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**An Infrastructure for Implementing e-Participation  
Services in Developing Countries**

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**Abstract** — The ability of citizens to participate in the government system is a key issue for governments in developing countries as these countries have limited and inflexible infrastructural information and communication technology (ICT) facilities. ICT can support the establishment of electronic interaction between citizens and government bodies just as e-commerce systems facilitate customers' services in traditional online businesses. e-Democracy or e-participation initiatives imply electronic-based government services for enhancing electronic interaction between citizens and government bodies. The services of e-participation require use of Internet infrastructure and web based applications as well as end user devices such as personal computers, laptops or PDAs. This paper proposes an infrastructure for user centric e-participation services in a developing country context.

**Index Terms**— e-participation; citizen engagement; Bangladesh

## I. INTRODUCTION

Today many citizens rely on technology enabled devices for everyday activities such as maintaining timetables and contacts, organizing daily tasks, and sending and receiving calls or messages. The expansion of telecommunication capacities, through the growth of local networks and increased bandwidth, is allowing a more pervasive environment permitting users easily to access a greater variety of services, both social and commercial. This capacity leads to increased requirements around traditional service provision. In addition to familiar e-commerce services for customers where they can sell, buy and interact, one of the newest service concepts for the public is in the area of e-government. e-Government can enhance citizen participation and make engagement in public life as well as the government's bounden duties easier through the use of electronic media and Internet based applications.

Despite well established social and community networks e-Government services are still in their infancy in developing countries. The United Nations e-Government Survey [1] suggests that e-government services particularly for South Asian developing countries are lower than North American and European countries, and fell below world averages (refer table 1). ICT adoption faces several hurdles: telecommunications access, speed and pricing, citizen literacy and motivation, usable and useful applications, trust, privacy and security or personal information, anonymity in system use or political participation, equality of citizen access across the digital divide and so on [22]. Our initial in-

vestigations suggest that e-government application adoption has been slower in developing countries due to telecommunication infrastructural issues, unsuitable web based technology being in place, a lack of citizen's awareness, and leadership responsibilities. While European countries have been investing in infrastructure and connectivity thus improving their ability to implement e-government, the same cannot be said for African, Caribbean, Central and South American, and Central and Southern Asian countries, which did not rate in the top 35 of e-government readiness ranking [1].

Table 1 Regional Average of e-Government readiness

Europe	0.6490
America's	0.4936
Asia	0.4470
Oceania	0.4338
World	0.4514

Recent recognition of improvement in the provision of e-government saw South Korea move to the number one ranking ahead of Taiwan and Singapore [2]. One initiative of the South Korean Government is the Government for Citizens (G4C) providing its citizens with a one-stop e-government window linking the existing systems of five major civil services, through enhanced legislation, digital payment and standard electronic templates for online services[3]. This initiative is similar to others elsewhere, such as the Singaporean Government's eCitizen portal which is designed as a first-stop for government services on the web, to meet the needs of citizens and customers [4]. However, both of these systems merely provide some aggregation of current services in a new interface, rather than extending access of citizens to government through greater interaction. In light of these advances and limitations, this paper discusses a project initiative on implementing e-democracy services in developing countries, specifically Bangladesh.

e-Government is a modern service concept that helps increase citizen interaction with government bodies through personal devices. Such services can also be found for government to government bodies, government body to other institutions or vice versa. According to Lambrinouidakis et al. [5], e-government applications can offer four types of electronic services: e-services, e-management, e-policy, and e-democracy. e-Services delivers information or required documents to citizens through electronic media, e-management applications serve government entities for

their operational management, e-policy is associated with the public policy design and finding out citizens' opinions about policy, and finally e-democracy services involves citizen participation in the processes of government activities to support democratic values. Within e-government initiatives more widely, the key issue of e-democracy is drawing attention of researchers, practitioners and policy makers from around the world. For example, the incumbent Bangladeshi government has promised to enhance common people's and leader's participation in government to ensure a fair and transparent administration. The present Government also expects a fair and transparent role of parliamentary members by promoting political conventions, discussion forums and so on. e-Democracy initiatives can provide such government services and allow for meeting the growing demands of citizens. Our present research complements the government objectives of improving participation of citizens and leaders in the political processes whether in parliament or in local communities in Bangladesh. In this paper we propose an infrastructure for e-democracy services and discuss its technical feasibilities in Bangladesh.

The paper is organized as follows. The next section describes the technological background and then section 3 the philosophical background of the work. Section 4 presents a discussion on the potential issues and required objectives and section 5 presents an infrastructure for e-democracy services. Section 6 provides a conclusion on this paper.

