Telstra Corporation:
An Integrated Wireless Solution Empowers Field Technicians

An IBM on demand Business Case Study

IBM

business on demand

on demand Business Driver

Telstra's field service technicians needed to spend less time accessing job orders, and more time completing their core tasks.

Business Process Adaptation

Field technicians now interact with customer service resources through a streamlined information pipeline, improving Telstra's responsiveness.

Key Solution Elements

The solution's open, XML-based architecture allows laptops and PDAs to access backend application data in realtime.

Why IBM

"To build the integrated, end-to-end solution we needed required a partner that knew both the technology and our company."

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THE TELSTRA SOLUTION at a Glance

BUSINESS DRIVERS

Customer Business Challenge

In the highly competitive Australian telecom market, the ability to deliver world-class customer service is a key competitive requirement. While Telstra's service technicians could access data in the field, they couldn't get to the information they needed in an efficient manner. As a result, they spent too much time retrieving the data, allowing less time to solve customers' problems.

on demand Business Rationale

Telstra's field service technicians need to be able to access their work assignments—and the backend data needed to perform them—in realtime. Faster access to "fresher" data enabled technicians to be more efficient and responsive to customers' needs for fast problem resolution.

BECOMING ON DEMAND

Business Processes Adaptations

Telstra created a new electronic communications system for its field staff that allows them to access data in realtime, thereby fundamentally altering the way they interact with Telstra's mission critical applications. Technicians can now access a wider range of applications more quickly.

on demand Operating Environment

Telstra is becoming an on demand business by building a flexible infrastructure with realtime integration with backend applications. The solution—designed and developed by **IBM Global Services Australia**—incorporates:

- **Software:** IBM WebSphere Everyplace Server (formerly WebSphere Everyplace Suite, which includes IBM WebSphere Application Server, IBM Everyplace Wireless Gateway, IBM Web Traffic Express, IBM eNetwork Dispatcher and Tivoli Personalised Services Manager), IBM Host Publisher, and IBM HTTP Server
- **Servers:** IBM eServer zSeries (formerly S/390 Parallel Enterprise Server)

ON DEMAND BENEFITS

Business Benefits

- Telstra's field service technicians access data and applications faster, improving their productivity and increasing customer satisfaction.
- By providing realtime access to network records, the solution allows field staff to access more timely and accurate data.
- Reducing field agents' reliance on call center staff allowed Telstra to restructure its in-house processes, further increasing productivity and lowering operating costs.

Technology Benefits

- Telstra's flexible, XML-based infrastructure makes it easy for the company to adopt different kinds of devices or architectures down the road—thus making the company more responsive to service improvement opportunities.
- The inherent flexibility of Telstra's architecture will also enable the company to roll out similar dispatch-oriented services within a much shorter deployment timeframe.

SITUATION ANALYSIS

Background

Telstra Corporation ("Telstra") is Australia's leading provider of telecom and information services, and represents one of the country's best known brands. Telstra's service offerings include:

- local, long-distance and international telephony services;
- mobile telecommunications services;
- data, Internet and online services;
- wholesale services to other carriers;
- telephone directories (White Pages™, Yellow Pages®); and
- pay television services (through an affiliate)

Telstra employs approximately 40,000 and generated revenues of some US$18 billion in its most recent fiscal year.

In the recently deregulated and highly competitive Australian telecom market, the ability to deliver world-class customer service has emerged as a key competitive requirement.

In the recently deregulated and highly competitive Australian telecom market, the ability to deliver world-class customer service has emerged as a key competitive requirement. At the front line of Telstra's customer service strategy is a corps of field technicians known as Field Officers, whose tasks range from the installation of new telephone lines to the repair of complex central office equipment. The critical task of coordinating Field Officer activities is performed by Telstra's Workforce Management Centre, the nerve center of its field service organization. Agents staffing centres receive service requests by telephone, which are then logged into a backend dispatch management system known as a Workforce Management System (WMS). The basic function of the WMS system is to assign jobs (via "Tickets of Work") to Field Officers on the basis of training, geographical proximity, and other service requirements.

