

The BlackBerry logo, consisting of the word "BlackBerry" in a white sans-serif font with a small trademark symbol, is positioned in the top left corner of the image. The background is a photograph of a man in a light blue turtleneck sweater and glasses looking at a smartphone in a warehouse setting. The scene is dimly lit with warm tones, and a large, semi-transparent BlackBerry logo is overlaid in the bottom right area.

BlackBerry™

# Mobility in Manufacturing

WELCOME TO AN IDEAL WORLD

# Mobility in Manufacturing

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### Introduction

Manufacturers are being pressured by customers, suppliers and competitors to do more, do it better and do it with less. To enter new markets, reduce costs and grow revenue, many manufacturers are embarking on joint ventures, mergers and acquisitions, strategic alliances and outsourcing to expand their global footprint. As a result, some companies have as many assets in foreign countries as they do in their domestic market. The firms that succeed know that innovations in manufacturing capability and reach must be matched with improvements in business processes. To sustain their competitive advantage and increase value for shareholders, customers, suppliers, partners and employees, manufacturers must stay on top of industry trends.

Identifying the technologies that will yield tomorrow's front-running business process improvements is not always obvious, even for established companies. This case is illustrated by numerous technologies that are only now starting to take hold in the manufacturing industry, despite their introduction many years ago.

- Radio Frequency Identification (RFID) now receives enormous attention worldwide and manufacturers are scrambling to assess this technology "breakthrough". Yet RFID is a sixty year old technology used to identify friendly aircraft in World War II. Only after Wal-Mart and the US Department of Defense (DOD) mandated that their suppliers use RFID tags did it garner serious attention.
- Supply Chain Management (SCM) was initially dismissed as a re-branding attempt by ERP vendors in the 1990s, with many claiming it was optional until Dell demonstrated how SCM could drive competitive advantage. Authorities trace the origin of SCM solutions to the Toyota Production System (TPS) of the 1950s.
- Software as a Service (SaaS) did not gain mainstream attention or adoption within manufacturing until very recently. No one took much notice of Marc Benioff in 2000 when he launched Salesforce.com and pronounced that his company would bring about "the end of software."<sup>1</sup> Now, six years later manufacturers are embracing Salesforce.com en masse, forcing software giants to take notice and leaving them scrambling to develop and market their own SaaS strategies.

Experience shows us that many important technologies get overlooked by all but a few and that the companies that embrace the business aids they provide the earliest reap the biggest rewards and gain an insurmountable head start on their competitors.

Is there another breakthrough lurking behind the scenes today? Absolutely! We are on the cusp of an exploding wireless phenomenon. Just as email changed people's lives and work habits and wireless email changed our lives even more, wireless applications are poised to penetrate every department and change the way we do business.

<sup>1</sup>San Francisco Chronicle, "Software shifts gear, Upstarts try to outrun high-tech 'dinosaurs' as on demand subscriptions gain ground", December 2005

### The Mobile Workforce Comes of Age

According to IDC, the mobile worker population was 650 million in 2004 and was expected to rise to 850 million—representing 25 per cent of the global workforce—by 2009.<sup>2</sup> An In-Stat survey reveals that manufacturers already have significant mobile workers led by sales (82.1%), managers (65.4%), field engineers (48.7%), field services (43.6%), IT workers (37.2%) and transportation (24.4%).<sup>3</sup> Despite the increasing mobility requirements within manufacturing evidenced by these numbers, manufacturers have not been able to improve their ability to work efficiently while mobile. Now, manufacturers have easy access to wireless technology, such as the BlackBerry® platform, and are starting to make up the gap by providing their mobile workers with access to important communications and information while they are on the go.

Mobility is pushing deeper into core business processes, triggering a greater interest in applications. A 2005 Forrester Research report shows companies are adopting BlackBerry and other wireless devices at a rate 12% greater than expected to satisfy their demand for wireless solutions.<sup>4</sup> To leverage their growing mobile workforce, manufacturers must extend business processes and applications to wireless devices to share and access information virtually anytime, anywhere. According to AMR Research, “companies who ignore wireless technology do so at their peril. The steady march of supply chain efficiency is at an inflection point. Those that do not keep the pace will be acquired or closed.”<sup>5</sup>

### Current Penetration of Wireless in Manufacturing

The Insight Research Corp. reports that manufacturing is one of eight vertical markets including utilities, health care, transportation, communications, wholesale trade, retail trade and financial services, poised to spend \$7.6 billion in 2006 on wireless data services alone.<sup>6</sup> That figure doesn't include the billions of dollars spent on hardware and software designed for those markets.

A recent IDC study of 933 U.S. and Canadian companies showed that 53% of process manufacturers and 39% of discrete manufacturing companies have already implemented some wireless and mobile technologies such as ruggedized devices, laptop computers, BlackBerry devices, Pocket PC™ and Palm OS™ smart phones and industry-specific tools.<sup>7</sup>

Many executives and sales road warriors are already carrying BlackBerry devices to stay in touch and stay informed. BlackBerry devices have been considered tactical tools, limited to phone, email and calendar tasks and justified by turning employee downtime into productive time. Even companies that have adopted BlackBerry solutions for their entire executive and sales team are only enjoying a fraction of the benefits of wireless.

There is a growing realization that wireless technology can drive increased agility and efficiency into manufacturing organizations. By bridging the gap between tethered applications and the mobile workforce companies can compete at a higher level. This is especially important for large companies, as it is more difficult for them to be nimble and responsive. According to AMR Research “Companies are recognizing that this is a viable technology, and what they are trying to do is look at it a little more strategically and understand how it can work in different parts of their business.”<sup>8</sup>

<sup>2</sup> IDC, “Worldwide Mobile Worker Population 2005-2009 Forecast and Analysis”, Oct 2005

<sup>3</sup> In-Stat, “Types of Mobile Workers”, 2005

<sup>4</sup> Forrester Research, “Enterprise Mobile Devices Need Innovation”, June, 2005

<sup>5</sup> Computerworld, “Wireless Leaders & Laggards: Manufacturing”, May, 2005

<sup>6</sup> Computerworld, “Vertical Horizons”, May, 2005

<sup>7</sup> IDC, “Vertical markets - Manufacturing Insights”, October 2004

<sup>8</sup> Computerworld, “Wireless Leaders & Laggards: Manufacturing”, May, 2005

### Getting Started with Mobility Solutions

When considering where to start, experts agree that you should pick the “low-hanging fruit” inside your company. Focus on applications that automate paperbound processes and improve customer service, enhance the productivity of expensive workers, reduce data-entry errors and cut process costs. Field service and sales are excellent initial candidates.

