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Analyzing Risk and Uncertainty of New Product Marketing: The Case of eMerge Interactive and VerifEYE®¹

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Abstract

This teaching case focuses on the application of decision tools to assist managers making choices in an uncertain business climate. The case considers the difficult task of introducing a new product into the market. Under consideration is a sophisticated, surface-scanning technology that has applications in the food processing, food retail, and health industry sectors. Management of eMerge Interactive is faced with uncertainties in legislation, demand, and competitor response. The case can be used as part of a course in strategy and/or risk management where tools such as influence diagrams, scenario and payoff matrices, decision trees, and real options are introduced.

Keywords: risk management, influence diagrams, payoff matrices, decision trees, and real options

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¹ Though eMerge Interactive and the VerifEYE technology are genuine, the financial numbers used in this case are hypothetical. The numbers are used for teaching purposes only and are unlikely to reflect reality for eMerge Interactive. The authors would like to thank members of the AGECE 690D course for their helpful comments and suggestions. This case builds upon a detailed case analyzing the future direction for eMerge Interactive Inc. written by John Foltz at the University of Idaho.

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Introduction

William Mies, the Vice-President of National Accounts for eMerge Interactive, was listening in on the second quarter results report on August 9, 2005. Dave Warren, CEO and President of eMerge Interactive, indicated that, "The medium- to longer-term outlook for our VerifEYE technology remains positive." Mr. Mies knew that testing by independent parties, including the USDA, indicated that VerifEYE significantly reduced visible and non-visible contamination on meat carcasses. With this outlook he was optimistic that investors would be willing to overlook the lower than expected short-term revenues for the significant long-term potential offered by the VerifEYE technology.

The future potential of VerifEYE and how best to capture the value created by the technology has been weighing heavy on the minds of Mr. Warren and his management team. They know the market for this scanning technology is fraught with many uncertainties including government mandates, consumer demand for scanned products, and the innovative responses of competitors. Although management wants to capitalize on the incredible value they believe lies in VerifEYE, they also know they need to limit their downside risk with the introduction of the product to remain an attractive investment.

As the conference call for the results report wrapped-up, Mr. Mies began to think about the challenge Dave Warren had issued him the day before. Confident that the future was bright, Mr. Warren asked Mr. Mies to begin quantifying some of the risks that they faced in rolling-out their VerifEYE technology. Mr. Warren charged Mr. Mies with developing a presentation addressing these market uncertainties, and asked that he be ready to share his findings with the senior management team next week.

eMerge Interactive Background

Located in Sebastian, Florida, eMerge Interactive is a start-up company attempting to bring information and traceability technology to the animal protein market. Incorporated as eMerge Vision in 1994, the company conducted an initial public offering in February 2000 raising \$130 million (www.emergeinteractive.com). These proceeds were used to fund three primary product areas: cattle marketing, an online agricultural products store, and a feedyard information management system. Adoption of these products was slower than anticipated and plans never fully materialized. In May 2001, eMerge discontinued its online store and halted development of many technical operations.

In August of 2001, a new management team headed by President and CEO Dave Warren took responsibility for the operations and strategic direction of eMerge. Mr. Warren has extensive experience in the livestock industry. He became president of

Allflex USA, Inc. (www.allflexusa.com) in 1990 and helped that company establish itself in North America. His experience within the livestock industry exceeds 30 years of sales and management expertise, and he used this knowledge to build a skilled management team (Table 1).

This new team pared back the cattle and online operations, and shifted focus to two products: CattleLOG and a yet unnamed fecal detection tool. It was these two products that appeared to have the most potential in ensuring eMerge’s future success, and so commercialization of both product lines was pursued.

CattleLOG is the name for a suite of products and services designed to allow for greater communication of individual animal data between producers and processors. These products include data collection software that operates on a user’s PC and a separate online data reporting service. This product allows producers, feeders, and packers to analyze individual animal data collected at all stages of production. The program is suitable for large, high volume cattle feedyards and smaller operations making it attractive to most cattle ranchers.

Management named the fecal detection system VerifEYE® and began working with meat processing plants to install it through a signed developmental agreement. As well, a handheld version of VerifEYE® was launched and received considerable interest in the U.S. and abroad.