Business Drivers: the Ongoing Need for Efficiency

Telstra's field service organization has long focused on maximizing operational efficiency—allowing it to deliver better, faster service while lowering costs. A key determinant of this efficiency is the method by which Telstra field employees communicate with the company's centralized service infrastructure. This includes both "downstream" communication of job assignments to Field Officers and "upstream" communication of job details and status updates from Field Officers. Prior to 1995, Telstra Field Officers telephoned into the Workforce Management Centre to obtain assignments and kept written diaries of job details. However, in 1995 the company adopted a wireless dispatch system that allowed field staff to download Tickets of Work to a tablet device. The system was highly successful, resulting in major efficiency gains and cost savings as field staff spent less time tied up on the telephone and more time completing jobs.

But by late 2000, Telstra's WMS system had begun to show its age. The cost of supporting the devices (Intel 486-based IBM 730T tablets running Windows 3.1) had begun to increase. With WMS fast approaching end-of-life, Telstra saw the need to create a new electronic communications infrastructure for its field staff. While escalating support costs were one driver of Telstra's initiative, the company also saw the changeover as an opportunity to correct some of the WMS system's functional shortcomings. The primary driver was the terminal device's bulk, which stretched the definition of "portable" and took up much of the passenger's side of the Field Officer's vehicle. An even greater weakness was the device's inability to run multiple applications, which often required Field Officers to establish multiple sessions in the course of a service call.

Downsizing Devices, Ramping Up Power

Streamlining the pipeline between field technicians and critical applications meant faster responses to customer problems—and happier customers.

Having resolved to migrate from the existing system, Telstra set out to articulate its vision of a future platform for field service communications. Perhaps the most fundamental element of this vision was device independence—the flexibility to use any types of devices in the field. This flexibility would enable Telstra to equip Field Officers that required more demanding applications such as advanced testing for data services equipment with more powerful laptops. By the same token, the Field Officers requiring less demanding applications such as the downloading of Tickets of Work could employ more portable and less expensive hand-held devices (i.e., PDAs). Thus, Telstra could not only deliver *more* information to the field *more efficiently*, but do so in a way that is cost effective and tailored to users' functionality needs.

David Kinnear, project manager for the initiative, saw the goal of the project as creating an unimpeded pipeline between Telstra's backend applications—both existing and future—and wireless devices in the field. "The whole idea was to create a pervasive infrastructure—built around standards like XML—in which any application can communicate with any device via any communication media," explains Kinnear. "We wanted the ability to provide PDA access—but not be restricted to PDA access—across multiple networks."

ACTION PLAN AND DECISION PROCESS

As Telstra's preliminary planning progressed throughout mid-2000, the required depth and complexity of the solution became more apparent. For instance, to obtain the kind of flexibility Telstra envisioned in the next-generation platform, it became clear that devices would have to move from a fat client to pure browser-based access—implying a substantial role for Java applets and servlets. Another challenging requirement was that the device allow field staff to work offline after downloading work assignments, and then automatically upload job data to backend databases once an online session was reestablished. Still another challenge was Telstra's plan to enable field service staff to use PDAs to access legacy applications that had previously been available through "green screen" 3270 terminals. As Kinnear points out, the epicenter of the project had evolved from simply upgrading the device to a broader and more complex overhaul of its IT infrastructure. "The more we looked at it, the more evident it became that we would also need to replace the entire end-to-end infrastructure," says Kinnear.

"The scope of work ranged from applications and user interfaces on the front end to the servlets and middleware that interacted with our backend systems."

By the second half of 2000, Telstra had begun the process of selecting a solutions provider to design and implement the solution, as well as the technology elements that would power it. According to Kinnear, Telstra's key criterion for provider selection was an ability to deliver a truly end-to-end solution. "We wanted a provider who could address the entire spectrum of our needs—from planning and design, to development and integration, to management and support," explains Kinnear. "We didn't simply want a provider who come along and drop a solution on our lap."

Telstra's provider selection process followed a number of iterative phases, during which the company evaluated provider capabilities while at the same time continued to define—and further refine—the requirements of the solution. After evaluating several providers, Telstra began working closely with IBM Global Services Australia (GSA). In addition to discussing the technical details of its proposal, IBM GSA was closely involved in a number of internal Telstra workshops designed to further flesh out the requirements of the solution by eliciting feedback from employees. By January 2001, with its workshops successfully completed and the functional requirements of its solution established, Telstra selected IBM GSA to design and develop it.

"With backend integration such a critical part of the solution, the fact that IBM GSA had acquired a strong knowledge of our applications and infrastructure was a major advantage."

