TRENDS

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Why Is SOA Hot In Government?

by Gene Leganza

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Why Is SOA Hot In Government?

Integration In Heterogeneous Environments Is The Key Driver

by Gene Leganza
with Mike Gilpin, Jost Hopperman, Laurie M. Orlov, Jacqueline Stone

EXECUTIVE SUMMARY

Service-oriented architecture (SOA) is the hottest three-letter acronym in government IT circles. Forrester's survey data shows that government agencies' adoption of SOA is strong and getting stronger. Why? SOA directly addresses government agencies' most pressing goals: integration of program functionality and information across organizational boundaries in a heterogeneous technology environment. And using the approach of wrapping legacy systems in SOA environments means agencies can transform their processes without funding huge, risky rip-and-replace projects for legacy applications. Agency chief information officers (CIOs) must step up to the plate and provide strategic leadership to ensure that their agencies maximize SOA's potential, by making best practices and design guidance available for all initiatives that can benefit from this approach to business and technology.

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NOTES & RESOURCES

We surveyed North American and European government organizations as part of our Business Technographics® November 2005 North American And European Enterprise Software And Services Survey and our September 2006 North American And European Enterprise Software Survey. We also surveyed US federal government enterprise architects in February 2006.

Related Research Documents

"Topic Overview: Service-Oriented Architecture" May 26, 2006, Topic Overview

"US Federal Enterprise Architects Are Committed To SOA, But Procurement Gets Complicated" April 12, 2006, Trends

"Government IT Follows Software Trends, But Legacy Issues Continue To Slow Progress" January 19, 2006, Trends

TARGET AUDIENCE

Chief information officer, enterprise architecture professional

SOA ADOPTION IS STRONGER IN GOVERNMENT THAN IN THE PRIVATE SECTOR

As a vertical industry, government typically falls into the technology laggard category, a risk-averse set of enterprises that adopt technological advances only after they cross the chasm into mainstream usage. But Forrester's survey data shows that:

- **A higher percentage of government agencies are using SOA than private sector firms.** Results from Forrester Business Technographics September 2006 North American And European Enterprise Software Survey show that 43% of government decision-makers respond that their organizations were either using SOA selectively or that they had an enterprise-level strategy and commitment to SOA as opposed to 39% of nongovernment respondents (see Figure 1). And this is not a new development: Our Business Technographics November 2005 North American And European Enterprise Software And Services Survey also showed government leading nongovernment, with 42% of government decision-makers either using SOA selectively or via an enterprise-level strategy and commitment to SOA, as opposed to 35% of nongovernment respondents.[1]

- **US federal architects see solid adoption and growth.** In a survey of Forrester's research panel of US federal enterprise architects in March 2006, 17 of 20 stated that they are using SOA and 12 say that they have an enterprise-level commitment to it (see Figure 2). Further, 17 also say that they expect usage to grow in the next 12 to 24 months.

- **But no clear leader drives the federal agencies' SOA strategy.** When asked the role of the enterprise architect (EA) group regarding SOA strategy, two of the 20 told Forrester that they are in the leadership role, six state that they are involved in all SOA projects, another six respond that no one is in charge of SOA, and three place SOA leadership elsewhere in the department or agency (see Figure 3). The only pattern is that there is no consistent seat of authoritative leadership within agencies driving adoption of SOA as a strategy.

But the lack of leadership may be changing, according to Dr. Brand Niemann, an architect in the Office of the Chief Information Officer of the Environmental Protection Agency (EPA). Niemann, who leads the EPA's data architecture efforts in conjunction with version 2.0 of the Data Reference Model, is the US federal government's most visible SOA advocate: He is the co-chair of the Service-Oriented Architecture Community of Practice, co-chair of the Semantic Interoperability Community of Practice, and secretariat of the Best Practices Committee of the CIO Council.[2] Niemann was instrumental in organizing two SOA conferences for federal practitioners in 2006, and he sees the responsibility for SOA coordination and governance moving to the EA community:

