Enterprise Application Integration (EAI) in Malaysian Electronic Government (EG) Applications

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Abstract

The implementation of Electronic Government (EG) started since the initiation of Multimedia Super Corridor (MSC) by Malaysian Government. There are seven pilot projects under the EG Application Initiative i.e. Human Resource Management Information System (HRMIS), Project Monitoring System (PMS), Electronic Procurement (EP), Electronic Labour Exchange (ELX), Licensing and Related Vehicle Services and Utility Payment (EDS), Electronic Syariah (e-Syariah) and Generic Office Environment (GOE) which each of the system is handed over to respective department to be managed. Most of the systems are currently being implemented with some modification or enhancement to certain aspect to cope with any changes in current policies and procedures. However, the effectiveness of the implementation of EG Application is widely discussed among IT people in Malaysia as well as foreign countries. One of the most mouthful aspect is the integration and interoperability among EG Application. The purpose of this paper is to discuss the concept of Enterprise Application Integration (EAI) in realizing the unity of these systems. The discussion includes, the definition and concept of integration, benefits, implementation status of EG Application. The next section of this paper will provide some examples of the success story in implementing EAI among EG Application in the context of Malaysian Government.

1. Introduction

Malaysian Government today has to cope with rapidly changing customer demands and innovation in providing services as well as information technology. Previously, many services provided by different government agencies can only be done manually in sequence. However, with the implementation of many EG Application, now, the public can have their service with only a single click. That means public can now for example renew license, pay quit rent and so on through single window interface only. Former Chief Secretary to Malaysian Government, Tan Sri Samsudin Osman in his note to a book called [1] has addressed the following:

> *"E-Government offers a collaborative and integrated environment not just for enhanced internal operations but more significantly for a heightened level of government services through a variety of electronic delivery channels thereby providing convenience to citizens and business".*

E-Government simply can be defined as the use of ICT in governments day-to-day business in particular giving services to public. [2] says that e-Government refers to the use of technology in government institutions and operations to enhance access to and delivery of public services. The common focus is on the application of ICT to improve the internal management of the government, to offer more flexible and convenient services to the public and to a limited extent, to enhance public participation and democracy as mentioned by [3]. In Malaysia, the implementation of E-Government was initiated in conjunction to introduction of the Multimedia Super Corridor (MSC) in 1996 which is coined by former Prime Minister of Malaysia, Tun Dr. Mahathir Mohamad.

E-government is one of the seven flagship applications introduced in MSC. The objectives of these flagship applications are: to jump start and accelerate the growth of MSC; to enhance national competitiveness; to creation of high value jobs and export growth; to help reduce digital divide; and to make MSC a regional hub and test bed. Under the e-government flagship, seven main projects were identified to be the core of the e-government applications. The e-government projects are Generic Office Environment (GOE), Electronic Procurement (eP), Human Resource Management Information System (HRMIS), Project Monitoring System (PMS), Electronic Services Delivery (eServices), Electronic Labor Exchange (ELX), and E-Syariah.

The vision of e-Government is a vision for people in government, business and citizens working together for the benefit of Malaysia and all of its citizens [4]. The vision calls for reinventing government using multimedia and IT to

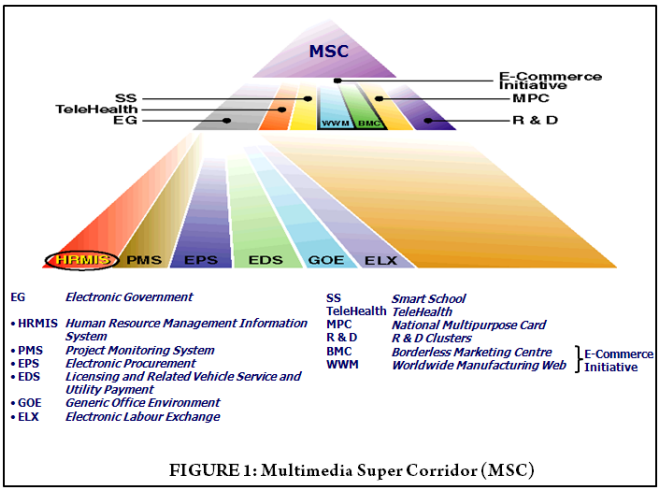

FIGURE 1: Multimedia Super Corridor (MSC)

