

NETWORKING ADVANCES EMERGING AGRICULTURAL TECHNOLOGIES

D.L. Varner, B.L. Schmidt and D.L. Kahl

*Southeast Research & Extension Center
University of Nebraska-Lincoln
Lincoln, Nebraska*

J.D. Ellis

*Department of Agricultural Leadership, Education and Communication
University of Nebraska-Lincoln
Lincoln, Nebraska*

ABSTRACT

Innovative Nebraska farmers and agribusinesses partnered with University of Nebraska-Lincoln (UNL) Extension in 2001 to form the Nebraska Agricultural Technologies Association (NeATA). UNL Extension faculty and NeATA members have collaborated for nearly a decade to further agriculturists' understanding and adoption of emerging agricultural technologies via machinery/technology field days, hands-on GIS/GPS computer workshops, aerial imagery experiential learning, annual technology conferences, and on-farm research associated with Extension initiatives and various grant-supported research efforts. NeATA has been instrumental in educating more than 1,500 Midwest agriculturists focused on site-specific management issues. A focus group evaluation of past and present NeATA members, conducted in the winter of 2008, identified two primary benefits associated with the organization's decade of educational efforts. The first focused on helping agriculturists acquire new knowledge related to available technologies and how to incorporate such tools into an operation in a functional and economical manner. The second centered on facilitating opportunities for agriculturists to interact with each other regarding various technologies and processes of interest. NeATA members report that attending annual NeATA conferences increased participants' awareness of emerging agricultural technologies, their understanding of technologies, and helped them identify financial and environmental benefits related to new technologies. The opportunity to share experiences regarding technology implementation and to learn from others was highly valued by NeATA conference participants. Using agricultural technologies improved participant's profitability and enhanced environmental stewardship through more efficient use of fertilizer, water and seed. This grassroots organization has been instrumental in helping UNL researchers acquire more than \$1,500,000 in USDA and industry grant funding.

Keywords: Precision agriculture, site-specific farming, emerging technologies, extension, education, user groups, networking, NeATA, evaluation

INTRODUCTION

Farmers are resourceful and traditionally form user support groups when resources are lacking and they feel the need to collaborate. The Kansas Agricultural Research Association (KARA) is another such group whose goal is to “enable farmers to better assess the economics of adopting precision agriculture technology and site-specific management” (Howe, 2010). A similar group is the Precision Agriculture Research Association (PARA) in Montana. PARA was one of the first precision agriculture focused user support groups in the country. The group focused primarily on remote sensing technologies applicable to farming and ranching.

Innovator and early-adopter producers, agribusiness professionals and educators formed the Nebraska Agricultural Technologies Association (NeATA) as an emerging agricultural technologies support group comprised of producers, industry representatives, academics and others. Collectively, members of this organization help each other explore, research, experience, understand and adopt new agricultural technologies. NeATA and University of Nebraska–Lincoln (UNL) have collaborated on research and education initiatives since 2001. This partnership has a successful history of research and education contributions that include farm research, acquisition of more than \$1,500,000 in USDA and industry grant funding, and numerous education programs.

NeATA education and networking happens via several venues. An annual two-day conference anchors the organization’s outreach efforts. This conference offers a series of plenary and concurrent educational seminars and workshops for participants. Additional educational efforts focused on hands-on field days and workshops addressing basic precision agriculture fundamentals, using aerial imagery in crop production, GPS-based auto-guidance and Manifold GIS software. Networking occurs at all educational venues, in particular the annual conference. Other more recent and autonomous networking is facilitated using listservs, websites and most recently Facebook and Twitter.

Diffusion theory describes how, why, and at what rate new ideas and technology spread through cultures. Rogers (1962) defined diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system."

Rogers (1995) proved that adopters of a new idea could be categorized as innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%). The “innovators” are farmers who interact with other innovators, are venturesome and were the first to adopt precision agriculture technologies. “Early adopters” are the respected farmers, opinion leaders who adopt new ideas early but cautiously, and continued to adopt these technologies. Rogers categorized the five adoption steps as: knowledge, persuasion, decision, implementation, and confirmation. The four main elements of the theory are innovation, communication channels, time, and the social system.

