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Descriptive Approach Towards Managing True E-governments

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e-Government Process Management, Government Integration Framework, e-Government Framework, e-Government and e-Business Process Management, Services Federation

ABSTRACT

The role of true e-Government is becoming vital and gaining much attention as modern businesses need adaptive, dynamic and strategic business partnerships in the form of Virtual Organizations and e-Enterprises to survive in the turbulent and global competitive environment. Therefore, managing today's dynamic, collaborative and networked nature of government environment is quite challenging. Real e-Government solution is expected to use, flexible and reusable technology to support valuable citizens and modern business expectations to access necessary government services and information. Here comes the requirement for more efficient ways of integrating their systems together under appropriate e-Government solution. It enables citizens and business organizations to interact with government on nearly all matters, 24/7, without knowing which part of the government is providing the required service. In fact, much research work is being done in e-Business Integration but e-Government Integration is comparatively ignored. As a matter of fact, practical implementation of 'seamless' government across jurisdiction is the most challenging aspect of the future of e-Government which is the subject of our research. In this research, we first formalize the basis/requirements of such e-Government Integration framework as standard and then analyze all candidate software solutions which could help us in development of better and appropriate integrated solution of e-Government, and finally develop the required e-Government Integration framework that adheres to the requirements. Fulfilling our requirement, major approaches like SOA and EDA, transformation of supporting technologies starting from Electronic Data Interchange to WS's and integration at processes level through XML are primarily examined with the intent to give easy to use, reusable, flexible, scalable and adaptable e-Government Integration solution. Our proposed solution encompasses the most difficult problem of efficiently connecting varied inter e-Governments and intra e-Government activities with citizens and modern business configurations like: Virtual Organizations (VO), e-Enterprises, etc. allowing the governments to respond efficiently.

Introduction

It is very obvious that the immense growth of the internet and web technologies is making way for a new paradigm shift in the mode of efficient government interaction with its citizens, as well as business organizations. Based on compelling benefits of e-Business and e-Commerce, many governments are being convinced to come up with their online versions. They have transformed some mission-critical modules of their operations/services on-line, and couple of them strive towards workflow management like version (Michael, 1997) and others (Boualem, 2003). Therefore, in many advanced countries, governments are becoming e-Governments for delivering improved services and now they are striving towards integration of such e-Governments which attracts the interest of research community towards standardization and solution development. Making use of information technology to facilitate all government operations, interacting with citizens and business and providing efficient services is called e-Government. It also enables citizens and business organizations to interact with government on nearly all matters, 24/7, without knowing which part of the government is providing the required service. Few important dimensions that outline the basic functions of e-Government are as follows:

- e-Services refer to the digital mode of delivery used for government services, information and government programs, not always but mostly through the Internet.
- e-Democracy means that all interaction are made through citizens for public decision making process only by making full use of electronic mode of communications for participation maximizations.
- e-Commerce means that for all goods and services, the exchange of money between business organizations, citizens and government is made electronically.
- e-Management means drastic improvement in the management of government by making use of modern information technology such as improved business processes, better maintainability of electronic records, better information integration and flow.

Considering the proposed framework development, we must be aware of connected government strategies as well. Different strategies of connected governments are based on few necessary pillars (Willi, 2004) which are:

- Citizen-centricity
- Standardized common infrastructure

- Governance
- New organizational model
- Social inclusion
- Back-office reorganization

For global consideration of our proposed e-Government Integration framework development, we have to support different standard interaction models such as G2C, G2B and G2G, etc. which definitely require, in this context, quiet flexible and global solution for complete integration. In fact, there are following few critical challenges in addition to many others, which must be addressed by only a comprehensive and completely integrated e-Government solution that makes use of:

- Integration of information and services
- Privacy and data sharing
- Dynamic use of the Web
- Partnerships and other organizational networks

In true e-Government Integration solution framework, special attention must be given to support completely collaborative nature of new business configuration, named Virtual Organizations (VO), which are goal-oriented and opportunity-based organizations defined as a dynamic, temporal consortium of autonomous legally independent organizations which collaborate with each other to attend a business opportunity or cope with a specific need, where partners share risks, costs and benefits, and whose operation is achieved by coordinated sharing of skills, resources and competencies and whose interactions are entirely supported by computer networks (Drissen-Silva & Rabelo, 2008), (I. Karvonen).

