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GOVERNMENT ORGANIZATION REFORM AND SHARED SERVICES DEVELOPMENT IN TAIWAN

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ABSTRACT

Electronic Government (e-Gov) has been seen as the competitive edge for modernizing public administrations over last few years. e-Government program has been initiated in Taiwan years ago. Taiwan government has engaged significant efforts in the operation of e-Government program. The researchers as well as the government *per se* also identify e-Gov Shared Service will be the critical element in the new stage of the e-Government program.

The goal of this article is to present the development and evolution of e-Gov Shared Service. Internal data from 2005 and 2008 through several governmental agencies was gathered and analyzed with regard of the demand of e-Gov Shared Service. This paper clarifies further the e-Gov. reform process and discusses the development issues, in particular those centric to consolidation. Among others, GRID, core services and a case on National Archie are clarified. At last, the paper summarizes the potential needs for Grid computing technology in the e-Gov Shared Service and e-Gov development.

Keywords : e-Government, shared services, GRID, consolidation, SOA

INTRODUCTION

The growth in significance and the number of e-Gov services has resulted in rising concerns with the management of the e-Government services and the ongoing operation. Many articles have advocated the model over the past few years for e-Gov services and programs. The study is to explore the potential trend of e-Gov systems due to new technologies introduced and operational requirements on e-Gov services.

The move, such as GRIDs carry on, toward providing IT services as a utility, similar to the telephone and power, has begun to emerge. While application service providers (ASPs) are probably the first harbinger of this emerging service, ICT utilities are beginning to populate the landscape of offerings and those competitors, *viz.* application infrastructure providers such as IDC and ISP have launched utility-based IT offerings.

This move to computing utility is expected over a long period of time to ultimately supplant the traditional outsourcing model in which the services providers manage customer-owned infrastructures and generally take control of the customer's IT and network staffs.

The implications of this model are now felt across not just the IT industry but also across the tele-communications, hardware, software, and other ICT services sectors. Hereby SOA may be the famous product aroused within this evolution. Thus, the impact of Grid/Web Services is moving from technological aspect

to business aspect. The economic value of e-services is captured by significant high-tech business as well as government's attention.

Figure 1 illustrates the goal and the trend of the e-Gov. reform, *i.e.* the adaptation as well agility from management point of view and the requirements within the reform process as a whole.

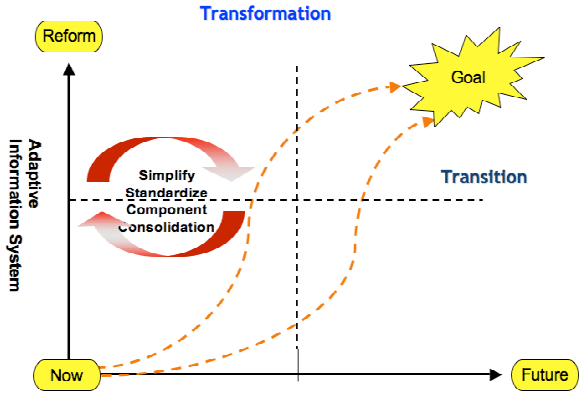

Figure 1: Goals for IT and Organization Reform

RESEARCH INTO E-GOVERNMENT

The research conducted in this paper has an explorative descriptive nature. Our aim is to develop an understanding of the relevant management issues of IT systems from operating e-Gov services but neither to develop nor validate a theory. E-Gov program office conducted an IT system survey over various government agencies and the result is shown in Figure 2 and Figure 3.

