CROSOMO: CROWD-SOURCED ELECTION MONITORING

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Goal statement

Create a scalable, exportable crowd-sourced formal election monitoring system that assumes the existence of minimal technical infrastructure but can incorporate additional technologies as they become available.

Security is the concept that the data collected, analyzed, and communicated to the public has not been subject to interference by outsiders. The concept embraces not just
security of the data processing system but also the storage of information that can be used to help establish future election systems.

*Accuracy* is achieved by training observers in monitoring activities and using them to verify reports. Communication with observers is two-way. In addition to receiving reports, the analysis boiler room can direct observers to areas identified but other observers, informants, or media as exhibiting problems.

*Timeliness* means that reports on the quality of the election are made available during the election. Most formal election missions grade an election after the fact. The purpose of this system is to make information available as soon as practicable so that it can be verified by others, problems can be resolved, and citizens can be assured that the conduct of the election is in fact be watched.

*Mobility.* The system needs to be mobile so that it is not specific to a particular country but can be deployed whenever an election takes place.

*Scalability* refers to both the technology used and monitoring coverage. The election monitoring system will be able to incorporate available technology of different complexities. The system is built around the assumption that phone service and SMS is generally available, but where affordable and reliable data transmission infrastructure exists then the system exhibits the agility to use different collection methods. The system allows information from other monitoring organizations to be displayed should data be shared. The system can be scaled to display data from social networks and news media should that be desired. The principle geographic limitation on the system is the number of trained volunteers. As election monitoring gains respectability, the number of volunteers is expected to increase so the coverage of polling places can be extended.
Democracy promotion and election monitoring

The motivation for the project is to use election monitoring as a tool for democracy promotion. Inculcating democracy requires both a perception that democratic institutions exist in a country and general acceptance by both elites and the public of democratic processes as practiced by the institutions (Bratton, Mattes, & Gyimah-Boadi, 2004; Mattes & Bratton, 2007; Nisbet, Stoycheff, & Pearce, 2012; Nisbet, 2008). The process of establishing a democracy, in other words, requires convergence of a demand for democratization and a supply of democratic practices that, if not quite satisfying the demand, demonstrates possibilities for successful integration of democratic practices into culture and politics. Commitment to democracy by the public increases the likelihood that an autocratic regime will establish some degree of democratic practices that, in turn, invests citizens with political power (Bratton et al., 2004).

Democracy is characterized by the existence of various functioning institutions empowering citizens, such as the existence of public spaces for discourse, journalism not controlled by the government, and fair elections, among others (Kedzie, 1997; Mattes & Bratton, 2007). The Internet, for example, is believed to have potential for promoting democracy by providing a synchronous mechanism advancing public discussion through two-way communication allowing timely discursive analysis and response (Bratton et al., 2004; Groshek, 2009; Leslie, 2003). The supposition is supported by studies establishing correlations between Internet penetration and national democratic characteristics (Best & Wade, 2009; Kedzie, 2002; Nisbet et al., 2012; Pilat & Wycoff, 2005) as well as
correlations between Internet use and the likelihood that an individual will engage in activities indicative of democracy (Drew & Weaver, 2006; Tolbert & McNeal, 2003).

The utility of election monitoring as a practice promoting democracy exploits the necessity for public perception that democratic institutions exist and that they are accepted by both elites and the public. The fact of an election held by an autocratic government does not engender a popular belief that the election expressed the will of the electorate. In the absence of credible information as to the functioning of the election system, the potential exists for citizens to believe that election results were distorted by manipulation of the voting process or tabulation (or both). Monitoring of elections by international third parties decreases the opportunity for fraud simultaneously with increasing confidence in outcomes (Bjornlund, 2004; Carothers, 1997; Daxecker, 2012; Hyde, 2007; Pastor, 1998).

Very little scholarly work looks at the efficacy of domestic election monitoring. Pastor (1998, p. 155) argues that amateur election monitors, perceived as a "nuisance" by international monitors, exercise diminished influence on the quality of an election but perform a positive function in developing civil society as a result of participating in the process. Carothers (1997) agrees that international monitors should strive to dissuade amateurs from observing elections while at the same time arguing that domestic observing groups should be encouraged.