improve productivity. There are eight projects launched to date under the e-Government Flagship since it was started in 1997. All these projects will use ICT and multimedia technologies to transform the way the government operates, coordination and enforcement. Since, all applications under the E-Government are anchored by different ministries and departments, therefore there are possibilities and gaps occurred especially in interoperability issues. Furthermore, during the initial stage of development of E-Government applications there was no standard to be followed until the introduction of National Data Dictionary (NDD) by Malaysian Administrative Modernization and Management Planning Unit (MAMPU) in 2002 [5].

As the time moves on, the interoperability issue has shown up as a principle in the conception and deployment of the e-government initiatives, and the interoperability frameworks have been the tool for implementing the principle. One of the key technologies used in overcome this gap is through Enterprise Application Integration (EAI). According to [6], interoperability between computing components may be generally defined as the ability to exchange information and mutually to use the information which has been exchanged. An interoperability framework aims at referencing the basic technical specifications that all agencies relevant to the e-government strategy implementation should adopt. This interoperability framework should enable, at least, the interoperability between information systems from different agencies in order to provide services to citizens and businesses in an integrated way [7].

2. System Integration Architecture (SIA)

2.1. Definition of SIA

[8] has defined System Integration Architecture (SIA) as the holistic view of the enterprise processes, information and information technology assets, as a vehicle for aligning business and IT in a structured, more efficient and sustainable manner. He also added that SIA is important in etermining factor for business survival and success, enabling managed innovation within the Enterprise and providing a plan for managing your IT Investments.

2.2. Types of System Integration Architecture

The most common types of SIA are as follows:

2.2.1. Point to Point Integration. According to [9], in order to get two independent systems to communicate with each other connectors have to be built which can translate data structures from one system to another. In a point-to-point architecture, integrating systems requires integration code for each interface. When any changes happen in either application A or B, the interface programs must be updated and changed (see figure 2). Further, application integration becomes increasingly difficult as new applications are added to the environment. For every new system added, it is necessary for it to create connection point interfaces with each existing system that it is connected with. As a result the integration solution grows in complexity and becomes hard to manage in the long run.

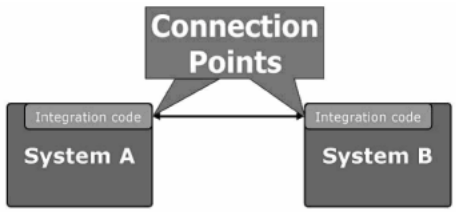

FIGURE 2: POINT–TO-POINT INTEGRATION (TRAVIS & OZKAN, 2002)

2.2.2. Enterprise Application Integration (EAI). Enterprises try to share data and processes without making comprehensive changes to the applications or data structures and also decrease the number of interface points. This is made possible by EAI architecture as suggested by [10].

In addition to the above explanation, [11] mentioned that the EAI architecture uses a central system (middleware) called a hub, as it sits in the centre. In this method, instead of the requestor application communicating with the respondent, the requestor communicates with the hub application, which in turn communicates with the respondent application (see figure 3).

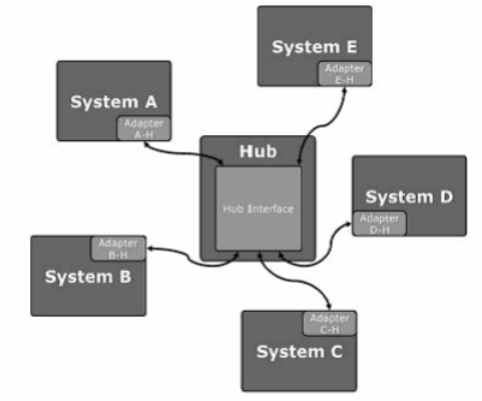

FIGURE 3: THE HUB MODEL (TRAVIS & OZKAN, 2002)

2.2.3. Middleware. In integration context, [12] had defined that 'Middleware' is basically any type of software that facilitates communications between two or more software systems. This is accomplished by providing common interfaces, which in turn enables all integrated applications to pass messages to each other. These are mostly used for moving information between applications and databases. An example of such middleware is a message broker.

