AgilePath’s SOA Quad Model™

An Integrated Model of SOA Entry Points and Implementation Patterns

An AgilePath Point of View by

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Executive Summary

An interesting quandary facing many organizations actively planning and implementing service-oriented architecture (SOA) initiatives is how to integrate and reconcile various “entry points” to SOA. During the initial planning and execution stages of SOA, many organizations have a predilection toward a particular SOA pattern or style. This tendency directly influences the services identified and implemented to realize that SOA pattern. Examples of these SOA patterns are process-centric, data-centric, legacy-centric, and consumer-centric. These SOA tendencies are real and reflect natural organizational biases that exist based on the current business challenges and imperatives, the initial problem domain targeted by an SOA initiative, the skills and experiences of the initial core SOA team, or the corporate culture of the organization itself.

AgilePath Corporation has developed a model to reconcile and integrate these various SOA tendencies. The SOA Quad Model™ establishes an integrated and holistic SOA framework that unites the fundamental SOA entry points around an SOA Reference Architecture and Services Reference Model so that there are no contradictions between the various SOA patterns. The SOA Quad Model is an extremely useful tool for planning, prioritizing and modeling SOA initiatives with business stakeholders, as well as for incorporating various SOA perspectives into a single SOA model.

AgilePath’s SOA Quad Model: Four Fundamental SOA Entry Points

AgilePath’s SOA Quad Model™ was conceived to address a fundamental disconnect in the SOA industry. As SOA initiatives gear up, one of the challenges an organization will face is how to identify appropriate SOA opportunities across the enterprise, and then how to identify candidate services that will be implemented to address the business challenges targeted by the SOA initiative.

Two SOA patterns tend to be pursued initially to address the incipient planning and implementation of SOA in an organization: process-centric SOA pattern and data-centric SOA pattern. The process-centric SOA pattern approaches enterprise problems from a value chain, process modeling and process decomposition perspective. SOA opportunities are focused on business process transformation and business process reengineering, often driven by Six Sigma or Lean Six Sigma initiatives. “It’s all about the process,” is the mantra of a process-centric business professional. Data-centric SOA patterns, on the other hand, have a bias toward modeling core entities and enterprise data. This SOA pattern centers on data-centric business challenges such as data accuracy, data latency, business intelligence, and real-time analytics, and thus approaches its SOA initiative from this perspective. Many data-centric SOA initiatives adopt the mantra of “It’s all about the data,” and from their perspective this is true.

The dichotomy of the process-centric and data-centric SOA patterns reflects a very real phenomenon in all organizations, one that has existed in IT organizations for a long time. Process-centric professionals do not talk to the data-centric professionals. They each view the world differently, have very different skills and training, and are frequently in different functional organizations within the enterprise and within the information IT organization as well. They are worlds apart in a cultural sense.

As we researched process-centric and data-centric SOA patterns, we realized that there are two additional SOA patterns that are just as important: an application/legacy-centric SOA pattern, and a consumer-centric SOA pattern. These two SOA entry points are not as common, and are far less polarizing in their overall approach, ideals and convictions.

The application/legacy-centric SOA pattern is concerned with managing, rationalizing and transforming the legacy application portfolio into services. This view is critical since most of an organization’s existing
business processes, logic and data operate today in its legacy application portfolio. Central to the application/legacy-centric SOA pattern are challenges such as integration tools, application adapters, wrappers and other technologies that enable legacy applications to expose and/or consume services as full-fledged participants in an SOA initiative.

The consumer-centric SOA pattern is focused on how various application frameworks leverage SOA infrastructure and consume various services to deliver service-enabled applications and capabilities to the business users. The consumer-centric SOA pattern ensures the provider-consumer relationship in an SOA is modeled from an application and capability delivery perspective, and ensures there is explicit consideration for service consumption by various application development paradigms of the enterprise. The consumer-centric SOA pattern is focused on delivery of business capabilities built from an SOA and services perspective.

As you can see, these four fundamental SOA patterns address the most common SOA entry points for an organization. The SOA Quad Model unites these SOA patterns into a holistic integrated SOA framework. This integrated SOA framework ensures that there is alignment between these four SOA patterns, and that there is a clear understanding of the business, architectural and technical interrelationships between these SOA patterns. AgilePath’s SOA Quad Model is illustrated in Figure 1 below.

