

MANAGING GOVERNMENT & BUSINESS IN TRUE PROCESS

Managing Government & Business in True Process Management Perspective

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ABSTRACT

Current era is expecting real e-Government which is critical to meeting citizen and business expectations of access to public sector information and services. To deliver improved services, government and public sector agencies must share information with each other, directly with the public and with other business organizations. This brings with it a requirement for more efficient ways of integrating systems together. e-Government should enable citizens and business to deal with government on a vast range of matters, any time of the day or night, without having to understand which part of government is providing the service they require. One of the most challenging aspects of the future of e-government is the practical implementation of 'seamless' government across jurisdiction. To address these issues, whole marketplace has emerged for software solution that can help to achieve improved e-Government Integration. Major approaches and evolution of enabling technologies ranging from EDI to Web Services and XML based process integration are analyzed to provide flexible, scalable and adaptable e-Government Integration solution. Presented solution comprises the challenge of efficiently integrating diverse e-Government processes and data within and across the e-Governments, citizens and business allowing the governments to respond efficiently.

1. INTRODUCTION

e-Government is the use of information technology to support government operations, engage citizens, and provide government services. From the user's perspective, e-government should enable citizens and business to deal with government on a vast range of matters, any time of the day or night, without having to understand which part of government is providing the service they require. Actually there are four key dimensions, which reflect the functions of real e-Government: - E-services: the electronic delivery of government information, programs, and services often (but not exclusively) over the Internet. E-democracy: the use of electronic communications to increase citizen participation in the public decision-making process. E-commerce: the electronic exchange of money for goods and services such as citizens paying taxes and utility bills, renewing vehicle registrations, and paying for recreation programs, or government buying supplies and auctioning surplus equipment. E-management: the use of information technology to improve the management of government, from streamlining business processes to maintaining electronic records, to improving the flow and integration of information. Based on the compelling vision following are the necessary pillars[21] of the connected government strategies: 1. Citizen centricity, 2. Standardized common infrastructure, 3. Governance, 4. New organizational Model, 5. Social Inclusion, 6. Back-office reorganization.

The growth of the Web is revolutionizing the way government interacts with citizens, business and governments efficiently. The benefits of e-commerce are convincing more and more governments to make online versions of their services. Many governments have moved some mission-critical portions of their operations/services on-line, and many have made great strides towards workflow management [1] and others [2]. In global consideration for engineering e-Government we have to support different business models such as: G2G, G2C, and G2B etc. which ultimately require global and flexible integration solution. Infact a comprehensive and completely integrated solution could address following few challenges in addition to many others: 1. Integration of information and services, 2. Privacy and data sharing, 3. Dynamic use of the Web, 4. Partnerships and other organizational networks.

Different type of complexities in e-Enterprises or Internet Enterprise which are the enterprises that conduct business over the internet [3] and perform their business process electronically [4, 5], should also be carefully considered in true e-Govt. Integration (e-GI) solution.

However the idea of e-Government regarding e-Enterprises gives rise to certain dilemmas among which, some are new and others are old. New problems have been raised due to the technology advancements that include interaction with new technologies like Mobile Agents [6] etc. Among the old problems "integration of heterogeneous services" tops the list [6]. When talking about integration, the major goal is to make the task simple and easy to use so that further integration of new services becomes easy.

There have been several attempts to provide tools and architectures that will facilitate the integration of heterogeneous applications, however all these tools and frameworks like BizTalk,

WISE, eCO, SOA require a degree of manual intervention and customization. Therefore an e-GI framework is presented that will minimize human intervention. The following section will provide details of the “e-Government Integration (e-GI)”.

