Integrating ICT in Elections: How Uganda Implemented Biometric Voter Registration, 2001–2016

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PROJECT DATA

Author Mbabazi Cynthia	**Country** Uganda
Region Sub-Saharan Africa	**Sector** Governance
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Delivery Challenges Coordination and Engagement, Staff Capacity, ICT and Infrastructure	**Organization** Uganda Electoral Commission
Organization type Government agency	

TABLE OF CONTENTS

Introduction

Maintaining an accurate, comprehensive voter registry is a crucial component of electoral processes, and critical to carrying out an election. An accurate voter register is an essential component in protecting voting rights of qualified voters (United Nations, 2005). Voter registration represents a vital government function, particularly after conflict, in order to ratify eligibility of voters, prevent multiple voting, and ensure that eligible voters enjoy their right to vote (Kelley, Ayres, & Bowen, 1967; Klein & Merloe, 2001; Kühne, 2010). This case study examines how the Uganda Electoral Commission (EC) overhauled its voter registry between 2000 and 2016, moving from a handwritten, manual compilation of information to a biometric register.

One of the EC's main functions is to compile, maintain, revise, and update the voter registry. Between 2000 and 2013, the EC worked to digitize the voter registry, issue voter identification cards, and incorporate biometric technologies into its approach. Beginning in 2014, and in preparation for the 2016 elections, voter registration activities were connected to a broader push to create a national identification system, in a project called the National Security Information System (NSIS). After a discussion of the EC's work to incorporate digital and biometric technologies into the voter registry, the case study examines the implementation of the NSIS and details the delivery challenges – non-technical challenges that impeded implementation, and which implementers had to address in order to achieve the project's outcomes – that the NSIS

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faced during implementation. These delivery challenges included how to ensure multi-institutional coordination, mitigate capacity and infrastructure gaps, and engage citizens for an effective registration process. Finally, the case study highlights lessons that emerged from the voter registration projects and suggests insights on the implementation of technology-based initiatives in electoral systems, particularly in developing countries.

Development Challenge

The development challenge was to achieve a credible, accurate and accessible National Voters' Register. This is a foundational task for governments around the world that seek to administer elections and build trust in electoral processes. Moreover, prior to around 2015, voter identification cards were the main form of identification for many Ugandans (World Bank, 2018).

Context: Initial Registration Exercises and the Creation of the Uganda Electoral Commission

After the conclusion of the Ugandan Bush War in 1986 (which was itself caused by strong disputes over the 1980 election results; see Seftel & Binayisa, 2010), it was imperative for the new government of Uganda to register voters in their different constituencies in preparation for the 1994 Constituent Assembly elections. This process was carried out by an interim body, the Commission for the Constituent Assembly (CCA).

In 1993, the CCA issued voters a certificate of registration and compiled a handwritten voter register. This handwritten register was used for the Constituent Assembly elections, which were held on March 28, 1994, to elect the Assembly members who were tasked with drawing up the country's new constitution.

The handwritten register had a number of drawbacks, which included difficulty updating and organizing the files. Moreover, the nature of the register made it a daunting task to search for information. Because the register only existed in physical (not digital) form, lack of storage space represented an additional issue. In light of these limitations, the Interim Electoral Commission (IEC), which had been created as an interim body to organize the 1996 elections, decided to store voter information on a computer using Microsoft Access to produce a text register in preparation for the 1996 elections. This was executed at the office headquarters in the capital city as the districts lacked the capacity and skilled personnel to prepare this register. The 1996 elections were the first elections in Uganda in 16 years. Subsequently, in 1997, the Electoral Commission (EC) was created as a permanent body.