"The Federal Enterprise Architecture (FEA) focuses on the [Office of Management and Budget] OMB budget process and project management while SOA is the actual modeling of complex IT and governance environments like [General Services Administration] GSA is doing for the financial management line of business (LoB). Both are needed and can be complementary and the SOA community of practice (CoP) is about 'dynamic partnering' in support of the LoBs, the new Federal Transition Framework (FTF), and the new Data Reference Model 2.0 Management Strategy.[3] More and more, the answer is SOA. We've heard about pilots, successes, and failures, and now, everyone is recognizing it as the way to go. All EA meetings seem to be about SOA, especially SOA governance: SOA is bubbling up all around the architects, so they're figuring it's their role to govern and coordinate the activity. The rapid success of the SOA community of practice is an indicator that there has been pent-up demand for sharing best practices about SOA — we had to cap registration at the first 'SOA For eGovernment' conference in May 2006 at 200, we added extra space for the October conference and we filled that up at 320 registrants."

Figure 1 Government Leads Private Sector In SOA Adoption

Base: 396 nongovernment IT decision-makers and 40 IT decision-makers at government agencies (percentages may not total 100 because of rounding)

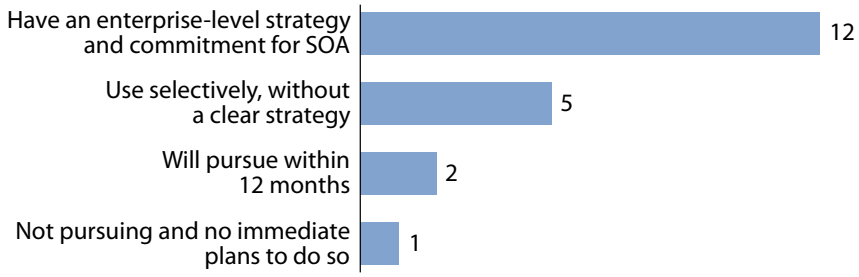
Source: Business Technographics® September 2006 North American And European Enterprise Software Survey

40673 Source: Forrester Research, Inc.

Figure 2 Federal Architects Are Committed To SOA

2-1 Federal architects are more committed to SOA than private sector counterparts

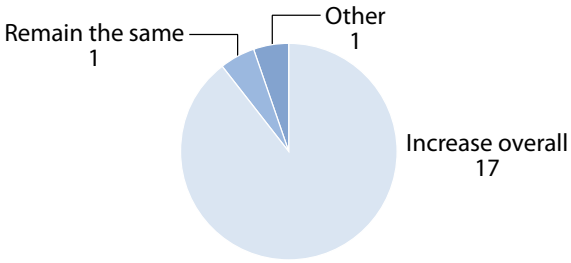
"Which of the following best describes your agency or department's use of SOA?"



Base: 20 enterprise architects

2-2 And federal architects expect SOA usage to grow

"How do you expect your SOA usage to change in the next 12 to 24 months?"

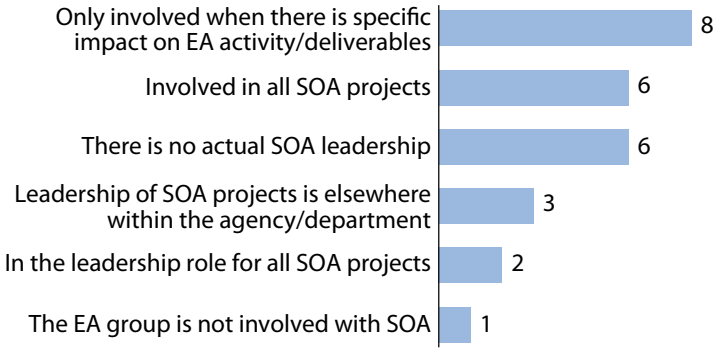


Base: 19 enterprise architects

40673 Source: Forrester Research, Inc.

Figure 3 But Federal Government SOA Leadership Is Distributed Throughout The Enterprise

"What is the role of the EA group in your agency or department with respect to SOA?"



