

# SOA Middleware Starts Where Web Services Leave Off

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## Executive Summary

Aberdeen analysis of approximately 400 companies over the past 18 months has shown a deep division between organizations that are deploying web services based applications, what we call *SOA Lite*, and those that are building out full SOA middleware infrastructure. With two such different software investment profiles, we expect to see significantly different success.

Organizations that are focusing on SOA infrastructure are outperforming those that are deploying only web services. They are realizing lower application lifecycle costs, better throughput for projects, and higher levels of user satisfaction.

"We are going from 12,000 applications to hundreds of services using an SOA. The lifecycle cost savings are already flowing through in lower maintenance costs and faster development cycles. This is turning into a major win for the business, not just IT."

- VP, Financial Services

### Best in Class Performance

Three key performance indicators (KPIs) were used to identify those companies that are succeeding in their application development efforts, Aberdeen's Best In Class.

KPI	Best In Class Performance
Application development costs	100% saw reduction
Application maintenance costs	72% saw reduction
User satisfaction in IT service levels	89% saw improvement

Source: Aberdeen Group, June 2007

### Competitive Maturity Assessment

Although prior Aberdeen research implied an even split between SOA infrastructure and web services strategies, the closer focus of this study revealed that Best In Class companies are building out SOA middleware infrastructure by a margin of nearly two to one (Figure 1). The typical Best In Class organization:

- Sees SOA applications as a way to improve service to end users (61%) and improve the agility of the IT department (60%);
- Is using SOA to simplify and standardize their development infrastructure (71%);
- Has deployed one or more ESBs (76%);
- Reports reductions in application development costs (100%);
- Is actively engaged in retraining their application development team (61%);
- Uses SOA middleware to make IT more agile in responding to new business requirements

## Required Actions

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In spite of the perceived complexity of full-blown SOA infrastructures, there are real savings available to those organizations willing to make the investments in time and budget. Areas to focus on are:

- **Simplify and standardize.** The effort spent in rationalizing existing processes and applications, and decomposing them into components and services, will be rewarded by increased agility and reduced development costs.
- **Concentrate on infrastructure.** Web services will carry an organization only so far. Organizations that are investing in infrastructure report improved returns on those investments.
- **Re-train the team.** Don't expect IT to just "get it" when it comes to SOA. The Best In Class recognize that SOA is a disruptive technology and are putting their money into building expertise.

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## Chapter One: Benchmarking the Best in Class

### Aberdeen Analysis

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While 90% of the Global 5000 have enthusiastically adopted plans and projects to implement new applications using services-oriented technologies (i.e., SOA), Aberdeen research in *ESB and SOA Middleware* (June 2006) and *The Legacy Application Modernization Benchmark Report* (September 2006) show a clear bifurcation of technology approaches to “getting to services”:

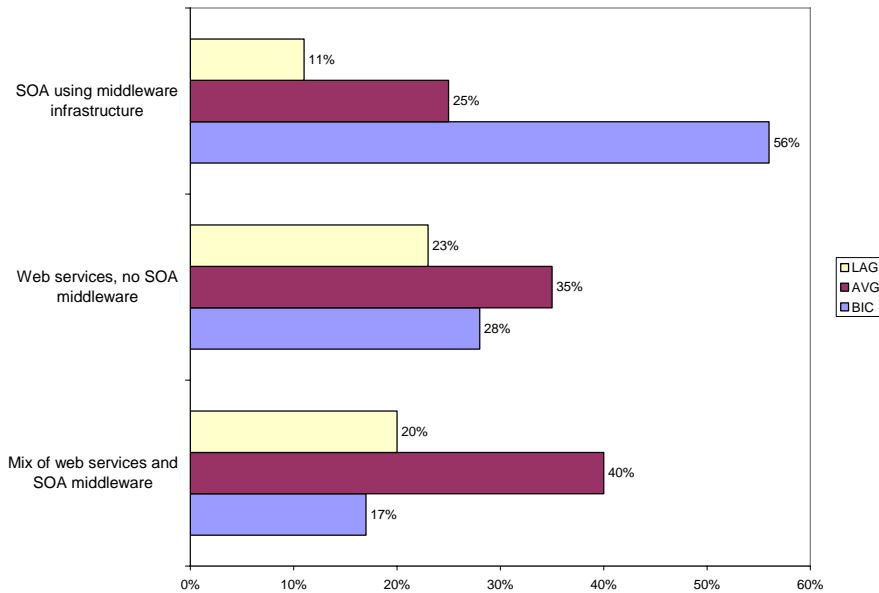
- Half are using Web services low-level technologies such as Extended Markup Language (XML), Simple Object Access Protocol (SOAP), a UDDI repository, and the 30+ standards/open source code technologies commonly called “WS-\*”. These are open source and no cost to obtain. Arguing for this side, one pharmaceutical CIO told us, “We can bang together composite applications with web clients to our legacy applications as fast as the line-of-business asks. Satisfying the business is more important right now than a five-year SOA build-out plan”. This half says Web services are SOA, in spite of industry and vendor definitions to the contrary
- The other half are investing in third-party infrastructure middleware including Enterprise Service Bus (ESB), registry/repository, security, management, and governance software unique to a Services-Oriented Architecture (SOA). On this side of the argument, a financial services technology VP said, “We are going from 12,000 applications to hundreds of services using an SOA. The lifecycle cost savings are already flowing through in lower maintenance costs and faster development cycles. This is turning into a major win for the business, not just IT.”