On the other hand, if we take another example, that of Internet Enterprises or e-Enterprises: enterprises that accomplish business by making efficient use of the Internet (Hoque, 2000) and carry out their complete business processes electronically (Urcan, 2001), (Hoque, Faisal, 2000); having entirely different set of complexities which should also be considered and supported in the framework.

However, regarding the development of proposed e-Government Integration solution framework, supporting the idea of Virtual Organizations and 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, etc. Among the old problems, "integration of heterogeneous services" tops the list (Shegalov, Gillmann, & Weikum, 2001). 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 to facilitate the integration of heterogeneous applications. However, all these tools and frameworks like BizTalk, WISE, eCO and SOA require a degree of manual intervention and customization. Therefore, an e-Government Integration solution framework is presented that will minimize human intervention. The following section provides necessary details of e-Government Integration (e-GI) and its architectures, followed by discussion on important candidate technologies. Other integration platforms are listed and then complete e-GI solution is presented with details. Finally, conclusion is presented.

e-Government Integration (e-GI)

For delivering improved services, it is very necessary that e-Government Integration must fulfill the primitive requirements of all our valuable citizens, dynamic business organizations, and government organizations in addition to other governments to efficiently access necessary information and services. It is quite evident that the role of true e-Government Integration is becoming vital and gaining much attention as modern businesses need adaptive, dynamic and strategic business partnerships in the form of Virtual Organizations and e-Enterprises to survive in the turbulent and global competitive environment.

Therefore, managing today's dynamic, collaborative and networked nature of government environment is quiet challenging. Real e-Government Integration solution is expected to use, flexible and reusable technology to support citizens, business and government organizations in addition to other governments to share their necessary information and services directly with each other. Here comes the requirement for more efficient ways of integrating their systems under appropriate e-Government Integration solution. It enables citizens and business organizations to interact with government on nearly all matters, 24/7, without knowing which part of the government is providing the required service. In fact, much research work is done in e-Business Integration but e-Government Integration is comparatively ignored. As a matter of fact, practical implementation of 'seamless' government across jurisdiction is the most challenging aspect. For example, integration must be done without making much modification to legacy systems and sources of data. On the other hand, software applications which were initially developed in standalone fashion are supposed to

be completely collaborative at government level, enterprise level and community wide (Danesh, 2012). There are wide ranges of diversified and complex systems which are participating and need to be integrated appropriately, such as the type of interaction needed by government departments in real-time. In contrast with government, business processes are collaborative and distributed across multiple enterprises and business lines over multiple countries in different time zones and need off-line interaction support. Therefore, to integrate them efficiently, adoption of best suited e-Government Integration approach is needed (Jurgen Dorn, 2007). To provide the government with greater competitive advantage, legacy and newer systems can be integrated. As we know, government requirement seems volatile in nature and we are always interested in decreasing total cost of ownership, whereas it is expected by e-Government to rapidly introduce new services which could only be fulfilled by having decoupled, service oriented (SOA) and event driven (EDA) functionality of government and its stakeholders' applications. This way, we efficiently add new functionality to system services by making full use of legacy system dealing with critical application and save our investments and resources successfully. Advantage of the approach is manifold which not only provide autonomacy and adoptability but also required level of flexibility through reusability.

Architectures of e-Governments

There are several architectures/frameworks that have been proposed in order to facilitate such integration. Among the architectures is "The Zero-Time T-Strategy framework" (Urcan, 2001). Regarding any Process Centric Management – PCM, following three aspects are identified as the most important in the success of an e-Government:

- Time to Market
- Strong positioning on the basis of competency
- Ability to adapt to changing government /market needs

Keeping these considerations in mind, the developers of this framework recommend a component based integration and application of engineering concepts for the e-Government framework development. The major focus of any architecture is to enable following major activities in the environment:

- Necessary government information could easily be integrated and managed electronically
- All types of processes could be effectively managed and evolved

- At each level, decisions will be made by workers through advance decision support capabilities provided by the system

USA's Federal Enterprise Architecture (FEA) is component and business based framework for government-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 government 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 Government IT systems. Brazil's Interoperability framework e-PING is a reference model used to guide the development of solutions and the implementation of e-Government technology infrastructure nationwide (Willi, 2004).

e-GI Enabling Technologies

Through detailed literature search, we found that different technologies have been used over a period of time for developing varied level of collaborative systems/integration solutions; the modern one's are evolutionary. Major such technologies 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

Service Oriented Architecture (SOA) Paradigm

To develop and efficiently manage e-Government services for business organizations, citizens, public sector agencies and other governments, SOA, an architectural paradigm, is used, which could be able to access the necessary information and Information Technology assets, dispersed and heterogeneous government functions, by having single interface independent of the structural composition of function and data, as well as its location. It is very important that such interface be mutually accepted by all stakeholders who are inter-

ested to access that service. New services could easily be offered by making full use of the old system functionalities. Few very distinct features of SOA are synchronous communication support, request/reply, and loosely coupled.