Start by providing mobile workers with basic, job-specific information such as inventory or customer history, accessed through simple icons on a dashboard display. Then add basic transaction capability to automate tasks such as logging a service call.

Keep in mind that users won’t be nimble-thumbed teenagers, so the data-entry process needs to be simple. If you are going to develop some or all of these applications, look for flexible development tools like the BlackBerry Mobile Data System™ (BlackBerry MDS™). This will enable your corporate developers to extend the information from back-office systems to mobile users.

The hardware’s form factor, portability and battery life are just as important as the software it runs. Will they be using devices inside their vehicles, or outdoors in rain and snow? Do they need a device outside of the plant at all? Do they need an expensive ruggedized unit or a laptop? If the answer to any of these questions is yes, then BlackBerry devices are the ideal solution. They are physically unobtrusive, easy to carry, don’t require constant logging on, constant docking or battery charging and have enough on-board memory to allow for continued operation when a persistent network connection is unavailable.

Finally, companies should determine whether their network coverage needs to support wide area wireless applications for field sales and service in addition to local area wireless coverage for the plant floor and distribution center. The BlackBerry Enterprise Solution™ can handle both scenarios.

### Mobility Applications for Today’s Manufacturer

This section offers some generic, “day-in-the-life-of” hypothetical cases to stimulate thinking on how mobility solutions can benefit your organization. Field service, asset management and field sales are the most obvious candidates, and to date these have received the most attention. The use of wireless solutions on the shop floor and for business intelligence is only just emerging, but already looks very promising.

Supply chain management is so broad and encompassing that it requires its own dedicated discussion paper. Consequently, we will introduce the current uses and benefits of wireless only as they pertain to supply chain logistics functions, such as material and shipment tracking.

### Mobilizing Field Service Management

For industries that sell and service equipment with long product life cycles, the number of field service technicians can be in the hundreds or even thousands. These technicians are the front line in the post-sale process. How well they perform their jobs can greatly influence both customer retention and new business opportunities.

### Before Wireless

A field service technician starts his day at the dispatch office. He picks up his list of service calls and heads out to his truck, where he looks over the list to figure out which call is closest to the depot. He reviews the balance of the calls and mentally maps them out to determine his route. He notices that one address is incomplete and goes back to the office for clarification. He returns to his truck and sets off for his first call.

When technician arrives at his first call the customer mentions that he'd asked for an additional spare part. Checking his dispatch list, the technician doesn't see a note to this effect. He apologizes to the customer and checks his truck to see if one is available. It turns out he doesn't have an extra part, but promises he will order one when he talks to dispatch. The customer asks when it will be delivered. The technician tells the customer he can't be sure until he checks the service parts inventory.

The technician finally gets to work and notices there is something else in need of repair. He locates the customer at the other end of the plant to inform him. The customer asks if the extra work is covered under warranty and if not how much it will cost. The technician doesn't have this information, so they have to walk back to the office so he can call out on a landline to check with the depot.

He calls dispatch and is put on hold while they consult their warranty records. Finally, dispatch informs him that the warranty does not apply and provides an estimate for the work. He tracks the customer down again to give him the estimate. The customer requests a written quote. He calls dispatch with the customer's fax number and then provides the quote to the customer, who OK's the work.

He is now running late and tells dispatch to call ahead and inform his other customers. While driving, dispatch radios to tell him that a customer is irate over this delay, since the repair he needs affects a mission critical piece of equipment. The technician heads to this customer even though it's out of the way. When he arrives, he finds that the customer upset and refuses to pay for the service call. The technician knows better than to argue and sets to work immediately. The work goes smoothly, but now the technician is even further behind. He asks dispatch to reschedule his final call. Dispatch informs him that this customer will not accept being bumped and suggests overtime to get his calls completed. The technician reluctantly agrees, and has to gas up the truck again thanks to all the extra driving. The rest of the calls go as planned. His shift finally over, he heads home, where he fills in his manual time sheets and updates the dispatch list with his start and finish times.

The next morning, he again starts with a visit to the service depot to drop off his time sheet and the previous day's service call reports. While there, a sales rep asks if the customer from his first call was interested in the promotion they were offering. The technician replies that he was not aware of any such offer. The sales rep is miffed at the missed opportunity and asks dispatch why there was no notice provided.

Once the technician is back out on the road, dispatch informs him that the customer from yesterday's first call is still waiting to find out when his part will be delivered. The technician realizes he forgot to even complete an order request form. Now he has to make an extra stop to pick up the part and deliver it. During this stop he receives another call from dispatch. The customer from yesterday's second call is furious that he has received an invoice. The technician realizes that he also forgot to inform dispatch and accounts payable about the special dispensation. He stops at a payphone to call his wife and tell her he will be late for dinner again tonight.

### Business Challenge Summary

Without the means to deliver relevant information to the technician when and where he needs it, he becomes less and less current the longer he is on the road. This results in:

Problem	Reasons
Loss of productivity	<ul style="list-style-type: none"><li>• Inadequate field info causes the worker to show up unprepared or misinformed</li><li>• Jobs take too long</li><li>• Lower average jobs completed per worker</li><li>• Excessive driving time</li></ul>
Inaccurate information	<ul style="list-style-type: none"><li>• Redundant data entry</li><li>• Data entry errors</li><li>• Delayed status reports</li></ul>
Reduced customer service	<ul style="list-style-type: none"><li>• Excessive downtime</li><li>• Missed appointments</li><li>• Repeat visits</li><li>• Expectations not being met</li></ul>
Increased Costs	<ul style="list-style-type: none"><li>• Increased support infrastructure</li><li>• Unnecessary overtime</li><li>• Unplanned additions to permanent headcount</li></ul>
Reduced employee morale	<ul style="list-style-type: none"><li>• Dealing with unhappy customers</li><li>• Workers feeling disconnected and unappreciated</li></ul>