For this study, we looked more closely at the approaches in use (Figure 1). With two completely different software investment profiles, we expected significantly different returns on investment.

#### Fast Facts

- √ **100%** of Best In Class organizations report an improvement in application development costs using SOA
- √ User satisfaction, IT agility, and reduction of operating costs are key drivers for deploying SOA applications

**Figure 1: What Technologies Are Being Used?**



Source: Aberdeen Group, June 2007

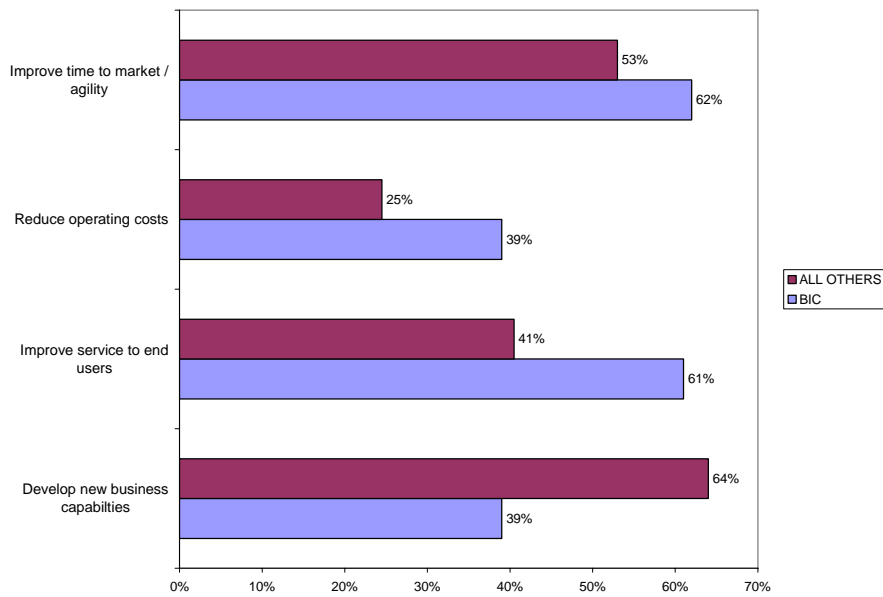
### Why Enterprises Are Focusing on SOA Middleware

SOA can be a complex journey. There must be compelling business reasons to invest heavily in both time and money in new technology such as ESBs, governance, and development environments.

The top three drivers for Best In Class are different than those of the Industry Average and Laggard groups (Figure 2):

- Improve time to market and agility of the IT department in responding to new business requirements;
- Improve service to end users;
- Reduce operating costs.

**Figure 2: Top drivers for SOA and web services**



Source: Aberdeen Group, June 2007

## Maturity Class Framework

Aberdeen used three key performance criteria to distinguish Best in Class companies from Industry Average and Laggard organizations:

- Application maintenance costs
- Application development costs
- User satisfaction levels

**Table I: Companies With Top Performance Earn “Best-in-Class” Status:**

Definition of Maturity Class	Mean Class Performance
<b>Best in Class:</b> Top 20% of aggregate performance scorers	<ul style="list-style-type: none"> <li>• 100% saw reduction in application development costs</li> <li>• 72% showed reductions in application maintenance costs</li> <li>• 89% saw improvements in user satisfaction levels</li> </ul>
<b>Industry Average:</b> Middle 50% of aggregate performance scorers	<ul style="list-style-type: none"> <li>• 59% saw reduction in application development costs</li> <li>• 57% showed reductions in application maintenance costs</li> <li>• 69% saw improvements in user satisfaction levels</li> </ul>
<b>Laggard:</b> Bottom 30% of aggregate performance scorers	<ul style="list-style-type: none"> <li>• 23% saw <i>increases</i> in application development costs</li> <li>• 26% showed <i>increases</i> in application maintenance costs</li> <li>• 14% saw improvements in user satisfaction levels</li> </ul>

Source: Aberdeen Group, June 2007

## Best in Class PACE Model

Aberdeen’s methodology for understanding the top performing 20% of companies – the Best in Class – looks at business pressures, potential actions, organizational capabilities, and technology enablers.