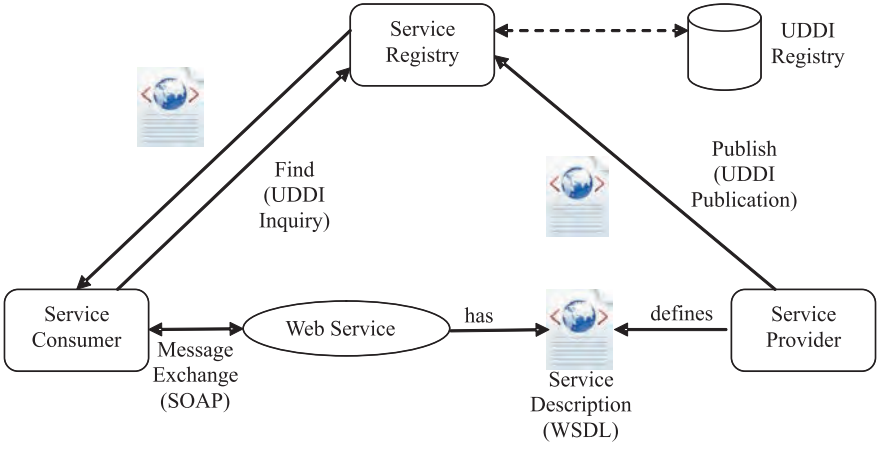

Figure 1: Web Services Reference Model

Web Services (Wss)

SOA's important feature and implementation is Web Service (Carlson & Tyomkin, 2004). WSs applications are loosely coupled, being cross-platform and open standard utilized. Therefore, they provide interpretability between trust boundaries. WSs applications are developed and used regardless of the context of the consumer and platform (Yinong Chen, Paul, & Chung, 2006), (Holley & Arsanjani, 2010).

Following distinct and important features of Web Services make them very well suited candidates for e-Government Integration Solution (Arsanjani, Zhang, Ellis, Allam, & Channabasavaiah, 2007), (Simmons, 2005.), such as service oriented components, firewall friendly, easily found and invoked at run time, widely accessible, platform independent, and most important, loosely coupled. Because of utilizing such protocols (see Table 1) which are Internet-based and open XML (W3C; Universal Description, Discovery, and Integration (UDDI), Simple Object Access Protocol (SOAP), Business Process Execution Language for Web Services (BPEL4WS), the Web Services are first described then registered therefore it could easily be found and invoked at run time. In Figure 1, interaction among WSs is shown.

Protocol Name	Purpose
Web Services Description Language (WSDL)	Describing operational features
Universal Description, Discovery and Integration Language (UDDI)	Provides programmatic interface for publishing and discovering
Simple Object Access Protocol (SOAP)	Lightweight messaging framework for exchanging XML formatted data, supported by variety of transport protocols (HTTP, FTP, SMTP), and structured as envelope containing header (features like Security, transaction, etc.) and body (actual data)
WS-Security, Monitoring & Management (WS-DM)	In standardization process
Others	WS-Reliable Messaging, WS-Eventing, WS-Notification, etc.

Table 1: WSs Protocols Summary

Finally evaluations of Web Services are being done for e-Government Integration framework and the following aspects have been highlighted:

- Using document-based communication instead of traditional interface like communication and introducing XML messaging framework (SOAP) provides integration of distributed and heterogeneous applications in loosely coupled fashion.
- As far as integration of heterogeneous applications (designed in Java, CORBA, etc.) is concerned, that can easily be reused by wrapping them and exposed as Web Services to be integrated. To enable Web Services to be developed through business process definition, Business Process Execution Language for Web Services (BPEL4WS) could be used and the advantage of adding BPM layer in our integration framework could be taken (S, P, & K, 2002).

To get maximum advantage, SOA's best practices and guidelines have to be followed in composition of Web Services. They must be divided in three well defined layers, which enable autonomacy and dynamic business process management (Fiammante, 2010).

