

A Management Approach of E-government Service Capability: An ITIL Perspective

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Abstract

To coherently provide e-government service (EGS) at a proper cost and time, it is necessary to evaluate and management EGS capability according to the demand of public in the current and future. That is, effective capability management will help to prevent unnecessary investments and response timely to any changes in IT capabilities. So, this study discussed the concept and aims of EGS capability management based on the international best practices in the IT capability management firstly. Then, it analyzed the capability management processes, objects, primary steps, value of the EGS through construct the capability “Holding-Enhancement” model. Consequently, argued the benefits of EGS capability management was argued. Finally, case study on EGS capability management was carried out. The approach proposed in this paper might be helpful for the government IT managers to management EGS capability effectively and efficiently.

Keywords: E-government service; IT capability; Capability management; Capability holding; Capability enhancement

1. Introduction

With the development of e-government (e-Gov) in China, especially the initiatives of “Internet +” and “the equalization of basic public services”, e-Gov service (EGS) system has been promoted quickly. At the same time, CTOs at all levels of government have paid lots of attention to improve the functions of processing and storage devices. Although the enhancement of hardware might improve EGS capability (EGSC) (*i.e.*, the performance, quality and efficiency) to some extent, there are some potential risks (*e.g.*, the excessive expansion in the scale of hardware will generate many additional management problems which need more expenses than the hardware costs themselves) [1].

The current discussion on EGSC is mainly based on two perspectives. One is the experience of external users on the quality of the EGS. It mainly focuses on the effects of e-service provided by government, including service efficiency, service quality, user satisfaction, and the effects of social environmental factors (*e.g.*, public demands, technology development, international circumstance, *etc.*) [2-4]. The other is the internal perspective, which mainly focuses on how the government uses, manages, and invests e-service resources and the role of internal environmental factors such as leadership, policy, and system [4-6]. Overall, many studies on EGSC are from the external perspective, but few researches focuses on the internal perspective.

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The studies in domain of IT operation show that the major costs of IT is not from the capabilities of IT investments, but from the management of these capabilities [1]. That is, effective capability management will help to prevent unnecessary investments and response timely to any changes in IT capabilities. The higher complexity IT infrastructures have, the deeper dependences IT components will form, and the bigger difficulty IT capability management will overcome. So we need a systematic and integrated method to guide the management of EGSC.

The Information Technology Infrastructure Library (ITIL) is such a method that is able to provide a set of objective, rigorous, quantitative standards and regulations for the management of EGSC. Therefore, this study proposed a management approach of EGSC based on ITIL, from both internal and initiative aspects, and then took a case of e-Gov operation and maintenance management in Shanghai to explain further the necessity and benefits of ITIL application in the management of EGSC. The aim of this study is to provide some references for the standardization management and scientific development of e-Gov. The method might be significant for Chinese local government sectors to design an effective mechanism in EGSC management.

2. Literature Review

2.1. ITIL

ITIL is a set of recommendations firstly developed by the UK Government's Central Computer and Telecommunications Agency (CCTA, it was merged into the Office of Government Commerce in 2001) in the 1980s. As a set of standards summed up from many best practices of all industries in UK, ITIL is a good guide to carry out and improve the IT service management (ITSM) which focuses on aligning IT services with the needs of business. Since it can develop the quality and efficiency of utilization of IT resources to help IT department to provide a high quality IT services for its customers, it was soon applied by many countries all over the worlds in the early 1990s, such as Australia, Canada and New Zealand and so on. The current form of ITIL is known as 2011 edition [1].

The basic frame of ITIL mainly contains six parts: Service management, the business perspective, ICT infrastructure management, application management, planning to implement service management and security management [1]. Among them, "service management" is a core module, which consists of two processes ("service support" and "service delivery"). In "service support" discipline, there are six sub-processes (service desk, incident management, problem management, change management, release management and configuration management). And in "service delivery" discipline, there are five sub-processes (service level management, capacity management, IT service continuity management, availability management, financial management). Through strict definitions of roles, responsibilities and processes, ITIL is able to allocate responsibilities and establish a platform for all the parties in IT construction and maintenance. With the rapid development of EGS in China, the e-Gov operation and maintenance management is becoming increasingly important [6]. But how can Chinese e-Gov meet the requirements in this new period? The application of ITIL may be a key to solve this problem effectively.

