

The Connected Jobsite

Posted @ 1/22/2014 12:30 PM by John Chaney | Files in **Tech**

How New Technologies Are Changing Field Work

Putting information into the hands of the people closest to the action is not a revolutionary concept. When the action takes place at multiple locations away from a control center and involves constantly changing conditions and participants, the flow of information becomes that much more important. This environment is what most contractors face every day—and began long before smartphones and tablets came on the scene.

Today, the construction industry faces something beyond the emergence of a new technology. The three fundamental aspects of information management—computing, communication and networking—are converging.

Clarifying the Cloud

Central to the story of technology convergence is the so-called cloud. The concept of cloud computing has been confused by a multitude of definitions, and the term itself has become something of a buzzword.

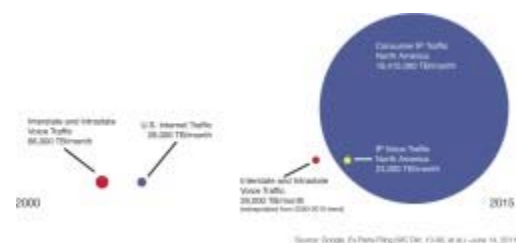
Cloud computing is simply a centralized collection of computing resources made available to anyone who can connect to these resources. If this sounds general, it' s because cloud computing is a broad concept.

Ubiquitous Internet coverage and cheaper, portable computing hardware make cloud computing a practical and more efficient way to access applications and data. Consider electric power: It is far more efficient and convenient to plug into a large grid powered by centralized power plants than it is to have everyone running their own small generators.

Working in the Cloud

The advantages of cloud computing go beyond more efficient distribution. By plugging into the applications and data needed from virtually any Internet-connected device, people can retrieve information when and where they need it without concern for the processing power, data storage or software that exists on that device.

This means information and applications that were available only in an office environment can be placed in the hands of people at the jobsite, and not just in the trailer. Project managers and supervisors can track progress and costs on multiple jobs, review and approve vendor invoices, update logs and submit change requests from nearly any location using virtually any device. Cloud computing provides the platform to efficiently deliver information and applications to the field workers who need it most.



MOVING TO THE CLOUD

Contractors looking to translate the efficiencies of cloud computing to real benefits in their companies must consider technology options as well as changes in business processes. The cloud is not a single entity; it is a general concept that can be deployed in different ways. Those responsible for a company' s information management must ensure they implement cloud-based applications and data storage in a secure and cost-efficient manner.

To put the horse properly in front of the cart, a plan must be in place for how field and office staff will use cloud-based applications, how they will change the flow of information and work, and what new equipment and

training costs may be incurred.

The biggest impact of the current shift in IT technologies is being felt by those in the field. Cloud computing can put more powerful applications in the hands of remote employees and provide access to virtually unlimited data. Information can flow faster among project team members and between field-based operations and office-based accounting staff.

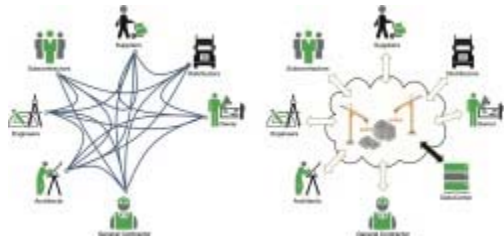
Some ways contractors are using new technology to streamline jobsite information flow include:

- replacing paper plans and specs with electronic documents that authorized team members can access from any device;
- reducing the need for IT support and computing hardware at jobsite trailers;
- speeding up the submission and approval of change requests, invoices and other field-generated documents;
- real-time linking of job financial and operational data, allowing managers to react to potential problems before they become real losses; and
- eliminating the need for multiple trips between jobsites and the office to deliver, gather or process information.

These time- and money-saving ideas also require contractors to revisit their investments in mobile computing hardware and software.

A NEW TYPE OF MOBILITY

Less than 15 years ago, the majority of U.S. digital traffic involved voice communications, not data. The situation is dramatically different today. By 2015, data traffic will consume more than 700 times the network bandwidth of voice traffic. Increasingly, this data will be consumed via mobile devices (primarily tablets and smartphones). In fact, 95 percent of people across the world can access a mobile device, according to the ITU Telecommunication Development Bureau. At the end of 2013, Business Insider projected nearly 1.5 billion smartphones were in use.



