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Cowboys and Computers: Communicating National Animal Identification in the Beef Industry

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1.1 Industries Collide

In May of 2005, I began working with a small software firm that develops software that would allow data ownership and transfer on a granular level. The idea was that rather than transferring entire documents or entire records, small pieces of information could be shared on the basis of permissions and commerce. To the firm, it seemed like a fine idea and a practical one. As I learned more, I discovered that the software was being specifically developed in response to a push by the United States Department of Agriculture (USDA) for a National Animal Identification System (NAIS) capable of tracking cattle moving through the supply chain. In theory, new technology and new methods of doing business would speed commerce and, more importantly, allow for swift containment of any disease outbreaks that might threaten consumers.

Upon being assigned to the project, my first thought was that this seemed like a significant advancement for the industry. As the technical communicator on staff, my first task was to establish relationships with potential customers and begin to gather information on what tools they would like to see included in a software product. Imagine my surprise, then, when one of my first cattle auction contacts told me that he did not understand the NAIS and did not need to.

Communication Practices in Engineering, Manufacturing, and Research for Food and Water Safety, First Edition.
Edited by David Wright.

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In his opinion, the NAIS was nothing more than an elaborate plot orchestrated by the Internal Revenue Service to spy on cattle producers throughout the country.

This individual was successful, widely respected, and by no means alone in his opinion of the NAIS as a waste of time and money. His ideas about the true motives for the NAIS were perplexing, to say the least.

Although the original NAIS plan was scrapped in 2010, that was not the end of the story. In April 2013, the USDA launched a new program designed to be much less restrictive and transparent to members of the beef industry; it would rely much less on the use of computer technology in particular. Whether the new plan will enjoy more widespread acceptance remains to be seen, but the USDA's retreat from the earlier initiative shows us that diffusing technology into an industry like the beef industry is not simply a matter of producing that technology but an exercise in communicating new technology to members of that industry.

The story of the original NAIS plan's ultimate failure within the beef industry is also a warning to other industries and agriculture in general, in that it illustrates potential difficulties when it comes to implementing widespread technologies. For technical communicators, this means that we should be asking ourselves very pointed questions now:

- What do we need to know about this situation (and similar future situations) in order to predict successful communications in the future?
- How can we best study industries and their technology?
- How can technology diffusion be successfully enhanced through research and targeted communications for specific audiences?
- When conflicts between industries do arise, what is the best way to ensure successful communication?

The story of the NAIS and the beef industry offers a preview of situations to come in which entire industries are resistant to new information technologies. Unfortunately, investigating the communicative failures that take place within supply chains is complex. Communications are not limited by form. They come in paper and digital forms, over cell phones, through policy statements from governmental agencies, and from industry alliances that wield great power over industry opinion. Finally, they come through the elusive art of personal communication. Stakeholders in some traditional industries are often not available in chat rooms or on our e-mail servers or through any of the other high-tech means of communication that have segregated us from each other.

This, however, does not mean that they do not communicate. These industries have established, complex communication networks that often play vital roles in technological diffusion. Technical communication must, therefore, develop methods that take into account the various forms of communication that are now available while maintaining an ethnographic perspective and methodology that investigates industries at ground level. We need holistic approaches to understanding intricate problems. This chapter is

one attempt to do so and to provide insight for the future. It also offers a set of tools for research that may give future technological deployments more success. Perhaps these insights will be useful to future practitioners and academics alike because of their direct link to the new technologies that show no signs of slowing down and continue to affect our lives at an increasing pace.

1.1.1 Resistance to Technology in the Beef Industry

The beef industry is steeped in tradition. It is an industry that does not change rapidly and does not readily adapt to change without good reason. Moreover, sometimes this industry has been unwilling to adapt to new technologies even when there would seem to be very good reason for it. Some sections of agriculture (and I will focus just on the beef industry in this chapter) have been slower to adopt new ideas and information technology. There are many factors that go into the lack of technological diffusion seen in the beef industry, not least of which is the fact that industry leaders see no need for new information technologies.

Yet, there have been substantial advances in other facets of the beef industry during recent years. For example, veterinary medicine has made remarkable advances in the treatment and prevention of many diseases and common animal sicknesses. Nasal sprays, injections, and other treatments enjoy widespread use to prevent animal deaths during transport and growth. Likewise, new techniques that include product branding, prepackaging, and efforts to make beef products healthier have radically changed supply chain management and distribution.

Yet, in one technological aspect, the beef industry has been at a standstill. I speak of computer and software technology in general and the slow pace at which the beef industry as a whole has adopted new methods of doing electronic business, even in the face of potentially disastrous consequences. While the beef industry seems perfectly willing to accept some types of innovations, computer technology and animal identification have been shunned, at least by many segments of the beef supply chain.

1.1.2 Having a Cow Over Mad Cow Disease

Still, the resistance to technology would be more understandable if the matters at hand were those of general office automation designed to make daily tasks easier. But beginning in December 2003, when the first case of “mad cow disease” or BSE (*bovine spongiform encephalitis*) was discovered in the United States, technology became a much more serious concern for the beef industry. In fact, the market for US beef changed so much that beef exports fell from more than US \$3 billion in 2003 to barely US \$500 million in 2004 [1]. The scare over the outbreak of mad cow disease led numerous countries to close their borders to US beef, and the fears hurt domestic sales as well.

The debate over using technology in the beef industry began in earnest at that time. Consumers were concerned about BSE because of the deadly effects of infected beef on humans. Adding fuel to the fire was a recent episode of BSE contamination, located in Alabama; USDA and state officials investigated five auctions and 36 different farms with DNA testing equipment in an unsuccessful effort to locate the source of contamination

[1]. Worldwide, more than 150 deaths had been linked to infected beef from numerous sources, and there may have been many other misdiagnosed cases in underdeveloped countries. Cattle producers were also concerned. Similar incidents including outbreaks of foot-and-mouth disease have led to the slaughter of hundreds of thousands of cattle, sheep, and pigs in numerous countries (most notably the United Kingdom in 2001) because of inability to trace the disease to its source or contain the outbreak [2].

After the 2003 BSE outbreak, Japan cut off shipments of US beef, as did many other countries including Canada and South Korea. The Japanese market was significant, as was the Canadian market. Japan alone bought US \$1.3 billion worth of US beef in 2002, but then promptly cut off imports after the outbreak. Likewise, South Korea, which imported US \$815 million worth of US beef, cut imports to zero. Although in 2006 both countries resumed imports after thorough inspections of US processing plants, they were still very wary of US ability to control and trace disease, and consumer/government confidence in those countries has yet to return to normal as of 2014. Thailand, China, South Korea, and Singapore, all significant importers as well, still had bans on US beef as of 2006 [3]. While South Korea and Japan have relaxed their stance on US beef since then, China (a major market) still bans US beef. The other countries still place restrictions on those imports [4].

In the wake of the scandal, the USDA and beef industry professionals began to seek answers to both national and international concerns. But industry resistance to a mandatory plan, coupled with a disagreement among industry associations, alliances, and businesses, crippled the proposed program and brought it to a standstill.

In addition to natural disease concerns, the fear of agriterrorism, which might produce an introduced disease, became a real concern at about the same time. After the terrorist attacks of September 11, concerns led many citizens and government employees alike to question the ability of terrorists to sabotage the US food system through biological means. Animal illnesses can spread rapidly and be difficult to trace [5].

In response, the USDA launched an initiative to implement a national animal tracking system that would allow animals to be tracked and traced to their point of origin in case of a disease outbreak. On paper, the idea was fairly simple. Animals would be tagged with an electronic radio frequency tag that contains a unique 15-digit identifier. This tag would then be scanned into computer software that would store the number, along with other vital statistics (perhaps), in a database. Then, as the animal moved through the supply chain, database administrators could track the animal on the basis of that number by continually updating the animal's location on the basis of new scanning information (presumably the animal would be scanned at each new location). This strategy should have, in turn, allowed for swift containment of any disease or potential harm to consumers and boosted both domestic and international confidence in US beef, because any animal's location could be easily tracked and any animal's place of origin could be known almost immediately.

Typically, after being raised on the farm for a given period of time, an animal moves from its place of birth to a livestock market, where it is sold to either an order buyer or directly to a packing company. (Note: many animals also move directly from the farm to a stocker or a packing company but most do not.) Figure 1.1 shows a typical beef supply chain. If the animal is purchased by an order buyer, it typically moves to either a

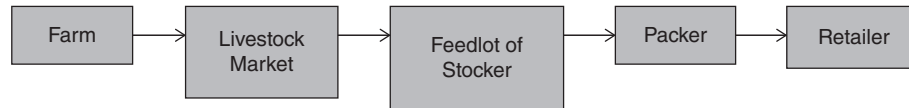


FIGURE 1.1. A simple beef supply chain from calf birth to harvest.

stocker operation, where it will feed on grass, or to a feed lot, where it will be fed grain. In either case, the animal eventually moves on to a packer for processing and then to a retailer like Walmart or McDonald's.

It would seem from this simple explanation of animal movement that tracking cattle from birth to our dinner tables should be quite manageable. Unfortunately, an animal's actual movement is often much more complex. Because of market influences that affect the way cattle are bought and sold, many animals move from one level of this supply chain to another and then back and forth again several times before finally arriving at our local retailer. It is not uncommon for a group of calves to be brought to a livestock market for sale together, having just left their place of birth. But at that point they may be sold separately to different buyers, sent to multiple locations, and then resold from those locations or at different auctions. In fact, many animals are bought, sold, and moved multiple times during their lives. They may spend that time in multiple states and with multiple owners. The overall effect of these transactions is a movement pattern that is very difficult, time consuming, and expensive to trace.

Still, societal health and safety concerns prompted the USDA and some beef industry companies to begin to look for a response to national and international pressure. As this technological niche within the beef industry began to open, companies specializing in software that would allow animal tracking and data collection began to spring up. In addition to health-related data, software companies sought ways to integrate individual animal data with supply chain data while assigning unique identification numbers to those animals. Their goal was to introduce new software and technology to the beef industry. If they were successful, then animals and financial data could be moved and tracked together, offering safety and possibly financial rewards.

But the sheer size of the problems associated with national animal identification meant that computerization would be essential for the beef industry to move forward in the areas of animal identification and electronic commerce. There are approximately 90–110 million beef cattle in the United States at any given time [6]. Of these, packing companies harvest between 35 and 40 million annually.

To deal with the high numbers of animal turnover in combination with animal identification, the USDA began the development of the NAIS in 2003. The proposed system would integrate three components: premises identification, animal identification, and animal tracking.

Premises identification was to be done only once per site, with a premise identification number assigned to each homestead or ranch where animals were raised. This part of the plan was a relatively uncomplicated process. However, animal identification and animal tracking would have required significant upgrades in computer technology within the beef industry. The USDA proposed a system requiring a 15-digit unique identifier for each animal in the country. This number would be assigned to the animal on the

premises where it was born, then recorded and tracked within a centralized database (or, as we will see later, perhaps numerous databases) as the animal moved through the supply chain. The animal could then be traced to its origin in the event of a disease outbreak.

Tracking and tracing the national herd, then, would have required approximately 100 million unique 15-digit numbers at any given time, each assigned to an animal in the national herd. Then, 35–40 million new animals would need to be assigned these numbers on an annual basis at birth. In addition, another 35–40 million unique identification numbers would need to be tracked at any given time as they moved through the supply chain from producer to livestock auction to feeder to stocker and ultimately to the packer, where they are harvested and processed. Clearly, this task could not be accomplished without the aid of computer technology.

There was certainly no lack of opportunity for the beef industry to adopt this new technology. In 2006, *Drovers* magazine listed over 50 companies in their directory of service providers for animal identification products [7]. Most of these companies offered software and/or database services to support the NAIS program. As Bob Scheiler of the *Wall Street Journal* reported, “The effort has sparked something of a stampede among makers of radio identification tags, retinal scanners, and other electronic gizmos with the potential to keep tabs on millions of animals from birth to slaughterhouse” [8, p. B.3].

In addition, many of the top US retailers like McDonald’s®, Walmart®, and Tyson® have actively encouraged the beef industry to adopt technology and a system that allows for animal traceability. Robert Cannell, McDonald’s United States Supply Chain Director, publicly stated his desire for animal identification on numerous occasions. In an issue of *Farm Week*, he said that while McDonald’s was sensitive to the fact that some beef producers needed both time and money to implement the NAIS, McDonald’s would not wait for the USDA to act. According to Cannell, McDonald’s would actively seek contracts with beef suppliers who could track all animals [9]. Because McDonald’s traditionally buys over 1 billion pounds of domestic beef annually, its desire for traceable beef would seem a strong incentive for members of the beef supply chain to act in developing the technology needed to satisfy this request. Yet, even now in 2014, while McDonald’s is able to trace 100% of its beef in countries like England and Ireland, the company is unable to do so in the United States.

1.1.3 Change Is Slow in the Beef Industry

Information technology within the beef industry has always been a hit-or-miss affair. Some beef professionals tend to be early adopters of new technology, while others refuse to adapt to new technologies even in the face of obvious benefits. The beef industry has been slower than most to adopt new technology for various reasons including expense, low return on investment, and a general lack of awareness concerning new technologies and their benefits. Even in 2006, it was not uncommon at livestock auctions to find dot-matrix printers, DOS-based computer programs, and hardware that would be considered ancient by most standards. While some offices were modern, most were not. The fact that some of the hardware I have seen in livestock markets still functions at all is a testament

to manufacturers. It is worth noting that this does not make their owners “backward” or behind the times. It simply means that current computer technology is not necessary for profitability and the usefulness of newer technologies is suspect. Since that time, many of those auctions have upgraded their hardware, but not necessarily their software as it relates to their business operations.

Secretary of Agriculture Ann M. Veneman asked the USDA’s Chief Information Officer to make creating a national animal ID system his top priority in 2003 [10]. Afterward, the date for the system’s debut changed repeatedly and eventually no longer included mandatory participation. Those who favored a national plan differed sharply on how that plan should be designed and administered, and many within the industry believed that the system will never mature at all.

Yet after Veneman’s 2003 mandate, the USDA pushed forward with its technical requirements. In March 2006, the USDA released performance standards for animal identification tags that included life span, reading distance, and failure rate specifications [11]. At roughly the same time, the USDA announced plans to allow numerous private databases to comprise a national system of identification and traceability. And in August 2006, the USDA approved a Minnesota company as the first manufacturer of “approved” NAIS RFID (radio frequency identification) tags.

However, private industry groups including many producers and politicians, like Representative Ron Paul of Texas, organized to block the system entirely except in the case of international sales. They saw the NAIS as unnecessary government interference and an infringement upon personal liberties. Articles continually appeared by authors like Jodie Gilmore, who stated that “The USDA has targeted farms and livestock facilities and their livestock for intrusive, unnecessary, and eventually mandatory identification and tracking regulations” [12, p. 1].

1.1.4 Communication Breakdowns and Coffee Shop Policymaking

In fact, as I will show, miscommunication and poor communication directly contributed to the confrontational atmosphere that developed surrounding the debate over the NAIS. While we can undoubtedly place part of the blame for the lack of technological development within the beef industry upon cultural resistance to technology and economic issues, it is also partly because of (i) miscommunication and poor communication by national entities, and (ii) misunderstanding promoted by communication networks about the tracking initiatives themselves.

To understand some of this story, it needs to be said that the beef industry is a very personal business, and communication circles are tight. There are defined networks of individuals who share information and opinions to reach a consensus. This process is not unlike what Rogers and Kincaid describe when they write, “It seems that almost everyone depends heavily on interpersonal communication channels to obtain the information that he/she needs to make important decisions” [13, p. 344]. In other words, we turn to those we know personally and trust for information about difficult decisions.