## II. TECHNOLOGICAL BACKGROUND

Oxford University's Prof. Stephen Coleman first defined e-democracy as a digital technology that enhances the democratic process in terms of the "relationship between government and governed, representative and represented" [6]. This definition gives a broad aspect of the entities relevant in e-democracy services. More explicitly, in outlining a policy framework for e-democracy the Queensland State Government [7] defined e-democracy as one way that government uses new ICT systems to improve the way of doing its business and to improve community outcomes. Another definition suggested that it is a use of ICT by democratic entities in the political processes of local communities, regions, states, and nations [8]. This project extends the above views towards the operational realm by considering e-democracy service development where user empowerment in their specific service is vital throughout the interaction or participation processes.

e-Democracy technologies are not simply a portal or other website where people can view or exchange documents but are rather a combination of networks, personal devices, software technologies, that may support the entire political process and canvass the desires among democratic entities through a meaningful interchange between citizens

and their governments. Researchers in the field have proposed many approaches; generally based on commonly identified requirements. For instance, Gross [9] introduced an approach that combines email, newsgroup and information displayed on the WWW. This approach maintains features for the simple interaction of users. These include how to communicate with other users through email, post messages for others, and find pieces of required information. Rather than offering features where users can design or tailor their own way to communicate with others these set a display view for a particular audience ensuring a unidirectional flow of information. This is because many government systems need unidirectional flows of information from citizens to government or government to citizens.

Shires and Craig's [10] approach addressed the issues of user customizable options. Their case example offers ways of tailoring views that simplify a user's information access by using a neural network based algorithm but which imposes an extra technical burden on users to understand key system functions. Fischmann, Jakisch and Riedel [11] proposed an approach combining several online services together for supporting citizen's everyday life in Vienna, Austria. This approach gives much more control to the users for viewing the information that enhances usability, albeit raising other issues such as data security, privacy and integrity. In addition, because the system handles large amounts of information, this causes a resource management issue for the system itself. Beyond technical requirements, understanding the issues relative to the user's active participation in government processes, an e-democracy service application is required also effectively to address the social consequences and collaboration issues of the users. Caldwell [12] presents a model that supports this stating that as engagement and influence increases there is a need to use interactive methods to support e-democracy (refer Fig 1). Increasing engagement and influence however implies a move away from a passive, one way asynchronous environment. As engagement increases two way communication is enabled through tools such as email, opinion polls and online surveys. As influence increases citizens move to a collaborative and interactive environment allowing dynamic monitoring of news media and the Internet. Finally, as both engagement and influence increases, e-democracy develops towards an interactive and strategic environment where citizens can engage and influence government. One way that this can be done is through the use of social networking software that allows web services users to contribute, share, and access information through the use of blogs and wikis.

