

## Enterprise Integration Challenge

Vendor Middleware-based Integration Solutions Offer  
Major Advantages Over Custom In-house Solutions



## About this White Paper

Business and system integration remains one of the top three CIO priorities for 2005/2006, along with increasing security and ensuring regulatory compliance. In fact, all three of these priorities are closely related.

Enterprises are seeking to improve/streamline their core business processes by integrating application silos within their enterprise and across their extended ecosystems. They also seek to defend their systems better, and ensure compliance with a fast-growing regulatory burden.

Enterprise Integration, where individual applications are programmatically linked to exchange information, has been a major effort for many years now.

But much more application integration work is still needed in almost every company, even though many have already implemented scores or hundreds of integration links to date. Application portfolios are large (*up to 1000 systems in the largest 500 global firms and up 400 in the next top 10,000 enterprises*). The number of integration points needed is also very high (*averages of 1000 and 500 respectively for these two groups*).

Robust, advanced Enterprise Integration middleware platforms that make application integration much faster and cheaper to implement and support, and provide superior operational attributes, have been available for over ten years. These platforms have advanced greatly and proved these benefits at thousands of customer sites. Adoption is near universal (~100%), amongst the largest 500 global enterprises, but plummets below 50% amongst the next 10,000 largest firms, and down to 20% amongst the next 250,000 medium businesses worldwide. Even amongst adopters, we found the proportions of the integration projects they have done using Enterprise Integration vendor middleware are surprisingly low (*30-45%, 15-25%, and 25-30% on average respectively*).

- So what have non-adopters used to deliver the application integrations already done?
- What are adopters using on the projects where they have not deployed their vendor Enterprise Integration middleware?
- Why are the proven benefits of vendor Enterprise Integration middleware not more widely accepted?

Our staggering and somewhat shocking research finding is that custom-built, in-house, hard-coded integration solutions (*the majority using free FTP software*) are much the most widely-used approach. These often take 2 to 4 times the time and effort to build as Enterprise Integration middleware-supported integration projects, require a similar multiple of ongoing maintenance and support effort, and are insecure, fragile and vulnerable to several serious risks. Enterprises heavily relying on this approach, as it seems most do, have built intrinsically weak links into their application infrastructure and wasted large amounts of precious development and support resources they need not have incurred. It is also hard to see how those using this approach can keep up with competitors using vendor Enterprise Integration middleware technology, or avoid becoming increasingly burdened with unproductive support.

Our research thus shows much of the market has yet to understand why a common vendor Enterprise Integration middleware integration platform provides a superior, universal, cost-effective and maintainable means of handling all/most of the many integration points they need to build today and tomorrow

In this White Paper, Software Strategies reviews the drivers for Enterprise Integration today, examines the global size and scale of the challenge and evaluates the main methods that companies have actually used to deliver integration to date. We also analyze the adoption and internal deployment levels of vendor Enterprise Integration middleware platforms by different sizes of enterprises, and seek to address the questions posed above.

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# White Paper

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# 1. Executive Summary

This new White Paper evaluates and assesses Enterprise Integration and what is driving the widespread increased demands for integration. It also identifies how companies are actually performing integration today. The Paper shows there is scope for considerable improvement through the wider use of vendor Enterprise Integration middleware platform software. This Executive Summary provides an overview of our findings, assessments and recommendations for IT users, which are detailed and developed more fully in the White Paper itself.

- 1. Top IT Priorities for 2005-2006:** Regulatory compliance, integration and security are rated top IT priorities for 2005-2006 in most CIO surveys, and are closely linked.
- 2. Strong Enterprise Integration Demand Growth:** Regulatory compliance, business transformation, On Demand business, and other forces, are driving many new Enterprise Integration projects. Enterprise Integration, the linking of separate enterprise applications to exchange information, has again come to the foreground as enterprises increase IT investments and look to generate top-line growth.
- 3. Enterprise Application Portfolios Must be Better Connected:** Enterprises built and acquired wide application portfolios over many years on a number of platforms. These portfolios are large (*400-1000 systems in top 500 global enterprises*) and many new integration points are still needed between them, and now also to numerous external ecosystem systems. How are companies actually implementing these important “bridges” between key applications? Are they making the best use of available technologies?
- 4. Vendor Enterprise Integration Middleware Platforms Well-proven:** The better Enterprise Integration middleware platforms make application integration much faster and cheaper to implement and support, and provide superior operational attributes. Such products have been available for over ten years, have advanced greatly, and proved their benefits at many thousands of customers. We found adoption is near universal at close to 100% amongst the largest 500 global enterprises who have the biggest integration challenges, and are usually the first to adopt productive IT technologies such as this.
- 5. But Many Enterprises are Missing Out on Proven Benefits:** Despite these widespread successes and long-proven Enterprise Integration middleware benefits, our research showed barely 50% of the next 10,000 largest enterprises, and just 20% of the next 250,000 largest medium businesses have adopted vendor Enterprise Integration middleware to date. These firms are missing out completely on a more flexible, faster and cheaper way of delivering the widespread and increasing needs for integration in their companies. This, of course, means that they are currently using other methods to deliver needed integration solutions, and we investigated what these were to find some surprising and even shocking results.
- 6. Even Adopters Usage Not Universal:** The picture is actually somewhat worse than the above suggests. We found that, amongst Enterprise Integration middleware adopters, the proportions of all the integration projects they had done to date using such middleware remained quite low (*30-45% for the 500 largest enterprises, 15-25% amongst the next 10,000 largest enterprises*). Clearly the use of other techniques often predated Enterprise Integration middleware adoption. Again the questions were, what alternative methods had they used to implement their integration solutions before adopting Enterprise Integration middleware, were they still using these as well and, if so, why?
- 7. Integration Solution Methods Used Surprising:** We found by far the most widely used method of building integration solutions, in all sizes of companies, was custom-built, in-house-developed solutions built with low-level languages, most using basic, free File Transfer Protocol (*FTP*) software for data movement. Such basic approaches require much costly development, are fragile and insecure in operation, and need costly ongoing support, and it is hard to understand why they are so widespread.
- 8. Custom-build Integration Users Wasting Time, Money:** Point 7 above means countless companies are using far slower, more staff-intensive, less-secure and lower-performing approaches to integration, and are also building into their organization a growing burden of costly future support; surprising when affordable vendor Enterprise Integration middleware alternatives are easily available. Our advice would be to “cease and desist”.
- 9. Problem Has Low Visibility:** We consider it likely that few CIOs realize just how widespread custom-built integration may have become within their organization, or what it is really costing, because this work tends to be low profile, commonly as a part of larger application projects. Asking some pointed questions to find out the extent, exposure and risk is therefore advised.
- 10. Vendor Enterprise Integration Middleware Platforms – The Way Ahead:** The class of Enterprise Integration middleware platforms provides comprehensive and broad-ranging capability to address almost all integration needs with a common platform. Earlier, the Enterprise Integration market had seen a profusion of specific point-middleware products for narrow roles or tasks. Today, we counsel prospective purchasers to look strongly to adopting such an Enterprise Integration middleware platform, rather than the several or many point products otherwise needed. Reasons for this advice are contained in this paper.
- 11. Vendor Enterprise Integration Middleware Benefits Not Understood Widely Enough:** It seems clear on our analysis that the 50% of the enterprise market and the 80% of medium businesses who have not yet adopted vendor Enterprise Integration middleware have not yet fully understood how strong the benefits are, and the quick ROI that is obtainable. We counsel them to investigate and get up-to-speed on this beneficial technology; which has become more affordable and now offers a wider range of entry points.

12. **Open Standards Vital to Enterprise Integration:** More than almost any other middleware category, open-standards play a disproportionately crucial role in enabling the integration, inter-operation and freedom from proprietary lock-ins that are essential. There are many open standards applicable to Enterprise Integration, including the J2EE™ programming model, the Eclipse open AD tools platform, Web Services, TCP/IP networking, Secure Sockets Layer (SSL) security, and many more. Enterprise Integration middleware platforms must fully support all these, and other standards, to achieve their fullest potential, and proprietary middleware approaches should be avoided.
13. **Enterprise Integration Market Concentration Eases Selection:** A small group of vendors offer more complete, integrated Enterprise Integration middleware platform suites that lead the market by software revenue share. These leaders are gaining ground as customers seek quality, security and endurance in a software sector that saw much turmoil and consolidation in recent years. Many of the early, smaller, point-Enterprise Integration middleware products and vendors have faded from the market. We list and cameo a selection of industry vendor firms in Section 7.
14. **High-level Criteria for Vendor Enterprise Integration Middleware Selection:** Although the Enterprise Integration middleware market has consolidated and settled into a more normal profile after the earlier profusion of vendors and offerings that flowered up to the dot.com bust, care and caution are advised in selection. Special characteristics of vendor Enterprise Integration middleware platforms demand particular care in short-listing and selecting a vendor/platform. We explore and examine these factors in Section 7 and propose seven high-level criteria that differentiate between the available alternatives. Prospective customers should find these helpful in making the right choice.
15. **Vendor Enterprise Integration Middleware Platform Example:** In Appendix B we profile and assess a leading example of a top vendor Enterprise Integration middleware platform to illustrate the broad functionality and capabilities such products can now provide. Those unfamiliar with this class of platform will find that this provides a useful overview of the sort of capabilities required.

## 2. Introducing Enterprise Integration

### About This White Paper

Specialist e-infrastructure analysts Software Strategies wrote this White Paper, published in April 2005. It examines and assesses how enterprises have implemented application integration to date. In particular, we were interested in how widely Enterprise Integration vendor application integration middleware has been deployed, and what advantages it offers over traditional alternatives. Based on our proprietary research and 15-years of middleware experience, we aimed to shed more light on whether there were areas for improvement in how enterprise IT organizations are tackling their expanding application integration challenges. The findings and conclusions are ours alone.

### Who Should Read This White Paper?

This White Paper was designed and written primarily for CIOs, CTOs, Heads of Development and other Senior IT Executives in enterprise IT customer organizations concerned with delivering an enhanced enterprise application portfolio to the business. It also addresses IT Managers in medium-sized businesses, who face similar application integration challenges on a smaller scale. ISVs and SIs, who are often concerned with selecting and supporting application integration middleware for and with their customers, will also find this White Paper of value.

### Application Integration Growth Fuelled by 1990-2005 Enterprise Application Portfolio Expansion

For the last fifteen years, a rapidly growing effort in enterprise IT organizations has been to develop and support an expanding number of application integration links. These interconnect diverse, different applications and platforms to enable better support for improved business processes. Increased application integration demand was triggered by the rapid 1990s proliferation of new distributed computing platforms (*Novell NetWare, Windows NT, and various RISC UNIX flavors, etc.*) alongside the long-established host mainframes, midrange systems and large PC workstation populations then and now also found in most enterprises. These new distributed platforms supported new types of applications that became pervasive and important components of today's enterprise application portfolios. Departmental and workgroup productivity, e-mail and collaboration, EDI, Enterprise Resource Planning (*ERP*), Customer Relationship Management (*CRM*), and Supply Chain Management (*SCM*) were foremost amongst these, and many new application integration links between core transaction and business systems and these newer e-business applications were needed.

The radical move to e-business and the Web became the next major driver of integration projects, adding Web sites, Web serving, B2C, B2B and many other new types of Web-based application, most of which also required multiple integration links with other enterprise applications.

## New Drivers Increasing Enterprise Integration Demands Today

Today in 2005, a number of drivers continue to increase Enterprise Integration demands, adding to the challenge faced by busy enterprise IT teams. Our research identified that the main drivers now include:

- **Regulatory Compliance & Corporate Governance Mandates.**
- **Need to Integrate ERP, CRM & SCM Application Packages With Other Enterprise Systems.**
- **Need to Integrate New E-business, B2B, B2C, B2P Web Applications With Legacy Applications.**
- **Diverse Enterprise-specific Tactical Application Integration Project Needs.**
- **To Support On Demand Business Transformation, Service Orientated Architecture (SOA) and Business Integration Initiatives.**
- **Vertical Industry-specific Application Integration Initiatives (e.g. HIPPA in healthcare).**
- **New Technologies Driving Application Integration Initiatives (e.g. RFID).**

We examine and evaluate these drivers more fully in Section 3, but note that regulatory and compliance mandates have today become a high-priority, top C-level Executive focus for boards in most industries and geographies worldwide.

## Application Integration Approaches – Early Evolution

Application integration always involves moving data out from one application, often across platforms, and into another. It may add other intermediate processes (*extraction, cleansing, transformation, aggregation, security, and logging, etc.*) performed en route.

Around 1990, most application integration links were custom-developed by IT teams, mostly using familiar, low-level 3GL languages, scripting tools, and file and database managers. A few brave users even developed their own integration technologies. Custom development was costly, both in its initial development time and effort and in the ongoing maintenance and support resource consumed. Proprietary system and application architectures, lacking common unifying standards, amplified the effort and cost of building these custom integration links. They were typically tightly coupled, hard-coded, and point-to-point. They were inflexible and vulnerable to changes in any part of the connected infrastructure. Analysts would therefore not expect to find this approach widely used today.

The rise of TCP/IP networking during the 1990s, now the near-universal enterprise network and Internet standard, brought in File Transfer Protocol (*FTP*), a simple, standardized method of moving files from one location or platform to another. Enterprises began using standard FTP software tools (*often free*) within their custom application integration solutions, to provide the core data moving function, wrapping it with still-considerable custom logic and code to perform the other needed functions, with the same rigidities as above, but some savings in effort. Amazingly, our research revealed that this simple, unsophisticated and basic approach to application integration remains overwhelmingly the most widely-used solution approach today.

## Enterprise Integration Middleware

With this near-universal and fast-growing wave of Enterprise Integration, a market for a new class of vendor application integration middleware sprang up at the start of the 1990s. The Enterprise Integration middleware uptake grew strongly over that decade and into the 21<sup>st</sup> century. One market research firm (*WinterGreen Research: August 2004 EAI Report*) for example, recorded \$2.5 billion in 2003 combined Enterprise Integration middleware software license and direct services revenues, and forecast growth to \$5.9 billion by 2009. An explosion of new vendors entered this market (*over 200 at its 2000 peak*), with diverse integration solutions. These included many proprietary and point offerings, and a few more open standards-based, universal platforms. In 2005, after much consolidation and turmoil, a well-defined Enterprise Integration middleware market, dominated by a few major players, has finally emerged.

## Vendor Enterprise Integration Middleware – What Does it Do, and Why is it Needed?

All vendor application integration middleware sought to simplify, speed, and ease application integration by providing standard middleware software engines offering common core functions and services required in most integration scenarios. Their use increased flexibility, and greatly reduced the custom development and maintenance effort, in return for software license fees for the products. In the best cases, these delivered compelling broad benefits. A wide variety of technologies and approaches were introduced, as in any new software markets, some purporting to be general platforms for integration, but most offering point-solutions or other, more specialized approaches. Over the fifteen-year period, the winning technologies and vendors have clearly emerged and proved their value at thousands of IT-user sites. The earlier profusion of smaller start-up Enterprise Integration middleware vendors has consolidated through mergers, acquisition or failures.

With the already high and growing pressure on enterprise IT teams to “do more with less”, readers would expect mature Enterprise Integration middleware (*now well-proven to deliver “better, faster, cheaper” solutions*) to be universally used on all application integration projects. One would expect this to particularly apply in most enterprise-level IT organizations, as well as in many “medium-sized” business IT groups where IT resources are even more constrained.

## Our Research Reveals Shocking Enterprise Integration Practice Truths

For this White Paper, we used a variety of research approaches to identify and broadly analyze how businesses had, in reality, implemented their application integration solutions to date.