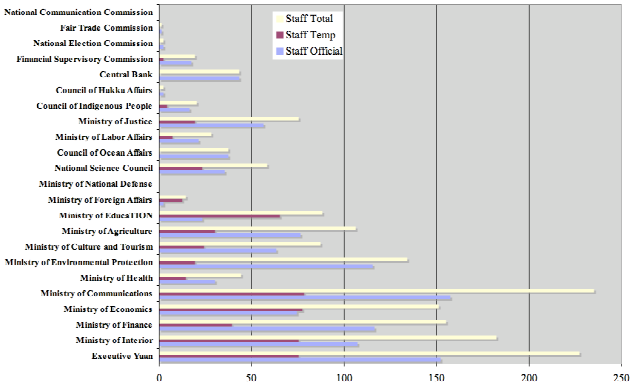

Figure 2: Government Agencies vs. IT Man Power

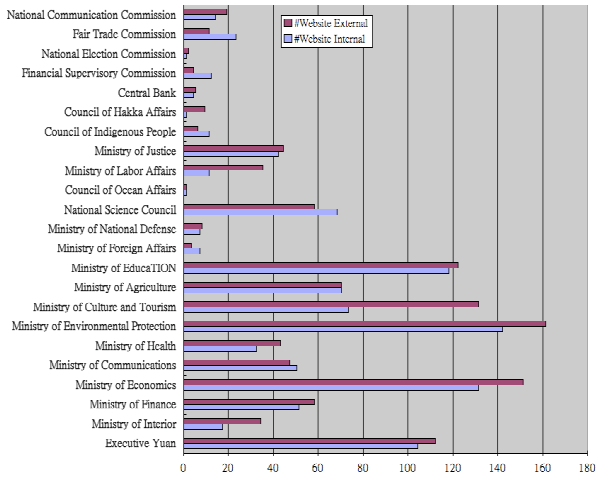

Figure 3: Websites for Government Agencies

A. Survey Data

With the understanding of the operational status of current IT services, we investigate one step further to seek the underutilized resources. By doing this, the potential IT consolidation can be addressed. The survey data is stated in Table 1 which shows the potential shared IT facilities among government agencies. The shared IT facilities include data center, information infrastructure, and websites. These IT facilities naturally can be aggregated in order to maximize their utilization or usage. This approach mitigates the unit cost of IT systems [5].

Table 1: Government Agencies vs. IT Consolidation

IT Consolidation	Government Agencies
Data Center	Ministry of the Interior, Ministry of Finance, Ministry of Economic Affairs, Environmental Protection Administration
Information Infrastructure	Executive Yuan, Ministry of the Interior, Ministry of Finance, Ministry of Communications, Environmental Protection Administration
Internal / External Websites	Executive Yuan. Ministry of Finance, Ministry of Economic Affairs, Ministry of Communications, Environmental Protection Administration, Ministry of Education, National Science Council, National Communication Commission

The importance of current IT systems indicates that there are more resources needed to maintain a high quality of service (QoS) to these systems. Several government agencies have critical IT systems with high system utilization (Table 2). However, it also shows the inconsistent utilization between data center and IT system.

The government agencies listed in Table 2 own hundreds of IT systems providing critical information services. However, the data center facilities seem perform less than expected, which remain rooms for IT systems' relocation. Relocation of IT system can reduce the unit cost of IT systems. Centralized management can even attract the best talents providing services and supports [7]. The momentum of IT system aggregation is compelling the needs for e-Gov shared services seem to be inevitable.

Table 2: Inconsistent utilization between data center and IT system

Organization	Type	Data center utiliza-tion	Importance of IT System	
			IT Utilization	Impact
Ministry of Finance	A	Low	22%: very high; 35%: high	34%: very high; 32%: high
Department of Health	A	Low	8%: very high; 66%: high	9%: very high; 57%: high
Environmental Protection Administra-tion	A	Low	8%: very high; 44%: high	7%: very high; 33%: high
Ministry of Education	B	Middle	7%: very high; 66%: high	10%: very high; 34%: high
Ministry of Foreign affairs	B	Low	0: very high; 60%: high	20%: very high; 60%: high

B. Reform Process

Resulting in the survey described above, a phased reform process is proposed as Figure 4 shows. State-of-the-art concepts and methodologies such as SOA, GRID and web services have in the first place influences on this proposal. The overall reform ought to consist of following 4 stages:

1. Phase 1: From pursuing the secured services up-to-date, a stable migration of available applications into the new architect.