—David Kinnear, Field Mobile Computing Project Manager, Telstra

While IBM GSA's ability to deliver an integrated, end-to-end solution was the primary driver behind its selection, Kinnear also sees the company's familiarity with Telstra's in-house systems—and the strength and fit of IBM technology—as weighing in IBM GSA's favor. "With backend integration such a critical part of the solution, the fact that IBM GSA had acquired a strong knowledge of our applications and infrastructure [from providing us with outsourcing services] was a major advantage," notes Kinnear. "On top of this, IBM had the best middleware products for what we needed and an unparalleled set of skills to match."

In selecting the technology components to run the solution, IBM GSA's architects worked closely with Telstra's architects to match the technology to the Telstra infrastructure. One of the key technology components required for the solution was a middleware layer to reside between wireless devices and legacy applications. From Telstra's standpoint, the component needed to be based on open standards, provide strong wireless support and have powerful security capabilities. Given this mix of requirements, Kinnear saw IBM WebSphere Everyplace Server—an integrated software platform designed to support all requirements of pervasive computing—as up to the task. "In terms of functionality, we were most attracted by the general fact that WebSphere Everyplace Server is optimized for wireless networks," says Kinnear. "A good specific example is its wireless gateway functionality, which supports all wireless network formats and improves the end user experience by providing strong security and authentication features." One such feature is Single Sign-On, which enables users to access multiple WebSphere Everyplace Server applications within an end-user session.