Base: 20 enterprise architects
(multiple responses accepted)

40673 Source: Forrester Research, Inc.

INTEGRATION DRIVES GOVERNMENT'S SOA INTEREST

Why is SOA relevant to government agencies? Forrester surveys point to three key aspects of the government IT landscape:

1. **Integration issues keep CIOs awake at night.** Forrester survey data from each of the past three years shows application integration topping the list of important initiatives (see Figure 4). Along with security, government's other major high-visibility issue, more government IT decision-makers have cited application integration as a priority than any other issue in our 2004, 2005, and 2006 surveys.[4]

2. **Operating and maintenance (O&M) costs continue to eat IT's lunch.** For the past three years, Forrester's Business Technographics surveys show that maintenance and ongoing operations costs — O&M in government parlance — eat an increasing amount of the IT budget, with the average split between O&M versus new initiatives reaching 80% and 20%, respectively, in 2006 (see Figure 5).[5] Separating out government respondents for 2006 shows that government shops, on average, fare slightly worse with 83% going to O&M and 17% going to new investments. But looking at the median is even more telling: Half of the government shops spend 90% of their budgets on O&M. Thin budgets for new initiatives provide little support for wholesale replacement of obsolete systems.[6]

3. **COBOL apps and other legacy albatrosses bog down government transformation efforts.** Forrester's government survey respondents are significantly more likely to have legacy COBOL applications (see Figure 6). These apps contribute strongly to the overwhelming O&M costs and present obstacles to breaking out of stovepiped government agencies' approach to services. They appear to present a conundrum: Moving forward with government transformations requires replacing the limiting legacy systems, but the cost of maintaining legacy environments and complex code that has been patched for decades eats too much of the budget to make a rip-and-replace strategy possible.[7]

SOA Addresses Government's Thorniest IT Problems

SOA is particularly suited to help government agencies deal with the obstacles to implementing the new systems that will enable them to modernize their business architecture, integrate agency service delivery, and share information across organizational boundaries. How?

- **The focus on service interface definition treats integration as a primary issue.** A critical feature of SOA design is that service interface definitions are first-class development artifacts.[8] This is a marked change from agencies' long-standing tradition of stovepiped development for stovepiped government programs. With integration designed upfront, agencies can deliver functionality that can be shared between internal business processes and external government and private sector partners, without having to first implement complex integration architectures or take on separate costly integration projects (see Figure 7).

- **The architecture expects heterogeneous environments.** A striking feature of SOA that makes it particularly suited to government environment is that it assumes that developers will implement application components in a diverse environment. Standard SOA infrastructure components provide interface points that not only work with J2EE or .NET implementations, but also enable interaction with the variety of legacy architectures used in government IT ecosystems.[9]

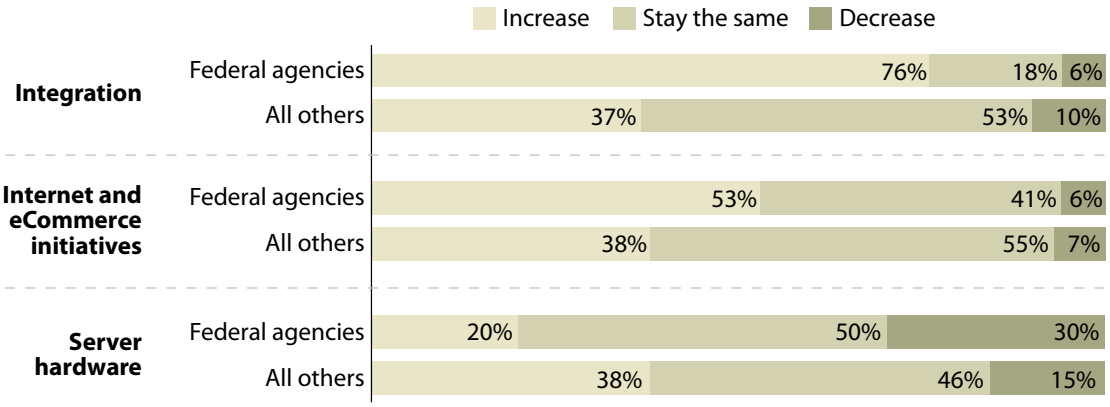
- **Application components directly enable business service components.** As government agencies re-engineer their business processes to provide horizontal integration to improve services to citizens, other government agencies, and their private sector partners, SOA allows the agencies to design application components that instantiate the atomic elements of business service delivery in explicit pieces.[10] Agencies can define components that can be shared across governmental entities or across internal agency boundaries, as well as program-specific services. The net result is an application architecture that mirrors the business architecture — a striking contrast to the current state of government legacy applications, where business rule implementation is buried within the black box of complex application code, accessible only to seasoned programming veterans with decades of experience with the applications.

