

A NOVEL SOA FOR E-CITY WITH THE INCREASE OF CITIZENS PARTICIPATION APPROACH

Sajjad Hashemi¹

¹Department of Computer Engineering, Science and Research Branch, Islamic Azad University, West Azarbayjan, Iran

ABSTRACT

In today's world the amazing development of IT caused more attention of governments and businesses to take advantage of it. In the meantime Cities have action to create electronic city, using IT and according to the needs of city managers to new ideas for managing the City and maximum participation of citizens in municipal affairs. For the success of e-city In addition to providing the necessary infrastructures and secure environment for data exchange citizens participation and interaction with government and private agencies should be considered. Because one of the factor keys to success in electronic city is people attention and their use of electronic city's services. Service oriented architecture is an appropriate approach to increase citizens' participation in municipal affairs with an increased interoperability between different organizations and integration between inter-organizational systems. In this paper, we've offered a new architecture, studying electronic city layers and focusing on the benefits of service-oriented architecture, to increase participation of citizens' in electronic city systems and Creating of a Secure environment to provide accurate information and efficient services to users.

KEYWORDS

Electronic City, Service Oriented Architecture, Information Systems, Participation, Security.

1. INTRODUCTION

Nowadays, using advantages of IT hopefully establishes new societies known as information society [1, 2]. The emergence of information society is shown in topics such as e-city. The first major and fundamental step towards establishing an e-government in the world backs to Singapore's program for information technology development in 1992. Then, in 1993, America's national infrastructure development project was formulated and launched to expand ICT infrastructure. In this year, South Korean also provided project to national infrastructure development of ICT, and made it operational [3]. Countries such as Japan, Taiwan and the United Kingdom have followed major plans in this area, during 1993 to 1996. There is no exact date given creation of e-cities. But it should be stated that the plan to establish for such cities backs to the date of creation and development of e-government. Thus, one can say that the first e-city is only 10 years old and within this distance, big e-cities such as Boston, Dubai, Berlin and Toronto each with different approach have been launched [1, 3, 4].

The modern definition to e-city is a city that most of its activities are conducted by E-Systems and internet and its goal is citizens access to all departments and other required information in a sustainable manner, reliable and privacy in all 24 hours of the day and it also

has its roots and foundation in information technology [5]. In other words a smart city is a program that focuses on modernization and upgrade of the engineering networks to create a general information space at a specific region [6].

Rapid growth of cities and its overtaking capabilities and resources of city managers have massive challenged them in providing adequate city services. Observations show that in the field of big city management, the development of information and communication technology have caused fundamental developments into intelligence systems management and control over municipal affairs that in return this development of ITC is proposed in the form of e-city[1, 7]. Therefore, codification of a framework for the architecture of e-city is one of the first and most important steps, and includes the major components such as transforming from current situation to a desired one that are general guidelines and lines of e-city development[1, 2]. One of the main steps of e-city evolution is integration which makes the establishing an intelligent efficient relationship with users in order to answering a wide range of questions, problems and their needs possible. To integration of information systems in e-city, numerous ways have been proposed. service oriented architecture (SOA) and distributed object oriented computing technologies are the most important approaches used in this field[1].

In this paper through studying e-city architecture and challenges of information systems in electronic city layers and with concentrating on advantages of service oriented architecture a new architecture has been offered, to Increase citizens' participation in electronic city systems and improve the security of electronic city's systems and their provided services and also overcoming the challenges of information systems.

2. ELECTRONICS CITY ARCHITECTURE

Generally considering e-city as a structure for offering e-services to citizens, its layers includes of stakeholders, service offering channels, e-services and technology platforms[8]. The highest layer consists of citizens, industries, companies and even government agencies. The next layer that acts as a communication channel can include various types of browsers or telecommunications equipment. A vast set of e-services such as e-learning, e-banking, e-insurance and others are categorized into e-services layer. The last layer which platforms which offer e-services are placed on, which this platforms in one hand are distributed various places and among organizations, and each one is designed with specific technology on the other coordinate and interoperability capabilities with other platforms [8]. Considering the e-city architecture, each one of its layers has requirements that we express some of them [1, 9, 10, and 11]:

Stakeholders (citizens, organizations, tourists, etc.):

- Simplicity of find and identify services and use of them
- Simplicity of learning to use of e-services
- Selection of the best option from various service providers
- Citizen participation in municipal affairs
- Spend lowest cost to reach the best municipal services.

Service offering channels:

- Qualitative features (reliability, security, etc.)
- Proper extension and coverage
- Existence of proper infrastructure and platform
- Political and governmental support
- Service providing with best quality and in minimum time possible

- Support of different communication protocols

E-services:

- Ability to be offered by various channels
- Reuse allowed
- Flexibility and Dynamism
- Ability to combining and providing of new services
- Coordination of technology and business
- Ability to easy identify and discovery
- Hide the internal implementation

Technology platforms and information systems:

- Interoperability of systems and platforms
- Standards observance
- Comprehensiveness and integrity of the internal data and processes
- Balance between profitable and non-profitable services

There are many various information systems in an e-city and one of the biggest challenges is providing a new architecture for integration of information systems, security and the interaction between them to provide detailed information as well as useful services to the users. Hence, with review of SOA, we propose a new service oriented architecture to explain collaborative strategies and overcome the challenges of the security of information systems.