The Best in Class (BIC) view SOA as a business strategy for accelerating the delivery of game-changing products and services, not as IT modernization.

**Table 2: Best-in-Class PACE Framework**

Pressures	Actions	Capabilities	Enablers
<ul style="list-style-type: none"> <li>• Improve the agility of the IT department to respond to new business requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Lower complexity of IT integration</li> <li>• Simplify and standardize development infrastructure</li> <li>• Re-skill application development teams</li> <li>• Deliver existing application functionality to partners via web browsers</li> </ul>	<ul style="list-style-type: none"> <li>• Measure application lifecycle costs</li> <li>• Deploy SOA management and governance software</li> <li>• Apply new methodologies and architectures to new application development (e.g., SOA)</li> <li>• Upgrade/replace development tools across application lifecycle</li> </ul>	<ul style="list-style-type: none"> <li>• SOA infrastructure middleware (i.e., ESB, repository, SOA management, etc.)</li> <li>• Legacy application modernization tools</li> <li>• Application lifecycle and governance software automation tools</li> <li>• Web services application development tools</li> <li>• Packaged software applications with SOA capabilities</li> </ul>

Source: Aberdeen Group, June 2007

**Aberdeen Insights – Which Approach Is Best?**

The need for new and changed business processes greatly exceeds the ability of IT to deliver in a timely fashion using traditional software development methodologies and technologies. To solve this supply-demand imbalance, more than 90% of Global 5000 IT organizations by the end of 2006 had embarked on using a new architecture (SOA) and new development technologies. But they are taking different technology approaches to accomplish the goals of lower IT integration complexity, faster development cycles, and lower application lifecycle costs. Even more confusing, everyone calls what they are doing “SOA”.

With such a deep divide between the two approaches to distributed applications, web services or full SOA infrastructure, we wanted to know which would yield the larger benefits in terms of application lifecycle costs, productivity, and user satisfaction. **Best In Class organizations are twice as likely as the industry average to have focused on SOA middleware infrastructure rather than web services.** Only 17% indicated that they used a combination of full SOA and web services in their application development.

In the next chapter, we will see what the top performers are doing to achieve these gains.

## Chapter Two: Benchmarking Requirements for Success

In the realm of composite application development, companies that are focusing on building out SOA middleware infrastructure are outpacing those that are relying solely on simple web services in several key performance areas.

### Case Study: Standard components make the difference at CFS

Clinical Financial Services, in Pennsylvania, saw a business opportunity in the pharmaceutical clinical trials area. With a vision to replace cumbersome, error-prone paper-based payment systems, the team quickly designed, developed, and deployed an end-to-end electronic payment service marketed to large pharmaceutical firms. Replacing a paper-based system with an all-electronic process from data collection to bank EFTs resulted in significantly increased user satisfaction for CFS's customers.

"Standards are the key to the speed with which we able to go from idea to market," according to VP Glen Slater. "Standard components, industry messaging standards, and standard processes let us rapidly assemble a robust application to bring our service to the pharma market."

For CFS, the promise of SOA came through with standard components that interacted with each other in a message-based environment and interfaced to off-the-shelf accounting applications. The company was able to deliver a fully functional product to the market in just fifteen months from the initial concept.

### Fast Facts

- √ Best In Class companies are **twice as likely** to have deployed SOA middleware rather than just web services.
- √ **39%** of Best In Class organizations measure application lifecycle cost, versus 13% of the Industry Average.
- √ **41%** of Best In Class are using SOA management and governance software. Only 17% of Industry Average and 7% of Laggard companies are using these critical tools.

## Competitive Assessment

Survey respondents fell into one of three categories – Laggard, Industry Average, or Best in Class — based on their characteristics in five key categories: (1) process (how the organization itself changes to accommodate new business requirements); (2) organization (large-scale changes in the IT department of technology or procedure); (3) knowledge (training of key personnel in new technologies); (4) technology (selection or appropriate tools and intelligent deployment of those tools); and (5) performance management (ability of the organization to measure the benefits of technology deployment and use the results to improve key processes further).