3. Enterprise Application Integration (EAI) in EG Application

3.1. Definition of EAI

Enterprise Application Integration (EAI) is an integration framework composed of a collection of technologies and services which form a middleware to enable integration of systems and applications across the enterprise. In the simplest sentence, the term may be referred to the use of any tool to glue together more than one systems that resided in same of different geographical area. Wisegeek.com had defined EAI as a process that brings together enterprise computer applications under a common programming umbrella [13].

On the other hand, Enterprise application integration (EAI) is the process of linking such applications within a single organization together in order to simplify and automate business processes to the greatest extent possible, while at the same time avoiding having to make sweeping changes to the existing applications or data structures. In the words of the Gartner Group, EAI is the "unrestricted sharing of data and business processes among any connected application or data sources in the enterprise [14]".

3.2. Types of Integration Models

According to [15], Integration Models can be defined as how applications will be integrated by defining the nature of and mechanisms for integration. The authors added that Integration Models that represents the state-of-the-art to integrating software are:

3.2.1. Presentation Integration. A presentation integration model allows the integration of new software through the existing presentations of the legacy software. This is typically used to create a new user interface but may be used to integrate with other applications.

3.2.2. Data Integration. A data integration model allows the integration of software through access to the data that is created, managed, and stored by the software typically for the purposes of reusing or synchronizing data across applications.

3.2.3. Functional Integration. A functional integration model allows the integration of software for the purpose of invoking existing functionality from other new or existing applications. The integration is done through interfaces to the software.

3.3. Benefits of EAI

There are several benefits of using integration solutions to organizations. The most important benefits being increased profitability, decrease in costs and increased efficiency. Integration solutions facilitate the use of data and functionality embodied in the organizations existing applications or legacy systems instead of replacing them with new systems. They also bring about benefits in the long run as well, for example organizations can gain an instant, real-time view of all their data and operations, which can lead to better decision-making. They also provide the flexibility to quickly adapt business processes to accommodate growth and meet new business challenges as they arise [16].

[17] present some of the areas of organizations which can be affected and the effects that can be brought about through system integration. They are as follows:

- Enterprise Reengineering / Process Improvement (establishing the business-process map, simplifying and reorganising some processes, optimising use of resources, simulating enterprise behaviour).
- Workflow design and management (automate critical processes)
- Improve enterprise performances (mostly in terms of costs and delays but also quality, reactivity and responsiveness)
- Management decision support (simulating of planned situations, forecasting etcetera)
- Enterprise integration (seamless exchange across the systems to provide the right information at the right place at the right time).

4. The Electronic Government (EG) Application in Malaysia

[18] have collected the following information regarding EG Applications in Malaysia:

4.1. Generic Office Environment (GOE)

The aim of Generic Office Environment (GOE) is to introduce a fully integrated, distributed and scalable office environment that leverages use of multimedia information technology (Yusoff, 2002). This will enable efficient communication, allowing collaboration across all workers, and ensuring right information reaching the right people in a timely manner.

The GOE project consists of modules namely Enterprise-wide Information Management System (EIMS), Enterprise-wide Communication Management System and Enterprise-Wide Collaboration Management System (Pilot Projects, n.d.). The EIMS provides a universal interface for users to manage, find, retrieve and compose the information that they need in their day-to-day operations. Via the Communication and Collaboration Management Systems, users can communicate and collaborate in a group to perform work functions. All three modules work together in an integrated fashion to provide the technical transparency for the users.

Three phases under GOE project are Pilot Phase, Operational Review Phase and Rollout Phase. In the Pilot Phase, the system will be developed and implemented in the Prime Ministers Office, Deputy Prime Ministers Office, and Chief Secretary to the Governments Office, Cabinet Division and Malaysian Administrative Modernisation and Management Planning Unit (MAMPU). Under the Operational Review Phase, the performance of the vendors will be reviewed and for extension to all other agencies. As of now, the GOE project is undergoing the third phase (Roll-Out Phase) where the system has been roll-out to other government agencies with focus on ministries moving to Putrajaya.

