Valuable Insights Through Big Data Analysis: A Commercial Airline Case Study

A commercial airline, faced with ever-increasing market competition and challenges in profitability, engaged Booz Allen to deploy advanced, globalized analytical tools to its private big data warehouse. In the past, the client had analyzed smaller datasets in-house, but because smaller datasets are, by nature, filtered or diluted subsets of the big data, the airline had not been able to extract the comprehensive understanding it was seeking. The ultimate goal of Booz Allen’s effort was to generate valuable insights from the big data that would not be readily apparent from studying smaller, localized datasets.

Our Approach

Booz Allen began with a thorough review of hardware and software options to identify the best solutions for our client’s particular needs. Working collaboratively with the client, we defined the computing requirements necessary for our team to access the client’s big data warehouse. Through this interface, Booz Allen leveraged a suite of big data analysis and visualization tools which, since its first aviation assignment for United Airlines in 1930, Booz Allen Hamilton, a leading strategy and technology consulting firm, has completed more than 1,000 successful engagements for clients in the airport, airline, aerospace, and travel industries, as well as for air navigation service providers and government and regulatory agencies worldwide. In 2007, Booz Allen was named “Best Consulting Firm to the Air Traffic Management Industry” by Air Traffic Management magazine. Working with clients across the industry, we provide deep functional knowledge spanning strategy, organization, engineering, operations, technology, and analytics. Our Decision Analytics Center of Excellence employs modeling and simulation, decision science, operations research, and quantitative analysis to deliver data-driven solutions that improve performance, optimize flows, and help stakeholders understand what and when events are likely to occur.

Booz Allen combines technical excellence with a core understanding of the airline industry to solve problems in:

+ Performance Benchmarking
+ Network & Schedule Planning
+ Fleet and Crew Optimization
+ Pricing and Revenue Management
+ Demand Modeling & Forecasting
+ Customer Analytics and Marketing
+ Big Data Mining and Data Architecture
+ Technology Deployment and Evaluation
+ Engineering and Maintenance Optimization
+ Safety and Security Risk Modeling
+ Legislative and Regulatory Analysis
+ Competitive Analysis and Wargaming

Heat map of performance metrics across airline network

Visualizations specifically suited to represent big data allow Booz Allen to work with clients to quickly identify holistic, network-wide challenges and develop a complete set of solutions.

Source: Booz Allen Hamilton
for this client, included Revolution R, BayesiaLab, Tableau, and JMP. By combining cutting-edge big data technology, advanced statistical and probabilistic techniques, and our airline market expertise, we were able to implement solutions both to explore the big data warehouse and to visualize the powerful results therein.

Using the big data infrastructure implemented for the client, Booz Allen was able to analyze large datasets containing more than 3 years’ worth of passenger data—approximately 100 gigabytes. We generated hypotheses to test from the data, including:

**Airline Market Performance**
- What are the client’s natural market types and their distinct attributes?
- What is the client’s competitive market health?
- Where does the client capture fare premiums or fare discounts relative to other carriers?

**Passenger Behavior**
- What is the variability of booking curves by market type?
- What are the intrinsic attributes of markets with the highest earn and highest burn rates?
- Can predictive modeling be developed for reservation changes and no-show rates for individual passengers on individual itineraries?

**Consumer Choice**
- What is the demand impact of increasing connection time?
- What is the effect of direct versus connecting itineraries on passenger preference?

**OUR RESULTS**
The results from mining this data included inferences about passenger booking behavior, airline performance, and market characteristics. Although these insights often seemed unintuitive, they could be acted on immediately by the airline to improve its performance.

**CASE STUDY SUMMARY**
The big data analysis capabilities Booz Allen implemented together with its airline partner are an industry first, and an area of rapid growth across the travel and hospitality sector. All of the big data capabilities we developed are software-agnostic, so they can be readily tailored for specific needs where client’s would derive value from mining historical data, analyze simulation results, or develop predictive models.
why unique events occur, and simulate the impact of changes. Potential benefits and applications include:

+ Real-time optimization of flight schedules
+ Optimized pricing based on greater fidelity of passenger data
+ More strategic marketing efforts based on targeted analytical analysis
+ Increased customer satisfaction with loyalty programs driving tailored rewards

Other Key Aviation Qualifications

In addition to our long history of work with airlines, Booz Allen is very highly respected by the entire Aviation and Aerospace community.

Booz Allen is one of seven firms chosen to help the Federal Aviation Administration with the critical systems engineering, operations analysis, financial analysis, and program management support necessary for successful implementation of the Next Generation Air Transportation System, a multi-billion dollar, 10-year initiative.

Booz Allen is also helping the aviation industry take a different approach to safe air travel by anticipating, planning for, and mitigating safety risks through application of the principles of the Safety Management Systems (SMS) used successfully in other industries.

Booz Allen Can Help You Be Ready for What’s Next

For clients that seek a thought partner in tackling their toughest challenges, Booz Allen is proud of its cadre of highly regarded functional specialists and aviation industry experts. With a rich history of advising the most senior leaders in industry and government, Booz Allen has the resources and experience to meet those needs.

Combining the firm’s unparalleled experience in cloud computing and big data analytics with its established airline and aviation expertise is our unique value proposition to both commercial business units and operational units alike. Our broad experience with airlines, manufacturers, air navigation service providers, and customers enables Booz Allen to bring the most highly skilled and knowledgeable staff in the industry to any client engagement to solve the tough problems faced in today’s challenging environment.

Whether you’re managing today’s issues or looking beyond the horizon, count on us to help you be ready for what’s next. See our ideas in action at boozallen.com/data-science.

About Booz Allen

Booz Allen Hamilton has been at the forefront of strategy and technology consulting for 100 years. Today, the firm provides services primarily to the US government in defense, intelligence, and civil markets, and to major corporations and not-for-profit organizations. Booz Allen helps clients achieve success today and address future needs by applying functional expertise spanning consulting, analytics, mission operations, technology, systems development, cybersecurity, engineering, and innovation to design, develop, and implement solutions.

Booz Allen is headquartered in McLean, Virginia, employs more than 22,000 people, and had revenue of $5.48 billion for the 12 months ended March 31, 2014. In 2014, Booz Allen celebrates its 100th anniversary year. To learn more, visit www.boozallen.com.

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