BVR Feasibility Study - Final Report

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Executive Summary

This report aims to inform decision makers faced with the question of whether and how to implement biometric voter registration in Ethiopia for May 2020 general elections. It first offers a baseline analysis of voter registration as currently conducted. That is a paper process, done freshly for each major electoral event. While inclusive, inexpensive, sustainable and easy to implement, this voter registration process has come in for criticism, mainly because of the lack of effective transparency and central oversight and supervision.

A key determinant in the feasibility of any technology is the capacity of the institution that must implement it. The Ethiopian elections management body, NEBE is understaffed and under-resourced. NEBE has relied in previous elections on a wide range of support from other public agencies. These include warehousing, offices and logistics.

Existing polling-station personnel are poorly trained (due mostly to resource constraints). There is minimal use of information and communications technologies, and there are no election-specific information systems, though some are in the pipeline. The level of human resource necessary to implement a nationwide high-technology voter registration solution would require NEBE to recruit, train and deploy tens of thousands of computer literate operators, and a large number of IT professionals, across almost six hundred locations, including Constituency offices that have yet to be established. The gap between the current and required capacity at NEBE is enormous and, even if unlimited resources become available, there is a question mark over the capacity to absorb in the available time.

The anticipated enfranchisement of large numbers of internally displaced persons could be handled using mechanisms previously adopted by NEBE for registration of university students and military personnel. However, the order of magnitude increase in voters so enfranchised presents a significant challenge to NEBE in voter registration, election day operations and management of results.

The Government of Ethiopia has a vision of using technology to transform the identity paradigm. It's Digital ID project seeks to offer foundational, biometric-based digital identity services to citizens and public and private sector users. The DigitalID project would wish to benefit from any biometric enrolment by NEBE undertaken for electoral purposes, but the election management body's autonomy with respect to any such collaboration is recognised by all interlocutors.

For planning purposes, a number of assumptions were made. These included the timing of the 2019 Census and the subsequent availability of both the aggregated results of said Census, and the large quantity of tablet devices procured for field enumeration across Ethiopia. The indefinite postponement of the Census robs NEBE of both, with negative impacts on operational planning and,

more critically, fresh delimitation of electoral boundaries. Other key assumptions include a nationwide, simultaneous voter registration process to be completed by end February 2020.

The study examines possible issues with electoral rolls and asks whether biometrics is the optimum solution. It examines the need for human adjudication when biometrics are used to flag potential duplicate registrations. Thereafter, five broad Scenarios are described. Several facets are discussed for each Scenario, including technology and human resource requirements; field and legal implications, integration and re-use. Indicative timelines and estimated procurement costs are discussed.

Scenario 1 is an enhanced manual process, with modest but substantial improvements to field reporting and training. Transparency and accountability are delivered by sharing scanned electoral rolls and conducting a list-to-people audit, respectively. Scenario 2 builds on the improvements in Scenario 1 by conducting data entry from the scanned electoral rolls and creating a full text-only voter registration database to facilitate basic text-only de-duplication and more nuanced WWW or SMS based sharing with stakeholders. Scenario 3 uses a simple tablet-based BVR solution to capture voter demographics and a photograph of each voter's face. Facial biometrics will be used to inhibit in-kit duplicate registration, and to facilitate broader de-duplication at the back end. Electoral rolls, including the photograph of each voter, will be laser printed and distributed for election day. As with earlier Scenarios, stakeholder scrutiny of electoral roll data will be facilitated by WWW and SMS. Scenario 4 is like Scenario 3 but with the addition of fingerprint and iris biometric sensors to the tablet-based BVR solution. These additional biometrics will take longer to capture, but offer a higher quality matching exercise. Scenario 5 proposes a more traditional laptop computer-based BVR kit.

The three high-technology Scenarios offer the opportunity to capture biometrics in ascending degrees of cost, complexity and risk. All three biometric scenarios have the potential to deliver a voter registration database that could be shared with a national identity process. Accordingly, any procurement for these scenarios must be technically and operationally compliant and any process conducted must be legally compliant with the national Digital ID paradigm.

The risks are clear and grow quickly depending on the ambition level with respect to the use of technology. The limited capacity of NEBE, the complexity and cost of procurement and deployment and the highly compressed timelines make any decision to attempt BVR very difficult to justify in purely electoral terms. Enhancements to the voter registration processes can be achieved with lower risk and lower cost options. Should NEBE conclude that the introduction of biometrics is desirable or necessary, the Scenarios herein give some insights into the cost and scope, and the urgency with which the work must begin.

Acronyms and Abbreviations

AU	African Union
BVR	Biometric Voter Registration
CEPPS	Consortium for Elections and Political Process Strengthening
CSA	Central Statistics Agency (responsible for Census)
DSS	United Nations Department of Safety and Security
ECES	European Centre for Electoral Support
EoI	Expressions of Interest, a pre-procurement pre-qualification modality to shortlist capable vendors
EMB	Election Management Body, a generic term
EOM	Election Observation Mission
EU	European Union
FTA	Failure to Acquire - when no biometric characteristic is available, e.g. missing or bandaged fingers
FTE	Failure to Enrol - when no useful biometric can be captured by a system, e.g. poor quality fingerprint
FVL	Final Voter List
ICT	Information and Communications Technologies
ID	Identity or Identification, for example Voter ID Card is Voter Identity Card
IFES	International Foundation for Electoral Systems
INSA	Information Network Security Agency
IOM	International Organisation for Migrants
IT	Information Technology
ITB	Invitation to Bid, a procurement modality
Logs	Electoral Logistics
MINT	Ministry of Innovation and Technology, Government of Ethiopia
NEBE	National Electoral Board of Ethiopia
Ops	Electoral Operations
PDF	Portable Document Format, created by Adobe Systems, a globally used file format for document sharing
PMO	Prime Minister's Office
PS	Polling Station - also where Voter Registration takes place, so aka Registration Centre
PVL	Provisional Voter List
RFP	Request for Proposals, a procurement modality
RFQ	Request for Quotation, a procurement modality
RMS	Results Management System
SMS	Short Messaging System - the text messaging functionality common to all mobile phones
ToT	Training of Trainers
UNDP	United Nations Development Programme
UNDP CO	UNDP Country Office
UNHCR	United Nations Refugee Agency
UPS	Uninterruptable Power Supply
VR	Voter Registration
WWW	World Wide Web

Introduction

Background

With the opening of the political space and the return of several opposition parties, the Ethiopian political landscape has witnessed dramatic changes. It is expected that the 2020 general elections will greatly depart from previous election rounds and will witness true and effective political competition. The Government is committed to ensure credible, inclusive and peaceful elections; this political will has materialized in a change in the leadership of the National Electoral Management Board (NEBE) and the widely anticipated amendment of the NEBE law. The new law is expected to strengthen NEBE's independence and institutional arrangements, thus enabling the Board to manage the upcoming general elections in a more transparent and effective manner. The Government also committed to introducing new IT based solutions to improve voters' registration and other electoral processes, in an attempt to showcase transparency and efficiency of the electoral management process. The government is keen on introducing a Biometric Voters Registration (BVR) in the upcoming elections. With the national census planned to take place in 2019 though postponed indefinitely, there is also high likelihood that the country would witness political debates on the delineation of electoral constituencies following the issuance of the new census data, should these emerge in sufficient time.

The Government has embarked on complementary national projects such as National Civil Registry, National Elections and National Census. Given the many parallels between these initiatives, the Government has sought to co-ordinate them via a single Programme Office under the tutelage of a Technical Committee and an Executive Committee composed of representatives of the Prime Minister's Office (PMO), Ministry of Peace (MoP), Central Statistics Agency (CSA), Information Network Security Agency (INSA), EthioTelecom (ET), Ethiopia Electric Utility (EEU) as well as representation from the National Electoral Board of Ethiopia (NEBE). The Programme Office has been tasked with the coordination and implementation of these projects as well as provide technical support to NEBE in building a secure and reliable voter registry with the dual purpose of also building and populating the National Population Database that will uniquely identify all citizens and residents of Ethiopia based on the Civil Register and Biometrics.

The Programme Office has partnered with the United Nations Economic Commission for Africa (UN-ECA) to undertake a Gap Analysis on the harmonization of regulations, infrastructure and capacity requirements in support of the National Digital ID Systems development process. The Study will inform the ID development system and programme, but will not have direct bearings on the Biometric Voter Registration (BVR) process. The Government of Ethiopia has hence requested UNDP to provide technical assistance to undertake a Comprehensive Feasibility Study on the potential use of BVR for the upcoming general elections planned for 2020 as well as leveraging the BVR to build the National Population Database to uniquely identify all citizens and residents of Ethiopia.

UNDP is engaged with programmatic activities with NEBE and it supported NEBE and the Programme Office by recruiting an International expert having a very string understanding of Electoral Systems and Information and Communications Technology (ICT) infrastructure to undertake the feasibility study. The goal of the study is to examine relevant issues to determine requisite conditionalities (technical, logistical and financial) to support the implementation of a biometric voter registration for NEBE and to also be used for the building of a National Population Database. This report

contains the analysis and resulting recommendations which have been presented to NEBE and the Technical Committee.

High technology solutions potentially offer more, but cost substantially more. While the cost of laptop computers has plummeted in real terms, other kit components have not followed suit. The low-cost single-finger digital thumbprint scanners typical of early biometric voter registration kits, for example, have given way to 'industrial-strength' airport-like, multi-finger scanners whose cost, in some cases, make this component the most expensive in the kit. There are hence several types and generations of kits that differ in cost and technological effectiveness and adaptability. NEBE and more broadly the Government of Ethiopia will need to decide on which type and generation to use in order to address their needs.

Overview of Mission and Methodology

The consultant arrived in Addis Ababa on Tuesday 19th February.

The methodology for this work is as follows:

a. Gathering and reading all relevant literature and documentation, including very recent reports prepared by EU contractors and others.
b. Identify all possible interlocutors, focussing on NEBE and key Digital ID partners, but also on other electoral stakeholders as time permits.
c. Prepare a matrix of interlocutors and topics for discussion.
d. Prepare questions to ask in advance of meetings, to ensure consistent information gathering, recognising the qualitative nature of the interactions.
e. Take careful notes and debrief all colleagues post-meetings to ensure accurate understanding of messages and information received.
f. Analysis of all information received and drafting of study.
g. Consultations and validation of findings (internal)
h. Limited external discussion of findings (external)
i. Consolidate feedback and submit final report (this document)

To maximise effectiveness, information, findings, agendas and as appropriate, meetings and logistics will be conducted with/shared with other consultants, particularly the UNDP RMS consultant, but also the Conflict Mapping consultant.

To assess real-world conditions for possible field-deployment of technology, a field trip was envisaged. This was to include, a visit to a NEBE branch office at Region State level, holding a past voters list, some typical polling stations/voter registration sites and possible engagement with other electoral stakeholders. Because of administrative hurdles (DSS requirements) this trip did not materialise as envisaged. But we did visit a conveniently located Region State office of NEBE on the outskirts of Addis Ababa. No polling stations were visited during the mission as none were operational.

Voter Registration in Ethiopia - a baseline analysis

Overview

The process of registering voters in Ethiopia is entirely manual and paper-based. A fresh voter registration exercise is conducted for every major election held. While materials are designed and procured centrally (the NEBE has its own printing facilities but also outsources some printing) and some recruitment and training is done centrally, Voter Registration is managed almost entirely from Regional Offices. Electoral Rolls (in the form of books) are taken, once the process is complete, to Constituency level and are stored there until polling day when they are sent back, with polling materials.

Citizens wishing to register as voters are invited to go to their nearest polling station by a legally mandated notice. However, registering to vote is an entirely voluntary exercise - it is not automatic and is fully citizen-initiated. Eligibility is determined as follows - to be registered as a voter, the person must:

- be a citizen of Ethiopia
- be 18 years or older on the date of registration
- be resident in the location for at least six months
- be of sound mind (not "notoriously insane")
- not be a person deprived by a court of law of the right to vote
- not be serving a prison term

Further, the law[1] explicitly prohibits registering in more than one location, or more than once in the same location (multiple registration).

Required Documentation for Identification at Registration

Voters may use a variety of identity documents (including expired Kebele or passport) to determine their identity. To facilitate those of voting age who cannot document this fact, as well as to allow persons who lack identity documents, the law allows for a variety of persons present to vouch for the identity and age of a person. The Registrars (NEBE officials who is conducting the voter registration process) may vouch if they recognise the person. The law allows for use of a "traditional or customary way" to identify the elector, though there is no elaboration of these. Finally, the testimony of the public observers may be used to identify an elector. Use of these mechanisms is recorded in the minutes.

Attributes Captured in Electoral Rolls and on Voter Cards

Details entered into Electoral Roll book (see Figure 1):

- Full Name including Grandfathers
- Regional State where resides
- Zone
- Woreda
- Kebele
- Designated PS

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[1] Article 22 - Directive for the Registration of Electors, 2/2009

- House Number
- Village or Locality
- Registration Number
- Serial Number
- Electoral Roll Page
- Elector's Signature
- Registrar's Signature
- Date of Registration

The Electoral Roll shall have Columns (see Figure 1):

- Serial Number
- Date of Registration
- full name including grandfathers
- age
- sex
- duration of residence within constituency
- signature or thumb mark at time of registration
- House number/Village or Locality
- Remark

Figure 1 Specimen Electoral Roll Book - Ethiopia (source: Ronan McDermott)

Each voter is given a Voter Card (see Figure 2) that is used to vote on election day. For General Elections, these are a one-time use card - they are taken from the voter in return for their ballot papers. For Local Government elections, the Voter Card is a two-time use card - there is a box that is ticked when the voter uses the card to vote in the first Local election. When the voter turns up for the second local election, the card is taken from them. There is provision for a voter who has lost his or her Voter Card to cast a vote where the polling station is "convinced of the matter". Electoral stain or ink is used to mark the finger of persons who have voted.

Figure 2 Specimen Voter Card (source: Ronan McDermott)

Daily and End-of-Registration Reporting

Forms are used to capture the number of voters by gender and age cohort at the end of each day's registration. At the end of the voter registration period, the books are "closed off" and no further registration is permitted. Forms with the summary number of the process are completed and submitted up the structure via Constituency and Regional State NEBE offices to HQ where the numbers are aggregated registration statistics are compiled and available for publication. This part of the process has come in for observer criticism. Indeed, NEBE interlocutors at HQ themselves complain of their difficulty in getting data from the field.

Public Display of Electoral Rolls

As soon as the period for voter registration is completed, the electoral roll is made available for public display for five consecutive days. In fact, since it is a book, it is not displayed, rather members of the public may "only look at the relevant pages of the roll or listen to it being read". No elaboration of relevance, or when the voter or party agent or observer may listen instead of reading the book. This is understandable, given that the book is the original and that there is no copy. However, this hardly amounts to any significant level of transparency of the electoral rolls. The public may lodge complaints. There is a Grievance Committee at Polling Station level with appeals possible to Constituency and Woreda level (but no higher).

Special Registration Processes

The law makes provision for mobile registration but only for pastoralists. There is also provision for special registration of university students and military personnel. This mechanism allows for persons to register at one location (where students are studying or where military personnel are stationed) but vote at another. This presents a challenge for registration (accurate determination of the home constituency) but particularly for polling operations (ballot papers, in the correct quantities, for all constituencies, must be delivered to the special polling stations) and for counting and results management. This mechanism has come in for criticism, not least because the results are only made public if they are material to the outcome - that is, if they change the outcome of the election as counted and announced at Constituency level.

Notwithstanding, NEBE has experience in managing a special voting mechanism which may be a suitable basis for future and important enfranchisement of IDPs of which there is a very large number in Ethiopia.

Personnel Involved in Registration

The voter registration process is delivered at polling station by five officials (Registrars), and is observed by five Public Observers. There is provision in the law for the agents of political parties and candidates to observe the registration of voters. Only one of the five Registrars receives formal training. The other four are, according to interlocutors, "briefed" by the one Registrar who received training. All staff receive a stipend that, according to interlocutors, is so low as to dissuade persons with more education from participating. This has a negative impact on the quality of staff working on voter registration. The very low level of remuneration would be a huge barrier to recruiting persons to operate any technology used at polling station level for voter registration, according to many interlocutors.

Assessment of Process - Pros and Cons

The voter registration process has advantages and disadvantages. First, and foremost, the process is inexpensive and sustainable. Because of the periodic nature of the process, the electoral rolls that emerge from the process will be almost completely free from the names of deceased persons (a problem that plagues voter registration in many countries). There should be minimal inclusion of persons who relocate. So Ethiopian electoral rolls may be said to be generally accurate and complete (bearing in mind the voluntary nature of the process - complete does not mean that 100% of eligible persons will necessarily participate[2]). The flexible provisions for determining identity and eligibility serve to enhance, not suppress, participation in the democratic process. There is a locally managed complaint and grievance process, with avenues of appeal for citizens who are not happy with the decision of the polling station grievance committee (first to Constituency, and finally to Woreda level committee/court).