2.2. EGS Capability (EGSC)

In the domains of service quality-based view (SQV) and capability-based view (CBV), EGSC is shown through service outputs (*e.g.*, service contents, service quality, *etc.*) and effective service delivery processes [7-9]. In terms of service outputs, better EGSC indicates more qualified service contents [10-11]. One of the widely adopted taxonomies classifies EGS contents into three kinds of functional services, namely information,

transaction, and participation [8] and [10-11]. In terms of service delivery processes, the government can provide e-services efficiently when it has high service delivery capability (SDC) [10-12]. The taxonomy focuses on the service providing characteristics (*e.g.*, reliability, availability, usability, security, *etc.*) that may influence the perceived satisfaction of customers. In the public area, social demands and IT change quickly more than ever [13-14]. These changes require the government to respond by adjusting relevant resources and arranging them in a flexible and agile manner [15]. Resource based view (RBV) context (*e.g.*, dynamic capability) suggests that the government should concentrate on adjusting its tech-schema, service supply strategy, and alignment of the two previous adjustments to the changes in ICT and user demands [16-17]. This kind of capability is defined as on-demand capability (ODC), which focuses on the adaptive ability that responds to the changes in public demands and technological advancement (Figure 1) [10].

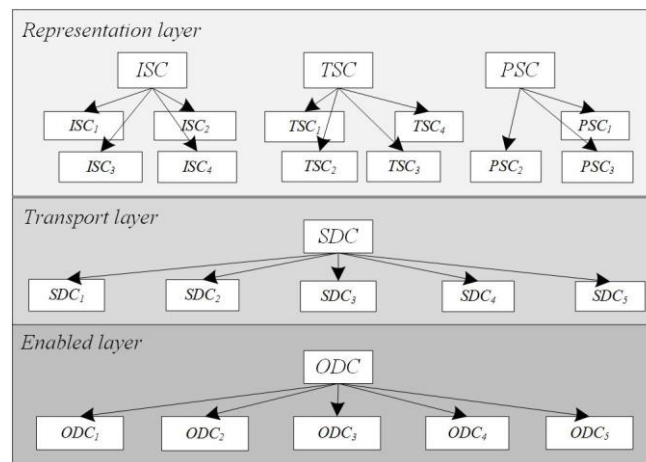


Figure 1. Conceptual Model of EGSC

3. The Management Approach of EGSC based on ITIL

3.1. The EGSC Management

EGSC management (EGSCM) means related activities implemented by e-Gov departments to cultivate, transform, develop, and foster EGSC through integrating and utilizing government data, information, and IT resources. The changes and growth of government resources which are result from the improvement of capability and the operation of service may be transformed into a new source of EGSC to deliver public service for society at the right time in an economical way (Figure 2). So, EGSCM aims to help governments provide enough public service in current and future as well as continuous and consistent IT service which is in compliance with the Service Level Agreement (SLA, here it is defined as a part of the service contract which formally regulates the service level) for firms and citizens [9].

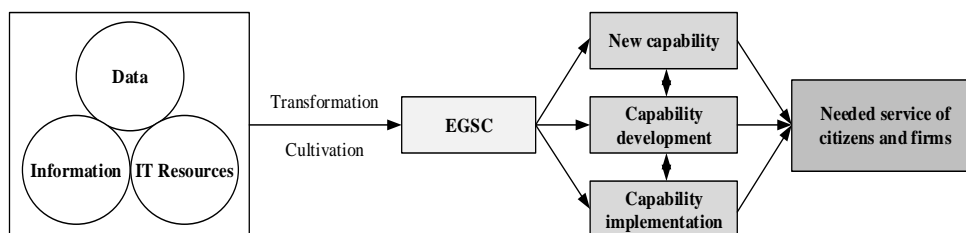


Figure 2. The Function Path of EGSC

EGSCM contains not only performances of the hardware and software (such as storage capacity, processing capacity of CPU, the network bandwidth and so on), but also some other aspects (such as the capability, quality, cost and continuous improvement of EGS). The main concerns of EGSCM are as follows:

Whether the existing EGSC can meet the current and future demands of public service?

Whether it is an appropriate cost to obtain the corresponding service capacity?

Whether the existing capacity has been fully utilized? *Etc.*

In addition, EGSCM should always consider the balance of two aspects: One is the balance between the cost and the capabilities needed; the other is the balance between supply and demand of EGSC. Reconciling these two aspects can guarantee the capability obtained at a suitable cost to meet the demand of public service but not be wasted.