It is our belief that the creation of an election monitoring system to be deployed domestically by trained citizens takes advantage of factors that increase perceived reliability and assist in the promotion of democratic values. Advantages include understanding of both the culture and history of elections in the country; the potential to
scale the system to provide widespread coverage of dispersed polling locations; the ability to observe preparations for an election; and the ability to deploy monitors during an election to verify reports of infractions communicated by social media, mass media, and informants of unknown reliability.

An essential element of the proposed system is to crowd-source the monitoring by having volunteers recruit other volunteers who are then trained to observe specific election activities, accurately report observations, and react to problems as they develop. An important advantage of domestic monitoring is the ability to observe preparations for elections. Simpser and Donno (2012) discovered that international observer and monitoring missions have the unintended consequence of shifting electoral manipulation away from election day activities in favor of tactics influencing outcome during preparation for the election. The lack of observable interference with the process on election day itself creates an impression of free and fair polling that does not reflect bias built into the system.

The most important factor is that election monitoring is performed by citizens rather than foreign observers. Participation in a monitoring program becomes part of the development of civil society structures essential to the development of a democratic culture. Reporting on the electoral process, as well as verifying results, becomes a critical part of the discourse necessary to fuel democratic development. The existence of a trained domestic observer corps capable of communicating observations that can be displayed to the general public is not incompatible with international observer missions. The difference is that the domestic observers stay in the country after the international mission departs. The ability to use election information to reform electoral practices in
subsequent elections, and then monitor for improvement, creates a path to democratic engagement.

Actually participating in an election monitoring program designed to increase the probability of a fair election is itself an expression of democracy. Using a system empowering citizens to validate elections necessarily constitutes participation in democracy. This result is consistent with social construction of technology theories that describe how the use of technology changes users. Users are not only agents of technological change but the use of technologies such as election monitoring systems results in the construction of different meanings for the technology by different social groups, known as interpretative flexibility (Oudshoorn & Pinch, 2005). The deployment of an indigenous election monitoring system will profoundly affect users, whether they actively participate in the system or constitute an audience for results.

**Approach**

The project intent is to create an election monitoring system rather than develop an interesting piece of technology. The consequence is our reliance on much technology that is already in place as possible. The systems approach takes a holistic view to the project, combining technological and human resources as required to meet goals (Ramo & St.Clair, 1998). The specific approach foresees the formation of a team with membership and technologies that change as specific problems are encountered that require expertise. The project is characteristic of Mode 2 knowledge production requiring agile configuration of resources. The reflexive nature of the project allows for transient teams focused on system goals. The nature of the goals, and specific approaches, evolve as new
problems are encountered, new solutions are crafted, and new resources are acquired (Gibbons et al., 1994).

The system contemplated at this early stage of project design encompasses two broad activities. The first is the collection of information about the progress of an election. The collection activity includes decisions as to the type of information collected, the manner of collection, and the method used to collate the information so sense can be made of it. The second activity is the delivery of collated information. Delivery requires that information be provided in a comprehensive and intelligible form requiring minimal manipulation by the audience in order to be employed. The breadth of each activity requires exploration of specific uses anticipated to exist. A personas approach aids in understanding requirements necessary for the system to achieve its goals. We anticipate that additional goals, and additional personas, will be added to the system during development.

**Personas**

**Persona-based design**

"Personas are representations of stakeholder roles that are useful to guide the information design process" (Reeder & Turner, 2011, p. 979). Persona-based design constitutes an ideal practice for developing project criteria. A personas approach allows the evolution of requirements as the problems change. The existence of heterogeneous and socially distributed potential users argues for a transdisciplinary approach based on personas (Gibbons et al., 1994).
Personas, to be effective, must be based upon contact with real people. The approach we used here to develop preliminary requirements relied upon personal experiences of the development team, an approach suggested by Pruitt (2006). A more sophisticated approach requires the resources and time to complete an ethnographic study of potential users that provides a basis for developing personas. A properly constructed persona must be defined in specific detail based upon extensive field research (Cooper, 1999). The personas presented here are suggestive of the type of users anticipated to be encountered by the system. The number of personas, as well as their complexity, should increase as information from actual people is incorporated into the personas.

