ORACLE SERVICE CLOUD

The New Connected Mobile Workforce

Charting the Past, Present, and Future of the Connected Field Service Employee

ORACLE WHITE PAPER | OCTOBER 2014

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Table of Contents

Introduction

This white paper explores past trends that have led to the enablement of the connected workforce and provides insights into how a highly functioning connected workforce can operate with today's commonly available technology (such as smartphones and tablets). This paper also provides examples of how a connected workforce can incorporate disruptive future technologies and trends, such as the Internet of Things, wearable devices, or self-driving cars.

Advances in communication technologies are rapid and constant. As new technologies take hold, the resulting flow of information increases exponentially in nearly every walk of life, from home to school to the workplace. People are quickly becoming more connected to each other.

For companies with mobile workforces, this new digital lifestyle creates opportunities to raise mobile employees to new heights of connectivity and productivity. Companies that embrace new communication technologies can now connect mobile employees with everyone in the service cycle in ways unheard of only a few years ago. By replacing dated mobile devices with smartphones, moving to device-agnostic applications, and connecting the field with back-office applications as well as directly to the customer, today's mobile employees have the potential to become more productive than ever. And the future holds enticing possibilities that go far beyond what mobile workforces are capable of today. There is staggering potential for growth in productivity, customer service, and sales opportunities.

In order to get the most out of today's technology and take advantage of rapidly approaching technological advances, companies need to future-proof their mobile workforces, acquiring the agility to adapt to whatever new environments they may encounter in business, in the field, and with customers. Connectivity holds the key.

By making mobile workforce connectivity the cornerstone of field service strategy, future advances—whether they be new hardware, software, or styles of working—will be easier to adopt and leverage.

There is staggering potential for growth in productivity, customer service, and sales opportunities.

Evolution of the Connected Mobile Employee

The History of the Modern Field Service Technician

Not so long ago, mobile employees could only connect with the dispatcher, the back office, or the warehouse, either face-to-face, by phone, or by two-way radio.

Technicians came to work at the beginning of their shift, got their schedules, collected materials and equipment, and headed off on their routes. Problems along the way? The only recourse was a call from the field tech to the dispatcher, or vice versa. One call might turn into two, three, or more, depending on the scenario unfolding in the field. Missing equipment, vehicle breakdowns, route delays, technical questions—all had to be handled by calls, and were often passed down the line until a solution was found.

Such limited communication capabilities meant little support and flexibility, and less certainty for the tech, the dispatcher, or the customer about how long jobs would take or when a problem would be resolved. Travel times were a question mark, and tracking down information or materials was time-consuming and troublesome.

To accommodate for this lack of communication and technician enablement, field service organizations were forced to overstaff and overstock in order to have enough service capacity to account for any disruptions. Often, time was wasted and customers were frustrated. Fortunately, advances in technology have broken this paradigm.

The Trends That Broke the Mold

After several decades, the limitations binding field service management were broken. Consumer-driven technology trends ushered in a new world as bandwidth and mobile device capabilities exploded. New browser-accessible and cloud-based solutions were developed. The attendant rise of more powerful, convenient, and affordable portable consumer devices, and the advent of the HTML5 standard for the web, all led to a new era of connectivity and leveraging of real-time data that revolutionized the industry.

Figure 1. Consumer-driven technology has led to a new era of connectivity for the mobile field service worker.

Field technicians and other stakeholders now have unprecedented power in the palms of their hands, which has enabled leaps in connectivity through the following technological advances:

Smarter Consumer Devices

Businesses worldwide have already moved toward the Bring Your Own Device (BYOD) environment. Instead of providing handheld devices for employees, businesses allow people to use the personal devices of their choice. This trend reduces a company's IT costs, while freeing employees to use the tools they're most comfortable with. This change in approach has been enabled by cloud-based, browser-enabled solutions. A recent study by Forrester Research showed that employees choose more than half of all the high-tech tools they use, either buying them or choosing from a company-approved list.

In the world of field services, the most-popular devices—powerful smartphones and tablets—provide mobile employees access to real-time updated information about routes, scheduled jobs, and inventory requirements. In addition, the devices can instantly connect mobile employees with colleagues who can answer job questions, locate equipment, and do other tasks much more quickly and efficiently than the dispatcher. The result is an increased number of first-time fixes.

