Managing change in airline operations with crew pairing optimization

Overview

Airlines are subject to constant change. Increasing competition, technological developments, international policies, and changes in industry practices are transforming the entire industry.

Unexpected events, union movements, regulatory bodies, and competitors also frequently disrupt airline operations.

Even internal pressures, including shareholder expectations for growth and profitability, can play a hand in nudging the status quo. Ultimately, these forces result in additional operational costs that can significantly impact the bottom line.

No one knows this better than the people in airline operations departments. Understanding the likely impacts of looming operational changes ahead of time is instrumental to maintaining optimal efficiency while minimizing cost increases and service disruption.

Having the right tools and data to make these complex decisions is critical, and this is where scenario planning makes a big difference. With the right crew planning software, operational planning departments can evaluate a wide range of scenarios to build the most efficient and cost-effective crew pairings before changes occur.

This white paper examines common uses of "what-if" modeling in the airline crew planning context, including negotiating contract terms, responding to new operational realities, understanding the impact of regulatory changes, and expanding the business.

Airline-centric optimization software is a critical enabler of scenario-based planning that:

- **Automates the complex job of building the most cost-efficient legal pairings and rosters by running tests for multiple scenarios**

- **Provides solutions faster by executing different scenarios simultaneously**

- **Accurately accounts for interrelationships between rules and data**

- **Reduces the risk of human errors**

- **Explores a vast range of approaches that even the most seasoned planner might overlook.**
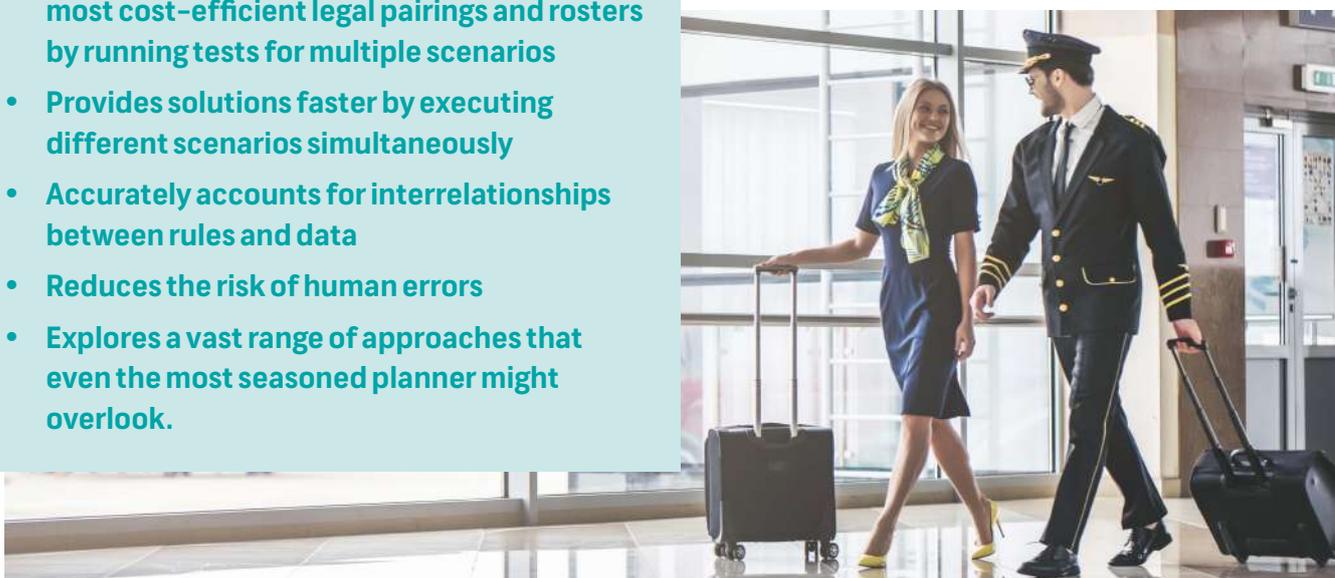
Gaining insights into the future

Crew planning is a challenging yet fundamental task for airlines as it represents a significant operating cost. Typically, thousands of employees must be assigned to hundreds of flights with aircraft varying considerably in size, equipment, and configuration. Crew skills, experience, and preferences must be considered, along with company policies, union rules, and labor regulations.

Building the most efficient and cost-effective crew pairings requires extensive use of "what-if" analyses. This is where harnessing the power of pairing optimization technology has a real and tangible impact.