While the basic message coming from portions of the supply chain (some large packing companies and retailers) and the USDA seemed clear (that animal tracking must be implemented), the specifics of that message needed to persuade others did not

reach the beginning of the supply chain (small producers and livestock auction owners). If those important messages had been delivered well to small producers and auction owners, there could have been much wider understanding of the logistics of the system and of the computer and technology required by the proposed NAIS. Those opposed to the NAIS might not have accepted it still, but they would have known much more about what, exactly, they were rejecting.

Much of the resistance to the proposed NAIS plan can be traced to communications concerning animal identification and technology. Although the USDA actively promoted national animal identification, communications about the business model and technologies that would necessarily accompany such a system were slow to change resistance, especially among livestock auction owners and producers. Part of the USDA's problem in communicating directly with constituents at "ground level" was the influence of industry alliances—those organizations that are voluntarily joined by beef industry professionals.

Those alliances are much better at keeping in touch with their membership than the USDA and are generally viewed by independent operators as much more in touch with the needs of common beef industry professionals than the government or hi-tech firms.

The sole mission of these alliances is to protect and create profit for their members. Membership in the alliances is tightly monitored, and information flows through their members to other members in the form of mailings, meetings, and informal, personal communication.

My experience working in the industry showed me that informal personal communication is still the predominant form of truly persuasive communication in the beef industry. Like it or not, more opinions are formed in the coffee shops of livestock auction markets and local cafés than are formed anywhere else. Part of this is because of the close-knit communities that make up the beef industry.

But another, perhaps more influential reason is that opinions in the beef industry rely upon established communication networks that are often far removed from mass communication. I have yet to hear a cattle owner in a coffee shop say, "Do you know what I read on the internet this morning?" But the influence of interest groups and alliances goes far beyond common knowledge. Members of alliances, including producers, market owners, buyers, and packers, believe that the alliances are their best (and perhaps the only) way to control their collective destinies through congressional lobbying and solidarity as an industry.

However, the various industry alliances have had difficulty agreeing among themselves on plans for new technology and animal identification, and for that matter, on many different aspects of the beef industry. For example, the National Cattleman's Beef Association (NCBA), which represents members of the beef supply chain including producers, feeders, and processors, and the Livestock Marketing Association (LMA), which is the organization that represents livestock market (cattle auction) owners, have historically agreed on very little concerning the NAIS. Both developed their own plans

for national animal identification in response to the USDA's original push. Those plans differed significantly from each other, and also from plans mapped out by the USDA. For example, the LMA requested that the federal government fund tagging services at auctions and manage the corresponding information database, while the NCBA favored entirely private tagging and database services. Then there were other producer organizations, such as the Ranchers-Cattlemen Action Legal Fund (R-Calf), which is centered in northern states, and also had its own agenda. Taken together, these differing points of view offered little consensus within the industry. When feedlots (where animals are typically "fattened up"), packers (who process the meat), and the various large-scale national retailers (Walmart, McDonald's, etc.) were added to the equation (each of whom had their own agendas), wide scale confusion and disagreement ensued.

Although there have been many articles, and even more opinion pieces, written in recent years about the debate between those for and against the NAIS system, there have been almost no attempts to analyze the lack of understanding that existed between those who supported a national animal identification system and those who opposed one.

1.1.5 Can We All Just Get Along?

Meanwhile, the USDA, seemingly paralyzed by this lack of consensus, struggled to come up with a plan that would suit all parties. A general uproar ensued, as all parties involved vied for control of both the proposed system and the data stored within that system. In fact, the potential benefits of animal identification were so misunderstood and so poorly communicated to members of the supply chain that they went largely unnoticed. For example, Representative Ron Paul [14] of Texas issued a statement through the US Federal News Service in which he called the National Animal Identification System nothing more than a tax on livestock owners that would allow the government access to detailed information about their private property.

The *Countryside and Small Stock Journal* (and other small journals as well) routinely printed critical articles concerning the NAIS. For example, Zaroni [15, p. 1] says that the NAIS will "[...] drive small producers out of the market, will prevent people from raising animals for their own food, will invade Americans' personal privacy, and will violate the religious freedom of Americans whose beliefs make it impossible for them to comply." Her assertions are debatable, but my investigations show that many producers agreed with her. They often cite (now, still, just as in 2006) government interference as one of the primary reasons for their resistance.

Taking things a step further, Senator Jim Talent of Missouri, who is also a member of the Senate Agriculture Committee, coauthored a bill in 2006 that would have prohibited the USDA from implementing a mandatory National Animal Identification System. Talent [16, p. 1] said, "The development and implementation of an animal identification system must be voluntary and done with the cooperation of producers rather than by coercing them to participate. I have made this point repeatedly to the USDA." Surprisingly, opponents of the NAIS said that the bill did not go far enough to crush animal identification and did not support the bill.

While the debate raged, the beef industry continued to search for a system that would alleviate the fears of both US and international consumers. At the same time, the USDA

seemed to be losing its ability to make any decisions about national animal ID, which only added to the confusion. That lack of authority was especially true among “ground-level” members of the beef industry. The problem was exacerbated by the exclusion of a major component of the beef supply chain. Livestock markets, which form a large part of the beef supply chain, were excluded, for the most part, from programs like the Process Verified Program and the Quality System Assessment Program, which were early attempts by the USDA to reduce fear of US beef in other countries. Those programs were not designed to include livestock markets, and the original USDA plans for the NAIS did not effectively incorporate livestock markets. Because some 40 million cattle are sold through these markets annually, and because they are typically focal points of communication for buyers, sellers, and brokers, this lack of information created a good deal of confusion surrounding the USDA’s plans.

Still, there was no clear plan, and as Joe Roybal of *Beef Magazine* reported, one of the major concerns for the near future of the beef industry was the “USDA’s seeming decline in credibility among various audiences and what it portends for the advancement of important industry issues and infrastructure such as the development of the National Animal Identification System” [17, p. 1]. Roybal’s statement rang true because of the credibility that the USDA lends to any identification system, and because without USDA involvement, many overseas markets will always be unwilling to accept an industry-led plan.

Nevertheless, some matters were agreed upon by most industry organizations, including the LMA, NCBA, and the USDA. They agreed that any NAIS must

- Provide biosecurity for the national herd
- Identify vaccinated and/or tested livestock
- Identify animals in national and international commerce
- Protect animal data
- Provide added value
- Allow for efficient tracking of animals and disease outbreaks

1.1.6 USDA Strategies for Communication

When the real push came to educate producers, consumers, and members of the beef supply chain, the USDA’s primary challenge was to communicate its plans and criteria for a national animal identification system to members of the beef community. Because the beef supply chain is so fragmented, this was not an easy task. Small producers often have limited contact with other producers, sporadic contact with livestock markets, and almost no contact whatsoever with large feedlots, stockers, or packers. This fragmentation was a problem for the USDA and other NAIS proponents because of the number of small producers that still comprise a major segment of the beef supply chain. Roughly one-third of the cattle sold annually in livestock markets come from small producers. Over 80% of those small producer operations have fewer than 50 cattle and approximately one-third of the national herd is in these small groups [7]. One-third of the national herd

equates to approximately 29 million animals raised on approximately 915,000 farms and ranches. So, in effect, the USDA needed to communicate with nearly one million farmers and ranchers who have little or no contact with the majority of the beef supply chain.

Communicating with that number of small producers was a difficult task, to say the least. Small producers in rural areas might only communicate with other ranchers on an occasional basis and would most likely only sell animals at a livestock market a few times per year. Although the USDA did produce literature and brochures designed to explain the proposed NAIS and did attempt to distribute that information, many small producers and even livestock market owners did not have direct access to that information, and those that did tended to ignore it for various reasons (discussed later in this chapter). The USDA also sent representatives to regional meetings hosted by state organizations to promote NAIS, but those meetings were only attended by a small fraction of the 915,000 million small producers currently raising cattle in the United States.

Of course, industry alliances were (and are) able to disseminate information and opinions through word-of-mouth and through newsletter mailings to their membership very quickly. The LMA, NCBA, and R-Calf, just to name a few, are able to communicate with producers, buyers, and market owners through direct methods such as mailings and conferences not necessarily available to the USDA. This lack of direct communication was part of the reason that so many small producers and livestock market owners began to form their opinions concerning national animal policy in what might best be described as “coffee shop diplomacy sessions” on the basis of partial or biased information. Buyers, market owners, and sellers tend to communicate at local livestock auctions and at whatever meetings are available. But the informal nature of that communication led to the larger supply chain entities’ representatives (who tend to travel more) passing on company or organizational interpretations of the NAIS to the smaller, more geographically limited producers and market owners.

As a result of these combined factors, confusion reigned supreme within the beef supply chain about what the proponents of NAIS were saying. That confusion prompted members of the beef supply chain to voice their concerns to their congressional representatives and to other members of the supply chain. In May 2006, a congressional subcommittee voted to withhold almost all funding for the NAIS until the USDA was able to better define the system’s objectives. Then, the Congress approved only one-third of the USDA’s requested funding for the fiscal year 2008 [18]. So what was it about the communications of NAIS supporters that did not resonate with livestock market owners, buyers, sellers, and producers? My research was designed to answer that question.

1.2 A New Approach to Studying Complex Communication Issues

I should point out that, as an employee of a technology firm, I had some interest in seeing the NAIS succeed. However, my primary objective during the time period covered by this research was to collect information about what members of the beef community thought of the proposed NAIS and how technology could best be adapted to their needs. The majority of information for this study was collected between 2005 and 2009.

In general, selecting research tools for an industry like the beef industry can be a daunting task. There are few research sources to consult from a communications perspective, and actual communication within the industry tends to be multifaceted. While some communications are paper-based, and others are posted on the Web, the majority communication within the industry is still of a much more personal nature, done either face-to-face or over the telephone.

In addition, the particular communications that I was interested in involved foreign subject matter, including new technologies and new methods of conducting business. Both were new to the industry and had not been studied previously. Therefore, I needed an approach to investigating this multifaceted communication that would analyze the effectiveness of various communications, while at the same time tracking how communications moved through the industry, affecting acceptance or rejection of technology as they evolved.

To address the issues at hand, I chose a model that would incorporate communication theory, linguistic principles, ethnographic principles, and theories of technological diffusion and communication networks. My intention was to include theories that would aid in the examination of the different methods of communication within the industry, while giving proper attention to the communication networks within the industry and maintaining a view of technological diffusion for its own sake. Certainly, technology diffusion has some life of its own, apart from communication, but in an environment like the beef industry, where technology (especially computer technology) does not yet have the stake that it has in other industries (even in 2014), diffusion and communication are almost inseparable due to the social nature of new technology diffusion.

In light of the beef industry's complex situation and the various methods of communication in play, four separate approaches seemed appropriate. Rogers and Kincaid's definition of communication networks [13] and Rogers' model of technological diffusion [19] were a good fit for the beef industry. Both are examinations of the way technological information is transferred and shaped. The two individual works go hand in hand in many ways, because they can be used to analyze the flow of information concerning the NAIS and technology within the beef industry and to analyze acceptance or rejection of that technology on the basis of principles of diffusion.

In addition, I needed an ethnographic methodology to understand the environmental and personal communicative factors that directly affect communications within the industry. Methods described by Fetterman [20] and Van Maanen [21] helped to establish an ethnographic perspective of my interaction with members of the beef community. Ethnographic methods were critical to the success of this analysis because of their ability to reveal some of the historical, demographic, and socioeconomic factors that affected the debate over technology and NAIS within the beef community.

Next, I needed to employ communication theory and linguistic principles to analyze documents from major proponents of the NAIS and technology, such as the USDA and technology development firms, and documents from those opposed to the NAIS and new methods of doing business. I needed to conduct a discourse analysis of message content and a general analysis of more informal communication. For these purposes, I chose to use Petty and Cacioppo's Elaboration Likelihood Model [22], and the linguistic concepts

of implicature and pragmatics as defined by Grice [23], Blakemore [24], Schiffrin [25], Zwaan and Singer [26], and others.

Each of these theoretical constructs is distinct in its form and function, but together they offer a more complete picture of industry-wide communications than any of them could alone. Together, they form a tool that allows for analyzing communications that take place within a complex environment. I use the theories in the following ways:

1. Ethnography—to observe interpersonal communications and work roles within the industry
2. Communication Theory—to examine textual communications on the basis of their validity and persuasive appeal
3. Linguistic Principles—to examine textual communications for their attention to instances of implicature and their pragmatic consideration
4. Theories of Diffusion and Communication Networks—to provide an umbrella for the research as a whole and to frame research data

1.2.1 Ethnography and Diffusion in the Beef Supply Chain

The first phase of my analysis was to conduct ethnographic research within the beef supply chain so that I could analyze NAIS diffusion and communication within the beef industry. Livestock market owners were the primary focus of my interviews, because livestock sales are a primary point at which animals become “lost” (untraceable) and because these markets mark the point at which much of the resistance to technology is born. However, I also spoke with other members of the supply chain, including stockers and packers. Because of my professional experience with members of the beef industry, both as a casual participant and as an employee of a software firm, I had already developed contacts within the industry. These factors helped me gain direct access to my subjects and their businesses. In time, I was able to develop relationships with many of the livestock market owners and their customers and to engage in very frank discussions with them. I considered these personal relationships invaluable, both as a researcher and as an employee of a software firm, because of the informal communication networks that permeate the beef industry.

My initial conversations concerning technology were primarily with livestock market owners. The conversations were casual in nature and designed to gather general information about personal attitudes and beliefs about technology and animal identification. I spoke directly with 48 livestock market owners over the phone in 10 different states, including (in order of contact)

- Oklahoma
- Texas
- Arkansas
- Kansas
- Nebraska

- South Dakota
- North Dakota
- Minnesota
- Missouri
- California

My research was enhanced by a series of personal visits to livestock auctions. Between September 2005 and August 2006, I visited 35 of the 48 auctions that I had previously contacted by phone. All states listed above were included, with the exception of Minnesota and California. My personal visits to the livestock auctions allowed me to move beyond the owners' perspectives to include other livestock market staff, buyers, and producers.

As I visited with owners, staff, buyers, and producers, I aimed my questions at gaining relevant data in three main areas.

1. The level of willingness among participants to use new technology and animal identification
2. Their experience, if any, using online technology, RFID technology, various software applications, and databases
3. Their understanding of animal identification, new technologies, and where they gained that knowledge

Most of my conversations at the livestock auctions, aside from those with the owners, took place with the following types of individuals:

- Auction employees in charge of intaking animals from sellers
- Office managers of the livestock auctions
- Producers selling animals at the auctions
- Large-order buyers who regularly purchase many of the animals sold at the auctions

I chose these participants because, with the exception of the auctioneer, they represent each stage of the process of intaking and moving an animal from seller to buyer within the livestock auction and because they are the most likely users of any new technology that would accompany an animal identification system. I was interested in determining how these participants would differ in their experience with technology and in their willingness to accept a new ideology in the beef industry.

In addition to livestock market conversations, I spoke with procurement officers from major packing companies, order buying firm managers, USDA Animal and Plant Health Inspection Service staff, national and state legislators, chief executive officers (CEOs) of companies within the supply chain and parallel to the supply chain, and many cattle producers.

When considering innovations like those facing the beef industry, there is always more to the story than relating ideas and advantages to potential adopters of that technology. Technology diffusion is a social change that is directly affected by communication and one that should not be confused with the advantages of the technology itself. Hence, identifying the communication networks responsible for disseminating information about new technology and the NAIS was one of my top priorities in conducting interviews, both as an employee and as a researcher.

Because I was able to travel to so many livestock markets, I was able to speak with hundreds of individual beef industry insiders and to ask them about their knowledge of technology and NAIS. I could also speak with them about where their personal information was coming from and whose opinions mattered to them.