- Amazingly, by far the most widely-used application integration method found deployed to date in all sizes of business was custom-developed, free FTP package-based approaches. These are relatively primitive, costly to develop and code, insecure, need substantial and costly ongoing maintenance, cannot provide high Quality of Service (*QoS*) levels, and are particularly vulnerable to software changes or errors in their environment. Enterprises depending heavily on this approach are burdening themselves with high development and ongoing support costs, weak security, and high risks. Why is this, when better alternatives have long been available?
- Vendor Enterprise Integration middleware platform-based solutions were the second most widely-used approach and offer a much higher-quality, lower-cost and faster time-to-value route. However, we found that, whilst almost 100% of the largest enterprises had now adopted this well-proven approach, barely 50% of the next 10,000 largest enterprises, and less than 20% of the next 250,000 medium-sized businesses have done so to date. Even those who had adopted and implemented vendor Enterprise Integration middleware had only used it on a varying but usually minor part of their total integration portfolio, so were also continuing to support many more primitive and costly in-house built, or point-middleware-based integration solutions. Why has adoption and penetration not been higher when the benefits are compelling?
- The third most widely-used method of integration was entirely custom-built, in-house solutions (*not using FTP*), that are even more primitive and costly even than the former, amplifying all the disadvantages above without the modest benefits of FTP.
- Incredibly, business change consultants have told us of discovering numerous cases of whole departments of staff being employed wholly or mainly to provide essentially manual application integration functions and processing. Clearly deployed to bridge incompatible and non-integrated application systems, these departments obviously incur massive staff costs, slow business processes whilst also introducing errors and omissions. These should have been fully or largely automated by software application integration long ago. Why have these companies and their IT teams not spotted and automated such a ludicrous waste of resources?

These surprising, even shocking findings from our work are more fully presented and discussed in Section 4.

### Findings Pose Important Questions for Enterprise IT Management

These findings pose important and challenging questions for CIOs (*and other senior IT executives*) responsible for enterprise IT strategy and technology that include:

- Why are such primitive and costly Enterprise Integration approaches still so widespread today, fifteen years after the first Enterprise Integration middleware solutions that now offer a much superior approach, long-proven to work well, became available?
- Do the companies so widely using these primitive approaches actually realize how much more these are costing them than the better vendor middleware-supported solutions, and how much higher the risks are?
- Amongst those who have recognized these benefits, and introduced vendor Enterprise Integration middleware, why have they only deployed it on a moderate proportion of their total application integration project portfolio, when its benefits are universal and well-established?

We amplify, discuss and seek to answer these questions, and to provide recommendations for improvement in this White Paper.

### Our Analysis

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*Traditional “hand-tools-based” and “do-it-yourself” in-house solutions for application integration remain widespread...*

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Enterprise Integration is a universal need that has expanded greatly over the last 15 years, as application portfolios have become much wider. Powerful drivers today are pushing enterprises hard to implement yet more integration links for compelling reasons, including powerful regulatory compliance demands.

Traditional “hand-tools-based” and “do-it-yourself” in-house solutions for application integration remain widespread, despite both their serious disadvantages and costs, and the long availability of well-proven vendor Enterprise Integration middleware platforms and point solutions to do a far better job.



The leading vendor Enterprise Integration middleware platforms have been near-universally adopted by the largest 500 enterprise IT users, but by far lower proportions of other enterprise IT users and by medium-sized businesses.

In our assessment, many enterprises are therefore wasting large amounts of scarce development and support resources by continuing to build and maintain application integration links with basic techniques. In doing so, they are creating a growing new legacy software burden that will soak up unnecessary support resources and, with the fragility of many of these solutions, creating higher risks of disruption for their business than they need to.

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*...many enterprises are therefore wasting large amounts of scarce development and support resources by continuing to build and maintain application integration links with basic techniques.*

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### 3. What is Driving Enterprise Integration Demand Growth?

#### Introduction

In the previous section we introduced and explained Enterprise Integration, and how it became a major effort within almost every business today, particularly in larger enterprises. We found additional drivers exerting pressure for additional application integration links to be implemented today. What are these drivers and which are the most important?

#### Research Reveals Seven Main Enterprise Integration Drivers

Our research has identified seven principal drivers that are today fuelling the rapidly growing demand for Enterprise Integration projects at enterprise IT organizations throughout the world.

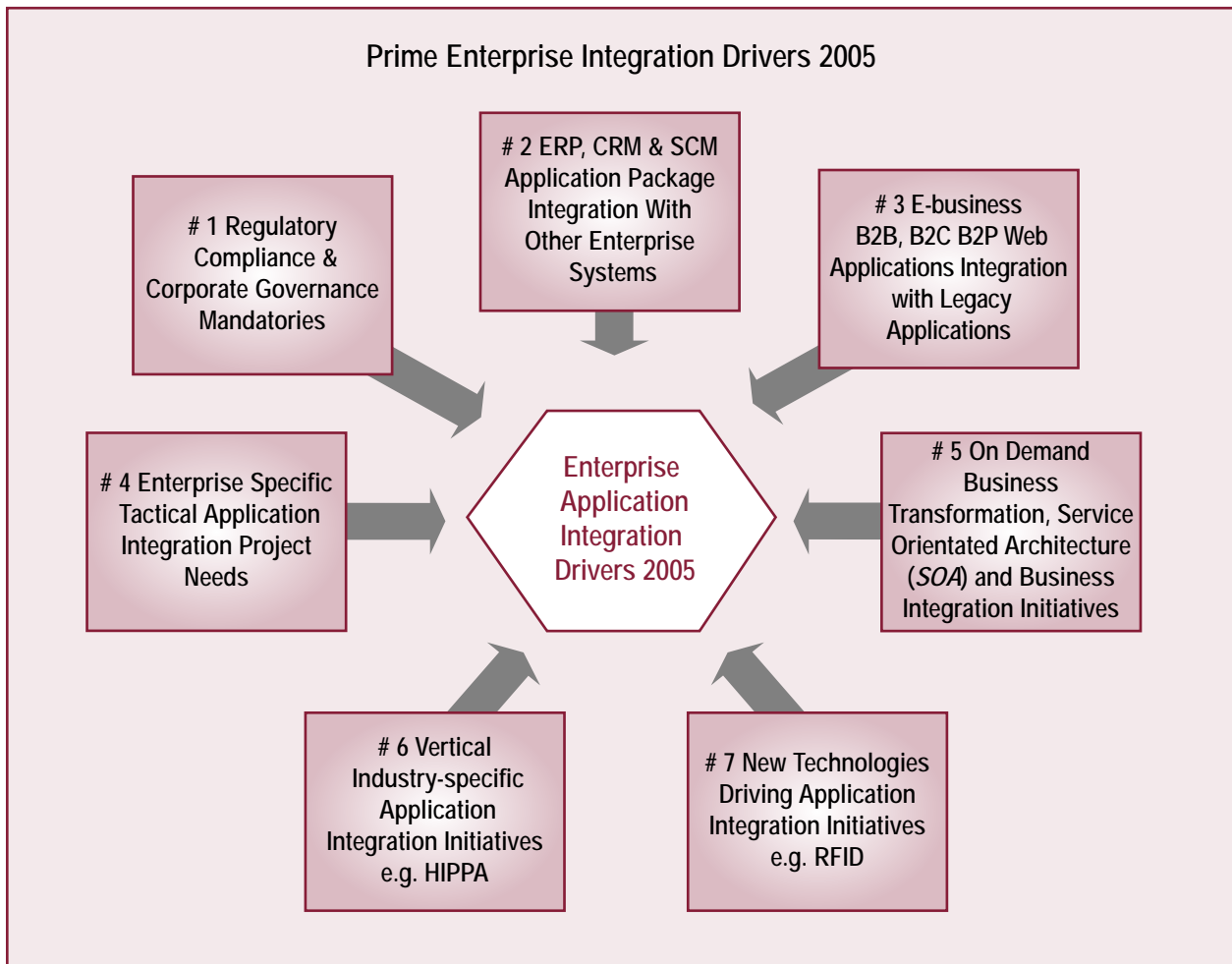


Figure 1: Prime Enterprise Integration Drivers 2005

These are highlighted and ranked in terms of their importance and frequency of occurrence as Enterprise Integration project drivers in our Figure 1 chart on page 9. We briefly discuss each of these below.

- **# 1 Regulatory Compliance & Corporate Governance Mandates:** Many analysts now rank the large and growing wave of regulation and compliance demands being placed on enterprises, in every marketplace and every geography, today as perhaps the strongest current driver of Enterprise Integration projects. Many of these initiatives place stringent demands for assured integrity, security, risk reduction, traceability and other attributes on the regulated organization that have now become a principal concern of boardrooms everywhere. Almost all of these regimes place stringent new demands on the enterprise IT systems that support the core business, and usually involve new application integration links. Efforts to improve corporate governance lie behind many of these regimes. We amplify and discuss this driver in Appendix A on page 28.
- **# 2 ERP, CRM & SCM Application Package Integration With Other Enterprise Systems:** Several \$100Bs were spent purchasing, implementing and deploying a new generation of packaged and standardized integrated enterprise applications in many enterprises over the last ten years. ERP, CRM, SCM and PLM are the four most widely-deployed categories of standard enterprise applications. Their implementation proved to be a massive and time-consuming effort, not least because of the large number of application integration points needed to connect these originally somewhat monolithic and proprietary applications to the other existing and new applications. Openness and integration options provided in enterprise application packages have improved considerably today, and most Enterprise Integration middleware offers adapters and connectors to the major packages to simplify integration. New integration link projects of this type continue to be a major driver. (*Ranked # 2*)
- **# 3 E-business, B2B, B2C, B2P Web Application Integration with "Legacy" Applications:** The third and continuing wave that is driving the need for many new application integration links has been e-business itself. Pulling together new Web applications to support B2B, B2C and B2P online applications has required, and continues to require, a profusion of application integration links and services to interconnect newly-written functionality, legacy applications and enterprise package applications, such as those above.
- **# 4 Enterprise Specific/Tactical Application Integration Projects:** There are a wide diversity of company, industry, or geographically-specific application integration links that are also needed that combine to form this large driver category, and which fall outside the other driver categories here – the national standard interfaces that integrate bank systems to the national clearing system in each market would be a typical example.
- **# 5 On Demand Business Transformation, Service Orientated Architecture (SOA) and Business Integration Initiatives:** Many leading enterprises are moving on to the next wave of e-business, which many are calling On Demand. Here, businesses are seeking to become better-integrated and more responsive, to streamline their core business processes and to respond faster to fast-changing demands. Business integration, process integration, and people integration within the enterprise are needed, and application integration is fundamental to all these.
- **# 6 Vertical Industry-specific Application Integration Initiatives:** In some vertical industries, networks, exchanges, markets, and/or data interchange standards are already important elements of that industry's ecosystem. These all require application integration with enterprise applications for members of that industry. Early examples included the SWIFT network and financial message exchange standards for inter-bank transactions, the SITA network and its protocols in the airline industry, and many others. Recently emerging are fundamental new models and standards, such as HIPPA in the US healthcare industry. This seeks to electronically integrate and standardize the whole healthcare provider, healthcare insurer, and healthcare management nexus of that industry around a common framework, to achieve large cost savings of benefit to all participants.
- **# 7 New Technologies Driving Application Integration Initiatives:** Other important drivers are some newly-emergent technologies that require extensive application integration with existing systems. Two examples illustrate this group nicely. Pervasive or mobile computing, connecting mobile devices to corporate systems, has emerged in recent years as a new productivity and communication support for increasingly mobile workforces using mobile devices such as cell-phones, pager, notebook PCs, and handheld computers, etc. All pervasive and mobile computing deployments require new application integration. Another just now gathering momentum is RFID (*Radio Frequency Identity Detection*), which promises to allow dramatically better tracking of supply chain and inventory/goods throughout their manufacturing, transportation, distribution, sale, and even use phases. RFID will generate a new flood of data and require extensive application integration with existing systems.

Not every enterprise will be emphasizing all seven types of driver on their business roadmap at any one time, but many will be focusing on two, three, or four of these. All require extended application integration capability.

## Our Analysis

The challenge of Enterprise Integration is already substantial, but the seven drivers above are increasing this challenge substantially. At a time when IT investment is again moving forward, a high proportion of critical business initiatives will fall into one or more of these categories, and will demand additional application integration.

Those enterprises wishing to cope better and faster with this wave of application integration and avoid adding a further future legacy support burden should ensure that they are using the much more productive Enterprise Integration middleware integration approach on all or most of their new integration projects. If they have not yet adopted Enterprise Integration middleware, now would be a good time to do so.

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*...should ensure that they are using the much more productive Enterprise Integration middleware integration approach on all or most of their new integration projects.*

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Enterprise portfolios of older, custom-programmed application integration links cannot easily be wished away overnight, but should be systematically replaced rather than patched when substantial upgrades are required to them or their linked applications for business reasons. Over a period, consistent application of this policy would steadily reduce the legacy maintenance burden this link portfolio represents today, and sharply cut business risks.

## 4. How Large is the Enterprise Integration Challenge Today?

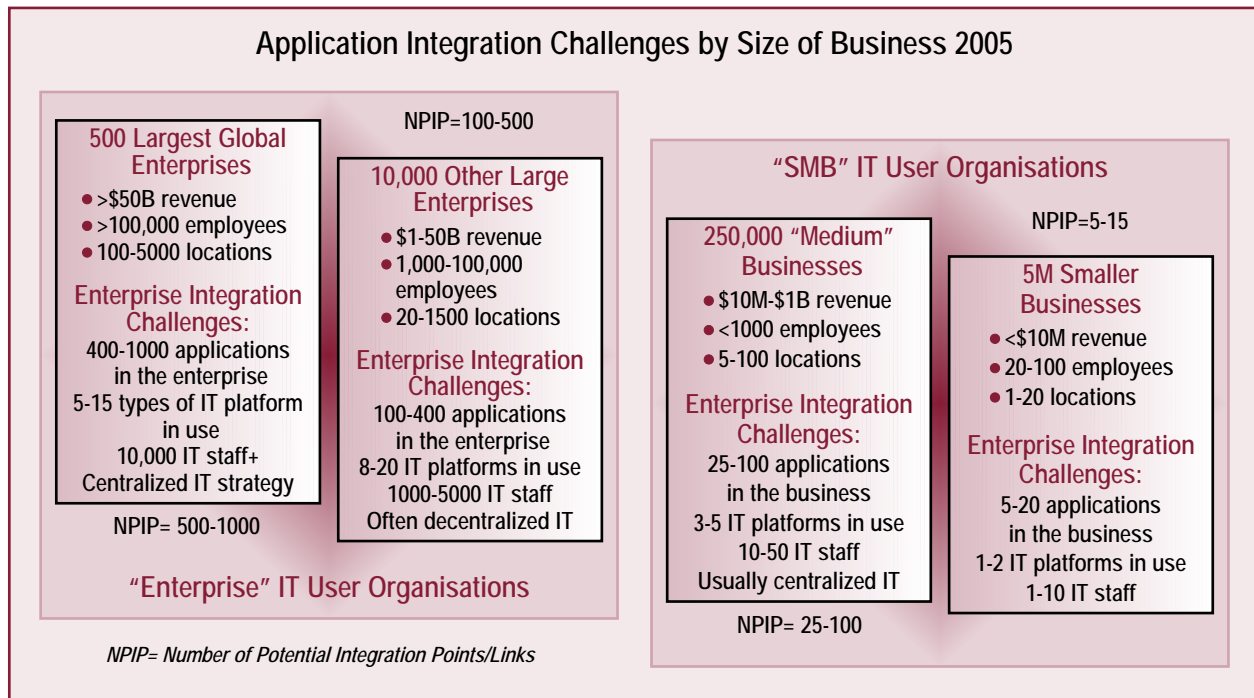
### Sizing the Enterprise Integration Challenge

So how widespread are the needs for application integration? What is the scale of the task and challenge to integration applications across business enterprises of various sizes? How do we measure the application integration task as a whole?

