fleet planning includes decisions on fleet acquisition and fleet retirement. With the integrated use of a forecasting system and a schedule optimization system, an airline can decide between several different fleet acquisitions.

The process starts by overbuilding the carrier's schedule based on its network structure and type of markets it intends to serve. The overbuilding process involves introducing services to new markets and increasing frequency to existing markets to account for growth. Some forecasting systems have add-on modules that can suggest new services based on total market demand and existing level of service. New flights should provide a reasonable aircraft flow pattern and obey minimum ground rules and any other constraints the carrier wishes to impose such as curfews.

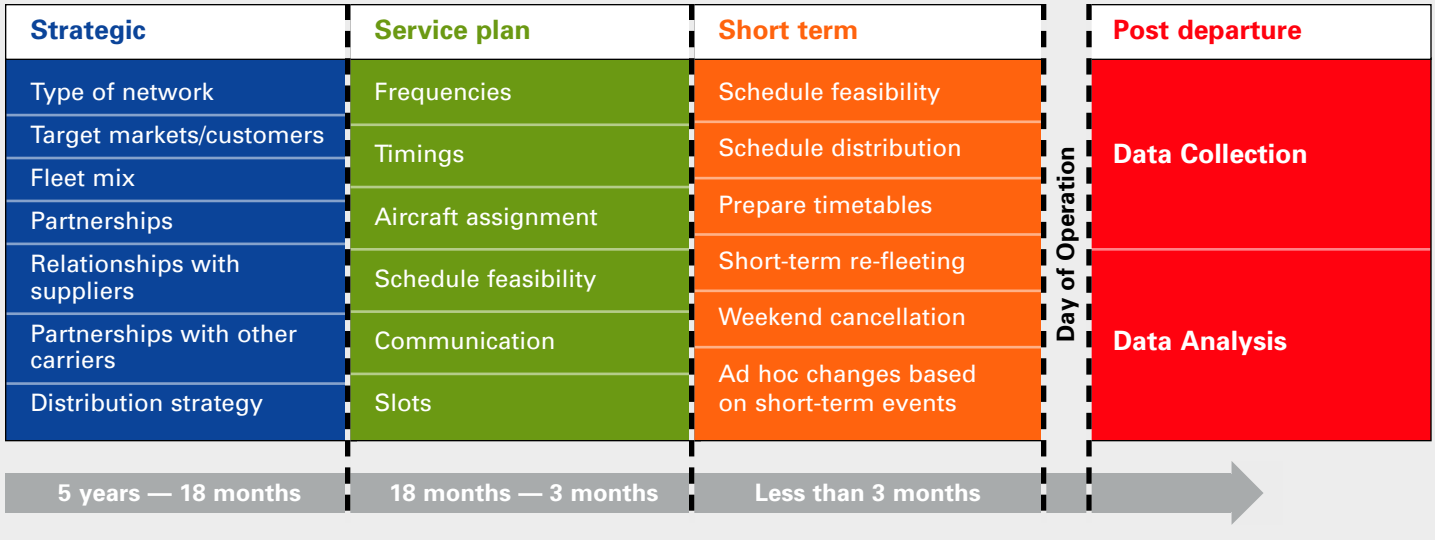
> "With the integrated use of a forecasting system and a schedule optimization system, an airline can decide between several different fleet acquisitions."

The next step is to forecast the demand for the overbuilt schedule flights using the forecasting system. The demand forecast is used by the schedule optimization system to reduce the schedule to the pre-determined aircraft count limit and determine the optimal fleet assignment. The schedule optimization system selects the fleet mix that optimizes the network revenue and cost from the different fleet alternatives. The optimized schedule is then fed again into the forecasting system to assess final expected performance, which typically requires several iterations between the forecasting system and the schedule optimization system. Better results can be achieved if the reduction step size is small in each iteration. Once the final fleet mix is achieved, transition schedules can be developed to phase in the new fleet and phase out the old fleet.

Fleet optimization does not have to be associated with fleet acquisitions or retirement. Optimizing fleet assignment should be undertaken on the intermediate schedules 18 to six months out. As the planning horizon decreases, the schedule becomes more defined and the mode of running the schedule optimization system changes from reduction, dropping under-performing flights, to switching fleet assignments. The level of constraints also increases as the planning horizon shortens, since schedule feasibility and operability become more important.

In the short term (45 to 30 days before departure), fleet optimization can respond to

Activities Over Time



Typical airline planning is divided into three timeframes — strategic/long term, intermediate and short term — each with a specific set of criteria or activities that map to the designated times. In addition, post departure data closes the feedback loop for the next planning cycle.

> "Following the best practices in fleet optimization across the entire planning horizon can lead to 4 percent to 5 percent improvement in profitability."