3.2. Main Goals of EGSCM

The aim of EGSCM is to coherently provide EGS at a proper cost and time according to the demand of public in the current and future. Thus, EGSCM ought to predict both the development trend of EGS and the changes of IT. Therefore, the main goals of EGSCM are mainly embodied in the following 5 questions:

1. Whether the cost of EGSC is proper to the demands of EGS? Is the corresponding EGSC used in a most effective way (cost vs. capacity)?

2. Whether the existing EGSC can meet the demand of public in the present and future? Whether the supply degree and potential of EGS can meet the social demand?

3. Whether the existing capacity has been fully utilized?

4. When will it need to build additional EGSC?

5. Whether we know what kind of EGSC and when will it be needed in the future?

To achieve the above goals, the processes of EGSCM ought to be both reactive (suitable for evaluation and improvement) and active (suitable for analyzing and forecasting).

3.3. A “Holding-Enhancement” Model of EGSC

The following “Holding-Enhancement” model of EGSC is established to explain the principle of EGSCM (see Figure 3).

The sources of EGSC consist of the government sectors’ assets (both tangible and intangible), social capital (refers to provide better EGS based on social relationships), organization capital (refers to the related links and procedures based on which the EGS value may be realized through the application of assets and social capital in government organizations). Specifically, the assets here mainly involve the IT infrastructure, computer hardware and software, as well as the related documents, procedures, standards in project management, security management, and quality management and so on [6, 10]. Social capital acts as some kind of lubricants and adhesives that may promote the seamless integration of government service processes and improve the user experiences of EGS. Corresponding to the organization capabilities promoted by Williamson [18] and Teece [19], organization capital is a kind of active element which can help organization turn input to output more efficiently.

In Figure 3, the keeping of EGSC includes general service capability, core service capability, and the usage of them by government sectors. The each part of EGSC is gained from the transformation and cultivation of the sources of EGSC. And meanwhile, the application of them can accelerate the development of EGSC. There are two sub

processes in the growth of EGS: the finding and supplement processes of EGSC. If government sectors find their current general or core capability cannot meet the service demand during the application of EGSC, the supplement process of EGSC will develop capabilities through mining the potential of resources or improving the operation of e-Gov, and the finding process of EGSC will foster new capabilities through the management and application of the sources and maintenance of EGSC. EGSCM mainly focuses on the planning and integration of EGS demands, so as to ensure the successful implementation of the agreed service level.

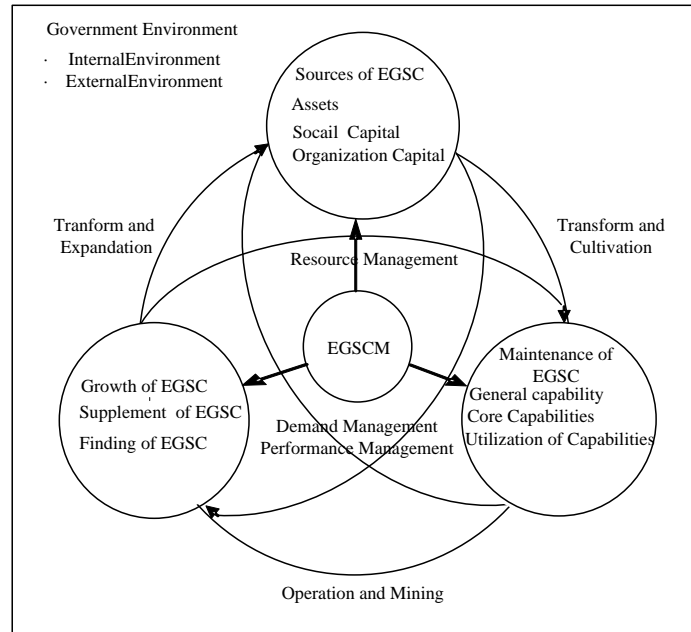


Figure 3. The “Holding-Enhancement” Model of EGSC

Therefore, the objects of EGSCM include service resource management, service performance management, service demand management, simulation test of service process, planning of service capability, service load management and selection of service application, *etc.* These concepts are interpreted as follows:

1. EGS resource management (EGSRM) contains the organization, coordination, management and application of service assets, social capital, organizational capital and other resources in government sectors.
2. EGS performance management (EGSPM) refers to maintaining high-performance management activities through the assessing, monitoring and adjusting of the general and core service capability to enhance the performance of EGS.
3. EGS demand management (EGSDM) means government should manage the demand of the supplement and growth of EGSC, which comes from the increasing EGS.
4. Simulation test of service process in EGS (STSP-EGS) refers to a process in which the business demand and best plan for EGSC will be determined.
5. Planning of EGSC (PEGSC) is a process in which the short-term and long-term plan should be made about how to use, find and enhance EGSC through analyzing the application situation and resource (it is used to meet expected demands of EGSC) in present and future.

