

## Fellowship Final Report: 2017

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### Introduction

Our ability to generate data has greatly increased in recent years. Agriculture is among those sectors that have seen a significant increase in the ability to collect large quantities of data. In this era of “big data,” challenges lie not only in storing and processing data, but distilling and presenting it so it becomes meaningful and offers insights to our intended audience.

One example where large quantities of agriculture data are being collected is Nebraska Extension’s On-Farm Research Network. This network works with farmers to collect valuable research information from their farming operations. This on-farm research data, when aggregated with research data from multiple farms and years, can offer insights to improve production practices and increase profitability and environmental sustainability. Unfortunately, scientific data is often presented in overly complex charts; these charts are hard for audiences to **interpret** and **remember**. This also is true for presentations delivered to both the scientific community and Extension audiences. Good information, when displayed poorly, does not prompt desired behavior change.

Historically, data visualization has been left to specialists such as data scientists and professional designers. This is no longer the case. Due to enhanced computing capabilities, new software and tools, and the ability to quickly collect and process massive quantities of data, most Extension professionals routinely produce charts and figures.

Effective data communication can remove the barrier to understanding and promote behavior change. From November 2016 through April 2017, I served as eXtension fellow on the topic of Data Visualization. The purpose of my fellowship has been to personally explore the topic of data visualization, raise awareness of its importance, and demonstrate innovative ways to visualize data using examples from the Nebraska On-Farm Research Network.

### Activities and Accomplishments to Fulfill the Submitted Plan of Work

#### ***Personal Professional Development Related to Data Visualization***

The first part of my fellowship was focused on professional development around the topic of data visualization. To this end I:

- Read *Effective Data Visualization* by Stephanie Evergreen.

- Read *Storytelling with Data* by Cole Nussbaumer Knaflic.
- Listened to the “Data Stories” Podcast (5 episodes, totaling 4.5 hours).
- Listened to “The Rad Presenters Podcast” (16 episodes, totaling 8 hours).
- Created graph “makeovers” of my own work based on what I learned through reading and podcasts.
- Published 3 blogs at eXtension summarizing data visualization basics and solicited feedback from readers.
  - Data Visualization for Extension Professionals: Why Does it Matter?  
<https://extension.org/2017/04/04/data-visualization-why-does-it-matter/>
  - 7 Elements of Good Data Visualization  
<https://extension.org/2017/04/11/7-elements-of-good-data-visualization/>
  - Data Visualization Makeover  
<https://extension.org/2017/04/13/data-visualization-makeover/>

### ***Personal Professional Development to Increase Graphing Skills and Explore New Software Options***

The next part of my fellowship was focused on exploring various software options for developing data visualizations. To this end I:

- Watched 2 hours of Tableau Training and experimented with creating various visualizations with this tool.
- Attended “R Club” at UNL – 3 hours.
- Currently participating in SDSU 1-credit online R course
  - Based on my experience with the 3 hours in R Club, I determined more dedicated training was needed for me to grasp and take off with this tool. I have enrolled in a 1-credit online R course from May to August 2017.
- Because I was not able to gain adequate skills in R, I did not write a blog post comparing these tools as originally planned.

### ***Develop Sample Project 1: Create an Interactive Online Chart Using Data Collected in On-Farm Research Studies***

A visualization was created to interactively share Nebraska On-Farm Research data on starter fertilizer effectiveness and use. Tableau has been demonstrated within eXtension for the purpose of presenting evaluation and impact data; however, it has not been demonstrated as a means of sharing research information with clientele. Viewers of a UNL Next Generation Extension webinar on Tableau expressed interest, but indicated they lacked ideas for how this could be implemented in their work. This provides another use case for Tableau in Extension.

- The visual created in Tableau is available here:  
[https://public.tableau.com/profile/publish/Test\\_StarterandSoilP/Dashboard2#!/publish-confirm](https://public.tableau.com/profile/publish/Test_StarterandSoilP/Dashboard2#!/publish-confirm)
- The visual was shared on Twitter, Facebook, LinkedIn, and UNL’s CropWatch eNewsletter.
- The interactive visualization was released on April 17, 2017, and as of April 27, 2017, had 309 views.
- This use case and other examples of innovative, interactive data visualizations were shared via an eXtension blog post “Beyond Static Graphs: Engage Your Audience with Interactive Data Visualizations”  
<https://extension.org/2017/04/25/beyond-static-graphs-engage-your-audience-with-interactive-data-visualizations/>

### ***Develop Sample Project 2: Video Presentations of Data Stories***

Videos already are being used to present research-based information in Extension; however, my focus was on presenting highly data-centric information using data visualization. My interest in this came after viewing an impressive data visualization video (<https://www.youtube.com/watch?v=jbkSRLYSojo&t=1s>). I thought this same technique could be used to present research data in Extension. However, after doing some reading on recent video trends, I found that currently 85% of Facebook videos are viewed without sound. This led me to take a different approach and attempt to present research data in a silent, short video where info is conveyed as text.

