

BY PETER M. TOBIA

**Editor's note:** This is another in a series of articles profiling members of the INFORMS Roundtable.

## Princeton Consultants Inc.

Firm aims to create competitive advantage through improved decision-making.



Princeton Consultants' goal is to help clients create operational and strategic advantage by using custom-produced software and business-process changes to improve decision-making.

Princeton Consultants ([www.princeton.com](http://www.princeton.com)) is a consulting firm with offices in Princeton, N.J., and New York City. The firm specializes in optimization, combining information technology and management consulting in every assignment. Its goal: help clients to create operational and strategic advantage by using custom-produced software and business-process changes to improve decision-making. Its mission: educate senior executives about how optimization enables companies to achieve competitive advantage, drive up the value of assets under management and provide a high-priority strategic investment.

### The History

Princeton Consultants was founded in 1981 by Steve Sashihara and Jon Crumiller. CEO Sashihara majored in philosophy at Princeton University, and COO Crumiller majored in computer science at the University of Delaware. Their early interest in solving business problems by creating algorithms and using computers to apply them led the two men to begin working with early copies of opti-

mization and statistical software from nearby Bell Labs and research professors from Princeton University

Today, Sashihara and Crumiller lead a firm of 80 full-time consultants, all of whom have worked their way up the through ranks by demonstrating success in client engagements. None are "lateral hires" from other consulting firms, assuring that clients are served by proven individuals who possess deep, practical knowledge of the field. The majority of the consultants have graduate degrees in science, engineering or applied mathematics. Approximately one third have Ph.D.s. The firm remains privately held and is run by senior staff – directors, senior specialists and senior consultants.

### The Need

According to Sashihara, companies spend massive amounts of money on technology to supply them with data. However, even with all this data, most are still using the "three Hs" to make decisions:

- History – It's right because it's the way we've always done it.

# All About the Roundtable

## 'Techies' have been unable to analyze organizations to identify where and how their software can add the most value.

- Hunches – It “feels right” to me.
- Hierarchy – Because I say so, and I’m the boss.

There are better ways to make decisions. For many years, IT consultants/specialists have had rigorous decision-making technology, which, like optimization, makes superior decisions. What these “techies” have been unable to do is analyze organizations to identify where and how their software can add the most value. For that, you need management consultants who are both business and technology savvy – in a word, optimizers.

Using their management consulting savvy, optimizers analyze a business to identify the most important decisions the company makes, how they are made and who makes them. Then, they look for ways to improve those decisions, using the powerful tools of IT; not tools that just gather data for reports and dashboards, but software that can actually make recommendations. The result: the ability to make hundreds of decisions a little better than they are currently being made – and to save a lot of money as a result.

### Unique Approach

Princeton Consultants does not engage in research for research’s sake. Its work is geared toward real-life business applications. While some optimization firms offer a menu of off-the-shelf products and “tweak” them for various applications, Princeton Consultants creates new software for each client to meet that company’s special needs. For example, Quad/Graphics, a Princeton Consultants client, is the largest private printer in North America, with 11,000 employees at 11 large facilities. There are thousands of small printers, and many of them use scheduling software in their operations. But there is no way to take an application created for a small printer and scale it up for a company the size of Quad/Graphics. Optimizing for Quad/Graphics required building optimization software from the ground up.

### The Results

In its 29-year history, Princeton Consultants has helped clients reap large benefits by applying the principles of optimization to various areas. Following are examples of its work with clients in three major ones: scheduling, allocating space and pricing.

**Scheduling:** For many high-profile personalities who shun commercial flights, the airline of choice is NetJets. NetJets flies approximately 400,000 flights annually on 775 aircraft to approximately 175 countries around the globe. Each of NetJets’ well-heeled passengers is a part-time “owner,” for whom a plane is available whenever and

INFORMS has two types of members: individual and institutional. The latter (usually a company) joins by joining the INFORMS Roundtable and appointing as its representative the person in overall charge of O.R.

The Roundtable has been very active since its founding in 1982, with three meetings each year and much communication in between. It, its member institutions and its member representatives take a strong interest in how INFORMS serves the needs of practitioners, and have undertaken many initiatives and provided many services toward this end. These involve, for example, public awareness of O.R., both of the annual INFORMS conferences, continuing professional education, one of the prizes and various committees.

In addition, the Roundtable has an advisory responsibility to INFORMS. One bylaw states that it “... shall regularly share with INFORMS leadership its views, its suggested initiatives and its implementation plans on the important problems and opportunities facing operations research and the management sciences as a profession and on the ways in which INFORMS can deal proactively with those problems and opportunities ...” By tradition, it meets with the newly elected INFORMS president-elect each spring to discuss practice-related topics of interest to him or her, and with the entire INFORMS Board each fall to discuss topics of mutual concern.

