

A Ventyx Whitepaper:

## Field Enablement

Key Considerations for Solution Selection



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# Executive Summary

Concepts such as *mobility*, *field force automation*, and *workforce optimization* can have vastly different meanings to different people, depending on their industry, job function and environment. The myriad of available technologies and solutions that comprise mobility can make defining, planning and deploying a field enablement solution a daunting task. The challenge any organization faces in automating their business in the field is to effectively and efficiently bring these technologies together to rapidly enable their field force with a solution that is sustainable over the long term.

The enterprise mobility market has proven highly dynamic and evolved from simple hardware based data collection, to electronic versions of paper forms, to software based point solutions for automating complex processes, to today's integrated solutions and services. The long sought "field worker of the future" has arrived, empowered with access to critical knowledge and resources in real-time, wherever they are. Schedulers, planners and managers can also have a real-time view to their workers and assets in the field around the globe.

Mobility can be an integral and essential part of the integrated enterprise, provided the right technologies are employed. It is critical that any solution be an integral part of an enterprise's overall IT strategy, and that it not just provide a short-term mobile solution to solve a specific problem. This is particularly important to enterprises in asset intensive industries. Such organizations need visibility and governance in all areas of the enterprise to optimally plan, sequence, and execute work, whether it be projects, planned maintenance or emergency repairs, to ensure uninterrupted services and optimal productivity, while securing their workers' and the public's safety.

This paper will review the key considerations organizations should make when selecting mobility solutions for automating a field workforce. It will provide guidance in making the right decision, whether looking to solve an immediate problem, or attempting to develop a longer-term strategy for enabling the broader mobile workforce.

# Field Enablement Readiness

Despite all the recent news around adoption of mobility and workforce management, field automation has been prolific in several industries for more than three decades. Some of the earliest adopters were consumer packaged goods and retail, who since the green screen days have been deploying barcode scanners and mobile computers to automate everything from labeling and cycle counting to merchandising and route sales delivery. Parcel delivery companies and auto rental agencies have been leading the way in their use of mobile handhelds to automate core customer facing processes.

But it has been the enterprises in utilities and telecommunications that have been the true pioneers in field workforce optimization tools and mobile applications. As first adopters, they have learned through expensive trial and error the challenges of user adoption in the field. Mobile technology vendors have responded with platforms, frameworks and services that mitigate many of the challenges. Enterprise software vendors are finally delivering after years of empty promises.

Organizations ready to finally take the step toward automating their field organization are often faced with several questions. These are common questions for organizations that are considering mobility solutions. Often they find themselves wading through the myriad of vendors, technologies and solutions available in the market.

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<b>Problem Definition &amp; Scope</b>	Am I just looking for a quick solution to solve a very specific problem? What is the long-term impact of a short-term solution?
<b>Build or Buy</b>	Do I build a custom solution or buy an existing solution?
<b>IT Team Capabilities</b>	Shouldn't I be able to solve my problems with generally available, and even free, tools and technologies?
<b>Project Scope</b>	Is it just a matter of electronically replicating all the forms and practices in place now? Mobile applications are just an extension of the back office, aren't they?
<b>Partner Capabilities</b>	Can we, or should we, trust our telecommunications provider and go with a mid-market solution? Have my partners helped to measure the short- and long-term value proposition and ROI associated with the different alternatives they have presented?
<b>Right Solution Selection</b>	There are a plethora of mobility platform vendors. Don't they all do more or less the same thing?

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## Many Choices to Solve the Problem

If properly defined, any set of processes or requirements in the field can be automated with any number of available mobile technologies. Put any technology vendor to the task, and they can ultimately automate the desired process. Give them enough time and spend enough money, and they can all come very close to delivering the same degree of functional benefit. However, each approach to the problem will vary in time-to-value and total cost of ownership.

