THE SCIENCE OF MOTORSPORTS MEETS THE BUSINESS OF NASA

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ABSTRACT

This case study compares and contrasts the business challenges and decision-making styles of two very different organizations. One is a highly visible government agency (NASA) and the other is a highly visible corporation (a NASCAR race team). The focus is on the business factors NASA uses to price its product and the scientific factors a race team uses to evaluate NASA's product.

INTRODUCTION

Decision making is an everyday event in the business of motorsports. Business decisions affect revenue, profit, ROI and investors; and deal with product promotion, customer satisfaction and pricing. Decision making at NASA is all about how to best use the budget voted by Congress to stretch the envelope of scientific endeavor. Revenues, profit, ROI, shareholder value and pricing never come up at NASA. Even the most elementary business fundamentals, such as the customer, customer satisfaction and new product promotion are foreign concepts.

It's hard to imagine two more different organizations with more divergent business models. For example, the motorsports customer drives its business model and every aspect of a race team's business performance. The customer (fan) evaluates the motorsports' "product" and pays for it. NASA has many customers, the scientific community, the taxpayers (its fans), astronauts and so on and each evaluates NASA's products. But NASA's customers don't directly pay for the product; Congress does. This fact situation makes for a very strange and disconnected business model.

This article deals with what happens when a few motorsports teams went in search of a test site to confirm the *science* of their race cars just as NASA was trying to decide how to enter the *business* of marketing and pricing one of its most unique assets, the Space Shuttle Landing Facility (SLF) at the Kennedy Space Center. The science of motorsports comes face-to-face with the business of NASA. NASA now had a paying customer who was evaluating and willing to write a check for a NASA product and its related services.

SITUATION

Although they look and behave entirely different, there are a few notable similarities between the business of motorsports and the business of space exploration. Motorsports has its Indy 500 and Daytona 500, NASA had the Moon 500. The objectives are the same; win the race. The difference is in the number of laps, NASA had one 500,000 mile lap and the space ship traveled at 25,000 mph. NASA replaced the moon rocket with the Space Shuttle, which as the name implies, shuttles equipment, astronauts and supplies in and out of earth orbit.

A few years ago NASA made the decision to retire its fleet of Space Shuttles which made a number of its facilities obsolete. This decision was based on scientific and space exploration goals; not on a market and customer needs analysis. NASA went in search of alternate, commercial uses for 13

payload processing facilities, 140,000 acres of land and its very unique Space Shuttle Landing Facility (SLF).

NASA had a number of business decisions to make but, unlike the typical business owner, NASA was not accustomed to, nor did it have the organization in place to make commercial business decisions. For example, NASA does not have a CEO, a business-savvy leadership team or even a marketing department. Its CFO directorate has no one with pricing experience. NASA's P&L statement lacks revenue and net income lines. The notion of sales, net income and an ROI were uncharted territory.

Other decisions centered around how to manage and staff a commercial enterprise. Who should lead this new NASA business and who should be on its leadership team?

The Space Shuttle is still flying and so decisions had to be made about scheduling and, even more importantly, about how to deal with contingency schedules when a launch date slips.

NASA knew the SLF was a one-of-a-kind product. The SLF is 15,000 feet long (~3 miles), 300 feet wide (length of a football field) and milled to be perfectly flat. (The earth drops off 9 inches every mile but the SLF does not conform to the earth's shape; it's perfectly flat). The SLF also has 2 different surfaces. The middle is smooth and the outer edges are rough. Because of the nature of NASA's work, security is tight; safety is hard wired into the culture and, due to the high risk of launch activity, the Kennedy Space Center is located in a wilderness preserve very near the beach. Rockets take off across the ocean.

NASA's most obvious target market of a shuttle landing facility is a customer needing to take off and land aircraft. For example, the SLF is used to take paying passengers on zero-g flights to experience a brief period of weightlessness. Its not so obvious customer was someone who had no intention of leaving the ground. Once that paradigm was broken NASA opened the door and motorsports walked in. After all, the motorsports industry had experience with testing at government facilities. The Wood Brothers have utilized the wind tunnel at NASA's Langley Aerospace Research Center [1] and teams have tested at the Aberdeen Proving Grounds in Maryland.

DEVELOPING THE PROCESS

Although NASA uses the Shuttle Landing Facility (SLF) to slow down the fastest machine man has ever made. Motorsports needed a facility to allow it to achieve the fastest speed possible on a straight- away. The Indy straight-away is 3,300 feet and Daytona's longer front stretch is 3,800 feet. And so the SLF's 15,000 foot long runway offers plenty of room for a car to stretch its legs.

Wind tunnels are valuable tools but they go just so far. Many wind tunnels are designed to test scaled models and have a static floor; there is only one full scale wind tunnel in the U.S. with 180 mph rolling-road capability [2]. Nevertheless, there's nothing like tires on asphalt and so enter the SLF.