1.2. e-Government Integration (e-GI)

e-GI is critical to meeting citizens, business and other government expectations of access to public sector information and services. To deliver improved services, government and public sector agencies in addition to other governments must share information with each other, directly with the public, business organizations and with other government organizations. This brings with it a requirement for more efficient ways of integrating complex range of systems together. e-Government should enable citizens and business to deal with government on a vast range of matters, any time of the day or night, without having to understand which part of government is providing the service they require. Therefore one of the most challenging aspects is the practical implementation of 'seamless' government across jurisdiction. Integrating the applications and data sources must be accomplished without requiring significant changes to these existing applications and data. Those applications that were not designed to interoperate, need to be integrated, enterprise government and community wide [7]. As government departments interact on a real-time basis and business processes cut across multiple enterprises and business lines, the need for information integration leads to the adoption of best suited e-GI approach [8]. Thus, legacy and newer systems can integrate to provide the government with greater competitive advantage. The volatile nature of government requirements, the effort to lower total cost of ownership, and the need to rapidly introduce new services require decoupled, event and service oriented (SOA & EDA) functionality of government and other applications. These government services not only provide new functionality but also leverage investments in legacy systems running the critical applications.

1.3. e-Government engineering architectures

There are several architectures/frameworks that have been proposed in order to facilitate integration. Among the architectures is “The Zero-Time T-Strategy framework” [4]. Through which or regarding any Process Centric Management - PCM following three aspects are identified as the most important ones in the success of an e-Govt.: 1. Time to Market, 2. Strong positioning on the basis of competency, 3. Ability to adapt to changing govt./market needs. Keeping these considerations in mind the developers of this framework recommend a component based integration and application of engineering concepts to the development of e-Government. The major focus of any architecture is to enable following major activities in the environment: Manage and evolve all technological and organizational processes effectively; Integrate and manage all government information electronically; and Empower knowledge workers at all levels with broad decision support capabilities. USA’s Federal Enterprise Architecture (FEA): is component and business based framework for govt.-wide improvement, based on five interrelated ‘reference models’ designed to facilitate cross-agency analysis and the identification of duplicative investments, gaps, and opportunities for collaboration within and across govt. agencies. Models are: Performance Reference Model (PRM), Business Reference Model (BRM), Service Component Reference Model (SRM), Data Reference Model (DRM),

and Technical Reference Model (TRM). e-Govt. Interoperability Framework (e-GIF): is collection of policies and standards endorsed for New Zealand Govt. IT systems. Brazil's Interoperability framework e-PING: is a reference model used to guide the development of solutions and the implementation of e-Govt. technology infrastructure nationwide [21].

2. E-GI ENABLING TECHNOLOGIES

Different technologies have been used for business integration, whereas major of them are classified as:

1. Electronic Data Interchange Based Integration
2. Component Middleware Based Integration
3. Business Process/Workflow Based Integration
4. XML Based Interaction Framework
 - 4.1. Microsoft BizTalk Server
 - 4.2. eCO. etc.
5. Web Services Based Integration Framework

2.1. Service oriented architecture (SOA) paradigm

An architectural paradigm for creating and managing "government services" that can access distributed government functions, IT assets, and information with a common interface regardless of the location or technical makeup of the function or data. This interface must be agreed upon within the environment of systems that are expected to access or invoke that service. It supports new government requirements through the creative use and reuse of existing assets in quick and easy way. SOA offers: Loosely Coupled, request/Reply, Synchronous Communication support.

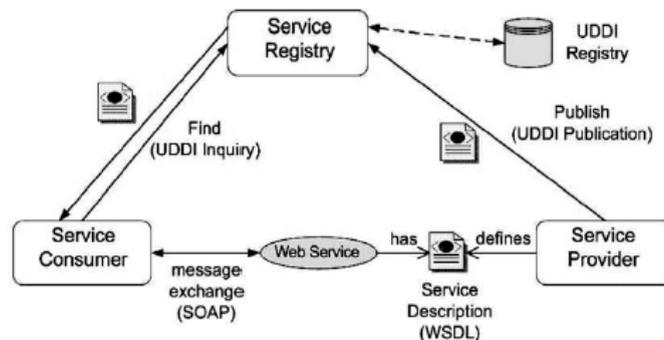


Figure 1. Web services reference model

2.2. Web services (WSs)

Web Service is an implementation and important aspect of SOA [9]. WSs are loosely coupled applications using open, cross-platform standard which interoperate across organizational and trust boundaries; they are free from client context and deployment requirements [10, 11]. Specifically Web Services are platform independent loosely coupled, dynamically located and invoked, firewall friendly and widely accessible which makes them appropriate for economical EAI solution [12, 13, 14]. They use open XML and Internet-based protocols for their