On the down side, there is a lack of any substantive supervision and oversight of the process - right from recruitment of most Registrars, the choice of Public Observers through the registration itself and the limited public display of the resulting electoral rolls. There is no centralisation of actual voter data, other than aggregate reporting of numbers (and genders and broad age cohorts) of voters

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[2] : The 99.5% participation rate reported in 2015 (source, AU EOM 2015 preliminary report) is worth investigating given the voluntary nature of the process.

registered. There is no opportunity to conduct any analysis on data. There has never been (to our knowledge) any list-to-people or people-to-list field survey conducted to determine empirically whether the electoral rolls are accurate, complete and free of non-existent or duplicate registrations. Nor is there available any statistics on the number or nature of electoral complaints with respect to voter registration. Though members of the public and stakeholders can access the electoral rolls, this access is highly restricted and inadequate to permit effective public scrutiny. Supervision, oversight and transparency of electoral rolls are three areas where NEBE, with minimal investment, can significantly and positively enhance the voter registration process with consequential improvements in stakeholder confidence.

Reported Problems with Voter Registration

Few interlocutors have suggested that the vulnerabilities in the system are widely exploited and that electoral rolls are packed with ghost or duplicate or underage voters. The problem for this analysis is that there is scant evidence that supports these allegations, however plausible they are. Consecutive EU EOM reports (2005 and 2010) make reference to the systemic deficiencies in Ethiopian voter registration but do not offer any evidence, even anecdotal evidence or complaints from national interlocutors, to support any conclusion that the electoral rolls were problematic. The African Union observer mission to Ethiopia in 2015 (none of whose reports are available from the AU or EISE websites) preliminary statement[3] reads

> *"Cognisant of the fact that civic registration in Ethiopia is localised and manually done, the AUEOM noted that the voters' register is also manually done and it is localised per polling station. The absence of a centralised voters' register makes it difficult for parties, independent observers and other stakeholders to undertake an audit to confirm its authenticity. The AUEOM notes that the credibility of the voter register is fundamental to the integrity of elections."*

Multiple interlocutors have suggested that the electoral rolls have not been the primary concern of electoral stakeholders in previous elections. Most interlocutors have echoed the findings of several international and regional electoral observer reports[4] that it is the management of results that is the least trusted aspect of the election process - not the electoral rolls.

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[3] African Union Election Observation Mission to the 24 May 2015 Parliamentary Elections in the Federal Democratic Republic Of Ethiopia, "Preliminary Statement Presented By H.E. Hifikepunye Pohamba Former President of the Republic Of Namibia and Head of the African Union Observation Mission. Addis Ababa, 26 May 2015" URL available on request to author

[4] EU EOM 2005 Final Report, p5, "EU observers witnessed cases that suggested serious irregularities with election results, including figures that were implausible." P21. "The process of counting in polling stations, re-counting at the constituency level and the publication of detailed results was very slow and flawed in many constituencies." EU EOM 2010 Final Report p32 " Equally important for the transparency of the process, in 25% of observed polling stations results forms were not given to all party agents and in nearly half of the polling stations observed by the EU EOM, results were not publicly posted as required. This significantly reduced the transparency and credibility of the process." AU Preliminary Statement on 2015 Elections "65. The AUEOM also notes that while in most of the polling stations the Presiding Officers posted the result sheets in line with article 76(1) of the Proclamation[7], a few polling stations did not comply with the

Accordingly, it is difficult to determine what the problems with Voter Registration actually are. The possible role of technology in improving the voter registration process must be carefully weighed in terms of which issues it can resolve and to what extent. Only then can a sense of the cost-benefit analysis be determined - to what extent does a given technology contribute to improving electoral integrity, and is it worth the cost to achieve this improvement?

Conclusions

Examining each of the potential issues with electoral rolls....

* non-citizens are registered

* persons under the age of 18 are registered

* non-resident persons are registered

* persons are registered more than once, or in more than one location

...we have to recognise that biometrics can address only one - the last one - and that other mechanisms must be found to address the first three. Biometrics cannot motivate citizens to go out and register - so a fifth problem with the voter registration process - that of non-participation or under-representation of women, youth, IDP or other groups - must also be addressed by other means. What biometrics can do is help inhibit multiple registrations (where in-kit matching warns of such an attempt at the polling station) and flag any duplicate registrations for possible removal by NEBE (where biometrics captured from different kits are centrally matched later). All the other potential problems need to be addressed by other means.

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provision. 66. The AUEOM wishes to reiterate the importance of the transparency of the counting and vote tabulation processes, as they are crucial to the overall integrity of an election."

Documenting Identity in Ethiopia

For electoral purposes, and in order to maximise participation, the VR components of the Electoral law and directives allow wide latitude with respect to documents acceptable for voter registration. Indeed, the law allows a person to be registered without any identity documents at all - identification by electoral officials or "through traditional or customary means in the case of rural areas" or testimony of public observers, "recorded in the minutes", is sufficient. Adding biometrics to such undocumented registration risks exaggerated credibility for the resulting record. Biometrics can tell you that a person is the same person who previously enrolled (authentication) or is a person who previously enrolled (biometric identification]. But biometrics cannot establish or authenticate the identity of a person who is not already enrolled in the system, i.e. a person whose identity has already been established by other means. It is a widespread fallacy that biometrics enhance the credibility of a person's identity. They do not.

By far the most commonly held identity document is the Kebele card, issued by the lowest level unit of local government (also called Kebele). Most interlocutors agreed that this ID document is so easy to obtain that it guarantees neither identity nor uniqueness. It is "relatively easy to forge."[5] [footnote]

Many interlocutors confirm that many Ethiopians hold multiple Kebele cards - the majority of these being new cards issued when you change address and not attempts at creating multiple identities.

Readers of this study will be assumed to have some familiarity with the efforts of the Government of Ethiopia to bring convergence and standards to bear on the difficult, but developmentally crucial matter of identity[6].

The legal "ownership" of identity is also in flux and may change. While the Digital ID project seeks to create an India-style foundational identity platform, the agencies within the Ministry of Peace with the current legal mandate on identity are under the Ministry of Peace. This institutional arrangement is under review and, by the time NEBE must reach a decision on whether and what to share (of any voter data or biometrics it may capture), it is vital that there be legal clarity on which agency will benefit from any capture of biometrics by the electoral management body. NEBE must know so that it can communicate openly and honestly to potential voters what data and biometrics it intends to capture, and for what purpose. This communication must be clear on what other agency or agencies NEBE will share data with post-elections. Prospective voters (and political parties and civil society) must know clearly in advance what the intention is. NEBE messaging for any biometric voter registration exercise involving biometrics may also warn people that if they have multiple identities, the one they use to register to vote may be the one they are stuck with down the road.

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[5] World Bank. 2016. ID4D Country Diagnostic: Ethiopia, Washington, DC: World Bank, http://pubdocs.worldbank.org/en/822621524689442102/Ethiopia-ID4DDiagnostic-Web040418.pdf, accessed on June 27, 2018. As cited in "Ethiopian Kebele cards", Danish National ID Centre, https://www.nidc.dk/-/media/nidc/Dokumenter/Notatbibliotek/03102018-Ethiopia--Appearance-and-issuance-of-the-Ethiopian-kebele-card.pdf
[6] Sustainable Development Goal 16.9, calls for "legal identity for all, including birth registration by 2030." https://sustainabledevelopment.un.org/sdg16

As outlined in the December 2018 report from ECES[7], there is a plethora of identity databases in the country, some with biometrics, others without. These are of limited value to NEBE in the very short time available for any field exercise as the time it would take to properly associate any records therein with polling stations (a necessary prerequisite for use of such data for voter registration) exceeds the time available. In any case, any voter registration exercise for 2020 would be better to start with a blank sheet and be fully owned by NEBE rather than a patchwork of other databases of unknown quality and (potentially) questionable provenance. As currently legislated, the voter registration process requires citizen-initiated in-person registration at a polling station. Any use of data from other sources would require legislation.

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[7] "Identification-Formulation Mission Ethiopia, Final Report" ECES, Addis Ababa 22-Dec-2018

NEBE Institutional Capacity

Voter Registration

The highly decentralised and largely local VR process in Ethiopia allows NEBE HQ to define procedures, procure and distribute materials to Region or Zone, collect interim and final voting statistics and report same. There is no central database of voters, no quality control or audit mechanisms to validate lists created in the field, and no electoral dispute mechanisms relating to voter registration.

NEBE interlocutors spoke of the challenges they face in recruiting and training ad-hoc staff who conduct voter registration. The extremely low remuneration offered can result in poor quality staff, while the low budgets for training mean that only one of the five personnel per polling station gets any formal training, and the others rely on this person to "brief" them. We were informed that the NEBE HQ recruits staff, while other sources[8] suggest that staff are recruited by the Regions Poorly paid and poorly trained staff means poorly conducted voter registration.

Several interlocutors in NEBE complained about the difficulty in getting interim and final aggregate VR numbers from the field. This resonates with findings in, for example, EU EOM reports of inconsistent and sporadic VR data. [footnote EOM...]. This is due in large measure to the lack of permanent Constituency offices, the absence of any NEBE communications and field reporting infrastructure, and the zero or low budgets available for individual electoral officers to use their own devices to communicate with Regional NEBE offices.

While NEBE's existing capacity may be adequate to conduct voter registration in the manner it has done so previously, any improvements to the process (even in Scenario 1 hereunder), would need, at minimum, investments in infrastructure, communications, full time human resources, creation of effective recruitment and training mechanisms. It is unclear whether the resources for these investments are available, or will be available in sufficient time to develop NEBE capacity in time for 2020.

NEBE's current capacity is inadequate to undertake a high-tech exercise. Even if unlimited resources became available to address the capacity limitations, there remains the risk that the institution may not be able to absorb these in the limited available time. Accordingly, NEBE capacity on VR is a genuine risk factor that increases rapidly with the complexity and sophistication of the chosen approach to voter registration for 2020.

ICT

The total ICT headcount, as reported to UNDP, is 19 persons at NEBE centrally, of whom 5 work for the Resource Centre, meaning just 14 report to the Director IT. Other than some rudimentary databases, no electoral information systems of any significance are in use. Sporadic use of desktop office productivity applications, electronic mail, was observed. An integrated database is in development by INSA (the Government of Ethiopia Information System Security agency) but it is unsure whether this will be suitable for use in the scenarios herein - further scrutiny of the system

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[8] "regional offices engage with local government and oversee revisions to the polling station map, as well as recruitment of voter registration staff and poll workers" - CEPPS Ethiopia Pre-Election Technical Assessment 2020 General Elections, p.12

under development is appropriate. The provenance of this system may also be problematic given NEBE's heavy reliance on agencies of Government.

The situation at Regional Branch offices is similar or worse. There were reportedly two positions for IT support staff at the Oromia Regional State office of NEBE, but both were vacant as there was "no technology for them to support." Anecdotal reports from other offices suggest similar low levels of ICT usage and staffing.

It is understood that the NEBE website will be re-launched in 2019 but there is no current online presence of NEBE. Again, external agencies are involved, raising questions about ownership of the online presence. There is no internal electronic mail system and NEBE personnel use their personal webmail (Gmail for example) accounts for official purposes.

Any implementation of the Scenarios for voter registration envisaged in this report would require that NEBE recruit large numbers of IT professionals for both permanent and temporary work. A draft assessment undertaken by UNDP of NEBE capacities, however, points out that the low level pay structure of the organization makes it very difficult to attract and retain skilled and experience IT personnel. This is a global problem for elections management bodies. For the purpose of this study, this problem must be flagged as a **major** risk factor.

Electoral Operations/Logistics

NEBE has a sizeable facility in the outskirts of Addis Ababa (The NEBE Training Centre Compound) where the Director of Operations and his team will soon relocate from the current HQ. This site includes some warehouse facilities, offices and, amongst other functions, a printing press.

From here, NEBE has, in previous elections, managed the operational and logistical aspects of voter registration and elections. Many of the buildings are in dire need of refurbishment. There is a reasonable amount of unused land at this location where permanent or temporary additional warehouses or other office facilities could be constructed. Conceivably, a disaster recovery site for NEBE's ICT operations could be located here.

NEBE does have permanent offices at Regional State level, but not all of these (reportedly) include adequate warehousing or logistical facilities. NEBE draws on other Government of Ethiopia agencies, ministries and similar public bodies to provide much of the operational and logistical support necessary to conduct voter registration and electoral operations. At Constituency level, too, temporary facilities are loaned by co-operating agencies, or rented.

In order to effectively implement a nationwide deployment, support and recovery of technology, the Operations department is going to have to provide to the IT department the following:

- Warehousing and storage facilities appropriate for the technology[9] in question
- Technical Support Facilities (including workspaces where equipment can be configured, tested, repaired, with adequate power, air-conditioning, networking and physical security
- Data Centre

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[9] Where lithium ion and similar battery technology is to be stored, the ambient temperature, if not controlled, has a significant bearing on the lifespan of the equipment

- Data Entry Centres
- Transport logistics to deploy, support and recover equipment and data
- Logistics associated with movement of ad-hoc staff for training and VR activities

Recruitment and Training

Many interlocutors spoke of the difficulty of recruiting ad-hoc election workers (for registration and polling) of sufficient quality because of the low levels of pay. The resource shortage also manifests itself in the low levels of training given to too few of these workers - just one in five of the Polling Station workers get formal training, and they must "brief" the other four.

Most available reports on previous elections, and all reports read[10] that look toward 2020 speak of the need to seriously address the training deficiencies previously experienced.

The recruitment and training challenges come into even sharper focus where technology is introduced into electoral processes. The old approach (one-in-five[11]) will simply not work. And the old-fashioned training methodologies (reportedly one trainer "lecturing" a hall full of two hundred trainees) will also not work. Only if NEBE can do professionally-delivered, classroom instruction in appropriate trainer/trainee ratios, with hands-on use of equipment and systems, should NEBE try to implement high technology solutions for 2020.

While there appears to be significant numbers of competent higher education graduates available to NEBE going forward, the lack of resources for adequate (and attractive) salaries and per diems, coupled with the lack of resources for adequate training mean that recruitment and training must be considered a high risk factor for any technology innovations for 2020.

It was hoped that the 2019 Census would have served both as a clear indicator of the feasibility in Ethiopia of nationwide field-deployable technologies, and provide to NEBE a pool of known capable human resource. The postponement, yet again, of the Census[12] both robs NEBE of the learning opportunity and may, depending on the timing of the rescheduled enumeration period,[13] deprive NEBE of the human resource pool.

Legal

The legal department at NEBE is aware of, but not driving the process of drafting new legislation. It is understood that enabling provisions[14] will be included in new NEBE electoral law. These provisions basically leave NEBE to use directives (the Ethiopian term used for regulations) to fill in the gaps. This buys more time, but adds to the effort required once the new NEBE is formed. Since Constitution, Proclamation (law) and Directives (regulations) comprise the "business rules" for any use of

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[10] EU EOM 2005 Final Report, p5. EU EOM 2010 Final report, p4. EU ECES Mission Report, December 2018, multiple pages. CEPPS External Assessment Report p16.

[11] Multiple interlocutors report that, due to budget constraints, only one in five of Registrars per polling station received formal training. These one-in-five then informally brief other staff.

[12] https://ecadforum.com/2019/03/19/ethiopia-commission-pushes-census-timetable-once-more/ See also https://www.thereporterethiopia.com/article/commission-postpones-census

[13] A number of sources suggest that November 2019 is being considered. This may overlap with NEBE VR exercise - a highly undesirable scenario.

[14] Draft language shared with us includes wording along the lines of "The Board may set up permanent voters' record by deploying modern technology…" and "The details of the … will be determined by a directive or regulation issued by the Board".

technology by NEBE, there is a risk that preparations for procurement may be delayed or derailed should a legal process diverge from assumptions. In the worst case scenario, a technology already procured and deployed may be found to be deficient with respect to a legal requirement. NEBE does not have ownership of the process of drafting new electoral laws, rather this is being undertaken by the Legal Advisory Council under the Federal Attorney General. Interlocutors involved in this process report that general enabling provisions with respect to technology will be included in the draft electoral proclamation leaving NEBE free to elaborate in their Directives. Since neither the Legal Advisory Council nor NEBE's Legal department have previously legislated/regulated BVR, there is a capacity gap that must be filled.

Other

NEBE does not undertake any significant procurements in-house. A low (but unspecified) ceiling exists for small local procurements, but once the amount exceeds this, the procurement is handled by the relevant public procurement agency. Any procurement on the scale envisaged in Scenarios 3, 4, or 5 below would expose NEBE's capacity constraints in this area. The technical and operational requirements for a BVR solution need to be drafted by experienced technical experts who have both the technology and electoral experience or a team comprising a mixture of such skills. The Scenarios in this document assume some international technical assistance would be provided in the area of elections technology procurement, but this is not assured - particularly if NEBE opts for other procurement modalities (for example, competitive or direct procurement via Ethiopian public procurement processes). When technology is procured at short notice by inexperienced agencies, the risk of price inflation, delays to timelines, vendor lock and inappropriate solutions grows steeply.

Summary

Strengths	Weaknesses
• NEBE has conducted VR successfully in the last three General Election cycles. The institutional knowledge is there.	• NEBEs capacities in ICT in particular, are very limited.
• NEBE can leverage resources from other public bodies to achieve electoral outcomes.	• NEBE has had to cut corners, particularly on training, because of past resource constraints.
	• The gap between current and required capacities may not be bridged in the available time
	• NEBEs aspiration to greater autonomy may be undermined by dependence on technical assistance and vendor in any high-tech initiatives.
	• NEBE lacks experience in substantive technology procurements.

