A sustainable ubiquitous engagement platform for open government Implementation.

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Abstract-
Open government is known as a systematic procedure of government towards ensuring collaboration, transparency, innovation and participation to make government answerable to its citizens. It has been identified to have four stages of implementation with a given conceptual model known as the open government implementation model (OGIM). The first stage of the model is increasing data transparency, the second stage is improving open participation, the third stage is enhancing open collaboration and the fourth and final stage is realizing ubiquitous engagement. Each stage of this model provides its own deliverables from the first stage down to the last however, this paper focuses on the specific final stage of the model which is realizing ubiquitous engagement. In order to realize ubiquitous engagement, a platform for citizen engagement needs to be made available everywhere and at any time. The paper is aimed at proposing a sustainable engagement framework for open government as well as using the adopted framework for the design of an n-tier application architecture for citizen’s engagement. The ubiquitous engagement platform is a mobile platform which provides a suitable avenue for active citizen participation in government policies and procedures. It is a one-stop application enabling government transparency and effective citizen communication. With the introduction of the platform, it bridges the communication gap between the citizens and government. Thereby enabling citizen’s participation to enabled at available at any time and at anyplace via a reliable platform. The platform also enables government transparency and trust in government.

Key words: Open government; E-government; M-government; M-participation; Citizen engagement; ubiquitous engagement.

1. Introduction
The appearance of social media and other Web 2.0 tools have opened up huge new conceivable outcomes of engaging the public in government work in different ways [1]. It is changing the public's assumptions regarding the manner in which government should work. For instance, individuals from Generation Y, or the Millennial Generation, will in general anticipate that government offices should interact with them just as business organizations interact with them through different social media sites [2]. The Open government approaches have strong inclination that government decision-making processes and activities should be more transparent and participatory. A particular concern is looking for mediums to empower citizens individually and organizations of civil society collectively through the process of making government open [3]. Citizens participate in government process when there is a trust worthy and well-known medium for participation. According to [4], one of the major factors considered to encourage citizens’ participation in government’s processes is to increase the medium of
accessibility to the process of participation. In the current information age that is based on real-time communication, the expansion of the limit with respect to both governments and citizens to publish and consume data is changing the ways in which governments function, how and what the public sector makes available, and ultimately how governments interact and engage their citizens. The government needs to be transparent by ensuring disclosures about how the budget is been implemented which is made known via a trustworthy e-government platform in a way that gives assurance to the public thereby enabling an open government [5]. The general concept of open government is founded on the philosophy of true democracy is actually a participatory process therefore, citizens of a particular nation must always have access to the right information if it is required of them to play an active and effective part in the process of governance. Open government provides the possibility of access to information and participation in decision making as well as monitoring of government actions [6].

Open government can be defined as a systematic procedure of government towards ensuring collaboration, transparency, innovation and participation to make government much answerable to its citizens [7]. Open government from this can be deduced to be a government where the citizens of that nation do not only have access privileges to information but can now actively participate meaningfully to the affairs of a nation. In order to implement an open government, [2] proposed a model for open government implementation known as the Open Government Implementation Model (OGIM). The OGIM is a conceptual model used for the implementation of open government and this implementation model defines four stages of open government implementation which describes the focuses, deliverables, benefits, challenges, best practices and metrics for each implementation stage.

1.1 Stage One: Increasing Data Transparency
This is the first step towards an open government however the use of social media and web 2.0 tools in general at this level to promote open government is limited due to the traditional web applications which provides data transparency. Agencies at this stage are concerned with increasing transparency of government processes and performance by publishing relevant data online and sharing it with the public. They consider two most important tasks at this stage which includes (1) identifying high-value and high-impact data for the public and (2) improving and assuring data quality in terms of accuracy, consistency, and timeliness. It provides an open access to administrative data relating this with the concept of open government data. Once a data is published to the public, it is very difficult to withdraw it without causing harm to the agency’s reputation in terms of trust. The public will be able to make use of this public data to make improved decisions, thereby improving the quality of their lives.

1.2 Stage Two: Improving Open Participation
This is the second stage of the OGIM and it focuses on improving the public’s participation in government processes, procedures and decision making through several methods and tools. Government agencies strive to harvest ideas and comments from the public. Open participation enhances policy decisions and government services by welcoming and utilizing the input of the public. As stage one opens the government to the public, stage two aims at opening the public to the government. Several web2.0 tools and social media are used in this phase. These tools can be considered as “expressive” social media in contrast to “collaborative” social media which is an important enabler for open collaboration at stage three. This collective intelligence, based on a diverse and large number of individuals, helps government agencies to make informed,
reliable decisions in real time. There are still challenges at this phase due to the fact that the agencies do not give real-time responses to the comments and ideas of the public.

