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# Enterprise Integration Engine - A Solution for Enterprise Integration

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## Abstract

*No man is an island.*

Like human beings, Businesses exist in collaboration with other Businesses. They have to be forthcoming, approachable and dependable to work smoothly and efficiently. Integrating Businesses with other stakeholders is always a challenge. Lack of common exchange standards, vulnerability risks etc. are few of the reasons that inhibit the Business organizations to venture towards Integration.

Most organizations use Enterprise Resource Planning (ERPs), a suite of applications that helps Businesses manage their different facets like Finance, Inventory, Purchase, Shipping or Human resources etc. The ERPs available today are well connected within an organization for all the employees to view and manage their data. The ERP applications are tightly-coupled and mostly proprietary, making it nearly impossible for the outside world (web) to access it.

In this white paper, I have tried to address the above problem with a flexible and loosely-coupled integration solution, viz. *Enterprise Integration Engine (EIE)* that facilitates inter and intra communication within processes and applications across the stakeholders of the (ERPs). The EIE is a viable solution that increases business value exponentially. It recommends use of popular technology trends that do not compromise on security and is also easy on the pocket. This white paper discusses the recommended solutions from a technical stand-point.

## Introduction

### ***Why Enterprise Integration?***

- Businesses succeed when the ecosystem in which they operate, works as efficiently as the organization itself [the handshake between the vendors, suppliers and other support systems needs to be flexible, yet coarse-grained]
- Businesses have internal ERP systems that maps business processes
- Real-time visibility of Vendor and Partner capabilities to assist the immediate needs of the Business
- Faster and efficient Business decisions
- Reduced delays in procurements, new orders etc.
- Reduced manual interventions and transactions
- More ROI(Return on Investment) for the Enterprise
- Seamless information exchange between disparate Enterprise systems
- Intelligence to analyze, report and initiate appropriate business actions
- Combine business processes and work-flows from different enterprises to create new business processes thereby adding business value and increased growth

### ***What are the challenges and apprehensions?***

- Business Information Security at risk
- Ownership of the data, what to share with whom?
- Lack of standardization or protocols to share enterprise data

- Need for manual intervention at various steps to facilitate communication between enterprises
- The Enterprise products and applications used by the different enterprise partners' maybe totally disparate – spanning different programming methodologies, languages, computing platforms etc.
- Most Enterprise products are inwardly focused towards the enterprise
- No ready-made solutions available to plug-in and enable the disparate enterprise applications seamlessly communicate

## Solution

### ***Preface***

*EIE* is an extensible framework that leverages the following:

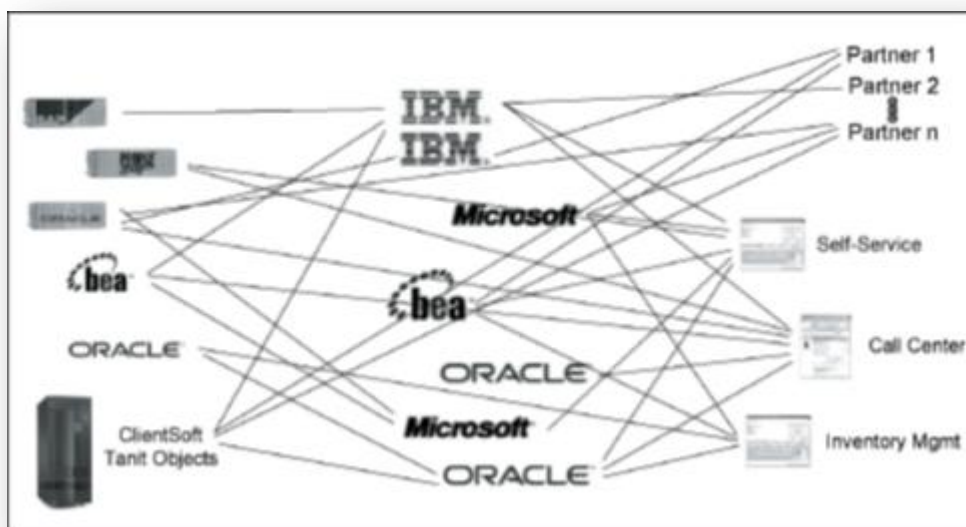
- Evolution of interoperable W3C standards such as Web services, XML, JSON etc.
- Support provided by most existing ERPs like Oracle PeopleSoft, SAP etc. to expose the internal business functions as Web services
- Leverage BPMN standardization for cross company workflows
- Presence of Robust Information Security architectures within the Web services
- Clear segregation between secure ERP zones and Edge systems that talk to the outside world

### ***Solution Recommendations***

#### ***Is Web Services a Good fit?***

Most of the top ERP vendors like Oracle, SAP, and IBM etc. expose their Business Services as Web services. These Web services provide a common ground for communication between the disparate ERPs.

