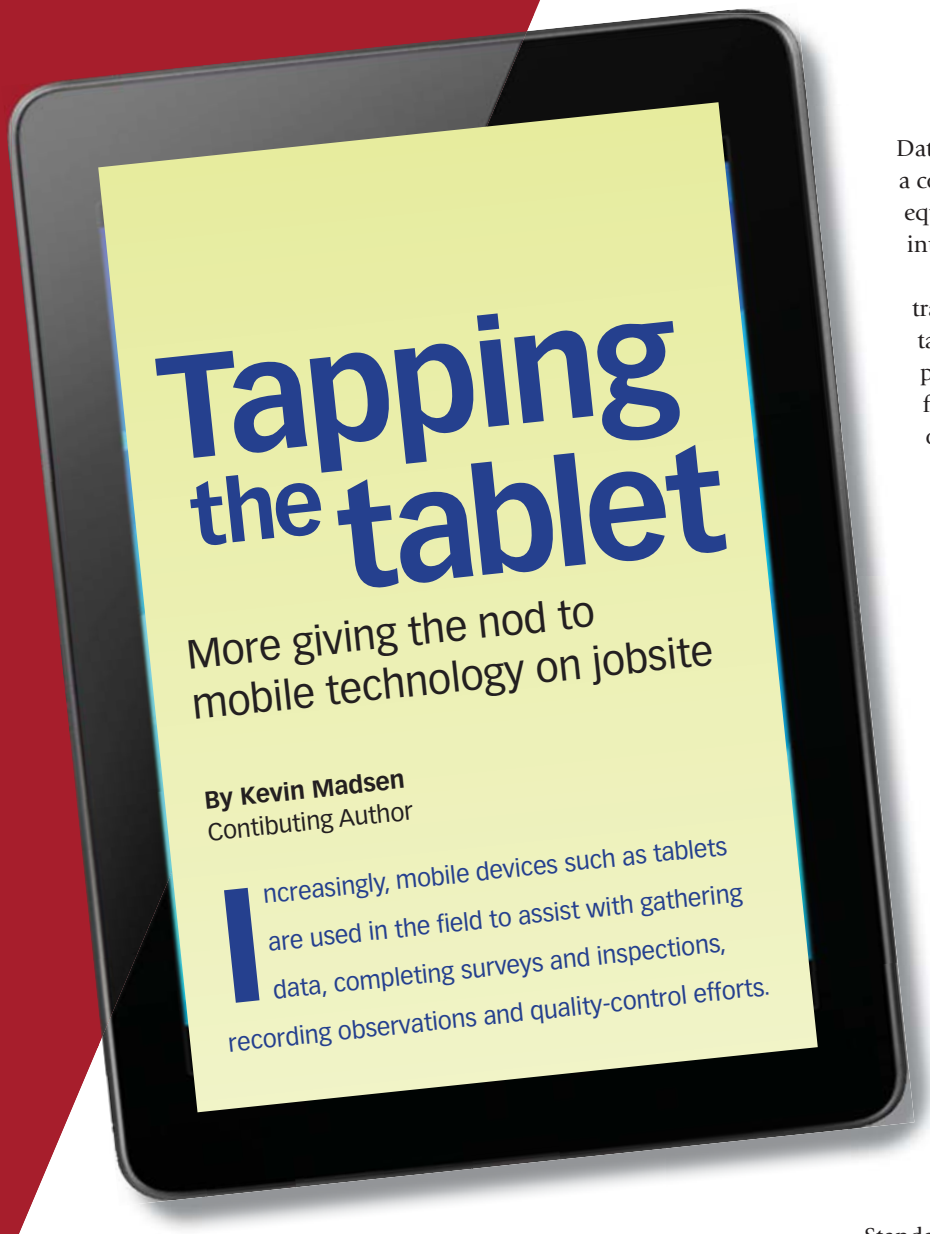


Tapping the tablet

More giving the nod to mobile technology on jobsite

By Kevin Madsen
Contibuting Author

Increasingly, mobile devices such as tablets are used in the field to assist with gathering data, completing surveys and inspections, recording observations and quality-control efforts.