This theory further explains the interpersonal relationships, information sharing and support realized by NeATA membership that ultimately leads to further understanding and adoption of new agricultural technologies. Rogers (1986) characterizes a communication network as consisting of “interconnected individuals who are linked by patterned communication flows.” Demonstrating these technologies, communicating their justification, giving the idea time to be considered, and reaching out to critical sectors of the organization are important to successful diffusion (Rogers).

Social network theory is the study of how the social structure of relationships around a person, group, or organization affects beliefs or behaviors. Information exchange is facilitated via social networks, with actors as nodes in the network and information exchange relationships as connectors between nodes (Haythornthwaite, 1996). NeATA was developed to be such a network, where players in the emerging agricultural technology arena are the nodes and organizational functions serve to facilitate networking.

The goal of this study was to evaluate the impact of NeATA on the understanding and adoption of agricultural technologies by its members. Specifically, the objectives of this study were to determine: (1) if agricultural technology adoption and understanding had occurred, (2) what role NeATA has played in this adoption, and (3) how NeATA can continue to help agriculturists adopt new technologies.

METHODS

Efforts to measure NeATA’s diffusion and networking impact using written evaluation instruments have resulted in poor participation and vague responses. The quest to evaluate NeATA members’ understanding and implementation of new agriculture technologies as a result of their membership required a user-friendly and interactive approach. Krueger (1989) suggests that focus groups are a field research method used to facilitate group interaction and greater insight into attitudes, perceptions and opinions of participants. Focus groups are a socially oriented, qualitative procedure that fits well within the culture of NeATA and the intent of this evaluation. Four focus groups were conducted. Open-ended questions were employed to encourage open discussion.

Participants

Participants were NeATA members who had attended a minimum of two NeATA sponsored educational programs. The goal was to recruit 6 to 10 members to each planned focus group. Participants represented farmers, crop consultants, Extension educators and private industry representatives.

Recruitment

NeATA members were notified via their organizational listserv regarding the impending focus group evaluation process. Members were randomly selected from a list of 125 NeATA members who had participated in two or more NeATA educational programs, thus assuring familiarity with the organization and its

purpose. Focus group candidates were mailed a letter explaining the focus group interview process. This correspondence included an informed consent form designed to meet Institutional Review Board (IRB) protocol. Candidates were asked to respond if they wished to participate in the focus group process. Participants who responded were mailed a follow-up postcard a week prior to their respective focus group session confirming their attendance.

Procedure and Format

Semi-structured focus group interview sessions were conducted in four Nebraska communities: Kearney, Grand Island, York and Lincoln. These communities are rural trade center communities that represent the majority of Nebraska NeATA membership. Focus group participants were invited to a complimentary lunch or dinner at an area restaurant which was followed by the focus group session. A total of 27 NeATA members participated in the 90 minute interview sessions. Each focus group consisted of 3 to 9 members. Open ended questions were developed to encourage open discussion. UNL Extension educators who were trained focus group facilitators conducted the sessions. One educator lead the focus group session while the other served as recorder. Focus group facilitators were familiar with NeATA, but not involved in organizational management or educational programming.

Facilitators welcomed participants and provided an overview of the focus group interview goals. Informed consent forms were collected and questions were answered. Participants were asked to respect the thoughts and confidentiality of all participants. Focus group sessions were conducted in rooms separated from the public area of restaurants. Institutional Review Board protocol was followed throughout this study.

Type of Data Collected and Questions Used

The data collected during this study consisted exclusively of the comments, observations and opinions shared by focus group participants in qualitative format. Each interview session was audio recorded for analysis. The number of participants included in each focus group session was documented.

A series of questions was developed to evaluate NeATA impact regarding understanding and adoption of agricultural technologies by its members. Examples of a few key questions include:

- Over the years, where have you gotten your information about new agricultural technologies?
- What new technologies have you adopted or worked with?
- What has helped you adopt these new technologies?
- Tell us about the NeATA conferences, workshops and field days you have attended.
- How has NeATA helped you in learning about and/or adopting new agricultural technology?

- Do you keep in touch with people you have met at NeATA conferences and events? If so, how do you do it?
- What has been the most valuable part about being involved with NeATA?
- How do you think NeATA can continue to serve your ag technology needs?