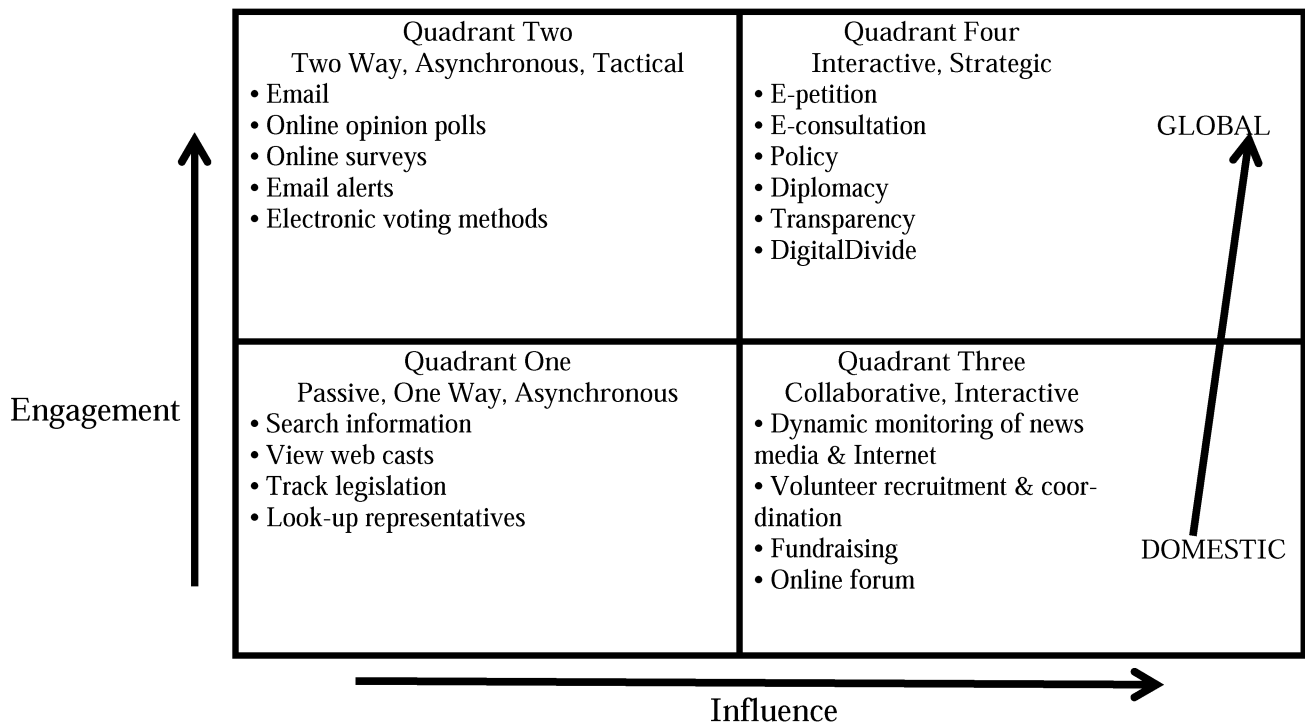


Fig 1 e-Democracy Model Institute for Electronic Government

Source-Democracy: Putting Down Global Roots [12]

Newer technologies such as Web 2.0 applications, wikis and blogs can improve on current technologies to create dynamic services for the citizens where participation and collaboration is ensured. Tapscott and Williams detail how many companies and industries are transforming themselves to adapt to a new era of openness and networking [13]. For example the Library 2.0 concept described by Abram [14] shows how traditional online library services can be changed by using web 2.0 technologies including blogs, wikis and tagging. Casey and Savastinuk [15] further explained advantages of the Library 2.0 technologies which offer features for feedback from end users in the form of reviews, ratings or comments. Also users can customise their web pages to include their own blogs and RSS feeds. The way previous online systems conceptualised ideas, information and users has changed, and the resulting organizational forms and strategies on display bear little resemblance to the traditional corporate model that dominated much of the preceding century. Significantly, this view can be applied into government services for citizens. As Governments face new possibilities both socially and technically, Web 2.0 technologies enable a paradigm shift toward increased collaboration between governments and citizens [16].

### III. PHILOSOPHICAL BACKGROUND

From a societal viewpoint, a key product of computer science can be seen in the form of ICTs whose primary role is to mediate communications between parties [17]. Dini [17] describes computer science as “(being concerned) with the construction of abstract machines (an their) performance, self-optimisation, self-healing capacities” (p.27) This philosophical aim motivates building or designing a ‘ma-

chine’ or system, that can operate within objective or subjective reality. Dini [17] states that activities could be improved if we know how to map user behaviour in software but Ciborra and Hanseth [18] have argued that it is not easy to make a clear line between the objective view of the technology we build and our subjective human experience. Recent works in design science suggest an appropriate paradigm for artefact design. Gregor and Jones [19] described the design science paradigm as a problem-solving oriented area that brings all inventions for artefact design together. Design science research helps produce shareholder-oriented and solution-relevant design through a rigorous and iterative process that includes evaluations with target users and communication of the solution to both operational and management users [20]. This view of technical design focuses more on specific design or a design from individual points of view, rather than focusing on technical system design within socio-technical phenomena. However, a digital ecosystem understanding goes beyond such a combined effort of e-democracy services as it has embraces a diversity of social implications. The digital ecosystems promises more precisely to describe the interdependent view of technical system design within a socio-technical phenomena where we build or design a service system by converting natural settings for enhancing communications in our social life [17].

### IV. SERVICE PRINCIPLES SETTINGS

It is important to set principles for engaging citizens in proposed government electronic services. Most of the previous research on citizen engagement suggests three main aspects for online services. These are access to public information, public discussions about political themes and

voting for supporting views or parties [9]. This can improve their way of living, awareness and responsibilities into the community. In Australia, the Queensland state government framed eight principles to engage local communities [7]: inclusiveness (extend to broader community involvement), reaching out (extend to enhance access to information and sharing), mutual respect (extend to standard of citizen's communication), integrity (extend to promoting information delivery and its transparency), affirming diversity (extend to incorporate diverse opinions), adding value (extend to building liaison and team), and security (extend to protection and authentication of citizens).

This view of increasing broader community involvement in the e-democracy process is being demonstrated in Queensland, in the recent use of an on-line petition and surveys to influence the Australian Government's spending of the 'Building Australia Fund' [21]. As an initiative of the Council of Mayors of South East Queensland (SEQ), a local government working group, its aim is to secure a fair share of the \$20 billion fund. This is through the use of an on-line petition, and business, community group, and resident's surveys. They also call for constituents to email or write to a Senator or their local Federal or State member, to tell them they support the 12 priority infrastructure projects identified by the Council of Mayors (SEQ) providing an opportunity for citizens to participate in the process and decision making of government. Such proposals assume both ready access and ICT literacy among citizens, and are typical of e-participation in first world nations. Solutions for developing nations however can not always be predicated on this assumption.

