

Evolutionary Approach to realizing SOA: A Microsoft Platform example

By Ananthalakshmi Vallapuzha and Manish Srivastava

An SOA approach based on business drivers and expected benefits helps in provisioning the right capabilities and strategies for successful realization

Organizations today are increasingly looking at SOA as a key business strategy to building an agile enterprise. However, the drivers for adopting an SOA approach and the benefits that organizations seek from the exercise are quite varied. For instance, a large utilities company wanted to be able to extend business services available on their agent desktop to a customer portal using SOA. A government transport agency used SOA to improve its interaction with partners and customers. A large financial firm wanted a central access point for services distributed across diverse legacy applications [1]. Other reasons often cited for wanting to adopt SOA are, to improve business flexibility and ability to respond to market changes, and better align IT to business. While SOA promises to help on all these fronts, the approach, capabilities and technical infrastructure required to achieve each of these can be quite different.

The drivers for organizations to adopt SOA may be attributed to one or more of three key primary needs:

Information Availability

The IT systems of most organizations are composed of mostly large, independent systems that were built in isolation. These legacy systems are generally not designed for interoperation; rather, they are fine tuned to meet specific functional and operational requirements. Tapping into the data and information encapsulated by these systems is no easy task. However, organizations are increasingly finding the need to integrate their systems in order to streamline processes and better utilize information available in these systems. Previous attempts to integrate systems through ad-hoc point-to-point interactions have resulted in a “spaghetti network” of links that are both difficult to manage and change [2].

Replacing these systems with modern systems architected for integration or reuse is simply not an option considering the business-critical nature of these applications and the enormous investments involved in terms of cost and effort. For instance, a leading utilities company wanted to consolidate and standardize its customer service processes, while still retaining its reliable and stable mainframe backend. The need then is to be able to unlock the information in legacy systems and make them available to other systems across the enterprise in a consistent fashion. Organizations then look to SOA as an option to do this. The utilities company mentioned earlier decided to SOA-enable the legacy backend and consolidate the front-end applications. The driver for SOA adoption in such a case is to enhance interoperability of the systems, to enable integration with other systems, or to address consolidation or reuse requirements.

Flexibility

In a highly competitive environment, the key to differentiation is innovation. Innovation requires agile systems that can help quickly get new ideas implemented and out into the market, ahead of competition. Increasing regulatory compliance requirements also step up the pressure on organizations to put in place mechanisms to ensure that enterprise systems are able to support changes to processes quickly and in a predictable manner. Such flexibility of systems and processes is then another key driver for organizations to adopt SOA. Here the requirement is to improve agility and adaptability of the systems that support the business, and be able to effect changes in business processes or put together new services for consumers quickly. Equally important is the ability to better predict the time to market for a new service or a change.

Manageability

Businesses are often tied down by the limitations of their IT systems. Business processes are run on systems that are defined, supported and managed by IT. Visibility into process performance is inadequate due to various reasons like the right data not being captured, inability to use the application level metrics to derive meaningful process information, data latency issues, inflexible reports amongst other things. While there are SLAs (Service Level Agreements) defined at IT application level, there is no clear means to translate or map these to business SLAs. The combination of low visibility and low control over business processes acts as a roadblock to increased competitiveness. Businesses then find the idea of management units on the lines of business processes composed of services rather than IT applications very attractive. This is the third key driver for organizations to adopt SOA. Here the main requirements are increased visibility and control. Businesses want to be able to define and manage service level agreements at business process and service boundaries, rather than at IT-defined application boundaries, so that they have much better control over the processes supported by IT.

APPROACHES TO SERVICE ORIENTATION

Realizing expected benefits from SOA requires the right kind of capabilities and investments. For instance, just implementing web services will not directly result in improving flexibility of the enterprise systems. Similarly, simply service enabling legacy systems will not result in bridging the business IT divide. It is necessary that the strategy and approach adopted be oriented towards delivering specific benefits.

Enabling Information Availability

The approach here is to tap into information

already available in the existing enterprise applications and build a façade of services over them making them available through a consistent interface that facilitates simple integration.

