An Evaluation of Electronic Field Data Collection Solutions: Lessons Learned

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Background/Objectives.
The advent of new electronic field data collection systems and backend data management software products has increased the availability of more robust technology solution for project implementation. The wide array of resources presents a challenge in the type and implementation of the field data collection system. This presentation draws upon experience from field applications to provide answers to the following questions.

- Which systems provide the best fit for an office or project?
- Do the solutions always need to be connected, and what kinds of limitations does that impose on the effort?
- Is there a singular solution?

Approach/Activities.
Several different technology configurations exist in the marketplace for field data collection. These include 1): tablets with specialized software, 2) ruggedized laptops, and 3) smartphones with various operating systems (OS), each of which can pair with different backend data management solutions. These different implementation approaches were evaluated quantitatively and qualitative across several projects types such as large and small groundwater monitoring projects, soil sampling, and field observation projects. A training session(s) was provided to each field operative for each collection device, and they were instructed to use the collection device in-lieu of the traditional paper field notes. Following the completion of the data collection, the field user was asked to provide a qualitative evaluation of the ease of use; likes/dislikes of the device or method of collection; and asked to provide improvement feedback. A quantitative assessment was made on the field data collection effort based on the reduction (or increase) in the number of billable hours it took to produce a report and the quality output from each data collection event. The output production included an assessment of the ease of moving the data from field collection unit to a backend data management system. An additional quantitative metric was added to the assessment in cost to equip each user with the specific field collection device.

Results/Lessons Learned.
Each site's data management needs should be evaluated based on cost to implement and then optimized to ensure field conformance, effectiveness, safe operation, and efficiency. Key learnings include:

- Repeated training sessions help to ensure data collection consistency and reduce collection drift.
- Strong mentoring efforts are needed to keep to keep the overall project goals on track.
- Equipment should be evaluated based on regional conditions (i.e., rain, snow, heat, etc.).
- Not all equipment is not created the same. Durability, user-experience, and functionality can vary across product lines.

- Selection of equipment and workflow should reflect the required level of data accuracy, volume of data collected and anticipated schedule of data collection events.
- The more complex the project, the more flexible and complex the field data collection solution needs to be. Upfront planning and objective determination can help match the project to the right implementation and manage costs of both equipment and time.