Engineering and construction companies
Cracking the collaboration code with mobility
## Table of contents

Mobility in the E&C sector: Do you have the right strategic focus? .................. 1  
Mobility as part of an effective collaboration .................................................. 3  
Overcoming challenges that can limit mobility adoption .............................. 6  
Mobility: Creating competitive edge .............................................................. 9  
Contacts .......................................................................................................... 10
Mobility in the E&C sector: Do you have the right strategic focus?

In today’s hyper-connected world, it would be a surprise to find an organization without a technology focus, particularly one related to the use of mobile devices. Statistics pointing to the ubiquity of mobile connections are compelling:

- Global mobile connections, including mobile phones and mobile hotspots, are likely to reach 9.5 billion in 2019, compared to around 6.9 billion in 2014.¹
- At 97 percent of its population, North America has the highest 4G coverage, compared to other regions.² Global 3G and 4G connections are forecast to increase to 70 percent of total mobile connections by 2020, compared to below 40 percent at the end of 2014.³
- In developed markets, mobile Internet subscriber penetration is expected to reach 70 percent by 2020, up from 60 percent in 2014.⁴

In line with the above trends, a recent Deloitte Center for Financial Services survey of engineering and construction (E&C) executives revealed that all respondent companies use mobile devices (smartphones and tablets) for work-related activities (please see “About the survey” below for more details). They also use broadband extensively, with 4G emerging as the predominant network connection for 75 percent of respondent companies.

Indeed, E&C companies also tend to place strategic emphasis on mobility, as 67 percent of respondents consider mobility either an important or the most important part of their technology strategy (see Figure 1). Further, 44 percent of the survey’s respondents allocate 1–5 percent of their technology spend on mobility, although 10 percent surveyed spend above 15 percent.

If you want to go fast, go alone. If you want to go far, go with others.

— An African proverb

The factors contributing to the increasing importance of mobile connections are clear. As with many other kinds of organizations, mobile devices are no longer just a mode of communication, but can now enable many activities and tasks in E&C.

Typically, in most large-scale E&C projects, multiple resources work on diverse activities, sometimes under difficult weather conditions, remote locations, or both. The success of a project generally depends on efficient execution, which depends largely on effective collaboration. Historically, even into the machine and electronic ages, many tasks were still performed manually, which often continued to jeopardize timelines. However, advanced features of mobile technologies, such as GPS and video, enable a number of additional capabilities beyond communication. For example, advanced mobility features enable the use of newer tools and technologies, such as social project collaboration tools and augmented reality, which can help manage work tasks such as registering, scheduling, locating, and even visualizing construction designs. Further, construction plans can be efficiently shared with various people at different

---

About the survey

The insights in this report are based on an executive survey conducted by The Marketing Audit on behalf of the Deloitte Center for Financial Services. The survey, fielded between March and May of 2015, polled executives of 48 E&C companies.

The survey was designed to assess their mobility usage patterns, with a focus on its strategic importance, current and future usage, benefits, and adoption challenges.

Of the 48 respondents, 50 percent of the responding executives were from small-sized companies (annual revenue between $250 and $500 million), 21 percent were from mid-sized companies (annual revenue between $500 million and $1 billion), and 29 percent were from large-sized companies (annual revenue of $1 billion or more).
locations on the construction site, accessed at the same time, sharing mobile screens. As a result, companies are not only able to complete projects in a more timely and efficient manner, but also can improve the quality of decision making and increase their focus on innovation.

Surveyed respondents highlight greater productivity (96 percent), data timeliness (83 percent), and higher employee satisfaction (67 percent) as the three most important benefits of mobility (see Figure 1). However, many E&C companies have yet to leverage the demonstrated benefits of mobility. For example, our survey identified that less than 50 percent of respondents use advanced mobile features and technologies such as video call (48 percent), social media (40 percent), GPS tracking (35 percent), social collaboration and project management tools (19 percent), Internet of Things (17 percent), and augmented reality (4 percent). This potentially limits collaboration among various functions.