A point-to-point communication between each partner for interaction with one another can be utilized as depicted below.



Source: <https://soa.sys-con.com/node/39683>

- With time, this setup becomes complex and un-manageable
- The cost, time to market and flexibility are affected deeply by adapting this design
- There is a one to one channel between each participating ERP partner/applications. With time, the complexity increases and performance decreases

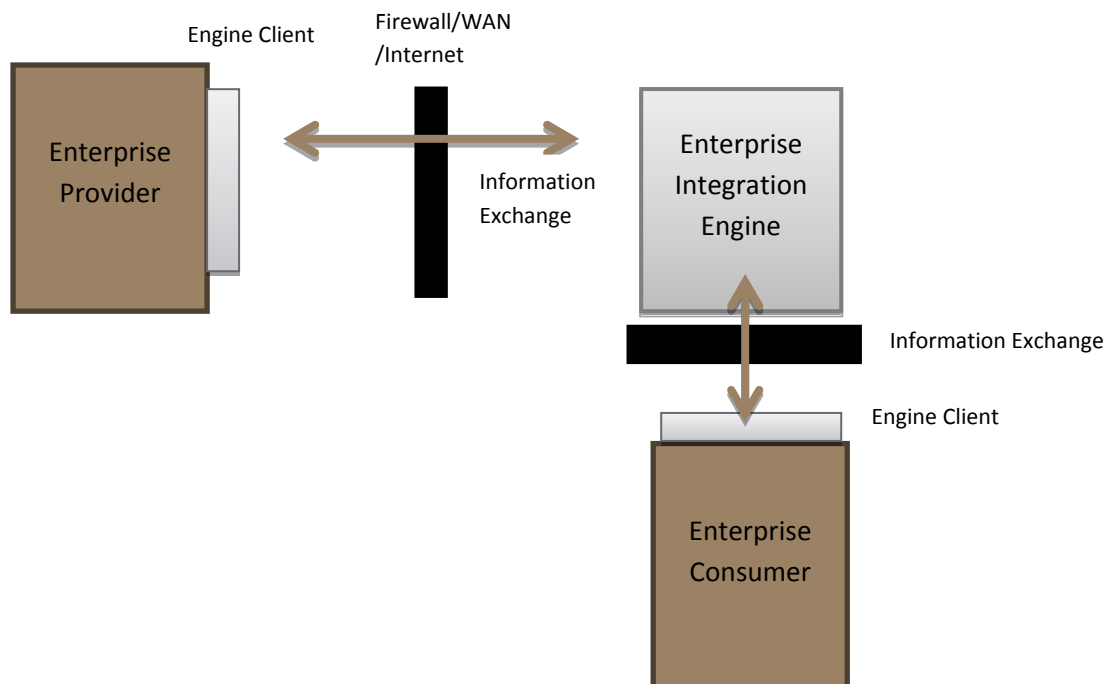
#### ***Having stated the above***

- Web services is a good technology fit for the Enterprise Integration Problem due to its interoperability and availability model
- In-built features like Life cycle management, Security policy enforcement, Traffic management, Monitoring etc.
- API exposures have been successfully commercialized by large businesses in the Telco and BFSI sectors. For e.g., Apple and ATT have adopted such strategies
- Exposure of APIs and Services have fostered innovation and optimal business processes
- XML is an underlying standard where data and data description, in one place makes Enterprise Integration comprehensible