- **The design approach is highly collaborative and iterative.** Because of the close relationship between application components and business architecture components, IT organizations that adopt SOA work more closely with business-area subject-matter experts to build the business services that comprise the resulting application. And, as the development focus is the application component delivering the business service, the development approach is iterative across a set of services rather than the monolithic approach used in the past to collect the superset of requirements and then embark in a multiyear development effort.[11] Agencies can budget for these smaller development chunks with smaller commitments and provide results in phases, taking on significantly less project risk and building a convincing argument for ongoing application investments, as further enhancements add to functionality in planned stages. This is another stark contrast to the typical approaches of the past, where expensive, long-running projects fell short of the mark, requiring repeated rounds of investment before delivering any meaningful business functionality.

Figure 4 Integration Is Consistently A Leading Issue

4-1 Integration tops spending increases for federal agencies' 2005 budgets

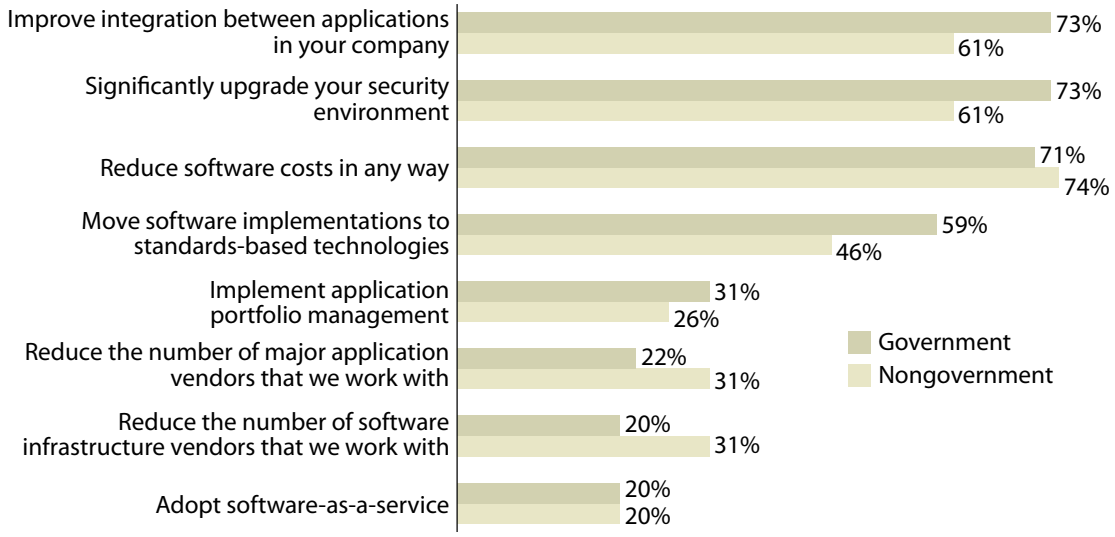
"For each of the following technologies, how will your company's 2005 planned spend compare with its actual spend this year?"



Base: decision-makers at North American companies
(percentages may not total 100 due to rounding)

4-2 Integration and security are top issues for 2006

"Which of the following are likely to be one of your IT organization's major initiatives for 2006?"
(3 or 4 on a scale of 1 [not on our agenda] to 4 [critical priority])