**Table 3: Competitive Framework**

	Laggards	Average	Best-in-class
Process	Applying new methodologies and architecture such as SOA to new application development		
	36%	45%	72%
Organization	IT department has upgraded or replaced development tools to accommodate new services-based architectures		
	26%	28%	53%
	Have deployed SOA operations management software		
	5%	14%	47%
Knowledge	Re-skill application development teams in SOA technologies		
	28%	25%	61%
Technology	Web services-specific application development tools		
	63%	62%	83%
	SOA infrastructure middleware		
	32%	38%	61%
	SOA governance software		
	7%	17%	41%
Performance	Systematically measuring application lifecycle costs		
	11%	13%	39%

Source: Aberdeen Group, June 2007

## Organizational Capabilities and Technology Enablers

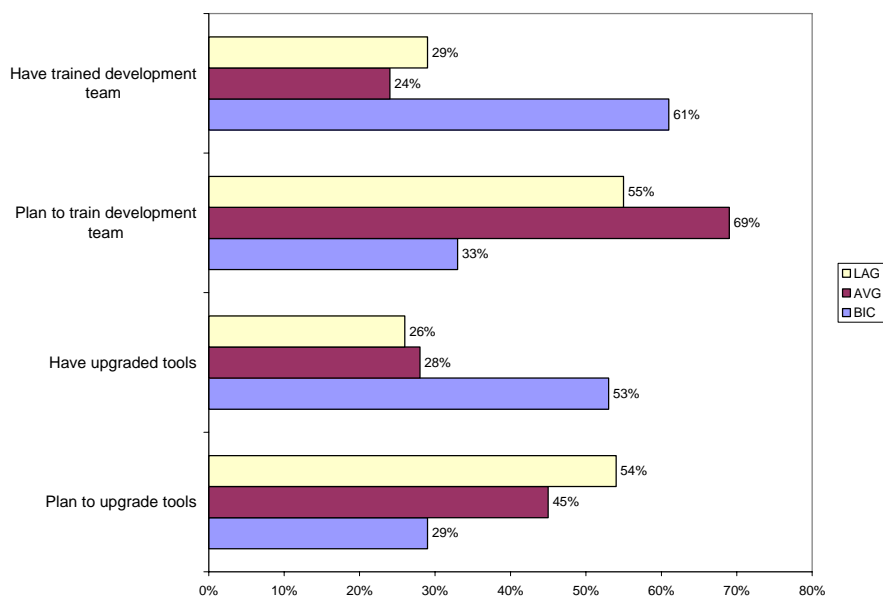
SOA has been described in many places as a journey. During the past eighteen months of research on SOA at Aberdeen, we have watched both the technologies and the organizations using them mature significantly. The Best In Class companies are still leading the charge, and with more overall experience under their belts, they are setting the pace for the rest of the industry.

This trend is clear in several key areas. For example, on the development side, 53% of the Best In Class have already upgraded or replaced their development tools in order to take advantage of better ways to create services-based applications. Only 28% of the Industry Average, and 26% of the Laggards have completed this important step. However, both of those groups are planning on catching up, with roughly 50% planning on upgrades during the next six months, versus 29% for the Best In Class (Figure 3).

We see a similar curve in the area of training. Sixty one percent of Best In Class have already completed training of key contributors in SOA technologies, versus under 30% for the Industry Average and Laggards. During the next six months, however, the latter two groups are looking at training: Sixty nine and 55% respectively (Figure 3).

These trends provide some comfort for the Industry Average and Laggard organizations that are in the planning stages, and we will examine specific steps for each group to take in the following chapter.

**Figure 3: Trends in training and development tools**



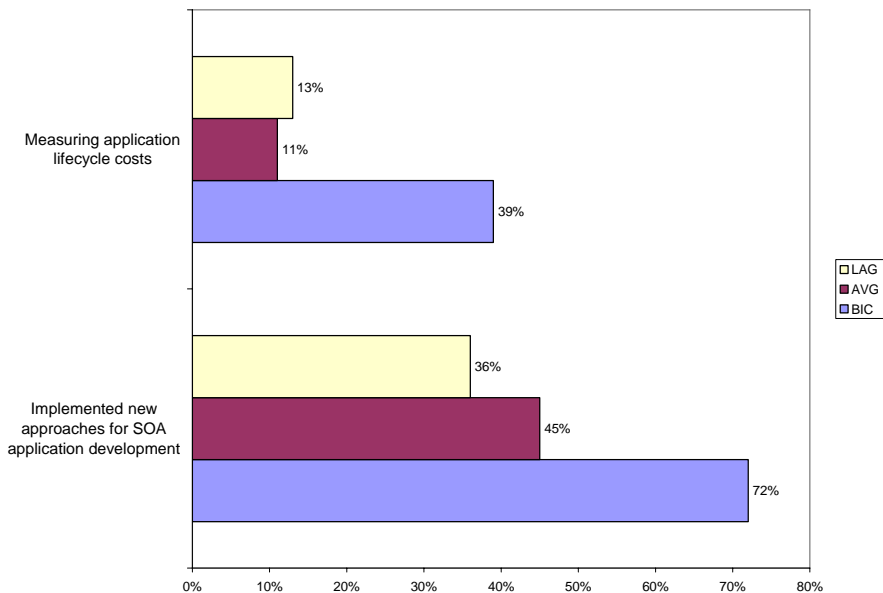
Source: Aberdeen Group, June 2007

### Process

The Best In Class organizations have, in general, been on the SOA journey longer and therefore have had more time to establish policies around their application work. They are twice as likely as the Laggard companies to have created new approaches to application development, such as designing for re-use, recognizing that composite and service-oriented software is fundamentally different than what has been done before.

