How Service Oriented Architecture Enables the Mobile Workforce

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Companies with mobile workers have the ongoing challenge of serving customers effectively and efficiently while gathering reliable, meaningful field data from their mobile workforce. Managing mobile workers can be an experience plagued with dual entry and redundancy due to paper processing, asset management, mobility of the workforce, and information from disparate data systems.

Improvement in mobile network speed and coverage, more powerful devices, and state of art development tools have enabled Service Oriented Architecture (SOA) to empower geographically dispersed mobile workers.

An Avanade-designed SOA provides device-neutral interoperability with legacy systems, flexibility, clearly defined interfaces, messages with context, and accessibility internally and externally. SOA also helps address many of the unique technical issues of a mobile workforce.
Business Challenges

Managing a mobile workforce differs from managing an office-based workforce in a variety of ways: how users access information, what devices and methods they use, how work is assigned, how customers are managed, and access to inventory. For example, because many mobile workers lack the ability to access system data directly, back-office personnel often provide relevant data from disparate systems to the mobile workers over the phone. Additionally, mobile workers receive work assignments from a centralized dispatch center and use cell phones as a primary means of communication with back-office personnel.

Other challenges associated with managing a mobile workforce include the following.

- **Inefficient and redundant processes.** Business practices and processes require mobile personnel to complete paperwork in the field. Data associated with this paperwork is often re-entered by back-office personnel.

- **Inefficient daily itineraries.** Most itineraries are optimized by area instead of by performance, which can create inefficiencies when traveling from customer to customer.

- **Lack of flexibility.** Some customers have special needs that might not be serviceable by all mobile workers. In these circumstances, customer management is reactive rather than proactive.

- **Inventory issues.** Some mobile workers carry inventory with them. Without the capability to organize and search this inventory, it's difficult to determine the location of items—which can present issues if completing a customer order requires specific inventory and the inventory cannot be located without several phone calls.

Addressing Challenges with Windows Mobile and SOA

Compared to paper-based business process implementations, an SOA Windows Mobile solution increases worker productivity, boosts revenues, and reduces costs. Implementing an SOA Windows Mobile solution in your mobile workforce also increases accessibility to data, helping mobile workers reduce costs, error rates, order processing time, and sales cycle time.

The efficiencies gained from an SOA Windows Mobile solution include optimizing customer scheduling in a back-office system that takes advantage of advances in mapping and location awareness. These advances facilitate optimal scheduling of customer appointments based not only on location, but also by job quota, job value, required skills, and time-slot allocation. Job quota ensures that work is spread among mobile workers. Job value ensures that high-value work is completed by employees. Required skills ensure that the right skills or equipment are assigned to customers at the right time. Required inventory ensures that relevant inventory is available and identifies where inventory is located. Time-slot allocation ensures that a time window is mapped to the actual time of day so that jobs can be completed for the customer during their assigned time slot.

The advances in mapping and location awareness can optimize itineraries of mobile workers in the following additional ways.

- **Geo-fencing** uses Global Positioning System (GPS) coordinates to continually transmit the location of a mobile worker to the back-office. It also helps reduce human error by automatically clocking a mobile worker in when they arrive at a customer site and then clocking them out when they leave.

- **Geo-coding** enables the back-office to determine the closest mobile worker's location to a particular customer, allowing just-in-time adjustments to a mobile worker's daily itinerary.

- **Reverse geo-coding** enables mapping the GPS coordinates of a mobile device to the nearest address to determine a mobile worker’s location.

- **Turn-by-turn** driving directions speed travel from customer to customer.

- **Off-route navigation** uses GPS coordinates to determine whether the mobile worker has deviated from the optimized route from customer to customer.
To enable mobile workers to report progress and completion to the back-office, companies can integrate mobile access to or reporting of work status, work completion, inventory control, account history and payment collection—which makes for a relatively low-cost mobile solution.

These optimizations are implemented through an SOA façade that enables systems integrators to access back-office legacy systems. For example, the service façade facilitates building services that interact with a variety of back-end systems through technologies like Web page parsing, 3270 screen scraping, and TCP/IP communications. Exposing back-office functionality to the mobile device through a service gives the mobile worker direct access to relevant data without intervention of back-office personnel.