Implementation Cost & Time-to-Value	Long-Term Cost of Ownership
<ul style="list-style-type: none"><li>• Application development effort</li><li>• Required skills to develop and deploy</li><li>• Availability of devices and networks</li><li>• Performance</li><li>• Scalability</li><li>• Ease-of-use</li><li>• Change management</li><li>• User adoption</li></ul>	<ul style="list-style-type: none"><li>• Required reliance on specialized resources</li><li>• Ease-of-administration</li><li>• Extensibility</li><li>• Upgradeability</li><li>• Reusability and portability</li><li>• Security</li><li>• Stability</li><li>• Risk mitigation</li></ul>

Evaluate application vendors and the functional business results will vary widely from the onset. Not only will the underlying technologies vary, but so will the approach to the problem. Every vendor will vary considerably in cost of ownership and deliverable benefit due to:

- Functional reach and relevance
- Degree of required customization
- Availability of additional relevant out-of-the-box applications to solve a larger problem(s)
- Domain resources to assist in defining and executing a strategic long-term field enablement plan

# Complete Mobility Platform Attributes

## Meeting all Mobile Workforce Requirements, Long- and Short-Term

Underlying every mobile user experience is a basic set of technology components including, but not limited to, the client, the mobile device, communication, data management, administration, and integration with the back office. These can all be individually cobbled together, or acquired in a single integrated mobility platform that ensures rapid time-to-value, minimizes total cost of ownership, and delivers functionally relevant applications that fully address the short-and long-term business needs of the enterprise. Select the right platform and everything falls into place.

A complete mobility platform should include a number of key attributes to ensure successful deployment of relevant solutions in the field, to minimize the total cost of ownership, and to strategically position the enterprise for long-term success through continual improvement. This section discusses each of the key attributes and their importance and value to the enterprise. Few mobile technology vendors adequately address more than a handful of the attributes.

### Change Readiness

Asset intensive enterprises are in a constant state of change, having to continually adapt to social, regulatory and economic factors. The fact that these enterprises and their infrastructure are large and distributed, and their assets are expensive and long-lived, only makes rapid adaption all the more challenging. They face the following challenges:

- Effectively servicing assets and infrastructure throughout their long lives, requires continual upgrades, changes, and additions to the asset base
- Rapidly and continually equipping employees and contractors with the tools, knowledge and skills they require to effectively service the changing asset base
- Enabling management with visibility and governance in the field to effectively manage their resources amidst turnover, retirement and integration of new workforces and third parties.

Processes and data relevancy are thus in a continual flux. Mobile solutions must continually and rapidly change in these dynamic environments to ensure the enterprise can continue service and production without interruption. Application, device and network changes must be simple, cost effective, fast, and most importantly, not affect the day-to-day operations of the business. Changes to the back office systems must be imperceptible in the field, so a change-ready platform should facilitate and promote change rather than impede it.

The hardcoded applications and solutions so prevalent in other industries are not feasible or viable in the dynamic environment of asset intensive enterprises. A successful platform should enable development of change-ready applications and solutions that can adapt to not only changing processes, data and skills, but to changing devices, operating systems and networks.

### Device Independence

Every year, industry analysts and thought leaders in mobility predict the convergence and standardization of mobile devices and operating systems. Continued consolidation among technology vendors and service providers, and the recent economic downturns, would seem to promote this. However, nothing could be further from the truth. Despite Microsoft's attempts to standardize mobile operating systems, it has done quite the opposite, enabling device manufacturers to develop their own individual user experiences. The advent of iPhone and the iPad, and the launch of Android, have only further fragmented the device market. This trend will only continue as consumers and professionals become more mobile and technologically savvy.

As hard as IT organizations may continue to fight it, the user expectations from consumer devices creep their way into the enterprises more and more every day - and it is no longer simply in the domain of the white collar professional. But even if IT organizations manage to resist the onslaught of multiple devices in the workplace, device manufacturers will continue to change their products at an ever increasing rate. While it is true that rugged and semi-rugged devices more suitable for the asset intensive field environment change far less frequently than consumer-grade devices, change is inevitable in the world of devices.

The enterprise must be able to cost effectively port its applications and solutions across devices as they evolve and take advantage of the new capabilities in those devices. Application upgrades cannot impede business. Yet many field organizations, once pioneers in mobility, are now handcuffed with applications and solutions that cannot port or upgrade without completely scrapping their existing investments. A successful platform should support mobile applications that both run on multiple devices and port across devices as they evolve. The triple threat of manufacturer, model and operating system should not affect the business.