3. SERVICE ORIENTED ARCHITECTURE

Service oriented architecture is a style of design, which concentrates on all aspects of creating and using of business services throughout their life cycle. It also is a method to provide required infrastructures for the exchange of information between different software with any operating system and programming language they've been created [1, 12]. SOA is a standard framework which in it, the services are built, deployment and management, and its aims is the increase of agility of IT in order to fast respond to business changes[13, 10]. Use of this architecture, will improve the integrated management of city network and also speed, reliability and security will be increased [6].

The main motivation of the proposed service-oriented architecture is to deal with challenges such as the lack of interaction and integration of all organizational information systems, differences between IT experts and business experts in opinions and vocabulary and lack of the IT's ability to adapt the business's changes speed according to the organizations constant need to changing of processes and services.

The most important objectives (motivation) of providing a SOA are as follows [1, 14]:

- 1) Improvement of flexibility and level of reuse of software components
- 2) IT flexibility to respond to continuous changes in business
- 3) Standardization and integration of platforms and IT infrastructure
- 4) Upgrade the IT coordinated with business
- 5) Improvement of the interaction between Enterprises.

Regarding The Service Oriented Architecture capabilities that are mentioned above Service-oriented architecture is a suitable platform for integrating information systems and the interaction

between them. The results of comparing the capabilities of the proposed approaches to information systems have been shown in table 1.

4. PROPOSED ARCHITECTURE

Just as we've noticed, to success of E-city in addition to providing the necessary infrastructures and secure environment for data interchange citizens' participation and interaction with government and private agencies should also be considered. Because one of the factor keys in the success of e-city is attention of people and their use of e-city services. Service Oriented Architecture is an appropriate approach for increasing citizens' participation in municipal affairs with the increasing interoperability between different organizations and integration between inter-organizational systems. Offered architecture according to above-mentioned problems in

TABLE 1: COMPARING DIFFERENT ARCHITECTURES OF INFORMATION SYSTEMS

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

electronic city systems includes these layers: user-oriented service layer, strategies for collaboration layer, security service layer, application-oriented interface layer, data services layer, information infrastructure layer. The 6-layer offered architecture is shown in figure 1.

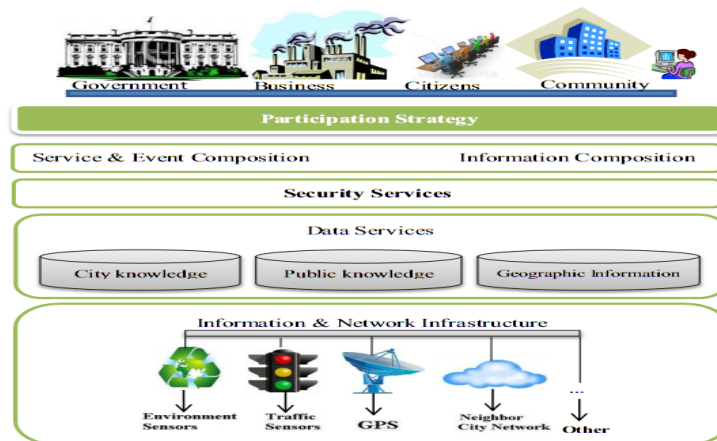


FIG.1. THE PROPOSED ARCHITECTURE FOR THE INCREASE OF CITIZENS PARTICIPATION IN E-CITY

According to the architecture needs, each of the layers is responsible to the following tasks:

- 1) **The user-oriented service layer:** This layer provides application services for organizations, users and etc., and also sometimes some of these services are a combination of each other.
- 2) **Participation strategies Layer:** This layer has been placed for explaining policies and Strategies to get maximum attraction of citizens to participate in E-City.
- 3) **The application-oriented interface layer:** This layer provides the integration of required infrastructure for data transfer and applications to the ultimate aim over the network.
- 4) **Security service layer:** This layer is used to provide security and securely and reliably service to users.
- 5) **The data services layer:** This layer is applied to organize and process information, information management and systems data services, city data and assign them to the knowledge base.
- 6) **The information infrastructure layer:** This layer is used to provide municipal information systems.

4.1. Provided services by this architecture

Generally the services provided on the portal, according to their providers, user groups and business properties are:

- **Public services for residents**, such as Tax services, Healthcare services, Police services, Law services, fire services, which are provided by the public sector.
- **Public services for businesses**, such as tax services, health services, police services, Law services, which are provided by the public sector.
- **Information services**, such as phone, climate, geographic information, information about facility, traffic and hotels services information, which are provided by Non-profit and for-profit commercial companies and are useful for residents and tourists.
- **Entertainment services**, such as games services, tourism services, Non-profit and for-profit commercial companies
- **Communication service for open communication**, such as community for human resources, tourists, students, drivers, homeowners.