Creating a Photographic Registry and Piloting Biometric Techniques: 2000-2014

The text register that the new EC inherited was marred by two major issues: duplicate entries caused by registration at different locations, and a lack of accuracy in identification, as many voters had the same name. The head of voter and data management, Mr. Ochama Ahmed stated in an interview that this made it hard to ensure "one person one vote" and achieve a fair election.[1] In order to resolve these issues, the EC, under the leadership of then-Commissioner Hajjat Hadijja Nasanga Miro, launched the Photographic Voter Registration Information System (PVRIS) project in 2000. The PVRIS marked a first step towards using biometric technology.[2]

The PVRIS was designed to capture photographic details in addition to other characteristics of the individual voter, and to utilize facial recognition to uniquely identify voters. Facial recognition was meant to sort out duplicates and improve integrity of the voter register. The project was launched after a thorough internal evaluation exercise, in which EC staff met for a conference over a period of three days in Mbale district. Two groups of electoral commission officers were also sent to other countries, including South Africa, carry out benchmarking and gain knowledge for implementation purposes.

Between mid-2000 and early 2001, the EC worked to compile the photographic register in preparation for the 2001 elections. Pilot studies were carried out in hard-to-reach areas of Uganda (such as Kalangala[3], Bundibugyo, and Karamoja,[4] among others) in order to

1 Author interview with Ochama Ahmed, 2021.

2 Biometrics are measurements and statistical calculations related to human biological characteristics. According to Dastbaz, Halpin and Wright (2013), biometric technology is the use of biometric authentication as a form of identification and access control based on some aspect of the individual's biology. DNA matching, voice recognition, facial recognition, retina scans, and fingerprint mapping are some forms of biometric technology used for identification.

3 Kalangala is an island with scarce means of transportation.

4 Bundibugyo and Karamoja have narrow roads, often in a state of bad repair, which were particularly problematic in rainy seasons.

understand capacity needs, and to project the number of registrations per day and the time of day when citizens were most likely to be available for registration. Floppy disks were used to store information from various districts and sent to the EC headquarters in Kampala. Data was processed using Optical Character Recognition (OCR) technology, which enables the conversion of images of text into machine-encoded text. This allowed the EC to compile a complete register at its headquarters for the 2001 elections. About 8.5 million voters were registered in six weeks and voter cards with photos were issued. The photographic voter register was successfully used in some parts of the country for the 2001 elections, supplemented by the handwritten register because the registration process had not been completed by the deadline to hold the election. The photographic voter register was completed in time to be used countrywide for 2006 elections.

In an interview, Mr. Ochama stated that the 2001 pilot study was very useful for planning subsequent activities, and that the coordinated efforts of parish officials to train staff and engage citizens were instrumental in the success of the photographic register.[5] The experiences gained in this exercise were also later put to use during the implementation of the NSIS. A training of trainers approach was used to manage the hiring costs involved in training staff. In this approach, EC staff from the headquarters in Kampala trained staff at the district level in demarcated regions. Then the staff trained at the district level trained and supervised staff at the subcounty level, and these staff members then trained and supervised parish-level staff

Despite its success, the photographic register still posed various challenges, including poor quality of photographs from floppy disks, mismatched photographs, missing photos, multiple polling stations being listed for one individual, and a lack of equipment at polling stations to verify a voter's photo on election day. As part of an ongoing effort to improve the integrity and accuracy of the voter register, the EC initiated fingerprint biometric voter registration in 2010 in preparation for the 2011 elections. This new form of biometric technology offered numerous advantages including unique identification, quick duplicate analysis, and easy verification on election day. A team of consultants from Nigeria and Uganda was convened to inform the project strategy. The EC also carried out benchmarking exercises with sister election management bodies in Kenya, South Africa, and Europe.

To test the new approach, the EC carried out a pilot in a few districts. Mobile units comprising a camera, signature pad, fingerprint scanner, and laptop were integrated in the registration kit used to capture voter's data. The pilot added about 4.2 million new voters to the National Voter Register. The biometric voter register with fingerprints was partially used for the 2011 elections, supplemented by the photographic register. This exercise was led by the ICT department in the Electoral Commission, and the department's relatively narrow focus limited its capacity to engage a large population of citizens. Later, this project was expanded to include a variety of institutions.

