

Information Delivery with SOA

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Context

Today enterprises are looking at SOA as a vehicle to improve IT efficiency and reduce the complexity. Improving the efficiency and complexity would directly map on to the way information is managed and its flow across the systems within the enterprise. This obviously influences the way systems are integrated. Typically most of the enterprises will have the mix of application-to-application (direct) integration, message oriented integration and batch integration across the systems. This article tries to describe the high level list of issues that an enterprise architect should deal with typically in the information delivery space. Now-a-days, many enterprises are increasingly looking to streamline the information delivery landscape by deploying an Enterprise information Bus that acts as the integration backbone at the enterprise level. Some of the integration initiatives are IT driven that allows us to streamline the existing connections between applications leading to only operational benefits minus the limited reuse and agility benefits. Bringing process centric view to the integration would maximize the reuse and agility benefits by looking at opportunities for optimizations, new integration opportunities to remove process discontinuities and also required activity automations that are fundamental to ensure real-time enterprise and agility.

Typical Scenario

At macro level, there are three types of integration patterns within the enterprise.

1. Direct Integration: Using APIs specific to one platform or technology
2. Message based Integration: This involves publish and subscribe mechanism using messaging topic. This facility can be used for generating events from upstream systems within a business process and to consume events by down stream systems.
3. Bulk or Batch Integration: When the volumes of the data to be handled are high and latency is not a major business disruptive factor

Point-to-Point Interfaces

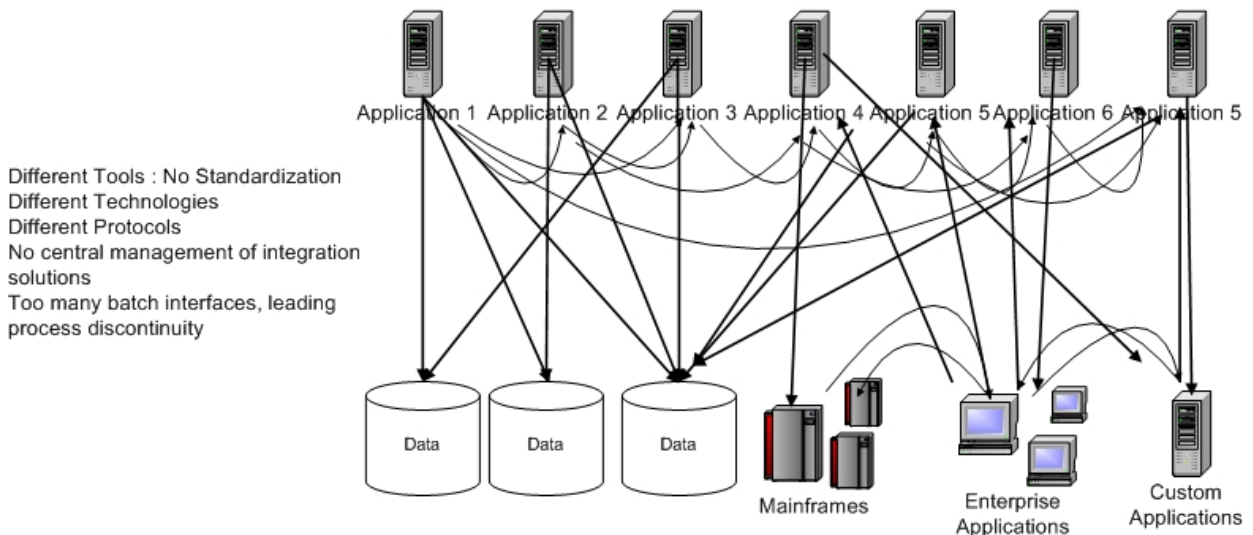


Figure 1

In general, the number of batch interfaces (both inbound and outbound) is higher compared to event or direct interfaces within the enterprises. This is due either to the fact that diverse tools, technologies used make the direct integration a difficult proposition and also huge volume of the data to be exchanged makes batch integration a must. The batch interfaces would introduce the latency of the data across the different systems involved in the overall business process based on the scheduled batch upload frequency. This leads to inconsistencies in the business data across different systems and geographies. Improving efficiency would involve smooth information flow across the systems with zero latency helping executives in right and quick decision support.

Information that is incorrect OR stale or old OR multiple sources of truth OR redundant would lead to either loss of business, add to operational costs in terms of additional storage & management and increased complexity. Direct integration using different technologies, protocols such as RMI, RMI-IIOP, DCOM, Web services etc for same types of use cases due to lack of standardization in accessing the data would lead to unnecessary operational and maintenance costs – diminishing the value created.