1.3 Stage Three: Enhancing Open Collaboration

Once there is data transparency as well as open participation, this will give room for open collaboration among government agencies, the public and the private sector. It has been noticed that the terms participation and collaboration are used interchangeably by the agencies however there is need to point out the differences between the two. Participation includes a form public of engagement which is relatively simple interactive communication such as blogging, social networking photo/video sharing and ideation. This is reliant on “expressive” social media to aid citizens share and communicate their ideas while collaboration on the other hand refers to complex tasks or projects that aims to produce specific outputs. It is reliant on “collaborative” social media such as google docs, jive social business software which combines collaboration software, community software, and social applications. Open collaboration goes beyond inter-agency collaboration and should include the general public as well. When the public engage in complex tasks from the government, there will be huge acceptance in government agencies while producing synergy effects of multiple collaborating parties resulting to time and cost saving while improving in the quality of innovation for government services and policies.

1.4 Stage Four: Realizing Ubiquitous Engagement:

At stage four of OGIM, the agencies must have achieved transparency, participation and collaboration in to a very high degree of public engagement. The agencies improve and fine-tune existing open government initiatives to maximize their benefits. Furthermore, they expand their portfolio of open government initiatives to further benefit the public. The agency has two goals at this stage and the first goal is to make public engagement and participation accessible through mobile and ubiquitous devices and applications. At this stage the public can access the open government data via various ubiquitous and mobile devices such as tablets, smartphones etc. via applications. Relevant government websites and applications are optimized for each of various computing platforms. The second goal is to make various public engagement tools, methods and services seamless across government agencies so that the public can navigate and engage in various activities without having to jump around different applications or logging in and off [8].

2. Related Work

[9] developed a ubiquitous platform that allows citizens to be involved in policy making processes (PMPs) regardless of their current locations and time. The study on the project ubiquitous Participation Platform for Policy makings (UbiPOL) was aimed at providing ‘context aware knowledge’ provision with regards to policy making. Through UbiPOL, citizens were enabled in identifying any relevant policies along with other citizens’ opinion ‘whenever they want’ ‘wherever they are’ according to their daily routines. [10] motivated by the latest trends in geographic information system (GIS) domain developed a mobile-based application for citizens participation based on GIS technology. The application developed for crowdsourcing and citizen participation enabled government in urban monitoring and planning. The technology used enabled government to know the density of citizens at different times and citizens were able to contribute to government survey and polls. [11] presented an executive summary of the Open Government data strategy for Columbian government which fits into the
government’s online strategy for allowing the demand and supply of public access data. The model presented in the paper was developed with the purpose of promoting economic and social development in the new generation. The platform presented allows the citizens and businesses to avenue to access public information in order for the information to be utilized in the development of government services that can create value to the public but the platform was focus mainly on information distribution and not on engaging the citizens. [12] developed a web-based portal for open governments data for Indonesia. With the demand of easy access to public access to non-confidential government data across various public sectors such as the health, industry and finance sectors, the authors investigate the implementation of open government data using the Tim Berners five-star rating and open stage model of Kalampokis. From the investigation, it can be observed that the drawbacks of the Indonesia’s open data implementation are the lack of ability to link the currently existing data with data from other sources. [13] highlighted the importance of mobile devices as a means for sharing implicitly and explicitly generated information and an important platform for a large group of individuals with emphasis on its ubiquity. The authors assess how the idea of user-generated content, web-based crowdsourcing, and mobile electronic coordination can be combined to extend crowdsourcing beyond the digital domain and link it to tasks in the real world. In view of that they implemented a crowd-sourcing platform that integrates location as a parameter for distributing tasks to workers. The application developed elicited opinions from a group of workers for a company. [14] explained crowdsourcing as a means for eliciting opinions from a group of individuals or as a means of engaging a group of citizens. The authors also pointed out that mobile devices offer a great platform for extending and diversifying web-based crowdsourcing applications to a larger contributing crowd, making contribution easier and omni-present. The authors developed and deployed an in-house engagement platform as a means for crowdsourcing. The application developed contains survey where users can answer a survey questions posted by the admin. The authors further reviewed the application with a given range of parameters such as privacy, data management, power consumption, performance amongst others. Finally, the authors gave recommendations for future works for the development of an application for crowdsourcing. [15] highlighted the importance of using mobile devices for crowdsourcing due to its portability, mobility and ubiquity. The paper further developed a ubiquitous crowdsourcing application for eliciting citizens opinion for urban stability. The application however, only provided modules for citizen survey in terms of urban planning and citizen feedback on project for urban development. The application developed in contrast contains just an aspect of citizen engagement. Other modules of citizen participation could however be activated such as the online polls and forum amongst other. The presence of this modules will enable better feedback form citizens. [16] highlighted the need for civic engagement and political participation. The authors also pointed out from studying the various existing medium for service delivery available in Canada via ICT. The authors implemented a web-based citizen consultation application which engaged numerous citizens in Canada. The web-based application enabled citizen participate in policy making by contributing to discussions and survey. The deployed application despite having several modules of citizen consultation still lacks the deliverable gotten from mobile devices such as its potability and ubiquity. Engagement as relating to government can be viewed as interactions and close relationships between the citizens and government. Active engagement gives the right to hold others accountable, and accountability is the process of engaging in participation. In Nigeria, a credible
platform for citizen’s contribution and input to major government’s process that affect their lives hardly exist. This assertion credited to [17], pointed out citizens’ participation in decisions on how the country is governed is very critical in democratic processes. In that article which noted that Nigeria as a nation is challenged with the crisis of democratic legitimacy and proper accountability hence the need for an open government. Furthermore, it can be seen in the article that governance in Nigeria is characterized by corruption, exhibition of contempt and disregard for the citizens. It has been observed that the decline in the level of citizen’s participation in governments process due to gap in communication between citizens and their representatives at different levels is considered to be one of the major challenges facing most democratic nations of the world [18]. For the purpose of bridging the gap in communication described by the authors, the ubiquitous engagement platform targets effective intercommunication between the government, citizens and stakeholders thereby giving rise to transparency, collaboration and participation. Transparency, participation and collaboration have found fertile ground in digital platforms, where many actors can be involved in monitoring, participatory and collaborative practices; however, because open government platforms are a relatively new phenomenon, much work still need to be put in in terms of evaluating what constitutes a sustainable open government platform [19].