Achieving device independence in a cost effective manner for the mobile application developer requires separation and independence of the client and server code components of a mobile application. Independence of the mobile device relies on the fact that the server application code is not wed to the particular client code component of a particular mobile device type. The server can service client code components simultaneously residing on different mobile devices.

## Network Independence

For many enterprises, the ability to move data across multiple telecommunications providers is critical to their success. This is particularly true for field organizations that operate in metropolitan areas or that service consumers and businesses. Network agnosticism is important to ensure a mobile application can communicate anywhere, and the enterprise can negotiate favorable terms with the most suitable carrier. But to the asset intensive enterprise, it is a far more complex matter. Utilities, for example, may service customers and even grids in areas with wireless coverage, but the reality is that much of the grid is in rural distant areas, and carrier coverage may not be available, feasible or safe in a distant power plant or farm. Whether in the mine, or in the plant, or hanging from a tower, workers must be able to communicate over a variety of means – Satellite, WLAN, mesh, cradle, etc.

This requires a platform that can support simultaneous communications over multiple IP based networks, whether by push or by pull. Bandwidth and cost are still often a problem for many enterprises, particularly in more remote parts of the globe, where one tends to find asset intensive enterprises. An effective platform must be able to efficiently handle large amounts of data across less capable networks without any perceived impact or latency to the user. Many processes are best suited to SMS and other messaging services. An effective mobile application should be able to operate not only with one protocol, but rather simultaneously over multiple protocols depending on the particular process in question.

While a mobile worker must be able to work independently when data communications are not possible, the asset intensive field is by its very nature a collaborative one. Multiple forms of communication should be able to coexist to leverage email and other communication methods between the back office and mobile worker, between mobile workers, and with external third parties.

For a mobile platform to achieve network independence, the network messaging and protocols must be isolated from the mobile applications leveraging the platform. The mobile applications should not be aware of any particular network idiosyncrasies, limitations, or restrictions. Furthermore, the platform interfaces that mobile applications utilize should not change or respond differently depending on the network or its availability. The platform should guarantee message delivery, and handle all conditions found in a typical unreliable network such as absent or expired acknowledgements, message duplication, etc.

## Intelligent and Opportunistic Data Management

A worker in the field cannot always rely on uninterrupted wireless communications. In many cases it simply is not physically possible given the depths, distances and enclosures in which a worker in an asset intensive enterprise must function. In others it is simply not safe, or against environmental, safety or health regulations. The worker must thus be able to operate in a disconnected mode independently. This requires all the necessary data and tools they need to execute their work effectively and efficiently without assistance from a distant service center or supervisor. However, they do need to receive and provide updates when they are back in wireless coverage or they can cradle in.

Even in environments with 100% wireless coverage, the network can go down. Independence is important. However, in environments with large workforces, if the network has been down for some time, the moment it comes online, the sudden surge of data in both directions can cause network problems of yet another variety. An effective mobility platform must be able to efficiently preempt these problems and handle these events without affecting the mobile worker and the business.

Not all data needs to be real-time. Distress alerts must be real-time. Status updates, progress checks, location-based tracking coordinates, and so forth, are typically more time sensitive. Inspection readings, time and labor, and so forth, are usually not time critical. This all varies by industry, company and user role. More importantly, it is not the data type that drives when the data should be uploaded or downloaded. The process and the business needs determine which data should pass when, and in which direction. A mobile worker performing repairs, for example, will require different data, and pass different data, throughout the day and during individual work orders. Most communication updates should be automatic and imperceptible to the worker. They should happen opportunistically and intelligently behind the scenes, efficiently and optimally leveraging the current network condition.

## Process-Centric Solutions

Mobile field workers have very different needs from back office workers. While they require data from the back office, and collect and update data that is critical to the back office, not all data in the back office is relevant, and not all data they work with is necessarily relevant in the back office. Their processes, while a seamless part of the end-to-end management of the asset lifecycle, are inherently different in the following ways:

- **Extension of the Back Office**

Many of the mobility pioneers and today's enterprise software vendors still treat mobile applications as an extension of the back office. They have tried to place their back office on wheels, whether by simply attempting to shrink down a back office application into a mobile device, or attempting to "dumb down" the process. They not only failed to improve service delivery in the field, but in many cases alienated the very mobile workers they were attempting to help, or actually introduced more work and inefficiencies both in the field and in the back office.