### Capabilities Needed

The critical issue is to get important information to the field service technician without the need to call in or visit the office. The following information pertaining to the customer and service request should be available on the technician's mobile device:

- Daily Dispatch List
- Customer Contact Information
- Customer History
- Service Request Summary
- Service History
- Product History
- Relevant Notifications and Bulletins
- Warranty Highlights
- Quotes
- Special Notes or Remarks

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Even more time could be saved by adding mobile transaction capabilities that exchange information with the enterprise, such as:

- Call completion reporting
- Appointment booking
- Service call escalation
- Service ordering
- Billing/Invoicing
- Payment recognition and receipts
- Printing
- Complaints Entry
- Barcode and RFID scanning
- Integrated GPS and routing

### After Wireless

The service technician is at home with a cup of coffee. He checks his BlackBerry device and selects the "Field Service" icon from a dashboard display. He is presented with a sub-menu of options. He selects "Today's Calls" to access the up-to-date dispatch list and scrolls through a summary of his planned service calls. He notices a customer that he hasn't called on before, so he clicks on the listing to get more details. He sees this customer owns a machine that he hasn't worked on in a while, so he selects "Technical Note" to read a short summary of the key maintenance issues.

He selects "Updates" to review any last minute product or service bulletins. The "Parts/Tools" feature gives him a summary of the service parts and tools he will need for the day and confirms whether they are on his truck or pending delivery. Thanks to this function, he rarely visits the depot since dispatch lists trigger drop-shipments using low cost delivery services. He selects "Directions" to get a routing summary and prints the itinerary on his wireless printer. The calls have been automatically sequenced to optimize his travel time.

At his first call, the customer asks for the spare part he had requested. The technician confirms he has it and selects the "Delivery" menu to pull up an e-form already populated with the customer's name and address, as well as the price of the spare part and part number. Using his wireless printer he provides the customer with written proof of delivery while at the same time transmitting confirmation to dispatch, inventory control, and accounts payable.

He begins the work and notices there is something else that needs repair. He accesses the "Warranty Status" for this customer and piece of equipment. Seeing warranty doesn't apply he selects "Get Quote," enters a time estimate and the estimating function returns a quote which he prints. He accesses the customer's cell phone number from his BlackBerry device and calls to tell him about the situation. He also lets him know there is a written quote waiting on his desk. The customer OK's the work.

Prior to leaving, the technician updates his call status report on his BlackBerry device. A reminder asks him to confirm whether he explained the latest upgrade offer. He informs the customer, who asks the technician to place an order. The technician selects "Order" to access an e-form with the details of the offer already populated. He transmits the order request and within seconds receives a delivery date. He prints the order for the customer and transmits order confirmation back to the sales and invoicing functions.

He realizes he is running slightly behind due to the extra work but he is confident he can make up for lost time since the next job is routine. The rest of the calls are completed as planned. He even fits in one additional call. Since his reports have already been completed as he worked, the technician calls his wife as he heads home and asks if she wants to go out for dinner tonight.

### Value and Benefits

Improved operational efficiency for mobile field service workforce results in:

Benefit	Value Drivers
Increased customer service	<ul style="list-style-type: none"><li>• More rapid response</li><li>• Faster reports to clients</li><li>• Improved first-time fix rates</li></ul>
Increased competitiveness	<ul style="list-style-type: none"><li>• Better customer retention</li><li>• Improved brand recognition</li></ul>
Increased revenue	<ul style="list-style-type: none"><li>• Win new customers</li><li>• Up sell potential</li></ul>
Lower service costs	<ul style="list-style-type: none"><li>• 20-30% better efficiency</li><li>• More calls per service person per day</li><li>• Reduced service penalties</li><li>• Reduced operation costs/travel</li><li>• Lower overtime costs</li><li>• Less service inventory</li><li>• Reduction in service related assets in field</li></ul>
Improved Intelligence	<ul style="list-style-type: none"><li>• Better compliance with regulatory bodies</li><li>• Improved service level agreement compliance</li><li>• Better analytics to perform depot analysis</li><li>• Increased community knowledge</li></ul>
Better worker morale	<ul style="list-style-type: none"><li>• Reduction in paperwork</li><li>• Fewer complaints to manage</li></ul>

### Back of the Envelope ROI

In industries that manufacture and service high-ticket capital equipment, field service costs can account for 10%-40% of revenues. A workforce of 500 field service technicians with annual labor costs of \$30M could save \$1.5M annually with a 5% increase in service efficiency. This doesn't include additional savings in supporting assets and operation costs, or any additional business won through better customer service.

### Mobilizing Asset Management

In many organizations, plants and assets are highly distributed but access to maintenance data has historically been centralized. Paper documents are carried to the field where the work is performed, and carried back to the office where actions taken are entered into the system. Maintenance delays can occur when the technician must request parts from inventory, enter additional service requests, or locate supporting technical information.

#### Before Wireless

A maintenance technician arrives at work and is greeted by a grim-faced plant manager. One of the surface mount machines is producing a high rate of rejects. The technician goes to the machine for a visual review but is unable to detect the problem. Returning to his desk he realizes he forgot to record the model or serial number in order to consult his on-line service records. He calls the shop floor manager on the internal phone system to get the information, but there's no answer. He walks back to the machine, records the data and heads back to his office.

Once there he searches the database and discovers that the machine has not had many problems, but it has recently been upgraded by the manufacturer's service technician. He also notices that another internal technician assisted in the upgrade. He consults the company directory to locate this individual. After several frustrating phone calls, he finally finds her extension. When he calls, he gets her voice mail and learns that she will be in a remote warehouse all day. The technician knows that pagers can't receive a signal in this particular warehouse. He then decides to contact the manufacturer's service rep. When he calls, the customer service desk asks for the service request number so they can identify which of their technicians performed the upgrade. Unfortunately this was not recorded in the asset management module. The technician says he doesn't know and asks them to find out who did the work and get back to him.

The technician is now falling behind on his regular preventive maintenance rounds. This is a real problem, since safety regulations require a strict maintenance schedule. The technician starts his rounds, but soon receives a page from the manufacturer. He returns to his desk, calls and is finally connected with the technician who installed the upgrade. He asks for technical notes that might shed some light on the current problem. The manufacturer's technician says he will send a document by email. He also suggests physically going to the machine so he can "talk him through" some diagnostics. Since he does not have a cell phone, however, the technician must wait for the email, print it, and then head to the machine. Fortunately, the diagnostics work and operation is restored.