**Scenario-based design**

Persona-based design can be augmented by employing a scenarios-based design process (Carroll, 2000). Scenarios "describe a sample procedure or execution of a system" (Potts, 1995, p. 247). A scenarios-based project methodology still addresses the user but does so by detailing primary usage in the guise of narratives describing potential activities before the action takes place. In our case, for example, we can address issues constraining criminal prosecution before any attempt is made to take these cases to court.

The salient elements of scenarios are settings, agents, and objectives (Potts, 1995). The process employs groups of personas imagined to interact under constrained sets of circumstances. Specific objectives need to be organized into goals, assigned to actors (both systemic and environmental), defined as goal-achieving and goal-maintaining, and then transformed into subgoals designed to mitigate obstacles (Potts, 1995, p. 249).
Employing narratives does not exclude personas in the design process (Grudin & Pruitt, 2002). The creation of an artifact can serve as a basis of discussion for understanding the needs of users when interviewed for data upon which personas can be based. Sharing this paper with potential users should motivate potential users to explore alternative systems by thinking through scenarios and imagining alternative systems (Potts, 1995). The important factor is that the process is recursive, with objectives and goals constantly revised with the production of knowledge resulting from the acquisition of additional information.

Set of suggested scenarios that involve persona(s) using the system

Amara Nwankpa

Amara Nwankpa is an IT professional and co-founder of the Enough is Enough coalition. Enough is Enough is a coalition of groups made up of young Nigerians that desire changes in the way the country is run. During the 2011 elections, Mr. Nwankpa led a group of young tech savvy volunteers to explore how social media platforms worked during the Nigerian election period.

As the co-founder of the Enough is Enough coalition, Mr. Nwankpa is interested in creating a web or SMS based technology for crowdsourcing citizen generated verifiable data on monitoring the different aspects of the 2015 Nigerian election. The aspects of the election to be monitored are pre-election activities such as the voters registration process; the elections, and post election activities. Mr. Nwankpa also intends that the crowdsourced information would be available for political parties that would want to seek legal redress after the elections.
By crowdsourcing the election monitoring process, Mr Nwankpa hopes to increase citizen engagement, that would in turn unfold positive effects for political accountability. Furthermore, Mr. Nwankpa hopes that with real-time aggregated information on election monitoring, there will be an improvement voter confidence in Nigeria, and this will reduce the incidence of post-election violence in the country. Through this system, he also wants to empower Nigerian citizens with a way to share their observations on various issues such as vote buying, registration hiccups, inappropriate campaign conduct, cases of violence, general complaints or positive feedback.

**Sheu John**

Sheu John is a young Nigerian that works at a bank in Lagos. Mr. Sheu is passionate about bringing change to Nigeria and he believes that one of the ways to achieve that is by voting for his candidate during the elections. Mr. Sheu is computer literate and can also work well with SMS and social media.

As a young, educated and financially comfortable Nigerian, Mr. Sheu is interested in volunteering for the Enough Is Enough coalition. He wants the crowdsourcing system to be based on any kind of web-based or SMS technology so that he can contribute his quota to the success of a free and fair elections.

**Umar Jonathan**

Sheu Jonathan is an 18 year old Nigerian. His family lives on less than $1.25 a day. It is the first time that Mr. Jonathan is voting, so he is very passionate about the elections because he believes that if the elections are free and fair, a new president would create
jobs for his father, a create better living conditions in the slums. Mr. Jonathan has never used a computer system, but he has a blackberry phone, and he is comfortable with sending SMS, and using mobile apps to send messages. However, Mr. Jonathan cannot afford the 15 naira per text cost his mobile network carrier would charge him if he sends reports by SMS.

As a patriotic Nigerian, Mr. Jonathan would need an SMS based technology that supports sending reports for free by SMS to a code number or a mobile app with which he can send his evaluation about the elections.