#### ***Enterprise Integration Engine (EIE), the Solution***

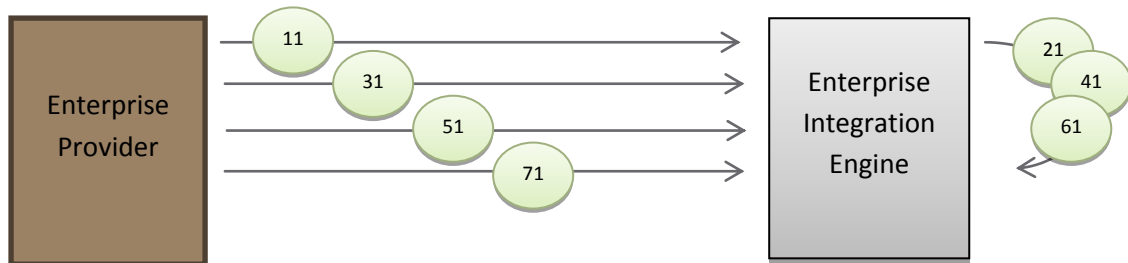
The Enterprise Integration Engine (EIE) is a solution that utilizes the advantages of a Service based Enterprise system (SOA approach) and works around its pitfalls to provide a realistic Enterprise Integration Solution.

The EIE acts as a broker between the Enterprise Provider and Consumer as depicted below.



The Enterprise participants or Business ERPs register themselves and their services to the EIE Engine. Once registered and published, the interested and authorized enterprise partners are able to access these services via the EIE.

The Service Registration and Publish workflow is depicted below:



1. Register Organization (ORG)
2. Update EIE Registry with ORG profile
3. Publish Registry
4. Update EIE Service Registry with the ORG Services
5. Define Roles and Mapping
6. Store ROLE-SERVICE-ORG Mappings
7. Add Partners

On a successful registration, the ERPs are able to expose their services while utilizing other Enterprise services.

### ***How does the ERP communicate with the EIE Engine?***

An EIE Client is provided to all registered Enterprise stakeholders. The Client minimizes the ERP system customization required in order to interact with the EIE. The Client handles the Enterprise Service request/responses by marshaling and un-marshaling the input/output data from the ERP application. The Client is designed such that in case of absence of a sophisticated ERP system, a basic program can work with the client to invoke Integration Engine (no need of complete ERP systems in place) An EIE client is provided to all the registered Enterprise Stakeholders, minimizing the ERP system customization that is required to interact with the EIE. The client handles the Enterprise Service request/responses by marshaling and un-marshaling the input/output data from the ERP application. The design ensures that a basic program can work with the client to invoke the integration Engine in the absence of a sophisticated ERP system.

### ***EIE Recommended Features:***

A typical EIE will be able to -

- Manage Organizations – register, remove, and manage profiles of organizations
- Service Definitions – define services exposed by the provider to the authorized access roles
- Service Discovery – locate services provided by a particular organization for a particular role
- Service Execution Engine – executes the service and responds with the result. The consumer does not have to worry about locating or invoking the service. It subsequently provides a two-way interaction between applications

- Alerts and Notifications Engine – sends conditional (when a business rule is met), un-conditional (when down time alerts of a provider is communicated) or event alerts (when a newly registered organization wishes to establish a trusted relationship with a consumer, in which case the consumer is notified)
- Role Mapper – maps roles and services (services are accessible only to the assigned roles)
- Analytic and Reporting Engine
- Business Rules and Workflow Engine
- Security Wrapper – security measures to conform to integrity and authenticity of information exchanged and service invocation
- Management GUI – Dashboard

### ***Advantages of EIE***

- Uses Web services. Information exchange is possible between disparate Enterprise and partners.
- Registers new partners or organizations, locates the partners, locates their services, provides role-based access to the partner's data in a secure and controlled manner
- May extend to have a dashboard to monitor, manage and analyze the service exchange, manage the partner profiles, analyze and report the enterprise data etc.
- May be coupled with Business Analytics to suggest optimal transaction profile, best supplier in a real time fashion, track supplier history, credibility and other ratings
- EIE is built on a hosted application model. Due to its SOA based design, the components of the Hub itself is exposed as Web services
- The EIE is Scalable, Extensible and Customizable. It is based on a hosted model and hence can be exposed as PaaS or SaaS
- The EIE can also be extended to have adaptive features which will allow transformation of data and communication between enterprises which are in-capable to talk through XML etc. (Inclusion of legacy systems, native systems is possible)
- Design of a centralized distributed EIE Engine can prevent risks associated with a centralized system like single point of failure etc.

Products like Mule ESB, Oracle SOA Suite, Apache Active MQ etc. are products which provides solutions to the problems discussed above, but each have their own advantages and limitations.

## **Conclusion:**

Alignment of Organizational Goals with the underlying technological capabilities is a necessity. The closer the goals translate into each other, higher the business value QoS.

The EIE uses the existing technologies to overcome the prevailing limitations. The engine provides simplified solutions to the Business Integration Problems.