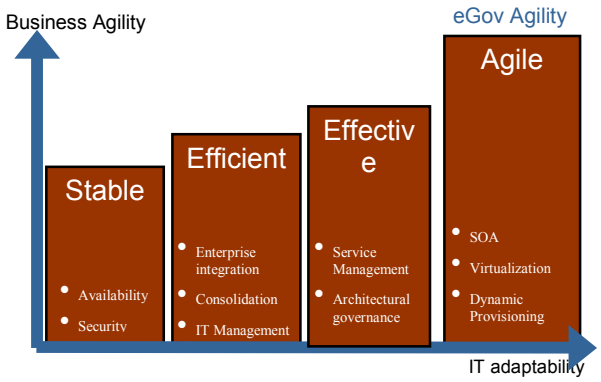

Figure 4: Phased eGov IT Reform

2. Phase 2: By means of consolidation and tools like EAI, the e-Gove system should shift into the IT- controllable manner from the efficiency aspect. Shared services and relevant workflow management may the most crucial issues starting from this phase.
3. Phase 3: The major goal of the following reform lies in the effectiveness, esp. cost/effective measure. Obviously, Critical Success Factor (CSF) and Key performance indicator (KPI) play the most important role in execution of the works. Major issues concerned are service management and governance.
4. Phase 4: Aiming at the e-Gov. agility, *i.e.* quick flexible response to the social changes and citizen needs, SOA shall be considered as a whole. Nevertheless, different friendly user interfaces, visualization of information contents and services leading to ease-to-use systems, dynamic provisioning, etc are the major tasks to be realized.

GOVERNMENTAL SHARED SERVICES

Shared services lead to consolidation and thus enable public sector organizations to be more effective and efficient in their day-to-day operations, and thus releasing resources to improve their service deliveries to citizens and business.

Shared services are gaining importance in public administration as a way to reduce cost and to improve QoS. There are many theories underpinning outsourcing theory [2]. The less appropriate resources are available within an organization *per se*, the more the organization will seek to overcome this lack of resources by calling

upon external expertise. External partners may be the only way to have access to the expertise, because of the relative immobility and the difficulty to imitate. Shares service provides a solution for the lack of resources by sharing among partners (*i.e.* government agencies) within a government entity [2].

The first stage in the journey to shared services is the identification of the business functions that possess process components common to several organizations across the public sector. The government has identified several area (HR, Finance and Accounting) are prime candidates. A professionally managed program to implement the changes to the processes is then possible. Finally decisions can be made as to the most effective mechanism for providing the shared services in house, outsourced or split.

Government agencies have increasingly established shared service centers in order to contain costs, improve QoS delivered, cater to commerce, and focus on core competencies [7]. The shared service centers leverage economies of scale for repetitive back-office tasks such as transaction processing. Finance and accounting led the way, followed by payroll and indirect procurement, and today many kinds of services have been added to the mix.

Whether services are in-sourced or outsourced, for the first time companies can better manage shared service operations with Service-Level-Agreement (SLA) and performance management assessment. Through a web-based service portal, shared services managers can keep their fingers on the pulse of service delivery across service providers.

DATA GRID AND DEMONSTRATIVE SERVICES

Being a new model of computing, Grids support resource sharing and integration over the Internet, using protocols provided for instance by the Globus open source community and other open technologies, including Linux. Grid protocols are designed to allow organizations to work more closely and more efficiently from levels of the team, process, product, and management [12, 13], *i.e.*: Resource aggregation, allowing corporate users to treat a company's entire IT infrastructure as one computer through more efficient management.

In this manner, GRID and Peer-to-Peer (P2P) services enable the sharing, selection and aggregation of geographically distributed heterogeneous resources to tackle large-scale problems with great flexibility. Shared service in current e-Gov practice implies the underlying service-oriented architecture. It allows e-Gov service providers quickly integrate the application logic by making use the resources on the infrastructure. From resource management perspective, shared service means that IT staffs can manage IT resources more efficiently and facilitate better resource utilization. Finally, service-oriented architecture provides the advantages of combined distributed system and logically recentralizes system.

Grid technology not just furnishes the required infrastructure of service-oriented architecture but also facilitates the application services development. Thus Grid technology facilitates the new e-Gov service program. Moreover, flexibility to enjoy good scalability of resources and services cost-effectively could be gained from Grid. As the QoS is vital for both e-Gov and its infrastructure, the complexity scales less while the fault tolerance and reliability will increase [13]. It is anticipated that there will be more shared services by adopting Grid technology into e-Gov in the nearly future.