ICT for Voter Registration in 2020

Working Assumptions

Too many variables are in play to allow all possible permutations and combinations to be discussed. For clarity, a number of working assumptions and planning parameters are essential, so that the Scenarios below can be compared like with like, and their relative merits and demerits considered fairly.

The following working assumptions and planning parameters prevail in this study. They are subject to change.

- ~~The Census will be completed in time to inform electoral boundary delimitation exercise~~
- ~~The tablets procured by the GoE for CSA will be available for NEBE use for voter registration and results management initiatives[15]~~
- There will be no Local Government Elections or Referenda held before General Elections 2020
- The planning date for General Elections is late May 2020
- VR must be completed 3 months prior to election day. This is practice, not law.
- Voters may be struck off the electoral roll, as provided for by law, up to election day
- Voter Registration will be conducted simultaneously nationwide.
- Claims and Objections (public display of provisional voter lists) will be conducted immediately following the registration exercise as per current procedures.
- Any procurement for polling-station use will be for 50,000 units.
- Any procurement for Constituency level use will be for 600 units.
- UNDP procurement modalities will be used for the purpose of the Scenarios in this study. Other modalities are available to NEBE.

As can be seen, the first two key working assumptions are already obsolete. The indefinite postponement of the 2019 Census has the immediate impact that we can no longer assume that the tablets procured for Census (and previously confirmed as available to NEBE post-Census) can be used. While circumstances may change, this study, of necessity, assumes that the tablets are with the Census agency.

Also, and more challenging for NEBE's electoral operations planning, no Census data will be available in time for voter registration. Equally important and politically sensitive, the delimitation of electoral boundaries (which should be completed prior to voter registration) may be delayed with potentially severe consequences.

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[15] Reportedly, despite the indefinite postponement of the Census, the tablets may possibly be available to NEBE. However, for elections planning purposes, such possible resource availability is not acceptable. Hence, the assumption is deleted. Should the tablets be confirmed as available, this development would require fresh planning.

Factors for Consideration

This section is where the use of technology to help NEBE improve its voter registration process is discussed in greater detail. It is important, before looking at individual scenarios, to raise some general points. A list of resources offering deeper reading opportunities on biometrics and the use of technology in elections is contained in Annex 3 - Further Reading.

Voter Registration Processes and Best Practice

The generic process flow for a BVR process is as illustrated in Figure 3 Generic BVR Process Flow Diagram:
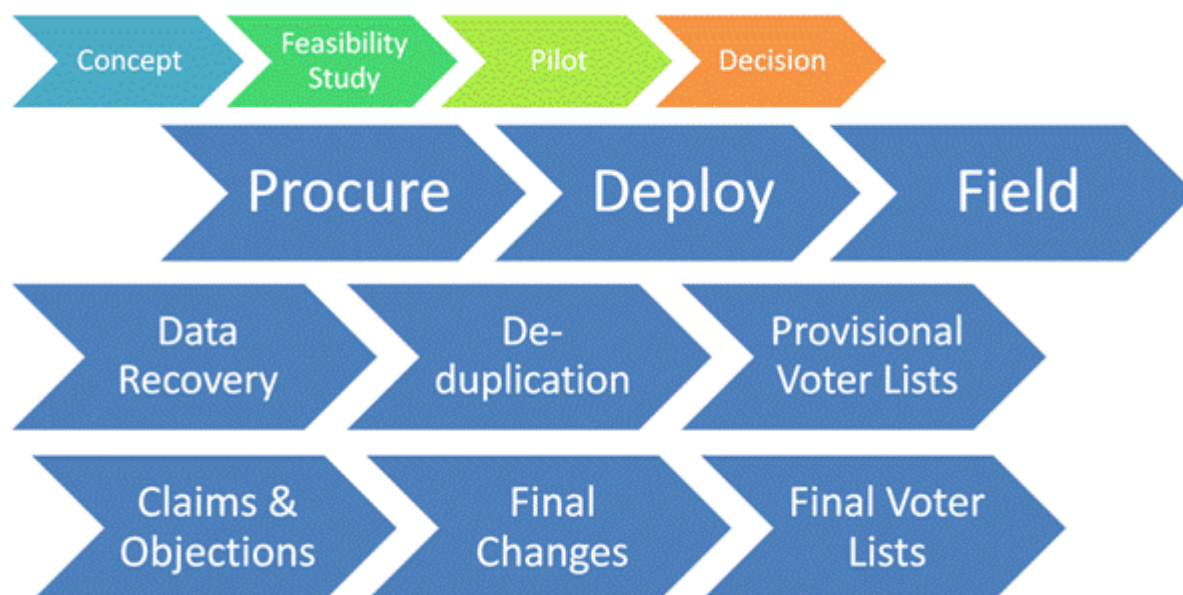
Figure 3 Generic BVR Process Flow Diagram

Because of the highly compressed timelines assumed for planning purposes it will not be possible to print a Provisional Voter List, distribute this to each Polling Station and conduct Claims and Objections based on this list. Instead, and following closely the current paper model as legislated, the Scenarios below envisage the immediate public display of electoral rolls. All transactions arising from the public display will be incorporated into the paper books in all Scenarios, and also data-entered into Tablet (Scenarios 3 or 4) or Laptop (Scenario 5) applications.

Final Voter Lists emerging following the use of biometrics to de-duplicate will have registrations adjudicated as duplicates removed. These final lists will not have been subject to public scrutiny and no redress is envisaged for voters wrongly removed from electoral rolls

While this approach is a reflection of current legal provisions (that allow voters names to be removed from electoral rolls right up to Election Day) , it falls short of best practise. It is a shortcut necessitated by the limited time available.

Further reading on the principles involved are listed in Annex 3 - Further Reading.

Biometrics; which biometrics; how much biometrics?

Elections management bodies use biometrics for two purposes. First to identify possible duplicate registrations so as to eliminate duplicates from voter lists. Second, less frequently, to facilitate verification of voters on election day. The decision to use biometrics should be taken where there is evidence of widespread multiple registration.

Once the decision to use biometrics is taken, the next consideration is - which biometric characteristic should be captured? Each of the most commonly-used biometric characteristics have their pros and cons. For electoral purposes, where technology is deployed to the field, it is almost always the case that the facial image is captured. Whether or not to use this as the basis for using facial biometric depends on factors such as image quality, time and cost. Facial image quality is significantly dependent on the environment in which the photograph is taken. Even with the best equipment and software, it is the training of the person who will operate the system that is the key driver of image quality.

The most widely-used biometric characteristic in most electoral applications has been fingerprints. The technology for biometric enrolment of fingerprints is mature and cost effective. However, as well documented, there are categories of people whose fingerprints are difficult and, occasionally, impossible to capture. Even with the best equipment and training, some citizen's biometric may not be captured. Failure to Acquire (FTA) is when nothing captured at all by the sensor (amputee, missing or bandaged finger, bandage on head, blind person with missing eye, etc.) Any population engaging in BVR will have numbers of people whose biometrics cannot be acquired at all. Then there is Failure to Enrol – where the image of biometric characteristic is captured, but system cannot extract biometric features or the extracted features are of very poor quality.

Because of the difficulty in controlling the environment in the field, higher failure to acquire (FTA) and failure to enrol (FTE) rates[16] in mobile BVR systems that use fingerprints (the majority) than in typical fixed (border control or national ID) systems. Similarly higher FTA/FTE rates in rural areas than in urban areas, because of the larger proportion of persons in certain categories (manual or farm labour, extractive industries, mechanics, certain types of food processing, charcoal handling). Great emphasis on hygiene (both of the sensor and the fingers of the subject) must be made during training. Operators of BVR kits must be trained and equipped (cleansing liquids / wipes etc.) to minimise FTA/FTE.

It is vital that any BVR process is configured to ensure that fully eligible citizens are not disenfranchised by FTA or FTE. Similarly any subsequent use of biometrics captured at BVR (for EVID/BVV or electronic voting systems) must also ensure that eligible citizens are not denied the right to vote because of current or previous FTA/FTE.

The use of multiple biometric characteristics (such as envisioned in Scenarios 4 and 5 below) helps overcome many FTA/FTE issues, but does so at a cost, both in terms of equipment required, and time to enrol.

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[16] Failure to Acquire is where no biometric is available - missing or bandaged fingers, for example. Failure to Enrol is where, despite the availability of the biometric characteristic, the system is unable to capture this at a sufficient quality level to extract a usable biometric template.

As described earlier in this report, the Government of Ethiopia's Digital ID vision is to capture foundational biometrics of all residents in the country, including ten fingerprints, the face and both irises. NEBE may wish to avail of its field exercise to capture the full range of biometrics with the purpose of sharing these biometrics in due course with the appropriate agency. However, it is important to recognise that, for electoral purposes, a more modest subset will suffice. This is implicit in Scenario 3, and also in the modest fingerprint scanners used in Scenarios 3 and 5.

Human Adjudication

All biometric matching is probabilistic. This is because, however carefully you design the system, a number of factors, especially the quality of the initial capture and biometric enrolment, contribute to errors. FTA and FTE also contribute to overall system error rates - if you cannot match, you cannot detect.

Errors mean that both false matches (where a voter is wrongly deemed to be a duplicate) and false non-matches (a duplicate registration goes undetected) will occur. The larger the population, the greater the number of false matches and false non-matches.

Because of this, best practise requires that when biometric matching should only be used as a tool to identify potential duplicates in a voter registration database. Thereafter, trained users will examine each duplicate and adjudicate - is this a duplicate registration, or not? Based on this adjudication, and the law and procedures of the elections management body, action may be taken. Even in cases where there is a legitimate match, there may be multiple options for actions to take. Aside from attempts to defraud the system, duplicate registration can happen for a number of innocent reasons – operator error, where an operator enrols the same person again in an attempt to correct an error; vanity may cause a voter to attempt to reregister to replace a photo they are not happy with; voter relocation during registration may lead to a voter re-registering in an innocent attempt to change polling station, etc.

Where very large numbers of duplicates are flagged (in large populations, where poor quality enrolment has occurred) the use of computer algorithms alone to remove duplicates carries the real risk of disenfranchising legitimate, unique voters. For this reason, human adjudication is deemed a minimum standard. Figure 4 illustrates a typical application used for this purpose. Given the size of the population of Ethiopia, a sizeable effort will be required to establish Duplicate Adjudication facility at NEBE where trained staff will ensure that only real duplicate registrations are processed.
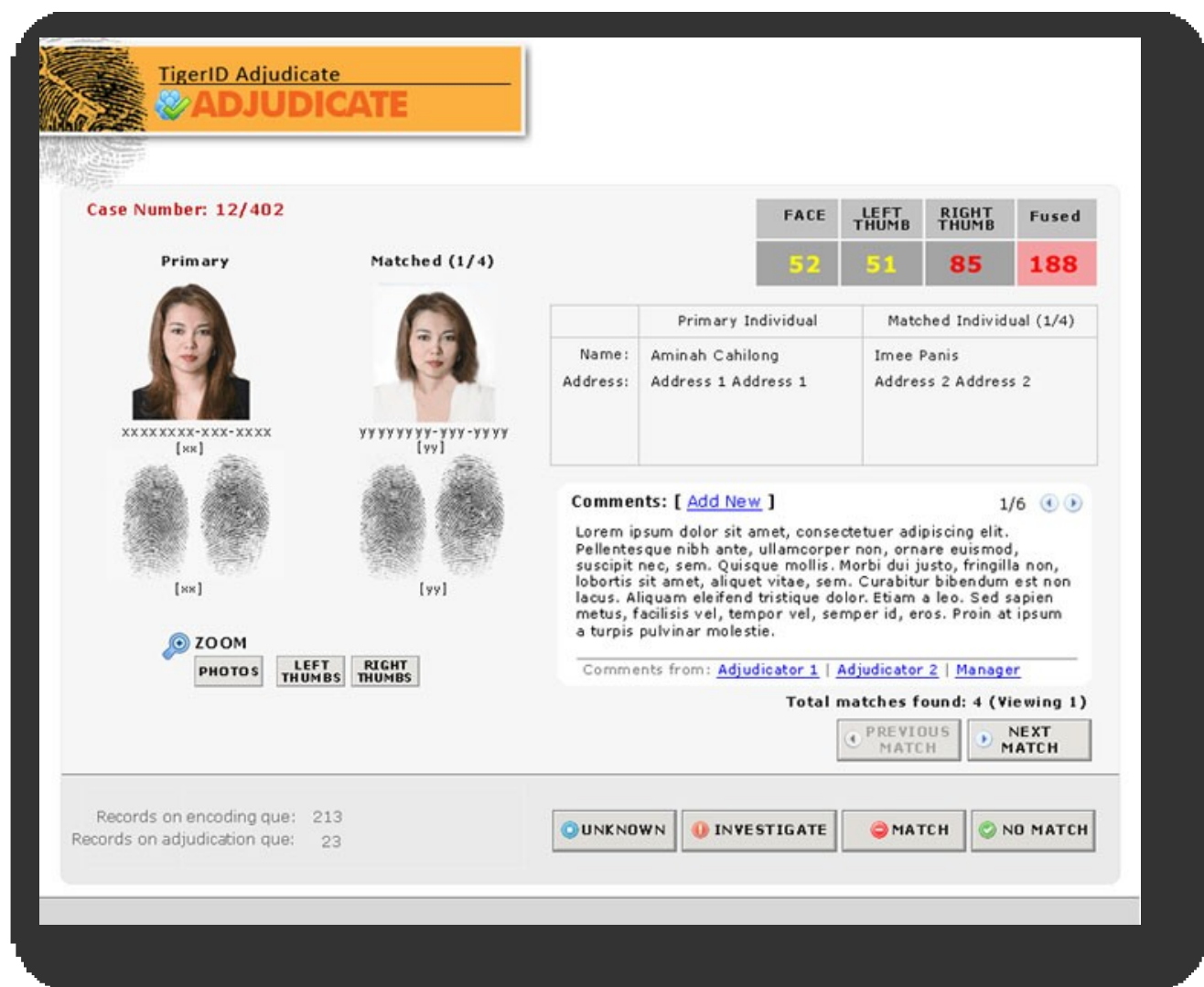
Figure 4 Example of an Adjudication Application (Source: TigerID)

Nationwide simultaneous VR or Phased VR?

The cost of a BVR exercise is the total of the cost of

- BVR kits
- data recovery middleware and infrastructure
- data centre and applications at the back end
- logistics
- human resources:
    - personnel
    - training
    - movement and
    - support staff

The very high cost of the kits often forces EMBs procure a smaller number (usually 20% of the number of locations to be served) of kits, and then conduct BVR in phases. The capital cost goes

down, because fewer kits are purchased, but the operational cost goes up slightly, as the cost of recovery and re-deployment of personnel, equipment etc adds to the recurrent budget.

Because of the extremely tight timelines for procurement in Ethiopia (given a completion of VR by end February for May 2020 elections), this study assumes that a **phased** BVR process is simply not feasible. Accordingly, Scenarios 3, 4, and 5 all assume that, as per the current process, voter registration will take place at 45,000+ polling stations nationwide simultaneously.

Localization

In its preparations for the imminent 2019 Digital Census, the CSA prepared its enumeration application in the five official languages used in Ethiopia. There is a political dimension to the provision of service in more languages. Discussions with multiple interlocutors leads to the conclusion that NEBE, will need to similarly localize it's VR applications in order to properly staff and conduct registration in all regions.

Accordingly, all databases, software application user interfaces, reporting tools, user training materials, voter outreach will have to be translated from source language into 4 or 5 local languages. This is technically feasible[17] but adds to the time and cost of the exercise.

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[17] Experience in other countries has shown that computer fonts, in particular, are difficult to standardise. No time was available to further explore this challenge, but it is an important issue to be elaborated well in advance of any procurement.

Scenarios for Voter Registration - Overview

Table 1 Overview of VR Scenarios for 2020

	Enhanced Manual	Digitized Voter Lists	Tablet Photo List	Tablet-based Full BVR	Integrated BVR Kit
Biometrics			✔	✔	✔
Audit Electoral Roll	✔	✔	✔	✔	✔
Register Format	Scanned Book	Scanned Book	Photo List	Photo List	Photo List
Voter ID Card	✔	✔	✔	✔	✔
VR on WWW		✔	✔	✔	✔
SMS Lookup		✔	✔	✔	✔

Scenario 1 - Enhanced Manual

Description

A mixture of simple-to-implement technologies and other mechanisms are applied in order to enhance the existing voter registration methodology by allowing greater transparency and NEBE oversight of the process. The key innovations are:

- Every polling station-level voter registration book is scanned and made available to stakeholders, including possibly online.

- NEBE conducts a list-to-people audit of the lists to measure the quality of the outputs of the voter registration process

- Significantly more and better training is delivered to ad-hoc Voter Registration Staff and other staff.

- Improved communications mechanisms between NEBE HQ and the field

Overview of Process

NEBE offices at Regions and Constituencies will be need to be equipped and connected as appropriate to facilitate this process. Procurement for this will commence well ahead of time.

Unlike previous voter registration exercises, NEBE will conduct more, and better training of Registrars. This will include a reminder to those staff that their work will be audited. Registration will take place as it does currently. Better design of the voter registration books will facilitate subsequent processing.

An improved voter card will be printed that will include a unique Voter ID number. This will be written into the registration books.

