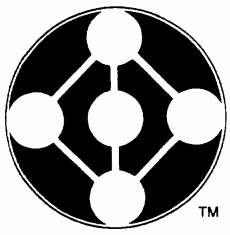

Alternative Technologies

Unwired Orchestration

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TABLE OF CONTENTS

1. Introduction

Business integration is one of the key challenges facing both business and IT management today. By business integration, we mean practices contributing directly to the smooth and aligned interoperation of every aspect of a business. Over the course of the past decade, the pressure on business managers to have a broad, integrated perspective has steadily accelerated. At the same time, tremendous advances have been made with respect to technical integration. A bewildering array of enterprise application integration technologies (including enterprise application servers, integration brokers, business process management systems, services orchestration, choreography, RFID, business activity monitoring, and composite applications) and standards (XML, XSLT, J2EE, EJBs, and Web Services) have come on the scene.

Pursuing business integration requires developing a strategy for using these technologies that is consistent with the business drivers that demand their use. Much has been made of the obvious business drivers such as regulatory compliance and the need for sustainable competitive advantage. However, there are other, more pervasive drivers intrinsic to every business that must be taken into account. These business drivers are leading inextricably to the need for the unwired enterprise.

The second section of this paper explains how those business integration drivers arise every enterprise. Section three discusses the all-too-common symptoms of being a wired enterprise. , and how these symptoms represent barriers to successful business integration. In section four, the unwired enterprise is defined, describing how being unwired involves overcoming certain barriers to integration. Section five discusses some of the challenges of an important subset of the unwired approach to business integration, namely mobile integration. The need for mobile effectiveness and efficiency are examined, including some new use cases. Finally, we look at the technical requirements for unwired integration, including a brief assessment of Sybase's Unwired Orchestrator, which has been designed to address, and is rapidly evolving to meet, these technical requirements.

To summarize our findings, we recommend that businesses pursue an unwired integration strategy. Such a strategy should be guided by identification of and focused removal of the barriers to achieving efficiency and agility that are symptomatic of the wired enterprise. We point out that the unwired enterprise represents a goal that should guide a continuous business integration strategy and practice, and not an achievement to be attained and forgotten.

2. Business Goals

Businesses constantly seek to differentiate themselves within a market, expand market share, diversify to avoid narrow market dependence, improve customer satisfaction, and improve profit margins. Market differentiation is one of the primary drivers of innovation. Market share expansion and market diversification are among the primary drivers of mergers and acquisitions. Improving customer satisfaction and improving profit margins are among the

primary drivers of quality initiatives and efficiency programs. Pursuing any of these business goals moves us ever closer to real-time enterprise, with ever greater demands for business integration.

- Market differentiation – With numerous direct and indirect competitors, most businesses require differentiation to create competitive barriers. As technology has enabled global commerce and trade with individuals, the potential competition for any specific sale has increased. Each competitor can bring the need for differentiation, effectively driving commoditization of a product or service. As the number of competitors increases, the mean time available to catch up to a competitor rapidly decreases, whether the goal is evolutionary features and functions, or radical innovation. Market differentiation, especially coupled with market expansion, is driving ever faster cycle times for innovation.

- Market share expansion and market diversification – These goals are often addressed through acquisitions. All too often, the rate at which larger firms engage in mergers and acquisitions forces IT departments to be in a state of continuous integration. As countless businesses have discovered, significant acquisitions and mergers often come at a price that far exceeds the negotiated terms. For companies of comparable size, the integration effort can easily take years because few companies have similar management structures, business processes, or cultures. If even one critical IT system must be preserved in each of the companies, application integration becomes a non-trivial issue. Only an incremental approach to these problems can smooth the transition and minimize the risk, but this demands a commitment to the principles of and technologies supporting business process management such as SOA.