**Fatimat Joseph**

Fatimat is a 50 year old Nigerian woman that lives in Delta State. Mrs. Joseph has a basic elementary school education, and she is not comfortable with speaking English but she speaks, understands and can read Nigerian Pidgin English fluently. She is very comfortable with using her smart-phone to send SMS and capture images, but she is not computer literate. She can afford the cost that comes with sending SMS. Mrs. Joseph is passionate about the conduct of the elections in Delta State because during the last elections, political thugs prevented registered voters from voting, but results were released for her polling unit where political thugs thumb printed all the ballot papers.

This upcoming elections, Mrs. Joseph has vowed to protect her votes, and report electoral frauds to the relevant authorities. Mrs. Joseph would want the crowdsourcing system to be based on a SMS technology and she would prefer that the questionnaire sent to her mobile phone about the conduct of the election is available in Nigerian Pidgin English
**Sanni Daniel**

Mr. Daniel is the policeman attached to monitor the safe conduct of the elections at the Victoria Island polling post. Mr. Daniel is also charged with the responsibility of notifying the state command of the Nigerian Police Force to call for a reinforcement of policemen when violence erupts.

Mr. Daniel is computer literate, and he is very comfortable with using social media and SMS. Mr. Daniel would want the crowdsourcing system to be based on a web or SMS technology that can display the GPS coordinates of the places where there is violence so that he can get there on time or call for a reinforcement before the violence escalates to other parts of the city.

**Amina Brown**

Amina Brown is Independent National Electoral Commission (INEC) election certification officer located at the Victoria Island polling post. Ms. Brown is mandated with monitoring that the elections at this polling post is free and fair, and that election materials are sufficient for the elections. Ms Brown is expected to have private communications with INEC headquarters on the voter registration and election days because of the sensitive nature of the information she will be passing across.

Ms. Brown would want to use a web-based platform that is visible to INEC and Mr. Nwankpa’s organization alone or SMS so that she can have her private communications.
Environmental scan

An environmental scan is a systematic review of external information designed to minimize both randomness of information used by project developers and surprises resulting from variations in external conditions (Aguilar, 1967). The purpose of an environmental scan is to establish current conditions and evaluate potential changes in the environment for a project (Fahey, King, & Narayanan, 1981). Environmental scanning is a continuous process that should be updated throughout the life of the project.

Three environments are pertinent. The task environment is the customer and users. The industry environment encompasses competitors and organizations that affect the operation of the system. The macroenvironment is composed of all direct and indirect STEEP (social, technological, economic, environmental, political) changes that influence operations (Fahey, 1986).

Task environment

Members of this project identified the lack of a clearly identified customer as a project impediment. One of the first activities in continuing the project should be to establish the customer for the final system. The customer may vary depending on funding and deployment decisions.

The identification of users needs to continue. Personas listed in the previous section should be the foundation for creating a larger and more sophisticated understanding of users.

Generally, there are two interrelated tasks. The first is to collect information on the conduct of an election. The second is to disseminate that information. The first task will grow to include preparations for elections since one result of election day monitoring is
the time-shifting of disruption. The task will grow to include pre-election planning and post-election tabulation/certification as capabilities of the system expand. On the distribution side, additional sources of information (such as from social media and other election monitors) can be incorporated into the system. A factor to monitor is whether the customer will ever wish to intervene in elections. Intervention may change the manner in which information is displayed. It may be necessary at some point to restrict access to a portion of the data.

**Industry environment**

*Crowdsourcing technology*

Souktel developed an election monitoring data collection scheme using mobile phones that provides a technology Crosomo should explore. Souktel was developed to provide employment information over a mobile phone network. The technology was adapted to provide information about voting on election day, to conduct exit polls, and - most important here - to implement election day incident reporting over SMS. Portions of the system have been deployed in Tunisia, Egypt, and Libya (Baldassaro, 2013). During the 2011 Tunisian elections an SMS system functioned as a hotline allowing incident reports to be sent to teams of lawyers provided by the Tunisian and the American Bar Associations (Souktel, 2011). More than 80 lawyers processed thousands of reports (Baldassaro, 2013).