In 2013, several institutions, including the Uganda Bureau of Statistics (UBOS), Uganda Registration Services Bureau (URSB), Ministry of Internal Affairs (MIA), National Information and Technology Authority Uganda (NITA(U)) and the Electoral Commission (EC) had requested resources for registering citizens independently. The Ministry of Internal Affairs took a lead role in presenting this duplication of tasks to the Cabinet. This in turn prompted the Cabinet to create a multi-institutional task force to develop a mass registration strategy, create a roadmap for implementation, develop a unified budget with cost benefit analysis, and coordinate the management and implementation of the project.[6] This project, which was called the National Security Information System (NSIS), was led by the Ministry of Internal Affairs. This mass registration exercise aimed to capture all citizen data including photograph, names, date of birth, parents' data, location (that is, the district, county, sub county, parish, and village) and fingerprints. The EC saw this as an opportunity to improve the voter register and increase coverage since its last pilot in preparation for the 2016 elections (Electoral Commission, 2020).

5 Author interview with Ochama Ahmed, 2021.

6 Multiple interviewees mentioned this dynamic. Author interviews with Mr. Wamala Joshua and Mr. Ochama Ahmed, 2021.

Delivery Challenges

The NSIS faced multiple challenges and obstacles during implementation. While some of these issues had been present in previous registration exercises, the ambitious scope of the NSIS meant that it would face a number of delivery challenges and would need to adapt to address these challenges. This project required robust coordination and constant engagement. A lack of skilled staff capacity and gaps in infrastructure countrywide posed a challenge to the mass enrollment of the project. On the ground, challenges lay ahead for the implementation team such as unsafe roads, lack of electricity and internet, unskilled staff, language barriers and skeptical traditions. Citizen engagement was vital to the success of the project, and thus it would be necessary to prepare robust outreach campaigns.

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Inter-institutional Coordination

Many multi-institutional projects face coordination challenges, such as competing priorities and deadlines, differing guidelines, and ensuring accountability, and this project was no exception. All the institutions involved in the project, including the Electoral Commission had already carried out activities concerning registration of citizens in various districts. In previous projects, however, they had worked independently, whereas this project required coordination of efforts, resources, and personnel. Coordination like in all relationships possessed its challenges. Different institutions had different priorities and deadlines. For example, UBOS had a 2014 deadline for the Population Census, while the EC had set a different deadline for the 2016 elections voter register. With limited personnel, it was also difficult to balance each institution's daily activities and specific project activities. In addition, all the institutions had different enabling legislation that governed their activities. This caused delays in implementation, as the variety of governing principles, accountability guidelines, and chains of reporting requirements meant that mismatched objectives and misunderstandings were likely. For example, the EC was in charge of compiling the voter register, but it required IT services and devices for the implementation team from (NITA(U)). These services had to go through an approval procedure according to the NITA guidelines. which led to a lengthy process, and this caused some delays during implementation.

Language

Uganda's ethnic and linguistic diversity was an important factor that implementers would need to consider. "We have about 45 Ethnic tribes with different languages and the registration team and material could only cater for 22 languages" Mr. Mashate, head of voter education and training explained.

Skilled Human Resources

When the NSIS began to be rolled out, it was apparent that implementation on the ground would rely on staff who, in some areas, lacked the necessary training needed to carry out this activity. Since the project was to be implemented countrywide, the rural areas presented greater challenges, both in terms of infrastructure and capacity inadequacies. The personnel especially in rural areas lacked the skills and experience to operate the new technological system, and equipment used for the project.

Infrastructure and Geographic Access

Since the equipment for biometric registration used electricity and internet, the lack of electricity and lack of internet access in certain areas posed a challenge. In addition, hard-to-reach areas like islands, nomadic areas, and remote villages with narrow roads presented challenges. Ochama recounted how on one visit, "[the] team's vehicle got stuck in a swampy area and we had to seek refuge in a nearby village in Kotido."[7] These geographical barriers ultimately meant that some citizens were not reached by the registration process, and were required to go to their local district offices to register themselves.