RESULTS & DISCUSSION

NeATA's Influence

NeATA serves its membership by facilitating learning opportunities. Focus group participants initially sought out the organization for one primary purpose—to gain information. They value information that helps them adapt, use, and/or troubleshoot current technology as well as learning about technology that is in the development phase that could benefit their operations in the future. Participants reported that they initially became involved with NeATA to learn: (1) currently available agricultural technologies, (2) technologies that were not well supported by companies, (3) how to analyze data they collected, and 4) how to integrate software and hardware components.

NeATA has met participants' desire to remain abreast of emerging agricultural technologies. The process is described as mentally stimulating. Participants stated:

Information is invaluable. NeATA brings an opportunity to expand your mind. It has caused us to think a little further down the road.

It (NeATA) is stretching the realm of possibilities and that is what it takes today.

This information is gained by NeATA members in a variety of settings, but the primary avenue identified is through the annual conference structure and other educational programming. Participants appreciate the variety of sessions at the conference, which range from basic research to solving practical problems. They also like knowing what is happening in academia. Several people mentioned finding out about additional resources at the NeATA conferences. Periodicals and web sites were also a frequent source of information, but were not necessarily trusted to the extent as information gained at the NeATA conference. Participants remarked:

As you get a lot of marketing from companies on their products, I really value a conference like NeATA that can help us weed out what is useful and what is not.

It is a conference that is information driven, not sales driven.

While it is evident that NeATA conferences benefit producers in the “here and now”, these sessions also help farmers look to the future. Many times the mix of sessions on current topics combined with sessions looking to the future was

mentioned as being a very positive programming aspect of NeATA conferences. NeATA was mentioned as the source for acquiring the necessary knowledge to make decisions concerning adopting agricultural technology. Participants suggested:

It (NeATA) has helped make decisions about if or what technology to invest in.

It exposes me to things and helps me eventually accomplish things better in an efficient way.

How NeATA is Making it Happen

Gathering new information about agricultural technologies is a significant benefit to NeATA members, but the way this information is acquired also is important. Participants appreciate the opportunity to meet with fellow farmers, technology providers and retailers, and researchers studying technology use and application. Members said:

I always judge a good conference by the discussions you have in the hallway. NeATA is good at creating that atmosphere.

I like the fact that they bring in different people. You can see what is from the farmer side and vendor side. NeATA offers a common venue to bring all of this together. I value that highly.

The networking and connections to other farmers, agribusiness people, and University of Nebraska faculty interested in agricultural technology is attractive to NeATA members. Many times their neighbors have not been interested in adopting new technologies, leaving them void of traditional sources and networks for information. Some agriculturists attend NeATA programs primarily for contact with other technology-minded people. Early adopters and innovators stated,

When I started yield mapping, no one was doing it and so listening to conference speakers was so helpful.

If you are a geek who likes to figure things out, NeATA is a source of people who like to try things. Going to the coffee shop, people do not know what you are talking about so it (NeATA) becomes a great network where you learn ideas from other people, including speakers from other places in the country. NeATA has helped me adopt (new technology) as much as anything.

This face-to-face interaction not only benefits farmers using technologies, but also those developing new technologies or applications. A study participant, who identified himself as a researcher, indicated he learned a lot by being able to visit with farmers face to face. Getting feedback from the producers attending NeATA

had been a very positive experience for him and NeATA had helped him secure a grant for technology development.

Talking to other users of technology and learning from their experiences was an overriding theme from the focus group participants. For these participants, NeATA has provided exposure and connection to others with agricultural technology experience, which has expedited their information acquisition compared to learning by themselves. NeATA has helped producers solve problems and acquire new ideas by providing a venue and process to help agriculturists contact others in similar situations.

What NeATA Members are Learning

Participants credited what they had learned from attending NeATA conferences with helping them make decisions or improve their operations. Technologies and management strategies that NeATA members have learned about through the organization's programs and have incorporated into their operations include, but may not be limited to:

- Sprayer efficiency
- Uniform water distribution under irrigation system
- Minimizing effects of runoff
- Quantifying profit and loss
- Whether or not to invest in a technology
- Thinking ahead to plan purchases
- Coping with limited man power.

One grower noted,

It has been the only way we could have gotten to where we are now. That's what it (NeATA) has done for us.