- Collaborative Services

Those high-level processes developed among integrating participant.

- Public Services

Those processes within an individual participant which are developed through different components and properly orchestrated.

- Private Services

All local activities within a component

Following are few common scalability issues. Therefore, care must be taken in developing scalable integration solution: specifically when data is exchanged in tagged language and complex data types are being used (unsupportable by SOAP) then XML parser will load XML schema and network will be overloaded. On the other hand, web services registry which is a scalability issue, could be distributed, centralized and replicated.

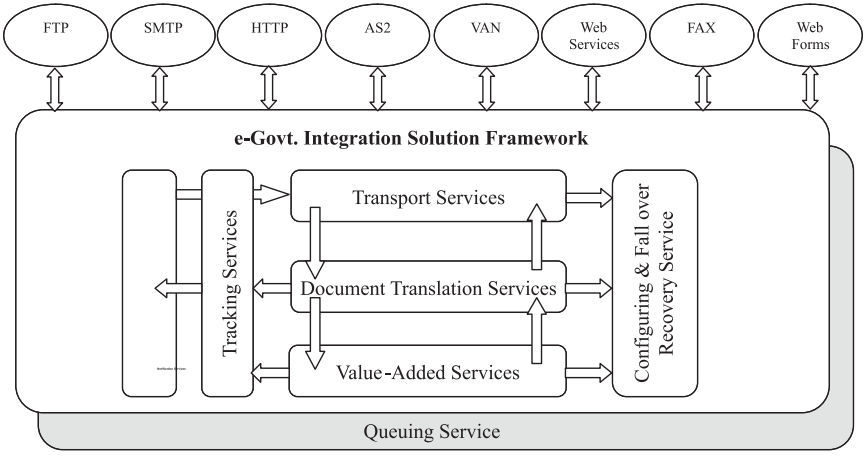

Figure 2: e-GI Solution Framework Service Layers

Standards for Composition of Web Services for Business Process Management

e-Government Integration solution highly demands easy to use, process oriented way of managing system integrations. Therefore, we are looking for well defined set of standards to be developed for Web Services composition for Business Process Management. A few have

already been designed like Web Services Choreography Interface (WSCI), Web Services Flow Language (WSFL), Web Services for Business Process Design (XLANG)), and Business Process Execution for Web Services (BPEL4WS) preceded to Business Process Modeling Language (BPML), etc.

e-Government Integration Platform

It is very important to get familiar with platforms that could be used to develop or implement the framework of e-Government Integration solution. These platform are: See Beyond E*Gate Integrator, Web Methods, BEA WebLogic Integrator, Versata Global, Vitria Business Ware, Sun Open Net Environment, Microsoft .NET, Microsoft BizTalk Server, IBM Websphere Business Integration Suit (IBM SOA foundation), HP Net Action IOE, Oracle Integration Server, Mercator Enterprise Broker 5.0, TIBCO Active Enterprise, etc.

<table>
<tr><th>Architectural</th><th>Real-time</th><th>e-Government</th></tr>
<tr><td>Scalability</td><td>Asynchronous</td><td>Flexibility</td></tr>
<tr><td>Autonomy</td><td rowspan="8">Publish/Subscribe</td><td>Agility</td></tr>
<tr><td>Decoupling</td><td>Usability</td></tr>
<tr><td>Manageability</td><td rowspan="6">Reliability</td></tr>
<tr><td>Adoptability</td></tr>
<tr><td>Distributivity</td></tr>
<tr><td>Heterogeneity</td></tr>
<tr><td>Security</td></tr>
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Table 2: e-GI Solution Framework Requirements

e-GI Solution Framework Requirement

The most important aspect for developing appropriate solutions is their requirements. Therefore, after going through detailed literature search, we are going to first formalize the basis/requirements of ideal e-Government Integration framework as standard to ensure productivity. Requirements are comprehensively covered under the following heads:

Architectural requirement, Real-time requirements, e-Government requirements. Each of them are expecting list of necessary features, which are shown in Table 2.

e-GI Solution Framework Architecture

As per the purpose of our research, major approaches like: SOA and EDA, transformation of supporting technologies starting from Electronic Data Interchange to WS's and integration at processes level through XML are primarily examined with the intent to give easy to use, reusable, flexible, scalable and adaptable e-Government Integration solution framework which adheres to our recommended requirements. In this section, we are going to present our proposed solution encompassing the most difficult problem of efficiently connecting varied inter e-Governments and intra e-Government activities with citizens and modern business configurations like Virtual Organizations (VO), e-Enterprises, etc. allowing the governments to respond efficiently. The proposed framework consists of the following layers.