Significantly, Best In Class are nearly **four times more often** actually measuring what it costs to create and deploy applications. The old rubric, “You can’t manage what you don’t measure,” is just as true in the software world as it is elsewhere. The rigor of measure-change-repeat allows IT to actively refine their processes with measurable results.

**Figure 4: Best in Class places an emphasis on process**

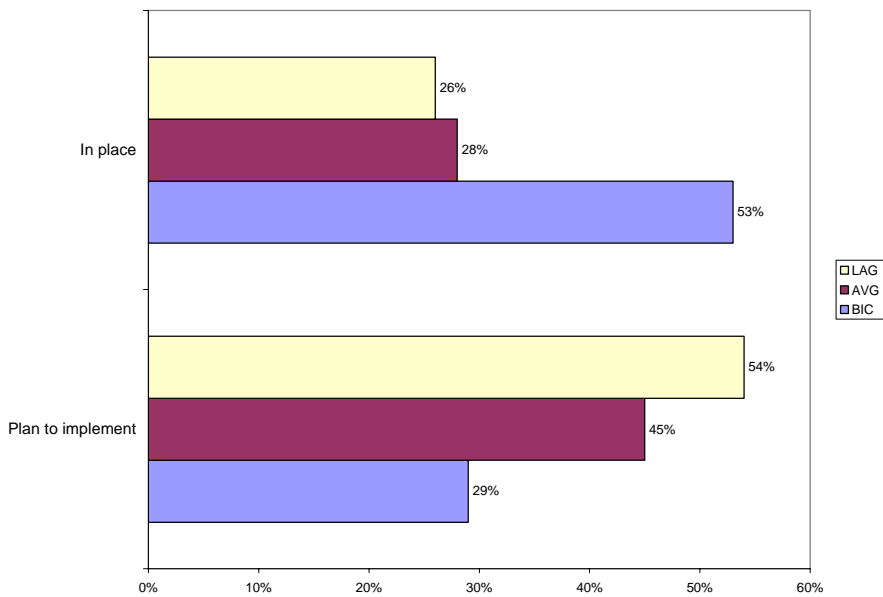


Source: Aberdeen Group, June 2007

### Organization

One way that Best In Class companies have shifted their thinking is in the area of the development environment. While it is possible to create services-based applications with nothing more than a text editor, the optimal approach is to use purpose-built development environments. This sort of fundamental change must come from the top down, and Best In Class departments are **twice as likely** to have taken this important step. Industry Average and Laggards also understand the benefits, however, and two-thirds of each group indicate that they plan to roll out new development environments in the next six months.

**Figure 5: New and upgraded development environments**



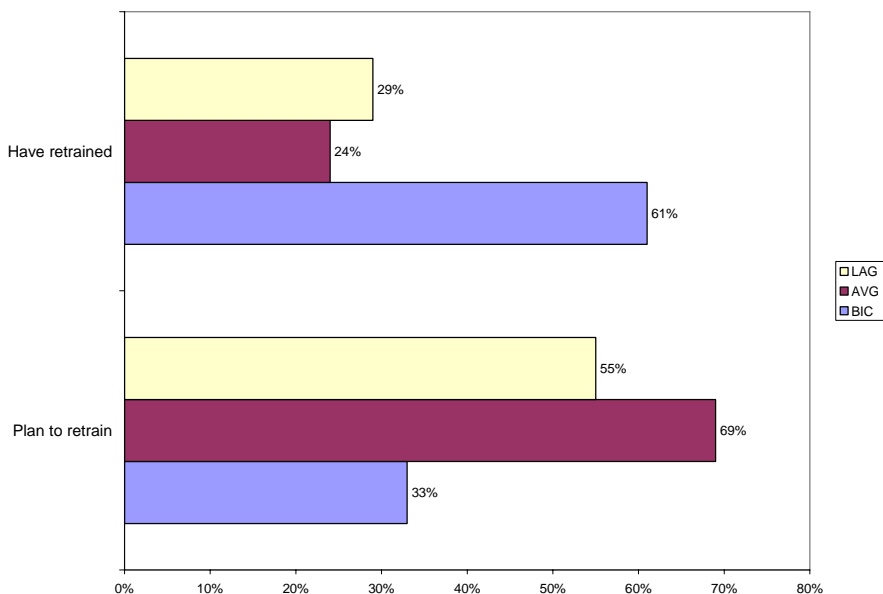
Source: Aberdeen Group, June 2007

### Knowledge

Training, often the poor step-child of technology, or simply an afterthought, instead is the underpinning of success for Best In Class IT organizations. While fewer than a third of Laggard and Industry Average companies have spent the time and money to retrain the IT staff, 61% of Best In Class have made this critical investment.