Once the voter registration process is complete at the Polling Station level, the books will be returned (as per current practice) to the Constituency Office. Here, each book will be scanned and a PDF file will be created for each Polling Station list. Other key forms may also be scanned[18]. Using appropriate channels, scanned VR books will be centralised to NEBE HQ.

During the process, improved field reporting mechanisms will facilitate better oversight and supervision by NEBE Regional and HQ of the ongoing process. Faster and more accurate voter registration statistics at NEBE HQ will also allow for greater transparency as the process evolves.

NEBE will share polling station level PDF files with stakeholders. This may be done using a variety of channels, with the simplest being the internet, via its website.

NEBE will conduct or commission a statistically rigorous sample-based list-to-people survey that will take cognisance of available granular Census data (enumeration-area level demographic data - sub-Kebele). The methodology will be such that the finding may be extrapolated nationwide with as high

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[18] For example, the minutes of Grievance Committees and the daily accounting forms.

degree of confidence as possible. As with any such exercise, the key is to conduct this audit activity sufficiently far in advance of the election to allow NEBE to take remedial action should the results reveal any problems with the voters lists.

An important point to make about the public sharing of scanned electoral rolls and the audit mechanisms is this - all staff who conduct voter registration must be informed in advance (during their training, for example) that their work will be subject to audit and to public scrutiny. This should have a positive impact on productivity and serve to inhibit malfeasance.

Technology Requirements

A modest data centre must be established at NEBE HQ. At NEBE Regional State offices, and at 571 Constituency NEBE Offices, modest scanning workstations will be installed, with local area networking as appropriate and communications links. Each Constituency Office will have 1 or more A4 document scanners[19] installed with generic document scanning software. Each PDF file will be stored locally and either transmitted (email, FTP, as appropriate) or copied to removable media.

NEBE website and hosting arrangements (if used) will have to be appropriate for the volume and size of files, and the appropriate bandwidth and traffic capacity to serve the expected demand.

Alternatively (or in parallel, to minimise web server load), removable media (USB thumb drives) can be used to share PDF of Voter Lists with key stakeholders.

Human Resource Requirements

NEBE HQ:

- Data Centre Operations and Maintenance Personnel (Systems Administrators, database administrators) 2 to 4 staff
- NEBE HQ Network personnel 2 staff
- NEBE Information System Security/Compliance personnel
- Voter Registration - Personnel to receive, check, clean incoming PDF files from Constituencies - 5 to 10 capable administrative staff.
- Voter Registration - Personnel to collate and report VR aggregate statistics, and progress on Scanning 1 or 2 staff.
- Web Site / Outreach personnel to publish PDF 1 or 2 staff
- Training Material Development - 2 to 3 staff
- Training Material Translation to 5 Languages 5 staff
- Master Trainers (to deliver top of Cascade at Regions) - (2 staff per Region) 22 staff

NEBE Region Offices:

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[19] It is proposed to procure scanners that can handle A3 documents as well - this is in order that the scanners are available for RMS usage, facilitating A3 results protocols. For more details please refer to the separate report on RMS.

- IT 2nd Level Support Person x 1
- Regional VR Reporting Officer
- Regional Training officer (to deliver training to Constituency Personnel) 1 or 2 as appropriate

Constituency Office:

- Voter List Scanning Staff x 2 (approximately 1200 staff nationwide)
- IT Support Staff x 1 (approximately 600 staff nationwide)

Field Implications

NEBE will need to secure appropriate office accommodation at Constituency level. NEBE will have to procure the necessary infrastructure and equipment to stand up these offices. If all Registrars are to receive adequate training, more suitable training locations will have to be identified per constituency and the additional resources in terms of time and cost will have to be budgeted. Each Region will need to hire and train the Scanning staff and the IT support technician for each of the Constituencies under their control. Both Constituency and Regional State offices will have to support the delivery of extra training to more Registrars than in previous cycles.

Legal Implications

No e any major legal obstacles are perceived to this Scenario unless the absence of explicit legal provision allowing publication or sharing of copies of voter lists is deemed to prohibit it. If so, then narrow provisions of Article 28 of the Directive for the Registration of Electors (2/2009) will need to be amended.

Where electoral rolls are shared with stakeholders and public, it is appropriate to amend the legal framework (Law or procedure) to make it an offence to misrepresent or abuse the privilege. At minimum, any code of conduct (for political parties, for candidates, for media, for observers) should include provisions require these stakeholders to use and not abuse the privilege of the shared copies of the electoral rolls.

Concerns about privacy arise when voter data is made public. Due to a lack of time, this study did not examine the broader Data Protection/Freedom of Information framework in Ethiopia. However, there is a need to engage electoral stakeholders in a debate on the balance to be struck between the right to privacy/data protection of citizens and voters with the need for effective transparency in the voter registration process.

Indicative Costs

Based on UNDP Procurement Support Unit (PSU) estimates, indicative procurement costs for this scenario are detailed below.

Included:

- 55 million Voter Cards with unique ID number, in books of 100
- 100,000 40-page A4 bound, pre-printed Registration Books (approximately 14 voters per page), basic security features
- Scanning workstations (A4 document scanner, PC, software) two per constituency
- Appropriate data centre at NEBE HQ (including compute resources, storage, UPS, standby power)
- Data Recovery & Consolidation solutions
- Operational Training (ToT and Technicians)
- Field Survey
- Indicative Procurement Budget - Scenario 1: U$5,100,000

NOT Included:

- Human Resource (Scanning operators, Technical Support persons at Constituency
- Premises costs (electricity, furniture)
- Data centre premises preparations (refurbishment, cabling, power installation, air conditioning, furniture, fire suppression)
- Training (venue rental, trainer expenses)
- Ops/Logistics
- Communications costs between Constituency offices, Regional Offices, NEBE HQ data centre
- WWW hosting costs
- Public and Stakeholder Outreach

Indicative Timeline

If decisions are made and resources available in a timely fashion, there is adequate time to procure the necessary equipment, software and communications infrastructure necessary to deliver this scenario. There is also time to recruit and train the necessary personnel. All procurement in this scenario is based on LTA (Long Term Agreements) and procurement timelines are significantly shorter than for Scenarios 3, 4, 5. In broad terms, the key milestones to deliver this scenario are:

1. Decision to proceed - end June 2019
2. Resources available - end July 2019
3. Premises identified - end August 2019
4. Staff recruited and available for training - end September 2019
5. Equipment delivered (Addis Ababa) - mid October 2019
6. Equipment deployed to constituencies - end October 2019
7. Voter Registration Exercise mid-November 2019 to early January 2020
8. Scanning of Books at Constituency - early January 2020 - mid-February 2020
9. Survey/Audit of Sample of Books - mid January - mid-February
10. Consolidation of PDF at NEBE HQ - end January 2020 - end February
11. Sharing of PDF online or by other channels - End February 2020[20]

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[20] There is an alternative approach possible - once PDF have been scanned at Constituency level, they are immediately shared with political parties, citizen observers and other electoral stakeholders at Constituency level, with subsequent publication online as appropriate. NEBE will make appropriate decisions on when and to whom scanned electoral rolls will be shared.

Integration and Re-use

If, as reported by a number of interlocutors, NEBE will maintain a permanent office at Constituency Level, the equipment and infrastructure procured under this Scenario will remain in those offices. If not, then the equipment could be recovered to Regional or Central storage for use in subsequent elections (Local Government, Referenda etc). The equipment procured for this Scenario can be used by NEBE to facilitate a Constituency-level scanning of election results forms as part of a reformed RMS.

Risk Analysis

As Voter Registration will be the first major nationwide exercise to be conducted, it is NEBE's first chance to make a good impression. This Scenario seeks to enhance, not replace, the existing voter registration process. As such, it is reasonably low risk in the technical sense, meaning that any failure to scan and share PDF will not stop or delay the election from taking place, because the original electoral roll books will still be available as per current process.

However, if NEBE commits to the transparency of sharing scanned PDF files of electoral rolls and does not deliver, there is a risk of diminished stakeholder confidence in the institution itself and the election process.

The relatively low cost (over and above existing process) of the mechanisms in this Scenario also make it very unlikely that the resources necessary cannot be found and made available in time. The procurement processes envisaged are using UNDP LTA modalities, so high quality, reliability and competitive pricing may be assumed.

Scenario 2 - Digitized Voter Lists

Description

Scenario 2 adds one additional element to those already described in Scenario 1. Using the PDF files created at Constituency level, staff at a specially established Data Entry centre at Addis Ababa will conduct data-entry and create a text-only database of all voters registered.

Accordingly, the key elements of this Scenario are:

- Every polling station-level voter registration book is scanned and made available to stakeholders, including possibly online.

- NEBE conducts a list-to-people audit of the lists to measure the quality of the outputs of the voter registration process

- Significantly more and better training is delivered to ad-hoc Voter Registration Staff and other staff.

- Improved communications mechanisms between NEBE HQ and the field

- All voter information from the scanned voter registration books will be entered into a database at NEBE HQ Data Entry Centre in Addis Ababa

- Text-based analysis will be undertaken on the resulting database

- WWW and SMS-based mechanisms can be used to publicise VR data

Overview of Process

NEBE offices at Regions and Constituencies will need to be equipped and connected as appropriate to facilitate this process. NEBE will establish a large Data Entry Centre at Addis Ababa with approximately 1,500 seats. A more substantial Data Centre will be established. Procurement for these facilities will commence well ahead of time.

Unlike previous voter registration exercises, NEBE will conduct more, and better training of Registrars. This will include a reminder to those staff that their work will be audited. Registration will take place as it does currently. Better design of the voter registration books will facilitate subsequent processing.

An improved voter card will be printed that will include a unique Voter ID number. This will be written into the registration books, and will be captured when data entry is conducted.

Once the voter registration process is complete at the Polling Station level, the books will be returned (as per current practice) to the Constituency Office. Here, each book will be scanned and a PDF file will be created for each Polling Station list. Other key forms may also be scanned[21]. Using appropriate channels, scanned VR books will be centralised to NEBE HQ.

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[21] For example, the minutes of Grievance Committees and the daily accounting forms.

During the process, improved field reporting mechanisms will facilitate better oversight and supervision by NEBE Regional and HQ of the ongoing process. Faster and more accurate voter registration statistics at NEBE HQ will also allow for greater transparency as the process evolves.

NEBE will share polling station level PDF files with stakeholders. This may be done using a variety of channels, with the simplest being the internet, via its website.

NEBE will make voter information available online via an SMS platform. Using their unique Voter ID number (on the Voter Card issued when they registered) voters may send that ID number to a free SMS service. The SMS service will respond with a message detailing their voter record, and including the name and location of their polling station. If the number is not found, a suitable message will be issued[22].

NEBE will conduct or commission a statistically rigorous sample-based list-to-people survey that will take cognisance of available granular Census data (enumeration-area level demographic data - sub-Kebele). The methodology will be such that the finding may be extrapolated nationwide with as high degree of confidence as possible. As with any such exercise, the key is to conduct this audit activity sufficiently far in advance of the election to allow NEBE to take remedial action should the results reveal any problems with the voters lists. Broad consultations in advance of an audit are essential to get buy-in on the methodology, and to prepare electoral stakeholders for the results of the audit.

An important point to make about the public sharing of scanned electoral rolls and the audit mechanisms is this - all staff who conduct voter registration must be informed in advance (during their training, for example) that their work will be subject to audit and to public scrutiny. This should have a positive impact on productivity and serve to inhibit malfeasance.

Technology Requirements

A more substantial (than Scenario 1) data centre must be established at NEBE HQ. At NEBE Regional State offices, and at 571 Constituency NEBE Offices, modest scanning workstations will be installed, with local area networking as appropriate and communications links. Each Constituency Office will have 1 or more A4 document scanners[23] installed with generic document scanning software. Each PDF file will be stored locally and either transmitted (email, FTP, as appropriate) or copied to removable media.

A large Data Entry Centre will need to be established with approximately 1,500 workstations and appropriate networking and server infrastructure. Voter Registration Workflow applications will be procured and deployed. Trained Data Entry Operators will key data into VR database from the scanned PDF. Supervisory and Quality Control applications will be used to manage the process.

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[22] A variety of mechanisms may be included to assist voters who are in possession of a Voter Card but who cannot find their record using the SMS service. For example, a Call Centre might be established where voters can call up and make an enquiry as to the status of their voter record, if not found via SMS.

[23] It is proposed to procure scanners that can handle A3 documents as well - this is in order that the scanners are available for RMS usage, facilitating A3 results protocols. For more details please refer to the separate report on RMS.

NEBE website and hosting arrangements (if used) will have to be appropriate for the volume and size of files, and the appropriate bandwidth and traffic capacity to serve the expected demand.

Alternatively (or in parallel, to minimise web server load), removable media (USB thumb drives) can be used to share PDF of Voter Lists with key stakeholders.

An SMS solution will be procured along with hosting of same on Ethiotelecom network. This will allow voters to send an SMS with the Unique ID on their Voter Cards (issued in the field) to confirm their presence on the Electoral Rolls, and to confirm the location of their polling station.

Where text-based database analysis reveals possible duplicate registrations, the necessary procedural steps must be taken. Precisely how such duplicate registrations will be handled must be finalised by NEBE and appropriate directives issued.

Human Resource Requirements

NEBE HQ:

- Data Centre Operations and Maintenance Personnel (Systems Administrators, database administrators) 2 to 4 staff
- NEBE HQ Network personnel 2 staff
- NEBE Information System Security/Compliance personnel
- Voter Registration - Personnel to receive, check, clean incoming PDF files from Constituencies - 5 to 10 capable administrative staff.
- Voter Registration - Personnel to collate and report VR aggregate statistics, and progress on Scanning 1 or 2 staff.
- Web Site / Outreach personnel to publish PDF 1 or 2 staff
- Training Material Development - 2 to 3 staff
- Training Material Translation to 5 Languages 5 staff
- Master Trainers (to deliver top of Cascade at Regions) - 2 staff
- Data Entry Centre Operations and Maintenance Personnel 4 - 6 staff
- Data Entry Centre - Operators - 4,500 (three shifts of 1,500)
- Data Entry Centre - Supervisors - 300
- Data Entry Centre - Managers - 15

NEBE Region Offices:

- IT 2nd Level Support Person x 1
- Regional VR Reporting Officer
- Regional Training officer (to deliver training to Constituency Personnel) 1 or 2 as appropriate

Constituency Office:

- Voter List Scanning Staff x 2 (approximately 1200 staff nationwide)
- IT Support Staff x 1 (approximately 600 staff nationwide)

Field Implications

NEBE will have to find and equip a venue for the approximately 1,500-seat Data Entry Centre. This might be at the Logistics hub, just off the A1 highway, west of Bole International Airport, or at a suitable premises leased for the duration of the exercise.

NEBE will need to secure appropriate office accommodation at Constituency level. NEBE will have to procure the necessary infrastructure and equipment to stand up these offices. If all Registrars are to receive adequate training, more suitable training locations will have to be identified per constituency and the additional resources in terms of time and cost will have to be budgeted. Each Region will need to hire and train the Scanning staff and the IT support technician for each of the Constituencies under their control. Both Constituency and Regional State offices will have to support the delivery of extra training to more Registrars than in previous cycles.

Legal Implications

No legislative basis currently exists for creating a national voter registration database. Legal provisions to enable this, and to give NEBE the flexibility to regulate (issue directives) in detail are necessary.

The legal status of paper and electronic records must be crystal clear.

A legal basis for possible removal from voter lists of persons identified and adjudicated as duplicate registrations must be assured.

Indicative Costs

Based on UNDP Procurement Support Unit (PSU) estimates, indicative procurement costs for this scenario are detailed below.

Included:

- 55 million Voter Cards with unique ID number, in books of 100
- 100,000 40-page A4 bound, pre-printed Registration Books (approximately 14 voters per page), basic security features
- Scanning workstations (A4 document scanner, PC, software) two per constituency
- Appropriate data centre at NEBE HQ (including compute resources, storage, UPS, standby power)
- Data Recovery & Consolidation solutions
- Data Entry Workstations (1,500) and related infrastructure.
- Data Entry Applications
- Text-based de-duplication applications
- Operational Training (ToT and Technicians)
- Field Survey
- Indicative Procurement Budget - Scenario 2: U$7,145,000

NOT Included:

- Human Resource (Scanning operators, Technical Support persons at Constituency)
- Human Resource (Data Entry Operators, Supervisors, Managers)
- Premises costs (electricity, furniture) at Constituency Level
- Premises costs (electricity, furniture, etc) at Data Entry Centre
- Data centre premises preparations (refurbishment, cabling, power installation, air conditioning, furniture, fire suppression)
- Training (venue rental, trainer expenses)
- Ops/Logistics
- Communications costs between Constituency offices, Regional Offices, NEBE HQ data centre
- WWW hosting costs
- SMS system costs
- Public and Stakeholder Outreach

Indicative Timeline

If decisions are made and resources available in a timely fashion, there is adequate time to procure the necessary equipment, software and communications infrastructure necessary to deliver this scenario. There is also time to recruit and train the necessary personnel. All procurement in this scenario is based on LTA (Long Term Agreements) and procurement timelines are significantly shorter than for Scenarios 3, 4, 5. In broad terms, the key milestones to deliver this scenario are:

1. Decision to proceed - end May 2019
2. Resources available - end June 2019
3. Premises identified - end July 2019
4. Staff recruited and available for training - end September 2019
5. Equipment delivered (Addis Ababa) - end September 2019
6. Equipment deployed to constituencies - end October 2019
7. Voter Registration Exercise mid-November 2019 to early January 2020
8. Scanning of Books at Constituency - early January 2020 - mid-February 2020
9. Data entry of voter data from scanned books, early-January 2020 to end February
10. Survey/Audit of Sample of Books - mid January - mid-February
11. Consolidation of PDF at NEBE HQ - end January 2020 - end February
12. Sharing of PDF online or by other channels - End February 2020[24]
13. Sharing online of voter data - end March 2020
14. SMS system available for voter checking - mid-April 2020

Integration and Re-use

If, as reported by a number of interlocutors, NEBE will maintain a permanent office at Constituency Level, the equipment and infrastructure procured under this Scenario will remain in those offices. If

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[24] There is an alternative approach possible - once PDF have been scanned at Constituency level, they are immediately shared with political parties, citizen observers and other electoral stakeholders at Constituency level, with subsequent publication online as appropriate. NEBE will make appropriate decisions on when and to whom scanned electoral rolls will be shared.

not, then the equipment could be recovered to Regional or Central storage for use in subsequent elections (Local Government, Referenda etc). The equipment procured for this Scenario can be used by NEBE to facilitate a Constituency-level scanning of election results forms as part of a reformed RMS.