Architecture Service Layers

e-Government Integration solution framework comprised of three service layers primarily in addition to three framework's administrative service layers, across each layer (see Figure 2). Functions of each layer are described as under:

- Government Process Integration/Value Aided Services (VAS) Layer

The primary role of Government Process Integration Layer or Value Aided Service Layer (see Figure 5) is to enable e-Government to efficiently integrate autonomous and diverse e-Government processes and data within and across the e-Governments, citizens and modern business configurations like Virtual Organizations (VO) and e-Enterprises, allowing the government to respond efficiently. Here very well-defined mutually agreed upon government process among relevant stakeholders is required to address the challenging issue of the interpretability of this layer. Information is transferred to Government Process Integration/VAS layer from presentation service layer which performs identification and transformation process to business document. Then, VAS layer performs the actual activity required for the collaborative government process regarding the document. The framework is developed in different levels of layers to support peer-to-peer communication between all framework users. Each layer will be used in order when its services will be required. If only transport services are required, then the document will be served by transport layer only and there is no need to pass on to higher level layers. In case, if applications need government process integration services/VAS, only then does the document need to be processed till the framework's highest level layer known as VAS, by passing through all its lower level layers.

Very important concept discussed and proposed in Danesh, Raahemi, Kama, & Richards, "Implementation of a Framework for Process Management in Service Oriented Virtual Organizations Using Service Zones, 2013, of extracting service choreographies which is acting as a roadmap to design lower level services for implementing VO's (Danesh, Raahemi, Kama, & Richards, 2013) could easily be employed at this layer.

- Presentation Service Layer

The main role of presentation service layer is identification and understanding of government document such that all provided information could easily be used by VAS layer and other framework layers.

Basically, the presentation layer performs tasks like transformation of documents by mappings, and the translation of information contained in the document to get distinct document representation integrated (see Figure 4). Primarily, the layer focuses on the content semantics concerning nature of document and performs integration of document layouts and data models.

- Transport Service Layer

Two types of communication in pure loosely coupled architecture could be configured using Web Services: one is interface based and the other is document based whereas the second one has more advantages over the first. In our framework, all applications will interact via varied documents using variety of protocols. The layer gives suitable protocol support to government users for document exchange. It simply provides gateway service to translate documents (see Figure 3).

Administrative Service Layers

There are three administrative service layers, across each layer, to claim manageability and reliability, which are as follows:

- Configuration and Failover Recovery Services

Here the monitoring of services is done continuously and when any failure is reported, it is notified to the Notification Manager. On the other hand, to maintain configuration and recovery operations system's metadata is also managed by the same service. In case, if any document is not served because of any error, either in document or service breakdown, it is reported to Configuration Manager and then all configuration at the state of failure is properly recorded in the configuration database. Simultaneously, administration staff will be

notified by the Notification Manager and as soon as the problem is resolved, then document is kicked back for processing by Recovery Manager. Very important feature of load balancing is also provided by the same service.

- ***Tracking Services***

The main role of this service is to monitor and track the activities of each service, and a log is maintained in Tracking Database. In case of any failure, the activity is transferred to the notification service.