Today, eMerge is divided into two business units: CattleLOG® and VerifEYE®. Their mission is to deliver innovative technologies to new industries in a manner that creates new value for the industry and consumers. Management continues to grow revenues while controlling costs (Figure 1).

Table 1: eMerge Interactive Management Team

Executive	Leadership Role	Experience
David C. Warren	President and CEO	More than 30 years of sales and management experience in the livestock industry including time with Allflex USA and Fermenta Animal Health
Robert Drury	Executive V.P. and Chief Financial Officer	More than 10 years of finance expertise including time with the Ag Chemical Division of FMC Corporation and Pepsi Co.
Mark S. Fox	Executive V.P. Technologies	More than 20 years experience in software design, development, and management including time with Professional Software Consultants/Intentia Americas and Cerner Corporation
William Mies	Vice-President National Accounts	More than 30 years of experience in the livestock industry including a key role in creating, and then advising, the National Beef Quality Assurance Program

Source: eMerge Interactive, Inc. corporate website

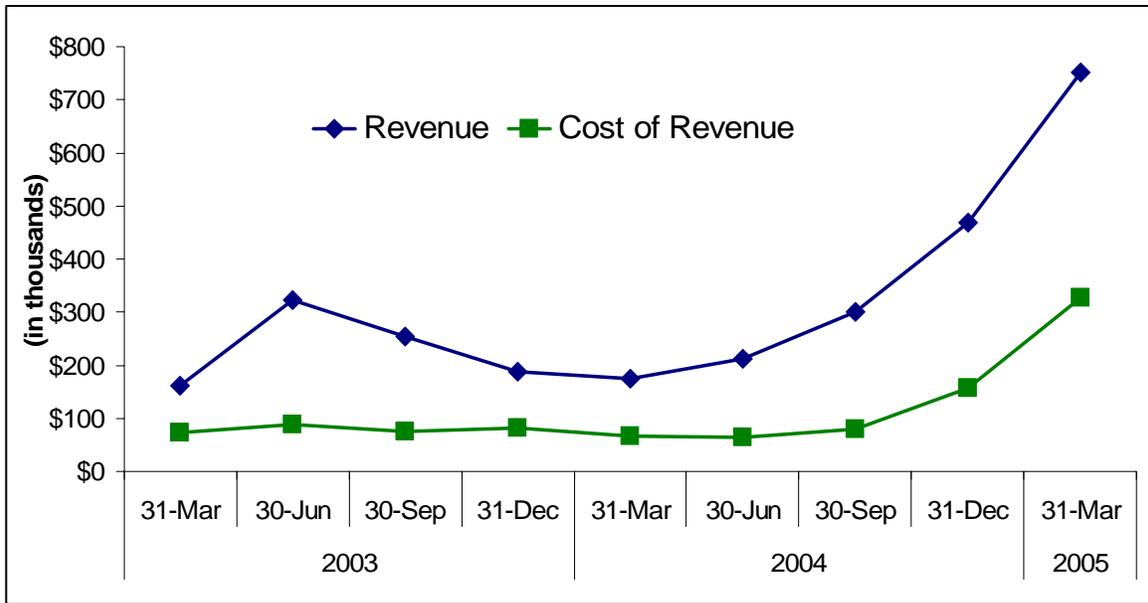


Figure 1: eMerge Quarterly Revenues and Cost of Goods Sold
 Source: SEC filings

The VerifEYE Technology

According to Mr. Warren in an interview with *The Wall Street Transcript*, “Today each packing plant has a series of interventions that attempt to remove contamination on the animal. Through the slaughter process, there are several areas where either fecal matter from the hide or from the ingesta of the animals can contaminate the beef. After the interventions, you have a USDA inspector who is part of USDA’s Food Safety Inspection Service or FSIS, to give USDA approval for the carcass. The problem is that the inspector can only see what the human eye can detect. VerifEYE uses a fluorescent response technology that provides the ability to detect microscopic or invisible amounts of contamination that could be harboring the deadly bacterial pathogens. Workers and inspectors now have a new technology to enhance their detection efforts.”

eMerge’s VerifEYE technology gives users the ability to detect the organic contaminants that carry bacteria (such as E.Coli) on animal carcasses and hand surfaces. The VerifEYE Food Safety Technology can detect the organic contaminants by fluorescence. This gives users the opportunity to be more efficient in their practice. For example, in the meat processing industry, workers can be more precise in their trimming job and waste from over-trimming can be reduced. Furthermore, chemical treatment of non-contaminated meat is unnecessary. Expenses and reputation problems caused by possible recalls can also be avoided. The technology can be incorporated in a hand-held scanning unit that users can use to scan carcasses.



