United Nations Development Programme

REQUEST FOR PROPOSALS

Provision of Voter Registration System Software Development and services, for the enhancement of Voter Registration System in Nepal.

Ref. 500008

February, 2013

United Nations Development Programme

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Section 1. Letter of Invitation

UNDP PSO, Copenhagen
February 14, 2013

Subject: RFP for the Provision of Voter Registration System Software Development and services, for the enhancement of Voter Registration System in Nepal.

Dear Mr./Ms.:

The United Nations Development Programme (UNDP) hereby invites you to submit a Proposal to this Request for Proposal (RFP) for the above-referenced subject.

The Deadline for Submission of Proposals as specified in Section 2 - Data Sheet is: 02 April 2013 by 14,00 hours (Copenhagen time)

This RFP includes the following documents:

> Section 1 – This Letter of Invitation
> Section 2 – Instructions to Proposers and Data Sheet
> Section 3 – Terms of Reference
> Section 4 – Proposal Submission Form
> Section 5 –Proposer Information Forms
> Section 6 – Technical Forms
> Section 7 – Financial Proposal Form
> Section 8 – Form for Proposal Security
> Section 9 – Form for Performance Security
> Section 10 – Contract for Professional Services, including General Terms and Conditions

Your offer, comprising of a Technical and Financial Proposal, in separate sealed envelopes, should be submitted in accordance with provisions included in following Section 2.

You are kindly requested to submit an acknowledgment letter via email to UNDP to the following addresses:

victor.margall@undp.org
andres.blasco@undp.org
patricia.diego@undp.org

The letter should be received by UNDP no later than five calendar days after date of this letter. The same acknowledgment letter should advise whether your company intends to submit a Proposal. If that is not the case, UNDP would appreciate your indicating the reason, for our records.

If you have received this RFP through a direct invitation by UNDP, transferring this invitation to another firm requires your written notification to UNDP of such transfer and the name of the company to whom the invitation was forwarded. If this RFP is only issued to previously shortlisted companies, transferring the invitation is not permitted.

This RFP is not to be construed in any way as an offer of contract. Your Proposal could, however, form the basis for a contract between your company and UNDP.

Should you require further clarifications, kindly communicate with the contact person identified in the attached Data Sheet as the focal point for queries on this RFP.

UNDP looks forward to receiving your Proposal and thanks you in advance for your interest in UNDP procurement opportunities.

Yours sincerely,

United Nations Development Programme

Procurement Support Office (UNDP PSO)

Section 2: Instructions to Proposers

Definitions

a) *"Contract"* refers to the agreement that will be signed by and between the UNDP and the successful proposer, all the attached documents thereto, including the General Terms and Conditions (GTC) and the Appendices.

b) "*Country"* refers to the country indicated in the Data Sheet.

c) *"Data Sheet"* refers to such part of the Instructions to Proposers used to reflect conditions of the tendering process that are specific for the requirements of the RFP.

d) *"Day"* refers to calendar day.

e) *"Government"* refers to the Government of the country that will be receiving the services provided/rendered specified under the Contract.

f) *"Instructions to Proposers"* (Section 2 of the RFP) refers to the complete set of documents that provides Proposers with all information needed and procedures to be followed in the course of preparing their Proposals

g) *"LOI"* (Section 1 of the RFP) refers to the Letter of Invitation sent by UNDP to Proposers.

h) *"Material Deviation"* refers to any contents or characteristics of the proposal that is significantly different from an essential aspect or requirement of the RFP, and : (i) substantially alters the scope and quality of the requirements; (ii) limits the rights of UNDP and/or the obligations of the Proposer; and (iii) adversely impacts the fairness and principles of the procurement process, such as those that compromise the competitive position of other Proposers.

i) *"Proposal"* refers to the Proposer's response to the Request for Proposal, including the Proposal Submission Form, Technical and Financial Proposal and all other documentation attached thereto as required by the RFP.

j) *"Proposer"* or "*Offeror*" refers to any legal entity that may submit, or has submitted, a Proposal for the provision of services requested by UNDP through this RFP.

k) *"RFP"* refers to the Request for Proposals consisting of instructions and references prepared by UNDP for purposes of selecting the best service provider to perform the services described in the Terms of Reference.

l) *"Services"* refers to the entire scope of tasks and deliverables requested by UNDP under the RFP.

m) "*Supplemental Information to the RFP"* refers to a written communication issued by UNDP to prospective Proposers containing clarifications, responses to queries received from

prospective Proposers, or changes to be made in the RFP, at any time after the release of the RFP but before the deadline for the submission of Proposals.

n) *"Terms of Reference"* (TOR) refers to the document included in this RFP as Section 3 which describes the objectives, scope of services, activities, tasks to be performed, respective responsibilities of the proposer, expected results and deliverables and other data pertinent to the performance of the range of duties and services expected of the successful proposer.

o) "*Vendor*" or "*Contractor*" refers primarily to the legal entity that resulted contracted after the relevant procurement process. "Vendor/s" is also used in instances in this document referring to suppliers in the industry in general.

A. GENERAL

1. UNDP hereby solicits Proposals in response to this Request for Proposal (RFP). Proposers must strictly adhere to all the requirements of this RFP. No changes, substitutions or other alterations to the rules and provisions stipulated in this RFP may be made or assumed unless it is instructed or approved in writing by UNDP in the form of Supplemental Information to the RFP.

2. Submission of a Proposal shall be deemed as an acknowledgement by the Proposer that all obligations stipulated by this RFP will be met and, unless specified otherwise, the Proposer has read, understood and agreed to all the instructions in this RFP.

3. Any Proposal submitted will be regarded as an offer by the Proposer and does not constitute or imply the acceptance of any Proposal by UNDP. UNDP is under no obligation to award a contract to any Proposer as a result of this RFP.

4. UNDP implements a policy of zero tolerance on proscribed practices, including fraud, corruption, collusion, unethical practices, and obstruction. UNDP is committed to preventing, identifying and addressing all acts of fraud and corrupt practices against UNDP as well as third parties involved in UNDP activities. (See http://www.undp.org/about/transparencydocs/UNDP_Anti_Fraud_Policy_English_FINAL_june_2011.pdf and http://www.undp.org/content/undp/en/home/operations/procurement/procurement_protest/ for full description of the policies)

5. In responding to this RFP, UNDP requires all Proposers to conduct themselves in a professional, objective and impartial manner, and they must at all times hold UNDP's interests paramount. Proposers must strictly avoid conflicts of interest. Any Proposer found to have a conflict of interest shall be disqualified. Without limitation on the generality of the above, Proposers, and any of their affiliates, shall be considered to have a conflict of interest with one or more parties in this solicitation process, if they:

    5.1 Are or have been associated in the past, with a firm or any of its affiliates which have been engaged UNDP to provide services for the preparation of the design,

specifications, Terms of Reference, cost analysis/estimation, and other documents to be used for the procurement of the goods and services in this selection process;

5.2   Were involved in the preparation and/or design of the programme/project related to the services requested under this RFP; or

5.3   Are found to be in conflict for any other reason, as may be established by, or at the discretion of, UNDP.

In the event of any uncertainty in the interpretation of what is potentially a conflict of interest, proposers must disclose the condition to UNDP and seek UNDP's confirmation on whether or not such conflict exists.

6.   Similarly, the Proposers must disclose in their proposal their knowledge of the following :

6.1   If their owners, part-owners, officers, directors, controlling shareholders, or key personnel are family of UNDP staff involved in the procurement functions and/or the Government of the country or any Implementing Partner receiving services under this RFP; and

6.2   All other circumstances that could potentially lead to actual or perceived conflict of interest, collusion or unfair competition practices.

Failure of such disclosure may result in the rejection of the proposal or proposals affected by the non-disclosure.

The eligibility of Proposers that are wholly or partly owned by the Government shall be subject to UNDP's further evaluation and review of various factors such as being registered as an independent entity, the extent of Government ownership/share, receipt of subsidies, mandate, access to information in relation to this RFP, and others that may lead to undue advantage against other Proposers, and the eventual rejection of the Proposal.

7.   Proposers will not be considered eligible (and respective Proposal will be rejected) if found to appear in the UN's Consolidated List of Individuals and Entities with Association to Terrorist Organizations, in the List of Vendors Suspended or Removed from the UN Secretariat Procurement Division Vendor Roster, the UN Ineligibility List, and other such lists that as may be established or recognized by UNDP policy on Vendor Sanctions.

Proposers must declare to the best of it's knowledge, that it is not included in the UN 1267/1989 List or the UN Ineligibility List, nor in any and all of UNDP's list of suspended and removed vendors.

8.   All Proposers must adhere to the UNDP Supplier Code of Conduct, which may be found at this link: http://web.ng.undp.org/procurement/undp-supplier-code-of-conduct.pdf

9.   Proposals submitted by two (2) or more Proposers shall all be rejected if they are found to have any of the following :

a)   they have at least one controlling partner, director or shareholder in common; or

b)   any one of them receive or have received any direct or indirect subsidy from the other/s; or

c)   they have the same legal representative for purposes of this RFP; or

d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about, or influence on the Proposal of, another Proposer regarding this RFP process;

e) they are subcontractors to each other's Proposal, or a subcontractor to one Proposal also submits another Proposal under its name as lead Proposer; or

f) an expert proposed to be in the team of one Proposer participates in more than one Proposal received for this RFP process. This condition does not apply to subcontractors being included in more than one Proposal.

10. **Joint Venture, Consortium or Association**

If the Proposer is a group of legal entities that will form or have formed a joint venture, consortium or association at the time of the submission of the Proposal, they shall confirm in their Proposal that :

i. they have designated one party to act as a lead entity, duly vested with authority to legally bind the members of the joint venture jointly and severally, and this shall be duly evidenced by a duly notarized Agreement among the legal entities, which shall be submitted along with the Proposal; and

ii. if they are awarded the contract, the contract shall be entered into, by and between UNDP and the designated lead entity, who shall be acting for and on behalf of all the member entities comprising the joint venture.

After the Proposal has been submitted to UNDP, the lead entity identified to represent the joint venture shall not be altered without the prior written consent of UNDP. Furthermore, neither the lead entity nor the member entities of the joint venture can:

a) Submit another proposal, either in its own capacity; nor

b) As a lead entity or a member of another joint venture submitting another Proposal.

The description of the organization of the joint venture/consortium/association must clearly define the expected role of each of the entity in the joint venture in delivering the requirements of the RFP, both in the Proposal and the Joint Venture Agreement. All entities that comprise the joint venture shall be subject to the eligibility and qualification assessment by UNDP.

If a joint venture's Proposal is selected for award, UNDP shall award the contract to the joint venture in the name of its designated lead entity. The lead entity shall sign the contract for and on behalf of all other member entities.

B. CONTENTS OF PROPOSAL

11. **Sections of Proposal**

Subject to provisions in the Data Sheet, Proposers are required to complete, sign and submit the following sections and their corresponding forms and requested documentation:

11.1. Proposal Submission Form (see prescribed form in RFP Section 4);

11.2. Eligibility and Qualifications (see relevant forms for some specific aspects in RFP

Section 5);

11.3. Technical Proposal (see relevant forms for some specific aspects in RFP Section 6);

11.4. Financial Proposal (see prescribed form in RFP Section 7);

11.5. Proposal Security, if applicable (see prescribed Form in RFP Section 8);

11.6. Any attachments and/or appendices to the Proposal.

12. Proposal Submission Form

The Proposer shall submit the Proposal Submission Form using the form provided in Section 4 of this RFP.

13. Eligibility and Qualifications of the Proposer

The Proposer shall furnish all documentary evidence as requested in the **Data Sheet** of its status as an Eligible and Qualified vendor, and complete the forms provided under Section 5, Proposer Information Forms, for the relevant aspects. In order to award a contract to a Proposer, its qualifications must be documented to UNDP's satisfaction.

In the case of a Proposer offering to supply goods under the Contract which the Proposer did not manufacture or otherwise produce, the Proposer must have been duly authorized by the goods' manufacturer or producer to supply the goods in the country of final destination;

The Proposer must also demonstrate that has the legal status, reputation and relevant Organization necessary to perform the Contract, disclosing any partnerships determining its capabilities in relation to this RFP;

Consortium/Joint Venture/ Subcontracting Agreement: In case the Proposer combines resources, collaborates with a partner or subcontracts in relation to any major part of the requirement (including local technical assistance), such collaboration must be fully reflected in a documented agreement, signed by all partners and detailing all aspects of such partnership.

14. Technical Proposal Format and Content

Observing aspects stated and documents listed in the **Data Sheet** , the Proposer shall structure the overall Technical Proposal with its corresponding documentation as follows:

14.1 Expertise and Capacity of Firm/Organization – this section should provide all relevant and requested details regarding the Organization of the Proposer and the same shall apply to any other entity participating in the RFP as a Joint Venture or Consortium. Each should provide relevant requested documentation in Data Sheet for its part of responsibility.

Proposers must demonstrate adequacy of resources, organizational/financial and technical capability and expertise to complete the services and tasks in relation to the

Requirements.

Where a joint venture is presenting its track record and experience in a similar undertaking as those required in the RFP, it should distinguish:

a) Those that were undertaken together by the joint venture; and
b) Those that were undertaken by the individual entities of the joint venture expected to be involved in the performance of the services defined in the RFP.

Previous contracts completed by individual experts working privately but who are permanently or were temporarily associated with any of the member firms cannot be claimed as the experience of the joint venture or those of its members, but should only be claimed by the individual experts themselves in their presentation of their individual credentials.

14.2 <u>Proposed Methodology, Approach and Implementation Plan</u> – this section should demonstrate the Proposer's response to the Terms of Reference by identifying and fully describing in detail the Methodology and different components of the Proposal, responding to all and each of the Requirements specified. Proposers are required to provide documentation, graphical illustration and relevant details of the proposed solution and detail implementation plan in the requested format, as per Data Sheet.

Proposers must be fully aware that the products or services that UNDP requires may be transferred, immediately or eventually, by UNDP to the Government partners, or to an entity nominated by the latter, in accordance with UNDP's policies and procedures. Proposers are therefore required to submit the following in their proposals :

a) A statement of whether any import or export licences are required in respect of the goods to be purchased or services to be rendered, including any restrictions in the country of origin, use or dual use nature of the goods or services, including any disposition to end users; and
b) Confirmation that the Proposer has obtained license of this nature in the past, and have an expectation of obtaining all the necessary licenses, should their Proposal be rendered the most responsive.

If any hardware elements are included in the Proposal, full details including technical & performance characteristics and exact model and country of origin shall be included. Specific details of items offered should be clearly stated as standard catalogues may offer options, including pictures showing detail and general views of the equipment and components.

Proposers must in this sense take into consideration the already existing equipment available for the project (hence, not to be purchased again under this exercise) as advised later in this document and provide full compatibility with it and any equipment included in the Proposal.

14.3 <u>Management Structure and Key Personnel</u>.

The Proposer is requested to outline the team and key personnel to implement the project as per Proposal, detailing the organization and capacities of them. In complying with this section, the Proposer assures and confirms to UNDP that the personnel being nominated are available for the Contract on the dates proposed. If any of the key personnel later becomes unavailable, except for unavoidable reasons such as death or medical incapacity, among other possibilities, UNDP reserves the right to consider the proposal non-responsive. Any deliberate substitution arising from unavoidable reasons, including delay in the implementation of the project of programme through no fault of the Proposer shall be made only with UNDP's acceptance of the justification for substitution, and UNDP's approval of the qualification of the replacement who shall be either of equal or superior credentials as the one being replaced.

14.4 Where the **Data Sheet** requires the submission of the Proposal Security, the Proposal Security shall be included along with the Technical Proposal. The Proposal Security may be forfeited by UNDP, and reject the Proposal, in the event of any or any combination of the following conditions:

a) If the Proposer withdraws its offer during the period of the Proposal Validity specified in the **Data Sheet**, or;

b) If the Proposal Security amount is found to be less than what is required by UNDP as indicated in the **Data Sheet**, or;

c) In the case the successful Proposer fails:
   i. to sign the Contract after UNDP has awarded it;
   ii. to comply with UNDP's variation of requirement, as per RFP clause 35; or
   iii. to furnish Performance Security, insurances, or other documents that UNDP may require as a condition to rendering the effectivity of the contract that may be awarded to the Proposer.

15. Financial Proposals

The Financial (Price) Proposal shall be prepared using the attached standard form (Section 7). It shall list all major cost components associated with the services, and the detailed breakdown of such costs.

All outputs and activities described in the Technical Proposal must be priced separately on a one-to-one correspondence. Any output and activities described in the Technical Proposal but not priced in the Financial Proposal, shall be assumed to be included in the prices of other activities or items, as well as in the final total price.

C. PREPARATION OF PROPOSALS

16. **Cost**

   The Proposer shall bear any and all costs related to the preparation and/or submission of the Proposal, regardless of whether its Proposal was selected or not. UNDP shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the procurement process.

17. **Language**

   The Proposal, as well as any and all related correspondence exchanged by the Proposer and UNDP, shall be written in the language (s) specified in the **Data Sheet** . Any printed literature furnished by the Proposer written in a language other than the language indicated in the **Data Sheet**, must be accompanied by a translation in the preferred language indicated in the **Data Sheet**. For purposes of interpretation of the Proposal, and in the event of discrepancy or inconsistency in meaning, the version translated into the preferred language shall govern. Upon conclusion of a contract, the language of the contract shall govern the relationship between the contractor and UNDP.

18. **Currencies**

   All prices shall be quoted in the currency indicated in the **Data Sheet**. However, where Proposals are quoted in different currencies, for the purposes of comparison of all Proposals:

   a) UNDP will convert the currency quoted in the Proposal into the UNDP preferred currency, in accordance with the prevailing UN operational rate of exchange on the last day of submission of Proposals; and

   b) In the event that the proposal found to be the most responsive to the RFP requirement is quoted in another currency different from the preferred currency as per **Data Sheet**, UNDP reserves the right to award the contract in the currency of UNDP's preference, using the conversion method specified above.

19. **Alternative Proposals**

   Unless otherwise specified in the **Data Sheet**, alternative proposals shall not be considered. Where the conditions for its acceptance are met, or justifications are clearly established, UNDP reserves the right to award a contract based on an alternative proposal.

20. **Validity Period**

   Proposals shall remain valid for the period specified in the **Data Sheet**, commencing on the submission deadline date also indicated in the **Data Sheet**. A Proposal valid for a shorter period may be immediately rejected by UNDP and rendered non-responsive.

   In exceptional circumstances, prior to the expiration of the proposal validity period, UNDP

may request Proposers to extend the period of validity of their Proposals. The request and the responses shall be made in writing, and shall be considered integral to the Proposal.

21. **Clarifications on RFP documents and procedures**

    21.1   Proposers may request clarifications of any of the RFP documents no later than the date indicated in the **Data Sheet** prior to the proposal submission date. Any request for clarification must be sent in writing via courier or through electronic means to the UNDP address indicated in the **Data Sheet**. UNDP will respond in writing, transmitted by electronic means and will transmit copies of the response to all Proposers who have provided confirmation of their intention to submit a Proposal.

    21.2   UNDP shall endeavor to provide such responses to clarifications in an expeditious manner, but any delay in such response shall not cause an obligation on the part of UNDP to extend the submission date of the Proposals, unless UNDP deems that such an extension is justified and necessary.

22. **Proposer's Conference**

    When appropriate, a proposer's conference will be conducted at the date, time and location specified in the **Data Sheet**. All Proposers are encouraged to attend. Non-attendance, however, shall <u>not</u> result in disqualification of an interested Proposer.

    Minutes of the proposer's conference will be either posted on the UNDP website, or disseminated to the individual firms who have registered or expressed interest with the contract, whether or not they attended the conference. No verbal statement made during the conference shall modify the terms and conditions of the RFP unless it is specifically written in the Minutes of the Conference, or issued/posted as an amendment in the form of a Supplemental Information to the RFP.

23. **Amendment of Proposals**

    23.1   At any time prior to the deadline of Proposal submission, UNDP may for any reason, such as in response to a clarification requested by a Proposer, modify the RFP in the form of a Supplemental Information to the RFP. All prospective Proposers will be notified in writing of all changes/amendments and additional instructions through Supplemental Information to the RFP and through the method specified in the **Data Sheet** .

    23.2   In order to afford prospective Proposers reasonable time to consider the amendments in preparing their Proposals, UNDP may, at its discretion, extend the deadline for submission of Proposals, if the nature of the amendment to the RFP justifies such an extension.

D. SUBMISSION AND OPENING OF PROPOSALS

24. **Submission**

    24.1 The Financial Proposal and the Technical Proposal Envelopes MUST BE COMPLETELY SEPARATE and each of them must be submitted sealed individually and clearly marked on the outside as either "TECHNICAL PROPOSAL" or "FINANCIAL PROPOSAL", as appropriate. Each envelope MUST clearly indicate the name of the Proposer. The outer envelopes shall bear the address of UNDP as specified in the **Data Sheet** and shall include the Proposer's name and address, as well as a warning that state "*not to be opened before the time and date for proposal opening*" as specified in the **Data Sheet.** The Proposer shall assume the responsibility for the misplacement or premature opening of Proposals due to improper sealing and labeling by the Proposer.

    24.2 Proposers must submit their Proposals in the manner specified in the **Data Sheet**. The Proposer must ensure that sufficient lead time has been provided in order to comply with UNDP's deadline for submission. UNDP shall indicate for its record that the official date and time of receiving the Proposal is the actual date and time when the said Proposal has physically arrived at the UNDP premises indicated in the Data Sheet.

    24.3 Proposers submitting Proposals by mail or by hand shall enclose the original and each copy of the Proposal, in separate sealed envelopes, duly marking each of the envelopes as "Original Proposal" and "Copy of Proposal" as appropriate. The 2 envelopes shall then be sealed in an outer envelope. The number of copies required shall be as specified in the Data Sheet. In the event of any discrepancy between the contents of the "Original Proposal" and the "Copy of Proposal", the contents of the original shall govern. The original version of the Proposal shall be signed or initialed by the Proposer or person(s) duly authorized to commit the Proposer on every page. The authorization shall be communicated through a document evidencing such authorization issued by the highest official of the firm, or a Power of Attorney, accompanying the Proposal.