Mobile technology and software advances in GPS data, GIS, digital photography and wireless networks (as well as others) have converged to enable powerful mobile platforms to provide significant capabilities in the field. The decreasing costs of iPads, Androids and Windows 8 tablets have made it possible to equip engineers in the field with the tablets in a cost-efficient manner.

Another significant factor driving the use of new mobile technologies is the accelerating rate of change in business. Change in the corporate world is happening at an increasingly rapid pace in part due to new customer demands and project requirements. Project requirements continue to push the envelope on what is expected to be delivered and how quickly it is to be delivered.

Traditional methods of using paper reference materials such as drawing sets, paper-based data collection forms, GPS survey equipment and cameras to gather data in the field are quickly becoming extinct. Data gathered on paper-based forms must later be entered into a computer and manually combined with data from GPS survey equipment and digital photos. The resulting process is very labor intensive, error prone and yields inferior results.

Mobile data collection is more efficient and accurate than traditional methods of data collection. By using electronic forms tailored for a specific data-collection task, engineers and field personnel can enter information directly into the electronic forms and databases. Based on specific needs and availability of wireless communications, the data can be immediately uploaded to a central database for real-time processing or collected, stored and later uploaded and combined. There are numerous benefits to collecting data electronically:

- Need for less staff due to elimination of data entry and combination tasks;
- Use of one piece of equipment instead of several (GPS unit, camera, paper forms);
- Ease, accuracy and speed of data collection;
- Ability to check data quality daily during collection; and
- Real-time feedback and analysis of the data while in the field.

Big with bridges

One area where mobile technology is being used successfully is the gathering of data to assess and rate conditions of bridge structures. Recent high-profile failures of bridges have highlighted the need to increase frequency and accuracy of inspections and subsequent recommendations. As a result, significant local and federal demand exists for expert analysis and opinions on the condition of in-service bridges.

Data-gathering activities range from formal bridge inspections adhering to the National Bridge Inspection Standards to simple data-gathering exercises for client reporting needs. Regardless of the need, the processes are data-intensive, utilizing large data sets such as existing inspection reports and structure drawings. In addition to consuming existing data, the process generates large amounts of additional data.

The additional electronic data that is gathered can include items such as GPS and attribute data including bridge name, roadway, description of defects, reference pictures, sketches, recommendations, description of previous work, inspectors, dates and ratings, all of which can be captured very quickly and shared in real-time with other team members.

The process of gathering data for bridge structures is a repetitive process, with similar data collected from each structure. Utilization of mobile technology improves the process by providing detailed and convenient electronic access to existing information instead of paper drawing sets and reports. Mobile tablets facilitate recording data directly into electronic inspection forms, attaching photos and sketching directly on the photos and drawings, eliminating the need

to enter and correlate the data into report form at a later time. The electronic forms also check accuracy and reasonableness of recorded data, ensuring it is more accurate and efficient than gathering data on traditional paper forms.

One major consideration when utilizing mobile technology is deciding what software should be used. To enable a highly efficient process to facilitate the gathering of data requires software and/or processes designed for the task. There are several options that exist for software, ranging from commercial purpose-built software for survey and/or inspection tasks in the field and custom-designed software to software-as-a-service options and simply using low-cost off-the-shelf apps.

Utilization of "off-the-shelf" mobile apps for forms, photos and drawings provides a cost-effective solution to managing the data. Avoiding costly purpose-built applications or custom-developed solutions allows for rapid customization based on client needs.