Scenario-based modeling in the crew planning context allows airlines to gain valuable insight into the future to:

- **Effectively negotiate contract agreements**
- **Rapidly respond to new operational realities**
- **Fully understand the impact of regulatory changes**
- **Strategically expand the business.**

Improving negotiation efficiency

Employment contracts for flight crew define company-specific rules and restrictions related to duty pay, rest requirements, and duty limitations, among other factors. These can have a major impact on crew pairings and rosters and, ultimately, on the cost of operating scheduled flights. With "what-if" modeling, an airline can gain valuable insights into the costs and benefits behind the "give and take" that will inevitably take place during contract negotiations.

Through scenario-based planning, airline analysts and managers can establish positions on anticipated points before entering negotiations. These scenarios can also help understand the complex interrelationships between various contract terms and the impact of changing existing terms on operating costs and quality of service. This type of interplay is difficult, if not impossible, to determine without an automated modeling tool.

"What-if" modeling is also indispensable for testing various proposals during negotiations. Once negotiations have begun, all stakeholders are pressured to respond in a timely fashion.
A modeling tool that can easily adapt to changing rules and contract terms and quickly react to different scenarios allows senior management to identify effective data-driven options.

Rapidly responding to new operational realities

Airline managers need to be ready to face constant operational changes. "What-if" modeling can help managers deal with potential operational disruptions such as the planned closure of an existing base, expected delays due to heightened airport security, or a sudden surge in absenteeism due to an unpopular planning rule.

Opening or closing an existing base triggers a ripple effect across the network, impacting staffing requirements at other locations and overall operational costs. Multiple "what-if" scenarios can be built to balance flying, mitigate extra costs, or even maximize expected cost reductions.

In the same way, scenario-based analyses can also help managers determine the impact on productivity that a recent security incident or health crisis will have at various bases.

Furthermore, when crew members suddenly call in sick after the introduction of a new planning rule, operations managers can devise a series of scenarios to evaluate alternatives.

Understanding the impact of regulatory changes

Several regulatory schemes have been introduced over the past decade to avoid aircrew fatigue. EASA in Europe, FAR 117 in the USA, and CARS in Canada are just a few. The schemes are being pushed further with notions of Fatigue Risk Management, which are currently being implemented in airlines across the globe. These notions can have a diverse impact on an airline's operations, depending on the type of schedule.

For instance, cargo-based airlines would be severely hampered by rules that restrict consecutive night duties since night-flying is very common in this industry. "What-if" scenarios that model the notions of acclimatization, local night, and consecutive night duties help these airlines quantify the impact and assess mitigation strategies.

Passenger-based airlines are less affected by local night requirements and limits on consecutive late, night, or early morning duties. However, these airlines may face other fatigue-related rules, such as avoiding repetitive landings at a destination or limiting the number of consecutive "elongated" duties.

The cost impact of changing an existing rule or adding a new rule or set of rules can be devastating to an airline. It could also present an opportunity to reap new efficiencies, however. By modeling potential changes to existing planning rules or introducing new rules, an airline can establish a decisive position when contributing to the definition of a new regulatory scheme. At the very least, "what-if" planning can enable managers to make necessary adjustments before new regulations come into force.

Strategically expanding the business

Depending on the industry segment an airline operates in, the impetus to expand the business can come from intensifying competition, shareholder demands for growth, or both.

A sudden expansion of the business can also occur as a result of a merger. Scenario-based planning is instrumental in quantifying the costs and benefits of:

- **Expanding the fleet**
- **Opening new bases**
- **Re-directing flights**
- **Adding new destinations.**
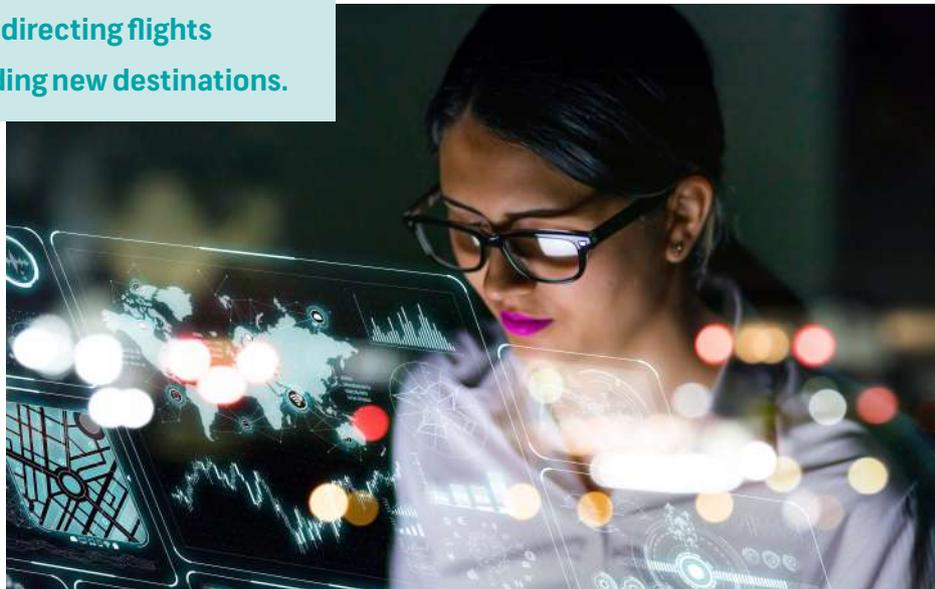
"What-if" scenarios can also help obtain significant cost reductions by looking for untapped efficiencies.

