
White Paper

# Vendor Middleware-based Application Integration Solutions Beat Custom Links – Provides SOA Messaging Backbone

## About this White Paper

Credit crunch, a global economic downturn, and widespread market turmoil, made a sombre backdrop for IT markets prognostications in late-2008. Forecasters reduced earlier 2009 global IT spending projections from a healthy 5.5-7% growth to half that level.

Chief Executive Officers *(CEOs)* face unprecedented change, and customers that are more demanding. They must sharply adapt their business models, innovate new products/services, radically improve processes to cut costs, advance to global business designs, better manage risks, whilst husbanding precious financial and human resources. *(Main findings IBM Global CEO Study 2008.)*

IT solutions remain largest business productivity improvement enablers. Top priorities for enterprise Chief Information Officers *(CIOs)* through 2009, in these tougher times, now include:

- Optimizing wasteful IT infrastructures *(server/storage/network consolidation, virtualization, & automation)* to drive out costs.
- Rapidly integrating the IT of opportunistic acquisitions/business consolidations.
- Business/Application Integration *(AI)* to transform business processes, often now via Service Oriented Architecture *(SOA)*, Business Process Management *(BPM)*, and/or Web 2.0 adoption.
- Improving Enterprise Performance Management *(EPM)* with dynamic Business Intelligence *(BI)* based upon enterprise-wide information exploitation in real time.
- Ensuring enterprise-wide regulatory mandates compliance.

Enterprises must further streamline business processes, integrating over internal application silos and partner ecosystems. Seamless integration of processes, people, and information enterprise-wide is the goal. AI is the vital underpinning of all such process improvements.

Despite rationalization, application portfolios remain large *(averages of <1,000 applications in "largest 500" global firms, and <400 in the next largest 10,000 enterprises)*.

Advanced Vendor Application Integration Middleware *(VAIM)* platforms evolved over the last fifteen years. They make application integration *(AI)* far faster/cheaper to implement and support, and add much-superior operational Qualities of Service *(QoS)*. Based on Message-Oriented-Middleware *(MOM)* technology, VAIM segment leaders today offer comprehensive application integration capabilities, and now deliver their well-proven benefits to over 20,000 medium to large IT users. Long-dominant VAIM market-share leader is IBM's WebSphere MQ *(WMQ)* platform. WMQ now also provides the **"SOA Messaging Backbone"** underpinning IBM's market-leading, full Smart SOA™ portfolio. IBM now uses the term **"SOA Connectivity"** to describe the combination of WMQ plus the connectivity elements of Smart SOA™. These now provide IBM's on-ramp to fuller SOA, and are SOA-extended application integration solutions. We use the term VAIM/SOA connectivity to refer to the generic *(non-IBM)* combination of VAIM and SOA connectivity software.

VAIM/SOA connectivity has now been near-universally *(~100%)* adopted by the largest 500 global enterprises, but by only just over 50% of the next 10,000 largest firms, and by just 20% of the next 250,000 largest medium-sized businesses. Even for adopters, their percentage of AI link projects to date using VAIM/SOA connectivity was still modest *(<42.5%, <22.5%, and <20.0%, averages respectively)*. These findings raise important questions, including:

- Which methods did these enterprises actually use to implement their AI link projects to date?
- Why had VAIM/SOA adopters also used other methods for some of their AI links?
- Why are the proven benefits of VAIM/SOA platforms not more widely accepted/understood?

One shock research finding was custom-built, in-house, hard-coded AI solutions *(most using free File Transfer Protocol (FTP) software)* were still the most widely used. Such links need 3- to 4-times more time/effort to build, and ditto maintenance/support, versus VAIM/SOA-based AI projects. Their links are also insecure, fragile, and vulnerable. Firms relying on custom-built AI approaches *(as many clearly do)* have serious, intrinsic weakness built into their application infrastructure, and wasted precious development/support resources needlessly.

Good VAIM/SOA connectivity platforms enable much superior, cost-effective, and more maintainable, AI solutions.

In this fully updated, 2009-focused, 3rd Edition White Paper, Software Strategies reviews the drivers for AI today, and assesses the global size/scale of the AI challenge. We reveal the actual methods used to deliver AI to date, and examine adoption/internal deployment of VAIM/SOA connectivity platforms by large and smaller enterprises. We suggest VAIM/SOA platform selection criteria, evaluate one market-leading VAIM/SOA connectivity offering, and present five customer deployment success examples. *(See Appendix B.)*

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# White Paper

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This Executive Summary overviews our findings, and recommendations for IT users, developed fully in the White Paper.

1. **Top IT Priorities for 2009:** Infrastructure *(server and storage)* consolidation and virtualization, business transformation, AI and SOA adoption, cost reduction, security, and regulatory compliance, are rated top IT priorities for 2009 in most Chief Information Officer *(CIO)* recent surveys.
2. **Application Integration *(AI)* Demand Growth:** AI, linking business applications to exchange information, remains a top IT priority as firms struggle with the downturn, stretch IT investments whilst striving for business transformation, and drive down costs. These will add many new AI projects in 2009. *(We introduce AI in Section 2, and assess its main drivers in Section 3.)*
3. **Distributed Computing Increased AI Challenge – Rollback Underway:** When most applications ran on mainframes, application portfolios were far smaller. Within-this-one-platform integration, at a central site, was far simpler. Distributed computing proliferated vastly since 1995, multiplying AI challenges many-fold. These sprawls since proved too complex, too costly, and too wasteful: today, many enterprises are actively consolidating to far fewer servers.
4. **Service Oriented Architecture *(SOA)* – New Application Landscape:** As 2009 opens, SOA has reached mass adoption *(11,000+ enterprises to date)*. Now dominant as the model for new-generation business applications, superior SOA-based connectivity/integration powerfully drove adoption. SOA's extensive open standards and higher abstraction level, ease interoperation, for significantly easier, faster, and cheaper application connectivity, lifting VAIM strengths up a higher level.
5. **Enterprise Application Portfolios Must be Better Connected:** Enterprises grew wide application portfolios on multiple IT platforms since the 1990s *(400-1000 each in the 500 largest global enterprises)*. Many more new AI links are still needed, both internal and with partners, a connectivity challenge illustrated in Figure 1. We firmly recommend VAIM, plus SOA connectivity with its additional benefits, as the far-preferred AI/connectivity approach best used today. *(We size up the AI challenge in Section 4.)*

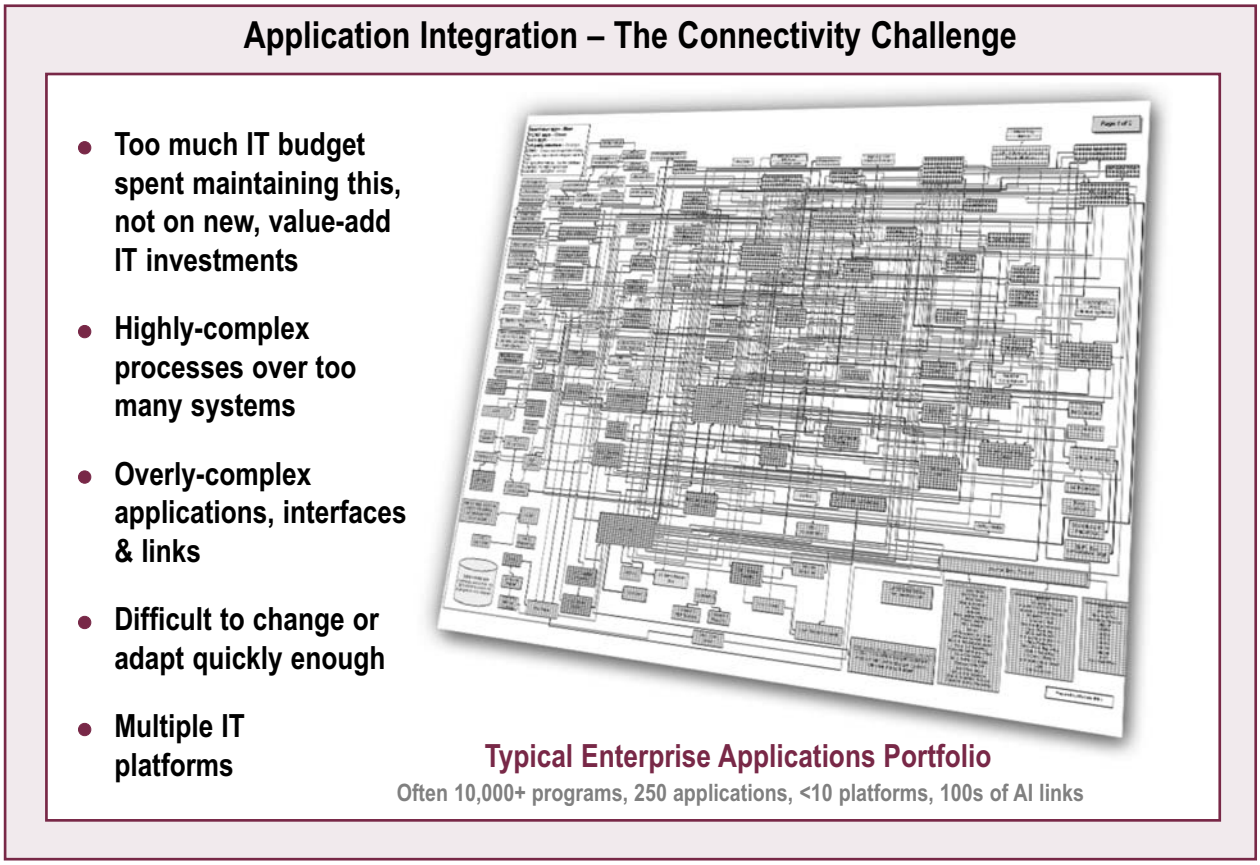


**Figure 1: The Connectivity Challenge – Application Integration**

6. **Vendor Application Integration Middleware/SOA *(VAIM/SOA)* Platforms Well-proven:** VAIM/SOA connectivity platforms make AI far faster/ cheaper to implement/support, and add superior operational Quality of Service *(QoS)*, versus older approaches. Leading suites evolved over fifteen years into wide platforms, and long proved compelling benefits for many thousands of customers. We found VAIM/SOA connectivity adoption near universal *(at ~100%)* in the largest 500 global enterprises. Why are other firms not yet making full use of this well-proven, productive technology?

7. **VAIM Also Messaging Backbone for SOA:** VAIM/SOA connectivity platforms also provide the messaging, connectivity, and integration backbone for SOA, underpinning their central Enterprise Service Buses *(ESBs)*, as well as delivering the traditional AI role as per point 6 above. Adopting VAIM now to support pressing application connectivity project needs is thus also a main enabler for, and a large step towards, SOA.

8. **Too Many Enterprises Still Missing Out on Proven VAIM/SOA Benefits:** We found just over 50% of the next 10,000 largest enterprises, and just 20% of the next 250,000 largest medium-sized businesses, had adopted VAIM/SOA platforms by end-2008. Given the proven benefits, non-adopter firms are missing out badly on this more flexible, faster, and cheaper way to solve AI needs, and prepare for SOA.

9. **Even VAIM/SOA Adopters Usage Not Universal:** Reality is actually still worse. Even at VAIM/SOA connectivity adopters, we found VAIM/SOA-based AI links built to date still low *(35-50% for the 500 largest enterprises, 20-25% amongst the next 10,000 largest enterprises)*. What alternative, older methods had these firms used for AI links, and why were they still using these? *(We examine VAIM adopter usage levels in Section 6.)*

10. **Integration Methods Used – Surprise:** The most widely-used approach, we found, were custom-built, in-house-developed application connectivity solutions. Built with low-level languages, a majority used free File Transfer Protocol *(FTP)* software for data movement. Such basic approaches need lengthy/costly development, are fragile, and so also incur heavy support costs. It is hard to understand why they are still so widespread! *(We assess the AI methods most used in Section 5.)*

11. **Custom-built AI Link Users Wasting Time and Money:** Countless firms are thus still using slower, more staff-intensive, less secure, and lower-performing applications connectivity approaches. These create heavy/costly burdens of future maintenance and support. Their still-widespread use is surprising when affordable, far more productive VAIM/SOA-based methods are so readily available. Our firm advice is to "cease and desist forthwith".

12. **Problem Has Too Low Visibility:** Many CIOs appear unaware of how widespread such custom-built application connectivity became in their applications and AI links portfolios, or how much more these were really costing their firms. Application integration work often has a relatively low business profile, and is commonly buried within larger application projects. Asking many pointed questions, to find out the current extent, exposure and risks of this problem, is therefore advised.

13. **VAIM/SOA Platforms – The Way Ahead:** Top VAIM/SOA connectivity platforms now provide comprehensive, broad-ranging capability for all application connectivity needs, and also underpin full SOA. Today, we counsel prospective purchasers to adopt their best-fit, single VAIM/SOA connectivity platform for enterprise-wide strategic use. These provide a far more comprehensive, productive, open, and fully integrated platform: the alternative – the jumble of point products from multiple vendors otherwise needed – offers few of these benefits.

*...we counsel prospective purchasers to adopt their best-fit, single VAIM/SOA connectivity platform for enterprise-wide strategic use.*

14. **VAIM/SOA Connectivity Benefits Not Understood Widely Enough:** We estimate that 20,000 firms have adopted VAIM, and around 11,000 have adopted SOA. We conclude non-adopters still do not understand just how strong VAIM/SOA connectivity benefits are, and their high Return on Investment *(ROI)*. *(Cited in Section 5.)* We counsel all such firms to now adopt this beneficial technology, now more affordable, both for next application connectivity link projects and to underpin their SOA adoption.

15. **Open Standards Vital for VAIM and SOA Success:** Open standards are an absolutely crucial enabler of easier applications connectivity and interoperation with VAIM/SOA. Many apply, including the open Java Enterprise Edition™ *(JEE™)* programming model, the Eclipse open Application Development *(AD)* tools platform, the Web services standards array, Transmission Control Protocol/Internet Protocol *(TCP/IP)* networking, Secure Sockets Layer *(SSL)* security, and many more. VAIM/SOA connectivity platforms must fully support all such standards: older closed, proprietary middleware is best avoided.

16. **VAIM/SOA Market Concentration Eases Selection:** A few software vendors today offer full, integrated, open VAIM/SOA connectivity platforms, and now control this market by software revenue share. *(IBM dominated with a 64% 2007 software share.)* They gained as customers sought quality, security, and vendor endurance in this rapidly-consolidating sector of recent years. A big wave of further SOA innovation *(including Business Process Management (BPM), Complex Event Processing (CEP), and links to Business Intelligence (BI)/Enterprise Performance Management (EPM), etc.)* has also just matured. *(We assess leading VAIM/SOA vendors in Section 7.)*

17. **High-level VAIM/SOA Platform Selection Criteria:** As per point 16 above, 2009's VAIM/SOA platform market is consolidated *(after earlier profusion of vendors/offerings)*, but great care/caution in strategic selection is advised. Specific VAIM/SOA platform characteristics demand special rigor in vendor/platform short-listing/selection. We propose nine, high-level criteria that sharply differentiate between the main vendor alternatives. Prospective customers will find these helpful in making their right choice. *(See Section 7.)*

18. **VAIM/SOA Platform Example:** In Appendix A we profile/assess the market-leader VAIM/SOA connectivity platform *(IBM's WebSphere MQ-based "SOA Connectivity" family)* as a good example, illustrating the broad functionality/capabilities that such a platform now provides. Those not yet familiar with the VAIM/SOA platform will find this a useful overview of the extensive capabilities that such leaders now provide.

19. **Customer Success and Benefits Striking:** In Appendix B, we profile five diverse enterprises from around the world that successfully adopted the IBM SOA Connectivity platform, gaining valuable benefits. These confirm and underline the generic benefits cited above with specific, quantified gains.

# 2. Introducing Application Integration *(AI)*

## About This White Paper

We published the 1st edition of this popular White Paper in April 2005. We issued an updated 2nd edition in November 2006, examining this vital topic again at end 2007. SOA had, by then, become the definitive architecture for next-generation business applications, and we explored the close relationship between VAIM and SOA. In late 2008, we again completely revised this 3rd edition of the White Paper, published on a January 2009 dateline. With recent major business and economic turbulence, our Paper's findings resonate strongly; our recommendations offer enterprises substantial savings not to be missed in this tougher climate.

## Who Should Read This White Paper?

This new 2009 3rd edition White Paper was specifically rewritten for CIOs, Chief Technology Officers *(CTOs)*, Heads of Development, and other Senior IT Executives in larger IT organizations who are concerned with delivering enhanced, better-integrated application portfolios, and with driving SOA adoption to improve their business processes. It also addresses IT Managers in medium-sized businesses, who face similar AI challenges, albeit on a smaller scale. Independent Software Vendors *(ISVs)* and Systems Integrators *(SIs)* often concerned to select and support AI/SOA middleware for their customers, will also find it of value.

## 1990-2008 Enterprise Application Portfolio Expansion Drove-up AI Needs

As 2009 dawns, fast growth and widespread adoption of SOA continues apace, now "across the chasm" with an estimated 11,000+, mainly mainstream majority, enterprise adopters. SOA is thus now firmly established as the dominant architectural model for advanced, flexible business software, and for BPM. SOA's wider deployment is also helping meet additional application connectivity demands. Indeed, these needs are one of five main entry points that companies begin SOA adoption to address. But how did application portfolios today become so broad and diverse, driving-up needs to integrate them?

Until the early 1990s, most business computing applications were custom-written by the enterprise's in-house development teams, mainly with 3GL or 4GL programming languages and related tools. The centralized proprietary mainframes were still the dominant enterprise-computing platform, but proprietary minicomputers were also widely deployed, and PC applications had proliferated. Earlier-generation ISV applications packages for accounting, inventory management, human resources, and other common basic business functions, were also broadly used on those proprietary platforms.

Since then, the IT industry drove explosive proliferation of scale-out distributed computing *(Novell NetWare, various UNIX flavors, and various Windows/Intel flavors)* which added literally tens of millions of distributed servers to the global installed base over the last decade and a half. These sprawling, distributed infrastructures went in alongside established host mainframes, proprietary midrange systems, and large PC populations found at most enterprises, and drove big new application connectivity requirements to link their applications with existing platform applications.

Distributed platforms ran new client/server applications that became important enterprise application portfolio members. Departmental and workgroup productivity, e-mail and collaboration, Enterprise Resource Planning *(ERP)*, Customer Relationship Management *(CRM)*, and Supply Chain Management *(SCM)* were foremost horizontal examples, each requiring many new connectivity links from existing applications to these newer packages. In parallel, a new generation of vertical industry applications, for banking, insurance, telecommunications, retail, healthcare, and other sectors, most based on distributed platforms *(and increasingly on common middleware)* later also emerged. Back then, many instances of each such application had to be deployed one per country, region, or plant, due to capacity and bandwidth limitations.

From the late-1990s, a huge wave of e-business and Web applications was the next major application connectivity projects driver. Most enterprises added Web sites, Web serving, Business-to-Consumer *(B2C)*, Business-to-Business *(B2B)*, Web portals, and other new Web-based applications, most requiring multiple links with existing applications. Web usage continued to expand through this decade, to become today's central enterprise IT foundation, with SOA and Web 2.0 among its recent important advances.

These trends multiplied both the size and the complexity of enterprise application portfolios *(visualized in Figure 1 on page 5)*. It also massively increased the number of application connectivity links that IT firms *(large and small)* now had to develop and maintain to connect their many diverse applications *(usually now on different platforms)*.

## AI Approaches – Early Evolution

AI always involved moving data out of one application and into another, often across platform. It often performed other intermediate processes *(extraction, cleansing, transformation, aggregation, mediation, security, and logging, etc.)* on the data en-route. AI links were originally all custom-developed by IT teams, using familiar, low-level 3GL languages, scripting tools, any available proprietary interfaces or exits, and file and database managers. This custom AI link development was costly, both in initial development time/effort, and in the ongoing maintenance/support resource they consumed.

Proprietary system/application architectures on multiple platforms, lacking common unifying standards, amplified the effort/cost of building such custom integration links. These links were tightly coupled, hard-coded, and point-to-point. They were also inflexible, as well as fragile – vulnerable to impacts of changes in any part of their connected infrastructure. Analysts would therefore not expect to find this approach still widely used today as 2009 begins.

Since the 1990s,TCP/IP networking became the now-near-universal enterprise network standard. TCP/IP brought us FTP, a simple, standardized method of moving files from one location/platform to another. Enterprises began using basic FTP software tools *(often widely available and free)* within their custom-built AI solutions. FTP software provided just the core data-moving functions, which the customer wrapped with still-considerable custom logic code to perform the other needed functions, with the same rigidities as above, but with modest effort savings. Amazingly, our research revealed that this simple and unsophisticated approach still remains the most widely-used AI link approach found today.

## Vendor Application Integration Middleware Evolution & Importance

To address this near-universal and fast-growing demand for increased application integration and connectivity, a new class of VAIM products first emerged from the early 1990s, and broadened greatly in this 2000 decade. As in any new software market, many technologies/approaches were tried, most offering proprietary point solutions/specialized approaches, a few offering more open, universal **VAIM platforms** for integration. Early this decade, up to 150 vendors contested a then-fragmented market, but much consolidation has now occurred, so today a few major vendors now dominate. Enterprise Application Integration *(EAI)* was a much-used synonym for VAIM for several years, but now seems dated. From 2004 through 2008, the category again morphed to become today's broad SOA-centric middleware market, which encompasses VAIM/SOA connectivity as a main foundation *(the SOA messaging backbone)*, along with BPM, CEP, Web 2.0, and such related SOA technologies.

The uptake of VAIM/SOA middleware overall has grown a great deal. For example, leading analyst firm Gartner, in a June 2008 report *("Market Share: Application Infrastructure and Middleware Software, Worldwide, 2007")*, found that worldwide Application Infrastructure and Middleware *(their term is "AIM")* software market revenue totaled $14.1B in 2007, a 12.8% increase from 2006 revenue of $12.5B. This rise came from new growth SOA-related segments, such as ESBs and BPM suites. In this study, IBM led, holding a $4.1B and 29% 2007 AIM software license revenue market share, according to this study.

## VAIM – What Does it Do, Why is it Needed?

VAIM products simplify, speed, and ease application connectivity by utilizing middleware software clients and servers that deliver the most common software functions/services required in application connectivity and integration scenarios. Their use increased flexibility, and greatly reduced custom development/maintenance effort, in return for VAIM software license and maintenance fees. The better VAIM products delivered broad, compelling benefits. Over this fifteen-year evolution, the winning technologies *(based on Message-Oriented-Middleware (MOM) message-passing technologies)* and vendors emerged, and have long proved their high value at and estimated 20,000 medium-large IT-user sites. VAIM/SOA connectivity platforms now provide the **SOA messaging backbone** underpinnings for their vendor's wider SOA platforms. With high and continuing pressure on enterprise IT teams to "do more with less", readers would surely expect such now-mature VAIM/SOA connectivity platforms *(well proven to deliver "better, faster, cheaper" AI solutions)* to be universally used on all AI projects.

## Widespread SOA Adoption Changing Application Landscape, Boosting VAI Use

SOA is a business-centric IT systems development and integration architectural approach that helps better integrate the business around business processes, supported by linked and interoperable software "services". The services comprising an SOA application are loosely-coupled, exchanging data with one and another as they participate in the core business process, using open standards, independent of and across hardware platforms, operating systems, programming languages, and other technologies. SOA lets enterprises build a new generation of far more flexible, adaptable, composite applications that draw upon new and existing functionality from multiple sources, within and beyond the enterprise, and that support transformed BPM.

SOA uses standard interfaces and Web services standards to turn software components into these reusable "services", and provides unprecedented agility, flexibility and speed in composing new applications that better support improved business models/processes. Existing application software components, when packaged as SOA services, can thus be heavily reused in new SOA composite solutions. The goal of SOA is thus to produce a totally different application architecture from traditional, monolithic, technology-specific enterprise applications.

Enterprise IT user SOA adoption has risen dramatically since its 2003 beginnings, as our metrics and data in Figure 2 *(on page 9)* shows, and has now reached the "mainstream majority" adoption phase amongst larger enterprises.

