1042-2587

RHS, Inc.: Innovation "Guiding" Agriculture

Mark T. Schenkel
Jane Finley
Wade Chumney

RHS, Inc. presents the story of an agricultural equipment business initially founded in 1980 on Rick Heiniger's personal experience and desire to improve his financial situation during challenging economic times. Having successfully expanded by leveraging technology through innovation over two decades, and most recently through a partnership with another venture, he now faced issues of how best to integrate the two entities to foster continued future successful growth. Despite his continued enjoyment in the process of building new businesses, he also wondered how his role as a leader would need to evolve.

Introduction

Farmers have historically relied on manual and backbreaking methods for planting and fertilizing crops, yet doing so with precision has always been difficult. Rick Heiniger would be one of the first to tell you that this was no longer the case. Since 1980, Rick created and built a series of companies—RHS, Inc. and Bestway—that have sought successfully to innovate and harness technologies that increase the precision, accuracy, and effectiveness of agriculture equipment. His most recent success, the Outback S™, took the form of a high performance global positioning system (GPS) receiver. This product was jointly developed between RHS and CSI Wireless and launched in early 2000. Reflecting on the success of this new product launch, Heiniger[1] was once again reminded that success in the entrepreneurial process had typically been accompanied by new challenges. He now found himself contemplating how best to move forward strategically. Issues of joint intellectual property (IP) ownership, risk, and operational logistics raised questions of how RHS and CSI might integrate effectively. Despite his continued enjoyment in the process of building new businesses, Heiniger also wondered how his role as a leader would need to evolve as a part of this decision.

Please send correspondence to: Mark T. Schenkel, tel.: (615) 460-5474; e-mail: mark.schenkel@belmont.edu, to Jane Finley at jane.finley@belmont.edu, and to Wade Chumney at wade.chumney@mgt.gatech.edu.

1. All references to Heiniger's reflections, statements (i.e., paraphrased or direct quotes), thoughts, and decisions are based on the authors' intent to capture these as accurately as possible through a series of personal communications with him between October 1, 2007, and October 3, 2009. Accordingly, any inaccuracies are ultimately the responsibility of the lead author. The inclusion of this footnote is also intended to "streamline" the case text by taking the place of repeated references to the personal communication.

DOI: 10.1111/j.1540-6520.2010.00408.x

Agricultural Machinery in the United States

Studies of the farm machinery and equipment manufacturing industry suggest that a combination of technology and innovation fueled agricultural growth in the United States over the past two centuries. Until farmers began using horses around the 1850s, human power and primitive agricultural implements dominated the production process. However, expanded demand for agricultural products rapidly brought about efforts to improve agricultural technology throughout the 19th century. By the turn of the 20th century, the gas-powered tractor had been invented and had become the primary step toward the use of mechanized horsepower. The number of tractors ultimately exceeded the number of horses and mules a little more than a half century later (IBISWorld, 2009).

More modern demand for farming equipment has been driven largely by the economic health of the farming industry, the success of harvesting seasons, and crop prices. Following World War II, federal loan and grant programs contributed toward a new wave of increased efficiency for farmers by providing increased access to capital funding for agricultural equipment purchases during the 1960s. Although individual farm production capacity had expanded significantly by the late 1970s, the overall growth in demand for agricultural implements had begun to slow (IBISWorld, 2009). This growth decline was due in part to drought and weak economic conditions. The total amount of farming land had also contracted. Crop prices declined and began to exert significant pressure on farmers' profits. As a result, many farmers, and particularly smaller ones, shifted their focus toward increasing crop yields. The consolidation of farms and pressure to yield more produce with less land and labor became directly associated with the trend toward technology use and mechanization improvements (Standard & Poor's Corporation, 1998).

Technological developments produced during these decades ultimately contributed to a major structural decline in the farming industry during the late 1970s. This decline was followed by a period of industry consolidation during the 1980s. Rising fuel and fertilizer costs led to the continued importance of economies of scale in the productivity of planted acreage throughout the 1980s and into the 1990s. Such pressures were accompanied by higher commodity prices, low levels of certain crop stocks (e.g., grain), and increased worldwide demand for food. As a result, the demand for agricultural equipment began to rise. Collectively, these shifts solidified the increased demand for precision in farming techniques and equipment. Demand for large tractors constituted the dominant source of industry revenues by the 1990s, and the demand for large tractor attachments such as grading equipment and sprayers accounted for approximately 5–10% of industry revenues (IBISWorld, 2009).

Demand for non-farm equipment (e.g., tractors under 40 horsepower) also emerged in the early 1990s. This trend reflected what would ultimately become a growth segment in the broader industry. Sales of such equipment in the United States grew by approximately 60% between 1992 and 2004 (IBISWorld, 2009).