    24.4 Proposers must be aware that the mere act of submission of a Proposal, in and of itself, implies that the Proposer accepts the General Contract Terms and Conditions of UNDP as attached hereto as Section 11.

25. **Deadline for Submission of Proposals and Late Proposals**

    Proposals must be received by UNDP at the address and no later than the date and time specified in the **Data Sheet**.

    UNDP shall not consider any Proposal that arrives after the deadline for submission of Proposals. Any Proposal received by UNDP after the deadline for submission of Proposals shall be declared late, rejected, and returned unopened to the Proposer.

26. **Withdrawal, Substitution, and Modification of Proposals**

    26.1 Proposers are expected to have sole responsibility for taking steps to carefully examine in detail the full consistency of its Proposals to the requirements of the RFP,

keeping in mind that material deficiencies in providing information requested by UNDP, or lack clarity in the description of services to be provided, may result in the rejection of the Proposal. The Proposer shall assume the responsibility regarding erroneous interpretations or conclusions made by the Proposer in the course of understanding the RFP out of the set of information furnished by UNDP.

26.2 A Proposer may withdraw, substitute or modify its Proposal after it has been submitted by sending a written notice in accordance with Clause 23.1, duly signed by an authorized representative, and shall include a copy of the authorization (or a Power of Attorney). The corresponding substitution or modification of the Proposal must accompany the respective written notice. All notices must be received by UNDP prior to the deadline for submission and submitted in accordance with RFP Clause 23.1 (except that withdrawal notices do not require copies). The respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," or MODIFICATION".

26.3 Proposals requested to be withdrawn shall be returned unopened to the Proposers.

26.4 No Proposal may be withdrawn, substituted, or modified in the interval between the deadline for submission of Proposals and the expiration of the period of proposal validity specified by the Proposer on the Proposal Submission Form or any extension thereof.

27. Proposal Opening

UNDP will open the Proposals in the presence of an ad-hoc committee formed by UNDP of at least two (2) members. If electronic submission is permitted, any specific electronic proposal opening procedures shall be as specified in the **Data Sheet**.

No Proposal shall be rejected at the opening stage, except for late submission, for which the Proposal shall be returned unopened to the Proposer.

28. Confidentiality

Information relating to the examination, evaluation, and comparison of Proposals, and the recommendation of contract award, shall not be disclosed to Proposers or any other persons not officially concerned with such process, even after publication of the contract award.

Any effort by a Proposer to influence UNDP in the examination, evaluation and comparison of the Proposals or contract award decisions may, at UNDP's decision, result in the rejection of its Proposal.

In the event that a Proposer is unsuccessful, the Proposer may seek debriefing from UNDP. The purpose of the debriefing is to discuss the strengths and weaknesses of the Proposer's submission, in order to assist the Proposer in improving eventual future proposals presented to UNDP. The content of other proposals and how they compare to the Proposer's submission shall not be discussed.

E. EVALUATION OF PROPOSALS

29.   Preliminary Examination of Proposals

UNDP shall examine the Proposals to determine whether they are complete with respect to minimum documentary requirements, whether the documents have been properly signed, whether or not the Proposer is in the UN Security Council 1267/1989 Committee's list of terrorists and terrorist financiers, and in UNDP's list of suspended and removed vendors, and whether the Proposals are generally in order, among other indicators that may be used at this stage. UNDP may reject any Proposal at this stage.

30.   Evaluation of Proposals

30.1   UNDP shall examine the Proposal to confirm that all terms and conditions under the UNDP General Terms and Conditions and Special Conditions have been accepted by the Proposer without any deviation or reservation.

30.2   The evaluation team shall review and evaluate the Technical Proposals on the basis of their responsiveness to the Terms of Reference and other documentation provided, applying the evaluation criteria, sub-criteria, and point system specified in the Data Sheet). Each responsive Proposal will be given a technical score.

A Proposal shall be rendered non-responsive at this stage if it does not substantially respond to the RFP particularly the demands of the Terms of Reference, which also means that it fails to achieve the minimum technical score indicated in the Data Sheet. Absolutely no changes may be made by UNDP in the criteria and point system indicated in the Data Sheet after all Proposals have been received.

30.3   In a second stage, only the Financial (Price) Proposals of those Proposers who achieve the minimum technical score will be opened for evaluation and review. The Financial Proposal Envelopes corresponding to Proposals that did not meet the minimum passing technical score shall be returned to the Proposer unopened.

The overall evaluation score will be based either on a combination of the technical score and the financial offer, or the lowest evaluated financial proposal of the technically qualified Proposers. The evaluation method that applies for this RFP is indicated in the **Data Sheet.**

When the Data Sheet specifies a combined scoring method, the formula for the rating of the Proposals will be as follows:

Rating the Technical Proposal (TP):

TP Rating = (Total Score Obtained by the Offer / Max. Obtainable Score for TP) x 100

Rating the Financial Proposal (FP):

   FP Rating = (Lowest Priced Offer / Price of the Offer Being Reviewed) x 100

Total Combined Score:
(TP Rating) x (Weight of TP, e.g. 70%)
+ (FP Rating) x (Weight of FP, e.g., 30%)
Total Combined and Final Rating of the Proposal

30.4 UNDP reserves the right to undertake a post-qualification exercise aimed at determining, to its satisfaction the validity of the information provided by the Proposer. Such post-qualification shall be fully documented and, among those that may be listed in the **Data Sheet**, may include, but need not be limited to, all or any combination of the following :

a) Verification of accuracy, correctness and authenticity of information provided by the Proposer on the legal, technical and financial documents submitted;
b) Validation of extent of compliance to the RFP requirements and evaluation criteria based on what has so far been found by the evaluation team;
c) Inquiry and reference checking with Government entities with jurisdiction on the Proposer, or any other entity that may have done business with the Proposer;
d) Inquiry and reference checking with other previous clients on the quality of performance on ongoing or previous contracts completed;
e) Physical inspection of the Proposer's offices, branches or other places where business transpires, with or without notice to the Proposer;
f) Quality assessment of ongoing and completed outputs, works and activities similar to the requirements of UNDP, where available; and
g) Other means that UNDP may deem appropriate, at any stage within the selection process, prior to awarding the contract.

31. **Clarification of Proposals during Evaluation**

To assist in the examination, evaluation and comparison of Proposals, UNDP may, at its discretion, ask any Proposer for a clarification of its Proposal.

UNDP's request for clarification and the response shall be in writing. No change in the prices or substance of the Proposal shall be sought, offered, or permitted, except to provide clarification, and confirm the correction of any arithmetic errors discovered by UNDP in the evaluation of the Proposals, in accordance with RFP Clause 32.

Any unsolicited clarification submitted by a Proposer, which is not a response to a request by UNDP, shall not be considered during the review and evaluation of the Proposals.

32. **Responsiveness of Proposal**

UNDP's determination of a Proposal's responsiveness will be based on the contents of the Proposal itself. A substantially responsive Proposal is one that conforms to all the terms, conditions, TOR and other requirements of the RFP without material deviation, reservation, or omission.

If a Proposal is not substantially responsive, it shall be rejected by UNDP and may not

subsequently be made responsive by the Proposer by correction of the material deviation, reservation, or omission.

33.   Nonconformities, Reparable Errors and Omissions

Provided that a Proposal is substantially responsive, UNDP may waive any non-conformities or omissions in the Proposal that, in the opinion of UNDP, do not constitute a material deviation.

Provided that a Proposal is substantially responsive, UNDP may request the Proposer to submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the Proposal related to documentation requirements. Such omission shall not be related to any aspect of the price of the Proposal. Failure of the Proposer to comply with the request may result in the rejection of its Proposal.

Provided that the Proposal is substantially responsive, UNDP shall correct arithmetical errors as follows:

a) if there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of UNDP there is an obvious misplacement of the decimal point in the unit price, in which case the line item total as quoted shall govern and the unit price shall be corrected;
b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to the above.

If the Proposer does not accept the correction of errors made by UNDP, its Proposal shall be rejected.

F. AWARD OF CONTRACT

34.   Right to Accept, Reject, or Render Non-Responsive Any or All Proposals

UNDP reserves the right to accept or reject any Proposal, to render any or all of the Proposals as non-responsive, to annul the solicitation process and to reject all Proposals at any time prior to award of contract, without incurring any liability, or obligation to inform the affected Proposer(s) of the grounds for UNDP's action. .

35.   Award Criteria

Prior to expiration of the period of proposal validity, UNDP shall award the contract based on the evaluation and award method indicated in the **Data Sheet**.

36.   Right to Vary Requirements at the Time of Award

At the time of award of Contract, UNDP reserves the right to vary the quantity of services

and/or goods, by up to a maximum twenty five per cent (25%) of the total offer, without any change in the unit price or other terms and conditions.

37.   Contract Signature

Within fifteen (15) days from the date of receipt of the Contract, the successful Proposer shall sign and date the Contract and return it to UNDP.

Failure of the successful Proposer to comply with the requirement of RFP Clause 35 and this provision shall constitute sufficient grounds for the annulment of the award, and forfeiture of the Proposal Security if any, and on which event, UNDP may award the Contract to the Proposer with the second rated Proposal, or call for new Proposals.

38.   Performance Security

A performance security, if required, shall be provided by the Proposer selected for award in the form provided in Section 9, for the amount and by the deadline indicated in the **Data Sheet** as applicable. Where a Performance Security will be required, the submission of the said document, and the confirmation of its acceptance by UNDP, shall be a condition for the effectiveness of the Contract to be signed.

The Performance Security shall be valid for 30 days longer than the entire contract period, including (but not limited to) manufacture, delivery, installation, training, implementation, technical assistance and warranty obligations. To that purpose, certificates of satisfactory installation, commissioning and training, signed by the customer, will be provided to UNDP.

The Performance Security shall be in one of the following forms:

1. A bank guarantee, issued by a reputable licensed bank in the form and content provided in this RFP (Section 9); or
2. An irrevocable standby letter of credit.

39.   Bank Guarantee for Advanced Payment

Normally UNDP does not conduct advanced payments. In case advanced payment is agreed, UNDP shall require the Proposer to submit a Bank Guarantee in the same amount as the advanced payment. A bank guarantee for advanced payment shall be furnished in the form provided in Section 10.

40.   Vendor Protest

UNDP's vendor protest procedure provides an opportunity for appeal to those persons or firms not awarded a purchase order or contract through a competitive procurement process. In the event that a Proposer believes that it was not treated fairly, the following link provides further details regarding UNDP vendor protest procedures: http://www.undp.org/procurement/protest.shtml

DATA SHEET

The following data shall complement, supplement, or amend the provisions in the Instruction to Proposers. In the case of a conflict between the Instructions to Proposers, the Data Sheet, and other annexes or references attached to the Data Sheet, the provisions in the Data Sheet shall govern**.**

DS No.[1]	Data	Specific Instructions / Requirements
1	Project title :	**Provision of Voter Registration System Software Development and services, for the enhancement of Voter Registration System in Nepal.**
2	Project reference:	Ref. **500008** (previously referred as 340372)
3	Country of Work Location:	Nepal
4	Language of the Proposal:	☒ English
5	Conditions for Submitting Partial Proposals for Parts or sub-parts of the TOR	☒ Not allowed
6	Conditions for Submitting Alternative Proposals	☒ Shall be considered. A proposer may submit an alternative proposal for specific aspects, but only if it also submits a proposal that meets the base case. UNDP shall only consider the alternative proposals offered by the Proposer whose proposal for the base case was the highest evaluated score.
7	A pre-proposal conference will be held on:	Teleconference Meeting to provide clarifications to Proposers will be organized as follows: Date: [14 March 2013] Time: 11:00 (Copenhagen Time) Instructions to connect will be provided in due time to all Proposers that confirm participation. The UNDP focal points for the arrangement are: Mr. Andres Blasco, UNDP PSO: andres.blasco@undp.org

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[1] *All DS number entries in the Data Sheet are cited as reference in the Instructions to Proposers. All DS nos. corresponding to a Data must not be modified. Only information on the 3rd column may be modified by the user. If the information does not apply, the 3rd column must state "N/A" but must not be deleted.*

		Ms. Patricia Diego, UNDP PSO: patricia.diego@undp.org
8	Period of Proposal Validity commencing on the date of deadline for Proposal submission	☒ 120 days
9	Proposal Security	☒ Required - Amount: US$ 50,000 Proposal Security must be submitted with the Proposal. UNDP does not necessarily return proposal securities on expiry.
10	Acceptable forms of Proposal Security ²	☒ Bank Guarantee (See Section 8 for template) ☒ Any Bank-issued Check / Cashier's Check / Certified Check
11	Validity of Proposal Security	120 days from the deadline of Proposal submission.
12	Advanced Payment upon signing of contract	☒ Not allowed
13	Liquidated Damages	☒ May be imposed under the following conditions : ▪ Percentage on consignment/deliverable value, per day of delay: 0.5% ▪ Max. no. of days of delay : 20 ▪ After which UNDP may choose to terminate the contract.
14	Performance Security	☒ Will be Required (from the awarded Vendor/s only) Amount : 10% of the total Contract Value Form: As per Section 9 of RFP. Deadline: The Security shall be received by UNDP within 30 days of receipt of the Purchase Order. The Performance Security shall permit the beneficiary to draw on it in any international location and specifically in Denmark or the United States. UNDP does not normally return performance securities on expiry.
15	Currency of Proposal and	☒ United States Dollars (US$)

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² *Surety bonds or other instruments issued by non-bank Financial Institutions are least preferred by UNDP. Unless stated otherwise, they shall be considered unacceptable to UNDP.*

	Method for Currency conversion	
16	Deadline for submitting requests for clarifications/ questions	10 calendar days before the submission date.
17	Contact Details for submitting clarifications/questions[3]	Mr Victor Margall, UNDP PSO: victor.margall@undp.org Mr. Andres Blasco, UNDP PSO: andres.blasco@undp.org Ms. Patricia Diego, UNDP PSO: patricia.diego@undp.org
18	Manner of Disseminating Supplemental Information to the RFP and responses to queries	☒ Direct communication to prospective Proposers by email
19	Deadline for Submission of Proposals	Date and Time : **[02 April 2013] by 14,00 hours (Copenhagen time)**
20	Allowed Method/s of Submitting Proposals	☒ Via Courier and/or Hand Delivery
21	No. of copies of Proposal that must be submitted [if sealed proposals (paper format) are requested]	Original in paper format : 1 Copies in paper format : 1 Electronic copy: 1 Sealed proposals are requested to include 1 ELECTRONIC COPY of the complete Proposal (files in .PDF format, Price and Delivery Schedule in editable formats as templates provided) in a standard USB memory support.

	Marking of Sealed Proposals	OUTER ENVELOPES MARKING:
		
		    "TO: UNDP PSO
		    ATTENTION: PROPOSAL OPENING UNIT
		    SEALED PROPOSAL ref: 500008
		    PROPOSER: [NAME AND ADDRESS OF YOUR COMPANY]
		    DEADLINE: [DATE/TIME OF DEADLINE OF SUBMISSION OF PROPOSALS]
		    NOT TO BE OPENED BY REGISTRY"

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[3] *This contact person and address is officially designated by UNDP. If inquiries are sent to other person/s or address/es, even if they are UNDP staff, UNDP shall have no obligation to respond nor can UNDP confirm that the query was officially received.*

		INNER ENVELOPES MARKING: "TO: UNDP PSO ATTENTION: PROPOSAL OPENING UNIT SEALED PROPOSAL ref: 500008 [TECHNICAL OR PRICE] PROPOSAL ENVELOPE [ORIGINAL or COPY 1] PROPOSER: [NAME AND ADDRESS]"
22	Proposal Submission Address for Courier and Hand delivery	**UNDP/PSO** **Midtermolen 3, P.O. Box 2530** **DK-2100 Copenhagen Ø** **Denmark**
23	Required Documents that must be Submitted composing the Proposal. Follow Instructions to Proposers for further details on documents listed here. Proposer must certify that all copies of documents provided are true and veridical.)	THE FOLLOWING DOCUMENTATION MUST BE INCLUDED IN THE PROPOSAL (even if any of it has already been included as part of the EOI submitted previously). Proposers shall use where corresponding those formats provided in Sections 4, 5, 6, 7 and 8: **A – ELIGIBILITY AND QUALIFICATION** ☒ Proposal Submission Form ☒ Statement of Full Disclosure, including confirmations and relevant documentation as per clauses 5, 6, 7, 8, 9 and 10 of Instructions to Proposers – General ☒ Certificate of Registration of the business, including Articles of Incorporation, or equivalent document if Bidder is not a corporation. ☒ Written Power of Attorney, authorizing the signatory of the Proposal to commit the Proposer. ☒ Consortium/ Joint Venture/ Partnership agreement if any applying, formalized and duly signed by all parties detailing all members, object of the agreement, responsibilities and roles, as relevant to this RFP , especially: - who is the main Proposer (the full and complete responsible for the Proposal and any eventual contract, as unique responsible in front of UNDP in terms of deliverables, project coordination, communication, guarantees, contractual performance and any contractual matter) - who is/are the partner/s in the Consortium/Joint Venture, and the exact area/s of responsibility or collaboration, specifically

distinguishing the main local partner providing support services, if any.

☒ Letters of authorization from Manufacturer/s to distribute goods to destination or act as Agent on behalf of the Manufacturer/s, for main equipment/items, including off-the-shelf software components integrated in the Proposal.

☒ Statement of Satisfactory Performance from the Top *3* Clients in terms of Contract Value the past *3 years.*

☒ Litigation History: All information regarding any past and current litigation during the last five (5) years, in which the Proposer or any of its Partners in this RFP have been or are involved, indicating the parties concerned, the subject of the litigation, the amounts involved, and the final resolution if already concluded.

☒ Proposal Security as per Section 8 – Form

B - TECHNICAL:

B.1 - Experience and capacity of the Proposer's Firm (and of any Partners as relevant):

☒ Proof of credit availability (either, or):

- A recent Letter from a Recognized Commercial Bank specifically stating credit availability of the company for a minimum amount of USD 1 Million
- or External Credit Rating (such as D&B etc…), proving sufficient credit availability for high profile projects.

☒ Proof and description of adequate Organizational set up, capability and resources to complete the assignment required by the RFP, include short Company profiles and explanation on Consortium or Partnership, if any, disclosing roles and responsibilities clearly.

☒ Warranty: Confirmation on compliance with Warranty requirements (refer to Sections on Terms of Reference, General Conditions) and provision of warranty procedures for carrying out replacements/repairs in the country of use

☒ Quality Certificates (e.g., ISO, etc.) and similar certificates, accreditations, awards and citations received by

the Proposer and its Partners if any, and as requested in Section 3, if any specific. Main equipment and off-the-shelf software shall comply with ISO or equivalent quality industry standards.

☒ Experience of Proposer (at least 3 relevant contracts of similar nature completed in the last 5 years), including copies of the Contracts or Purchase Orders, stating date, Purchaser, object and scope, total amount, delivery terms as applicable. Proposer is requested also to provide updated contact details of relevant contact person of the customer in each project for UNDP to conduct cross-check of references provided. If Proposal involves any Partner, relevant experience of each Partner is required to be submitted proving capacities and expertise, note Instructions to Proposers relevant clauses.

B. 2. Proposed Methodology, Approach and Implementation Plan:

☒ Identify and summarize in the form of a Proposal Technical Summary the specific components and methodology proposed.

☒ Technical explanation in detail on how the Proposer offers to address the requirements specified in this RFP:
- explain proposed response point by point in full to all requirements,
- state any deviations from the requirements (for clarity, state 'no deviations' if none),
- explain Quality Assurance and Review Mechanisms
- identify risks and mitigation measures that will be put in place
- provide hardware details as relevant, and with a detailed description of the essential performance characteristics proposed;

Such description of the Voter Registration System enhancement solution should include all technical aspects to be considered in the evaluation to assess the compliance of the proposed solution in relation to the requirements specified in Section 3 and Evaluation Criteria outlined below in this Section.

If any hardware elements are included in your Proposal: Full details are requested to be provided, including technical & performance characteristics and exact model and country of origin of any hardware included in your Proposal. Specific

details of items offered should be clearly stated as standard catalogues may offer options, including pictures showing detail and general views of the equipment and components.

Proposers must in this sense take into consideration the already existing equipment available for the project (hence, not to be purchased again under this exercise) as advised later in this document and provide full compatibility with it and any equipment included in the Proposal.

☒ General Arrangement Drawings: Showing all relevant processes and information flows for software/system, database architecture, hardware and software structures and plan/layout of each of the software modules and the complete Solution offered.

☒ Identify the works/portions of the work that will be subcontracted, stating who will perform them, control mechanisms, coordination and organization set up in relation to subcontractors;

☒ Demonstrate how the proposed methodology meets or exceeds the specifications, while ensuring appropriateness of the approach to the local conditions and the rest of the project operating environment.

☒ Project proposed implementation schedule/plan, shall provide detailed plan on development of the solution, installation and implementation, and proposed progress of the service as per performance stated and in compliance with the timelines requested, indicating functional areas/tasks, durations, start end dates for each task, etc.

The methodology and project plan must be detailed in an implementation timetable and Gant Chart, responding to the duration of the contract as specified in the Technical Requirements.

☒ Reporting and Monitoring: Description of the mechanisms proposed for this project for reporting to the UNDP and partners, including a reporting schedule.

☒ Statements on Export licenses, as per Instructions to Proposers.

☒ Dangerous Goods: Proposers are requested to identify any items/components that are classified as 'dangerous' for transportation and provide UN class no as per the guidelines

outlined in UNECE Committee on Trade - Recommendation No. 11: Documentary Aspects of the International Transport of Dangerous Goods

B.3. Management Structure and Key Personnel:

☒ Organogram: Complete Organogram showing the structure and position of the management and key personnel dedicated to the project, as a team and within the overall structure of the Proposer Company

☒ Comprehensive Curriculum Vitae (CVs) of the key personnel that will be assigned to the project, clearly defining the roles and responsibilities vis-à-vis the proposed methodology. CVs should establish competence and demonstrate qualifications in areas relevant to the TOR, including capacities in Nepali language and to work in Nepal environment, expertise to meet the timelines requested and in line with the tasks in the Plan provided by the Proposer.

☒ Staff deployment Plan indicating the number of team components involved at each stage, duration of their involvement, and if such personnel is involved in full (100%, working exclusively for this project) or if under other conditions.

