

Natural Resources Conservation Service

## Soil & Plant Science Division

Soil Survey Region 2 Office, Davis, CA

May 2019



### Sonora MLRA Soil Survey Office

## 2019 IoT World Hackathon—Water in Agriculture Challenge

### Purpose

On May 13<sup>th</sup> and 14<sup>th</sup>, 2019, a “hackathon” took place in Santa Clara, California. This event was part of the 2019 Silicon Valley AgTech Conference and Internet of Things (IoT) World Conference.

### What is a Hackathon?

*Hackathon* is a portmanteau of “hack” and “marathon.” The word makes use of the broader meaning of the word *hack* as referring to managing activities more *efficiently*.

Hackathons are typically multi-day events where programmers and designers work together to solve problems. The goal is not gaining unauthorized access to computer systems or necessarily producing a completely polished product; rather, hackathons focus on innovation, collaboration, and rapid application development.

### The challenge for this year’s participants?

*Sustainable management of water in agriculture.*

### Participants were asked to consider:

1. Use of USDA Open Data in their decision-making process, machine learning, or artificial intelligence model.
2. Applicability of and alternatives to broadband in rural America.
3. Cybersecurity.

More on hackathon, AgTech, and IoT World conferences:

<https://iotworldhack.bemyapp.com/>

<https://tmt.knect365.com/silicon-valley-agtech/>

<https://tmt.knect365.com/iot-world/>

More about USDA Open Data:

<https://www.usda.gov/content/usda-open-data-catalog>

<https://coe.gsa.gov/2019/05/08/da-update-3.html>



*All code had to be complete by 1:00 p.m. on the second day. In the afternoon, each team had 3 minutes to pitch their design. Of the eight groups, three were selected to present in greater detail on stage in the Expo Center. The winner was chosen from the three presentations.*



## Key Outcomes / Products

NRCS involvement in this event was requested due to the correlations between the hackathon theme, the AgTech conference, and our work supporting agriculture and water conservation.

The solutions devised by the teams were impressive and painted an optimistic picture for the future of USDA data-driven decision making at the nexus of water management and agriculture.

Some of the most successful solutions made use of SSURGO, SCAN, and/or SNOTEL data. Several solutions had prototypes and demonstrations involving moisture and temperature sensors, microcontrollers (e.g., Raspberry Pi), and various methods for data transfer (e.g., WiFi, Bluetooth, and radio). Software “stacks” employed by the teams were diverse and made extensive use of machine learning methods and a mixture of cloud computing and edge computing.

### Several NRCS employees were onsite as subject matter experts (SMEs):

- **California.**—Hudson Minshew (State Agronomist) and Greg Norris (State Engineer)
- **West National Technology Support Center.**—Harbans Lal (Environmental Engineer)
- **National Geospatial Center for Excellence.**—Bruce Nielsen (Authoritative Data Team Leader)
- **Soil and Plant Science Division, Soil Survey Region 2.**—Andrew Brown (Soil Scientist)

SMEs interacted directly with participants during design and assisted, if necessary, with questions from judges during deliberation.

The judging panel included two individuals from USDA and two from the private sector. The representatives from USDA were:

- Carlos Suarez (California NRCS State Conservationist)
- Ted Kaouk (USDA–OCIO Chief Data Officer)

## Future Goals/Conclusions

This was an excellent opportunity for networking with individuals both inside and outside our agency. Further, the event made rich USDA datasets a focal point for a room full of Silicon Valley programmers, data scientists, and businessfolk.

Participants were certainly challenged by the complexity of agro-environmental problems. That said, they were impressed by the depth and breadth of data related to soil and climate provided by NRCS and the rest of USDA.



*Judges and SMEs meeting with Hackathon organizers for deliberation after the first round of project pitches.*