I asked the following questions to all formal interviewees. Other questions followed in most cases for clarification, but these questions were universal:

1. How would you rate your understanding of the National Animal Identification System (NAIS)?
2. What is your experience with technology including computer technology, ear tag scanning technology, and Internet/database technology?
3. How have traditional beef industry values and current business pressures shaped your opinions about both technology and the NAIS?
4. Do you believe that proposed new technologies will work within the beef industry?
5. Does the new business model of the NAIS fit the needs of the beef industry?
6. Where have you found most of your information about the NAIS and its accompanying technology?
7. How would the implementation of the NAIS and the accompanying technology affect your daily business activities and your personal responsibilities?
8. Who do you talk to about things like the NAIS, technology, and business concerns?
9. How has the information you have received concerning new technology and the NAIS affected your personal opinion of new technology and the NAIS?
10. Which information sources were most influential in shaping your current opinion of the NAIS?

My purpose in asking these specific questions was to gain an understanding of the culture within the beef industry in addition to specifics about the NAIS. As Fetterman writes, "Ethnography is the art and science of describing a group or culture. The description may be of a small tribal group in some exotic land or of a classroom in middle-class suburbia" [20, p. 1]. Van Maanen agrees, stating, "In the most general sense, ethnography refers to the study of the culture(s) a given group of people more or less share" [27, p. 4]. In this case, that description may be of a singular industry or segments of that industry, such as the beef industry. Fetterman points out that ethnography is, in many ways, like

the task of an investigative reporter, except for the fact the investigative reporter seeks out the unusual, while the ethnographer seeks out the everyday, the usual. I sought to seek out the everyday person within the usual course of events in the beef industry.

As Van Maanen sees it, the insider's position in ethnography grants ethnographic research, "[...] a kind of documentary status on the basis that someone actually goes 'out there,' draws close to people and events, and then writes about what was learned" [27, p. 3].

Fetterman tells us that fieldwork is the most characteristic element of any ethnographic research design. Classic ethnography often requires extended periods of observation. However, as Fetterman also points out, in applied settings, long-term continuous fieldwork is neither possible nor desirable. The most important element of fieldwork is being there to observe, to ask questions, and to be in contact with your chosen culture. In the beef industry, that means spending time at livestock markets talking with market owners, buyers, sellers, producers, auctioneers, sale personnel, and other members of the beef industry.

1.2.2 Communication Theory, Linguistics, and Diffusion in the Beef Supply Chain

The second stage of my research was to analyze written communications concerning the NAIS and technology. My focus in analyzing written documents was upon the USDA and several NAIS proponents and detractors. Specifically, I was interested in the efforts to promote technology and animal identification within the beef industry, in analyzing the ways in which those ideologies were transmitted, and in comparing NAIS documentation with responses from industry alliances.

I chose seven primary texts for analysis on the basis of two considerations. First, I wanted the texts to be from sources directly and influentially involved in the NAIS technological debate. Second, I wanted the texts to be representative of the written materials that have been most widely circulated and read by industry insiders on the basis of my conversations with members of the beef community. The primary texts for analysis were these:

1. *Audit, Review, and Compliance (ARC) Branch Policies for USDA Process Verified Program 2004* [28].

This document was designed to give readers an overview of general policies concerning the USDA Process Verified Program (PVP), which was the forerunner of the NAIS.

2. *ARC 1001 USDA Process Verified Program 2004* [29].

This document is provided by the USDA Audit, Review and Compliance (ARC) branch as a guideline for applying for Process Verified Program status.

The PVP was designed to assure customers and consumers that animal products have been raised and processed according to a prescribed set of standards designed to ensure safety and quality.

3. *The National Animal Identification System (NAIS). Why Animal Identification? Why Now? What First 2005* [30]?

This is a brochure designed by the USDA to persuade beef industry professionals to adopt the system. It was intended to offer insight into the merits and advantages of the National Animal Identification System.

4. *The United States Animal Identification Plan.*

This is the initial report issued by the National Institute for Animal Agriculture (NIAA), which was the nonprofit organization that organized a task force of USDA and industry professionals in 2003 to draft a plan for the NAIS. The draft was issued in January, 2004 [31].

5. *Livestock Marketing Association Comments on the US Animal Identification Plan 2005* [32].

The Livestock Marketing Association's response to the NIAA's report.

6. *National Cattlemen's Beef Association NAIS Industry Proposal White Paper.*

The National Cattlemen's Beef Association Response to the NIAA report, issued in February, 2005 [33].

7. *R-Calf USA 2006 Position Paper: National Animal Identification System* [34].

R-Calf's response to the National Animal Identification System.

Together, these documents provide an overview of the USDA's pre-NAIS responses to international pressures concerning animal identification, the USDA's plans for the NAIS, and the responses to that plan from the largest industry alliances. Using theories of communication and linguistics to analyze these documents was critical to identifying misunderstandings as opposed to simple disagreements. My goal was to use communication theories to discover what strategies were used to attract and persuade members of the beef community, which strategies were or were not effective, and what strategies were missing.

My hypothesis was that gaps in language commonality and poor use of contextually based persuasion techniques may have led to some of the miscommunications that occurred during the initial debate over the NAIS and technology within the beef industry. Therefore, I began with Elaboration Likelihood Model (ELM) principles by investigating whether

1. an individual message was likely to be considered using critical thinking skills;
2. readers would be motivated to consider information presented by the source of the message;
3. typical readers would be able to understand the information presented by the message;
4. positive or negative cues were likely to be adopted by the reader in the absence of central route processing;
5. bias may have affected persuasion.

The ELM, developed by Petty and Cacioppo [22], provides a unique perspective on relevance and the likelihood of cognitive consideration from members of communication networks. According to the ELM, the question is this: What is it about the content of a

message that gives that message the ability to persuade listeners to really listen, so that actual persuasion can take place? The ELM was originally developed specifically for examining communication intended to be persuasive, and it can be applied to both oral and written communication as a measure of both persuasiveness and effectiveness.

The model is built upon several basic assumptions about communication. One is that users want to form correct attitudes. As the authors point out, we are motivated to hold correct opinions because of their influence on our mental and physical well-being [22]. While the correctness of an opinion is inherently subjective, our opinions and attitudes can always be judged against other standards that allow us to evaluate our attitudes and behavior.

Another basic assumption of the model is that, although we want to form and hold correct opinions and behaviors, the ability to do so varies by person and by situation. In other words, the amount of effort we are willing to expend toward forming correct attitudes varies on the basis of a person's ability to consider the facts of a message, the context in which the message is received, and the relevance of the subject matter for the message receiver.

Finally, the model points out that we are simply unable to think critically about every persuasive communication we receive. Consider for a moment the number of advertisements, political messages, written opinion pieces, newspaper articles, and television reports we see in an average day. It would be impossible to consider all of those messages critically and get anything else done. We would spend all of our time in a futile effort to form correct opinions on an endless variety of persuasive subject matter.

On the basis of those postulates (and several others), Petty and Cacioppo outlined two routes through which persuasive communications are channeled. The central route is the route that is used when a message recipient is both motivated and able to think carefully and critically about the information being presented. The authors define this route as the route used by message recipients when they are both willing and able to elaborate (think critically) upon the information presented. As they put it, "By elaboration, we mean the extent to which a person thinks about issue-relevant information" [22, p. 7]. Elaboration likelihood is high when the conditions surrounding the message are not distracting, the motivation of the recipient to correctly process the message is high, and the individual abilities of the message recipient are conducive to elaboration of the content matter of that message.

If the message recipient is unable or unwilling to use the central processing route, the recipient will be more likely to use the peripheral processing route. In this case, the recipient is more inclined to use positive or negative persuasive cues in context to determine the validity of the message. In this case, the elaboration likelihood is said to be low. In other words, the message recipient either does not possess the ability to process the information presented or is not motivated to do so and will turn to peripheral cues to form an opinion.

The central processing route, which requires critical thought, will produce more affective and lasting changes in attitudes and behavior, while attitudes and behaviors formed through the peripheral route tend to be less enduring and affective. As to persuasion, we can assume that users are persuaded to the extent to which they find communication usable, understandable, and relevant to their personal context and goals. It

makes sense, then, that if these conditions are met, users will be more persuaded of the value of new technology and business methods.

1.2.3 Linguistic Textual Analysis

Next, I turned to linguistic theory to analyze the same documents on the basis of implicature and pragmatics. My goal in doing so was twofold. I was looking for instances of both implicature and pragmatic assumption that would hinder communication between the USDA, industry alliances, and the average beef industry professional. Specifically, I was first looking for the number of implicatures required of the reader, defined as the number of times the reader is required to fill in information in accordance with the Gricean maxims. Second, I was looking for pragmatic acknowledgment, defined as the amount of context given to the reader about situational aspects of the text (i.e., in what situation you would be expected to perform certain operations or understand certain ideological concepts). I was interested in what the texts assumed the user's context to be, the number of implicatures required by the texts, and their use of lexical items as either abstract or definite concepts.

Implicature, as described by Grice [23], is that part of the meaning of a sentence or text that is left to be filled in by the reader. Implicature is a function of what Grice calls the cooperative principle. The cooperative principle is based upon general assumptions about conversations stated as maxims:

1. Quantity—communication should be as informative as necessary, but not more so.
2. Quality—communication should not be deliberately false or one for which you lack sufficient evidence.
3. Relation—communication should be relevant to the subject at hand.
4. Manner—communication should be clear, orderly, unambiguous, and concise.

These maxims are what we expect in conversation, but as Grice points out, we often deviate from these maxims in any number of ways. For example, we rely upon violations, or *conversational implicatures*, on the basis of our context, to make conversation easier. In other words, our conversational situation often creates a need to violate the maxims.

For example, look at the following hypothetical conversation.

Conversation 1

Statement: "Let's go out to eat tonight."

Response: "We don't have any money."

From this conversation, we are able to deduce relatively quickly that the couple cannot *afford* to go out to eat, even though the response might have an entirely different meaning without the initial statement. In Gricean terms, this conversation represents a successful implicature based upon the maxims of conversation, which in essence state

that participants in a conversation operate cooperatively under the assumption of a set of rules. The two speakers are able to create this successful implicature because of their shared context, goals, and background.

This cooperative principle helps us to conduct communicative interactions within spoken and written contexts and operates under the assumption that both parties have similar goals for the communication, that the amount of information is enough, but not too much, and that the information should be both factual and relevant to the conversation. In the conversation above, the initial speaker is able to make sense of the response because of shared background and contextual knowledge with the respondent. We understand that going out to eat requires money. Thus, even though on the surface the response seems to be irrelevant, we understand its implications.

It is in this respect that implicature becomes necessary in communication. For example, let us revisit the conversation above. Without the implicature it might look like Conversation 2.

Conversation 2

“Let’s go out to eat tonight.”

“We don’t have any money.”

“So what?”

“So we can’t go out to eat.”

“Why?”

And so on...

Thus, knowledge that having no money means that the couple is unable to eat out is critical to the conversation. Without it we might be unable to complete this explanation before dinner! Recent linguistic theory assumes that implicatures are processed simultaneously with text, or sound in the case of spoken conversation, making the reader instantly aware of complex nuances that change the meaning of the communication [35]. This is the reason we understand the implicature required by Conversation 1 and is the reason we rely on implicature so completely in written texts. Within the beef industry, we can begin to see why this might have an impact on communications about technology and the NAIS. For example, what if Conversation 2 looked like this?

Conversation 2A

“Let’s track our animals after they leave here.”

“We can’t.”

“Why not?”

“We would need a database.”

“What’s a database?”

And so on...

However, there is one major difference between the implicatures required in the example above and those required in many written documents. The implicatures required of readers of written documents are often not based upon the maxim of quantity, which

states that the reader's background knowledge must be taken into account so as not to give too much information. Violation of this maxim is often necessitated by single words that function as lexical items for other concepts or terms. Lexical items can be briefly described as the mental image or abstract thoughts produced by words, and they are closely tied to context. For example, when we read the word *paste* in a situation involving computer software, we do not think of glue. More likely, we think of the concepts involved with cutting and pasting procedures in word processing applications. Thus, a whole range of concepts and activities that may be required of the reader are encapsulated by a single term. To understand that term, we must understand not only the definition of it in this context but the actions that pertain to it in the current context.

Pragmatics, which, broadly defined, equates to the study of language in context, is concerned with the difference between what a sentence of text says and what the reader takes as its meaning. The perceived meaning is usually based upon the situational context of the communication. Thus, pragmatic considerations play an important role in shaping our interpretation of written and spoken language, which brings us to the critical role pragmatics plays in communication. While *pragmatics* can be defined as the study of language use in context, *context* can be best described as the situation in which the reader or listener will be using the information provided plus the relevant background knowledge the user brings to the situation. This definition is perhaps narrower than most definitions of context within linguistics, but more closely aligned with the concept of context within technical communication. Let's return to Conversation 2.

Conversation 2B

"Let's go out to eat tonight."
"We don't have any money."
"So what?"
"So we can't go out to eat."
"Why?"

If we know that both parties are solvent, it might look different.

Conversation 3

"Let's go out to eat tonight."
"We don't have any money."
"So we'll stop at the ATM."

Once again, the conversation makes sense, as long as we are aware that the statement "We don't have any money" only means that the couple does not have any money *with them*. This meaning can be inferred because of our background knowledge concerning their wealth, which is part of the context in which we use the information provided.

Pragmatics also considers the situation in which a conversation takes place. For example, if Conversation 3 were held in a raft adrift on the ocean it would be humorous, even though the couple might be starving. Why? Because the context in which the conversation was held would signify that the remark was meant to be humorous. Therefore, we must consider both context and background in communication analysis.

In the beef industry, it is easy to see that we might find problems in communication on the basis of both implicature and pragmatics. Terms like *database* and *software*, which are not common to the beef industry, might create a need for implicatures that cannot be created by readers. Furthermore, even if the reader has some familiarity with the terms, the fact that they have not traditionally been used in the context of the beef industry may create problems with pragmatic consideration of their meaning.

I determined the number of implicatures present in each of the seven publications selected for analysis by using the following criteria and by assuming the abilities of an average market owner or producer on the basis of my ethnographic investigation:

1. How many times is the reader required to fill in information as a result of implicature that would be beyond the ability of the average beef industry reader (as determined by my conversations with them)?
2. Does the text give indications as to the expected background knowledge of the reader?
3. Does the text offer specific contexts to use in interpreting the text?

For example, the following passage from the USDA NAIS brochure creates implicatures on the basis of a lexical item and on the basis of assumptions made about the background of the reader.

Example 1

Database systems must be developed and maintained, equipment must be purchased, animals must be identified and tracked, programs must be monitored, and labor is needed for all of these activities [30, p. 1].

The language used in Example 1 requires the reader to identify the term “database” through implicature or background knowledge. This term is not explained within this brochure, at least not to the extent needed by a novice technology user. In effect, this segment rests upon assumptions about user background knowledge concerning database technology that are probably unfounded. This assumption means that the reader will either have to stop at this point to find what the term means or continue without the knowledge that the correct implicature would provide.

I was also looking for provision of user context and goals within this type of passage. For example, does the text tell us *why* we might want to use a database? Or where that database might be used? In this case it does not. Example 2 offers another implicature from the USDA PVP policies. In speaking to what is required of PVP-endorsed companies, the USDA observes as follows.

Example 2

All evaluations and reevaluations of must be in accordance with the *Principles of Auditing* as defined in ISO 19011:2002 guidelines for quality and/or environmental management systems auditing [36, p. 2].

Again, Example 2 requires the reader to possess knowledge about several terms, including “Principles of Auditing” and “ISO.” Some readers may understand that auditing is related to accounting and accountability and that ISO refers to the International Organization for Standardization. However, on the basis of my interviews, most beef industry professionals (and most people) are unfamiliar with these terms and certainly have no idea what the International Organization for Standardization does or why it is important. When we look at the actual implicature drawn by this reference, we see that the writing assumes knowledge sets that are probably unrealistic.