Enabling availability of information locked in legacy systems requires mechanisms and the necessary technical infrastructure to interface with the legacy systems and help expose the information as services. Tools that can help assess the service-orient-ability of legacy applications and determine the services to be exposed at the appropriate level of granularity and reusability are invaluable. Based on the different kinds of legacy systems supported in the enterprise, technology and application adapters that can integrate with them and help expose their functionality in a standardized format will be required. The architecture and design of certain legacy applications as well as the technology they are built on may constrain the ability to expose the information within. In such cases, it will be necessary to employ engineering techniques such as migration or re-factoring to enable the legacy applications to be service oriented. Tools that help in migration and re-factoring to whatever extent will be very useful. Also required are service creation and description tools that can help simplify creation of the service façade and publish the services in accordance with SOA standards.

It is to be noted that while this approach can help to quickly leverage and integrate legacy systems, the services thus exposed may not necessarily be at the right level of granularity or reuse to be suitable for an enterprise wide use, and may require additional wrappers or changes to match the common information model.

Enabling Flexibility

Enabling enterprise agility or flexibility requires different SOA capabilities. Typically, legacy

The four tenets of SOA

- Boundaries are explicit
- Services are autonomous
- Services share schema and contract, not class
- Compatibility is based upon policy

applications are monolith applications that have business logic embedded in application code. This makes it very difficult to make changes to the processes or introduce new processes. In order to bring in flexibility through SOA, the approach is to transform the application functionality into a set of modular services that can be orchestrated.

To enable true agility, services need to be designed in accordance with good service design principles such that they can be independently developed, maintained and managed.

Additionally, to leverage the full benefit of adopting SOA at an enterprise level, services need to be designed to be reusable across the enterprise. This requires the organization to put together capabilities and mechanisms to identify and define services at the optimal level of granularity and reuse. Common services such as data translation and transformation, message routing, caching, transactions and security are essential, preferably supported at the platform level. There may also be a need for establishing a common information model across the enterprise to enable exchange of common data entities necessary for reuse of services across business functions.

Once well-defined services are available, these can be orchestrated into meaningful business processes. The workflow components need to be modeled as separate entities that can be determined and changed independently from the services that they orchestrate. Process management tools that can help create and

manage processes will be required. Business rules must be modeled separately and managed independently from the business processes through dedicated rules engines and management tools. At this stage, the proliferation of services within the enterprise will necessitate mechanisms for cataloging and categorization of the available services. As more functionality is made available as services and the process of service orienting applications matures in the organization, building a new service or process increasingly becomes a matter of identifying the right set of services from the catalog and orchestrating them using orchestration tools. Not only does this greatly reduce the time and effort required for adding new services or making changes to processes, but also makes the whole service creation process that much more predictable, thus greatly improving the time to market for a new service or change.

Enabling Manageability

The approach for enabling manageability is to facilitate increased visibility and control for business users into the business process performance, and provide mechanisms for enhanced collaboration between business and IT in mapping business needs to IT capabilities. Increased visibility implies making the right information about the business available at the right time through the right channel to business users. This requires not only business service monitoring, business intelligence and reporting capabilities, but also technology that can help deliver the information in near real-time. The information generated thus should be available to business users at anytime on their channel of choice, necessitating multi-channel delivery capabilities. Mechanisms that track the state of the process, help identify deficiencies in the process and take corrective actions are also required for better control.

Moving to enterprise SOA also requires a cultural shift in the way that business and IT work together. There is a need for organizational governance mechanisms and the establishment, enforcement and management of security and business policies. This implies the need for supporting technical infrastructure for advanced security and policy management.

The most important benefit that SOA brings at this stage is the ability to define SLAs at service and business process boundaries, enabling much better levels of corporate performance management. This requires business and IT monitoring capabilities so that both business SLAs and technical SLAs such as availability, reliability and performance can be tracked and managed. There is a need also for mechanisms to enable business users to define SLAs and KPIs (Key Process Indicators), track them through performance dashboards, and initiate and track processes for corrective actions.

Since services effectively model business processes, the flow of data and transactions through service oriented applications can produce valuable business data. What can really take this to the next level of better business-IT alignment is the capability to churn this rich service usage information to identify potential optimization possibilities or untapped business opportunities that can help in business innovation and differentiation.