![AgilePath’s SOA Quad Model](image)

The SOA Quad Model illustration merits a few comments. First, our contention is that while an organization can begin its SOA efforts along any of the four dimensions or entry points of the SOA Quad Model, it must ultimately execute all four dimensions of the SOA Quad Model. All of these SOA entry points are valid, yet none are sufficient alone. They all rely on the others for a complete and integrated SOA implementation. Achieving success with one SOA pattern will require competency with the other SOA patterns.
For example, if your SOA initiative begins with a data-centric SOA pattern, it will need to analyze the context in which data is consumed, which leads to both process-centric and consumer-centric SOA patterns. What processes invoke what data, how often and in what formats? What are the data requirements for the appropriate consumer-centric application frameworks? How will data services be accessed by a portal, or by a composite application, or by a dashboard or rich internet application? A data-centric SOA pattern will also require aspects of a legacy/application-centric SOA pattern to determine the authoritative sources of data, how to wrap and expose data from various legacy data stores and applications, and how to integrate these legacy environments. All of these SOA entry point patterns are valid starting points for SOA and services. But an SOA entry point must be integrated and reconciled with the other SOA patterns to deliver complete capabilities.

The SOA Quad Model: A Deeper Dive

Let’s explore the SOA Quad Model in more detail. As we have stated, the SOA Quad Model simplifies SOA into four fundamental entry points supported by their respective SOA patterns, as listed below:

- Process-centric SOA
- Data-centric SOA
- Application/Legacy-centric SOA
- Consumer-centric SOA

Each of these SOA entry points and supporting patterns will be described in the sections that follow.

Process-Centric SOA

A process-centric SOA approaches SOA from a perspective that emphasizes enterprise business process challenges, business process improvement, and business process reengineering. A process-centric SOA leverages a top-down approach, often with business sponsorship and explicit business engagement. The disciplines required for a process-centric SOA include value chain analysis, business process modeling and analysis, and business process improvement skills such as lean six sigma, business process redesign, business process modeling and continuous improvement tools.

Technical approaches supporting a process-centric SOA include business process management (BPM) solutions, service orchestration tools based on business process execution language (BPEL), business process modeling notation (BPMN), composite applications, and business rules engines, among others. The process-centric SOA essentially implements the business process services layer of an SOA reference architecture.

The outcomes from a process-centric SOA include improved business capabilities, automated business processes, and optimized process execution via SOA, BPM, and BPEL orchestration of coarse-grained business services. The process-centric SOA often requires business process redesign support to document business processes, then improve, lean or redesign them, and then service-enable them to automate the optimized process.

Data-Centric SOA

A data-centric SOA approaches SOA from a core entity and enterprise data modeling perspective. Often, this is an orthogonal approach into SOA because it does not necessarily map into a top-down or a bottom-up model, since data is orthogonal to them both. A data-centric approach to SOA begins with core business entities or enterprise data modeling disciplines, and establishes SOA services from those core entities. The data-centric SOA does not require business engagement or as much business sponsorship, and thus can
be initiated from within the IT organization. Often, ontology tools such as OWL-S\(^1\) are leveraged to identify and model business entities, but more frequently, traditional data modeling tools are used.

Technical approaches to a data-centric SOA include XML modeling tools, vocabulary and schema management solutions, metadata management tools, as well as transformation and data mapping tools. Additional tools focus on bundling these data-centric requirements into a single “data services” platform that essentially implements the data services layer of an SOA reference architecture.

The typical outcomes from a data-centric SOA approach include rationalization of databases, storage platforms and infrastructure, elimination of direct data access and point-to-point data interfaces to databases, as well as eliminating unnecessary data replication and instead exposing data through a data services layer. Data integration and system interfaces will also be simplified via a data-services SOA approach.

**Application/Legacy-Centric SOA**

The application/legacy-centric approach to SOA emphasizes the enablement and transformation of legacy applications into services using integration solutions and adapters to “tap into” various types of applications to expose business logic and data. We treat any existing commercial or homegrown application as legacy, since the service enablement approach is fundamentally the same. This is a bottom-up approach that tends to be very integration-centric, while enabling legacy logic and data to be exposed and leveraged into the process-centric and data-centric SOA paradigms.

Technical approaches include enterprise application integration (EAI) solutions, enterprise service bus (ESB) tools, data integration platforms similar to those focused on the data-centric SOA approach, adapters, screen scraping tools and others that can service-enable various technical implementations from disparate platforms.

Outcomes of this approach include exposing services of all types from various legacy platforms and applications, as well as retirement of legacy system interfaces, legacy integrations, and other custom-integrations accumulated over the years in response to various business requirements. Often, the application/legacy-centric SOA approach is used in conjunction with legacy portfolio rationalization efforts, which depend on establishing an abstracted services layer over the application portfolio, allowing common services to be built to replace duplicate stove piped applications across the enterprise.