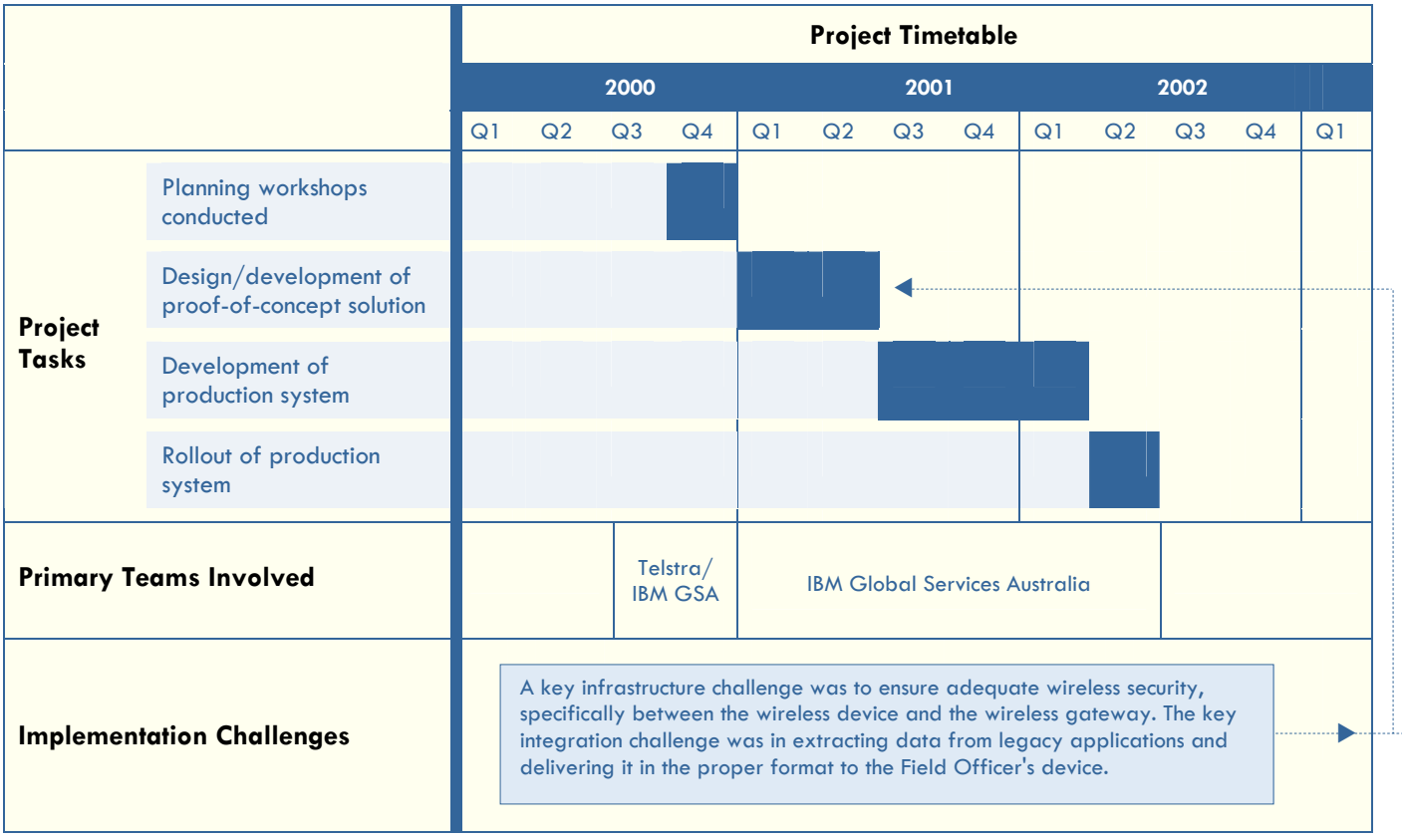
SOLUTION PROFILE AND IMPLEMENTATION STRATEGY

The Project: Development Approach and Timetable

The Telstra solution was designed and implemented by IBM GSA's Business Integration Services unit in three phases. The first phase, focused on planning the solution, began in October 2000 when IBM GSA worked with Telstra to conduct design workshops. The second phase, beginning in January 2001, focused on the design and deployment of a Proof of Concept to demonstrate the performance and viability of the proposed architecture. Upon completing the Proof of Concept in July 2001, the team began deployment of the Production system—the final phase of the implementation. The Production system was completed in April 2002.

Under the approach followed by the IBM GSA team, each of the main components of the solution—application development and infrastructure

EXHIBIT 1: DEVELOPMENT TIMETABLE FOR THE TELSTRA SOLUTION



Source: Telstra and IDC

deployment—were developed in parallel by focused teams. The application development team focused on developing servlets and client software code. The infrastructure team's primary focus was in deploying WebSphere Everyplace Server and—in conjunction with Telstra's internal IT staff—integrating the solution with Telstra's backend systems. In addition to developing the FMC solution, IBM GSA performed all project management and continues to provide ongoing maintenance of the application.

In designing and deploying the solution, Telstra and the IBM GSA team faced technical challenges. On the backend of the solution, the key challenge was in extracting data from applications across the company and delivering it in the proper format to the Field Officer's device. Another technical challenge posed by the Telstra solution was the issue of wireless security. Not surprisingly, Telstra placed an extremely high priority on ensuring maximum security between the wireless device and the wireless gateway (the interface between Telstra's wireless network and its enterprise systems). After conducting a series of discussions around the subject of security, the Telstra and IBM teams formed a consensus that the system employ WTLS (Wireless Transport Layer Security, a wireless security protocol similar to SSL) to perform gateway authentication and data encryption. In response to Telstra's request, IBM GSA and Telstra architects—working in close collaboration with IBM's Software Development Lab—modified the wireless client and gateway to enable WTLS security in the solution.

Telstra needed to reengineer its call center workflow procedures to reflect the increasing amount of automation afforded by the new system.