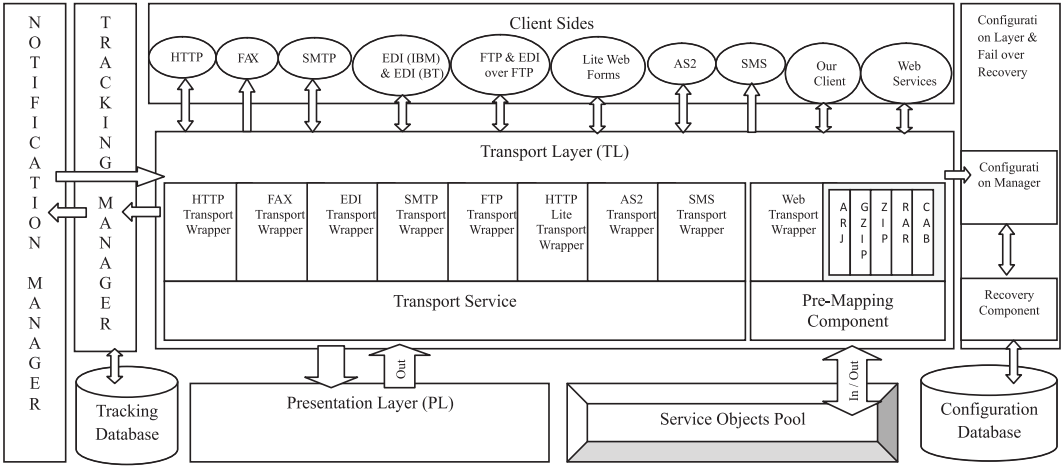

Figure 3: e-GI Solution Framework's Transport Layer Interactions

- ***Notification Services***

Simply offer the reporting services to framework's administrative personnel to recover the failure. Different types of formats are available for reporting like sms, e-mail, Fax, etc. As soon as the failure is reported, it will be recovered.

e-GI Framework's Compatibility Towards Requirements

We are expecting that every true e-Government Integration framework must fulfill such group of requirements titled as real-time, architectural and government requirements for productivity. Therefore, the following section presents level of framework's compatibility with these requirements.

Compatibility of features concerning architectural requirement of the framework are discussed as follows:

- Heterogeneity

Could be defined as the degree of dissimilarity among stakeholders' applications; therefore e-Government framework's stakeholders could have heterogeneity of different levels such as semantic, structural, etc. Making use of document based interaction method in our proposed framework, heterogeneity support is provided through services/processes applied in sequence like: first document transportation in varied formats, transformation, document translation and finally validation.

- Security

Most important requirement of e-Government integration framework, which primarily needs few basic security features like mutual authorization, confidentiality, authentication, and perfect non-repudiation. It is completely provided with typical Public Key Infrastructure securities, system stakeholder's authentication, SHTTP, SSL, and S/MIME, etc.

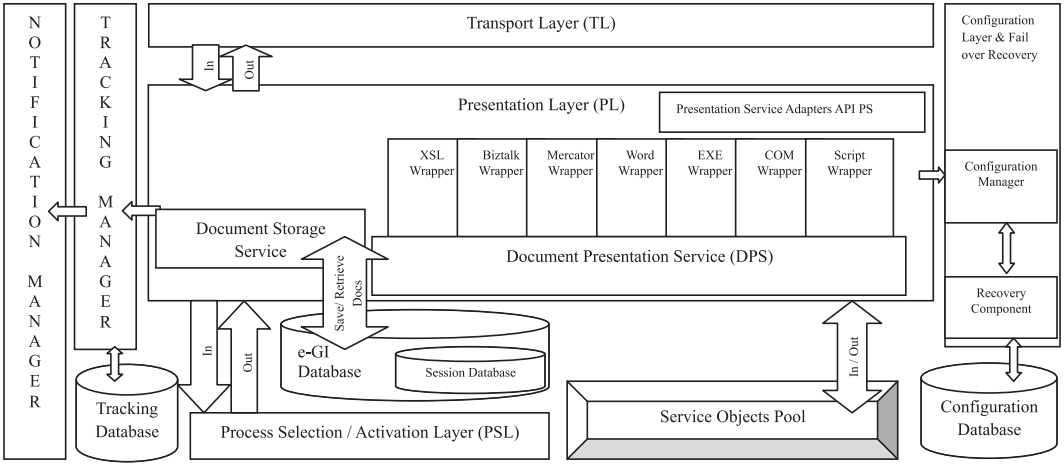

Figure 4: e-GI Solution Framework's Presentation Layer Interactions

- Scalability

In today's globalized world, the system could rapidly extend/grow in many dimensions and this capability is called scalability. It is very much desirable that new integrations must be established in the easiest way, with low cost and efforts. Our framework's scalability is guaranteed through such features like creation of government processes with the help of simple orchestration, enabling reusability by wrapping old service with extensions, and support of built-in government services templates.

- Distributivity

At distinct integration levels/layers, collection of similar services could be divided and then capability to properly integrate them to give required level of integration is called distributivity. Our framework supports distributivity through orchestration to enable integration of appropriate service-components at distinct framework's layers and simply publish them as Web Service for fulfillment of certain government service.

- Manageability

Refers to degree of ease in the framework's administration to provide smooth operations and increase productivity. In other words, manageability means level of system's administration and visibility like control, supervision and performance of system's execution. Therefore, manageability is provided in our framework through following managers, across each framework's service layer, which are named as notification manager, configuration manager, tracking manager and recovery component.