Back on his regular maintenance rounds, the maintenance technician's supervisor asks him why he is behind. After explaining the morning's chaos, the supervisor authorizes overtime to get back on track. Resigning himself to another late night, the technician reluctantly agrees.

### Business Challenge Summary

Without the means to deliver relevant information in a timely manner to the maintenance technician, whenever and wherever he needs it, the following problems can occur:

Problem	Reasons
Increased Costs	<ul style="list-style-type: none"><li>• Costly mission critical equipment downtime</li><li>• Manufacturing quality issues</li><li>• Increased maintenance labor costs/headcount</li><li>• Unnecessary overtime</li><li>• Increased support infrastructure</li></ul>
Loss of worker productivity	<ul style="list-style-type: none"><li>• Repairs take too long</li><li>• Inadequate information causes workers to arrive unprepared or misinformed</li></ul>
Inaccurate information	<ul style="list-style-type: none"><li>• Data entry errors</li><li>• Redundant data entry</li><li>• Delayed status reports</li></ul>
Liability Issues	<ul style="list-style-type: none"><li>• Exposure to safety infractions</li><li>• Regulatory compliance (e.g. FDA, OSHA)</li><li>• Lease management obligations</li></ul>

### Capabilities Needed

It is critical to get important information and communication capabilities into the hands of maintenance service technicians when and where work is being performed. This includes:

- Work ticket/order assignment
- MRO inventory availability
- Plant info and equipment location
- Tool availability/location
- Asset condition and history
- Third party service contracts
- Third party contact information
- Notifications and Bulletins
- Access to knowledgebase, FAQ
- Warranty Highlights

Additional efficiency can be realized by extending maintenance service mobile capabilities to incorporate simple transactions and expanded information, such as:

- Work ticket creation
- Integration with RFID
- Integrated GPS and routing
- PDF equipment display
- Counter readings
- On-site call completion reporting
- On-site service call escalation
- On-site service ordering

### After Wireless

A maintenance technician arrives at work and is greeted by a grim-faced plant manager. One of the surface mount machines is generating a high rate of rejects. The technician goes to the machine for a visual review but is unable to detect the problem. Using his Bluetooth®-enabled RFID device, he reads the RFID asset tag that retrieves the machine's make, model and serial number. This information is then displayed on his BlackBerry device. He selects "History" from the dashboard menu of icons to retrieve the latest service records and related contact information. He opens a trouble ticket which is already populated with the RFID information. The ticket is automatically transmitted to the Asset Management system. He notices the machine has not had many problems, but it has recently been upgraded by the manufacturer's service technician. He also notices that another internal technician assisted in the work. The contact information for both is already displayed. Since they have a WLAN installed and all internal technicians carry BlackBerry devices that can operate on Wi-Fi® networks, he is able to reach her immediately, even though she is working in a remote warehouse where standard pager and cell phone devices are ineffective. She suggests contacting the technician who did the work since she was just observing. He calls and leaves a voice mail and also sends an instant message asking for help. Within seconds he receives an instant message in reply from the manufacturer's service rep saying that he is in a meeting but will excuse himself and call immediately.

The technician receives a technical note from the service rep followed by a phone call. Using a push-to-talk capability on his BlackBerry device, he is walked through some routine tests. Fortunately, the diagnostics work and operation is restored. He thanks the technician and then closes the trouble ticket from his BlackBerry device. While doing his regular maintenance rounds, his supervisor catches up with him and asks how his day is going. The technician shrugs his shoulders and says, "Oh, you know, the usual."

### Value and Benefits

Mobile solutions enable the maintenance worker to access critical data while in the field. Supported by virtual real-time, bi-directional communication using phone, email and instant messaging, this results in:

Benefit	Value Drivers
Asset lifespan increased	<ul style="list-style-type: none"><li>• More time for preventive maintenance</li></ul>
Lower service costs	<ul style="list-style-type: none"><li>• Less technician idle time</li><li>• Reduced downtime</li><li>• Less travel time</li><li>• Better warranty tracking and leveraging</li><li>• Reduced operation costs/travel</li><li>• Lower overtime costs</li><li>• Less MRO inventory</li></ul>
Improved Intelligence	<ul style="list-style-type: none"><li>• More accurate analytics, e.g. MTTR</li><li>• Better compliance with maintenance agreements</li><li>• More accurate asset inventory</li><li>• Up to date asset condition reports</li><li>• Better visibility into outsourced activity</li><li>• Lease management compliance</li><li>• Ensure regulatory compliance</li></ul>
Better worker morale	<ul style="list-style-type: none"><li>• Reduce paperwork/less redundancy</li><li>• Less need for office visits</li><li>• Less wasted time retrieving information</li></ul>

### Back of the Envelope ROI

In industries that are machine and facility intensive asset management costs can equate to 5% of revenue. A workforce of 100 maintenance technicians with annual labor costs of \$6M could generate an annual savings of \$600K with just a 10% increase in service efficiency and this doesn't include additional savings in supporting assets.

### Mobilizing Field Sales

During the past decade an explosion of sales force automation (SFA) and customer relationship management (CRM) systems were introduced to the market. Despite these enormous investments, however, user adoption is still challenging and limited. Extending SFA and CRM functionality to accessible, easy-to-use wireless devices puts these high value systems into the hands of mobile workers where and when they need them most, dramatically increasing user adoption rates and end user buy-in.

#### Before Wireless

A regional sales rep spends an average of three days per week making face-to-face calls on prospects and customers. When she is in the office, she attempts to dedicate a morning a week to cold calling to feed her sales pipeline. Recently, the company extended its SFA to the laptop to try and alleviate the glut of reporting at the end of the week and the number of late reports. While she finds the system easy to use in the office, this is not the case when she is away. As a result she "stores up" her updates until she can get back to the office.