A solution can also be designed so that messages pass context. Message context allows a variety of clients to use the same service or services based on the context of the message passed to the service. For example, using context, the same service can provide data to both mobile workers and third-party contactors. This means that not only can mobile workers benefit from these services, but so can internal customers.

Exposing existing systems creates an opportunity to leverage the silo data stores of regional business units. With data aggregated across regional business units, new opportunities present themselves to create management dashboards and other views of business data.

**Avanade’s Differentiators**

**Knowledge and Experience**

Avanade has extensive experience and success in designing, building, and implementing mobile and enterprise SOA solutions that have achieved measurable benefits for customers. Our mobility projects span market segments including utilities, products, telecommunications, and federal, state, and local governments. Our close partnership with Microsoft means superior expertise with Windows Mobile and the Microsoft .NET Compact Framework. Avanade can help an organization assess the application needs and develop a strategy and architecture that ensures flexibility and extensibility with your current and future mobility and SOA needs.
Assets
Avanade’s ACA® Devices 2006 provides a set of development accelerators and run-time architecture for building mobile and embedded applications. Mobile applications can be reliably deployed over multiple client devices including laptops, PDAs, and smart phones in an occasionally connected environment. This framework accelerates the delivery of client applications for the field-service technician. ACA® Devices 2006 has been designed to enable the creation of business-critical mobile line-of-business applications on the Windows Mobile family of devices (Smartphone and PPC) with rich client features and simple deployment of new functionality without sacrificing application manageability or architectural flexibility.

Avanade’s ACA® Devices Hardware Abstraction Layer facilitates abstraction of mobile peripherals from the core application code, allowing for interchange of peripherals through configuration instead of changes to the source code. This facilitates the deployment of multiple mobile peripherals such as printers, credit card magnetic stripe readers, barcode scanners, radio frequency identification (RFID) readers, and GPS devices.

Avanade’s SOA Factory automates a large amount of the routine work involved in building Service Oriented Applications. SOA Factory is built on three main pillars: Windows Communication Foundation (WCF), ACA.NET Aspects and Run-Time Services, and the Domain Specific Language (DSL) toolkit from the Visual Studio SDK. SOA Factory is an application designer and generator. Its scope covers all contract, communication, structural, and aspect-related code, and promises to bring an unprecedented level of speed, quality, and consistency to the application development process.

Avanade’s ACA® Analytics provides a foundation for building “intelligent” applications that leverage the business intelligence capabilities in SQL Server 2005. It includes frameworks, services, components, and guidance that can be used to create interactive, collaborative, analytical-driven solutions using SQL 2005.

Achieving Success
Customers who work with Avanade leverage the power of Avanade assets to design and implement a Service Oriented Architecture integrated with mobility. ACA® Devices 2006 provides core framework services and mobility services to accelerate the delivery of business-critical mobile solutions. The extended capabilities of Avanade’s ACA® Devices Hardware Abstraction Layer accelerate the integration of peripheral devices such as printers, credit card readers, and barcode reading devices into the solution.

Avanade works with customers to:

- Select the right business processes to mobilize, based on business impact.
- Implement a pilot program to validate the architecture, hardware, form factor, and platform choices.
- Expose data from back-office systems through a services façade for both external and internal consumers, helping expose legacy systems to mobile workers.
- Create an optimized itinerary solution that best fits the business processes. Customers can identify optimization criteria for mobile workers’ itineraries based on GPS location, job quota, job value, skills required, inventory required, and time-slot allocated.
- Determine the mapping requirements to support the business processes. Avanade can assist by integrating commercial mapping services into the solution.

Conclusion
Avanade believes that companies with mobile workers benefit by defining an SOA strategy with mobility as an integrated part. Avanade believes that companies who deploy a mobile solution which provides a two-way data conduit to mobile workers without the requirement for intervention of back-office personnel start to realize their full potential. Avanade has the experience and assets to accelerate the process of deploying a Service Oriented Architecture and a Windows Mobile solution. Deploying a Windows Mobile solution with full desktop functionality is possible on commodity devices available in the marketplace today.

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