6. Load management of EGS (LMEGS) refers to a process in which the appropriate resources will be determined through analyzing the characteristics of different business demands.

7. Election of EGS application (LEGSA) refers to a process in which the resource capability will be defined in support of the new, improved service and future load of service.

3.4. Key Processes in EGSCM

EGSCM has a set of management sub-processes in which the input (*e.g.*, technology, business level, business strategy, business plan, *etc.*) will be transformed into the output of EGSC's identification, measurement, improvement. And all these sub-processes constitute the main content of EGSCM (see Figure 4).

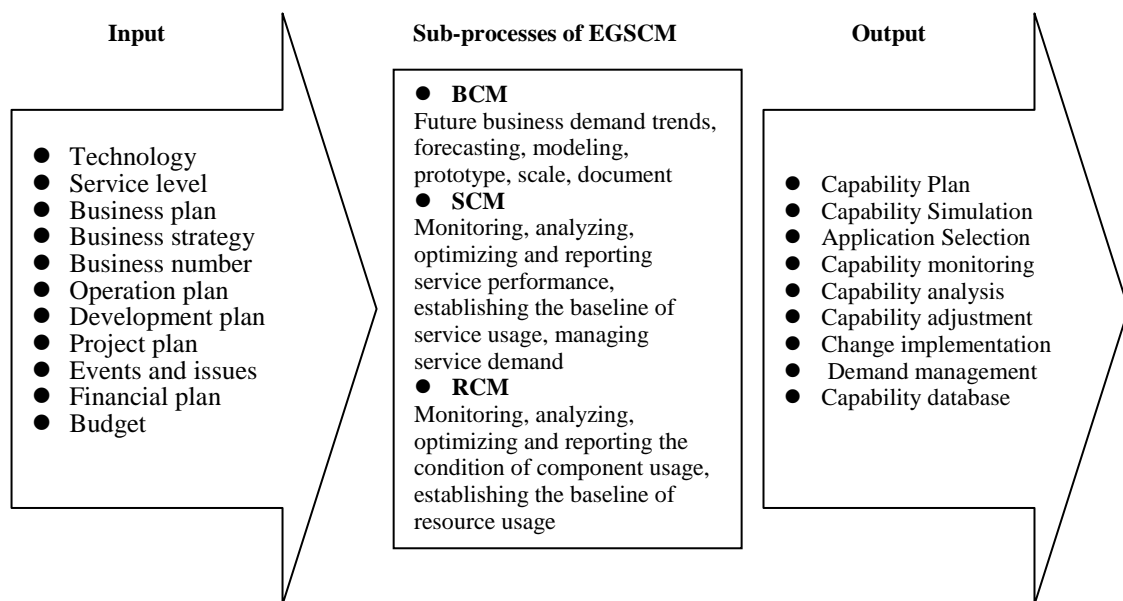


Figure 4. The Key Processes of EGSCM

In the corresponding input and output, the service level defines the continuous and consistent IT service level provided for the society. Service strategy gives the ways and methods which should be adopted during the implementation of EGS. The database of EGSC in which data of various capability indexes is stored provides the measurement data for different levels of capability baselines.

However, the three sub-processes in EGSCM explain the management of capability from three levels:

1. Business Capability Management (BCM)

The aim of this sub-process is to understand the current and future business needs which may be determined by trend analysis or gained from the users (the enterprises and public, *etc.*). For example, the kinds of public service they care about, the ways they hope to be provided services, the number of services they need. This sub process is an active process.

2. Service Capability Management (SCM)

The aim of this sub-process is to monitor, analyze, optimize and report the performance of EGS, and build the baseline of service usage. In order to ensure that the appropriate service agreement be developed and signed, the performance of EGS operation and the

capability load in the peak period should be known. This sub process is closely related to the service level management in the negotiation and formation of service terms which reflect public services policies of government.

3. Resource Capability Management (RCM)

The aim of this sub-process is to identify and understand the service condition of e-Gov system infrastructure and its components. Typical resources contain network bandwidth, the capability of service processing and service capacity. In order to effectively manage these resources, potential problems should be discovered as early as possible, the latest development of technology should be known and the trend of EGS system operation should also be closely monitored by organization.

Since EGSCM is related to government department's business needs, it is also an important part in the planning of organization's business processes. So the relationship among EGSCM and other processes needs to be highly concerned about as well.