No previous approaches have so far offered an e-democracy solution in the specific context of Bangladesh. The majority of the local area in Bangladesh has Internet connections however, it is important to set principles of services that can enhance community involvement initially in government, and in keeping with cultural values. Bangladeshi citizens or local representatives may play their roles interactively with government's decision making and rural development. Initially, this may support the government's transparent decision making and delivery of information to its citizens. On the other hand, leaders can play their roles interactively for both citizens and government by exploring deeper community inputs to government activities.

## V. E-DEMOCRACY SERVICE ARCHITECTURE

Given this background we propose an approach in which citizens can play an active role with government bodies or representatives. In keeping with best systems development practice and with Bangladeshi cultural values we looked for a broader view of e-democracy service development where user empowerment in their specific service building or collaborating is vital throughout the interaction and participation processes.

Fig 2 illustrates the connection architecture for a unit of e-democracy services. A service unit can represent a city's local council, department, or ministry. The underlying tech-

nologies (particularly Web 2.0 technologies) offer enhanced features for building or enabling suitable applications through their mobile or personal devices (such as laptops, PDAs, mobile phones).

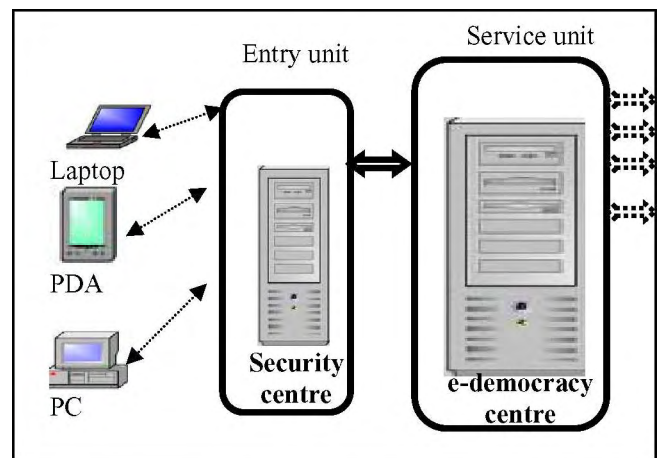


Fig 2: A unit architecture for e-democracy in Bangladesh

In the architecture from the user side, the e-democracy centre provides service space throughout the entry point which ensures access control in terms of security and user authentications. The server holds databases and the connections from other city councils, departments, or ministries to extend its service boundary. The e-democracy centre provides a set of services which includes consultation and discussion forum, feedback service, voting for candidates, and retrieving information about missions. Software for such everyday government applications is already available or being developed in many countries.

In this architecture, the e-democracy centre can be connected in parallel with any existing services or servers thus expanding the environment with similar or new democracy services. Local governments or city councils handle the accesses from the user's point of view and the relevant data resources from the services point of view. This may allow better server side management especially for dealing easily with technical support services and the developing of a secure network structure. In the context of the Bangladesh Government, this architecture can be seen as a starting point. The modernisation of the voting process through the enabling of greater interaction between candidate and citizen is one way. Enabling voters, when deciding for voting potential candidates, to listen to a candidate's speeches or videos (similar to video conferencing but in a more enhanced way) and join into a conversation virtually. There is no similar system in place for the provision of such services, thus changing and modernising the electoral process. Through this initial service architecture, the present Bangladesh Government can achieve four main aspects under the e-democracy applications. These are to ensure active involvement of citizens in government decision-making, transparent processes in democratic systems, enhanced responsibility and awareness of local and/or national leaders and local citizens; and put forward a capability that could

support the further development of the Government's 'Digital Bangladesh' concept.

## VI. CONCLUSION

This paper proposes an infrastructure model of e-democracy service for unit level services in a local context of Bangladesh. We have developed an initial prototype to test the local requirements and their application to a local city council in Bangladesh, where local citizens have started interaction through its services. Due to privacy issues, the prototype can be only demonstrated by a request for organisation's participation in other than the business environment.

Although Web 2.0 technologies can suffer from security threats as the technologies do not have any particular definitions or well defined architectures. Web 2.0 is generally accepted as a new way of using existing web resources interactively by using a programming technique called AJAX which stands for "Asynchronous JavaScript and XML" that helps make web pages more interactive and enables collaboration for participants. This interactivity and collaboration may provide ways for hackers to hit a web server, to exploiting sites in attacks on visitors. However, as AJAX is a server sided (rather than a user sided) technology, it may have lesser security risks. The functionality in the proposed framework compares with those developed in other countries (e.g. Korea [2]), but is designed towards web 2.0 operations. It is also predicated upon a characteristic citizen context of ready internet access, interactive interfaces and personal devices now emerging in contemporary Bangladesh, but also true of many other developing nations, Although to date testing has been limited we look forward to the opportunity to test the framework further in the future.

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