Asynchronous communication using messaging topics has been a decent architectural solution being used in many enterprises where event based triggering of the business logic is required across different applications or subscribers. However, even this is implemented with different tools and technologies like JMQ, IBM MQ, Biz Talk server etc in different business units.

Service Oriented Integration

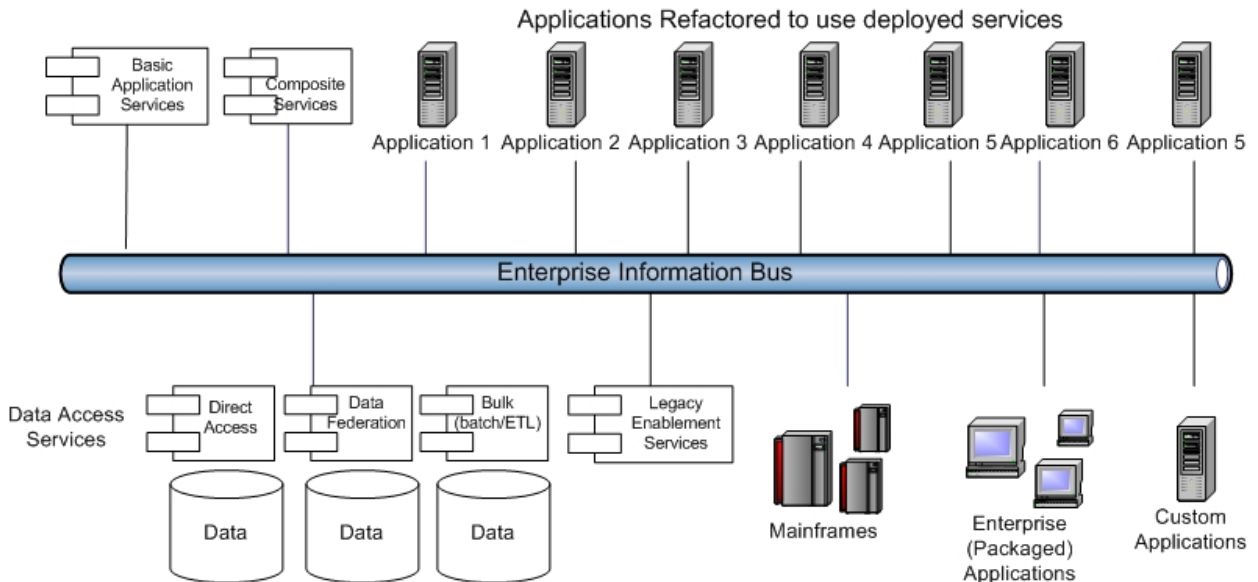
Increasingly more enterprises are proposing to use Enterprise Service Bus to streamline integration based on service oriented principles. In addition to the types of integration mentioned in previous section, ESB coupled with BPEL engine would facilitate orchestration and choreography to weave together set of services to form a process. Although the reason for employing ESB is well understood in the market space, choice of ESB has always been a subject of interesting debate. This is due to the fact that there has been no single acceptable definition for ESB today and has been a harvesting field for product vendors!!

Some enterprises are choosing integration vendors and some are opting for ESB provided by platform vendors. The other divide in the ESB market is whether it is JBI or SCA compliant. Whichever ESB is chosen, it is recommended that a common minimal set of features based on standards like content based routing, transformation, message level security (WS-Security) and protocol translation etc to be used. But for security and management aspects, it is better to use separate infrastructure that can be leveraged across the enterprise. Given the fact that not all ESBs available in the market are pure play vendors, care should be taken to ensure no proprietary features are used that would lead to issues while connecting/federating different ESBs.

Assuming that a pure play ESB is selected, information delivery also needs additional infrastructure to support traditional messaging needs. Since service orientation introduces many types of reusable services into IT eco-system, there is a need for registry, BPEL engine and data services platform.

The following diagram depicts the typical architectural representation involving information bus.

Service Oriented Integration



- (i) Standards based integration
- (ii) Central control and visibility of the messages for effective compliance
- (iii) Central management of integration solutions
- (iv) Streamlined batch integration
- (v) Translation and transformation over the network
- (vi) Central and consistent security approach

Figure 2

Some of the important characteristics of bus architecture are streamlined and standards based integration between applications, central administration of the interfaces, central security, centralized control on the messages being exchanged between applications, central auditing and monitoring, event based co-ordination of batch integration leading to data consistency across applications and business processes spanned across many geographies, transformation and translation over the network rather than at the end-points, etc, federated integration across different instances of information bus deployed across the enterprise.