The up-to-date target of GRID Service Architecture and perhaps SOA as well, is to define standard approaches, mechanisms and basic solutions to what are common to a broad variety of service systems, such as service discovery, communication between services, identities and authorization, service collection, etc.

Among others, the major issues of our e-Gov. reform lie in currently the problematic of consolidation and systematic component building with high quality. Thus, the concept of "core services" becomes crucial to the success of the reform. We will clarify the development of core services and explore the lessons learned from the groundwork of long-term preservation (LTP) of the National Digital Archive Program (NDAP), for LTP is obviously common to all the government agencies.

A. Core Service

The term "Core Service" means the realization of functionalities that are generally used by a wide variety of higher-level services and that implement widely useful capabilities [12]. It is the most crucial elements for the consolidation with respect to the identification of business functions that possess process components common to several organizations across the public sector described in the section II. Currently, the major development *w.r.t* the core service lies in the following areas [12, 13]:

1. Service Discovery
2. Security and Authentication
3. Service Interaction and Communication
4. Service Management

B. Data GRID and the logical Model

Among others, National Digital Archive Program (NDAP) of Taiwan is the pioneer to build up long-term preservation infrastructure and services systematically by making use of DataGrid [13]. Typical workflow in the NDAP that are mainly from the perspective of archive management and general users could be summarized as follows:

1. Accumulation: Identification, appraisal and collection of objects to be archived based on the curation policy.
2. Material Organization and Description: Conduct content analyses to create metadata, and provide annotation and interpretation by domain experts; also construct the linkage based on the collection-level metadata.
3. Digitization: The purpose of digitization is to collect as complete as possible the digitized forms that can be stored, manipulated and edited.
4. Verification: Validate the digitized objects and the annotations are represented in good quality of the original object.
5. Accessing: Design multi-accesses, including browsing, query and search, for users to obtain information they needs precisely.
6. Dissemination: Provide information services and products through any means to publish and promote the contents and services.

To achieve the aforementioned goals, an information structure that centers on integrated distributed resources was established. Other extensive IT supports and integration undertakings are as follows:

- Standardization of digitization process and establishment of resources management system.
- Distributed data resources and editing organization interface
- Establishment of integrated well-formulated index structure
- Extensible framework for data federation
- Architecture of storage resource management system
- Portal with user-friendly interface of digital archive services including browsing guide and query functions.

The Semantic DataGrid system we constructed enables users to create, manage, and collaborate with flexible, unified "virtual data collections" that may be stored on heterogeneous data resources distributed across a network [13]. Logic architecture of the NDAP -LTP DataGrid system could be found at Figure 5.

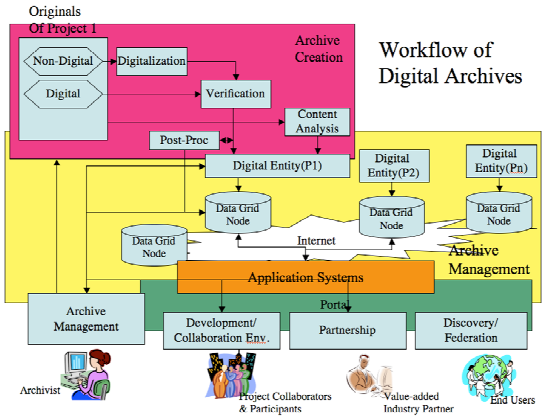

Figure 5: Logic architecture of DataGrid system

Basically, OAIS model [11, 13] is a reference behind the scene other than the workflow requirements from the archivists, although OAIS is just a conceptual model for digital objects preservations. As we mentioned at first, flexibility to adopt new system architecture and new technology while meet the workflow requirements would be the key for a long-term preservation system.

A new approach to keep track and produce the evolving knowledge of the digital objects should be included as a core service. Relationship between digital objects other than the inherit collection association should be allowed to extend by the users dynamically. Thus, innovative correlations among digital contents would be discovered and more good value would be generated as well. This approach introduced the Web 2.0 concepts to make the added value of digital archives with more synergy.