4.2. Electronic Procurement (eP) Project

As for the Electronic Procurement (eP) project, the aim is to re-engineer, automate, and transform current procurement system (Yusoff, 2002). The project would cover central contract, tender, and direct purchase.

Besides that, the use of eP will increase transparency, saves time and money while encourage suppliers to go electronic and join the K-Economy. The electronic procurement project has taken off with the introduction of ePerolehan and can be accessed at www.eperolehan.com.my. It is the governments initiative to take its procurement exercises online (Alex,n.d.). With ePerolehan, all suppliers can obtain tender documents and submit bids on the Internet. The suppliers are equipped with smartcards that enable them to transact with the ePerolehan system. Two modules in ePerolehan system are central contract and direct purchase, and have been fully functional and used by the government in its procurement exercise.

With the introduction of ePerolehan system, it hopes that the system could streamline the processes and procedures as well as improve efficiency and productivity, while lowering the governments operational cost overtime. For the suppliers, it could translate into new markets, additional revenues and higher margins. Besides that, ePerolehan allows suppliers to present their products on the Internet, receive, manage and process purchase orders and eventually receive payment from government agencies via the Internet.

This project started in year 1999 and as of 2006, total active registered suppliers is 92,106 where 26,054 enabled suppliers. The Direct Purchase (DP) Catalogue increased by 33.4 percent and enabled suppliers increased by 193 percent since July 2004 (Flagship Applications Progress Status, 2006).

4.3. Human Resource Management Information System (HRMIS)

The introduction of Human Resource Management Information System (HRMIS) as an e-government project will provide single interface for government employees to perform human resource functions effectively and efficiently (Yusoff, 2002). Furthermore, it will help to standardize all human resource processes for federal, state, statutory body, and local authority services.

The objective of HRMIS is not just for record keeping but also provide transactional functions such as leave application, loan processing, competency management, recruitment, and selection of employee.

The HRMIS project will provide a single interface for government employees to perform human resource management functions effectively and efficiently in an integrated environment. The HRMIS project is anchored by the Public Service Department (PSD). The project started in 1999 and will take 42 months to be completed (Status Kemajuan, n.d.). However, due to much time consumed on the Business Improvement Process (BIP), the application development of HRMIS system was delayed. As such, a Supplementary Agreement is signed by Government and the application development consortium in January 2001.

4.4. Project Monitoring System (PMS)

Project Monitoring System (PMS) as one of the e-government projects will create a mechanism to monitor project implementation throughout various government agencies and statutory bodies (Yusoff, 2002). PMS would also provide a platform to exchange ideas and to demonstrate

best practices in information management and communication services. The PMS is designed to provide a mechanism for monitoring the implementation of government projects (Pilot Projects, n.d.). The service also provides a platform for exchanging ideas and demonstrating best practices models in information management and communication services.

The overall scope of PMS covers three services: namely, Application Services, Data Services and Communication Services. Types of projects to be monitored are the e-government projects, five-year development plan projects and any special project. The first phase of implementation was in 1998. In the first rollout, PMS was to monitor some of Malaysias Seventh Development Plan projects.

Project Implementation has been completed at federal agencies throughout the country. Post implementation activities are ongoing such as the assessment of additional Project Monitoring System (PMS) II capabilities: Elektronik Sistem Perancangan dan Kawalan Belanjawan (eSPKB) Pusat Khidmat Kontraktor (PKK) Interface (Flagship Applications Progress Status, 2006).

4.5. Electronic Services Directory (eServices)

The next e-government project is Electronic Services Delivery (eServices) (Yusoff, 2002). This project is a pilot project that allows citizens of Malaysia to engage in transactions with government and utilities payments such as telephone and electricity bill, police summons, Road and Transport Department (RTD) services, etc. The eServices is accessed via multi channel service delivery such as the Internet and kiosk machines.