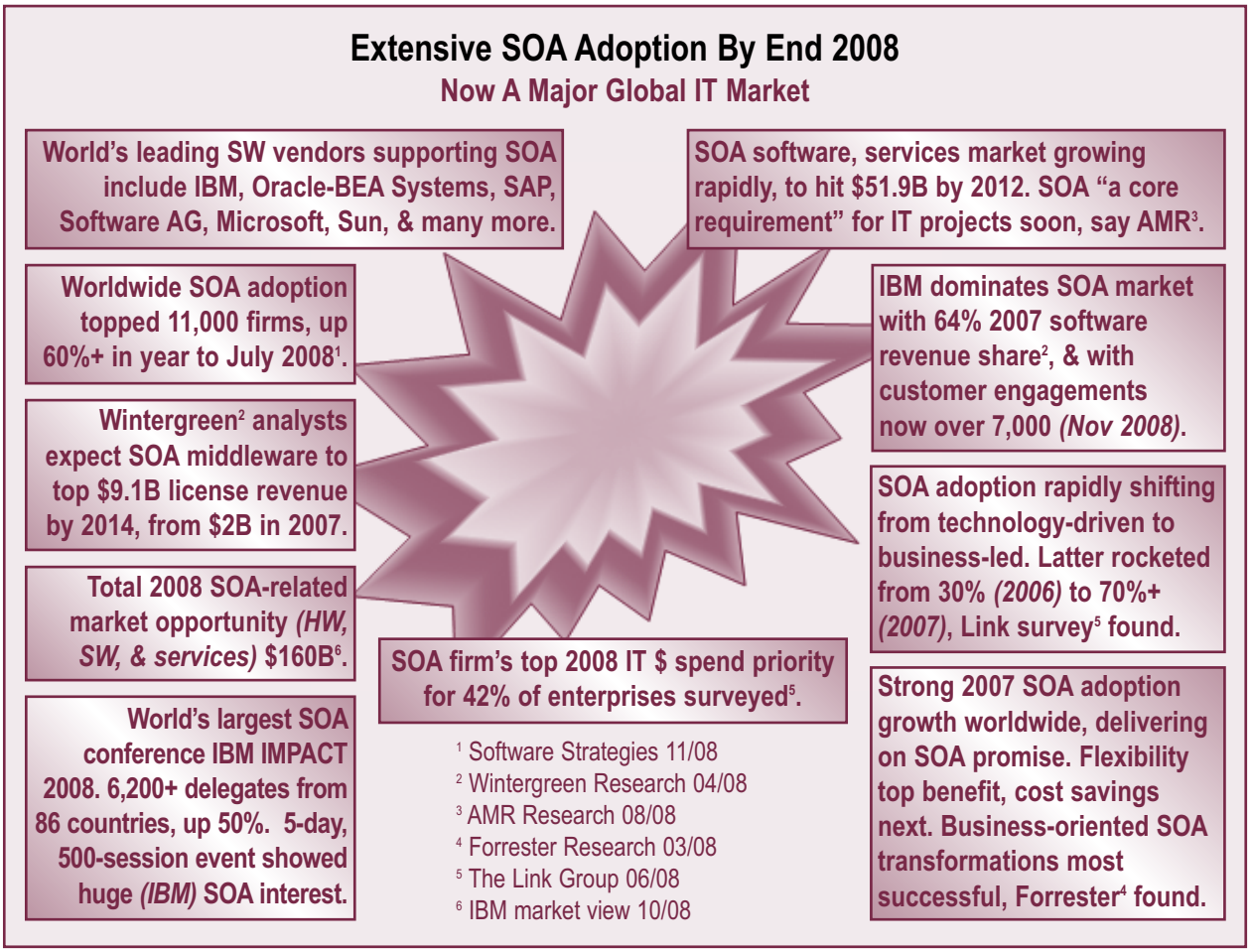


**Figure 2: SOA – Soaring Adoption – Major Market**

VAIM/SOA connectivity platforms now provide the foundation messaging and connectivity underpinnings for their vendors' now much broader, SOA software platforms: the latter now includes higher-level SOA ESB connectivity offerings that further simplify integration in full SOA deployments, as well as service registry/repository capabilities, and message brokers. In 2009, full SOA platforms from leading vendors now offer comprehensive, integrated VAIM/SOA middleware server capabilities, linked BPM offerings, powerful SOA development and integration tooling, new CEP facilities, Web 2.0 style enterprise mashup capabilities, and tight links to their complementary BI/EPM software. Every full SOA adopter will need to deploy the matched, underpinning VAIM/SOA connectivity platform.

Adopting a VAIM/SOA connectivity platform alone brings immense direct benefits in all complex, traditional application environments, but is also the AI and connectivity entry-point to fuller SOA deployment.

## Research Shows Shocking Application Connectivity Practice Truths

We researched how enterprises had actually implemented their applications connectivity links inventories to date. In descending order, these were:

1. **Custom-developed, free FTP package-based approach.** Amazingly, this still remained the most widely-used application connectivity approach deployed to date.
2. **VAIM platform-based solutions.** The second most widely used, and most popular middleware-based approach. Linked to full SOA *(see 3 below)*, for which VAIM is a major entry point.
3. **Fuller SOA adoption.** This has climbed rapidly to now become the third most widely-used connectivity approach. Incorporates VAIM as SOA messaging backbone, add SOA connectivity solutions, and underpins full SOA.
4. **Custom-built, in-house solutions *(not using FTP)*.** Now the fourth most widely-used method.
5. **Vendor "Enhanced FTP-based" middleware point solutions.** The fifth most widely used application connectivity approach.
6. **Manual functions/processing.** Incredibly, business change consultants discovered numerous cases of whole staff departments employed wholly/mainly to provide manual application connectivity and integration operations.

These surprising, perhaps shocking, research findings are fully discussed in Section 4.

## Findings Pose Important Questions for IT Management

The above findings posed tough questions for CIOs *(and other senior IT executives)* responsible for IT strategy and technology, including:

- Why are such primitive, costly application connectivity approaches *(1, 4, 5 above)* still so widely used today, over fifteen years after the first VAIM solutions *(offering superior solutions, and now long-proven to work well)* became available?
- Do users of these primitive approaches realize just how much more these cost than VAIM/SOA-supported solutions, and how much higher their risks of failure are?
- Among adopters of VAIM/SOA connectivity platforms *(clearly recognizing their benefits)*, why have they only deployed the middleware on only part of their applications connectivity links inventories, when their benefits are universal, as well as long and well-established?

We address these questions, and provide our recommendations for improvement, later in this White Paper.

## Our Analysis

AI is a universal need that greatly expanded over the last 15 years, as application portfolios grew much wider. Today, powerful drivers demand that enterprises implement many more AI links for compelling reasons. The rapid adoption of SOA is now one of the foremost of these drivers, as well as the main AI solution path.

Traditional "hand-tools-based" and "do-it-yourself", in-house custom development approaches to AI remain much too widespread, despite their serious disadvantages and costs, and long availability of well-proven VAIM *(and now SOA)* platforms that do a far better job. The leading VAIM/SOA connectivity platforms have been near-universally adopted by the largest 500 enterprise IT users, but barely over half of other enterprise IT users, and by just 20% of medium-sized businesses.

Our assessment is that many enterprises have therefore wasted large amounts of scarce development and support resources by building and maintaining AI links using such basic techniques, or by not extending use of their VAIM/SOA connectivity platforms widely enough. By doing so, they have added greatly to their legacy software support burden. These AI links soak up unnecessary support resources and, with their fragility, cause far higher risks to, and more disruption of, the business when they break.

# 3. Application Integration Growth Drivers

## Research Shows Nine Main 2009-on AI Drivers

Our research identified nine main 2009 drivers of IT user organizations' *(large and medium)* still growing demands for more application connectivity and integration links worldwide. These are highlighted, and ranked by our rating of their 2009-on importance, in Figure 3 *(on page 11)*, and discussed below.

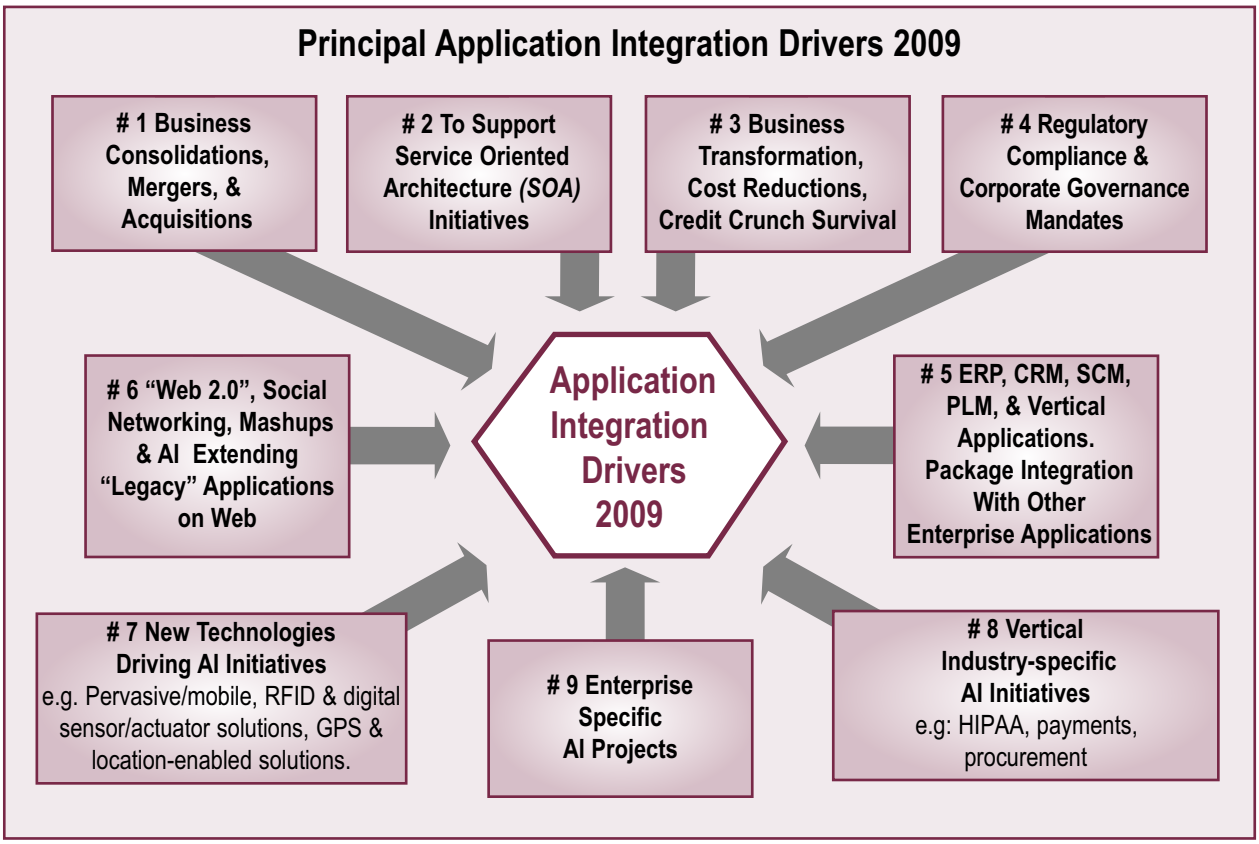


**Figure 3: Principal Application Integration Drivers 2009**

**# 1. Business Consolidations, Mergers & Acquisitions *(M&A)*:** Global M&A transactions reached record highs from 2005 through early 2008, as global business boomed and stock market prices were still high. Now, in 2009's post credit-crunch downturn, government-brokered mergers, distressed firm takeovers, and opportunistic "bottom fishing" acquisitions by the strong, are widespread, with more expected over this economic cycle. Most businesses today are now totally dependent on their IT systems. Whatever M&A transaction motivations, planning and executing rapid, successful IT integration is crucial to business merger success and benefits capture. Quickly, skillfully integrating, rationalizing, and de-duplicating the acquired firm's applications portfolio and IT infrastructure with the buyer's IT portfolio is now crucial. Cost savings from IT systems, data center, applications, and staff resource consolidation/rationalization can be major benefits. Deployment of improved, "best-of-breed" business processes, bringing faster cycles, lower costs, better customer service, increased cross-selling, and increased productivity across the merged enterprise, are other major M&A benefits. But many M&A deals fail to yield the hoped for synergistic benefits, and the complexity of IT integration is often a big cause. Advanced VAIM/SOA connectivity platforms under an SOA approach *(see # 2 below)* drastically simplify and speed these complex system/AI transitions, and ensure that M&A benefits are landed faster, at lower risk and cost. *(Ranked # 1.)*

**# 2. To Support Enterprise SOA Initiatives:** SOA adoption has passed 11,000 medium-larger enterprises worldwide *(at date of writing)* with still wider adoption projected for 2009-2012. Figure 2 on page 9 shows facts, findings, and forecasts that highlight this mass scale of SOA adoption. Its dramatic rise since 2003 came because SOA was the most business-transforming software architecture of commercial IT's fifty-year history. SOA brings decisive advantages over earlier, monolithic and/or component-based, application architectures. SOA lets users integrate and reuse existing applications as callable services, via Web services-based open standards, linked to newly developed services. SOA directly helps enterprises transform their core business processes *(enabling improved BPM intrinsic to SOA)* whilst integrating/delivering new composite applications made up from linked software services that support/enable that improved process. This brings much closer business-IT alignment, greater flexibility, and faster changes. SOA's connectivity aspect is based upon ESB products that interconnect these software "services" over the enterprise in a "links-lean" fashion. These SOA ESBs are in turn underpinned by the "SOA messaging backbone" of an advanced VAIM platform, providing the application component integration/communication services needed to link services/components across all platforms. Full SOA can be implemented incrementally, step-by-step, and area-by-area, for early payback on modest investments.

SOA is crucial for all enterprises aiming to better-integrate their processes, people and information, those who want to streamline their core business processes, and be better able to respond to fast-changing demands quicker. SOA therefore supports business integration, process integration, and people integration, and applications connectivity is fundamental for all of these. SOA based on VAIM/SOA connectivity middleware also has much to offer for the IT integration of business mergers, as per # 1 above, and to the issues of # 3 below. *(Ranked # 2.)*

**# 3. Business Transformation, Cost Reductions, and Downturn Survival:** This powerful, collective driver will be high on boardroom and IT leadership team agendas at all enterprises affected by the credit crunch and global economic downturn. From their intense discussion will flow numerous revised business strategies, major decisions on business model changes, new opportunity-driven M&A considerations, and crucial new business improvement investment plans. All of these *(whichever other driver type they fall under)* require extensive IT support, and all will involve extensive additional applications connectivity requirements. For IT to be able to meet these imperative, urgent, and critical demands fast enough, extensive use of an advanced VAIM/SOA connectivity platform is a strategic business necessity, not a technology choice. *(Ranked # 3.)*

**# 4. Regulatory Compliance & Corporate Governance Mandates:** Today's still large wave of regulation/compliance demands, are placed on enterprises in most marketplaces and geographies, remaining a continuing important driver of applications connectivity projects for the next several years. Such initiatives already placed more stringent demands for assured integrity, security, risk reduction, traceability *(and other such attributes)* on their regulated organization sets, than previously demanded. Indeed, with the extreme turmoil seen in 2008 across the global financial services industry in particular, much more new regulation is being urgently demanded by governments, stock markets, investors, economists, and the global general public. Regulatory regimes often place much pressure on the enterprise IT systems supporting core business, usually involving complex new applications connectivity links. Efforts to improve corporate governance continue to lie behind many of these regimes, but management of risk, the preservation of value, and the need for better accounting integrity, all now take on new levels of global importance. These regulatory issues will thus continue to be a significant concern of boardrooms everywhere. We amplify and discuss this important applications connectivity driver more fully in Appendix C on page 44. *(Ranked # 4.)*

**# 5. ERP, CRM & SCM Application Package Integration with Other Enterprise Systems:** Several $100Bs was spent worldwide since the mid-1990s to buy and implement a new generation of horizontal *(cross-industry)* client/server enterprise package applications. ERP, CRM, SCM and Product Lifecycle Management *(PLM)* were the four top such categories. SAP and Oracle were the largest two vendors. Original implementations were major, time-consuming efforts, because of the customization, and the many applications connectivity links needed to connect these *(originally monolithic, proprietary applications)* to users' other applications. Over the last two years, leading ISVs have grown new-generations of their packages, based on SOA architectures and for the Web. These improve their openness/integration options greatly. Leading VAIM/SOA connectivity platforms today now also offer mature, refined, standard adapters/connectors to the major packages *(and versions)* greatly simplifying applications connectivity. Major vertical industry-specific applications packages also became strategically important solutions in some industries, including banking, insurance, telecommunications, retailing, and healthcare, some from industry-specialized ISVs, others from the majors. Implementing such vertical solutions also needed big applications connectivity efforts to hook them up to customers' other applications. Such vertical ISV solutions are also now adopting SOA technologies for greater openness and easier applications connectivity, with many now re-basing onto a leading VAIM/SOA stack *(mainly IBM or Oracle)*. These newer generation, horizontal and vertical ISV enterprise application packages, re-architected for the Web and SOA, have kicked off a fresh, decade-long new cycle of older package replacement. Many thousands of ISV customers will migrate to these newer, server-centric, Web browser client-based, more consolidated instance, SOA-enabled enterprise application solutions over that time. These migrations will all require large additional numbers of applications connectivity links, which powerful VAIM/SOA connectivity middleware can best support. *(Ranked # 5.)*

**# 6. "Web 2.0", Social Networking, Enterprise Mashups, & Web-extended "Legacy" Applications:** Since 1997, a long-running, large-scale driver of many new applications connectivity links was e-business, the global migration of business onto the Web. Creating online Web B2B, B2C and Business-to-Partner *(B2P)* applications required a profusion of new applications connectivity links to interconnect their newly-written functionality to legacy in-house applications, enterprise package applications *(such as those in # 5 above)*, and ecosystem partner applications/services. Web portal solutions also enjoyed huge success, by providing integration and unified delivery of applications and information via their common Web user interface, needing extensive applications connectivity to feed them. Most analysts now categorize this Web-centered integration under the broader SOA banner, with its newer Web services technology and true open industry standards-based, componentized integration approach. The newest, so-called **Web 2.0 generation** of rich-media/User Interface *(UI)*, social networking, user-contributed content, and/or enterprise mashup applications is today generating another rising wave of this type of development. Whilst closely related to # 2 above, this driver is so widespread, and so much discussed, that it merited being called out here. *(Ranked # 6.)*

**# 7. Newer Technologies Driving Applications Connectivity Initiatives:** Another important driver of new applications connectivity link needs are some newly-emergent technologies that must each be closely linked with existing systems. Four examples illustrate this group. **Pervasive/mobile computing**, connecting workforce mobile devices to corporate systems has spread widely in recent years as a productivity/communication tool for increasingly mobile workforces, using mobile devices such as cell-phones, pagers, notebook PCs, and handheld computers, etc. All such pervasive and mobile computing deployments require extensive applications connectivity links. The rapid rise of powerful smart phone platforms, in particular, is accelerating this one rapidly. Already at mass-market volumes, low-cost **Global Positioning System *(GPS)*-enabled navigation/location devices** *(car, personal, and mobile phone satellite location and navigation)* have already spawned many new location-specific application solutions and services, with more expected. Another, also now gathering real business-use momentum, is **RFID *(Radio Frequency Identification)***, which promises to allow dramatically better tracking of supply chain and inventory/goods throughout their manufacturing, transportation, distribution, sale and "in-service" lifecycle phases. RFID is now moving beyond pilot and Proof-Of-Concept *(POC)* trials to real deployments, each generating floods more data, and always requiring applications connectivity links with existing systems, plus also needing specific new RFID-supportive software. Other digital **Sensors and Actuators-based systems** are another growing, newer technology class with volume applications spreading – for example, the remote monitoring of instrumented pipelines, process or manufacturing plants, and transportation systems. Falling costs of digital sensors allow these to now be more widely attached to detect statuses, and of actuators to change plant/equipment controls, both able to be remotely monitored and operated over networks. *(Ranked # 7.)*

**# 8. Vertical Industry-specific Standard and Integration Initiatives:** In some vertical industries, networks, exchanges, and markets, data interchange standards are already important in that industry's ecosystem. These all require considerable applications connectivity between enterprise applications of industry network members. Early examples included the Society for Worldwide Interbank Financial Telecommunication *(SWIFT)* network for financial message exchange standards for interbank transactions, the Société Internationale de Télécommunications Aéronautiques *(SITA)* network and its protocols in the airline industry, and many others. Recently emerging are fundamental new models/standards, such as Health Insurance Portability and Accountability Act *(HIPAA)* 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. The national standard interfaces that integrate bank systems to national clearing systems in each market, are other typical examples. As more industries understand the large benefits and cost-savings such industry-wide initiatives bring all participants, their number has steadily increased. Most such standardization and integration initiatives are also now moving to incorporate open Web services and SOA underpinnings, for further convergence and savings. All of these initiatives need extensive applications connectivity by enterprises participating in that network, and VAIM/SOA middleware provides the best means to connect up. *(Ranked # 8.)*

**# 9. Enterprise-specific Applications Connectivity Projects:** There are also many other company-specific applications connectivity links needed. These we combine in this last catchall category, as they fall outside the other drivers mentioned above. *(Ranked # 9.)*

Few enterprises will experience all nine of the above drivers in their business development roadmap at one time, but many firms will be engaged with at least three or four. Several of these drivers are also closely interrelated. All require considerably extended applications connectivity capability, and all benefit hugely from using powerful VAIM/SOA connectivity solutions that simplify applications connectivity dramatically.

## Our Analysis

SOA became the most important new architecture for business applications in IT history, and mass enterprise adoption is progressing rapidly. SOA provides new flexibility, adaptability, tighter business-IT alignment, easier reuse of existing software assets, and many new ways of more easily integrating the enterprise's business processes, people and information. SOA is based on ESB products that provide a standardized, simplified, top-level means of communicating between application and system "services" *(or components)*. ESBs are in turn underpinned by the same VAIM-based "SOA messaging backbone" technologies that long provided the most effective applications connectivity solutions, extended with SOA's support for event-driven interactions *(CEP)*, and BPM. SOA's further advances in applications connectivity will thus motivate thousands more enterprises to early SOA adoption, implicitly following our advice to use a common, strategic VAIM/SOA connectivity platform. This VAIM/SOA connectivity combination allows today's enterprise application software to be reused as services in next-generation SOA business applications, in an incremental manner, quickly and easily.

Our nine major drivers discussed above will continue to increase applications connectivity demands substantially for years to come. Major business transformation savings and benefits accrue from many such initiatives, now more vital for enterprise survival and/or continued success through this troubled 2009-on period.

*We also recommend that these enterprises standardize on the best available, single integrated VAIM/SOA connectivity middleware stack...*

Enterprises must equip to meet these large future applications connectivity requirements *(from their own mix of our drivers)* more productively than in the past, and must avoid adding new future burdens of legacy applications connectivity link support. We urge all enterprises *(yet to do so)* to now standardize applications connectivity upon the far more productive VAIM/SOA platform-based approaches for all their new applications connectivity projects. We also recommend that these enterprises standardize on the best available, single integrated VAIM/SOA connectivity middleware stack – to minimize duplication, and to better share skills and learning faster, across their enterprise.

Especially in the current business climate, all enterprises yet to adopt a common VAIM/SOA connectivity platform enterprise-wide, and enforce its widest use, should definitely do so now, wherever upon their SOA adoption roadmap they stand. *(See Section 7 for our guidance on how to select.)*

The large enterprise inventories of these older, custom-programmed applications connectivity links cannot easily be swept away overnight. We recommend these old links should be systematically replaced *(not be patched-up again)* whenever the linked applications receive business-justified upgrading. Applications being moved onto SOA provide another good opportunity to retire many fragile, costly, older custom applications connectivity links, replacing them by far fewer, de-coupled SOA links. Following these recommendations will reduce legacy AI link maintenance burdens, and sharply cut business risks, at modest incremental costs, through on projects already committed to. Migrating the enterprise away from current dependency on these serious danger points should be achieved as quickly as possible.

# 4. Sizing the Application Integration Challenge

## Measuring Applications Connectivity Challenges?

How big is the applications connectivity challenge for large and small business enterprise from 2009? We found that three observable metrics broadly determine the amount of applications connectivity/AI needed by an enterprise/business:

- **Enterprise/Business Application Portfolio Size:** The number of applications in the customer's portfolio is an obvious determinant. Most IT groups recognize/use this metric; enterprise application architecture charts and/or inventories commonly summarize the application portfolio. Their typical size and complexity was graphically illustrated in Figure 1 on page 5. Year 2000 portfolio cleansing retired/replaced many earlier obsolete applications, and funded refreshes of many others. Enterprise package deployments eliminated other older legacy applications. Post-2000 cost-cutting/modernization/consolidation further trimmed portfolios. However, many new vertical, e-business, Web, and now SOA applications, have been added. Overall, enterprise applications portfolios are in rather better shape today than in 1999, but most are in urgent need of further heavy simplification, de-duplication, and rationalization.
- **Number of Potential Integration Point Links:** Our second metric is how many "integration point links" does the business now need? Both internal links *(Internal Integration Point links – between the enterprise's own internal applications)* and external links *(External Integration Point links – between external ecosystem applications and internal systems)* must be considered, their sum being the total Number of Potential Integration Point *(NPIP)* links. Most enterprise application portfolio charts show currently implemented applications connectivity/AI links, and dotted lines sometimes indicate new links needed/planned. Traditional point-to-point NPIP rises exponentially with the size of application portfolio, and with the size/complexity of the firm's external ecosystem. Under an SOA approach using an ESB, each software service needs only one link to the ESB, dramatically reducing the number of actual integration links that need be supported under an SOA.
- **Number of Different IT Platforms:** The more different IT platforms used to support an enterprise applications portfolio *(internal and external)*, the more complex, difficult, and costly applications connectivity implementation and support becomes. It is invariably easier, faster, and cheaper to integrate applications running on the same IT platform, than to integrate across those running on different IT technology platforms. Consolidation/simplification/virtualization of platform infrastructures has been in progress for the last five years, but still has far to run; overly complex distributed server sprawls are still a major problem. We still encounter large enterprises using over 20 different IT platforms – the extreme end of the heterogeneous platform spectrum. But many smaller businesses do run on a single, or just a couple, of IT platforms. An important further SOA benefit is the transparency, isolation, and platform independence SOA's open connectivity and communications standards bring to multi-platform applications and their interconnection.