Three important measures that indicate the span and scale of the application integration task as a whole for an enterprise or business (*some already done, some still to be done*) are:

- **The size of the existing enterprise/business application portfolio:** Clearly, application integration involves linking together applications, so the measure of how many applications the enterprise is using today is a good starting point. Although there are some difficulties in defining an application, and whether all the existing applications are still of value, etc., most IT groups recognize and use this term. Most maintain enterprise application architecture charts that allow relatively simple determination of the measure. The Year 2000 cleansing investments thankfully forced a considerable clear-out of obsolete applications and allowed refreshes of many of those remaining, the first compelling “clean house” in IT’s history. Cost-cutting and modernization during the economic downturn since then has further trimmed back the number of older, superseded applications, so the portfolios are in considerably better shape today than in 1999. New applications are, of course, continuing to be added steadily.
- **Number of Potential Integration Points:** The most direct measure of the application integration scale and challenge then becomes how many “integration points” do there need to be (*in business logic terms*)? These include both those between all the applications within the internal enterprise application portfolio and those between the enterprise’s applications and those of its external ecosystem. We call this the Number of Potential Integration Points (*NPIPs*). In principle, software application integration links are thus needed for every required Integration Point. Clearly, many of these are implemented and running today, but many others are still to be developed. NPIP clearly increases both with the number of applications in the firm’s application portfolio (*Internal Integration Points*) and the extent and complexity of the external ecosystem the enterprise participates in (*External Integration Points*). In most cases, far less than “any-to-any internal” and external application-to-application integration points would ever be required, so NPIP is far lower than the number of applications. NPIPs, however, clearly increase much faster than linearly with the number of applications involved. Some of these integration points are commonplace and are nearly always implemented today – for example, sales and purchase ledger financial applications to general ledger. Implemented levels are much lower for newer mainstream types of integration (*for example, CRM to customer account applications*) and fall to just a few percent in the case of the newest technologies driving integration, such as RFID and mobile/pervasive computing. Most fundamentally, when using the right enterprise integration middleware technology-based approach, there is no need for point-to-point direct connections between every pair of applications requiring integration, as there is with custom-built links. Essentially, a single generic connector to each application services all links to/from that application. The concept is analogous to the “bus” concept in computer hardware. Each application (*device*) just connects to the integration middleware “bus”, and this bus enables any-to-any application connection. This dramatically reduces the number of individual links that are needed, compared to custom-built, point-to-point integration. The term “Enterprise Service Bus” (*ESB*) is now used to describe this key middleware integration function: we discuss the ESB architectural pattern in Appendix B. We exclude from these numbers the packaged integration interfaces that are provided (*for example, between the modules of an integrated application suite*) and that require little or no specific implementation work.
- **Number of Different IT Platforms:** The wider the diversity and number of different IT platforms supporting the application portfolio (*internal and external*), the more complex, difficult and costly the implementation of application integration becomes. It is clearly easier, faster and cheaper to integrate two applications sharing the same platform than over different technologies. We have often found larger enterprises still using over 20 different platforms.

There are wide variations in these factors between different types of industry, depending on the IT histories, platform preferences and the typical application portfolio structures that have evolved in each industry. For example, larger banks have continued their traditional approach of in-house application development for core systems, and their heavy use of centralized mainframe platforms in place for decades, but have added numerous other types of application and platform around these central systems.



**Figure 2: Application Integration Challenges by Size of Business 2005**

In Figure 2 above, from many research sources, we have synthesized and broadly characterized the four main classes/sizes of organization that use most of the world's IT. The four classes are the global 500 largest enterprises; the next 10,000 largest enterprises; the next largest 250,000 substantial medium businesses, and the next largest 5M small businesses worldwide. For the latter we have restricted this group to those with at least 10 employees, the lower threshold for IT beyond PCs, and thus excluding the many more millions of smaller firms.

We show broad measures of average business sizes, and the average scale of their typical IT environments, in terms of the size of their typical application portfolios, the number of different IT platforms they are using, and the number of IT staff for each class. So, for example, the 500 largest global enterprises, giants with revenues over \$50B and usually with more than 100,000 employees, commonly have 10,000 plus IT staff and an application portfolio ranging from 400-1,000 enterprise applications. The next 10,000 largest enterprises typically have \$1-\$50B in revenues and 5,000-100,000 employees, with applications portfolios of, on average, 100-400 applications. Our “smaller businesses” class, at the other end of the scale, have revenues of up to \$10M, up to 100 employees, and typically have 5-20 applications. Many IT market research studies have confirmed these broad IT market demographics. The information we present on the size of enterprise application portfolios and NPIP derive from reviews of typical enterprise application portfolio maps for a selection of enterprises in each size category across industries and geographies encountered in our analysis work, and from published work by others.

Several conclusions can be highlighted from this indicative picture:

- **Application Integration – Universal Need:** The first and clear observation is that application integration is a universal need in every size and type of business from the largest global businesses downwards. Dependence on IT applications, and their diversity, has spread this need even to quite modest sizes of smaller business.
- **The Larger The Enterprise, The Greater the Application Integration Challenge:** Our research clearly indicates that the larger the business, the larger the application integration challenge. For example, our best estimate of NPIP for the top global 500 was that on average 500-1000 significant integration points were potentially needed; for the next 10,000 largest enterprise, the NPIP average needed was 100-500, and even for the smaller businesses above, it was 10-25.
- **Number of IT Platforms Also Drives Enterprise Integration Cost:** Using many different IT platforms adds considerably to the cost and effort of application integration links that need to span IT platforms. Interestingly, the largest 500 global enterprises on average have less diversity of platform (5-15), than the next 10,000 enterprises, because they have retained a more centralized IT governance and exert stricter controls on diversity. The next 10,000 group have, on average, 8-20 platforms in use, a result of more devolved IT governance to Line Of Business (LOB) units, and less standardization from the center. Our class of “medium businesses” were much less diverse, averaging 3-5 different IT platforms in use.
- **Smallest Businesses:** The many millions of the smallest businesses (*below our 10-employee threshold*) typically use PC desktop platforms (*possibly networked*) and integrated business application suites for their commercial applications. The standard external interfaces provided in these suites, plus the use of standard tools such as MS Office, plus external Web based services (*such as e-banking*) suffice to meet most integration needs of this large group. They are therefore not a substantial current market for integration middleware.

## Complex Application Infrastructures – An Example

The complexity and scale of the application and platform landscape in larger enterprises reached high levels, largely as a result of the spread of the distributed computing platforms and the associated new types of applications they support, which we discussed earlier. An actual customer example encountered by this analyst sharply illustrates the scale of the typical application integration challenge faced by the larger enterprise.

The company was the recently-privatized national telecommunications carrier of a medium-sized European country, a substantial IT user for 30-plus years. Since privatization, the new business had come under considerable shareholder and market pressure to sharply cut costs, bring up new e-business solutions to improve customer service, and become more responsive, flexible and competitive in its now more dynamic and open market. Without its previous near-monopoly, telecommunication services prices were falling fast. With over 2,000 staff, its IT operation (*upon which the business was totally dependent*) was substantial. This IT group had reviewed, mapped and inventoried the company's enterprise applications portfolio, and found that it was operating over **800 distinct applications systems, comprising over 50,000 programs, and deployed across over 20 different types of IT platforms, sited in multiple locations** across the country. The applications portfolio represented many thousands of person-years of development work. Most were silo/product-focused, not customer-facing, extremely complex, costly to support and maintain and run, and left the organization with little capacity for new initiatives. Worse still, on each core business process, many different application systems were involved. For example, the vital business private line provisioning process required the use of fifteen different applications that were poorly integrated. Therefore, many of the company's core business processes were slow and costly to operate, and extremely prone to human error. Basic customer data was scattered over as many as 20 different databases, built earlier for different specific needs, often inconsistent and contradictory, which resulted in much manual reconciliation and further errors. After privatization, in the more fiercely competitive and open telecommunications market, this could not continue.

The seemingly obvious approach, rewriting a clean, all-new modern suite of non-overlapping applications from scratch to fully meet the new needs, was inconceivable for a multi-\$B business of this scale. It would have taken 7-10 years, many hundreds of millions of dollars in cost, and needed tens of thousands of developer person-years, none of which were affordable. No comprehensive, standard, off-the-shelf, integrated application packages exist for this industry that could be bought and more quickly implemented to meet its overall needs, so that route was also a "non-starter".

This company's chosen approach was to extend and integrate the better existing application components that it had, using vendor Enterprise Integration middleware to support the new e-business solution needs quickly. It intended to rationalize and steadily de-duplicate and modernize the application portfolio by software componentization and reuse. It also sought to cut the diversity of platforms and locations as quickly as possible, to retire the most obsolete applications whilst building new functionality only where needed for the core, streamlined business processes of greatest impact to the businesses bottom line. A large number of new integration connections were needed to support these changes, and many of the older existing ones already in place, were known to need replacement and modernization as well. Application integration was therefore a strategic necessity and high focus area for the IT group in this telecommunication carrier, as it set out to transform and modernize both its core business and its over-complex and aged enterprise application portfolio.

Many large enterprises reveal similar patterns, so this is far from an extreme example. This example highlights the scale of the renovation; modernization and integration challenges faced by most large and very-large enterprise IT users and the scale of their Enterprise Integration challenge.

## Our Analysis

Application integration requirements have grown steadily since the early 1990s. In many larger enterprises, one or two hundred integration links have often already been implemented, sometimes more. Supporting all of these links and their software, scripting, operating processes, etc., has become a considerable effort that consumes skilled developer and support resources which are better used on new developments. The level of support, maintenance and modification involved is often high, because such integration solutions are sensitive to changes or failures in the two applications at either end. Any changes to the platforms or their operating systems, or in the networking or middleware transport technology used to effect the link, new releases, changes in protocols, hardware or software failures, etc., can "break" such links. These combine to create a substantial support workload on the cumulative integration portfolio being supported.

On top of these large existing integration portfolio support efforts, many additional new integration links are still urgently needed, fuelled by regulatory compliance, On Demand business transformation, new technologies, and the other drivers shown in Figure 1, which we discussed in Section 3. To productively tackle and implement this considerable portfolio of new integration needs, we recommend enterprises look hard at the methods, techniques, and the technologies they use for application integration. Unless they do this, they are certain to create a further legacy burden, create inflexible and unresponsive applications environments, and condemn their businesses to the penalties of insecure, fragile and far from seamless interoperation links between their changing and developing enterprise application portfolios. These are serious risks and burdens no modern business should lightly assume at a time when all are being asked to move faster, be more flexible, increase IT responsiveness and connect up better with their ecosystems.

As the specific example above illustrates, for almost every medium and larger enterprise, "clean sweep" complete rewriting and/or replacement of their tangled existing applications portfolios, however theoretically appealing and desirable this may often seem to be, is completely infeasible and uneconomic for most enterprises. This means that enterprise integration, blending many parts of the existing application portfolio with new components, and incrementally improving the existing applications, is really the only feasible, affordable and realistic way forward for most organizations.

# 5. What are the Main Enterprise Integration Options Used Today?

## Introduction

We saw the scale and breadth of the today's Enterprise Integration challenge sharply portrayed in the previous section. This highlights the importance, investment effort, time and cost that larger enterprises in particular are facing to prioritize, develop, implement and support all the new integration links that are now required, in addition to continuing to support all those that they have already implemented.

So how and with what technologies are companies delivering and operating application integration today? What are they using to build and deploy and manage all the growing number of application integration links ever more of which will be required in the more connected On Demand business world?

For those all who could not escape the loud software industry marketing from the many and diverse application integration middleware vendors who began offering a bewildering assortment of middleware products from the early 1990s, readers could be forgiven for assuming that vendor-middleware solutions were absolutely dominant. Most analyst studies of the Enterprise Integration market list the main vendors, review their products, technologies and market shares, but do not cover what most enterprises are actually doing today. Surprisingly, the reality is rather different.

## So How Are Enterprises Actually Performing Application Integration Today?

We decided to look more deeply at this topic, and discovered some surprising, worrying, and frankly astonishing results. Our research was based upon market reviews, other published analyst studies, discussions with scores of enterprise customers, feedback from software vendors, and the particularly valuable feedback from many systems consultants conducting systems integration projects at enterprise customers (*who are well-placed to give objective assessments*). We have synthesized and summarized this work to show the real picture of how Enterprise Integration has been performed to date.

Our findings showed that many enterprises are heavily reliant upon custom-built, in-house developed and crafted links, most using the standard, but basic, FTP technology, creating a new legacy software nightmare with ever-growing maintenance burdens, and suffering low QoS.

We identified the five broad approaches most widely used in the enterprise IT segment to perform and deliver the application integrations that have been implemented to date, and these are shown in declining frequency of use order in Figure 3 below, labeled as Options # A to # E.

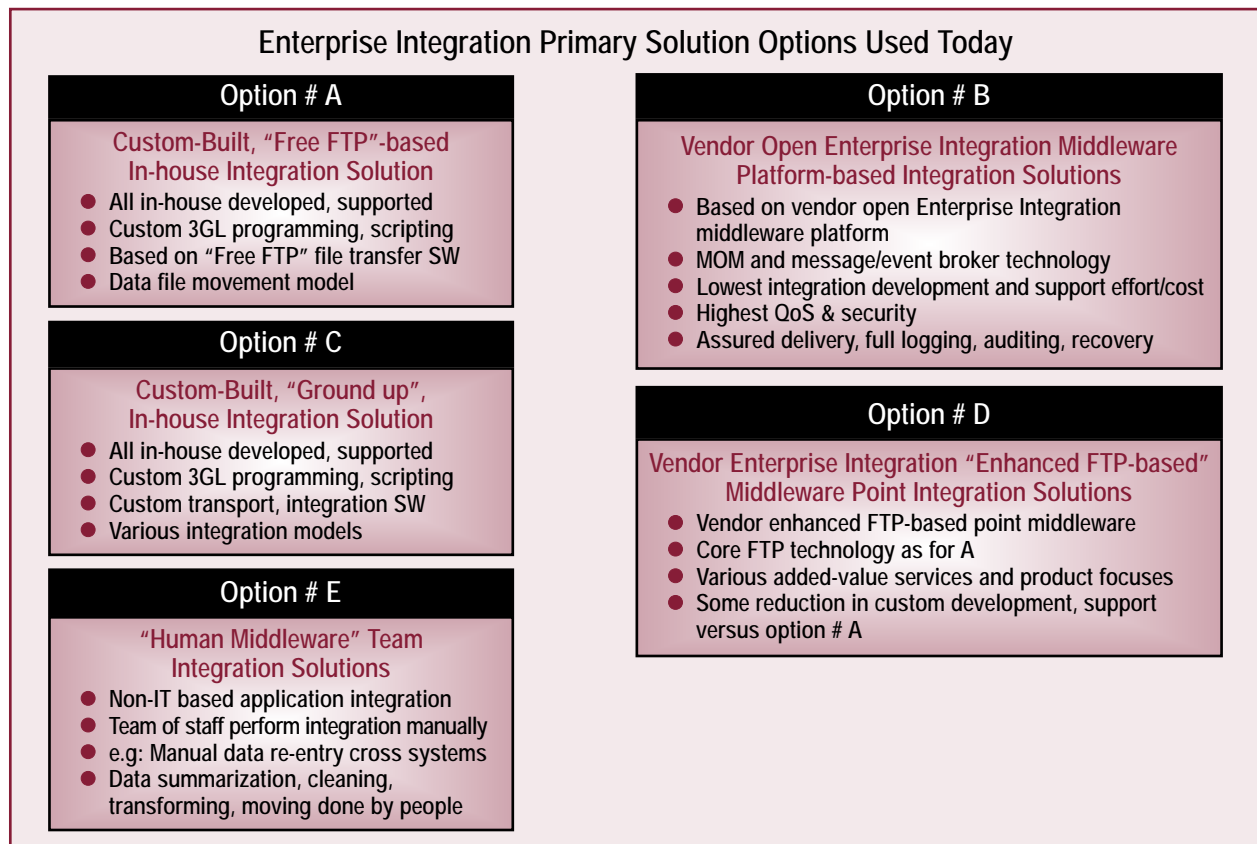


Figure 3: Enterprise Integration – Primary Solution Options Used Today

We explain, characterize and discuss the merits and demerits of each of these Option approaches below:

- **Option # A – Custom-Built, “Free FTP”-based, In-house Integration Solutions:** Much the most widely and universally used approach to application integration, found in use on many different integration projects in almost every enterprise IT organization, was what we term “custom-built, free FTP-based, in-house integration solutions”.