EVOLUTIONARY LEVELS OF SERVICE ORIENTATION

A strategic move to SOA is a challenging proposition that requires transformation of the organization's IT infrastructure, re-alignment of applications and processes to the SOA paradigm, and establishment of necessary controls and governance mechanisms to manage the organizational shift to SOA. Adopting a big-bang approach for service orientation of

the enterprise can hence be a risky proposition. A recommended approach is a gradual and structured evolutionary adoption that helps realize immediate benefits, while at the same time, laying the foundation for the next level of adoption. This kind of SOA roadmap helps provide incremental benefits along the way, building a stronger business case for greater adoption.

Approaches based on the key business drivers discussed above also correlate quite well to increasing levels of SOA adoption [Fig. 1] and these approaches may be used as stages of realization of enterprise SOA.

Realizing these approaches requires putting together necessary platform capabilities and employing relevant engineering techniques for each of the levels. The platform chosen for such a realization should be flexible and modular enough to support an evolutionary realization by allowing capabilities to be added in stages, rather than a package kind of implementation that requires everything to be built in one go. The Microsoft platform allows a modular build up of capabilities and hence is a good choice for realizing an evolutionary approach. Here, the evolutionary realization is described through an illustrative Microsoft platform example. Note that in this example, some of the products and technologies mentioned are yet to be released. However, these are slated for release in the near future and have been considered in this illustrative example because of their significance in an SOA realization on the MS platform.

Consider a hypothetical telecom organization XYZTel that is planning a long term SOA realization strategy, but has a primary need to improve its call center operations. It performs an assessment of its current enterprise architecture and decides to adopt an evolutionary roadmap to realizing SOA that

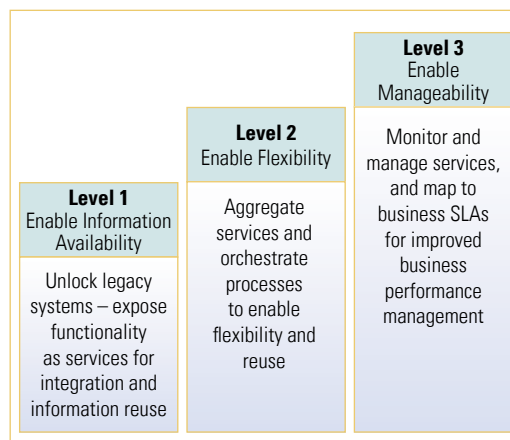


Figure 1: Increasing levels of SOA adoption

Source: Infosys Research

helps address immediate needs while building up to the end state realization. XYZTel has also made a strategic decision to use the MS platform as its platform for SOA realization.

Realizing Information Availability

One of the main issues is that CSRs (Customer Service Representatives) have to individually access multiple applications to handle a single call, impacting productivity and call handling times, and XYZTel wants to change this and make consolidated information available. Since all necessary information is already available in the existing applications, it decides to go the SOA way and build service wrappers around each of these applications, making the information available externally as services. Custom modules will access these services and aggregate the data and deliver consolidated information to the CSR’s desktop [Fig. 2].

For its business applications running on IBM mainframes, HIS is chosen to interface with them at application or data level. The Biztalk SAP adapter is used to integrate with its SAP system.