3.5. Key Activities in EGSCM

In Figure 4, the key activities in the process of EGSCM include capability planning, capability simulation, application selection, capability monitoring, capability analysis, capability adjustment, change implementation, demand management, capability database, *etc.*, which are mainly the output of EGSCM.

1. Capability Planning

Capability plan describes the current and future needs of EGS system, the expected changes of IT infrastructure capability demand, the replacement of process components and the latest development of IT. It also explains the necessary changes in providing the agreed service level based on SLA at an acceptable cost, considering the future service level requirements. And capability plan should not only be revised yearly, but also be reviewed quarterly to ensure its correctness.

To some extent, among the outputs of EGSCM, capability plan is the most important one which usually contains both an annual capability plan (synchronized with budget, financial plan and long-term plan) and a quarter capability plan (includes detailed information about the changes of scheduled capability) . Thus, it will form a set of consistent plans whose level of detail will be improved with the extension of the planning cycle.

2. Capability Simulation

Capability simulation is a very powerful tool of EGSCM. It mainly used to test the working state and load capacity of IT infrastructure and EGS information system. In capability simulation, there are many management tools from the simple assessment tools to the comprehensive simulation and test tools, and so on. Assessment tools are often used in routine management activities, due to their relatively low cost and simple application. Simulation test tools are usually used in projects of large system implementation.

Between the two kinds of tools, there are some modest tools which can be ordered according to the cost of their applications: Rule of thumb, linear prediction (trend analysis), analysis of simulation, analog simulation, baseline evaluation (benchmark), observation of the system's actual operation. Among them, the baseline evaluation tool is the most accurate one, but the cost is high; trend analysis can get the information about the system load and forecast the generally response time of service; analysis of simulation and analog simulation have distinctive advantages in cost and benefit (*e.g.*, analog simulation can be used to accurately predict the performance of a host computer or be used as an element of the application selection), but they require significant resources and time; baseline evaluation means that an actual operating environment of system should be created in advance and the baseline system is evaluated according to the index of baseline

in the test run. The baseline evaluation can solve the following problems: What kind of results it will cause if an application component is removed from one server to another? What would happen in the operation of service system if the number of customers to obtain services were doubled? What would the requirements be for the service personnel if there were 10000 processes of online interactive business at the same time? *Etc.*

3. Application Selection

Application selection mainly examines the necessary resources for the operation of new or improved services (*e.g.*, services in the developing or maintaining state or services needed to be purchased according to the requirements of customers). Its predictive information should contain the expected fragments of system performance, the necessary resources and cost, *etc.* This method is particularly important in the first development stage of service products. And the hardware or other IT resources as well as accurate information of expected cost required in this stage is very useful for management. The method is also helpful to make new or improved service level requirements or SLA.

It will require a lot of efforts to conduct application selection for a large or complex service system environment. EGSCM need to achieve a unified service level requirement with the developers in advance. Once the service operation enters the arrangement or acceptance stage, its performance will be checked with the goals of agreed service level to ensure that they can be achieved well.

Since every output of application selection is affected by workload changes, it can be used to predict how many capabilities would be developed, if users were increased by 25%. The other indicators of the workload are capability demands within a certain period of time (times of service peak daily / weekly / yearly, and trend of service growth in the future).

4. Capability Monitoring

The aim of monitoring the IT infrastructure and service system of EGS is to ensure that the agreed service levels can be achieved successfully. There are some typical examples of resources which we need to monitor, such as the utilization rates of CPU, disks, networks and personnel as well as the number of concurrent users (*e.g.*, a number of 1000 users allowed by system to visit ID card system at the same time) and so on.

5. Capability Analysis

This activity refers to analyze data gained from capability monitoring as needed. Trend analysis can be used to predict the future growth potential and confirm the “bottleneck” of EGSC, which will trigger efficiency improvements or obtain additional IT components. Activity analysis needs to have full understanding of the overall condition of IT infrastructure, business process and the relationship among the elements in the sub-processes of business, services and resources management.

6. Capability Adjustment

Adjusting activities can optimize the system for actual and expected workload, based on monitoring data which has been analyzed and interpreted.

7. Change Implementation

The aim of implementation is to introduce an improved or new service capability. If this means a change, there will also be a change management process in these activities.

8. Demand Management

The goal of demand management is to affect the users’ demands for EGSC. For instance, a user wrote a tough SQL report at noon and led to the congestion of database and network. To solve this problem, SCM may propose this user to finish the report the

night before so that he/she can get this report the next morning. By means of running related system at different times as in the example above, the network congestion or system busy can be avoided.