There are three phases of deliverables for the eServices project (Status Kemajuan, n.d.). The first phase includes driver licensing and summons services, and Tenaga Nasional Berhad (TNB) and Telekom Malaysia (TM) utility bill payment services. The first phase rollout is focused in the Klang Valley and this is followed by Proof-of-Concept for duration of 3 months. In the second phase, the contractor is granted with the opportunity to extend the rollout of driver licensing, summons services, and utility bill payment nation-wide. Subsequently, the development of vehicle registration and licensing, and Ministry of Health information services are carried out in the Klang Valley. The first phase and second phases have successfully completed. The third phase is currently in progress where the scope of vehicle registration and MOH information services Proof-of-Concept is being taken care of.

There are several websites and kiosks that have offered eServices application. For example, Rilek services allows members of the public to access general information and information on their outstanding summons through specially built touch screen infokiosks or through the www.rilek.com.my website (Easier Payments, 2003). These website and kiosks allow the public to make online payments to the Road Transport Department (RTD) or the Police by credit card. Other than that, the public can also enquire about and pay their TNB and TM utility bills online via the Rilek service. The government also allows the public to take their driving theory tests at approved Rilek centre.

4.6. Electronic Labor Exchange (ELX)

The main objective of the Electronic Labor Exchange (ELX) is to improve the mobilization of human resources and optimise work force utilisation through systematic matching of job seekers to job vacancies (Yusoff, 2002). As such, this would enable the Ministry of Human Resources (MOHR) to be a one-stop centre for labour market information that will be accessible to the public.

The ELX project initially started in November 2000 and was expected to complete in fourteen months (Status Kemajuan, n.d.). Until February 2005, about 11,086 job seekers and 466 employers were registered. Of a total vacancies posted, 3,447 resulted in 21,320 jobs matched. This project is fully rolled out for Kementerian Sumber Manusia and all state district offices of Manpower and Labour Department at 105 sites (Flagship Applications Progress Status, 2006).

4.7. E-Syariah

The main objective of implementing E-Syariah is to improve the quality of service in Syariah courts (E-syariah, n.d.). This will eventually enhance the Islamic Affairs Departments effectiveness through better monitoring and coordination of its agencies and improving the management of its 102 Syariah courts. The E-Syariah application consists of Syariah Court Case Management System, Office Automation System, E-Syariah Portal, Syarie Lawyers Registration System and Library Management System.

The E-Syariah project launched in April 2002 and expected to be fully operational in 2005 (Money Game, 2003). Via the system, the Syariah judges are able to get access to past cases and have all the information they need for a particular case quicker than before.

The overall E-syariah project is completed and the E-Syariah Portal was launched on 31st March 2005. The User Training and System Performance Acceptance Test/Final Acceptance Test (PAT/FAT) activities for Syariah Court Case Management System (SPKMS) have been completed and the system is fully implemented at all fourteen states where it covers 110 courts (Flagship Applications Progress Status, 2006).

5. Success Story of EAI in EG Application

There are many integration facilities that being used in integrating various applications in government agencies both

EG and non-EG applications. Two of them which considered a success are:

- Integration Between HRMIS and eSPKB
- Integration Between HRMIS and SIREN

5.1. Integration Between HRMIS and eSPKB

5.1.1. Background. HRMIS or Human Resource Management Information System is one of the EG Application that is anchored by Public Service Department (PSD) which is totally a human resource based application. For any purposes other than HR functions, HRMIS need to be integrated to outside application such as Sistem Perancangan Kawalan Belanjawan Elektronik (eSPKB).

5.1.2. Objectives. The objectives of developing the integration between HRMIS - eSPKB are:

- To complete the human resource (HR) process cycle which cannot be fully implemented in HRMIS
- To help in reducing time taken in process works for example in claim management from 14 days in normal process to only 7 days
- To promote paper-less environment which lead to minimization of government's expenditure in office equipment.

5.2. Integration Between HRMIS and SIREN

5.2.1. Background. HRMIS or Human Resource Management Information System is one of the EG Application that is anchored by Public Service Department (PSD)

5.2.2. Objectives. The objectives of developing the integration between HRMIS - SIREN are:

- To complete the human resource (HR) process cycle which cannot be fully implemented in HRMIS
- To verify all Identity Card (IC) key-in in HRMIS
- To import personal record of government's staff to speed up the process of inserting personal record to database

6. Conclusion

It is important that any organization should pay attention to integration aspect in order to make full use of enterprise application especially any systems which is isolated to the outside organization.

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