NASA

To undertake the marketing and pricing process, NASA started by designating a Manager of Business Development from its Center Operations Directorate and formed a team representing Finance, Safety, Engineering and the SLF Manager. They then sent out an RFP (Request for Proposals) and received 15 proposals. One of the criteria used by NASA when reviewing the proposals was the linkage between NASA's business and that of the companies submitting proposals. A short list of ten proposals was created, with each of the ten companies invited on-site to determine compatibility with NASA and to see if the facility would meet the company's requirements [4].

One of the successful proposals was from a race team. NASCAR teams were looking for new venues to test their cars since the sanctioning body had banned testing on NASCAR sanctioned tracks. NASA's challenge was how to fairly price a unique asset and thereby ensure a win-win for it and its new customer. NASA benchmarked other test sites frequented by racing teams including the Aberdeen Proving Grounds and the Oscoda-Wurtsmith Airport in Michigan. Both sites featured shorter runways and each charged $1,500 per day. The SLF is longer, a nicer facility, offers state-of-the-art EMT and fire services, and is more secure; as a result NASA charged $2,000 per day.

One Race Team's Experience

One of the full time, multi-car NASCAR teams reported that they started using the SLF for testing in mid-2007. There were numerous factors that went into their decision to utilize the facility. There were very few facilities and no good state-of-the art wind tunnels available for straight line, aerodynamic testing. The team used the Maxton WWII bomber training facility in NC but found the facility to be rough and bumpy. The SLF testing facility was very flat and smooth. Since the team competes in Toyotas, they were able to utilize Toyota's proving grounds in AZ for testing, and although the proving grounds has only a 2 1/2 mile straight-away, it is a 10 mile oval which allowed the cars to circle around utilizing both the front and the back stretch straight-aways. The team could test at Toyota's facility free of charge; however the cost of travel was much more significant than taking a van load of employees to FL for testing. In addition, as new, more sophisticated wind tunnels became available, the cost to rent time in these tunnels was also significantly more expensive. A 3-day test at SLF would be budgeted for $12,000, whereas the cost to test at Wind Shear was approximately $40,000 per 10-hour shift. Therefore, the SLF was also more attractive from a cost standpoint.

However, there were drawbacks that needed to be taken into consideration when making the decision to rent time at the SLF. The team found it difficult to coordinate booking test time based on the SLF's schedule, the safety features were a bit much, and it was also too short for the type of testing the team wanted to perform. In addition, there was occasionally wildlife roaming on the SLF which created a tremendous hazard at 180+ mph; and, the weather in July was an issue to take into account. The team also found it became more complicated to deal with the logistics of testing since the facility switched general contractors and all of the processes changed.

The team books time at the SLF less frequently since late 2008 and primarily uses wind tunnel testing at this time. The wind tunnel allows more controlled testing resulting in more repeatable, accurate and believable data. In addition, a wind tunnel can be used to test side force, whereas this cannot be tested at an outside facility such as the SLF [3].

SUMMARY

Since 2006, at least six different motorsports teams have used the SLF to wind test its cars in an effort to maximize fuel usage at different speeds with different setups. Each race team comes fully equipped with a machine shop, and equips each car with 6 computers to process and analyze all the data collected. A typical test event starts with a Monday PM set up, testing Tuesday through Thursday and pack up on Friday. They typically bring the whole race team. NASCAR is the heaviest user but one notable IRL (Indy Racing League) team - Andretti Green - rents the SLF three times a year. Three weeks after one of their test sessions, Andretti Green won the Indy 500 with the car tested at the SLF. Nevertheless, demand for the facility has recently declined by nearly 50% due to budgetary cuts within the race teams.

At last check, NASA is doing a brisk business marketing and selling the alternate use of its space assets. Although the Space Shuttle program added three new flights through the end of 2011, there's still plenty of available time to book on the SLF and six new race teams have signed up to use part of that time.

In March 2010, NASA Kennedy Space Center (KSC) held a Commercial Space Transportation Industry Workshop to acquaint attendees with all the features and benefits of KSC's spaceport infrastructure and to discuss ways to use those resources to achieve safe, reliable and low cost access to space.

LESSONS LEARNED

Every race team has one and only one goal, to win. Power, aerodynamics, weight, center of gravity and driver skill combine to make a competitive advantage. Given just that small sample of the variables, the number of permutations is dizzying. Every race team also faces a set of business decisions including where and when to test its equipment given the relative value (price and quality) of each option. As the competitive landscape evolves in motorsports, the techniques used to study these variables and make sound business decisions will also evolve.

NASA is figuring out what it takes to be competitive by improving its decision making processes and business management skills. One notable example is NASA's new web site aimed at commercial customers for its unique set of assets at Kennedy Space Center, (http://kscpartnerships.ksc.nasa.gov/). The SLF is one of several physical assets advertised on the site. The web site also lays out the how-to's and frequently asked questions to help potential customers take the first step in doing business with NASA. This is advertising and product promotion, which represent a whole new world for NASA to explore.

Customer satisfaction surveys and capturing the voice of the KSC customer are fast becoming integral parts of the NASA business model. The concepts of revenue, profit and ROI are also creeping into the vernacular. As one NASA executive aptly stated, "it's a brave new world for us to boldly go where no NASA civil servant has gone before."

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