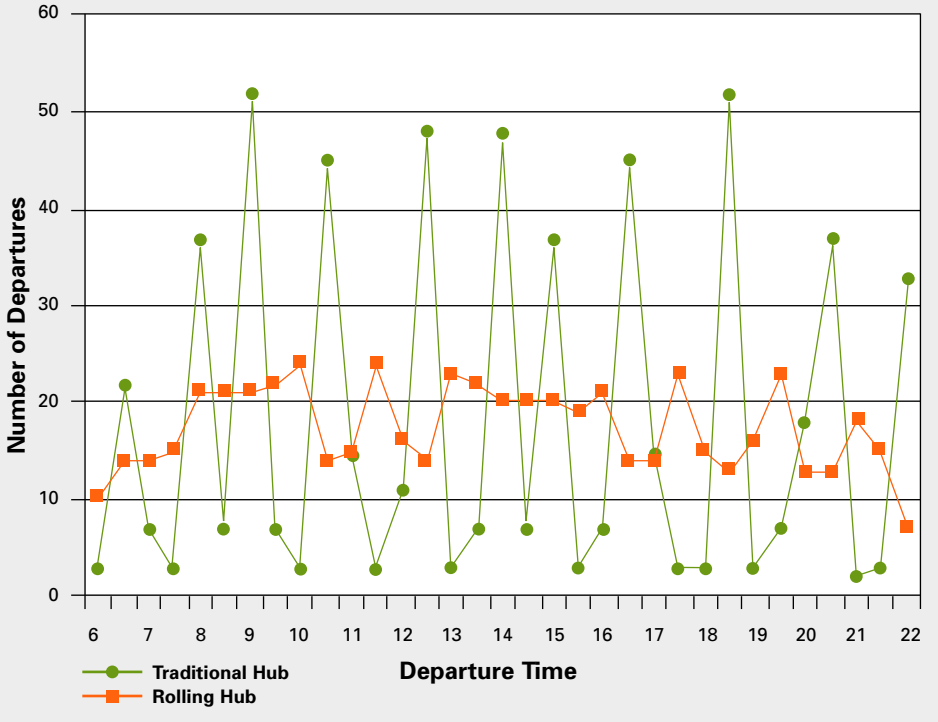
observed booking levels in the revenue management system by switching common flight deck aircraft (see related article on page 22). At this point in the schedule life cycle, schedule changes can be unwieldy and only minimal cost changes are tolerable. Common flight-deck aircraft are crew compatible and can be switched without disrupting crew patterns. In this case, the demand forecast would come from the revenue management system. This process enables the carrier to respond quickly to variations in passenger demand, special events or competitive actions. Short-term schedule re-fleeting is gaining popularity as airlines are realizing that they can generate 0.5 percent to 3 percent additional annual revenue by adopting this approach on a rigorous basis.

Following the best practices in fleet optimization across the entire planning horizon can lead to 4 percent to 5 percent improvement in profitability.

Alliance and Codeshare Analysis

Another example of applying network planning and scheduling software tools is in alliance and codeshare analysis. Codesharing expands a carrier's reach and feeds more traffic to its flights at a reduced cost. Common trunk routes can enjoy more complete time-of-day or day-of-week coverage. Many partner relationships can improve revenues as the relationship brings about coordination of fares, sales and distribution as well as create more pricing power. Software tools can help a carrier decide which alliance to join, which codeshare partners to have and how to set up codeshare deals with these partners. There are many factors that should be considered when choosing an alliance or codeshare partner. In addition to network synergies, other factors include cultural compatibility, regulatory issues, implementation difficulty and level of interest among partners. Software tools enable partners to coordinate their schedules to maximize synergies and traffic feed. The schedule development system provides easy means to view partners' schedules, identify candidate codeshare flights and suggest potential retiming of existing flights to maximize network synergies. Several schedule scenarios can be developed and evaluated using the forecasting system. The schedule optimization system optimizes fleet assignments based on the additional demand generated by new codeshares. Software tools can also help in evaluating different codeshare agreements. Many codeshare scenarios can be modeled in the forecasting system to assess the impact on the partners' revenues.

