

Predicts 2010: Addressing Key Advancements in Application Architecture

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With the growing influence of the Web on business applications, architecture continues to evolve from more monolithic and stove-piped applications to more community-driven (people and systems), open, standards-based and distributed composite applications. Accordingly, new design patterns are rapidly evolving around Web-oriented architecture (WOA), event-driven architecture (EDA), complex-event processing (CEP), service-oriented architecture (SOA) and cloud-influenced architecture. Additionally, social media technologies and practices are driving an entirely new approach to designing and delivering collaboration solutions.

Key Findings

- The WOA substyle of SOA that leverages representational state transfer (REST) principles continues to gain prominence in enterprise implementations.
- Smart devices, sense-and-respond application systems and business dashboards, and other near-real-time monitoring tools for business people are a growing part of new application system deployments. This will accelerate the adoption of EDA and CEP.
- Enterprises are progressing beyond simply providing social-software tools, and are beginning to design and deliver business-relevant social media solutions.
- Cloud computing is positioning SOA as a key aspect of Web architecture.

Recommendations

- Expect to employ multiple SOA variations during the next three years when building composite business applications and taking advantage of cloud computing.
- Begin actively acquiring skills and developing competencies around designing and delivering social media solutions to build communities and tap the power of the collective.
- Evaluate your application and project portfolios for EDA and CEP applicability, then formulate and execute an appropriate strategy for extending your application capabilities.

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STRATEGIC PLANNING ASSUMPTIONS

By 2014, WOA (REST)-style services will be in use in 80% of organizations pursuing SOA.

By 2012, 50% of large, new application systems will include event-driven functions to improve business responsiveness.

By 2012, only 30% of IT organizations will build a repeatable competency in delivering social media solutions.

By 2014, more than 65% of programmatic enterprise access to cloud services will be through SOA-style methods and technologies.

By 2013, lack of a systematic investment in composition tools, methodologies and governance will be a leading cause of failure in enterprise SOA initiatives.

ANALYSIS

1.0 What You Need to Know

Web-based systems are rapidly becoming more and more mission-critical to the majority of enterprises, and the importance of Web architecture is mounting. One consequence is the advancement of WOA as a prominent SOA substyle, bringing the agility and scalability of the Web to enterprise implementations. Another is the key role SOA plays within cloud computing and the assembly of composite applications. Additionally, with EDA and CEP capabilities, SOA is also advancing to enable highly scalable sense-and-respond systems. Event collection and notification is at the heart of EDA; it makes news dissemination, data synchronization and asynchronous business processes run faster and better. CEP is a computational capability that extracts information value from multiple input "base" events, and generates summary-level complex events that provide more-comprehensive insight into current and future business conditions.

Leading-edge companies now recognize that you can't create a highly collaborative culture and gain substantial business benefits by simply providing access to a software product. Although many enterprises simply provide social software tools, very often with disappointing results, some are beginning to deliver high-value social media solutions. A social media solution is the use of appropriate social technologies to solve an explicit collective-centric business purpose. The social media solution architecture discipline is in its infancy, but demand for a better approach to success beyond "installing a wiki" is driving its rapid evolution.

2.0 Strategic Planning Assumptions

Strategic Planning Assumption: By 2014, WOA (REST)-style services will be in use in 80% of organizations pursuing SOA.

Analysis by: Daniel Sholler

Key Findings: WOA identifies a model for services (sometimes called REST application programming interfaces [APIs]) that uses the design precepts of the Web and REST as its basis. This model has shown itself to be extremely flexible, but a lack of common design patterns and conventions limits the opportunity for tooling automation.

Market Implications: Although nearly all Web interfaces (those intended for use over the Web) will use the WOA model, this will not be true for the majority of services. The lack of a consistent

set of design approaches will mean minimal support from the existing tooling. This, coupled with the object-oriented approaches used in most existing software, will make these types of services more complex to design and build versus traditional request/response method-oriented service patterns.

The use of WOA-style services will be focused on those services targeted at a general audience, and many will be specifically designed for use in applications developed by business partners using mashup approaches. As organizations increase their use of cloud-based computing capabilities, and increasingly rely on Web and mobile interfaces in their business systems, the use of WOA-style services will grow. Organizations that aggressively use these technologies will also adopt the WOA style for their internal services, especially those that cross domain boundaries. By 2014, this approach will be commonplace within organizations, but will remain a minority approach, because the method-centric style will align better with internal system designs and with the current tooling.

Recommendations:

- Users should gain experience in designing services according to WOA, and implement those designs for services that are intended to be external-facing for a general audience.
- Organizations should explore the use of mashup-style approaches for delivering complex information from multiple sources as part of Web applications.