**Consumer-Centric SOA**

The consumer-centric SOA approach is focused on various application frameworks that consume the services of an SOA to create service-enabled applications for the business consumers or stakeholders of an SOA initiative. The consumer-centric SOA solves business problems using service-enabled applications and supporting tools and technologies.

Consumer-centric SOA establishes clear service consumption requirements for all applications patterns including composite applications, portals, rich internet applications, mash-ups and RSS feeds, traditional J2EE and .NET applications, Spring and ruby-on-rails, desk top integration and similar application development frameworks.

The fundamental difference between a consumer-centric SOA approach and traditional application paradigms is that the consumer-centric SOA application paradigm is explicitly architected and designed to consume the services in an SOA. These are service-enabled applications that rely on various types of services to be provided by service providers in the enterprise in accordance with an SOA reference architecture.

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\(^1\) OWL-S is a Web service ontology based on the W3C Ontology Web Language (OWL).
Consumer-centric applications expect services as the substrate of application development, or based on the application design, they trigger demand for services to be exposed from service providers.

Consumer-centric SOA outcomes are rapid application development based on SOA and services, increased compositability of applications through reuse of various enterprise services. Consumer-centric SOA represents the business consumers of enterprise services, and is where the true value proposition of SOA is driven from – through consumption and reuse of services that drive business value.

**SOA Entry Points and SOA Patterns**

AgilePath’s SOA Quad Model suggests the concept of SOA “entry points.” Again, as we have emphasized above, the fundamental dimensions of the SOA Quad Model represent organizational tendencies that describe various SOA entry points for beginning an SOA initiative in an organization. Depending who sponsors the SOA program, as well as the major business challenges being addressed by the SOA initiative, the resulting SOA pattern will directly reflect these choices and influences.

However, SOA entry points should be considered the initial on-ramp to your SOA journey. They get you started on the road to SOA, but they are not the entire journey. They are SOA beginnings that hopefully align to some compelling business requirement or IT challenge that SOA can solve, and thus serve as focal points for committing resources to an SOA initiative. In order to be successful with SOA, you must expand from the initial SOA entry point and the resulting SOA pattern to leverage the other SOA dimensions described by the SOA Quad Model. One SOA entry point alone is insufficient; you must work all dimensions of the SOA Quad Model for complete success.

**SOA Demographics: Process-Centric and Data-Centric SOA Entry Points are Most Common**

Our client experiences indicate that most SOA initiatives are process-centric, with roughly 50% of SOA initiatives focusing on process-centric implementations leveraging business process management (BPM) tools, orchestration of services using business process execution language (BPEL) or business process modeling notation (BPMN) and related process modeling and automation tools. On the other hand, our client experience shows that 25-40% of SOA initiatives begin from a data-centric entry point.

The other SOA entry points in the SOA Quad Model are nowhere near as common as the process-centric or data-centric approaches. Application/Legacy-centric SOA initiatives are far and few between, which is unusual since most operational business logic and application implementations are existing legacy applications. The consumer-centric approach to SOA is emerging but still relatively rare, primarily because the explicit consumer perspective toward SOA and services requires more maturity than most organizations have achieved to date with their SOA initiatives. Furthermore, SOA initiatives are frequently initiated from within the IT organization, which, regardless of good intentions, can still suffer from a heavy bias toward “provider side” thinking as opposed to “consumer side” thinking.

The reality of the SOA Quad Model is that regardless of the initial SOA thrust an organization pursues in its early SOA planning, all four dimensions of the SOA Quad Model must be realized for an SOA to deliver on a business promise, and to deliver value to the organization. SOA value cannot be realized without working all four dimensions of the SOA Quad Model. AgilePath’s SOA Quad Model is a useful device for exploring these competing agendas in an organization and integrating them into an SOA planning and implementation framework for execution.

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**SOA Quad Model Integrates around an SOA Reference Architecture**

As mentioned above, the SOA Quad Model integrates various SOA entry points and implementation patterns around your SOA Reference Architecture and the logical services layers described by a service taxonomy. Figure 2 below shows how the four dimensions of the SOA Quad Model map into your SOA Reference Architecture.

Leveraging the SOA Quad Model will force you to describe and integrate the various SOA patterns and entry points around an SOA Reference Architecture. The logical service layers that will be part of the SOA enterprise architecture documentation must describe the various service design and implementation patterns and their relationships to one another. The main point is that the SOA Quad Model integrates all SOA implementation patterns around a holistic view of services, supported by the appropriate SOA Enterprise Architecture artifacts including an SOA Reference Architecture, Services Reference Model, and the supporting documentation and artifacts.