*Al-Jazeera, Ushahidi, Souktel, Crowdflower*, the African Diaspora Institute combined to use an SMS system allowing citizens and the greater diaspora to report
opinions regarding violence in Somali. A survey sent to 5000 SMS subscribers resulted in about 2000 replies (Meier, 2011b).

The Souktel system demonstrates the feasibility of using SMS reporting to obtain data. The system can be synchronous, with report requests and surveys going to subscribers. Mobile telephony can be used to perform non-intensive training.

*Nigeria ELMO*

The following have been identified as performing election monitoring in Nigeria:

- *National Democratic Institute*
- *Nigeria Civil Society Election Situation Room* - A project of the Open society Initiative for West Africa. NCESER brought together a coalition of civil society groups to monitor the April 2011 elections. They were hosted by the Policy and Advocacy Legislative Centre.
- *Agora* (Nigeria Elections Coalition) - Self-described as a virtual network combining information from various civil society institutions. The large list of coalition members can be found here. Operated in the 2011 election.
- *Nigerian Civil Society Organizations* - Name changed to Nigerian Churches and Mosques in 2010.
- *European Union Observers Mission (EU-OM)* - Sent 100 observers to the 2011 election. Final report is here.
* **Carter Center** - collaborated with NDI and Human Rights Watch in 2011.


* **The Transition Monitoring Group (TMG)**

* **Coalition for Democracy and Good Governance**

* **Network of Mobile Election Monitors (NMEM)** - Used an SMS tool to allow volunteers to text reports in the 2007 Nigerian elections. Utilizes Frontline SMS.

* **Enough is Enough** (EiE) - attempted to use mobile phones and and voters with Internet access into an informal election monitoring system


* **Coalition of Democrats for Election Reforms** - Set up Facebook page to distribute information on 2011 elections. They also had a reporting system called PollWatch2011.com that provided some mapping.

* **Justice and Equality Organization** - Domestic NGO. Members were trained to monitor the 2013 Anambra state elections.

The Independent National Electoral Commission (INEC) approved 21 domestic observer groups to monitor the Sokoto State Governorship election on February 18, 2012. The list can be found [here](#).
**Macroenvironment**

**Social**

Nigeria has a population estimated at 140 million people. Important social factors are listed using data from the International Telecommunications Union (Southwood, 2012, p. 3)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>&gt;170 million people</td>
</tr>
<tr>
<td>Median age</td>
<td>17.9 years</td>
</tr>
<tr>
<td>Population under 14 years</td>
<td>40.9%</td>
</tr>
<tr>
<td>Average literacy rate</td>
<td>61.3%</td>
</tr>
<tr>
<td>Male literacy rate</td>
<td>72.1%</td>
</tr>
<tr>
<td>Female literacy rate</td>
<td>50.4%</td>
</tr>
<tr>
<td>Christian/animist believers</td>
<td>50%</td>
</tr>
<tr>
<td>Muslim believers</td>
<td>50%</td>
</tr>
<tr>
<td>Ethnic groups</td>
<td>&gt;250</td>
</tr>
<tr>
<td>Languages</td>
<td>&gt;500</td>
</tr>
</tbody>
</table>
Several characteristics that affect Crosomo are immediately apparent. The diversity of languages and ethnic groups impacts the development of a system that can be used consistently and accurately across the country. The population age distribution is relatively young, which can benefit the adoption of new technology. Nigeria has the fastest adoption rate for social networking sites in Africa (Southwood, 2012). The gender discrepancy in literacy rates, and the relatively low overall literacy rate, create problems in engineering a system that can be widely used. The divergence in literacy will impact the recruitment of election monitors as well the distribution of people able to make use of data once compiled.

**Technological**

Various technological systems are available in Nigeria for the collection of data if properly utilized. Many have been used in other countries of Africa.