3. Methodology

The citizen engagement framework to be used for the design the application architecture was adapted from the maturity model of m-participation proposed by [20]. The authors described m-participation as the next phase of e-participation and basically just an extension or evolution of e-participation. The m-participation maturity model is based on the UN model and comprises on three stages; m-information, m-consultation and m-enabling. The adjusted stages and their components can be described as follows:

1. M-information: This is the one-way communication between governments and citizens, for the provision of public information. Information is put out by the government to keep them informed about the happenings. The citizens in turn use the information to plan out strategies to carry out business and other personal activities. The characteristics that make-up m-information includes the following:

   a. Government Structures: This information includes the organization of government bodies ranging from the federal to the state and finally the municipalities. It includes information on the particular department of government body responsible for handling various services in the nation. It shows the various ministries, national representatives, state representatives, municipality representatives etc.

   b. Contact details: This includes the information for contacting the administration responsible for handling various government processes such as public administration address, public phone number, email and fax. The personal information of the governments agents is not displayed but kept private.

   c. Open Government Data: Open government data is deduced from government data and open data. The data published here enables transparency, accountability and value creation by making the government data available to all. Various data from ministries such as budget, expenditure, census etc. are published for citizen use.
d. Newsfeeds: A section within the application houses various forms of online publications from the government informing citizens on public information. This is the first display for the citizens when logged into the application.

2. M-consultation: This entails a two-way communication for raising citizens’ voice for gathering opinions, ideas, and proposals, such as reporting illegal activities, posting complaints and comments and participating in polls and surveys. It serves as a means of directing the expression of the citizens. The characteristics includes:

   a. Online Polls: Online polls serve as a means for citizens to express themselves. Citizens are given the opportunity to vote within a certain range of options. The poll is made open in order to allow citizens know the total amount of voters and the percentage for each thereby enabling transparency.
   b. Online Survey: The survey online targets citizens in form of a questionnaire in order to draw feedbacks and get data from the public. A target audience is set and the survey is administered with a view of getting data from that to be further analyze the data.
   c. Online complaints: There is also a provision with the existence of online forms for citizens to submit their complaints. The complaints are centered towards getting a huge range of issues bothering citizens.
   d. System Feedback: The presence of a system for collecting, computing and publishing reputation scores based on citizens opinions and perception on government services such as the quality of the service or the speed of service delivery.