She begins a three-day road trip by car. Arriving at her first appointment, she discovers her appointee had sent an email explaining he would not be available, and had arranged for her to meet instead with one of his technical staff. In addition, he had some specific questions that were also in his email. The sales rep has never met this member of the technical staff, so she has no background on his role in the company or the sales process. In the meeting, he asks about the boss's questions and seems annoyed that she is not prepared to address them. She promises to provide a technical brief by email and makes a mental note to follow up.

On her way to the next appointment she gets a voice mail on her cell phone regarding a customer looking for a quote. If she can submit the quote that day they will approve the purchase immediately. Taking a detour, she stops at two different hotels looking for a wireless hotspot so she can connect to the office. She logs on, prepares a quote and emails it to the customer. She calls ahead to her second appointment, saying she is running late. The receptionist puts her on hold for several minutes, and when she comes back on the line tells her the appointee has asked to rebook for a later date.

Realizing she now has some unexpected free time, she wonders if she should do her call report. Since she finds the reporting system inconvenient and annoying, however, she decides to make a call on another customer instead. She searches her contact list and locates a couple customers close by. One agrees to the short notice visit if she can advise them on the new upgrade. She calls product marketing, who send a brief status report by email. Then the office calls saying the customer she quoted earlier was asking what the price would be if they increase their order. She hurries to a hotel equipped with Wi-Fi to log on to the ERP order history to get price break information and her email. Using the hotel's business center, she prints the upgrade information for her next appointment and sends a revised quote with the better volume pricing. All the extra time has eaten into her schedule, so despite the extra effort the additional customer site visit turns into a brief handshake and exchange of literature in the lobby.

Later, her afternoon appointments completed, she checks in to a hotel. She logs on and downloads her email. An email from her manager reminds her to update the pipeline report. She also sees an email from her first appointee, who is not happy as they are still waiting for the technical summary she promised. She logs on to the SFA system and begins her call updates. Despite having an SFA application on her laptop, she still feels disconnected from the information she needs to do her job and views the SFA system as a hindrance. Given her aggressive quota, she is much more interested in preparing for tomorrow's calls and feels the SFA reports cost her not only her time, but her commission as well.

### Business Challenge Summary

Field sales is a constant balancing act between practice and process. Without the proper tools to have immediate access to critical sales support information and the ability to quickly and easily update sales activity, the following problems can occur:

Problem	Reasons
Decreased Selling Efficiency	<ul style="list-style-type: none"><li>• Too much non-selling time</li><li>• Too much paperwork</li><li>• Less customer touch time</li><li>• Fewer outbound calls</li><li>• Missed up-sell and cross-sell opportunities</li></ul>
Outdated pipeline intelligence	<ul style="list-style-type: none"><li>• Opportunity pipeline updates often late</li><li>• Sales methodology not adhered to</li></ul>
Reduced worker morale	<ul style="list-style-type: none"><li>• Feel burdened by administration</li><li>• Concerned with impact on personal earnings</li></ul>

### Capabilities Needed

The critical need is to get important information from the SFA system to the sales reps. BlackBerry solutions give them virtual real-time access to vital sales aids and support information, such as:

- Contact management
- Personal and team calendar access
- Team notification for action items
- Personal to-do lists and alerts
- Situational fluency sheets
- New lead alerts
- Inventory availability
- Customer order history
- Order and delivery status
- Pricing and break points
- Offers, discounts and promotions
- Competitive updates
- Product bulletins
- Access to knowledgebase, FAQ

Consider extending your mobile field sales capabilities further still and incorporate simple transactions so sales reps can complete reports as they go. This would include:

- Sales process tracking
- Call status reporting
- Pipeline metrics
- Quote and invoice creation
- GPS integration
- Product catalog access

### After Wireless

A regional sales rep prepares for a road trip. Recently, the company extended its SFA to the BlackBerry device. Using a dashboard display of icons, the BlackBerry device gives the sales rep access to critical SFA and PIM functions, such as on-the-spot call status reporting, contact manager, to-do lists, appointment calendar, email, marketing bulletins, product updates, pricing, quotation, and full cellular phone capabilities.

Armed with her BlackBerry device and a Bluetooth-enabled printer, the sales rep begins a three-day road trip. On the way to her first appointment, she receives an email from the appointee saying explaining he will not be available and has arranged for her to meet instead with one of his technical staff. Furthermore, he has some specific questions he would like addressed. She replies, confirming she will make the appointment and requesting background information on the new contact. After reading the response and the technical questions, she selects the 'Technical Specifications' icon to access the knowledgebase directory. Using a wireless printer she prints the appropriate document. She also sends an instant message to tee up an internal consultant should she need one during the meeting. Her contingency meeting goes well and the technical staff member is pleased with the information provided. Using her BlackBerry device, she selects the prospect from her contact list and then the 'Call Update' icon. Scrolling through the milestones in the associated sales strategy, she selects the "technical review complete" step to immediately update the pipeline and call reporting functions at head office.

She notices an email advising her that one of her customers is looking for a quote. She selects the customer contact link embedded in the email and accesses the 'Customer History' function to review past orders. She then accesses 'Product Catalog' to view the products and services required for the quote. Since the 'Quote' function is tied to pricing and order history, she is automatically alerted to the next price break, assuming she can bump up the order. She prepares two quotes and emails them to the customer. A short while later she places a follow-up call and learns the customer is very pleased with the second option and promises to place the order for the larger amount that day.

She realizes she is running ahead of schedule and decides to make an additional call. Since her customer contact list has map proximity and auto routing, she easily locates a couple of customers close by and calls them. One customer agrees to the short notice visit, providing she can update them on the progress of the new upgrade. She agrees and accesses the 'Product Updates' function, retrieves the required information and prints it on her Bluetooth-enabled printer. The customer is very pleased with the update information and responsiveness and promises to give the upgrade serious consideration. She accesses the 'Opportunity' icon to instantly add the potential new business to the pipeline, including potential deal size, related products, and sales process milestones.

After making all her other appointments prepared and on time, she checks in to a hotel. Since she has been updating her call status reports in virtual real-time on her BlackBerry device and has responded to her email throughout the day, she can focus on her to-do list, also located on her BlackBerry device, and create her sales strategy for the following day. With the reduction in non-selling time and activities, she is confident she will exceed her aggressive quota and feels she is able to communicate effectively with her customers and her manager.