C - FINANCIAL (PRICE) – To be submitted in separate envelope, if submitting sealed offer:

☒ Prices, breakdown, and any financial information as requested and as per form provided in Section 7 – Financial Proposal Form, fully completed and duly authorized.

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All submittals shall bear seal/marking/signature of Proposer and UNDP/PSO may request additional supporting documentation

Failure to provide all the above listed information may result in the proposal being rejected. Proposals that appear significantly unclear or incomplete may be considered non-responsive and hence not be evaluated.

24	Technical Evaluation of Proposals:			

Summary of Technical Proposal Evaluation		Points Obtainable
1.	Expertise and Capacity of Firm / Organisation	125
2.	Adequacy of the Proposed Work Plan and Methodology	375
3.	Qualifications and competence of key staff	200
TOTAL TECHNICAL PART:		**700**

Detailed Technical Evaluation Criteria constituting parts above:

1. **Expertise of firm / organisation submitting proposal:**

   a. Reputation of Organization and Staff / Credibility / Reliability / Industry Standing

   b. General Organisational Capability which is likely to affect implementation (consortium, holding company or one firm, size of the firm / organisation, strength of project management support e.g. project financing capacity and project management controls)

   c. Extent to which any work would be subcontracted (subcontracting carries additional risks which may affect project implementation, but properly done it offers a chance to access specialised skills).

   d. Quality assurance procedures and certificates, warranty

   e. Relevance of:

      1. Specialised Knowledge

      2. Experience on Similar Programme / Projects

      3. Experience on Projects in the Region and in English speaking environment.

      4. Work for UNDP/ major multilateral/ or bilateral programmes

      Total Points Part 1: 125

2. **Proposed Work Plan and Methodology/Approach**

   a. Proposer's understanding and comprehension of the tasks

		b. Appropriateness of the conceptual framework adopted for the task.
		c. Is the scope of task well defined, does it correspond to and fully addresses the TORs?
		d. Have the important aspects of the task been adequately addressed and in sufficient detail?
		e. Are the different components of the project adequately weighted relative to one another?
		f. Is the proposal based on and proves solid knowledge on the project environment?
		g. Is the presentation clear and is the sequence of activities and the planning logical, realistic and ensuring efficient implementation to the project within the timelines requested?
		Total Points Part 2: 375
		3. Proposed Staffing and Resources
		• Task/Project Manager/s' minimum General Qualifications and suitability for the project: - International Experience - Training Experience - Professional Experience and knowledge in the area of specialization of the project - Knowledge of the region Advanced or native and English Languages • Implementation Expert/s' minimum General Qualifications and suitability for the Project: - International Experience - Training Experience - Professional Experience and knowledge in the area of specialization of the project - Knowledge of the region - Advanced or native and English Languages
		Total Points Part 3: 200
		The evaluation committee shall evaluate the Technical Proposals on the basis of their responsiveness to the complete Terms of Reference and Requirements, applying the evaluation criteria and point system specified. Each responsive Proposal will be given a technical score (St). A Proposal that a) does not respond to important aspects of

		the RFP, and particularly the Terms of Reference and b) fails to achieve the minimum technical score of 70% in the criteria categories above will be considered non-responsive. Only proposals that pass the technical evaluation as per minimum criteria established will be further considered for price evaluation.
25	Price Evaluation of Proposals:	Price Evaluation will be based on: ☒ The total amount of the Proposal, including all requested lots.
26	Contract Award method:	☒ Combined Scoring Method, using the 70%-30% distribution for technical and financial proposals, respectively, where the minimum passing score of technical proposal is 70%
27	UNDP intends to award the contract to:	☒ One Proposer only
28	Post-Qualification Actions	☒ Considered, as per potential aspects listed in Instructions to Proposers
29	Signature of Contract	Within 5 working days of receipt of the contract the successful Proposer shall sign and date the contract and return it to UNDP.
30	Conditions for Determining Contract Effectively	☒ UNDP's receipt of Performance Bond
31	Latest Expected date for commencement of Contract	*May 30, 2013*
32	Delivery terms	Proposers must quote delivered to and implemented in : **DAP Kathmandu, Nepal, ECN premises, cleared and installed.** **Delivery schedule:** Proposers must provide as requested above details of their development and implementation schedule, including for any hardware the corresponding Transportation/Freight Plan, confirmation on Insurance Class A is applied, and proving to meet delivery deadlines indicated in Technical Requirements –Section 3.

Section 3: Terms of Reference (TOR)[4]

3.1.   Introduction

This RFP project and the following software system requirements are aimed at enhancing the existing voter registry that the Election Commission of Nepal (ECN) is currently using. The present voter registry is functional but a number of additional features are intended to be incorporated, such as updating existing records, abilities to share voter information with partners of the Election Commission, tools to facilitate maintenance and modification of the data or the registry functions, and accountability features that will ensure the voter data can be trusted over the coming years.

The requirements involve three categories for the part that relates to the software solution:

- Firstly, there are technical requirements pertaining to the behavior, structure and function of the central voter registry.

- Secondly, there are requirements that pertain to the district and ward level voter registry applications. These requirements cover mainly the particular areas of updating of existing records, data communication and security.

- Thirdly, there are methodological requirements pertaining to how a vendor shall provide this new set of behavior, structure and functions to the Election Commission.

This exercise refers to the Voter List Applications (VLA) as the overall system is named, which in turn involves the Central Voter List Application (CVLA), the District Voter List Application (DVLA) and Data Collection Application (DCA), details of which are provided in this document.

The aim of the intended enhancement is to provide the present system with:

1. A best practice and standards based system's architecture that supports the requirements of the ECN and makes maintenance easier. A modular structure and an application layer to be

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[4] *This document serves as a guide to Requestor on how to write the TOR for the RFP, by suggesting contents. This document is not to be shared with Proposers in this current state and form. The TOR actually written by the Requestor shall be the TOR that will be attached to this part of the RFP.*

introduced to the CVLA, between the database and the clients. It serves to provide data independence as well as a sustainable services, security, accountability and maintainability.

2. An enhanced design and functionality of the CVLA to deal with identity, access, accountability and audits. The present 3 VLA applications have reasonable security and accountability mechanisms built in, but are too basic to deal with a general, maintainable solution catering for a more sustained identity model and a richer set of permissions and roles.

3. Ensured quality and trustworthiness of the voter registration data collected. Accountability must be built in pervasively, such that trust in the voter registry data is maintained over years. The ability to see who edited what data at what time and what changes were made are essential. It is critical that all stakeholders trust that logs and historical data are immutable.

4. New requirements on how to update voter records. Functionality catering for Continuous Voter Registration (CVR) must be implemented on three levels; central, district and at the ward level.

   - New CVR business procedures allowing for modifications, transfers and deletions to the voter records must be supported by new software functions.

   - A new and improved functionality for   voter record verification must be implemented to ensure that invalid and/or duplicate records are avoided. Enhanced biometric matching process that is more efficient, easier to use, gives better control and better supports the business processes must be in place.

5. An appropriate design and functionality of the CVLA to deal with different **external software systems** including the DVLA (District Voter List Application) and the GIDC/NID (Gov. Integrated Data Center/National ID Management Center). The functions will be implemented in the application layer, and will serve to insulate the internal structure of the VR (Voter Registry) and provide targeted services for the various consumers of VR data. The requirements for sharing data are guided by Nepal's Enterprise Architecture and Interoperability Framework defined by the Government of Nepal.

An important consideration for the entire project is avoiding a vendor lock-in situation and ensure the full sustainability of the system in the future. Hence the requirements involve that technology used must be based on public, proven, non-proprietary standards as much as possible, that the system architecture and different software modules use compatible and optimal software languages and that the eventual Vendor provides all tools and code that allow the Electoral Commission of Nepal to use, modify and expand as necessary the provided system without depending on the same Vendor.

Conventions and terms

All formal requirements are numbered and written in as requirements definitions in courier new typefont. If there appears to be a conflict or inconsistency between a figure, text and requirements definition, then the requirements definition supersedes other text which again supersedes the figures.

There is a glossary for terms and abbreviations and words written in *italics* are frequently defined in the glossary.

Numbers in [] refer to other documents, resources and books listed in the annex 2 reference.

Module requirements

- *Module:* Which module the requirement belongs to. Many requirements are qualified as they are found under a module heading that signifies which module the requirement belongs to. If there is none of these qualifications, the requirement spans all modules.

- *Phase:* There are 3 phases to the proposed project. Most requirements belong to a phase.

3.2. Overall Objectives

In relation to the aim of the RFP outlined above, this RFP is to provide a new CVLA, DVLA and DCA for the Election Commission of Nepal (ECN), with two primary requirements (REQs.):

REQ. 1. **Provide a maintainable and accountable voter registry for the ECN:** At the central level (CVLA) an already existing two tier client-database application that is in production, must be refactored or replaced to be a multi-user, modular, 3-tier application:

    a. A new 3-tier application must be able to cater for new, external and DVLA clients that share voter data in a secure, accountable, appropriate and controlled manner.

    b. A monolithic database schema that caters for business logic, user administration and accountability must be refactored such that these concerns are modelled separately and independently.

    c. Security and accountability must be built in pervasively, such that trust in the voter registry data is maintained over years.

    d. The system must be modular, maintainable and extendable. Industry practice, software engineering best practices, open standards.

    e. Inclusion and provision of source codes and SDKs to the UNDP and ECN for the solution developed for this project must be full and ensure future use and sustainability, avoiding vendor lock.

    f. In the event that any element or component of the existing application is retained or refactored the vendor must ensure its full functionality, compatibility with the rest of the system and reliability, being the Vendor fully responsible for the final quality of such components, including them under its own warranty.

REQ. 2. **New functionality must be implemented:** Most importantly, functionality catering for Continuous Voter Registration (CVR) must be implemented on all three levels; central, district and at the ward level.

    a. New CVR business procedures allowing for modifications, transfers and deletions to the voter records must be supported by new software functions.