Stakeholder Engagement

Since registration was a voluntary exercise, catalyzing and facilitating widespread citizen participation in the registration drive was key to its success. Yet convincing citizens to participate in the project itself could represent a challenge. According to Mr. Wamala Joshua, Head

7 Author interview with Ochama Ahmed, 2021

of Election Management from 1993–2019, citizens loathe long lines, paperwork, and extended processes, and are skeptical of government activities. Ochama Ahmed explained that turnout was often poor for activities like local council meetings, awareness-raising campaigns, and vaccination drives – particularly in urban areas and among working adults, who could often ill-afford to take time away from their jobs to fill out paperwork.[8] Since without citizen participation, the investment in the project would go to waste, it would be necessary to stimulate the needed participation and engagement.

Tracing the Implementation Process

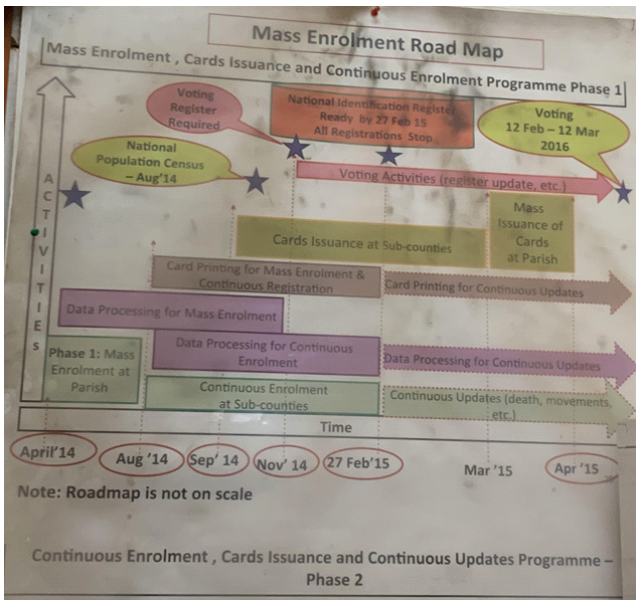
This section examines how the NSIS was implemented and explains how some of the delivery challenges faced during implementation were addressed. As the agencies involved in implementation got down to work, they would need to figure out how to work effectively together, and then devise a strategy for how to implement the project in the field.

Developing a Mass Enrollment Strategy and Getting All Institutions on Board

Under the leadership of the Ministry of Internal affairs, the taskforce convened in 2014 included personnel from the Uganda Bureau of Statistics (UBOS), Uganda Registration Services Bureau (URSB), Ministry of Internal Affairs (MIA) and the Electoral Commission (EC). This task force devised a mass enrollment strategy, roadmap, budget, and governance structure (Namugera, 2017). The strategy was to register all citizens that were 16 years and above, as well as resident aliens, and issue them a unique national identification number and a national ID card or alien card. The strategy and budget were approved by the Cabinet and implementation commenced in the first half of 2014. The implementation team, led by the late General Aronda Nyakairima, was a blended team with personnel from different sectors including the Electoral Commission, the Directorate of Citizenship and Immigration Control, UBOS, URSB, and National Information and Technology Authority Uganda (NITA(U)). They were supported by the Uganda People's Defense Force (UPDF), the Uganda Police Force, and the Uganda Prisons Service to provide security for equipment and people. The team was divided and allocated different responsibilities. Various institutions contributed staff, vehicles, furniture, office space, and other resources to the exercise.