**Figure 1:** Strategic emphasis and benefits of mobility for E&C companies

<table>
<thead>
<tr>
<th>Strategic emphasis</th>
<th>Benefits</th>
<th>Greater productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>67 percent of respondent companies believe mobility is an important or the most important part of their technology strategy.</td>
<td>83 percent of respondent companies identify data timeliness as a benefit of using mobility.</td>
<td>96 percent of respondent companies recognize productivity benefits of using mobility.</td>
</tr>
<tr>
<td>C-suite focus</td>
<td>71 percent of respondent companies have a director or above responsible for implementation of mobile strategy.</td>
<td></td>
</tr>
<tr>
<td>Employee satisfaction</td>
<td>67 percent of respondent companies experience higher employee satisfaction as a result of using mobility.</td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>44 percent of respondent companies spend 1–5 percent of their technology budget on mobility.</td>
<td></td>
</tr>
</tbody>
</table>
Mobility as part of an effective collaboration

Business communication tools in the E&C industry have continued to evolve over the last few decades, from telephone-based fax machines in the 1980s to widely adopted voice-based mobile technology in the 2000s. Unlike the pre-mobile era, where employees typically completed tasks, passed along their work product to the next stage, and initiated another task, mobility enables organizations to efficiently utilize time, talent, and tools while driving more effective collaboration. It also continues to evolve as a critical enabler of collaboration as it can facilitate information flow anywhere, anytime, both inside and outside a company. For many E&C companies, information flow through mobile devices can be gauged by activities such as information sharing, reviewing and editing documents, and tracking progress of activities. This, in turn, is largely influenced by the type of mobile features and technologies used by the companies.

Along these lines, our survey suggests that companies are generally using mobile devices for information flow at three different levels. We categorized our respondents as skeptics, rationalists, and enthusiasts, based on a combination of features, advanced technologies, and tasks performed using mobile devices (see Figure 2). There could be several reasons for the varying depth of mobile usage among our survey respondents, but in general, our survey suggests that the respondent companies placing greater strategic emphasis on mobility—enthusiasts (91.7 percent), rationalists (70.8 percent), and skeptics (33.3 percent)—tend to use advanced features and technologies and perform more complex tasks.

- **Skeptics** represent the 25 percent of respondent companies that use only basic features like chat and email. They have a relatively low level of information flow as only 50 percent of skeptics use mobile to share information externally, just over 40 percent review and edit documents, and only a third track progress.

- **Rationalists** are the 50 percent of respondent companies that use basic features and at least one of the advanced features, among video call, social media, and GPS tracking. The use of more advanced mobile features enables relatively better information flow as 83.3 percent of rationalists exchange information externally, 58.3 percent review and edit documents, and 54.2 percent track progress.

- **Enthusiasts** represent the 25 percent of respondent companies that use basic and advanced mobile features and at least one advanced technology among the Internet of Things, augmented reality, and social project management tools. As such, they also have relatively superior information flow—review and edit of documents (91.7 percent) and tracking project progress (75 percent). The same number exchange information externally (83 percent) as do rationalists.

Figure 2: Depth of mobile usage among survey respondents

<table>
<thead>
<tr>
<th>Tasks performed through mobile</th>
<th>Skeptics</th>
<th>Rationalists</th>
<th>Enthusiasts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share information externally</td>
<td>50%</td>
<td>83%</td>
<td>92%</td>
</tr>
<tr>
<td>Review and edit documents</td>
<td>42%</td>
<td>58%</td>
<td>75%</td>
</tr>
<tr>
<td>Track progress</td>
<td>33%</td>
<td>54%</td>
<td></td>
</tr>
</tbody>
</table>

Deloitte Center for Financial services 2015 E&C mobility survey
Understanding the distinctions of just some of the advanced features and technologies helps explain why they are favored by rationalists and enthusiasts:

**GPS tracking** can enable project managers to remotely manage complex tasks such as tool and equipment tracking. Currently, 58.3 percent of enthusiasts and 29.2 percent of rationalists use mobile devices in their field data collection function to remotely track equipment location. E&C companies can consider using barcodes or radio-frequency identification (RFID) tags for all building material, which can then be tracked using GPS. In addition, E&C companies can consider using advanced GPS mechanisms to define geographical boundaries for movement of materials, which is also known as geo-fencing. They can thereby get more accurate information about their inventory, which would allow them to enhance efficient usage while also reducing pilferage.

**Social project management tools** can help E&C companies connect with employees, owners, and sub-contractors and effectively manage various tasks and the overall project as they increasingly engage in joint ventures, public/private partnerships, and strategic alliances. Companies can use these tools to improve client experience—enhance communication and provide sophisticated status reporting, visual progress reports, and more timely change orders. This would allow clients to remotely monitor progress or quickly respond to issues as they occur. Approximately 58.3 percent of enthusiasts currently effect social interaction for joint-venture projects through mobile devices. Typically, many social collaboration tools act as a one-stop shop for all project-related documents and discussions, and can be accessed through an app or the mobile web. Such tools can also help employees to be aware of industry leading practices as they can access state-of-the-art insights from external experts and address technical construction queries through crowdsourcing. For example, an app such as MangoApps allows companies to determine information access levels, view the status of both an overall project and individual tasks, as well as share and create a repository of all project files, documents, directories, and more. It integrates a company’s intranet with real-time messaging, team collaboration tools, and social networking.

Mobile Internet of Things for the E&C sector typically involves using smart sensors at job sites to provide more intelligent information, such as moisture levels in concrete or equipment condition (e.g., status of parts or maintenance requirements) rather than just data on equipment or material location. This information, when aggregated across various factors and over a period of time, can generate valuable insights such as relative strength levels of the built structure or expected time for equipment overhaul using predictive rather than reactive measures. Mobile devices will potentially act as the interface to access and share the insights generated from connected sensors and machines. Currently, more than half of enthusiasts use their mobile devices to enable Internet of Things.

**Mobile augmented reality** helps architects, engineers, owners, and contractors at various locations to visualize a lifelike building based on interactive 3D models using the latest in building information modeling (BIM) technology. In addition to visualization, augmented reality capabilities on mobile devices can also be used for construction design analysis. Contractors and architects can collaborate on prefabrication components, and discuss any potential design changes that may be required between design and construction. This would enable more effective and efficient processing of change orders during construction, both from a customer and supplier standpoint. Further, combined with the use of drones or wearable technologies...
such as Google Glass, field information (including video format) can be captured in real time, synced with mobile devices, and shared uninterrupted with requisite stakeholders on an ongoing basis. Such information sharing can result in improved tracking of project progress and increased accuracy, earlier issue identification, faster inspections, and more informed decision making. Despite the demonstrated benefits, adoption rates are quite low; our survey found only 16.7 percent of enthusiasts use mobile augmented reality.

In summary, in spite of the management focus and high priority attached to mobility, there is likely significant opportunity for E&C companies to increase their usage for better information flow and collaboration. Perhaps companies can increase their use of mobility for procurement (supplies and resources), logistics, and supply/equipment management. Bechtel is among the few E&C companies that has kept pace with and adapted to emerging mobile trends to drive effective collaboration. (See sidebar describing Bechtel’s use of mobile technology.)

Having said that, companies potentially need to acknowledge that providing a mobile device to every employee may not necessarily result in desired levels of information flow and collaboration. A lot depends on how mobility is used as an enabler by integrating advanced technologies and applications.