- Customer satisfaction improvements – Customer satisfaction requires delivering the product customers want at competitive prices with better quality and support than they could obtain from a competitor. But as competitors increase in number, achieving these results may be a continuous competitive effort. Furthermore, the less stable the market, the more frequent the changes to product specifications and processes. The need for ever more rapid response to these changes places a burden on IT and the entire organization. Continuous quality and process improvement are the only possible solution.

- Profit margin improvements – In a highly competitive market, neither increasing prices nor lowering the cost of raw materials are likely to be options. However, production costs can often be reduced by improving efficiency, which translates into reducing latencies and improving quality. Additionally, responding to today's competitive markets ultimately increases the rate of operational change. Because few businesses are capable of accommodating such rapid change smoothly, it is necessarily accompanied by proportionally higher overhead costs.

It follows that each of these business goals drives more and more business events in ever shorter time frames and fostering the need to reduce latencies as much as the dual goals of

efficiency and flexibility will permit. In other words, evolving toward a real time enterprise is on your agenda.

3. Wired Symptoms

The typical wired enterprise faces limits to efficiency and flexibility by impediments that stretch far beyond the lack of automation. These impediments are manifestations of the fact that most managers, knowledge workers, and even physical laborers must gather the informational resources they need from multiple sources and integrate them in order to decide and act. It is as if every worker were bound to each resource by wires that stretch only so far. The wired worker is one who must access a particular informational resource in a particular way. Being wired means you cannot respond freely, that you are constrained in ways that slow you down.

Being wired is so common, businesses hardly recognize the symptoms which then tend to go untreated. But the reality is that being wired manifest in business in many ways:

- Commitments – These are the most subtle and often overlooked symptoms of being a wired business. How many times each day do you say or hear someone else say "I will X as soon as Y?" The commitment to accomplish a needed bit of communication or make a decision or act on information ranges from is "… as soon as I get off the phone" or "… as soon as I get to my office" or "… as soon as we have our meeting" or "… as soon as I get that report." These commitments, however well-intentioned or even necessary, are merely delays or deferrals in disguise. And they almost always represent the need to access an unavailable resource (information, personnel, or materials).

- Coordination – The need to coordinate schedules is seldom unavoidable. Often it is a symptom of poor resource management, especially when the subsequent need is knowable in advance. If the need was knowable but not known, then information is not being conveyed or pushed to the appropriate people as soon as its available. For example, if a salesperson requests an accelerated ship date for a customer (the business event), it may be known that joint approval of four managers (sales, production, inventory, and shipping) will be required. Conveying the request only to the sales manager introduces unnecessary schedule coordination steps with the other managers. The resulting overhead is costly, with many unforeseeable and unintended side effects.

- Meetings – As has been often pointed out by management experts, meetings can be avoided simply by conveying information promptly and soliciting a decision. Anytime the information necessary to make a decision is worth explaining to a group, it is generally also worth recording as are the decisions that result. Indeed, this process may even be required for regulatory compliance and risk mitigation. By following a policy of collecting and conveying to all decision makers in a permanent form the information necessary to make decisions, many meetings become unnecessary. And, of course, the individual decisions can be collected, recorded, and consolidated at the earliest moment as well.

- IT Delays – Being wired also means being dependent on IT resources that aren't aligned with business operations or properly triggered by business events. Several examples will be familiar. For example, how often have you needed to have an operation performed that required the use of a particular application that is only accessible from particular workstations or systems? Or perhaps the operation itself, although you knew exactly the business parameters, had to be performed by a particular department or person after you struggled to convey to them what needed doing? Or the data you needed to identify a business problem or make a timely decision was spread across multiple unconnected IT systems or stored in multiple Excel spreadsheets on multiple desktops? How many times each day does someone in your business decide to simply work around such problems, accepting a lack of information or a degree of inaccuracy in favor of timeliness?

Each of the preceding wired symptoms involves tremendous overhead that prevent businesses from achieving primary business goals. High latencies and poor cycle times are merely the obvious first order effects. The second and higher order effects are much more insidious and, though difficult to prove, it is not hard to argue that they are even more costly.