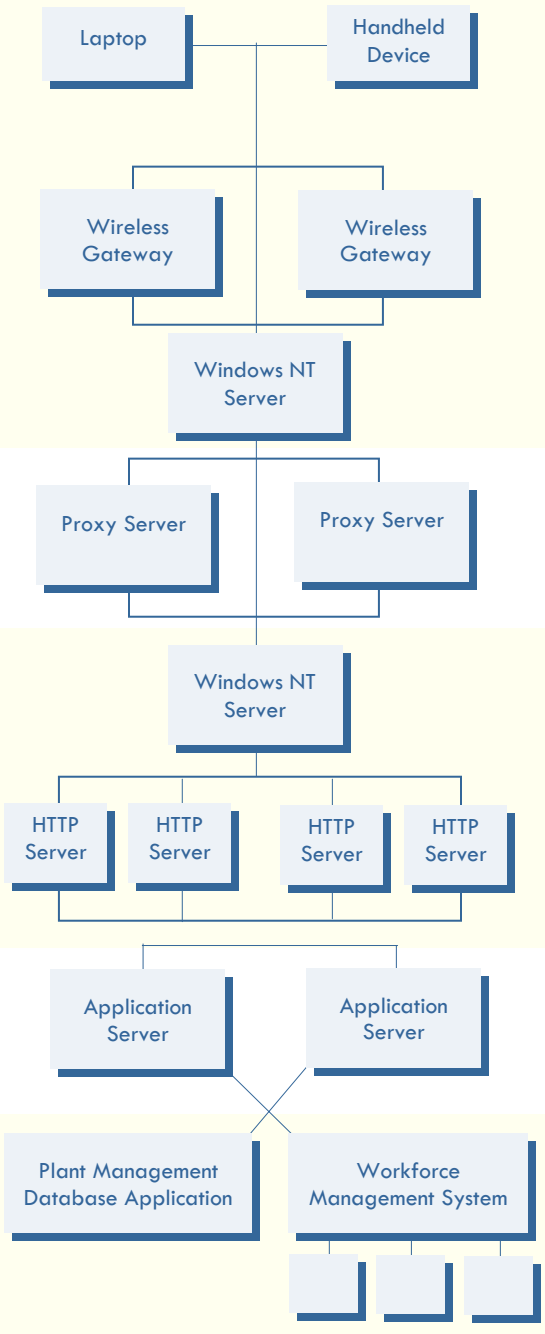
Telstra's initiative also presented a number of business-level challenges, most of which centered around the need to adapt business processes to reflect the new system's capabilities. The most fundamental business-level challenge was the need to train Telstra's Field Officers on how to use the new system. Similarly, the company needed to realign the skills of its internal help desk to support the integration of the new system. In addition to training issues, Telstra needed to reengineer several of its core processes—including call center workflow procedures—to reflect the increasing amount of automation afforded by the new system. IBM GSA performed much of this process reengineering in the course of the engagement.

The Solution: Core Functionality and Architecture

Known internally as Field Mobile Computing (FMC), Telstra's wireless initiative produced two primary applications:

- *Workforce Management System*—Allows Field Officers using PDAs or laptops to download work assignments (i.e., Tickets of Work). Once a user downloads a work assignment, the WMS application allows that user to log off the system and update the status of the job by altering the Ticket of Work stored on the PDA or laptop. Upon completion of a job assignment, the user can log back onto the WMS application, at which point the data is automatically sent "upstream" to Telstra's backend WMS application (running on a geographically distributed cluster of UNIX servers). The user can then retrieve new job assignments that had been queued in the system.

EXHIBIT 2: BASIC ARCHITECTURE OF THE TELSTRA SOLUTION

Solution Element	Solution Topology	About Solution Elements
		**End User Profile** Field Officers access the FMC solution via PDAs and laptops. Requests are sent by the devices in XML format.
Wireless VPN		Devices communicate with Telstra's infrastructure through a wireless gateway (part of the IBM WebSphere Everyplace Server group of products) which runs on two UNIX servers. Below it, a Windows NT server runs IBM eNetwork Dispatcher.
Authentication		Two UNIX servers run IBM Web Traffic Express, a proxy server used to authenticate users (also a part of WebSphere Everplace Server).
Web Servers		A Windows NT server running IBM eNetwork Dispatcher provides load balancing for four HTTP servers (running IBM HTTP Server) and (below them) two UNIX servers running WebSphere Application Server and IBM Host Publisher. A Java servlet converts requests from XML into the proprietary protocol used by the legacy Workforce Management System.
Application Servers		
Legacy Systems		The Plant Management Database application runs on a series of UNIX servers configured in a hub and spoke arrangement. Telstra's NPAM system runs on a single IBM zSeries server.

Source: NSCL/UPenn and IDC

- *Plant Management Database Solution*—Accessed through the same wireless device and interface as the WMS application, Telstra's plant management database solution allows Field Officers to access a database containing information on the status of installed communications lines (e.g., which pair of cables in a facility are in use and/or which Telstra services are provided through these lines). Like the WMS system, users of the plant management database solution can make corrections, changes, and updates to the data offline and, upon reestablishing an online session, automatically post the data to the backend plant management system running on an IBM eServer zSeries.

The Telstra solution employs an n-tiered architecture. While the original WMS application employed a fat client running on a tablet, the FMC solution employs a Web browser running on a PDA and a laptop (for more sophisticated applications such as testing). End user devices communicate with Telstra's infrastructure through wireless linkages (using the CDMA and/or GSM wireless protocols) to a wireless gateway, which forms a virtual private network (VPN) between the wireless devices and Telstra's enterprise network. This wireless gateway, part of the IBM WebSphere Everyplace Server group of products, runs on two UNIX servers.