Each institution provided mandatory data fields that they required to the NSIS coordinating team that compiled a citizen registration form to capture information for the database. These fields (including photograph, names, gender, place of residence, date of birth, and parents' information) were then specified in the system during the development phase. The EC made certain that all data fields required for the extraction of the Biometric Voter register from the NSIS were captured in the enrollment exercise. A roadmap with key dates for mass enrollment of registration, data processing, ID card printing, and issuance of the ID cards were drawn up and shared with the whole team for accountability purposes. Team leads were put in charge of key activities on the roadmap and were accountable to their managers to ensure that all teams adhered to the roadmap (See Figure 1). Ten operational regions were drawn up, each one named for and centered on an important city of Uganda in order to ensure that all areas of the country were covered (these included Arua, Soroti, Mbale, Mbarara, Masaka, Kampala, Kabarole, Jinja, Hoima, and Gulu; see Figure 2).

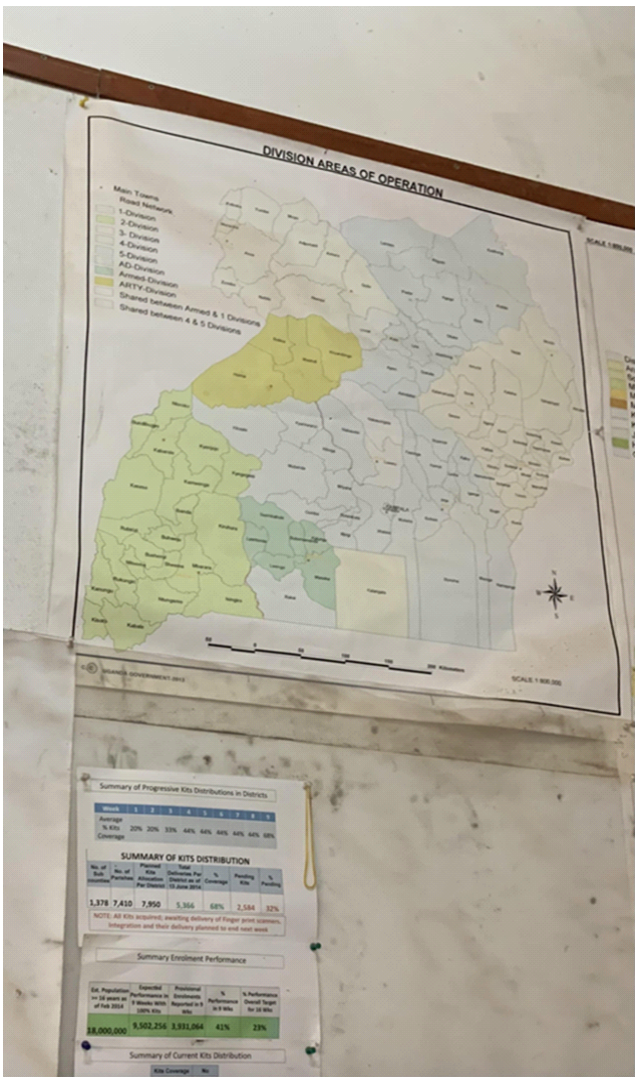
Figure 1: Roadmap for Enrollment Activities



Source: Photograph by Author, NIRA Planning Office, April 7, 2021.

8 Author interview with Ochama Ahmed, March 2021.

Figure 2: Map Depicting Operations Areas for Voter Registration Activities



Source: Photograph by Author, NIRA Planning Office, April 7, 2021.

While the various institutions worked tirelessly to execute the project, the exercise required numerous personnel and a dedicated agency to manage the registration of persons, data processing, storage and continuous updating. There were delays in project procurement of registration kits, which led to underperforming on set targets. In addition, each institution had independent rules governing registration of citizens in various capacities (e.g., voter registration, registration of births, marriages, and deaths, and registration of population census respondents). To consolidate these rules, under the leadership of the Ministry of Internal Affairs, the task force developed the Registration of Persons Bill in 2014 and presented it to the Parliament. The Bill was aimed at harmonizing the law on registration of individuals, establishing a national identification register, establishing a national identification and registrations authority, and enabling the issuance of national ID cards and Alien ID cards. The bill was passed by parliament on March 26, 2015, as the Registration of Persons Act, 2015 (Parliament of Uganda, 2015). This Act created the National Identification and Registration Authority (NIRA).