### Value and Benefits

With SFA functions extended to the BlackBerry wireless solution, sales representatives can view and update key information in every step of the sales cycle without needing to connect to the back-office system. Being able to generate quotes, enter sales orders and access sales aids related to product, pricing and customer history results in the following:

Benefit	Value Drivers
Reduced Selling Costs	<ul style="list-style-type: none"><li>• Improved sales productivity</li><li>• Less non-selling time</li><li>• Less paperwork - more calls</li><li>• Sales manager becomes more efficient</li></ul>
Higher quota attainment	<ul style="list-style-type: none"><li>• Increase sales revenue per rep</li><li>• Improve close ratio</li><li>• Increase up sell and cross selling</li><li>• More customer touch time</li><li>• Faster order entry, fulfillment</li><li>• Capture new customers with faster response</li><li>• Increase deal size by including all options and configurations</li><li>• Provide on-site quotes</li></ul>
Improved Intelligence	<ul style="list-style-type: none"><li>• Increased visibility into opportunity pipeline</li><li>• Virtual real-time feed to manufacturing forecasts</li><li>• Sales methodology enforced</li><li>• More accurate sales cycle analytics</li></ul>
Better worker morale	<ul style="list-style-type: none"><li>• Better morale - less administration</li><li>• Higher sales increases earnings</li></ul>

### Back of the Envelope ROI

If, through better time management and access to critical information, each sales rep could increase their personal quota by just 1% to 3%, the combined impact would make for a very handsome ROI. Consider a company with \$2B in annual revenue. A 1% to 3% increase in sales productivity would generate \$2M - \$6M in additional revenue.

### Mobilizing Shop Floor Management

Wireless-enabled radio frequency data-capture devices such as wands, scanners and imagers are used fairly widely for identifying, tracking and monitoring almost everything that moves within a manufacturing environment—except people. A Gartner Group study found that workers in a manufacturing facility are away from their desks up to 40 percent of the time. How effective can they be without access to corporate information or basic communication capabilities?

#### Before Wireless

A production manager arrives at the office early, hoping to get through his email before the shift begins. He immediately notices one marked “critical,” related to a production line that contributes substantially to the company’s shipment revenue. The email from the evening shift supervisor explains that a critical machine was generating off tolerance parts, so they opened a trouble ticket and paged the technician. They waited for him to arrive, but he didn’t show up before the end of the evening shift. The situation is critical as it is month end and this machine is a feeder to several downstream processes.

The production manager sighs, realizing this is going to be one of those days. He consults the company’s phone directory and calls the maintenance supervisor’s extension. He leaves a short voicemail, “Get someone out NOW to fix this machine.” He then calls the evening shift supervisor at home to get some background and to ask why he is just finding out about this now. The supervisor is not at home so he leaves another voice mail requesting he call the office ASAP.

Being a believer in “management by walking around” (MBWA), he would rather be making his rounds than putting out fires, so he heads to the shop floor.. In front of the idle machine he sees a large queue of work and several containers full of finished parts with “reject” tags. He makes his way to a satellite office to call quality control. Since the inspector who did the quality check is not on the day shift, he asks for a copy of his report. He has to walk to the inspection office to retrieve it. On the way he stops by his own office to check his voice mail. The maintenance supervisor left a message saying a technician is on the way.

The manager grabs a copy of the report from QC and heads back to the floor. It only then occurs to him to check with Materials for replacement parts. He meets the technician at the machine, gives him the report, and heads back to the office. He notices his voice mail indicator is on again but doesn’t dare check for fear he will be pulled off track. He calls Materials, who promise to look into it and get back to him. He does a quick scan of his growing email inbox to see if any other hot items are lying in wait. Most of them are related to the problem he is working on, with people wanting updates. He decides to spend his time fixing the problem first and inform everyone later. He heads back to the shop and is relieved to learn the technician has identified and can fix the problem, providing they have the necessary repair parts in the MRO stockroom.

Encouraged, he heads back to the office to check on material status. He forwards through his voicemails until he hears one from Materials. He listens and is relieved to learn additional raw materials are available. The maintenance technician appears in his office and reports that the replacement part is in stock and the machine will be running shortly. He calls his dayshift supervisor’s extension to make sure he is ready but gets no answer. He returns to the shop to locate him and to organize overtime to be tagged on to the evening shift. He calls the evening shift supervisor at home to advise him of the need for 4 hours of overtime. The production manager returns to his desk and starts making calls to the downstream production supervisors affected by the stoppage. He looks at the clock and sees most of the morning is gone already. Then he picks up the phone and dials the VP of Operations to explain the delay and the need for overtime.

### Business Challenge Summary

When plant, production and operations managers take needless trips to the line or can't be located during a crisis while their voice mail and email pile up, the following occurs:

Problem	Reasons
Waste	<ul style="list-style-type: none"><li>• Contrary to Lean principle</li><li>• Accessing critical time-sensitive information is time consuming and restricted to tethered devices</li></ul>
Reduced worker satisfaction	<ul style="list-style-type: none"><li>• Voice mail and email considered a burden, instead of a communication tool</li></ul>
Reduced employee Communication	<ul style="list-style-type: none"><li>• Too much time spent locating people and resources instead of problem solving</li><li>• Too much time organizing ad-hoc groups to accelerate problem resolution or reach a quick decision</li></ul>

### Capabilities Needed

Environmental conditions and the presence of heavy equipment make the plant floor a less-than-ideal environment for broad wireless use. A wireless local-area network (WLAN) and a WLAN enabled BlackBerry device can provide shop floor personnel with the following productivity tools:

- Internal phone directory
- Third party phone directory
- Instant messaging
- Inventory status
- Production schedules
- Work order progress

To further extend shop floor mobile capabilities, the following two-way transactions can be added:

- Virtual real-time alerts on shop floor KPI's (e.g. late orders, bottlenecks)
- Escalation process
- Team notification for action items
- Integration with RFID and barcode
- Service requests

### After Wireless

A production manager is at home when his BlackBerry device alerts him to a production problem. It affects a critical production line so he knows that the alert has also been broadcast to the VP of Operations, plant manager and maintenance supervisor on their own BlackBerry devices. The associated email from the shift supervisor explains that a critical machine is just beginning to generate off tolerance parts. The email confirms that a trouble ticket has been opened and an instant message has been sent to the designated technician. An automated escalation procedure will send a similar message to the entire pool of technicians if the assigned technician does not respond in 10 minutes.