We found wide variations in these metrics across different industries and sizes of enterprise, depending on their IT histories, platform preferences, and the typical application portfolios that have evolved in each industry. For example, larger banks long used in-house application development for core systems, based on centralized mainframe platforms, but have added many other applications and platforms around these central systems since. In contrast, many large/medium-sized manufacturing firms moved to standard, pre-integrated and packaged, ISV-provided ERP software for their core manufacturing/inventory/distribution/financial applications from the mid-1990s.

## Findings by Size of Company

Figure 4 shows average values of our metrics *(from many research sources)* for four classes/sizes of organizations that use most of the world's IT. These 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. *(The latter excludes firms with under 10 employees, typically the threshold for IT above PCs, and so excluding many millions more smallest firms.)*

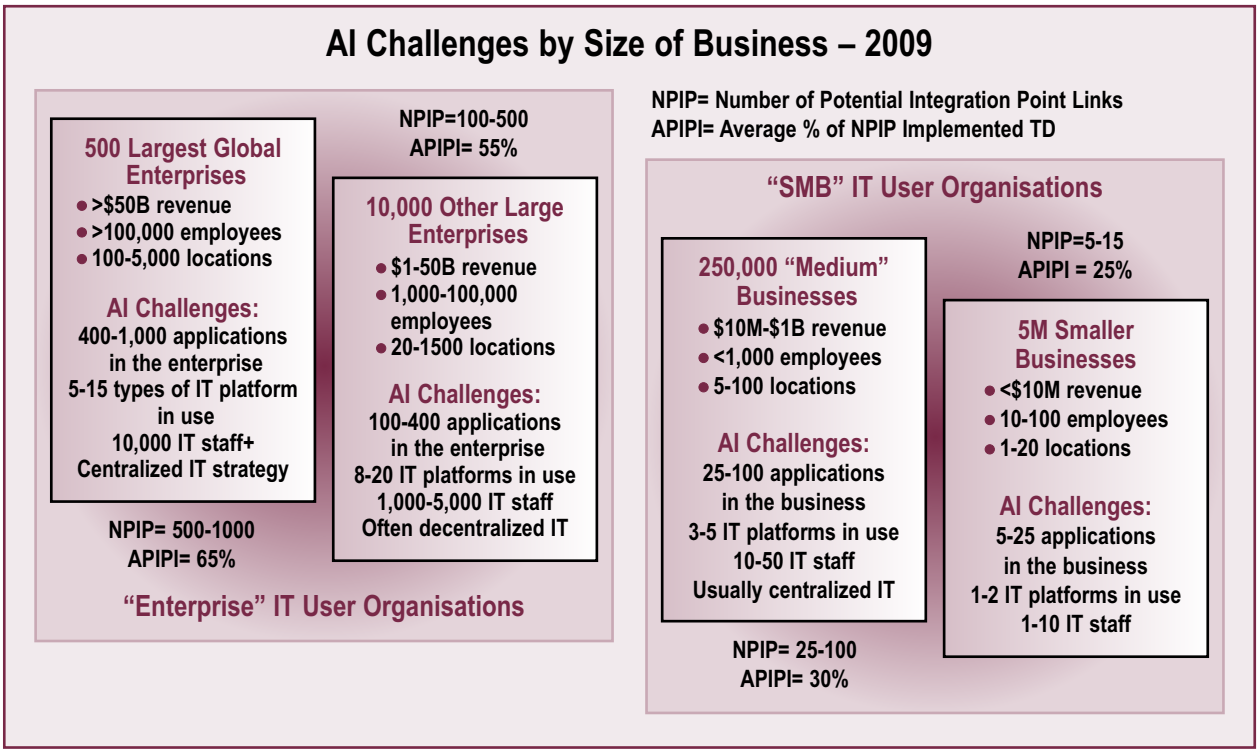


**Figure 4: AI Challenges by Size of Business – 2009**

Our chart shows broad average business size metrics, IT environment size – by application portfolio, number of different IT platforms used, and the number of IT staff – for each class/size. From Figure 4, the findings by size of enterprise can be summarized as:

- **The 500 largest global enterprises**, giants with revenues over $50B, and usually with more than 100,000 employees, commonly employ 10,000 plus IT staff, and support portfolios of 400-1,000 enterprise applications. *(NPIP= 500-1,000.)*
- **The next 10,000 largest enterprises** typically have $1-$50B in revenues and 1,000-100,000 employees, with applications portfolios averaging 100-400 applications. *(NPIP=100-500.)*
- Our **next largest 250,000 medium enterprises** typically generate $10M-$1B in revenues, have up to 1,000 employees, and run average application portfolios of 25-100 systems. *(NPIP= 25-100.)*
- Our **"smaller businesses"** class, at the lower end of our size scale, have revenues of up to $10M, 10 to 100 employees, and typically have 5-25 applications. *(NPIP= 5-15.)*

Other IT market research studies provided these broad IT market demographics. Enterprise application portfolio sizes and NPIP estimates come from enterprise application portfolio reviews for each size category across industries and geographies encountered in our analysis work.

## How an SOA Messaging Backbone, ESBs, and SOA Dramatically Simplifies AI

Where only traditional point-to-point application integration is used, the number of connection links potentially needed grows exponentially as the size of application portfolio increases. For complete Point-to-Point *(PTP)* connectivity, linking every pair in a portfolio of "n" applications, up to n**(n-1)*/2 links are theoretically required. So a 25 applications portfolio could require up to 300 links, a 100 applications portfolio up to 4,950 links, and a 1,000 applications portfolio up to 499,500 links, a frightening combinatorial explosion. In reality, many pairs of applications are completely unrelated, needing no interconnections, so the practical numbers of PTP links needed will normally be far lower. *(Practical NPIP averages were shown in Figure 4 on page 15.)*

However, when linking one complex, traditional, monolithic application to another with a single applications connectivity link, the depth of logic and the complexity of functionality of such links are often high. This is because each link must provide code to cater for all the possible interchanges between the pair of applications, as well as all the interchange functionality needed. Alternatively, each pair of applications will require a number of simpler links to be built. Whichever the case, substantial development, testing, debugging, and maintenance efforts are needed just to fully connect any two significant applications. The size of this link development task is symbolized by case 1 on the left of Figure 5. Multiply that large, single-pair link effort/cost by the hundreds of PTP links actually required, and the massive burden of integrating typical-sized enterprise application portfolios using PTP links becomes abundantly clear.

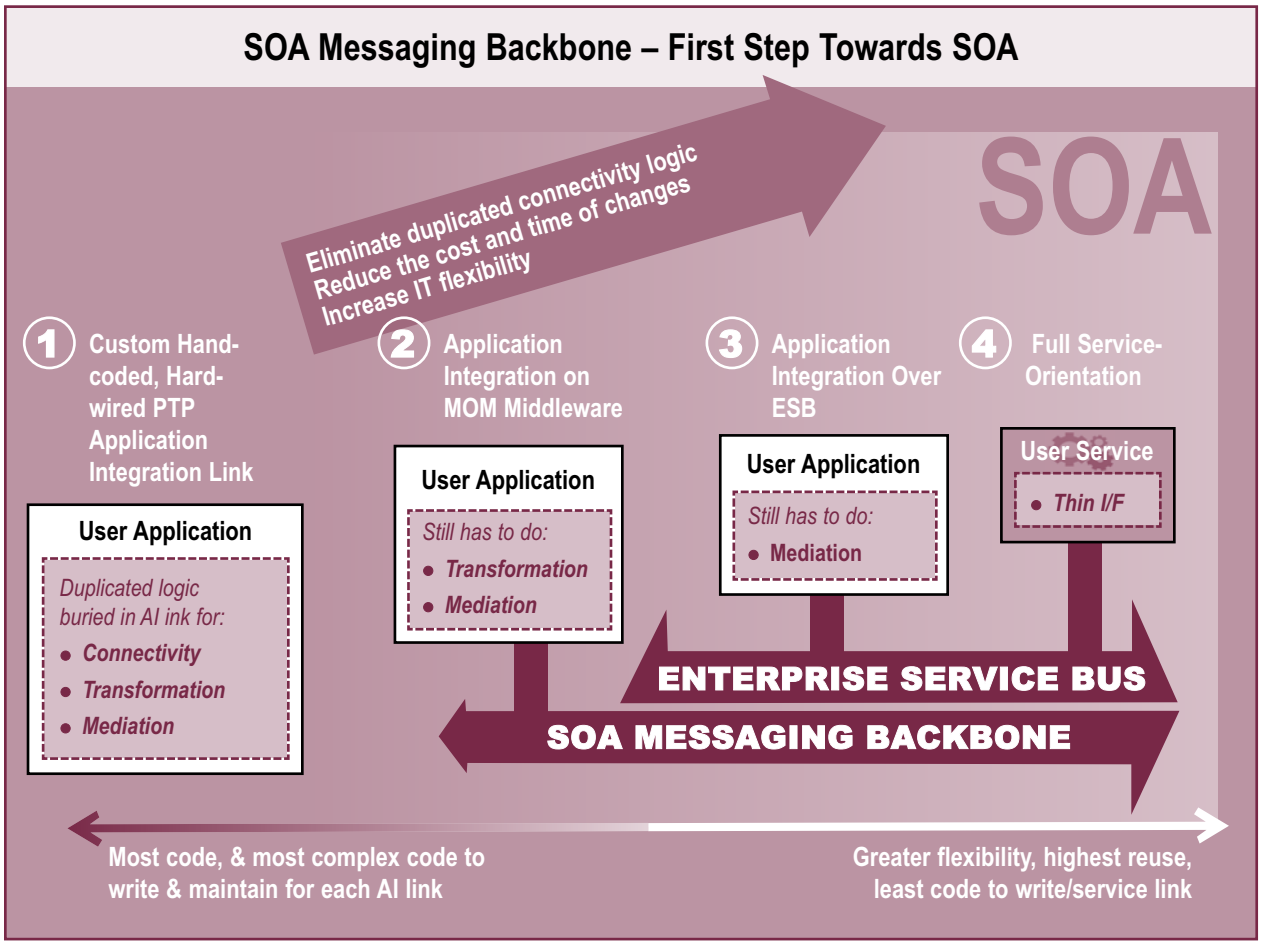


**Figure 5: SOA Messaging Backbone – First Step Towards SOA**

Moving application integration onto a VAIM-based messaging backbone platform, case 2 in Figure 5, shows the considerably smaller applications connectivity link development task now needed, because the middleware now handles all the connectivity aspects. Case 3, application connectivity over an ESB atop an SOA messaging backbone *("SOA connectivity")*, further reduces the applications connectivity link development task because the ESB now handles transformational functionality. The full SOA implementation, case 4 on the right of Figure 5, requires the lowest service link development, as mediation functionality is also now provided by the SOA infrastructure. With cases 3 and 4, most PTP direct connections between pairs of applications to be integrated *(as is the case for custom-built links – cases 1 and 2)* are eliminated. Each application *(case 3)*, or service *(case 4)*, now needs only a single connection link to the ESB *(or to each ESB if several are used)*, with the ESB providing the connectivity to every other ESB-connected application service.

As a user migrates from case 1 to 2, 3, and to case 4, the greater VAIM/SOA connectivity middleware functionality provided at each step sharply reduces the time/effort/cost needed to develop, debug, test, and maintain each application or service interface link. The link code needed becomes smaller *("thinner AI interfaces")* from left *(the application-to-application PTP case 1 above)* to right *(case 4, full SOA)*. Typical business services in an SOA are usually designed as relatively coarse-grained, substantial functionality components – perhaps of the order of 8-10 main services providing the equivalent functionality of substantial traditional application.

## Our Analysis

We draw the following conclusions from our applications connectivity indicative research picture:

- **Applications Connectivity – Universal Need:** Applications connectivity is a universal need in every size and type of business, from the largest global firms downwards. Improving business processes demands better integration between their previously siloed applications. Today's much higher dependence on IT applications, and their much greater diversity, has greatly expanded applications connectivity needs, which have spread into even modestly-sized smaller businesses.
- **Enterprise Application Portfolio Sizes Now Extensive:** The size and complexity of enterprise application portfolios has extended dramatically since 1990, for reasons described earlier, and today frequently reaches 1,000 applications in the largest enterprises. Indeed, some enterprises this analyst has seen have enumerated over 5,000 applications! With such overlapping, complex patchworks of many generations, instances, and types of applications, the total applications connectivity need is obviously huge. Portfolio rationalization, de-duplication, and application consolidation is thus also urgently needed by many enterprises. Unfortunately this is a slow, complex, and difficult-to-implement task, which can often only be justified where a business transformation ROI case can be made.
- **Larger Enterprises Face Greatest AI Challenge:** Our research clearly indicates that the bigger the business, the larger their applications connectivity/AI challenges. For example, our best estimate of NPIP for the top global 500 was that *(on average)* 500-1,000 significant integration point links were needed; for the next 10,000 largest enterprise, the NPIP average needed was 100-500, and even for the smaller businesses, it was 10-25. Significant percentages *(100% – Average Percentage of Integration Points Implemented (APIPI) links needed on Figure 5)* of 35%, 45%, and 70% of required applications connectivity work remains undone to date, we found, pointing up a big need for improved approaches to deliver this for less effort/cost.
- **Number of IT Platforms Drives-up AI Costs:** Using multiple IT platforms *(as most enterprises still do)* greatly adds to application connectivity/AI costs/efforts. Interestingly, the largest 500 global enterprises have lower platform diversity *(5-15)* than the next 10,000 enterprises *(8-20 platforms average)*, because the former operate more centralized IT governance with stricter platform diversity controls. It seems the second group devolved more IT governance to their Line-Of-Business *(LOB)* units in the 1990s, resulting in their wider platform diversity. Our class of "medium businesses" were much less diverse, averaging 3-5 different IT platforms in use, so facing less of an applications connectivity challenge.
- **Small Businesses Use Standard Package AI Options:** The few million "smaller businesses" *(20-100 employee range)* typically use networked PC platforms, and/or System i, often with integrated Small to Medium-sized Business *(SMB)* business application suites, providing their commercial applications. The extensive internal and standard external interfaces, provided in these suites, standard tools *(e.g. Microsoft Office)*, plus external Web-based services *(such as e-banking)* meet many integration needs amongst this large group of small firms. For those reasons, this Paper thus excludes this class from further discussion.
- **Growing AI Demand, Much More Still Needed:** Applications connectivity/AI needs grew rapidly with these expanding application portfolios since the mid-1990s. In larger enterprises, a few hundred integration links have often already been implemented, but many more are needed, fuelled by M&A, SOA adoption, business transformation, regulatory compliance, and the other drivers shown in Figure 3 on page 11. Far too many links implemented to date, according to our research, were hard-coded and of PTP type, many using the primitive methods highlighted in Section 5.
- **Hard-coded AI Links = Heavy Link Support Burden:** Supporting hard-coded, PTP AI links *(and their software, scripting, and operating processes, etc.)* consumes too much skilled developer/support resources better used for new developments. Their support, maintenance and modification effort is so high because these integration links are highly sensitive to changes/failures. Any changes or new releases to the applications, their platforms, the operating systems, or to networking transports, such as new releases, changes in protocols, hardware or software failures, etc., can all easily "break" such links. Because these events happen so frequently, they demand large support efforts to keep all such integration links running, worsening total effort with each new addition.

To best implement new applications connectivity needs, we recommend that enterprises **review their integration approach**, and change the methods and technologies they actually use for applications connectivity. Unless they do so, they will continue adding to their 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 applications. These are serious risks and burdens no modern business should lightly assume at a time when most need to move faster, be more flexible, increase IT responsiveness, and connect up better with their ecosystems.

Blending and integrating many parts of the existing application portfolio with new components, and thereby incrementally improving the applications, remains the only feasible, affordable and realistic way forward for most organizations. SOA is increasingly the architectural approach and enabler for this renewal and integration.

# 5. What Application Connectivity/AI Options Are in Actual Use Today?

## Introduction

Section 4 highlighted the high effort and costs that enterprises face to develop and implement the new applications connectivity links they need, as well as supporting all those built to date. So what technology approaches did companies actually use to implement their applications connectivity links inventories up until now?

*Whilst VAIM adoption has indeed been substantial, the reality we found, across the whole inventory of AI links deployed to date, was surprisingly different.*

Many readers will recall loud, extensive marketing from applications connectivity middleware vendors since the late 1990s. From their noise, gentle readers might easily assume VAIM-based solutions, by now, must be quite dominant in deployed AI link inventories a decade later as 2009 begins. Whilst VAIM adoption has indeed been substantial, the reality we found, across the whole inventory of AI links deployed to date, was surprisingly different.

## So How Are Enterprises Actually Performing AI Today?

When we first conducted this research in 2005, we discovered surprising, even frankly astonishing results. We used market reviews, other published analyst studies, talks with scores of enterprise customers, software vendor feedback, and SI project systems consultant *(well placed to give objective assessments)* feedback. We updated this research to end-2008, and have identified the now six approaches most widely used to implement applications connectivity to date. These are shown *(in descending frequency of use order)* in Figure 6 below.

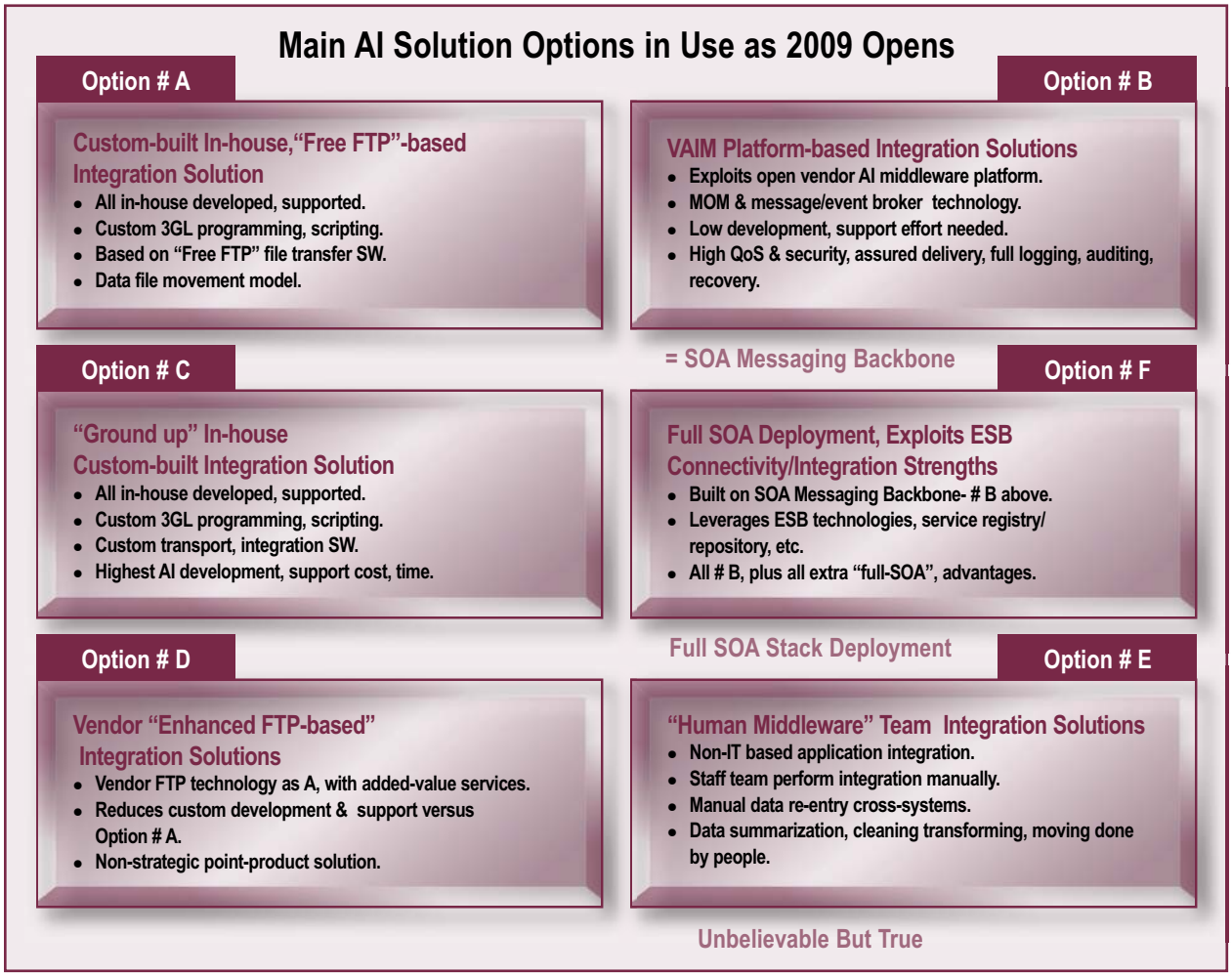


**Figure 6: Main AI Solution Options in Use as 2009 Opens**

We explain, characterize, and discuss the merits and demerits, of each approach below:

- **Option # A – Custom Built "Free FTP"-based, In-house Integration Solutions:** The still most widely-used applications connectivity approach was "custom-built, free FTP-based, in-house integration solutions". FTP is the standard file transfer capability in TCP/IP networks. Simple FTP programs come with operating systems, or are free from elsewhere. Applications connectivity requires data movement from one application to another. This approach wraps basic FTP file transfer operations *(from the FTP package)* in custom 3GL-coded integration logic. This may perform transformation, aggregation, cleansing, and validation, etc., on file contents, often complex. A scripting layer, to manage transfer operations and add basic control services, is usually added. These are therefore complex, low-level software modules needing much development, test, debugging, and maintenance effort.

  Free FTP packages may cost nothing but offer no value-added services. Maintaining/supporting such applications connectivity modules consumes much skilled resource. Any environment change impacts them, typically disrupting each such AI link several times yearly. This triggers continual rework/re-testing, and generating high and recurrent maintenance/support burdens. Actual failure of such links is often the first signal that changes have taken place, so application service reliability/availability is also poor. This approach thus suffers serious, costly, and intrinsic problems. We were surprised, even shocked, that such a basic approach remains so widespread still. Why is this wide use so common? IT developers, like building-trades people asked to tackle a new household job, will mostly use basic "hand tools" from their immediately-available personal toolkit *(3GL, scripting, and FTP packages)*. They use these even when higher-powered, faster, more productive "power tools" *(which could safely do the job better/faster)* exist, but are not to hand. However, when their job prices become un-competitive against other trades-people using the better technologies, they adopt the higher-productivity tools.

  IT management should be greatly concerned at the costs/effort level this basic integration approach creates, but also at the business rigidity, lack of flexibility, and unresponsiveness, such hard-coded links cause.

- **Option # B – VAIM/SOA Messaging Backbone-based Integration Solutions:** VAIM products first emerged some 15 years ago, c. 1993. Leaders matured into today's comprehensive SOA messaging backbones, flourishing widely. The best provide robust, universal, now open standards-based means to integrate most applications over most platforms. They offer strong value-added services, leveraging the core technology of MOM. They allow loosely coupled applications connectivity by the exchange of messages between applications, and by message/event brokering. These value-added services sharply reduce the custom development work needed, by providing most of the "heavy lifting". Applications connectivity link coding is far less. Because the vendor supports environmental advances *(operating system, Database Management System (DBMS), networks, and standards)* far less link maintenance/support is required from customer IT teams. Once developers learn the relatively simple skills of using this middleware, successive projects are delivered far faster, with support burdens much lower. The QoS of these solutions in production is also far higher, because their standard value-added services *(including assured delivery, enhanced security, logging, and workload distribution, etc.)* provide much more dependable applications connectivity operations.

  Far the market leader here is IBM's WebSphere MQ *(WMQ)* family. WMQ also provides IBM's SOA Messaging Backbone that underpins the giant's now-extensive Smart SOA™ middleware stack. To illustrate what a category leader offers today, our assessment of the latest WebSphere MQ V7.0 family is presented in Appendix B.

  Such VAIM platforms are now deployed in near-100% of the 500 largest enterprise IT users, we found, but still in only just over 50% of the next 10,000 larger enterprises. However, these adopters are using VAIM only on integrations *(some or all)* completed after adopting this technology; they are also still using all their applications connectivity inventory links that pre-dated their VAIM introduction. Enterprises using Option # B are also now migrating rapidly to Option # C, because VAIM adopters are quick to appreciate the valuable extra benefits that full SOA offers, which therefore motivates them to upgrade. Because VAIM adopters have already moved to the integration/application architectural foundation that is best suited to supporting full SOA, the further step-up to such full SOA deployment is not large.