Demand management provides information sources for formulating, monitoring and adjusting capability plan and SLA. It also takes differentiated billing methods (such as taking different billing standards during peak hours and off-peak hours) to influence user's behaviors by means of controlling their demands during peak hours.

9. Capability Database

Capacity Database (CDB) means gathering and updating technological, business and any other information associated with EGSCM. However, it isn't a best idea to store all capability information in one physical database. So every network and computer administrator should have their own methods. Generally, CDB is defined as a set of databases which store the appropriate information of EGSC (see Figure 5).

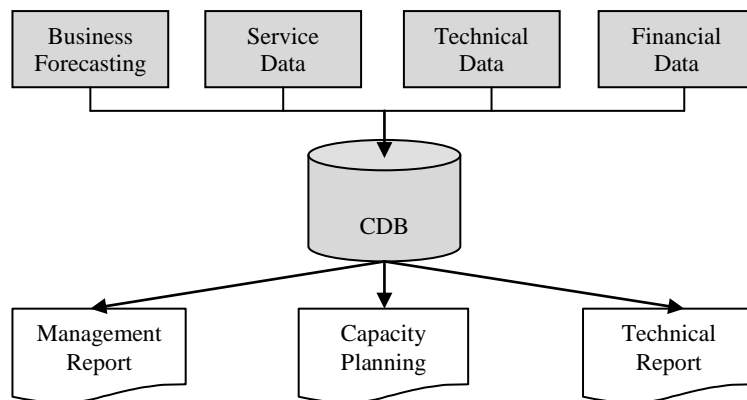


Figure 5. Information Sources of CDB

3.6. The Benefit of EGSCM

EGSCM can bring the following benefits:

1. The EGS resource can be managed effectively and service system performance can be monitored continuously, so the risk of cost out of control can be reduced in government service providing process.

2. From the application selection, new or improved services' effects on existing systems can be determined, and it will reduce the risk of failure or fault in new or improved services.

3. Investing at the right time, which means that the government procurement process doesn't need to buy excessive capabilities any more for temporary emergency procurement or ahead of demand, and it will reduce the total cost of service system running.

4. Through determining the possible impacts of EGSC caused by changes, it is possible to cooperate closely with change management, and avoid the urgent changes resulting from improper or incorrect estimation of capability, so as to reduce the frequency of interruptions during business operations.

5. Forecast becomes more flexible, accurate and timely, so it will make the response to social demand become more rapid and accurate.

6. Since the supply and demand of EGSC can be balanced in an earlier stage, the efficiency of EGSCM will be improved.

7. Due to a higher efficiency of EGSC, the investment of personnel, financial and physical resources will be managed well, and even the inputs on these aspects will be reduced.

Besides the benefits above, the relation between EGS and social users can be improved as well: Firstly, EGSCM can consult and communicate with these users at an earlier stage, and predict their demands in advance. Secondly, government departments can send their demand information to suppliers in a planned way, so that temporary and emergency purchase can be avoided, and the relations with suppliers can be improved. In addition, agreements relevant to purchase, delivery, installation and maintenance can be planned and implemented more available.

4. Case Applications

There have been some successful cases of ITIL application in e-Gov around the world. Although started late in China, it has been developed rapidly these years. This article takes ITIL application in the operation and maintenance management(OMM) of EGS system in Shanghai as a typical case, and analyzes the good effects on the promotion of EGSC after the application of ITIL to improve the ability of management process [20-21].

Because business applications become more complex with the gradually expansion of the e-Gov platform scale, and the government functions are required to transform from “management” to “service”, the OMM of IT system in Shanghai e-Gov was facing huge pressures and challenges:

1. Because of ignoring the demand of service transformation, the e-Gov development mainly focused on the management of inner affairs. Consequently, external application service management is not standardized, and the quantity is varied. At the same time, all level of governments paid more attention to the IT system construction and technology maintenance, but didn't invest enough in OMM resources.

2. In terms of the organization mode of service delivery, due to limited government workers and financial input as well as an enormous increment in service demands, OMM must scientifically allocate the limited resources of human, material, financial and time to adapt to the new demands for EGS as quickly as possible. However, most departments and jobs in government departments at all levels are divided vertically according to their functions, while the service delivery needs a traverse division according to the process. Although ITIL can provide guidance for carrying out service process management, how to deal with integration between the existing government organization structure and service process still requires the process optimization combining with practical situation to increase the rate and efficiency of service response.