3. M-Enabling: M-enabling regards a two-way communication with citizens and the government. It involves direct participation in public projects, decision making and helping to spread awareness of the application. It includes the following characteristics:

   a. Forum: The online forum is an asynchronous discussion platform where citizens can hold discussions and conversation in the form of posted messages. It has a tree-like structure and a forum can contain sub-forums with headings as the topic for discussion. The topic of a forum which is called a thread can be tagged and citizens following that particular tag can make contributions and be updated on the topic. This creates an avenue for citizens to interact amongst themselves. Citizens view can be dialogue internally on several issues before it is brought out to the public.
   b. Chat rooms: This is known as a synchronous conference platform and is done real-time unlike the forum. It is structured to assemble a small group of citizens to discuss on different issues and share similar ideas privately. Citizens view can be dialogue internally on several issues before it is brought out to the public. It can also be between the citizens and their delegates in public offices.
   c. Social Network Affiliation: The presence of social media on the application helps for awareness to other members of the public about the application. It invites other users to register to use the application. Social networks such as Facebook, Twitter, YouTube can serve in order to make the engagement application know.
4. Proposed Architecture
The proposed architecture is based on a multitier architecture which is also known as an n-tier architecture. With \( n = 3 \), the architecture consists of 3 layers, the data layer, the application layer and the presentation layer, all having their roles in the total functionality of the system. This architecture is engineered to have the processing, data management, and presentation functions physically and logically separated. The major advantage of this architecture is that a change in a particular layer will not affect the functions of another layer. Other benefits of the architecture can also be derived such as scalability, easy management, flexibility and security where each tier is secured separately using different methods.

The Ubiquitous engagement platform is a mobile participation and an open government system based on mobile technology for the provision of m-government, m-participation and open government services for citizens, government and business interaction. The services which include M-information, M-consultation, M-enabling are used on mobile devices such as

![Figure 1: A Ubiquitous Engagement Framework Adapted from [21]](image-url)
smartphones, tablet PCs and PDAs. The services provided are centered around an open government in order to achieve transparency, accountability, collaboration and trust in government. The ubiquitous engagement platform is structured in three basic layers which includes:

1. Presentation layer: The presentation layer is responsible for transforming the data and information into the appropriate format for display in the mobile device used to access the services. This layer is responsible for handling data compression, data encryption/decryption, character/string conversion and graphics display. In this layer, data is communicated in several formats from various sources. This layer is responsible for the graphical user interface (GUI) of the platform. The display at this layer will be dependent on the mobile device operating system, thereby the device will adjust the display capabilities of the requesting device. For the definition of the user interface XML will be used for the application. Extensible Markup Language (XML) is a markup language that defines the set of rules for encoding the document of this application in the format that will be readable to the users of the application. It is aimed at simplicity, generality and usability across the internet. The XML documents are easy to create hence it has been added to the architecture of the application.

2. Application Layer: In the application layer, the process of the data and information gotten from the system is done here. The engagement and interaction logic required for the functioning of the services are implemented into the code of this layer. The relevant communication mechanisms supported by the system such as the m-enabling characteristics which include chat, forum and social media affiliation resides in this layer. The application layer also controls content required for updating services on the application such as the m-information services which includes the government structures, contact, open government data, and newsfeeds. Finally, the citizens consultation services which are used for getting feedbacks from the citizens such as the online survey, online polls, online complaints and the system feedback also resides at this layer. For the application layer which encompasses the logic of the entire system, Java programing language will be used as a tool to process information for the application which is stored in the database.

3. Data layer: The data layer from the is the layer where data is stored. All the information, communication and government services store and retrieve the required data and information from this layer. The database to be used for this application is the firebase database. This database provides real-time database and backend services for the application. One of the major advantages of selecting the firebase as the database is that, data is synced across all client in real-time and the data remains available when the application goes offline. Data is stored in JSON and synchronized in real-time to every connected client.

The figure 2 shows the Architecture used for the engagement platform and has been adopted from Haeng (2015) and it is the generic mobile application architecture and it is known as the rich client mobile architecture.
5. Conclusion
The introduction of the platform for ubiquitous engagement of citizens and government agencies totally enables an open government and bridges the gap of communication by making the platform for participation to be always available at any time and at anyplace. Several benefits of this platform enable a total open government involving all stakeholders, encouraging:
• Virtuous cycles for sustaining and improving public participation
• Public engagement throughout entire lifetime
• The public continuous and seamlessly engaging in several government activities and programs
• Government openness to become a norm

Finally, with the ubiquitous platform available for public participation, open government will fully be realized and trust in government, development in the society and all the benefits of open government will finally be actualized.

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