1.2.4 Diffusing Innovations in the Real World

Everett Rogers’ [19] book concerning diffusion of innovations provides a valuable tool for analyzing traditionally nontechnological industries like the beef industry, where proponents of the NAIS are seeking to diffuse new information technology and innovations. Rogers also worked with Kincaid [13] in research about communication networks; because communication within the beef industry is highly networked and affected by multiple perspectives, this second text provides an additional tool for analyzing communication networks. Together, the two texts form a powerful tool capable of analyzing both technological aspects of diffusion and the human side of communication that can dominate technological discussions.

Technology, in Rogers’ description, is a means of reducing uncertainty about cause and effect. The potential benefits of the innovation motivate us to learn about the innovation, while the possible consequences of adoption limit our acceptance. In the case of the beef industry, the proposed innovation is the NAIS and, consequently, a new method of doing business. The benefits of that innovation could lead to a safer food supply, better demand for products, new methods for tracking animals, and host of other potential benefits. But, the unknown facets of the plan, combined with known disadvantages, are a constant pull away from the innovation’s adoption. In this case, the confusion is compounded by the fact that the new technology also brings a new business model with it.

The balance of these two considerations determines the willingness to accept new technology. In this sense, innovation acceptance or rejection is essentially a process of information seeking and experimentation. When confronted with innovations, people typically begin by asking a series of basic questions designed to help accept or reject technology:

1. What is it? (e.g., What is the NAIS?)
2. How does it work?
3. Will it change the way I work?

4. Why does it work? Or why does it fail?
5. What are the possible negative consequences of its use?
6. What are the possible advantages of its use?

To answer these questions, potential adopters go through the process of diffusion, which Rogers presents as a combination of four elements:

1. Innovation—during which new technology is compared to existing technology. Questions that users ask during this phase include these:
 - (a) To what degree is it better than what we have now? (relative advantage)
 - (b) Is it consistent with the values, experiences, and needs of our current situation? How much do I have to change?
 - (c) How difficult is it to understand and to use the innovation?
 - (d) To what extent can it be tried and evaluated?
 - (e) Can we know what the current results of its use are? And are we able to observe trials?
2. Communication channels—the means by which messages about the innovation get from one person to another. But the messages themselves are not the pure information we would often like them to be, because most people within social networks rely upon the subjective evaluations of others to form opinions about innovations.
3. Time—which can be measured through the completion of five stages:
 - (a) Awareness of an innovation and some knowledge of how it functions
 - (b) Formation of an opinion about the innovation
 - (c) Active acceptance or rejection of the innovation
 - (d) Implementation of the innovation (if put to use)
 - (e) Confirmation or reversal of a decision because of experience or new information
4. The social network—used to form opinions of new innovations. Most individuals seek the opinions of others whom they respect or trust or both. In the case of the beef industry, those “others” typically are peers in the industry and representatives of industry alliances.

1.2.5 Diffusion and Communication Networks

There is an old joke that we only read the user’s manual as a last resort. Although formal structures do exist for communication flow in most industries, there is an informal element to those communication networks that often defines much of the communication that takes place. In other words, we ask a friend first. In the case of the beef industry, and others I suspect, those informal networks are actually separate networks that operate independently of the formal networks that are organized around the supply chain. Social

networks form within industries and control the flow of information apart from formal structure. Eventually, certain patterns form. In a sense, they resemble the path water takes in a stream as the flow becomes normalized over time. A channel forms, and almost all water follows that path to its ultimate source. The same can be said of information within the beef industry. As individuals become comfortable with other individuals as sources of information, information tends to flow from the same source repeatedly. At the same time, this well-developed channel begins to exclude other sources of information.

Rogers' and Kincaid's work on communication networks is an attempt to explain communication in real-world contexts. In their view, communication in social networks often involves two or more persons sharing information simultaneously in order to reach mutual understanding. They call this process convergence. This model places emphasis on the relationships between those exchanging information rather than on individuals themselves as units of analysis. Members of the beef community receive information about new technology, but their communications are anything but linear, and those communications are directly affected by personal and social variables. Therefore, the beef industry more closely resembles a network model of communication than linear models.

In the network model, information is not a commodity to be transferred from one individual to another as one would hand someone a glass of water, but an interpersonal act complicated by special relationships, psychological bias, and mutual causation. Communication, then, is a process that is affected by the individuals involved, their experiences, their predispositions, and their personal histories. Certain individuals within the network routinely communicate with other individuals within the network, and patterned flows of information are created. The most important step in determining how a communication network affects behaviors on the basis of information is determining which individuals (or organizations) are affecting others within the system.

Although a message may flow from one source to an end point, that information will be interpreted and often reshaped as it travels through established paths of communication. We might think of these interpretation points as ports along the stream metaphor. In the case of the beef industry the LMA, NCBA, R-Calf, and other similar alliances operate as these interpretive ports, as do influential businesses and individuals.

1.3 Results of My Investigation

Most readers have probably never been to cattle auctions, which are typically held at livestock markets. But if you want to get a feel for what is really happening in the beef industry, there is no better place to start. Livestock markets vary widely. Some are held in their original buildings (which may have been built decades ago). Others are newer, with modern office space separate from the auction building. Some are in urban settings like Oklahoma City, while others are literally hundreds of miles from anything resembling urbanization.

Still, they share some characteristics regardless of their location. They are dusty, noisy, active places. In many parts of the country they serve as a focal point of both agricultural business (which is the only business in some areas) and social interaction.

Most auctions have a café that also serves as a coffee shop. On sale days, which are typically weekly events, agricultural professionals from the area gather at the livestock market to discuss current events, buy and sell animals, and to keep abreast of what is happening in different agricultural markets. It is both a social and professional endeavor. News and ideas are exchanged, business partnerships are formed, and services are procured. There is a generally lighthearted atmosphere outside of the auction arena, but once the sale begins, the market personnel become more serious in their efforts to manage a fast-paced environment where big money changes hands.

My conversations with and observations of livestock market staff revealed a great deal concerning both technology and the NAIS within the beef industry. While the results were predictable to someone who has been involved in the process, they may offer some surprises to those with little experience in dealing with inexperienced technology users. My initial results from these conversations and observations with market owners, staff members, producers, and buyers can be summarized by category.

1.3.1 Alice at the Auction

Cattle auctions are busy, fast-paced environments, with numerous employees performing a variety of tasks and both buyers and sellers trying to keep up with the action. At the head of the auction business apparatus are the office managers. Auction office managers, on the whole, have had more direct experience with technology than any other personnel. They are typically called upon to perform several professional jobs at once including accountant, human resource manager, administrative assistant, communications director, and a general point of contact for anyone and everyone.

The first office manager I met was named Alice, and after a while I began to refer to all of them as “Alice.” They are strikingly similar as a group, being largely overworked, underpaid, always female, and probably the most knowledgeable people at the auctions in terms of daily happenings. They tend to be generally cheerful in spite of their workload, but one quickly finds that in addition to being intelligent and cheerful they are “not to be messed with.” Most of them have a reputation for their ability to deal with everything from angry customers to delinquent accounts.

Office managers were usually more willing to discuss technology than other auction personnel. They were so much more willing, in fact, that my habit became to look for “Alice” upon my arrival at every auction. On the whole, the office managers I spoke with were by far the most accepting of the idea of new technology and business methods. They seemed to be the most willing of the participants to explore the potential benefits of the NAIS and the accompanying technology. My conversations with them revealed that most have had experience with a string of data collection systems over time. However, most of these data collection systems were nothing like the advanced technology that would be required by the NAIS. In truth, the data collection systems used by most auctions I visited in 2006 were either severely outdated (many still based on a DOS platform) or were built to work on outdated networking systems. Of the 48 auctions I visited, only 15 were in the process of updating their systems, or they were already running current Microsoft® operating systems.

The many tasks that office managers perform during animal sales are often hampered by the general technological inefficiency that accompanies them. For example, my observations showed that livestock market staff members typically enter data manually for each animal as it is sold. In many cases, information is written by hand on note-size forms as each animal or group of animals is sold. The forms are then taken in batches to the auction office, where they are entered, by hand, by Alice and any help that she may have into whatever accounting/spreadsheet system exists. Later, they fax these data to the buyers, which is an inefficient and time-consuming process. Many office managers would be happy to automate these processes if technology could help. One office manager told me that she would be able to die happy if she could just eliminate entering sale data manually. However, even the office managers, as a group, are far removed from the concepts of networked machines, databases, servers, and Internet data transfers.

In effect, the office managers run the auctions on sale days. The owners are rarely involved in the accounting and data transfer that accompanies a fast-moving auction. Instead, they are busy dealing with customer concerns. But, most office managers are also responsible for training their sale-day office staff, and my conversations with them revealed a lack of confidence among office managers concerning training themselves and others in the use of new technology. Most would be unable to direct such training and would not have time to do so anyway. Also, they worry that if this training were to go poorly after hardware had been installed and new methods of business had been implemented, the auction could be severely hampered and they would be blamed.

Finally, it was clear that the information that the office managers did have about the NAIS and the technology that would accompany it had been gained from largely informal interactions with their respective market owners, animal buyers, and animal sellers. Their opinions of the NAIS tend to reflect those of the other main players at the auction, and their opinions vary. People in some areas tended to have more optimistic feelings about the NAIS than those in other areas, but more specifically, producers and market owners had different opinions from auction to auction. While those differences during my investigation may have been only varying levels of confusion and distrust, the differences show in the opinions of the office managers.

1.3.2 Backstage at the Sale Barn

Of course, before animals could be sold at an auction in accordance with the NAIS, and long before the office manager would be involved, they would need to be fitted with an electronic ear tag or some other device containing unique identifying data. Tagging done at the sale barn would need to be done in the pens behind the sale barn in a specialized chute designed to keep animals stationary for their protection. Normally, these chutes are used to immobilize animals for injections and other veterinary procedures, but they would also be used to immobilize animals so that RFID tags could be placed in their ears. Those responsible for both attaching the tags and reading them would likely be the livestock intake personnel.

Not surprisingly, the intake personnel at the auctions who would be responsible for collecting identification information have, for the most part, extensive cattle knowledge



FIGURE 1.2. The back of a cattle auction is where cattle are sorted and kept before the sale.

and almost zero exposure to the type of technology required by the NAIS, or even personal computers in many cases. My conversations with intake workers revealed that they had no real fear of technology, but they did not trust it. Most received limited, if any, help with the technology at their markets and would prefer direct instruction with new technology, as they have no patience for manuals.

The “back of the barn,” where the intake workers spend most of their time, is a series of metal frameworks and chutes that are used to control animal movement, group animals together, and coordinate arrivals. It is a dirty, noisy, chaotic environment with hundreds or even thousands of animals on hand on any given sale day. Figure 1.2 shows the back of the sale barn in Kilkenny, Ireland. The area itself is usually covered, but rarely enclosed, and most of them have walkways over the many animal pens to speed movement from one side to another. Some employees are usually on horseback herding animals, while others tend the gates that control animal movement.

It is not surprising, then, that the idea of a laptop computer or similar technology in this area of the auction often makes intake workers laugh. The very notion of advanced technology in such a traditional, hands-on environment seems almost ridiculous, even to an outside observer. In addition, intake workers were extremely concerned with the additional animal processing time that NAIS technology might require during an auction. Auctions often have hundreds, if not thousands, of animals to sell on a sale day, which means that speed is critical to their tasks. Intake personnel must move quickly to keep up with the demands of the auctions. An addition of even 10 seconds per animal, for example, could extend an already lengthy sale by hours, causing added stress for all involved.

However, it should be noted that many animals arrive one or two days before the auction, which would allow for these tasks to be done over time with those animals. Still, the addition of new technology, and therefore new tasks to the sale, would require

extra staff and new skills during that time. And, in their defense, the USDA has initiated a large effort to identify private ranches with premises identification numbers so that animals could be tagged before even coming to the auction.

But, even if the animals were tagged at the ranch before arriving at the market, the tags would need to be read with specialized wands or other equipment to collect the data stored on the tag. Therefore, the employees working in the back of the livestock auction would be responsible for first RFID tagging the animal's ear (if not already done) and then reading that tag into the data collection system (probably on a laptop computer or specialized data collection device), at a minimum.

Nonetheless, as with the office managers, some intake workers favor a system that could automate tasks and save time. I say some, because most intake personnel are perfectly happy with the way things are. The system in place has worked for them for the past 50 years, they say, so why fix what isn't broken?

1.3.3 Buying the NAIS

Of course, after an animal has been processed in the back of the barn, it must be sold. Without a sale, there is no animal movement, which is what the NAIS was designed to track in the first place. That is where the order buyers come into the picture. Order buyers typically move from auction to auction on different days of the week, purchasing large numbers of cattle that are then shipped to other locations. Sometimes those locations are feed lots, where animals are fattened for harvesting. Sometimes those locations are other ranches, where the animals feed, live, and produce young ones. And sometimes those locations are packing plants, where the animals are harvested and converted into the packages we find at the grocery store.

Although order buyers are certainly not the only buyers at the auctions, their firms operate by taking orders for cattle from many places and then sending buyers to auctions to fill those orders, which often range in the hundreds of thousands of head per year. Additionally, packers often send their own buyers to auctions to fill quotas for production. Most of a typical order buyer's clients are either packers, stockers who intend to let the calves graze on grass or wheat as they grow, or feed yards, which hold thousands of cattle at a time while they are fed on grain.

Because the buyer and/or the staff of the buying company are responsible for quickly and accurately transferring data that usually come by fax into a spreadsheet form of some type (which has to be done manually), most can see clear benefits to new technology. However, I spoke with several large order buyers who have experimented with some type of electronic data transfer and have experienced setbacks because of their lack of experience and lack of information.

One story I heard concerned these initial attempts to streamline data transfer. The company in question was using an automated data transfer to dump purchase information directly into a Microsoft Excel spreadsheet. At the same time, they were experimenting with buying tagged, identifiable animals. While there were several distinct sets of data being collected in the spreadsheet, one of those columns was reserved for the unique animal identification number from the tags.

The experiment went well at first, until the company's office became convinced that all of the unique identification numbers transferred with the animals were identical. This confusion resulted from their staff failing to realize that after exporting the data to Microsoft Excel, the numbers (being very long) would be automatically expressed in scientific notation by Excel. The results caused a great deal of confusion and were typical of the many small problems that I heard of while discussing technology and the NAIS with order buyers.

In general, the buyers themselves are more concerned with getting quality animals at a good price than the technology that might accompany them. While their home offices may benefit from technology, provided that they understand how to use it, most buyers I spoke with saw the NAIS as fraught with potential problems and hassles.

Furthermore, what understanding they did have of the NAIS had been gained from sources other than the USDA. Unlike office managers and intake workers, buyers tend to have more contact with other elements of the supply chain. They are in between the producers, office managers, intake workers, market owners, and the rest of the supply chain. In a sense, they operate between small business and big business, making them excellent sources of information and perfect change agents, or so it would seem.

Strangely, they are not. The majority of buyers I spoke with were just as reluctant as anyone else to change their way of doing business, especially because they tended to have even less understanding of how the NAIS would affect their personal responsibilities and daily lives. In the end, buyers were less likely to have an opinion (or at least to express one) than any other group I spoke with. They simply were not interested.

That sentiment makes them more like the sellers of those animals than different. The sellers at the auction are typically the producers, or those who have raised the animals on their land. Sellers want to earn top dollar for their animals, while buyers want to pay as little as possible. But the two groups share a common communication network (at least in part) and both see the NAIS as a potential problem in terms of both daily life and profits.