The use of "science" in farming also increased in the early to mid 1990s. Factors such as weather, governmental subsidies, fluctuating commodity prices, and continued strong global demand for food products were largely beyond the control of individual farmers, although collectively, these forces negatively impacted farm income. As a result, farmers became increasingly interested in how emerging scientific developments such as agribiotechnology and GPS technology could be leveraged as sources of control for enhancing their existing resources to improve crop yields. GPS emerged as a technology that offered

the promise of land-use optimization through more precise planting and fertilization applications as the 21st century approached.

From Farmer to Entrepreneur

Rick Heiniger graduated from Kansas State University with a degree in agricultural mechanization. After graduation, he went to work in a salaried position on a farm in Kansas. Weak economic conditions and a severe drought in the late 1970s led Heiniger to explore ways to supplement his farm salary. Beyond supplementing his income, Heiniger's aspirations were straightforward at the outset. He wanted to stay within his field of expertise (agricultural mechanization) and have more control over his own schedule.

After evaluating his options, Heiniger concluded selling agricultural equipment was the most logical fit. Heiniger decided to launch Rick Heiniger Sales as a sole proprietorship in 1980. The venture focused on distributing fertilizer and spray equipment supplies in northeast Kansas, with the original sales office located in a small farm house just outside Fairview.[2] Heiniger decided to change the name of the company from "Rick Heiniger Sales" to RHS in 1981, believing this change improved the venture's image as a real company as opposed to a lone person working from a trunk.

RHS: A Shifting Focus Toward Spray

In 1983, Heiniger decided to sell spray equipment for Rockey Manufacturing Company (RMC). A year later, he signed an agreement to distribute equipment exclusively within a four-state area. Under this agreement, Heiniger's company eventually reached a threshold that required a greater personal and financial commitment to foster continued company growth. The relationship with RMC provided Heiniger with a broader range of agricultural knowledge and expertise. It also provided additional marketplace name recognition for RHS and enhanced that company's marketplace credibility. Collectively, these additions raised Heiniger's confidence that further growth was possible. Yet, with only about $10K in the bank, Heiniger and his wife, Debbie, were cautious about a move forward without thorough due diligence.

Heiniger assessed possible open niches in the agricultural equipment industry. He and Debbie concluded the industry was mature, with most product categories fairly well served. For instance, power (i.e., engines) had been around for many years. Major manufacturers such as John Deere were filling this need, an observation that led Heiniger to decide that this market did not represent a good industry category for RHS. Similarly, mechanical harvesting equipment was well evolved regardless of crop type. The maturity of this category was fueled in part by government programming designed to promote efficiency there. Planting, cultivation, and tillage categories were also well developed though some opportunity did appear for innovation in tillage. Farmers were turning toward no-till or low-till methods to curb erosion, and the possibility of new opportunities in that category had already attracted the attention of competitors.

---

2. Photos of this and other company facilities, as well as various products referenced throughout the case, can be found at the following URL: http://rhs-inc.com/index.php/www/company/rhs_timeline

The one industry category still in its infancy was spray equipment. As a result, the Heinigers decided that spray equipment would ultimately be their core focus. It wouldn't be enough merely to manufacture equipment. Rather, RHS needed to focus on innovating in the area. Although it was a relatively small category of the overall farm machinery equipment industry, accurate, precise spray technology was in demand in order to foster improved crop yield. Crop yield, in turn, offered the potential to increase farmers' ability to positively influence profit consistency from season to season. The Heinigers concluded that technology was lacking in the spray category and that existing companies had targeted little innovation in that direction.

Heiniger focused first on marketing and distribution at the front end of the value chain and then worked backward toward a focus on engineering and production. He already had a head start on distribution channels through his prior work. The RMC relationship brought complementary product lines and offered the potential for expanding the RHS "footprint" into other farm applications. It also provided manufacturing capability for the RHS branded product line. In short, Heiniger believed his new direction added an aspect of control to RHS that would allow it to become more competitive in the future. He began engineering the first RHS branded product, the Eagle Pickup Sprayer, in 1985. He also hired his first two salesmen to expand distribution efforts. By 1987, Heiniger saw that the time had come for direct control of manufacturing. He decided to buy the assets of RMC to bring all operations under RHS.

Growing the Venture Through Innovation

Over the next several years, the Eagle Pickup Sprayer remained the core of the RHS product offering. A key challenge for RHS was it needed to create its own products characterized by unique capability. Heiniger began by experimenting with several products, particularly spray accessories and attachments for the Eagle Pickup Sprayer. One such product was the boom—the long tubular apparatus mounted on a sprayer that actually applies product across a particular soil span. Historically, booms had been manufactured from steel. RHS, by contrast, experimented with manufacturing booms from lighter weight fiberglass material. In 1989, the first fiberglass boom was introduced. It measured 45 ft long, 15 ft longer than standard booms of the day. While initial demand and sales were strong, a major material problem surfaced within weeks of the product launch. Heiniger recalled that roughly half of those booms failed within the first 3 weeks of operation. In his words, "It was just a horrible disaster. These were not only booms. They were entire sprayers and scattered all over twenty states. Given this was one of our first major product launches, I couldn't afford the negative reputation of putting out a bad product. I knew I was in trouble."