Carcass Scanning Unit



Hand Held Unit (SOLO)



Hand Scanning Unit

Figure 2: VerifEYE Units

Source: www.verifeye.net

In the healthcare industry, a hand scanning unit can help reduce food-borne illness outbreaks and the spread of disease by reducing improper hand hygiene. The technology can also be used to scan workers' hands after washing them to detect whether organic contaminants are present.

eMerge Interactive Goals and Strategies for VerifEYE

According to their website, the VerifEYE Food Safety Group is dedicated to developing and marketing cutting-edge products that improve food safety in the meat/food processing, food retail and foodservice industries to achieve the highest levels of food safety for all American households. To accomplish this, they continue to dedicate resources, in particular their skilled research and development team, toward innovation of products that can reduce food borne illness and improve quality of life.

Support for the VerifEYE technology has come from industry, academia, and government alike. Executives at Excel Corp., Rosen Meat Group, and ABC Research Corp. have provided endorsements; positive reports have also come from the University of Florida and The Handwashing Leadership Forum. Most recently the Secretary of Agriculture awarded the Secretary's Honor Award to the inventors of VerifEYE for "Enhancing Protection and Safety of the Nation's Agriculture and Food Supply."

Potential VerifEYE Customer Sectors

According to the United States Department of Agriculture 32.7 million head of cattle are slaughtered and processed into 24.7 billion pounds of beef, which accounts for more than half of the 45.6 billion pounds of red meat (beef, veal, pork, and mutton) produced each year. There are 855 red meat slaughter plants in the U.S. under federal inspection. More than 80 percent of these plants slaughtered at least one head of cattle in 2004, with the remainder of these plants processing exclusively hogs and sheep. Just 13 plants (under 2 percent), however, processed more than 52 percent of the head of cattle slaughtered (Figure 3).

Generally speaking U.S. red meat processing is highly concentrated among the five largest processors. The largest player, Tyson Foods, alone accounts for more than 30 percent of the volume of beef processed (Figure 4). The next four (Excel, Swift, National Beef, and Smithfield) account for another 67 percent of the industry, and each of them are also involved in the poultry and pork processing sectors – enterprises that also stand to benefit from the carcass scanning technology. The management of eMerge Interactive has established relationships with several of these processors. eMerge is open to leasing and/or selling the VerifEYE units to processors. They offer extensive servicing of the units once they are installed.