Available technology is covered in the section of this report on system design. Nigeria's ICT infrastructure, while not comparable to much of the rest of the world, is second on the continent only to South Africa according to the International Telecommunications Union. The technological data in the chart is from ITU (Southwood, 2012).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet penetration in 2011</td>
<td>22.1%</td>
</tr>
<tr>
<td>Broadband penetration in 2011</td>
<td>6.1%</td>
</tr>
<tr>
<td>Internet users</td>
<td>33.5 million</td>
</tr>
<tr>
<td>Metric</td>
<td>Value</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>PC penetration rate</td>
<td>4%</td>
</tr>
<tr>
<td>Desktop/laptops built in country</td>
<td>0.5 million/year</td>
</tr>
<tr>
<td>Households with TV</td>
<td>19.1 million</td>
</tr>
<tr>
<td>Internet users on mobile networks</td>
<td>74%</td>
</tr>
<tr>
<td>Mobile phone subscribers (2012)</td>
<td>102 million</td>
</tr>
<tr>
<td>Teledensity</td>
<td>73.1%</td>
</tr>
<tr>
<td>International cables</td>
<td>5</td>
</tr>
<tr>
<td>National wholesale fiber nets</td>
<td>5</td>
</tr>
<tr>
<td>Fiber nets with national reach</td>
<td>2 (1 not in operation)</td>
</tr>
<tr>
<td>Cost of 1 Mbps wireless service</td>
<td>US$39.76/month</td>
</tr>
<tr>
<td>Cost of 1 GB mobile bundle</td>
<td>US$22.08/month</td>
</tr>
<tr>
<td>Cost of 5 GB mobile bundle</td>
<td>US$50.85/month</td>
</tr>
<tr>
<td>Connection rate to national grid</td>
<td>40%</td>
</tr>
</tbody>
</table>

Hurdles to deploying an Internet based technology in Nigeria include high network price, low network reach, unreliability of power, and vandalism. The high volume of construction activity in the country results in frequent cable cuts. Vandalism is usually related to criminals hoping to find copper cables, although some is related to a tactic of
creating repair work (especially digging trenches) for locals after a cut (Southwood, 2012, p. 7).

**Economic**

The major export commodity of the country, and the principle source of government revenue, is oil. Dependency on oil results in Nigeria being greatly affected by fluctuations in the world energy market. (Southwood, 2012).

Since the 1990s Nigerians have conceptualized democracy as a mechanism to relieve poverty. Previous military dictatorships were marked by intractable poverty. The economic effect of democratic rule has been mixed. 90% of the population was deemed impoverished at the end of military rule in 1999. The rate decreased to 55% by 2004, climbed to 61% in 2010, and continued to climb in 2012. Although the worldwide recession deeply affected the country, internal corruption and poor governance undermine economic activity (Omodia, 2013, p. 571).

The Nigerian conception that democracy and economic development are linked creates both an opportunity and a problem for Crosomo. To the extent that the system increases participation in governance and promotes trust in democratic institution, a demand for domestic election monitoring should exist. The large number of international and indigenous organizations engaged in election observation missions lends credence to the salience of this belief. The other side, however, is that economic progress depends on factors not directly influenced by Crosomo, such as stable government. An underlying frustration with economic performance could incite violence when elections appear to be unfair, or where it appears that a party seeks to undermine the electoral process.
Environmental

Environmental constraints in the context of strategic analysis means the interplay of biophysical and socio-economic factors that affect operations (Olokesusi, 1987). The sheer size of the country - 923,768 sqkms - creates a barrier to effective telecommunications systems. The country covers three distinct climate zones - the arid North, tropical center, equatorial South (Southwood, 2012). Environmental factors have a limited impact on Crosomo. Nigeria's principle socioeconomic problem relates to rapid transformation of the country from rural to primarily urban land use (Olokesusi, 1987). The consequence for election monitoring is that the pattern of population distribution changes with the construction of roads, houses, and industrial facilities. Patterns of urbanization must be monitored in the continuing environmental scan as they determine the location of polling places and ultimately the distribution of election monitoring resources.

Political

Nigeria is organized for governance on a federal system much like that of the United States. There are 37 states. Economic activity, however, is preponderantly located in the cities of Lagos, Abuja, and Port Harcourt (Southwood, 2012).