4.2. Evaluation of proposed architecture

To increase participation of citizens some strategies should be used. Such as:

- **Collaboration of a city's different information systems:** With this strategy, urban stakeholders can easily interact with urban systems, and receive their desired Services through the city portal. By collaboration of different city systems, municipal stakeholders are only aware of law and their concerns and nothing more. Also the workflow is carried out by workflow management system.
- **Hide the internal complexity from stakeholders:** this causes the simplicity of receiving services from urban service providers and encourages the city stakeholders and increases the participation rate.
- **Stakeholders' emphasis on quality control instead of the process control:** it is completely supported by the concept of orchestration.
- **Easy identification of services possibility:** using this approach can attract the participation of the users who have less knowledge.

- Transparency of inputs and outputs: urban stakeholders declare their applications and desired once, and the result will be sent to them. These factors encourage them to do their jobs using electronic services.
- Reuse of municipal services and service composition.
- The independency of the services during calls by various stakeholders.
- Creation of security and a secure platform for provided services.

5. CONCLUSIONS

The purposes of e-cities are citizens' access to all required information in entire week and at all hours and in a stable, reliable and confidential manner. Citizens' attention and their use of electronic city's services are critical because one of the factor keys in the success of e-city is participation and interaction of citizens with government and private agencies. Service Oriented Architecture is an appropriate approach for increasing citizens' participation in municipal affairs with the increasing interoperability between different organizations and integration between inter-organizational systems. In this paper we've studied electronic city layers and have focused on the benefits of service-oriented architecture, then proposed a 6-layered architecture including: user-oriented service layer, strategies for collaboration layer, security service layer, application-oriented interface layer, data services layer, information infrastructure layer. The proposed Architecture with stated strategies can raise the citizens' participation to use municipal services, and also provide a secure and Interoperable platform for electronic city's information systems.

REFERENCES

- [1] Sajjad, Hashemi, Seyyed Yasser Hashemi, "A Novel Service Oriented Architecture For Integration of Information Systems In Electronic City", INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 1, ISSUE 11, pp.6-9, DECEMBER 2012.
- [2] Freeman, P. and Aspary, W., "The Supply of Information Technology Workers in the United States, Washington D.C. "Published by Jossey-Bass, A Wiley Company, pp. 5-20, 1999.
- [3] Smart GIS/IT, "The city of cape town in south Africa has pursued a 'smart city' goal through the integration of GIS with it systems", GEOconnexion International Magazine, 2007.
- [4] Berntzen, L., Olsen, M.G, "Benchmarking e-Government – A Comparative Review of Three International Benchmarking Studies", This paper appears in: Digital Society, ICDS '09. Third International Conference on, pp. 77 – 82, 13 February 2009.
- [5] E. Asgharizadeh, M. AjalliGeshlajoughi, and S. R. SafaviMirmahalleh, "Identification of the Electronic City Application Obstacles in Iran", International Journal of Human and Social, pp. 15-163, 2009.
- [6] EvgenDuravkin, E., "Using SOA for development of information system (Smart city)", Modern Problems of Radio Engineering, Telecommunications and Computer Science (TCSET), pp. 258 – 258, 12 April 2010.
- [7] M.R. Zynoddini, An Enterprise Architecture Framework for Electronic City, Master Thesis, Payame Noor University, Iran, 2011.
- [8] A. Mahjorian, F. Shams. "Designing a Service-oriented Enterprise based on SOA Principles.", The 6th Intl. Conf. on Information and Communication Technology Management, Tehran, Iran, pp. 1-6, February 2010.
- [9] D. Zhu, Y. Li, J. Shi, Y. Xu, W. Shen, "service-oriented city portal framework and collaborative development platform", Journal of Information Sciences, Vol.179, No. 1, pp. 2606–2617, 2009.
- [10] Arsanjani, A., "Service Oriented Modeling and Architecture", In: IBM Business Consulting Services, pp. 1-4, 2004.
- [11] PouriaAmirian, Ali A. Alesheikh, AnahidBassiri, "Standards-based, interoperable services for accessing urban services data for the city of Tehran", presented at Computers, Environment and Urban Systems, pp. 309-321, 2010.
- [12] Newcomer, E., Lomow, G., "Understanding SOA with Web Service", Pearson Education, 2005.
- [13] Thomas Erl, "Service-Oriented Architecture (SOA): Concepts, Technology, And Design", Prentice Hall Ptr, 760 p., 2005.

- [14] Patriatech group, “Need to Service Oriented Architecture”, 2012, <http://www.patriatech.com/solution/soa/index.php> [accessed: 2 May 2012].

Authors

Sajjad Hashemi is a M.Sc. student in Computer Engineering Department, Science and Research Branch, Islamic Azad University, West Azarbayjan, Iran.