Traditional Versus Rolling Hub



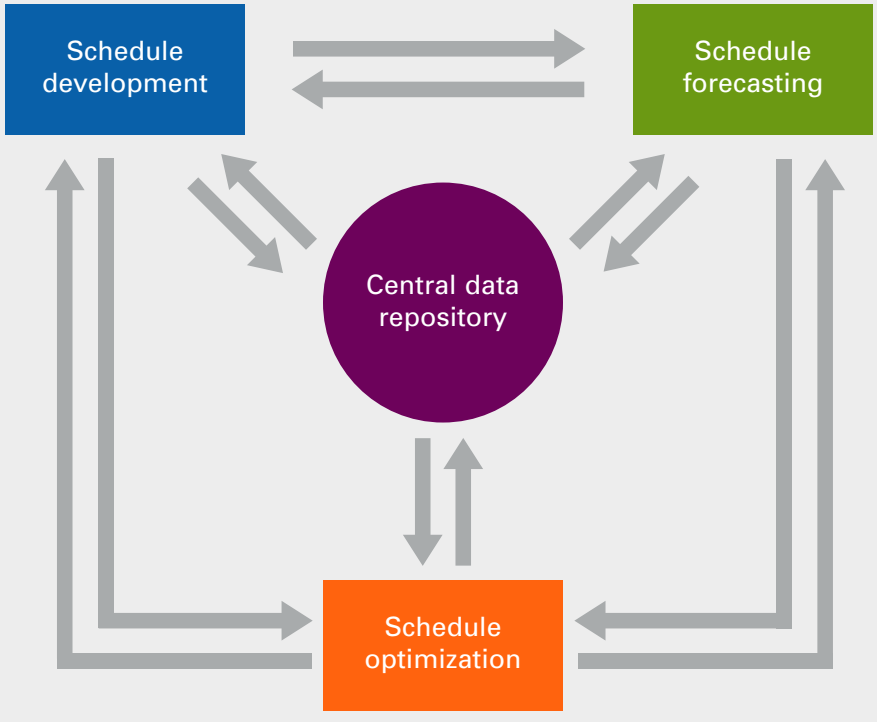
A traditional hub operation includes a wide variation in the number of departures compared to that of a de-peaked hub model. In a rolling hub, flight departures are spread more evenly throughout the day.

Hub Optimization

One of the newly popular actions adopted by network carriers in the last few years is hub de-peaking, also known as rolling hub. Hub de-peaking spreads out aircraft arrivals and departures at an airport such that aircraft movements are distributed more evenly throughout the day, resulting in more efficient and more dependable schedules and allows for increased aircraft utilization and more efficient use of the airline's assets. Connecting passengers have to wait a few more minutes for their connecting flights, but enjoy less waiting time on the tarmac during congestion hours. Hub de-peaking

An integrated airline planning and scheduling system contains four main components that, to operate seamlessly and effectively, must follow a specific protocol when interacting with each other.

Planning and Scheduling Components



has adjusted the traditional hub-and-spoke model, which was based on funneling flights into a hub at peak business travel times. The traditional hub-and-spoke model came under a lot of pressure as business-fare travel dwindled significantly since the end of 2000, and low-cost carriers managed to surpass the major network carriers with their more efficient operations and better utilization of assets.

American Airlines was one of the first carriers to implement hub de-peaking, moving to a maximum of 34 departures out of the Dallas/Fort Worth International Airport in a 30-minute period in its June 2004 schedule compared to 70 in June 2000. American estimated US$100 million of savings per year as a result of de-peaking its hubs at D/FW and Chicago O'Hare International Airport. American owes its successful efforts to de-peak its hubs to the use of its operations research analysis and network planning technology.

Creating a rolling hub without network planning and scheduling tools is an extremely difficult exercise. The schedule creation process is enormous as the schedule structure changes completely. Many iterations have to be tried between the forecasting system and the schedule optimization system to make sure that desirable levels of service are in place in the markets the carrier's network covers. Rolling hub exercises can be accompanied by fleet simplification and turn-time reduction. The ground-shaving capability of some of the advanced schedule optimization systems and the automatic retime capability greatly help develop a schedule in which planes are flying as much as possible, thereby increasing revenue.

Competitive schedule changes such as changing frequency, retiming flights, entering new markets, pulling out of existing markets and average fare changes can be evaluated quickly in the forecasting system for their impact on the host carrier's market share, traffic and revenue. Once the impact of these changes has been assessed, the tools can be used to evaluate different response plans and choose the best response to eliminate any adverse effect on the host carrier.

The schedule is the core product that an airline offers. Basic business principles dictate that companies that offer the best product win. Network planning and scheduling software tools should be an integral part of the overall network planning process at an airline. The advanced analytical capabilities that these tools offer enable airlines to devise the best schedule. Airlines should have the organizational structure to unleash the maximum potential of these tools. Since these tools help build the optimal network, an organization built around individual routes or groups of routes would not be as effective. A more effective organization would be one that is structured around the network planning time horizon.

> "The advanced schedule optimization systems and the automatic retime capability greatly help develop a schedule in which planes are flying as much as possible, thereby increasing revenue."

Network planning and scheduling software tools have a wide range of applications. These tools can help a carrier remain competitive by staying ahead of the competition and by responding quickly to competitive actions. They automate many of the manual tasks and free analysts for more rigorous analysis and decision making. With their network-wide focus, they analyze financial impact on the entire airline network and enable decisions to be based on total network performance rather than performance of individual routes.

Technology alone will not bring success to an airline; however, it can certainly contribute significantly toward achieving that goal.

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