- Adaptability

Refers to the capability as to how quickly the framework's applications adapt to dynamic changes. To claim our framework as being highly adaptable, it is developed in component based layered architecture to limit the impacts of changes to only specific layer, and within that layer to specific components. Therefore, changes can easily be incorporated only in that service component.

- Autonomy

Maintains organization's privacy and control over local services, while at the same time provides maximum flexibility to manage collaborative processes, rules and events as if we are their owner without affecting each other. This is completely supported through adhering to SOA best practice and rules for composing WSs in three layers such as Collaborative Layer, Public Layer and Private Layer. Therefore, integration is done in such a simple way that each participant is considered as "Black-Box". Similarly, by removing our integration developed in e-GI star/spoke Model will not affect local working of any participant.

- Loose Coupling

In our proposed framework, the exchange of information is completely on-demand; therefore participants are not dependant. Partner's system components are behaving as Black-Box when integration is made because of loosely coupled system. Coupling determines effect of change. Effect of change is reduced to negligible in loosely coupled systems. Making

use of SOA and composing document based Web Services interaction ensures loose coupling feature support of our framework. From event driven architecture's perspective, following are few real-time requirements which must be supported in our proposed framework:

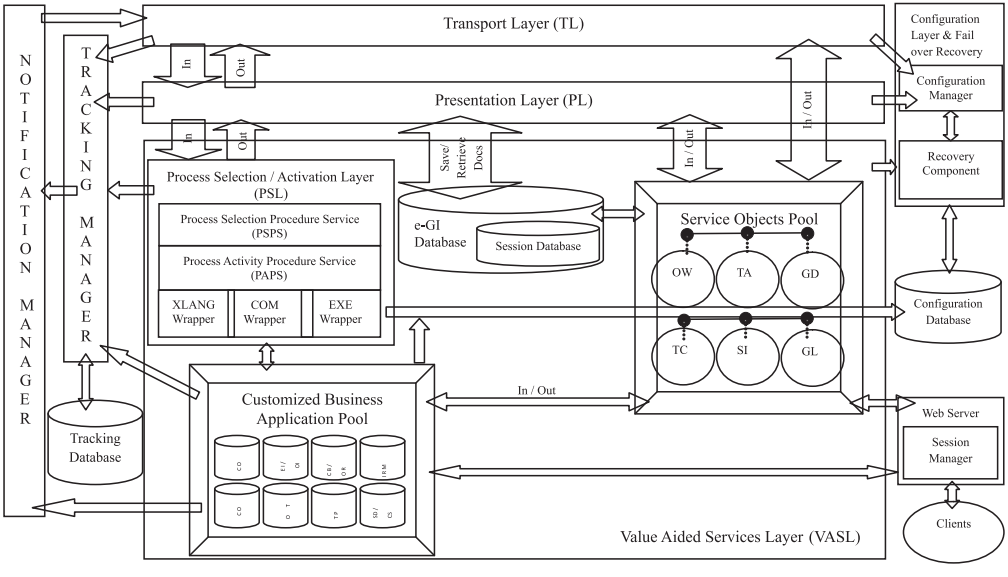

Figure 5: e-GI SOLUTION Framework's Value Aided Services Layer Interactions

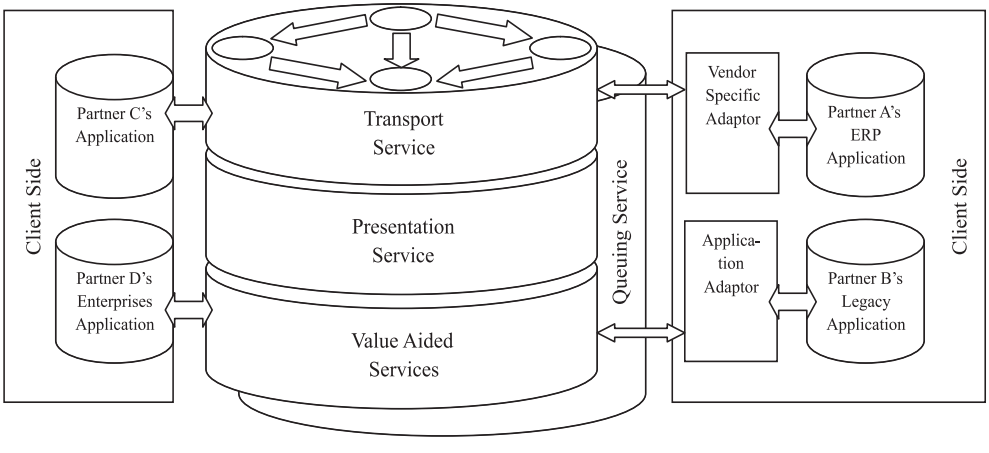

Figure 6: e-GI Framework Star/Spoke Model

- Publish/Subscribe

A very typical type of interaction is known as Publish/Subscribe, in which, when information publisher generates some piece of information then it must be sent to all official subscribers. Our framework supports it through its database, which creates publisher/subscriber relationships utilized by each government process service of our framework.