Nigerian government is based on an elitist democratic system, which decreases political participation and increases poverty, as the system is not based on the people. "In the Nigerian state, the democratic process of governance and political participation is seen as a learning one. This is because the democratic structures and
institutions are very fragile and coupled with the fact that the citizenry to a great extent manifest low level of democratic culture as a result of long years of military dictatorship (Omodia, 2013, p. 571)."

Nigeria is experiencing conflict between the country’s North and South, as well as regional problems. The problems manifest in a lack of confidence in government resulting from uneven representation in national institutions. The Nigerian constitution attempted to ameliorate the divide by mandating a rotation of the presidency between citizens of the North and South. The rotation system broke down in a manner that undermined national integration. The heightened awareness of differences exacerbates underlying ethnic distrust (Omodia, 2013).

One goal of Crosomo is to increase opportunities for political participation. Crosomo encourages participation on the front end by having citizens perform the observation and data collection tasks then on the back end it makes data available to citizens to inform local projects with accurate data.

Nigerian elections have been marred by violence. Between 1960 and 1999 the country held two elections. Both governments were overthrown by the military. In 1999 Nigeria moved to civilian rule. Elections in 2003 were similarly questionable and violent. The elections that year were so tainted that the Carter Center reported that it was impossible to accurately assess the outcome. The European Union observer mission declared the 2007 elections to be the worst they had ever witnessed. At least 300 people died in post-election fighting. Human Rights Watch reported that over 800 people died in rioting following the April 2011 election even though the election was considered to be the
fairest in Nigerian history. The police and government were implicated in much of the violence, according to HRW’s investigation (Human Rights Watch, 2011).

The tendency to violence after an election raises questions about the process of election monitoring. It is more than conceivable that the provision of accurate, real-time information could be a catalyst for violent protests. Various scenarios are possible, ranging from incumbents using government forces to stay in power to opponents reacting to voter suppression. The circumstances behind the violence needs to be explored as part of the election monitoring system. It may be necessary to curtail the public dissemination of information in some form. A factor that must be addressed in moving forward is to establish protocols to address the threat of violent action.

**System design**

**Monitor recruiting scheme**

The nature of both crowdsourced information and elections in conflict areas pose several problems to accessing prospective monitors and integrity of data. The potential of anti-users within the system is always cause for concern in regards to the validity of information in a crowdsourced project. Additionally, access to would-be users and their willingness to participate is diminished as a result of the area’s high-risk conflict, which often leads to great mistrust and feelings of insecurity within the populace (Arieli & Cohen, 2011).

To overcome these constraints and concerns, this system will implement a snowball sampling method (SSM) to recruit potential monitors. Using a blended affinity business/affinity social SSM strategy, the client in Nigeria would initiate recruiting by selecting a small group (three of four) of his staff that has self-declared as interested and
has been deemed sufficiently trustworthy (Sadler, Lee, Lim, & Fullerton, 2010). The client will then train this group on the proper usage of the technology and project goals. Once their training is completed satisfactorily, the individuals of this group will in turn each recruit and train a small group of qualified individuals—and like so the process will continue until a sufficient number of people have been recruited.

Coined “bounded crowdsourcing” by Patrick Meier (2011a), this SSM approach to crowdsourcing has the obvious advantages of being quicker and cheaper than traditional means of recruiting. Furthermore, because individuals are recruited by those within their own social network SSM is inherently culturally competent and engenders trust and greater security amongst the participants (Sadler et al., 2010). Nevertheless, it must be noted that because SSM produces a “convenience sample” it has the potential for bias, as it may not be wholly representative of the general population. For the purposes of this system however, such bias could be an advantage as snowball samples tend to be “more biased toward the more cooperative participants” thus reducing risk of anti-users (Arieli & Cohen, 2011).

Field data collection

In 2012 the mobile phone penetration in Nigeria was at 73% with over 102 million subscribers, however its Internet usage (22.1% in 2011) and PC ownership (4.7%) remain significantly lower (ITU, n.d.). Furthermore, of the mobile phone subscriptions 25% are smartphones, 18% are advanced feature phones, and 59% are basic feature phones (TNS). Accordingly, all data collected by election monitors in the field will be SMS based to provide a familiar, reliable and readily available tool for the monitors. A mobile phone
service such as Souktel, which offers SMS based surveys and SMS incidence report databases, can be integrated with the main platform to receive and tag field data.