He accesses his materials manager contact information and adds him to the discussion group. This automatically forwards the alerts and email string so that he can get caught up immediately. The materials manager emails a reply saying that he will check inventory status from his BlackBerry device and advise. The maintenance supervisor emails the group stating that a technician is on his way, while the evening inspector has forwarded the e-form inspection report that he had submitted from the shop floor using his BlackBerry device. The team gets an update from Materials saying that they can replace the rejected parts and the stockroom supervisor is added to the group to ensure the parts are delivered to the line.

A short while later the technician advises the group that he has identified and can fix the problem. Furthermore, by using the inventory lookup feature on his BlackBerry device, he has already confirmed that there is a spare part in the MRO stockroom. The production manager sends a quick email message to the evening shift supervisor to arrange for 30 minutes of overtime that night.

The production manager returns to his television show. He looks at the clock and sees he's missed half of the sitcom he was watching. Then he gets a message from the VP of Operations, saying "Nice work team". He sighs and realizes this is going to be one of those days where he is glad he has both a BlackBerry device and a Personal Video Recorder.

### Value and Benefits

A WLAN enabled BlackBerry device can act as a portable extension of the internal phone system. Phone calls and emails can be forwarded so that the workload doesn't pile up. Multiple contact options to communicate with fellow employees can also be provided, along with a hand held portal into the company's back office information system. This results in the following benefits:

Benefit	Value Drivers
Reduced waste	<ul style="list-style-type: none"><li>• More responsive to virtual real-time events</li><li>• Reporting problems on the factory floor brings faster resolution</li><li>• Less time spent on repeat voice or email</li><li>• Predefined alerts for quality, delivery, production problems, etc.</li><li>• Access to enterprise systems relating to jobs, inventory, schedules, trouble tickets, etc.</li></ul>
Better employee communications	<ul style="list-style-type: none"><li>• Less wasted time trying to locate and communicate with colleagues</li><li>• Collaborate with others in the organization to solve business issues</li></ul>

### Back of the Envelope ROI

Shop floor personnel who spend less time searching and more time doing can have a very positive impact on a business. This overall increased agility will improve on-time delivery performance. Assuming a steady monthly shipment rate, and a modest 1% increase in on-time delivery, a \$2B company could realize an additional \$1.6M per month in on-time shipments.

### Mobilizing Business Intelligence

Business Intelligence (BI) is typically the process of converting data into information and then into knowledge. Organizations gather information to assess macro level performance such as financial trends, marketing or competitor analysis, as well as tactical, event-driven activity like threshold alerts.

#### Before Wireless

A VP of Operations is responsible for the domestic, EMEA and Latin American operations of a large, publicly traded multinational manufacturer. He is also part of an executive committee tasked with evaluating how to best expand into China. This project is a strategic imperative and the VP is spending significant time in Asia, as well as at countless local seminars and conferences on the subject. He is getting ready for another two week trip to China to meet with numerous people in both government and private industry.

His company is part of a highly competitive industry where any missteps can have serious consequences on the street. He has seasoned operations managers in each location, but is concerned that he is not as "hands on" as he used to be. In the past he would make regular visits to all sites, but as the company expanded, and with the special China assignment, he has been forced to cut back on these personal visits.

In preparation for his trip, he sends an email to all his first line managers requesting that he be kept advised of any critical issues. It is the last month of the third quarter and the company needs to meet performance targets. He packs his laptop and cell phone, and a complete set of printed reports and begins his travels. On the way to the airport he gets a phone call from his US manufacturing plant telling him they are going to be hard pressed to make their shipment target, due to some unexpected component supplier delays. The VP calmly but firmly says, "Missing the schedule is not an option".

At the airport, he locates a Wi-Fi hotspot and, after paying the \$12.95/hour fee, uses his laptop to send one final email to all his managers reminding them of how critical it is to make their shipping schedules. He also tells them he expects to be notified the instant someone thinks this goal might be in jeopardy. After he sends the email, he disconnects and realizes that this is a tall order for them to fill. The last time he was in China, he experienced substantial difficulties in getting conventional email and phone coverage. He had even greater difficulties logging on remotely to access vital performance statistics from the corporate ERP system. He further realizes that he will need to devote his full time and attention to the Chinese delegates in all his meetings. He boards the plane with trepidation, worried he will not be on top of the situation at all times. He can also imagine the mountain of email he will have to deal with when he is lucky enough to get access. He hasn't even taken off yet, and already he is feeling swamped and out of touch.

### Business Challenge Summary

Without any means of accessing critical intelligence and operational alerts in virtual real-time, wherever mobile managers may be in the world, the following can occur:

Problem	Reasons
Slower Decision Making	<ul style="list-style-type: none"><li>• Communications happen late</li><li>• Critical KPIs received late</li><li>• Getting input from project team members takes longer</li><li>• Getting approvals from committee takes longer</li></ul>
Lost productivity	<ul style="list-style-type: none"><li>• Spending too much time checking up on operations</li></ul>

### Capabilities Needed

In addition to standard phone, email, calendar and messaging functions, when managers are away from the office, it is vital that they still have access to key information from back-office BI and ERP applications such as:

- Virtual real-time KPI alerts and escalation
- Six SIGMA scorecards
- Lean scorecards
- Essential P&L information
- News bulletins
- Competitive updates

### After Wireless

The VP of Operations is getting ready for another two week trip to China. Over the past several months, he has been working with his management team and the IT group to provide a mobile version of all company Lean and Six Sigma scorecards, to be accessed from their BlackBerry devices. He packs his BlackBerry device and begins his travels. On the way to the airport he gets an email from his US manufacturing plant advising him of unexpected component supplier delays. The VP sees that the message has been broadcast as a "priority case" to a special cross-functional team comprising Production, Supply Chain and Procurement. He is confident they will do what it takes to fix the problem. He also knows that he will automatically be alerted as soon as the issue is resolved.