C. The three-copy strategy as an underlying mechanism

As the Grid has been proved to be production quality and sustainable by many e-Science projects in the world, Grid infrastructure is the viable solution for shared services. The off-the-shelf facility with open and reliable operation systems and standard TCP/IP protocols are necessary for the base layer of the infrastructure. Upon that, the DataGrid middleware would support automatic replication under a global name space and global metadata catalog and unified access. Thus, three-copy strategy, as shown in Figure 6, is implemented with standardized metadata annotation in collection and record level respectively. Distributed storage resources management and certificate-based security model are also provided on-the-fly by the DataGrid itself. Workflow and

data discovery services would be supported right above the middleware as well. DataGrid here is for the integration of Internet resources and to collaborate by means of virtual organization (VO). Semantic Grid services are integrated to enable effective discovery, automation, integration and reuse of information across applications upon Grid by giving information well-defined meaning.

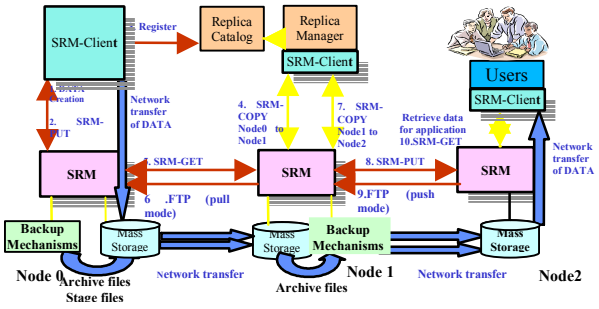

Figure 6: Three-copy strategy for Federation/ Collaboration/Synchronization

D. Security and Authentication Proxy

Nevertheless, there left still the security issues as the most service oriented developments should notice. We have proposed the Archive GRID Security Infrastructure as Figure 7 illustrates, which is an extension of PKI on the GSN (Government Service Network) developed within the e-Gov. Project over the past 5 years.

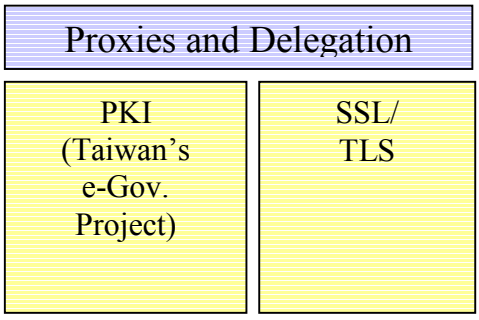

Figure 7: The Archive GRID Security Infrastructure

Upon the infrastructure, the Authentication for resource sharing can be defined for different service consumers. For the further e-Gov. development, we propose to define the notion of "User Right" in terms of "contents and Services" (ref. Figure 5 and Figure 6) and to delegate the right to 6 levels of user roles, i.e. (1) System Administrators, (2) Validation Authorities, (3) Schema Generators, (4) Document Generators, (5) Official users and (6) Users in Public (Citizen).

CONCLUSION

Our research objective is to find out the deficits in the e-Gov. development and the needs on shared services for the development of e-Gov. This research conducted interviews and survey to gather the requirements and experiences of the current IT practice. The shared service model is fundamental to enhance the workflow performance and minimize required resources required by unbundling and centralizing services and in this way combining the advantages from centralized and decentralized business model. Based on the survey result, the 4-phase e-Gov. reform was described in this paper.

Consolidation enabling shared services is the most crucial task in the e-Gov reform. Grid technology is obviously the essential component of the shared e-service architecture. Resource sharing and collaboration are the best advantage from Grid, while resource utilization, efficiency of the workflow and the service reliability are being optimized. We foresee the deployment of Grid and shared service that can lead better cost/benefit effects and QoS of the government will be emerging very soon.

Although there are challenges for e-Gov. services such as the long-term preservation services for NDAP at this moment and makes the policy, technology, infrastructure, and methodology varies a lot. The philosophy we have is to figure from the infrastructure and workflow points of view. A semantic DataGrid system is constructed to support remote backups with three-copy strategy and fulfill longer term preservation by migration the approach which contributes to the underlying storage resource sharing and management for the e-Gov infrastructure.

Based on the government document archival and the National Digital Archive Program executed in Taiwan, standard procedure to annotate digital object by well-defined metadata scheme, fruitful basic attributes can be further collected and the sustainable information content architecture can be enlarged. The effects of perceived issues experienced and potential development of shared services for e-Gov. are worthy of further investigation.

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