We noted previously that FTP is the standard file transfer capability for TCP/IP networks, FTP programs are often included with operating systems or available free from other sources. Every application integration project requires movement from out of one application and into another. The typical solution of this type wraps a basic FTP operation (*provided by the FTP package*) in custom 3GL coded integration logic, which may perform transformation, aggregation, cleansing, validation, etc., on the file contents and be of substantial complexity. In addition, a scripting layer is usually added, to manage transfer operations and provide some control services. These solutions can therefore be quite complex, low-level development jobs, requiring considerable development effort. The standard FTP packages used may cost little or nothing, but offer few value-added services, so this is a basic technology. Obviously, maintaining and supporting many such modules rapidly becomes burdensome as the number of them in use climbs, eating up significant skilled resources to keeping them running. Changes in any part of the environment (*that often occur*) impact the code. Such changes, that occur regularly in every IT shop, include new releases or updates of the linked applications themselves, changes in the compiler/programming language environments in which the applications are written, changes or new releases in the operating systems and utilities of the platforms running the linked applications, and changes in the networking environment over which the custom-built integration runs. In practice, the frequency of such changes disrupting existing custom-built integration links is high, likely to occur several times per year for each custom-built link. The amount of rework and re-testing required for each custom-built integration depends on the specific environmental change, but will often be considerable, and can even be as much again as for its original creation. This makes for a high burden of maintenance and support that recurs repeatedly throughout the life of each such integration. In many cases, failure and disruption of the custom-built integration link will be the first signal that changes in the environment have triggered the need for rework, resulting in poor overall service reliability and availability. These are serious, costly and intrinsic problems of this approach. We admit to being somewhat surprised and shocked that this rather crude and basic approach is, in fact, still in such widespread use today.

This wide usage probably arose because IT developers, like any craftsmen asked to tackle a new household job, will usually pick up and use the basic hand tools in their immediately-available toolkit (*3GL, scripting, FTP packages*). They use these, even when high-powered, much faster and more productive power tools which could safely do the job better and faster exist, but are not immediately to hand.

IT management should be greatly concerned at the mounting costs and effort this basic integration approach creates.

- **Option # B – Vendor Open Enterprise Integration Middleware Platform-based Integration Solutions:** Vendor open Enterprise Integration middleware platforms started to emerge around 1990, and have matured and flourished widely ever since. These platforms provide a more robust, universal, standards-based way to integrate diverse applications and platforms. There are several layers of function that provide additional incremental value-add services, but the core technology used is Message-Oriented Middleware ( *MOM*). These allow loosely-coupled application integration by exchange of messages, and message or event brokering, and provide significant additional value-add services. Using such a middleware platform allows much-reduced custom development because the platform services do more of the job. Because the middleware is vendor maintained to support advances in operating systems, databases, networks and standards, much less integration maintenance and support is required by the customer’s team. Once a customer has acquired the relatively simple skills needed to use such middleware, each successive project can be more quickly delivered, and overall support burdens are reduced. The number of discreet integration links needed can also be greatly reduced by using the advanced models such middleware supports (*e.g. publish-and-subscribe rather than point-to-point*). The QoS of these integration solutions in production is also much higher, because of the value-added services (*including assured delivery, enhanced security, logging, and workload distribution, etc.*) result in more dependable integration operations in production.

The market leader in this category, by a wide margin, is IBM’s WebSphere MQ family, which provides the foundation layer for the giant’s much broader WebSphere Business Integration suite. To more fully illustrate what a leading example of this software category offers, we provide our overview and assessment of WebSphere MQ and WBI in Appendix B on page 29.

This class of integration technology and approach is now deployed in almost 100% of the 500 largest enterprise IT users, but in barely 50% of the next 10,000 larger enterprises. Even amongst those who have adopted it, most are still using it on a modest proportion of their completed integrations, many of which pre-dated its introduction.

- **Option # C – Custom-built, “Ground-up”, In-house Integration Solutions:** Similar to Option A, except without the use of FTP packages. In this approach, the “heavy lifting” of the integration is developed and supported using custom 3GL programming, scripting and standard interfacing facilities. The latter may include application exits and interfaces, operating systems services, utilities, or DB/TP system options, and techniques such as sockets programming, or the use of RPC calls. Some of these may themselves be relatively stable and established interfaces, but the overall custom-built integration solution suffers all the time, cost, risk, maintenance burdens and other disadvantages of Option # A without even the modest benefits use of an FTP engine allows.

This type of integration is also widely deployed, often predating the use of the middleware technologies cited in Options B above and D below. Many of these have been left to running on the old IT principal of “if it ain’t broke, don’t fix it”. Reworking old but running integration modules is clearly neither popular nor exciting. Most IT teams would far rather do more interesting new development work, and most LOB groups are reluctant to spend money fixing “plumbing” that apparently still works. However, both are condemned by this Option to repeatedly face the need to rework and fix these links that (*as we discussed above under Option # A*) are continually “broken” by normal environment changes that affect their smooth working. Given the high and continuing costs and effort needed to fix these custom-built links repeatedly, the business case for replacing them with a more robust, lower-effort approach (*e.g. Option # B*) is actually extremely strong. We recommend enterprises plan a systematic program of replacement of such custom integration links, to drive out these wasteful and costly support efforts, and to greatly improve overall reliability and availability.

Other analysts and ourselves would firmly argue that many of these integration solutions represent a serious and costly weak link in the applications infrastructure, and are certain to hinder the types of transformation, flexibility and QoS likely to be required in future.

- **Option # D – Vendor Enterprise Integration “Enhanced FTP-based” Middleware Point Integration Solutions:** This is the second most widely vendor middleware-based integration solution approach in use today. A number of independent software vendors have developed what we term “enhanced or value-added”, but FTP-technology-based, point middleware integration products. These have originated in a variety of market segments, each offering base FTP file transfer integration with differing bundles of value-added services appropriate to their market focus. Examples include products from Sterling Commerce that grew out of its EDI market focus, and from CommerceQuest from its B2B integration focus. For integration projects within their target focus, products such as these can represent sound point solutions. They typically provide useful value-added services that reduce custom development and supplement base FTP omissions, and may offer relevant standards support or interfaces within their sector. The better products therefore offer worthwhile benefits over the Option # A route if the requirement falls within their focus. However, they remain a tactical, point solution to rather specific needs rather than a broad platform, and their smaller vendors pose other business risks in some cases.
- **Option # E – “Human Middleware” Team Integration Solutions:** Amazing but true, business change consultants have often reported to us the discovery of whole staff departments performing what can only be described as “human middleware” roles. These groups are operating multiple IT applications, often extracting information from one and re-entering it in others, manually manipulating information, or providing human links in fractured business processes to bridge gaps between IT systems. Often located within LOB organizations or loosely linked to the IT group, these departments appear to have grown up as a tactical fix to bridge important gaps in the integration of applications within these enterprises. It goes almost without saying that these departments are costly, unreliable, constraining, and usually unnecessary functions, but were deemed important enough to demand such a costly manual solution. Discovering one or several such groups within your organization identifies a compelling need and case for early application integration IT solutions that will usually show high ROI.

## Application Integration

*The first important point to note is that enterprises are already using considerable numbers of application integration points and links, and are adding many new ones to those already in use each year...*

So with this surprising distribution of Enterprise Integration solution approaches in use today, what are the business impacts for enterprises? How many integration solutions are companies currently supporting, and how many more are needed?

The first important point to note is that enterprises are already using considerable numbers of application integration points and links, and are adding many new ones to those already in

use each year under the drivers discussed previously. Our profiles, shown on in Figure 2 on page 12, found broad averages of the total NPIP required between applications to be:

- **For the largest 500 global enterprises**, on average 400-1,000 integration points. Applications portfolios average 400-1000 distinct systems.
- **For the next 10,000 global or national larger enterprise**, on average 100-500 integration points. Applications portfolios average 100-400 distinct systems.
- **For the next 250,000 medium-sized businesses**, on average 25-100 integration points. Applications portfolios average 25-100 distinct systems.
- **For the next 5M smaller businesses worldwide**, on average 5-15 integration points. Applications portfolios average 5-20 distinct systems.

These results were obtained by reviewing a selection of actual enterprise application portfolios that we have seen for typical businesses in each category, and determining the number of applications in the portfolio and the number of implemented plus needed integration links involved. There are wide variations in these numbers for all sizes of company depending on their industry, the complexity of their business, the evolution of their application portfolio, and on how far forward they have moved towards an On Demand business posture by rationalization and modernization. They do, however, provide a useful overall problem-sizing guide.



## So What is the Scale of the Application Integration Challenge?

From several sources, we have estimated that the proportion of the integration links needed already implemented averages 65% of the potential links required for the largest enterprises, around 55% for the next 10,000 largest, around 45% for the next 250,000 medium businesses, and some 25% for the 5M next smaller firms.

As can be seen in Figure 4, global 500 largest enterprises, for example, are on average already supporting several hundred existing application integrations (260-650), and need to implement a few hundred (140-350) more, and so on.

Measure	For the largest 500 global enterprises	For the next 10,000 global or national larger enterprise	For the next 250,000 medium-sized businesses	For the next 5M smaller businesses worldwide
Average Number of Potential Integration Points (NPIP) Needed:	400-1000	100-500	25-100	5-15
Average % of Integration Points Already Implemented:	65%	55%	45%	25%
Average Number of Existing Software Integrations Being Supported and Maintained:	260-650	55-275	11-45	1-4
Average Number of Additional Integration Points Required to be Developed:	140-350	45-225	14-55	4-11
Average Number of Additional Integration Points Developed Per Year (4-year horizon):	35-87	11-56	3-13	1-3

Source: © 2005 Software Strategies Estimates

Figure 4: Number of Application Integration Links Done to Date and Needed by Size of Business Estimates

These are large numbers and clearly indicate that:

- **The burden of continuing support, maintenance and updating** on the existing portfolio of application integration links, the level of which depending on how they were implemented, is already considerable and is increasing steadily as additional new needed links are implemented.
- **The development and implementation costs and efforts** of implementing the tens or scores of additional needed links per year (*probably over a three- to five-year time-span*) is a considerable annual development effort, the level of which depends on the solution approach used.

Restructuring and modernizing application portfolios, adding completely new applications, changes to the enterprise IT infrastructure, etc., that typically occur on a regular basis in most enterprises, will clearly continue to generate additional application integration link needs, or demand the rebuilding of existing ones. In addition, many of the oldest original integration solutions implemented earliest almost certainly need replacing by more modern and secure solutions. It therefore seems certain that a continuing flow of integration development will be needed for the foreseeable future. Indeed, today's emphasis on business transformation and modernizing core business processes is accelerating these demands.

## Relative Costs/Efforts of These Application Integration Offerings

How different are the costs and efforts between the different application integration approaches in use today? What impact do these differences have on an enterprise's overall development effort and costs for their existing and annual new application integration link development effort?

The impact is broadly illustrated by Figure 5 on page 18, which shows the relative total costs/efforts of implementing and supporting an increasing number of Enterprise Integration links. Clearly, Option # C (*all custom in-house developed*) is much the most resource- and thus cost-intensive. The most widely used Option # A is slightly better than Option # C because the use of free FTP software packages for the transport requires less custom coding. Option # D (*vendor enhanced/value-added FTP*) is considerably better than either Options # C or # A, because the value-added software services provided in such point-middleware further reduces custom development time and cost over these Options. Their limitation is that these somewhat targeted middleware products are not generally applicable, and can normally only be used within their design focus scope.

Vendor Enterprise Integration middleware platform-based solutions, Option # B, require much the lowest cost/effort for both initial development and deployment, and are virtually universally applicable to almost all integration project needs.

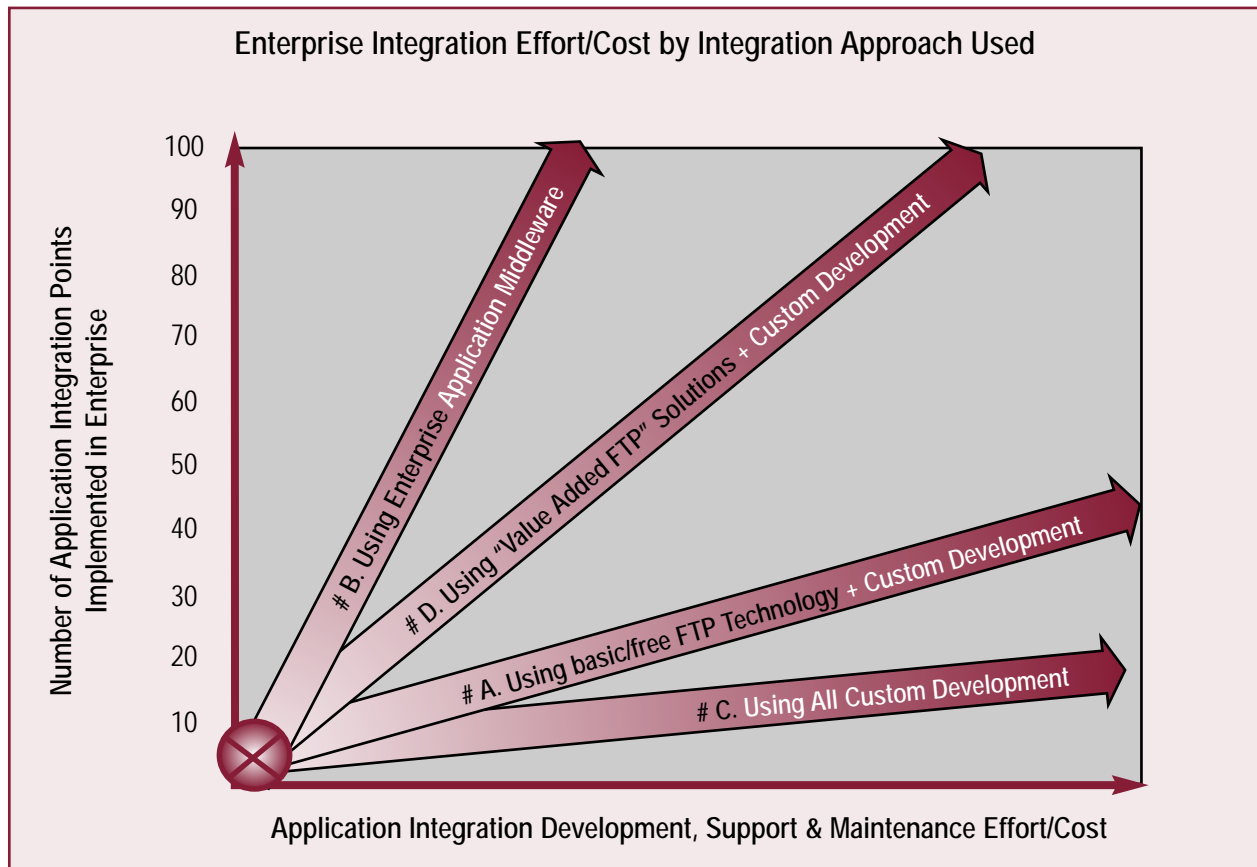


Figure 5: Enterprise Integration Effort/Cost by Integration Approach Used

Information from enterprise developers experienced in both routes indicates that, with Option # C as the baseline, Option # A (*custom-built + free FTP*) is typically 10-15% lower in effort/cost and elapsed time to value. These developers also report that Option # B (*vendor Enterprise Integration middleware platform-based*) is 65-75% lower in effort/cost and elapsed time than Option # C. Option # D (*vendor-enhanced FTP*) falls between these, averaging 40-45% lower effort/cost, but this gain varies widely between specific products, depending on the strength of the value-added software services they offer.

Application Integration Approaches – Relative Development Resource Effort/Cost				
	Option # C Baseline	Option # A	Option # D	Option # B
Option # C Baseline	100 Baseline	85-90	45-55	25-35
Application Integration Approaches – Multiple of Lowest Development Resource Effort/Cost				
Option # B Baseline	3-4 Times Higher	2.4-3.6 Times Higher	1.3-2.2 Times Higher	1.0 Baseline

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Figure 6: Relative Development Resource Costs/Efforts by Application Integration Option Used

We summarize these average differences in the development resource effort/costs of implementing application integration using the four IT-based Options considered in Figure 6. The first data row sets the least productive approach of Option # C as the baseline of 100, and shows that of the other three Options in comparison.

Another view in the second data row takes the most productive Option # B as the baseline of 1.0, and shows how many times more resource effort/cost the other three Options on average incur.

## Our Analysis

We regard it as both surprising and somewhat shocking to find the most widely-used method of implementing application integration today is the relatively basic Option # A approach of custom in-house development using a free FTP package for file transport. These customers are, we estimate, using 2 to 4 more resources as much on integration development/support as they need to do, compared to adopting and using a vendor Enterprise Integration middleware platform. The significant number still using fully custom-built, in-house solutions not even based on FTP was also surprising. Even allowing for the software cost of Enterprise Integration middleware, these are large differences.