Touchscreen devices have also eliminated the need for paper and its associated costs. Customer contracts, quotes, and other forms are presented and stored within the device or, even better, in the cloud. Customers can sign for work electronically and have their information stored instantly in a customer record system, with a copy e-mailed instantly back to them for recordkeeping. The digitization of paper continues to streamline workflows, increasing field service productivity.

HTML5

Advances in programing languages have dramatically increased the capabilities of browser-based software. HTML5, in particular, has allowed browser-based applications direct access to a system's hardware. This advancement has become one of the primary enablers of the BYOD movement. For example, with a proper HTML5 framework, a web application can access device peripherals such as a camera or a barcode scanner; allow full offline mode of browser-based apps; and access either a device's Global Positioning System (GPS) or other location services functionality, allowing for resource tracking. HTML5 also allows ease of migration to new devices and enables easy access for contract and seasonal employees.

Enhanced Mobile Bandwidth

4G is the latest enhancement in bandwidth. It provides far more useful and context-aware information to the mobile employee, allowing instant exchange of important information from text messages and documentation to streaming video and inventory exchanges. For companies on the leading edge of this technology, video calls will become commonplace between techs, dispatchers, field supervisors, and remote support, helping to identify and resolve problems more quickly.

Data Analytics

The combination of smart devices, increases in network bandwidth, and advancements in programming languages have allowed for the high-velocity collection of valuable field data. Workforce efficiency, business trends, and customer feedback—just to name a few—can now be measured in real time. The transparency created through advanced analytics supports business decisions that improve operations and give companies a competitive advantage.

Today's connections save time and costs as well as dramatically increasing the number of first-time fixes.

Today's Connected Mobile Employee

Advancements in smart devices, increased bandwidth, improvements in programming languages, and the advent of data-driven decisions have laid the foundations for today's connected worker. Thanks to this revolution in cloud-based technology and mobility, the mobile employee can now be connected to a much wider scope of resources—connections that save time and costs as well as dramatically increasing the number of first-time fixes.

Most importantly, mobile employees are more connected to the customer. Today, they not only connect face-to-face but through the technologies that encompass all types of media—from e-mail and texting to the use of social networks. Below are the points of connection for today's mobile employee, and the benefits that each connection provides.

Schedules and Job Information

Today's connected employee has instant access to constantly updated schedules and job information, including

- Location of the job
- Promised and expected arrival time
- Customer information
- Required tools and inventory
- Expected job duration
- Location of the next job (and subsequent jobs)

The schedule also indicates the impact of delays, reschedules, early completions, and cancellations. All involved users can connect through the schedule and see what's happening at any given location, at any given time. This allows visibility into when events will occur and what actions, if any, must be taken to keep the schedule on track. For example:

- Field supervisors can see how their teams are doing against their assigned work, or who has capacity to help a colleague
- Dispatchers can assign new jobs to mobile employees or reassign jobs in jeopardy
- Technicians can alert everyone in the service cycle if they have a problem or are falling behind schedule

Customers

A large volume of mobile appointments involve a visit to a customer or someone who has a stake in when the appointment will occur. Customers typically have to rearrange their schedules to meet with a mobile employee. How long they are prepared to wait—and how they feel about a company as a result—depends on

- How much they value the appointment (most people will wait all day to have their internet connection or TV fixed, but are less willing to wait for a smart meter installation that may result in a higher utility bill)
- How well informed they are kept about when the appointment will occur
- Previous history of a field service company (if a previous appointment was accomplished early, on time, late, or was cancelled, that will affect a customer's tolerance for waiting)

Measuring and predicting with a high degree of accuracy when the appointment will take place, and making that information available to a customer, is an extremely powerful tool in improving and growing customer satisfaction.

Customer communication is also critical post-appointment. Gathering customer feedback can occur

- Right after the appointment to check that their service is working—collecting this information can reduce return visits and improve customer satisfaction
- With a sample group of customers over time—gauging the overall performance of the field force and improving critical measures such as Net Promoter Score (NPS)

Finally, progressive field service organizations are using face-to-face customer interactions to enable the up-sell of additional products and services to their customer base. This dynamic can occur by providing field service employees basic sales training or, more likely, through the placement of guided sales scripts through their mobile device (much like an internet pop-up ad).

Colleagues

One of the most exciting capabilities of today's connected workforce is the ability to collaborate. Inspired by social trends in the mainstream consumer market and driven by the ubiquity of consumer mobile devices, field service technicians have the ability to connect with one another in intelligent ways, ushering in a new era of expedited problem solving.