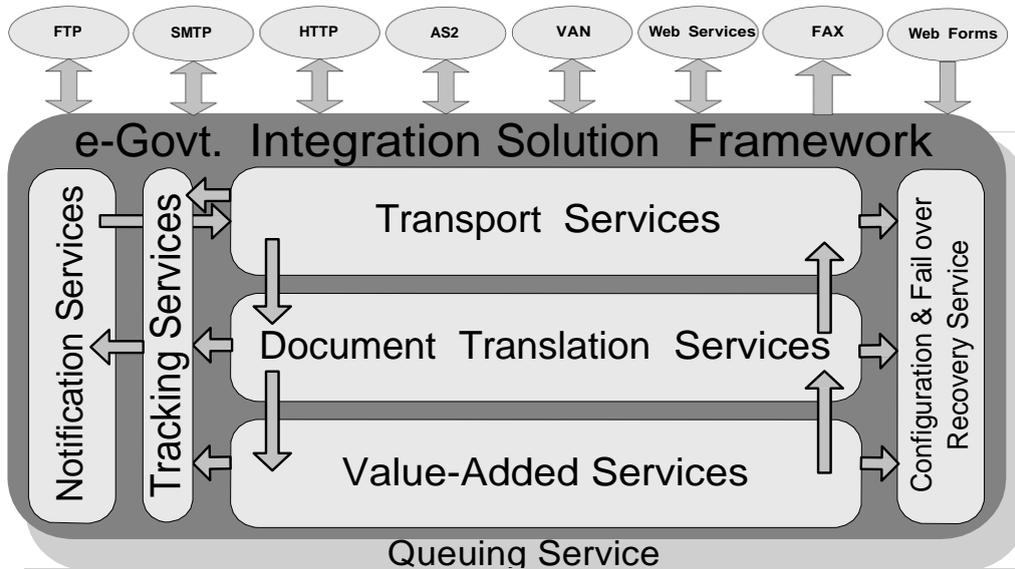


Figure 2. e-GI solution framework service layers

description, registration and invocation: Web Services Description Language (WSDL) used for describing operational features [15]; Universal Description, Discovery and Integration Language (UDDI) provides programmatic interface for publishing and discovering [16]; Simple Object Access Protocol (SOAP) [17] offers lightweight messaging framework for exchanging XML formatted data, supported by variety of transport protocols (HTTP, FTP, SMTP), and structured as envelop containing header (features like Security, transaction etc) and body (actual data). Other standards like: WS-Security, Monitoring and Management (WS-DM) are developed, in addition to: WS-ReliableMessaging, WS-Eventing and WS-Notification which are in standardization process. Interaction among WSs is shown in figure 1.

Adoption of an XML based messaging (SOAP), and use document based messaging model, over well-established protocols enables communication among heterogeneous systems and loosely coupled relationship. Standards like BPEL4WS [18] could be used for business process definition through WSs. Heterogeneous applications (CORBA, Java etc.) may be wrapped and exposed as WSs. However WSDL neither model semantic features (document type: PO etc) nor include security oriented information such as role based access control etc. regarding adoptability service signature may change which require automatic detection and handling of changes. Using tagged language for data exchange and use of complex data types, which are not supported in SOAP (require XML parser to load XML schema from remote location) will overload the network. Another scalability issue refers to registry which could be centralized, distributed and replicated.

2.2.1. WS composition standards for BPM.

Many efforts has been made for developing standards for WS composition [46], such as XLANG [19], Web Services Flow Languages (WSFL) [20], Web Services Choreography Interface (WSCI), Business Process Modeling Language (BPML) and finally superseding, Business Process Execution for Web Services (BPEL4WS).

3. E-GI PLATFORMS

Following are the platforms to develop e-GI solutions: TIBCO Active Enterprise, Mercator Enterprise Broker 5.0, Oracle Integration Server, HP Net Action IOE, IBM Websphere Business Intigration Suit, Miscrosoft BizTalk Server 2004, Microsoft .NET, Sun Open Net Environment, Vitria Business Ware, Versata Global 2000, BEA WebLogic Integrator, Web Methods, SeeBeyond E*Gate Integrator, etc.