1.3.4 Down on the Farm

Undoubtedly, the largest group to be affected by the NAIS would have been the producers—those persons involved in raising animals for sale at markets. My initial conversations with producers were unenlightening. Those I initially contacted saw any form of a National Animal Identification System as an intrusion by the government into their private affairs and nothing more. Like the animal intake workers, the producers I observed and spoke with had almost no ties to technology. Most producers I spoke with would have no use for any type of NAIS system unless it had proven economic benefits or was mandated by the federal government. They are, for the most part, people who have been raising cattle for most of their lives in exactly the same way.

Generally speaking, they are not interested in changing now unless they are forced to change or shown significant profits. In fact, the only example of sustained producer interest that I witnessed during my observations was at an auction in Texas, where a major order buyer began offering premiums for source and age-verified calves (which is proof of age and where the animal originated only). When the premiums were consistent,

producers consistently provided the information that was needed to source and age-verify their calves. But when the premiums stopped, the producers selling animals at the auction became unwilling to provide animal data or to go out of their way to comply with NAIS goals because they had more profitable things to do with their time. Several times, I observed producers asking about premiums, only to change their minds about participating when an auction worker attempted to explain the process to them. One producer in particular told me,

“Raising cattle is a 24-7 job already. If I can’t make money with this thing then I can’t use it.”

He meant, of course, that if there were no profits to be had from animal identification, he had better things to do with his time.

His attitude was typical for producers. Although in my experience they tend to have the least understanding of the system and technology that would be required by the NAIS, they would potentially be the most affected group by its implementation. Because of this contradiction, producers who had been exposed to NAIS information tended to be interested in what it would mean for them. However, their information was typically gathered in places like the coffee shop and from sources that included market owners, other producers, and industry alliances like the NCBA and R-Calf.

Many producers are not “in the industry” as a lone profession. Small producers often have other full-time jobs that provide stable income, health insurance, and other benefits. That does not mean, however, that they are not dependent on the income they receive from their livestock operations. It means that they are unable to devote large amounts of time to understanding the NAIS and new technology. The result is that they turn to quicker, trusted sources of information to form their opinions. Market owners (those who own the auctions where buyers purchase animals) are the people in the area who devote time to interpret information about industry developments, so producers often turn to them for information. The fact that many of them do not turn to the USDA for information is interesting, but not surprising, given the principles of communication we have discussed to this point. In truth, producers turn to whatever sources of information are available.

The accuracy of those sources is questionable in many cases. I overheard countless highly opinionated conversations on the subject of the NAIS between producers, buyers, market staff, and office managers. Many of those conversations were based, at least in part, on either faulty or partial information. It was evident that during those conversations the participants were not dealing with information as presented by the USDA. The information that drove those conversations had often been interpreted, repackaged, and passed from one communicator to the next or one communication network to the next. Stops along the metaphorical stream had already altered the original information, because the original information had not been understood, because it was incomplete, or because of biases inherent to information gatekeepers within the industry’s communication network. As shown by ELM, when presented with incomplete or confusing information, we tend to rely on peripheral cues that are more readily available. That

tendency was a major component to the misunderstandings and resulting backlash that plagued the NAIS among members of small communication networks. Nevertheless, opinions were formed, and they were not unlike those formed by beef industry insiders with access to more information.

1.3.5 Interviews with Members of the Beef Industry

Although my casual conversations and observations with members of the auction community provided valuable insight into general feelings about the NAIS and technology, they were limited in their ability to provide detailed information. I needed to conduct more formal interviews, starting with livestock auction owners. Predictably, my interviews with livestock market owners echoed my original conversations with and observations of them in that they felt generally uncomfortable with the NAIS and new technology. However, they did provide information about the communication barriers and communication networks that have affected the debate surrounding the NAIS and the interpersonal and written discourse that have shaped opinions of the NAIS within the beef community.

In addition, my interviews with other members of the beef supply chain provided an external perspective that also proved insightful. My interviews made several things clear. First, the beef community as a whole still had no idea what to expect from the USDA concerning the NAIS. Second, livestock market owners did not fully understand either the ideology or the technology that would accompany the NAIS. Finally, communication networks were influencing members of the beef industry to a much greater extent than the official communications from the USDA and other proponents of a national animal identification system.

In spite of those general attitudes, there were more technologically progressive elements of the industry, even if they did not support the NAIS plan. One of the most illuminating interviews I conducted outside of the livestock markets was with a senior executive for Cargill Meat Solutions, which is one of, if not, the largest beef-packing companies in the world. Compared to producers and livestock markets, corporate packing companies are much more technologically sophisticated. Many of the large packers trade cattle like any other commodity, and to visit their offices feels much more like a trip to any other large corporate entity than a trip to a ranch or a livestock market. He spoke with me at length about the problems facing the NAIS.

The executive's attitude could best be summarized as cautiously optimistic although disdainful of the USDA plan. He reiterated to me that the beef industry still had no clue about how two of the domestic mad cow disease cases actually started and that this was a definite problem. However, he was adamant that the plan for the NAIS offered little profit return on investments that would have to be made to implement the NAIS plan.

He believed that the USDA would never be able to justify a national system solely on the basis of risk and that they must provide incentives other than a "feel good attitude" for participants to justify a national system. Otherwise, he believed that the only way to gain widespread acceptance would be to mandate participation, which would require political action. In his opinion, political action would be hard to gain because of the

USDA's long history of ignoring the business needs of the beef industry and industry alliance ties to state and national legislators. He said that although some companies like McDonald's have actively pushed the NAIS and have even offered to pay premiums for source and age-verified animals, they were alone for the most part among large retailers, because others were unwilling to commit to a plan backed by the USDA that is so ill-defined. Finally, he claimed that the plan changed from month to month, continually being swayed by different special interests, which led to a continually changing story from the USDA about what to expect of participants.

My conversations with other food company executives were similar. I had numerous conversations with personnel from other companies. Some of those included Smithfield Foods®, Tyson Foods®, several order buying firm managers, order buyers, USDA Animal and Plant Health Inspection Service staff, national and state legislators, CEOs of companies within the supply chain and parallel to the supply chain, and many cattle producers. Several themes emerged which were similar to those found in my interviews with livestock market owners: namely, that the USDA's plan had been ill-defined from the start, that it had been communicated poorly, that there was no general consensus as to what the plan would be or if it *ever would* be, and that the information that had been provided was confusing.

1.3.6 Interviews with Livestock Market Owners

Although I spoke with many different members of the beef supply chain, most of my personal discussions and interviews were conducted with livestock market owners. My initial conversations showed that livestock auction owners already knew more than they would like about the NAIS. Although they were interested in the potential benefits of the system, they were concerned with the economic implications of any NAIS plan. In addition, aside from this general attitude, most owners expressed no real desire to become familiar with operating NAIS technology and no desire to become technologically proficient in the details of the system. Most of the owners I spoke with in 2006 indicated that they did not use computers on a regular basis and did not want to. Most of those owners still own the same auctions today.

I did not get the impression that they were completely against technology. Indeed, owners described technology such as automatic scales and veterinary technology as indispensable to the cattle industry. Yet, as a group, they showed no ability to be involved in operating the technology that would accompany the NAIS—especially computers. In fact, 80% of the owners I originally contacted by telephone told me that they did not understand NAIS technology and did not feel they had been given much information about what would be required to implement the system. One owner told me that a certain number of market owners would need to die before advanced computer technology would ever become commonplace in markets! In general, they believe that any NAIS plan would result in more work for everyone and additional expenses.

Moreover, it was clear from my initial conversations with owners that they did not understand what was being proposed and were extremely reluctant to commit themselves to any ideology or course of action until they knew more. Furthermore, they were reluctant to commit to any course of action until market owners had established a

consensus and until the physical and technological parameters of any such plan had been firmly established. They were also genuinely concerned with the challenges that new technology and the NAIS would pose for their staff members.

Of the 48 owners I had originally spoken with and/or visited, many were also willing to participate in interviews concerning the NAIS and technology. I knew some of those who refused to participate well enough to ask, "Why?" The most common answer was that the owner believed that he or she would have nothing to say on the subject. Further investigation revealed that many of those who did not participate felt that they had not spent enough time personally investigating the facts to offer insightful comments. I attributed their reluctance to apathy at first, but as my study progressed, I began to see their reluctance as confusion, more than apathy. My interviews provided direct insight into the reasons behind this surface-level apathy. Again, here are the primary questions asked of market owners and summaries of their responses to those questions. The responses on the whole were surprisingly similar:

1. *How would you rate your understanding of the National Animal Identification System (NAIS)?*

All owners I spoke with had some understanding of the plan, yet very few claimed to have a solid understanding of the mechanics of the plan. They were also quick to add that the USDA did not know what it wanted to do, either. Naturally, I spoke with some owners who had spent more time investigating proposed regulations than others, but the general consensus was that owners did not believe that anyone understood the plan, most of all themselves. They were also frustrated by the lack of details available from "official" sources and the confusion surrounding the technology of such a far-reaching plan.

2. *What is your experience with technology including computer technology, ear tag scanning technology, and Internet/database technology?*

Most owners I spoke with had at least some experience with tagging animals. The required animal pregnancy scan has also given them some insight into the process of reading a scan. In addition, some of the younger market owners have had experience with computer technology, but only four of the owners I spoke with were under the age of 40 in 2006. Two of those had veterinary medicine degrees, while the others had degrees in animal science. Still, members of the older generation of market owners have almost no computer experience, and those that do have not used that experience to influence the industry as a whole. Most, in 2006, did not even use e-mail, and when discussing the Internet or database technology, one might as well be speaking a foreign language. I should point out that this is not true of every owner. Some auction owners have deliberately sought out the latest technologies, but they are few.

3. *How have traditional beef industry values and current business pressures shaped your opinions about both technology and the NAIS?*

In general, when asked this question, owners respond that the resistance to technological change comes from their customers more than from

themselves. Most owners reported that their local producers did not want to deal with the NAIS, did not understand it, and were under no immediate pressure to get involved. Furthermore, they said that because there were still so many small producers whose animals make up such a large percentage of the national herd, it would be difficult to get a high degree of participation in any program.

Also, three market owners mentioned that a large portion of small producers are not directly involved in raising animals for large profits, but are interested in the lifestyle that comes with raising cattle. In my experience, many small producers are attracted to raising cattle for the independence it provides and for the outdoor, hands-on work that it involves. It is often a source of extra income and a rural home life that they want. Computers and databases are not a part of that vision even today, for most of these small producers. In addition, the auction owners were quick to point out that their customers are no more literate about technology than themselves. In short, their customers are resistant to change and to the computer technology that might come with change.

4. *Do you feel that proposed new technologies will work within the beef industry?*
Somewhat surprisingly, more than 75% of market owners answered yes to this question, although they believed that the process would be a lengthy one. Market owners believed that the USDA had done a poor job of defining exactly what those technologies would be and how they would be used. Instead, the USDA, according to market owners, tried to let private industry complete that part of the picture, even though they had not made clear what their own goals were. Market owners also stated unanimously that any technology diffusion would require additional training for their staff. Yet no funds or opportunities for that training had been provided or even discussed. Finally, market owners were clear in their belief that any move to technological means of animal tracking will have to be mandated or demanded by the market before most market owners would be willing to get involved, and even then, they would need much more information about the plan and its regulations.

5. *Does the new business model of the NAIS fit the needs of the beef industry?*
My sources responded overwhelmingly in the negative to this question. Although they tended to believe that some form of NAIS was inevitable, they also tended to be more than willing to wait for its arrival. Information is a critical commodity in the beef trade. Yet roughly 85% of the market owners I spoke with saw no guarantee in their ability to control their information or to receive data back from higher levels of the supply chain. Packers and feed yards are notorious for their unwillingness to share pricing and purchasing data according. Their reluctance led many small producers to see the NAIS plan as a plan to create one big database that could be used by the “big boys” to manipulate the market to their own advantage.

Because the USDA was unable to explain to them exactly how data would be controlled and kept private, and because producers and market owners had limited trust in the USDA to begin with, there was little chance that they would

be convinced of their data security without specific procedures being laid out and explained to them in detail.

6. *Where have you found most of your information about the NAIS and its accompanying technology?*

Market owners overwhelmingly responded to this question by citing the LMA or another industry alliance, regardless of their background with computer technology or their reported understanding of the NAIS. These alliances are clearly thought of as unions, not just organizations. Market owners believe that the USDA does not have their best interest in mind like the LMA does, although 100% of them report having read at least some of the information distributed by the USDA and other proponents like McDonald's.

Market owners I interviewed told me that information from the USDA was largely unreadable because it is out of touch with their reality. One owner called USDA materials "boring and uninformative." Furthermore, although his customers knew that the USDA materials were available, nobody wanted them because they were not written in a language that they understood.

Producer opinions are a major determinant of market owner opinions in the beef industry. Producers are the market owner's customers. According to market owners, producer opinions are not being formed by the USDA or other NAIS proponents. During my conversations and interviews with market owners, I heard over and over that most cattle producers with no opinion of the NAIS will go to a friend first, a competitor second, and an enemy third before seeking official USDA information on the subject of the NAIS. The result of this avoidance is that most opinions concerning the NAIS are formed "in the coffee shop" as one producer explains his understanding of the program to another. That understanding is almost always based upon an interpretation of the NAIS that has been received from an industry alliance such as the NCBA or a trade journal targeted specifically to the producer's niche within the beef industry.

7. *How would the implementation of the NAIS and the accompanying technology affect your daily business activities and your personal responsibilities?*

The first response to this question was always to cite increased costs and increased demands upon staff and producers. There was genuine resentment among market owners and producers alike toward the USDA for proposing a system that will cost them money while being unwilling to provide funding for training and expenses. Because market owners sell animals on a commission basis, they rely upon their customers' animals to create revenue. And because the producers had little desire to participate in the NAIS, no market owner wanted to be first to adopt the system, thereby increasing costs to his customers and potentially driving them to a competitor.

Second, there was a genuine fear among market owners that any technology that would necessarily accompany NAIS would be cumbersome and difficult for their staff to operate. Every owner I spoke with expressed worry that the NAIS

might slow the pace of auctions and drive away buyers as they become tired of spending more hours at the auction and more money on cattle.

8. *Who do you talk to about things like the NAIS, technology, and business concerns?*

According to market owners, there were more meetings on this subject than one might think. But again, the information that most owners trusted came from meetings sponsored by industry alliances and special interest groups. Owners reported that they were much more likely to speak with another market owner or an officer from the LMA or a similar alliance than they are to seek information directly from the USDA or other proponents of the system. It is interesting to note that although market owners are in direct competition with other market owners in many cases, they still prefer their competitors' opinions to more "official" NAIS information sources.

9. *How has the information you have received concerning new technology and the NAIS affected your personal opinion of new technology and the NAIS?*

Not surprisingly, almost all market owners said that their opinion had changed little during the past three years (2003–2006). Most said that their initial interest in NAIS was met with indecision, scarce and confusing information, and poor planning from the USDA. After that, their interest quickly faded. While they had been paying attention since then, owners had not been persuaded by additional information from the USDA or by attempts to explain the good of the NAIS for the beef industry as a whole. If anything, the information flow from industry alliances and other beef industry professionals reduced the willingness of market owners to get involved. Owners typically reported that they trusted the LMA much more than the USDA and that they were unwilling to go against their "union" solely on the basis of USDA propaganda (which they do not trust anyway).

10. *Which information sources were most influential in shaping your current opinion of the NAIS?*

Once again, the clear winners were the industry alliances and peers within the industry. Not one owner told me that his primary source of information concerning the NAIS had been the USDA. Instead, they revealed that information from the USDA strikes them as hard to understand, removed from their personal situation, mired in bureaucratic conventions, and in some cases decidedly against the best interests of owners.