For example, questions from the field—say, quickly locating a missing piece of equipment or tool—would previously be sent to the dispatcher, who then would have polled the field to find the answer. Questions can now be directed from tech to tech, allowing for quicker problem resolution with little need to involve the back office.

Like a tweet's hashtag (#) automatically providing the context of a 140-character message, with new mobile workforce technology job information can be tagged automatically, directing the message to the relevant people.

Dispatchers

Although the dispatcher's role is becoming increasingly more automated, connecting directly with the field to solve urgent problems is still a critical part of most field service operations. Software-based technology and communication has replaced phone or text message conversations between mobile employees and dispatchers.

Like a tweet's hashtag (#) automatically providing the context of a 140-character message, with new mobile workforce technology job information can be tagged automatically, directing the message to the relevant people.

However, much as field resources can now connect with a colleague, a dispatcher can connect the same way. Resolving issues, changing job assignments, and updating status for jobs that haven't been completed or that have been canceled are done through asynchronous means. This allows a tech to respond when able and, more importantly, respond with the proper context regarding a question or a message about a job. The communication method automatically provides the context for a job within both the message and the employee's application.

Field Supervisors

Connecting the mobile employee and the field supervisor to each other, as well as to an up-to-date schedule and customer satisfaction scorecard, gives far more information and control to the field. Now the field supervisor can see quickly, easily, and in real time how the team is doing with their tasks for the day. The connection allows each mobile employee to provide feedback or coaching to improve problems that day before they become serious.

Remote Expert Support

The application of expert support has become a major driver of change in the connected mobile workforce. If a mobile employee cannot solve a problem alone or with the help of coworkers, he or she can present it—with context—to a group of remote experts for real-time discussion and resolution. The immediate impact is a reduction in the number of times a technician gets stuck on a job, in essence increasing the number of first-time fixes and mean time to resolution. The same trend is expected to have a longer-term impact on the entire field service industry by reducing the required technical experience and knowledge for a mobile employee to be effective, thereby allowing companies to consider other skills, such as sales, in their mobile workforce.

Location Awareness and Tracking

Companies have used GPS devices to track the location of their vehicles and mobile employees as a safety precaution for years. Such technology provides visibility into how and where vehicles are being driven, and allows for the monitoring of worker compliance. The advent of smart devices, increased bandwidth, and HTML5 has taken this concept to the next level; instead of tracking vehicles, companies can now track employees directly from their mobile devices.

Companies can easily compare where a mobile employee is versus where they should be, whether they are at their destination or several hundred yards away from it. This technology can then generate warnings or notifications when the variations exceed defined limits such as time, distance, or other factors.

This information also allows the company to react quickly and effectively in the event of an emergency such as a network outage, where the nearest technician with the right skills can be quickly diverted to fix the priority issue. Mobile employees can see which lower-priority jobs are near their current location if they finish a job early, or see who in their team is close by and can help with a job.

Connected Mobile Employees: The Big Picture

The typical topology of a connected mobile employee was described in the previous section. However, the vectors and nodes of connectivity are fluid as customer demands, competition, and advances in technology rapidly change. The true value of the concept comes not from how or to what a mobile employee is connected, but rather from the assumption that the mobile employee will always be connected. Entire businesses will change on the assumption that the field can access whatever back-end process it needs.

Therefore, placing connectivity as the cornerstone of a field service strategy prepares an organization for market or technological changes. The next section reviews future trends that may affect the mobile workforce, and how a connected worker is well positioned to take advantage of these trends.

The Future of the Connected Mobile Employee

The trends described above that created today's connected mobile employee are just the beginning. As Moore's Law predicts, the exponential growth of computing power—which translates into the power of the mobile device—and the bandwidth and connectivity of a mobile employee will grow in parallel. Increasing competition and economic pressure will also put more demands on them and the services they provide.

New technology and business trends are already emerging that, when completely developed, will have a clear impact on companies with connected mobile employees. By implementing current best practices for a connected mobile workforce, companies will be well positioned to take advantage of several future trends, ranging from hardware such as wearable technology and self-driving vehicles to the Internet of Things. Here are some current trends in development designed to spark the imagination.

Wearable Technology

Portability of technology has been an evolving trend for the past 20 years. From the home PC to the laptop, to the mobile phone and finally the smartphone, technology has not only gotten smaller but virtually morphed into an extension of the human body. The practical applications of wearable technology like Google Glass, the FitBit, or their successors can be extremely beneficial to connected mobile employees.