Scenario 3 - Tablet Photo List

Description

This Scenario involves a tablet used to capture voter details and, with the integrated tablet camera, a photograph of each voters face. In-kit matching ensures no person can register more than once on a given kit. As a safety mechanism, traditional paper books are also used to capture voter details. A Voter ID card is issued to each voter. The data is concentrated at NEBE HQ where further matching identifies possible duplicate registrations for human adjudication.

When all central processing is complete, final voter lists, including the photograph of each voter, can be printed and distributed to polling stations for use on polling day.

Overview of Process

NEBE will recruit computer-literate users to be part of the team of 5 Registrars in each polling station. A cascade training process will deliver appropriate training to all Registrars, with extra training for BVR Kit operator(s).

This Scenario requires the specialised procurement of a tablet-based solution for use in each polling station. The tablet will have a camera suitable to capture a facial image of sufficient quality and resolution to permit the extraction of a facial biometric template. Software in the tablet will ensure that this is achieved. In-tablet facial matching will be undertaken to inhibit same-kit multiple registrations. VR applications running on the tablet will capture all other voter demographic details. The solution may permit the photographing of supplied identity documents.

Data Recovery and Consolidation solutions involving resources at either Constituency or Regional NEBE offices will be procured and deployed to manage the return of data from BVR kits in the field during, and after, the process is complete.

A high performance, high availability data centre, of sufficient computational power and storage capacity will be procured. Here, multi-biometric data from BVR kits will be consolidated and matching undertaken to identify possible duplicate registrations.

An Adjudication Centre with 100 workstations will be needed where trained NEBE personnel will adjudicate on duplicate registrations flagged by the systems.

As with previous Scenarios, high capacity laser printers (and appropriate consumables - paper and toner) will be procured to print Voter Lists.

Electoral roll data can be shared with stakeholders in a format to be determined by NEBE. Electoral Roll data can be placed on the WWW. An SMS system can be created, and voters can submit their Voter ID numbers to this system which will send them a response confirming their presence on the electoral rolls, and informing them of the location of their polling station.

Technology Requirements

This Scenario requires the specialised procurement of a tablet-based BVR solution for use in each polling station. The Tablet camera will be of sufficient standard to be used to capture photograph of

the face of each voter being registered and allow a facial biometric template to be extracted. A customized Android BVR application will be developed and be installed on tablets. Solution includes in-kit facial matching (to inhibit in-kit multiple registrations), and provides relevant reports. The solution may permit the photographing of supplied identity documents if desired.

Data Recovery and Consolidation solutions involving resources at either Constituency or Regional NEBE offices will be procured and deployed to manage the return of data from BVR kits in the field during, and after, the process is complete.

A high performance, high availability data centre, of sufficient computational power and storage capacity will be procured. Here, the facial biometric data from BVR kits will be consolidated and matching undertaken to identify possible duplicate registrations.

An Adjudication Centre with 100 workstations will be needed where trained NEBE personnel will adjudicate on duplicate registrations flagged by the systems.

High capacity laser printers (and appropriate consumables - paper and toner) will be procured to print Voter Lists which will contain the photograph of each Voter.

Electoral roll data can be shared with stakeholders in a format to be determined by NEBE. Electoral Roll data can be placed on the WWW. An SMS system can be created, and voters can submit their Voter ID numbers to this system which will send them a response confirming their presence on the electoral rolls, and informing them of the location of their polling station.

All facial images captured will be stored in a format compatible with DigitalID standards.

Human Resource Requirements

NEBE HQ:

- Data Centre Operations and Maintenance Personnel (Systems Administrators, database administrators) 2 to 4 staff
- NEBE HQ Network personnel 2 staff
- NEBE Information System Security/Compliance personnel
- Voter Registration - Personnel to receive, check, clean incoming PDF files from Constituencies - 5 to 10 capable administrative staff.
- Voter Registration - Personnel to collate and report VR aggregate statistics, and progress on Scanning 1 or 2 staff.
- Web Site / Outreach personnel to publish PDF 1 or 2 staff
- Training Material Development - 2 to 3 staff
- Training Material Translation to 5 Languages 5 staff
- Master Trainers (to deliver top of Cascade at Regions)
- Adjudication Staff - 100 operators, 10 Supervisors, 2 Managers
- Adjudication Support - 3-5 IT Support Personnel

Addis Ababa - Vendor Support

- Third Level Technical Support x As Appropriate
- Spares, Swap/Repair personnel x As Appropriate

NEBE Region Offices:

- Second Line IT Support Person x 4
- Regional VR Reporting Officer
-
- Regional Training officer (to deliver training to Constituency Personnel) 1 or 2 as appropriate

Constituency Office:

- Data Recovery and Consolidation Personnel x 2
- First Line IT Support Staff - 1 per 40 kits in rural areas, 1 per 60 kits in urban areas. Approximately 800 staff nationwide

Polling Station

- BVR Kit Operators 1 or possibly 2 per Polling Station (45,000 to 90,000)

Field Implications

Full-scale BVR in the field requires that NEBE deploy a kit with trained personnel to each of the over 45,000 polling stations nationwide. Significant IT support, Operations and Logistics efforts will be required, especially to get equipment to remote polling stations, to support it while it's deployed, to recover data and equipment at the end of the process. NEBE will need sizable facilities in Addis Ababa and at Regional and Constituency level where equipment will be staged, prepared, configured, for deployment. Ongoing support will require facilities close to the locations where the kits are used, so Constituency-level IT support is essential. Spare kits and components will need to be stored for rapid swap-repair. Data recovery during the field exercise (where possible) will require logistics. Data consolidation and reconciliation will need appropriate infrastructure and personnel at Constituency, Regional and HQ levels.

Sizable operational and logistical effort will also be essential to support the recruitment and training processes for BVR staff.

Provision must be made for late enrolment of citizens whose complaints (about being denied registration during the BVR field exercise) are upheld by the relevant authority. This may mean providing a staffed office at Constituency or Woreda level.

Legal Implications

Significant legal amendments will be necessary to allow for biometric voter registration of eligible Ethiopians. The replacement of the old paper system with the BVR approach envisaged in this Scenario will need to be explicitly provided for in Proclamation (law) or Directive (regulations) as appropriate. A provision should be made to require all voters to allow themselves to be photographed as part of the registration procedure. The output of a computer system must be

explicitly recognised in law as a valid electoral roll. Provision must be made for circumstances where a given biometric characteristic is not available (persons with disability) or cannot be enrolled (elderly person whose fingerprints cannot be captured). If NEBE is to make biometric and biographic data captured during voter registration available to another Government agency, this must be according to law. Arguably, any BVR process must adhere to any data protection or data privacy laws. The sharing with stakeholders or publishing of draft or final electoral rolls must be done in accordance with law, and NEBE must comply with any Freedom of Information legislation.

The processes by which duplicate registrations are identified, adjudicated and handled must be clearly defined in law and aggrieved voters who are struck off must have an opportunity to seek redress.

Where a citizen is denied the opportunity to enrol during the BVR field exercise there must be an opportunity to complain. Where this complaint is upheld, the citizen's enrolment must be facilitated.

Legal provisions for eligible persons and groups to register at locations where they are not resident (for example IDP) must be made.

Indicative Costs

Included:

- 50,000 single-biometric, field-deployable BVR tablets to capture facial image using tablet camera. In-kit AFIS for on-site matching.
- 55 million Voter Cards with unique ID number, in books of 100
- 100,000 40-page A4 bound, pre-printed Registration Books (approximately 14 voters per page), basic security features
- Significant data centre at NEBE HQ (including compute resources, storage, UPS, standby power)
- Voter List - high capacity printers and consumables
- Adjudication Workstations (approximately 100)
- Multi-biometrics matching solution for approximately 55 million voters
- Data Recovery & Consolidation solutions
- Operational Training (ToT for Master Trainers and Technicians)
- Third-level Technical Support
- Field Survey
- Indicative Procurement Budget - Scenario 3 : US $ 35,635, 000

NOT Included:

- Human Resource (Scanning operators, Technical Support persons at Constituency
- Premises costs (electricity, furniture)
- Data centre premises preparations (refurbishment, cabling, power installation, air conditioning, furniture, fire suppression)
- Training (venue rental, trainer expenses, trainee per diems/accommodation/catering)
- Ops/Logistics
- Communications costs between Constituency offices, Regional Offices, NEBE HQ data centre

- WWW hosting
- SMS system costs
- Public and Stakeholder Outreach

Indicative Timeline

	ID		Task Name	Duration	Start	Finish	Predecessors
			PSU PROC TIMELINES ETHIOPIA VR 20190312				
	1		**PROCUREMENT OF REGISTRATION MOBILE EQUIP (UNITS TBC) ITB (INTERNATIONAL COMPETITION)**	251 days	Wed 13/03/19	Wed 26/02/20	
	2		Technical Specifications DEVELOPED AND AGREED, incl MISSION if needed	42 days	Wed 13/03/19	Thu 09/05/19	
	3		**NEBE confirms to UNDP to initiate public procurement**	1 day	Wed 15/05/19	Wed 15/05/19	
	4		Prequalification (first part of ITB)	12 days	Thu 16/05/19	Fri 31/05/19	3
	5		Solicitation Period (ITB)	22 days	Mon 03/06/19	Tue 02/07/19	4
	6		**NEBE initiates preparations for SVT and operations/storage/data center**	65 days	Thu 16/05/19	Wed 14/08/19	3
	7		**FUNDING TRANSFERRED TO UNDP**	1 day	Mon 17/06/19	Mon 17/06/19	5SS+10 days
	8		Conference with Bidders - NEBE invited to participate, 1 or 2 participants incl technical	1 day	Mon 24/06/19	Mon 24/06/19	5SS+15 days
	9		Technical and Financial Evaluations in Copenhagen - NEBE participating with 1 or 2 technical staff	8 days	Tue 02/07/19	Thu 11/07/19	5FS-1 day
	10		**Site validation test in Addis (part of evaluation of offers), including preparations and reporting IF REQUIRED (NEW KITS), OTHERWISE IGNORE**	7 days	Fri 19/07/19	Mon 29/07/19	9FS+5 days
	11		CAP Submission (UNDP rules & regs)	5 days	Fri 12/07/19	Thu 18/07/19	9
	12		ACP Submission (UNDP rules & regs)	5 days	Fri 19/07/19	Thu 25/07/19	11
	13		**Contract Award & negotiations**	3 days	Fri 26/07/19	Tue 30/07/19	12
	14		Production, delivery, installation of SW and configuration (either KITS, SW, components) and transfer to NEBE	50 days	Wed 31/07/19	Tue 08/10/19	13
	15		**NEBE: operators, technical staff, trainers hired and ready for receiving training**	1 day	Wed 11/09/19	Wed 11/09/19	14FS-20 days
	16		**NEBE: warehouse, data center and training facilities ready**	1 day	Wed 11/09/19	Wed 11/09/19	14FS-20 days
	17		training of trainers	15 days	Wed 11/09/19	Tue 01/10/19	14FS-20 days
	18		TRAININGS AND FINAL PREPARATIONS FOR REGISTRATION	25 days	Wed 02/10/19	Tue 05/11/19	17
	19		<New Task>	0 days	Tue 05/11/19	Tue 05/11/19	18
	20		**OPERATIONAL REGISTRATION PHASE/s**	81 days	Wed 06/11/19	Wed 26/02/20	
	21		Deployment	7 days	Wed 06/11/19	Thu 14/11/19	18
	22		Registration Exercise	35 days	Fri 15/11/19	Thu 02/01/20	21
	23		Transport	7 days	Fri 03/01/20	Mon 13/01/20	22
	24		Consolidation of data	12 days	Tue 14/01/20	Wed 29/01/20	23
	25		Duplicate analysis	20 days	Thu 30/01/20	Wed 26/02/20	24

Figure 5 Indicative Timeline for BVR for 2020 (Source: UNDP PSU, Copenhagen)

Integration and Re-use

If, as reported by a number of interlocutors, NEBE will maintain a permanent office at Constituency Level, some of the equipment and infrastructure procured under this Scenario will remain in those offices. The equipment procured for this Scenario can be used by NEBE to facilitate a Constituency-level scanning of election results forms as part of a reformed RMS.

Unused equipment will be recovered to Regional or Central storage for use in subsequent elections (Local Government, Referenda etc). Other uses of equipment procured in this Scenario are discussed further in All Scenarios - Integration and Re-use below.

Scenario 4 - Tablet-based Full BVR

Description
As Scenario 3, but with the addition of a fingerprint reader and an Iris capture device.

Overview of Process
NEBE will recruit computer-literate users to be part of the team of 5 Registrars in each polling station. A cascade training process will deliver appropriate training to all Registrars, with extra training for BVR Kit operator(s).

This Scenario requires the specialised procurement of a tablet-based solution for use in each polling station. The tablet will have a camera suitable to capture a facial image of sufficient quality and resolution to permit the extraction of a facial biometric template. The tablet-based kit will also include an iris capture device. Software in the tablet will ensure that this is achieved. In-tablet facial matching will be undertaken to inhibit same-kit multiple registrations. VR applications running on the tablet will capture all other voter demographic details. The solution may permit the photographing of supplied identity documents.

Data Recovery and Consolidation solutions involving resources at either Constituency or Regional NEBE offices will be procured and deployed to manage the return of data from BVR kits in the field during, and after, the process is complete.

A high performance, high availability data centre, of sufficient computational power and storage capacity will be procured. Here, multi-biometric data from BVR kits will be consolidated and matching undertaken to identify possible duplicate registrations.

An Adjudication Centre with 100 workstations will be needed where trained NEBE personnel will adjudicate on duplicate registrations flagged by the systems.

As with previous Scenarios, high capacity laser printers (and appropriate consumables - paper and toner) will be procured to print Voter Lists containing the photograph of each voter.

Electoral roll data can be shared with stakeholders in a format to be determined by NEBE. Electoral Roll data can be placed on the WWW. An SMS system can be created, and voters can submit their Voter ID numbers to this system which will send them a response confirming their presence on the electoral rolls, and informing them of the location of their polling station.

Technology Requirements
This Scenario requires the specialised procurement of a tablet-based BVR kit for use in each polling station. The BVR kits will include an Android Tablet BVR solution, to be installed on tablets. Solution including capture of fingerprints with the connected scanner, as well as iris images through iris sensor. Solution includes in-kit matching, and provides relevant reports. The solution may permit the photographing of supplied identity documents.

Data Recovery and Consolidation solutions involving resources at either Constituency or Regional NEBE offices will be procured and deployed to manage the return of data from BVR kits in the field during, and after, the process is complete.

A high performance, high availability data centre, of sufficient computational power and storage capacity will be procured. Here, multi-biometric data from BVR kits will be consolidated and matching undertaken to identify possible duplicate registrations.

An Adjudication Centre with 100 workstations will be needed where trained NEBE personnel will adjudicate on duplicate registrations flagged by the systems.

As with previous Scenarios, high capacity laser printers (and appropriate consumables - paper and toner) will be procured to print Voter Lists.

Electoral roll data can be shared with stakeholders in a format to be determined by NEBE. Electoral Roll data can be placed on the WWW. An SMS system can be created, and voters can submit their Voter ID numbers to this system which will send them a response confirming their presence on the electoral rolls, and informing them of the location of their polling station.