3. In terms of OMM and technical specifications, since governmental data and resource standards are lack of uniform regulation, information is diverse and dispersive, and outsourcing projects are isolated and lack of coordination, the sharing and comprehensive utilization of information is high cost but low efficiency. Besides, low system running efficiency and frequently service delay and interruption were caused by a series of problems, such as low level of operation and maintenance technology, passive and empirical fault handling, a lack of standardized work flow and no performance indicators of the job of operation and maintenance and so on. Thus, it is difficult to meet the demand of EGS.

To solve the above problems, ITIL was introduced into the reengineering process of the EGS's OMM in Shanghai. On the basis of diagnosis of EGSCM from three aspects of ITIL personnel, procedure and tools, as well as analysis of the demand for service management, the service management system and the operation and maintenance platform of e-Gov have been constructed step by step through pilot from three layers

(organizational management mode, regulation system and technical support system). All IT resources in each department are under standardized, normalized and elaborate management based on this unified platform. In terms of organizational management mode, through locating service users, hacking service category and optimizing the roles and duties of existing organizations, management responsibility of every department was clearly defined; And the training and consulting of service management(*e.g.*, ITIL) should be developed to enhance service-oriented management consciousness of leaders and operation-and-maintenance teams; Evaluation system for teams and individuals was established based on key performance indicators (KPI), which will benefit the standardized management and control of operation-and-maintenance outsourcing. With respect to systems, processes and regulations, starting with difference analysis on the processes of existing service and ITIL service, service desk and event management have been defined as starting points, and standardized process of ITIL (to follow up problems, changes, configuration management, *etc.*) has been designed. Besides, daily operation and maintenance work of departments has been standardized as well. As for technical support, according to ITIL, ISO2000 and ISO27001, the platform of operation-and-maintenance service management has been divided into four layers (service integration layer, operation-and-maintenance service layer, basic support layer and IT infrastructure architecture layer) to ensure operation stability and effectiveness of the whole platform.

After the implement of the project, EGSC in Shanghai has been significantly improved. Taking administrative examination and approval of e-Gov in Zhabei District for example, after implementing new processing flow of IT faults, the faults from all levels can be timely responded and treated. There are some data recorded in January 2014 shown in Table 1, which indicate that all IT faults have been timely received and properly treated. Thus, the service level and effectiveness of OMM have been greatly improved. Therefore, the application of ITIL in EGSCM will make e-Gov system have stronger ability of risk management and control, reducing service cost, increasing service effectiveness, promoting user satisfaction and also accelerate the process of government functions' transformation.

Table 1. IT Operation and Maintenance Service Effects in Shanghai e-Gov

NO.	Task Names	Launch Date	Finish Date
1	Personnel Tax Service system cannot operate normally	2014/01/02	2014/01/02
2	Tax service is terminated	2014/01/06	2014/01/06
3	The businesses are duplicate among the Department of Industry and Commerce (DIC), the Administration of Quality Supervision (AQS), and Tax Department (TD).	2014/01/09	2014/01/09
4	Service of DIC is terminated	2014/01/14	2014/01/14
5	Data of county DIC can't be exchanged on the Intranet	2014/01/16	2014/01/16
6	Service of AQS is terminated	2014/01/27	2014/01/27

5. Conclusions

Being paid increasing attention, the widespread use of e-Gov has made it a new way for government to provide public service for society. However, the most immediate concern in this field is how to meet the growing demand of public service for citizens and enterprises by e-Gov. Particularly, the construction of "service-oriented party and government" has been clearly made as a priority in future government work at the Eighteenth National Congress of the CPC, which put forward an urgent need for EGSCM. Hence, against this background, it has great theoretical and practical value to do systematic researches on the major problems and methods of EGSCM.

EGSCM aims at providing right IT resources at right cost as needed, according to the current and future requirements of EGS. It not only requires a prediction for the trend of public service development which may influence the public demands, but also needs a

pre-judgment of IT development to understand some situations (*e.g.*, the performance & cost ratio, the matching degree between capabilities, the efficiency of capabilities, and the strain condition of capability building, *etc*). Therefore, this article discusses the processes, objects, basic steps and major activities in EGSCM from the perspectives of reactivity and initiative, and makes some further analyses on the efficiency of EGSCM, hoping to provide references for the EGSCM in government at all levels over the country and the building of Service-Oriented Government (SOG).