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b. A new and improved functionality for voter record
   verification must be implemented to ensure that invalid
   and/or duplicate records are avoided. Enhanced
   biometric matching process that is more efficient,
   easier to use, gives better control and better supports
   the business processes must be in place.
```

3.3.   Scope of Supply

3.3.1   LOT 1 – Solution (Software and any Hardware required) Development, Installation, Testing and Delivery/Transfer to the End User, involving and complying with:

1. Requirements pertaining to a software module providing **Continuous Voter Registration** functionality

2. Requirements pertaining to a software module providing voter record matching and deduplication, including biometric matching functionality

3. Requirements pertaining to a software module providing **identity, security and access control** functionality

4. Requirements pertaining to a software module providing **log and accountability** functionality

5. Requirements pertaining to a software module providing **external system integration** functionality

The scope comprises project management, software design, testing, deployment development, data migration and integration, import/export data, de-duplication and documentation

See following **figure 1** below for an overview of the logical application architecture. 1 EC IT Data Centre and 2 EC IT Clients are inside the scope of the RFP. The system must include features to create output services to group 3 external clients mentioned in figure 1, but External Clients application per se is outside the scope of this RFP.
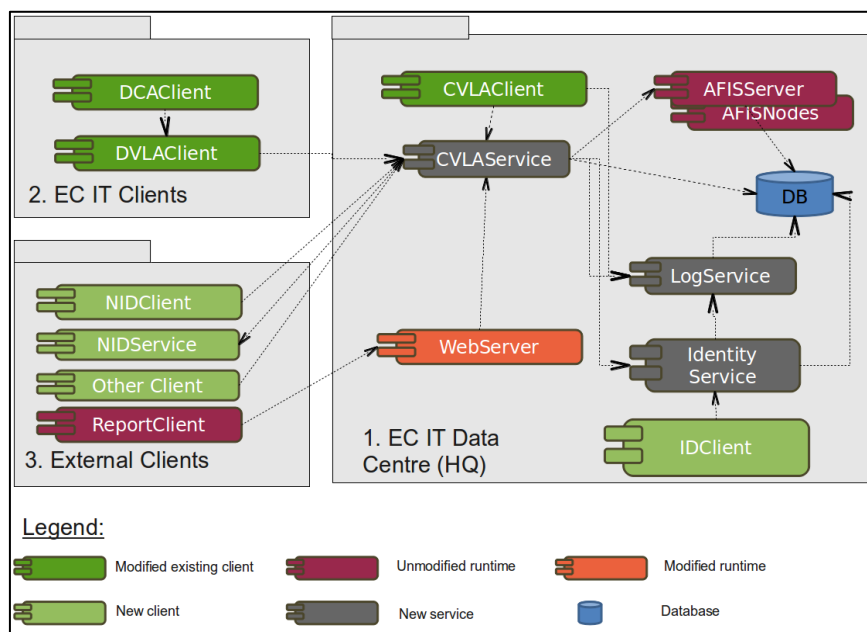
Figure 1: Logical application architecture

3.3.2   LOT 2 – Training

6. Specific Training Programs to be conducted in Kathmandu for the End User (different software engineers, technician and staff groups including Training of the Trainers for system operators).

7. Continued on-the-job training and knowledge transfer from Supplier to Technicians and Software engineers trained as per above specific trainings should be conducted throughout implementation and operation periods, to ensure effective system operability by the End User technicians and sustainable capacity to manage the system in the future.

3.3.3   LOT 3 – Technical Support and Warranty

8. Technical Support and Warranty covering in full the use of the resulting system, assisting the End User in conducting operations, and includes any repair, patches, installation, commissioning and corrections needed on the system/solution provided to ensure its full functionality and compliance with the requirements.

Technical Support will address the necessary operation in line with LOT 1, regarding Data migration, integration, import, export, de-duplication and biometric matching related to Voter registration system. This Technical Support is requested to be provided:

a) During the stages of implementation and installation of the solution in Kathmandu.

b) For a period of 12 months after the Solution is completed, implemented and delivered according to the requested schedule and once the relevant users are trained.

All services are to be provided in Nepali primarily (and English when requested) and using the local partner resources as relevant, under the full responsibility of the Vendor.

3.4.   Existing Voter Registration System

There are several documents that describe the *baseline* VLAs (e.g. [b][f][g] annex 2), which are provided as a reference to the existing system.

If there is doubt as to exactly what features or functionality is defined for a VLA, it is the current run time deployed at the ECN at the time of contract signature that takes precedence. Some feature improvement may have happened without the documentation necessarily reflecting it yet.

Formally it is the current run time and associated source at the ECN at the time of contract signing that defines a particular baseline VLA (CVLA,DVLA, DCA).

The existing (i.e. baseline) *Voter List Applications* (VLAs) involve three distinct applications;

A.   The *Data Collection Application* (DCA),that registers voters in the wards and villages of Nepal.

B.   The *District Voter List Application* (DVLA), that registers voters but also lets users do verification work (based on text field information) as well as producing reports.

C.   The *Central Voter List Application* (CVLA), includes all functions of the DVLA, and also provides voter registration duplication analysis by employing a biometric identification and matching system as well as producing additional reports.

The general flow of data is from DCA's to DVLA and finally to the CVLA. There are presently some 3600 DCAs in the field, some 75 DVLAs and a single central CVLA.
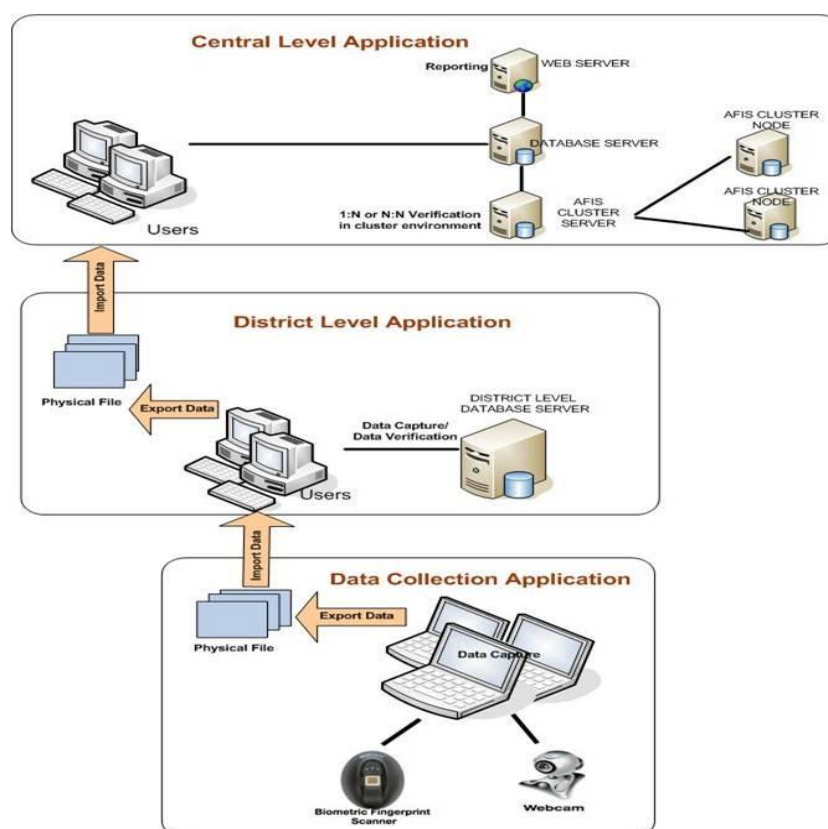
Figure 2 : Architectural overview of the baseline VLA

Information model

The baseline VLA information model is for each of the VLA applications a single schema. For the CVLA there are 40 tables. The central tables ECN_REGISTRATION_FORM and ECN_REGISTRATION_FORM_M relate to most other tables through 11 foreign keys. To categorize, there are roughly the following types of tables:

- **Category** tables like COM_CONSTITUENCY, COM_GENDER, COM_EDUCATION_LEVEL and so forth

- Tables capturing **media** like face pictures and fingerprints, e.g. ECN_FINGER_PHOTO and ECN_REG_PHOTO.

- Tables related to **users, credentials and roles** like COM_USER and COM_ROLE

- Tables related to **accountability, logs and security**, like COM_AUDIT_TRAIL and COM_EXPORT_CHK

- A few miscellaneous tables.

Infrastructure

The VLA applications

The baseline VLA applications are built as Microsoft .NET 3.5 applications collaborating with the following software and hardware:

VLA	Database	Hardware
DCA	Oracle XE 10g	a. Dell Latitude E5400 Intel Core2Duo 2GB Ram, 160GB HDD (x1000) b. Dell Latitude E5410 Intel Core i3 2GB RAM, 160 GB HDD (x2600) c. Logitech 1.3MP C500 webcam (x3600) d. Finger Scanner:- U.are.U 4500 Finger Print Reader Part:- 50013-001-103 DigitalPersona .Inc. (x3600)
DVLA	Oracle PE 10g	a. Dell Optiplex 780MT Intel Pentium Dual Core 4GB RAM, 320 GB HDD (x75)
CVLA	Oracle EE 10g	a. Dell (TM) PowerEdge (TM) R815 Rack Mount Server (x3) b. Dell EqualLogic PS6010E SATA Storage Array (x2)

Table 1: Hardware and Software Infrastructure for VLA Application

The DCA .net source code comprises some 112 KLOC of c# source code (including comments) over some 226 .cs files. Similarly, there are 427 .cs files and 161 KLOC c# source code (including comments) for the CVLA.

The ECN data centre Physical characteristics

The ECN data centre features two main physical servers, a backup server, two physical SAN drives, a backup drive and a management server, all connected by 10gb/s lines. The main servers are 48 core 256 gb RAM 300 gb HDD servers and the SAN drives are raid configured 10 tb each net capacity drives.
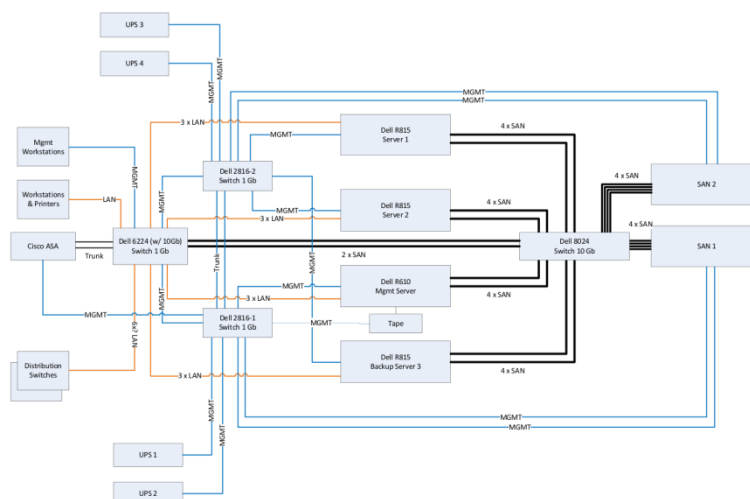
Figure 3 : Physical infrastructure

The backup server and the second SAN drive is intended in the future to be located elsewhere, and will serve as backup and feature the DMZ zone services. The possible move of the drives is outside the scope of this specification and is included here for information purposes only.

Virtual characteristics

A Citrix XenServer v6 cluster runs on top of the physical hardware providing virtual environments, network and devices as needed. There are three xenserver nodes, node 1 and 2 mapping onto the 2 main servers, and node 3 mapping onto the backup server.

Licenses

The ECN has the following licenses available for use with the target VLA:

Name	Purpose	Qty.
PostgreSQL Plus Advanced Server	Central database for CVLA	1
PostgreSQL Plus Standard Server	Central database for web and intranet/Extranet applications	1
Oracle PE	DVLA and CVLA database while new application is developed	76
XenServer 6 Platinum Edition	Server platform for central and backup site system	3

Aware PreFace SDK	Quality assessment software for voter photos (for NIDC)	1
MegaMatcher 4.3 Extended SDK	AFIS system for de-duplication and biometric identification/verification of registered voters.	1
Cluster Server		1
Fast Fingerprint Matcher		20
Fast Face Matcher		20
Fingerprint Client		3
Face Client		3
Volume License Manager		1

Table 2: Available Software Licenses

Behavior

The basic flow of data when doing registration is to collect data with a DCA, import DCA data sets to the DVLA, and finally import approved data into the CVLA where duplication detection takes place. See following figure for an illustration.

Note that there is flow from the CVLA back to the DVLA of verified data corresponding to the particular district in question.
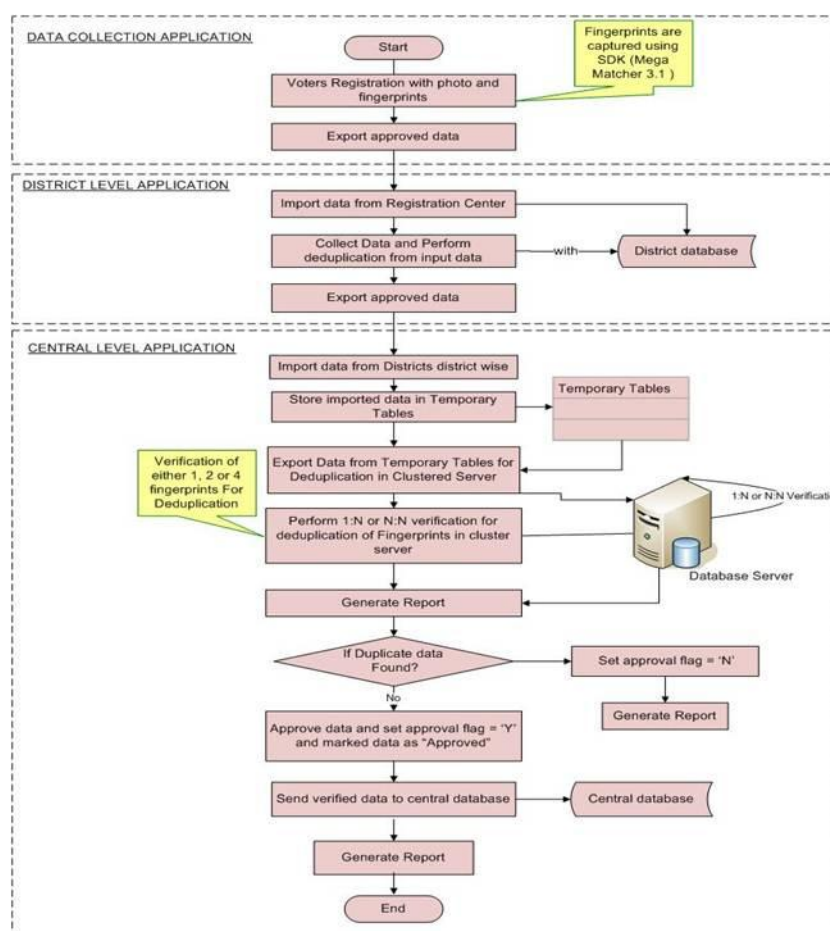
Figure 4 : Baseline VLA process flow

The verification procedure

The ability to verify that records are correct and that there are no duplicates is critical to VLA functionality. Conceptually the verification procedure is done in three stages;

i.   at the ward level with the DCA, approval of the record after checking that the details are in fact correct

ii.   at the district level with the DVLA, approval of records after an optional duplicate check and checking that the details are in fact correct

iii.   at the central level with the CVLA, approval of the records after an optional duplicate check and biometric de-duplication.

Furthermore, there are three system functions available to support the verification;

a)   Approval which is supported by a separate GUI form. This function changes record state from unapproved (at that level), to approved.

b)   Text field based duplicate search, supported by a separate GUI form. It is possible to work on a per record or on a record set basis. The result is a result set of records, but there is no state change (from unapproved to approved) from this function.

c)   Biometric based fingerprint matching for duplicate search, supported by a separate GUI form. There are two different functions supported here, one named "*Verification From TempTable* " and one named "*Fingerprint Verification* ". The former concerns itself with matching unapproved records with existing, approved records, whereas the latter concerns itself with matching approved records with existing, approved records. The result from the former function is the insertion of records into the approved, nationwide record database. These functions are only available to the CVLA.

In the baseline source code, it is the class BBVRS.Forms.Finger.Verification that does the actual fingerprint matching. The central api call is a NMatcher.Verify() call from the Neurotechnology's Megamatcher 3.1 .NET Neurotec.* packages. It either does

•   a 1:N template match (verification) where the inner loop is a 1:1 record match (the Verify() call above). In the GUI you may indicate whether to match with a single individual or a set N.

•   a N:N template match with the double inner loop doing 1:1 record match (the Verify() call above), with no optimizations. In the GUI you may constrain N by district or by citizenship.

Seen from the applications (VLAs), the term verification is used more narrowly and does only include the two matching functions. This specification adopts that terminology, maintaining a difference between approval and verification.

3.5.   Methodology

REQ. 3.   The Vendor must have project and technology competent staff available at the ECN premises as necessary such that communication, planning and deployment are adequate. The designated staff must have authority to make decisions on the Vendor's behalf.

3.5.1   Confidentiality

REQ. 4.   During work with the VLA, the Vendor will get access to voter record and user record information. Vendors shall confirm in the Offer that they will maintain full confidentiality of such information and will not use, sell or store any such information without a written requirement and express consent in writing of the UNDP ESP and the ECN.

3.5.2   Configuration management

REQ. 5.   Database schemas, source code and other artefacts being part of a release must be versioned. They must be subject to a revision control system and be clearly labelled with their Vendor internal version as well as a release tag/name.

REQ. 6.   Source code, database schema and definitions, configuration and build artefacts, documentation and any other custom developed artefact of the VLA software specifically developed for this project (i.e the *VLA SDK*), in order for the ECN to be able to ensure independent maintenance and updating/modification of the software in the future, must be made available as configured items.

3.5.3   Deployment

REQ. 7.   With each release, the Vendor shall provide *testable documentation* on how to deploy the release on all relevant hosts and environments, taking into account the present configuration at the Quality Assurance (QA) or production environment. To the extent possible, the procedures shall be automated and script/code-based.

REQ. 8.   Data migration is part of a release, in this case the Vendor shall, in collaboration with the ECN, provide *testable documentation* on how to do the migration and integration. To the extent possible, the procedures shall be automated and script/code-based.

REQ. 9.   If there are problems with the deployment of a release and the ECN IT staff are not able to get a release deployed, either in QA or in production, the Vendor shall assist in getting the release deployed until the release is deployed to the satisfaction of the ECN.

3.5.4   Builds

REQ. 10.   The building of the VLAs from source code and other *artefacts* shall be fully automated, and user friendly.

REQ. 11.   In the test environment a build shall be performed every night, making the new build available to the Vendor and ECN for inspection.

REQ. 12.   The same build system and configuration as is in place in the test environment shall be made available and easy to use for the ECN for use in the QA or production environment.

3.5.5   Acceptance Tests

There shall in general be three types of tests the ECN/UNDP ESP is involved in and where acceptance plays a formal role;

- **Iteration acceptance tests**. These are tests performed after each iteration and on a defined release.

- **Phase acceptance tests**. These are tests performed after each phase and on a defined release.

- **Project final acceptance test**. This is the final acceptance test for the entire project release.

REQ. 13.   For each iteration, phase and at the end of the technical implementation part of the project there shall be acceptance tests.

There are three acceptance test outcomes for a release:

(a) *Accepted*. The content is accepted according to the test plan.

(b) *Tentatively accepted*. The content is not accepted according to the test plan, but the shortcomings are not so severe and a list of issues is produced. This list of issues is addressed during the next iteration and tested again the next release.

(c) *Rejected.* The content is not accepted according to the test plan and the shortcomings are so severe that an additional iteration has to be put in place to fix the outstanding issues.

Acceptance test results are at the sole discretion of the ECN.

REQ. 14.   For the target VLAs to be finally accepted as a whole, all single iterations (planned and/or spurious) must have been accepted and all requirements herein must have been met.

REQ. 15.   For change requests which are raised during acceptance and which have not been agreed by the ECN/UNDP ESP as a new feature request, the Vendor shall fix these without any cost to the ECN/UNDP ESP, impediments to the rest of the project or any pre-conditions.

3.5.6 Release management

The vendor must work according to a work model that is from the ECN's perspective characterized by

1. The software must be built iteratively. An iteration is relatively short, in order of a month. An iteration consists of;

   a. A **plan** part, where the Vendor and the ECN/UNDP ESP decides what this iteration is going to include. The inclusion is in general based on the requirements, modules and phases described in this document. The plan also includes the tests that are the basis for acceptance for this iteration

   b. A **construction** part, where the Vendor builds a solution that meets the requirements.

      - The construction part ends with a demonstration, typically a presentation where the vendor and the ECN/UNDP ESP physically sit

together and the Vendor demonstrates a running solution, going through the agreed upon requirements (from the plan part) and illustrating how these are met.

c.   An **acceptance** part, where the ECN reviews, evaluates and tests a running solution (typically in the QA environment). This part ends with an acceptance statement.

d.   A **fix** part. From the acceptance, there might be a list of issues raised that are by default regarded as bugs. The Vendor and the ECN/UNDP ESP may agree that an issue is in a new feature request instead. For bug fixes the Vendor fixes these issues during a short period before the next iteration proceeds. For the new feature requests and for bug fixes that are too big to fit into a short fix period, the Vendor and the ECN/UNDP ESP agree on how to deal with the issue.

2.   Each iteration is followed by a release. The content of the releases are defined in accordance with this document and the on going planning that defines each teration.

3.   A release is a named, complete set of configured artifacts that when built comprises all that is necessary to test all VLA requirements herein. This release scope is called a *VLA* release. A VLA release is self-sufficient in that it contains documentation on how to build and test it.

4.   A release is testable according to the acceptance criteria for the release.

5.   The vendor shall provide an environment where the ECN may test and inspect the release for the duration of the next iteration .
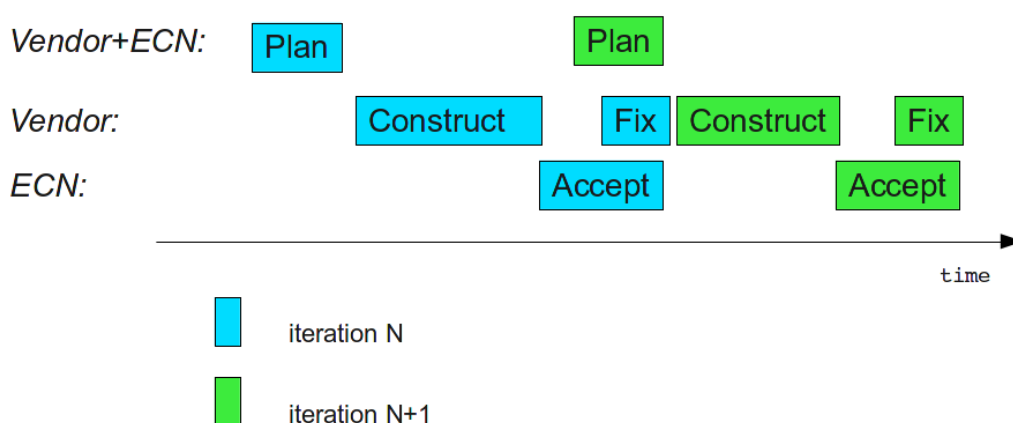
Figure 5: Two iterative work cycles

For testing a release and its features a test plan is made. The test plan consists of a set of test cases, acceptance criteria and test data. A test case typically has a use case scope (user centric, focusing on a particular important user task).

REQ. 16.   The Vendor must maintain an issue tracking system where the Vendor and the ECN together model releases, functionality and what artefacts with what versions go into such a release.

REQ. 17.   The software must be built iteratively. The project delivery shall be over multiple releases. Each iteration is

followed by a release and will comply with the iteration plan
above.

REQ. 18.   All releases are subject to acceptance testing. The tests
are made jointly by the ECN and the Vendor, where the ECN makes
the general test case and acceptance criteria, and the Vendor
details the case with test data and detailed steps. The ECN is
free to test with other data and in other ways than planned.

REQ. 19.   The Vendor shall provide easy, configurable technical
mechanisms that make it possible to test non-functional
requirements, in particular with regards to high-availability and
security. The test mechanisms must be available in the test
environment and must be a part of the deployment artifacts such
that they easily are replicable in the QA environment.

3.5.7   Organizational resources

The ECN will provide sufficient capacity filling the following roles;

- Operations role
  - Domain admins
  - Data Entry operators
  - System admins
  - Training roles, ensuring the Line organization is ready for new releases of the software.
  - Line users (end users)

- Maintenance/Development Role
  - Functional requirements role, usually people from the Line (Line Managers and the like), taking responsibility for detailed functional specifications and Graphical User Interface aspects for upcoming work items
  - Non-functional role, usually technical people to follow-up on security, performance, builds, configurations and maintainability.
  - Quality assurance roles, in particular
  - test roles that have responsibility for iteration and delivery acceptance

The ESP will provide sufficient capacity filling the following roles;

- **Management committee :** comprise of ECN and UNDP-ESP senior management
- A **Project Manager:** Overall coordination between Management committee, vendor and technical team. Direct liaison with vendor on day to day basis

- A **technical team** will closely work with vendor through project manager;

The Vendor must provide at least the following, committing the necessary organizational resources over the project lifetime:

- **Project leader/manager**

- **Functional Lead**, dealing with particular aspects of functionality and GUI, as well as actively participating with planning new iterations and clarifying functional aspects of work items. **Technical Lead**, or Non-functional lead. This role takes care of clarifying and implementing all aspects of the solution that doesn't have to do with business functionality, like architecture, security, performance, environments, building, deployment and maintainability.

- **Developer Lead**, implementing the work item functionality, unit tests and preparation for other tests.

- **Test Lead**, ensuring the solution is testable on all levels, that it is automated and that the ECN and the Vendor work together on test and acceptance.

- **Training Lead**, ensuring that relevant staff of the ECN are trained to use the new software

REQ. 20.   In line with the requirements, the Vendor must include in their technical team the necessary experts during the whole period of service and technical assistance, including at least the below profiles in sufficient number to ensure completion of the TORs within the specified timelines:

1. Project Manager

    i.   Proposers shall provide details of the appointed Project Manager who will be present in Kathmandu for the duration of the services as accountable person (either employed by the supplier or working for their local representative/partner) on the ground that can take final decisions on behalf of the supplier.

    ii. CV of the proposed Project Manager to be provided and if a different person is finally appointed; he/she should comply at least with the same or superior profile, once agreed.

2. Functional Lead