The structure of these SMS should be considered in future work. There are several options to explore, including a series of surveys that could be sent out to monitors via SMS (ie. Did the polls open on time? Respond with 1 for yes, 0 for no), a defined hashtag scheme, or simply free form. However, the design implemented must be easy to use on the field and simple to parse through once received.

**System architecture**

The general framework of the system can be defined as a client server architecture with a centralized server and two types of clients—information publishers (the monitors who will send information to the servers via SMS and volunteers in the situation room who will tag and aggregate this data) and information consumers (the general public who can view the aggregated data on the website). The software will reside on the server side of the system and the clients using the system can either update the information on the server or view it using a web browser.

The back-end must be integrated with an SMS-based platform, such as Souktel, that will allow for sending/receiving SMS data. Once received this information will then be tagged by situation room volunteers for real-time, geo-visualization display on the interactive front-end.

The system design is such that is has no special hardware requirements and will work with the standard nine button cell-phone, with or without data connectivity.
Front-end:

- Interactive geo-visualization of real-time information about an election as monitored by trained volunteers and tagged and aggregated by administrators.
- Real-time information consists of tweets, SMSes and photos which depict the state of the election as accurately as possible.
- Aggregation of the real-time information is done by integration of Aggie into our system.
- Ability to filter messages by state and/or message type.
- Statistical information such as number of messages received per hour etc.

Back-end:

- Real-time backup of data.
- Protection against attacks on servers (such as penetration, Denial of Service)

Future Work ("Hand-off")

This section lists work that should be undertaken by any group advancing this study:

1. Think about the relationship between election monitoring and violence

Daxecker (2012) demonstrated a connection between electoral problems documented by international monitors and violence in an empirical study analyzing post-election violence in Africa from 1997-2009. The results of this study create the very real possibility that a robust election monitoring system like Crosomo can induce
violence. We note that there appears to be a direct positive relationship between the number of election monitors in Nigeria and the level of violence. The positive relationship does not mean that the monitors induced violence but it raises the question of whether increased availability of information about the conduct of elections correlates to severity of violence. We suggest the inquiry:

a. Further explore the literature on election violence.

b. Interview citizens as to the relationship between monitoring and violence, as well as methods to minimize the possibility of violence (for example, by restricting data availability in whole or part) with the end result of creating new personas and scenarios.

c. Interview other election monitors about approaches to violence.

d. Investigate the feasibility of conducting a study on the relationship between available information and severity of violence, as well as ways to test tactics to minimize induction of violence. A number of confounding factors should be explored. For example, perhaps the large number of monitors is a factor in that the focus by various groups raises an expectation that the election is conducted irresponsibly. Economic, social, and media-related factors should be explored.

e. Start developing protocols for responses of the election monitoring system to violence.

2. A customer needs to be identified.

3. Additional personas should be created based upon an investigation of actual users in the country.

4. Following interviews with actual users that have been identified new scenarios
should be created.

5. The environmental scan should be expanded and updated. The purpose of an environmental scan is to predict changes that could affect the operation of the system.

6. Contact should be made with Souktel and others to determine the availability of their technologies. Technical teams need to acquire information for adapting any potential technologies.

7. Contact should be made with other election monitors proposing to operate in Nigeria to determine whether there is any possibility of data sharing or other cooperative arrangements.

8. International standards for free elections and for the conduct of election monitors need to be evaluated to insure that the system is in compliance.

9. Training modules need to be developed that insure the capability of volunteer election monitors to collect data while protecting personal safety and remaining in compliance with local laws and international standards.

10. Survey forms need to be developed that reflect the type of data that should be collected by the system.

11. Once a determination as to the nature of data is made and forms created they need to be formulated in a manner compatible with SMS or other communication system to be used.

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CROSOMO: CROWD-SOURCED ELECTION MONITORING

View tweets, SMS and photos (Aggie-aggregated content on right)
CROSOMO: Crowd-Sourced Election Monitoring

View statistics for election monitored content
Filter messages by states