Human Resource Requirements

NEBE HQ:

- Data Centre Operations and Maintenance Personnel (Systems Administrators, database administrators) 2 to 4 staff
- NEBE HQ Network personnel 2 staff
- NEBE Information System Security/Compliance personnel
- Voter Registration - Personnel to receive, check, clean incoming PDF files from Constituencies - 5 to 10 capable administrative staff.
- Voter Registration - Personnel to collate and report VR aggregate statistics, and progress on Scanning 1 or 2 staff.
- Web Site / Outreach personnel to publish PDF 1 or 2 staff
- Training Material Development - 2 to 3 staff
- Training Material Translation to 5 Languages 5 staff
- Master Trainers (to deliver top of Cascade at Regions)
- Adjudication Staff - 100 operators, 10 Supervisors, 2 Managers
- Adjudication Support - 3-5 IT Support Personnel

Addis Ababa - Vendor Support

- Third Level Technical Support x As Appropriate
- Spares, Swap/Repair personnel x As Appropriate

NEBE Region Offices:

- Second Line IT Support Person x 4
- Regional VR Reporting Officer
-
- Regional Training officer (to deliver training to Constituency Personnel) 1 or 2 as appropriate

Constituency Office:

- Data Recovery and Consolidation Personnel x 2
- First Line IT Support Staff - 1 per 40 kits in rural areas, 1 per 60 kits in urban areas. Approximately 800 staff nationwide

Polling Station

- BVR Kit Operators 1 or possibly 2 per Polling Station (45,000 to 90,000)

Field Implications

Full-scale BVR in the field requires that NEBE deploy a kit with trained personnel to each of the over 45,000 polling stations nationwide. Significant IT support, Operations and Logistics efforts will be required, especially to get equipment to remote polling stations, to support it while it's deployed, to recover data and equipment at the end of the process. NEBE will need sizable facilities in Addis Ababa and at Regional and Constituency level where equipment will be staged, prepared, configured, for deployment. Ongoing support will require facilities close to the locations where the kits are used, so Constituency-level IT support is essential. Spare kits and components will need to be stored for rapid swap-repair. Data recovery during the field exercise (where possible) will require logistics. Data consolidation and reconciliation will need appropriate infrastructure and personnel at Constituency, Regional and HQ levels.

Sizable operational and logistical effort will also be essential to support the recruitment and training processes for BVR staff.

Provision must be made for late enrolment of citizens whose complaints (about being denied registration during the BVR field exercise) are upheld by the relevant authority. This may mean providing a staffed office at Constituency or Woreda level.

Legal Implications

Significant legal amendments will be necessary to allow for biometric voter registration of eligible Ethiopians. The replacement of the old paper system with the BVR approach envisaged in this Scenario will need to be explicitly provided for in Proclamation (law) or Directive (regulations) as appropriate. A provision should be made to require all voters to allow themselves to be photographed as part of the registration procedure. The output of a computer system must be explicitly recognised in law as a valid electoral roll. Provision must be made for circumstances where a given biometric characteristic is not available (persons with disability) or cannot be enrolled (elderly person whose fingerprints cannot be captured). If NEBE is to make biometric and biographic data captured during voter registration available to another Government agency, this must be according to law. Arguably, any BVR process must adhere to any data protection or data privacy

laws. The sharing with stakeholders or publishing of draft or final electoral rolls must be done in accordance with law, and NEBE must comply with any Freedom of Information legislation.

The processes by which duplicate registrations are identified, adjudicated and handled must be clearly defined in law and aggrieved voters who are struck off must have an opportunity to seek redress.

Where a citizen is denied the opportunity to enrol during the BVR field exercise there must be an opportunity to complain. Where this complaint is upheld, the citizen's enrolment must be facilitated.

Legal provisions for eligible persons and groups to register at locations where they are not resident (for example IDP) must be made.

Indicative Costs

Included:

- 50,000 tablet-based, multi-biometric, field-deployable BVR Kit to capture facial image, ten fingerprints, two iris. In-kit AFIS for on-site matching.
- 55 million Voter Cards with unique ID number, in books of 100
- 100,000 40-page A4 bound, pre-printed Registration Books (approximately 14 voters per page), basic security features
- Significant data centre at NEBE HQ (including compute resources, storage, UPS, standby power)
- Voter List - high capacity printers and consumables
- Adjudication Workstations (approximately 100)
- Multi-biometrics matching solution for approximately 55 million voters
- Data Recovery & Consolidation solutions
- Operational Training (ToT for Master Trainers and Technicians)
- Third-level Technical Support
- Field Survey
- Indicative Procurement Budget - Scenario 4: US $ 60,685,000

NOT Included:

- Human Resource (Scanning operators, Technical Support persons at Constituency
- Premises costs (electricity, furniture)
- Data centre premises preparations (refurbishment, cabling, power installation, air conditioning, furniture, fire suppression)
- Training (venue rental, trainer expenses, trainee per diems/accommodation/catering)
- Ops/Logistics
- Communications costs between Constituency offices, Regional Offices, NEBE HQ data centre
- WWW hosting
- SMS system costs
- Public and Stakeholder Outreach

Indicative Timeline

PSU PROC TIMELINES ETHIOPIA VR 20190312

ID	Task Name	Duration	Start	Finish	Predecessors
1	PROCUREMENT OF REGISTRATION MOBILE EQUIP (UNITS TBC) ITB (INTERNATIONAL COMPETITION)	251 days	Wed 13/03/19	Wed 26/02/20	
2	Technical Specifications DEVELOPED AND AGREED, incl MISSION if needed	42 days	Wed 13/03/19	Thu 09/05/19	
3	NEBE confirms to UNDP to initiate public procurement	1 day	Wed 15/05/19	Wed 15/05/19	
4	Prequalification (first part of ITB)	12 days	Thu 16/05/19	Fri 31/05/19	3
5	Solicitation Period (ITB)	22 days	Mon 03/06/19	Tue 02/07/19	4
6	NEBE initiates preparations for SVT and operations/storage/data center	65 days	Thu 16/05/19	Wed 14/08/19	3
7	FUNDING TRANSFERRED TO UNDP	1 day	Mon 17/06/19	Mon 17/06/19	5SS+10 days
8	Conference with Bidders - NEBE invited to participate, 1 or 2 participants incl technical	1 day	Mon 24/06/19	Mon 24/06/19	5SS+15 days
9	Technical and Financial Evaluations in Copenhagen - NEBE participating with 1 or 2 technical staff	8 days	Tue 02/07/19	Thu 11/07/19	5FS-1 day
10	Site validation test in Addis (part of evaluation of offers), including preparations and reporting IF REQUIRED (NEW KITS), OTHERWISE IGNORE	7 days	Fri 19/07/19	Mon 29/07/19	9FS+5 days
11	CAP Submission (UNDP rules & regs)	5 days	Fri 12/07/19	Thu 18/07/19	9
12	ACP Submission (UNDP rules & regs)	5 days	Fri 19/07/19	Thu 25/07/19	11
13	Contract Award & negotiations	3 days	Fri 26/07/19	Tue 30/07/19	12
14	Production, delivery, installation of SW and configuration (either KITS, SW, components) and transfer to NEBE	50 days	Wed 31/07/19	Tue 08/10/19	13
15	NEBE: operators, technical staff, trainers hired and ready for receiving training	1 day	Wed 11/09/19	Wed 11/09/19	14FS-20 days
16	NEBE: warehouse, data center and training facilities ready	1 day	Wed 11/09/19	Wed 11/09/19	14FS-20 days
17	training of trainers	15 days	Wed 11/09/19	Tue 01/10/19	14FS-20 days
18	TRAININGS AND FINAL PREPARATIONS FOR REGISTRATION	25 days	Wed 02/10/19	Tue 05/11/19	17
19	<New Task>	0 days	Tue 05/11/19	Tue 05/11/19	18
20	OPERATIONAL REGISTRATION PHASE/s	81 days	Wed 06/11/19	Wed 26/02/20	
21	Deployment	7 days	Wed 06/11/19	Thu 14/11/19	18
22	Registration Exercise	35 days	Fri 15/11/19	Thu 02/01/20	21
23	Transport	7 days	Fri 03/01/20	Mon 13/01/20	22
24	Consolidation of data	12 days	Tue 14/01/20	Wed 29/01/20	23
25	Duplicate analysis	20 days	Thu 30/01/20	Wed 26/02/20	24

Figure 6 Indicative Timeline for BVR for 2020 (Source: UNDP PSU, Copenhagen)

Integration and Re-use

If, as reported by a number of interlocutors, NEBE will maintain a permanent office at Constituency Level, some of the equipment and infrastructure procured under this Scenario will remain in those offices. The equipment procured for this Scenario can be used by NEBE to facilitate a Constituency-level scanning of election results forms as part of a reformed RMS.

Unused equipment will be recovered to Regional or Central storage for use in subsequent elections (Local Government, Referenda etc). Other uses of equipment procured in this Scenario are discussed further in All Scenarios - Integration and Re-use below.

Scenario 5 - Integrated Full BVR

Description

This scenario is included in response to a request by NEBE for a BVR solution that avoided a tablet with a collection of peripherals (as per Scenario 4) in favour of a more integrated device or kit[25]. This Scenario involves a full, competitive international procurement of new, customised Biometric Voter Kits.

Overview of Process

NEBE will recruit computer-literate users to be part of the team of 5 Registrars in each polling station. A cascade training process will deliver appropriate training to all Registrars, with extra training for BVR Kit operator(s).

A BVR kit will be deployed to each of 45,000 polling stations. Citizens will come and register, providing their details and any supporting documentation to the Registrar. Each citizen will have their biometrics captured in the BVR kit. If the citizen has previously registered in this kit (that is, if the registration is an attempted multiple-registration at this polling station) the system will flag the attempt and appropriate steps may be taken.

Data will be backed up and, depending on the physical remoteness of a given kit, recovered by use of secure removable media, and consolidated at Constituency, Region and HQ. As data is received at HQ Data Centre biometric matching will be undertaken to identify potential duplicate registrations. To save time, an appropriate subset of available biometrics may be chosen and binning may be utilised in order to maintain the timeline.

Trained NEBE Adjudication Officers will use customised BVR Applications to decide whether system-flagged duplicate registrations are indeed such. Action will be taken according to NEBE Policy.

At the end of this process, per-Polling Station Voter Lists, with photographs of each Voter, will be printed and distributed via usual channels.

As in previous Scenarios, procurement must commence immediately. Preparations for the Data Centre (site selection and preparation, structural works) should commence as soon as possible. NEBE should commence recruitment processes as soon as possible. NEBE should commence the process of identifying Constituency-level premises as soon as possible.

Technology Requirements

This Scenario requires the specialised procurement of a BVR kit for use in each polling station. The modular kits will include interconnected equipment comprising laptop, high quality dual (2 fingerprints at once) scanner, IRIS reader, thermal printer to provide receipt, web camera + LED

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[25] NEBE's desire was for an integrated multi-biometric device - that is, one with all sensors integrated into the device. A brief market survey suggested that such devices are very high in cost and that NEBE would almost certainly be locked to a single vendor for this solution. UNDP strongly recommends a modular kit approach, with components integrated by the vendor, together with customized software for NEBE's requirements.

light, 2 powerbanks, charger, signature pad, solar panel and powering module, SW and licenses for in-kit matching based on fingerprints. A high quality case is also included to store all components for safe transport.

Data Recovery and Consolidation solutions involving resources at either Constituency or Regional NEBE offices will be procured and deployed to manage the return of data from BVR kits in the field during, and after, the process is complete.

A high performance, high availability data centre, of sufficient computational power and storage capacity will be procured. Here, multi-biometric data from BVR kits will be consolidated and matching undertaken to identify possible duplicate registrations.

An Adjudication Centre with 100 workstations will be needed where trained NEBE personnel will adjudicate on duplicate registrations flagged by the systems.

As with previous Scenarios, high capacity laser printers (and appropriate consumables - paper and toner) will be procured to print Voter Lists.

Electoral roll data can be shared with stakeholders in a format to be determined by NEBE. Electoral Roll data can be placed on the WWW. An SMS system can be created, and voters can submit their Voter ID numbers to this system which will send them a response confirming their presence on the electoral rolls, and informing them of the location of their polling station.

Human Resource Requirements

NEBE HQ:

- Data Centre Operations and Maintenance Personnel (Systems Administrators, database administrators) 2 to 4 staff
- NEBE HQ Network personnel 2 staff
- NEBE Information System Security/Compliance personnel
- Voter Registration - Personnel to receive, check, clean incoming PDF files from Constituencies - 5 to 10 capable administrative staff.
- Voter Registration - Personnel to collate and report VR aggregate statistics, and progress on Scanning 1 or 2 staff.
- Web Site / Outreach personnel to publish PDF 1 or 2 staff
- Training Material Development - 2 to 3 staff
- Training Material Translation to 5 Languages 5 staff
- Master Trainers (to deliver top of Cascade at Regions)
- Adjudication Staff - 100 operators, 10 Supervisors, 2 Managers
- Adjudication Support - 3-5 IT Support Personnel

Addis Ababa - Vendor Support

- Third Level Technical Support x As Appropriate
- Spares, Swap/Repair personnel x As Appropriate

NEBE Region Offices:

- Second Line IT Support Person x 4
- Regional VR Reporting Officer
-
- Regional Training officer (to deliver training to Constituency Personnel) 1 or 2 as appropriate

Constituency Office:

- Data Recovery and Consolidation Personnel x 2
- First Line IT Support Staff - 1 per 40 kits in rural areas, 1 per 60 kits in urban areas. Approximately 800 staff nationwide

Polling Station

- BVR Kit Operators 1 or possibly 2 per Polling Station (45,000 to 90,000)

Field Implications

Full-scale BVR in the field requires that NEBE deploy a kit with trained personnel to each of the over 45,000 polling stations nationwide. Significant IT support, Operations and Logistics efforts will be required, especially to get equipment to remote polling stations, to support it while it's deployed, to recover data and equipment at the end of the process. NEBE will need sizable facilities in Addis Ababa and at Regional and Constituency level where equipment will be staged, prepared, configured, for deployment. Ongoing support will require facilities close to the locations where the kits are used, so Constituency-level IT support is essential. Spare kits and components will need to be stored for rapid swap-repair. Data recovery during the field exercise (where possible) will require logistics. Data consolidation and reconciliation will need appropriate infrastructure and personnel at Constituency, Regional and HQ levels.

Sizable operational and logistical effort will also be essential to support the recruitment and training processes for BVR staff.

Provision must be made for late enrolment of citizens whose complaints (about being denied registration during the BVR field exercise) are upheld by the relevant authority. This may mean providing a staffed office at Constituency or Woreda level.

Legal Implications

Significant legal amendments will be necessary to allow for biometric voter registration of eligible Ethiopians. The replacement of the old paper system with the BVR approach envisaged in this Scenario will need to be explicitly provided for in Proclamation (law) or Directive (regulations) as appropriate. A provision should be made to require all voters to allow themselves to be photographed as part of the registration procedure. The output of a computer system must be

explicitly recognised in law as a valid electoral roll. Provision must be made for circumstances where a given biometric characteristic is not available (persons with disability) or cannot be enrolled (elderly person whose fingerprints cannot be captured). If NEBE is to make biometric and biographic data captured during voter registration available to another Government agency, this must be according to law. Arguably, any BVR process must adhere to any data protection or data privacy laws. The sharing with stakeholders or publishing of draft or final electoral rolls must be done in accordance with law, and NEBE must comply with any Freedom of Information legislation.

The processes by which duplicate registrations are identified, adjudicated and handled must be clearly defined in law and aggrieved voters who are struck off must have an opportunity to seek redress.

Where a citizen is denied the opportunity to enrol during the BVR field exercise there must be an opportunity to complain. Where this complaint is upheld, the citizen's enrolment must be facilitated.

Legal provisions for eligible persons and groups to register at locations where they are not resident (for example IDP) must be made.