4. E-GI SOLUTION FRAMEWORK ARCHITECTURE

Aim of this paper was presenting e-GI with the intent to introduce appropriate e-GI solution, therefore the bases of framework are proposed as:

4.1. Architecture service layers

e-GI solution framework comprised of three service layers (see figure 2):

4.1.1. Transport service layer.

Pure loosely coupled architecture is claimed through document based communication model; therefore business applications communicate through diverse business documents via various protocols. Transport service layer provides appropriate protocols to exchange documents between business communities. In general partners can use different protocols for documents which require gateway service/transport service to translate documents between heterogeneous protocols (see figure 3).

4.1.2. Presentation service layer.

After receiving the business document from transport service layer it must be

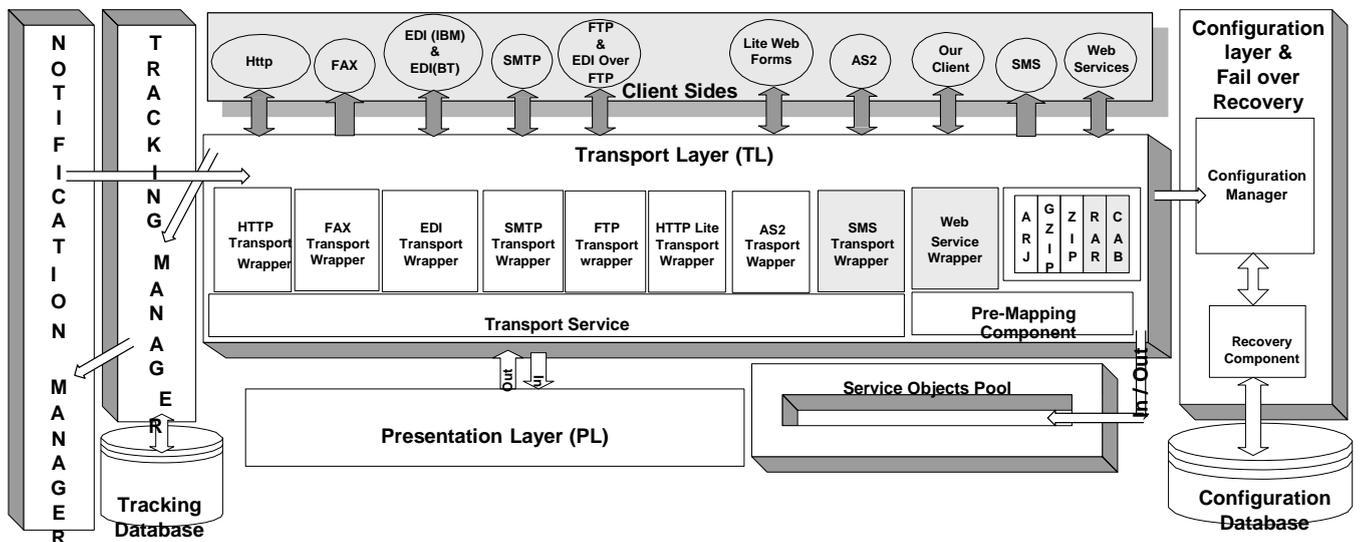


Figure 3. e-GI solution framework's Transport Layer interactions

identified and understood in such a way that the information provided in that document could be accessed by the system and other lower service layer. Major services of presentation layer are: document transformation (using EDI mappings), information translation and integration among disparate

representation (see figure 4). In short we can say that it mostly deals with content semantics regarding type of business document and provides integration of data models and document format.

4.1.3. Value aided services (VAS) layer.

The major requirement of business partners is to integrate diverse business processes for cross organizational business processes which is done through VAS/Business Process Integration layer (see figure 5) and require well-defined agreed upon business process. After the identification and transformation of business document by presentation service layer the information is transferred to VAS layer where certain business process related to document is applied. Objective of this layer is to provide interaction among business process of autonomous and heterogeneous partners therefore interpretability at this layer is a challenging issue which require well defined agreed upon business processes. Layered service architecture supports peer-to-peer communication among governments etc and it depends upon situation that which level of service is required .some times business integration may require transport services only, or for some situation business integration is required till presentation service, or it may be possible that business is integrated to highest level known as value aided service layer for process integration.

