Information Systems Integration in E-Government

Wing Lam
Universitas 21 Global, Singapore

INTRODUCTION

Through e-government, an increasing number of nations are making major commitments to modernize and reform government in an effort to achieve greater efficiency, broaden access to government services and improve service levels (Schware & Deane, 2003). Technology is seen as a key enabler for e-government (Elmagarmid & McIver, 2001). Ultimately, e-government seeks to centralize and make a cohesive and seamless set of government services available to end-users. Hence, the integration of information systems (IS), both within and between different government departments, will become a critical issue as e-government matures (Golden, Hughes, & Scott, 2003).

As e-government matures, information systems (IS) integration will become critical to the ability to provide centralized and seamless online services. This article examines the different scenarios of IS integration, and discusses the critical success factors for IS integration. The architectures for achieving IS integration as also described. A roadmap for IS integration in e-government is proposed which provides a framework for more detailed project planning and technical decision-making.

BACKGROUND

The challenge of IS integration is not specific to e-government. IS integration is also a challenge facing many organizations in the commercial sector, particularly those involved in developing enterprise-wide solutions such as e-business, supply chain management (SCM), customer relationship management (CRM) and enterprise resource planning (ERP), which require integration between "islands of applications" (Sawhney, 2001) that have traditionally operated in isolation (Markus, 2000; Themistocleous, Irani, & O'Keefe, 2001). Indeed, a study by research firm IDC (2002), based on 1,350 interviews, indicated that more than 80% of CIOs and CTOs believed integration was either mandatory for addressing mission-critical activities or a key enabler for meeting business-critical needs.

Large-scale IS integration poses at least three major problems. First, the scale of integration and sheer number of IS to be integrated can be overwhelming. Large organizations such as governments tend to have a huge portfolio of IS comprizing hundreds, even thousands of IS (Cummins, 2002). Second, the nature of IS to be integrated is usually quite diverse, including packaged applications, legacy applications, bespoke applications and a myriad of database management systems. Individual IS often have significantly different underlying architectures, with some based on legacy and others based on more modern computing technology, which impedes integration (Lam 2004). Third, older legacy IS may have been inherently designed to be standalone, or integrated with in only very limited ways. However, replacing such legacy IS, which represent huge investments in institutional knowledge, is not always desirable or feasible (Robertson 1997).

Whereas IS integration is extensively dealt with from a technology perspective, there is much less advancement in the strategic planning and management required to achieve IS integration. Such strategic issues are important for establishing an overall framework for more technical decision-making and therefore of interest to chief information officers (CIOs), chief technology officers (CTOs), IS directors and anyone involved in formulating IS strategy in e-government. This article examines strategic planning and management for IS integration in the context of e-government. The article draws from existing research in the field of IS to present and justify a roadmap for IS integration in e-government.

INFORMATION SYSTEMS INTEGRATION

Scope of IS Integration

Lam (2004) identifies four main types of IS integration scenarios, namely, enterprise application integration (EAI), B2B integration, B2C integration, and "Webification." The four main types of IS integration can be distinguished in terms of the purpose of integration and the crossing of organizational boundaries, as described in Table 1.

Table 1. IS integration scenarios

Integration Type	Scope of Integration	Purpose
Enterprise application integration (EAI)	The integration of IS within a single enterprise, either within a business division or with other business divisions within the enterprise	To improve business efficiency and to meet the need for real-time information processing
B2B integration	The integration of IS between different organizations	B2B commerce such as integrated supply chain management and B2B trading
B2C integration	The integration of back-end transactional systems, often of a legacy nature, with Web-based front-end applications such as storefronts and personalization engines	B2C solutions which provide customers with a Web channel for accessing products, services, or information
Webification	The integration of legacy systems with Web-based applications	Ease of access to information held in legacy systems

In the context of e-government, EAI can be compared to the integration of IS within a single government department or with other departments in a government. B2B integration can be compared to government-to-government (G2G) and government-to-business (G2B) integration. Such scenarios might arise, for example, in relation to joint government initiatives such as the combating of international crime and the need to exchange criminal intelligence. B2C integration and Webification can both be compared to a government-to-citizen (G2C) scenario, or the integration of legacy government IS with Web-based front-end applications such as citizen portals to provide services such as the online submission of tax forms.

Levels of Integration

IS integration can be viewed at four levels of complexity namely, data, application, method and process (Linthicum, 2001). The four levels of IS integration are described in Table 2.

Various integration technologies and architectures are used to achieve integration at each of the four levels. Federated databases, triggers, and batch processing can be used to achieve data integration. For application integration, application programming interfaces (APIs) and distributed components such as Enterprise Java Beans (EJB) and distributed component object model (DCOM)

Table 2. Levels of IS integration

Level of Integration	Description
Data	The synchronization of data held in different databases. Synchronization can be achieved either in real-time or in batch mode where some temporary delay in data freshness is permissible to the enterprise.
Application	Enabling IS to directly access functionality of other IS in a real-time fashion. Popular packaged IS such as SAP and PeopleSoft, for example, provide well-defined application programming interfaces (APIs) that expose the functionality within the IS.
Method	Providing IS with a common set of reusable business logic from which finer grain application calls are made. For example, reusable business logic for creating a new customer may trigger separate customer creation processes in several different IS. At this level, there is a clean separation of business logic from the technical means by which IS are integrated.
Process	The abstraction and definition of business process or workflow models from which relevant methods are called. Process integration is particularly relevant in collaborative contexts, such as B2B, where there are significant business information flows between trading partners.