Both SOA and web services application development pose unique challenges to the skills of the department. It is tempting to assume that the smart people you hired to write and manage applications in other technologies will “just figure it out,” but across the board, companies are realizing that formal retraining is worthwhile (Figure 6).

**Figure 6: Retraining of application development teams**



Source: Aberdeen Group, June 2007

## **Technology**

The seed of this research was an observation made over several SOA studies: While everyone reported that they were implementing SOA applications, about half were in fact developing web services, and the other half were focusing on full SOA infrastructure. For this benchmark, we hypothesized that organizations investing in SOA middleware, including ESBs, repositories, governance, and registries, would outperform those organizations concentrating on just web services in several key metrics. For the purposes of this report, we defined web services as applications based on XML, UDDI directories, SOAP, and WS\* standards, but *not* using SOA.

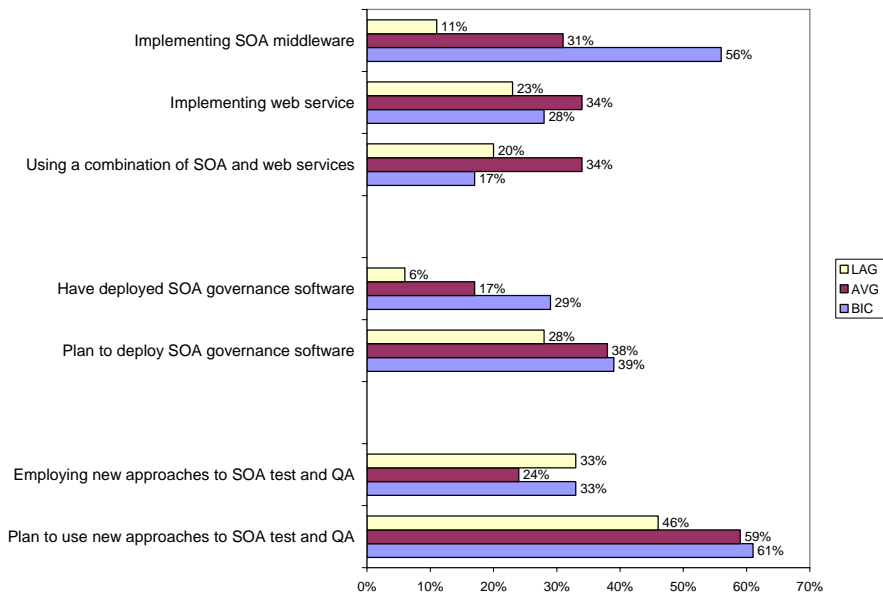
The results support our hypothesis. As shown in Chapter 1, we measured Best In Class on a number of key performance indicators such as improvement in application development costs, user satisfaction, and the number of completed projects. Once Best In Class was determined, we looked at the technologies that the group uses (Figure 7).

Fifty six percent of Best In Class are focusing primarily on SOA infrastructure, versus 31% of the Industry Average. Only 11% of the Laggards are building and deploying SOA applications.

Another key differentiator is SOA governance software. As projects move from pilot to production, the interaction of services across the ESB increases. The number of combinations and permutations can quickly grow to a number which humans can't manage. To handle the complexity, 41% of Best In Class are using automated governance software, while only 17% of Industry Average and 7% of Laggard organizations are doing so. One explanation is that the latter two groups are simply following the Best In Class in the SOA journey, and this is supported by noting that just under 70% are planning on implementing this functionality in the next six to twelve months.

One of the challenges of SOA applications is in testing them. The QA environment is quite a bit different than that for traditional applications. Across the board, all groups indicate that deploying new testing methodologies is a high priority in the next twelve months.