Heiniger knew he needed to act decisively. He contacted his alma mater, Kansas State University, and asked for the brightest engineer who had come through their program in the last 10 years. Heiniger was told the person he sought was working for Caterpillar, and that he would never get him. Yet Heiniger contacted and was able to convince the young engineer to join RHS and lead the redesign of the fiberglass boom. Within a few months the newly redesigned booms were marketed and the broken ones replaced at a cost of approximately $100K. From Heiniger's perspective, he simply needed the skill and the cost was secondary.

No Standing Still

Farmers appeared to recognize the underlying value innovation that RHS brought to the market. The redesigned booms were successful, and RHS was rewarded with rapid and spectacular sales growth. However, Heiniger had concerns about the timing and the emerging competition. As do many small companies, RHS made it to market quickly with its product and was able to take advantage of a competitive vacuum. However, by 1991 major industry competitors had taken notice of RHS's success and were willing to compete with significantly larger engineering budgets. Unlike RHS's use of truck-mounted spray equipment, these major competitors decided to utilize a tractor base on a self-propelled unit. Heiniger recalled informing his sales department to prepare for a devastating blow upon seeing the competitor's first unit. He believed that most of RHS's market share would be lost within the following 2 years. Despite their disbelief, Heiniger challenged his associates to identify what their next product would be.

Both Heiniger's engineers and salesmen reacted to his observation with a sense of competitive vigor. However, their view was that RHS was too well known and the product too effective to lose so much market share so quickly. They were convinced all that was needed was a redesign of the existing product. In contrast, Heiniger's major concern was the underlying technology platform. A minor redesign was only a short-term fix, he thought, and at best would buy the company another year or two. By 1993, Heiniger's intuition was confirmed. The Eagle Sprayer went from generating 95% of sales to producing nearly zero sales in 2 years. While the custom application sprayer products were still a growing segment of the market, new and existing major competitors were simultaneously capturing both new markets and the market share that RHS had formerly possessed.

Until that point, Heiniger believed the Eagle Sprayer would last forever, but he knew that it was critical to embrace the market changes. He decided to shift his focus but remain within the spray equipment market. As he recalls, "We almost didn't care *where* in the spray business equipment we innovated. We just wanted to innovate in the spray business." He focused on the development engineering capability at RHS and added engineers one by one. After he hired his first engineer at a cost greater than his own salary, he knew that additional engineering talent would be expensive. Heiniger recalled the catalytic impact of this focus. The subsequent everyday pressures of having to figure out what to do with each engineer led to new RHS products. The move also added capacity for private production design.

Innovation at RHS evolved quickly from composite materials to the automatic ultrasonic boom height sensor (Heiniger, Kolb, & Funk, 1993). The essence of this technology was the ability to sense the crop height beneath the boom and automatically raise and lower the equipment so the fertilizer was applied with maximum effectiveness without harming the crop. This product became so successful that it was eventually sold to Toro for use in golf course sprayers. The next innovation came in the form of a chemical injection system. Previous sprayer technology required the chemical and water be mixed in the tank for distribution to the fields. The new RHS chemical injection system allowed the tank to be filled only with water and chemicals added as a field was sprayed. This seemingly simple innovation stopped farmers from ending their runs with a full tank of chemical mix that could not be distributed. The change resulted in improved efficiency and reduced costs for farmers.

Heiniger was pleased with the innovative spirit the new hiring direction brought to RHS. The addition of private production design generated a focus on expanded and enhanced customer value. The product development approach was rooted in understanding customer needs and problems. In the process, private production design had also become a feeder for both sales and manufacturing that would contribute to RHS's continued growth into the future.

Guidance Technology Appears

Heiniger's next innovation was a crude guidance technology. He had observed that farmers were simply terrible with driving mobile sprayers. Many often relied on judgments that seemed little more than "best guesses" in applying products to fields. Overlapping and skipping were enormous problems that Heiniger felt a good guidance system could resolve. In 1989, RHS introduced the foam marker distribution system to address this problem. The concept of the foam marker distribution system was to generate and place a biodegradable foam deposit on the field. This innovation allowed the driver to easily see actual distribution results from the tractor's cabin. In accordance with Heiniger's forethought, the foam marker business surged and the timing could not have been better. As Heiniger recalled, "At the time that our truck sprayer took that nose dive, it was really the foam marker that was the thing we pulled out of our hats." RHS quickly became the market share leader for foam markers.