National Training and Infrastructure Plan

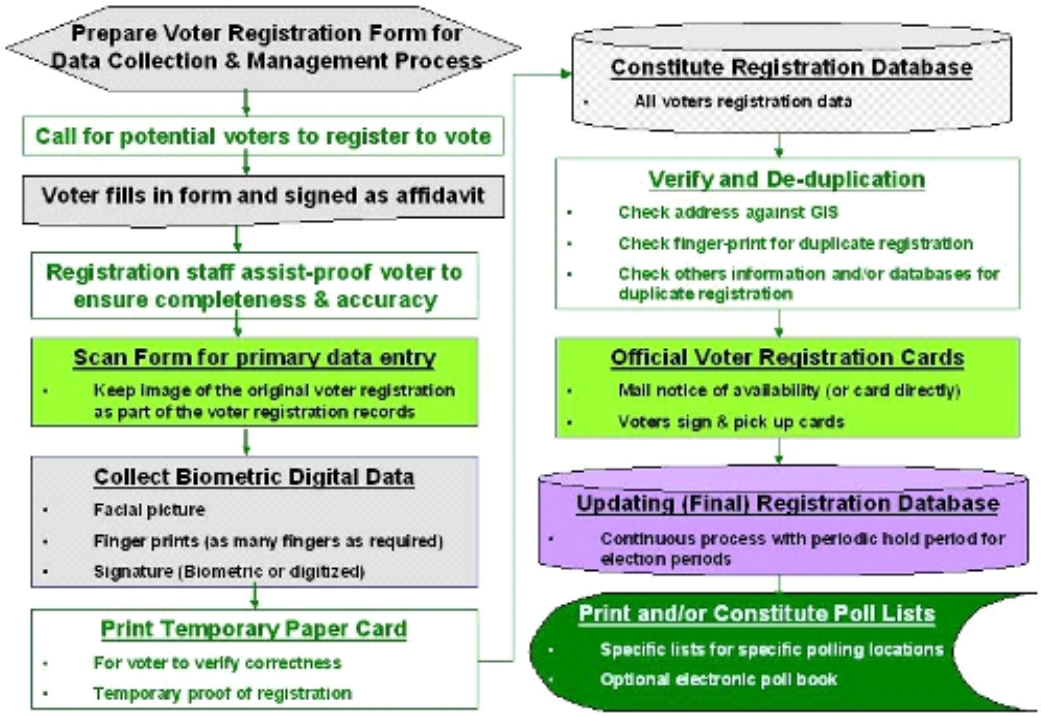
From its previous activities on the photographic voter registration mass roll out, the Electoral Commission had developed an understanding of the key challenges on ground and devised a strategy to address these. To prepare for the project, the Commission shared challenges that lay ahead on ground and advised the team accordingly. Uganda has a very diverse population with about 45 ethnic groups. The project also needed to ensure the inclusion of people with disabilities. It was even necessary to account for the fact that the registration form was filled out in handwritten form, and the registration system could be affected by the difficulty of reading some peoples' handwriting. Taken together, these factors meant that there was a need to present information in a manner that could be easily understood by the citizens of various communities and enable precise capture of data. The registration materials were translated into 22 different languages to enable outreach to diverse ethnic groups, and translators were deployed to provide oral translation. Braille registration forms were provided for the blind.

Implementation would rely on staff to carry out the tasks associated with the biometric information systems.

The biometric registration system used automatic data capturing with advanced Optical Mark Recognition (OMR) and direct capturing of biometric fingerprints, photograph, and digital or digitized signature for verification and de-duplication (Avante, 2021).

