

# Business-oriented data management in conglomerates: insights from government data sharing

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**Abstract.** Nowadays, the management of big data has become an emerging question for companies. Managers in conglomerates, or corporations made up of many businesses, concern more about data management as data integration and sharing inside the corporate can bring about product innovation, risk control and operation efficiency. To solve the technical and managerial problems that hinder data sharing, this study drew reference from federal enterprise architecture framework implemented constructed by the United States. By exploring this framework, this study suggests a methodology for data sharing in conglomerates, and stresses on the business-driven principle and a top-down architecture design with supporting from high-level decision-making.

## 1 Introduction

Nowadays, as more and more data are produced and consumed in the Internet, how to manage these big data has become an emerging question. Especially, managers concern about how to share data between different departments or companies, as data sharing could promote the interconnection of information, strengthen relationship between corporations, promote knowledge diffusion, optimize the allocation of resources, and contribute to the creation of innovation.

Conglomerates, in other words diversified business groups, pay special attention to big data sharing. A conglomerate is a corporation made up of a number of different and sometimes unrelated businesses. In the process of business development, each subsidiary corporation of a conglomerate has accumulated different dimensions and different types of user data. These data accumulate naturally with the business development of subsidiary corporation, and they are separated from each other, forming “information isolated island” within a conglomerate. Sharing these data between different subsidiary corporations can strengthen cross selling, optimize operation and management, and promote product innovation and risk control [1]. Therefore, conglomerates have strong motivation to integrate and share these big data.

However, the influence of sharing of big data remains unknown in practice. Many conglomerates, such as PingAn financial group in China, began to lay out data sharing and system connectivity in 2009, built the infrastructure of data sharing to integrate data resources, and finally gained rapid development for more than 10

years. However, the industrial also see failed cases in many conglomerates who constructed data sharing platform without ideal results.

Thus, here comes to the question that what is the challenges of data sharing in a conglomerate between subsidiary corporates. Furthermore, how those conglomerates could solve these problems and facilitate data sharing. This study draws reference from big and open linked data sharing in US government, and concludes on insights of federal enterprise architecture (FEA) framework on conglomerates in finance industry. This study provides a basis for data management and integration in conglomerates, and the suggested FEA framework would facilitate data sharing and information exchange across subsidiary corporation boundaries.

## 2 Literature review

From the perspective of social technology theory, researchers pointed out that social process and technological development both affect the integration and sharing of information resources [2]. The process of information resources integration and sharing will be accompanied by workflow reorganization and organization structure adjustment, which would be expensive and time-consuming [3]. By studying e-government, some researchers demonstrate that the integration and sharing of government data are hindered by resistance to change, IT infrastructure incompatibility (hardware, software, etc.), organization goal diversity, and environment complexity [4]. In a subsequent study, they found that the integration and sharing of data between government departments are closely related to the degree of e-government construction in both developed and

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developing countries.

Researchers have investigated the antecedents of data sharing among different government departments, suggesting the crucial role of technology development and management factors. In terms of technology, the main problem is IT infrastructure incompatibility and data specifications inconsistency. In terms of management, switching costs at individual level, conflicts of interest among departments at organizational level, lack of reasonable incentive mechanism at motivation mechanism level are main factors [5].

### **3 FEA introduction**

#### **3.1 The background**

In late 1980s, with the tide of administrative reform and the application of enterprise architecture in enterprise information digitization, the United States began to explore e-government. The world-shaking terrorist attack in 2001 highlighted the urgency of data sharing within government departments, and then application of information technology to promote inter-department communication was accelerated. In 2002, Federal Enterprise Architecture (FEA), the top-level design of e-government of the United States, came into being [6,7]. The FEA framework contains not only architecture framework methodology (i.e., FEA reference models), but also detailed implementation guidelines and management tools, which transform the conceptual design into concrete operational practice.