- **Forms Automation**

Another historically popular approach to automation in the field has been forms automation. In the case of very simple forms, the need is met. However, in many cases, a completed form is actually only the result of a very complex set of steps and processes that are not documented, and often not even standardized. To effectively automate these forms and to actually introduce measurable improvements in the field, and thus ensure user acceptance, intelligent processes and logic must be built into these forms to help the worker make his way quickly through the process ensuring quality, consistency, relevance and timing in the data.

- **Process is Repeatable, Execution is Not**  
Field work processes tend to be repeatable and consistent. Yet execution in the field is typically not to standard and far from consistent. Most applications in the field today are not process driven to rapidly guide the mobile worker through his job. In fact, they typically slow down the worker and add perceived overhead for the purposes of reporting or tracking. A successful mobile application should enforce standard, consistent, effective and efficient execution in the field (while allowing for the unavoidable exceptions).
- **Putting Devices Before Applications**  
Enterprises will often select a device before actually designing or selecting the application most suitable to automate a field process. Even in those cases where the application or solution is identified first, it is either not suitable for the selected device, or cannot take full advantage of the device's capabilities. In a successful solution, process drives the application, the device, and the communications. These must be optimized synchronously to effectively deliver the correct solution to the field worker. As technologies change and evolve, the application should be readily changeable or extensible to optimally work with those technologies.

## Effective Change Management and Deployment

In an around-the-clock, distributed asset intensive enterprise, bringing in devices to load or update software or troubleshoot problems is not practical. The interruption this would cause in the field would be too costly. IT organizations are typically not staffed to support these volumes of effort, unless they contract out such services. IT should have the option of automatically installing software and updates individually, or en masse, over the air or via cradle banks.

Devices are a significant investment for the enterprise. Once loaded, the devices need to be regularly monitored in the field to maintain the optimal working condition, ensure optimal performance, and secure the devices, their use, and more importantly the integrity and security of the applications and data on the device. An effective mobility platform should be able to track and monitor each device and its unique characteristics. When the device's integrity, performance or lifespan is failing, the platform should be able to port the resident applications and data to a new device with no perceived interruption to the mobile worker.

## Non-Intrusive Integration

Field workers will often require data that does not exist in the back office. Yet, without it their mobile application will not succeed. The answer is typically to introduce changes in the back office in order to deploy the mobile application. Deployment of a mobile application can thus be a very intrusive event, resulting in a very expensive and lengthy implementation. Integration with the back office is usually the long pole in field automation projects. It introduces upgrade and support challenges with the back office application. A simple mobile deployment can render a back office enterprise suite unsupported.

Requirements in the field and in the back office are continually changing after the initial deployment. Deploying and managing these changes without adversely affecting the users and nullifying vendor maintenance and support agreements is complex and costly. A successful mobility platform should facilitate rapid deployment of mobile applications without requiring intrusive changes to the back office. Changes in the back office should be imperceptible to the mobile worker so that they can continue their day-to-day operations in the field.

The same separation of the mobile application client and server code components that promotes device independence also plays a role in the isolation of the mobile worker from back office changes. When the client and server code components are independent, the contract between them need not change although the integration of the server component to the back office may change significantly. The platform should support the specification of this contract to ensure best practices when designing and developing mobile applications.

## Data Collaboration and Orchestration

Mobile applications are often designed and developed as point-to-point solutions, to work with a specific back office application or database. They cannot be ported to other similar back office applications, nor can they work with data from multiple systems simultaneously. The reality is that a mobile worker often requires data from multiple systems even when executing a single work order, and will invariably collect and report data that must feed multiple systems. Integration between complex systems is required in the back office to ensure that the one back office application communicating with the mobile application supports all the required data. This is expensive, lengthy and often not even possible.

Another solution typically deployed is to simply provide the mobile worker with multiple applications, each communicating with a different system. This can be an overwhelming proposition for the mobile worker resulting in low adoption, and can introduce additional inefficiencies in the field, as well as burden IT with added maintenance costs.