If anything is clear from my conversations with livestock owners, it is that the innovations that would accompany a NAIS, both real and theoretical, are at best misunderstood by many members of the beef community. Rogers [19] describes diffusion in terms of benefits that enhance acceptance of new technologies and ideologies, and possible consequences that limit that acceptance. He also defines innovations in terms of hardware, such as new equipment, practices, and technology, and software, the abstract ideologies whose acceptance requires a deviation from current thought and acceptance of a new paradigm.

1.3.7 Rules from the Road

As shown by my conversations with livestock market owners, the hardware that accompanies the proposed NAIS was still largely a mystery in 2006 even to those who studied NAIS developments. For example, one market owner told me, while I was visiting him in South Dakota, that he had recently purchased a software system that would perform all functions of the proposed NAIS with no additional hardware required. At his invitation, I was able to examine his new software. It was certainly a capable accounting system that could automate certain communication functions, but was in no way capable of creating and tracking the type of data sought by the USDA and the NAIS.

I had many such experiences, but even in the most remote locations I did not find a single market owner who had not at least heard of the NAIS and spent at least some time gathering information about it. Still, two facts were clear. One was that the hardware that would accompany the NAIS was either misunderstood or not understood by most market owners and producers. Market owners believed that the USDA did not understand what will be required in terms of hardware either. Their record of continually changing the plan for a NAIS did nothing to change this assumption.

In effect, then, with no clear description of hardware and its functions to evaluate, market owners and their customers were unable to see the potential advantages of the system.

Even if the requirements had been clearly drawn, they probably would not have understood potential benefits of the system on the basis of the information they received.

The other clear fact was that the top-down communication network that would have maximized the USDA's ability to control the discussion of the NAIS (whereby information would flow from the USDA and other architects of the system to large and small businesses and producers along the beef supply chain) did not exist. Earlier I discussed the notion that most industries have both a formal communication network developed along supply chain lines and also a more informal communication network. In this particular industry, at least on the subject of the NAIS and technology, the informal communication network was the primary communication network. Industry alliances such as the LMA, the NCBA, and R-Calf were much more likely to be primary sources of information than is the USDA. Secondary information sources were most often peers within the industry or others that might be found at local meetings or at the coffee shop. The USDA and other proponents such as McDonald's and other retailers were a distant third in this communication network.

An innovation must have both clear advantages and a means of communication to explain those advantages to would-be adopters in order to gain acceptance. Because the advantages and possible drawbacks of the NAIS were unclear to market owners and their customers, and because communication of its advantages was hampered by unclear and often diverted (through industry alliances) communications, successful diffusion was

impossible. The fact that LMA members had the highest change agent status within the livestock market social group, as was routinely reported to me by the owners, did not help the USDA's agenda. As I have shown, the USDA's announcement of the NAIS plan set off a power struggle between industry alliances who sought to control the process of shaping the plan. The ensuing struggle, and the USDA's inability to mediate that struggle, according to market owners, damaged the USDA's efforts to become change agents on the topic of NAIS.

Rogers [19] speaks to this facet of diffusion when he presents *timing* as a crucial element in the diffusion process. Market owners that I spoke with usually told me that the USDA had botched the NAIS rollout from the start. However, the timing of that rollout, combined with poor communications, and failure to recognize the prevalent communication networks within the beef industry were at least as responsible for the ensuing backlash as poor planning, in the eyes of market owners.

Another factor that directly affected the debate over the NAIS is that the plan was not mandated in any way, despite the best efforts of the USDA. The program's voluntary status only added to its continuance as a highly social process. Because market owners turn to peers or friends first for information and advice concerning the NAIS or, for that matter, difficult business decisions in general, communication networks are even more closed and self-reliant than they would be if proponents of the NAIS had more relevant information.

The nature of the beef industry's sociological makeup also contributes to the communication network's influence. Market owners and producers generally fall into the category that Rogers calls "late adopters." People within the beef industry tend to stick to their own kind. They tend to be heavily involved in their work, do not seek influence from external sources, and are highly independent, not overly social, slow to trust and to change, and uninterested in societal fads. This generalization does not apply to all market owners and producers, but few of the owners I spoke with could be described as early adopters based upon Rogers' definition. In fact, most of the people I spoke with that could be described as early adopters were involved either in "higher" levels of the beef supply chain, such as packing or retail distribution, or with a business that produced some sort of technology support for the proposed NAIS.

Market owners and producers also tend to be close-knit, both in their social groups and their communication networks. Their convergence, as described by Rogers and Kincaid [13], happens only within established patterns of communication, between themselves, others like them, and alliances they trust implicitly. They converge only by agreeing to general opinion within their own established communication networks, and they are inherently divergent from external communication networks or even those that are perceived as outsiders. These attributes make them, in Rogers' definition, late-adopters of new technology and ideologies and, in Rogers' and Kincaid's view of communication networks, isolates them within the larger beef supply chain. Therefore, any attempt to persuade them must first conquer the natural defensiveness of the livestock market/producer communication network, and then be extremely persuasive in order to convince a naturally distrustful audience being asked to move out of its comfort zone.

1.3.8 Communication Gaps and Communication Theory

Of course, navigating those communication networks is only part of the equation. As I have said, the content of the message is as important as the process of getting it to recipients. Both must be successful to affect persuasion and technological diffusion. My next course of action was to determine what messages were being given to the market owners and their customers, and to analyze those messages on the basis of my personal communications and observations, communication theory, and linguistic theory. I turn first to my document analysis on the basis of the Elaboration Likelihood Model. I was interested in determining

1. whether an individual message was more likely to be considered using critical thinking skills;
2. the motivation of the reader to consider information presented by the source of the message;
3. the ability of the reader to understand the information being presented by the message;
4. the positive or negative cues most likely to be adopted by the reader in the absence of central route processing;
5. the message's source and bias that may have affected cognition.

The results of my analysis, by document, are recounted below.

1. *Audit, Review, and Compliance (ARC) Branch Policies for USDA Process Verified Program*

This document was designed to give readers an overview of general policies concerning the USDA PVP and also contains specific procedures for applying for PVP status. The PVP was designed as an accountability tool to allow beef business entities to advertise their adherence to certain quality standards that would ensure product safety. In many ways, the PVP was a marketing tool, designed to recover lost export markets in the wake of the original BSE scare. Proving that certain standards of safety and compliance were being observed would allow, in theory, for companies to market themselves as process verified companies. However, it was the first written product encountered by many American beef industry professionals, which had specific guidelines for quality management. While the PVP is separate from the NAIS, it was a first response to the problems caused by animal disease and inability to trace animals and provide safety assurances within the beef industry. In many ways, it was a "first look" for the livestock market owners and beef producers at the type of bureaucratic requirements that might be presented by a national animal safety system.

In short, the requirements of the PVP confused market owners and producers. They were not intended to be participants in this program, but because they knew of the impending NAIS initiative, many were interested in the requirements of the PVP. Their fears were quickly confirmed by the most influential sources

within their communication networks. The PVP requirements were designed by the Agricultural Marketing Service (AMS), while the NAIS is directed by the Animal Plant and Health Inspection Service (APHIS). In theory, the two divisions of the USDA have separate missions. This distinction, however, was not clear to many within the market owner/producer communication network.

The communication network members were undoubtedly already biased by the fact that the PVP was a USDA creation. However, many were also intrigued. But the details of the PVP do not lend themselves well to central route processing as defined by ELM. First, the language is intensely bureaucratic. For example, this section gives an overview of the requirements for agricultural product data services:

Data services that do not validate the data being entered into the system are not eligible for approval under the programs.

The ARC branch will allow verification of data services which

1. validate the data entered by the user through on-site evaluations; and
2. validate the data entered by users through data evaluations. Data must be validated to ensure that it is accurate and reliable. Data validation must be addressed within the receiving process under the Programs [36, p. 1].

Using the principles of ELM, it would be almost impossible to conclude that any livestock market owner or producer would be able to use the central processing route to think critically about this passage. The references to data and data services within this section, and throughout the document and its accompanying instructions, only serve to confuse and provide negative cues to the reader. My interactions with market owners and their clients prove that they consider the document vague and ill-defined, requiring the business entity only to provide validation for data. The resulting ambiguity served only to prevent them from understanding, despite their initial motivation, and thus limit central route processing.

2. *ARC 1001 USDA Process Verified Program*

This document was provided by the USDA Audit, Review and Compliance branch as a guideline for applying for PVP status. These are the step-by-step guidelines for applying for the program outlined in the document above. Unfortunately, the specific requirements are often as vague and confusing as the overview. The program requirements cover 19 pages and still vaguely identify specific tasks or procedures to be performed. The document lists these requirements.

The company must

- (a) identify the processes needed for the QMS and their application throughout the company;
- (b) determine the sequence and interaction of these processes;
- (c) determine criteria and methods needed to ensure that both the operation and control of these processes are effective;
- (d) ensure the availability of resources and information necessary to support the operation and monitoring of these processes;

- (e) monitor, measure, and analyze these processes; and
- (f) implement actions necessary to achieve planned results and continual improvement of these processes [36, p. 2].

The individual business was responsible for developing quality standards that will adhere to these standards. Problematically, this approach required those who were already confused about the standards of the PVP to develop their own procedures that would adhere to those standards.

The PVP program requirements continue by demanding the business to produce a quality manual that will meet the following stipulations for a quality management system. Businesses would need

- (a) An organizational chart or similar document listing all personnel assigned to managerial positions within the program;
- (b) A description of the scope of the QMS, including details of and justification for exclusions;
- (c) The specified process verified points;
- (d) Documented procedures established for the QMS;
- (e) Reference to all forms, tags, and labels used to track or demonstrate product conformance;
- (f) A master document list that shows the most current issue of all QMS procedures, forms, tags, and labels used to track or demonstrate conformance;
- (g) A description of the interaction between the processes of the QMS; and
- (h) All other documentation as required in this Procedure [36, p. 3].

Again, as with the general overview of the PVP, it would be nearly impossible for a livestock market owner to adhere to these guidelines even if they were written in accessible language. They are too vague. It is important to note, once again, that these requirements were not written for livestock markets. They were created for commercial packers and retailers. Yet they were widely distributed among all segments of the beef industry. As with the general overview of the PVP, there is nothing in this document that would allow most readers to use critical thinking skills even if they were motivated and unbiased. Based on my experience with livestock market owners and their customers, bias did exist, and the document's language is too far removed from anything feasible or recognizable to small business owners or cattle producers to counteract that bias through central route processing.

For example, section 1.2.3 in that document addresses document control and reads as follows.

1.2.3 Control of Documents

The company must control all documents required by this Procedure.

- (a) A documented procedure must be established to define the controls needed
- (b) To control all documents required by this Procedure;

- (c) To ensure that changes and the current revision status of documents are identified;
- (d) To ensure that relevant versions of applicable documents are available at points of use;
- (e) To ensure that documents remain legible and readily identifiable;
- (f) To prevent the use of obsolete or unapproved documents; and
- (g) To retain all documents for at least 1 year after the year in which the audit was performed [36, p. 3].

While these directives might be usable for someone accustomed to designing audit-based processes on the basis of government directives and the bureaucratic vocabulary, they constitute a foreign language for most members of the livestock industry. The language of the document is far too removed from the daily operation of a livestock market owner or producer to reasonably employ pragmatically based interpretation of the requirements of the PVP for market owners or producers. I intentionally disqualified this document from analysis on the basis of implicature. The document *is* an implicature, having almost no applicable text that can be applied to any daily operations of an average beef industry professional.

3. *The National Animal Identification System (NAIS). Why Animal Identification? Why Now? What First?*

Unlike the previous two documents, this pamphlet was designed specifically for producers and others within the beef industry who might have limited knowledge of the NAIS. It was intended to be persuasive by providing insight into the merits and advantages of the National Animal Identification System. Also, unlike the PVP documents, this pamphlet was published by APHIS, which was directly in charge of the NAIS. Interestingly, the message from the start is that the NAIS is about controlling disease, and the language is much better suited to a livestock industry insider than that used in the PVP documents.

However, on the basis of my interviews and conversations, market owners and producers find more questions unanswered than answered by this document. For example, technology is not mentioned until the final page of the document. When technology is addressed, it is as follows:

Rather than focus on specific technology, USDA will focus on the design of the identification data system—what information should be collected and when it should be collected and reported. Once the identification system is designed, the market will determine which technologies will be the most appropriate to meet the needs of the system. [30, p. 14]

Although this is interesting and necessary information, it lacks the type of specifics that would allow livestock market owners and others within the beef industry to think critically about the NAIS. This text is readable and understandable because it is not overly reliant on bureaucratic, vague terminology and on

technical terminology. However, much like the PVP requirements, it is so devoid of specifics that there is nothing to consider critically. Livestock market owners told me that when they looked at this type of document they were further convinced that the USDA had no plan. Nothing in the document details how supply chain complexities would be handled by the proposed system.

Also, there is no plan outlined to pay for the system or to train personnel to operate whatever technology would be required by NAIS, both of which were clearly central concerns of livestock market owners. When the pamphlet does finally refer to these questions (in the final paragraph) they are addressed as follows:

Both public and private funding will be required for the NAIS to become fully operational. Database systems must be created and maintained, equipment must be purchased, animals must be identified and tracked, programs must be monitored, and labor is needed for all of these activities. [30, p. 8]

Again, while this information is undoubtedly true, there is nothing to critically evaluate and nothing that would be persuasive based on my interviews with livestock market owners. It could be argued that this document was meant to be merely a brief overview of the program, but most beef professionals saw it as a confirmation of a flawed plan with no direction.

4. *The United States Animal Identification Plan*

This document is a summary of the initial document issued by the NIAA, which was a nonprofit organization that organized a task force of USDA and industry professionals in 2003 to draft a plan for the National Animal Identification System. It is the document that truly started the outcry and debate surrounding the NAIS. The NIAA's inclusion of some groups into drafting the plan at the expense of others created a highly politicized environment surrounding the NAIS. As with the USDA's materials, when viewed through the lens of communication through critical thinking, the document falls short in its ability to engage members of the beef community in persuasive, critical thought.

For example, consider the following passages:

- The infrastructure for individual animal identification will be made available as premises become enrolled to provide for the timely introduction of official ID with the new national numbering system.
- The plan contains no mandatory requirements at this point in its development. Eventually, as the plan is finalized and tested, all livestock and food animals will be able to be tracked through the system.
- While preliminary projections for financial requirements have been made, the plan is still being developed so no specific amounts are yet available [31, p. 7].

The NIAA plan never gets more specific than these general sweeping statements. Like the USDA's brochure, the plan makes grand claims for what

will be accomplished by the NAIS without offering any specifics about *how* those goals will be accomplished, what will be required, or who will pay for meeting those requirements. So, while the plan may sound like a good idea in theory, the biased, skeptical readers of the plan that are the producers and livestock market owners were again given nothing concrete to consider and no reason to alter their perception, and were again unable to use the central route processing and critical thinking that would have aided in their persuasion. Even if market owners had been desperate to understand the NAIS, the NIAA's document gave them nothing specific to judge, and no reason to be persuaded that the plan is a necessity.

At the same time, the document makes several promises as to what the plan will do and when its goals will be attained. Among those promises is a call for a national premises registration system to be established in 2004. Also, the plan calls for mandatory participation in the NAIS by 2006. However, over time, both of these target dates and many others came and went. The USDA continued over the next several years to set new deadlines for premises registration and other facets of the program that could not be met. The result was a decrease in the perceived power of the USDA to be sincere about its own policies and to implement those policies. Producers, buyers, and livestock market owners began to question the validity of USDA communications and USDA influence.