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References

- [1] OGC. ITIL[EB/OL]. [2013-5-13]. http://www.ogc.gov.uk/guidance_itil_4672.asp.
- [2] S. Y. Hung, C. M. Chang and T. J. Yu, "Determinants of user acceptance of the e-Government services: the case of online tax filing and payment system", *Government Information Quarterly*, vol. 23, no. 1, (2006), pp. 97-122.
- [3] J. M. Burroughs, "What users want: Assessing government information preferences to drive information services", *Government Information Quarterly*, vol. 26, no. 1, (2009), pp. 203-218.
- [4] X. Papadomichelaki and G. Mentzas, "e-GovQual: A multiple-item scale for assessing e-government service quality", *Government Information Quarterly*, vol. 29, no. 1, (2012), pp. 98-109.
- [5] L. G. Anthopoulos, P. Siozosa and I. A. Tsoukalas, "Applying participatory design and collaboration in digital public services for discovering and re-designing e-Government services", *Government Information Quarterly*, vol. 24, no. 2, (2007), pp. 353-376.
- [6] G. Hu, W. Pan and J. Wang, "Impact antecedents of e-government content service capability: An exploratory empirical study", *The 2011 International Conference on Business Computing and Global Informatization (BCGI 2011)*, Shanghai, (2011) July 29-31.
- [7] D. L. Baker, "Advancing E-Government performance in the United States through enhanced usability benchmarks", *Government Information Quarterly*, vol. 26, no. 1, (2009), pp. 82-88.
- [8] I. Lindgren and G. Jansson, "Electronic services in the public sector: A conceptual framework", *Government Information Quarterly*, vol. 30, (2013), pp. 163-172.
- [9] G. Hu, W. Pan, H. Lin, K. Kang and M. L. Best, "Study on the Framework of e-Government Services Capability: An Empirical Investigation", *Social Science Computer Review*, vol. 32, no.1, (2014), pp. 56-73.
- [10] G. Hu, J. Shi, W. Pan and J. Wang, "A hierarchical model of e-government service capability: An empirical analysis", *Government Information Quarterly*, vol. 29, no. 4, (2012), pp. 564-572.
- [11] C. Tan, I. Benbasat and R. T. Cenfetelli, "IT-mediated Customer Service Content and Delivery in Electronic Governments: an Empirical Investigation of the Antecedents of Service Quality. *MIS Quarterly*, vol. 37, no. 1, (2013), pp. 77-109.
- [12] H. Demirkan and D. Delen, "Leveraging the capabilities of service-oriented decision support systems: Putting analytics and big data in cloud", *Decision Support Systems*, vol. 55, no.1, (2013), pp. 412-421.
- [13] D. J. Teece, "Explication Dynamic Capabilities: the Nature and Microfoundations of (Sustainable) Enterprise Performance", *Strategic Management Journal*, vol. 28, no. 8, (2008), pp.1319-1350.
- [14] B. Klievink and M. Janssen, "Realizing joined-up government: Dynamic capabilities and stage models for transformation", *Government Information Quarterly*, vol. 26, (2009), pp. 275-284.
- [15] T. A. Pardo, T. Nam and G. B. Burke, "E-Government Interoperability: Interaction of Policy, Management, and Technology Dimensions", *Social Science Computer Review*, vol. 30, no. 1, (2012), pp. 7-23.
- [16] S. Salunke, J. Weerawardena and J. R. McColl-Kennedy, "Towards a model of dynamic capabilities in innovation-based competitive strategy: Insights from project-oriented service firms", *Industrial Marketing Management*, vol. 40, no. 8, (2011), pp. 1251-1263.
- [17] S. Fernandez, Y. J. Cho and J. L. Perry, "Exploring the link between integrated leadership and public sector performance", *The Leadership Quarterly*, vol. 21, no. 2, (2010), pp. 308-323.

- [18] O. E. Williamson, "Strategy research: Governance and competence perspectives", *Strategic Management Journal*, vol. 20, no.12, (1999), pp.1087-1108.
- [19] D. J. Teece, "Explication dynamic capabilities: The nature and micro-foundations of sustainable enterprise performance", *Strategic Management Journal*, vol. 28, no. 8, pp. 1319-1350.
- [20] Z. Chu, "Design and application of the IT service management in e-government network in Shanghai", *Information China*, vol. 3, (2008), pp. 28-31.
- [21] L. Wang and W. J. Tan, "ITIL: Regulate the operation and maintenance management of e-government", *Shanghai Informatization*, vol. 6, (2014), pp. 48-50