**Figure 7: Approaches to SOA and web services technology**



Source: Aberdeen Group, June 2007

**Aberdeen Insights – Technology**

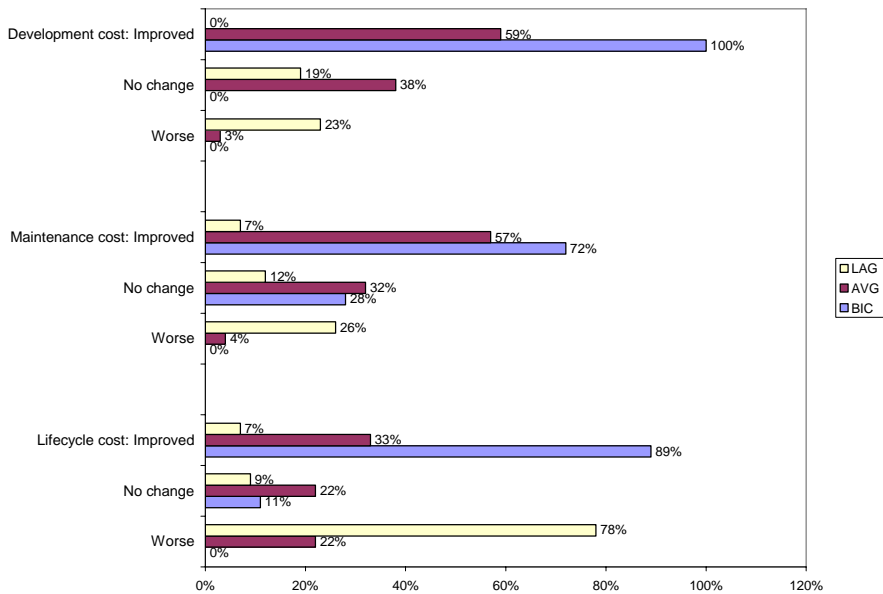
Best In Class companies understand that SOA is a complex approach to application development, and they are making key investments not only in SOA middleware, but also in enabling technologies such as automated testing software. Governance practices, both run-time and design-time, are crucial parts of any SOA strategy; Best In Class organizations are placing as much emphasis on them as they are on middleware itself.

The mixed-technology approach, using a combination of web services and SOA infrastructure, might seem an attractive middle ground, but the added complexity makes for unnecessary stumbling blocks in the enterprise. Pick one or the other, and stick with it.

**Performance**

They say that the proof is in the pudding, and in this study the proof is in cost savings. **One hundred percent** of the Best In Class, those companies that are concentrating on SOA middleware rather than web services, report that application development costs have improved. While 59% of the Industry Average have seen improvement, 0% of the Laggard group has. Twenty three percent report that costs have increased (Figure 8).

**Figure 8: Application costs**



Source: Aberdeen Group, June 2007

## Chapter Three: Required Actions

Based on the information in Chapters One and Two, readers should determine whether their organizations fall into the “Laggard”, “Industry Average,” or “Best in Class” categories. The key to gaining value from this report is moving your organization along the maturity path to Best in Class. The following actions will help spur necessary performance improvements:

### Laggard Steps to Success

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- **Upgrade development tools now.** Couple training with either upgraded or new development environments that take advantage of SOA technology. The Best In Class have already completed this cycle and are seeing significantly lower application development costs.
- **Move beyond web services.** Simple web services suffice for some applications, but look to SOA to move to the next level of service. Avoid mixing web services and SOA: The added complexity will reduce your organization’s effectiveness.
- **Deploy SOA governance software.** Both run-time and design-time governance help unlock the promise of SOA. Without governance, SOA environments quickly devolve into a morass of functionally similar objects with multiple, possibly incompatible, versions. Change control is critical in a fully evolved SOA environment.

### Industry Average Steps to Success

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- **Focus on infrastructure.** While building out a SOA middleware infrastructure might seem daunting, in the long run the rewards reaped from it will include better productivity, a simplified application landscape, and higher levels of end-user satisfaction.
- **Measure, adjust, repeat.** One clear indicator of Best In Class organizations is that they consistently measure organizational performance, make adjustments, and look for improvement. By not measuring key performance metrics such as application lifecycle costs, Industry Average companies cannot make intelligent decisions about IT investments.
- **Don’t skimp on training.** Even though SOA applications are similar to earlier distributed architectures that you may have experience with, the differences are significant and require new approaches to design and development.

## Best in Class Steps to Success

- **Re-tool QA and test processes.** Functional testing isn't enough for SOA applications; integration testing is an absolute requirement. Forward-thinking IT organizations are starting to reshape their thinking around QA to encompass the complexity of SOA.
- **Focus on performance.** As SOA deployments become more complex, bottlenecks will start to develop. Scalability and performance of SOA applications are complicated by the black-box approach to SOA components. Investing in performance methodologies now will pay off in improvements in SLAs and throughput later.

### Aberdeen Insights – Summary

Over the past two years we have seen SOA technologies and the organizations using them mature as work moved from pilot to production. Lessons learned during early deployments are now being applied to new projects, and as the leading edge of the technology change moves from small SOA environments to larger, more complex systems, new challenges such as scalability and testability are emerging.

The divide between web services and full SOA is growing wider. Organizations must re-evaluate their application strategy in the light of a more mature market and decide if the path that they are on will support critical business requirements over the next decade.

Upcoming Aberdeen reports will look closely at how Best In Class companies are managing QA and testing of SOA and web services applications, and at approaches to building performance into composite applications.