Related Research:

- "Tutorial: Web-Oriented Architecture: Putting the Web Back in Web Services"
- "Reference Architecture for Web-Oriented Architecture"
- "Case Study: Best Buy Extends Its Reach With a Public WOA API"
- "Q&A: How Do You Reconcile SOA, WOA and ESB?"
- "Key Issues for SOA, EDA and WOA, 2009"
- "Key Issues for Composite Applications, 2009"
- "Survey Update: The Value of SOA"
- "2008 SOA User Survey: Adoption Trends and Characteristics"

Strategic Planning Assumption: By 2012, 50% of large, new application systems will include event-driven functions to improve business responsiveness.

Analysis by: Roy Schulte

Key Findings: Developers are using event processing in a growing number of new applications. Event-driven business dashboards and other continuous-intelligence monitoring systems give users situation awareness by displaying near-real-time performance indicators and similar metrics in customer contact center management, physical intrusion detection, transportation operations management and many other operational decision-support applications. Some dashboards and other monitors also allow users to take follow-up actions without having to switch to a separate user interface. Event processing is used in network intrusion protection systems (IPSS), data activity monitoring (DAM) programs that guard against unauthorized access to data, and a variety of risk management and continuous controls monitoring (CCM) systems.

Event-driven systems that automatically respond without human involvement are not as widely used as event-driven decision-support systems, but they are growing at a faster rate. They address business tasks that must be executed very quickly or that involve large amounts of event data that must be analyzed to detect threat and opportunity situations. Smart appliances, smart buildings, smart electrical grids, automated process plants and other event-driven physical entities improve the efficiency and effectiveness of operations in home and industrial applications. Fully automated event-driven functions in application systems execute algorithmic trades in capital markets, reduce credit card fraud by shutting off purchases on accounts that have been hijacked, and perform other sense-and-respond business tasks.

Any event-driven software component or device is "smart" in the sense that it doesn't have to be told when to run — rather, it sends information to a monitor or other alerting channel, or runs an application or machine automatically when it detects that something relevant has occurred in its environment. Simple, smart event-driven systems respond when they receive one event signal. Smarter event-driven systems respond after analyzing two or more incoming event signals. They extract meaningful insights and generate complex events by finding patterns or calculating aggregate figures from multiple incoming events (this is CEP).

Simple-event processing and CEP are becoming less expensive and easier to implement because of:

- The dropping prices of sensors, computers and networks
- The growing availability of streams of event data from the Web, people, application systems and other event sources
- Wider understanding of how to implement EDA and CEP among application architects, business analysts and software engineers

The net effect is an upsurge in the use of event processing in many new business systems.

Market Implications: Messaging facilities, including message-oriented middleware and message-based communication protocols, are commonly used to convey event signals from event sources to event consumers. The use of commercial and open-source messaging systems will expand as more applications are instrumented to emit events. Commercial CEP products will also grow in popularity as more user companies develop intelligent event-processing applications that rely on detecting patterns in event data. However, many CEP-based applications will use custom-coded CEP logic, rather than leveraging a commercial CEP or business activity monitoring (BAM) product, so CEP growth will outpace the growth of commercial CEP products. The demand for architects, software developers, business analysts and consultants familiar with event processing will increase.

User companies that leverage CEP-enabled monitoring and sense-and-respond capabilities as part of their business process improvement programs will have a competitive advantage over companies that rely on traditional, slower forms of performance management. These capabilities will move from competitive advantage to competitive necessity during the next decade, or sooner in some applications. For certain applications and industry sectors, these are already a requirement just to keep up.

Recommendations:

- Professionals in any company with active governance, risk and compliance (GRC) programs already need event-processing expertise related to those specific disciplines.
- Leading-edge and fast-follower companies should develop CEP skills in one or more application architects and business analysts now.

- Mainstream companies should develop CEP skills in some key members of their application development staff by 2012, to position themselves to build and maintain continuous-intelligence business applications and smart systems.
- Companies should make CEP and EDA an integral part of their business requirements collection, process modeling and related application development practices.
- Most companies already have some messaging technology that can be used to implement event processing, but many will need to buy more messaging products as their event traffic increases in volume and in the required quality of service.

Related Research:

- "Smart Devices and Sense-and-Respond Systems Are Event-Driven"
- "The Growing Impact of Commercial Complex-Event Processing Products"
- "Hype Cycle for Governance, Risk and Compliance Technologies, 2009"
- "Pattern Discovery With Security Monitoring and Fraud Detection Technologies"

Strategic Planning Assumption: By 2012, only 30% of IT organizations will build a repeatable competency in delivering social media solutions.

Analysis by: Anthony Bradley

Key Findings: Our research indicates that the prevalent "provide and pray" enterprise practice of providing a social software tool and praying something valuable comes from it has about a 90% failure rate. If you consider noncollaborative solutions, a 90% failure rate for simply providing a technology seems pretty low. Imagine installing a relational database and expecting a business intelligence solution to just emerge. IT organizations recognize that they must deliver application solutions ("solution" here is defined as a solution to a stated business challenge, rather than a general activity).