**Bechtel rides on mobility-enabled collaboration success**

Bechtel’s customer sites are located at far-flung locations and tend to stretch for miles, which can hinder direct interaction among colleagues. As the largest construction company in the USA, it has had to manage a significant amount of data and daily filing of various reports and maintenance forms. An even bigger challenge has been ensuring worker and equipment safety, as a slight error in execution can result in the loss of millions of dollars and worse still, put lives at stake. Bechtel has employed mobility to help overcome some of these challenges.

For instance, Bechtel is using social applications to break down information silos and foster real-time employee interaction. The company has built application programming interface (API)-based in-house apps to enable project managers to conduct safety audits, collaborate on complex drawings, and make informed decisions on the go. To help tackle data collection and reporting challenges, Bechtel uses a mobile data collection app, which efficiently captures and manages field data. The company is also using mobile augmented reality and advanced GPS features that enable sophisticated construction design analysis. These and many other mobile solutions have enabled Bechtel to take innovation from the desk to the field and substantially improve collaboration.
Overcoming challenges that can limit mobility adoption

Rachel Hinman, in her book “The Mobile Frontier: A Guide for Designing Mobile Experiences,” discusses how the mobile device is “lush with opportunity to invent new and more human ways for people to interact with information.” The rapid pace at which mobile technology is advancing may require E&C companies to rethink their strategies in order to enhance focus on deepening the use of mobility. Our survey suggests that the key challenges in improving mobile penetration are similar across the three categories of users: skeptics, rationalists, and enthusiasts. We recommend that companies consider the following steps when addressing these challenges.

**Develop an enabling technology infrastructure**

The use of advanced technologies in conjunction with mobile to drive superior information flow and collaboration often means E&C companies will need to build the appropriate technology support. Essentially, using mobile devices to perform the many tasks listed earlier requires enhanced network connectivity and higher computing power, which can strain legacy IT systems. Companies can consider leveraging cloud technology to provide scalable IT infrastructure and analytical capabilities. According to Jeff Mann, research director at Gartner, “when combined with other trends of cloud and enhanced information access, mobility and social collaboration can transform existing business models.”

Further, 42 percent of our survey respondents that acknowledge limitations in mobility adoption have issues with low network speed and bandwidth. This can be particularly true for difficult and distant construction sites or sensitive areas such as prisons or government facilities. E&C companies will potentially benefit from offering offline mobile capability to onsite employees to increase the ubiquity of mobile functionalities.

Mobile apps can become an extension of offline functionalities. This can be particularly helpful in information access and exchange in the field, where parts of data are required and where these apps can supplement existing enterprise software systems. Per our survey, less than a third of the respondents use proprietary apps and less than two-thirds use paid external apps to access information on their mobile devices. Therefore, E&C companies should focus on customized proprietary apps for different functions, particularly ones that are compatible across platforms, as they can enhance mobile computing power and also help provide more efficient information flow.

**Establish a center of excellence to help overcome integration challenges**

E&C companies can derive significant benefits from effectively integrating mobile technologies with their existing internal IT systems, as well as those of clients and other third parties such as sub-contractors, architecture and design firms, and suppliers. In fact, 38 percent of respondent companies are focused on mobile integration with client systems and data, and 46 percent plan to integrate over the next two years. However, integration with existing IT systems is the top challenge for over 75 percent of respondent companies that face limitation in mobility adoption. Indeed, the use of more than one type of mobile device (smartphone and tablet), different applications and versions of the building design, and a fragmented supply chain, all tend to limit collaboration due to interoperability issues.
Companies will potentially benefit from establishing a mobility center of excellence that centralizes all mobility pursuits and bridges the gap among various functions to efficiently manage information flow from design to building and management. One of the points to keep in mind is that the chief information officer or IT leader cannot be effective while working in a silo. It is imperative for them to collaborate with various functional leaders to better understand their requirements and enhance the depth of use of mobility solutions. In fact, 63 percent of our survey respondents facing integration issues suggest that solutions providing a common platform to integrate different mobile devices is one of the ways to address this challenge (see Figure 3). Further, the center of excellence should be nimble and adaptable to respond to rapid ongoing developments in mobility.