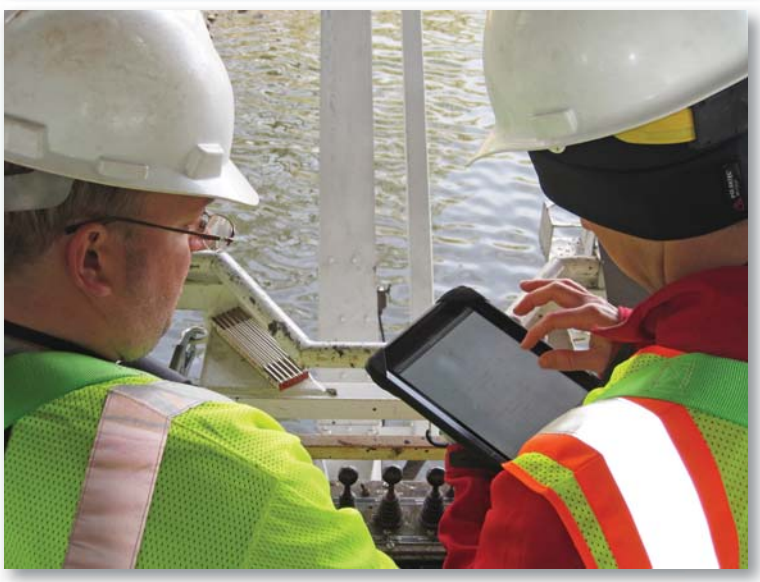
App assistance

So how can software be developed for use in the field on mobile platforms? Software-development methodologies, such as the Waterfall model, have been used for decades. This model follows a sequential process, starting with the idea and flowing through many phases including analysis, design, testing, implementation and ongoing maintenance. To be successful, the requirements must be known up front and must not change significantly during the development. Projects of this nature can take months or even years from start to finish. While the resulting systems can be very good, it is very likely the development can take significantly longer than the project allows.

To address the increasing demands for rapid development and change, many IT organizations have adopted new development methodologies such as Agile and Scrum. Some of you might have experience with these development methodologies. Even those who have not formally adopted these methodologies have probably modified the development, integration, testing and rollout processes to be streamlined and more efficient. Why? Because business environment demands it.

How do these ideas apply to using mobile technologies in the field? Simply put, business will demand that mobile solutions be provided rapidly and in a cost-effective manner. To do this, don't overlook consumer-based technology and off-the-shelf apps. According to figures recently published by Forbes and Apple, the Apple app store reached more than 1 million apps earlier this year. Many of these applications are usable out of the box by project teams in the field and are available for only a few dollars each.

Start by getting IT involved with project teams early in the project life cycle. Identify processes in the field that are labor-intensive, repetitive and heavily utilize traditional processes such as data collection on paper forms, dictation and photos taken with cameras that are not linked to supporting data. Many of the best candidate processes also will have significant post-processing of the data that is collected, often remotely, to collate, analyze, input and prepare reports. Focus on these processes and assist teams by rapidly developing new processes using technology they can use to become more efficient.



One area where mobile technology is being used successfully is the compilation of data to assess and rate conditions of bridge structures. These activities range from formal bridge inspections to simple data-gathering excercises for client reporting needs.

Ready at all times

By Jason Burg
Contibuting Author

Technology on the go is now a key part of every business. Yes, every business. Even your mail carrier is checking her e-mail and making sure her direct deposit went through on a smart phone. Ever glance around an airport gate waiting area? Everyone is jockeying for position at a charging station or conducting tablet or phone business in more than half the seats. As a software provider to the construction industry, we have seen a dramatic shift in the need for "anytime, anywhere" data in the last few years. For heavy/highway contractors in particular, access to data is now a necessary factor in a tight construction market for keeping an edge on the competition.

In the field

The paper trail that project managers and job foremen in the field generate can be overwhelming. In many cases, heavy/highway contractors have someone drive back to the home office each day with an armload of paperwork featuring labor information for HR, change orders and invoices. With an iPad at the jobsite, this step becomes obsolete, since all the information can be entered directly into the software package the contractor has chosen to help run the business. Plus, the simplicity and lightweight nature of tablet devices make them so easy and practical to use at the project location that more and more contractors are bringing them along. According to Heavy Highway/Civil Construction Sales Manager Jesse Miller, heavy/civil contractors are using tablets and smart phones to capture data for a variety of reasons:

- **Equipment usage tracking**—Odometer readings, fuel usage, maintenance records and testing results are just a few examples of the data being logged onto iPads from contractors in the field. Other contractors have reported recording equipment inspections and truck cycle times as well;
- **Daily logs/reporting**—iPads have proven invaluable for storing and organizing jobsite notes, subcontractor information, weather notes, jobsite photos and materials-received data;
- **Productivity**—Organizing payroll by capturing time-card information at the jobsite is being widely used by heavy/civil contractors these days; and
- **Reporting**—Tablets have made reporting accurate, fast data a much simpler process. Job cost and productivity reports are common examples of what's being generated in a much easier way thanks to mobile technology.