4. Unwired

Savvy business managers increasingly recognize the need for an unwired approach. It should be obvious that every company and every person can benefit from being unwired. Being unwired isn't a single application, but an approach to business problem solving. The benefits of being unwired are essentially the same as those rules taught by so many efficiency experts such as "never handle anything twice" and "never put off until tomorrow what can be done today."

Imagine the ability to always put the ball in an appropriate someone else's court. Imagine voice mail that worked like email, except messages are automatically prioritized and actively solicit attention (without interrupting you unnecessarily). Imagine unwired laborers who easily obtain instructions for a task rarely performed, get approval to use resources or change tasks, or obtain additional help. This requires "smart messages" containing enough identifying information to supply a meaningful context (the context of the business activity and process), in turn requiring business process management designed for the unwired enterprise.

Being unwired means that a business has the option of becoming a real-time enterprise. It need not be at the mercy of late notification of business events, insufficient or incomplete information, or delayed decisions and actions. The unwired enterprise addresses these symptoms of missed opportunity and inefficiency by overcoming the technical barriers within its IT infrastructure. These features of the unwired enterprise include:

- Process Continuity – Business processes have traditionally been embedded in application logic. Where parts of the business process have been embedded in several applications with other parts implemented by manual procedures, businesses have had

to find some method of interconnecting these, usually by additional manual procedures. These business process discontinuities represent opportunities for errors and inefficiencies. In some cases, they are bridged in an ad-hoc manner. In other cases, they are bridged using software that does not permit the business user to make changes except at great expense.

- Process Flexibility – Process inflexibilities are increasingly intolerable in today's fast changing and demanding business world. Inflexibilities result from embedding in application logic, weak services orchestration, or tightly-coupled integration software. Another dimension of inflexibility is process step granularity. Even if accessible as services, the higher the granularity of process steps, the more difficult it is to reuse them appropriately when business process requirements change.

- Data Accessibility – Business data is often scattered, in disparate formats, and trapped in functional silos. Whether stored in desktop spreadsheets and databases, data warehouses, operational data stores, transaction processing systems, or captive application data stores, timely access to appropriate data is necessary to make decisions or perform business activities. Data may be inaccessible to a business user or system for many reasons. Its form is not comprehendible by the user or even readable using available software. It may be on a system that is unconnected, overloaded, undergoing maintenance, inaccessible for security reasons, or firewalled. It may be unreachable because of limited delivery mechanisms.

- Data Compatibility – Moving data between applications requires that it (a) have the content required by the receiving application, (b) be in a form readable by the receiving application, (c) have the semantics assumed by the receiving application, and (c) be received in a timely fashion. These same issues apply to data consolidation or aggregation, whether for report generation, dashboards, business activity monitoring, enterprise performance management, strategic analysis, auditing, or compliance. Perhaps even more important, they apply when data is delivered to users.

- Endpoint Flexibility – Endpoints are the means of interaction between an IT infrastructure and the business environment, whether for detecting business events, delivering business event alerts, implementing business activities, or capturing, delivering, and managing business information. Most IT infrastructures support a limited number of endpoint types. Real-time enterprise requirements demand that the infrastructure be endpoint agnostic if interaction is to be timely and independent of physical delivery circumstances. Workstations, laptops, smart phones, PDAs, pagers, RFID, and so on, whether continuously or occasionally connected, all need to be supportable without disrupting the business process implementation.

Endpoint flexibility means that the user is free to use whatever interaction device is immediately available (smart phone, PDA, laptop, desktop, etc.) and however connected (dialup, LAN, Wi-Fi, Bluetooth, etc.). The mere possibility of supporting lots of interaction devices is insufficient if, for each new device, doing so requires heavy investment in redevelopment or a different definition of the business process and its business activities.