- **Option # C – SOA-based Application Connectivity & Integration:** Similar to Option # B – based on embedded VAIM messaging middleware – extended into a full SOA environment. SOA global adoption has been strong since 2003 *(we estimate 11,000+ enterprises using at end-2008)*. The technologies use to solve enterprise applications connectivity/integration challenges was a strong SOA adoption driver. SOA also offers extra advantages over Option # B *(which it incorporates)*. Other top adoption drivers were BPM, software service reuse, and people interaction/collaboration. SOA adds an ESB *(or ESBs)* layered above the SOA messaging backbone transport provided by VAIM messaging software. Only one link to the ESB per service is needed, and each such interface is smaller and faster to create than within Options # A or # D, because the SOA middleware functionality is highest *(including connectivity, transport, transformation, mediation, security, and recovery, etc.)*. SOA-based applications connectivity also needs the lowest effort/cost to maintain/support, and is the fastest and easiest to change/adapt for business changes. SOA also further simplifies applications connectivity across disparate IT platforms, with SOA middleware best isolating and abstracting developers from platform issues. An SOA vendor maintains their stack for all new hardware, operating systems, databases, networking, and other underlying platform environment changes; thus users' SOA applications are far more robust, and less affected by such changes. SOA provides extensive support for dynamic changes at run-time, for example to make dynamic lookups *(calling services)* to locate assets or to run business rules, a substantial further step in flexibility beyond the more static form of integration offered by VAIM.

Contrast these SOA advantages with the custom-coded Options # A, # D, & # E, where environment changes of any kind at either link-end often bring these custom-coded AI links crashing down – these are immensely fragile to such changes that occur all too frequently in every IT shop.

- **Option # D – Custom-built, "Ground-up", In-house Integration Solutions:** Similar to Option A, without the FTP package. Here, all the applications connectivity "heavy lifting" is developed/supported by the customer, using solely custom 3GL programming, scripting, and standard interfacing facilities. The latter may include application exits/interfaces, operating systems services, utilities, Database/Transaction Processing *(DB/TP)* system options, sockets programming, or the use of remote procedure calls. Some of these may be relatively stable interfaces, but custom-built integration solutions suffer all the time, cost, risk, maintenance burdens and other disadvantages of Option # A, without even modest productivity benefits of an FTP package.

  This type of applications connectivity also remains fairly widespread, often found on older/oldest applications connectivity links. Many are still used under the old IT principal of "if it ain't broke, don't fix it". Reworking old but still-running applications connectivity links is neither popular nor exciting. Most IT teams would rather do more interesting new development, and most LOB groups are reluctant to spend money fixing such software "plumbing", provided it apparently still works. But we analysts see these as costly "weak links" in applications infrastructures. Business inflexibility, unresponsiveness to rapid change, and highest applications connectivity links inventory maintenance and support costs, are unavoidable where this applications connectivity approach is widely used. Firms must repeatedly rework/fix such links as they are continually "broken" by the environment changes disrupting them. Poor service reliability, business rigidity, and lack of flexibility or responsiveness, are other hard-coded applications connectivity link negatives. Also, given their high/continuing costs/efforts, the business case for replacing them with more a robust, lower-effort approach *(e.g. Option # B)* is convincing.

- **Option # E – Vendor "Enhanced FTP-based" Middleware Point Integration Solutions:** The fifth most widely used approach. Similar to "Option # A. Several ISVs offer "value-added FTP-technology-based" applications connectivity products, aimed for various segments. Each offers base FTP file transfer plus select, value-added applications connectivity services geared to their market focuses. Sterling Commerce, for example, long offered such a product focused on Electronic Data Interchange *(EDI)*. For applications connectivity projects in their target focus, such products can provide sound point solutions for a niche need. The value-added services cut custom development, supplement basic FTP omissions, and may offer relevant standards support for their niche. Better such products thus offer worthwhile benefits over Options # A or # D, if fitting the need. But, as tactical point solutions for specific niches, they are not strategic applications connectivity platforms. The smaller vendors of most such offerings also pose vendor risks.

- **Option # F – "Human Middleware" Team Integration Solutions:** Amazingly, business change consultants found groups doing "human integration middleware" roles. Their staff run multiple silo IT applications, extracting information from one and re-entering in others, manually manipulate information, and/or provide human links to join fractured business processes, and to bridge gaps between IT systems/processes. Often located in LOB organizations, these groups grew as tactical fixes to overcome critical applications connectivity and business process gaps. They exist where complex, overlapping, yet incomplete and not fully connected application portfolios are present. Such portfolios contain duplication of application coverage, wide gaps between applications, and inconsistent and conflicting data versions, etc. Such groups "paper over the cracks" of these problems manually, and are clearly costly, unreliable, unnecessary functions. Finding one or more of these pinpoints good cases for early applications connectivity solutions, and for streamlined business processes built on SOA that will show high ROIs.

## Sizing the Enterprise Applications Connectivity Challenges

How many applications connectivity links are companies currently supporting, and how many more are needed in future? Figure 4 on page 15 gave our estimates of **average application portfolio sizes, average NPIP** *(Number of Potential Integration Point)* links needed, and **APIPI** *(Average Percent of Integration Points Implemented)* links needed to date, for the four enterprise/company size classes we defined in Section 3. APIPI averaged 65% for the largest 500 enterprises, was around 55% for the next 10,000 largest, averaged 30% for the next 250,000 medium businesses, and was at 25% for the 5M next smaller firms. We found each of the global 500 largest enterprises was already supporting several hundred existing applications connectivity links *(260-650 range average)*, and still needed to implement more than a hundred *(140-350)* more, for example.

Figures varied widely *(for each size of company class)* depending upon industry, firm complexity, and on application portfolio rationalization undertaken to date. These averages provide a useful problem-sizing guide. Large numbers of additional applications connectivity links are needed, with less than 45% of those needed yet implemented, except in the largest 500 firms. It also clearly means:

- **Enterprise burdens in continued AI links support/maintenance/updating** for their existing applications connectivity links *(the effort for which depends upon on how implemented)* are large. These burdens also increase as new applications connectivity links are implemented. Only when the enterprise changes to more advanced, productive applications connectivity approaches can it begin reducing these high maintenance burdens, per link and overall.

- **Enterprise new AI link development/implementation costs/efforts**, to put in the tens/scores of additional needed applications connectivity links per year, is a considerable annual new development effort, the level of which again depends on the solution approach adopted.

Restructuring and modernizing application portfolios should ideally be a continuous background IT process, but is mostly driven by business priorities, and to a degree by technology viability considerations. But for twenty years, most businesses focused more on adding new applications and solutions to support evolving business models and LOB units, devoting less effort to simplifying, rationalizing, and consolidating applications "spaghetti". Thus, enterprise application portfolio complexity reached the extensive levels reported in Section 3.

Complex, overlapping, duplicated and redundant application portfolios demand extensive applications connectivity to make disparate systems work together. Operating, supporting, and maintaining these complex portfolios, their applications connectivity links, and their underlying IT infrastructure, absorb most of the IT budget *(typically 75-80%)* to just stay at "status quo" level, leaving few IT resources free for new developments. Attacking this excessive complexity, overlap, duplication, and redundancy in application portfolios, and thus also reducing the applications connectivity links needed, is desirable for most enterprises, but practically hard to do with the conflicting priorities that IT departments always face.

Adopting advanced VAIM/SOA middleware that sharply cuts applications connectivity link development/maintenance time, effort, and cost several-fold should thus be a "no-brainer" adoption decision for CIOs and CTOs, as should then mandating its universal usage for all applications connectivity link projects within the enterprise once adopted. However, as with all advanced software infrastructure improvements, justifying the investments required to move up to VAIM or SOA remains a significant challenge, even when the IT team/CIO are fully convinced of the case.

Our top reason for re-writing this White Paper again for 2009 was to summarize/present all the strong arguments for adopting VAIM and SOA, and to provide clear quantification of the major productivity and cost saving benefits they bring. We also, once again, highlight the extremely high costs and risks that enterprises continue to incur when they still rely upon custom-coded applications connectivity links and fail to take advantage of SOA or VAIM. We anticipate our Paper's research findings, and benefits data on SOA and VAIM, will help hundreds more enterprises make realistic business/ROI cases to successfully justify new SOA or VAIM investments.

We also strongly recommend that enterprises review their existing IT infrastructures and application portfolios, seeking out high business priority, high-pain-point, and large benefit, application integration needs/opportunities, but which require relatively modest effort and investment to deliver. These "low hanging fruit" projects are an excellent means to start, or to spread, SOA or VAIM adoption, whilst easily justifying the expense, whilst building skills and positive experience. IBM offers customers an existing infrastructure HealthCheck service that seeks out just such high ROI infrastructure improvement opportunities, as well as recommending specific solutions.

We also recommend a disciplined process for enterprise application portfolio improvement that is business-priority-driven, systematic, and organized. Realistically, this process must include:

- Implementing new enterprise applications *(ISV packages and custom-built)* by strategic business priorities, but also eliminating and retiring as many predecessor applications as possible, reducing duplication/overlap, in a combined upgrading and cleaning-out process.
- When modernizing/updating existing applications for business needs, simplifying, rationalizing, consolidating, and de-duplicating all applications concerned, as part of the modernization/update effort, reducing footprints, and trimming future support costs by simplification.
- Adopting/deploying strategic technologies *(SOA and VAIM)* that bring escape from the deadlock of existing applications portfolio and custom-built applications connectivity links support. SOA adoption allows de-duplication, simplification, and rationalization of existing applications, whilst delivering high-value business process transformations, in a business-process-by-business-process incremental fashion.
- Conducting regular application usage audits to identify unused, lightly-used, or low-value applications that have become obsolete and are at their end-of-useful-life, phasing these out as soon as possible.

The vital, parallel IT process of reviewing, updating, virtualizing, and consolidating IT infrastructures continues as a top priority for most enterprises today, but still has further to run even after past years of such efforts. *(The June 2008 Goldman Sachs IO Survey ranked server consolidation # 1, server virtualization # 2, and AI as # 3 highest, of 2009 CIO priorities.)* Rationalizing and consolidating IT system platforms demands rationalization and consolidation of the application portfolios these servers are running, thus also forcing substantial application portfolio improvement.

Both processes will also create additional applications connectivity link needs. Many older, existing links need replacing with more modern and secure solutions. Thus, a continuing flow of applications connectivity development/replacement can be expected for the foreseeable future in all sizes of business. Indeed, today's emphasis on business transformation, modernizing core business processes, and on adopting SOA technologies is accelerating these demands. SOA connection architectures themselves dramatically reduce the number of links needed and the efforts required.

## Relative Costs/Efforts of Different Applications Connectivity Approach Options

How different are the costs and efforts between the alternative applications connectivity approaches used today? How do these affect an enterprise's total maintenance and support effort/costs for their existing applications connectivity links inventory, and for new applications connectivity link development effort and cost budgets?

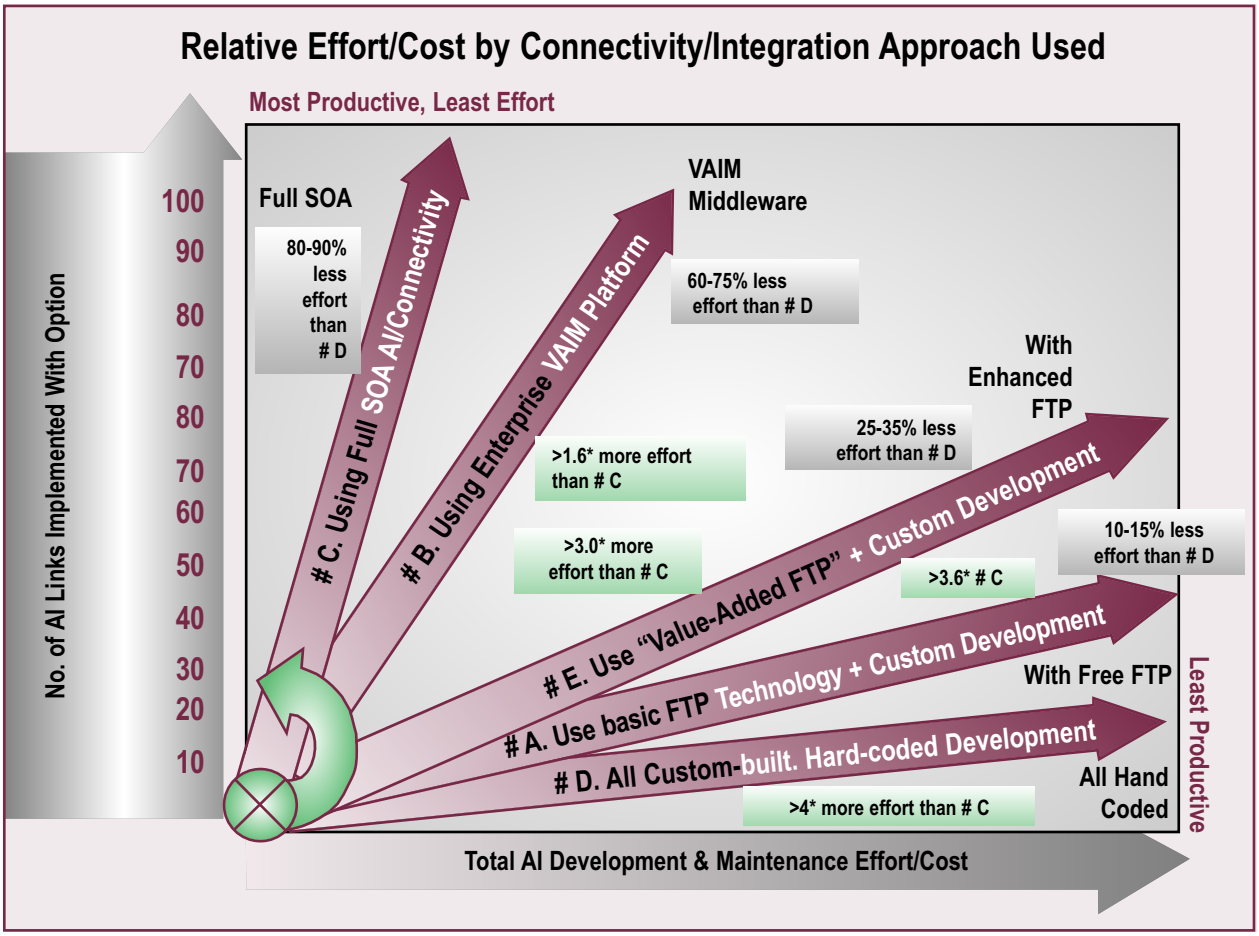


**Figure 7: Relative Effort/Cost by Connectivity/Integration Approach Used**

Our findings on these topics are summarized in Figure 7. The chart's x-axis shows total development costs/efforts to implement and maintain a given number of applications connectivity links. The y-axis shows the total number of applications connectivity links built *(or to be built)*. The five large, sloping arrows each shows the relative productivity of one of the five IT-based applications connectivity link Options above. The steeper an arrow's slopes, the higher that Option's development productivity, and the lower its development costs. The arrow slope also represents relative maintenance/support costs. We established the relative development effort/cost levels reported here, for the five different approaches, through discussions with enterprise and SI development managers experienced with all five applications connectivity options. Our research clearly showed:

- **Option # C – Full SOA** – is much the highest development productivity, and the lowest development cost approach *(shown left)*, requiring on average **80-90% less development effort/cost** than the least productive Option # D *(All hand coded)* approach. Full SOA is already the third most frequently used applications connectivity approach by end-2008 – climbing fast we found. Full SOA adoption, using a leading SOA platform, also provides the most advanced, comprehensive, and strategic long-term solution to current and future applications connectivity needs, and offers other big advantages, so is recommended by us as the fullest, best applications connectivity solution.

- **Option # D – All Hand Coded** – the lowest productivity and highest development cost approach *(shown bottom right)*, requiring **over 4-times more development effort/cost than the most productive Option # C** *(Full SOA)* approach above. Despite these highest development/maintenance costs, and being the most fragile and unreliable, we found large numbers of such all-custom-built applications connectivity links still in service, many older than cross-inventory average. These should now be high priority for early replacement. This approach is intrinsically highly labor-intensive, needs most code written, and requires high skills in the environments *(application and systems)* being integrated, often scarce for older technologies, sources of its highest costs.
- **Option # B – VAIM Middleware-based** – is the second highest productivity and second lowest development cost approach after Option # C *(Full SOA)*, requiring on average **60-75% less development effort/cost** than the least productive Option # D *(All hand coded)*. VAIM-based solutions were the second most widely used applications connectivity approach at end-2008, although the SOA Option # C is now subsuming this base as adoption expands. Leading VAIM platforms provide strategic, enterprise-wide solutions addressing near-all applications connectivity needs. They also add SOA messaging backbones needed for fuller SOA. We recommend this approach to all firms yet to adopt VAIM, and/or intending to adopt SOA.
- **Option # A – Free FTP+ Custom** – is the second lowest productivity and highest development cost approach, taking an average 10-15% less development effort/cost than "worst case" Option # D *(All hand coded)*, showing a small benefit from basic FTP functionality. Option # A is still *(at the end of 2008)* the most widely used approach. Option # A requires **over 3.6 times more development effort/cost** than the most productive and lowest development effort/cost approach, Option # C *(Full SOA)*. We recommend moving such links up to either Option # B *(VAIM)*, or to Option # C *(Full SOA)* approach as fast possible.
- **Option # E – Enhanced FTP+ Custom** – nearest to Option # B, requires on average 25-35% less development effort/cost than "worst case" Option # D *(All hand coded)* approach. These productivity improvements stem from the value-added applications connectivity services vendors add around the FTP core in their packages. Option # E still needs **over 3 times more development effort/cost than the most productive Option # C** *(full SOA)*. These targeted, niche middleware products are only useful within their design-focus scope, and so cannot provide universal applications connectivity solutions.

Note the wide differences in development and maintenance efforts/costs between the five IT-enabled applications connectivity approaches most widely used at end-2008. **These reached over 4 times** *(and often far over 4 times)* **the effort/cost** where the lowest productivity approach *(All-hand-coded)* was adopted rather than the highest *(Full SOA)*.

Custom-built applications connectivity link development project to fully interconnect two significant applications *(one full AI link)* often incur man-months of development/test efforts. Project costs of from $20,000-$60,000 *(simpler cases)*, into the $100,000-$200,000 range *(for medium complex cases)* are common, with $0.5-$1.0M+ costs for more complex major projects not uncommon at commercial SI fee rates *(USA)*. Maintaining and supporting fragile, troublesome applications connectivity link easily adds 15-25% to initial development effort costs per year for their lifetime. They often require rework when frequent environment changes *(that always occur in complex IT infrastructures)* "break" the links, causing service disruption and often emergency-call-out-type urgent, stressful rework.

The largest 500 enterprises, we found, were each supporting/maintaining AI link inventories averaging 260-650 links each, and the next largest 10,000 enterprises were each supporting/maintaining AI link inventories averaging 55-275 links, at end 2008. We found that these classes of enterprise will need many more new links – often into three figures – over the next five years. Even the "largest 500 enterprises" class, essentially all of who have adopted VAIM middleware *(or SOA)* already, have rarely implemented more than about 45-50% of their AI link inventory with this more productive approach to date. Percentages were much lower in our "next 10,000 largest enterprises" class. So a significant majority of the total applications connectivity links inventory in service today, for all classes of business size considered, were built on the around 3-4 times less productive, custom-built approaches. *(Options # D, # A, & # E above.)*

Simple maths indicates the large sunken development investment made to create these existing AI link inventories. A 2005 Gartner study reported that up to 35% of total enterprise IT budgets globally were then being spent to maintain, support, and operate their accumulated applications connectivity links inventory. The further substantial VAIM and SOA adoption between 2005 and end 2008 have hopefully now improved that picture.

Another view on high applications connectivity spend is IT services industry revenues, which posted total 2007 sales of $748B, forecast to reach $819B in 2008*. Global development and integration services were $232.5M in 2007*, and were forecast to hit $256B in 2008, one third of total IT services revenue. Scores of major, and hundreds of smaller, third-party SIs and other IT service providers *(both onshore and offshore)*, deliver thousands of systems and applications connectivity projects, as well as application development projects, for enterprise customers each year, forecast to total $256B revenue in 2008.

* "Forecast: IT Services, Worldwide, 2008-2012", July 2008, Gartner news release.

Significant proportions of this are spent on "system integration", much of which, in turn, involves heavy applications connectivity. These firms also deliver many hundreds of new ISV package implementations, each of which also drives considerable applications connectivity work in most cases.

### Our Analysis

SOA-based architecture is now widely accepted as the best model for new-generation business applications, and SOA adoption has now spread widely to over 11,000 larger enterprises, across most industries and geographies worldwide. SOA is based on an ESB approach for universal application *(services)* connectivity/integration. ESBs are underpinned by an SOA messaging backbone provided by a VAIM platform, now based on open industry SOA standards. Adopting a VAIM platform in 2009 is therefore an excellent first-step entry-point, and a crucial enabler of, SOA adoption, as well as being of major, direct value in its own right.

SOA further reduces the number of applications connectivity links required, and also further cuts the cost, time, and effort to add an additional new link, as well as to maintain and support it each year over its duty lifetime. SOA is becoming a dominant application connectivity architecture, but replacing the existing applications connectivity links inventory will take many years more. But what of today's actual applications connectivity links portfolio?

*Businesses using these approaches are, we found, often spending over 3 to 4 times more resources on their applications connectivity link development...*

We remain shocked that the most widely-used approach used to implement applications connectivity links up to the end of 2008 was still the relatively primitive Option # A – custom in-house development using a free FTP package for file transport. Still worse, in our view, was that still-significant numbers of applications connectivity links had been built using the fully custom-built in-house approach *(not even based on FTP)*. Businesses using these approaches are, we found, often spending over 3 to 4 times more resources on their applications connectivity link development, and on annual support/maintenance effort, than if they adopted/used a VAIM platform or a full SOA approach. Even after paying software license and maintenance fees for VAIM or SOA software platforms, a high ROI can be expected by switching, projects can be delivered much faster, and many fewer staff resources will be used. Inflexible and hard to change, such custom hand-coded applications connectivity links also seriously inhibit business flexibility and responsiveness, because they are so complex, costly, and difficult to change.

That business change consultants have commonly found "human middleware applications connectivity departments" almost beggars belief.

Most vendor-enhanced FTP middleware-based approach *(Option # D)* offerings are specific in their focus/scope: where a project need falls in their focus, these tools provide some advantage, but cannot be universally applied. Enterprises using such niche middleware may therefore need to acquire, learn and support several such point products, adding complexity, requiring different skills, and incurring multiple license costs.

Since the advantages, in development effort/cost, in recurring maintenance/support costs, and also in production systems QoS, of the VAIM and full-SOA based solution approaches are so much stronger than older approaches, why are these not yet universally used today? We suspect that many senior IT managers do not realize just how much development/maintenance effort has been wasted internally by the still widespread use of custom-built, in-house applications connectivity approaches. The fragility and vulnerability of these links also poses significant risks to service continuity: it seems these serious risks are still not properly recognized. Such approaches are also dependent on the staff who built these links; where these have moved on, a "support capability black hole" often exists. Whilst it may take years to phase out and replace all older custom-built applications connectivity links, the savings, far higher flexibility, and greater reliability, combine to make a compelling case for enterprises to do so wherever possible.

## 6. VAIM & SOA Platform Deployment

### VAIM & SOA Adoption/Deployment

How has adoption and internal deployment of VAIM platforms proliferated across the market since their early 1990s introduction, and how has the advent and widespread adoption of SOA *(which includes VAIM)* extended these? The rate of adoption and the breadth of internal deployment of this *(indeed any)* technology by customers since it first became available is, of course, an excellent proxy for how valuable customers have found its benefits to be in "real-world" use.