Leveraging optimization technology

Airline-centric optimization software is a game-changer for scenario-based modeling. By reducing the manual effort involved in building legal pairings and rosters, an optimizer can consistently deliver cost-efficient, accurate, and operationally robust results.

Moreover, an optimizer can rapidly execute a range of reliable "what-if" scenarios. Since it can run multiple test cases at once, it is not prone to human errors common in repetitive tasks.

Crew pairings can be built manually. However, "what-if" modeling often requires multiple simulations in a short period, with minor variations having important repercussions. In these situations, the chance of human error is high, as are the stakes.

Optimizers are also likely to provide better decision-making support since they systematically account for complex interrelationships. They also generate a comprehensive range of solutions, including many that planners would not be able to come up with on their own.

With change being the only constant in the airline industry, scenario-based modeling with the help of a crew pairing optimizer is an asset that cannot be underestimated.

About iFlight Crew Pairing

iFlight Crew Pairing is the travel industry´s most coveted optimization engine. Every year, it generates millions in cost savings for airlines by mitigating the impact of operational changes. iFlight Crew Pairing recommends the most efficient and cost-conscious aircrew pairings while maintaining full compliance with company rules, union collective agreements, and government regulations. iFlight Crew Pairing´s pioneering algorithms systematically explore a vast number of flight and duty combinations that yield the best possible pairings while reducing the chance of human error and consistently delivering reliable results.
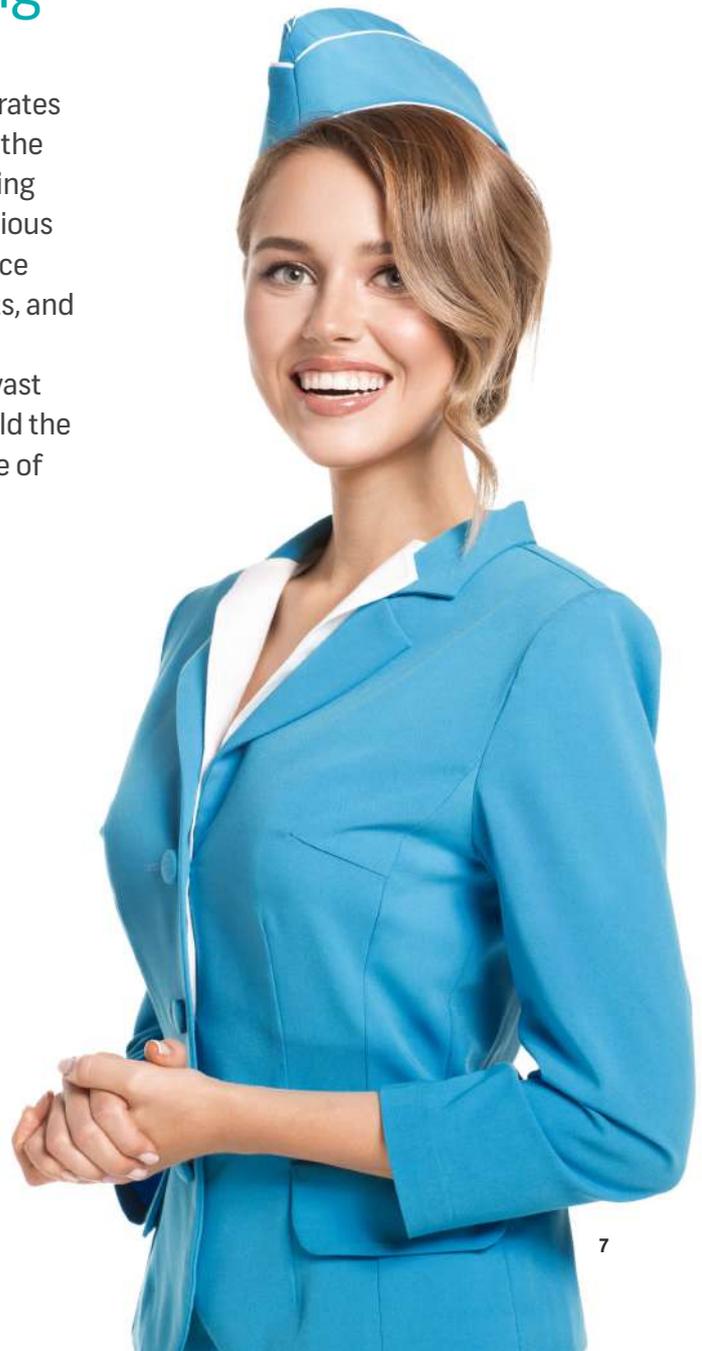
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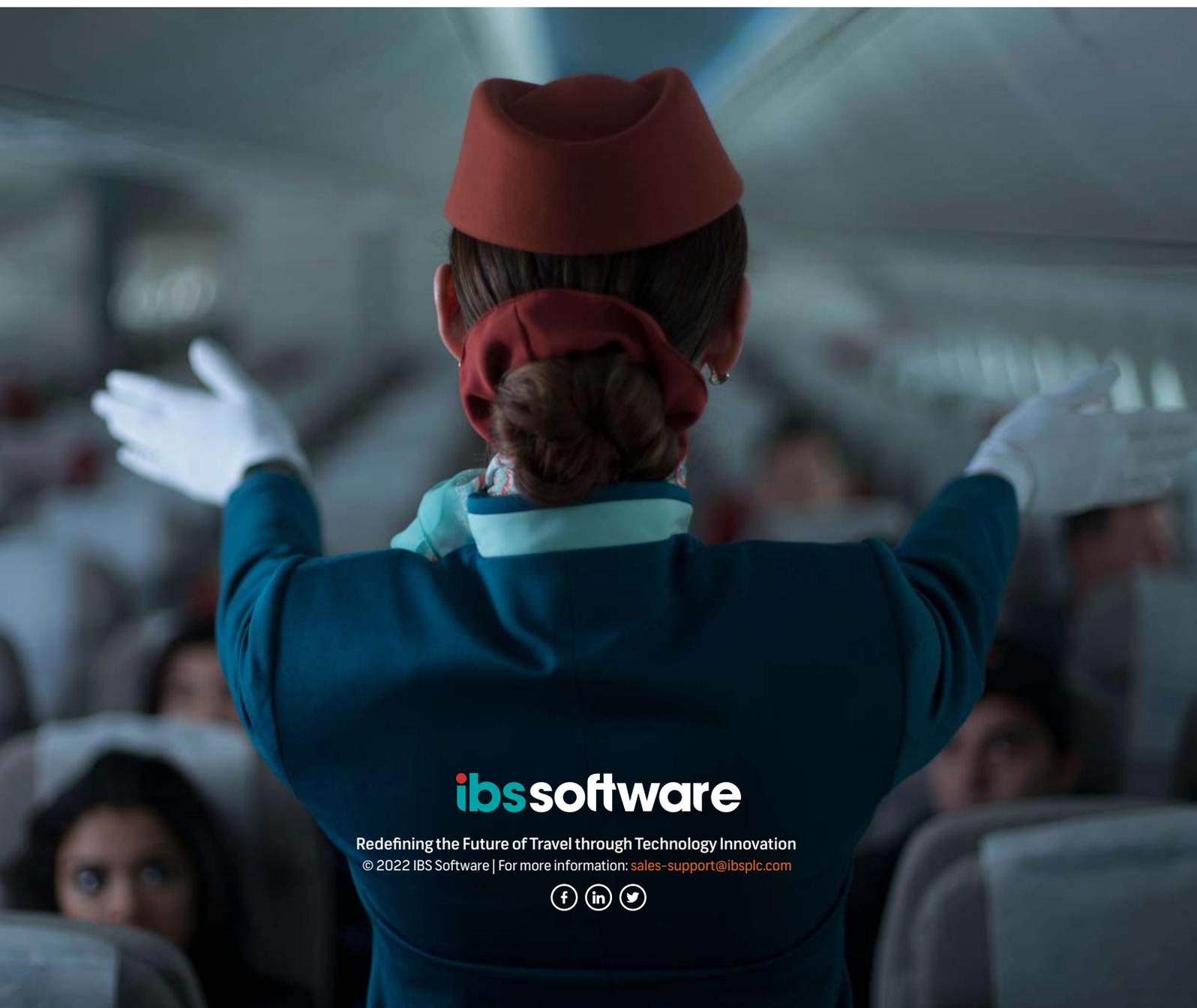
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