While encouraging innovation, Heiniger also kept close track of the marketplace. As he watched the fundamental industry trends, he realized that pull-type sprayers were returning to the farms. Heiniger acted on this trend in 1995 by acquiring Bestway, a company that made quality pull-type sprayers, though its products were a bit dated in appearance. Heiniger gained confidence through the acquisition, in part, because the resources and capability at Bestway enabled him to explore moving into other product lines. Specifically, the acquisition brought the benefits of existing name recognition, cash flow from existing product lines, added engineering capability, and an established dealer distribution network. Together, these resources and capabilities would provide RHS with a strong foundational growth component reflected in a more mature business and, correspondingly, less risk. Acquiring this mature technology lowered Heiniger's overall company risk and thereby enabled him to take more specific product risks.

The acquisition proved to be a good one. Heiniger worked quickly to redesign the products to provide a more updated appearance, improve the branding, and expand distribution. He subsequently decided to market all RHS brands officially under the Bestway name, and the company fluctuated between numbers one and two in market share of pull sprayers for years. But, as is the case with many technological innovations, the competitive advantage gained by Heiniger began to show signs of a limited time.

New Questions as GPS Technology Emerges

Having seen an application for guidance technology within the spray arena, Heiniger noticed the emerging technology of the GPS in the mid 1990s. GPS technology was originally developed by the U.S. Department of Defense (DOD) to target Soviet Union intercontinental ballistic missiles. It was based on a network of satellites positioned above the Earth's surface (~12,000 miles) that transmit radio signals to ground. These signals allowed users to identify their precise location through a process known as triangulation.

While GPS was initially developed strictly for military use, this changed in 1983 when a Korean Air civilian plane was shot down by the Soviet Union. Because access to better navigational technology may have prevented such a disaster, President Ronald Regan declared that GPS technology would be made freely available for public use as a "common good" (Pellerin, 2006).

Although GPS initially appeared to be a cumbersome and expensive technology for farming applications, the more Heiniger explored it the more he was convinced of its viability and potential to disrupt the foam marker business entirely. He related the technology to an old farming adage that overlap was simply the intention to avoid skip. Every tractor driver knew that drivers overlapped intentionally. Every tractor driver also knew that every inch of overlap is 100% waste with respect to resources including time, chemical costs, fuel, equipment wear and tear, and lost productivity. Thus, if drivers could wave a magic wand to make every pass in the field perfectly (i.e., with no skip or overlap), they would have achieved significant savings. Heiniger calculated the diesel fuel cost for individual farms in North America and found that it amounted to several billion dollars. Considering that cost on a worldwide basis, he saw the potential savings based on the use of the new technology as phenomenal (R. Heiniger, personal communication, October 1, 2007).

At a cost of approximately $2,000, the investment in a basic GPS unit was substantial for the farmer. However, even a basic unit helped reduce fuel, chemical, and fertilizer costs. Add-on GPS units brought the ability to accomplish other advanced farming tasks at greatly reduced costs. For example, seed controllers added precision to the amount of seed placed in various sections of a field, an improvement that resulted in significant up-front planting savings (Sisk, 2008).

Foam marker technology remained firmly entrenched in Heiniger's mind and the RHS product line. However, he had witnessed firsthand that history was replete with examples of companies that had lost sales and market share due to inability to shift core technologies with market forces (e.g., Bower & Christensen, 1995). Based largely on his imaginative application of the technology and an understanding of the consumer experience, Heiniger was convinced that "the numbers" for farmers favored the continued emergence of GPS-based applications over the foam marker product in the future.

A New Partner Leads to Growth

Over the next few years Heiniger started to think about how RHS would develop products based on GPS technology. One of the first challenges he confronted was the two types of GPS services. The first was precise positioning service. This service was used by the DOD. The second service was the standard positioning system (SPS), which was available for worldwide civilian use (see http://www.gps.gov for an extended discussion of how GPS technologies and applications work). However, when the SPS system was created, the DOD intentionally degraded the accuracy of the GPS signal to only 100 meters to maintain a strategic military advantage over other nations.

In 1999, Heiniger decided to begin development on what would become RHS's first GPS guidance system in cooperation with a company named Satloc. Satloc was a venture experienced in designing GPS receiver systems that RHS didn't possess. Heiniger developed an algorithm that increased the accuracy of the artificially degraded signal. This algorithm ultimately created a competitive advantage for RHS. During that process, however, Heiniger concluded that he needed to focus development on a high performance product that would truly separate his system from others expected to emerge. Heiniger

thus identified a new partner firm he believed would be integral in higher performance design capability. While he "searched the world over looking for a partner with design skills in high performance GPS receivers," Heiniger eventually found a small GPS division of a publicly held and Canadian-based company called CSI Wireless with just such a skill set. CSI Wireless was chiefly a cell phone company, but it also housed a small division made up of a group of GPS engineers. Some of the division's GPS engineers were also skilled in aviation. More importantly to Heiniger, the division had essentially been orphaned as CSI leadership hadn't yet determined how to utilize the group profitably. The division leaders wanted it to be productive and to establish a market presence in GPS receiver applications.