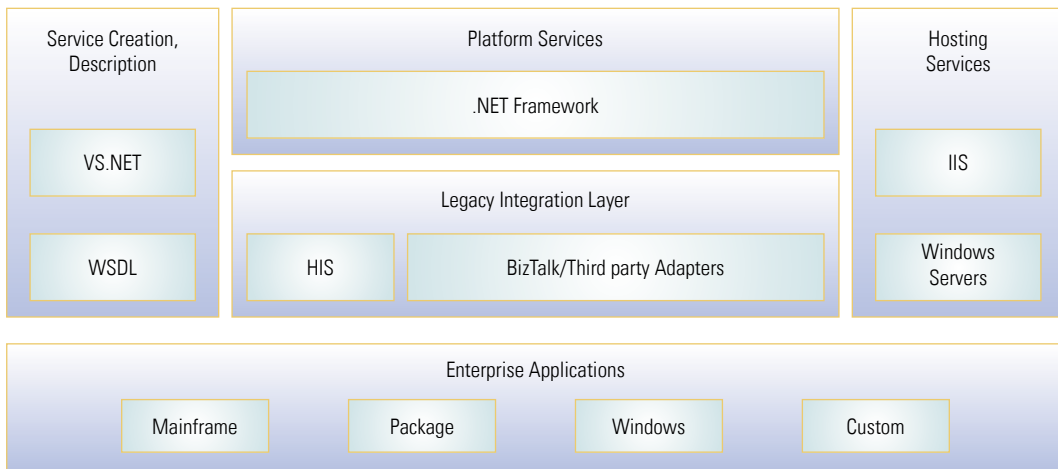


Figure 2: Illustrative MS technology stack for realizing Information Availability **Source:** Infosys Research

Biztalk also provides application adapters for SAP, Siebel, PeopleSoft, Oracle, TIBCO, etc., as well as transport and messaging adapters such as the IBM MQ Series adapter, IBM DB2 adapter and SOAP adapter.

The services are exposed to external applications by building .NET service wrappers. Custom .NET business components access these services and provide consolidated information to the agent desktop.

Realizing Flexibility

Another issue faced by XYZTel is the IT constraints involved in bringing out new services and campaigns. Since these involve changes to application code, process latencies and the time required for implementation and testing result in delay in these services hitting the market, effectively negating the potential benefits of these schemes.

In order to improve the flexibility of its applications, the organization takes up the exercise of modularizing business functionality and modeling them as services, building on the

services exposed from the legacy applications [Fig. 3]. It goes through a detailed process of service identification and definition. To help modularize services on its mainframe based business applications, XYZTel uses third-party tools such as the Enterprise Application Modernization Framework, a mainframe modernization product from Relativity Technologies, to assess service orient-ability of the applications, re-factor code where necessary, and separate out business rules.

WCF is used to provide a service connectivity layer that helps address service security, reliability and transactions, and also supports flexible data formats, transport protocols, and synchronous and asynchronous invocation mechanisms.

Business processes are modeled as workflow that orchestrates the services. XYZTel decides to use Biztalk to create and run these processes with any necessary data transformation and mapping between the coordinating services. Embedded rules are identified and captured separately, and made accessible through the