Figure 8 *(on page 25)* shows our end-2008 VAIM platform adoption and deployment penetration estimates *(as a % of customer applications connectivity link inventories)* to date, for the company size classes previously defined. We also cover their SOA stances, and highlight some of the key differentiating factors we found between classes/sizes of enterprise.

| Average Measures & Adoption Factors | For the largest 500 global enterprises | For the next 10,000 global or national larger enterprise | For the next 250,000 medium-sized businesses | Next 5M Smaller Businesses |
|---|---|---|---|---|
| **Application Portfolio Size:** | 400-1,000 | 100-400 | 25-100 | 5-20 |
| **AI Needs:** | Highest | High. Much M&A | Medium | Lowest |
| **% VAIM Platform Adoption:** | ~100% | 50% | 20% | 10% |
| **% Adopter AI Portfolio Deployment With VAIM/SOA Platform(s):** | 35-50% | 20-25% | 15-25% | 25-35% |
| **VAIM Platform Adoption:** | Earliest adopters from 1993 on. Penetration strongest. | Adoption 1995 to date. Usage more variable, project-by-project. | Later adopters, 2000 on. Exploit VAIM well once started. | Most recent. Small sites. 2003 on. "Express" sites. |
| **Typical IT Governance:** Centralized shops drive more internal deployments of technologies like VAIM. | Centralized, strong standards & controls. | Less centralized, more LOB influence, less standards driven. | More centralized, less diverse. | Centralized, 1 IT manager. |
| **No. of IT Platforms:** More means more application integration needed. | 5-12 Diversity limited by central policy. | 8-20 Highest diversity from LOB decisions. | 3-5 Lower diversity, simpler infrastructures. | 1-2 Lowest diversity. Much Wintel and IBM System i. |
| **Strategic IT Infrastructures/ Architectures Investor:** Will front learning costs for earlier benefits of technology. | Strongest investors & enforcers. | Variable. Many more driven by LOB current or tactical needs. | Variable, lower budgets limit pre-investment. | Normally use packaged, standard AI options from main SMB vendors. |
| **SOA Adoption:** VAIM platform essential pre-requisite for SOA. | Earliest SOA adopters from 2003 on. Now heavily SOA committed. | SOA adoption rose fast 2005-08. Approaching majority, & usage depth now increasing. | SOA adoption began c.2006. Rising strongly through 2008, smaller scale. | Limited scope/adoption. |
| **Other Comment:** | Strongly committed to fully exploiting VAIM/SOA platform across enterprise. | Project-by-project decisions, many point AI tools here, as well as much VAIM/SOA. | VAIM only affordable here 2000 on, good implementers when started. | Microsoft software most widespread. |

**Figure 8: VAIM/SOA Platform Adoption/Deployment to End 2008 – By Class**

Our main findings from this Figure 8 analysis are:

- **AI Portfolio Deployment by VAIM Platform(s) Adopters Remains Moderate:** The percentage of applications connectivity links implemented with VAIM/SOA connectivity platforms amongst their adopters has risen *(since 2006)*, but remains moderate to low, depending on enterprise size. Even in the largest, longest-standing users, this averages 35-50% to date, so far wider deployment remains advantageous to all adopters. These rates are primarily because many enterprises have AI link inventories accumulated over, and many individual AI links dating back, up to 15-20 years or more. Only as these older connections, together with the applications they link, are replaced or modernized, will newer applications connectivity approaches penetration rise considerably higher.
- **Centralized IT Governance-style Shop Adopters Deploy VAIM Better/Faster:** More centralized IT organizations *(who apply tighter common standards and stricter policies on platforms and architectures)* exploit beneficial new enterprise IT platforms such as VAIM *(and now SOA)* better, faster and more widely than decentralized IT governance shops. The latter adopt more tactical, project-by-project solutions, driven by immediate LOB needs, and are thus much less effective at standardizing on/deploying strategic technologies like VAIM and SOA. Such firms also often end up with an assortment of point middleware solutions and custom-links, each approach chosen tactically on a project-by-project basis, adding cost and complexity to their infrastructure. The more centralized governance IT groups have, we found, lower IT platform diversity, and thus face less complex, cross-platform integration than their more heterogeneous platform-using, less centralized and homogeneous IT environment peers.
- **SOA Adoption Driving Wider VAIM Deployment – Synergistic:** SOA adoption has progressed rapidly amongst our top two classes of company during the last two years *(reaching most of the top class, and many of our second-size class group by end-2008)*. Uptake by the medium-sized firms of our third class group has also climbed from near zero to just into a double-digit percentage adoption rate over the same period. The strategic SOA architectural model of composite applications, made up of loosely-coupled software services, linked through open Web services standards, and operating over an ESB *(or ESBs)*, requires an SOA messaging backbone transport underpinning foundation only a VAIM platform can provide. The continuing rapid advance of SOA is therefore also dragging wider VAIM adoption and deployment to support these additional, SOA-triggered needs.

- **Mandating VAIM/SOA as Enterprise Connectivity Standard Brings Strongest Benefits:** Those adopting enterprises that mandated VAIM/SOA connectivity as their standard method for applications connectivity are achieving much the greatest savings/benefits fastest, and have higher proportions of their link inventories implemented under these more productive technologies. They are able to develop/implement new applications connectivity links, often with 4-times less effort/cost, deliver new business solutions correspondingly faster, and support their links with similarly lower effort, across their entire, newly-implemented applications connectivity link portfolio. This also helps them justify purchasing the best enterprise VAIM/SOA connectivity software platform, by driving fastest ROI payback. Those failing to mandate in this way will clearly under perform their peers substantially.
- **Project-by-project AI Decisions Anathema:** Where decisions on applications connectivity technology were taken solely at a project-by-project level, costly custom-built solutions *(such as Options # A & # D in Section 5)* and diverse point-solution middleware *(Option # D)* solutions were often used, resulting in a high-cost, diverse applications connectivity links inventory. The former display all the negative characteristics that we portrayed earlier and the latter end up with customers acquiring/supporting a patchwork of tactical middleware products of limited general applicability.
- **VAIM Unbundling, Price Reductions Enable Wider Use/Smaller Customers:** By earlier this 2000 decade, leading VAIM platforms had been simplified, unbundled, and their entry-price levels fell substantially *(to c. $5,000 per platform)*. This greatly broadened their market opportunity, and brought their benefits well within the reach of our wide "medium–size class", third group of customers. These price-point changes also allowed larger enterprises to add incremental VAIM purchases and deploy by project, rather than needing a "big-ticket/up-front buy". Since about 2003/2004, most enterprise software vendors had worked hard to create lower footprint, simpler to install and use, and lower cost versions of their applications connectivity software solutions, in order to better address the large, important SMB market, where most had previously held weak shares. These moves have been relatively successful; at least "M" sized SMB firms are now well catered for by leading applications connectivity software vendors, and is now an important customer base for these firms.
- **Smaller Businesses Mainly Use Package and/or Microsoft-Windows Connectivity Capabilities:** About 10% of our 'smallest firms' class *(the next 5M smaller firms worldwide)* have adopted VAIM platforms, which are now often within their financial means. Adopters are naturally mostly found amongst the upper-end of size and IT complexity within this class of firm. Generally, these run much smaller application portfolios *(5-20 applications average)*, rely heavily on packaged applications, and mostly adopt integration options from their packages, and/or hardware/operating system platform vendors. Because Windows/Intel platforms predominate here, Microsoft VAIM/connectivity software is the most widely used by this business-size class.

## Wider VAIM/SOA Connectivity Proliferation & Deployment Experience Validates Benefits

Almost all the largest global enterprises, and now a majority of the next 10,000 largest enterprises, are already using VAIM platforms to varying degrees, and have continued to increase their already substantial deployments through 2008. These adopters are aware of the effort reduction, cost savings, and the QoS improvement benefits of the technology.

These enterprises are also now comfortable with, and skilled in, VAIM use, and are deploying it more broadly as new connectivity projects arise. SOA adoption, highest in these two groups, is also further driving increased proliferation of VAIM as the SOA messaging backbone essential for SOA-based integration and connectivity. This broad adoption and wider usage with adopters' portfolios, speaks volumes for the benefits that VAIM has clearly delivered for these users.

## Major Savings Available from Wider VAIM Deployment

Gartner *(2005)* estimated that a strikingly high 35% average of enterprise IT budgets were being spent then on supporting/maintaining/operating AI links. *(The largest number were still custom-built links of the Option # A or # C type)*. Operating, supporting, and maintaining existing applications and IT infrastructure portfolios consumes, on average, 70-80% of the total IT budgets in most enterprise IT organizations. The 2005 35% figure above implied applications connectivity operations, maintenance, and support costs averaged 44-54% of total "status quo" costs that year. This huge burden prevents enterprise IT groups moving forward with vital new business and technology initiatives. The substantial further VAIM and SOA adoption, and the further productivity gains these technologies achieved from 2005 and end-2008, has improved this stark picture. Making *(generous)* allowance for these VAIM/SOA connectivity deployment and technology advance dividends over three years, we estimate 20% of 2009 enterprise IT budgets may now be devoted to applications connectivity, which means 25-29% of total "status quo" operations and support costs attributable to applications connectivity. Non-adopters can thus achieve large savings by switching to more productive/lower maintenance cost VAIM platforms, or the fuller SOA connectivity approach. "Fuller SOA " involves converting all existing applications connectivity links of other types to VAIM/SOA connectivity technology, as well as utilizing these technologies for all new connectivity/AI projects.

Indications of the large-scale opportunity for savings that enterprises could achieve by wider VAIM adoption/deployment, based on this Paper's data, can be readily seen from the following indications, all numbers being enterprise-size class averages:

- **Largest 500 Enterprises:** Business revenue $50B, IT budget $1.75B *(2.5% of revenue)*, total applications connectivity operations/support costs $350M *(20% of IT Budget)*, and applications connectivity links inventory of 455 links per firm. 57.5% of the applications connectivity links built to date by this class of firm – or 262 links – were not yet on VAIM/SOA middleware. These will yield significant support savings if they were replaced by VAIM platform-based solutions. These firms also typically build 61 new AI links per year, we estimated.
- **Next 10,000 Largest Enterprises:** Business revenue $4B, IT budget $100M *(2.5% of revenue)*, total applications connectivity operations and support costs $20.0M *(20% of IT Budget)*, and applications connectivity links inventory of 162 links per firm. 89% of all links built to date by this much more numerous class – or 146 links – are not yet on VAIM/SOA. Such firms also build 33 significant new applications connectivity links per year, we estimated.
- **Next 250,000 Medium Firms:** Business revenue $25M, average IT Budget $0.6M *(2.5% of revenue)*, applications connectivity support cost $0.125M *(20% of IT Budget)*, and an applications connectivity links inventory of 26 links per firm built to date. 96% of all links built to date by the quarter million firms in this wide class – or 26 links each – are not yet on VAIM/SOA. Such firms also each build about 8 significant new applications connectivity links per year, we estimated.

Large sums are thus spent each year, both to implement the new applications connectivity links needed and to support and maintain the substantial, cumulative inventories of all applications connectivity links built to date. As indicated above, many additional, new applications connectivity links still need to be built each year. The relative productivity data in Section 5 indicated 3- to 4-fold development effort/cost savings come from VAIM/SOA usage, with similar savings on annual maintenance for all links moved onto VAIM or SOA connectivity infrastructure, compared to custom- built hand-coded connectivity/AI solutions.

For those enterprises yet to start SOA adoption, we recommend a strategy of actively replacing custom integration links, and of enforcing a policy of building all new links on a standard VAIM platform. This will bring rising savings on both new developments, and for ongoing link maintenance support costs, freeing up IT resources for new development. It will also position the enterprise for SOA adoption *(when desired)* by introducing one of its key foundation technologies – VAIM – which provides the SOA messaging backbone.

## Our Analysis – Overturning Barriers to VAIM/SOA Adoption/Deployment

To analysts like ourselves, firm advocates of VAIM middleware for 15 years, it was surprising that custom-built, in-house *(using FTP or 100% custom)* applications connectivity approaches still remained the most widespread approaches used in applications connectivity link inventories at end-2008. These incurred far higher development and support costs/efforts, provide less robust/secure operational performance, and suffer high fragility to environment changes. Why do they remain so widespread? How can this be explained? Where does responsibility lie?

Part of the explanation is that many of the links in today's enterprise AI link inventories date back many years, in some cases to before VAIM platforms became widely available. Another is that a rather larger number of applications connectivity links were implemented within the last fifteen years, either before their enterprise adopted VAIM middleware anywhere, or where they had adopted but chose not to deploy it on these applications connectivity projects. VAIM adoption followed the normal software adoption ramp-up curve, starting about 1993 and only reaching full adoption for the largest firms as recently as 2005/2006. Barely over 50% in the next 10,000 largest firms had adopted by end-2008.

Were more CIOs fully aware of AI links costs, most would surely be replacing older ones; to increase application portfolio resilience and cut costs. We suspect other business-driven development priorities pre-empt such improvements where these links are at least working. Hidden "plumbing improvement" tasks like these are not high profile, and *(like old plumbing)* replacement can seem hard to justify until the pipes burst and flood the property.

Connectivity/AI efforts are also often buried inside the total AD and maintenance resources of a development project, and thus **remain invisible above project level**. The real cost/effort of integration across all enterprise AD projects/applications will therefore also not be clearly visible, and yet this is reportedly consuming significant proportions of enterprise IT budgets; at least 20% in 2009 we estimate.

Where technical authority rests with project technical leaders, and no corporate standard guidance is given, many will and do turn to **familiar, freely available, "hand-tool" AI approaches**. They may not hold overall lifecycle cost responsibility for the application, and thus be unable to make the ROI case for a "power-tool"-based VAIM or SOA connectivity solution on their single project. Whilst VAIM will save several-fold, both on the initial build cost and lower lifetime support, it requires a VAIM or SOA connectivity software buy, often outside the authority of such staff. We recommend that project leads of all current AI projects should meet/communicate regularly, to share experience and best practice. They can then combine to support the case for a common VAIM/SOA connectivity platform, where not yet adopted, or for more universal deployment where already installed.

Pre-2000, VAIM software license costs were a real adoption barrier. "Big-ticket enterprise platform" bundling and higher price tags then were a real deterrent for medium/smaller enterprises. Today's more granular packaging and lower unit prices for medium needs mean that **software price is no longer a real barrier**. Microsoft *(with its high-volume, lower-cost, often operating system-inclusive middleware offerings)* drove price commoditization at the lower end of the SMB market, which it dominates. However, as most enterprise applications connectivity projects involve multiple unlike hardware platforms, Microsoft's Windows-centric solutions had limited overall impact.

We concluded that many CIOs, CTOs, AD and project leaders in yet-to-adopt VAIM or SOA enterprises must still remain **unaware of these compelling/substantial VAIM and SOA benefits**. This is a paradox, because VAIM was a heavily marketed software category between 1995 and 2003, and SOA has been hugely promoted over the 2003-2008 period. But considerably more market education seems to still be needed, outside the top 500 global enterprises, to overcome their inertia, and this apparent lack of knowledge.

*...these customers should now re-evaluate their application connectivity approaches and adopt a VAIM/SOA connectivity platform for all projects in future...*

In our assessment, these customers should now re-evaluate their application connectivity approaches and adopt a VAIM/SOA connectivity platform for all projects in future, as well as for replacement of all older links that fall due. Those who already adopted VAIM/SOA technology are advised to apply it on more *(or all)* of their future application connectivity projects. In many cases, SOA deployment initiatives provide an additional rationale and justification for VAIM adoption, with many other benefits.

We also recommend VAIM/SOA platform-adopting enterprises extend their early project successes, and share the skills gained, by creating an in-house SOA and AI Centre Of Expertise *(COE)*, virtual or physical, to help accelerate proliferation of these crucial technologies enterprise-wide. The COE approach shares skills, knowledge, experiences, and best practice techniques, across all projects, enables pitfalls to be avoided, and helps ensure a coherent, enterprise-wide approach to AI and SOA adoption is followed. Such a COE also provides the ideal focal point for SOA governance, for making the VAIM/SOA software acquisition case, for organizing SOA education/training *(and similar cross-project, enterprise-wide aspects)* to be coordinated effectively. Such a COE helps to ensure higher VAIM/SOA platform productivity, lower development costs, and reduced maintenance benefits are proliferated faster to business priority projects across the enterprise.

# 7. Selecting the Right VAIM/SOA Platform/Vendor – The Way Forward

## Our High-level Criteria for VAIM/SOA Platform/Vendor Selection

Many software vendor/product selection guides begin with detailed product descriptions plus extensive feature-function comparisons, and this remains important in any selection. The VAIM/SOA market evolved fast in recent years, with 11,000+ enterprises now SOA adopters. The overall VAIM/SOA domain has also broadened to include the closely-associated BPM and business modeling, and newer Event-Driven Architectures *(EDA)*, and CEP technologies. BI/EPM is also now closely associated with SOA today, because almost every new SOA application that is created naturally also requires an integral BI, query, and reporting capability.

Enterprise VAIM/SOA platforms must deliver and support all these technologies in one, well-integrated, comprehensive software platform. This must support the full, complex web of hardware platforms, operating systems, software platforms, open industry standards, and the AD tooling requirements now needed to support enterprises of all sizes using a wide diversity of IT infrastructures.

Since this White Paper's last edition *(2006)*, the VAIM/SOA software segment *(as we predicted)* has seen sharp consolidation. Industry majors snapped up pure-play SOA ISVs to build-out fuller portfolios, and a dramatic reshaping of the BI/EPM software industry segment further strengthening three VAIM/SOA majors who each added now-powerful BI capabilities.

*Since this White Paper's last edition (2006), the VAIM/SOA software segment (as we predicted) has seen sharp consolidation.*

Because of these VAIM/SOA characteristics, we recommend that a focused set of higher-level selection criteria should guide vendor candidate short-listing. Solutions implemented across the enterprise with a chosen VAIM/SOA connectivity platform will be core application infrastructures for a decade or more. SOA itself will be the enterprise application architecture for two decades or more. VAIM/SOA connectivity software platform selection and standardization is now a crucial strategic enterprise decision. It merits considerable care and research if enterprises are to avoid the risks of disruptive product/vendor changes causing major rework and investment write-offs arising from a wrong selection or a vendor failure.

We recommend that enterprise VAIM/SOA software platform/vendor selection from 2009 should be guided by these nine primary selection criteria, each explained below:

1. **Product Line Track Record, Market Share, Customer Base and Reputation:** Market success, endurance, market share, and customer/installed base size are acid tests of the long-term merits of a VAIM/SOA platform, and high ratings in all these areas indicate a low-risk, well-proven, and attractive platform/vendor combination. Awards, industry reputation, quality rankings, and ISV and partner support are also all strong positive indicators.

2. **Vendor Financial Strength/Staying Power – Vital for VAIM/SOA Platform Customers:** VAIM/SOA platforms will underpin users' application portfolios, applications connectivity, and BPM developments for the next decade or longer. Customers must select the VAIM/SOA platform from a vendor with unquestioned and enduring financial muscle. Vendors must have this so that they can support their VAIM/SOA platform in the long term, to continually bring out the new technology needed, and to fully support a broad, product set globally with continuous R&D improvement. This criterion was long rightly used to select other foundation software categories *(such as database systems, application servers, and major applications)* where similar considerations apply. For a VAIM/SOA platform, we consider that a selected vendor must be able to show prospective customers at least ten years ahead of near-certain, continued financial strength to merit selection – a tough hurdle to overcome.

3. **Deep, Ongoing Product/Vendor Support for Open Industry Standards:** Applications connectivity and SOA critically depend on open industry standards to facilitate interoperation/interconnection of software assets, services, and components. It is these open standards that allowed the breakthrough interoperability, across platforms and vendor offerings that are crucial advantages of VAIM/SOA. It is thus imperative that a chosen VAIM/SOA platform supports all key open standards of SOA, and continues to do so as these standards evolve. These include networking/communications standards *(TCP/IP and others)*, messaging *(e.g. Java Message Service (JMS))*, industry-standard programming models – notably JEE™ and .NET, security *(e.g. SSL)*, Web services, and development tool standards *(i.e. the Eclipse Platform)*. For a VAIM/SOA platform to remain forefront here mandates that its vendor be an active leader in the main open standards development groups and processes concerned.

4. **Comprehensive Product Support for All Main Platforms, Programming, Network, and Security Models, etc.:** Every customer has different IT infrastructure and enterprise application portfolio mixes. When selecting a VAIM/SOA platform, ensure that it supports all of your IT platforms, and integration "touch points, with current servers, links and robust adapters/connectors. This minimizes custom development and eliminates any need for extra point middleware products. For example, resurgent growth of the System z mainframe *(now in its latest System z10 generation)* has greatly reinforced the importance of the mainframe platform at the heart of enterprise infrastructures at over 10,000 enterprises. This must now be a major factor in VAIM/SOA platform selection at all of these customers.

5. **Closely Integrated Companion SOA Platform Available From the Same Source:** VAIM is an important IT infrastructure foundation technology. However, it alone is not sufficient for fully-fledged, next-generation SOA Web applications. A robust, comprehensive, enterprise SOA runtime and tools platform must include closely-coupled and tightly pre-integrated VAIM capabilities – the SOA messaging backbone– with added SOA-level connectivity services. Together these provide the full SOA "stack" needed by all next-generation SOA applications. Otherwise, customers would be forced to integrate these closely inter-dependent platforms themselves. Major advantages thus accrue from selecting a VAIM platform whose vendor also offers/integrates a complete SOA connectivity platform layered over their VAIM offering.

6. **Modular Packaging, Incrementally Deployable, Affordable Entry Pricing, and Scalable:** Until the late 1990s, leading VAIM platforms were offered under monolithic, "complete-package-big-ticket" commercial terms. Today, enterprises rightly demand more granular, incremental and affordable product packaging/licensing, to enable them to build-up their AI infrastructure in smaller steps, each bringing benefit from implemented projects with faster paybacks. Today's best VAIM/SOA connectivity platforms are well packaged, simpler to install, learn and use, and more affordable/suitable for smaller *(SMB)* businesses. These also benefit POC projects at larger enterprises. Some leading vendors now offer such versions alongside their full, enterprise-level releases.

7. **Vendor Capacity to Maintain the Extensive Cross-testing Needed by VAIM/SOA:** We estimate that testing/validation of VAIM/SOA platform software absorbs 50% of vendor total R&D, two-and-a-half-times software industry averages *(of about 20%)*. Enterprise VAIM/SOA connectivity platforms must provide long-term, all current releases support for multiple hardware platforms and operating systems, multiple software platforms and Application Server Software Platforms *(ASSPs)*; and for several JEE™ and .NET platform and Web services standard generations. They must also support communications protocols like TCP/IP; security standards like SSL; and popular enterprise applications *(such as SAP and Oracle offerings)*. The combinatorial explosion of VAIM/SOA configurations, which must all be developed and fully tested in parallel before final packaging, is wide. It needs large, dedicated laboratory resources continuously testing all new VAIM/SOA software combinations. Only larger software vendors can cope with these heavy test demands, year-in-and-year-out, over a full platform product set. And yet it is this extensive vendor effort that provides flawless middleware isolation and interoperation that brings customers many powerful productivity benefits.

8. **"Extended-SOA" Functionality In a Cohesive, Single VAIM/OA Platform:** Newer closely-related technologies associated with SOA have gained increased prominence and rapid adoption in the last couple of years. BPM, with its associated business process modeling, and Business Activity Monitoring *(BAM)*, is the most advanced and widely used of these, and it is now almost invariably seen as an integral part of SOA. More recently emerging are CEP and EDA. We consider these are also best viewed as extensions of SOA, and that comprehensive enterprise VAIM/SOA connectivity software platforms should integrate with, and provide good support for, these newer domains, within the single, coherent platform framework.

9. **BI & EPM Closely Allied to SOA:** In earlier years, all leading BI/EPM ISVs were independent, third-party firms, some offering multi-platform, enterprise-grade BI/EPM suites, with smaller players offering niche solutions. Since our 2006 Edition, this changed dramatically. Three of the largest VAIM/SOA software leaders – IBM, Oracle, and SAP – each acquired one of the largest, previously independent, BI/EPM ISVs: Cognos *(by IBM)*; Hyperion *(by Oracle)*; and Business Objects *(by SAP)*. Each has aggressively improved and extended integration with/support for their newly-added BI/EPM facilities with their VAIM/SOA middleware stacks *(all three)* and with their applications *(Oracle and SAP)*. Since BI/EPM functionality is a vital on almost every new SOA application deployed, this closer BI/EPM integration is good for customers. Also, standardizing on one BI/EPM platform for the enterprise offers many additional advantages. We now recommend that this BI/EPM aspect be fully considered in all VAIM/SOA software platform selections.

Focusing on these overriding vendor/platform criteria will ensure that a sound short shortlist can be constructed, and the best solution selected, after a detailed technical review.

## VAIM/SOA Platform/Vendor Candidates for Consideration

So, which VAIM/SOA connectivity platforms/vendors should enterprises consider for their shortlist? Our high-level criteria above, and each customer's existing IT infrastructure, will narrow the list considerably. A helpful starting point is to consider seven important ISVs with major VAIM/SOA offerings, five of them industry majors, and two smaller pure-play VAIM/SOA specialists. Figure 9 below gives our cameo overviews of these seven vendors from our VAIM/SOA perspective.