At the airport, he scrolls through the scorecards on his BlackBerry device to see the latest performance figures before he boards. Each scorecard has predetermined thresholds set to alert him of any deviations from the plan across every aspect of operations. The last time he made this trip he was impressed when he automatically received up-to-date performance statistics from the corporate ERP and BI systems. He knew that unless there was a critical alert, he would be able to devote all his time and attention to his meetings with the Chinese delegates. He boards the plane feeling confident he is on top of the situation, eagerly anticipating his exciting journey.

### Value and Benefits

With BI extended to the BlackBerry device, mobile executives, managers and supervisors don't need to connect to the back office to view up-to-the-minute key performance indicators on every facet of the business. This results in the following benefits:

Benefit	Value Drivers
Faster decision making	<ul style="list-style-type: none"><li>• Predefined alerts for virtual real-time KPI thresholds increases responsiveness</li><li>• Less time spent on low priority issues</li><li>• Faster approvals by committee members</li><li>• Forces rethinking of what information is truly critical</li></ul>

### Back of the Envelope ROI

It is inherently difficult to quantify the savings from improving personal productivity. Mobile business intelligence will enable better informed, dynamic decision-making which will increase your organization's agility and responsiveness. Furthermore, the expanded data gathering and visibility will improve your corporate knowledge base. One critical event resolved in a more timely fashion may justify the cost and effort many times over.

## Mobilizing Supply Chain Management

Supply Chain Management (SCM) is a broad topic that encompasses many strategic issues such as number, location and size of warehouses, distribution centers and facilities; partnerships with suppliers, distributors, and customers; product design impact; and technology infrastructure. It also encompasses tactical processes such as demand planning, forecasting, sourcing, production, third-party logistics, scheduling, inventory and transportation.

Most applications of wireless technologies today involve the use of Radio Frequency Identification (RFID) devices for material handling in distribution warehouses, moving inventory, cycle counting, shipping and receiving, and direct store delivery programs. Retail and consumer products companies with vast supplier and distribution networks have led the charge. Mainstream manufacturing is still in the early stage of adoption. Typical requirements for wireless in supply chain logistics management are:

- Mobile dispatch
- Mobile order tracking
- Package tracking
- Converged voice, data, GPS, route and vehicle information
- Integration to various data collection devices, e.g. barcode, RFID, electronic signatures
- Instant messaging
- On-the-spot mobile printers
- Exception alerts
- Virtual real-time vehicle tracking
- DoT reporting
- Fuel tax reporting
- Yard management
- Cross docking

### Value and Benefits

Improving efficiency and accuracy in logistics and material handling leads to better demand management. AMR Research revealed that companies that excel at demand forecasting have 15% less inventory, 17% stronger order fulfillment, and 35% shorter cash-to-cash cycle times than typical companies.

Benefit	Value Drivers
Improved material tracking and handling	<ul style="list-style-type: none"><li>• Increased inventory accuracy</li><li>• Locate and secure spare parts</li><li>• Reduced pick and place time</li><li>• Better order fill rates</li></ul>
Reduced cost/waste	<ul style="list-style-type: none"><li>• Reduce paper handling</li><li>• Eliminate material handling time</li><li>• Reduce manual tasks</li></ul>
Improved driver management	<ul style="list-style-type: none"><li>• Work orders sent directly to the driver</li><li>• Route or reroute off line or in virtual real-time</li><li>• Manage drive time per DOT regulations</li><li>• Audit truck inventory automatically</li><li>• Provide virtual real-time proof of delivery</li></ul>

### Back of the Envelope ROI

The best examples of verifiable ROI using RFID and wireless hand held devices are from the retail sector. Wal-Mart could reportedly save \$8.35 billion annually with RFID: \$600 million through avoiding stock-outs; \$575 million by avoiding theft, error and vendor fraud; \$300 million through better tracking of a billion pallets and cases; \$180 million through reduced inventory; and \$6.7 billion by eliminating the need to scan barcodes.<sup>9</sup>

<sup>9</sup> University of Arkansas, "Does RFID Reduce Out of Stocks? A Preliminary Analysis", Nov 2005

# Mobility in Manufacturing

## Welcome to an Ideal World

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### Summary

Manufacturers have come out of the latest economic cycle with increased awareness not only of the importance of inventory control, but also the importance of improving customer service and visibility into their operations. Wireless can be a key enabling technology for businesses seeking to improve information quality, reduce costs, increase revenues and improve customer service and responsiveness. A wireless solution extends the value of your existing investments in enterprise and e-business applications. It also empowers your mobile employees both in and out of the building by delivering critical information to the point of performance and enabling them to record as they work.

Wireless solutions will undoubtedly drive the ubiquity of computing. Users are demanding access to information and computing resources whenever and wherever they need it. This is very good news for manufacturers, because real value is generated when you connect workers with immediate knowledge, processes and people.

Mobility isn't about mobilizing existing processes. It's about rethinking them and finding new ways to harness the growing mobile workforce. Gradual change and ongoing process refinements is preferable to delaying your wireless initiatives until you can roll-out a sweeping change. Mobility solutions lend themselves well to the following principle:

- Think Big** – wireless can and will alter virtually all businesses practices
- Start Small** – choose one functional area and then expand
- Move Fast** – control initial project scope to deliver rapid results
- Make Money** – eliminate waste and generate accounting verifiable ROI

Now is the time to make wireless mobility solutions part of your short, medium and long-term IT infrastructure plans. By investing in wireless solutions today, you can position your company to take full advantage of the "next big thing" tomorrow.

### RIM Understands the Mobility Needs of Manufacturing.

The BlackBerry Enterprise Solution provides a complete wireless connectivity platform for keeping mobile professionals connected to people and information. It provides users with wireless access to a full suite of productivity enhancing tools, including email, applications, Internet, intranet, phone, SMS and organizer features. The BlackBerry Enterprise Solution is a fully integrated platform that provides what organizations require to go wireless: innovative server software, advanced wireless devices and essential support services and programs. It incorporates advanced security features and allows organizations to quickly and cost-effectively deploy wireless information to mobile workers.

The BlackBerry Enterprise Solution has been purpose-built for the demands of business and encompasses all of your mobility needs. The BlackBerry Enterprise Solution can help you improve productivity, increase revenue, decrease production costs and improve customer satisfaction – from top floor to shop floor.

# Mobility in Manufacturing

## Welcome to an Ideal World

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