

A Novel Service Oriented Architecture For Integration of Information Systems In Electronic City

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Abstract:- Cities have been equipped with different information systems, which these systems need to cooperate with each other, in order to provide the consumers with accurate, efficient and trustworthy information. But existence of different data types in different organizations which these systems are implemented in different platforms is considered a Challenge for interaction of these systems. Service oriented architecture as a computational model and an approach to integration of information systems and interaction between them, could largely overcome these problems. In this paper through studying challenges of information systems in electronic city and with concentrating on advantages of service oriented architecture, a new architecture for integration of systems in electronic city and overcoming the challenges of information systems security to providing accurate information and efficient services to consumers has been proposed.

Index Terms:- Electronics City, Information Systems, Interaction, Integration, Loosely coupled, Service Oriented Architecture, Security Services.

1 INTRODUCTION

MAN has left behind different eras ranging from agricultural to industrial age and he has always tried to overcome the limitations, given that man has faced restrictions in industrial era, he has resorted to information technology. The ITAA (Information Technology Association of America) is defining working fields in scope of studying, designing. Development, implementation, management and support of computer based systems [1]. Nowadays, using advantages of information technology hopefully establishes societies known as information society [1]. The field to an information society has emerged within subjects such as electronic city. The first macro and fundamental step towards establishing an electronic state in the world backs to Singapore's program for IT expansion in 1992. After that, in 1993 America's national substructure development project was written and established to expand the communication and information substructure. In the same year, South Korean government also provided a plan to national substructure development of communications and information, and made it operational. Countries such as Japan, Thailand and Britain have followed major plans in this regard, during 1993 to 1996. There is no exact date given with respect to issue of electronic cities. However it is assumed that the plan for such cities backs to the date of establishment of electronic government in the world. Therefore, one can say that the first electronic city is only ten years old and within this space, Enormous electronic cities such as Berlin, Boston, Toronto and Dubai each with different approach have been launched [2, 3, 4 and 5].

A new definition to electronic city is a city that most of its activities are performed through internet and electronic systems and its purpose is citizens access to all offices, urban areas and other required information in a sustainable, trustworthy and confidential manner during whole week an in all 24 hours of the day and It also has its roots in IT [6]. In other words a electronic city is a program that focuses on modernization and renovation of the engineering networks to establish a public space of information at a specific region [7]. Rapid extension of cities and it's surpassing from managerial sources and abilities have hugely challenged them in providing good out decent services. researches shows that in the field of city management of world's metropolises, the development of information technologies and telecommunication have caused huge fundamental developments into intelligence systems management and control systems over civil affairs that in return this development of information technology and telecommunication is proposed in the form of electronic city. Therefore, for development of electronic city, codification of a framework for the architecture of electronic city is one of the most basic and most fundamental actions, and consists of basic components such as transforming from current situation to a desired one that are general polices and lines of electronic city development[8]. One of the major steps of electronic city development is integration which makes the setting up a smart and efficient communication with consumers in order to responding a range of problems, questions and their requirements possible. In order to integration of information systems in electronic city, several methods have been proposed and implemented. Distributed object-oriented computing technologies and service-oriented architecture are the most important approaches used in this field. Some of the most important proposed methods based on distributed object-oriented computing technology are CORBA, J2EE and COM/DCOM [9]. Despite the major advantages of this approach, generally this approach does not have a high efficiency to integration information systems. To overcome the problems of distributed object-oriented computing technology and in order to information systems integration, various models based service oriented architecture has been suggested [10]. Service oriented architecture is a standard framework which in it, the services are made, establishment and managed, and its purpose is the increase of agility of information technology in order to quick reaction to business changes and to create an

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integrated interface for city consumers [4, 11]. Through this architecture we can reduce the cost of developing new components as well as expanding existing methods. Using this architecture will improve integrated management of city network, and will increase speed and reliability [7]. In the continuance of this paper we've studied the architecture of electronic city and information systems challenges in the layers of electronic city by focusing on advantages of service oriented architecture, we've proposed a new framework to electronic city systems integration and overcoming the challenges of information systems and security to provide accurate information and efficient services to consumers.