5. *Livestock Marketing Association Comments on the US Animal Identification Plan*

This document is the Livestock Marketing Association's response to the NIAA's report. Despite the fact that the LMA was involved in the drafting of the NIAA's proposal, their objections are evident from the start of their comments. They do not directly attack the NIAA, but immediately turn to commenting on the long histories of livestock markets as focal points for disease control and of livestock market owners in bearing the burdensome costs of those initiatives. The major difference between this document and those produced by the USDA and the NIAA is that the LMA's comments are directly related to the day-to-day operations of the livestock markets themselves. For example, consider the following passage from page 2 of the LMA's response:

It is important that the cost projections of the ID program as they relate to markets consider much more than just the cost of the "Data Collection Infrastructure" or market readers, if indeed that is what the current United States Animal Identification Plan cost projections cover. For instance, the cost of refitting markets to accommodate the movement of animals through the market and past the readers will likely be much greater than the cost of the readers themselves. Also, we anticipate that the cost of setting up and maintaining a computer infrastructure and hiring technical staff to run and maintain these systems in the markets will be equally enormous. [32, p. 3]

Owners' concerns were based upon financial and training needs, lack of support from and mistrust of the USDA, and lack of specifics from proponents of the NAIS about how the plan would be executed. In the space of one paragraph, the LMA's document does more to address the specific concerns of the livestock market owners than any of the documents from proponents of the system. At the same time, the LMA's response confirms those fears and implicitly invites the membership to oppose the plan by calling the plan's financial cost "enormous."

Furthermore, after examining the lack of funding and underestimated costs projected by the NIAA, the LMA's document goes into an in-depth analysis of the many potential problems they expect livestock markets to encounter on the basis of the vague specifications set forth by the NIAA. The LMA is persuasive in both its ability to speak directly to the concerns of the market owners and its ability to provide a day-to-day operations perspective of the many potential problems with the NIAA plan, largely because the LMA leadership is comprised of livestock market owners. LMA leaders understand the context of other market owners and write directly to their concerns; the commentary is understandable and motivates readers to consider their information carefully, as it relates directly to their daily concerns.

According to the LMA documents, the NIAA plan claims to offer the ability to track livestock. Yet, as the LMA points out, there are innumerable variables and animal comingling variations that must be addressed before any such plan could even begin to become reality. The USDA describes no plan for those eventualities in its documents. USDA plans have no procedures for moving animals through tagging at livestock markets, what information would be required at the markets, or who would oversee the proper coordination and compliance of those activities.

6. *National Cattlemen's Beef Association NAIS Industry Proposal White Paper*

This white paper was the response of the National Cattlemen's Beef Association to the NIAA report. Like the LMA's response, the NCBA's paper immediately focuses upon the financial concerns of its membership, saying that the USDA has yet to receive the necessary level of funding to make the NIAS fully implemented, and thus, like the LMA's document, speaks directly to one of the primary concerns of its membership.

However, unlike the LMA's document, the NCBA goes on to provide a rationale for a completely private system, also by speaking directly to constituent concerns over data privacy. Because many producers are greatly concerned over the federal government or large businesses gaining access to their personal data, the NCBA's proposal calls for data service providers and data trustees, both of which would be private industry sources, to control the data and to provide services only in accordance with mandates approved by the NCBA's constituents and the technology firms serving as contractors to the privatized national system [33].

Interestingly, the NCBA does not discount the need for NAIS, but the document is persuasive to its membership because of its ability to speak directly to member concerns over price fixing by large companies, unfair competition, and

the USDA's inability to describe how confidential data will be protected. Potential bias can have a strong influence upon persuasion. The NCBA proposed a privately held plan that would be more in tune with the desires of its membership.

Yet it is highly persuasive in its promises to privatize the system, to remove "Big Brother" from the equation, and to protect system data from outsiders. The NCBA's promises have an undercurrent that says, "We know you don't understand, but we do"—more so than the LMA's direct interpretation of the effects of any NAIS. Still, the promises provide comfort to the NCBA audience by removing the responsibility of compliance from the average producer, which correlates with one of the postulates of ELM. By removing personal responsibility from the audience, the NCBA document, in many ways, encourages members to use the peripheral ELM route when considering NAIS and to defer to the NCBA "union" on the matter.

7. *R-Calf USA 2006 Position Paper: National Animal Identification System*

R-Calf's response to the proposals that came from the NIAA's meetings is straightforward. Unlike the LMA and the NCBA, the concerns of the R-Calf organization, which consists mostly of cow-calf producers, center upon whether a need for a national animal identification system truly exists. R-Calf initially proposed country-of-origin labeling, which would have labeled each package of meat according to its country of origin. In its view, the need for a national animal identification system has never been truly demonstrated. It believed that labeling beef products by country of origin would give consumers the information needed to strictly regulate quality within the US beef supply chain.

Yet, like the documents from the NCBA and the LMA, R-Calf's documents consistently speak to its members' concerns, and like the LMA document, to the specific concerns of their members that are related to daily business operations. R-Calf's position is that any system must remain in public, rather than private hands, because of a private system's potential for abuse by large business interests.

This position is consistent with R-Calf's commitment to the "small operator" [34] and traditional values such as maintaining producer freedom and a level playing field with large operators. For example, R-Calf believes that any national system must include traditional methods of animal identification such as branding. Traditional identification methods would be difficult to incorporate into the digital system proposed by the USDA and other alliances. However, like the responses from the LMA and the NCBA, R-Calf's commitment to branding, public funding, and data protection is consistent with the values of its members, as I found in my discussion with many northern state (where R-Calf is most prevalent) producers and livestock market owners.

Once again, on the basis of those values, R-Calf's positions can be much more easily analyzed by its members than those of the USDA because of the language used, the paper's ability to link the issues to producers' daily concerns, and its ability to speak to the fears concerning the NAIS that hamper the USDA's efforts among producers.

Also, like the NCBA and the LMA, this paper was produced by an organization with a singular mission to safeguard the livelihood of its members. The members of R-Calf would be more motivated to read this paper than one from the USDA on the basis of this fact alone. But because the content of that paper is consistent with the daily operations of its membership, as opposed to the USDA's publications, the reader's motivation and ability to process the information are greatly enhanced. Hence, the readership's understanding of the NAIS is much more likely to be drawn from the R-Calf documents than from documents produced by the USDA.

The message of R-Calf to its members is more prohibitive than inclusive. Unlike the messages of the LMA and the NCBA to their memberships, R-Calf's document seems only to indicate its willingness to fight against a mandated system and to guard small producers' data against an incursion by the federal government. R-Calf was direct in its questioning of the NAIS and has generally refrained from giving its membership directives. Still, as with the other industry alliance documents, R-Calf is much closer to the concerns of the average reader than anything produced by the USDA.

1.3.9 Textual Analysis with Implicature and Pragmatics

As you might expect from the results shown by analysis with communication theory, the results of my investigation show large differences in the numbers of implicatures and in the extent and depth of pragmatic consideration given to readers in the definition of context and background knowledge. While none of the texts overtly describe the type of background knowledge required by the reader, it is easy to see that the texts are written for very different audiences in terms of their background, and the implicatures required of readers show a clear pattern.

In general, the USDA and NIAA documents show a consistent disregard for both reader vocabulary and reader background knowledge. Although there are a handful of beef supply chain professionals that would understand the USDA's documents, they are far from the norm. Most members of the supply chain expressed to me in conversations and interviews that the type of terminology found in the USDA documents is largely foreign to them and to their customers. Furthermore, when implicature is required by the documents from the USDA and the NIAA, it is consistently reliant upon ideologies far removed from the daily activities of any market owner or producer. Finally, and this is perhaps the most pronounced difference, the texts from the LMA, NCBA, and R-Calf only introduce one concept at a time and tend to base their analysis of any given concept from the USDA and NIAA documents upon "real-world" concepts that can be pragmatically applied by most of their members. The difference in the number of counted implicatures required of readers is largely a result of this. Total implicature counts for the seven documents analyzed and the terms that required implicatures are documented in Tables 1.1 and 1.2.

The implicature count results per document are somewhat misleading because of their differences in referring expressions. As previously noted, each of the documents seemed to have a different persuasive purpose. It is tempting, looking at the implicature

TABLE 1.1. Implicatures required per analyzed text are shown.

Text	Implicatures Required
<i>Audit, Review, and Compliance (ARC) Branch Policies for USDA Process Verified Program ARC 1001 USDA Process Verified Program</i>	14
<i>The National Animal Identification System (NAIS). Why Animal Identification? Why Now? What First?</i>	Disqualified because of overwhelming implicature 10
<i>The United States Animal Identification Plan General Overview</i>	8
<i>Livestock Marketing Association Comments on the US Animal Identification Plan</i>	4
<i>National Cattlemen's Beef Association NAIS Industry Proposal White Paper</i>	25
<i>R-Calf USA 2006 Position Paper: National Animal Identification System</i>	0

count results, to classify the NCBA's document as the most poorly written. But, as I noted earlier, the NCBA document seemed from the start to be aimed at removing the NCBA constituents from the process of implementing the NAIS.

Overall, per page, the USDA and NIAA documents exhibit the most implicature requirements of the reader, especially given the complete lack of pragmatic consideration given to each. The documents prepared by the LMA, NCBA, and R-Calf are constructed for specific purposes with specific audience concerns in mind. They also show a direct correlation to the daily activities (with the exception of most of the NCBA document) to members' daily activities. They are documents constructed for a purpose and addressed to US beef professionals. This is more than can be said for the USDA and NIAA documents, which are far too vague and far too removed both linguistically and practically to be either communicative or persuasive for most of the beef industry audience.

1.4 Lessons of Beef and Bandwidth

Considering my results, there was clearly misunderstanding and disagreement between the proponents of NAIS and its technology and the livestock market owners and producers who would need to adapt to the NAIS and its technology. I began to notice the gap between the two factions almost as soon as I started talking with cattle producers and livestock market owners. Even the coffee shop talk that was going on in livestock markets made it obvious that there was some level of disagreement and misunderstanding. Of course, that did not explain what was causing the rift. I believe that the misunderstandings can be traced to poor communication strategies employed by NAIS proponents, coupled with a lack of systematic planning and pragmatic consideration.

TABLE 1.2. These terms required implicatures of readers.

Text	Implicatures
<i>Audit, Review, and Compliance (ARC)</i> <i>Branch Policies for USDA Process</i> <i>Verified Program</i>	Verification Data services Validate Data Program Data System Non-validated data On-site evaluation Data evaluation Data validation USDA Process Verified Program Audit Principles of auditing ISO 19011:2002 Independent and systematic Evidence-based approach
<i>ARC 1001 USDA Process Verified</i> <i>Program</i>	Disqualified on basis of near complete implicature
<i>The National Animal Identification</i> <i>System (NAIS). Why Animal</i> <i>Identification? Why Now? What First?</i>	Identification data system National Data Standards System architecture Premises and animal identification State or tribal animal health authority Animal identification number distributor Database Zoonotic disease outbreak Identification system Design of the identification system
<i>The United States Animal Identification</i> <i>Plan</i>	Radio frequency technology Individual animal identification ISO 11784 ISO 11785 Code structure Technical concepts Code of federal regulations Official identification devices
<i>Livestock Marketing Association</i> <i>Comments on the US Animal</i> <i>Identification Plan</i>	Canadian ID experience Non-producer participant Market participant RFID tags warrant Data file transmission

TABLE 1.2. (Continued)

Text	Implicatures
<i>National Cattlemen's Beef Association NAIS Industry Proposal White Paper</i>	NAIS architecture Centralized database Service provider Data Trustee Private database Information management company Animal health authority Robust technical solution NAIS network NAIS database Data collection ISO HDX FDXB Mobile applications Ramping available data Interfacing PDA Import identification numbers Hosting facility Redundant hardware Disaster recovery Off-site storage Middleware data-scrub software Merge and search application software
<i>R-Calf USA 2006 Position Paper: National Animal Identification System</i>	None

1.4.1 No Pardon for Jargon

Written documents highlight differences in the views espoused by the USDA and other proponents of NAIS compared to the views of NAIS opponents. In general, the materials from the USDA were much more technical, had a higher incidence of implicature, paid less attention to background knowledge and current industry trends, were not targeted to key stakeholders, and largely ignored communication networks. USDA documents were also less likely to target themes that promoted central route processing and critical thought. In short, the USDA's persuasive strategies and methods of technical communication were ineffective because of their lack of audience perspective, their avoidance of livestock market owner and producer business concerns, and their inability to use communication networks to successfully diffuse NAIS technology. In hindsight, I believe that the USDA would have had a hard time selling NAIS to the beef community even if it had produced solid, pragmatically considered materials, because the USDA alienated primary beef industry communication network change agents, such as the LMA and

NCBA, from the start. But, misunderstandings only served to compound that error and to prevent any recovery.

It seemed clear from my initial conversations and observations with market owners, producers, buyers, and others that there are a wide variety of skill sets and expectations within the beef industry concerning NAIS and its technology. To change technology resistance in this case, it was imperative to promote that technology in language that made sense to the stakeholders involved.

1.4.2 Alice Is Not in Wonderland

The office managers, who are, as a group, the most technologically advanced employees at livestock markets, seemed willing to entertain the idea of new technology and new ideologies, but they were so unfamiliar with the types of advanced technology required of them by NAIS that they would still require training, as would their staff members. Also, they were, in general, unwilling to take on the role of tech-support person in addition to their already busy schedules. The market owners knew less than the office managers about computer technology, and in general did not want to know more. Of course, the office managers were not targeted for persuasion or education on the facts of NAIS like the owners were. So, in effect, the most technologically knowledgeable personnel in the livestock market industry were ignored by NAIS proponents. It is true, of course, that the level of technological sophistication among office managers was not generally sufficient to maintain NAIS systems at livestock markets on a national level, but they would probably be a more fertile starting ground for exploring technological possibilities than the market owners.

Also, there is a prevalent sense of disdain for technology among many producers. Younger producers are much more accepting, but there are fewer of them. Older producers are much more rigid in their ways. As a group, they do not trust technology. Many of them are of an older generation, which means that they did not grow up with computers or software. In fact, they have a proud sense of self-reliance that leads them to frown upon new ideologies and methodologies and to adhere to the old ways of doing things. Producers are individuals who are accustomed to working with their hands and are not comfortable with processes that cannot be seen or understood. Their distrust of the federal government is strong, and that distrust is particularly true of the USDA.

Poor communication from NAIS proponents did nothing to alleviate their concerns. If anything, those communications caused more confusion. That confusion was, in many ways, the beginning of resistance to the NAIS among livestock market owners and their customers. When confronted with a controversial innovation, they were forced to consider the innovation and to attempt to understand the benefits and drawbacks of the NAIS. Yet they were unable to gather the information they needed to make an informed, critical decision.

Most market owners indicated that they had, at least at one time, been intrigued by the idea of NAIS. However, over time, most of the owners soured on the idea, and many quit paying much attention to the latest developments. In addition, most owners that I spoke with profess no love for technology in general. It is not that they do not respect technology's potential, but they see technology in terms of time and priorities.

Most owners put in long work days, and learning new computer skills was definitely at the bottom of their priority list. They saw the NAIS and new technology as a ticket to more work and less profit. Communications about the NAIS in its infancy did nothing to alleviate these central concerns.

1.4.3 The Telephone Game Still Happens

Information is shaped as it travels. Communication networks had a huge impact on early acceptance/rejection of the NAIS. Any form of the NAIS that would be able to acceptably diffuse throughout the beef industry will need the backing of the industry alliances and the willingness of the communication network as a whole to pass along accurate and understandable information. The alliances, in conjunction with influential individuals throughout the industry, are the true conduits of information and bridge the distance between government and corporate entities and the thousands of small business owners spread around the country.