5. The Challenges and Uses of Mobile Integration

One of the biggest challenges for the unwired enterprise is mobile integration. Though it suggests the term wireless, mobility is merely one aspect of the unwired enterprise. Mobile device support is not sufficient for mobile integration, let alone unwired integration. The goal should be to eliminate mobile applications as a special category, and instead strive for mobile deployment as a straightforward option of every enterprise application. The challenge of mobile integration, rather than being focused on the mobility of the interaction device or endpoint, is the mobility of the user and endpoint flexibility.

Mobile applications do impose certain challenges, predominantly because many of the enterprise applications that need to be exposed via mobile devices aren't designed to be highly distributed, highly available, robust under connection failure, or endpoint flexibility. Of course, these are always good design goals, but mobile applications tend to expose failures in these areas rapidly. These inadequacies stand out even more when a business becomes unwired. These issues are best illustrated with a couple of use cases.

- Insurance claims adjusters in the field have to investigate claims, estimate damages, and help customers obtain payments. When a natural disaster strikes, claims adjusters are often overloaded. Mobile integration is ideal in such a situation. The adjuster can collect claims, verify identification and property information, initiate the claims process, and often even determine if there are any reasons on file to suspect fraud, all while still in the field where it is easiest to obtain further information should it be required.

  These activities require mobile access to relevant policy data, the ability to initiate business processes which may include numerous updates, and the ability to trigger and review the results of potentially complex analysis. Issues such as limitations on display form factor, local data storage capacity, and connection robustness must be taken into account, preferably by the infrastructure. Reducing latencies and cycle times in this process is clearly advantageous to the insurance company. It is invaluable to the insured, often under considerable stress. In some cases, the claims adjuster may be able to identify service providers and make provision for badly needed services (e.g., housing) that can put the insured out of danger, reducing the risk of further claims.

- Warehouses and distribution centers, from warehouse retail outlets (e.g., home supplies) to automobile rental agencies, require periodic inventory audits. Common practice dictates that field or independent auditors be used, rather than in-house local personnel. Auditors take (or at least supervise) physical inventory, review inventory management practices and records, identify and account for inventory losses, investigate losses due to illicit activities, and certify results. Inventory tracking and reconciliation is particularly difficult when inventory can be moved directly between stores (inter-store or inter-center transfers) since this may require checking outgoing and incoming

packing slip records help on geographically separated systems. Loss prevention efforts include the detection of tag switching, physical theft, fraudulent returns and exchanges, and loading dock errors. Manual confirmation of paper procedures is required. Sales records must be checked to see that the proper prices have been charged. Often, this requires considerable physical movement of the auditor between inventory locations and IT systems with attendant potential error between data collection and data entry.

The efficiency and accuracy of these tasks can be greatly enhanced with mobile integration. Checking inventory reasonableness is greatly aided by access to seasonally adjusted sales or inventory turnover in the light of current sales specials, demand, sales volumes at nearby outlets, and so on. Inventory errors (counting or entering the wrong units) can be more easily detected, flagged, and even corrected almost immediately. Missing can be differentiated from misplaced or miss-shipped inventory.

- Perhaps the most valuable and under-implemented use case is collaborative management, a composite application. Most managers have access to and frequently use collaboration suites with integrated email, calendars, spreadsheet, word processing, contact management, instant messaging, and so on. Rarely integrated with other applications, they often create islands of information that strain the process of regulatory compliance. These suites are often the primary delivery vehicle of key business performance and analytical reports. Although actionable, even important actions are limited to emails, scheduling meetings, and other indirect steps. Without access to real-time performance information, the latency between business events and actions can cause costly errors in managing a specific customer account, partner relationship, product shipment, product rollout, sales lead generation program, and so on. Through unwired (service orchestration, data access, and mobile) integration, collaboration suites can be enhanced to support real-time activity monitoring while providing contextual drill down into traditional business intelligence reports. Users can start new or influence existing business processes in response to real-time notification of events, while continuing to use the familiar collaboration suite facilities and workflows. Rather than requesting status information, the manager responds to exception events from monitored business processes and activities with immediate, informed action. Empowered, managers become more effective, reducing the insidious latencies and cycle times within the management process itself.