However, this presented a challenge: personnel that understood how to operate the systems were mostly in the capital, Kampala. They often had relatively high salary expectations and little knowledge of the numerous languages spoken across Uganda. To effectively bring the implementation process to the local level in a cost-effective way, however, meant relying on personnel at the arish level, who often lacked the skills needed

Figure 3: Biometric Voter Registration System



Source: Avante (retrieved on 24th December 2021) Biometric Voter Registration System https://www.avantetech.com/products/biometric/biometric-registration/

to operate these systems. To tackle this challenge, the team developed a national training strategy, first used during registration exercises for the photographic register, that employed a cascade or training-of-trainers strategy. In this strategy, staff were trained at the district level in demarcated regions; then the district-trained staff trained and supervised the subcounty-level staff, who also trained and supervised the parish-level staff. Thorough supervision was carried out to achieve accuracy of the data obtained in the field.

Many rural areas lacked electricity and internet, which, since the machines being used relied on electricity and internet connections, posed a challenge forproject implementation. For areas that had no access to electricity and internet, the team utilized batteries depending on the number of registrations per day. With the help of the Uganda Communications Commission (UCC), which is the government body that regulates communications the communications sector in the country, a remote network was set up to provide internet. In addition, the Ministry of Works and Transport (MoWT) provided resources (e.g., vehicles, drivers, fuel) to access hard to reach areas during the mass enrollment.

Citizen Engagement

"Citizen registration is a voluntary exercise and with no publicity of the project, most people won't register, and others will turn up on the last day which would overwhelm the project resources," asserted Mr. Ochama.[9] Moreover, many citizens were averse to long lines and paperwork and lengthy processes, and many citizens were skeptical of government activities in general.[10] For the project to succeed, citizen participation had to be stimulated through outreach and awareness campaigns. To increase public awareness and propel interest in the registration campaign, the government contracted a number of influential figures and "influencers" (e.g., music artists, actors) to promote the importance of registering as a citizen. It also conducted outreach to religious figures and traditional leaders so that they could conduct outreach to their parishioners and constituents. Various influential individuals were filmed for television ads touting the importance of registering as a citizen. The President of Uganda, Yoweri Museveni, was also filmed at his home being registered, and this was aired

9 Author interview with Ochama Ahmed, March 2021.
10 Author interview with Mr. Joshua Wamala.

on television. The task force also created media engagement through targeted talk shows on radio and television, newspaper articles, social media, and direct SMS, utilizing these channels to create awareness and answer repetitive questions. Registration exercises were also carried out at village markets, schools, churches, and mosques with the help of community leaders, local government officials, and the police. Mr. Charles Mashate asserted that "utilizing the community influencers and reaching out citizens on different occasions worked to raise awareness of the registration exercise."[11]

Extraction of Data from NIRA for Compilation of the National Voter Register

After the mass enrollment exercise was completed in 2014, the National Identification and Registration Authority (NIRA) was set up in 2015 to manage registration of citizens, and to create, maintain and update the national identification register, among other functions. The registration of persons is a continuous activity managed by NIRA. In preparation for the 2016 elections, the Electoral Commission extracted data from the NIRA database including biometric data (photograph and 10 fingerprints), and demographic information including the polling station. The EC then used the extracted data from the national identification register to compile the national voter register, which is publicly displayed at polling stations for verification by voters. In case of any amendments, the EC updates the voter register.

The National Voter Register for the 2016 General Elections included a standard set of information for voters, including photograph, names, date of birth, and place of residence (that is, the district, county, constituency, sub county, parish, village, and polling station), and fingerprints to prevent ineligible persons from voting. Voters had to present their voter ID card or national identification card at the polling station, which was further validated using biometric voter verification system (BVVS) machines. According to the Electoral Commission, "The Biometric Voter Verification System (BVVS) machines basically use fingerprints to match voter details which helps the election officer to confirm that the voter is on the roll of that polling station. The aim is to improve the integrity of the electoral process through authentication of voter identity" (Electoral Commission, 2016).

The Commission acquired 32,334 machines for the 28,010 polling stations for the 2016 general elections. These machines were expensive if directly purchased, so the Commission leased them and saved about 25 percent of the procurement cost.