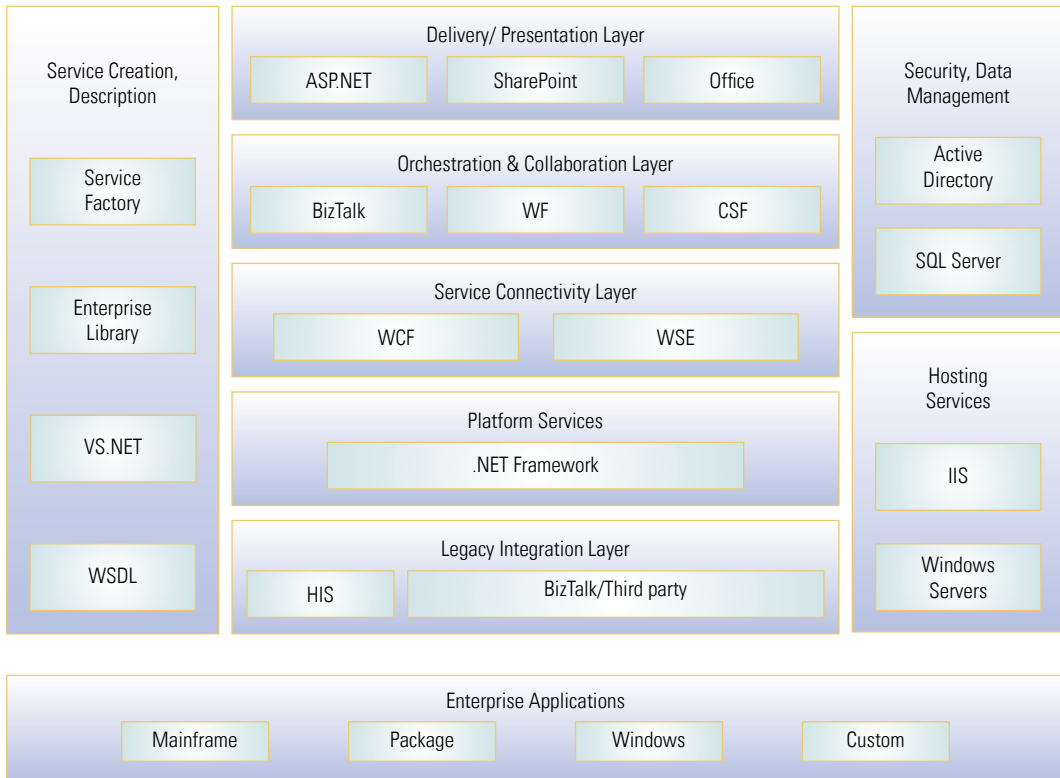


Figure 3: Illustrative MS technology stack for realizing flexibility **Source:** Infosys Research

Biztalk rules engine. With these changes in place, XYZTel finds that rules can be changed easily and independently, business processes changes often require only modifications to the workflow without impacting individual services, and new services can be created and plugged in comparatively easily and quickly.

XYZTel also wants to reduce the load on its call center operations by making some of its services directly available to the customer through a self-service portal. In order to do this, the relevant business processes are themselves exposed as services using Biztalk, and the self-service portal applications call these services directly, making the same functionality available through the portal. XYZTel discovers that it

can now extend the same model to improve information availability to its field agents on their mobile devices, helping them provide better customer service.

Realizing Manageability

XYZTel goes the next step and implements service monitoring and management mechanisms [Fig. 4]. It uses Microsoft Operations Manager (MOM) 2005 in conjunction with other third party partner products that provide both operational (performance, availability) as well as business services monitoring support for service management. It finds that analyzing the process tracking data obtained from Biztalk helps provide much better visibility into operations,

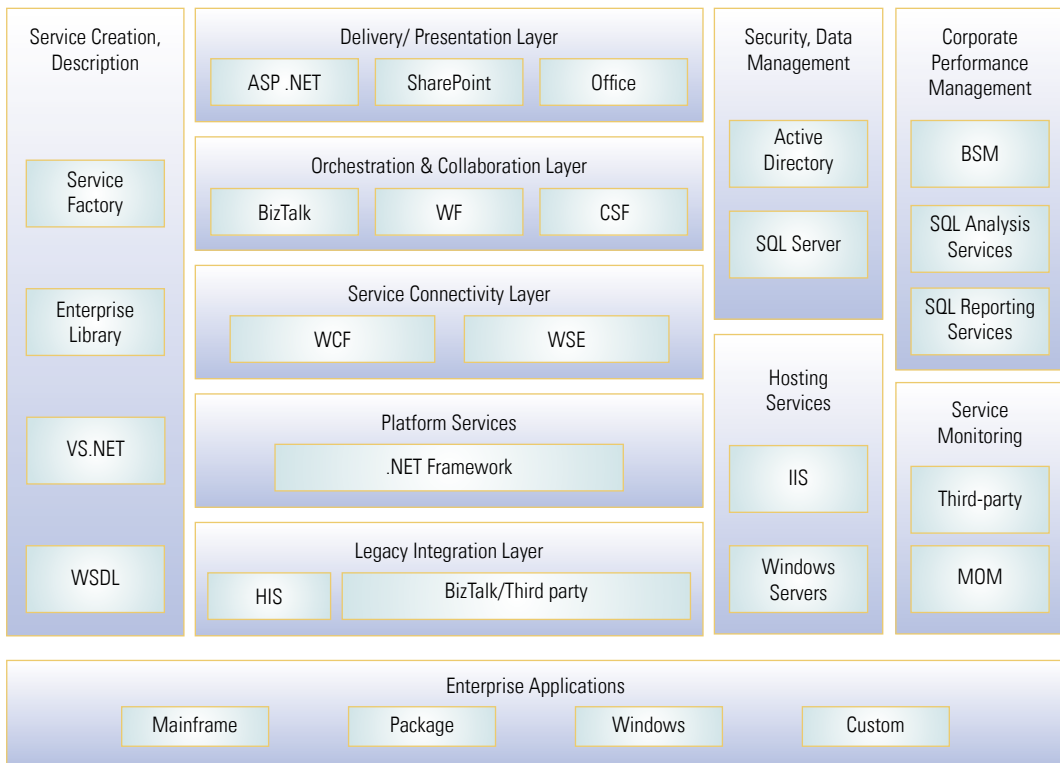


Figure 4: Illustrative MS technology stack for realizing manageability **Source:** Infosys Research

helping better monitor agent productivity and identify process optimization possibilities. With the Biztalk Business Activity Monitoring (BAM) it is also able to easily track the statuses of all processes, quickly identifying delays or bottlenecks. Using SQL Reporting and Analysis services to build in business intelligence features to analyze the tracking data, XYZTel is also able to provide a richer and near real time view of operations to its senior management, enabling them to make better informed and quicker decisions.