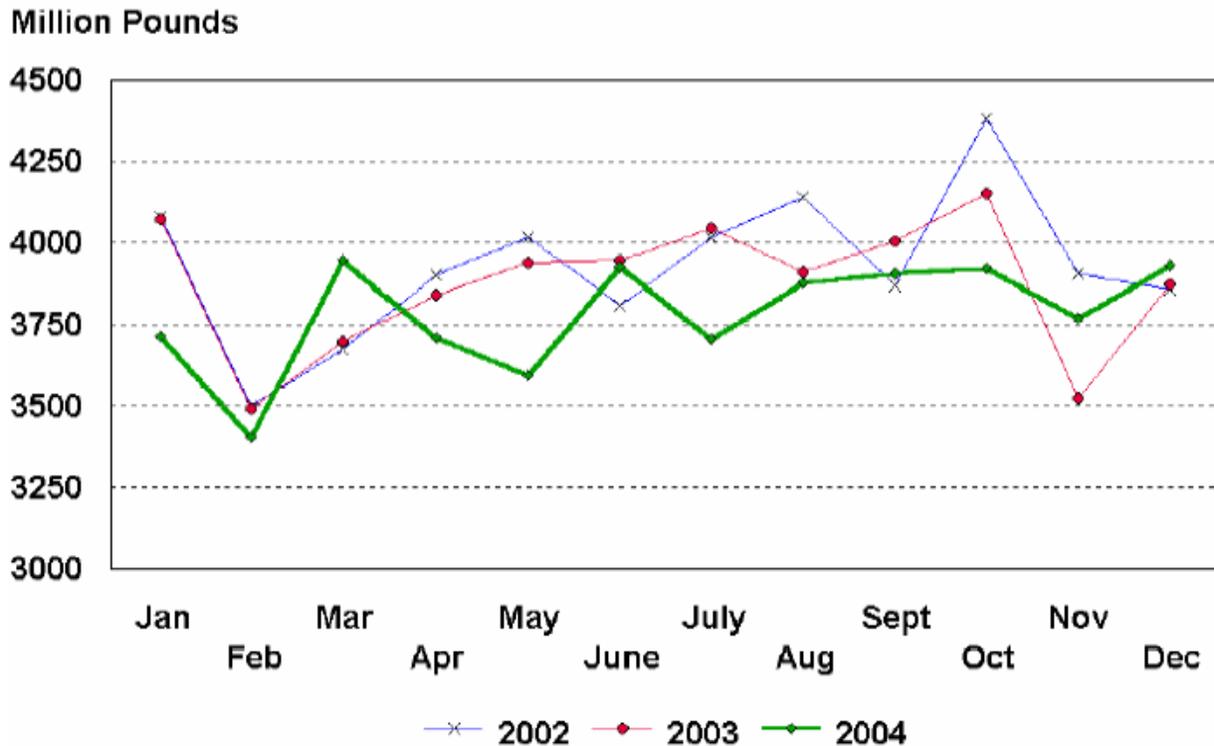


Figure 3: U.S. Monthly Commercial Red Meat Production

Source: USDA-NASS

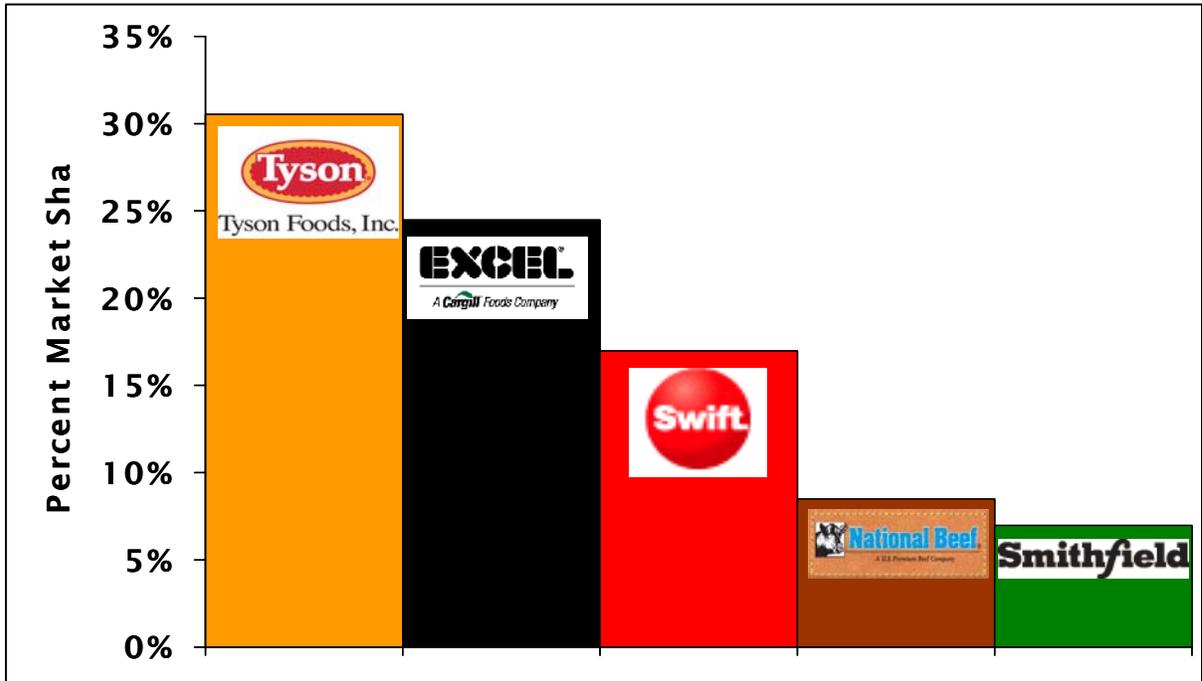


Figure 4: Market Share of the Largest Beef Processors

As noted earlier, other sectors that could potentially benefit from this type of scanning technology are hospitals, nursing homes, day care centers, and food retailers. All of these share the important characteristic that the cleanliness of employee’s hands plays a critical role in the quality of a good or service being delivered. The hand scanning unit can detect the same visible and invisible contaminants that could potentially transmit disease among patients, particularly children or the elderly. In fact, eMerge’s own research indicates that the VerifEYE Hand-Hygiene System will identify contaminants on contaminated hands which the U.S. Centers for Disease Control (CDC) deems responsible for up to 23% of the estimated 76 million cases of food borne illness each year.

According to the CDC there are nearly 5,800 hospitals and nearly 16,500 nursing homes in the United States. More than 13 million people provide health care services in the U.S. including 5.6 million in hospitals and 1.9 million in nursing homes. Furthermore, the CDC estimates that healthcare-associated infections account for 2 million infections and 90,000 deaths in U.S. hospitals alone. This results in \$4.5 billion in excess health care costs annually. On their website the CDC states that “adherence to recommended infection control strategies can protect patients by reducing infections substantially.”

Child day care centers would also find VerifEYE useful in the hand-scanning unit. Because kids are at an increased risk for acquiring some illnesses, this would help child care providers ensure adequate cleanliness by employees. According to the

U.S. Census Bureau there are more than 54,300 child day care providers employing more than 740,000 employees annually. Two other sectors that could benefit from VerifEYE are full and quick service restaurants. Nearly 7 million employees work in more than 366,000 establishments.

The Problem: Managing Market Uncertainty

For this case study you are a member of Mr. Mies's staff and he has come to you to lead this project. You are attempting to assess the market environment that will unfold for the VerifEYE technology. Your discussions thus far have focused your attention on three major sources of uncertainty – government legislation, consumer demand, and competitor response. Vice-President Mies has asked you to frame the analysis and help him prepare to present this information at the next executive meeting. Appendix