Although Heiniger hadn't worked with the company previously, he decided that teaming up with the CSI Wireless GPS engineering division offered the potential to generate substantial consumer value by way of facilitating cost savings throughout the farming industry (i.e., in the billions of dollars). He convinced the leadership of CSI to buy into his vision for collaboration. The agreement called for CSI Wireless to manufacture the core guidance unit and for RHS to supply the guidance algorithm piece. It also committed RHS to performing the sales, marketing, and distribution functions. The Outback S™ guidance system was launched in 2000 as the first product of the collaboration.

The decision to be an early adopter of GPS technology initially proved extremely successful from a strategic standpoint. It catapulted Heiniger's company and CSI Wireless to the forefront of the industry. RHS and CSI Wireless had successfully developed a technology to increase the accuracy significantly of the GPS signal available for farming applications. Signal performance was the highest in the market, experienced fewer blackouts, and had faster signal acquisition times with fewer signal drops. Heiniger decided that this mix of product features combined with ease of product use and his experience in the field brought a significant competitive advantage to the design process. At this point in his career, in contrast to earlier days, Heiniger also realized the importance of protecting his technological innovations. He had conceived his first product well but didn't consider how to defend it in the marketplace. In hindsight, he knew he had no reasonable way to defend it given the small size of the venture at the time. His situation with GPS was different. He believed a defensive strategy was vital to maintaining a strong competitive advantage and avoid being "gobbled up" moving forward.[3] He also believed the drive toward making the technology affordable for almost anything outdoors opened up opportunities for its application in other markets.

A Changing Competitive Landscape: New Market Opportunities Await?

GPS was clearly becoming the leading technology in the practice of precision farming. The 1990s ushered in a new trend toward technologies and applications that increased site specific crop yields. The need to continue to feed a rapidly growing global

3. The GPS products developed by Heiniger are protected by no fewer than five U.S. Patents, including: U.S. Patent No. 7,373,231 Articulated equipment position control system and method (McClure, Heiniger, Timm, Funk, & Wong, 2007); U.S. Patent No. 7,162,348 Articulated equipment position control system and method (McClure, Heiniger, Timm, Funk, & Wong, 2003); U.S. Patent No. 7,142,956 Automatic steering system and method (Heiniger, Funk, McClure, Collins, & Timm, 2004); U.S. Patent No. 4 6,711,501 Vehicle navigation system and method for swathing applications (McClure, Collins, & Heiniger, 2003); and U.S. Patent No. 5 6,539,303 GPS derived swathing guidance system (McClure, Collins, & Heiniger, 2000).

population was expected to do nothing but intensify this trend (Standard & Poor's Corporation, 1998). By 2000, interest had shifted away from yield and toward the guidance aspect GPS offered. For example, customers started to express interest in GPS applications that would facilitate auto steering techniques. Given the continued expansion in technology and agricultural business programs, factors such as distribution, service and support, and consultation by equipment manufacturers on the latest use of technology were only expected to grow (Dobberstein, 2009).

Competitive interest in GPS had also grown in the equipment manufacturing sector by 2000. Though there were thousands around the world, John Deere, AGCO, Case New Holland, and CLAAS constituted the four major farm equipment manufacturers in the industry. Each had enjoyed extensive distribution, excellent reputations, and competitive pricing. Each had also expressed interest in incorporating GPS into their equipment lines and had the ability to invest more in technology development, but doing so independently would be expensive and somewhat risky. An emphasis on GPS was also counter to market perceptions of each company's core competitive advantage. Deere's reputation, for instance, was largely based on "bending iron" (i.e., the quality of tractor construction and other farm implements) up to that point. Consequently, each major manufacturer had elected to buy GPS components from smaller companies focused on specialized equipment offerings (Hoover's, 2009).

Trimble, by contrast, was chiefly a land surveying company that also possessed a small agricultural group. Trimble's leaders saw the potential that aspect of the company had to complement their traditional land surveying business. Like the major players in the farm equipment manufacturing industry, Trimble leadership was seeking new growth directions. The primary GPS competitor had the capability to produce receivers with accuracies close to that of RHS. Other small competitive companies existed as well. However, none appeared to challenge RHS directly. Novariant, for example, was a niche company whose products targeted "close-in" work for high value crops, whereas RHS's focus was on general applications.

The use of GPS technology had also expanded beyond its original intent into other industries including rail, automotive, road and transportation, land surveying, aviation, marine, environmental studies, and meteorology. GPS technology helped pinpoint oil spill locations, track endangered animals' migratory patterns, and enhanced scientists' attempts to anticipate earthquakes. The recreation industry had also begun to apply GPS in aiding in the safety of outdoor adventurists, as well as improving the accuracy of golfers, boaters, and skiers (http://www.gps.gov).