As per 2008 ebizQ survey report on SOA Governance, SOA is being adopted mainly for agility, integration and process optimization [1]. Enterprise Information Bus would help in setting up the plumbing for information flow across different systems using service oriented principles such as reuse, loose coupling, etc. In a service oriented world, information is made available via data services. In SOA transformations, data services are low hanging fruits that give immediate returns. Please note that bus delivers the information that is posted either as-is or after enrichment or transformation. However, information quality is something that goes beyond the scope of information delivery and requires special initiatives, such as Master Data Management [9], Meta Data Management [8], Data ware housing, etc. Although these are different initiatives, SOA links all of them via data services that provide an abstraction layer [2]. For example, user or customer data dispersed across multiple systems can be brought into one single data mart and provide an interface to all applications or consumers needing access to that data. Another example is moving the batch file created using ETL process across the systems in a sequence, after processing it, based on events generated to reduce the latency across systems [7]. This would enable triggering product pricing changes in different geographies across the globe at once to ensure consistency. Another example would be propagating the changes in upstream systems to downstream systems using events.

Overall Approach

Introducing information bus changes the integration architecture radically. Hence it has to be evolved in a controlled fashion with a centralized approach to integration needs. As a best practice based on current SOA adoption trends, it is recommended to involve enterprise architects in analyzing the integration needs and define the roadmap while utilizing the solution and technical architects to engineer the solution. Please refer [10].

The following diagram represents the overall approach to enterprise service oriented integration.

Approach to Information Delivery based on SOA

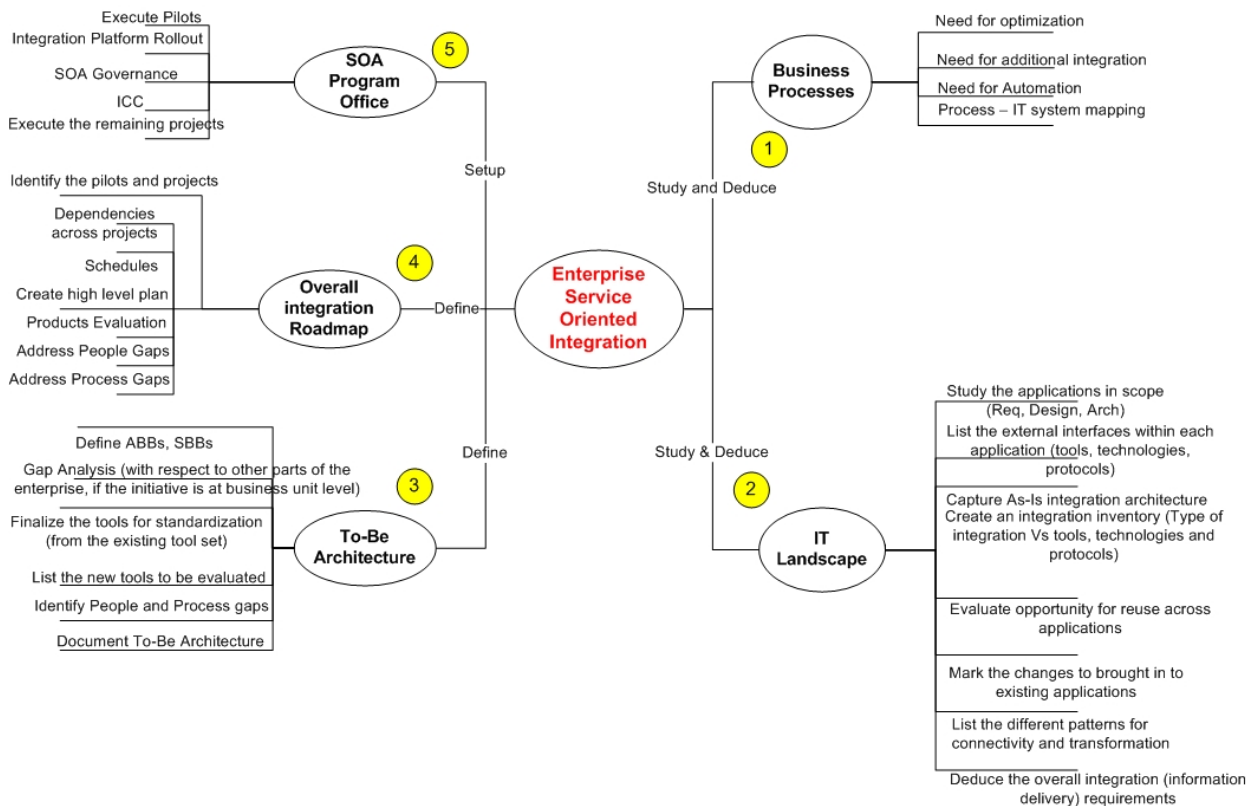


Figure 3

The following are the steps involved in making the information bus rollout a success.