**Candidate Strategic VAIM/SOA Platform Vendor List**

| Vendors of VAIM/ SOA Platforms | Our Cameo Vendor VAIM/SOA Overview |
|---|---|
| **TIBCO Software** | Long-established pure-play VAIM, and now BPM ISV, offers its application integration, business process management *(BPM)*, SOA, and BI platform, underpinned by its MOM messaging platform *(TIB/Rendezvous™)*. TIBCO's broadest user base is in financial services, but the firm serves other industries too. TIBCO reported revenues of US $577.4M in its 2007 FY ending 30.11.2007, up 11.6%, and had 1,900 employees *(at April 2008)*. Recent results *(Q3 2008)* showed a healthy 20% revenue growth. Open standards support is behind others *(late Eclipse Platform adopter, but is a Sun J2EE™ Licensee)*, no application server. Smallest vendor in this table, known for lively marketing. |
| **SAP AG With SAP NetWeaver®** | German ISV leader in enterprise applications with mySAP.com ERP suite centerpiece, and proprietary past. Now offers SAP NetWeaver™ Platform middleware software as its VAIM/SOA stack, and to underpin its newer apps. Built out new-generation SAP NetWeaver SOA-based applications as updates to mySAP ERP 2005 through end-2008. "SAP-centric" users are widespread in manufacturing/distribution, where it has thousands of enterprise customers. Its SAP VAIM/SOA offerings are aimed at users viewing SAP as "centre-of-their-IT-universe", easing its integration with other systems. Middleware products are sound, but lag leader capabilities. SAP's $6.7B January 2008 buy of leading BI/EPM ISV Business Objects, added strong BI/EPM capabilities to its range. SAP now exhibits good open standards commitment *(including JEE™, Eclipse for tools, Web services, and Linux open source OS support)*. |
| **Software AG, incorporating webMethods** | Long-established German enterprise database (Adabas) and 4GL (Natural) software vendor, was active in modernization of legacy software with XML offerings, and in ESBs and SOA governance space. Software AG's large, $546M April 2007-agreed, acquisition of pure-play SOA ISV webMethods *(strong in BPM and BAM)*, will probably lift it up the VAIM/SOA league table into around fifth place when the full-year 2008 numbers are published. Software AG's boosted FY 2007 revenue was Euros 621M, and the firm had 3,479 employees at year-end, second smallest vendor in this group. |
| **Sun Microsystems Enterprise Java™ System** | Server vendor Sun also offers its Enterprise Java™ System middleware stack, used mostly on and thus of interest mainly to users of, its proprietary Solaris RISC UNIX server systems. AI/SOA capabilities of Sun's portfolio were extended by its August 2005 acquisition of competent pure-play SOA vendor SeeBeyond for $383M. In February 2008, Sun also closed a $1B acquisition of open source database leader MySQL. But through 2008, Sun struggled again without an evidently viable software business model. Despite many rich software assets, Sun is not a major SOA software competitor in 2009, say most analysts. Excellent JEE™ support from the platform's inventor, a good open standards posture, but a Linux late adopter, Sun remains most committed to its own Solaris OS. Its proprietary JEE™ AD tools are not on the leading open Eclipse tools platform. |

Continued on next page...

...continued from previous page

| Candidate Strategic VAIM/SOA Platform Vendor List *(continued)* | |
|---|---|
| **Vendors of VAIM/ SOA Platforms** | **Our Cameo Vendor VAIM/SOA Overview** |
| **Oracle Corporation** **Oracle Fusion Middleware + BEA Systems Acquisition *(2008 on)*** | Major RDBMS, enterprise applications, and now middleware software, vendor. Oracle vastly extended its enterprise applications portfolio via its PeopleSoft, JD Edwards, Siebel, *(and other apps.)* acquisitions, all successfully absorbed. With these, it competes head-on with SAP. By early 2008, it had almost build-out its own Oracle Fusion Middleware stack, including AI, SOA, and BPM, capabilities. It was also busy writing next-generation, SOA-based applications *(branded Oracle Fusion Applications)*, atop this new Fusion Middleware. But the dramatic, long-expected, acquisition of leading VAIM/SOA ISV BEA Systems *(and its respected WebLogic SOA software family)* closed for $8.5B in April 2008, changed Oracle's plans. It has since been rationalizing these two deeply overlapping middleware stacks. Reworking Oracle Fusion Applications for the resulting middleware stack changes was also needed. When these rationalizations are fully complete later in 2009, Oracle will be well placed with a powerful VAIM/SOA stack, as well as new-generation Oracle Fusion Applications. Adding BEA's $1.1B p.a. revenue will also lift Oracle in VAIM/SOA markets. It will likely claim second place behind IBM with an 8-10% software share, when full-year 2008 figures are out. Oracle/BEA are both open standard supporters *(deep commitments to JEE™, Eclipse for tooling, SOA, Web services, and to Linux OS platform)*. |
| **Microsoft Windows Server System Servers & Services *(Inc. MS MQ)*** | Major industry force, but "lagging-edge" software technology, many analysts argue. Offers sound, basic AI portfolio within its Windows Server Platform middleware, designed to help "Windows-centre-of-the-universe" customers integrate their Windows applications, and bridge to those on other platforms, via proprietary .NET Web services programming model. Early BizTalk offerings provided low-end BPM-business integration solutions. Rather left behind in broader SOA by other competitors here. But remains market AI/BPM leader in the lower half of the SMB segment, where Windows/Intel is a ubiquitous platform. MS software runs only on Intel processor-based, distributed hardware, but can communicate with *(although not run on)*, UNIX, mainframe, and a few other platforms. Reasonably good Web services standard support, but otherwise deeply proprietary, especially Visual Studio and related development tools. Deadly enemy of, and competitor to, Eclipse Platform now adopted by almost every other tools vendor but Sun. Has now toned down earlier sharp attacks on Linux, adopting a more "coexistence" stance. Microsoft held a far distant second place, with a 7% 2007 VAIM/SOA software market share*, behind dominant leader IBM. |
| **IBM Corporation** **Smart SOA™ WebSphere Portfolio, Including WebSphere MQ, the VAIM leader** | Industry market leader in servers, IT services, and overall enterprise middleware software *(including database, application servers, VAIM, and SOA)*. Extremely strong IBM Smart SOA™ WebSphere portfolio is dominant market leader, with 64% of the 2007 SOA middleware software market*. No other vendor held even an 8% share*. IBM's WebSphere MQ VAIM platform is the long-established segment leader, with 10,000+ customers, running on over 80 platform configurations, and supporting all the newest standards and technologies in its latest WMQ V7.0 release. These deep open standards support aspects include JEE™, the Eclipse tool platform, Web services connectivity, and many others. WebSphere MQ is tightly integrated with IBM's extensive Smart SOA™ WebSphere SOA, BPM, and CEP, portfolio, providing these with a powerful IBM SOA Messaging Backbone. Strongest System z mainframe and System i VAIM/SOA capabilities, and excellent support for all other major IT platforms. With IBM's largest ever, $5B acquisition of Cognos, the giant now also offers a closely-integrated, leadership enterprise Cognos 8 BI/EPM platform highly complementary to its VAIM/SOA offerings. Leading advocate for, and supporter of, the Linux operating system. World's most extensive AI/SOA services capability from IGS. |
| Listed in reverse alphabetical order, excludes several other smaller VAIM/SOA vendors *(Sonic Software, etc.)*.<br>* 2007 VAIM/SOA middleware software market share – Wintergreen Research 2008 SOA Report<br>All vendors above, except Microsoft, are Sun JEE licensees.<br>All vendors above, except Microsoft and Sun, are Eclipse Foundation Strategic Members or Members. | |

**Figure 9: Candidate Strategic VAIM/SOA Platform Vendors Assessed**

## VAIM/SOA Connectivity Platform Example

To illustrate the capabilities that enterprise customers can expect to find in modern VAIM platforms, we include our overview of one leading example. We chose the market leader in this sector – IBM's WebSphere MQ – as a useful benchmark for readers. We also review the additional IBM SOA Connectivity solutions that wrap and extend WMQ. This overview may be found in Appendix B from page 39.

## Our Analysis

Enterprise IT users, for decades, first met emerging new business application needs with custom-built software applications written in available lower-level languages and tools. Where such a class of application became widespread/important, the software industry often created new middleware technologies to simplify development/deployment.

Each such middleware technology abstracted common programming tasks *(originally custom-coded by the developer)*, replacing them with standard software services from the middleware engine. Custom coding was much reduced, the middleware offered additional, value-added functionality, and a more robust application solution was delivered. Where well conceived/implemented, such middleware engines became widely adopted as standard enterprise runtime infrastructure.

Notable examples include:

- **Online Transaction Processing *(OLTP)* Monitors.**
- **Java Application Servers.**
- **DBMS.**

Few organizations today would attempt to deploy significant transaction applications without using a Transaction Processing *(TP)* monitor, or build a complex data management application without using a DBMS. It is universally accepted that such middleware engines greatly simplify application development, and provide much superior runtime execution for such tasks.

These provide exact parallels with the applications connectivity area. VAIM platforms have been available for over 15 years, reached first maturity before 2000, and have continued to develop rapidly this decade. They greatly reduce the time, effort, and cost of developing applications connectivity links, and provided a richer, more secure, and better-featured runtime environment. They also now provide the SOA messaging backbone, and are thus one of the principal entry-points to, and enablers of, fuller SOA adoption.

Why therefore *(in 2008)* did we still find that the most widely-used applications connectivity approach remained custom-built, in-house AI *(commonly using free FTP or all custom)*, with all the disadvantages of those routes?

The answer lies in the years-long adoption and diffusion patterns of such middleware technologies. Initially, new middleware technology of the "Release 1.0 and 2.0" generations are first tried out by pioneering, rich, "early adopters". Later, when the products become refined enough for the benefits to outweigh the downsides, and the usually high early prices, the middleware next proliferates amongst other equally rich and sophisticated, but more cautious, mainstream adopters. Later, the technology is adopted much more widely by rather more cautious, and also by rather smaller, users. Within each successful middleware adopter there is also a years-long process of internal diffusion of the new technology, where it is used on more and more projects as these are developed and deployed over the years.

Today, for example, we found ~100% VAIM/SOA platform adoption amongst the 500 largest global enterprises. Over time, software prices usually fall as sales volumes rise, skills and knowledge become more widespread/accessible, and success stories become widely known. This encourages the next tier of enterprises to move through the adoption curve a few years behind these largest firms. Our finding that just over 50% of the next 10,000 largest enterprise users have adopted VAIM/SOA platforms to date shows this segment midway through the adoption cycle at end 2008.

More risk-averse businesses often wait until a growth new software market has settled down, and the number of vendors has consolidated to a few clear leaders, before they adopt *(slower/later adopters)*. These firms then feel more confident in safely choosing a software partner without the high vendor risks inherent in chaotic early markets. The VAIM market saw a profusion of vendors emerge from the late 1990s up to 2003, but is now heavily consolidated around major VAIM/SOA players. Similarly, many new SOA players emerged from 2002 to 2005, but that software market has now sharply consolidated around the major ISVs *(see Figure 9)* for 2009.

VAIM/SOA technologies are now available at lower price points, and in appropriately packaged, lower-complexity offerings that are affordable/manageable for every "enterprise" and "medium-sized" business, and even by some of the "smaller" businesses group. The remaining barriers to adoption appear now to be more to do with some continuing lack of knowledge of the benefits, a lack of experience with the technology, and some scarcity of the needed new skills.

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

- **Survey and quantify their current AI portfolio**, and the effort/resource being expended on its annual maintenance and support. They will commonly find that this is a far heavier burden than expected, which itself creates a call for action.
- Where a VAIM/SOA software platform has already been adopted/proven, steps should be taken to **rapidly spread the skills gained**, and to ensure that this **approach is used on most/all new connectivity projects**. An active program of replacement of older, in-place, custom integration links is also recommended, to cut their high recurrent support costs/effort.
- **Setting up an in-house COE on application connectivity/SOA** *(discussed on page 28, last para of Section 6)* is also strongly recommended to ensure wise governance and more rapid diffusion.

*...enterprises yet to adopt a strategic VAIM/SOA connectivity platform are now urged to do so...*

- Those **enterprises yet to adopt a strategic VAIM/SOA connectivity platform are now urged to do so** for their next high-profile connectivity projects and/or initial SOA adoption, and to follow the path above when early successes have been delivered.

- **VAIM/SOA vendors, consultants and IT analysts can help** by providing guidance, education and training, and access to references, which can accelerate the skills acquisition learning process.
- If using external **SIs**, be clear that their business interest remains to sell the maximum billable days for your applications connectivity projects, and creating some dependency on their services for future support. **Their interests are diametrically opposed to yours**. Such firms can thus be less likely to propose a more productive, economical, VAIM/SOA-based solution approach. We recommend that users make the use of the firm's chosen standard VAIM/SOA platform a mandatory condition in all such contracts.

# Appendix A: 2009 – An Example VAIM/SOA Connectivity Platform – Smart SOA™ Connectivity & IBM WebSphere MQ V7.0

## Market-leading IBM WebSphere MQ Family – Extraordinary Breadth at 15th Birthday

Today, the IBM WebSphere MQ *(WMQ)* platform provides the industry's broadest backbone for messaging and business data delivery/transport, offering universal SOA connectivity internally across the enterprise, and externally across ecosystems, we found. Celebrating its 15th birthday in 2008, WebSphere MQ was long the clear market leader in the MOM-based VAIM software market. Over 550,000 WebSphere MQ servers have been deployed by over 10,000 customers to date, supported by 1,500 partners, making WMQ the industry de facto standard MOM platform for medium to larger enterprises.

As Figure A1 shows, the IBM WebSphere MQ platform today offers extraordinary breadth and depth, providing a comprehensive suite of interconnected protocols and QoS options to meet all widely-varying enterprise messaging needs.

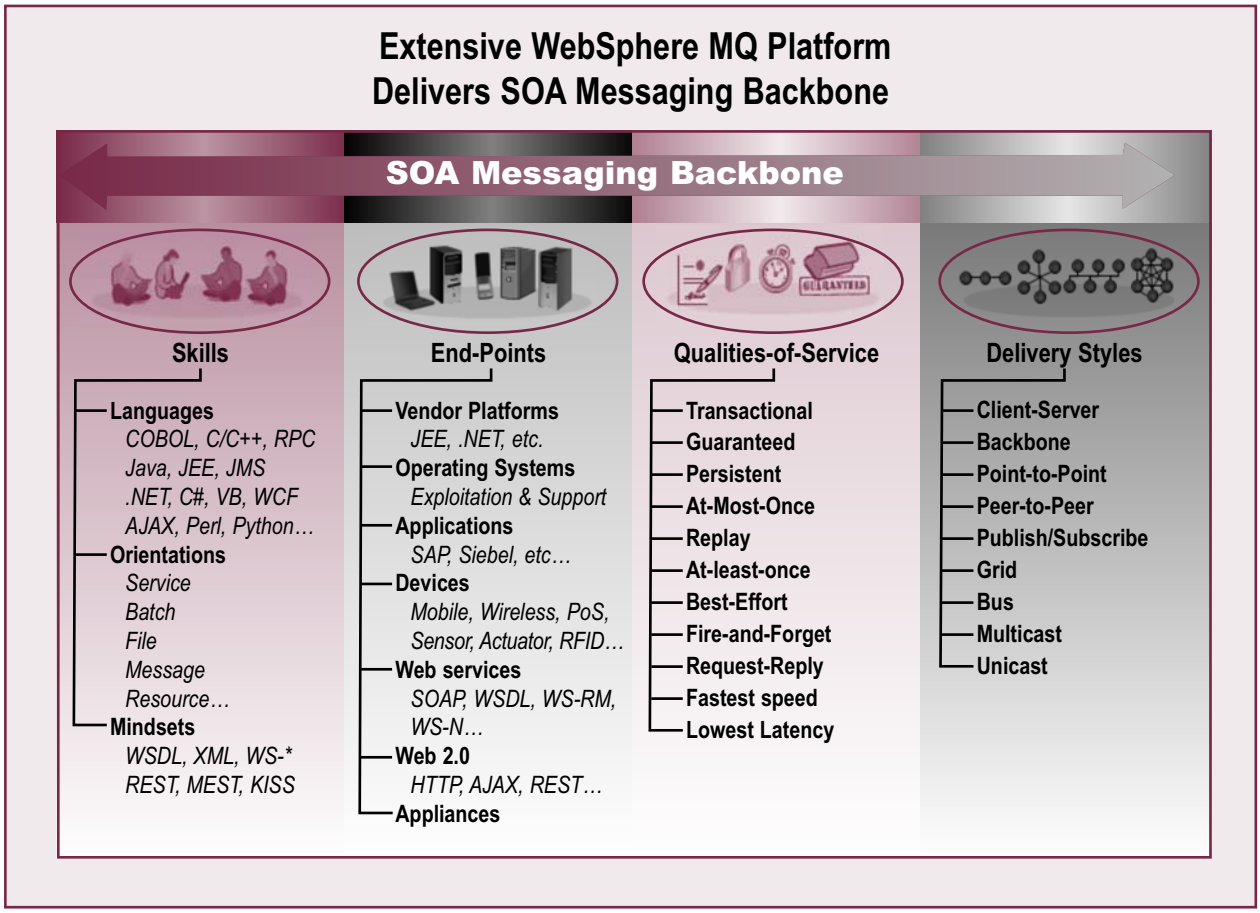


**Figure A1: Extensive IBM WebSphere MQ Platform – Delivers SOA Messaging Backbone**

WMQ uses advanced queuing and transactional facilities to preserve message integrity throughout the network, cutting risks of information loss, and reducing needs to reconcile communicating IT systems. Its extensive range of resiliency features support 24/7 availability, end-to-end security, and transaction tracking.

When using WMQ, developers need not write complex communications code, but call simple Application Programming Interfaces *(APIs) (MQ Message Queue Interface (MQI) and JMS™)*. These are supported consistently across more than 80 WMQ operating environments *(from both IBM and WMQ Business Partners)*, the industry's broadest coverage, integrating the diverse "End Points" shown in Figure A1. IBM WebSphere MQ also supports the broad range of developer skills/client environments, orientations, and mindsets, shown under "Skills" on the chart.

IBM WebSphere MQ takes care of network interfaces, assures 'once-and-once-only' delivery of messages, deals with communications protocols, dynamically distributes workloads across available resources, handles recovery after system problems, and helps make programs portable. It also ensures the reliable delivery of messages, including eXtensible Markup Language *(XML)* documents and Simple Object Access Protocol *(SOAP)* messages, connects applications and Web services, and spans important programming environments such as JEE™ and Microsoft .NET.

This successful, pioneering VAIM platform is a leading product of IBM Hursley Laboratory, the giant's main UK software products development site. The Hursley Laboratory in also today's home of IBM's famous Customer Information Control System *(CICS)* TS mainframe transaction server *(and – in an earlier role – housed the design office for the legendary World War II Supermarine Spitfire fighter plane)*. IBM WebSphere MQ won the MacRobert Award of the UK's Royal Academy of Engineering in 2004, the first software-only product ever honored in this way.

## IBM WebSphere MQ – SOA Messaging Backbone

IBM WebSphere MQ delivers the SOA Messaging Backbone that underpins and extends ESB Messaging & Enrichment of IBM's market-leading Smart SOA™ software platform, and is a major enabler of more rapid, lower-effort SOA deployment. This role is illustrated in Figure A2 below. IBM has rapidly built-out an extensive Smart SOA™ portfolio in a few recent years, creating the industry's most comprehensive SOA platform, and capturing a commanding 64% SOA software market-share in 2007 *(according to Wintergreen Research)*.

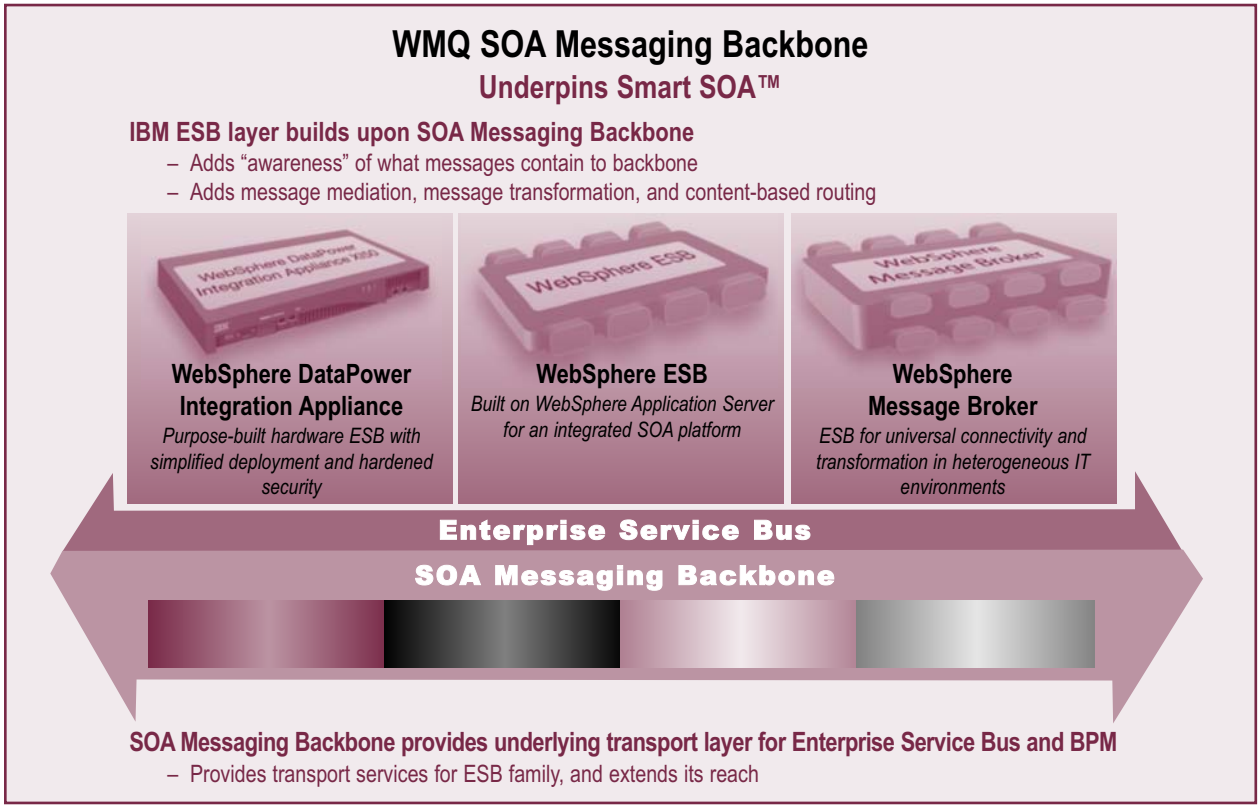


**Figure A2: IBM WMQ SOA Messaging Backbone – Underpins Smart SOA™**

Figure A2 shows IBM's Smart SOA™'s extended SOA connectivity, provided by the three ESBs it now offers. These are the **IBM WebSphere DataPower Integration Appliance** *(high-performance hardware appliance ESB)*, the **IBM WebSphere ESB** *(software ESB for pure Web services integration, based on the WebSphere Application Server (WAS))*, and the **IBM WebSphere Message Broker** *(ESB software for heterogeneous connection/transformations)*. Smart SOA™ ESBs contribute message mediation, message transformation, and content-based routing, as well as awareness of what messages contain, and run atop IBM's SOA Messaging Backbone. IBM WebSphere MQ provides the latter, both as an independent VAIM platform, and via WMQ messaging services integrated with the Smart SOA™ servers.

This Smart SOA™ ESB portfolio provides built-in transaction coordination, connections for third-party JMS providers, complete integration with the IBM Smart SOA™ platform *(see below)*, and offers massive scalability, with the performance needed to handle high–volume, back-office transaction processing systems. Collectively, these IBM ESBs, plus the WMQ platform, provide universal SOA connectivity and integration far beyond the capabilities of conventional ESBs, and integrate closely with other key Smart SOA™ foundations. The latter includes the **IBM WebSphere Application Server *(WAS)***, the **IBM WebSphere Process Server *(WPS)*** BPM foundation, and the **IBM WebSphere Service Registry and Repository *(WSRR)*** which is IBM's hub for Service Visbility and Governance capabilities that provides interoperability between ESB Messaging and Enrichment products.

## Major New IBM WebSphere MQ V7.0 Release Extends Strengths

IBM WebSphere MQ, Version 7.0 *(released to General Availability (GA) on 06.16.2008)*, is the latest major WMQ release, delivering IBM's SOA Messaging Backbone with robust connectivity that provides flexible and reliable messaging for applications, Web services, Web 2.0, and now file transfer, and which connects almost every IT platform. This new version delivers market-leading JMS™, and publish-and-subscribe, messaging, with much-enhanced ease-of-use from powerful new tooling. WebSphere MQ, V7.0 delivers many significant advances summarized visually in Figure A3. These further strengthen IBM's market-leading MOM platform.