A proportion of the integration portfolio is likely to have been built some or many years ago. Where these are not causing immediate problems, "leave well alone" probably applies. That business consultants have found numerous "human middleware application integration departments" almost beggars belief.

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*We regard it as both surprising and somewhat shocking to find the most widely-used method of implementing application integration today is the relatively basic Option # A approach of custom in-house development...*

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The vendor-enhanced FTP middleware-based solutions (*Option # D*) are mostly rather specific in their focus and scope: where the requirement matches the focus, they provide useful advantage, but cannot be universally applied. This also means that an enterprise following this route may need to acquire, learn and support several such point products, bringing further disadvantage in adding complexity, needing different skills, and license costs, etc.

The scale of application integration challenge varies with the size of the enterprise, but even medium-sized businesses have significant numbers of links (*and need many more*) and larger enterprises need hundreds. Figure 4 on page 17 gave our estimates of these numbers. Multiplying these link estimates by any reasonable average project effort/cost estimates and average integration maintenance/support effort estimates clearly indicates a major IT burden.

If the advantages, both effort/cost and in terms of function and operation, of vendor Enterprise Integration middleware solutions are so superior to the alternatives, why are they not universally used today? Do senior IT management realize the amounts of development and maintenance effort being wasted within their organizations by the widespread use of the custom-built, in-house approach? The fragility and vulnerability of these links also poses significant risks to the organization using them, and we must assume that these risks are not properly recognized. Using these approaches also creates a high dependence on the staff that understand and manufactured these links; who may well now have moved on or out, leaving a "black hole" in support capability.

We delve more deeply into these issues in Section 6.

## 6. Vendor Enterprise Integration Middleware Platform Deployment

### Introduction

Answers to some of the questions posed by our findings can be revealed by examining how the use of the most productive and advanced method of application integration provided by the use of vendor Enterprise Integration middleware has spread and proliferated across the market since its introduction. The depth of penetration of this technology into the customer since first adoption is a good proxy for how valuable customers have found its benefits.

### Vendor Enterprise Integration Middleware Adoption and Deployment

In Figure 7 (*on page 20*) we summarize our broad estimates (*derived from a number of analyst studies, vendor opinions, and other sources*) of the percentage of IT user customers in each of our size groups that have adopted and installed vendor Enterprise Integration middleware by mid-2005. We also show the percentage penetration their usage of this technology has reached out of their total integration portfolios.

We discuss and comment on each group's figures, and our interpretation of what they mean, below.

- **Largest 500 Enterprises:** Adoption of vendor Enterprise Integration middleware amongst this group of companies is high, with almost 100% using the technology today. Many of these were relatively early adopters, with first introduction as far back as 1995 or before. However, even in these large enterprises, many using vendor Enterprise Integration middleware for quite a number of years, the penetration of the use of this technology across their whole integration portfolio remains moderate at 30-45%:
  - This group of global giants typically have more centralized IT organizations, with more common standards, platforms, and policies than the Next Largest 10,000 Global Enterprises group.
  - They also typically plan and invest in strategic enterprise IT infrastructure as a foundation for their operations at an architectural level, and are often prepared to adopt newer technologies and make strategic investments early for advantage.

- Where they select and deploy a foundation technology (*like vendor Enterprise Integration middleware*) that they find productive, they are the most likely to make it an internal standard, and drive its use more systematically across new projects than less-centralized IT shops.
- This group are currently also the earliest market adopter community, advancing quickest in the new strategic software approaches of composite applications linked by Web Services standards under a Service-Oriented Architecture (SOA) approach, which requires a vendor Enterprise Integration middleware integration transport underpinning.

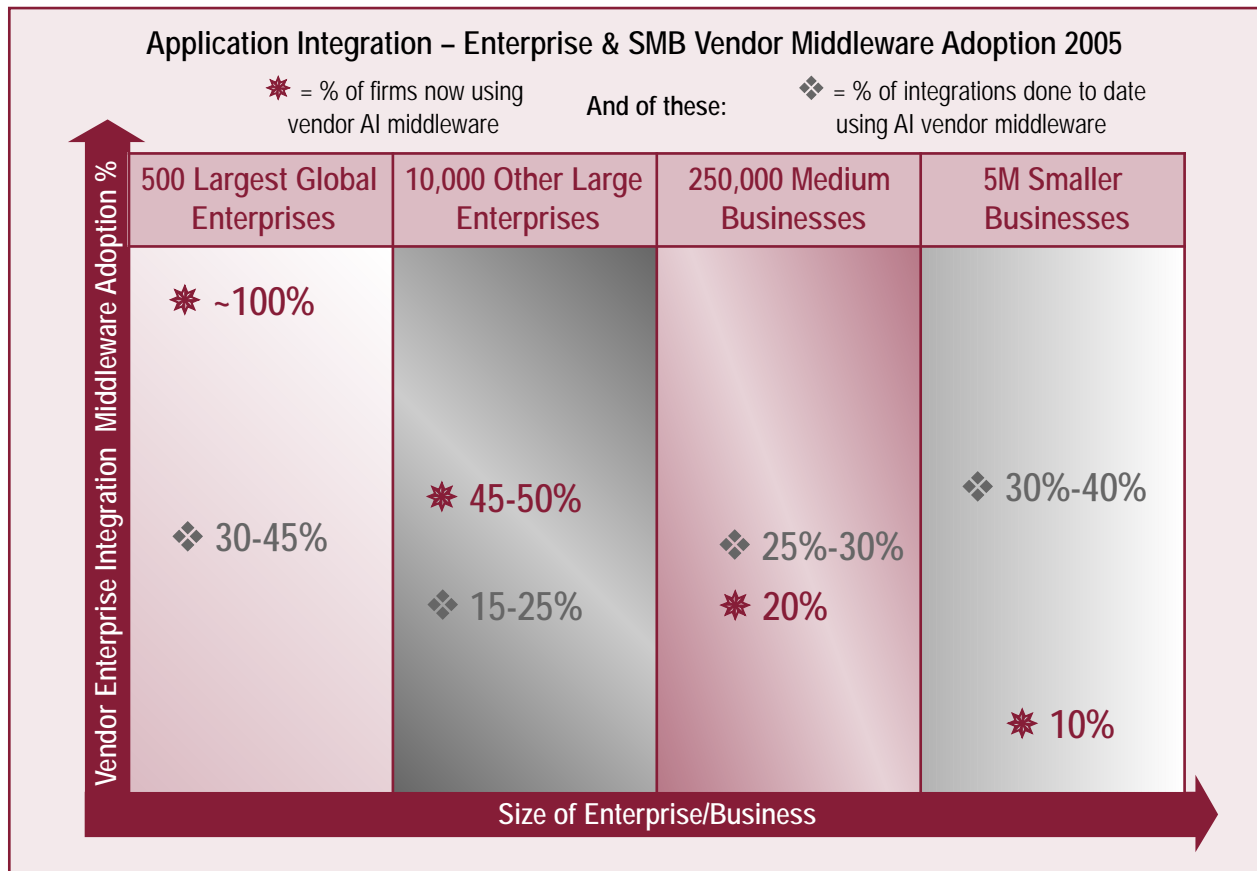


Figure 7: Application Integration – Enterprise & SMB – Vendor Enterprise Integration Middleware Adoption 2005

- **Next Largest 10,000 Global Enterprises:** We found these results quite surprising, but the truth appears to be that less than 50% of this large and important group of substantial enterprises have adopted vendor Enterprise Integration middleware platforms, even though the technology has been available and well-proven for over ten years now. The depth of penetration of the technology is also significantly lower than in the group above, at an estimated 15-25%. This almost certainly reflects their more recent adoption, and their lower enforcement of common standard approaches to integration projects:
  - This group typically has more diverse, less centralized IT governance than the global giants above, with the influence of their LOBs much stronger. This has led to these firms operating a wider diversity of IT platforms arising from this less-centralized control where LOBs made platform decisions in isolation.
  - This group has also been less inclined (*or able*) to set central architectural IT standards, slower to widely adopt new foundation technologies, and more inclined to make decisions on a project-by-project basis. The latter approach always makes it harder to justify adopting a new software platform technology for the first time, because the learning curve costs for the whole organization must be justified by a single project.
  - Whilst their typical application portfolios are somewhat smaller than the giants (*100-400 systems*), these are still substantial, and their application integration needs are equally substantial (*NPIP*), so the modest adoption of vendor Enterprise Integration middleware, offering proven benefits, is puzzling.
  - This group, driven by their project-by-project specific approach have, however, been the main adopters of point vendor middleware products that seemed to fit specific project needs, but some, as a result, now find themselves with a substantial and costly portfolio of different point middleware tools with no common synergy.

- The decentralized approach almost certainly means that decisions as to how to implement application integration are left to the individual project technical leaders, with senior IT management exercising limited control and probably being unaware of the routes chosen, or their longer-term implications.
- For the reasons above, we suspect many CIOs of these enterprises are unaware of how dependent they are on fragile and costly, custom-built application integration solutions or of the jumble of point middleware solutions they have acquired project-by-project. This means they do not fully appreciate the excess costs and efforts, as well as the risks, their organizations are incurring by not using an enterprise Enterprise Integration middleware platform.
- **Next 250,000 Medium Businesses:** About 20% of this category has now adopted vendor Enterprise Integration middleware, typically more recently than the larger enterprises. This is partly because their application portfolios and integration needs, whilst still significant, are themselves somewhat smaller. Another influence was that in the mid- to late-1990s, vendor Enterprise Integration middleware was mostly promoted and sold as an “enterprise-infrastructure platform” at relatively “big-ticket” costs, which many of these businesses could not afford at that time. By this decade, most vendor Enterprise Integration middleware had been unbundled and entry prices and options had fallen substantially (*now starts a c \$5,000 per platform*), bringing their benefits well within reach of this group and allowing more incremental purchase and deployment:
  - Application portfolios, and thus integration needs, are more modest in this group, although of equal relative importance to their businesses as in larger firms.
  - IT platform diversity is significantly lower than in the previous group, and more of these medium businesses retained a centralized IT governance, because they could not afford or justify the extreme diversity many larger firms allowed.
  - Their smaller size and budgets prevented this group from purchasing such a diversity of point middleware solutions as their larger enterprise brethren, as most of these products were priced and packaged for the latter.
  - With their smaller development resources, closer CIO or IT management oversight of projects, and their higher need to be productive with limited resources, we expect this group to adopt vendor Enterprise Integration middleware much more widely over the next decade. However, a lot of market education on the feasibility and benefit is still needed to promote and encourage this.
- **Next 5M Smaller Businesses:** We estimate around 10% of this group have adopted vendor Enterprise Integration middleware, which has more recently come within their financial reach. This group has much smaller application portfolios, relies heavily on packaged applications, and is most likely to use the integration options provided by their application packages and/or their hardware/OS platform. Windows/Intel platforms predominate in this space by a wide majority; so that where vendor Enterprise Integration middleware has been used in these firms it is most frequently the standard Microsoft offerings that have been adopted.

## Deployment Experience Indicates Faster Proliferation

It is significant that almost all the most sophisticated and largest global enterprises are already using vendor Enterprise Integration middleware, and are increasing their already substantial usage more widely. They are well aware of the effort, cost and QoS benefits of the technology, have become comfortable and skilled in its use, and are deploying it ever more frequently as new integration projects arise. This speaks well for the benefits delivered, and now well understood by this group.

One phenomenon we have often observed in enterprises that adopt Enterprise Integration vendor middleware and are successful with their early projects is interesting. The team concerned often develops this specialized skill into a wider integration solution service or centre of expertise, which quickly attracts a queue of other internal integration projects. The higher productivity from the software, combined with the growing experience and expertise of these teams enables them to deliver more rapid and more robust integration solutions, and a respected new job discipline emerges.

For example, with IBM's WebSphere MQ (*the market leader vendor Enterprise Integration middleware foundation platform*), the MQ team often expands its portfolio of projects rapidly in this way, as early successes make the powerful benefits clear within the organization.

This in turn leads to accelerating proliferation of the technology across the enterprise. We have always found that the few classes of software that proliferate and spread rapidly within an enterprise in this “viral” manner always offer unambiguous and powerful benefits that are easily and clearly seen when experienced in-house. This is clearly the case with the better vendor Enterprise Integration middleware platforms.

## Major IT Budget Savings Available From Enterprise Integration Middleware

Gartner Group have estimated that an average of 35% of enterprise IT budgets today are spent on maintaining and supporting the current portfolio of application integration links, the large majority of which remain custom-built links of Option # A or Option # C type. This is a dramatic and strikingly high figure. It is widely known that maintaining and supporting existing applications and infrastructure in most enterprise IT shops consumes between 65-80% of total IT budget resources. Gartner's figure thus implies that application integration maintenance and support is therefore accounting for between 54% and 44% of this high “status quo” support cost that is often preventing enterprise IT groups move forward fast enough with new business initiatives.

This means large IT budget savings can be achieved in most enterprises by switching their application integration method to the much more productive and lower maintenance cost Enterprise Integration middleware platform approach, the relative advantages of which were quantified in Section 5 above. Figure 8 below uses our earlier data and this Gartner estimate to show the typical average savings that full use of enterprise integration middleware platforms would provide to our three larger size groups of enterprise.

Factor	Size of Enterprise		
	Largest 500 Enterprises	Next 10000 Largest Enterprises	Next 250,000 Medium Enterprises
Average Business Revenue \$	\$50B	\$5B	\$100M
Average IT Budget \$B/M – % of Business Revenue	\$2.25B 4.5%	\$150M 3.0%	\$3M 3.0%
Gartner est. of integration support costs @ 35% of IT Budget	\$787.5M per year	\$52.5M per year	\$1.05M per year
% of all existing integration links not supported with Enterprise Integration Middleware (From Figure 7)	<ul style="list-style-type: none"> <li>● 100% of firms use Enterprise Integration middleware.</li> <li>● Average 37.5% of existing integrations done TD use Enterprise Integration middleware.</li> <li>● = 62.5% of all existing integration links do not use Enterprise Integration middleware across these firms.</li> </ul>	<ul style="list-style-type: none"> <li>● 50% of firms use Enterprise Integration middleware.</li> <li>● Average 20% of existing integrations done TD by Enterprise Integration users use Enterprise Integration middleware.</li> <li>● = 90% of all existing integration links do not use Enterprise Integration middleware across these firms.</li> </ul>	<ul style="list-style-type: none"> <li>● 20% of firms use Enterprise Integration middleware.</li> <li>● Average 35% of existing integrations done TD by Enterprise Integration users use Enterprise Integration middleware.</li> <li>● = 93% of all existing integration links do not use Enterprise Integration middleware across these firms.</li> </ul>
Average IT Savings Per Year If All Existing Integration Links Used EI Middleware. 2.5 times more productive/40% of support cost (From Figure Y)	62.5% of links TD could be transformed \$295.3M per year each firm 13% of IT Budget saving	90% of links TD could be transformed. \$18.9M per year each firm 12.6% of IT Budget saving	93% of links TD could be transformed. \$390K per year each firm 13% of IT Budget saving
% of new Integration Links Needed	35% more integration links still needed	45% more new integration links still needed	55% move new integration links still needed

**Figure 8: IT Budget Savings Obtainable by Using Enterprise Integration Middleware Platforms**

The table shows our best estimates of the ongoing annual support and maintenance resource savings that the average firm in each category would realize, if all their existing application integration links were today supported by Enterprise Integration middleware platforms, rather than the actual majority of custom-built links and minority Enterprise Integration middleware solution mix used today. The figures are:

- **Largest 500 Enterprises:** Savings of \$295.3M per year per firm.
- **Next 10,000 Largest Enterprises:** Savings of \$18.9M per year per firm.
- **Next 250,000 Medium Firms:** Savings of \$390K per year per firm.

These savings, just on better supporting the existing application integration links portfolio, amount to an average 13% of the IT budgets of each size of firm, a large and important saving.

Readers should also consider that many new and additional integration links still require to be built (35%, 45% and 55% more respectively for the three size groups, we found in Figure 4). This means large further savings (an average of 60% of both the initial development effort and the ongoing long-term support costs we found in Figure 6) can be delivered by using Enterprise Integration middleware versus custom-built integration approaches on all or more of these.