Planning for the Future of NeATA

The focus group results clearly indicated that NeATA was a valued resource to its members, both for content knowledge and networking. This study went beyond current benefits and also investigated how NeATA can continue to be a viable resource for its members in the future. The following are suggestions for continuing current programs or roles as well as areas for potential consideration and development:

- Keep providing a platform, a place to go to learn and discuss
- Keep providing information and a direct link to the research that is being conducted
- Expand focus from just crop production to machinery, livestock, fuel efficiency and different sources of energy
- Field days where you actually get a chance to use equipment
- Combine workshops with the conference

- Must maintain an agriculture/farmer focus. Be farmer driven
- Work to attract producers from the livestock industry
- What is the most valuable way to use resources efficiently? It may not be cropping. Water is a huge issue and technology may provide the tools for using it efficiently even if it just helps with accountability.

Participants also had comments about involving young people when talking about the future of NeATA and agriculture. They see technology as being a way to connect with youth coming back to the farm and a way to get young people excited about agriculture as a career. Technology was discussed as a ‘carrot’ to get youth interested in agriculture, whether they come from the farm or are urban students. Participants were excited about seeing young people at the NeATA conferences. Suggestions included developing a portable educational exhibit to take around to various locations or making a precision agricultural video game to capture the attention of youth. Having a presence at the state FFA convention also was mentioned.

Focus group participants commented that NeATA members commonly interchanged NeATA, referring to the organization, with NeATA, the annual conference. One might infer that participants did not view the organization as providing much more than the conference. This surfaces the question of whether NeATA should be, or wants to be, known as an organization that provides numerous opportunities to its members. If so, then organizational management might consider repositioning NeATA as a source of agricultural technology information and a service provider rather than a conference planner or sponsor.

Discussion regarding future information and education delivery occurred at each focus session. Participants anticipated busier schedules making attending face-to-face programs more difficult in the future. Suggested solutions included delivering education via distance education technology or recording speakers for web delivery on a fee basis. Desired solutions include those that allow just-in-time-learning at the convenience of participants.

CONCLUSION

Participants in the NeATA focus groups conveyed an enthusiastic appreciation for the knowledge they had gained and used from attending NeATA conferences where they were able to access a variety of researchers, vendors and other producers with common interests. They indicated they wanted to see NeATA continue in the future not only for themselves, but to reach new audiences of youth and other producers.

Two primary themes arose from the focus group conversations with NeATA members regarding benefits of the organization and what they gained from attending NeATA conferences. The first theme focused on acquiring new knowledge related to available technologies and how to incorporate such tools into an operation in a functionally and economically useful manner. The second theme centered on the opportunity to interact with other event participants regarding various technologies and processes of interest.

RECOMMENDATIONS

Focus group participants reinforced the need for an organization such as NeATA, which serves to fill the technology information gaps that often occur when new products and services are introduced. Several challenges lie ahead for NeATA. The following are recommendations to maintain NeATA as a viable organization:

- Refine organizational goals in regards to target audience, mission and goals.
- Offer just-in-time, autonomous education via internet or smartphones that is essential to retaining the organization's innovators and early adopters.
- Consider engaging more youth in agricultural technology exploration and implementation.
- Partner with additional organizations including other educational institutions, United States Department of Agriculture (USDA) and private industry to enhance information and education development, learning and adoption.
- Expand expertise resources for NeATA membership globally by inviting international expertise to engage members via webinars and other means.
- Target specific agricultural technology sectors (technicians, advisors, growers, educators? with focused educational programs.
- Continue to “push the envelope” employing technology and people resources that will pioneer new frontiers in agriculture.

REFERENCES

Haythornthwaite, C. 1996. Social network: An approach technique for the study of information exchange. *Library Information Science Research*, 18: 323-342.

Howe, D. 2010. Envision precision. *Corn and Soybean Digest*. February, p. 38.

Krueger, R.A. 1989. *Focus Groups: A Practical Guide to Applied Research*. Newbury Park, CA: Sage Publications.

Rogers, E.M. 1962. *Diffusion of Innovations*. Glencoe: Free Press.

Rogers, E.M. 1986. *Communication Technology: The New Media in Society*. New York: Free Press.

Rogers, E.M. 1995. *Diffusion of Innovations*. New York: The Free Press.