As RHS's product performance was high in terms of signal accuracy, Heiniger perceived new opportunities inherent in these applications. However, he knew that his particularly intimate knowledge of the challenges farmers confronted and the application of this knowledge toward RHS products were crucial to his success.

Unexpected Challenges Lead to Growing Concerns and New Questions

In May 2000, the DOD ceased degrading the GPS signal. An accurate signal was now available for anyone interested in GPS applications for civilian use. Initially RHS sales for the Outback S^{TM} were negatively impacted by this policy shift, but the ongoing collaboration continued. Additional products were introduced and the market positions of both RHS and CSI Wireless remained strong. Heiniger's company was now significantly larger and stronger on a number of levels. Within the partnership, questions emerged as to how

combining the two companies in a more structured way could insure continued future success.

The first issue concerned the joint intellectual property (IP) developed. Specifically, both RHS and CSI leaders asked who truly "owned" the IP. Closely related to that question, who was at risk for losing control of the IP? These questions grew in importance because several subsequent products were developed which resulted in a buildup of IP. Another emerging issue was the impact of success. RHS had quickly become more than 50% of the revenue stream for CSI's GPS division. Some of CSI's leaders were concerned about the implications of having such a significant portion of revenues tied to a single source. A third issue was logistics. Given the initial success, coordinating the logistics of purchasing and other supply chain functions had become increasingly difficult as production scaled up.

Heiniger considered buying the GPS division from CSI Wireless. He was willing to make the purchase even though he questioned the added debt and complexity brought by the acquisition. He decided, however, that the purchase was feasible and formalized the agreement. However, the deal ultimately fell through because CSI's stock price shot up at the last minute. Heiniger considered simply moving forward with both companies as separate entities, but was nagged by new questions that arose as he considered the purchase of the GPS division. What if at some point members of the CSI board decided to move forward alone? Heiniger knew he was positioned to protect RHS given his existing IP rights and access to distribution channels, but he had misgivings nonetheless. One possible alternative was a joint venture. This option seemed mutually advantageous as it would give RHS and CSI equal ownership interests moving forward. He contemplated if there were other potential options that made more sense.

Heiniger was keenly aware that further growth would require focused attention and effort. He also realized that his own personal satisfaction lay in growing companies rather than, in his words, "any specific vertical per se," but knew his industry knowledge and experience had been critical to his success thus far. Heiniger wondered how his leadership role would evolve as a part of the decision to combine the two companies in a more structured way. Decision-making control was, in his view, imperative for continued successful growth, regardless of how the two companies would be combined. Even if he sold his company, he decided he would have to follow it for the combined entity to succeed. Whatever the outcome, Heiniger remained convinced the future possessed the prospects of both significant opportunities and challenges.

REFERENCES

Bower, J.L. & Christensen, C.M. (1995). Disruptive technologies: Catching the wave. *Harvard Business Review*, *73*(1), 43–53.

Dobberstein, J. (2009). *Solving the riddle of variable rate Application*. Retrieved 25 September, 2009, from: https://www.farm-equipment.com/pages/Feature-Articles—Solving-the-Riddle-of-Variable-Rate-Application.php

Heiniger, R.W., Funk, K.D., McClure, J.A., Collins, D.M., & Timm, J.T.E. (2004). U.S. Patent No. 7,142,956. Washington, DC: U.S. Patent and Trademark Office.

Heiniger, R.W., Kolb, T.C., & Funk, K.D. (1993). U.S. Patent No. 5,348,226. Washington, DC: U.S. Patent and Trademark Office.

Hoover's. (2009). *Farm equipment distributors*. Hoover's First Research Industry Report. Retrieved from CareerBeam industry database.

IBISWorld. (2009). *Tractors & agricultural equipment machinery manufacturing in the U.S.: 33311*. Available at http://www.ibisworld.com, accessed ••.

McClure, J.A., Collins, D.M., & Heiniger, R.W. (2000). U.S. Patent No. 5 6,539,303. Washington, DC: U.S. Patent and Trademark Office.

McClure, J.A., Collins, D.M., & Heiniger, R.W. (2003). U.S. Patent No. 4 6,711,501. Washington, DC: U.S. Patent and Trademark Office.

McClure, J.A., Heiniger, R.W., Timm, J.T.E., Funk, K.D., & Wong, R.B. (2003). U.S. Patent No. 7,162,348. Washington, DC: U.S. Patent and Trademark Office.

McClure, J.A., Heiniger, R.W., Timm, J.T.E., Funk, K.D., & Wong, R.B. (2007). U.S. Patent No. 7,373,231. Washington, DC: U.S. Patent and Trademark Office.