As the circle of adoption increases and the number of services increase, XYZTel uses CSF identity management capability to manage identities where processes cross business

function boundaries. It additionally taps into CSF collaboration features such as sharing of customer profiles across services to provide value-added benefits to customers and exploit cross-sell opportunities.

Key processes are increasingly composed of services, some of which are themselves processes, and XYZTel is able to manage business SLAs much better by assigning and managing SLAs at the composite services level. XYZTel implements an enterprise business score-carding process using the Business Scorecard Manager tool from Microsoft. This helps quickly identify and drill down to where SLAs have been breached and take corrective action. It creates a Sharepoint

Drivers	Approach	Platform Capabilities required	Supporting Technologies (for a MS platform realization)
Information Availability	Service enable legacy systems and expose functionality as services for external access.	<ul style="list-style-type: none"> • Technology and application adapters • SOA assessment and migration tools • Messaging capability 	<ul style="list-style-type: none"> • HIS • Biztalk Adapters • MSMQ, MQ Series • Relativity, SEEC
Flexibility	Process-orient applications by orchestrating modular services. Separate business rules.	<ul style="list-style-type: none"> • Ability to identify and design modular and reusable services • Establishment of Common Information Model • Support for data translation and transformation, message routing, caching, transactions, security and other platform services • Workflow modeling capabilities and process engine • Rules engine • Multi-channel delivery 	<ul style="list-style-type: none"> • Biztalk orchestration and rules engine • Windows Communication foundation • Workflow Foundation • ASP.NET • Windows Sharepoint technologies • Connected Services Framework • MS Office
Manageability	Use service monitoring to enhance process performance visibility. Enable process level SLAs and performance management	<ul style="list-style-type: none"> • Service monitoring and management • Service collaboration • Business intelligence and performance management tools • Policy management and governance • SLA definition and management tools 	<ul style="list-style-type: none"> • SQL Server Reporting and Analysis services • Active Directory • Connected Services Framework • Microsoft Operations Management • Partner Service Management products

Table 1: Snapshot of adoption strategies and capabilities *Source: Infosys Research*

collaboration environment for business users that provides a one-stop, personalized view of reports, operational dashboard and business scorecard. It additionally uses this to build in a closed loop system of analyzing, actionizing, tracking and measurement of business SLAs, thus greatly improving corporate performance manageability.

XYZTel has thus realized enterprise SOA by addressing it in evolutionary steps, instead of a big-bang approach, while at the same time realizing targeted benefits at each step.


CONCLUSION

SOA is a buzzword today and many organizations are in the race to adopt SOA. However, it is important to ensure that the right approach is selected and the right capabilities are provisioned to ensure successful realization. Here, we recommend selecting an approach based on the primary business drivers for adoption and expected benefits.

A snapshot of the approach based on the driver, the platform capabilities required and the technologies that can provide those capabilities is provided [Table 1].

We also recommend adopting an evolutionary approach to SOA rather than a big-bang approach. The approaches described can be leveraged for such an evolutionary adoption.

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Author in this issue

ANANTHALAKSMI VALLAPUZHA

Ananthalaksmi Vallapuzha is a Senior Technical Architect with the Microsoft Technology Center, Infosys. She can be reached at ananthalakshmi@infosys.com.

MANISH SRIVASTAVA

Manish Srivastava is a Principal Architect with Infosys Technologies. He is leading the solution development efforts for the Infosys Microsoft joint technology led transformation program called Catalytic IT. He can be reached at manishsv@infosys.com.

For information on obtaining additional copies, reprinting or translating articles, and all other correspondence, please contact:

Telephone : 91-80-41173878

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