A successful mobility platform should support communication between multiple applications in the back office and a single or multiple mobile applications. Integration should be fast, seamless and non-intrusive in order to minimize cost and risk. If deployed effectively, a mobile platform can tear down the walls of siloed data within an enterprise, serving as a bus itself. It should facilitate and promote sharing of data not only between the back office and the mobile worker, but among mobile workers, and between mobile workers and third parties. The result is ultimately full visibility in the back office. Also like a bus, the platform should support standard secure synchronous and asynchronous non-proprietary integration options conforming to modern technology standards. It should feature workflow, data mapping, and data transformation capabilities to expedite the deployment of the back office integration.

## Data Integrity and Intelligence

Data without context to time, location and process, is static and, at best, useful for limited reporting and analysis in the back office (not to mention unhelpful to the mobile worker). Field data with contextual awareness is not only powerful for analysis, but can actually automatically initiate critical process both in the field and in the back office by way of alerts, approvals, orders, requisitions, and more. Coupled with real time tracking and monitoring of the field force, it can feed the optimization tools required to effectively and efficiently manage the field organization and ensure the highest level of asset productivity. A successful mobility platform must enable applications and processes with contextual awareness to data in the field, and facilitate real time communication of relevant data.

That data must be accurate, timely and complete. The mobility platform must support applications that validate, allow and enforce data quality. This can be a difficult proposition in the field due to dropped communications and multiple data owners generating conflict. The platform must provide robust conflict resolution, transactional control, audit tools and alerting mechanisms to promote and ensure data integrity.

## Rapid Development and Deployment

Some enterprises often think of mobile solutions as add-ons or extensions to their existing inventory of back office capabilities. This misperception is further amplified by the misleading small or portable nature of the mobile devices even though they are often laptops and tablets (PDAs can be quite robust computing platforms as well). The simplified user experience is often misperceived as a “dumbed down” solution. These enterprises are thus surprised when they experience drawn out implementations.

In truth, mobile applications can be more robust or intelligent than back office applications. The simplicity required in the field to be able to work efficiently and independently with complex data and working conditions, in an often disconnected mode, requires intelligence and logic not typically required in the back office. A simplified user experience, location based services, device monitoring, peripheral integration, opportunistic and intelligent data management, and security must all pack into the mobile solution, often with considerable development and configuration cycles. Yet, asset intensive organizations are in a constant state of dynamic change. By the time a typical mobile solution is deployed, it can be obsolete.

A successful mobility platform must enable rapid development, configuration, integration and modification to ensure the lowest cost of ownership in the long-term and deployment of effective and compelling solutions that address real and immediate challenges. This requires integrated development environments, tools, and frameworks for rapid development of applications optimized for the target device and user role, rapid integration capabilities for communication with multiple back office systems, and rapid provisioning and deployment to multiple device types and multiple user communities simultaneously.

## Technology Standards

Acquiring and retaining skilled and experienced resources is difficult in today's environment, particularly for asset intensive organizations in remote locations. Recruiting specialized resources is even more difficult. Maintaining their skills as technologies change is an ongoing challenge particularly given the ever increasing rate at which technology vendors are evolving their products.

A successful mobility platform must be non-proprietary and developed and maintained with prevailing and known standards. While the implementation of those standards may be on the cutting edge, and patented, the solution must nevertheless be open to the IT organization and its partners. This ensures continued support and facilitates rapid change. The solution should be deployable traditionally, as a managed service, or in the cloud. This requires development in web standards, a service oriented architecture, and a non-proprietary database.

## Scalability

Performance is everything in the field. Time is measured and managed in hours and minutes. This is particularly true in asset intensive organizations where asset productivity and uptime are critical. These companies have hundreds and thousands of users in the field at any moment. These workers require far more data, information and intelligent tools in the field than the typical parcel delivery rep, the HVAC tradesman, the auto rental agent, or the retail auditor. The user experience must be fast and effortless, and data updates in either direction must be imperceptible as they cannot be distracted in dangerous circumstances. Supervisors and management must be able to track them in real time to effectively manage the business and ensure safety. The data loads and communication can be demanding on the network and servers, requiring linear scaling to ensure high performance, and efficient data management to minimize hardware investment. A services-based architecture should support distribution of all the server components physically and virtually.