- Asynchronous

Talking about 24/7 services delivery/continuity management and location independent boundary less government, we must expect fully asynchronous support. In such situations, connection-less services are similarly treated as connection-oriented services, and offer more independence. In many real-time situations, it is allowed to send the information of an activity without hope of instant response and at-least processed as well, although in offline fashion, such as in case of failure or service unavailability. Therefore, asynchronous support is compulsory. We have provided asynchronous support through queued document functionality by using message queuing facility. On the other hand, regarding communication SOA, document Based Web Services interaction supports both synchronous and asynchronous.

Following requirements are supported specifically for e-Government:

- Usability

Easy to use descriptive way to business process management, including orchestration and choreography, provision of framework ultimate usability.

- Flexibility and Agility

Such features support like BPM based service description, highly scalable service oriented approach, reusable functionality of service components, having separate layer for each service ultimately makes e-GI implementation very flexible and provides required level of agility inherent in government service provision.

- Reliability

Most important provision of the framework is complete recovery service provided by recovery component in addition to parallel deployment of several instances of the solution framework that ensures required reliability.

e-GI framework Technologies and Architecture

In our proposed integration framework, business process management, a descriptive approach towards integration, BPM engine is used to illustrate the government process workflow by simply choosing pre-developed appropriate services within relevant framework's service layers and finally composed as simple Web Service. Keeping in mind the nature of e-Government, variety of transport forms must be supported. Therefore, framework provides complete layer named transport layer which is furnished with different commonly used pre-build .Net COM components which are used as transport wrapper components to convert the government document's native format into required transport form and vice versa. Facility of commonly used templates is provided to create and customize them as well. For identification and understanding of document, in such way that all provided information could easily be used by next framework layer, our framework's presentation layer is furnished with many commonly used Web Services which are pre-build for document mapping and transformations. Similarly, to make our framework government centric and user friendly, government process integration layer is fully furnished with pre-build and easily customizable Web Services containing commonly used government logics. Such Web Services are categorized under different government services sectors. MSMQ is used for making inter layer communication possible (see Figure 2).

e-GI framework's topology: star/spoke model

Our framework provides different topologies for integration like peer-to-peer, star/spoke/hub and supply-chain and therefore productively respond to dynamic market changes because of its loosely coupled architecture. But as far as the specialized nature of e-Government is concerned, only star/spoke topology would appropriately support all e-Government requirements and therefore star/spoke model is recommended for e-Government framework. In such configuration, e-GI will be configured centrally and all stakeholders are supposed to export their appropriate documents towards the star/spoke and vice versa where integration is actually configured. That's why stakeholders' applications will remain unchanged. Sometimes, appropriate application adaptors could be used (see Figure 6). Provision of continuity management, fault tolerant and load balancing features, just only the e-GI Framework star/spoke is supported by the backup exchange.

Conclusion

Conclusively, many solutions regarding e-Government are found in advanced countries and few in other countries as well. Eventually some problems are still unsolved; among them the

most important is the appropriate integration of e-Governments and its stakeholders for emerging economies. Such integration will surely make it possible that the government and all its stakeholders would be able to minimize costs by enabling them to use legacy systems and at the same time, make electronic interaction convenient to one another. Problems could be solved by various emerging technologies and tools.

The most important thing is appropriate adoption and structuring which will make many e-Government Integration technologies complementary. However, we found the following basic guidelines as base line for solving the integration problem. For example, most effective graphical BPM could be used to expose services and compose SOA compliant Web Services. It seems scalable that the interaction between government and all its stakeholders must be through loosely coupled document based model. Using Web Services for data transfer in XML will increase network traffic therefore avoided. For global adoption by all stakeholders, solution must be able to export document in various form of transport protocol. Our solution adheres to the guidelines and therefore it is appropriate for emerging economies.

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