There must be few services across all the layers to claim reliability and manageability like:

4.1.4. Tracking services.

Provide Tracking and Monitoring facilities. Every service informs their activities to tracking manager, which maintain tracking and monitoring log when any failure is reported to tracking manager it transfer that activity to Notification Manager.

4.1.5. Configuration and failover recovery services.

Configuration manager continuously monitor the services if any service found fail then it is informed to Notification Manager. It also maintains system's metadata. Once any business document fail to receive service due to document error or service failure it is notified to configuration manager by that layer which logs failure configuration in configuration database and when the failure is recovered it is kicked back through recovery service. It also offers load balancing.

4.1.6. Notification services.

Provide Notification Services to monitoring staff through available modes of transport such as: e-mail, Fax, and sms. After reception of failure notice the failure is recovered.

4.2. Architectural, real-time & government requirement for e-GI framework

It is recommended that real-time e-GI solution framework offer following Architectural features: (scalability, security, heterogeneity, adaptability, manageability, distributivity, decoupling, autonomy), real-time requirement: (asynchronous, publish/subscribe) and Business requirements: (flexibility, agility, usability, reliability) for productivity.

Following are architectural features of the framework:

4.2.1. Scalability.

Ability of a system to grow in different dimensions is referred as scalability. In business community establishment of new relationships in low cost and efforts are desirable. Therefore provision of business services component templates and establishment of new business processes through orchestration ensures framework scalability.

4.2.2. Security.

It requires mutual authentication, authorization, confidentiality, and non-repudiation. This is supported with Partner's authentication, SSL, SHTTP, S/MIME and PKI securities.

4.2.3. Heterogeneity.

Different levels of heterogeneity exist within partners like: Structural Heterogeneity,

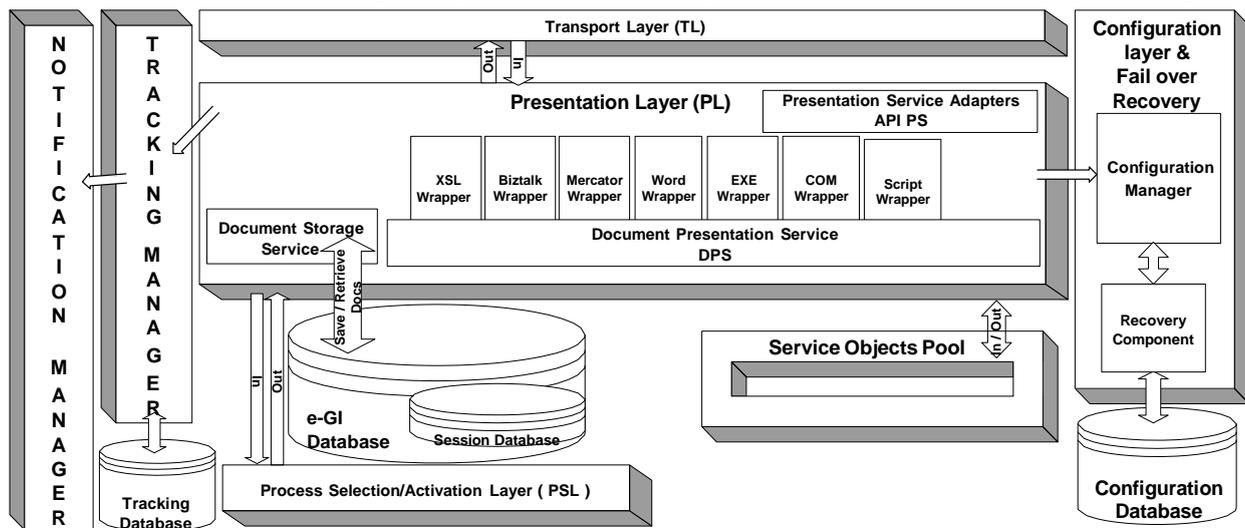


Figure 4. e-GI solution framework's Presentation Layer interactions

and Semantic Heterogeneity etc. In general, degree of dissimilarity between partners is referred as heterogeneity. In document based communication model, it is fulfilled by providing document validation, translation, transformation and transportation in diverse forms.