» **Freedom.** Wearable technology allows mobile employees complete freedom of movement, without losing access to important tools.

- **Enablement.** Wearable technology enables the use of augmented reality, guiding employees through the steps of problem diagnosis or installation. This increases productivity, reduces mistakes, and potentially equalizes the skill levels. The result will be a greater number of mobile employees able to complete a greater number of jobs.
- **Collaboration.** Wearable technology not only enables connectivity with remote subject matter experts (SMEs), it allows SMEs to directly engage in the field experience. Remote SMEs will see what the technician sees, and can help guide a mobile worker through difficult tasks.

Self-Driving Vehicles

What was pure science fiction just a few years ago is quickly becoming a reality. The self-driving vehicle trend started with simple features such as lane warnings and parking assistance, and has now expanded to the brink of full driverless functionality being legalized in some major urban areas. The statistics of this technology are compelling not only in terms of accident reduction, but also in improved vehicle economics. With the real potential of self-driving vehicles becoming commonplace, implications for the connected workforce cannot be underestimated—the vehicle itself becomes another vector of the connected workforce.

Impacts include

- **Efficiency.** Programmed to take the most-efficient routes, driverless vehicles will eliminate human error in travel time. Vehicles can make immediate route adjustments based on schedule changes, potentially even before the mobile employee knows that an adjustment has been made to the schedule.
- **Cost reductions.** Improved performance of driverless vehicles over human drivers will potentially lead to cost savings in fuel, vehicle wear, and travel time. Companies may also see a massive decrease in insurance costs associated with vehicles and drivers on the road.
- **Synchronization.** When vehicles are equipped with information such as appointment start and stop times, as well as the tools and equipment required for a particular job, the one-to-one connection between tech and vehicle can be broken. The new field force will consist of smaller fleets of driverless vehicles arriving at locations only when they are needed, dramatically reducing the overhead of operations across staffing, fleet management, and inventory.

What was pure science fiction in mobile workforce technology just a few years ago is quickly becoming a reality.

The Internet of Things

The mobile employee is connected to an ecosystem of technologies and business process that will forever change how the employee operates in the field. Yet it's important to note that these elements will also be connected to each other. This includes equipment installed throughout a company's infrastructure or even at a customer site. Everything will be connected to the internet in what is being called the Internet of Things (IoT). The IoT will have a direct impact, transforming the following areas:

- **Speed.** There will be no delay between the time a problem is discovered and the time it takes a service company to dispatch a field service employee. Field service technicians can arrive at a job even before a problem has occurred. Critical information regarding customer support will be fed to the workforce in near real time.
- **Customer expectations.** Machines will phone the customer's home if experiencing or anticipating a problem. As a result, customers will expect the field service team to be aware of any problems as soon as they occur, and what's more, to take immediate action. Customers will become less willing to bear the responsibility of making their own service requests.
- **Visibility.** Not only will field service organizations be instantly aware of when a fault occurs in the field, they will also have a clearer diagnosis of the problem. The IoT will constantly provide real-time information on the performance of each asset in the field, enabling the right technician with the right parts and the right tools to be sent to the appropriate job.

In addition to technology as a driver of change, there are also a number of industry and economic forces that will have an impact on the mobile employee of the future.

Dispatcher-Less Connected Mobile Employees

The connected mobile employee now has far more information at hand than ever before. With that information comes the wherewithal to make more-informed decisions at a faster rate than those that back-office managers can make. Mobile employees simply need empowerment to make decisions.

Mobile workforce management tools are giving organizations an air traffic control–like level of field visibility. This visibility permits a shift from a regionalized dispatch—with a ratio of dispatchers to mobile employees typically in the region of 1:8 to 1:12—to a centralized dispatch where dispatchers are typically handling 30 or more mobile employees.

Gradually, however, with that same information more readily available and digestible, dispatch responsibility will move from centralized teams out to the mobile workforce. Over time, field supervisors and even peer-to-peer relationships between mobile employees will resolve jeopardy situations and other issues currently handled by back-office management. As this information shifts, the power will shift as well, and the role of the dispatcher or jeopardy manager may change radically or disappear altogether.

Gradually dispatch responsibility will move out to the mobile workforce.