Furthermore, the number of apps available to help gather, process, analyze and upload data has been growing exponentially. As of last May, XYOLOGIC reported more than 150 billion apps were downloaded from the Apple and Google online stores combined. Apps give mobile devices a way to be “smart,” but the biggest impact of new mobility on the construction industry is the fact that, with data as the medium,

project teams can move from the chaos of many one-on-one conversations to a structured, collaborative work environment.

This way of working enables the combination of data-capable mobile devices and cloud computing. Combined, these technologies allow project team members from different companies with various roles working in disparate locations to stay connected. They can, as permitted by the manager of the cloud-based services, view entire threads of project communications. And all participants can access and work from a common set of project documents with mark-up and revision control tools built into the service.

Contractors looking to invest in improved jobsite mobility face three important considerations: the company’s mobile strategy, device standardization and jobsite connectivity.

MOBILE STRATEGY

This is the most important step in taking real advantage of new mobile and cloud computing technologies. The strategy should focus on how jobsite workflow can be improved by putting more information, processing and

reporting tools into the field. Too often, companies start by looking at new hardware and software, and then consider if and how to incorporate them into business processes.

New technology is just a means to an end, so contractors first should set some explicit objectives for improving the flow and efficiency of work, and then see where and how a better flow of information can help achieve these objectives. Following are examples of what some early adopters of cloud computing are doing.

- **Go paperless.** Plans, specs, submittals, change orders and all the other documents that are part of every job can be stored in the cloud and viewed and edited in the field on tablet computers by any authorized person. Some software even allows for plan markups or change request creation directly from a tablet.
- **Log on the go.** Project managers spend a considerable amount of time tracking and logging job activity. Usually this task is performed after a full day on the jobsite or traveling between the office and remote locations. With easy-to-use logging apps, field supervisors can record jobsite information quickly as work progresses. In many cases, these apps can integrate with a company's project management software, eliminating the need for duplicate data entry.
- **Extend the ERP.** Complete construction management software systems (i.e., ERP software), including accounting and operational applications, are moving to the cloud. If properly designed to take advantage of cloud computing and mobility, the full capabilities of construction ERP software can be accessed by virtually any device via a web browser, so no other software needs to be on the device.
- **Use complementary apps.** In most cases, contractors will not want to open full ERP functionality to everyone at the jobsite. Licensing costs can be prohibitive, and field staff needs easy-to-use apps that accomplish single-purpose tasks such as time tracking and material management. Native apps—programs that run directly on a mobile device—can be ideal for this purpose. Designed specifically for tablets or smartphones, native apps typically work offline and allow users to enter, view or modify data from remote, unconnected areas. These apps are particularly valuable when they synchronize with the construction management software already in use, especially when they do so automatically whenever the mobile device reconnects to the Internet.

DEVICE STANDARDIZATION

Once it's clear how mobile, cloud-based information can improve jobsite workflow, the question of how to equip field staff with smart mobile devices must be answered. With so many apps available on multiple platforms, and with the web browser being the only app needed to access true cloud-based software, standardizing on a single type of device often is irrelevant. With so many people owning (and preferring) their own devices, the emerging trend is "bring your own device." This can save a contractor considerable time and money, but must be implemented with policies regarding appropriate use, data security and employee compensation.

JOBSITE CONNECTIVITY

Unless a contractor's mobile strategy involves only using native apps, it will need to evaluate the wireless data coverage at each jobsite. Larger projects with stationary job trailers can establish Wi-Fi networks across work areas. Using new "piconet" technology (small wireless devices that extend Wi-Fi coverage and can be easily repositioned), connectivity at the site can be optimized to match where work is going on, including underground and interior locations.

For less permanent jobsites, public wireless networks provide broader coverage at higher speeds. Verizon alone covers roughly 75 percent of the population with 4G LTE service that provides data download speeds averaging between five and 12 megabytes per second. However, relying on public wireless networks means relying on their coverage in areas where work is taking place.

When done with a plan in place, an improvement in information flow can translate to better workflow, which in turn can result in better cash flow. As with everything involving technology, what is an advantage today will

become a requirement tomorrow.

Cloud Considerations

Make sure hosting services:

- comply with SSAE 16 standards;
- provide Transport Layer Security (TLS);
- offer 128-bit or better encryption; and
- have secure, locked-down facilities.

Protect data with:

- geographically remote backup;
- frequent snapshots;
- distributed denial of service protection; and
- disaster recovery planning.

Implement cloud services using:

- dedicated server resources;
- fast redundant links to the Internet;
- intelligent routing protocols; and
- load balancing.

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