#### **3.2 Five reference models**

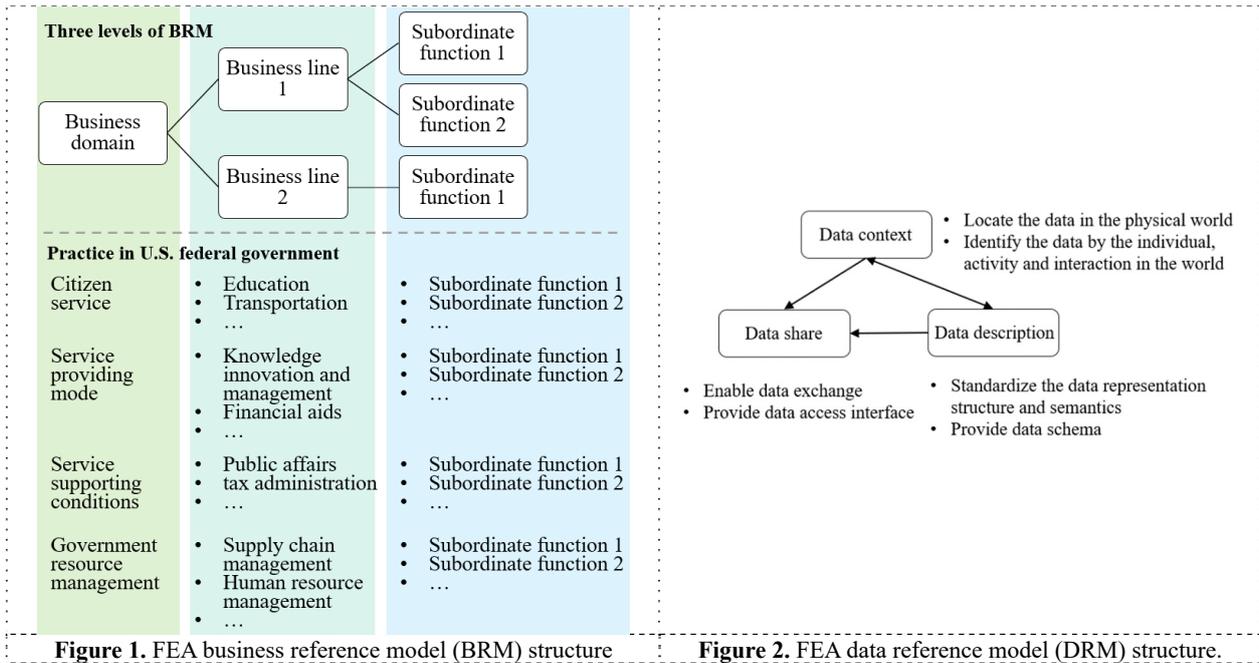
The FEA reference model consists of five reference models: performance, business, service component, data and technology reference models. Among them, the crucial models are business reference model, performance reference model and data reference model.

Business reference Model (BRM) is a framework that puts forward from the business perspective rather than the department perspective, aiming to clarify the business lines for subsequent data sharing. It describes around the

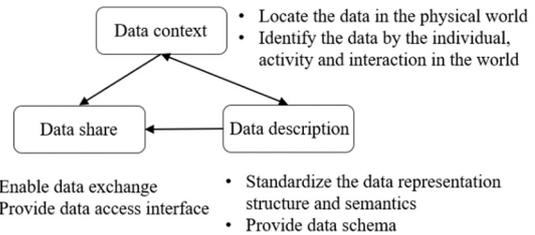
business scope and promotes the cooperation between departments and agencies. The model consists of three levels, that is, business domain level, business line level and subordinate function level. When applied to the United States e-government, business domain level specifically refers to four categories of government business operation, namely, citizen service, service providing mode, service supporting condition and government resource management. Each business domain is composed of business lines that provide similar activities and services with similar information definition and data structure (see figure 1). Each business line is composed of a sub-function set containing similar business processes and units.

Performance reference model (PRM) is a set of performance evaluation standards used to understand how and to what extent technology can output and results. It consists of evaluation field, evaluation category and general evaluation index. In the U.S. e-government project, the evaluation field includes tasks and business achievements, customer achievements, processes and activities, human capital, technology and other fixed assets. The evaluation categories are grouped according to the attributes and characteristics described in each evaluation field. General evaluation index are customized indicators designed for specific departments, which need to be defined under the guidance of FEA team.

Data reference Model (DRM) connects data taxonomy and management with BRM, and uses the concept of business association to identify the business environment in which data exists. The three levels of DRM are data context, data description and data sharing. Data context refers to the information to the purposes for which the data was created and used. Data description standardizes the data representation structure and semantics, with the purpose of data representation, discovery, sharing and utilization. Data sharing standardizes data exchange specifications and data access interface in order to exchange data among different departments and agencies. By standardizing data in the above fields, it effectively promotes the cross-department identifying, using and sharing data by the federal government (see figure 2).



