



Model Driven Solutions

Where Business Meets Technology

The Architecture of Services TM

Achieving Business Value with SOA in the Government

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Agility, effectiveness and efficiency are the modern cornerstones of business, government and defense. These key goals are the basis for much of the transformation in the way we architect our enterprise and information systems and SOA has emerged as a key enabler.

There has been some confusion in the industry as to the positioning of SOA as a technology or business architecture. SOA, as presented here, is *both* a business and a technical approach. The SOA approach to organizing an enterprise focuses on agility by treating customers, suppliers and separable parts of the enterprise as a network of services. The SOA approach to technology helps realize these enterprise services with an agile, interoperable and modular technology base. The *combination* provides a path for transforming the enterprise.

To achieve pervasive business value the architecture of services focuses on how business and technical services work together to achieve business, government or military goals. The focus of architecture is not on “a service” but the network of services that serve a community or organization. SOA is a path to architecting this network of services, incrementally transforming both the enterprise and enterprise systems.

This paper provides a business and technical framework for achieving agility, effectiveness and efficiency with Service Oriented Architecture, or SOA. We will start with a foundation for what SOA is and why it is important. We will then explore what constitutes a quality SOA and the business value it provides.



Driving Requirements for SOA

As the modern world has progressed the key markers for effectiveness have also progressed. The key metrics of today must focus on agility in the face of change, the ability to collaborate inside and outside the organization, exploitation of technology and on effectively and inexpensively achieving our mission.

The structurally and technically monolithic, static, waterfall and closed approaches that were successful in the past are now barriers to transforming into the organizations we must become. Overcoming these barriers requires a change in our way of thinking about our organizations and a change in approach to solutions. It also requires a blending of business and technical architecture into mutually supportive views. The organizations that can achieve this transformation have an opportunity to prosper and will ultimately replace those who can't.

For these reasons the following are the driving requirements for our approach, the approach we will identify as SOA;

- Agility in every businessⁱ, organizational and technical dimension
- Ability to collaborate quickly and effectively both inside and outside the organization
- Ability to respond to new mission, business or external needs and goals
- Ability to respond to and exploit technology and technical change
- Ability to operate with reduced resources and resources out of our control
- Ability to operate within communities, to achieve joint goals
- Modularity of business and technical capabilities
- Ability for incremental success and early results

We can and must architect our organizations and I.T. projects with an approach that can satisfy these requirements. This is different than what we are doing today but builds on what we have.

The cornerstone of SOA transformation

How can we hope to achieve such widespread and dramatic transformation? How can we deal with the complexity of our organizations, relationships and technologies in such a way that we are agile? Has the very success of our vertically and horizontally integrated organizations made it impossible to respond?

There are general and proven approaches that have succeeded over and over to manage complexity with effectiveness and agility. There have been groups, organizations, systems and projects that have overcome hurdles to achieve. What makes this work?

These same problems have been dealt with in manufacturing, government, defense and complex information systems. The unifying principle for success was identified by



[Edsger W. Dijkstra](#), a famous thinker in the area of software and software architecture. That unifying concept is;

- ***Separation of concerns***

Separation of concerns is what allows us, limited humans, to deal with complexity and interdependencies of diverse needs and resources. It is what allows us to achieve a joint purpose without a centralized control. It is what allows us to design, build and run huge organizations and information systems. While Dijkstra focused on software, the principles of separation of concern can be applied to any “complex system”, be it government, business, military, natural or technical. The modern “network centric” approach to warfare is another expression of the same concept, as are the proven management principles of delegation and a focus on core competency.

Separation of concerns is simply the art of focusing ones attention on a particular aspect of a problem, organization, mission or system. This focusing of attention provides both a way to **comprehend that aspect**, to **understand how it relates to other aspects** and to accept that **other aspects may be under the control of others**. Our challenge is to understand how to separate our concerns while making sure that these concerns come together to achieve our mission – this is the art of architecture and design.

Delegation – business and technical

Great managers know that they can’t do everything, they are great at delegation – at assigning responsibility, letting good people achieve and making sure all the parts work together. Great managers have learned how to separate concerns along the dimension of responsibility and action so that their team works effectively. Thus delegation is a powerful tool for separation of concerns.

Delegation allows creativity and diversity in how responsibilities are met, while putting constraints on that creativity and diversity so that the goals of the whole organization are achieved.

Encapsulation – business and technical

Encapsulation is another term that is popular in systems architecture, but that applies just as well to organizations. Encapsulation is separating the concern of **what** Vs. **how**. In computer terms this is sometimes called the “interface” Vs. the “implementation”. One thing the great manager is doing when they are delegating is encapsulating a responsibility – this is where the creativity and diversity come in.