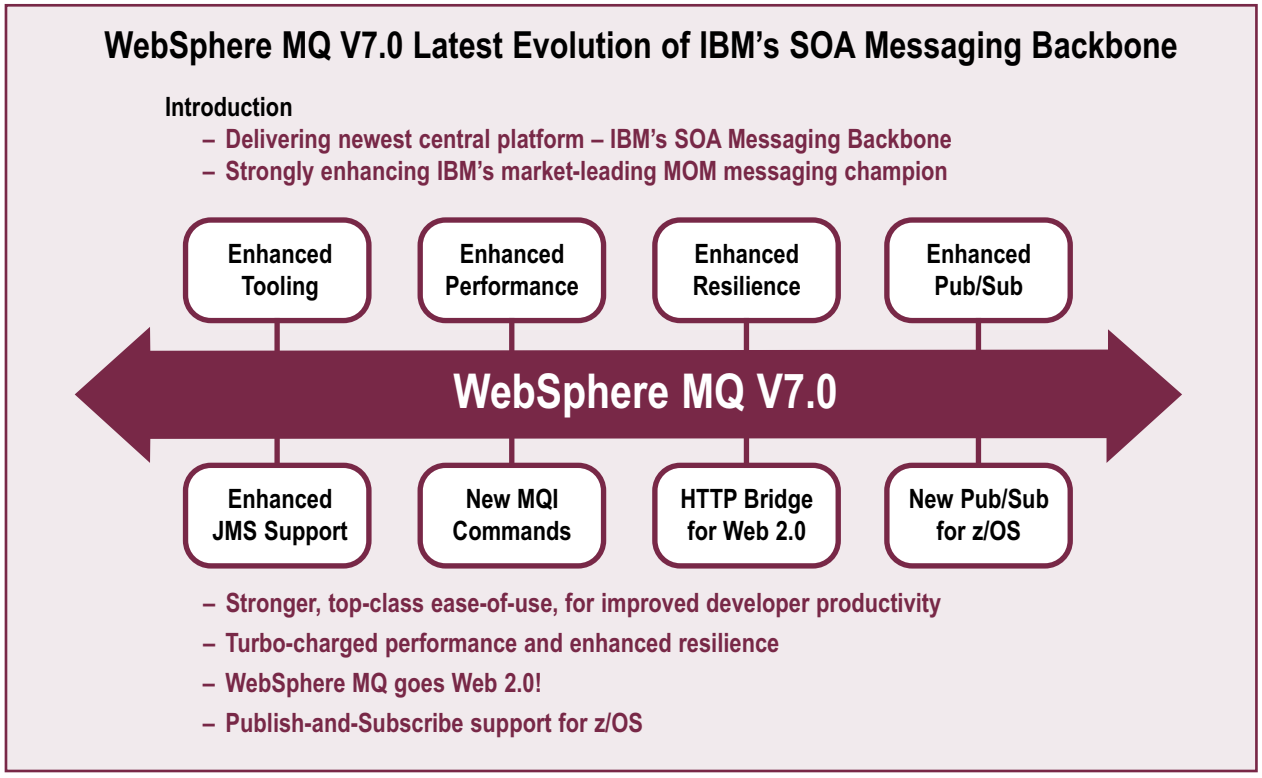


**Figure A3: IBM WebSphere MQ, V7.0 – Latest Evolution of IBM's SOA Messaging Backbone**

Amplifying the above major advances in WMQ V7.0, these include:

- Greater ease-of-use, with graphical configuration of publish-and-subscribe and JMS messaging through the Eclipse-based MQ Explorer Graphical User Interface *(GUI)* tool.
- New reliable file transfer solution.
- Enhanced publish-and-subscribe performance, increasing throughput *(by up to 20% on tests)*.
- Enhanced JMS performance, increasing selectors and JMS listener throughput *(by up to 45% on tests)* with improved latency.
- Extended verbs and behaviors for the MQI programming interface, improving developer productivity.
- Enhanced WebSphere MQ clients, greatly increasing non-persistent throughput *(by up to 300% on tests)* and increasing resilience and availability with failure detection.
- Web 2.0 support helping create richer user experiences by bridging Hypertext Transfer Protocol *(HTTP)* applications with Asynchronous Java And XML *(Ajax)* and REpresentational State Transfer *(REST)* to the WebSphere MQ messaging backbone.

- Supports industry-standard SSL security and offers an Extended Security Edition with advanced security.
- Operating systems supported are: AIX; HP-UX Unix; i family; Linux; Sun Solaris; Windows; and z/OS.
- Offers end-to-end governance, with the Extended Security Edition.
- Supports IPV6 and awarded Common Criteria certification.

All the established WMQ fundamentals are naturally also carried forward or improved in V7.0, including the ability to integrate virtually anything, assured message delivery, powerful development facilities, and end-to-end security with SSL. They also include enhanced Web services support *(adding reliability, traceability, & buffering)*, clustering for MQ workload distribution, time-independent *(asynchronous)* processing, and the scalability to support extreme growth.

## The IBM WebSphere MQ & SOA Connectivity Products Family

The IBM WebSphere MQ & SOA Connectivity offerings now encompasses an extensive product portfolio, which closely supports the rest of the IBM Smart SOA™ portfolio in their roles as IBM's SOA Messaging Backbone. In Figure A4 below, we list and briefly assess the main products in the WMQ product family. Two important, newer WMQ products of high interest – **IBM WebSphere MQ File Transfer Edition, V7.0** and **IBM WebSphere MQ Low-Latency Messaging, V2.1** – are first introduced in the second and third rows of this table, but merited our fuller assessments, given in two so-headed subsections following Figure A4. Because we extensively reviewed IBM's Smart SOA™ portfolio in another 2008 Paper *(see page 46, item 3)* our overall coverage here is minimal.

| WebSphere Product | Core Capability & Functionality | Latest Version Advances/Benefits |
|---|---|---|
| **IBM WebSphere MQ, V7.0.** | Latest June 2008 major release of flagship enterprise WebSphere MQ platform, delivering all the enterprise-class WMQ capabilities & advances more fully described above, & supported on 80 IT platforms. | |
| **IBM WebSphere MQ File Transfer Edition, V7.0.** | Important new WebSphere MQ family member first released in December 2008, that provides reliable, managed file transfer over WebSphere MQ networks for the SOA era. Assessed more fully in own subsection of Appendix A below. | |
| **IBM WebSphere MQ Low-Latency Messaging, V2.1.** | Latest version of quite new WebSphere MQ family product first launched in November 2007. Provides very high throughput, ultra-low-latency *(sub-millisecond)* messaging transport, optimized for demanding applications in financial market firm front/middle offices. Assessed more fully in own subsection of Appendix A below. | |
| **IBM WebSphere MQ for z/OS, V7.0.** | Optimized WebSphere MQ tightly integrated to exploit unique System z capabilities under z/OS. Enables message passing between different z/OS address spaces. Supports CICS, IMS, MVS Batch, TSO, plus other subsystems. z/OS code base fully exploits high integrity, reliability, availability, & serviceability, techniques used on System z & in z/OS. | WMQ for z/OS, V7.0 brings new publish-and-subscribe support integrated into the WMQ for z/OS queue manager. It also offers enhanced ease of use for JMS messaging, enabling remote graphical configuration of JMS and publish-and-subscribe messaging through the Eclipse-based MQ Explorer, as well as the other WMQ, V7.0 advances discussed above. |
| **IBM WebSphere Message Broker V6.1.** | Delivers universal connectivity, offering extensive transformation strengths, to integrate disparate IT systems, platforms, devices, & APIs. It distributes information & data generated by complex business events in real time, to people, applications, & devices across *(and beyond)* the enterprise, exploiting WMQ messaging infrastructure. IBM WMB also offers a simple programming model, great breadth *(of transport protocols, data models, & mediations)*, strong systems management, & high performance. Several Editions, platforms, & Add-on Extenders are offered. | The latest IBM WebSphere Message Broker, V6.1 release has been available since November 2007. It offers ease-of-use improvements, enhanced SOA support, extended connectivity, improved administration & system management facilities, extended platform support, improved performance, & extended coexistence and migration support. Extended integration with IBM WebSphere Service Registry and Repository is an important feature. IBM WMB for z/OS is optimized for System z mainframe platform heavy-duty usage. |
| **IBM WebSphere ESB, V6.2.** | IBM WebSphere ESB *(WESB)* provides pure Web services connectivity, JMS™ messaging and Service Oriented integration, to power an SOA environment. Integrations between applications & services can be quickly & easily created & deployed, with many fewer, & much simpler, interfaces. WESB offers faster time to value and seamless integration with the overall IBM Smart SOA™ platform. | The newest version, IBM ESB, V6.2, was released 12.12.2008. It now offers new policy-driven ESB mediation, including integration with IBM WebSphere Service Registry and Repository for policy management. Enhanced Web services standards support, enhanced service mediation capabilities, & wider currency, are other major advances. The latter includes z/OS & z/OS.e V1.9, IMS V10, & WebSphere Adapters V6.2 support. |
| **IBM WebSphere MQ Extended Security Edition** | WebSphere MQ Extended Security Edition expands WMQ security support with an end-to-end, application-level data protection model features. Available as an upgrade to WebSphere MQ, it enables enterprise-wide, remote management of security polices and can be deployed to secure existing production environments without changes to existing WebSphere MQ applications. | |
| **IBM WebSphere MQ Everyplace, V2.0.** | WebSphere MQ Everyplace connects mobile & wireless applications with enterprise systems with secure, dependable application messaging. Supports a wide range of platforms/devices with a small, customizable footprint. Offers extensive customization options for this class of applications. | WMQE, V2.0 extends robust messaging to fragile mobile & wireless networks over intermittent connections. Offers a choice of languages, APIs, and environments like Java™, C, JMS™ and J2ME™. Support once-only messaging, peer-to-peer, synchronous, & asynchronous links. Rich encryption, non-repudiation & authentication features provide strong security. |

Continued on next page...

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| WebSphere Product | Core Capability & Functionality | Latest Version Advances/Benefits |
|---|---|---|
| IBM WebSphere Adapters, V6.2. | Broad range of predefined IBM WebSphere adapters help developers rapidly & fully integrate business applications into their enterprise's SOA environment. Provides in-depth support for major applications like SAP & Oracle, plus offers an Enhanced Toolkit for developing custom adapters. V6.2 is latest release. | |
| IBM WebSphere Transformation Extender | The IBM WebSphere Transformation Extender is a universal data transformation and validation engine with a codeless, graphical approach to development, deployable anywhere in the enterprise. It helps faster application deployment with reduced development/ maintenance costs. | |
| IBM WebSphere DataPower Integration Appliance XI50 | The XI50 is IBM's hardware form-factor ESB for simplified integration deployment, with hardened security. It helps adopters simplify, secure, & accelerate their SOA. A 1U rack-mount unit, this ESB appliance provides higher security assurance certification levels only hardware can offer, plus hardware-assisted, Gigabit-wire-speed SOA performance. Extensive transformation capabilities, new Web services standards support, & broad connectivity is included. ✪ | |
| IBM WebSphere Service Registry & Repository, V6.2. | Core IBM Smart SOA™ integrated service metadata repository to govern services & manage their lifecycle. It allows enterprises to easily publish & find services capabilities over all lifecycle phases of an SOA, promoting services reuse, increasing services visibility, aiding consistency, and helping drive SOA governance. ✪ | |
| IBM WebSphere Process Server, V6.2. | Foundation IBM Smart SOA™ business process management server latest release, works closely with IBM WebSphere ESB above for connectivity, & with IBM WebSphere Integration Developer below for integration development. ✪ | |
| IBM WebSphere Integration Developer, V6.2. | Principal IBM Smart SOA™ user-friendly development tool for end-to-end composite application integration and connectivity development in an SOA. WID is an advanced Eclipse-based GUI tool for building SOA-based BPM and integration solutions across IBM WebSphere Process Server, IBM WebSphere ESB, and the IBM WebSphere Adapters. Further coverage outside this Paper's scope. ✪ | |

✪ = Further coverage outside this Paper's scope.

**Figure A4: IBM Smart SOA™ Connectivity Software**

## Introducing New IBM WebSphere MQ File Transfer Edition, V7.0

New and first released on 12.05.2008, IBM WebSphere MQ File Transfer Edition *(WMQ FTE)*, V7.0 delivers enterprise-wide managed file transfer for the SOA era, and has aroused great interest from WMQ users worldwide. This important new offering uses WebSphere MQ to provide reliable, managed, secure, and auditable, bulk file transfer transport to move files – of all sizes – between IT systems, without the need for any programming. It operates over the existing WMQ messaging backbone that already handles enterprise messaging, consolidating these two infrastructures into a single backbone. Core WMQ FTE functionality provided includes:

- The SOA-ready managed file transfer approach enables file transfers to be moved onto the SOA infrastructure, including SOA messaging Backbones and ESBs.
- The ability to move files of any size *(including those larger than maximum WMQ message sizes)*, and of many types. *(Including ASCII/EBCDIC, CR/LF, Flat files, z/OS QSAM, BPAM, and VSAM files.)*
- Offers fully-automated/controlled file movements between IT systems, including scheduling or triggering transfers when file-related events occur.
- Extends the WMQ Explorer GUI with integrated GUI configuration and file transfer tooling. This allows quick and easy remote definition of file transfers without any programming, and supports the monitoring of transfer progress. Transfer initiation, unattended operation, scripting, scheduling, and restart policies are all set from the GUI.
- Records a time-stamped log of file transfers at source and target for audit purposes. These verify and document that business data files were transferred with full integrity from source to target systems.
- Offers scripting support option for fully-programmatic control of file transfers.
- Delivers files reliably, using proven WMQ MQ transport technology, and eliminates the need to use troublesome FTP.
- Supports important operating system platforms, including distributed IBM AIX, HP-UX, Linux, Sun Solaris, Microsoft Windows, Linux on x86 platforms, as well as z/OS on System z mainframes.
- On distributed platforms, WMQ FTE, V7.0 includes a full WMQ, V7.0 license, delivering both file-oriented and message-oriented styles of data movement combined in one package.

With this excellent ease of use, simplicity *(small footprint, no programming)*, extensive breadth *(platforms, file types, WMQ versions)*, full audit capability, and strong security, we expect this important new WMQ family member to be hugely popular and successful.

It will help WMQ users to further reduce costs, support real business processes, and escape from risky FTP. WMQ FTE provides a powerful new file transfer backbone with many advanced capabilities, including indirect routing, automatic transfer path selection, with control and monitoring from any point, and with end-to-end audit logging. Both ad hoc and planned/scheduled file transfers can be made, all initiated from the GUI tooling, as well as from programmatic and scriptable interfaces. Unlike FTP, WMQ FTE also offers reliable file transfer that preserves the integrity of the file data, using a checkpoint/restart mechanism that allows files' transfer interruptions to be detected and retried automatically until success, without any manual intervention, based on reliable WMQ foundations. It also supports time-independent file transfers, exploiting core WMQ asynchronous behavior so that sender, receiver, and network need not all be concurrently available for the transfer to be completed. Event-driven file transfer support also enables flexible distribution of file data, audit logs, progress and alerts. WMQ FTE complements the IBM ESBs, delivering files and documents reliably to and from ESBs, and allowing appropriate ESB capabilities to be applied to the files being transferred.

WMQ FTE, V7.0 thus also provides a crucial solution for financial organizations that must comply with government regulations – such as Sarbanes-Oxley – that require accurate tracking and filing of data. See also Appendix C.

With WMQ FTE, V7.0, WebSphere MQ's family extends beyond the SOA Messaging Backbone role to become the single, unifying enterprise connectivity solution carrying all file-oriented, message-oriented, service-oriented, and event-oriented applications, and Web 2.0 traffic. Using this single, reliable backbone helps enterprises achieve higher operational efficiencies by eliminating any need to deploy/manage separate parallel networks for messages, files, SOA, and/or events.

## IBM WebSphere MQ Low Latency Messaging, V2.1

First joining the WMQ family with a November 2007, V2.0 public release, **IBM WebSphere MQ Low Latency Messaging *(WMQ LLM)*, V2.1** is the latest version of this very-high-throughput, ultra-low-latency messaging transport, optimized for crucial *(sub-millisecond latency)* needs of financial market firm front/middle offices. It is also suitable for other industries where such data delivery speed is paramount. Exploding data volumes in financial markets, with higher-velocity trading and analytic workloads, have driven these "extreme messaging" needs to the forefront.

WMQ LLM is based on patented technology from IBM's Haifa Research Lab, earlier proven in embedded roles. It attains its breakthrough speeds *(see below)* by packetizing data efficiently, and by exploiting IP multicast infrastructure daemonlessly to eliminate network connections.

Now offered standalone, the product is also included in the **IBM WebSphere Front Office for Financial Markets**offering. Reuters also adopted WMQ LLM *(on an Original Equipment Manufacturer (OEM) basis)* for their new RMDS Multicast Server in the 2008-on release of its famous Reuters Market Data System – RMDS 6 – providing faster delivery of Reuter's data and content.

WMQ LLM offers three messaging models, spanning topologies, speeds, and reliability levels. These are:

- Reliable, highest performing, one-to-many multicast messaging *(RMM)* over User Datagram Protocol *(UDP)*, with positive-or negative-receiver feedback reliability, and traffic control, features. Reliable, lightweight and fast, point-to-point unicast messaging over UDP, with positive- or negative feedback, and traffic control, features.
- Reliable, point-to-point unicast messaging over TCP, with reliability and traffic control primarily handled by TCP.

Other important WMQ LLM features include:

- High-reliability and traffic control features not found in other UDP multicast, or unicast, solutions.
- Stream failover for high availability, plus static and dynamic traffic rate and congestion control.
- Flexible, fine-grained, message-based, or coarse-grained, topic-based filtering.
- Robust APIs to monitor application and network statistics, including internal and external latency.
- Highly configurable, to fit diverse application messaging and threading needs.
- Support for Linux, Windows, and Solaris, platforms most used by Financial Services front offices.

*...extremely low latency of 5 microseconds has been achieved for 45-byte messages at 10,000 messages per second throughput rate...*

The latest V2.1 release adds important Reliable and Consistent Message Streaming *(RCMS)* high-availability with extensive features, .NET and Java API client support, IBM & Sun JVM support, property-based message selection and filtering, receiver-defined late joiner support, and native InfiniBand support for further improved performance.

With the latter, extremely low latency of 5 microseconds has been achieved for 45-byte messages at 10,000 messages per second throughput rate *(41 microseconds on Ethernet)*. RMM on native InfiniBand can now deliver >40M 12-byte messages per second, and near 3M 120-byte messages per second, both on common x86 servers.

## Our Analysis

The IBM WebSphere MQ family has been the **clear, market-leading VAIM platform**, expanding for over fifteen years; and with its associated Smart SOA™ product family today, now provides comprehensive SOA connectivity, as well as traditional AI solution enablement, for businesses of all sizes. It also provides all the message and event broking services, secure message transmission, QoS, and AI management services that are required of an SOA messaging backbone, with publish-and-subscribe, assured message delivery, sophisticated event handling, and broking to trigger business activities in defined circumstances as base value-added services.

The latest Version 7.0 enhancements, and family additions discussed above, substantially extend and strengthen the platform. It also comprehensively supports 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.

# Appendix B: Representative IBM WebSphere MQ Customer Experiences

Real-world customer experience and results with VAIM/SOA connectivity platform middleware provides the most compelling evidence of the benefits that these powerful technologies deliver. We include below recent profiles highlighting the benefits delivered by IBM WebSphere MQ-based VAIM/SOA Connectivity deployments at five varied enterprise IT users in very different industries and geographies.

## 1. Crowley Maritime Reduced Application Delivery Time/Costs, Improved Efficiency/Productivity with VAIM/SOA Connectivity Solution from IBM/Ultramatics

Crowley Maritime Corporation *(based in Jacksonville, Florida)* is a diverse worldwide marine transportation and logistics services company, employing 4,100 people. Founded by Tom Crowley in 1892, and family run for 116 years ever since, privately-owned Crowley has five main operating lines of business – liner services, logistics, marine services, petroleum services and technical services – and operates 210 vessels. The firm's maritime services range from RO/RO and LO/LO vessels, tugs and barges, to container ships, with operations from Central America and the Caribbean to Alaska's North Slope. Crowley needed to reposition its business operations to meet the challenges of its second century of operations – including reducing operating costs and increasing profits and ROI from existing routes/platforms. It also needed to address legacy application modernization. Crowley selected an IBM VAIM/SOA Connectivity solution, designed/implemented by Ultramatics *(IBM Premier Business Partner – "SOA Specialty" certified, Tampa, Florida)* that included:

- **IBM WebSphere Message Broker.**
- **IBM WebSphere MQ.**
- **IBM eServer zSeries 890 mainframe.**
- **IBM WebSphere Process Server.**

Crowley had previously been heavily dependent on many hand-coded, PTP, custom-built integration links between its legacy applications, each typically taking at least 300 hours of IT development. Ultramatics recommended an IBM VAIM/SOA Messaging Backbone solution that quickly showed a reduction *(by at least half)* of the usual time/costs incurred in tying new, third-party applications into the Crowley core infrastructure, which included a 30-year-old, heavily-customized, mainframe-based, customer-information system.

Business/strategic benefits were even more important. In 1H 2006, Crowley implemented a new transportation management application for inter-modal transportation, to automate the routing of its cargo containers *(hundreds per day)* to dozens of terminals across North America. This major new application easily "plugged into" the IBM SOA Messaging Backbone, quickly integrating this major addition with existing systems. This delivered unprecedented efficiencies, with the routes chosen proving better, cheaper and faster, and delivering much-improved customer service/satisfaction.

The Crowley/Ultramatics team has now built at least 20 major interfaces using IBM VAIM/SOA Connectivity software – including interfaces to equipment control systems, the legacy Accounts Receivable system, the Customer/Vendor information system, and others. The IBM solution now provides Crowley with a robust middleware backbone for all its future corporate, business and AI needs.

*"This [SOA] solution directly translated to $225,000 in savings for Crowley over our previous practices. Not to mention the soft dollar implications on resource utilization costs and efficiency as those resources can now focus their efforts on other fronts."*

**Jerry Dresch, Director of Application Services, Crowley Maritime Corporation**

The IBM/Ultramatics solution reduced the new applications connectivity delivery time and costs by more than half, saved $15,000 per integration interface, and showed an anticipated initial $225,000 saving over previous practices. It also gave significant improvements in business efficiency, productivity, and business flexibility, whilst reducing errors and omissions. It also added years of productive life to Crowley's legacy applications. The company has since been busy adding its human resources, and business-to-business interaction applications, to its IBM SOA Messaging Backbone.

*The IBM/Ultramatics solution reduced the new applications connectivity delivery time and costs by more than half, saved $15,000 per integration interface, and showed an anticipated initial $225,000 saving...*

## 2. GROHE Enjoys Integrated Solutions On-tap with IBM Service-enabling WMQ Software

Grohe AG is the global market leader in premium sanitary fittings for bathrooms and kitchens. It is also Europe's largest water technology solutions provider, the largest exporter of faucets, bath/shower and other fittings worldwide, and is renowned for its top-quality, attractive, well-designed fixtures. This successful 5,100-employee firm is now headquartered in Dusseldorf, Germany, runs 6 plants, 20 sales subsidiaries, and 15 other sales offices, selling into 130+ countries. 2007 annual sales topped €1,017M *(up 8%)*, operating profits *(EBITDA)* rose 19% to €203M, 84% of sales were exported/outside Germany, and over 50 new products were innovated.

GROHE needed to integrate its then-new SAP ERP modules with existing central mainframe-based applications. These included duty and plant applications, delivery, invoice and product catalog systems, bar coding, logistics and inventory management software. Grohe identified that 14 new interfaces were needed between these systems and the new SAP ERP modules, and needed quickly to meet tight launch deadlines. The options were to implement these with hand-coded, point-to-point links or to purchase/deploy a VAIM/SOA connectivity middleware platform to speed these vital applications connectivity tasks. After considering several vendor proposals, GROHE implemented an IBM SOA Connectivity advanced ESB solution for SAP integration, using IBM WebSphere MQ VAIM software, aided by experienced AI/SOA services from SerCon GmbH. *(an IBM company)*. The solution used the following IBM WebSphere SOA Connectivity software:

- **IBM WebSphere Adapter Framework.**
- **IBM WebSphere Adapter for JDBC.**
- **IBM WebSphere Adapter for mySAP.com.**
- **IBM WebSphere Message Broker.**
- **IBM WebSphere MQ.**

It also used a high-performance IBM System p 670 server running the WebSphere Message Broker to control message flow, distribute incoming business objects to the right queues, and transform messages into the format required by recipient systems. WebSphere MQ provides scalable, assured delivery of messages over the company's Gigabit Large Area network *(LAN)*. Passing/transforming initially between 5,000 and 25,000 messages per day, the IBM SOA Connectivity solution enabled a global exchange of information via services between decoupled front- and back-end applications. The SOA used standardized interfaces with common message formats *(XML and SAP Intermediate Documents)*, ensuring GROHE business services remain stable and well-defined, yet easy to change for new business needs.

*"Using the older method of point-to-point integration, it would have taken up to six months to program one interface. With the IBM WebSphere SOA Connectivity solution, it took two months to complete all 14 projects. This was a stunning success for our team and our company. In fact, we have now service-enabled our legacy systems, which will facilitate all future business integration projects."*

**Armin von Dolenga, Software Manager, GROHE AG**

*This IBM solution decreased average integration time by up to 84% (two-to-four-weeks versus up-to-six-months)...*

With this approach, von Dolenga found that his IT groups could now bring a new software service online within just two-to–four-weeks. This IBM solution decreased average integration time by up to 84% *(two-to-four-weeks versus up-to-six-months)*, drastically reducing the total effort and cost of integrating legacy applications with new SAP modules *(compared to hand-coded, point-to-point integration techniques)*. It also provided more reliable and available data transfers, and has SOA-enabled GROHE's legacy systems for reuse as valuable software assets on demand. Grohe has also since successfully deployed SAP R/3 for all its overseas subsidiaries over 2007 and 2008, also using this applications connectivity solution and greatly streamlining its global IT infrastructure and business processes.