**Figure 1.** FEA business reference model (BRM) structure



**Figure 2.** FEA data reference model (DRM) structure.

Service component reference model (SRM) refers to the IT system structure framework to support the functions of business. Technical reference models (TSM) describes technologies and standards that may be used in building the integrated e-government system.

## 4 FEA Solution for Data Sharing Problem

**4.1.FEA Framework Characteristics**First, FEA architecture is a top-level design driven by business. Business-oriented classification of government activities can make the government cover citizens' needs more completely, and thus ensure better government performance [8]. Second, FEA framework strengthens the concept of government as a whole and weakens the attention for a single department performance by facilitating business collaboration. The business classification in the FEA framework does not depend on departments classification, meaning that two or more departments may complete some business together. Third, top-down design is combined with bottom-up management. The government accomplishes the goal of data sharing by analyzing business structure and constructing suggested IT infrastructure using a top-down approach, and fills the framework with detailed metrics and data formats by working with specific departments.

### 4.2. The Operation and Management of FEA Framework

The implementation of the FEA framework mainly depends on the office of management and budget (OMB) of the United States with IT project approval mechanism. After the announcement of FEA architecture, OMB cooperated with the federal chief information officers

council (CIO) and the general affairs administration (GSA) on developing a series of guidelines and management tools, including federal segment architecture methodology and enterprise architecture assessment framework.

Specifically, OMB manages FEA framework implementation by the following ways. First, it regularly carries out reporting and evaluation work, including determining the annual evaluation content, metrics and scoring standards. Then departments at all levels can submit segment reports and self-evaluation reports quarterly. Second, OMB announces some key business lines that will be included in the president's management list. These business lines show a higher possibility to be approved for IT budget. Third, the office examines whether the e-government investment and construction of departments at all levels conform to the FEA framework, in order to reduce the redundant and repeated IT investment.

### 4.3. Solutions for Technical and Management Problems in Data Sharing

FEA architecture solves the technical problem of data sharing among departments by coordinating technical architecture and standardizing data formats. The FEA architecture specifies common technical standards through technical reference models, so that different departments can identify and reuse IT assets. The data reference model also provides standardized architecture for data description, sharing behavior and taxonomy methods, which advance information and data interaction between different departments.

To solve the management problem, the business-oriented FEA framework can promote value redistribution across departments. The business classification in FEA framework is driven by business in practice, so is performance evaluation, which establishes the connection between business components and results. Therefore, at the motivation mechanism level, compared to the

performance evaluation of departments respectively, the FEA framework guides benefit distribution by business results, which can effectively lead the motivation mechanism to encourage cross-institutional activities. At the organizational level, under the guidance of business reference model (BRM), the government can better decompose the business domain and business line from the top-level design, and subdivide them into specific sub-functions. Departments that need to work together are clarified responsibilities in order to complete those sub-functions. Under this circumstance, the clear responsibilities help reduce the problem of vague duties and help quantify the benefit and cost of each role those departments play.

## 5 FEA framework applying in conglomerate data management

### 5.1.A proposed FEA framework for conglomerates in financial industry

Data sharing in conglomerates faces similar problems as that in a government, including technical problems such as incompatible technical structures of subsidiaries, as well as management problems such as conflict of interests. The methodology and framework of data sharing among government departments can be used to improve conglomerates data management.

To practice the FEA framework, this study focuses on conglomerates in financial industry, or financial holding

Business domain	Business lines	Subordinate functions
<b>Wealth management</b>	<ul style="list-style-type: none"> <li>Investment activities</li> <li>Financing activities</li> </ul>	<ul style="list-style-type: none"> <li>Primary market business</li> <li>Secondary market business</li> <li>Credit loan</li> <li>Mortgage</li> </ul>
<b>Service providing mode</b>	<ul style="list-style-type: none"> <li>Marketing</li> <li>Research</li> <li>Investment banking</li> <li>Broking operation</li> </ul>	<ul style="list-style-type: none"> <li>Sales</li> <li>Marketing</li> <li>Customer service</li> <li>Macro research</li> <li>Industry and company research</li> <li>Bond issuance</li> <li>Equity issuance</li> <li>Merger and acquisition</li> <li>Finance consultant</li> </ul>
<b>Service supporting conditions</b>	<ul style="list-style-type: none"> <li>Compliance</li> <li>Public affairs</li> <li>Risk management</li> <li>Finance management</li> <li>Strategic planning</li> </ul>	<ul style="list-style-type: none"> <li>Financial accounting</li> <li>Managerial accounting</li> <li>Com and media relation</li> <li>Operation analysis</li> <li>Legal</li> <li>...</li> </ul>
<b>Resource management</b>	<ul style="list-style-type: none"> <li>Human resource management</li> <li>IT management</li> <li>General resources management</li> </ul>	<ul style="list-style-type: none"> <li>Talent development</li> <li>Recruiting</li> <li>IT infrastructure</li> <li>Data management</li> <li>...</li> </ul>