Indicative Costs

Included:

- 50,000 Integrated, laptop-based multi-biometric, field-deployable BVR Kit to capture face, ten fingerprints, two iris. In-kit AFIS for on-site matching.
- 55 million Voter Cards with unique ID number, in books of 100
- 100,000 40-page A4 bound, pre-printed Registration Books (approximately 14 voters per page), basic security features
- Significant data centre at NEBE HQ (including compute resources, storage, UPS, standby power)
- Voter List - high capacity printers and consumables
- Adjudication Workstations (approximately 100)
- Multi-biometrics matching solution for approximately 55 million voters
- Data Recovery & Consolidation solutions
- Operational Training (ToT for Master Trainers and Technicians)
- Third-level Technical Support
- Field Survey
- Indicative Procurement Budget - Scenario 5: US $147,285,000

NOT Included:

- Human Resource (Scanning operators, Technical Support persons at Constituency
- Premises costs (electricity, furniture)
- Data centre premises preparations (refurbishment, cabling, power installation, air conditioning, furniture, fire suppression)
- Training (venue rental, trainer expenses, trainee per diems/accommodation/catering)
- Ops/Logistics
- Communications costs between Constituency offices, Regional Offices, NEBE HQ data centre

- WWW hosting
- SMS system costs
  Public and Stakeholder Outreach
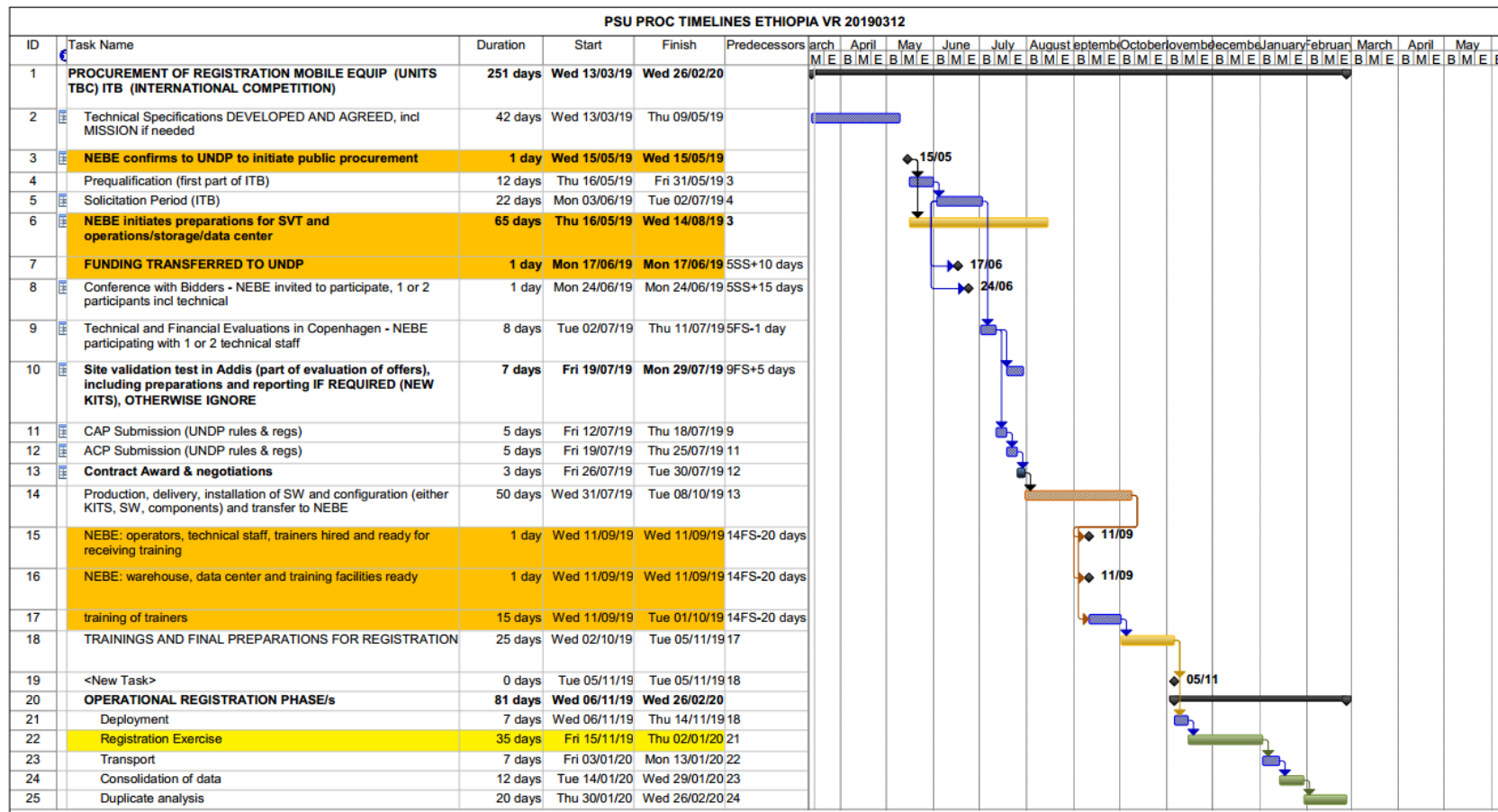
Indicative Timeline

ID	Task Name	Duration	Start	Finish	Predecessors
1	**PROCUREMENT OF REGISTRATION MOBILE EQUIP (UNITS TBC) ITB (INTERNATIONAL COMPETITION)**	**251 days**	**Wed 13/03/19**	**Wed 26/02/20**	
2	Technical Specifications DEVELOPED AND AGREED, incl MISSION if needed	42 days	Wed 13/03/19	Thu 09/05/19	
3	**NEBE confirms to UNDP to initiate public procurement**	**1 day**	**Wed 15/05/19**	**Wed 15/05/19**	
4	Prequalification (first part of ITB)	12 days	Thu 16/05/19	Fri 31/05/19	3
5	Solicitation Period (ITB)	22 days	Mon 03/06/19	Tue 02/07/19	4
6	**NEBE initiates preparations for SVT and operations/storage/data center**	**65 days**	**Thu 16/05/19**	**Wed 14/08/19**	3
7	**FUNDING TRANSFERRED TO UNDP**	**1 day**	**Mon 17/06/19**	**Mon 17/06/19**	5SS+10 days
8	Conference with Bidders - NEBE invited to participate, 1 or 2 participants incl technical	1 day	Mon 24/06/19	Mon 24/06/19	5SS+15 days
9	Technical and Financial Evaluations in Copenhagen - NEBE participating with 1 or 2 technical staff	8 days	Tue 02/07/19	Thu 11/07/19	5FS-1 day
10	**Site validation test in Addis (part of evaluation of offers), including preparations and reporting IF REQUIRED (NEW KITS), OTHERWISE IGNORE**	**7 days**	**Fri 19/07/19**	**Mon 29/07/19**	9FS+5 days
11	CAP Submission (UNDP rules & regs)	5 days	Fri 12/07/19	Thu 18/07/19	9
12	ACP Submission (UNDP rules & regs)	5 days	Fri 19/07/19	Thu 25/07/19	11
13	**Contract Award & negotiations**	**3 days**	**Fri 26/07/19**	**Tue 30/07/19**	12
14	Production, delivery, installation of SW and configuration (either KITS, SW, components) and transfer to NEBE	50 days	Wed 31/07/19	Tue 08/10/19	13
15	NEBE: operators, technical staff, trainers hired and ready for receiving training	1 day	Wed 11/09/19	Wed 11/09/19	14FS-20 days
16	NEBE: warehouse, data center and training facilities ready	1 day	Wed 11/09/19	Wed 11/09/19	14FS-20 days
17	training of trainers	15 days	Wed 11/09/19	Tue 01/10/19	14FS-20 days
18	TRAININGS AND FINAL PREPARATIONS FOR REGISTRATION	25 days	Wed 02/10/19	Tue 05/11/19	17
19	<New Task>	0 days	Tue 05/11/19	Tue 05/11/19	18
20	**OPERATIONAL REGISTRATION PHASE/s**	**81 days**	**Wed 06/11/19**	**Wed 26/02/20**	
21	Deployment	7 days	Wed 06/11/19	Thu 14/11/19	18
22	Registration Exercise	35 days	Fri 15/11/19	Thu 02/01/20	21
23	Transport	7 days	Fri 03/01/20	Mon 13/01/20	22
24	Consolidation of data	12 days	Tue 14/01/20	Wed 29/01/20	23
25	Duplicate analysis	20 days	Thu 30/01/20	Wed 26/02/20	24

Figure 7 Indicative Timeline for BVR for 2020 (Source: UNDP PSU, Copenhagen)

Integration and Re-use

If, as reported by a number of interlocutors, NEBE will maintain a permanent office at Constituency Level, some of the equipment and infrastructure procured under this Scenario will remain in those offices. The equipment procured for this Scenario can be used by NEBE to facilitate a Constituency-level scanning of election results forms as part of a reformed RMS.

Unused equipment will be recovered to Regional or Central storage for use in subsequent elections (Local Government, Referenda etc). Other uses of equipment procured in this Scenario are discussed further in All Scenarios - Integration and Re-use below.

Summary of Estimated Procurement Costs

The table below summarises the earlier procurement budgets per Scenario. Additionally, at the request of NEBE, for Scenarios 4 and 5, the indicative procurement budget without iris scanners is offered.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
All Scenarios include: Data Centre (of increasing size/scope), 55 million pre-printed Voter Cards (with unique ID#), 100,000 Registration Books, Software applications appropriate for the scenario, Data Recovery/Consolidation, Top of cascade Training; (Vendor) Support; Field Survey of electoral rolls;				
2 Scanners per constituency plus LAN/WAN	As Scenario 1 plus 1,500 workstations for Data Capture at HQ	Tablet and software solution for BVR, in-kit and back end facial matching, Adjudication workstations [Facial]	Tablet and software solution for BVR, in-kit and back end matching, Adjudication workstations [Facial/FP/Iris]	Integrated, laptop based BVR Kit, in-kit and back end multi-biometric matchers, Adjudication workstations [Face/FP/Iris]
US$5,100,000	**US$7,145,000**	**US$35,635,000**	**US$60,685,000 or, without Iris US$42,185,000**	**US$147,285,000 or, without Iris US$128,785,000**
Not Included: Human Resource, Training, Ops/Logistics, WWW Voter Outreach	Not Included: HR, Training, Ops/Logistics, premises for Data Capture, WWW, Voter Outreach	Not Included: HR, Training, Ops/Logs, premises for Adjudication, SMS system, WWW, Voter Outreach	Not Included: HR, Training, Ops/Logs, premises for Adjudication, SMS system, WWW, Voter Outreach	Not Included: HR, Training, Ops/Logs, premises for Adjudication, SMS system, WWW, Voter Outreach

Figure 8 Table of Indicative Procurement Costs

Charting Time, Integrity, Risk and Cost

The following is a graphic visualisation of the relative scores for each scenario.
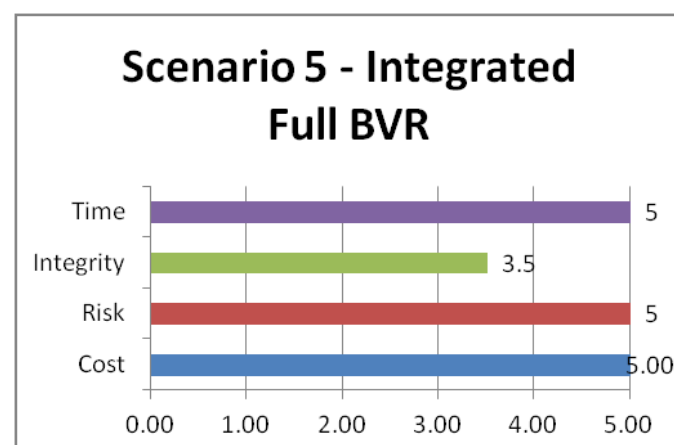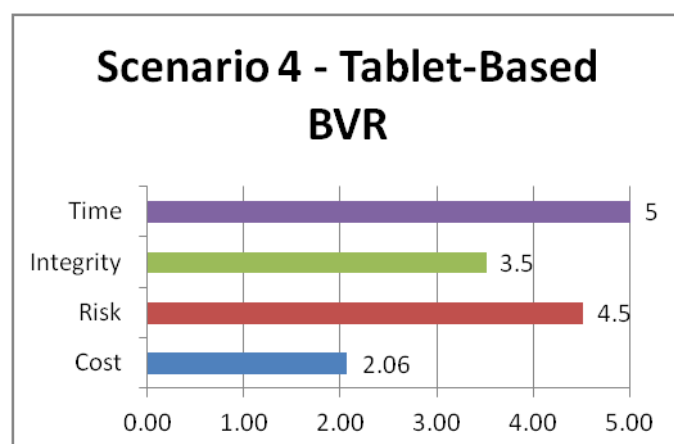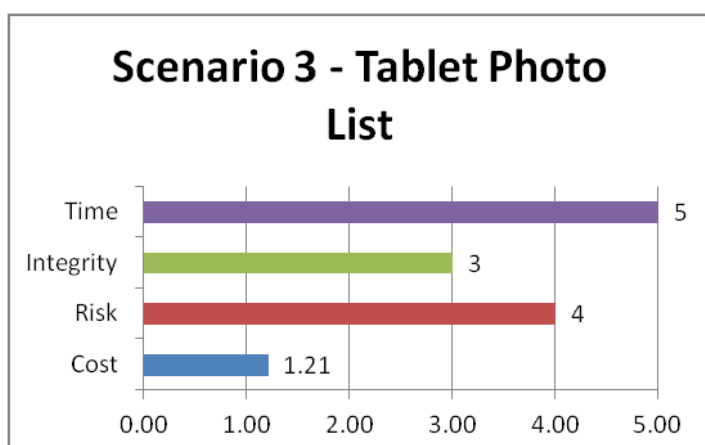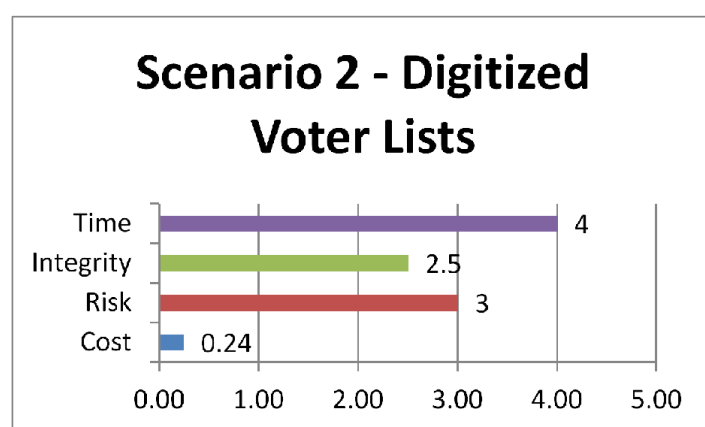

Scenario 1 - Enhanced Manual
- Time: 3
- Integrity: 2
- Risk: 1
- Cost: 0.17

Scenario 2 - Digitized Voter Lists
- Time: 4
- Integrity: 2.5
- Risk: 3
- Cost: 0.24

Scenario 3 - Tablet Photo List
- Time: 5
- Integrity: 3
- Risk: 4
- Cost: 1.21

Scenario 4 - Tablet-Based BVR
- Time: 5
- Integrity: 3.5
- Risk: 4.5
- Cost: 2.06

Scenario 5 - Integrated Full BVR
- Time: 5
- Integrity: 3.5
- Risk: 5
- Cost: 5.00
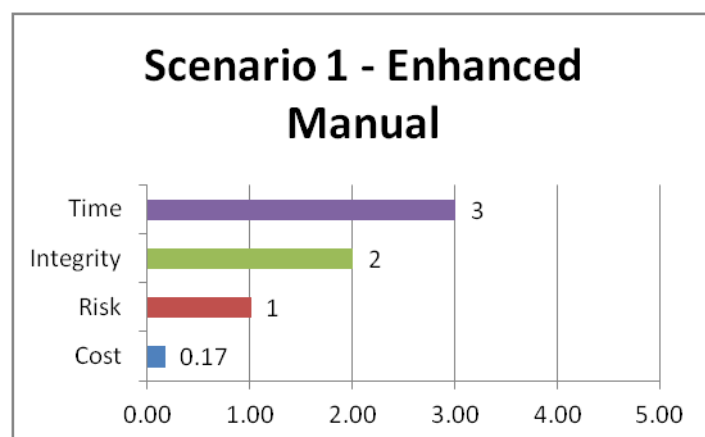
Figure 9 Time, Integrity, Risk, Cost - Graphics

Time refers to the time necessary to implement. All three BVR scenarios require immediate commencement of preparatory technical work. Scenarios 1 and 2 can commence a little (but not much) later and still be completed for May 2020 elections. Integrity refers to the relative positive contribution to electoral integrity offered, in the opinion of the author, by the Scenario. Risk is a composite of four parameters - Resources (shortage, delay), Procurement (complexity/integrity), Human Resource Recruitment/Training, Legal/Institutional . Risk - Low score good, high score bad. Cost is illustrated as follows. The most expensive Scenario is scored 5. Other Scenarios Costs are scored relative to the most expensive.

All Scenarios - Integration and Re-use

This section of the feasibility study was intended to describe how Scenarios 3 and 4 offered NEBE the opportunity to leverage the considerable investment made by Ethiopia in field-deployable tablets for the 2019 Census by re-using the tablets for voter registration.

The indefinite postponement of the Census (which had been due to start field enumeration in early April 2019) has all but ruled out re-use of Census tablets. Accordingly, NEBE must consider fresh procurement of tablets.

The need to procure Tablets or BVR Kits in Scenarios 3, 4 or 5 now places the onus on NEBE to ensure sustainable use of the invested resources. The timing of the news of the postponement of Census 2019 from April to an unspecified future date came too late for any detailed consideration in this report of options for NEBE post electorally. But here are some possible uses for the tablet or BVR kits:

- If NEBE wishes to facilitate continuous voter registration some of the equipment can be operated at Constituency Offices to provide this service
- NEBE could hand the equipment off to DigitalID (or designated enrolment agencies approved by DigitalID) for ongoing use for civil/national identity registration
- NEBE could make the hardware available to other agencies who seek to use biometrics for enrolment - including (but not limited to) IOM,

The need to re-use procured solutions should inform procurement decisions so that minimal proprietary hardware is involved and all equipment can be shared with other agencies.

Risk Analysis

The following analysis is an attempt to describe in a holistic manner the complex and interdependent risks that are faced as Ethiopia and NEBE decide how to conduct voter registration for the next General Elections. What is needed is to consider whether the institution in question can implement a given technology in the time available. We should not look at this or that technology in isolation. Nor should we consider just how long it takes to implement a solution.

By far the greatest risk facing NEBE is its own lack of experience in the use of technology. Most elections management bodies that introduce biometric voter registration solutions have evolved to this level of technology over multiple electoral cycles. Typically, a paper system is enhanced with digitization (with key-from-form or possibly OMR[26] solutions applied). In a subsequent electoral cycle, photographs of voters are added (with some EMBs starting with Polaroid or similar analogue photo solutions, then adding digital photographs later). The introduction of biometrics is more easily achieved when the EMB has had previous experience of nationwide voter registration exercises involving mid-level technology. The incremental approach allows the EMB to identify lessons to be learned and mistakes to be corrected in subsequent exercises. Also, critically, the capacity of the EMB is organically grown as each incremental introduction of technology takes place. Stakeholder trust in technologies is also more likely when the institution is itself trusted.