Pellerin, C. (2006). United States global positioning system technology: New GPS satellite ushers in a range of future improvements. Available at http://www.america.gov/st/washfile-english/2006/February/20060203125928lcnirellep0.5061609.html, accessed 10 August 2008.

Sisk, C. (2008). GPS pinpoints farmers' needs. *The Tennessean*, p. E1.

Standard & Poor's Corporation. (1998). *Standard & Poor's industry surveys: Agribusiness*. New York: Standard & Poor's Corporation.

Mark T. Schenkel is an assistant professor at Belmont University, Nashville, TN, USA.

Jane Finley is a professor at Belmont University, Nashville, TN, USA.

Wade Chumney is an assistant professor at Georgia Tech, Atlanta, GA, USA.

We want to acknowledge and thank Justin Entzminger, Chris Gray, and Joe Ormont for their outstanding efforts in helping prepare the RHS, Inc. case. We also want to acknowledge and thank Belmont University for its support. A prior abridged version of this case was presented at the *United States Association for Small Business and Entrepreneurship* 2009 annual meeting.

Instructor's Note
RHS, Inc.: Innovation "Guiding" Agriculture

This case illustrates the challenge of Rick Heiniger, a highly successful entrepreneur in the agricultural equipment business, as he decides how best to integrate his company's efforts with those of CSI Wireless as he seeks continued growth. Heiniger's company, RHS, Inc., had just completed a successful collaboration with the Canadian-based CSI Wireless, which brought together the former's innovative guidance algorithm, insight into customer needs, and marketing and distribution networks with the latter's high performance GPS receiver design capability. Despite the success of this collaboration, unexpected changes in government policy and issues surrounding jointly developed IP, supply chain logistics, and the emergence of new market opportunity beyond agriculture were creating concerns for Heiniger over the sustainability of collaborative efforts. Although he remained optimistic about the ongoing collaboration, it was not clear if he should continue with the somewhat informal alliance or if he should seek greater formalization in the relationship moving forward.

Key Issues and Discussion Points

At the heart of the case is the question of how entrepreneurs strategically leverage technological innovation, particularly in collaboration with others, to foster successful venture growth. The entrepreneur must consider his or her goals, the relationship among technology, opportunity, and risk; the distinctive competencies each collaborator brings; and the ability of different types of collaborative strategies to address changing market and industry conditions.

To make his decision, Heiniger needed to evaluate RHS, Inc., its future, and the potential contributions a greater formalization in the relationship with CSI Wireless could bring to the collaboration. Given the rapid emergence of GPS guidance technology, its widespread acceptance across markets, and CSI's publicly held structure, he also needed to understand how CSI leaders were likely to react to a diverse range of new potential opportunities. Because Heiniger lacked experience beyond agriculture, it was a challenge for him to understand fully the additional complexity this would bring to the collaboration and his potential to lead RHS through it.

In order to evaluate the situation, the following major teaching questions should be addressed:

1. What elements factored into Heiniger's initial opportunity assessment (i.e., the launch of Rick Heiniger Sales)?
2. What is the relationship between technology and opportunity?
3. As RHS, Inc. grew, what did Heiniger's decision making suggest about his assessment of the relationship among opportunity, risk, and technology?
4. Does the opportunity for future collaborative growth fit Heiniger's personal goals and background?
5. What are RHS's strengths and weaknesses as an ongoing business?
6. What are some of the potential advantages and disadvantages of acquisition strategies?
7. What are some potential advantages of strategic alliances or other forms of cooperative strategies such as joint ventures?
8. Evaluate Heiniger's options for fostering future collaborative growth. What recommendation would you make regarding the integration of RHS, Inc. and CSI Wireless in the future? What should his role be, if any, as a leader? Justify your answer.

Potential Audience and Uses

This case is intended for use in undergraduate and graduate courses in entrepreneurship, new venture creation, venture management, or technology and innovation management. It also could be used for community-based seminars designed to support practicing entrepreneurs. Heiniger's story is intended to illustrate and provide a basis for the analysis of several fundamental issues critical to the entrepreneurial process, including:

- Opportunity assessment;
- The strategic role of technology in venture growth;
- The role of IP as a means of reducing risk while creating opportunity and sustained competitive advantage; and
- The challenges to sustaining collaborative efforts across ventures in search of new opportunities for growth.

Suggested Teaching Approach

Because it is comprehensive and its content follows a staged development view of the new venture creation and growth process, the case offers flexibility in terms of when or how instructors may elect to use it in a course. For example, one teaching approach that lends itself well to using the RHS case is to familiarize students with foundational entrepreneurial concepts such as "opportunity" early on in a new venture creation. Similarly, the case could be used to introduce students to the opportunity assessment process by having them explore the relationships among such concepts as technology, uncertainty, and risk in a venture or technology management course. Instructors with such teaching objectives may wish to assign or focus a class discussion on questions 1–3 noted above.