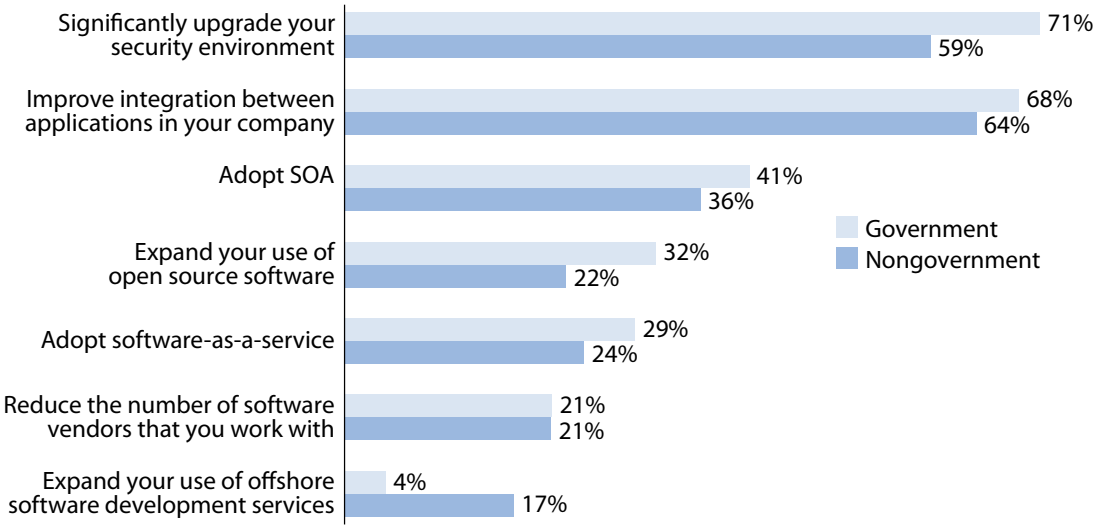
Base: 852 nongovernment IT decision-makers and 59 IT decision-makers at government agencies

Source: Business Technographics® November 2005 North American And European Enterprise Software And Services Survey

40673 Source: Forrester Research, Inc.

Figure 4 Integration Is Consistently A Leading Issue (Cont.)

4-3 Security and integration again outstrip other issues for 2007



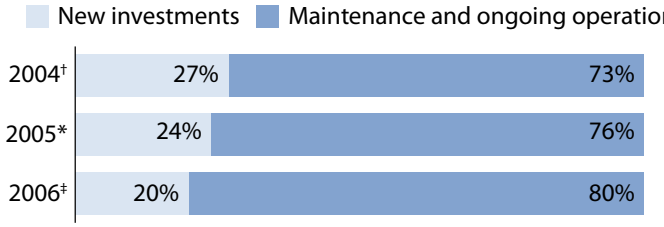
Base: 983 nongovernment IT decision-makers and 95 IT decision-makers at government agencies
Source: Business Technographics® September 2006 North American And European Enterprise Software Survey

40673 Source: Forrester Research, Inc.

Figure 5 O&M Spending Eats Agencies' IT Budgets

5-1 IT spending on m aintenance and ongoing operations is growing steadily

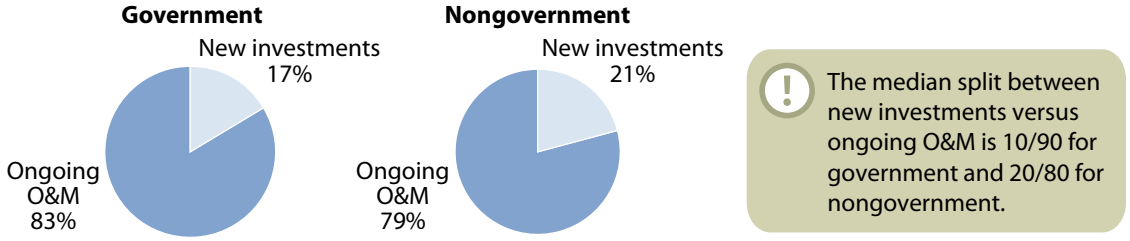
"Approximately what percent of your company's overall spending will go to new investments versus ongoing operations?"



†Source: Forrester's Business Technographics® November 2003 North American Benchmark Study
*Source: Forrester's Business Technographics November 2004 North American And European Benchmark Study
‡Source: Forrester's Business Technographics November 2005 North American And European Enterprise IT Budgets And Spending Survey

5-2 Government IT typically spends more on O&M

"In 2006, approximately what percent of your company's overall IT spending will go to new investments versus ongoing operations and maintenance (O&M)?"