Whilst no organization can instantly convert their large numbers of existing custom-built integration links to Enterprise Integration middleware platforms overnight, our analysis shows rich long-term savings and extremely high ROIs are readily obtainable. An aggressive program of replacement of custom integration links, combined with a policy of building all new links on Enterprise Integration middleware platforms, is the strategy we recommend. Consistently applied over time, the cumulative savings and reductions in on-going support and maintenance costs, as well as for new link implementation, that such a policy brings will have major benefits in freeing up IT budget resources from this major source of un-needed cost.

## Our Analysis – Barriers to Vendor Enterprise Integration Middleware Adoption and Deployment

To analysts such as ourselves, used to explaining middleware for over 15 years, it seems amazing that custom-built, in-house solutions (*using FTP or 100% custom*) approaches to integration remain considerably the most widespread in use today.

This is even though they clearly incur higher development and support costs and effort, provide less robust and secure operational performance, and suffer high fragility to changes or errors in their environments. How can this be explained? Why does this remain the case? Where does responsibility lie?

- We suspect that most CIOs are probably not aware in detail of the scale of their organization's current use of, and dependence on, such primitive and costly links. If they were fully aware, it seems unlikely most would wish to continue this route, and many would plan to slowly replace such weak links over time, to increase enterprise application portfolio resilience and cut costs. It may also be other development priorities always pre-empt improvements in elements of their portfolio that are at least working, even where less than ideal. Hidden "plumbing" tasks like these are not high profile.
- Application integration efforts are often hidden within the application development or maintenance effort for the overall application, and may therefore not be visible above the project level. In this case, the full cost and effort of the integration components for all the projects in the enterprise will also not be clearly visible, and yet may be consuming a substantial share of scarce resources. Indeed, Gartner Group has put the average cost of application integration support and maintenance at 35% of enterprise IT budgets, a staggeringly high figure that is less surprising when the scale of this activity (*that we quantified in earlier Sections*) is appreciated.
- Where technical solution authority is devolved to the project technical lead, and no corporate standard guidance is given, it is not surprising that many should turn, by instinct, to familiar and freely-available "hand tools". Since they may not be responsible for the overall lifecycle cost implications of their solution choice, they are unable to make the ROI case for the "power tool" vendor Enterprise Integration middleware-based solution. The latter will save both on the initial build cost and return many-fold more over its lifetime in lower support, but does require a software buy that may be outside the authority of such staff. We strongly recommend that project leads for all current application integration efforts should meet or communicate regularly, to share experience and best practice, and combine to support the case for a common Enterprise Integration middleware platform where not yet adopted, or for more universal deployment where already installed.
- In earlier years, the license cost of Enterprise Integration middleware software was certainly seen as a barrier to adoption by many customers. This was partly because of the "big-ticket" enterprise platform bundling and high price tags prevailing at that time, perhaps appropriate for the largest enterprises but certainly a deterrent to smaller enterprises and businesses. However, with today's granular, incremental product packaging and lower unit price tags in this more mature market, entry price can no longer be a real barrier, unless old false price perceptions linger. In this regard, Microsoft has driven some price commoditization in this space through its high-volume, lower-cost or OS-inclusive middleware offerings, and this has also had an influence on the market. However, as a high proportion of all application integration projects involve multiple unlike hardware platforms, Microsoft's Windows-centric solutions have had limited impact.
- We also conclude that significant numbers of CIOs, CTOs, development leaders and project leaders in these yet-to-adopt enterprises must remain unaware of the compelling and substantial benefits of deploying vendor Enterprise Integration middleware. This is somewhat of a paradox, because Enterprise Integration middleware was a heavily marketed category throughout the mid- to late-1990s, as the explosion of up to 200 vendors in the space fought to establish the market and their positions. This cacophony bought some hype fatigue to many IT professionals at that time. The shakeout of vendors and the business downturn from 2000-2003 drastically reduced overall middleware vendor marketing. It now seems considerably more market education is needed outside the top 500 global enterprises to overcome this inertia, and lack of knowledge.

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*We also conclude that significant numbers of CIOs, CTOs, development leaders and project leaders in these yet-to-adopt enterprises must remain unaware of the compelling and substantial benefits of deploying vendor Enterprise Integration middleware.*

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In our assessment, most remaining enterprise customers, and a much higher proportion of medium business should now re-evaluate the approaches they are still using for application integration, and adopt Enterprise Integration middleware platforms for projects going forward, as well as for rewrites of older links falling due for replacement. Those who have already adopted the technology are advised to apply it on a higher proportion of their future projects.

## 7. Selecting the Right Enterprise Integration Middleware Platform/Vendor

### Our High-level Criteria for Enterprise Integration Platform/Vendor Selection

Many software vendor/product selection guides begin with detailed product descriptions and extensive feature-function comparisons, and this remains an important aspect of any selection. The Enterprise Integration market is fast evolving and embraces a complex web of hardware platforms, operating systems, software platforms, open industry standards, and tooling requirements. Because of these specific Enterprise Integration characteristics, we consider that a handful of higher-level selection criteria are especially important in this sector to guide vendor candidate short-listing. Application integration solutions implemented in the enterprise with the chosen Enterprise Integration middleware platform will form an important part of that customer's enterprise application environment for many years after their implementation, and the business should never have to face disruptive product/vendor changes that cause rework.

Our seven, high-level, primary criteria are:

1. **Product Line Track Record, Market Share, Customer Base and Reputation.**
2. **Vendor Financial Strength and Staying Power; Vital for Enterprise Integration Platform Customers.**
3. **Deep and Ongoing Vendor Support for Open Industry Standards.**
4. **Comprehensive Product Support for All Main Platforms, Programming Models, Integration Methods, Network and Security Models.**
5. **Closely Integrated Companion Infrastructure Platforms Available From the Same Source.**
6. **Modular Packaging, Incrementally Deployable, Affordable Entry Pricing But Highly Scalable.**
7. **Vendor Capacity to Maintain the Extensive Cross-testing and Continuous R&D Especially Needed in Enterprise Integration Middleware.**

### Why These Criteria?

We explain and comment briefly why we regard these criteria as so important below:

1. **Product Line Track Record, Market Share, Customer Base and Reputation:** Market success, endurance, market share and customer base size are the acid tests of the long-term merits of an Enterprise Integration middleware platform, and high ratings in these areas indicate a low-risk, well-proven and attractive product/vendor combination.
2. **Vendor Financial Strength and Staying Power; Vital for Enterprise Integration Platform Customers:** Enterprise Integration middleware platforms will underpin their customer's enterprise application portfolios, integration efforts and business process management developments for the next decade and more. They must therefore select an enterprise IT infrastructure software platform whose vendor has the financial muscle to endure and support the platform long-term, to keep bringing out the technology and innovation needed, and to support a broad, multi-component product set globally. Such a view has long been taken when picking other foundation software vendors in categories such as database systems, application servers and enterprise applications, where similar considerations apply.
3. **Deep and Ongoing Product/Vendor Support for Open Industry Standards:** Application integration depends critically upon, and is greatly enabled by, open industry standards that facilitate interoperability and interconnection between diverse software assets. Therefore, it is imperative that the chosen Enterprise Integration platform supports all the key standards that interplay in Enterprise Integration, and will continue to do so as they evolve. These include networking and communications standards (*TCP/IP and others*), industry-standard programming models, notably J2EE™ and .NET, security (*e.g. SSL*), Web Services, and development tool standards (*i.e. the Eclipse Platform*). For their products to remain at the leading edge in open standards mandates that the vendor is also an active leader in the standards creation and development process.
4. **Comprehensive Product Support for All Main Platforms, Programming, Network and Security Models:** Every prospective Enterprise Integration customer will have a different IT infrastructure and enterprise application portfolio mix. When bringing in an Enterprise Integration middleware platform, it makes sense to ensure the chosen platform supports all the platforms and types of integration "touch points" within the environment, with servers, links and robust adapters and connectors. This is essential to minimize the need for custom development, or to add point-middleware products.
5. **Closely Integrated Companion Infrastructure Platforms Available From the Same Source:** Enterprise Integration is an extremely important IT infrastructure foundation technology, but not the only one required for next-generation e-business. ASSP platforms, business integration software platforms, and systems management platforms, in particular, need to be closely coupled and tightly pre-integrated with the Enterprise Integration platform, and with each other, to provide the complete "stack" needed without forcing the customer to integrate the software platforms themselves. These are real advantages of selecting an Enterprise Integration platform whose vendor also offers and integrates these other software platforms with their Enterprise Integration offering.
6. **Modular Packaging, Incrementally Deployable, Affordable Entry Pricing but Highly Scalable:** In the mid-1990s, some Enterprise Integration middleware platforms were offered under rather monolithic, "complete package" and "big-ticket" commercial terms. Today, enterprises rightly demand more granular, incremental and affordable product packaging and licensing that allows them to build up their Enterprise Integration infrastructure in smaller steps that align better with business benefits derived from implemented projects for fast pay-off. Entry-level versions are also desirable, for smaller businesses and proof-of-concept-type projects.



**7. Vendor Capacity to Maintain the Extensive Cross-testing and Continuous R&D Especially Needed in Enterprise Integration Middleware:** We estimate that the testing and validation of Enterprise Integration middleware platforms absorbs 50% or more of vendor total R&D resources, over two-and-a-half-times the software industry average of around 20%. Enterprise Integration platforms must provide long-term, current release support for: multiple hardware platforms and operating systems, multiple software platforms and ASSPs; J2EE™ and .NET platform and Web Services levels and generations; communications protocols like TCP/IP, security standards like SSL; and popular enterprise applications. The resulting combinatorial explosion of Enterprise Integration configurations, which must all be developed in parallel and be fully tested before packaging, is enormous, and demands dedicated laboratory resources continuously devoted to testing the advances in the Enterprise Integration platform.

Focusing on these overriding criteria will ensure that a sound shortlist can be constructed and the strongest solution selected after a detailed technical review.

## “Enterprise Integration” Products/Vendor Candidates for Consideration

So, which possible Enterprise Integration products from which vendors should enterprises seeking to acquire the right Enterprise Integration middleware platform consider for their shortlist? Our high-level criteria recommended above, and the existing IT and application infrastructure will narrow the range considerably. A helpful starting point is to consider six important industry companies with strong (or some) Enterprise Integration offerings, five of them industry majors, and one a leading pure-play Enterprise Integration vendor. Figure 9 provides our cameo overviews of these six vendors from an Enterprise Integration perspective.

Candidate Strategic Enterprise Integration Platform Vendor List	
Vendor Enterprise Integration Platform/Product	Our Cameo Enterprise Integration Overview
<b>TIBCO Software</b>	Largest and longest established pure-play Enterprise Integration/EBI software vendor, offering extensive Enterprise Integration middleware software platform with more recent EBI overlays. Open standards support weak ( <i>not on Eclipse Platform, no Sun J2EE™-Certified products</i> ). Strongest base in financial services industry.
<b>SAP AG</b> NetWeaver	German ISV is market leader in enterprise application software with mySAP.com enterprise resource planning suite, and NetWeaver Enterprise Integration infrastructure and integration software underpinnings. Available on major hardware platforms, and on the IBM and Microsoft software stacks. With thousands of enterprise customers, “SAP-centric” organizations are widespread in manufacturing and distribution. Enterprise Integration offerings designed for those viewing SAP as their “centre-of-the-IT-universe”. Vendor and products sound and secure, and open standards commitment good. Now likes Linux too.
<b>Sun Microsystems</b> Enterprise Java™ System	Market third-ranking server vendor also offers Enterprise Java™ System middleware stack, used primarily on its proprietary Solaris RISC UNIX server systems. Limited Enterprise Integration capabilities, not a main segment player. Of interest mainly to Sun server-centric users. Excellent J2EE™ support as inventor/initiator, and good general open standards posture. Recent Linux adopter, but remains committed to its Solaris operating system.
<b>Oracle Corporation</b> Unbranded	Major # 2 database and enterprise application software vendor, now increasingly pushing its Oracle database-centered middleware stack, including emergent Enterprise Integration and BPM capabilities. Important force in overall IT markets, but minor player in Enterprise Integration sector to date. Oracle Applications, plus recent PeopleSoft acquisition, makes stronger # 2 in enterprise applications. May become more important player in Enterprise Integration mid-term. Appeal to heavily “Oracle-centric” accounts. Open standards commitments good. Likes Linux.
<b>Microsoft</b> Windows 2003 Server System & Services (Inc. MSMQ)	Major industry force. Offers sound Enterprise Integration portfolio within Windows 2003 Server Platform, targeted to help “Windows-centre-of-the-universe” customers integrate Windows applications to those on other platforms over .NET Web Services programming model. Market Enterprise Integration/EBI leader within the SMB segment, where Windows is the ubiquitous platform. Software runs only on Intel processor-based, distributed hardware, but can communicate with ( <i>although not run on</i> ), UNIX, mainframe and some other platforms. Good Web Services standard support, but otherwise somewhat proprietary. Dislikes Linux very much.
<b>IBM Corporation</b> WebSphere MQ	Industry market leader in servers, IT services, and enterprise middleware software ( <i>including database, application servers, Enterprise Integration and EBI sectors</i> ). WebSphere MQ Enterprise Integration platform long-established leader with 10,000 customers, runs on over 35 platforms, and supports newest standards and technologies. Deep open standards support, including J2EE™, Eclipse, Web Services connectivity and others. WebSphere MQ tightly integrated with whole WebSphere Software Platform ( <i>ASSP and EBI platforms</i> ). Strongest zSeries mainframe Enterprise Integration support. Likes Linux very much.

Listed in reverse alphabetical order, excludes other smaller Enterprise Integration vendors.

Figure 9: Candidate Strategic Enterprise Integration Platform Vendor List

## Enterprise Integration Middleware Platform Example

To illustrate the capabilities that enterprise customers can expect to find in modern Enterprise Integration middleware platforms, we have included in this White Paper our overview of one example. This shows what such a platform offers to provide a better approach to application integration than the (*still-widespread*) use of custom-built, in-house solutions. We chose the market leader in this sector – IBM's WebSphere MQ – as a useful benchmark for readers. This overview may be found in Appendix B on page 29.

### Our Analysis

This industry has a long history of meeting new business application needs when they first emerged with entirely custom-built software applications written in the standard low-level languages and tools available at the time. If this class of application was widespread and important enough to merit the effort, the industry has, on a number of occasions, created new middleware software engine technologies to help.

These each abstracted common programming tasks that originally had to be written by the developer, with the middleware engine now providing these as services. When this occurred, the custom-programming task was simplified and reduced, the middleware engine offered additional value-added functionality, and a more robust solution was delivered. If well conceived and implemented, these middleware engines would become widely adopted and become a standard part of the development and runtime infrastructure. Where business-critical applications depended on having a new middleware engine, and no commercial offerings were readily available, some pioneering enterprise users even wrote their own middleware engines, mostly to withdraw to their core business some years later when a robust commercial offering could be used. Notable examples include:

- **Transaction Processing Monitors:** When the concept of OLTP was conceived, application developers building an OLTP business application would have to program all the additional transaction handling logic within their application, using low-level language and OS services. This common requirement spawned the TP monitor, a middleware engine that provided all the transaction management infrastructure services needed to run an OLTP application, making it far easier to develop such applications, and run them more efficiently. CICS, IMS DC and Tuxedo are examples,
- **Database Management Systems (DBMS):** Every business application program needs to be able to read and write information to and from storage. In earlier decades, developers managed information storage and retrieval from their Assembler or 3GL programs using the basic file systems, or access methods such as VSAM, supported on their hardware platform, which required considerable code in the application. Database managers were invented to provide a higher level of abstraction, and more advanced high-level constructs for data management that provided a higher level of information management functionality to the program. IMS, IDMS and ADABAS were early examples, and today DB2, Oracle and SQL Server are the leading relational generation database managers.

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*Few organizations would attempt to deploy significant transaction applications without using a TP monitor or a complex data management application without using a DBMS.*

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Few organizations would attempt to deploy significant transaction applications without using a TP monitor or a complex data management application without using a DBMS. It is universally accepted that these engines greatly simplify application development, and provide much superior run-time execution for these tasks.