Of course, the more wired an enterprise, the more difficult and costly mobile integration and deployment. A development and deployment infrastructure that addresses the technical requirements of the unwired enterprise removes technical barriers to mobile integration.

6. Technical Requirements and Unwired Orchestrator

Services-oriented development of applications (SODA) is the orchestration of loosely-coupled services into an application that runs on a services-oriented architecture (SOA). Gartner Group has defined SODA as requiring hosted development, services creation and assembly, services

repositories, services look-up and discovery, external interface specification, dynamic runtime service selection, distributed debugging, service I/O translation, and message-oriented modules.

Unwired integration places additional technical demands on SODA. These include data movement between data silos; initiate and participate in business processes or composite application; combine disparate data to control process alternatives; receive and send business event alerts; monitor business activities; and handle unexpected disconnects robustly. With these capabilities, unwired integration combines benefits of services orchestration, data integration, application integration, business activity monitoring, and mobile deployment.

The technical requirements for these facilities, and how Sybase's Unwired Orchestrator addresses them, are as follows:

- SODA and composite applications development – The unwired integration system should provide a rich, uniform, hosted SODA environment for services creation and assembly, whether developing new applications and integrating existing applications.

  Unwired Orchestrator runs on a J2EE enterprise application server. It includes an Eclipse-based Java development environment for developing J2EE services, a Web Services Toolkit for exposing ActiveX, C, C++, or J2EE components as Web Service, and Orchestration Designer for services composition. Orchestration Designer provides several methods for control of process alternatives, including combining disparate data for rule-based decisions (the Rules component) as well as the usual split and join. Internal and external (including local and Web-based) service repositories, service lookup and discovery, and debugging are supported.

- SOA-based enterprise services orchestration – Services orchestration should be supported by an enterprise-class SOA. An enterprise SOA must be reliable, scalable, and highly available, while supporting the performance requirements of today's businesses. Support for standards improves interoperability, reuse, and software investment protection.

  Unwired Orchestrator uses Sybase's Enterprise Application Server as the runtime SOA necessary for scalability, reliability, and performance of services. Services can run on clustered, fault-tolerant servers, providing load balancing across multiple instances of services. The environment supports Web Services (SOAP, WSDL, UDDI) and Java standards (J2EE). Clustering and failover properties can be set at the process instance level.

- message-oriented support – The underlying messaging system should support guaranteed once and only once delivery with message order preservation. A variety of messaging protocols should be supported including standard protocols and popular proprietary protocols. The messaging system should be highly available, with automatic recovery mechanisms.

Unwired Orchestrator supports a variety of messaging protocols including standard protocols such as JMS and popular proprietary protocols such as WebSphere MQS, MSMQ, and TIBCO. In cases where messaging is inappropriate, it also supports communication via flat files.

- transaction management – An unwired integration system must support transaction processing. Transactionality is required not only for business activities, but also for combinations of activities implemented across multiple systems.

  Unwired Orchestrator provides transaction support for both process activities and for message delivery, with both traditional transaction recovery and compensation. The application server on which it resides supports JTS, OTS, and XA models, and transaction logging for Java, ActiveX, C, and C++ components.

- endpoint flexibility – Endpoints include both interaction devices and software systems, involving both standard and custom formats. The unwired integration system should support a wide variety of endpoints and should not require changes to the business process or activity definition in order to support them. Endpoint choice should not limit service orchestration functionality such as initiating or participating in a business process or business activity, obtaining reference information, or updating databases.

  Unwired Orchestrator supports a variety of endpoints including Web Services, applications, and databases through its Endpoint Manager. Endpoints can be redefined after deployment. The optional Unwired Accelerator can be used to rapidly redeploy existing web pages on mobile devices, which can have widely varying form factors, storage capabilities, protocol support, and so on, and be only occasionally connected.