Base: Average response from 43 government and 623 nongovernment IT decision-makers
Source: Business Technographics® November 2005 North American And European Enterprise IT Budgets And Spending Survey

40673 Source: Forrester Research, Inc.

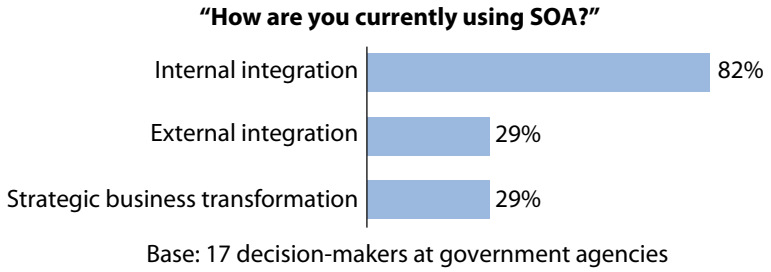
Figure 6 Government's Legacy Problem Is Acute

"Does your company currently run mainframe COBOL applications?"

Base: 554 nongovernment IT decision-makers and 29 IT decision-makers at government agencies
Source: Business Technographics® November 2005 North American And European Enterprise Software And Services Survey

40673 Source: Forrester Research, Inc.

Figure 7 Agencies Use SOA For Internal Integration



Source: Business Technographics® September 2006 North American And European Enterprise Software Survey

40673 Source: Forrester Research, Inc.

Examples Show Information Integration Focus

Recent examples of SOA in government show that agencies are using SOA to enable integration across traditional boundaries:

- **NGA uses SOA to get information to first responders.** National Geospatial-Intelligence Agency (NGA) needed to get geospatial data to first responders in federal, state, and local agencies — without any funding for infrastructure. It used an SOA approach to enable integration of disparate data sources and provide stakeholders with information without having to purchase and distribute software infrastructure.[12]

- **EPA uses Web services extensively.** EPA has hundreds of Web services that enable sharing of critical environmental information among federal, state, and local government agencies. In retrospect, EPA CIO Kim Nelson quips, "I wish we had created more Web Services than data warehouses."[13]

- **The District of Columbia used SOA for its transformation from worst to first.** The Washington, D.C. Office of the CTO (OCTO) targeted the innovative use of technology as the way to significantly improve the district's standing for services and safety compared with other urban areas. Extensive use of SOA and Web services has transformed information sharing and a variety of government services to dramatically improve government services and make D.C. an exemplar of the possibilities of technology-driven government transformation. Among the awards the D.C. OCTO has won is the National Association of State CIOs' (NASCIO) 2006 Recognition Awards for Enterprise Architecture. The D.C. OCTO nomination cited, "What truly sets the District apart is its deployment of advanced SOA solutions, fully integrated within EA planning, to solve government business problems."[14]

RECOMMENDATIONS

DEFINE AN ORGANIZATIONAL CENTER OF GRAVITY FOR SOA ADOPTION

Organizations vary significantly in their ability to capitalize on their own advances in adopting evolving technology. Too often, one part of a large enterprise is confused about how to get started with a new paradigm while another area makes innovative strides with pilot implementations. CIOs in best practices organizations make sure that the whole organization knows what any part of the organization knows by creating formal structures — like centers of excellence — for the collected wisdom of the enterprise. In many agencies, the EA program office already plays that role, and is poised to foster innovation by bringing SOA's capabilities to bear on program-area problems. How can you help your organization help itself?

- **Define the vision for SOA adoption in your agency using "street-level strategy."** Pursue a strategy that contributes to long-term enterprisewide goals while addressing near-term pain points — build the future state one project at a time.
- **Create an organizational clearinghouse for all SOA-related initiatives.** Your EA program office is an ideal organizational go-to team to make information about existing pilots, trials, and production SOA implementations available to anyone considering their own SOA initiative.
- **Provide one-stop shopping for guidance.** Extract best practices for design, technology selection, and implementation strategies from your own and other government agencies' experiences and provide concise guidance in the form of design patterns and recommendations. Again, the EA program office is the best spot for advice and leadership in bringing business needs and technology's capabilities together in detailed SOA guidelines.
- **Participate in any available communities of practice.** Look to the US federal CIO Council's Communities of Practice and the NASCIO for opportunities to learn from organizations that are a step ahead of you.