These are exact parallels with the situation with Enterprise Integration. Robust Enterprise Integration middleware has been available for at least 10 years, and reached full maturity some while ago. It greatly reduces the time, effort, and cost of developing application integration software, and provided a richer, more secure, and better-featured run-time environment.

Therefore, why in 2005 did we find that the most widely-used approach across the market is still custom-built, in-house application integration (*with or without using FTP*), with all the obvious disadvantages of that route?

The answer lies in the mysteries of the adoption pattern of such middleware technologies. Initially, the usually flaky new middleware "Release 1.0" is first tried by pioneering, large and rich early adopters. When refined enough for the benefits to outweigh the downside and the usually high early prices, the middleware proliferates amongst other equally rich and sophisticated, but more cautious, adopters. Today, for example, we found 100% Enterprise Integration middleware platform adoption amongst the 500 largest global enterprises.

Over time, software prices usually fall as sales volumes rise, skills and knowledge become more widespread and accessible, and success stories become widely known. This encourages the next tier of enterprises to move through the adoption curve a few years behind the larger group. Our finding that 50% of the next 10,000 largest enterprise users have adopted Enterprise Integration middleware platforms to date shows this segment midway through the cycle. The cycle often continues down market until the technology finally appears as PC software costing \$10s and affordable by single-person businesses, where this makes sense (*e.g. personal database*).

Risk-averse businesses also often wait until the confusion of a growth software market has settled and the number of vendors has consolidated to one or a few clear leaders that they can feel confident in safely choosing a partner without high vendor risk. The Enterprise Integration market saw a profusion of vendors emerge in the 1990s, but has now heavily consolidated and is well past this point today.

In fact, the Enterprise Integration technology is also available at price points, and in appropriately-packaged, low-complexity offerings, to certainly be affordable and manageable by every "medium" business in our category, and even by a large number of the smaller businesses group.

The main remaining barriers to adoption appear now to be lack of knowledge of the benefits, lack of experience with the technology, scarcity of skills, and perhaps higher IT priorities.

In the light of our findings in this White Paper, we therefore recommend enterprise IT organizations should:

- Survey and quantify their current application integration portfolio, and the effort and resource that is actually going into its annual maintenance and support. It will be commonly found that this adds up to a far heavier burden than is usually assumed, and creates a call for action.
- Where enterprise integration middleware has already been adopted and proven, steps should be taken to rapidly spread the skills gained, and to ensure this approach is used on many more new integration projects. An active program of rapid replacement of older, in-place custom integration solutions is also recommended, to start cutting back on the high recurrent costs and effort of supporting these.
- Those enterprises yet to adopt enterprise integration middleware at all are now urged to do so for their next high-profile application integration projects, and to follow the path above when early successes have been delivered.
- Enterprise application integration vendors, consultants and IT analysts can provide guidance, education and training, and access to references, which can accelerate the learning process.
- If using external systems integrators, be clear that their business interest is in selling as many billable days as possible for each of your integration project, and in creating a longer-term dependency on their future services for support. These interests are diametrically opposite to yours. These firms are therefore less likely to propose the more productive and economical enterprise integration middleware-based solutions. We recommend you make the use of your chosen standard middleware a condition of all such contracts.

*In fact, the Enterprise Integration technology is also available at price points, and in appropriately-packaged, low-complexity offerings, to certainly be affordable and manageable by every "medium" business in our category..*

# Appendix A: Expanding Regulatory Regimes and Compliance Demands Drives Application Integration Workloads

## Regulatory Compliance Demands Soar – Impact IT

Fast-increasing panoply of regulatory compliance demands, from many sources, are imposing stringent new controls and demands on enterprises in most industries and geographies. Meeting these tough new regulatory compliance mandate demands almost invariably requires complex changes and new integration levels amongst the enterprise's application portfolio and the IT infrastructures that support the business. This regulatory torrent emanates from global institutions, the supra-national bodies (e.g. *European Union*), national governments, various standards bodies, and vertical industry regulators.

Some are well known, such as the Basel II Convention (*which sets new international standards for banking operational, credit and market risk management*) and which thus drives new IT requirements, including information availability, delivery and monitoring. This is due to be applied to banking/financial institutions worldwide from late 2006. Another is the Sarbanes-Oxley legislation in the USA concerning the integrity of reported company financial results. There are many others applying to specific vertical industries, nations, business or professional functions (*accounting, for example*), and specific market places, etc.

## Why This Regulatory Flood?

A number of major triggers seem to have occurred in recent years, each of which has driven calls for increased regulation, and many of these are now coming into effect. Our picture of these main regulatory regime triggers is shown in Figure A1.

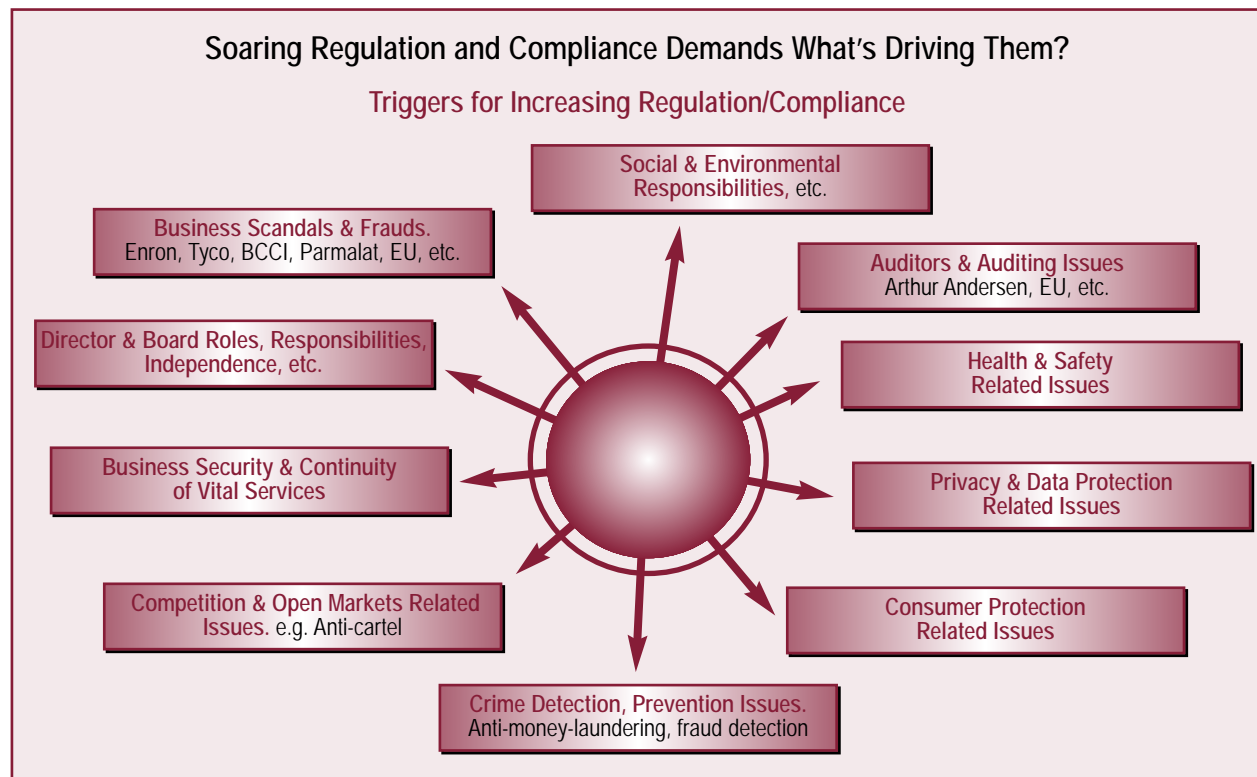


Figure A1: Soaring Regulation and Compliance Demands – What is Driving Them?

The many big business scandals and frauds are a major force, linked to the growing calls for better corporate governance and better corporate executive and board behavior. The need to ensure the integrity of company financial results by properly accounting for business and risk to appropriate standards is another. Market competition rules and constraints apply in many sectors to prevent monopolistic behavior and market abuse. Many key industry and public sectors can now be best described as "regulatory hotspots" where, for a variety of motives, regulation and control levels are especially high.

Many of these newer regulatory regimes impose direct and personal liability on the board of directors and senior executives, with serious sanctions for non-compliance that have got their full attention. This has pushed regulatory compliance right to the top of 2005 board agendas for many firms, a priority they almost invariably reflect through to their IT teams.

## IT Heavily Impacted – Demands Application Integration

These regulatory regulations each add new, and often stringent, requirements and demands upon the IT organizations of enterprises: for example, the types of demand they are making on IT include:

- Demands that enterprises can show and report complete pictures of customer histories. (*Many cannot easily do.*)
- Anti-money-laundering regulations that demand more stringent identification and documentation of customers and the tracking of all contacts.
- Financial reporting and accounting systems that can assure full enterprise compliance with accounting and results integrity standards.
- Data retention regulations that extend the need to retain data and records, often for many years, with a retrieve-on-demand requirement, or a full ILM implementation, needed.
- More demanding regulatory reporting that requires extensive integration to assemble and combine the required information.
- Extended audit trail and logging requirement, to provide extended traceability of transactions, goods, and products, etc.
- Business service continuity requirements, which impose new IT resiliency and continuity levels demanding more extensive Disaster Recovery (*DR*) and Business Continuance (*BC*) investments.

It is clearly apparent that many of these aspects of regulation-driven IT change require or depend upon more advanced application and systems integration, and often also on better management and control facilities for the main business processes that the systems are supporting.

In 2005, regulatory compliance has therefore become the most powerful driver of new application integration needs, as well as a top priority for corporate and IT management alike. Whilst the IT industry has responded with many new point solutions, products and regulatory compliance-related services, there are few “quick fix”, “plug-in-a-box” solutions that can “magic away” the problem.

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*In 2005, regulatory compliance has therefore become the most powerful driver of new application integration needs, as well as a top priority for corporate and IT management alike.*

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## Appendix B: Example Vendor Enterprise Integration Middleware Platform – IBM WebSphere MQ Version 6

### Positioning/Introduction

Business and application integration is a central enabler of the new On Demand world. In this environment, integrating and connecting applications securely, reliably and manageably over network connections is a universal requirement. This and other drivers (*Figure 1 and Section 3 discussed these more fully*) have created widespread and expanding requirements in all larger enterprises for many new and enhanced integration links between applications in the enterprise application portfolio. Vendor Enterprise Integration middleware platforms that provide secure, reliable, easy and fast-to-implement, robust, efficient services that enable enterprises to create, deploy, operate and manage these integration links have therefore become a hugely important category of middleware software in the market. What is required of these platforms is open - standards-based, multi-platform-based capabilities that simplify development and provide loosely-coupled integration between

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*Vendor Enterprise Integration middleware platforms that provide secure, reliable, easy and fast-to-implement, robust, efficient services that enable enterprises to create, deploy, operate and manage these integration links have therefore become a hugely important category of middleware software in the market.*

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applications using messages to transfer data and actions/events between the different applications involved. The prime technology that accomplishes this goal is MOM. In this category, IBM's WebSphere MQ has, for over ten years, been the unambiguous world market-leading software. It is also the foundation of IBM's complete WebSphere Business Integration middleware suite. This family builds out an extensive set of additional business integration capabilities and layers upon the WebSphere MQ transport foundation. The reference architecture of WebSphere Business Integration is shown in Figure B1 (*on page 30*).

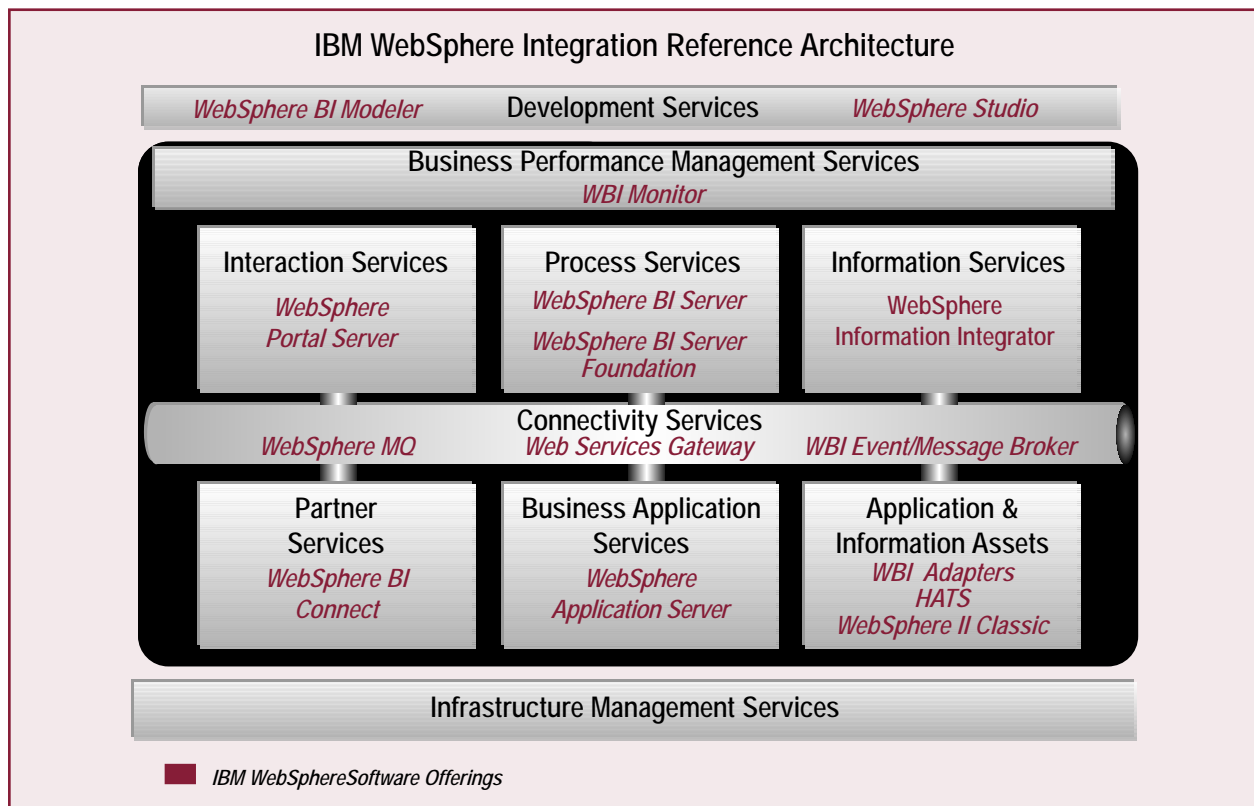


Figure B1: IBM WebSphere Integration Reference Architecture 2005

## Enterprise Integration Platform – WebSphere MQ Foundation Capabilities

WebSphere MQ ensures the reliable delivery of messages, including XML documents and SOAP messages, connects applications and Web Services, spans important programming environments such as J2EE™ and Microsoft .NET, and bridges over 40 different IT platforms.

The WebSphere MQ messaging products enable application integration by helping business applications to exchange information across different platforms by sending and receiving data as messages. They take care of network interfaces, assure 'once and once only' delivery of messages, deal with communications protocols, dynamically distribute workload across available resources, handle recovery after system problems, and help make programs portable.

Integrated support for the latest Java™ Messaging Service interface standard, JMS V1.1 – including publish-and-subscribe messaging – makes WebSphere MQ the JMS provider of choice for multi-platform environments. (*with WebSphere Application Server the JMS provider of choice for J2EE™ environments.*) WebSphere MQ also provides comprehensive security options using SSL, the Internet standard for secure communication. The standardized interfaces

*With these advanced MQ services, new application integration needs are much quicker and cheaper to implement, and to support and maintain over their lifecycle.*

of WebSphere MQ also simplify the development of Application Programming Interface (API) exits to allow monitoring and implementation of local customer standards. The middleware also automatically and dynamically distributes workloads across available server resources, and ensures that all data is delivered free from errors and safe from unauthorized access.

With these advanced MQ services, new application integration needs are much quicker and cheaper to implement, and to support and maintain over their lifecycle. In production they run

more reliably, efficiently and securely than any custom-built, in-house application integration solutions. This frees up enterprise development programming resources to better deploy their skills to handle essential business requirements, instead of wrestling with underlying network complexities.

A selection of enterprise customer and business partner cameos, outlining their experience with WebSphere MQ, are presented in Appendix C, to illustrate the benefits found.