Diversification of the Mobile Employee

A number of companies with a large mobile workforce are finding that they have less work for the field force. For example, businesses whose core activity was to deliver letters have experienced a reduction in demand in the age of e-mail and social media. Traditionally, the answer has been to downsize or rightsize in whatever way seems most effective. However, the connected workforce presents another possible solution.

For organizations that have already made massive investments in a mobile workforce, the connected workforce will allow for a dramatic expansion of service offerings, with many companies exploring ways to assign other tasks to mobile employees once at a job site. These tasks do not necessarily need to be related to a particular organization's primary business. For example, a local cable provider may both read a meter and deliver a package while visiting a home. This increased value of the mobile workforce can generate new revenue streams through the execution of noncomplex fieldwork—a concept often referred to as "picking up pennies."

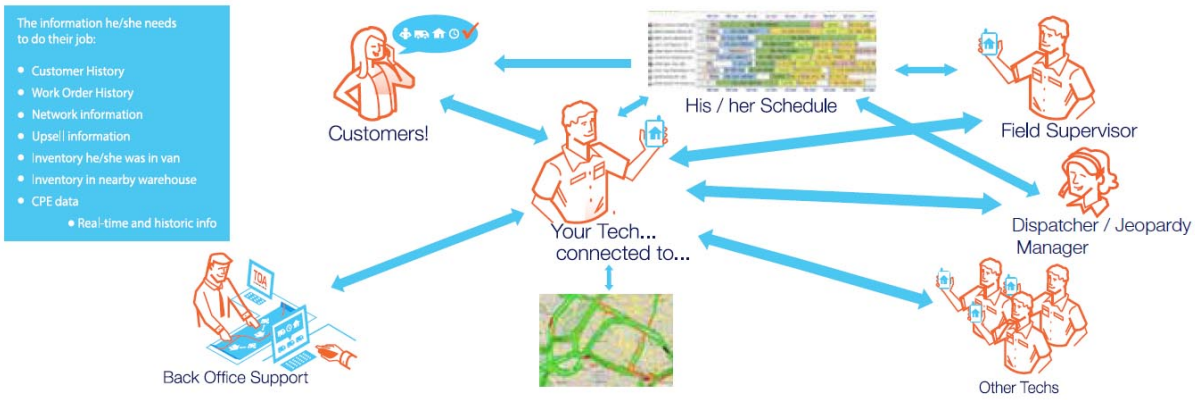

Figure 2. The connected mobile employee has more information at hand than ever before and is therefore more productive.

New Types of Mobile Employees

The connected workforce enables new field services that were not possible or cost effective until recently, allowing other industries to join the ranks of mobile workforces. The UK's National Health Service, for example, is now placing a far greater emphasis on "care in the community" rather than care in the hospital. While fieldwork has always been an aspect of the healthcare industry, this trend is making it much more widespread and closer to the core of what the healthcare industry provides. This adds an urgent new dimension—literally one that is a matter of life and death—to the mobile employee, far beyond the usual factors of convenience and customer satisfaction.

Conclusion: Future-Proofing the Mobile Employee

The connected employee is a recent phenomenon that's changing the way pioneering companies think about their mobile workforces, and these companies are already reaping the rewards of the connected workforce. The best way to join their ranks and future-proof your workforce is to make connectivity the cornerstone of a field service strategy.

The best starting point is to create some of the connections powering today's mobile employee. Once these connections become ingrained in your business processes, adding new connections will create minimal disruption, and field service organizations will be well poised to reap the benefits of each new connection.

The increased flow of information back and forth from the field, and the ability of devices to process and display that information in useful ways, puts the connected mobile employee in a new position of having access to all the information and support needed to make the best decision for the company. As companies realize this and empower their field employees to take advantage of the new reality, there will be a change in roles and a shift of power from the back office to the field.

By replacing mobile devices with smartphones, moving to device-agnostic applications, and connecting the field with back-office processes as well as the customer, today's mobile worker is more effective and productive than ever. Technological advances like wearable tech and the IoT will further enhance the connected mobile worker's role. Companies that implement best practices today will be best positioned to take full advantage of these future trends. In addition, new industries will develop mobile workforces, while longstanding industries such as healthcare will continue to expand into new field services. All will be driven by new advances in technology that solve unique business problems.

And for those companies that already have a mobile workforce? This new power of connectivity and technological advances in communications present exciting opportunities to optimize and inspire their workforces to new heights of productivity.

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