    i.   Proposers to disclose who and number and provide CVs of technicians appointed. A functional lead deals with particular aspects of functionality and GUI, as well as actively participating with planning new iterations and clarifying functional aspects of work items. The lead is also a developer, implementing the work item functionality, unit tests and preparation for other tests. CV of proposed Technical person to be provided and if a different person is finally appointed; he/she should comply at least with the same or superior profile, once agreed.

3. Technical Lead

    i.   Proposers to disclose who and number and provide CVs of technicians appointed. This role takes care of clarifying and implementing all aspects of the solution that doesn't have to do with business functionality, like architecture, security, performance, environments, building, deployment and maintainability. The lead must have in-depth knowledge of the technical aspects of the supplied System. They should be able to install, set-up, run, shutdown and maintain the supplied system and software, and should be present during (or conduct as relevant) the installation process, the training of the staff and for the necessary time during operation. CV of proposed Technical person to be provided and if a different person is finally appointed; he/she should comply at least with the same or superior profile, once agreed.

4. Test Lead

    i.   Proposers to disclose who and number and provide CVs of technicians appointed. This role , ensures the solution is testable on all levels, that it is automated and that the ECN and the Vendor work together on test and acceptance. CV of proposed Technical person to be provided and if a different person is finally appointed; he/she should comply at least with the same or superior profile, once agreed.

5. Training Lead

    i.   Proposers to disclose who and number and provide CVs of technicians appointed. This role ensures that relevant staff of the ECN are trained to use the new software. CV of proposed Technical person to be provided and if a different person is finally appointed; he/she should comply at least with the same or superior profile, once agreed.

6. Software Developers/programmers and Database architects

    i.   These experts should have in depth knowledge of the propriety software and be able to install, troubleshoot, debug and solve software related issues of the supplied Systems, including programming and redesigning. The experts should in addition be able to train the ECN staff on the Software solution and Software Development Kit supplied for the System provided, give solid advise on best practices for using external databases, installing the Software Development Kits (SDK), help develop the best and optimum solution including duplicate analysis module enhancements, show and teach how to fine tune the system for optimum performance. CV of proposed Software Developers/programmers and Database Architects to be provided and if a different person is finally appointed; he/she should comply at least with the same or superior profile, once agreed.

REQ. 21.   The Vendor shall, at a minimum, provide qualified
personnel filling the Vendor lead roles described above, as well
as all the operational and developer staff needed. These shall in
general be available, responsive and participate in their
respective role domains, with the adequate level of competencies
and experience to perform the roles and activities desc

REQ. 22.   The Vendor must define which people shall fill which
roles at what times during the project timeline. The persons
shall be identified by individual CVs.

3.6.   Project Timelines

The activities and the project schedule depend on the planned releases and the organizational resources. The current plan spans 7 iterations, scheduled as per the attached indicative timeline in Annex 3 . There are two perspectives on the schedule. There is the schedule and resource allocation for each iteration and there is the overall schedule for the project.

3.6.1   Project schedule

There are three phases planned for the project. Each phase includes work on a subset of the defined modules. The majority of requirements in this document map to a module and a phase.

The project schedule is assumed to feature a single team from the ECN/UNDP ESP and two teams from the Vendor that can work in parallel as depicted in the project timeline.

3.6.2   Milestones

A milestone is a point in time when a major delivery or set of activities are finished. There are four types of milestones in this project

1) A Phase milestone. When the release that encompasses an entire project phase is accepted, there is a phase milestone.

2) Feasibility milestone. When the feasibility acceptance is accepted, there is a feasibility milestone.

3) Module milestone. There is a module milestone that signifies that there has been iteration acceptance for all phase 1 VLA CVR modules.

4) Acceptance milestone. When the release that encompasses an entire technical project implementation is accepted, there is an acceptance milestone.

Note that certain of the milestones have data migration and module production dependencies.

REQ. 23.   The project shall work according to an agreed plan that
is split into activities and milestones with defined dates. An
activity shall be defined in terms of deliverables. A deliverable
shall be defined in terms of an unambiguous set of requirements
that shall form the basis of delivery acceptance.

REQ. 24.   The Vendor must comply with timelines and work priorities according to a schedule as specified above.

REQ. 25.   The Vendor create and receive approval by ECN an Inception Report that includes a detailed solution design with graphical GUI form layouts (including Devnagari text, buttons, size and type of fields), form control flows, an application architecture, a solution design for non-functional aspects of the solution (including security, integrity, accountability and reliability), an infrastructure architecture and other aspects the ECN or the Vendor have identified.

REQ. 26.   The Vendor will create detail delivery plan and receive approval from ECN, specifying iterations, releases and their contents, acceptance criteria, activities, milestones and commitment requirements from the ECN.

REQ. 27.   The vendor will create summarised feasibility study report and receive approval from ECN on how the bare-bones solution, described above, fared.

3.7.   General Requirements

3.7.1   Documentation

Within the scope of this specification, the documentation requirements fall into 3 main categories;

a) End-user documentation.
   - Audience: non-IT professional ECN staff
   - Language: Nepali
   - Delivery: This delivery would in practice be three user guides, for the DCA, DVLA and CVLA.
b) Operations' documentation.
   - Audience: IT operations professionals installing, upgrading, configuring and running as well as dealing with incidents and issues pertaining to the VLAs.
   - Language: English
   - Delivery: Operations Manual
c) Maintenance and development documentation. This is documentation on the VLA SDK and source code.
   - Audience: Two distinct groups:
     o IT development professionals that aim at modifying the VLAs themselves
     o IT development professionals that aim at using the services provided by the VLAs.
   - Language: English
   - Delivery:
     o VLA developer's manual
     o Application Developer's Guide to the VLA

d) Training of the Trainers documentation.

- Audience: IT professional ECN staff
- Language: Nepali and English
- Delivery: Training manuals for trainers.

REQ. 28. As part of the releases beginning with iteration (Registration), the Vendor is required to deliver a CVLA user guide. Upon each iteration the guide shall be expanded by the Vendor so that the scope of the content reflects the scope of the release. All operations, GUI forms and functions shall be explained in detail. The guide must be completed by milestone (Phase 3 milestone).

REQ. 29. As part of the releases beginning, the Vendor is required to deliver the corresponding VLAs Operations Manual. Upon each iteration the manual shall be expanded by the Vendor so that the scope of the content reflects the scope of the release. The manual must be completed by milestone (Phase 3 milestone).

REQ. 30. As part of the releases beginning, the Vendor is required to to deliver the corresponding VLAs developer's manual. Upon each iteration the manual shall be expanded by the Vendor so that the scope of the content reflects the scope of the release. The manual must be completed by milestone (Phase 3 milestone).

REQ. 31. As part of the releases beginning with iteration VLA CVR, the Vendor is required to to deliver the corresponding Application Developer's Guide to the VLAs. Upon each iteration the manual shall be expanded by the Vendor so that the scope of the content reflects the scope of the release. The manual must be completed by milestone (Phase 3 milestone).

REQ. 32. As part of the releases beginning with iteration DVLA & DCA, the Vendor is required to to deliver the corresponding DVLA and DCA user guides. All operations, GUI forms and functions shall be explained in detail. Upon each iteration the manual shall be expanded by the Vendor so that the scope of the content reflects the scope of the release. The guide must be completed by milestone (Phase 3 milestone).

3.7.2 CVLA-DVLA-DCA integration

The ability to import data from a DVLA to the CVLA and being able to export data from the CVLA to the DVLA is of critical importance. Furthermore, the DVLA must be able to import data from the DCA.

This requirement specification need to cater for three different communication mechanisms. They are numbered 1, 2 and 3 with orange boxes.

9. *Legacy:* In the baseline VLA, the provision was to "Import data from USB Flash or CD/DVD" and realized as an import facility for an encrypted database dump (from the DVLA or DCA). The VLA must maintain this for backwards compatibility and to cater for districts with no internet connection, although amended for accommodating the new 3-tier architecture and audit requirements.

10. *Offline:* With Continuous Voting Registration (CVR) there must be a way to import from a (typically offline) VLA only the records that have been updated, added or deleted, such that the VLA avoids having to import the entire database just for a few changes.

11. *Online:* There must be a web services based method such that an online VLA may export or import the present set of updated, added or deleted voter records.
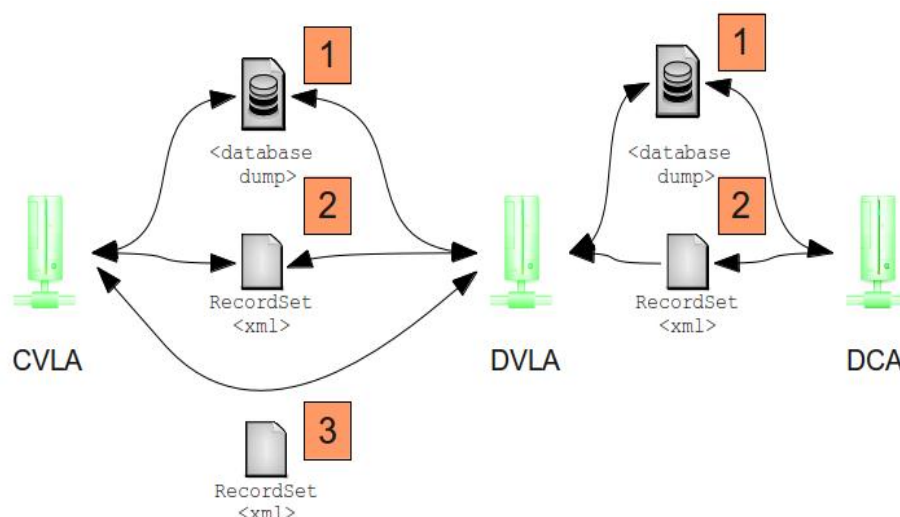
Figure 6: The communication between the CVLA, DVLA and the DCAs

Note that for method 3, the arrow is bidirectional, but it is not intended that the DVLA provides services. Thus, for the DVLA to get a *RecordSet* over web services from the CVLA, it would have to poll.

For methods 1 and 2, the file itself must be encrypted. For method 2 the file must be signed with a key pair tied to an identity that the IdentityService knows about. For method 3 normal web services security mechanisms providing encryption, authentication and authorization must be employed.

- Audit information shall always accompany transferred voter record information.

- Record history (including but not extending beyond last central-verified Stage State) shall be included when transferring data upstream (DCA->DVLA->CVLA) but not downstream (CVLA->DVLA->DCA).

REQ. 33.   The   CVLA,   DVLA   and   DCA   must   support   the   *legacy* communication mechanism.

REQ. 34.   The   CVLA,   DVLA   and   DCA   must   support   the   *offline* communication mechanism.

REQ. 35.   The CVLA and DVLA must support the *online* communication mechanism.

3.7.3   Common VLA non-functional requirements

3.7.3.1 Architectural requirements

An all-encompassing requirement for all the VLAs is that the ECN doesn't suffer from vendor lock-in. It shall be possible for the ECN at some future point to choose a different vendor, platform, persistence solution and/or products.

REQ. 36.   ECN should not be locked in with a particular vendor, platform, persistence solution and/or products. It shall be easy for the ECN to, in the future, choose a different vendor, platform, persistence solution and/or products for maintenance, operations or further development.

REQ. 37.   All development, platforms, persistence and products shall be to the extent possible be based on open, non-proprietary, widely adopted standards supported by several major, independent companies.

REQ. 38.   Technical solutions shall not be based on proprietary fixes, solutions or optimizations which lock ECN into a specific vendor.

REQ. 39.   Similarly, methodological aspects and tools underpinning the methods, shall be based on open, non-proprietary, widely adopted standards and procedures so that the ECN isn't methodologically locked in.

3.7.3.2 Multi-tier application

With reference to the target application architecture the VLA must be a multi-layer application where there is a separate layer catering for business logic and which insulates the clients from the database, providing lower coupling and less vendor dependability. In particular there shall

- be no direct access to database from clients

- be possible for multiple service consumers to be serviced in parallel.

- web services as a primary means of communication between clients and servers.

The fundamental principles here are that

- a layer should only have access to the layer below

- a layer may communicate with the layer below but not vice versa.

REQ. 40.   The CVLA shall have an intermediary layer/tier between external clients/DVLA and the database.

REQ. 41.   The CVLA shall have an intermediary layer/tier between the CVLA Client and the database.

REQ. 42.   There shall be no direct access to the CVLA database from DVLA clients or other external service consumers.

3.7.3.3 Component collaboration model

The requirements in this document are categorized according to a modules. Similarly, the solution provided by the Vendor shall be modularized. Each module shall be a cohesive, self-contained unit realized as one or more components. It shall in general be possible to remove a module and replace it with another one

that features the same functionality, interfaces and non-functional behavior but with a different implementation.

Service consumers and providers shall be based on a component based design, where a component is a versioned functional run time black box that exposes a set of interfaces, adheres to defined non-functional requirements, depends on a defined set of services and data types and may itself be exchanged with another implementation, possibly based on a completely different technology. A component should generally be designed with the aim of exhibiting low coupling and high cohesion.

REQ. 43.   The   solutions   provided   by   the   Vendor   shall   be modularized. Each module shall be a cohesive, self-contained unit realized as one or more components. It shall in general be possible to remove a module and replace it with another one that features the same functionality, interfaces and non-functional behaviour but with a different implementation.

REQ. 44.   Service   consumer   and   providers   shall   be   based   on   a component based design where the exposed interfaces and the service and data dependencies are well defined and part of the documentation both as run time technical interfaces and as an annotated human readable model.

3.7.3.4 Information model integrity

The integrity of information in the VLA is of utmost importance. In particular:

- There shall be 3 independent domains (identity, voter, audit) such that they may be in separate databases later if so is needed..

- the voter registry data must physically reside within the ECN data center although backup of these data will be at another location .

- The quality of the voter registration data, both text based and image based must be of sufficient quality so that voter identity verification can be achieved.

REQ. 45.   Information shall be loosely coupled and dependent groups of information entities shall exhibit a high degree of cohesion. To the extent possible, there should be cohesive correlation between components using the information and the information model.

REQ. 46.   The VLA voter registry data (including identity data and metadata) must physically reside within the ECN data centre (with a possible future exception for the backup data) or if placed elsewhere, either temporarily or permanently, must be encrypted at all times and with the ECN as the sole agency having access.

REQ. 47.   All private keys and trusted certificates shall be stored in secure key stores (or similar mechanisms) protected by a non- invertible secure digest passphrase mechanism. The passphrase itself shall not be stored on disk or other permanent medium anywhere in the VLA ecosystem. The digest shall be at a minimum SHA-256 or equivalent.

REQ. 48.   For voters whom are registered or updated after the
   target VLAs are in production, the equal error rate for voter
   identification using the VLA Verification functionality must be
   on average over 10 runs, lower than 3% for a uniform sample of
   5000 voters for each run. A single threshold configuration shall
   apply for all runs.

REQ. 49.   For voters whom are registered or updated after the
   target VLAs are in production, the *False Reject Rate* (FRR) shall
   be less than 3% given a *False Accept Rate* (FAR) less than 0.1%.
   This shall apply on average over 10 runs for a uniform sample of
   5000 voters for each run and with a single threshold
   configuration for all runs.

3.7.3.5 Service integrity

Services must be engineered with redundancy such that if one particular service implementation is unavailable, then another automatically takes over. In the case of a service or consumer going down, all services must exhibit transactional behaviour in that the state of the service and data must be defined at all times, and that there will be no loss of data where stored or for data that are in transit.

Services must be versioned and there must be facilities for providing and resolving several versions of the same service at the same time if needed.

Web services need to be reliable in the sense that if either party or the connection itself fails during transfer the transfer behaves transitionally in compliance with ACID properties.

All type definitions being part of an exposed service must refer to a versioned, CVLA-wide namespace. Phased-out, old service definitions must be advertised as such and meaningful error messages must be provided as a response including referrals to newer, valid services. An automated way of managing service life-cycle and service life-cycle policy must be in place.

REQ. 50.   Services and dependencies between providers and consumers
   must be safeguarded in compliance with section 3.7.3.4 above and
   in the areas of robustness, security, scalability and
   interoperability.

3.7.3.6 Accountability

The architecture must provide trust in that an audit operator may get to know who did what at what time, what the state of the system was before a business event and the state after. This implies the architecture must provide pervasive services for security, access control, logs and audit functionality, authentication, authorization, encryption and monitoring.

Furthermore, there must be a design that enforces a separation of concerns, in that business functions, identity and access control functions and audits are entirely separate on all levels in the architecture, from the business level, throughout the application and information level and through the technical level.

REQ. 51.   For the CVLA, there must be a design that enforces a
   separation of concerns, in that business functions, identity and
   access control functions and audits are entirely separate on all
   levels in the architecture, from the business level, throughout

the application and information level and through the technical level.

REQ. 52.   There must be pervasive services for security, access control, logs and audit functionality, authentication, authorization, encryption and monitoring that all business functions and exposed services fully use.

REQ. 53.   The run times of the DVLA and CVLA must be signed and there must be a platform based mechanism that is active that ensures the authenticity of the run time.

3.8.   Hardware Requirements

REQ. 54.   The software products that the ECN needs to acquire and/or license to receive, build, put in production run, support and maintain the releases should be in compliance with the hardware and facilities available at the ECN and in particular the ECN data centre.

REQ. 55.   If as part of the Vendor bid, any hardware items included must be enumerated, defined, planned for and included in the price proposal adding to the total costs of the solution.

> All equipment outside the Sanctum (including computer, printer, biometric extensions, webcam, batteries and UPS) must be able to operate in dusty, humid environments at temperatures ranging from 5°C to 45°C, humidity between 20% and 90%.

3.9.   Software Requirements

3.9.1   Transitions

3.9.1.1 Baseline to target transition

At some point in time the baseline CVLA, DVLA and DCA will retire (be put out of service) and the new target CVLA, DVLA and DCA will be set in production. This section states the state requirements of the data and databases at certain milestones in the release plan.

3.9.1.2 Transition state at Voter Milestone

The VLAs shall be based on the following databases at voter milestone:

VLA	Database
CVLA	Enterprise DB PosgreSQL Advanced Server
DVLA	Oracle 10g PE
DCA	Oracle 10g XE

REQ. 56.   At Voter milestone the databases shall be as detailed above.

3.9.1.3 Target state at Phase 3 Milestone

The VLAs shall be based on the following databases at Phase 3 milestone:

VLA	Database
CVLA	FOSS PostgreSQL
DVLA	FOSS PostgreSQL
DCA	FOSS PostgreSQL

REQ. 57.   At Phase 3 milestone the databases shall be as detailed above.

3.9.1.4 Transition tasks

There are two major tasks to be handled when phasing out the baseline VLAs and putting the target VLAs in production;

A.   The migration of production data from the baseline to the target

B.   The setting of the CVLA, DVLA and DCA in production.

The baseline CVLA is not expected to be under very tough uptime constraints at the time of phase out. The ECN can accept downtime in terms of hours for a particular one-off event.

REQ. 58.   The migration of CVLA production data from the baseline to the target must happen at most with least disruption to the VLA operations.