## Security

Mobile solutions are often the weakest point of security for any enterprise. The challenges of securing the safety of the mobile worker, the integrity of the data on the device, the device itself, and ultimately access into the enterprises' valuable databases, can be considerable and multi-dimensional. These challenges in an asset intensive enterprise bear much greater risk than in the typical field organization, given the public interest, regulatory requirements, and the required security levels and clearances in governments. A successful mobility platform must support deployment across multiple security tiers and DMZs, as well as ensure authentication and encryption at multiple levels, and this must be configurable to comply with each enterprise's unique security policies. The architecture should support distribution of all server components physically and virtually.

## Purpose-Built Applications

Automated mobile workforce management solutions have been available to service organizations for several decades. IT organizations were quick to seize on the opportunities presented by new technologies in mobility, resource optimization, and knowledge management as early as the 1980s. The result has been a proliferation in automated field service solutions across multiple industries. Yet, these solutions have traditionally been designed for field sales, field delivery and field service workers in non-asset intensive businesses. Even solutions deployed in the utilities industries have been restricted primarily to the distribution end of the value chain, for functions such as meter readings, provisioning and disconnects.

Asset intensive industries such as defense, mining, oil and gas, transportation, and even utilities, have been largely underserved. The conditions and challenges they face are more complex and their priorities vastly different. They require purpose-built solutions for servicing and managing their assets in the field and their extensive and distributed inventories of service parts. Despite these obvious differences, many of these organizations have purchased packaged solutions not designed for their businesses and attempted to force them in, or decided to build solutions specifically for their business, potentially utilizing the wrong tools, or tools that did not easily facilitate the level of development and change required to deploy an effective solution.

As an example, one area that is specifically misunderstood in asset intensive enterprises is the maintenance organization. A small lapse in procedure or slight bottleneck in data can result in millions of dollars in lost production, injuries, or even fatalities. Repairing the failure and picking up the pieces after the event is not an option. Though maintenance organizations inherently understand the criticality of prevention, they often do not have the tools in the field to operate preventively. Field work management solutions purpose-built for asset intensive industries can provide a huge opportunity to:

- Ensure workforce safety through adherence to best practices
- Measurably decrease maintenance costs through optimal workforce utilization
- Rapidly transform a maintenance organization into a preventive operation
- Optimize production and service delivery through relevant, accurate, real-time information at the asset
- Tear down the information silos that prevent collaboration across teams and operations to improve overall business effectiveness

Whether automating the field maintenance organization, field operations, warehouse clerks, construction crews, or exploration teams, the right platform will enable the field workforce with applications that are purpose-built – whether the organization is building the applications from scratch, or deploying pre-packaged solutions developed and managed on the platform.

## Conclusion

The “field worker of the future” has finally arrived. The many new and powerful technologies and services available will continue to evolve and grow, presenting the enterprise with choices and possibilities previously unimagined. However, the enterprise will continue to be challenged by pulling together these technologies and strategies effectively. Doing so is only feasible with a robust mobility platform that comprises the following:

- Change Readiness
- Device Independence
- Network Independence
- Intelligent and Opportunistic Data Management
- Process-Centric Solutions
- Effective Change Management and Deployment
- Non-Intrusive Integration
- Data Collaboration and Orchestration
- Data Integrity and Intelligence
- Rapid Development and Deployment
- Technology Standards
- Scalability
- Security

The selection of a mobility platform to develop, support and maintain process-based mobile applications, and an experienced partner in asset intensive industry solutions for the field force, will measurably increase the probability of success. Purpose-built solutions to enable the field workforce to optimally service and operate mission critical assets is now possible and field enablement is no longer just for the pioneers. Select the mobile platform and everything falls into place.

## About Ventyx

Ventyx, an ABB company, is the world’s leading supplier of enterprise software and services for essential industries such as energy, mining, public infrastructure and transportation. Ventyx solutions bridge the gap between information technologies (IT) and operational technologies (OT), enabling clients to make faster, better-informed decisions in both daily operations and long-term planning strategies. Some of the world’s largest private and public enterprises rely on Ventyx solutions to minimize risk, enhance operational and financial performance, and execute the right strategies for the future.

To learn more about Ventyx solutions visit [www.ventyx.com](http://www.ventyx.com) or contact a Ventyx sales representative today.