NEBE aspires to go from a largely localised paper-based voter registration process to high-technology biometric voter registration in one cycle. Further, the cycle in question is not the usual four or five-year electoral cycle - it is a highly compressed timeline currently offering 13 months. As currently resourced and staffed, NEBE simply cannot, in this author's opinion, achieve this outcome.

All of the milestones between March 2019 and 2020 envisaged in the indicative timelines must happen on schedule. The indefinite postponement of the Census has already thrown up obstacles to on-time decision making by NEBE. Any delay to the passage of legislation on the establishment of the new NEBE, and of the process of consultation and appointment of new Board members will have the immediate effect of rendering unfeasible the timelines for procurement in Scenarios 3, 4, and 5.

If the financial resources are not made available in a timely fashion, procurement cannot happen as proposed. If the level of financial resource is inadequate to deliver simultaneous nationwide biometric voter registration, and NEBE opts for a phased approach, the indicative timelines are not achievable.

Even based on UNDP procurement modalities involving pre-qualification, the indicative timelines are incredibly ambitious. The key early procurement milestones herein are:

- Technical specifications finalised 9th May
- Decision to proceed - 15th May
- Funds transferred - 17th June
- Contract Award - 26th July
- Production of 50,000 kits in 50 days, delivery to NEBE, ending 8th October
- NEBE warehousing, training facilities and data centres ready 11th September

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[26] Optical Mark Recognition, a hybrid paper/digital solution successfully used, for example, in Ghana and other west African countries in the early years of the current century.

- All personnel hired and ready for training - 11th September
- Training of Trainers complete 1st October
- Training of Registrars complete 5th November
- Deployment to 45,000 polling stations nationwide competed 14th November
- BVR starts 15th November, ends 2nd January 2020
- …

NEBE may seek to procure using other modalities in order to save time. There are risks associated with this approach too. The task of specifying the required solutions in sufficient detail to permit successful tendering and procurement is urgent and complex. As seen with the procurement of tablets for the Census exercise, all procurements can be delayed due to unforeseen circumstances. Elections Management Bodies do not have the option of repeatedly postponing elections - these are time-critical national events.

It was hoped that the Census exercise would illuminate the field-level human resource context very clearly so that NEBE's decision on whether or not to implement BVR would benefit from the CSA's experiences. This opportunity is now diminished significantly and NEBE's decision making is hampered.

In summary, the totality of the challenges - NEBE's capacity gap, the highly compressed timeline, the complexity of procurement of field-deployable electoral technologies, the uncertain human resource make any decision to implement BVR highly risky.

Conclusions and Recommendations

The way in which Ethiopia currently conducts voter registration, while open for improvements, is inclusive, inexpensive, well understood and sustainable. No surveys or audits have been conducted to establish any empirical basis for assessment of the quality or otherwise of the electoral rolls. Therefore, any assessment can only be based on the information received from meeting stakeholders and reading available reports.

Few interlocutors expressed the belief that the vulnerabilities in the process were systematically exploited and that electoral rolls were full of duplicate voters. None of our interlocutors prioritised reform of the voter registration process over reform of the results management process.

Of the problems that can exist with electoral rolls, biometrics can address only one - that of duplicate registrations. Other issues (underage registration, registration of non-citizens or non-residents) need to be addressed in other ways.

A variety of improvements and integrity mechanisms should be considered by NEBE in order to improve its management and oversight of the voter registration process; to increase the transparency of the process and, by extension, to increase the accountability of the process. These include (but are not limited to):

- More and better training for all personnel involved
- Improved field communications and reporting
- Sample-based auditing of voter registration outputs (books or data)
- A full commitment to transparency, sharing scanned electoral roll (books) with electoral stakeholders
- Making electoral roll data available to voters and stakeholders online and via SMS

Whether or not NEBE chooses to introduce biometrics into its voter registration processes the measures just outlined above can and should be implemented.

The question of whether and how to introduce biometrics is more complicated. The presence of duplicate registrations on electoral rolls is plausible but unproven. It is no more or less likely than the presence of minors, non-residents or non-citizens. Therefore, the use of biometrics, while desirable, may not be a priority for electoral purposes. The arguments in favour of the introduction of biometrics are not electoral, rather more national in scope. The other primary driver for the introduction of biometrics - that of allowing NEBE's voter registration to serve as the primary biometric enrolment for future National Identity purposes - need to be carefully considered. It is perfectly reasonable for NEBE to wish to use its voter registration exercise to kick-start the DigitalID vision for Ethiopia. However, Ethiopia should not seek to use de-duplication of electoral rolls as a justification for a risky and high-cost BVR exercise in a compressed timeline implemented by an institution whose capacity is far below what is needed for the task. As this study demonstrates, there is very limited time to implement, there are significant human resource and capacity challenges and the visible costs are very high.

NEBE's capacity is far below that necessary to undertake large scale high-technology initiatives. The institution has scant experience of dealing with vendors and contractors on this scale. It is in the early stages of procurement of electoral technologies, when the detailed specifications for both

hardware and software are elaborated that the lack of experience and knowledge can prove problematic with consequences emerging much later on. NEBEs field presence is flimsy, with understaffed Regional State offices and nothing below that - even the modest offices required for Scenarios 1 or 2 must be established from scratch.

It is by no means certain that NEBE can secure the significant resources necessary to increase its permanent and temporary workforce and create offices at each Constituency. Even if the necessary funds become available, the capacity to absorb resources to bridge the capacity gap in the available time is uncertain and remains a huge risk factor.

The postponement of the Census has the potential to derail or undermine any major technology initiative by NEBE in multiple ways. First, by making the tablets unavailable, it forces NEBE to procure any and all technology required for Voter Registration or Results Management initiatives. Second, depending on the timing of a rescheduled Census, the available pool of potential users of technology at field level for NEBE would be severely limited. Finally, the delay to the availability of Census population estimates hinders NEBE's operational planning, and undermines, if not prevents, fresh delimitation of electoral boundaries.

. Any of the Scenarios in this study, if implemented, requires a level of procurement beyond NEBE's previous capacity in this area. Should NEBE opt to avail of UNDP's experience in this area, the technical preparations should begin immediately (before end March 2019). The green-light final decision must be taken before middle of May 2019 and the resources (financial) on hand with UNDP by the middle of June 2019. The risk of just one of these three failing to materialise is genuine and questions the feasibility. NEBE and the Government of Ethiopia have other procurement modalities they can use, but these carry their own risks, including, but not limited to delay (ref Census postponements). A limited BVR, (focussed geographically or on a particular demographic, IDPs, Universities, military camps, for example) is less risky, but still requires very early decision making and resource mobilization.

In conclusion, the proposed transparency and accountability mechanisms in Scenarios 1 or 2 can appreciably add to stakeholder confidence in electoral rolls for 2020 in an inexpensive and sustainable fashion. The modest infrastructure investments in both these scenarios can act as a solid platform for a transformed Results Management System for NEBE. Given that most interlocutors prioritised reform of results management over the voter registration process, these Scenarios should be seriously considered by NEBE.

Thereafter, should NEBE conclude that the introduction of biometrics is desirable or necessary, then Scenarios 3, 4, and 5 illustrate possible ways forward, but at significant cost, and, given the highly compressed timelines, at some considerable risks.

Annexes

Annex 1 - ToR (relevant extracts)

Scope of the Study

The study will assess the feasibility for and requirements/conditionalities that would support the implementation of BVR for the upcoming elections. It will include, among other components, a rollout plan with a testing period, the schedule of the delivery of the assets, training requirements and the implementation phases, timelines and budgets, and an estimation of the cost of maintaining the suggested ICT solutions. The study will look at different systems for Biometric Voter Registration (BVR) and would cover:

- Biometric enrolment (face, fingerprint, iris, etc., depending on sensors deployed);
- In-kit automated fingerprint identification system (detecting and preventing multiple registration attempts on this kit);
- Facial photo capture, quality control and enhancement;
- Assessment of the Cost

All of the above keeping in mind that the same data will be used to generate a Unique ID populating the National Population Database.

The study should consider the potential for synergies with other relevant initiatives, particularly the upcoming census and the planned introduction of the Digital ID system. The BVR Study will adopt an approach that enables it to inform the overall Digital ID Programme and will benefit and inform the outcomes of the UNECA supported study currently ongoing. To do so, the international expert to be hired by UNDP is expected to consult all relevant institutions, working groups, and experts working on these and other similar initiatives and offer concrete and specific recommendations. Considering in particular the planned use of technology for the census (tablets and specialized software), the expert should provide recommendations regarding if and how this investment in hardware, software and human resources (recruitment and training of thousands of operators) may be leveraged for other purposes, such as elections and Digital ID. In addition, the expert should provide an overview of the issues that should be considered in designing the BVR system and making it compatible with the planned Digital ID system.

Deliverables

The primary objective of the Feasibility Study is to produce a comprehensive report that will propose designs and architectures as well as potential ICT solutions for building a secure and reliable voter registry (biometrics in particular) for the upcoming general elections in Ethiopia and the building of the National Population Database. The report will be preceded with the design of the survey tool(s) and methodological approach, which would need to be presented and approved by the GoE/NEBE and UNDP.

The final report will include at a minimum the following elements:

- A baseline assessment of the strengths and weaknesses of the current voter registration system;
- Building on the baseline, an assessment of the opportunities and risks of using ICT for voter registration for the upcoming national elections, and more broadly for the national ID system;
- Consultation with NEBE staff to explore the field implications of potential technologies;
- Analysis and review of potential ICT solutions keeping the Digital ID in mind;
- An assessment of the legal implications and requirements of adopting the suggested ICT solutions;
- Confirm procurement timeline and costs of the suggested ICT solutions in cooperation with the UNDP Procurement Services Office in Copenhagen;
- An assessment of the requirements for NEBE to adopt and manage the suggested ICT solutions;
- A rollout plan, including the testing period, the schedule of the delivery of the assets, the training requirements, and the implementation phase;
- An overview of sustainability challenges (including budget and technical expertise);
- An overview of the estimated cost of implementing and maintaining the suggested ICT solutions;
- Recommendations and assessment regarding the potential for integration and re-use of the technology (hardware and software) and human resources to be used for the upcoming census;
- Recommendations on how to leverage the BVR system to serve the Digital ID system.

The report will include indicative timeline and budget for the introduction of the suggested ICT solutions.

Annex 2 - Meetings Held

- National Electoral Board of Ethiopia Chair, Mrs Birtukan Mideksa (initiation and de-brief)
- Security Briefing, UNDSS
- NEBE Head of Secretariat (Nega Dufissa)
- NEBE Director of ICT (Daniel Teklay) and Director of Communication (Tesfalem Abraha)
- MINT Digital ID Program Manager, FDRE
- NEBE Director of Operations & Logistics (Getachew Rabira)
- NEBE Director of Legal Dep. (Awdro Tadess)
- NEBE Director of Finance and procurements (Lemma Cherinet)
- OIC for IOM DTM, acting coordinator (Nikki Herwanger)
- Attended and briefed Development Advisory Group Meeting
- UNFPA/CSA Chief Technical Advisor Collins Opiyo
- CSA Head of Operation Mr. Asalfew
- ARRA : returnees reintegration PM Zewdu Bedada
- Ethiopian Public Procurement Agency, Ms. Marta Eyu
- NEBE Ops/log, ICT and Head of Secretariat

- Regional NEBE office Oromia. (Ambassador Dissasa Doribssa and Operations Team Leader Ato Regasa Lielete)
- Victor Margall von Hegyeshalmy , Electoral/ID Procurement Lead Bureau of Management Services, UNDP PSU (Copenhagen)
- IFES Ethiopia team
- NEBE Head of OP/log (Getachew)
- NEBE head of Legal (Awdro Tadess)
- Meeting ICT Head of ICT, Daniel Teklay
- Meeting with EthioTel Technical director Mr Powlas
- Embassy of Switzerland, Courtesy Ambassador Daniel Hunn
- Meeting the chairman of the Drafting committee on Democratic Institutions Dr Getachew Assefa (+251 93 859 6642).
- Irish Embassy,
- De-brief presentation to DAG/GTWG
- CERO (Human rights civil organizations), multiple civil society groups

Annex 3 - Further Reading

EU-UNDP Joint Task Force

There are a number of valuable publications relevant to ICT and Elections Management on the website of the EU-UNDP Joint Task Force for Electoral Assistance. These are available from this link:

https://www.ec-undp-electoralassistance.org/publications/

In particular, we suggest:

- **Electoral Results Management Systems: Catalogue Of Options**
- Thematic Workshop On ICT And Elections Management. Summary Report

Online Training Course

EU-UNDP Joint Task Force on Electoral Assistance has an online course (it can also be downloaded for offline study) on ICT and Elections Management. It includes a module on Biometrics. The entire course should take you only 6 hours. Well worth the investment of your time. There are other online courses too - available here:

http://elearning.ec-undp-electoralassistance.org/

IFES

The International Foundation for Electoral Systems has a series of valuable publications. The topic *Election Technology* is at this link:

http://www.ifes.org/Publications.aspx?topic=C3783C89A926492EB75A5C7AE59CD488

and includes these publications:

- Electronic Voting & Counting Technologies: A Guide to Conducting Feasibility Studies

- Direct Democracy: Progress and Pitfalls of Election Technology

The topic *Voter Registration* is at this link:

http://www.ifes.org/Publications.aspx?topic=6FB170082FF34E9895E6DAC561BA5CF7

and includes these publications:

- Civil and Voter Registries: Lessons Learned from Global Experiences
- Biometrics in Elections

OSCE/ODIHR

The Organisation for Security and Co-operation in Europe's Office for Democratic Institutions and Human Rights (ODIHR) has a range of excellent publications including:

The ODIHR handbook on observing new voting technologies is available in both English and Russian:

http://www.osce.org/odihr/elections/104939

IDEA

The International Institute for Democracy and Electoral Assistance, in addition to its excellent handbooks and papers, is responsible for the ACE Project, a vital resource:

http://www.aceproject.org

Though written about the introduction of electronic voting, the following IDEA policy paper offers much broader lessons about the criticality of trust when technology is introduced into electoral processes:

http://www.idea.int/publications/introducing-electronic-voting/

The IDEA Publications Catalogue, available here:

https://www.idea.int/publications/catalogue

contains a number of useful and relevant resources, including:

- Introducing Biometric Technology in Elections
- Open Data in Electoral Administration
- Certification of ICTs in Elections
- Guidelines for the Development of a Social Media Code of Conduct for Elections
- The Use of Open Source Technology in Elections

Conference Proceedings

E-Vote-ID Conference

This conference is one of the leading international events for e-voting experts from all over the world. In 2016 the two previously bi-annually held conferences, EVOTE and VoteID, were merged into the annual E-VOTE-ID conference. The third joint conference will take place in October 2018.

The proceedings of previous eVote and VoteID conferences are available online and represent a significant resource on the subject of electronic voting and identity. Here is the link:

https://www.e-vote-id.org/proceedings/

Other Training Courses

UNDP/PSO

The United Nations Development Programme Procurement Support Office offers both generic and election-specific procurement training courses. Whether or not an EMB intends to procure via the UNDP PSO, it is appropriate to seek training on all aspects of procurement. This is particularly important for technology procurement. PSO can deliver training in your country.

http://www.iapso.org/

Biometrics

European Union

The EAB is a non-profit organization seeking to advance the proper and beneficial use of biometrics in Europe, taking into account the interests of European citizens, industries, academia and governments. The European Association for Biometrics (EAB) is the primary European multi stakeholder platform for biometrics.

The EAB targets its activities at the following areas of interest:

- Communication and community building

- Training and education

- Research and programme development

https://www.eab.org/

The EU Science Hub does not, regrettably, have a research topic specifically on Biometrics. Nevertheless, this web portal may be of interest, as biometrics do feature under several research topics:

https://ec.europa.eu/jrc/en

USA

The Biometric Consortium (BC) serves as the U.S. government's focal point for research, development, test, evaluation, and application of biometric-based personal identification / verification technology.

http://www.biometrics.org

Biometric Recognition: Challenges and Opportunities (2010), National Academies Press

http://www.nap.edu/catalog.php?record_id=12720

NIST

NIST - ANSI/NIST-ITL 1-2011 Update:2015 Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information

ISO/IEC 19794-1:2011 Information technology -- Biometric data interchange formats -- Part 1: Framework

NIST - NISTIR 7271 The Myth of Goats: How many people have fingerprints that are hard to match?

UN

UN General Assembly Resolution on the Right to Privacy in the Digital Age

https://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/73/179

See also: Annual report of the United Nations High Commissioner for Human Rights and reports of the Office of the High Commissioner and the Secretary-General - The right to privacy in the digital age

https://www.un.org/en/ga/search/view_doc.asp?symbol=A/HRC/39/29

See also: United Nations Compendium Of Recommended Practices For the Responsible Use & Sharing of Biometrics in Counter Terrorism [In association with the Biometrics Institute]

https://www.un.org/sc/ctc/wp-content/uploads/2018/08/Compendium-Final-Draft-June-18.pdf

IOM Data Protection

https://publications.iom.int/system/files/pdf/iomdataprotection_web.pdf

UNHCR

Guidance on Identity and Registration Management

https://www.unhcr.org/registration-guidance/