However, traditionally, IT doesn't generally think of collaboration in terms of delivering a solution (for example, IT doesn't deliver an e-mail solution; the same goes for IM and Web conferencing). IT basically delivers a platform for general collaborative interactions. Social media is different in that the vast majority of successes are solutions to specific business needs. It is this tendency of IT to think of providing a collaboration platform, rather than delivering a business solution, that leads to the prevalent provide-and-pray bad practice. Until IT makes the "platform to solution" shift, the failure rate for social media initiatives will remain high. See "Ten Primary Design Considerations for Delivering Social Software Solutions: The PLANT SEEDS Framework" for best practices in making this shift.

Market Implications: This shift from platform to solution represents change, which often does not come easy. Enterprises will need to develop entirely new skill sets around designing and delivering social media solutions. Many still do not recognize the need to shift competencies. A dearth of methods, technologies and tools will impede the design and delivery of social media solutions in the near term. As a result, we will see an apparent dichotomy in social media adoption. We will continue to see high-profile successes and high-profile missteps. What we won't see are the multitudes of failures that don't gain attention, because they never achieve significant adoption.

The public nature of the high-profile successes and failures will eventually cause enterprises to realize that success is possible, but that it is not guaranteed, and that a careful approach to delivering a solution is required. Post-2012, we will see the social media success rate climb faster

as "the shift" is recognized by most and as momentum around delivering solutions increases. It is at this point that the social software market will accelerate growth and social media will start significantly changing business and societal behaviors.

Recommendations:

- A high failure rate for a few successes is not endemic to social media. Enterprises should avoid the provide-and-pray worst practice, and begin formulating a strategy for delivering business-relevant social media solutions.
- Focus on identifying which specific business purposes will benefit from social media as part of an enterprise vision for social media.
- Get ahead of the curve and begin building a competency in social solution architecture for delivering community-centric applications.

Related Research:

- "Use a Gartner Governance Model to More Safely Empower Grassroots Social Media Efforts"
- "Toolkit: Planning for Social Software Applications Using a Purpose Road Map"
- "Ten Primary Design Considerations for Delivering Social Software Solutions: The PLANT SEEDS Framework"

Strategic Planning Assumption: By 2014, more than 65% of programmatic enterprise access to cloud services will be through SOA-style methods and technologies.

Analysis by: Yefim Natis

Key Findings: Cloud computing is about services. SOA too is about services. Not all cloud services are SOA style, but all are seen as services in the general sense of a provider serving the customer (individual consumer or an enterprise). There are two core ways to access cloud services: through user interfaces or programmatically, through programmatic interfaces. Both patterns are important, both are used now and both will remain strategic to most cloud service providers. To be useful, the programmatic access interfaces of cloud services have to be well-documented, accessible remotely and must encapsulate the functionality of the service behind the interface, creating a modular view of the application's back-end. These interfaces are service-oriented. In 2009, most of them are either based on SOAP-style Web services or on REST. Over time, event-driven cloud services will be the notable third SOA-style option in accessing the cloud. Thus, organizations with well-established, advanced SOA skills and infrastructure are best prepared to exploit the opportunities of cloud computing (advanced SOA includes both request-driven and event-driven SOA patterns).

Market Implications: The success of cloud-computing initiatives by service providers depends on the ability of their prospects and customers to access the services. The continuing growth of composite applications and other forms of integration will force cloud service providers to offer programmatic interfaces to their cloud services. To offer a competitive portfolio of service interfaces, providers will have to adopt the principles of advanced SOA. Most cloud service providers will endorse SOA and will offer Web services, REST and EDA interfaces to their solutions, in addition to their native user interfaces. SOA backplane technologies (in the form of cloud brokerages) will be used to manage the traffic to and from the cloud environment. The cloud will cement the use of SOA principles in mainstream enterprises.

Recommendation:

- To prepare for cloud computing, sharpen your SOA and EDA skills.

Related Research:

- "Cloud Computing Will Cement the Mainstream Role of SOA"
- "Scalability, Elasticity and Multitenancy on the Road to Cloud Services"

Strategic Planning Assumption: By 2013, lack of a systematic investment in composition tools, methodologies and governance will be a leading cause of failure in enterprise SOA initiatives.

Analysis by: Yefim Natis

Key Findings: SOA principles are useful in designing stand-alone applications, but most enterprise projects intend SOA, at least in part, for the sharing of software (services) with other applications. Such sharing is a form of application integration. To be more specific, it is the form of application integration called "composite applications."

Composite applications are a result of integrating some processes and data of multiple, independently designed applications into a new solution. Composite applications are a fast-growing category of new software projects. Few new applications are designed in total isolation from the rest of an organization's applications. Not all enterprise composite applications use SOA principles, but the well-designed ones do.