Miller also pointed out that even though it is a little rarer in the heavy/civil space, he has run across several contractors who are using tablets for the service work they provide. Work-order generation, invoicing and job/task completion are easily captured as well, thanks to mobile devices.

The future is now

Perhaps one of the greatest technological opportunities tablets present to heavy/civil contractors is around project collaboration and building information modelling (BIM) delivered via the cloud. There are already tools on the market that provide an app for enhancing BIM work flows for infrastructure and road-building projects. The views of the project delivered via this technology are astounding—photo-realistic renderings with unparalleled details can be shared among all the project stakeholders. The benefits of this technology are exceptional, ensuring everyone involved in the project is looking at the same data, images and updates which help avoid surprises and problems down the road.

Get mobile

With the age demographics of construction professions shifting from the old guard to younger, technologically savvy workers, the demand for mobile usage on the jobsite is only increasing year after year. The companies willing to adapt and take advantage of the opportunities that the mobile landscape offers will rise above the competition due to the efficiencies and accuracy that capturing data in the field can provide. From capturing equipment, labor and production hours at the jobsite to sharing images and up-to-the-minute project information collaboratively across all your key stakeholders, tablets are changing the way contractors do business. Now is the time to get mobile, because be assured—your competition is already there.

Burg is with Viewpoint Construction Software.

Popular industry apps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Subgrade Resilient Modulus Calculator


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Caterpillar Paving Production Calculator

Transportation Construction Advocate

I'm Stuck - Connect with Congress about being stuck in traffic.

One trap that many analysts fall into is trying to develop a complete end-to-end solution that is fully integrated and reusable on many projects—remember the Waterfall methodology? Doing so may provide a great solution, but one that likely will not be developed rapidly enough or be cost effective. Don't fall into this trap. There may be a different way to approach the challenge while providing better results. Many times, the goal should not be to create a perfect solution, but one that is good enough to get the job done.

After the process is fully understood, break it down into small functions such as collect the data, collect photographs, connect the data to the photographs, transmit the data, import into the database, etc. A process flow chart is very helpful during this stage. Identify individual functions that match up well with off-the-shelf apps. For example, use one of the many available form-creator apps to design simple data-collection forms. Many of these also have the capability to integrate taking pictures and geolocating the picture with GPS coordinates. Then utilize 4G wireless capabilities to upload the collected data directly to a remote database for processing using a simple app.

Obviously, the above example is very simple. There are many types of apps that can be used, ranging from photo editing, forms collection, PDF-file manipulation, cloud file storage and others. One very simple but overlooked solution is to provide full sets of reference data or drawing sets to the project members working in the field. The files can be cached locally, stored in the cloud or even stored on live collaborative systems in the design center, providing better security and more convenient access to the data for those working in the field. Beyond simple applications, more complex apps are available, some of which directly integrate with back-end systems such as existing database and GIS systems. By using these simple techniques, project teams can be quickly outfitted with tablets in the field for data-collection activities while investing very little.

There are multiple benefits of using this approach. On recent field engagements to observe and document existing bridge conditions, project teams have experienced significant labor savings. In addition, the data collection was faster and required significantly less post-processing of the data.

The project teams also required shorter schedules for data gathering and preparing final reports. The shortened schedules have allowed teams to provide final reports ahead of scheduled deadlines. With data being collected and inputted in the field into live databases, errors can be identified early in the process, allowing for real-time corrections, resulting in better quality data.

From the owner's perspective the benefits are very similar. They include lower costs, better quality and shortened schedules. One major advantage to using off-the-shelf apps is the ability to quickly and cost-effectively respond to requests to adjust the process or deliverables "in flight." Utilization of low-cost mobile apps enables rapid deployment of mobile solutions to create an environment where information technology teams and project teams can work together to make projects very successful. **R&B**

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