The Roundtable membership comprises about 50 organizations. Further information is available at <http://roundtable.informs.org>.

This series of articles aims to share with the INFORMS membership at large some information and insights into how O.R. is carried on in practice today.

wherever it is needed. The resulting complexity makes efficient scheduling a major challenge.

Knowing that improvements in fleet utilization would give its owners tremendous advantages, NetJets called on Princeton Consultants to create a scheduling system that would maximize utilization while minimizing customer dissatisfaction.

Many rules govern the decision as to who should get which jet, when. Some are related to the size and speed of the planes. Others are mandated by the FAA. There are also union regulations to consider and company policies. Another complicating factor: The high net-worth individuals who use NetJets often think nothing of changing their plans at the last minute. Weather and air-traffic patterns are another source of constant uncertainty and change. So choosing when and where to fly each jet and crew at the moment of truth – when a customer calls and wants a jet now – is an energy-draining challenge.

Princeton Consultants’s optimization team successfully created an optimizing software program that took into account all the rules and constraints under which the airline operates and prescribed the optimal solution. The bottom-line results? NetJets successfully uses Princeton Consultants’ models in production to schedule all world-wide pilots and jets.

**Allocating space:** Space is another asset that can be as scarce as equipment and no less contentious. Take ad space, for example. It is a precious and limited asset, both for businesses needing to reach a target audience and for those who own the media outlet, making ad space a prime candidate for optimization. The *Wall Street Journal* provides a case in point.

Given the complexity of its numerous editions and the number of rules governing where ads can be placed, laying out the paper’s ads is tricky business. For many years, it was done manually each night by two employees. The ads that didn’t fit were shelved, and advertisers didn’t learn that they had been left out until the next

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morning. The result: lost revenue and lost advertisers, who headed for more reliable advertising venues.

Realizing that it was time to replace this antiquated system, the paper's management asked Princeton Consultants to develop a program that would optimize WSJ's use of advertising space. The firm's team worked side-by-side with the employees who had created the playbooks and about 100 support staff at the paper to design software that rationalized the ad-placement process and drove up value.

As a result of the project, the *Wall Street Journal* did not have to buy more presses, hire more people or discount its rates to increase its revenue. Just getting more ads into the paper each day did it. Placing ads with the *Wall Street Journal* also became much more customer friendly. Now, an advertiser can call and ask for an ad and find out almost immediately if it will appear in the next day's paper, eliminating surprises. The bottom-line results? Dow Jones & Company successfully uses Princeton Consultants' models in production to layout all worldwide editions of the *Wall Street Journal*.

**Pricing.** Agile price setting can be a competitive advantage in many industries, especially in large, B-to-B transactions. How would your customers and prospects react if you could give them a price quote in seconds instead of days? What would such agility do for your company's reputation? How many more prospects would call for a quote?

One of Princeton Consultants' clients is CSX Railroad. Each day, CSX moves more than 20,000 railroad cars of essential items throughout North America. Some shipments are scheduled months in advance; other requests come in at the spur of the moment. The employees who schedule the freight shipments need to know, at all times, exactly how much space is available, on which trains and how much it can be sold for. If a CSX train from Jacksonville, Fla., to Chicago is going through Nashville, Tenn., with several empty cars, and a business in Nashville can fill a couple of them, CSX can probably offer the shipper a favorable price. The optimization software created and installed by Princeton Consultants can calculate the price point that will make it a win-win for both CSX and the customer, and it can do so instantly. The bottom-line results? CSX successfully uses Princeton Consultants models in production to provide instant Web pricing and order booking, making what CSX Intermodal President James Hertwig called "a prime example of our determination to be the most progressive intermodal service provider in North America."

## The Future of Optimization

Some industries, such as transportation, have been using optimization for decades with excellent results. Despite their demonstrated successes, other industries have been slow to follow their lead. For example, the healthcare industry has been slow to adopt optimization techniques. Much of the discussion concerning optimization in healthcare represents academic research, not field applications used on a daily basis to reduce inefficiencies and improve service. Paul O'Neill, former secretary of the Treasury and veteran optimizer, summed up the extent of the missed opportunities when he said, "For me, there is no bigger smorgasbord of potential opportunity for the application of your [optimizers'] talents and insights than in the practice of American medical care."

It is not just the medical profession that has been slow to adopt optimization. Throughout the business world, companies continue to manage scarce and expensive assets in traditional ways, shunning proven optimization techniques.

Sashihara maintains that this is about to change. "I am very excited about the future of optimization for two reasons," he says. "The plummeting cost of hardware and globalization. You can't just cut costs, centralize and mass produce anymore. You need to be able to 'mass customize,' which is what optimization enables you to do."

Sashihara, who also serves as co-chairman of the Association of Management Consulting Firms (AMCF), adds that optimization is about to emerge as one of the hottest growth areas in consulting. **INFORMS**

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