REQ. 59.   The migration of CVLA production data from the baseline to the target shall be subject to a test run, done in the QA environment with realistic number and type of applications, procedures and data volumes. As with other tests in QA, the Vendor shall provide sufficient plans, scripts, support and training that the ECN is able to conduct the test in a satisfactory manner. The test result shall be subject to formal acceptance from the ECN before migration of production data can be attempted.

REQ. 60.   The phasing out of a baseline VLA type (CVLA, DVLA, DCA) must happen only once for each type and project phase. There must not be a disruption of operations of prolonged hours for each of the VLA types before target VLAs of the same type are operational.

REQ. 61.   The phasing out of a type of baseline VLA and phase in of a target VLA type shall be subject to a test run, done in the QA environment with realistic number and type of applications, procedures and data volumes. As with other tests in QA, the Vendor shall provide sufficient plans, scripts, support and

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training that the ECN is able to conduct the test in a
satisfactory manner. The test result shall be subject to formal
acceptance from the ECN before phase out and phase in, in
production can be attempted.
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3.9.1.5 Transition plan outline

- *Pre-Voter Milestone:* Before voter milestone the Baseline VLAs are in production.

- *Voter milestone:* VLAs based on the target information model is being tested.

- *Phase 1 milestone*: At phase 1 milestone all phase 1 modules (CVLA, DVLA, DCA) are in production. Report functionality is still being served by baseline VLAs in parallel. Baseline VLAs are no longer being used to update the registry.

- *Phase 3*: At phase 3 milestone, baseline VLAs are phased out. All three methods for data exchange have been implemented. No functionality is dependent on the baseline VLAs.

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REQ. 62.   The Vendor must as part of the feasibility iteration,
   provide a detailed transition plan which involves data migration
   and a dependency analysis. The plan shall state clearly when and
   which parts of the target are set in production.
REQ. 63.   The migration of the baseline CVLA data to the target
   CVLA shall go through multiple stages, spanning more than one
   iteration and being repeatedly tested in successive environments.
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3.10.   Target architecture

3.10.1 Application architecture

3.10.1.1   CVLA Logical view

The target CVLA must be set up as, at a minimum, three layer server-client application.
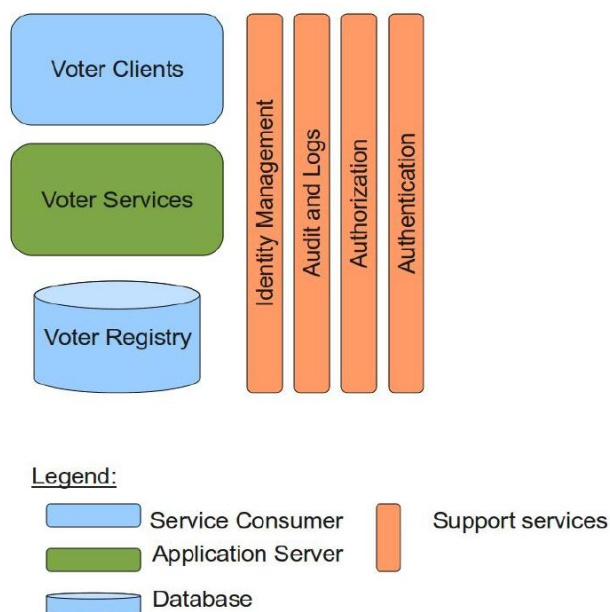
Figure 7 : CVLA logical view

In addition to a database layer and a set of clients as the baseline solution is today, there should be an application layer that serves to cater for business logic, lessen coupling with external systems, manage identity, authorization and access as well as providing enhanced auditing and logging capabilities.

This is a basic, very common architectural blueprint for enhancing system maintainability, security and accountability and is in accordance with the design requirement in. The architecture should to the extent possible rely on the standards and industry-wide blueprints.

3.10.1.2 CVLA Structural view

From a structural, components dependency view, there are three main component domains:

1. Internal, ECN IT clients

2. External clients

3. The ECN IT data centre

As can be seen from the specific CVLA requirements, it is critical that the DVLA Client and any potential external clients such as the NID Client are connected via an intermediary tier, the CVLA Service, and not having direct access to the CVLA database. It is desirable that the CVLA Client itself also communicates via the CVLA Services. .

REQ. 64.   There shall be a service layer between clients and persistent storage that caters for business logic. All functions available to the user via a GUI shall use the service layer and not depend directly on the persistent storage.

REQ. 65.   There shall be a separation between a service providing
    subject matter (things that pertain to registered voters), named
    CVLA Service, support services like identity and access control,
    named *Identity Service* and accountability services, named *Log
    Service*. By separation it is meant that one type of service may
    reside in run time on an entirely different host and different
    run time environment than another service.

3.10.1.3   DCA and DVLA structural views
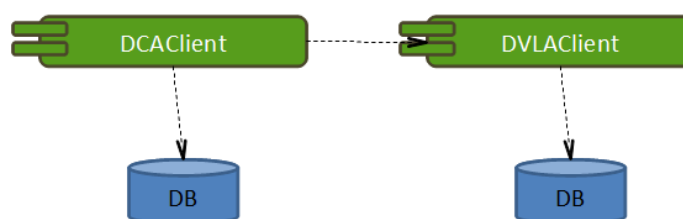
Figure 8 : The DVLA and the DCA

In difference to the CVLA, the DVLA and DCA shall retain their client-database architecture. The DVLA/DCA clients rely on a database and the DCA relies on the DVLA for further processing of the acquired voter data.

3.10.1.4   Modifications to the VLA client architecture

The *baseline* CVLA and DVLA clients communicates directly with a database. When the *target* DVLA Client and CVLA Client are to communicate with the CVLA database they need to do so via a CVLA Service layer.
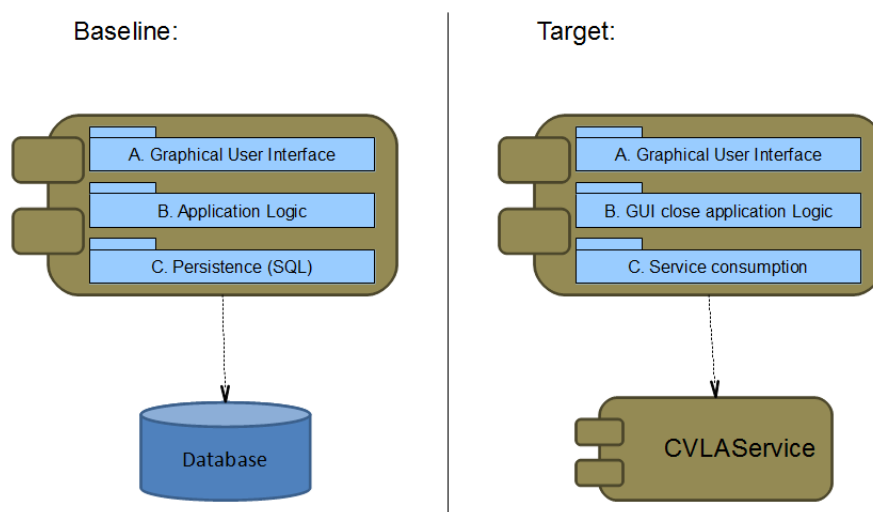
Figure 9 : Baseline and Target client communication

3.10.1.5   Information architecture

There are three independent sources of information the CVLA application relies on:

- Information about Voters

- Information about Identities

- Accountability information

In the baseline CVLA they presently map to a single database, but in the target are required to remain as entirely separate schemas. The domain models used for the CVLA should to the extent possible, mirror or depend upon the data models provided by the Government of Nepal's Enterprise Architecture Guidelines. To the extent there is available relevant run time accessible data models from the NeGIF Metadata & Data Standard Specification at the time of implementation, the ECN should adhere to these as much as possible.
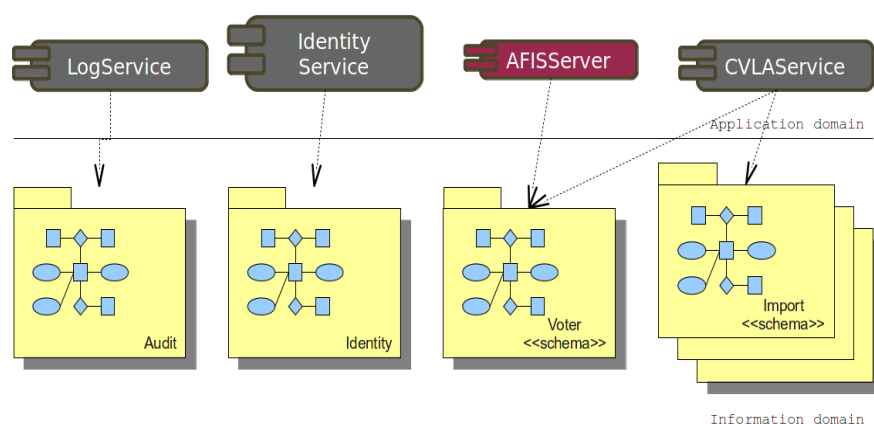
Figure 10 : The four independent information models of CVLA

- The *Identity Information Model (IIM)*. This model encapsulates everything that has to do with the users of the CVLA, ECN staff, their roles and permissions. It may serve to provision an LDAP/AD source if needed and it may later serve as the information store underpinning an identity federation service if that need should arise.

- The *Voter Information Model (VIM)*. This is the core information source of the CVLA and is the Voter Registry as such. Voters, their details, biometrics and various housekeeping attributes are found here. There are two different types of information in this model

  - *Voter records*. There is in general one active record per voter. A Voter record has at least one dependency to a registration record.

  - *Registration records*. This is a record that captures the content on a registration form. There are four types of these, "new", "transfer", "correction", "removal".

- The *Import Information Model (ImIM)*. This model is used for temporary storage of imported voters from a DVLA registry. In the baseline DVLA and CVLA this is the *TempTable*.

- The *Audit Information Model (AIM)*. This model is used to store traces of all or a subset of application server operations exercised and database operations. The scope and type of operations under audit should be configurable as a policy.

> The estimated total number of eligible voters as per 2011 that are to be in the register is 14.7 million voters. For an estimate on lifetime database size requirements one has to take into account voters coming of age, mortality and continuous voter registration, particularly during pre-election periods.

REQ. 66.   For the CVLA there shall be at least three separate information models. There shall be the Voter information model, the Identity information model and the Audit information model.

REQ. 67.   For the CVLA, the dependencies between service components and the information models shall be as is depicted in Figure 10.

REQ. 68.   When communicating data between the CVLA and the DVLA using any communication methods, the CVLA and the information model in particular, must support backwards compatibility with all previous DVLA versions.

REQ. 69.   With the CVLA, there must be capacity to store all identities, voters and their changes (new voters maturing, CVR, deaths, possibly several forthcoming elections) over the lifetime of the system and minimum for 10 years.

3.10.1.6   Important keys

There are principally three main types of keys handled by the VLAs. There are keys for voters, registrations and there are keys for VLA operators.

1. Any verified Voter Record shall have a voter id, a VID, that is immutably and permanently tied to this person and that is not correlated to any external, paper-based or registration/enumeration based index number.

   - A Voter Record has a version

2. Any VLA operator shall have a unique id that is immutably tied to this principal, a PID.

3. Any registration (i.e. any time a subject is filling out a registration form and submitting it) is identified by a registration id, an RID.

   - There is, in difference to the baseline VLAs, no registration form number. The RID is VLA generated.

In relation to these, please see Requirements 118, 119 and 120 later on in the document.

3.10.1.7   CVLA Technical architecture

Technology

REQ. 70.   The production and backup CVLA, DVLA and DCA databases should be an appropriate variant of PosgreSQL.

REQ. 71.   For web pages served by the Web Server, it is required that the full content and functionality is accessible by MSIE 7+, Firefox 3+ and Safari 4+ on Windows (XP SP3, Vista, 7), Linux

(Ubuntu 10+) and Mac OS X (10.4+) to the extent the browser is supported on the platform.

REQ. 72.   As a part of the Vendor bid, the Vendor shall provide an exhaustive list of software/hardware products that the ECN needs to acquire and/or license to receive, build, put in production, run, support and maintain the releases. The list must include versions, license particulars and in general make it possible for the ECN to make a precise estimate of the software product costs that come with the Vendor releases so that these sums may be factored into the total cost of the bid. Any system, hardware or software development needed to guarantee the full operation must be included in the offer, and no extra costs can be accepted thereafter in order to comply with the requirements.

Deployment

From a deployment viewpoint there are three main domains.

1. The external, non-secure zone, outside ECN control and jurisdiction

2. A demilitarized zone for exposing services and web server functionality and a backup database are under ECN control and jurisdiction, but physically these might in time not reside at the ECN data centre.
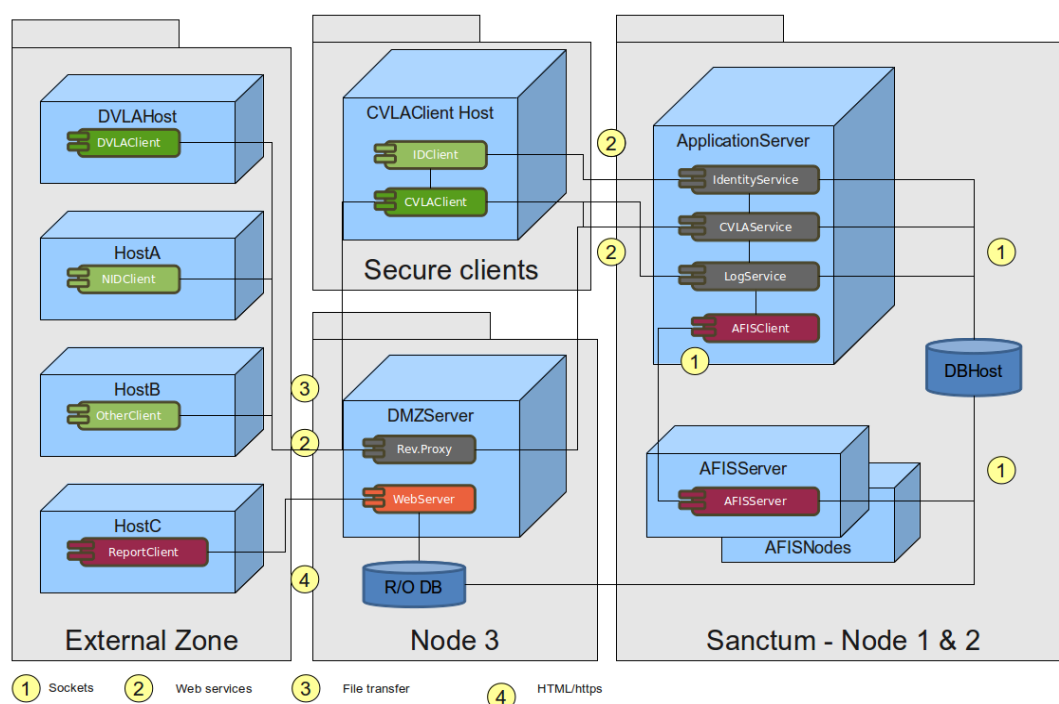
Figure 11 : Deployment architecture

Secure zones comprising the core services, the Sanctum, and a set of secure clients, all under ECN control, jurisdiction and physically on the data centre premises.

Environments

There shall be at least four technical environments related to the development, running and maintenance of the target VLAs:

- There is a *development* environment. It is under the governance, maintenance and sole control of the Vendor and used for software development, possibly related to maintenance and bug fixing.

- There is a *test* environment. It is under the governance and control of the Vendor, but the ECN has access to it. The main function of this environment is to test and validate work in progress. It also serves as the main platform for which the Vendor and ECN may communicate about technical aspects, recent changes, progress etc. The ECN shall not change anything in this environment.

- There is a *quality assurance* (QA) environment. It is under the governance, maintenance and control of the ECN. The main function of this environment is to test for acceptance of releases.

- There is the *production* environment. It is under the governance, maintenance and control of the ECN. The main function of this environment is to serve the users/clients of the CVLA.

REQ. 73.   The Vendor must maintain a test environment where the latest builds and the latest releases of the CVLA and the DVLA are (remotely) available to the ECN. The environment shall at least provide access to the build system, documentation, database, the service components and the clients as well as general OS desktop and command line access to the hosts in the environment.   The test environment must be accessible from a Windows XP SP3 or Linux Ubuntu 10.04 client or later.

REQ. 74.   The Vendor's test environment shall at the least perform 1/3 as well as the requirements put forth for High Availability.

REQ. 75.   The Vendor shall acquire and maintain at their own cost software products and licenses for the test and development environments necessary to develop, release and maintain the VLA's in development and/or in maintenance.

3.11.   Functional modules

A functional module is a defined set of runtime components that collectively serve a particular functional whole. I.e. a module is functionally cohesive. A component is a versioned runtime replaceable artefact with a defined behaviour and interfaces. A component may be a product or custom developed code.

There are 5 functional modules in this delivery;

1. VLA CVR

2. VLA Verification

3. CVLA Log

4. CVLA Identity

5. VLA Integration

Each module is given functionality in certain phases of the project;

Module	Phase 1	Phase 2	Phase 3
VLA CVR	Yes	No	Yes
VLA Verification	Yes	Yes	No
CVLA Log	Yes	Yes	No
CVLA Identity	Yes	Yes	No
VLA Integration	No	No	Yes

3.11.1 VLA CVR overview

This is the functional module that deals with the Continuous Voter Registration. Here we find new registration and approval screens corresponding to the physical registration forms as well as enhanced search and edit functionality. Data migration from the present database product to a new product, backup functionality and information model enhancements are also included here.

3.11.1.1 VLA CVR Phase 1

REQ. 76. In phase 1 the functional and non-functional tasks for the module consists of:

- Ability to register, change, transfer and remove voters by a data entry operator. Ability to register claims and objections by a data entry operator. Collectively, these are termed the *CVR Registration functions*. Ability to approve and disapprove all these by a domain administrator.

- Provide an application layer that insulate the GUI functions of a CVLA client from the information model in the database and allow for a multi-user environment. The middle layer shall be component based and provide well defined and documented APIs. The components shall be functionally cohesive. The components shall exhibit redundancy so as to ensure reliability.

- Migrate existing voter data to a new Postgresql database platform and update the Voter Information Model to accommodate the new CVR Registration functions.

- Ensure there are regular backups taken of all voter, identity and log information.

- Provide enhanced search and edit functionality. Domain administrators must be able to edit all registered voter data, including state information, keys and captured media as well as categories used for registration. System administrators must be able to edit user details. Similarly, domain administrators must be able to search for all records using a combination of fields including keys and state. System administrators must be able to search for all identities using a combination of fields and keys.

- Provide reports, as is in the existing VLAs.

3.11.1.2 VLA CVR Phase 3

REQ. 77.   In phase 3 the functional and non-functional tasks for the module consists of:

- Ensure there continuous replication of the voter registry information to a secondary storage that will be used as an additional backup as well as report functionality of the CVLA.

- Report functionality, including all existing (baseline) reports as well as new reports supporting voter verification and reporting.

- Provide all VLA client reports, including all existing (baseline) reports as well as new reports on users, access control and logs.

- Ability to support VLA operators in their work flow, so that the CVR business process flows are better supported and that GUI screens are linked as page flows. These are termed the *CVR Flow functions*.

- Ability to employ the voter and identities common domain model to share data between the VLAs, so as to save bandwidth and select certain subsets of the data for particular business purposes.

- The functionality shall perform within defined response times.

3.11.1.3 VLA Verification overview

This is the functional module that identifies voter record duplicates by biometric or text field based matching. The basis for biometric matching is fingerprints and face images.

3.11.1.4 VLA Verification Phase 1

REQ. 78.   In phase 1 the functional and non-functional tasks for the module consists of:

- For the CVLA de-duplication functionality, the de-duplication is constrained by both text based matching and biometric matching.

- For the CVLA and DVLA, text field based record matching including a combination of fields and keys.

- All GUI verification functionality shall work exclusively through an application layer, in the same fashion as for the VLA CVR module GUI functionality.

3.11.1.5   VLA Verification Phase 2

REQ. 79.   In phase 2 the functional and non-functional tasks for the module consists of:

- Optimization of the de-duplication process, meeting error targets through an empirical investigation process.

- For the DVLA de-duplication functionality, the de-duplication is constrained by both text based matching and biometric matching.

3.11.2 CVLA Log overview

This is the functional module that ensures that all changes to the persistent store may be inspected. That includes all changes to the voter registry as well as all changes to identities and access permissions. The log itself shall be verifiably immutable by all under all circumstances.

3.11.2.1   CVLA Log Phase 1

REQ. 80.   In phase 1 the functional and non-functional tasks for the module consists of:

- Log all changes to the Voter Registry at the database level, including all updates, inserts, creations, deletions with a time stamp and a user id. The users shall correspond to valid users recognized and administered by the CVLA Identity module. Common/system users are not allowed. The log itself and log entries shall be signed.

- Instructions on how to navigate the log for finding particular entries or changes.

3.11.2.2   CVLA Log Phase 2

REQ. 81.   In phase 2 the functional and non-functional tasks for the module consists of:

- Log all changes to the Voter Registry at the service level, including all parameters, return values, call-backs with a time stamp and a user id. The users shall correspond to valid users recognized and administered by the CVLA Identity module. Common/system users are not allowed. The log itself and log entries shall be signed.

- Log all changes to the Voter Registry at the database level, enhanced by providing former values for values

that changed as well, including biometric content as well as a reference to the service level log entry.

- Provide GUI functionality for configuring log levels (granularity) and scope.

- GUI functions for inspecting previous voter records or record values, constrained by time or by links between records backward and forward in time. There shall be functions for undeleting deleted records by domain administrators.

- GUI functions for inspecting previous identity, access and permission records or record values, constrained by time or by links between records backward and forward in time. There shall be functions for undeleting deleted users by system administrators.

- All GUI Log functionality shall work exclusively through an application layer, in the same fashion as for the VLA CVR module GUI functionality.

3.11.3 CVLA Identity overview

This is the functional module that deals with identities (users), roles, access control and permissions.

3.11.3.1   CVLA Identity Phase 1

REQ. 82.   In phase 1 the functional and non-functional tasks for the module consists of:

- Provide functionality for creating, updating and deleting users of the system.

- Provide user credentials by password.

- Provide functionality for mapping users to roles. There shall be minimum 9 roles, the system administrator, the domain administrator and the data entry operator for each of the CVLA, DVLA and the DCA. The roles shall be the roles the rest of the VLA applications employs for access control purposes.

- Provide two configurable identity sources, either a built-in custom identity source or an external LDAP product. For the built-in identity source, passwords shall be encrypted.

3.11.3.2   CVLA Identity Phase 2

REQ. 83.   In phase 2 the functional and non-functional tasks for the module consists of:

- Provide GUI functionality for creating, updating and deleting roles for all VLAs in runtime.

- Provide GUI functionality for creating, updating and deleting role based access lists and permission configurations to individual CVLA services and/or GUI functions in runtime.

- Provide GUI functionality for creating, updating and deleting users of the system in runtime.

- All GUI Identity functionality shall work exclusively through an application layer, in the same fashion as for the VLA CVR module GUI functionality.

- Allow *federation* of identities from external identity providers. The role mapping shall be managed internally.

- All runtime components shall work through a single-sign-on functionality provided by the CVLA Identity, so that no unnecessary login needs to be performed.

3.11.4 VLA Integration overview

This is the functional module that manages external agents consuming CVLA services.

3.11.4.1 VLA Integration Phase 3

REQ. 84.   In phase 3 the functional and non-functional tasks for the module consists of:

- Provide a service interface to search, retrieve, add, update and change voter records, subject to role constraints.

- Provide a serializable common domain model for voter records based on widely adopted, modern, public, non-proprietary, interoperable, international standards. All services that are exposed to external clients shall be duplicated to reside in a separate DMZ network zone, shall employ widely adopted, modern, public, non-proprietary, interoperable, international standards for service publication, communication and content formats, security and access control. The CVLA services themselves shall be implemented as durable and transactional web services.