A summarizes an internal interview Mr Mies has had with Dave Warren that provides additional background and Mr. Warren's perspective on the challenges and opportunities for eMerge Interactive and the VerifEYE technology. You recently had a chance to review some ideas on scenario analysis, payoff matrices, decision trees, and real options and thought they might be helpful in capturing thoughts and framing the analysis and discussion.

Appendix A - An Interview with CEO and President Dave Warren

William Mies (WM): Dave, how are we going to convey to eMerge investors the excitement about the VerifEYE technology that we've been developing?

Dave Warren (DW): I think that this is an incredibly unique product that has the ability to substantially reduce the likelihood of a food borne illness that can be caused when contaminants such as E-coli and salmonella make it through the food supply chain. Just as importantly, the scanning technology has many uses beyond just the food processing industry such as in the health and child care industries and in the food retail sector. Look, as more people start dining out more frequently they are going to increasingly demand food safety from restaurants. This technology can reduce the amount of contaminants that are passed along as the result of poor hygiene on the part of food service employees, child care workers, and hospital staffs. This unique product is patented and our competitor intelligence tells us that competitors are still a ways away from producing competing products. Our guess is that competitors are likely to wait until demand for these types of products begins to materialize before they make a move. This, I think, gives us an excellent opportunity in the marketplace.

WM: What does the roll-out for VerifEYE look like and what is our timeline?

DW: We have already begun working with meat processors that we know very well from our relationships built around our CattleLOG products. However, marketing

this technology is much more difficult for our company when we think about some of these new applications in the food service and health care industries. We are considering a few options and would like to identify within the next year if we can directly market this product or if we need to work with reputable companies that already serve these industries and license the product to them to distribute. I think we need to resolve this decision very soon. Part of what concerns me in this decision is that we aren't sure if there will be government legislation demanding significant improvements in contaminant identification and reduction.

WM: Do you see a mandate coming in the near future?