4.2.4. Adaptability.

Ability of system to quickly adapt to dynamic business changes. Because impacts of changes are limited in layered architecture therefore changes are incorporated in specific service component for adaptability.

4.2.5. Manageability.

Degree of application's visibility and manageability such as supervision, control and performance of its execution, which is provided by tracking, notification, configuration, and recovery services.

4.2.6. Distributivity.

Ability to separate group of common services into different integration levels and connect them appropriately to provide required level of integration, which is achieved by orchestration facility which integrates various service components at different layers and compose them in form of web service for certain business processes.

4.2.7. Loose coupling.

The most important feature of e-GI that partners should not be dependent on each other and exchange business information on demand. Impact of changes closely depends on the degree of coupling. Document based communication model is followed.

4.2.8. Autonomy.

Provides more local control over local services and allow maximum flexibility to change processes without effecting to each other, such as each

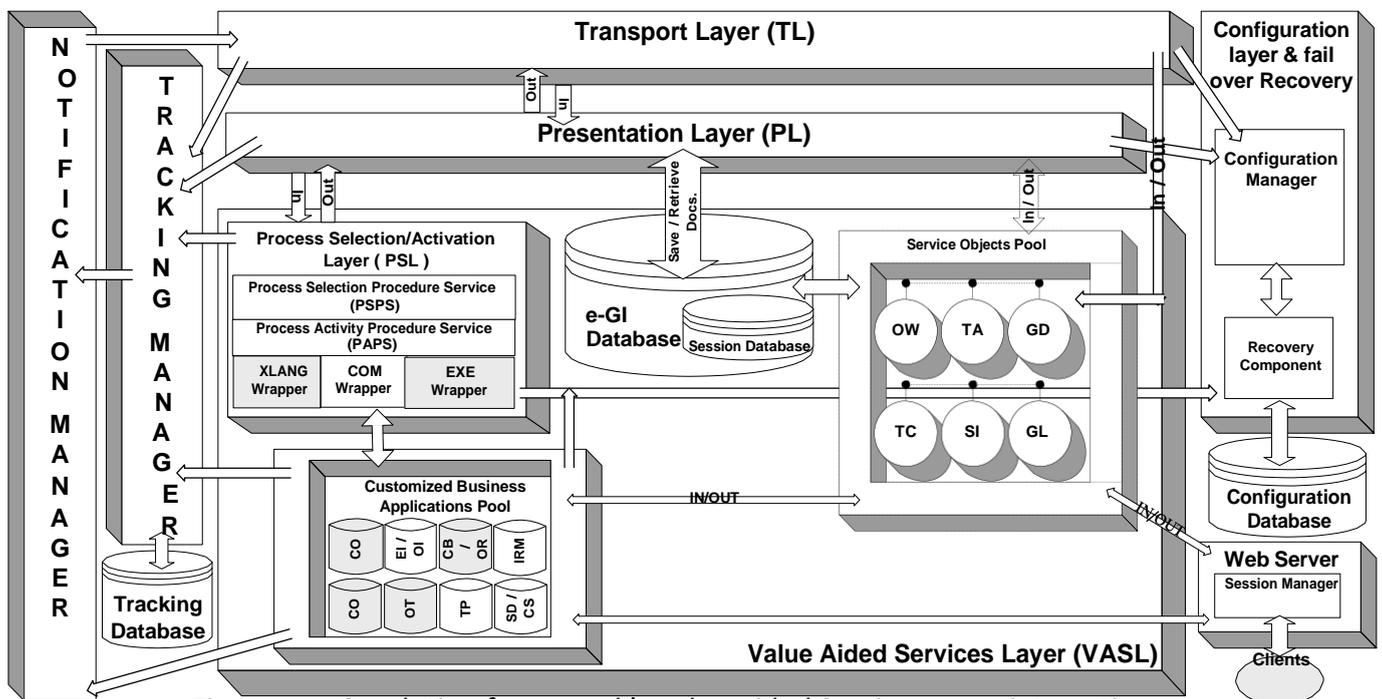


Figure 5. e-GI solution framework's Value Aided Services Layer interactions

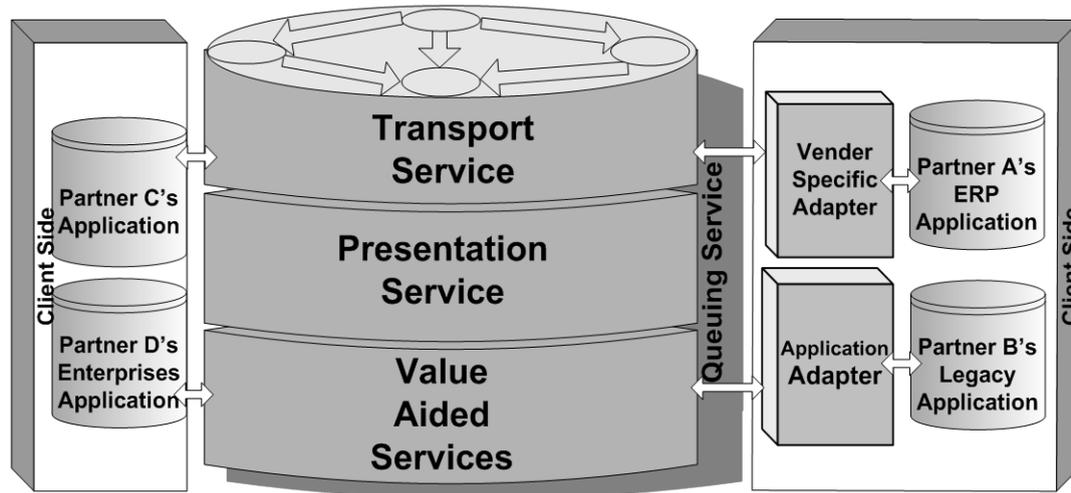


Figure 6. e-GI framework hub model

partner is viewed as black box. Therefore partner's integrations are not effected due to e-GI Hub Model.

Regarding EDA real time govt. support requires:

4.2.9. Asynchronous.

In asynchronous business demand information should be sent without the expectation of an immediate response or no requirement of maintaining alive connection among two systems while waiting for response, which offer more independence, and achieved by queued document facility by using message queuing facility in asynchronous business demands or in case of failure.

4.2.10. Publish/subscribe.

Provides many-to-many consumer/producers interaction such as once producer produce information about an event that must be received by all authorized consumers. It is accomplished through e-GI Solution Framework DB by maintaining consumer/producer relationships accessed by every activated business process service.