Unlike a manufacturing business, for example, members of the beef industry are widely dispersed. There are cattle producers and livestock markets all over the country and they reside in predominantly rural areas. The distances between members of the communication network directly affect personal communication and even further empower the effects of coffee shop diplomacy and establish communication networks. There are parts of North and South Dakota where a person can drive on a state highway for half an hour without seeing another car. Communications in these rural areas take place between trusted friends at regular meeting places. Communications are personal and influential. This is not true for the entire industry, but Web-based communication is certainly not the dominating force that it is in many industries. So, even though the USDA's website contained a plethora of information about the NAIS, many members of the beef industry never saw that information. Instead, as I have shown, they relied on interpretations from others within their communication network. Thus, market owners and producers, in particular, were left to form their own opinions on the basis of the information that they had.

The market owners, for their part, believed that the number of small producers is decreasing continuously anyway, as fewer young men and women want to get involved in raising livestock because of shrinking profit margins and urbanization. The NAIS, in their opinions, would only have further consolidated production in the hands of "Big Business." Over time, many continue to believe that consolidation will take place, resulting in fewer producers, more large production ranches, and increased opportunities for a program like NAIS to become feasible. But, they do not want this outcome, and despite the efforts of the USDA and companies like McDonald's, most market owners and producers were not persuaded of the need for the NAIS.

Many producers and market owners, who are of the pre-computer age, candidly told me that they hoped to retire before the industry took on new digital ways of doing business and transferring information. They saw it as dehumanizing to their business and as an affront to their traditions that hold a handshake as a firm commitment, regardless of contracts or database figures.

1.4.4 It All Comes Down to Doin' Business

There were also practical matters that were not fully thought through by NAIS proponents. At certain times of the year, a weekly auction can last 12 hours or more (sometimes more than one day). A small delay in processing each animal sold at auctions could greatly increase sale time, which *nobody* wants. To be fair, the USDA promoted premises identification (and still does), which would allow animals to be largely identified before arriving at auctions. This could eliminate problems caused onsite at livestock markets. Also, many livestock markets allow animals to be dropped off the day before a sale, which would also cut down on sale delays. However, animals are often paired with other animals before, during, or after a sale, which would make tracking more difficult.

In fact, one recent study found that of two million animals studied in Colorado, almost 90% had come in contact with animals identified as “sick” by the research team at some level [37]. Cattle tend to move often once they begin to be sold, which leads to high levels of interactions with other animals. The same study found that all 19,000 identified premises in the study had had some level of contact with the infected animal. Does this mean that all 19,000 premises would be infected by a communicable disease? No. But the ability to trace an animal with computer hardware and software does not necessarily guarantee containment of a communicable infection, which was another sore point among producers and market owners.

Still, it is not hard to see that the ability to trace animals would be of value in terms of tracking disease. As I have said, several countries such as the United Kingdom and Australia are already operating successful tracking programs. But those programs are mandatory in most cases and had significant government financing in their infancy. They also enjoy a level of support from members of their beef industries that has yet to be seen in this country.

The same technology that would drive the NAIS could also be used, at least in theory, to relay information from packers to producers and feed lots that could be very valuable and could potentially lead to better animals and better products for consumers. But that relies on the assumption that members of the supply chain would be willing to share information and that the technology itself could be managed by those who would benefit.

Technology would be a pivotal factor in successfully selling animals and tracking data within any form of NAIS plan. Therefore, any NAIS plan and the technology that would accompany it would need to be completely understood by members of the supply chain (especially among members such as producers and livestock market owners) and would need to operate both efficiently and quickly. Because the USDA, in the opinion of market owners and producers alike, failed to explain how that would happen, they were distrustful and resistant to the ideology and technology of the NAIS.

The advantages of new technologies and ideologies cannot be confused with the social processes that lead to their acceptance. Even when an idea has merit, as we have seen, communication networks, background knowledge, experience, and social dynamics all directly affect the success of technology diffusion. That is exactly what has happened with the NAIS. The USDA relied upon the technological efficiency and safety concerns to sell its ideology, while ignoring the societal values and technological

abilities of their audience. They also failed to communicate with members of the beef supply chain in a manner that could have overridden their concerns with clear, relevant information about their plans.

Within the highly competitive business environment of livestock market owners and their customers, this type of ambiguity is interpreted as a lack of planning and is distrusted. Financing is a central concern of the market owners and their customers. The statements made by USDA documents and communications did nothing to dissuade their fear of being required to pay for the program themselves and for training their employees. Therefore, rather than engaging them in critical thought, these partially considered communications lead to an emotional response based upon long-standing distrust of the USDA and fears of overwhelming changes to business models, technology, and costs.

Many members of the beef community that I interviewed never got past the initial price tag of the NAIS. However, some did, and were genuinely interested in understanding the technology that would support such a bold initiative. On that account, my interviews and conversations with livestock market owners and other beef industry professionals revealed several consistent themes:

- First, livestock market owners and their customers are clearly more influenced by industry alliances than by the USDA.
- Second, although many made an effort to read and comprehend the plans laid out by the USDA, the industry as a whole found those materials to be detached, confusing, and incomplete.
- Third, the portions of those materials that were understood by market owners, their customers, and industry alliance officers were not persuasive.
- Last, that personal contacts and informal communication networks are still vital to communication within the beef industry.

As I have shown, one of the USDA's first actions, although unintentional, was to create a virtual "turf war" among the predominant industry alliances that removed the USDA from the role of change agent and cast it in the role of "Big Brother." Materials distributed by proponents of the NAIS were system-based rather than user-centered. Those materials did not create a common background between writer and reader, which was confusing and disheartening for members of the beef industry.

Thus, fearing for their own livelihoods, and convinced that the USDA's "mystery plan" would either enslave them or bankrupt them (or both), the individual alliances, which are, as I have also shown, the overseers of beef industry communication networks, began a fierce anti-NAIS campaign designed to wrest control of the NAIS from the USDA and protect their own interests. Had they access to a fully realized plan from the start, I do not believe that their reaction would have been so antagonistic.

Furthermore, the USDA responded to the initial industry backlash against the NAIS by promoting a string of "deadlines" for the adoption of NAIS, all of which were later postponed. Over time, these unrealized deadlines were treated much the same as any empty promise—they were ignored.

Even if the USDA had moved past pricing and politics before the debate over the NAIS began, it still would have needed better communication strategies to sell the idea. As my results show, the USDA's written communications suffered dramatically, as did its informal communications, as a result of its divergence from communication maxims that could have helped channel key communications through social networks and better defined written communications for intended audiences. Grice's model shows that we expect an appropriate amount of information from communication and that we expect it to be relevant. Neither of those conditions was met by early communications about the NAIS.

1.4.5 What We Have Here Is a Failure to Communicate

Motivation was not originally a problem for NAIS customers. Market owners saw themselves as responsible for performing specific tasks related to NAIS and for adhering to NAIS policy. They were, therefore, sufficiently motivated to form correct opinions and behaviors with respect to the NAIS. We can also assume that they were not initially distracted, because all information about NAIS was initially coming from the USDA. For the same reason, there was no initial overabundance of information about NAIS. The overwhelming number of messages and message sources concerning NAIS presented themselves only after the industry had determined that the USDA plan was incoherent and industry alliances began to vie for control of the process. Afterward, old resentments and distrusts began to make NAIS diffusion both social and political.

The ELM states that new information encountered by message recipients with an existing bias toward the source of the message or the subject will likely bolster the existing attitudes of the message recipient. However, as ELM also points out, the personal relevance of a message to the recipient can overcome this initial bias, leading the recipient to attempt to form objective opinions in spite of original bias. The NAIS, as a primary business concern for livestock market owners and producers, provided plenty of motivation for them to understand its principles. For that reason, we cannot conclude that bias was an initial impediment to the central processing route for them, even though bias did exist. We can also conclude that there were no initial distractive communications that would have prevented them from understanding NAIS. And finally, we can conclude that the livestock market owners and producers, as nonoriginators of the plan, were shielded from personal responsibility for its success.

Thus, having eliminated distraction, motivation, bias, relevance, and personal responsibility as factors that would prohibit communication, we must place the blame on the communications themselves. The only other factor that blocks critical thinking, persuasion, and information processing is a message recipient's inability to understand the content of the message. We have seen that most market owners were at one time motivated to understand NAIS. The only missing link was their ability to understand the information presented. My results show that the information presented to market owners by the USDA was not understood because that information was not designed for the beef audience, and when it was understood, it was so pragmatically removed from the daily operations of beef industry professionals that the information did not speak to their concerns. That translates into *no plan*, and no concern for those impacted by the plan. Hence, emotional responses and communication network sources (such as

the industry alliances) became dominant, and the principle determinants of technology diffusion success became external interpretations of NAIS policy from sources claiming to represent the message recipient's best interests.

Yet, there were also problems with USDA communications at a textual level.

Even if the documents produced by the USDA and other NAIS proponents had been on topic and pragmatically centered, they were often so poorly written that they could not have been understood or persuasive.

Pragmatically, the documents seem to be created for no one in particular and by no one in particular, and they contain very few specifics about anything in the context of daily beef operations.

Written communication relies upon creating successful implicatures through phrasing and terminology. We expect enough relevant information, based on shared knowledge, to communicate without explanation of every facet of a discussion. The consistent need of the USDA and NIAA's texts for extensive implicature seriously hampers the ability of the text to ease beef industry readers into NAIS understanding. By consistently referring to concepts unavailable to the reader, they create confusing passages without explanation. As soon as the reader is making progress, the reader finds another term that requires implicature based upon unavailable references.

In contrast, the documents from the industry alliances (with the exception of the NCBA) and newspaper and magazine articles (which tend to oppose the NAIS) typically reference familiar situations and terminology. The bureaucratic terminology employed by the USDA to streamline discussions is a victim of its own practices. The very terminology employed in its writing style is misunderstood by its customers. It requires implicatures through references, obscure terms, and concepts that do not lend themselves well to everyday beef industry practices.

Implicature is essential to both the reader and the writer, because it decreases our need to explain every little thing. But, it is also essential that implicatures be built upon common background knowledge shared by both the reader and the writer. In the case of NAIS proponents and the beef industry, this shared knowledge was not properly incorporated into communications (especially documents). When we speak of specialized concepts such as the NAIS and technology, implicature becomes more of a burden than it does in regular text. Documents promoting the NAIS clearly fall into this category. Because those documents frequently refer to specialized concepts, as opposed to everyday concepts, implicatures are more frequently required and are much more difficult for the reader to create. In that situation, the burden falls upon the writer to use text to create a situational model that encompasses a delineated starting point. In this case it did not.

In short, it is a long way from a desk at the USDA's Washington, DC, offices to a sale barn in Texas. If the writer does not share background knowledge with the reader, then the writer and reader cannot share pragmatic meaning of language. The situational context of USDA directives, written from a system-centered point of view by USDA employees, is too far removed from the context of anything happening at that Texas livestock market to be integrated into everyday business.

If we return to my initial examples of implicature concerning the couple going out to eat, we can see that they are built on everyday concepts such as money, restaurants, and the link between the two. This correlation does not appear within NAIS discussions from the USDA, where a reference to something like a *database* may have no inherent connotations whatsoever for the average reader, unless, of course, we know the context from which the reference came, such as the setting of the couple being stranded in a raft, or in the case of the NAIS, the context of the livestock market. Again, market owners and producers were not given that context.

The USDA, and others trying to explain the merits and everyday workings of the NAIS to market owners and producers, would have been better served by creating hypothetical situations, such as that of a market owner who wanted to implement NAIS and has concerns. The most common scenarios could have been identified and used in a way that would have provided at least some type of contextual backdrop and less confusion.

Pragmatic consideration should also be given to similar efforts in the future. How can a producer be expected to understand the complexities of a national system unless those complexities are first explained in terms of a small ranch? Regardless of the specific communication, the need to include implicature, pragmatics, communication theory, and core industry values into similar programs is real. They are also fundamental to any industry that seeks to implement radically new and different technology, and the beef industry is certainly not the only industry that will be asked to adopt radically new technologies in coming years.

The NAIS plan sought to expand its prerogative to almost every agricultural industry, and similar technologies are poised to radically alter manufacturing, shipping, and other agricultural industries, just to name a few. Those industries will face communication challenges similar to those that the beef industry has experienced.

Unfortunately, current technologies seem to change before our understanding of them is complete. Technology will continue to change, computer technology will continue to affect new industries, and there will be a need for extensive guidance and education concerning that technology.

The overseers of the beef industry communication networks, such as the LMA and NCBA, have considerable political clout. They are seen as “grass roots” organizations in their home states, and politicians are reluctant to offend them, especially in highly agricultural states. In fact, most politicians I spoke with were interested in promoting animal identification only as far as it would be supported by their constituents; and even when support is high in a certain area, supporting the initiative with state or federal dollars seems to strike them as a risky proposition.

1.4.6 Culture Is King

Several themes were apparent during my investigation into the beef industry and seem likely to resurface during similar struggles in the future. The first of these was that beef industry professionals see what is going on in the world through trade journals and magazines, from reports from the industry alliances, and even through reports from the USDA. They understand that global marketing is important for their future and that other

countries are making concerted efforts to promote their beef as safe and traceable. They also understand that the beef market may quickly become reliant upon traceability. But, they were unwilling to commit their current financial standing to a program that was been poorly communicated, is ill-defined, and had no political backing.

Market owners and producers are not stupid. Cattle owners know cattle. Many of them are very successful financially. Their financial standings and lifestyles make them independent in a way that most of us cannot understand in today's world. But the convergence of cattle and computer technology is just starting, and will be difficult. If we took computer programmers and placed them in the back of a cattle auction, asking them only to move cattle from the pen to the sale arena, there would be pandemonium!

The NAIS, as a plan, existed only as a construct to be argued for or against on the basis of limited information. As a group, the beef community *is* willing to use new technology, although they insist that it be understandable, beneficial, and profitable. In an industry like the beef industry it stands to reason that digitizing some or all of their processes could save both time and labor. This concept is something that all participants seem to support. To them, the only reason to use technology is if it makes things easier and more profitable. Confusion among any technologically inexperienced group of users is met with immediate frustration and must be countered by effective explanation and pragmatically centered design.

Finally, the skill set likely to be encountered within this industry and others like it that are new to computer technology is prone to be widely varied. While not common anymore, it is still possible to operate a livestock auction without a computer at all. As we have seen, there are some who have no intention of having anything to do with hardware or software or anything else computer-related. In turn, there are those who we would not expect to be savvy, who are. This must lead us to consider the needs of the beef industry user from an all-encompassing perspective, while realizing that each individual user expects a certain amount of tailoring to his needs.

One thing that all participants seem to realize is that the industry is changing. Whether they want to be involved or not, they all seem to realize that eventually *someone* will *have* to be involved.

Whatever the future holds, it is my hope that the findings of this investigation will prove to be beneficial in the pursuit of a better technological future. For that matter, I hope that the model employed here will be beneficial to other industries as well. I believe that the combined analysis of technology diffusion, communication networks, theories of communication, and principles of written communication can be adapted to other industries that are moving into more technologically driven modes of operation.

Technology is advancing at such a rate that we cannot hope to keep up, save for our own limited areas of expertise. That means that entire industries will need communicative strategies for explaining computerized technology to new users. That situation is in no way limited to the beef industry.

1.4.7 The Situation Now

As of 2013, the USDA announced its final rules for animal identification [38] within the United States. The rules that will be implemented are a far cry from those envisioned

in 2004 and even as late as 2009. Most of the original plans proposed by the USDA have been abandoned. For example, identification of any kind applies only to animals that move across state lines. That identification can be any one of several low-tech documents including veterinary inspection, owner-shipper statements, or brand certificates. In addition, animals going to slaughter can be identified with only a back tag, and brands, tattoos, and breed registry certificates are now considered official forms of identification. Finally, only animals over 18 months of age are subject to any identification requirements, and electronic identification, centralized databases, and movement reports have been eliminated completely. In short, very little has changed.

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