- Provide a serializable common domain model for identity and access records based on widely adopted, modern, public, non-proprietary, interoperable, international standards. All VLA integration functionality shall work exclusively through an application layer, in the same fashion as for the VLA CVR module GUI functionality.

3.12.   Module: VLA Integration

REQ. 85.   All functions used by the DVLA and any external client must be using a services layer and not access the target CVLA database directly, being in compliance with the target architecture.

3.12.1 External integration

REQ. 86.   The integration challenges must be resolved in compliance with the Government of Nepal's Enterprise Architectural guidelines [c]. From a technological standpoint, the Governmental Enterprise Architectural principles in section 3.2 of [c] are of particular importance.

REQ. 87.   It must be easy and secure for new partners to the ECN to start depending on the ECN voting registry for their data needs. It must be quick and easy to add new services, to share data in a way that minimizes dependencies and maximizes maintainability. It must be easy to plug into and maintain the ECN security architecture with new roles, users and permissions.

3.12.2 Common exposed domain model

The content of the information models will in part be needed to be communicated and shared, principally as parameters and return values in web service calls. This serializable model must be carefully designed as it is one of the principal dependencies to other, external software components.

The serialization (file) format is to be an XSD defined format suitable for being used as parameters and return type in a web services call. The format must cater for the multimedia aspects of the record as well and in general capture all the fields that are found on the Registration Form of the baseline CVLA as well as the new registration forms introduced for CVR.

The serialization format must be modular and loosely coupled. A single voter record, a set of fields pertaining to a record, a registration form/record associated with a voter record are all chunks of information that may be communicated without the context they rely on. Thus references to these contextual elements must be present and resolvable, but not necessarily be communicated at the same time. The particular information granularity/chunking must be tailored to fit the needs of the services using the information. The common exposed domain model constitutes a language, and it important the terms and relations between terms of the language are recognizable by domain experts.

REQ. 88.   There must be a defined, comprehensive, loosely coupled, versioned data interchange format for Voter registrations based on a versioned xsd that underpins the offline and online communication methods. It must support lists of voters, a single voter, voter record state, voter history with accountability information, registration forms associated with a voter record as well as authentication and encryption facilities. The format must be usable as a serialization format for Voter information, piecewise or as an assembly. The versions referred to shall be composed of major and minor version numbers.

REQ. 89.   In a similar fashion, there shall be defined a comprehensive, loosely coupled, versioned data interchange format for the identity model in use, in compliance with Core RBAC standards and preferably in compliance with a standardized serialization format.

3.12.3 CVLA-DVLA-DCA Integration

REQ. 90.   On all CVLA search result windows that produce voter related results, there must be an export button that exports the result set as a *RecordSet* file. The export does not include record history but only the current voter state. This provides a more light-weight communication option.

REQ. 91.   There must be a GUI dialogue under "Data->Central Import" allowing import to happen via a *RecordSet* file. This applies to CVLA, DVLA and DCA.

REQ. 92.   Where the DVLA is communicating over web services with the CVLA, the same requirements concerning communication security and as is governing the CVLA, must hold for the DVLA as well.

REQ. 93.   In the DVLA, there must be a GUI dialogue that allows for the creation, update, view and deletion of a connection to the CVLA for data exchange purposes.

REQ. 94.   In case the DVLA is online and connected to the CVLA, there must be a GUI dialogue (under Data->Import) that reliably and securely imports all verified voter records from the CVLA over web services, subject to a filter that shall include a date range and/or geographical, *VID*, *StageState* and *MatchState* constraints. There is not to be any record version history accompanying this import.

REQ. 95.   There must be a GUI dialogue (under Data->Export,) that exports all approved Voter records as a *RecordSet* file constrained by a date range. This applies to the DCA, DVLA and CVLA.

3.12.4 Identity integration

REQ. 96.   There shall be a set of services that allow for information sharing of identity and access information over common, standard, industry wide mechanisms and standards, in particular SAML 2.0.

3.12.5 VLA Integration non-functional requirements

3.12.5.1 Multi-tier application

REQ. 97.   Interoperable web services based on open, non-proprietary, widely adopted standards shall be the primary means of communication between service consumers and service providers.

3.12.5.2 Component collaboration model

For basic component collaboration a standardized way need to be employed such that components realized with different types of technology and under different organization's control, can communicate.

This is in line with the Government of Nepal's Enterprise Principle #6 [c]. A reasonable approach would be to employ

- WS-I BP version 2.0
- Simple SOAP Binding Profile Version 1.0

as the technical basis for such communication. The service provider components must be fashioned in such a way that the business logic is separate from the executable code, preferably on a declarative form and such that if the ECN at a later stage wants to amend the business logic or implement it in another fashion (e.g. as a BPEL/BPMN or rule engine) that change will pose as few challenges as possible.

The services, their parameters and the information transmitted shall be semantically close to the business domain and in general be recognizable by domain experts. Thus, a document oriented, more coarse grained service design, as opposed to a chatty, fine-grained RPC style service layer, is required.

REQ. 98.   The service provider components must be to the extent reasonable, be compliant with the Enterprise Architecture of Nepal [c] such that they may be plugged into and used in that framework with as little trouble as possible in the future.

REQ. 99.   There shall be a model for component life-cycle management where mechanisms for introduction of new components, updating them and phasing them out shall be covered, both technically, methodologically and in documentation.

3.12.5.3 Information model integrity

The domain models should to the extent possible, mirror and depend upon the Government of Nepal's NeGIF framework [d]. One should in particular adhere to the model details in section 5.1 and section 4.2. Care should also be taken to ensure model details are exported in compliance with the data integration standards of Nepal Government enterprise architecture guidelines [c] in section 5.1.

REQ. 100.   There must be a common domain model that is publicly available both as a run time artefact and as an annotated human readable model, is versioned and aligned with the domain model work with the Nepal Enterprise Architecture Framework [c]. All CVLA web services employ the common domain model for sharing information.

3.12.5.4 VLA Integration service integrity

Quality related aspects of the services provided by a component need to be advertised in compliance with ws-policy.

Guarantee of message delivery and ensuring secure, transactional aspects of such a transfer is important. In particular, the ws-Reliable Messaging and W3C Web Services Addressing 1.0 - SOAP Binding are important to comply with for all services. If the vendor relies on two-phase commit type behaviour between several services, compliance

with relevant standards like ws-AtomicTransaction and ws-coordination would be required.

An interoperable way of dealing with large binary data must be in place where this is relevant. A natural choice would be to rely on MTOM.

REQ. 101.   Communication between a consumer and a provider shall be transactional and delivery guaranteed. On the CVLA server side the message communication shall be durable and transactional.

REQ. 102.   ws-ReliableMessaging shall be employed for communication between a consumer and a provider.

REQ. 103.   There shall be a model for service life-cycle management where mechanisms for introduction of new services, versioning, updating them and phasing them out shall be covered, both technically, methodologically and in documentation.

REQ. 104.   Service safeguards in terms of robustness, security, scalability and interoperability shall be based on open, non-proprietary, widely adopted standards.

REQ. 105.   An interoperable way of dealing with large binary data must be in place using MTOM.

3.12.5.5 VLA Integration accountability

With respect to the component collaboration, a reasonable approach would be to ensure fundamental technical security services through complying with WS-I Basic Security version 1.1 as well as ensuring the CVLA can be easily set up as a identity service provider to trust and relate to arbitrary identity providers over SAML 2.0. Authorization must be based on a standardized, non-proprietary declarative authorization model, like XACML or similar.

Assertions related to security constraints and policies of the services provided by a component need to be advertised in compliance with ws-SecurityPolicy.

REQ. 106.   Service security is based on WS-I Basic Security version 1.1 and ws-SecurityPolicy.

REQ. 107.   Identity may be provided over SAML 2.0 and authorization is based on a standardized, non-proprietary declarative authorization model, like XACML or similar.

3.12.5.6 VLA Integration security

REQ. 108.   Public services including the Web Server and the Reversed Proxy shall have, require and employ certificates as the basis for their server-side identification.

REQ. 109.   Service encryption shall be based on Xml encryption and shall as a general rule employ recommended and mandatory parts. Encryption must be sufficiently strong and shall employ AES-256 or 3DES.

REQ. 110.   All public services shall be exposed through a reversed proxy in a DMZ.

REQ. 111.   There shall be zones and communication directions as specified in Figure 11.

REQ. 112.   The Vendor shall assist the ECN and take responsibility for that all (DMZ) exposed services shall be identified by CA issued certificates.
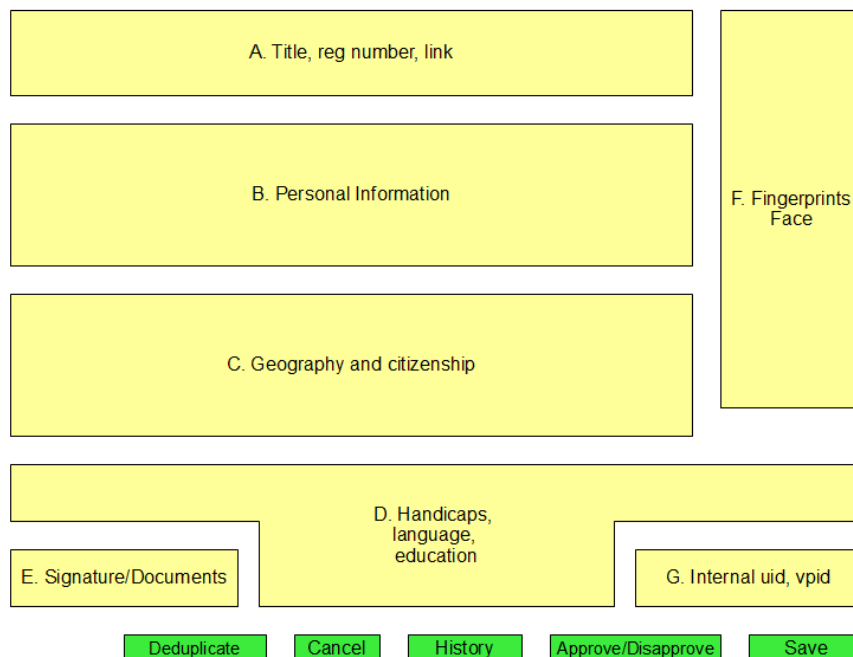
REQ. 113.   The Identity and Access model of the CVLA shall to the extent feasible and reasonable, comply with the Nepal Enterprise Architecture [c][d].

3.13.   Module: VLA CVR

3.13.1 Voter Records and Registration Records

The major difference between the target VLAs and the baseline VLAs is that in the target there are more than one type of voter registration. In the baseline VLA only new voter records are added to the voter register and no specific change or transfer transactions could be recorded. In the target, there are several types of CVR registration and these may impact one or more voter records.

The information model includes a new entity, the Registration Record. Based on the baseline Registration Form (both in the database and as a GUI entity).

Figure 12 : The Voter Record GUI form

The principal differences to the baseline registration form are:

- It is only used in conjunction with verification, search and matching, not registration.

- In subform A there is

    ▪ a clickable link to the registration form that caused the present version of the voter record.

- no registration form number as in the baseline, but a machine generated RID

- In subform E the operator may inspect an image of the identity document and signature provided during registration.

- In subform G, the voter id (a unique, machine generated id) is printed together with the operator user id (PID), modification date and version of this record. This is to facilitate record search for administrative and auditing purposes.

Of the green buttons, the history button will allow the operator to see previous or more recent versions of the record by showing a log depicting a change per row and listed chronologically. The rows shall feature columns summarizing the type of change (CVR type, manual edit, merge after match) as well as timestamp and operator. The operator shall be able to click on a row and inspect the voter record at that time/version.

The de-duplication button is a convenience shortcut that initiates verification with a single domain record.

REQ. 114.   The system must provide functionality to inspect and edit all voter records.

REQ. 115.   All voter records must be possible to inspect and edit by a GUI form that is similar to the VLA baseline edition but extended as described above.

REQ. 116.   The de-duplication convenience shortcut is requested to be implemented as described above.

REQ. 117.   All verified Voter Records must have a voter id, the VID that is permanently tied to a single person.

REQ. 118.   All Voter Records must be linked to the registration record (by the RID) that last initiated a change to the record.

REQ. 119.   All VLA operator's Records must be linked to the operators ID (by the PID) that last initiated a change to the record.

3.13.2 Core registration information

The information captured by the VLA are generally all the attributes captured in the baseline registration form, with some few additions. They are categorized as follows (with reference to the figure above):

- Category A:
  - Registration form type
  - Registration number (the RID)

- Category B: Personal Information
  - Name in Nepali
  - Name in English
  - Gender

- Husband's name
- Mother's name
- Father's name
- Grandfather's name
- Category C: Geography and Citizenship
  - Permanent Address
    ° District
    ° Municipality
    ° Village/Street
    ° Polling Location
    ° Ward no.
    ° House no.
    ° Family no.
    ° Telephone Number
    ° Mobile Phone Number
  - Citizenship details
    - Date of birth Nepali/Western calendar
    - Citizenship certificate/ NID
      ° ID Type
      ° Number
      ° Issuing district
      ° Issuing date
      ° Birth Address
        o District
        o VDC/Municipality
        o Ward
- Category D: Handicaps, Education
  - Handicap categories and comment field
  - Level of education
  - Literacy
- Category E: Signature/Documents
  - Signature (image)
  - Either NID or Citizenship certificate (images)

- Document numbers for other necessary documents such as marriage certificate, transfer certificate etc (images)

- Category F: Fingerprints and face

  - 4 fingerprints (images)

  - Face (image)

- Category G: Internal

  - Last principal to modify record and timestamp, by PID

  - Voter id (VID)

  - Registration id (RID)

  - Voter Record State

  - Unique record version id

These information elements apply both to voter and registration records.

REQ. 120.   The core information elements above must be part of the persistent voter information model.

3.13.3 Registration record state

The target VLAs are to be used for Continuous Voter Registration (CVR). The baseline VLAs have no specific functionality for CVR.

States:

1. *DCA Complete*: DCA will capture the new record from the field and after manual verification of new records all the eligible data will be ready for DVLA Import. This state is denoted as *DCA Complete.*

2. *DVLA Import:* Records imported to DVLA will be identified as *DVLA Import*.

3. *DVLA Approved: after the manual approval of the record by district office, record moves to DVLA approved.*

4. *CVLA Import: Record imported to CVLA will be identified as CVLA import.*

5. *CVLA Matched: each new record imported from DVLA goes through the matching process and only those records that do not result in matching exceptions will be identified as CVLA matched*

6. *CVLA duplicate: periodic de-duplication will be conducted and potential duplicate voter records will be identified for further processing as CVLA duplicate*

7. *CVLA Approved: All voter records need to be manually approved and became a CVLA approved before affecting central database updates and being ready for export to district offices.*
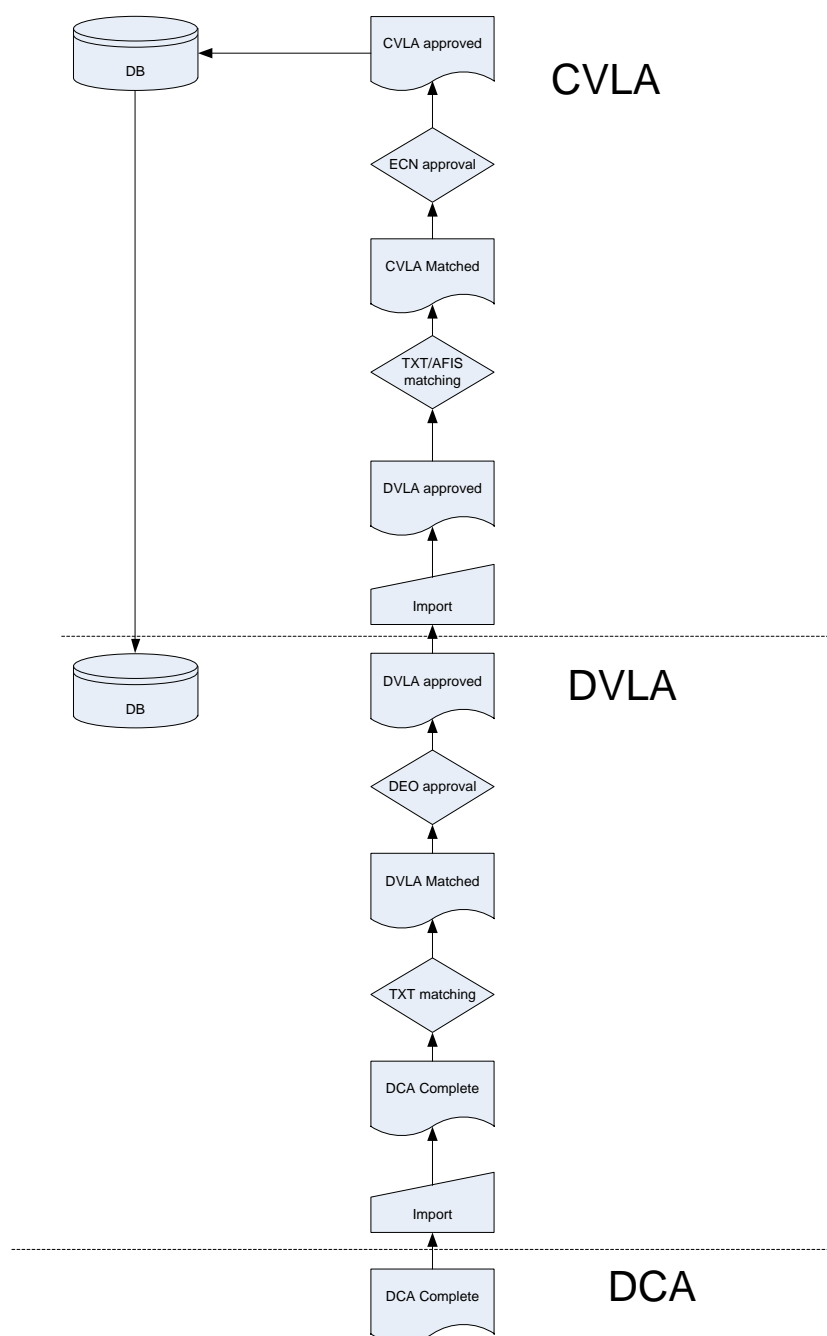
Figure 13: VLA State Flow

3.13.4 The maintenance cycle of the Voter Registry

The ECN goes through a perpetual cycle with respect to maintaining the voter registry. Incoming continuous voter registration applications are registered and accepted at mobile field locations and the DEO. Periodically these registrations are communicated to the ECN Data centre where they are inspected, matched with the existing records, and verified prior to being incorporated into the national voter register. Periodically updates and specific record sets are then disseminated to the relevant DEOs so that the district registries may be refreshed and verification work may continue. At what times and what size of the transfers (a)

and (b) happen depends on the communication mode between the DEO and the ECN data centre. It may be online, per-record or it may be as a batch.
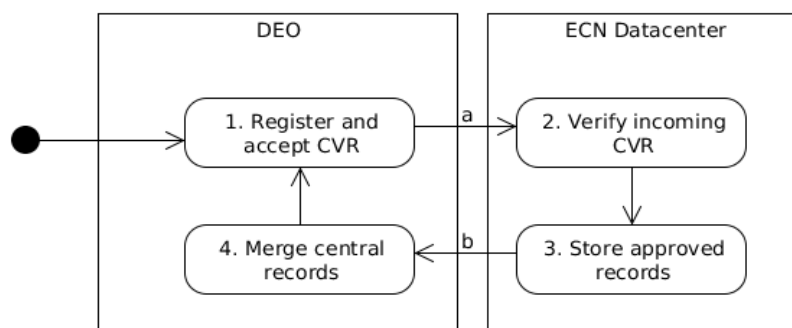
Figure 14: The maintenance of voter records

The CVR activity flows and requirements below touch upon the first three of the activities in Figure 15. The fourth activity is the merging of central updates.

REQ. 121. The Registration Type is an integral part of the voter record (for model, persistence and communication purposes).

REQ. 122. Each registration instance must have a globally unique, machine-generated, internal and immutable id number or string, the RID, that accompanies the registration throughout the activity flows and which is tied to the voter record. The number must be visible when searching for or registering a voter.).

3.13.5 Voter states for matching

REQ. 123. The CVLAMatched state is an integral part of the voter registration record (for model, persistence and communication purposes).

3.13.6 Continuous Voter Registration

Continuous voter registration (CVR) comprises four business operation:

- New Voter Registration

- Change Correction of Voter Detail

- Transfer of Voter (Migration)

- Removal of Voter

REQ. 124. All voter records have a defined, GUI visible state.

REQ. 125. The Voter state has consequences for what can be done with this particular voter, in accordance with the baseline VLAs. This must be maintained in the target CVLA.

REQ. 126. There must be GUI functions in all VLAs that allow the updated state and the transitions.

REQ. 127. There must be a GUI function to view and "undelete" the records.

3.13.7   New voter registration

When a new voter is registered at a DCA by a Data collection operator, the registration record moved to state *DCA Completed*. The record is transferred to the relevant DVLA and text matching will be performed upon imported data. This text matching process separates unique records and duplicate records. After this process the DEO will manually verify and approve the unique records which will be moved into *DVLA_approved* state. These records will be eligible to export into CVLA. After text and biometric based matching of *DVLA_approved* records, again the unique records and duplicate records will be separated in *CVLA_matched* state. After this process ECN will verify and approve the records in *CVLA_approved* state. The data from CVLA_approved state will be eligible to send DVLA for further process.

REQ. 128.   The functionality for registering new voters should be merged with and not remain separate from the baseline registration functionality. The CVR functionality for new registrations is an expansion upon and amendment of the original baseline and target requirements.

REQ. 129.   The new registration functionality shall be in compliance with the below subsections.

3.13.8 New registration activities
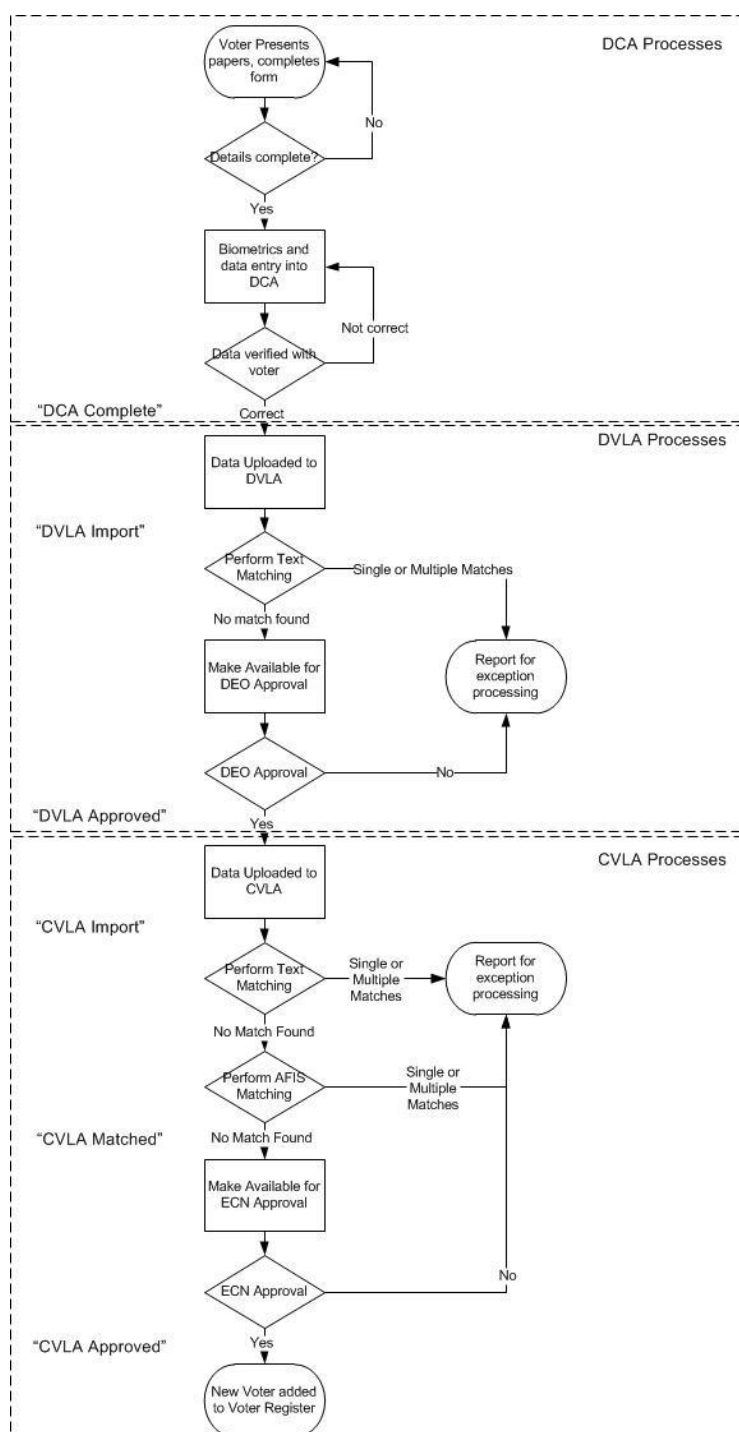
Figure 15: New registration activities flow

Use cases

These are use cases that pertain to activities that involve a voter list application.

At the Registration Unit (with the DCA)

Name: UC_A.1 Registration

Actors (roles); Data Entry, Domain Admin

ID	Task	Activity	Role
1	Collect Documentation. Valid Documentation (one of Marriage or Divorce Certificate), Registration Form and Id (either a Citizenship Certificate or a National ID Card). Citizenship certificate/NID is mandatory, the other documents are optional and depend on the circumstances of the registration.	A.1.1	Data Entry
2	Check that registration form conforms to the documentation. Verify that this is about a new registration. Make photocopies of documentation if possible.		
3	Enter details as a new record. Enter particulars, registration form id, one or more id numbers and optionally valid documentation ids.	A 1.2	
4	Capture media. Acquire face image, fingerprints, signature and record document numbers.		
5	Verify with voter and record as complete.		Data Entry
6	Export to DVLA		Domain Admin

At the District Electoral Office (DEO), with the DVLA

Name: UC_B.1 Process incoming records

Actors (roles); Data Entry, Domain Admin

Id	Task	Activity	Role
1	Import from DCA		Domain Admin
2	Verify matched records based on text based matching and perform manual verification against document submitted at the time of registration.	V	Data Entry, Domain Admin
3	Unique (where no existing match found) records will be made available for the approval process. Duplicate records will be reported as exceptions for manual follow-up including correction or rejection		Data Entry, Domain Admin
4	Export DVLA Approved records to CVLA		Domain Admin

At the ECN data centre (CVLA)

Name: UC_C.1 Match and integration voter records

Actors (roles); Domain Admin

Id	Task	Activity	Role
1	Import records from DVLA		Domain Admin
2	Perform text based matching on records and separate unique records and duplicate records with appropriate state. Records with no matches should go through secondary AFIS matching.	V	