DW: That's a great question and something we have been considering to great lengths. We have even contemplated waiting until the government has decided on the mandate before choosing a marketing strategy. Right now it seems like the chances of a mandate or no mandate are roughly equal. Bill, it isn't enough to just hypothesize about potential outcomes, but we need to spend time thinking about the likelihood of different scenarios occurring and assigning probabilities to these events. This will enhance our ability to make decisions given what our expertise in the market is signaling. In this case our contacts in Washington have indicated that the mandate is currently in committee meetings with several members of Congress raising some concerns about the implementation costs of a mandate. The benefits appear to be substantial and we are providing that type of information to Congress to help speed the decision. But like I said, right now it seems like a 50/50 chance.

WM: How would this type of mandate impact the profitability of VerifEYE?

DW: First off, I don't think we are going to wait for a mandate. But, if the government chooses to mandate stricter regulations we will be ready. A mandate more or less dictates what demand will be but it also tends to create a lot of competitors trying to fill the same gap. With a government mandated demand, if we can roll out with a partner, my staff estimates the benefits will be in the area of \$60 million or so. But, if a competitor or competitors innovate similar technologies – then we might see profits in the area of \$27 million. And there's probably a 40% chance that competitors are ready with similar technologies. We are more concerned with innovations that would be superior to VerifEYE, which are roughly as likely as similar technologies being innovated. We estimate this would mean negative profits of about \$3 million for eMerge.

Alternatively, if we go with a direct marketing strategy and there is a government mandate, we will maintain more control over the supply chain, but will have to hire additional staff to carry out the marketing activities which will delay rollout and increase the probability of preemptive technologies by about 10%. Without competitors we expect profits to be \$75 million due to the additional influence we'll have in the channel, but similar technologies would cut profits by about \$40 million

from that number, and profits would again be negative \$3 million if we see a better technology introduced into the marketplace.

WM: How do you see the market for VerifEYE if the government does not enact a mandate?

DW: This is a great product and our market research indicates there is some chance that there will be high demand for the VerifEYE technology. We want to be the preeminent company in food safety and we are considering rolling-out the technology with a license agreement despite a 60% chance that adoption will be low in the first few years of its initial offering. With the limited investment of this approach to the market, we'll see some cost savings and lower downside risk. We would expect that if there is high demand, competitors will innovate and produce preemptive technologies about half the time, but we would still be profitable to the tune of roughly \$7 million. There is also a 40% chance that similar technologies will be rolled out at the same time and profits under this scenario are expected to be about \$25 million, but would be about \$63 million if we don't see any competitors in the marketplace.

WM: What if demand is low as you have indicated is a possibility?

DW: Under the license agreement we would pursue, we would see limited exposure. Our competitors would be less likely to innovate into preemptive technologies, and we would anticipate just 30% of the time there would be such innovations and even then we would likely have a loss of about \$3 million. I anticipate about 40% of the time competitors will be in the market with similar technologies. Then it will be dog-eat-dog competition for market share and we might not see any short term profits. But, if no competitors get in, which we would expect to occur about 30% of the time, we would see small profits to the tune of about \$12 million.

WM: If we choose a direct marketing strategy instead what does the future hold if the government doesn't enact a mandate?

DW: This option seems to offer the most upside potential if demand materializes. We would hire the best marketing team possible and would expect a good return on the investment – we would expect an increase in the probability of high demand around 60% of the time. There is no reason to believe that our competitors would innovate with different probabilities than if we used a license marketing strategy, but we would see profits be just \$5 million if preemptive technologies emerge, \$20 million if similar technologies emerge and a homerun of \$68 million if we are the only supplier in the market.

WM: How does this direct marketing strategy look in the face of low demand?

DW: That's a good question and we are working to limit our downside risk. Certainly we wouldn't expect our competitors to react in a different way as a result of our marketing strategy, but with direct marketing we would anticipate some of the costs of the marketing team to be unrecoverable. Thus, with a preemptive technology we might suffer losses of around \$7 million, while under similar technologies we would expect small negative profits. If there were no competitors we might still turn a modest profit of \$20 million or so.

WM: Thanks, Dave, I should have something ready next week for the board.

DW: Thank you, looking forward to the meeting.