



## **Case Study 1**

### **Norfolk Southern**

There are four large freight railroads in the United States, and Norfolk Southern is one of them. Each day, the company moves approximately 500 freight trains across 21,000 route miles in 22 eastern states, the District of Columbia and Ontario, Canada. Norfolk Southern manages more than \$ 26 billion in assets and employs over 30,000 people.

For more than a century, the railroad industry was heavily regulated, and Norfolk Southern and its predecessor railroads made money by managing their costs. Managers are focused on optimizing the use of railcars to get the most production out of their fixed assets. Then, in 1980, the industry was partially deregulated, which opened up opportunities for mergers and allowed companies to charge rates based on service and enter into contracts with customers. On-time delivery became an important factor in the industry.

Over time, Norfolk Southern responded to these industry changes by becoming a “scheduled railroad.” This meant that the company would develop a fixed set of train schedules and a fixed set of connections for cars to go between trains and yards. In this way, managers could predict when they could get a shipment to a customer.

Norfolk Southern has always used a variety of sophisticated systems to run its business. Becoming a scheduled railroad, however, required new systems that would first use statistical models to determine the best routes and connections to optimize railroad performance and then apply the models to create the plan that would actually run the railroad operations. These new systems were called TOP, short for Thoroughbred Operating Plan; TOP was deployed in 2002.

Norfolk Southern realized that it was not enough to run the railroad using TOP, it also had to monitor and measure its performance against the TOP plan. Norfolk Southern’s numerous systems generated millions of records about freight records, railcars, train Global Positioning System (GPS) information, train fuel levels, revenue information, crew management, and historical tracking records. Unfortunately, the company was not able to simply tap into this data without risk of impacting operations.

In 2002, the data warehouse became a critical component of TOP. Norfolk Southern built a TOP dashboard application that pulls data from the data warehouse and then graphically depicts actual performance against the trip plan for both train performance and connection performance. The application uses visualization technology so that field managers can more easily interpret the large volumes of data (e.g. there were 160,000 weekly connections across the network). The number of missed connections has decreased by 60% since the application was implemented. And, in the past 5 years, railcar cycle time has decreased by an entire day, which translates into millions of dollars in annual savings.

Norfolk Southern has an enterprise data warehouse (EDW), which means that once data are placed in the warehouse, the data are available across the company, not just for a single application. Although train and connection performance data are used for the TOP application, the company has been able to leverage that data for all kinds of other purposes. For example, the marketing department has developed an application called access accessNS, which was built for Norfolk Southern customers who want visibility into Norfolk Southern’s extensive



transportation network. Customers want to know where their shipments are “right now” and at times, they want historical information: Where did my shipment come from? How long did it take to arrive? What were the problems along the route?

AccessNS allows more than 14,500 users from 8,000 customers’ organizations to log in and access predefined and custom reports about their accounts at any time. Users can access current data, which are updated hourly, or they can look at data from the past 3 years. AccessNS provides alerting and Really Simple Syndication (RSS) feed capabilities; in fact, 4,500 reports are pushed to users daily. The self-service nature of accessNS has allowed Norfolk Southern to give customers what they want and also to reduce the number of people needed for customer service. In fact, without accessNS, it would take approximately 47 people to support the current level of customer reporting.

Departments across the company from engineering and strategic planning to cost and human resources use the EDW. One interesting internal application was developed by human resources. Recently, the department needed to determine where to locate its field offices in order to best meet the needs of Norfolk Southern’s 30,000+ employees. By combining employee demographic data (e.g. zip codes) with geospatial data traditionally used by the engineering group, human resources was able to visually map out the employee population density, making it much easier to optimize services offices locations.

Today, the Norfolk Southern data warehouse has grown to a 6-terabyte system that managers an extensive amount of information about the company’s vast network of railroads and shipping services. Norfolk Southern uses the data warehouse to analyze trends, develop forecasting schedules, archive records, and facilitate customer self-service. The data warehouse provides information to over 3,000 employees and over 14,000 external customers and stakeholders.

Norfolk Southern was the first railroad to offer self-service BA, and its innovation is setting an example that other railroads have followed. The company was also one of the first railroads to provide a large variety of historical data to external customers.

- **Question 1:** What were the top 3 “big picture” business motivators that drove that company to begin or expand their BA efforts presented in the case?
  - **Question 2:** What were the 4 most valuable specific business functions delivered by the business intelligence initiative?
  - **Question 3:** Consider our three BA types. Which of the three were done according to the case write-up?
  - **Question 4:** Please give examples of what that company might do in a future version in each of the types of BA
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- Adapted from Business Intelligence: A Managerial Approach (2nd Edition) By Efraim Turban, Ramesh Sharda, Dursun Delen, David King 2010, Pearson