**What about the SOA Platform and Tools?**

You may be wondering, where are the SOA platforms, tools and enabling technologies? Where’s the SOA stack? We purposefully omit the SOA stack from the SOA Quad Model. This is intentional as a mechanism to force the SOA discussion around the services that are required to solve a class or multiple classes of business challenges. All too often an organization begins its SOA initiative with a premature investment in vendor tools (the SOA “stack”) without appropriate consideration for the services required to solve their current and future business problems.

We suggest using the SOA Quad Model to organize your thinking around the types of enterprise business challenges you have identified, and determine what SOA entry point best addresses the most immediate business challenges. Once you have identified a list of appropriate SOA opportunities and the SOA patterns that address them, (e.g. process-centric SOA, data-centric SOA, application/legacy-centric, or consumer-centric SOA), you can then use those consumer-centric SOA requirements and services requirements...
to specify, acquire and integrate your SOA platform and tools for design, quality assurance and testing, and runtime operations. Figure 3 below illustrates how the SOA Quad Model can be used to specify your SOA platform based on services-driven requirements derived from the SOA Quad Model.

We encourage you to leverage the SOA Quad Model to specify and implement your SOA platform by mapping and aligning your initial SOA business drivers from your SOA entry point around to the other dimensions of the SOA Quad Model. This SOA Quad Model alignment and balancing process will ensure you are not specifying an SOA platform that only meets the business and technical requirements of one dimension such as process-centric, data-centric, et al. If you have strong process-centric requirements, you should ensure you work the other Quad Model dimensions and ensure the SOA stack can sufficiently address those requirements as well.

The SOA Quad Model thus can be used to develop your SOA business and technical requirements prior to defining and specifying your SOA platform. Your SOA platform must support all four SOA Quad Model dimensions, however, not just those requirements that emerge from the initial SOA entry points. Be careful to leverage the SOA Quad Model, or “work the Quad” to develop all your SOA platform requirements before you acquire the tools.

**SOA Quad Model as a Planning Tool: Opportunity Roadmapping and Business Engagement**

As the last section indicates, the SOA Quad Model is a very useful tool for planning your SOA initiative for the long haul. We stated above that the SOA Quad Model should be used to help develop the requirements for your SOA design and runtime platform. Because the SOA Quad Model does not model infrastructure or technical services, or the capabilities of the SOA stack, it forces you to consider only the various services represented by the SOA dimensions of the Quad: process-centric, data-centric, application/legacy-centric, and consumer-centric. Thus, we urge you to use a services-driven approach of the SOA Quad Model to help specify your SOA stack.
In addition, however, the SOA Quad Model is an excellent tool for mapping various business initiatives and projects into an SOA opportunity roadmap. The SOA Quad Model is a simple construct, so you can use the SOA Quad Model to facilitate a discussion with your business stakeholders to determine how SOA patterns support their business requirements. If you have a body of business requirements that suggest a process-centric SOA approach, you can show how beginning with a process-centric view will map into and integrate the other dimensions of the SOA Quad Model. The SOA Quad Model can help establish appropriate business engagement with all the SOA stakeholders in your enterprise. We suggest conducting SOA Quad Model workshops to ensure stakeholder alignment and integration into the SOA process sooner rather than later.

**Applying the SOA Quad Model for Service Identification and Modeling**

The SOA Quad Model is also useful to facilitate candidate service identification in your organization. Service identification, modeling and design are relatively new disciplines that are not broadly supported by proven methodologies or modeling tools. Often, as we have discussed above, an organization begins identifying candidate services from a particular perspective, such as core entity analysis or process modeling and decomposition, or from a narrow set of business requirements that represent a single business unit or consumer as opposed to broader enterprise requirements. The SOA Quad Model offers an integrated model to accelerate identification of candidate services based on the four SOA patterns and feed those candidates into the Services Reference Model to map them into its logical service layers. Figure 4 below depicts the SOA Quad Model as a service candidate identification tool:

![SOA Quad Model Diagram](image)

The SOA Quad Model will also help establish the relationships between various services, such as process services and data services, and legacy services to both process and data services, and of course all of these to the consumer-centric SOA perspectives.

The SOA Quad Model helps break down projects and initiatives into the four SOA on-ramps, identify the candidate services by major categories, as well as determine the service delivery process required to build or expose those services. In addition, the SOA Quad Model will help identify services requirements to facilitate the technical and architectural requirements for your SOA platform. In other words, service candidate identification
will drive the specification and requirements for the infrastructure and technical “services” offered by your SOA platform.