In order to routinely produce data-centric videos, the method of video creation needs to be fairly quick. For this video, I chose a quick, easy video production tool – Adobe Spark. While this limits flexibility in video creation options, it does give the ability to produce professional looking videos very quickly, and for those unfamiliar with video production, dramatically decreases the learning curve.

The video I produced can be found on:

- YouTube (<https://www.youtube.com/watch?v=aiDVzweC5ow>)
- Facebook ([https://www.facebook.com/OnFarmResearch/videos/vb.133798170075605/117999889545552/?type=2&theater&notif\\_t=like&notif\\_id=1492741732754930](https://www.facebook.com/OnFarmResearch/videos/vb.133798170075605/117999889545552/?type=2&theater&notif_t=like&notif_id=1492741732754930))
- Twitter (<https://twitter.com/AgTechLaura/status/854763473024188428>).

Within 72 hours of posting, the video had been viewed:

- 79 times on YouTube
- 128 times on Facebook
- 534 times on Twitter.

Additionally, on Twitter, it generated 2,697 impressions, 15 retweets, and 13 likes. In sum, the video was viewed 741 times in three days, supporting the concept that these short, silent videos may be a useful avenue for sharing data stories.

I wrote an Ideas at Work article for *Journal of Extension* (under review) on the topic of telling data stories through short, videos without audio.

While this method allows one to quickly and easily produce data videos, I was not satisfied with the options for animating and displaying graphical data. I opted to do a work-around animation in PowerPoint and record this using screen recording for inclusion in the presentation. This is a limiting factor; I was not able to find a tool that allowed engaging and convenient data animation for the purpose of video production. This is an area that I will continue to explore.

#### ***Additional Activities and Accomplishments***

- To conclude the project, a webinar on May 30 covered in brief all aspects of this fellowship, including data visualization guidelines and interactive visualizations. A total of 44 attended this webinar and it is posted online at <https://nextgenerationextension.org/>. Comments were very positive and indicated that attendees found the material interesting, informative, and helpful.
- Throughout this process I attempted to “work out loud,” primarily through Twitter, the eXtension blog, and LinkedIn, providing some excellent opportunities for dialogue with colleagues from other states whom I had not previously met.

## Conclusions and Recommendations

As blogs were published, I solicited feedback through surveys. These responses served to guide my work in the project and also provided valuable information moving forward.

The first survey had 13 respondents:

1. Prior to reading this article, had you heard of data visualization?
  - 85% of respondents said yes
2. What do you think are our greatest challenges in effectively communicating data?
  - Five responses centered around knowing the audience or how to communicate with that audience.
  - Three responses cited the challenge in communicating simply without losing meaning.
  - Two responses cited the need to learn new tools and methods for data communication.
3. Do you plan to do anything to learn more about data visualization after reading this article?
  - 12 of the 13 respondents stated they planned to continue learning about data visualization. The person stating they would not cited lack of time, not lack of interest, as the reason.
4. What resources related to data visualization would you like access to?
  - Seven respondents requested “how-to” articles, short videos, or webinars.
  - Three respondents requested specific examples of effective data visualization.

The second survey had 4 respondents:

1. After reading this article, what do you plan to do?
  - Three indicated they would re-evaluate a graph they had made.
  - Two indicated they would visit a data visualization website.
  - Two indicated they would read a data visualization book.
  - Two indicated they would follow a Twitter account featuring good data visualization
2. What is your biggest hindrance to developing effective data visualizations?
  - The most popular response was time to be intentional about creating effective visuals, followed by needing more appropriate examples.

## Recommendations

Some will be more interested in data visualization than others and some will be more naturally adept. In order to improve data communication throughout Extension, and therefore increase our impact, there are several avenues to consider.

1. Invest in training for everyone.
  - Provide webinars, videos and articles on basics and reasons to care about data visualization for those who are not currently connected with this idea.
  - Develop specific webinars, videos, articles, or training courses for those who are looking to learn new skills or tools for data visualization.
  - Establish a “help desk” environment. Ideally, this would be an internal “safe” venue (Slack, perhaps) in which Extension professionals could share graphics as they are developing them in order to get feedback from their peers. Getting honest feedback from someone who is unfamiliar with my data and work has been very beneficial.
  - Leverage internal experts in a “coach/consultant” role for the “help desk” venue. This would require additional investments in professional development for the “coaches.”
2. Generate momentum and provide examples through contests.

- On several online websites, bloggers curate the “best data visualizations.” Extension could develop a similar model, rounding up the “Best Extension Visualizations” which would be featured on a monthly or quarterly basis. This serves as a way to recognize individuals who have taken time to intentionally visualize data and brings additional awareness to the work of these individuals and Extension in general.
  - A Twitter hashtag could be established, so those tweeting out their visualizations could use a specific hashtag to be entered into the monthly contest. Each month the contest winner would be announced and would add to a gallery of model examples. This collection would further serve to meet the request for more examples and offer a way to share and raise awareness of Extension work and the importance of effective data visualization.
- 3. Outsource to an expert.
  - Develop an avenue by which Extension professionals could apply to have an expert consultation on their data visualization at no cost. The disadvantage of this approach is that it does not encourage skill building within the organization; however, in cases of difficult visualizations, this resource would be beneficial.