Government requirements are offered as: Descriptive approach to BPM increase framework usability; and scalable service based layer approach makes business implementation flexible to cover business agility, whereas recovery service and multiple instances framework deployment in parallel claims ultimate reliability.

4.3. e-GI framework technologies & architecture

e-GI is done by making use of descriptive BPM to describe process workflow which involves selection of different service components from respective layers. Transport layer contains common transport wrapper components based on .NET COM components to support different forms of transports. They can be created and customized through common templates. Presentation layer is based on multiple common WSs for mapping and transformations. For process integration; Business validations are

enabled using WSs at VAS layer. Common business logics with respect to sectors are already exposed in WSs form which can easily be customized. Inter layer communication is achieved through MSMQ (see figure 2).

4.4. e-GI hub model

e-GI Solution Framework is centrally managed where every partner is required to send their government documents to e-GI Framework Hub where their business is integrated. No changes are expected in partner's application except application adaptors for certain situations (see Figure 6). e-GI Solution Framework hub must be supported by Backup Exchange.

5. CONCLUSIONS

A lot of e-Government efforts can be tracked in the market. There are a few problems that are still not completely solved among which some are new and the rest are old. Among the old problems, integration is on the top. This is due to the fact that integration will enable the organization to leverage costs by enabling the organization to use legacy applications and will facilitate electronic communication with business partners. To solve this problem several tools and technologies have emerged. Different e-GI technologies can be viewed as complementary, if they are properly adopted and structured. However basic findings are: making use of graphical BPM which can compose WSs compliant to SOA could be effective. Loosely coupled document based communication seems scalable. XML based data transfer using WSs should be avoided to minimize network traffic, support wide variety of transports, and easily adoptable for partners. In fact the proposed solution is highly suitable for those countries which are not much organized and advance in technology standards.

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