- data flexibility – Because data is stored and exchanged in many formats and in many data stores, an unwired platform should be capable of complex data extract, enrichment, transformation, and integration, in addition to the SODA requirement of I/O transformation.

  Unwired Orchestrator provides facilities to specify and support both standard and custom message formats (a.k.a. wire formats) and external interfaces at endpoints. Formats can be unique to a business or industry (sometimes called "custom wire formats") such as SWIFT, UCCnet, and RosettaNet. XML, DTD and XSLT are supported, although more powerful and reusable systems may be required as well. RepConnector enables Unwired Orchestrator to detect database events propagated by Sybase Replication Server. I/O translation, data transformation, and data enrichment are enabled by Rules and Formatter. Database endpoints supported include Sybase ASE and ASA, Microsoft SQL Server, DB2, Oracle, and any JDBC compliant DBMS.

- connection support – Support should be available for synchronously, asynchronously, and occasionally connected endpoints. When the endpoint is a mobile interaction device, this requires that dropped connections be automatically recovered and that automatic data resynchronization be supported so that locally generated updates or

business events are properly propagated among the device, other users, enterprise applications, and databases.

Unwired Orchestrator supports connections to mobile and wired endpoints, including alerts delivered via email, pagers, PDAs, and cell phones. With Unwired Accelerator, mobile and occasionally-connected interaction is supported.

- business activity monitoring – If the unwired enterprise is to respond quickly to business events as they occur in the context of a business process or composite application, the unwired platform must support collecting, analyzing, and displaying data representative of events.

  Unwired Orchestrator includes BizTracker for business activity monitoring. Probes can be defined to send any process data to BizTracker, where it can be analyzed and displayed in dashboards or used in reports generated with the InfoMaker component.

- administrative support – An unwired platform requires facilities for services management, error handling, performance monitoring and tuning, and so on. Cost of ownership is strongly correlated with the completeness and ease of use of these facilities.

  Unwired Orchestrator incorporates facilities to manage, monitor, and schedule server and process instances, and manage Directory Services, security, and logs. Error handlers provide a uniform method of responding to abnormal conditions.

7. Conclusions

As businesses inevitably pursue their strategic and tactical goals, they face many frustrating barriers to success, many of which can be characterized as consequences of being a wired enterprise. At the same time, the unintended consequences of ordinary business decisions are an increasing commitment to the real-time enterprise. This paper has explained why this implies that businesses need to become "unwired," and what being unwired means. We've examined both use cases and technical requirements, and provided a brief analysis of Sybase's Unwired Orchestrator, which is addressing the needs of the unwired enterprise.

Sybase's Unwired Orchestrator provides service oriented development of applications (SODA), combined with an SOA deployment environment, with integrated support for various optional facilities. With this combination, Sybase is addressing the many issues businesses face in becoming an unwired enterprise. At the same time, Unwired Orchestrator offers many of the elements essential for composite applications, services orchestration, and deployment in a services oriented architecture.

About the Author and Alternative Technologies

David McGoveran is the President and Founder of Alternative Technologies, an independent analyst and consulting firm founded in 1976. Mr. McGoveran has been a pioneer in the definition, technical architecture, and uses of relational databases, distributed applications, integration, and Business Process Management Systems. He has helped define marketing strategies, products, and technical direction for companies such as Hewlett-Packard, IBM, Candle Corporation, Microsoft, and many others. He has been lecturing and writing publicly on the topics of EAI and BPMS since 1997. He is Senior Technical Editor and co-founder of the Business Integration Journal – formerly the eAI Journal, in which appears his monthly column *Enterprise Integrity* and in which he published the BPMS Reference Architecture. Mr. McGoveran provides consulting and teaches seminars on Business Process Management, as well as other topics.

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