## WebSphere MQ Product Family

The WebSphere MQ line now includes an extended range of versions that target specific needs. We give our overview and assessment of these offerings in Figure B2.

The IBM WebSphere MQ Product Family – Our Overview		
Product Version	Our Overview	Our Analysis
IBM WebSphere® MQ Express	WebSphere® MQ Express is a newer member of the family that delivers application-to-application connectivity, providing both a simple solution to mid-market connectivity needs and a foundation on which to build and develop integration solutions.	Specifically designed, optimized, packaged and priced for SMBs and entry enterprise integration needs, WebSphere MQ Express minimizes the time it takes to get started by being quick and easy to install, simple to use, and fully provided with context-sensitive tutorials to help new users learn quickly. Provides a low-cost entry-point to the MQ family for smaller businesses.
IBM WebSphere® MQ	Core flagship enterprise product of the family delivering all the enterprise-class MQ capabilities described above and available for all major IT platforms. WebSphere MQ Version 6, available Q2 2005, is the latest and most advanced version.	Now with all ease-of-use features of MQ Express.
WebSphere MQ for z/OS®	Optimized and extended version of WebSphere MQ tightly integrated with the unique capabilities of zSeries mainframes under the flagship z/OS operating system. Fully exploits the high integrity, reliability, availability, and serviceability techniques of OS/390 and z/OS. WebSphere MQ for z/OS Version 6, available Q2 2005, is the latest and most advanced version.	As a standalone OS/390 and z/OS™ subsystem, WebSphere MQ for z/OS provides additional system services that offer simple ways of passing messages between programs in different OS/390 or z/OS address spaces. This allows easy communication between programs that operate under CICS/ESA®, IMS/ESA, MVS Batch, TSO, and many other platforms.
IBM WebSphere® MQ Extended Security Edition	WebSphere® MQ Extended Security Edition expands the security services available in WebSphere MQ and simplifies the process of securing business end-to-end. This newer solution consolidates IBM WebSphere MQ and IBM Tivoli® Access Manager for Business Integration ( <i>TAMBI</i> ) into a single, value-added package.	WebSphere MQ Extended Security Edition delivers all of familiar and trusted messaging infrastructure features customers know from WebSphere MQ. It extends these to enable users to implement an end-to-end, application-level data protection model and provides enterprise-wide, remote management of security policies on queues. These advanced features enable customers to secure current production environments without changing or modifying any existing WebSphere MQ applications.
WebSphere® MQ Everyplace	WebSphere® MQ Everyplace connects mobile and wireless applications with the enterprise using secure and dependable application messaging, thereby extending application and business integration to mobile devices. The product enables secure, robust and dependable access to business-critical applications – anytime, anyplace, anywhere – over fragile networks across a broad range of platforms and devices.	WebSphere® MQ Everyplace offers: <ul style="list-style-type: none"> <li>● End-to-end connectivity for mobile applications.</li> <li>● Broad mobile device support.</li> <li>● Robust mobile integration.</li> <li>● Extensive customization options.</li> </ul> The product therefore provides a sound foundation for the expanding new class of pervasive and mobile applications that integrate mobile workers with enterprise applications and new solutions.
IBM WebSphere® Business Integration Message Broker	WebSphere® Business Integration Message Broker ( <i>formerly known as WebSphere MQ Integrator Broker</i> ) transforms and enriches in-flight information to provide a level of intermediation between applications that use different message structures and formats. IBM WebSphere Business Integration Message Broker now also includes the functionality of IBM WebSphere Business Integration Event Broker.	WebSphere® Business Integration Message Broker adds significant value to an MQ environment by supporting: <ul style="list-style-type: none"> <li>● Enriched real-time information distribution from multiple, disparate sources through a network of access points or a centralized broker offers a powerful new way to unify organizations.</li> <li>● Close integration with databases to perform message logging, data merge, and database update functions.</li> <li>● Simplifies integration of existing applications with Web Services, by transforming and routing SOAP messages and logging Web Services transactions.</li> </ul>

Figure B2: The IBM WebSphere MQ Product Family – Our Overview

## Enhanced Business Value in WebSphere MQ Version 6

WebSphere MQ Version 6, generally available in Q2 2005, is the newest version and extends the integration platform with the advances shown in Figure B3. These enable customers to better leverage existing investments through integration, to maximize availability and visibility of the MQ integration infrastructure, and to offer more responsive and efficient configuration and management of this infrastructure. WebSphere MQ Version 6 provides a robust, scalable and secure integration backbone for making wider use of application software assets and data in new e-business applications and connecting these to other components in these solutions. New Eclipse open development standards-based configuration tooling makes the setup of MQ easier and faster on all platforms. Enhancements in WebSphere MQ problem determination and reporting aid and assist in the efficient management of integration services, and to more rapid issue resolution.

<b>Available Q2 2005</b>	<b>WebSphere MQ Version 6</b>	<b>Companion Products:</b> <ul style="list-style-type: none"><li>● WebSphere Business Integration Message Broker</li><li>● CICS BEP</li><li>● WebSphere Business Integration Server Foundation</li><li>● WebSphere MQ Workflow</li><li>● WebSphere Business Integration Monitor</li><li>● WebSphere Business Integration Modeler</li><li>● Tivoli Access Manager for Business Integration</li></ul>
<ul style="list-style-type: none"><li>● <b>Get more from existing investments:</b> Provides reliable integration from key platform resources to other applications. (<i>e.g. CICS, IMS and DB2 on z/OS</i>)</li><li>● <b>Easier to Configure:</b> With new Eclipse-based configuration tools that can connect to, and configure MQ, on all platforms including z/OS</li><li>● <b>Improved Availability:</b> For z/OS with shared queues, support for messages up to 100MB, and improved z/OS system configuration capabilities</li><li>● <b>Improved Problem Determination and Alerting:</b> With extended status information and support for common request</li></ul>		
<p>"With WebSphere MQ, we estimate it's as much as 80 percent faster to bring new customers online. Plus, in the WebSphere MQ environment we can make changes quickly, without having to support such a diverse skills set. We expect we'll reduce our development and maintenance time 30 percent." <i>Tom Kindred, Vice President, Information Technology, CUETS, Canada</i></p>		

Figure B3: Business Value Enhancements in WebSphere MQ Version 6

Key features in this new Version include:

- **Improved Usability:** Enhancements to methods in which WebSphere MQ can be configured, operated and managed, focusing on simplicity and ease-of-use.
- **Enhanced Management Capabilities:** Improving visibility of information flowing across On Demand business by logging and outputting additional operational data and statistics, used by WebSphere MQ tooling or other system management applications, to help deliver on SLA commitments.
- **Better Performance:** Further improving on the already enterprise level of performance and scalability that WebSphere MQ provides today, and delivering higher availability and greater throughput.
- **Extended Connectivity:** Adding new ways in which applications can be connected together making use of the strengths of WebSphere MQ across networks.
- **Open Standards Support:** Forefront support of key open industry standards, for example the JMS v1.1 interface standard, including publish-and-subscribe messaging – making it the leading JMS provider.
- **Speeding Time-to-value:** Enabling faster and easier deployment of new application integration links and connections, with less development efforts through standardization and tooling.
- **Strong Security:** WebSphere MQ offers comprehensive security options using SSL; the Internet standard for secure communication.

## Foundation for the Enterprise Service Bus

An "Enterprise Service Bus" (*ESB*) is an architectural pattern that offers a flexible and consistent approach to integration. The ESB pattern is founded on and unifies message-oriented, event-driven and service-oriented approaches; the three main models of integration technology today. An ESB underpins a SOA and an On Demand Business™. Support for open-industry connectivity standards (*including XML, JMS, SOAP, Web Services, and more*) is central to the ESB pattern. IBM has been a leading contributor to the development of all the main open industry standards for connectivity. This ESB concept sits at the heart of the firm's middleware strategy, and today all WebSphere® family products can already plug straight into an ESB pattern.



The WebSphere MQ family provides the foundation for a customer's ESB. The ESB pattern can be implemented incrementally as new integration needs require enhancements to the connectivity infrastructure, helping to reduce up-front investments and cut maintenance effort. The ESB pattern and WebSphere MQ therefore helps to optimize the delivery of information and services that improve cycle-time, reduce costs, and improve IT flexibility. It also provides transparent interoperability between the various different platforms, programming models and software architectures used in larger enterprises today. By easily enabling reuse of software assets in new ways, an ESB also helps to protect and enhance the large existing investments in applications, services and skills.

## Our Analysis

WebSphere MQ has been the clear market-leading Enterprise Integration platform for the last ten years, and with its extended product family today, now provides application integration solution enablement for businesses of all sizes. It provides the message and event broking services, secure message transmission, QoS, and application integration management services that are required of an ESB, with publish-and-subscribe, assured message delivery, sophisticated event handling, and broking to trigger business activities in defined circumstances as base value-added services. Version 6 substantially extends and strengthens this key engine that is central to application integration and industry-wide migration to SOA-based, composite applications that reuse existing software assets combined with new components written in modern languages like Java connected through Web Services standards.

*WebSphere MQ has been the clear market-leading Enterprise Integration platform for the last ten years...*

## Appendix C: Representative WebSphere MQ Customer Experiences

Real-world customer and partner deployment experience and results with enterprise integration middleware is perhaps the most compelling evidence of the benefits of this powerful technology. We include below a small selection of brief cameos of the use and benefits found with WebSphere MQ at several leading enterprises and smaller solution providers.

### *Danone – Leading French/International Food Company – Enterprise Service Bus*

IBM Business Consulting Services helped Danone design and implement an Enterprise Integration solution based on WebSphere MQ Integrator Version 2.1 (*WMQI*). *WMQI* acts as the central Enterprise Integration hub in charge of all communication between THEMIS, hosted by IBM in Montpellier, and Danone France's internal legacy systems. The *WMQI* hub connects to THEMIS through an MQ Link for R/3 connector. Danone France's legacy systems are distributed throughout Danone's organization, including its headquarters in Levallois Perret, six remote plants and nine remote logistic platforms. The *WMQI* hub connects to the customer's legacy systems through WebSphere MQ Version 5.2.1 using an asynchronous transport and file adapter. These interfaces have to be asynchronous and near real-time because availability is critical to Danone's business operations, where even a 15-minute interruption could stop production lines. The Enterprise Integration hub is hosted on a high-availability cluster server. Additionally, a specific GUI application has been developed for activity tracking, including auditing processed messages, recovering errors and updating routing rules. The *WMQ* products provide Danone with a versatile "Enterprise Service Bus" architectural pattern for current and future integration needs.

### *Fortis Bank – Leading Belgian Banking Group – Application Integration*

Fortis had previously used File Transfer Protocol (*FTP*) to exchange business data between its branches, which was cumbersome and inefficient. This dynamic banking group needed a solution that could grow with their organization. They selected and deployed WebSphere MQ and WebSphere MQ Integrator to enable automated integration between their various systems and applications, both internal and external. In particular, the solution eased integration between the banks Windows PC clients and their central z/OS mainframe systems. Fortis found the primary benefit to be greatly reduced development time for application integration, but also valued the smoother, more resilient operational performance achieved. All of Fortis Bank's branches – and a total of about 6,000 employees – now rely on WebSphere MQ for communication with the central mainframe system.

### *Raiffeisen Group – German Savings Banks IT Service Provider – Application Integration*

*"Our integration solution, built on IBM middleware, has centralized securities trading and substantially improved the integration of the distributed systems in the branches. IBM is a leader in integration, and it guarantees long-term support. In the world of finance, the WebSphere MQ messaging platform is the standard for integration solutions."*

Martin Frick, Head of Project and IT Architecture, Raiffeisen Group

### ***Blue World – Secure e-Business Solutions Provider***

*"Our File Transfers used to take place in batches. Most of this information needs to be transformed and distributed to other applications and be available in near real-time. WebSphere MQ sits between our different operating platforms and enables us to integrate applications, with WebSphere Business Integration Message Broker performing the necessary data transformations."*

**Michael Roy, President, Blue World Information Technology Inc.**

**About Blue World:** Blue World Information Technology Inc. has been in business in the secure e-business arena for over ten years, serving customers across North America from offices in Seattle, San Francisco, Los Angeles and Vancouver, Canada. The firm focuses exclusively on building secure e-business solutions based on IBM middleware and toolsets, which support every major computing platform. Visit [www.blue-world.net](http://www.blue-world.net)

### ***Ultramatics – Enterprise Application Integrator***

*"We build mission-critical solutions for our customers that require robust and proven technologies as their foundation. WebSphere MQ is a solid and proven platform for building such highly reliable solutions. WebSphere MQ is a core component of our integration solutions and provides reliable, scalable and heterogeneous messaging functionality."*

**Saru Seshadri, President, Ultramatics, Inc.**

**About Ultramatics:** Ultramatics has experience integrating complex large-scale applications and ensuring success. The organization has expertise in building robust solutions using WBI, WebSphere Commerce, WebSphere Portal, WebSphere Application Server and other IBM products. Ultramatics is a "One Stop Shop" for IBM customers as an IBM Software Reseller, IBM Regional Systems Integrator and IBM Premier Level Business Partner who can bundle software and services to serve clients better. Visit [www.ultramatics.com](http://www.ultramatics.com)

### ***Digital A.V. – Integration Solution Provider***

*"WebSphere MQ enables us to link together systems, applications and services. It is an integral part of our overall integration strategy within our company."*

**Scott Sudman, Chief Technology Officer, Digital A.V., Inc.**

**About Digital A.V.:** Since 1983 Digital AV has conceptualized designs and provided professional services for Information Infrastructures. Their focus on this crucial element is so unique they named it "Infostructure". The goal of the firm's work has and always will be business process improvement. Their designs stress information integration of document and data models, communication, collaboration and coordination, and usability, while maintaining open standards for Internet distribution and hardware independence. Visit [www.digitalav.com](http://www.digitalav.com)

## **Other Related Software Strategies Research**

1. **"IBM WebSphere Business Integration Leads the Way with Fullest J2EE™ and Eclipse Support – Business Integration Software Swings to Open Standards"** Software Strategies White Paper, 2<sup>nd</sup> Edition, September 2004, 24 p.p., 16 charts and tables. (*Comparative evaluation of WebSphere Business Integration Suite & open standards.*)
2. **"Enterprise Transformation, Modernization & Integration Top Priority Today – Resurgent zSeries Mainframe Stakes Powerful Claim for Expanded Role"** Software Strategies White Paper, September 2004, 56 p.p., 20 charts and tables. (*Enterprise transformation, modernization and integration with resurgent zSeries. Software stack-centered, in-depth assessment of the mainframe as an enterprise platform as at Fall 2004.*)
3. **"zSeries Mainframe Resurgence Beyond Question – Software/Costs See Major Advances: IBM Tools Break USV Grip"** Software Strategies White Paper, January 2004, 50 p.p., 18 charts and tables. (*zSeries resurgence and software stack assessment.*)
4. **"e-business on demand™ IBM's New "Grand Challenge" – Re-invention to Lead On Demand Business Era"** Software Strategies Report, October 2003, 110 p.p., 68 charts and tables. (*Strategy review.*)

## Software Strategies

Software Strategies is a specialist analyst firm focused on e-Infrastructure platform strategies and issues. Since 1997 we have published reports, white papers and newsletters, hosted and spoken at numerous successful industry events, and have worked closely with industry leaders, including: IBM; Microsoft; Intel; ICL; Unisys; Computer Associates; BMC; Stratus Computers; Misys Plc; Notability Solutions; and many others.

Specialist expertise on mainframes, servers, storage, processors, Microsoft technology, Intel environments and enterprise middleware has been a common thread. Many thousands of enterprise IT users have benefited from our authoritative events, presentations, conferences, newsletters, white papers, and reports.

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This White Paper was researched and written by Ian Bramley, Managing Director of Software Strategies, and was published in April 2005. The views expressed are those of Software Strategies, and are based on our proprietary research. Bramley founded Software Strategies in 1997, is an experienced enterprise infrastructure analyst, a keynote speaker at many industry events, and has published many reports and papers. Before this, he served as Director of Enterprise Platforms at Butler Group and was Founder/Chairman of the Enterprise NT Management Forum from 1998 to end-2000. Previously, he held a variety of executive positions with international software vendors over a 25-year industry career.