Just inside the wireless gateway is a Windows NT server running IBM eNetwork Dispatcher (a k a IBM WebSphere Edge Server), which provides load balancing at the front of the architecture. In the next layer are two UNIX servers running IBM Web Traffic Express, a proxy server whose function is to authenticate users (and also a component of WES). Beneath these proxy servers is another Windows NT server running IBM eNetwork Dispatcher, which provides load balancing for four HTTP servers and (below them) two UNIX servers running IBM WebSphere Application Server and IBM Host Publisher.

The lowest tier of the architecture—the systems accessed by the Web applications—include two key elements. The first of these, the WMS application, runs on a series of UNIX servers configured in a hub and spoke arrangement. The "hub" in this model is a centralized dispatch server that is linked to 29 individual WMS hosts ("spokes") distributed geographically across Telstra's region. The function of the dispatch server is to pass users to the specific WMS host for which they are configured. Telstra's NPAM system runs on a single IBM zSeries server.

The Solution in Action

After logging into the WMS application, Field Officers are forwarded to a home page stored locally on the wireless device where they then select the "Request Work" option on their screen. This command sends out an XML packet that goes through the wireless gateway and onto the Web Traffic Express server, which then proxies the request and sends it through to WebSphere Application Server. The receipt of the request by WebSphere Application Server triggers a Java servlet (developed by IBM GSA) that converts the request from XML into the proprietary protocol used by the legacy WMS application. The request is then sent to the WMS Dispatch server and then back to the appropriate WMS host (the authentication scheme governing this is discussed in the Security Profile section below). The response to the request—the Ticket of Work—is then converted back to XML via the servlet, sent through the Web Traffic Express server and then back to the browser.

After receiving the Ticket of Work, the user then disconnects from the system and performs the required tasks. While offline, the user inputs task-related data (e.g., parts needed, time required) into the device. Once offline work is completed, the user logs back into the system. Upon hitting "Submit" the task-related data is then automatically posted back to WMS in the backend. The user is then free to download another Ticket of Work.

Viewing cabling data from the plant management database provides Field Officers with information critical to the planning of their assigned tasks.

Like WMS, users access the plant management database application through a home page link that sends an XML request through to the proxy server (running Web Traffic Express). The request is then directed to IBM Host Publisher (an IBM product designed to convert 3270 screens into HTML data). Here users are presented with the Host Publisher main menu, where they can log into the plant management database application. At this point in the session, the login menu automatically populates the user name and password fields (by virtue of the solution's single sign-on capability, discussed in depth below), enabling the user to simply tap "OK" to log in. After the user submits a request, Host Publisher extracts the appropriate 3270 data, converts it to HTML, formats it for the PDA and sends it to the user's device. Viewing cabling data from the plant management database provides Field Officers with information critical to the planning of their assigned tasks.

Security Profile

From a security standpoint, one of the defining characteristics of Telstra's FMC architecture is the placement of the HTTP server and application server components of the solution on different tiers, separated by a firewall. Telstra needed to address the issue of authentication in two areas:

- authentication (and encryption) between the wireless device and the wireless gateway, and
- authentication of users inside the wireless gateway.

As discussed, the Telstra solution employed WTLS to perform wireless gateway authentication and data encryption. Authentication for the core of the solution is enabled through a combination of an LDAP database (running on the proxy server) and Tivoli Personalised Services Manager, which performs all user management in the solution. When a user logs into the Telstra solution, his username and password are stored in an LDAP directory. For a user accessing the WMS application, a request received by WebSphere Application Server triggers the system to look back into the LDAP directory to match the user's information with the appropriate WMS host (i.e., the "spokes" discussed above). This matching data is retrieved and sent along with the request to the WMS dispatch server (i.e., the "hub"), which then directs the user's request to the appropriate WMS host. The LDAP directory and Tivoli are also critical enablers of the solution's Single Sign-On capability.

Business-Level Benefits

Telstra's wireless solution was conceived as a way to improve the efficiency and productivity of its field service staff—resulting in an improvement in customer satisfaction. On that score, the solution has proven highly successful. For Field Officers on the front line of customer service, the adoption of the PDA solution has streamlined nearly all facets of the dispatch and reporting process—allowing them to complete more job assignments in a given period of time. Complementing this is a newfound ability to run multiple applications, eliminating the time-consuming need to log off one application in order to log onto another.