WHAT IT MEANS

REUSE WILL LAG INTEGRATION AS A BENEFIT

SOA zealots are quick to point out that SOA adoption can mean the end of redundant application code as organizations create services that are common to various business processes. But Forrester believes that reuse will lag integration as the primary near-term benefit of SOA, because:

- **Integration, especially data integration, is government's top concern.** Many agencies' top focus is integration. Information-sharing initiatives across internal agency program boundaries, across agencies, across levels of government, and across to private industry partners are grabbing the spotlight as the most beneficial advances in program effectiveness for agencies. Service integration across program boundaries also is featured in agencies'

business transformation efforts. These initiatives are prime candidates to take advantage of SOA, and service reuse is not the focus or even part of the value proposition. Where information crosses agency boundaries, and each system of record is bound by its own set of regulations, it's unlikely that one agency could use another's components for internal processing. For example, it would not be appropriate for intelligence agencies to share their service implementations, but data sharing across agencies is highly desirable.

- **Effective reuse requires comprehensive governance.** To maximize the benefit of service reuse, organizations must be able to intercept application development at the point when they can recognize the opportunity to reuse existing services. Agencies — like IT shops everywhere — are in the early stages of SOA adoption and few organizations have the organizational and process maturity to provide the comprehensive application scrutiny required to ensure that services are reused whenever possible. In addition, the common practice of putting development projects out to bid makes it difficult to build a business model around service reuse. Procurement officers will have to figure out how to reward system integrators for reusing existing services without eroding the financial benefit of avoiding paying for duplicative development.
- **But reuse does have value to government.** Large agencies, like any large enterprise, will have significant opportunities for service reuse within their agencies' processing. As for crossing agency boundaries, the government IT community is already adept at sharing — they are the opposite of private industry, which closely guards competitive secrets. Government decision-makers actively reach out to learn from one another's best practices, success stories, and mistakes, and sharing services would be a logical extension to this model. Forrester has spoken with metropolitan technology leaders who are looking to establish a way to reuse services for the business processes that are common to all city governments. And with the high participation levels in the US federal CIO Council's SOA Community of Practice, as well as the groundwork laid by CORE.gov, Forrester fully expects that service reuse will become a routine practice.[15] However, it will take time for the appropriate support processes to gel — expect government service reuse to emerge beyond the pilot stage in the three- to five-year time frame.

ENDNOTES

[1] Government technology decision-makers may be risk-averse, but they are not the laggards that their stereotype dictates. See the January 19, 2006, Trends "Government IT Follows Software Trends, But Legacy Issues Continue To Slow Progress."

[2] The US Federal CIO Council sponsors many opportunities for collaboration. Source: GSA's Wiki Home Page (http://colab.cim3.net/cgi-bin/wiki.pl?WikiHomePage), GSA Intergovernmental Communities (http://www.gsa.gov/collaboration), and CIO Council (http://www.cio.gov/).

[3] Dr. Niemann credits industry for the term "dynamic partnering." Source: Jeanne Ross, Peter Weill, and David Robertson, *Enterprise Architecture As Strategy,* Harvard Business School Press, 2006.

[4] There is a growing realization among CIOs that while technology prowess and depth are critical for their organizations, they must help the business units of their enterprise achieve still-elusive efficiencies from technology. See the October 25, 2006, Trends "IT Execs Boost Focus On Business In 2007."

[5] Legacy applications and the infrastructure they require account for an increasing proportion of IT budget of any IT organization saddled with decades-old, intractable applications. See the September 12, 2006, Best Practices "Got Legacy? Migration Options For Applications."

[6] Forrester's data shows a close correlation between adoption rates for Agile and SOA: Organizations with an enterprise-level commitment to SOA are twice as likely to use Agile processes. Firms are attracted to Agile and SOA for similar reasons, but there's more to this pairing than common values. Enterprises experience more success with SOA when they eschew big top-down delivery projects and instead get down in the trenches with an evolutionary approach. Agile processes provide a basic structure for this kind of incremental delivery. See the February 7, 2006, Trends "Agile Processes Enable SOA Success."