A second teaching approach that lends itself well to using the case is to have students examine the more central question of how best to integrate RHS and CSI to foster continued growth moving forward. Because this question requires students to consider issues associated with distinctive versus collaborative competence, rapid market change, and the integration of organizational cultures, it is particularly well suited for use in the middle or latter portions of these courses when students have a clearer understanding of the fundamental aspects of the entrepreneurial process. Instructors following this approach would be advised to assign questions 1–7 to students to prepare in advance so that in-class discussion may move right to the evaluation of options posed in question 8 and student recommendations.

A third teaching approach instructors may wish to adopt at their discretion is to explore a number of potential side issues reflected in the case. These include entrepreneurship as a viable career path, a balance of passion, creativity and market analysis to achieve a healthy skepticism, and the acquisition of key talent and resources.

Outside or Supplementary Readings

GPS Applications: http://www.gps.gov/applications/

This website can be helpful in familiarizing readers with both GPS technology and the broader context of its use in the agricultural industry.

Kirzner, I.M. (1997). Entrepreneurial discovery and the competitive market process: An Austrian approach. *Journal of Economic Literature*, *35*, 60–85.

This article explains the determination of market prices in terms of entrepreneurial discovery processes. It focuses on the notion of opportunity *discovery*, which reflects a widely held view of entrepreneurs as "alert" individuals noticing opportunities for profit generated by earlier unsuspected errors. It reflects the Austrian view, which sees market equilibrating tendencies as a series of competitive discoveries increasing mutual awareness among market participants.

Sarasvathy, S.D. (2008). *Effectuation: Elements of entrepreneurial expertise*. Northampton, MA: Edward Elgar Publishing, Inc.

This book provides an overview of an emerging perspective on the origins of entrepreneurial expertise in a logic labeled *effectuation*. It outlines the fundamental elements of this perspective and contrasts them against those upon which the more traditional *causal* logic accounting for the recognition of entrepreneurial opportunity are based.

Rogers, E.M. (1971). *The diffusion of innovations* (3rd ed.). New York: MacMillian Publishing.

This book provides a classic, yet current, framework derived from management research that focuses on how innovations are diffused throughout organizations.

Shane, S. (2009). *Technology strategy for managers and entrepreneurs*. Upper Saddle River, NJ: Pearson Education, Inc.

This book covers the evolution of technology, the meeting of consumer needs, the capturing of values generated by investments, and the development and implementation of technology strategy. It emphasizes how managers and entrepreneurs can employ the strategic management of technology and innovation to improve future venture performance.

Bagley, C.E. & Dauchy, C.E. (1998). *The entrepreneur's guide to business law*. Eagan, MN: West Educational Publishing Company.

This book emphasizes the major legal issues confronted by entrepreneurs and small business owners. Its primary purpose is to provide guidance regarding the legal issues that entrepreneurs should be aware of when launching and growing ventures.

Role of the Authors

The lead author learned of RHS, Inc. through a conversation with a graduate student following a class meeting early in the semester of a required course in entrepreneurship for all business graduate students (MBA and MACC) at Belmont University. While discussing another case early in the course, the graduate student recalled observing her uncle's (i.e., Rick Heiniger's) efforts to launch and grow a company as she grew up. Although she didn't have a strong understanding of exactly what the company did beyond "something in agriculture," she perceived many parallels to topics that were scheduled to be covered throughout the semester. As a result, she suggested the instructor consider inviting Heiniger to share his experience with class members in a future class meeting.

The instructor (and lead author) subsequently contacted Rick Heiniger to discuss his entrepreneurial efforts. During this conversation, both he and Heiniger quickly agreed that Heiniger's experience with the launch and growth of RHS, Inc. would bring a host of meaningful examples of entrepreneurial concepts to students in the course. Accordingly, the lead author invited Heiniger to speak on the topic of managing growth later in the semester. Both he and the students found Heiniger's presentation intriguing as a practical example of the role(s) technology can play in the new venture creation and growth processes. The lead author approached Heiniger shortly thereafter with a brief and informal proposal outlining how his experience could be developed into a written teaching case. Heiniger was enthusiastic about the prospects of sharing his story and graciously agreed to participate in the process.

Both primary and secondary sources of data were utilized in the development of the case. The project was initiated through the development of an interview protocol by the authors. Chris Gray, a graduate student in the MBA program studying entrepreneurship, conducted the initial and follow-up interviews with Heiniger. This information was compiled and primary emphasis placed upon trying to capture Heiniger's thought and decision-making processes. Gray transcribed the initial interview information in order to capture and preserve its richness as the case development process progressed. The information collected directly from Heiniger was then supplemented by the collection of information from broader industry-related secondary sources of information. As this information was compiled, primary emphasis was placed simultaneously on validating the historical accuracy of the "facts" collected with respect to the development of the venture, as well as on establishing the timeline of key events presented throughout the case.