- (i) **Analyze the business processes within the scope:** This would help us in finding
 - a. Optimizations required within the existing automation
 - b. New activities to be automated
 - c. Any additional integrations required to address existing disconnects
 - d. Identify the tentative list of services (top-down approach [5])
- (ii) **Capture the information delivery platform requirements:**
 - Study the existing IT integration landscape to understand the different technologies, tools, platforms and techniques used for integration and to capture some of the non functional requirements like throughput, batch file & message sizes, response times and availability requirements.

- Identify the redundancy across applications leading to framework services, basic reusable services from the redundant business logic (bottom-up approach [5])
- Capture the data on number of batch interfaces, number of event interfaces, number of direct (point-to-point) connections.
- List different methods used in batch integration. For example, integration could be done using files or creating operational data store or data marts. List out the various tools used for this purpose.
- List various methods of application to application integration.
- List different tools and technologies that are used for the event based integration
- Understand the different security solutions in place
- Understand the connectivity and transformation patterns for standardization
- From the data gathered above, enterprise architect can paint the as-is architecture. Next step would be to
 - a. Understand the business value of improving integration landscape with options like reducing the batch interfaces and moving to near real-time, replace point-to-point interfaces with loosely coupled interfaces, standardize the asynchronous interaction styles etc.
 - b. Form centralized strategy for transformation needs
 - c. Standardize the way in which different applications are connected to each other in different contexts. For example, siloed evolution may have lead to different ways of connecting to PeopleSoft, SAP etc and hence the need to standardize the approaches in different contexts.
 - d. Decide on additional things are required to secure service interfaces and interactions.
- Final step is to document and analyze the enterprise information delivery requirements

(iii) To-Be Architecture:

- Develop Enterprise information delivery logical view
- Identify the architectural building blocks for service oriented integration based on the requirements gathered in step (ii)
- Tentative building blocks for information delivery are Mediation component (service + message bus), Workflow engine, Orchestration & Choreography engine (BPEL Engine), Service Registry and Service Repository, Service management and monitoring tool, Data Services Platform, IDE, XML /Web Services Security infrastructure, Policy Server, Rules Engine, Transformation / translation engine, ETL tool, XML accelerators, XML gateway etc.
- Gap Analysis [3] [6]
 - Assess the above requirements for leveraging the existing platforms within the enterprise across different business units, if possible. This step would possibly avoid introducing another middleware (like ESB) into the enterprise unnecessarily creating the scenario of trying to bridge middleware of middleware [4].
 - Identify the people and process gaps.
- Decide on the Solution building blocks (products/tools/technologies etc.): Having to consider all the integration scenarios before deciding on ESB & message broker or hybrid bus vendor would not only make the whole transformation

process an architecture driven initiative rather than vendor/product driven initiative but also helps in deciding the features of ESB to be used[4].

- For the tools that are to be introduced newly into the enterprise, to fill the identified gaps, do a thorough evaluation with respect to functional requirements as well as in performance point of view.
- Final step is to document the To-Be architecture

(iv) Define the overall roadmap:

- Identify the pilots and projects
- Create a high level plan
 - Understand the dependencies across between projects and also with pilots & product evaluations
 - Prepare high level schedule
 - Plan for addressing people gaps: Evangelization, Developing communication packages, workshops etc.
 - Plan for process gaps: Refine or define the required IT processes, Develop communication packages, Roll out the process etc.
- Consider various options, Define a high level integration transformation roadmap.

Sometimes business case will be built with ballpark figures initially. It is recommended to correlate the business case with more deterministic estimates after defining the overall roadmap that takes into account current state analysis and To-Be architecture.

(v) Setup a program office: To execute pilots, information bus platform rollout and projects. Also setup a governance board to address IT process gaps and Integration Competency Center (ICC) to address people gaps and evangelize the new concepts and principles based on SOA.

Summary

Though the transformation initiatives are executed in an iterative, incremental or progressive manner, major integration infrastructure decisions require thorough study of enterprise level information delivery needs. Without spending enough time on capturing enterprise information delivery needs with a central approach, the iterative and incremental approach quickly turns the SOI into quick and dirty implementations leading to proliferation of different ESBs. Over time - this transforms the whole business initiative into a focus on solving technology issues, such as trying to bridge the ESBs!! This article described a generic approach that can be considered for information delivery at the enterprise level. As part of the approach, this article discussed the various issues that are of interest to enterprise architect.

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Glossary of Terms

ABB	Architecture Building Blocks
BPEL	Business Process Execution Language
ESB	Enterprise Service Bus
ETL	Extract Transform Load
ICC	Integration Competency Center
IDE	Integrated Development Environment
PMO	Program Management Office
SBB	Solution Building Blocks
SOA	Service Oriented Architecture
SOI	Service Oriented Integration
TOGAF	The Open Group Architecture Framework

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