"The fact that the solution provides realtime access to our cable plant records improves the timeliness of the data available to our field staff. And by empowering them with the ability to update our backend from the field, we're greatly increasing the integrity of the plant management data."

—David Kinnear, Telstra

In addition to improving the efficiency of information access for field service staff, the new mobile solution has also improved the *quality* of information they use on the job. "The fact that the solution provides realtime access to our cable plant records improves the timeliness of the data available to our field staff," says Kinnear. "And by empowering them with the ability to update our backend from the field, we're greatly increasing the integrity of the plant management data."

By enabling a broad restructuring of core business processes, Telstra's wireless initiative has also produced a wide range of cost savings. By getting a new mobile solution into the field quickly to replace its existing system, Telstra was able to avoid increasing costs associated with continuing to run a legacy system—the likely scenario had the older WMS system not been replaced.

Technology Benefits

In addition to its operational benefits, the Telstra solution—by virtue of its open n-tiered architecture and use of XML and Java-based technology—promises to delivered a number of IT-related benefits. For instance, by relying on a pure browser-based client, Telstra now has much more flexibility to enhance its core applications, without the need to upgrade the client software of its large field staff. Similarly, by deploying WebSphere Everyplace Server at the core of its infrastructure, Telstra has gained a tremendous amount of flexibility both in the area of end-user devices *and* in the types of backend legacy applications it wishes to tap in the future. This WebSphere-enabled flexibility opened the door for Telstra to use low-cost PDAs, avoiding the need for a ubiquitous upgrade to costlier laptops. On the backend, this flexibility will in the future allow Telstra to quickly and easily integrate with legacy systems, shortening deployment cycles.

EXHIBIT 3: OVERVIEW OF BUSINESS RESULTS FOR THE TELSTRA SOLUTION

Business-Level Benefit(s)	Enabling Process Changes	Linkage to Solution
Improved Productivity—Telstra's field service technicians access data and applications faster, improving their productivity and increasing customer satisfaction.	Improving the efficiency with which field technicians access and communicate with mission-critical customer service applications.	The solution provides field service technicians with a more robust platform for accessing data and applications.
Improved Data Quality— By providing realtime access to cable plant records, the solution allows field staff to access more timely and accurate data.	Enabling field technicians access to cable plant records in realtime.	The solution integrates with mainframe-based data applications in realtime.
Streamlined Call Center Workflow—By reducing field agents' reliance on call center staff, Telstra was able to restructure its in-house processes, further increasing productivity and lowering operating costs.	Making field service technicians less reliant on call center staff for dispatching and problem solving.	The solution provides a richer array of applications and information.

Technology Benefit(s)	Underlying Product or Technology	Key Product or Technology Attribute(s)
Improved Flexibility—Telstra's flexible, XML-based infrastructure makes it easy for the company to adopt different kinds of devices or architectures in the future—thus making the company more responsive to service improvement opportunities.	WebSphere Everyplace Server	Ease of integration both at the front end (i.e., to different devices) and to backend applications.
	XML	Ability to enable "device independent" services
Faster Development—The inherent flexibility of Telstra's architecture will enable the company to roll out similar dispatch-oriented services within a much shorter deployment timeframe.	WebSphere Everyplace Server	Ease with which application code can be reused for new applications and services.

Source: Telstra and IDC

CASE EPILOGUE

Going forward, Telstra plans to build on the success of the FMC initiative by making it available to other parts of the company. As Kinnear points out, the company's ability to leverage its flexible infrastructure will make it easy to extend wireless and Web functionality to other important customer-facing processes. "We see the field service initiative as being the 'thin edge of the wedge' in terms of potential opportunities," says Kinnear. "Good examples of mobile Web users include our sales and marketing and directory services people, as well as contractors who install cable networks for us."

"We see the field service initiative as being the 'thin edge of the wedge' in terms of potential opportunities."

—David Kinnear

Looking back on the engagement, Kinnear notes that—in the end—the technology expertise and knowledge of Telstra's legacy systems that favored IBM GSA in the selection process proved indispensable to the project. "To build the kind of integrated, end-to-end solution we needed—in the tight timeframe we were looking at—required a partner that knew both the technology and our company," says Kinnear. "IBM GSA combined them both to deliver a powerful solution."

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