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## Featured Underwriters

This research report was made possible, in part, with the financial support of our under-writers. These individuals and organizations share Aberdeen's vision of bringing fact based research to corporations worldwide at little or no cost. Underwriters have no editorial or research rights and the facts and analysis of this report remain an exclusive production and product of Aberdeen Group.

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## Appendix A: Research Methodology

Between April and May 2007, Aberdeen Group examined the responses of more than 150 companies across a variety of geographies, industries and company revenues.

Aberdeen supplemented this online survey effort with telephone interviews with select survey respondents, gathering additional information on SOA management strategies, experiences, and results.

The study aimed to identify emerging best practices for SOA operations management and governance, and provide a framework by which readers could assess their own organization's capabilities and maturity.

Responding enterprises included the following:

- **Job title/function:** About two-thirds of the survey respondents are in their organizations' IT departments. The research sample included respondents with the following job titles: senior executive (CEO, COO, CFO, VP) (25%); CIO (10%); IT manager or director (42%); internal consultant (7%), and IT staff (9%).
- **Industry:** The research sample included respondents predominantly from high-technology industries and companies. These represented 20% of the sample. A significant number of respondents were in the transportation and logistics industries (8%), and finance and banking (9%).
- **Geography:** The survey respondents were distributed: North America (U.S., Canada, Mexico) 51%; Central and South America 4%; Asia/Pacific 17%; Europe, Middle East, and Africa 28%.
- **Company size:** About 24% of respondents were from large enterprises (annual revenues above US\$1 billion, including 11% over US\$5 billion); 35% were from midsize enterprises (annual revenues between \$50 million and \$1 billion); and 41% of respondents were from small businesses (annual revenues of \$50 million or less).

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**Table 4: PACE Framework**

PACE Key
<p>Aberdeen applies a methodology to benchmark research that evaluates the business pressures, actions, capabilities, and enablers (PACE) that indicate corporate behavior in specific business processes. These terms are defined as follows:</p> <p><b>Pressures</b> — external forces that impact an organization's market position, competitiveness, or business operations (e.g., economic, political and regulatory, technology, changing customer preferences, competitive)</p> <p><b>Actions</b> — the strategic approaches that an organization takes in response to industry pressures (e.g., align the corporate business model to leverage industry opportunities, such as product/service strategy, target markets, financial strategy, go-to-market, and sales strategy)</p> <p><b>Capabilities</b> — the business process competencies required to execute corporate strategy (e.g., skilled people, brand, market positioning, viable products/services, ecosystem partners, financing)</p> <p><b>Enablers</b> — the key functionality of technology solutions required to support the organization's enabling business practices (e.g., development platform, applications, network connectivity, user interface, training and support, partner interfaces, data cleansing, and management)</p>

Source: Aberdeen Group, June 2007

**Table 5: Maturity Framework**

Maturity Framework Key
<p>The Aberdeen Maturity Framework defines enterprises as falling into one of the following three levels of practices and performance:</p> <p><b>Best in class (20%)</b> — Application development practices that are the best currently being employed and significantly superior to the industry norm, and result in the top industry performance.</p> <p><b>Industry norm (50%)</b> — Application development practices that represent the average or norm, and result in average industry performance.</p> <p><b>Laggards (30%)</b> — Application development practices that are significantly behind the average of the industry, and result in below average performance</p> <p>In the following categories:</p> <p><b>Process</b> — What is the scope of process standardization? What is the efficiency and effectiveness of this process?</p> <p><b>Organization</b> — How is your company currently organized to manage and optimize this particular process?</p> <p><b>Knowledge</b> — What visibility do you have into key data and intelligence required to manage this process?</p> <p><b>Technology</b> — What level of automation have you used to support this process? How is this automation integrated and aligned?</p> <p><b>Performance</b> — What do you measure? How frequently? What's your actual performance?</p>

Source: Aberdeen Group, June 2007

**Table 6: Relationship between PACE and  
Competitive Framework**

**PACE and Competitive Framework How They Interact**

Aberdeen research indicates that companies that identify the most impactful pressures and take the most transformational and effective actions are most likely to achieve superior performance. The level of competitive performance that a company achieves is strongly determined by the PACE choices that they make and how well they execute.

Source: Aberdeen Group, June 2007

## **Appendix B: Related Aberdeen Research**

Related Aberdeen research that forms a companion or reference to this report include:

- Service-Oriented Architectures (October 2005)
- The SOA in IT Benchmark Report (December 2005)
- The Legacy Application Migration Benchmark Report (September 2006)
- The Composite Applications Benchmark Report (December 2006)
- Management and Governance: Planning for an Optimized SOA Application Lifecycle (March 2006)
- Modernizing Legacy Applications: Maximizing the Investment (June 2007)

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