[7] Although organizations are vocal in their dissatisfaction of legacy technology, legacy systems continue to run core business functions for medium, large, and Global 2000 companies as well as government agencies of all sizes. Agencies considering migration must prioritize the work based on the business value, examine the available replacement options, and make a "right-fit" decision that will stand up to business scrutiny. See the September 12, 2006, Best Practices "Got Legacy? Migration Options For Applications."

[8] In Forrester's definition of SOA, a key point is that service interface definitions are first-class development artifacts, receiving the same degree of design attention (and more) as databases and applications. See the March 29, 2005, Trends "Your Strategic SOA Platform Vision" and see the September 16, 2002, IdeaByte, "Service-Based, Service-Oriented Defined: 'Ready to Integrate' Is the Core Value."

[9] An enterprise service bus (ESB) is a basic infrastructure component used to SOA-enable a diverse set of architectures. The specific requirements for ESB connectivity will vary from one organization to the next, but they often include not only the obligatory Web services stack, but also support for legacy infrastructure, such as message-oriented middleware, Microsoft .NET serviced components, Java Remote Method Invocation (RMI), .NET Remoting, host transactions (IBM Customer Information Control System, IBM IMS, BEA Tuxedo, etc.), and even Object Management Group's CORBA. See the August 13, 2004, Tech Choices "What Is An Enterprise Service Bus?"

[10] Characteristics of SOA include modular access to applications according to business units of work, shared services, standards-based protocols and infrastructure, open access via loose technology coupling, and flexible implementations via policy-based configuration. Using a model Forrester calls "concurrent business engineering," IT and the business can work jointly to simultaneously design both the business process and the technology solutions to support it. See the May 26, 2006, Topic Overview "Topic Overview: Service-Oriented Architecture" and see the June 20, 2005, Best Practices "Concurrent Business Engineering."

[11] Historically, the business throws its needs "over the wall" to IT in the form of a requirements document. Instead, Forrester recommends taking a lesson from manufacturing's use of concurrent engineering. This provides the context needed to design the right business services and, more importantly, it enables an appropriate level of dialogue around — and tradeoff between — business and technology considerations. In the end, this will foster greater levels of business innovation and optimization. See the June 20, 2005, Best Practices "Concurrent Business Engineering" and see the February 7, 2006, Trends "Agile Processes Enable SOA Success."

[12] By the mid-1990s, imagery was the basis for both imagery intelligence and map-based imagery products, and in 1996, the US Congress, the CIA, and the Department of Defense agreed to combine the efforts of the country's mapping and imagery analysis efforts, and created the National Imagery and Mapping Agency (NIMA). In 2003, the President signed the 2004 Defense Authorization Bill, a provision of which authorized NIMA to change its name to the NGA. NGA's geospatial intelligence products serve a variety of military, civil, and international needs. NGA staff have presented their approach at SOA and EA conferences targeting the US federal IT community. Source: National Geospatial-Intelligence Agency (http://www.nga.mil).

[13] In addition, EPA provided Dr. Niemann the time to lead the SOA Community of Practice and the Semantic Interoperability Community of Practice. See the September 23, 2005, Best Practices "EPA's Business Architecture Reflects A Changed Business." Also see: GSA's SICop (http://colab.cim3.net/cgi-bin/wiki.pl?SICoP) and GSA's SOACoP (http://colab.cim3.net/cgi-bin/wiki.pl?AnnouncementofSOACoP).

[14] NASCIO's Web site includes detailed descriptions of award winners. Source: NASCIO (http://www.nascio.org/awards/2006awards/enterpriseArchitecture.cfm). In another award, *InfoWorld Magazine* named D.C. CTO Suzanne Peck one of their top CTOs of 2006 — and the only government CTO in their list. Source: "District's Suzanne Peck Named Top CTO," Office of the Chief Technology Officer, Government of the District of Columbia press release (http://newsroom.dc.gov/show.aspx/agency/octo/section/2/release/6345/year/2006/).

[15] CORE.gov is the General Services Administration's (GSA) Component Organization and Registration Environment, used for sharing of a variety of artifacts across federal agencies. Source: CORE.gov (http://core.gov) and "XML Schema Validation Process for CORE.GOV," National Institute of Standards and Technology white paper (http://www.mel.nist.gov/msidlibrary/doc/kc_morris/gsa-final.htm).

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