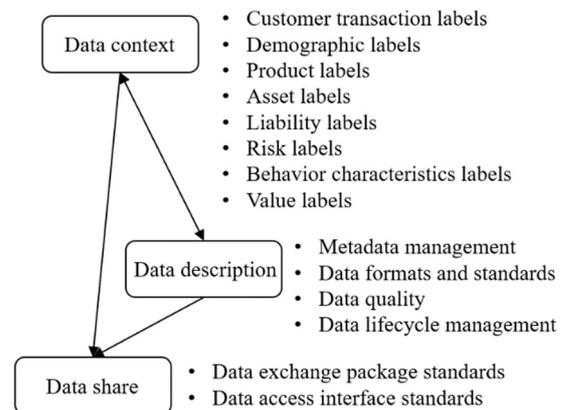
**Figure 3.** Business reference model for wealth management business

company in other words, and suggests a data management and data sharing architecture for the financial holding company with reference to FEA framework.

In the business reference model (BRM), this study explores wealth management field. According to FEA framework, BRM has three levels, that is, the business domain, business lines and subordinate functions. The business domains in this situation include wealth management, service delivery mode, service supporting conditions and resource management (see figure 3). Each business domain is composed of multiple business lines. The principle of creating a business line is that a business line is not necessarily conducted by a subsidiary corporation, but the information definition and data structure should be quite similar. This ensures the facilitation of information exchange and data management between subsidiaries.

In the performance reference model (PRM), this study designs performance metrics for credit loan business in retail finance services. This study develops performance metrics of credit loan business in the financial dimension, customer dimension, internal operation dimension and innovation growth dimension by combining FEA framework guidance and the bank literature [9].

In the data reference model (DRM), this study designs the data labels in the credit loan business for data context identification, and suggests the data quality standards for data description and data formats for data sharing and transmission (see figure 4).



**Figure 4.** Data reference model in credit loan business

Considering that service component reference model and technical reference model are supportive models in financial holding companies, which are not distinguished from technical models in other companies, so this study does not elaborate on these two models.

### 5.2. Suggestions for implementing FEA framework in conglomerates

First, in order to implement big data sharing in conglomerates, the project should follow the business-driven principle. The fundamental purpose of data sharing in conglomerates is to improve the overall service capability. In fact, customers pay little attention to which

subsidiary corporations provide products or services, but only remember the output of conglomerates as a whole. Therefore, when sharing and integrating data, managers should keep consumers' need in mind and underline the demand of the business instead of subsidiary boundaries

Second, FEA framework provides a complete and comprehensive information technology resource sharing framework. Data management and sharing are not only tasks to IT departments, but also closely associated with business departments. If data taxonomy and data description are ignored by business departments, data sharing construction is unable to adapt to business processes and market dynamics. In this situation, the data sharing system may turn out to be additional burden on employees in business apartment. Hence, related performance evaluation of business and relevant data sharing is an important means to collaborate IT and business departments. In addition, overall assessment and management of IT resources in the FEA framework can effectively reduce repeated IT project construction and incompatible structures. The five reference models of FEA framework focus on establishing a common business language to encourage cross-department communication and collaboration [10].

Third, data sharing in conglomerates requires a high-level decision-making mechanism. Data sharing is a systematic project which needs the coordination of various subsidiaries, otherwise it is difficult to be promoted and successfully implemented. The reconstruction of business segments, redesign of business process and development of data sharing cannot be completed by only IT department. Therefore, data sharing construction should be encouraged by high-level decision-making, and its implementation team is empowered to manage relevant issues across subsidiary corporations.

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