Many enterprise designers make the wrong assumption that, once SOA-style services are established, the composition of these services into composite transactions is a minor matter of connectivity. In fact, composites can be a real management challenge to the IT organization, considering that they are built from software that operates independently and is only partially open to central controls.

Enterprises planning SOA-style applications intended for composite applications must invest in managing and monitoring their composite SOA environment or face potentially fatal challenges to the integrity, performance, availability and data quality of their composite applications.

Market Implications: The desire to reuse existing transactions and information in composite applications is irresistible. Most organizations already use some composite SOA applications, and many are currently engaged in building new ones. Early compositions are focused on information retrieval from external sources. Such compositions, if badly managed, will provide low-quality data to the user, but will not threaten the integrity of the enterprise's databases.

As projects attempt composite applications, where some of the functionality causes changes to external databases, the ability to monitor and manage the composite transactions moves from desirable to essential. Enterprise IT departments will be increasingly demanding management tools that are expressly designed for heterogeneous, composite application environments. Inevitable project failures when such tools prove insufficient will deter some organizations from advanced compositions, while increasing the demand for advanced, composite SOA management tools from the others.

Recommendations:

- Invest in systematic design and governance of compositions or face project failures as SOA grows in your IT portfolio.
- Start building composite applications using retrieval-only external services to minimize the risks.

- Demand technical and architectural information about external services before deciding on their use.
- Keep the depth of service-call nesting to no more than two to three levels.

Related Research:

- "Q&A: Is SOA Another 'Meltdown' Waiting to Happen?"
- "SOA Overview and Guide to SOA Research"

3.0 A Look Back

On Target: 2007 Prediction

Prediction: Through 2010, the lack of working SOA governance arrangements will be the most common reason for SOA failures.

This prediction, published in January of 2008, was on target, and indeed we still expect SOA governance to challenge SOA success through 2010 and beyond. As SOA evolves into additional uses for WOA, EDA, CEP, context-aware systems and advanced composite applications, the governance challenges will escalate positioning governance as a moving target that enterprises will chase for SOA success. During the past two years, we have seen many organizations make significant strides in SOA governance competency, and the industry is responding with better tools.

However, a large number of enterprises are just gaining experience with SOA and have not paid or are not paying appropriate attention to governance. This fact, combined with the new governance challenges arising from emerging SOA uses, means that governance will continue to pose a serious threat to SOA success for at least the next few years.

The only potential issue with this prediction is that readers might infer that, after 2010, governance will no longer threaten SOA success. This is not the case. It is important for enterprises to recognize the existing and evolving SOA governance challenges, and build enterprise governance capabilities accordingly. This challenge was present in 2007, is present now and will continue to challenge SOA success for years to come.

Missed: 2007 Prediction

Prediction: By 2010, at enterprises in which the adoption of SOA and EDA has reached maturity, context-aware computing will be a new top-level IT objective.

In hindsight, this prediction was too aggressive. Context-aware computing has not yet emerged as a top-level IT objective. However, at the time, our research indicated growing interest in context-aware computing. A few trends have slowed its progress. First, the economic crisis stifled investment in new types of systems, in favor of making the most of existing system investments. Context-aware computing, as well as a number of other new technologies (such as enterprise mashups), slowed in the face of this IT spending retrenchment. Likewise, industry investments in context-aware computing tools and technologies did not accelerate as anticipated.

The economic crisis also slowed SOA and EDA maturity, which, as stated in the prediction, is a dependency for context-aware computing advancements. Additionally, the inherent complexity of EDA and CEP also slowed SOA and EDA maturity adoption rates, and reduced the demand for related context-aware computing. Other IT movements, such as cloud computing and Web 2.0 (especially social media), started grabbing top-level IT attention, at the expense of context-aware computing and other newer technology approaches.

Context-aware computing is not dead and has progressed slowly in the past few years. As a large number of IT organizations again increase investments in new technologies, context-aware computing will resume its climb into more application systems.

Note

Recently, Gartner conducted an independent survey of its clients. Your direct feedback is underpinning the activities we have under way to continually improve our research. This year's Predicts report is one example of those changes.

You told us to simplify the number of different terms we use. In the past, we used two different terms to identify our most important statements about the future. We have standardized on one term — "Strategic Planning Assumption" (SPA) — and we continue to use this nomenclature.

You told us that you value our research most when we are direct. Your confidence in our advice comes from the facts and assumptions we provide in supporting our positions.

You told us that you wanted us to be open about tracking the accuracy of our predictions. In this report, we again take a look back and highlight where we were on target — and where we were not — and why.

This research is part of a set of related research pieces. See "Predicts 2010: Revised Expectations for IT Demand, Supply and Oversight" for an overview.

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