**Figure 3:** Integration challenges and potential solutions

<table>
<thead>
<tr>
<th>Potential solutions for integration challenges**</th>
</tr>
</thead>
<tbody>
<tr>
<td>63% Would provide a common platform to integrate different mobile devices</td>
</tr>
<tr>
<td>63% Would use application programming interface (API) strategies that complement mobility strategy</td>
</tr>
<tr>
<td>33% Would use mobile devices that are compatible with company’s mobile platform</td>
</tr>
</tbody>
</table>

* Base includes respondent companies who broadly face challenges in mobility adoption.
** Base comprises respondents who face integration challenges.

Source: Deloitte Center for Financial Services 2015 E&C mobility survey
Invest in mobile device management (MDM) to address security and privacy concerns
E&C companies often remain concerned that, with the increased use of mobility, data breaches could become more frequent, resulting in financial, legal, and reputational risks. Security and privacy issues pose the second-most important challenge, cited by 65 percent of our survey respondents that face limitations in mobility adoption. E&C companies can consider different options to address these issues, whether from a perspective of stolen hardware, software breaches, or both. Generally, MDM helps companies to better manage and control mobile devices. As a starting point for the MDM plan, E&C companies can enable automatic disablement of stolen mobile devices, a solution viewed positively by 85 percent of our survey respondents who face security and privacy issues (see Figure 4). Further, as companies increase their use of apps, an enterprise app store would enable better control.

**Figure 4:** Security and privacy issues, and potential solutions

<table>
<thead>
<tr>
<th>Potential solutions for security and privacy issues**</th>
</tr>
</thead>
<tbody>
<tr>
<td>85% Would prefer automatic disablement of stolen devices</td>
</tr>
<tr>
<td>80% Would only allow company-owned and approved devices</td>
</tr>
<tr>
<td>35% Would use a more secure Wi-Fi or mobile network</td>
</tr>
<tr>
<td>30% Would use secure mobile identification methods such as fingerprint or iris-scan technology</td>
</tr>
<tr>
<td>30% Would screen employee-owned mobile devices before allowing employees to use them for official work</td>
</tr>
</tbody>
</table>

* Base includes respondent companies who broadly face challenges in mobility adoption.
** Base comprises respondents who face security and privacy issues.

Source: Deloitte Center for Financial Services 2015 E&C mobility survey
Mobility: Creating competitive edge

Today, mobility is arguably one of the key enablers of collaboration. The scale, nature, duration, and complexity of E&C projects underscore the importance of mobility in helping to improve efficiency, accuracy, and timeliness. The continuous evolution of mobile features and technologies can increasingly drive real-time information flow across E&C functions, such as project management, field data collection, reporting, and customer relationship management. E&C companies that remain at the forefront and are agile in adopting mobile technology advancements will likely be able to differentiate themselves through enhanced collaboration.

They can also benefit from gradual scaling of mobile infrastructure to adopt new features and technologies. Establishing centers of excellence and investing in mobile device management can alleviate integration, and security and privacy concerns, respectively. However, transformational changes are likely to be costly and result in internal resistance. E&C companies should consider a step-by-step implementation approach, which should be complemented with a culture of learning and gathering feedback to help minimize internal resistance.

While not always an easy transition, our survey results indicate E&C companies are generally on the right track with their emphasis on the use of mobility. They should now focus on making smart and intelligent investments in mobility as it really is and will likely continue to be a significant competitive differentiator.

Endnotes
2 “The Mobile Economy, 2015,” GSMA (Groupe Speciale Mobile Association) Intelligence.
3 Ibid.
4 Ibid.
6 Ibid.
12 This information was originally published by Construction Business Owner magazine at www.constructionbusinessowner.com as a guest blog contributed by Dexter + Chaney.
14 Ibid.