2 ELECTRONICS CITY ARCHITECTURE

Generally considering electronic city as a structure for offering electronic services to citizens, its layers consists of consumers, service offering channels, electronic services and technology platforms[12]. The highest layer includes citizens, factories, industries and even government departments. The next layer that functions as a connection channel can include various browsers or different telecommunication equipment. A vast set of electronic services such as electronic banking, electronic learning, electronic insurance and others are categorized into electronic services layer. The last layer of this architecture which platforms which offer electronic services are placed on, which this platforms in one hand are distributed among organizations and various places, and each one is designed with specific technology on the other hand they are capable of interaction and incorporation with other platforms [12]. Considering the electronic city architecture, each one of its layers has requirements that we express some of them [9, 11, and 13]:

Consumers (citizens, organizations, tourists, etc.)

- Simplicity of discover, identifying services and use of them
- Simplicity of learning to use of electronic services
- Selection of the best option from different providers
- Citizen Participation in urban affairs
- Spend less cost to achieve the best urban services and etc.

Service offering channels

- Existence of proper platform and substructure
- Political and governmental support
- Proper extension and coverage
- Qualitative features (security, reliability, etc.)
- Service offering with best quality and at the shortest possible time range
- Support of multiple communication protocols

Electronic services

- Ability to be offered by different channels
- Possibility of reusing
- Flexibility and Dynamism
- The possibility of combining and offering of new services
- Coordination of technology and business
- Ability to easy identify and discovery
- Hide the internal implementation

Technology platforms and information systems

- Interaction systems and platforms

- Standards observance
- Integrity of the internal data and processes
- Establishment of balance between profitable and non-profitable services

There are different information systems in an electronic city, and one of the most important challenges is the proposing an architecture for integration of information systems and the interaction among them to provide accurate information as well as efficient services to the consumers. Hence, with regard to capabilities of service oriented architecture as a computing model as well as an approach to integrate information systems and interaction among them, with review of service oriented architecture, we propose a new service oriented architecture to overcome the challenges of the information systems.

3 SERVICE ORIENTED ARCHITECTURE

Service oriented architecture is a standard framework which in it, the services are made, establishment and managed, and its purpose is the increase of agility of information technology in order to quick reaction to business changes. Main challenges in the face of information technology and especially systems in organizations are summarized in main three items [4, 11]:

- Lack of interaction and integration of all organizational information systems to call and use of common software components independently from the operating system, platform, technology, and sides communication protocols.
- The difference of viewpoints and vocabulary of information technology experts and business experts brings the lack of a common understanding of information systems which needs to be productive.
- Lack the ability of information technology to adapt with the business changes speed with respect to needs of organizations as to constant changing of processes and services.

According to three main challenges mentioned, the main motivation to provide a service-oriented architecture is to deal with these challenges. The most important goals of offering a service-oriented architecture are as follows [14]:

- 1) Improvement of the level of reuse and flexibility of software components
- 2) Flexibility of the information technology to respond to ongoing changes in business
- 3) Standardization and integration of platforms and information technology substructures
- 4) Upgrade the information technology coordinated with business
- 5) Improvement of the Interaction between organizations.

In terms of service oriented architecture, the Loosely coupled concept has a special significance, which means capability of interaction between services is independent from coding and place of services, in a manner that, the services at running time, in addition to changing the location, can change their internal procedures or even use a new technology having no negative impact on consumers [11]. Loosely coupled is a feature for information systems which in it, the interfaces between components (modules) are designed to minimize the dependency between the components as a result it reduces the risk of effects of changing one of the components in others

[12]. With respect to the advantages of service oriented architecture which some of them are mentioned earlier, service oriented architecture is a corporate base to information systems integration and interaction among them. In the Table 1 the results of capabilities of proposed approaches have been introduced for information systems architecture.