**The SOA Quad Model as an SOA Enterprise Architecture Tool**

The SOA Quad Model is an excellent tool to support SOA Enterprise Architecture (EA) activities as you plan and implement your SOA initiative. The SOA Quad Model supports SOA EA in the following ways:

- **Establish Services Reference Model and Service Portfolios:** The SOA Quad Model will help you develop your services reference model, its logical layers, and how various projects and initiatives will “populate” or build out your service portfolios over time. The SOA Quad Model will help you quickly establish a preliminary Services Portfolio based on the SOA on-ramps and entry points.

- **Map your services into a Services Reference Model:** The SOA Quad model will help you think through the definition of your services reference model, its logical services layers, and the technical design and interoperability standards for each layer of the model.

- **Develop requirements for SOA platform:** Based on the Services Reference Model, you can develop your service business and technical requirements to facilitate the definition, specification and selection of your SOA platform for design, QA and testing, and runtime. The SOA stack is best defined based on analysis of the services you will be building, as well as the applications you will build based on services. The SOA Quad Model will accelerate the requirements process for your SOA platform.

- **Develop SOA SDLC based on SOA entry point, on-ramps or patterns:** The SOA Quad Model is a useful tool for modifying or adapting your existing software development life cycle (SDLC) into an SOA-enabled SDLC. As you think SOA and how projects will be delivered, begin with the consumer-centric on-ramp, and determine how various application frameworks will consume various services in your enterprise. Also consider how your projects will contribute services to your service portfolio over time. As you consider your SOA SDLC, ensure you have an understanding of how various SOA design patterns for the respective SOA on-ramps fit into an overall project SDLC. You must also map the SOA Quad Model perspective to the deployment and provisioning side of the SDLC, in other words getting services built and deployed onto your SOA platform. You must ensure you have complete provider-side, quality assurance and testing, and consumer-side perspectives clarified and documented in an SOA-enabled SDLC. The SOA-enabled SDLC is a frequent weakness in most organizations, and is an area of focus from an SOA Governance perspective as well.

**Balancing the SOA Quad Model**

How do you achieve balance with the SOA Quad Model? We like to say you “balance the Quad” when you have a portfolio of SOA initiatives and services that support all four dimensions of the SOA Quad Model, and then aligns them with the SOA platform architecture you. If you are over-tilted toward any one dimension of the SOA Quad Model, then you will have an imbalance. Balancing the Quad means that you have all four dimensions of the SOA Quad Model represented by your SOA initiatives from an SOA project portfolio perspective, and that any one SOA initiative will touch or relate to all four dimensions of the SOA Quad Model itself. If you have already acquired your SOA platform before you balanced the Quad, you are out of balance because you have not mapped business and services requirements of the SOA Quad Model to the capabilities of the SOA stack. Be sure you achieve a balanced portfolio using the SOA Quad Model, and actively seek to balance the Quad.
**SOA Quad Model as a Business Value Identification tool**

The SOA Quad Model, as we have discussed, can be a valuable tool to help identify business value from an SOA initiative. As we have argued, business value comes from consumption of services through various applications and consumer-centric SOA activities that represent business consumption of services. As you evaluate business programs and initiatives, you can model these against the SOA Quad Model to ensure you are driving a consumer-centric SOA approach predicated on consumption of services, as well as mapping and aligning the portfolio of projects against proven SOA implementation patterns. The SOA Quad Model will help ensure you represent all dimensions of SOA, and that you have an integrated holistic view of SOA regardless of the SOA entry point you have chosen as a start point. SOA is a journey. The SOA Quad Model shows how various SOA on-ramps can get you started on your journey, while leading to a comprehensive and integrated approach supported by your SOA Reference Architecture.

**Summary**

AgilePath’s SOA Quad Model is a construct we have found to be very useful in the planning and implementation of SOA initiatives for our clients. As you plan and implement your SOA initiative, “work the Quad” and see how well the SOA Quad Model helps integrate and align your SOA initiatives with various SOA implementation patterns. Use the SOA Quad Model to ensure your SOA Reference Architecture and supporting artifacts integrate the four dimensions of the SOA Quad Model and ensure coverage for all four dimensions. The SOA Quad Model is a tremendous tool for planning, prioritizing and ensuring SOA business value. As you identify business initiatives in a dialog with your business stakeholders, use the SOA Quad Model to facilitate the discussions, and to prioritize business initiatives as they map into the SOA Quad Model. Do not forget to balance the Quad. Use the SOA Quad Model to balance your SOA project portfolio, and use the SOA Quad Model to balance the services consumed or provided by individual projects as well.