A business example

If a manager is telling someone exactly what to do, this is assignment, not delegation. Assignment is a powerful tool, but it has problems in the large. Eventually the responsibility, the “what” has to be separated from the details of how something will be achieved.

Consider two scenarios. In one case a detailed process for accounts receivable has been “wired” into an organization. The details of how A/R is done are specified in great detail and it is integrated into all parts of the organization. This kind of tight integration is



called for in some situations and is the basis for some management theories. In the other scenario A/R is delegated to a specific group of experts, experts who have a clear responsibility and interact with customers and other parts of the organization to gather information and assist where such information is required. What A/R does for the organization is clear – but exactly how they do it is not so wired into the organization.

What if management decided to outsource accounts receivable? In the first scenario the organization would be dramatically effected, they would have to change their processes and the way they work together. In the second scenario the change could be almost invisible, because in the second scenario A/R was already “acting” like an outsourced organization – they were providing a service to the organization without being wired into it. This starts to provide a hint as to why a services approach is a good way to think about your organization.

Now think outside your organization, isn't your customer (or whoever your organization serves) delegating some responsibility to you? Aren't you delegating responsibility to your suppliers? Externally and internally there is a need to encapsulate “the other guy” so that we can play in a larger community while not being overly concerned about how they work “inside”. It should be starting to be clear that “encapsulation” is needed to structure or organizations and missions and that this is the business side of SOA; SOA as “business services” that interact and, together, achieve the goals of the organization and the communities in which it operates.

A technical example

In software the concepts of encapsulation are well established, in fact they are the basis for most quality software architecture. The “object oriented programming” revolution of the 80's and 90's is largely based on encapsulation – that “objects” have interfaces and associated required behavior, but how the objects are “implemented” is hidden. This hiding of implementation was controversial at first, because it seems that it could impact efficiency (the same comment is made when businesses encapsulate and delegate). But the complexity and fragility of systems that do not employ encapsulation has proven to be a much more substantial problem than the loss of efficiency – the agility and stability are worth the cost.

With the onset of the internet and the ability for widely distributed systems to interact, the need for encapsulation has multiplied. Our systems now routinely work with other systems inside and outside our sphere of control, it is simply unreasonable to think we can impose on their implementation or their process, we can only deal with what they expect from us and what we expect from them – as we will see, this is an essential element of SOA as a technical architecture.

If the “pattern” of SOA doesn't seem much different for the business and technical example, you have caught on – that's the key.

Community and Collaboration

A central driving theme in business, government and defense is collaboration – bringing together diverse groups, individuals and resources to achieve a shared goal. Collaboration exists within a community – some groups that wants to or needs to work



together. The capability these communities need is collaboration, the ability to work together.

This drive towards communities and collaboration is so deep that it impacts the way we think about our organization, from supply chains to network centrality. The focus is now on “joint action” rather than individual actions. The environment in which we operate becomes a driving force for defining our purpose and how we fit in to the community, how we collaborate and the value we provide.

Communities and collaboration fit hand-in-hand with delegation and encapsulation – only with separation of concerns are we able to be sufficiently agile to work within a dynamic community, only by “encapsulating” our details from “the outside” can we remain efficient and agile and only by delegating responsibility to others can we help achieve the goals of the community. Helping the community achieve its goals correspondingly provides value to each participant.

This suggests a shift in thinking from one that is focused on “our process” to “how we collaborate in a community”. Our process is not the center, it is a means to providing value to communities. That value is realized by the services we provide to the community and accomplished using the services of others. These services are realized by a combination of organization, resources and technology, working together.

Communities can be large or small and have almost any purpose. Anytime there is “working together”, “customers”, “collaborators” or “suppliers” there is some community, here are a few examples;

- Retail buyers and sellers
- The multinational force in Iraq
- The accounts payable department
- The U.S. Central Contractor Registration “CCR” (The vendors, manager of the information and consumers of the information)
- Internet routers
- The federal supply service
- Insurance providers
- Visa International
- The 9th Infantry Division
- Facilities Management
- The providers and consumers of internet time service (NTP)
- General Motors

Summary

In summary, the concepts understood as “SOA” provide a vehicles for government and industry to be more effective, more collaborative and more agile. This transition is not easy as it requires a new way to think about the enterprise as well as its supporting technologies. This transition has already started in at least one government agency – The General Services Administration, where they have defined an SOA based “One GSA” architecture and started to realize that architecture with projects in finance and acquisition.