TABLE 1
COMPARE DIFFERENT ARCHITECTURES OF INFORMATION SYSTEMS

	Reuse	Agility	Interaction	Participation	Integration
SOA	Depends on	High	High	Depends on	High
Web/Client	Average	Low	High intermediate	High intermediate	High intermediate
Client/Server	Average	Low	Average	High intermediate	High intermediate
Single APP	No	No	Low	Very low	Low
Batch	No	No	No	No	No

4 THE PROPOSED ARCHITECTURE

As we mentioned, existence of different data types in different organizations which these systems are implemented in different platforms is considered a Challenge for interaction of these different systems, which are equipped to provide accurate information and efficient services to consumers in the electronic cities. In addition security to offer services is one the major options which must be considered in information system architecture located in electronic city. The proposed architecture, with respect to the mentioned problems, to integrate electronic city systems as well as overcoming the challenges related to information system architecture is including layers of user-oriented service layer, application-oriented interface layer, security service layer, data services layer, information infrastructure layer, as shown in Fig. 1.

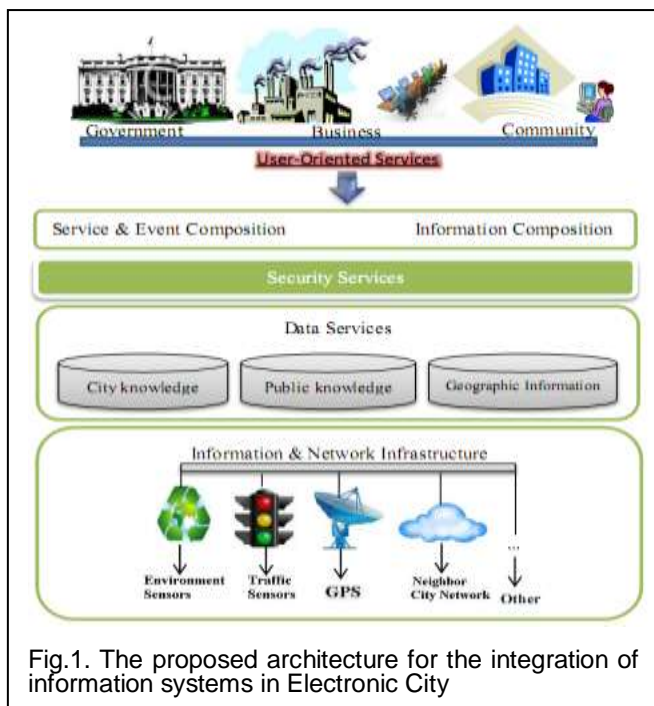


Fig.1. The proposed architecture for the integration of information systems in Electronic City

With respect to the requirements of architecture, each one of layers is responsible for the following duties:

1. The user-oriented service layer: This layer provides application services for enterprises, users and etc. Some of these services can sometimes be a combination of both.
2. The application-oriented interface layer: This layer provides the integration of required substructure for applications and data transfer to the end goal over the network.
3. Security service layer: This layer is used to provide security and safe and reliable service to users.
4. The data services layer: This layer is used to organize and process information, management of information flow and systems data services, urban data and allocate them to the knowledge base.
5. The information infrastructure layer: This layer is used to provide information and urban systems.

5 CONCLUSION

Electronic cities are built according to modern cities potential. In electronic cities most of the activities are done through internet and electronic systems, and its purpose is citizens access to all offices, urban areas and other required information in a sustainable, trustworthy and confidential manner during whole week an in all 24 hours of the day. Various information systems are being used to achieve these goals in substructures of electronic city, which these systems are need to cooperate and interact with each other, to provide information and efficient, accurate and reliable services to the consumers. Creating interactions between information systems and building trustworthy bases are the main challenges in proposing architecture to electronic city. Accordingly, and to overcome the mentioned challenges we have proposed the an architecture consists of 5 layers which are user-oriented service layer, application-oriented interface layer, security service layer, data services layer, information infrastructure layer. The proposed architecture, somewhat over comes the mentioned problems and provides a secure, interaction field for information systems of electronic city.

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