## 3. Staples Brings Customers Online – Becomes a More Flexible, Highly Successful Online Business.

Staples is the world's largest office products firm, with $27B sales after its July 2008 acquisition of Corporate Express *(leader in office product supply to businesses and institutions)*. Staples now serves businesses of all sizes *(from home-based businesses to Fortune 500 companies)* and consumers in 27 countries over North and South America, Europe, Asia and Australia, from >2,170 *(Q2 2008)*superstores *(whose concept it invented)*. Staples offer a broad range of office products, including supplies, technology, furniture, and business services, through the superstores, via catalogs, and over the Internet. NASDAQ-listed Staples was founded in 1985, and is headquartered in Framingham, near Boston.

Staples Business Delivery, its unified selling channel, combined its Staples.com *(SMB & home customers)* site with the Staples' catalog businesses. With online channels crucial to its growth strategy, Staples needed a new e-commerce platform that could support/fuel major online business growth – and not hold it back like the then-existing platform. Teaming with IBM to deploy a powerful, flexible, online e-commerce platform, Staples created groundbreaking, first-of-a-kind services on Staples.com that set new sector value standards, and delivered revolutionary order automation. As a result, Staples' newfound ability to introduce stand-out services for its customers faster than competitors contributed to 30% online sales growth and to Staples becoming the rated number two online retailer by 2008. *(After only Amazon.)* Staples' e-commerce solution included the IBM software products, systems, and services below:

*Staples' newfound ability to introduce stand-out services for its customers faster than competitors contributed to 30% online sales growth and to Staples becoming the rated number two online retailer by 2008. (After only Amazon.)*

- **IBM WebSphere Commerce.**
- **IBM WebSphere Application Server.**
- **IBM DB2.**
- **IBM WebSphere Message Broker.**
- **IBM WebSphere MQ.**
- **IBM System p servers.**
- **IBM Global Business Services *(IGBS)*.**
- **IBM Software Group Lab Services.**

Staples had worked with IGBS before, moving its StaplesLink.com site *(for larger business customers)* onto a new IBM WebSphere Commerce-based platform, resulting in sharp improvements in performance and scalability. This success led Staples to select the same solution for the crucial new Staples.com site. It again teamed with IGBS who provided the IBM software, hardware, and services above. This new, consolidated Staples.com architecture was built on more powerful, scalable and efficient IBM System p UNIX servers. IBM WebSphere Commerce was again the software hub, running over IBM WebSphere Application Server, and using IBM DB2 to store the extensive customer and transaction data. The partners worked closely to design, deploy, and to integrate this new solution tightly with, Staples' numerous backend systems, using IBM WebSphere MQ and IBM WebSphere Message Broker to speed the extensive application connectivity needed, and to add the robustness, capacity, and scalability needed for this high-growth, very-high-volume, e-commerce operation. The speed productivity of applications connectivity development these products provided enabled demanding project schedules to be met. The Staples.com IBM-powered site has since been a huge business and technology success, including:

- 60% increase in online conversion rates in the first year alone.
- Sharply increased customer satisfaction, through a better-tailored retail experience.
- 30% peak transaction volume increase *(over old platform)* handled easily, hitting 9,000 orders per hour *(or 2.6 transactions per second)* with no impact on performance and reliability, at late 2006 peak day.
- Enabled Staples to bring many differentiating services/programs to market faster and cheaper through 2008.
- Supporting Staples e-commerce revenues reaching almost $5B in 2006.
- By 2008, burgeoning e-commerce revenues now ranked Staples as the second largest Internet retailer *(after Amazon.com)*, in Internet Retailer Magazine's top 500 retail Web sites.
- Delivered much-increased infrastructure scalability and resiliency over this huge business growth period.

The Staples.com and StaplesLink.com e-commerce channels use the same type of IBM infrastructure as above, and were major factors in the company's online business growth successes.

*"By giving us the means to create an innovative, more customer-centric buying experience, the IBM solution helped us deliver more value to customers, which helped us increase their satisfaction and loyalty."*

**Pete Howard, Senior Vice President, Staples Business Delivery**

*"The fact that we are more flexible and responsive as a business has made us leader in the office supply market. In addition to providing a rich customer experience from a business feature perspective, we are also able to scale the environment as the business grows and provide excellent performance for our end users."*

**Christine Putur, Vice President, Information Systems, Staples North American Delivery and Supply Chain**

*The fact that we are more flexible and responsive as a business has made us leader in the office supply market.*

The strongest, strategic benefit of the new platform was enabling Staples to deliver unique retail experiences per segment and customer, taking personalization and customer profiling to new levels. This sharply raised satisfaction, aiding higher customer retention. It also saved customers much time and effort, with features like the Easy Reorder and Easy Rebate offerings. Staples has now also added an SOA framework into its IT strategy, to uncouple and share services across the Staples enterprise, using IBM WebSphere Message Broker as its core integration technology, in collaboration with IBM.

## 4. Brazil's CAIXA Econômica Federal Saves $300M IT Infrastructure Costs With New IBM SOA-based National Lottery & Banking Solution

Based in Brazil's capital city of Brasilia, CAIXA Econômica Federal *(CAIXA)* is now the largest public bank in Latin America, operating since 1861. In addition to its national banking services, CAIXA manages the country's lottery system – a major source of revenue for the federal government. CAIXA is also the main agent for federal government public policies serving the whole Brazilian population, not only with its banking, the lotteries, but also urban infrastructure investments, and major social program payments, including unemployment benefit. CAIXA currently serves 8.4M current account holders and 29.1M savers, 31% of Brazil's national savings market. In 2005, the bank paid R$155B into the Brazilian economy, 6% of the country's entire Gross Domestic Product *(GDP)*. It also runs extensive parts of the national cultural, artistic, and historic patrimony, including museums, theatres, and galleries, at its Cultural Complexes in major cities, including Brasilia, Sao Paulo, Rio De Janeiro, Salvator, and Curtiba. CAIXA's mission and values statement also publicly pledges the bank to use "state-of-the-art information technology in all its assistance channels", to serve the nation with maximum efficiency.

CAIXA had been outsourcing Brazil's national lottery operations to a third-party provider. However, the outsourcing solution was expensive to maintain and offered CAIXA little control and expandability. CAIXA decided to bring the lottery system in-house to regain control of the system. It also wanted to increase the scalability and technical independence of the system, whilst reducing costs, and CAIXA engaged IBM to submit a POC for a solution.

Teaming with IBM Global Business Services *(IGBS)* and IBM Global Technology Services *(IGTS)*, CAIXA designed and implemented a scalable and efficient new national lottery system. The solution supports lottery games, financial services, and social services for the Brazilian population. Two IBM System z9 Enterprise Class servers provide the backbone of the solution. To support lottery system data, CAIXA adopted the IBM DB2 for z/OS data server, and implemented a suite of IBM DB2, IBM Rational, IBM Tivoli, and IBM WebSphere SOA Connectivity software servers and tools that enabled it to build and run the new lottery system efficiently. The system also allows all of the lottery stores in Brazil to operate as extended banking branches. CAIXA relied on a number of IBM service groups to train its personnel on the new software, and to configure the new lottery system solution.

IBM's Smart SOA™ WebSphere software provided the core SOA applications and integration platform for the new lottery system solution, which included *(along with too many other IBM CICS, DB2, Rational, & Tivoli products to list here)*:

- **IBM DB2 for z/OS.**
- **IBM WebSphere Application Server for z/OS.**
- **IBM WebSphere Business Modeler.**
- **IBM WebSphere Enterprise Service Bus.**
- **IBM WebSphere Process Server.**
- **IBM WebSphere Message Broker for Multiplatforms.**
- **IBM WebSphere MQ for z/OS.**
- **2 * IBM System z9 Enterprise Class Mainframes.**
- **IGBS & IGTS Services.**
- **IBM Business Partner RSL Informatica.**

The IBM solution has dramatically cut CAIXA infrastructure costs, increased lottery participation and boosted convenience, by bringing its banking service to its lottery offices nation-wide. Specifically, this IBM solution has:

*Slashed CAIXA's infrastructure acquisition costs by over US $330M, over 50%.*

- Slashed CAIXA's infrastructure acquisition costs by over US $330M, over 50%.
- Increased lottery participation nation-wide by 7%, increasing social funds available.
- Helped CAIXA deliver enhanced convenience and efficiency to its nation-wide customers by extending its banking services to lottery offices.

*"The new lottery system allows us to extend our banking services through our lottery offices. In fact, more than 60% of bills paid in Brazil are now paid at our lottery offices."*

**CAIXA Econômica Federal**

**Analyst Comment:** Although specific details have not yet been published, the number of applications connectivity interfaces needed for such a major national-scale solution can only have been extensive: IBM's Smart SOA™ Connectivity software clearly helped these crucial links to be created successfully. In addition, with CAIXA's tens of millions of savers, the population's huge lottery usage, 60% of Brazil's bill payments, and with multiple federal social program payments to many millions of citizens, the many billions of transactions that CAIXA's new IBM solution infrastructure now smoothly processes is highly impressive.

*In fact, more than 60% of bills paid in Brazil are now paid at our lottery offices.*

## 5. New York Power Authority – Uses IBM Smart SOA™ to Revolutionize SAP Customer Billing and Integration Challenges

The New York Power Authority *(NYPA)* was set up by State Governor Franklin D. Roosevelt *(later US President from 1933-1945)* in 1931, to start New York's pioneering model of public control of state hydropower resources. Today the NYPA is the USA's largest state-owned power organization, runs 18 generating facilities and 1,400 circuit-miles of transmission lines, and provides much of the state's lowest-cost power. The NYPA has major hydropower facilities on the Niagara River, the St. Lawrence River, and in the Catskill Mountains, plus over a dozen smaller hydro and conventional plants across New York State. NYPA sells power to government agencies, community-electric systems and rural electric cooperatives, to companies, to private utilities for customer resale *(without profit)* and to nearby states, under federal requirements. 2007 operating revenues were >$2.9B, net revenues $235M, and net power generation was 26.3M megawatt-hours *(MWh)*.

But for the many employees and stakeholders of NYPA, increasing complexity was their lot. Four billing systems supporting hundreds of investor-owned utilities gave rise to overlapping accounting hierarchies. Their programmers were supporting 120 interfaces, each individually developed using point-to-point programming. The developers spent most of their time maintaining existing interfaces, with scarcely any time to build new applications. The NYPA lacked an infrastructure that could satisfy the demands of its many stakeholders needing more information about their customers.

The NYPA required a much more flexible and reusable enterprise system that simplified integration of SAP with its scores of external interfaces, and that brought modern human workflow and data reconciliation support into its business processes.

The NYPA streamlined its billing systems by service-enabling the core SAP R/3 Billing, Customer Care and Services System *(CCS)*, integrating its four disparate billing systems into a single, consistent environment, with IBM VAIM/Smart SOA™ software. This business-centric, SOA-based approach enabled full integration of the NYPA's business as linked, repeatable business tasks/services, bringing a radical streamlining of business processes. NYPA, a committed SAP shop, aimed to fully integrate its SAP and other systems, simplify those >120 customer billing interfaces, and fulfill new deregulation demands that it should provide better customer information to stakeholders.

The NYPA considered solution proposals from IBM, TIBCO, and a customized solution based on the proprietary SAP Advanced Business Application Programming *(ABAP)* language. The IBM solution was selected because it offered the most flexible SOA/integration software platform around SAP, showed fullest open standards support, and was backed by extensive IBM development services locally available to help the NYPA implement the new solution. These also offered IBM's rich experience of best SOA practices for knowledge transfer, and full IBM training. The solution used IBM products and services, including:

- **IBM WebSphere Message Broker.**
- **IBM WebSphere Process Server.**
- **IBM WebSphere Adapter for SAP.**
- **IBM Global Services.**
- **IBM WebSphere Application Server *(Embedded in WPS)*.**
- **IBM WebSphere MQ.**
- **IBM Solution Architecture for Energy *(SAFE)*.**

For its SOA foundation the NYPA, chose IBM WebSphere Process Server, IBM WebSphere Message Broker, and IBM WebSphere Adapter for SAP Software, all core parts of IBM's Solution Architecture for Energy *(SAFE)*. SAFE is a solution-driven, comprehensive, SOA-based enterprise framework that helps reduce cost and risk in the Energy and Utility industry. SAFE and Smart SOA™ provide flexibility that protects a utility's investment in existing applications, systems and infrastructure, whilst meeting newer, modern needs such as that at the NYPA.

This IBM Smart SOA™ solution now allows the NYPA to bill all customers in the same, unified IT environment, bringing major improvements to how it now conducts business. IBM WebSphere Message Broker is used to route and reformat messages, integrating with the target destinations, allowing extensive reuse of data and applications, and embracing open standards use. The IBM WebSphere Adapter for SAP allowed the NYPA to fully exploit the various interfaces SAP R/3 provides to integrate CCS with its other systems much more effectively. The IBM WebSphere Process Server is used to review reports out of SAP, automatically taking corrective actions to rehabilitate data, or to alert a member of staff to take the needed next action*(s)*. This automation greatly streamlined the crucial business process of giving accurate, comprehensive information to stakeholders. Also, all the NYPA's reporting data now comes from one repository/business warehouse, giving all stakeholders a single information view.

*The reusability it provides means that we develop in weeks rather than months, it's a tremendous improvement in our productivity.*

The NYPA found a major WebSphere advantage was that it enabled extensive reuse of the services built. These it published in its growing SOA services library, heavily exploiting them repeatedly for other new applications/interfaces, and speeding those more. The development team found about 50% of functional needs in subsequent new application requests could immediately be met by such reuse, halving total development effort already.

This successful solution has delivered dramatic development time/effort reductions for new applications and interfaces, greatly increased the productivity of NYPA's IT and business professionals, and sharply improved data integrity, billing accuracy and customer satisfaction.

*"I am very pleased with the level of effort and type of support that IBM was able to provide in this project. The reusability it provides means that we develop in weeks rather than months, it's a tremendous improvement in our productivity. We have consolidated four systems into one, standardized and improved the maintainability of our interfaces, freed staff time for more valuable work, and have one version of the truth, which makes us more efficient. This has also freed up at least 15 full-time billing employees for more valuable tasks."*

**Dennis Eccleston, Chief Information Officer, New York Power Authority**

For the future, the NYPA now sees its IBM Smart SOA™ solution as a platform easily able to expand to integrate additional applications and systems, and that can support advanced business process capabilities, such as complex event handling and business monitoring.

# Appendix C: Regulatory Compliance – Credit Crunch Will Trigger New AI Demands

## This Decade's Regulatory Compliance Expansion – Already Heavily Impacted IT

Since Year 2000, the steadily increasing panoply of regulatory compliance demands, from many sources, imposed increasingly strict controls and demands on enterprises in most industries and geographies. Meeting these tougher new regulatory compliance mandates almost invariably required complex changes to, and new integration levels amongst, enterprise applications, and over the IT infrastructures supporting the business. This regulatory torrent emanated from many sources: global institutions, supranational bodies *(e.g. the European Union)*, national governments, standards bodies, and vertical industry regulators.

Some were well known, such as the Basel II Convention *(which sets new international standards for banking operational, credit and market risk management)*, which has driven many new IT requirements *(including higher levels of information availability, delivery and monitoring)*, and which came into effect from late 2006. Another major example was the stringent US Sarbanes-Oxley legislation about the integrity of reported US company financial results. Many others apply to specific vertical industries, nations, professional functions *(accounting, for example)*, etc. Many triggering forces drove these increased regulation levels of recent years – many shown on the lower part of Figure C1 on page 45.

## 2008's Credit Crunch Sequel – Will Unleash New Regulation Wave

Dramatic credit crunch events that unfolded over the second half of 2008 starkly revealed gross national and global failures of regulation that significantly failed to prevent the extraordinary events witnessed over this period. A strong wave of new regulations now seems certain to wrap the global financial services industry, as well as institutional investors, stock markets and all their participants, central banks, and international financial institutions. Dire failures to control/regulate sub-prime and other excessive lending had deeply toxic effects upon balance sheets of numerous banks.

*A strong wave of new regulations now seems certain to wrap the global financial services industry...*

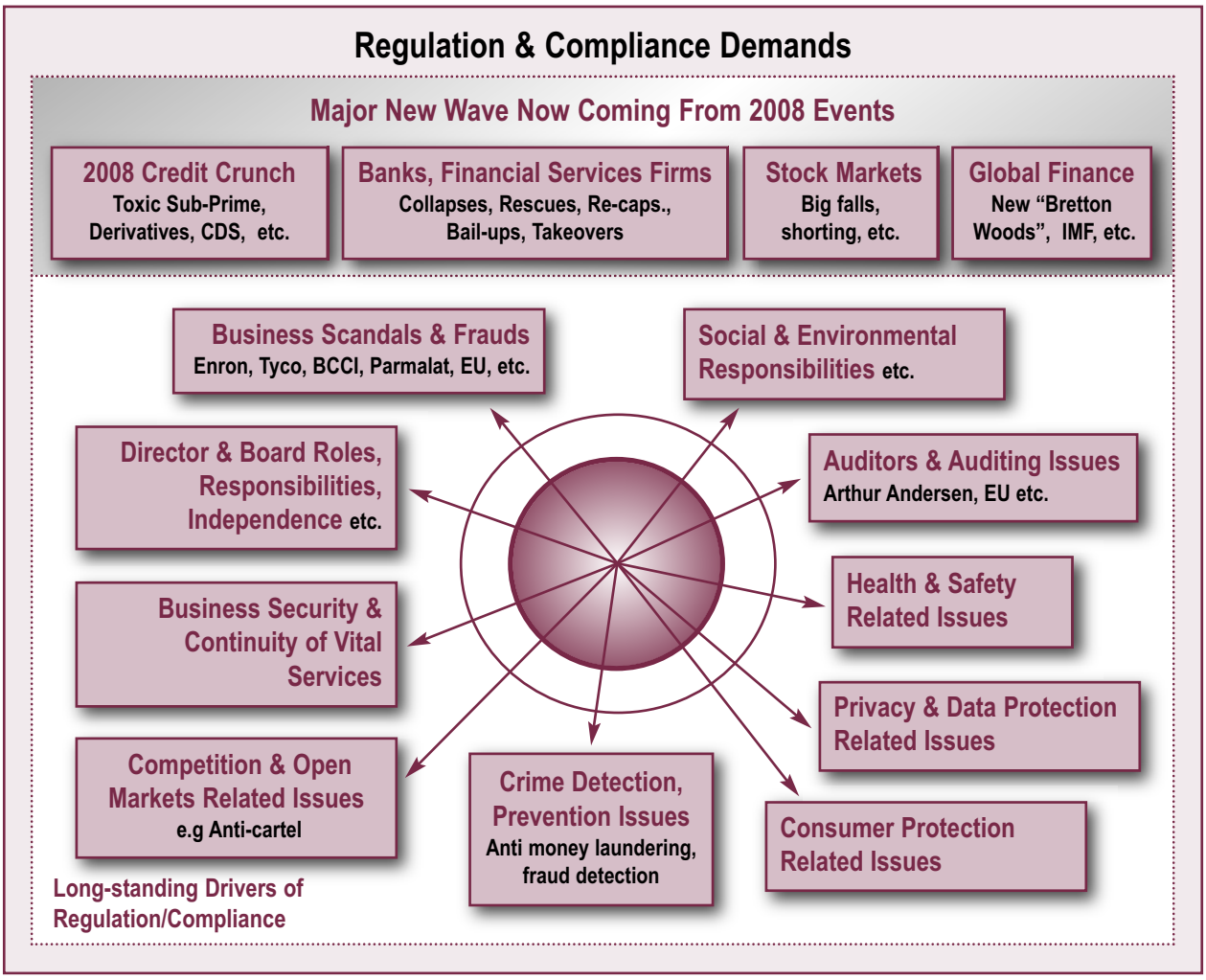


**Figure C1: Regulation & Compliance – Major New Wave to Follow 2008 Events**

These failing, plus the impact of complex derivative and Credit Default Swap *(CDS)* instruments, amplified by the wholesale failure of ratings agencies to properly measure real risks, combined to wreak havoc upon the worldwide banking and financial services industry. It has taken huge taxpayer bailouts to keep many major banks afloat. Several whole countries have required rescue by the International Monetary Fund *(IMF)* after excessive borrowing or speculation led to financial, economic, or currency near-collapse. Stock markets plummeted worldwide, with short-selling by hedge funds and other speculators blamed for some of the losses. These falls severely hit investment portfolios, pension funds, and all other stock-based unit and investment trust savings globally. The upper part of Figure C1 highlights main trouble spots where new regulation is now almost certain.

Vaunted existing regulatory regimes, such as Basel II, must be adjudged to have failed badly to prevent these disasters. Loud calls for far stronger regulation of all these sectors have become impossible to resist politically and socially. Extensive new regulation is thus a certainty for the above sectors from 2009 onwards.

## IT Heavily Impacted – Compliance Demands More Applications Connectivity

Regulatory regimes each added new, stringent requirements/demands upon enterprise IT organizations; these demands usually included some combination of:

- Demands that enterprises can show/report complete **customer histories**. *(Many cannot easily do so because of lack of integration of customer-related applications and data.)*
- **Anti-money-laundering regulations** that demand more stringent identification and documentation of customers and the tracking of all customer contacts. *(Which requires cross-checking with other account types, products, and credit agencies, etc.)*

- Financial reporting and accounting systems that can assure full **enterprise compliance with accounting and company results integrity standards**. *(Some accounting standards, such as mark to market rules, have proved unfit for purpose and perverse, actually making the credit crunch crisis much worse, and will now have to be changed.)*
- Regulations that extend the need to **retain data and records**, often for many years, with a retrieve-on-demand requirement, or a full Information Lifecycle Management *(ILM)* implementation, needed.
- More **demanding regulatory reporting**, that requires extensive integration to assemble and combine the required information, plus powerful BI/EPM capabilities to produce the needed analyses.
- **Extended audit trail and logging requirements**, 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 Continuity *(BC)* investments.

All these regulation-driven IT changes require/depend upon more advanced application and systems integration of the main business processes that the IT systems are supporting.

For 2009, regulatory compliance therefore again **remains a major driver of new AI requirements**, and is still a priority for corporate and IT management alike. The IT industry has responded to regulatory compliance needs with many new point solutions, products, and related services, but there are few "quick-fix", "plug-in-a-box" solutions that can "magic away" all these needs. A strategic VAIM/SOA platform – that can enable/support/deliver all the integration needs in a common, consistent, and productive manner – is therefore now absolutely essential. Adoption of SOA application architectures provides the most comprehensive, flexible and adaptable application services portfolio, which is more readily able to meet future regulatory changes easier, as SOA is deployed enterprise-wide. Since early VAIM adoption is also a main entry-point to SOA, it not only provides immediate relief in implementing pressing compliance needs today, but also installs the SOA connectivity and messaging backbone needed for wider SOA deployment within the enterprise.

## Other Recent Software Strategies IBM Software Research

1. **"Multi-billion Dollar 2008 System z10 Software Advances – Will Bring Thousands More Mainframe Sites."** Executive Paper, published September 2008, 20 p.p., 11 charts & tables.
2. **"Impressive IBM Tivoli Service Management Center for System z – Exploits z Strengths to Deliver Service Management Enterprise-wide."** Executive paper, published May 2008, 20 p.p. 6 charts & tables.
3. **"New IBM Smart SOA™, Enterprise Modernization, & AD Software Powers System z's Enterprise-wide SOA Role."** White Paper, 2nd edition, published July 2008, 72 p.p., 19 charts & tables.
4. **"System z Central to IBM's Burgeoning Information on Demand – Cognos Buy, New IOD Software Powering Strong Growth."** White Paper, published March 2008, 62 p.p., 18 charts & tables.

## Software Strategies

Software Strategies is a specialist analyst firm focused on enterprise IT platform strategies and issues. Specialist expertise on middleware software, AD and BI tools, mainframe and servers platforms, and operating systems, have been our common threads. Since 1997, we have worked closely with numerous industry leaders including IBM; Unisys; Microsoft; Intel; Misys; Fidelity National Information Systems; CA; BMC; Stratus Computers; ICL; NetIQ; and others. Many tens of thousands of Enterprise IT users have benefited from our authoritative reports, white papers, and our presentations at scores of IT events, seminars, and conferences.

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This completely updated AI White Paper was researched/written by Ian Bramley, Managing Director of Software Strategies, and published in January 2009. It follows two popular, widely-read, previous Editions on this topic, published in 2005 and late 2006. The views expressed are those of Software Strategies alone, and are based on our proprietary research. Bramley founded Software Strategies in 1997. He is an experienced enterprise infrastructure analyst, has published scores of popular reports and white papers, and has served as a keynote speaker at many industry events. Before this, he was Director of Enterprise Platforms at Butler Group, and Founder/Chairman of the Enterprise NT Management Forum industry group, from 1998 to 2001. Previously, he held executive positions with four international software/services vendors over a 25-year, prior IT industry career.