Outcomes

Registration of new voters and updating of existing voter particulars was simplified. This is because NIRA continuously registers new citizens and updates the national identification database that is used to extract data for elections management. In the process, expenditure of time and resources on registration kits, data processing, expensive hardware and software for deduplication has been transferred to NIRA. This provided more time and resources for the EC to focus on its main functions. In additions savings were achieved from sharing resources amongst the participating institutions.[12] The EC was able to keep costs at US$8.60 per elector from US$11.30 for the 2016 elections, saving the country US$42.7 million (Ush. 156 billion) (World Bank, 2018). The project was described by international observers as a cost-effective and practical model (Chipfunde, 2016).

Mr. Alvin Mutebi, a Researcher at the Citizens' Coalition for Electoral Democracy in Uganda (CCEDU) noted that "The project improved public perception of the voter register."[13] It made it easier for a voter to quickly identify their correct polling station by typing in their national identity number in the system on the Commission website. Fingerprint data in the Biometric Voter Register extracted from the identification database was used by the biometric voter verification system (BVVS) that was deployed at 28,010 polling stations in the 2016 General elections. Mr. Wamala asserted that voter fraud arising from impersonation and multiple voting was eliminated because of the BVVS technology that uniquely identifies a voter accurately.[14]

11 Author interview with Mr. Mashate

12 Author interview with Christopher Kamtinti (Head ICT, NIRA), April 2021.

13 Author interview with Alvin Mutebi, April 2021.

14 Author interview with Wamala Joshua, 2021.

Lessons Learned

Uganda's experience implementing biometric voter registration suggests some potential lessons for similar initiatives in other countries. These lessons may also be of interest for broader processes of civil registration and the issuing of national identification credentials, given that these processes were closely intertwined with voter registration after 2015.

Consolidating Efforts of Institutions that are Pursuing a Similar Goal

When government organizations are pursuing similar tasks, sharing resources to achieve a similar outcome can be a cost-effective course of action. It is also important to engage all stakeholders in the planning stage for successful execution of a shared project and ensure that all actors are effectively rowing in the same direction. In the implementation of the NSIS, multi-institutional coordination was strengthened by designating a specific body to be responsible for project implementation. This was important to avoid overburdening staff in each agency that had a role to play in the project. During implementation, it was also important to strictly comply with the roadmap, because any delays could have led to unmet targets. Designating a lead agency contributed to effective oversight of progress on the roadmap. Mr. Kiyimba Umar, Head of Election Management at the EC, stated that "the efforts made to formulate NIRA saved time and costs for efficient registration of citizens and producing a more accurate voter register."[15]

Enlisting Influential Figures to Galvanize Citizen Engagement

During the implementation of the NSIS, it was important to use influencers to encourage citizen participation in government activities especially for the working populations. Influencers including the President, music artists, actors, religious leaders, and traditional leaders could, by promoting the importance of registering as a citizen, increase citizen participation. In addition, media engagement and community outreach went a long way in reaching out to hard-to-reach communities. Mr. Mashate explained it this way: "Keep in mind, people will not come to you, so you have to reach out to them." Hiring local language speakers to translate the materials for citizens also facilitated the process of registration.

Cascading Training of Staff to Overcome Skill Gaps

Elections are largely data driven, and technological measures tend to evolve. This means that deploying ICT in elections can be expensive and requires continuous maintenance and skilled resources. Mr, Sam Muyiyi, a Voter Data Management Officer at the EC, explained that "The more advanced the technology, the more expensive the human resource."[16] It was therefore important to train low-skilled staff to manage staff costs for big projects. Cascading training using a training-of-trainers approach was a cost-effective mechanism to provide unskilled staff with adequate skills and supervision. This was accomplished by training staff at the district level, who then trained and supervised staff at the subcounty level staff; these staff members then trained and supervised the parish-level staff.

15 Author interview with Kiyimba Umar, 2021.

16 Author interview with Sam Muyiyi, March, 2021.

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