3	Unique records will be made available for CVLA Approval. Duplicate records will be reported as exceptions for manual follow-up at the Central or District level including correction or rejection	C.1.1	
4	CVLA Approved records are added to the VR as new voters and made available to be transferred to DVLA for integration.	C.1.2	
5	Export approved records to DVLA		

3.13.9 Change/Correction of voter detail

REQ. 130.   The change/correction registration functionality shall be in compliance with the below subsections.
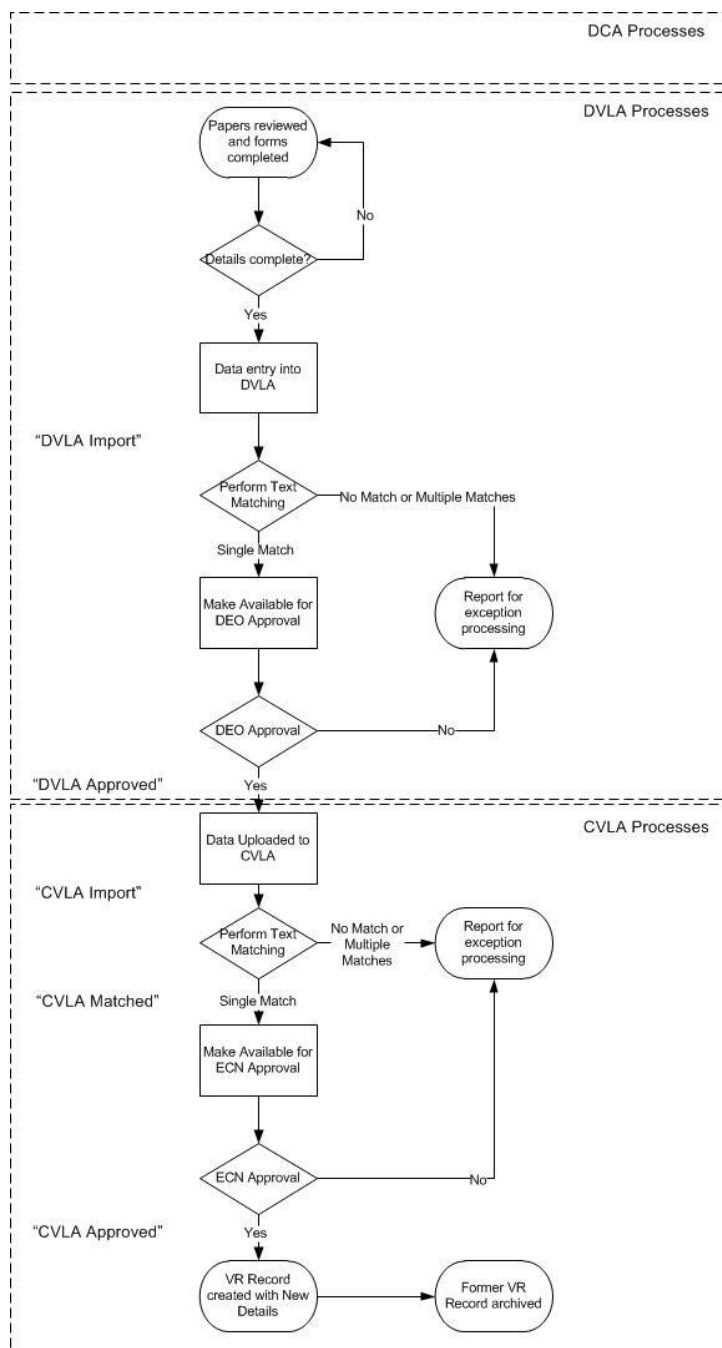
Figure 16 : Change/Correction Flow

Use cases

These are use cases that pertain to activities that involve a voter list application.

At the Registration Unit (with the DCA)

Not applicable at the DCA.

At the District Electoral Office (DEO) of the district in which the voter is registered, with the DVLA. Changes/corrections will be subject to the submission of a Claim Form submitted by the voter, direct member of the voter's family, or possibly may be generated by ECN.

Name: UC_B.1 Process incoming records

Actors (roles); Data Entry, Domain Admin

Id	Task	Activity	Role
1	Review claim forms as supplied by voter or direct member of voter's family. ECN may also generate a claim request.	V	
2	Complete data entry of change/correction request into DVLA and submit for text based matching.	B.1.1	Data Entry
3	Single matches (where the change request matches to a single voter record on the DVLA) will be made available for the approval process. Change requests that find no matching voter record (voter not found in this District), or multiple matches (more than one matching record found) will be reported as exceptions for manual follow-up including correction or rejection		Data Entry, Domain Admin
4	Export DVLA Approved records to CVLA		Domain Admin

At the ECN data centre

Name: UC_C.2 Match and integrate records

Actors (roles); Domain Admin

Id	Task	Activity	Role
1	Import records from DVLA		Domain Admin
2	Perform text based matching on records and separate records with appropriate state.		
3	Single matches (where the change request matches to a single voter record on the DVLA) will be made available for the CVLA approval process. Change requests that find no matching voter record (voter not found on VR), or multiple matches (more than one matching record found) will be reported as exceptions for manual follow-up at the Central or District level including correction or rejection.		
4	CVLA Approved records are used to create a voter record with the new (corrected/changed) details. The former voter record is archived and a history link established between the new and former records. Both records are made available for		

Id	Task	Activity	Role
	transfer to the originating DVLA.		
5	Export approved records to DVLA		

3.13.10 Transfer of voters (migration)

REQ. 131. The transfer registration functionality shall be in compliance with the below subsections. *(subject to be changed)*
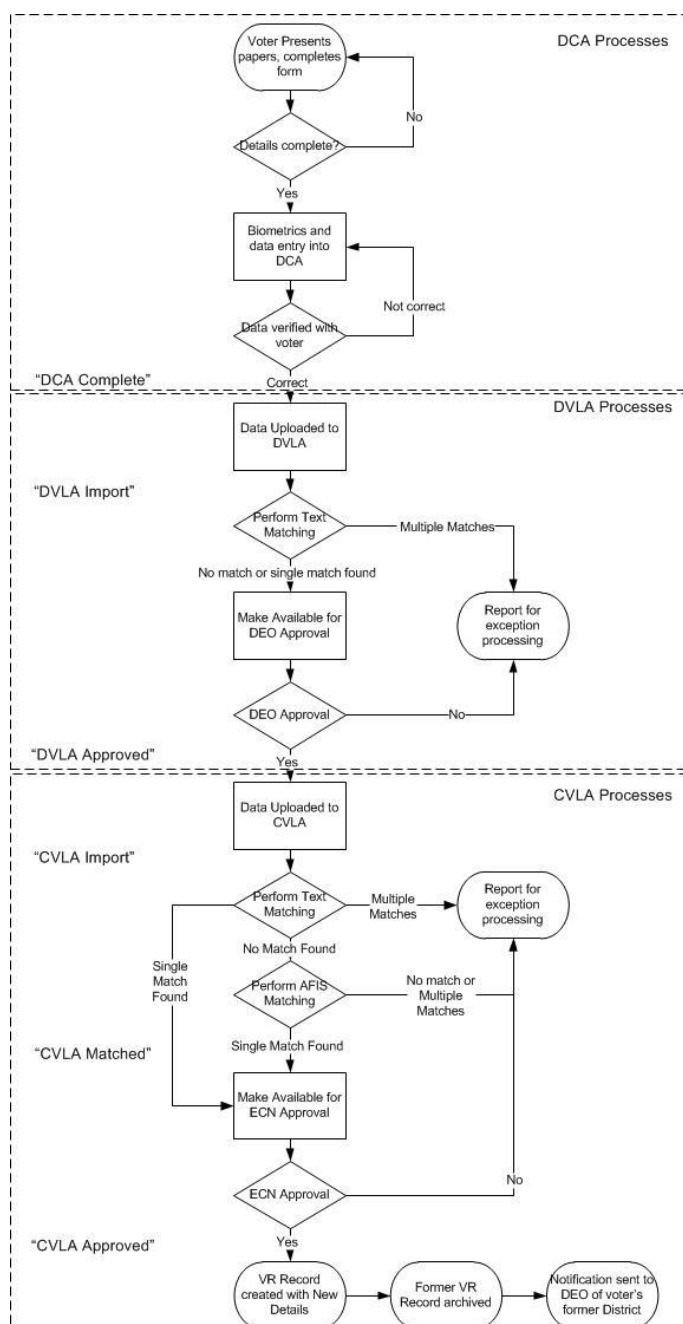
Figure 17 : Transfer of voters

Use cases

These are use cases that pertain to activities that involve a voter list application.

At the Transferred To Registration Unit (with the DCA)

Name: UC_A.1 Registration

Actors (roles); Data Entry, Domain Admin

ID	Task	Activity	Role
1	Collect Documentation. Valid Documentation (one of Marriage or Divorce Certificate), Registration Form and Id (either a Citizenship Certificate or a National ID Card). Citizenship certificate/NID is mandatory, the other documents are optional and depend on the circumstances of the registration. Where available receipt of previous registration should be requested.	A.1.1	Data Entry
2	Check that registration form conforms to the documentation. Verify that this is a transfer as opposed to new registration. Make photocopies of documentation if possible.		
3	Enter details as a transfer record. Enter particulars, registration form id, one or more id numbers and optionally valid documentation ids.	A 1.2	
4	Capture media. Acquire face image, fingerprints, signature and record document numbers.		
5	Verify with voter and record as complete.		Data Entry
6	Export to DVLA		Domain Admin

At the Transferred To District Electoral Office (DEO), with the DVLA

Name: UC_B.1 Process transfer records

Actors (roles); Data Entry, Domain Admin

Id	Task	Activity	Role
1	Import from DCA		Domain Admin
2	Verify matched records based on text based matching and perform manual verification against document submitted at the time of registration.	V	Data Entry, Domain Admin

3	Unique (where no existing match found, possible inter-district transfer) records, and where a single matching voter record is found (intra-district transfer) will be made available for the approval process. Multiple matches (matching to more than one existing voter record) will be reported as exceptions for manual follow-up including correction or rejection.		Data Entry, Domain Admin
4	Export DVLA Approved records to CVLA		Domain Admin

At the ECN data centre

Name: UC_C.3 Transfer records

Actors (roles); Domain Admin

Id	Task	Activity	Role
1	Import records from DVLA		Domain Admin
2	Perform text based matching on records and separate records with appropriate state. Where no matching voter record is found secondary AFIS matching should be used.		
3	Single matches (where the change request matches to a single voter record on the DVLA) will be made available for the CVLA approval process. Change requests that find no matching voter record (voter not found on VR), or multiple matches (more than one matching record found) will be reported as exceptions for manual follow-up at the Central or District level including correction or rejection.		
4	CVLA Approved records are used to create a voter record with the new (transferred) details. The former voter record is archived and a history link established between the new and former records. Both records are made available for transfer to the relevant DVLA including notification to the DEO of the former District of the voter.		
5	Export approved records to DVLA		

3.13.11 Removal of voter

REQ. 132. The removal registration functionality shall be in compliance with the below subsections.
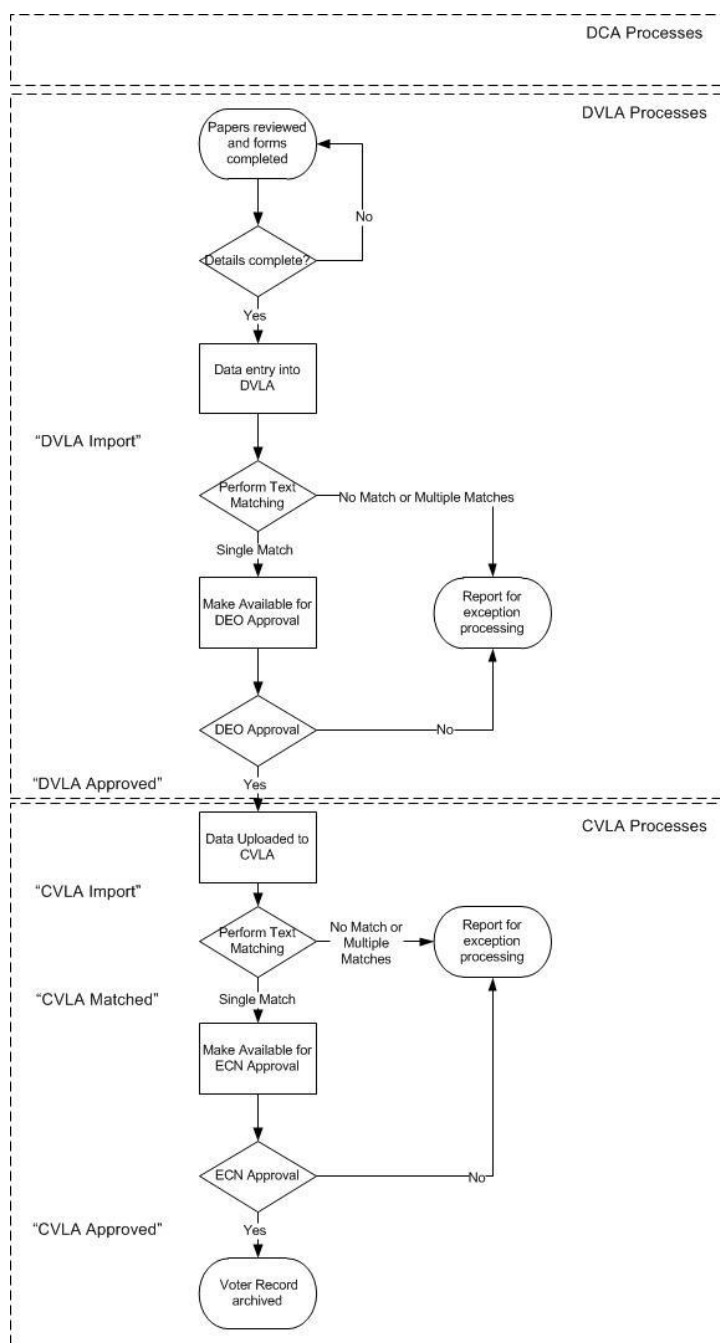
Figure 18 : Removal of voter

Use cases

These are use cases that pertain to activities that involve a voter list application.

At the Registration Unit (with the DCA)

not applicable at DCA

At the District Electoral Office (DEO) in which the voter is registered, with the DVLA as a result of an Objection Form submitted by a direct member of the voters family or generated by an ECN official. Voters may be removed on the grounds of duplication, death, or loss of entitlement.

Name: UC_B.2 Register a voter removal

Actors (roles); Data Entry, Domain Admin

Id	Task	Activity	Role
1	Review objection forms as supplied by direct member of voter's family. ECN may also generate an objection/removal request.	V	
2	Complete data entry of removal request into DVLA and submit for text based matching.	B.1.1	Data Entry
3	Single matches (where the removal request matches to a single voter record on the DVLA) will be made available for the approval process. Removal requests that find no matching voter record (voter not found in this District), or multiple matches (more than one matching record found) will be reported as exceptions for manual follow-up including correction or rejection		Data Entry, Domain Admin
4	Export DVLA Approved records to CVLA		Domain Admin

At the ECN data centre

Name: UC_B.1 Process removal of record

Actors (roles); Domain Admin

Id	Task	Activity	Role
1	Import records from DVLA		Domain Admin
2	Perform text based matching on records and separate records with appropriate state.		
3	Single matches (where the change request matches to a single voter record on the DVLA) will be made available for the CVLA approval process. Change requests that find no matching voter record (voter not found on VR), or multiple matches (more than one matching record found) will be reported as exceptions for manual follow-up at the Central or District level including correction or rejection.		
4	CVLA Approved records are used to archived the specified voter record. The archived voter record is made available for transfer to the originating DVLA.		
5	Export approved records to DVLA		

3.13.12 Common requirements

There are a number of requirements that are common to one or more of the CVR operations. They are listed below.

REQ. 133.   It must be possible to enter the details of all and any one CVR registration form with the additional information required for the particular CVR operation. The activity flow for the particular operation. The GUI functions supporting this must retain a similar look and feel as the existing registration functions feature. This functionality must be available in all VLAs (CVLA, DVLA and DCA).

REQ. 134.   When entering the details for of all and any one CVR registration form, all VLAs should require the capture, by web camera, of one or more personal identity documents by camera or scanner.

REQ. 135.   When entering the details for of all and any one CVR registration form, except removals or claims submitted by member of voter's family, all VLAs should allow the acquisition of a new face image and fingerprints of the voter.

REQ. 136.   For the Domain Admin it must be possible to edit registration records when there is a discrepancy between the underlying documentation and the record. The voter state must change accordingly. In general all text fields must be editable. All changes to voter records must result in new versions of the records and must as for all other record changes be logged. Imported registration records that are rejected must be possible to delete with appropriate audit trail. This functionality must be available in the DVLA and from a GUI point of view may be regarded as a constrained version of requirement in below.

REQ. 137.   It must be possible to search for unapproved records by way of record Registration Record State, RID/registration form number/VID as well as other text fields. It must be possible to list match results, so that the appropriate records for relevant DEO's for activities may conveniently be found and used. This function should be part of the Report and Search set of functions. This function should be available in the CVLA and DVLA.

REQ. 138.   For the Domain Admin it must be possible to edit all types of records (any type of Registration Record State or incoming, unverified records (i.e. records in the Import Information Model)), to address unresolved issues pertaining to the record. All fields and links to other records must in general be possible to edit. All changes must result in new versions of the records and must as for all other record changes be logged. The version history and logs shall not be possible to edit. This functionality must be available in the CVLA.

REQ. 139.   For the Domain Admin it must be possible to edit records when there is a discrepancy between the underlying documentation and the record. The registration state must change accordingly.

REQ. 140.   There shall be a configurable check that bars
   registration of the same fingerprint for multiple fingers.

REQ. 141.   All GUI strings shall be externally defined as separate
   UTF-8 text files where the structure shall allow for multiple
   languages (to accommodate a possible future multi-language
   requirement).   Changes to the text files shall be reflected in
   the GUI after a client restart and without recompilation or other
   manual procedures.

REQ. 142.   In the same style as for the baseline DVLA, the main
   language of the application will be Nepali written in Devanagari
   and all GUI functions, new or old must be available in this
   language and alphabet.

REQ. 143.   To prevent illicit data access, in the event of hard disk
   theft or tampering, the contents of the VLA database as an entity
   and/or hard disk shall be encrypted.

3.13.13 Exception Processing

For all types of voter registration processing as outlined above there must be a facility at the DVLA and CVLA levels to review the results of matching exception processing.

It must be possible for the Domain Admin to report on and/or review the matching exceptions and perform the following:

- Hold the registration for further review to be conducted at the Central or District level.

- Delete/reject the registration record with appropriate audit trail.

- Edit the registration record (including where necessary registration type) where the record details do not match underlying documentation. The registration record will then be returned to the matching process.

REQ. 144.   The DVLA and CVLA systems must provide a facility for the
   reporting and review of exceptions from the matching process. The
   Domain Admin must be able to process these exceptions as outlined
   in the above section.

3.13.14 Close of the Voter Register

The electoral law stipulates that the voter register must close to registration activities prior to the conduct of an election. Under current policy this must occur 75 days prior to elections but the number of days may be subject to change if electoral laws are reviewed.

Following the close of the voter register only registration activities as a result of Claim and Objection may be processed. This would therefore only include:
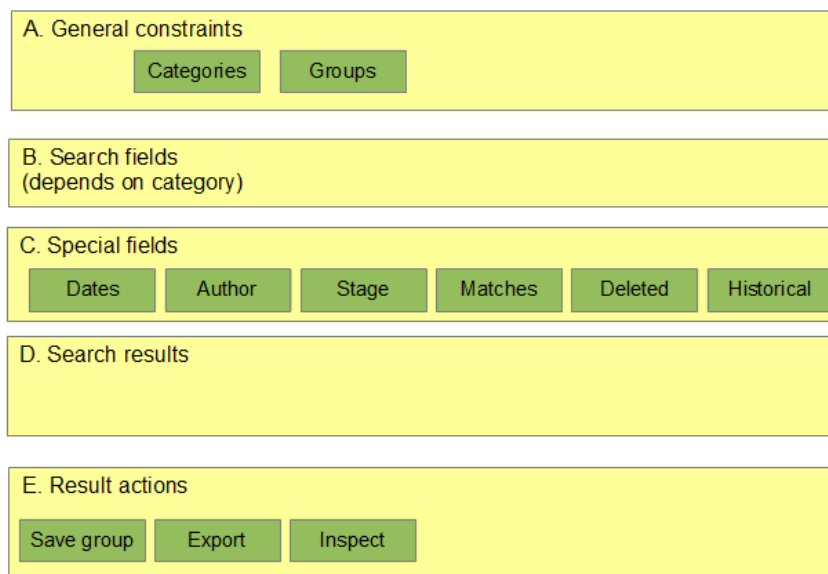
- New voters added to the register as a result of a Claim.

- Changes/corrections to the register as a result of a Claim.

- Removal from the register as a result of an Objection.

Claims and Objections may be processed on the voter register at any stage of the electoral cycle including after the close of register.

REQ. 145.   It must be possible to close the Voter Register at a specified number of days prior to elections. From this point only voter registration requests resulting from Claims and Objections will be accepted into the system and processed. It should be possible to close the register on a national or District basis.

3.13.15 Voter record search system

In general one must be able to search for Voter Records.

Figure 19 : The Search GUI form

In line with the baseline VLAs [b], the search form will be based on choosing a search field set category.

- In subform A there shall be

  - Functionality for choosing search field set category. The categories are identical to the voter information sub-form types and headings B, C and D. The choice of category determines the layout and functionality of sub-form B.

  - Functionality to load, add and delete previously saved result sets, named a "group". To add a group means to add the resultset to the existing resultset, sub-form D.

  - An optional specifiable max result set size

- In sub-form B all the specific search fields for the chosen category are found.

- In sub-form C special fields that do not pertain directly to voter details are found. These include

  - Ability to choose a single or subset of StageStates and/or MatchStates.

  - Ability to filter the search on author (a principal)

  - Ability to filter the search based on a date range for creation or last modified date

  - Ability to include deleted and/or historical records

- In sub-form D the results of a search are found. In line with the baseline VLAs, results are shown as one record per row and with navigation buttons to see more records if the result set is larger than the form layout permits showing. Sorting and resizing of each column shall be possible. For each row one shall be able to
    - Select the row, possibly in combination with several others
    - A customizable set of columns, including all information pertaining to the voter itself, a column showing the type of accompanying registration form as well as internal fields like the ones specifiable in sub-form C and unique keys, like VID and RID.
    - Whether the record already has been matched to one or more records, if relevant.

- In sub-form E the possible actions that an operator may perform on the selected records. This shall include:
    - Save resultset as a group
    - Export resultset.
    - Inspect (opening the approval form for the record)

REQ. 146. The search functionality shall conform to the above description.

3.13.16 CVLA specific CVR

Functional requirements

From [1] there are 8 functional areas the CVLA covers:

1. Registration - A collective view of all voter registration data including photograph and fingerprints.

2. Biometrics

    1. registration - A view allowing the operator to acquire biometric information.

    2. extraction of fingerprint and facial biometric templates.

3. Matching - One to many matching for de-duplication of records. One to one matching for person searches.

4. Proofing - Providing clients with proofing of voter list records for updates and corrections.

5. Reporting

    1. A view providing reporting on registered voters, draft voter lists and other reports.
    2. Ad Hoc searches on all fields.

6. Administration - A view providing access control settings, general configuration such as database, default field data and other settings. Data export to various media shall also be facilitated.

    1. Audit & Synchronization - Facilitates export and import of updated records to/from the central voter list application. Audit facilities shall also be provided securely registering all changes and updates to the voter list.

2. Database Management - voter list records management and performance tuning.

Requirements for Reports

REQ. 147.   The audit report must provide information on all value changes on a voter record, making the user able to look up the previous value, the new value, who did the change and at what time.

REQ. 148.   There must be a new report that shows access to the Identity and Access system (IdentityService). The report must show changes and access to users, roles, permissions and policies. Note that it is likely another set of permissions are required to get access to this report than the one in the requirement above.

REQ. 149.   There must be a new report that shows access to the Log system (LogService). The report must show changes to the Log configurations. Note that it is likely another set of permissions are required to get access to this report than the one in the top requirement in this section.

REQ. 150.   There shall be a new report type "Generate report for Registration Approval", that accommodates the needs of activities as well as results from verification acceptance, based on *Registration Record State*, whether the record was superseded/updated during verification, time interval as well as geographical particulars.

REQ. 151.   Similar to the baseline report "Generate Report for Individuals based on Registration centre", there shall be a new report type, "Generate Report for Individuals based on Registration type", that summarizes registrations based on CVR type (new, transfer etc), a combination of reason fields and address details (district, constituency, vdc). The result set shall contain reason and address particulars.

REQ. 152.   During import of data, there might be user mismatches. There must be a function to produce a report that highlights which users the user indicated have no reasonable match in the CVLA such that the user may create these before proceeding.

REQ. 153.   There shall be a new report for Electoral Rolls, based on permanent address and where the layout visual look conforms. The report sorts under "Reports->Generate Report for individual based on address". It shall be possible to indicate whether the roll is a draft or final roll and this shall be clearly shown on the report.

Data

Central Import

When importing data from the DVLA there might be mismatches between various categories and users known to the DVLA and CVLA. E.g. in the DVLA an area/tole may have been added that is unknown to the CVLA. Or a new domain admin user

may have been added to the DVLA that is unknown to the CVLA. These differences need to be resolved before a proper input of data may happen. There shall be manual mapping functions and accompanying report types allowing the CVLA to retain its integrity.

REQ. 154.   The existing "Central Import" function in the baseline CVLA must be retained in the GUI, but must work through the CVLAService to persist the data in the import database tables.

REQ. 155.   During import of data, there must be a GUI dialogue where one must map unknown categories (i.e. independently DVLA made "Setup" categories to known CVLA categories).

REQ. 156.   For accountability purposes, prior to verifying data, there must be a GUI dialogue where the operator must map unknown users (i.e. independently DVLA made users that has changed or entered voters) to known CVLA users

Backup

There will be a read-only database at node 3, that will serve as registry backup. There is furthermore a tape drive associated with the management console in virtualization node 1 and 2.

REQ. 157.   An export facility must be present to make it simple to backup the CVLA database. It must be possible to do a total backup (everything at the CVLA database copied) and an incremental one (only copy what has changed in difference to an already existing backup).

REQ. 158.   The backup export facility must be automated and happen by itself according to an operator specified plan.

REQ. 159.   There shall be support for continuous asynchronous replication of data from the production database to the read-only database. After a time delay of no more than 30 secs, the read-only database shall mirror any changes done in production.

Export data

REQ. 160.   All records that are exported (by either of the three data sharing mechanisms) must carry a persistent export time stamp.

Web based application

REQ. 161.   The user types must be compliant with the general identity model and the types must be modeled as Roles.

REQ. 162.   There shall be a new web report type "Generate report for Registration Approval", that accommodates the needs of activities as well as results from verification acceptance, based on *Registration Record State*, whether the record was superseded/updated during verification, time interval as well as geographical particulars.

3.13.17 DVLA specific CVR

REQ. 163.   In general, and if nothing else is mentioned in this document, all functions that are available in the baseline DVLA are to be available in full and as they appear to the user, in the target DVLA.

REQ. 164.   All functions available to users in the baseline DVLA must retain sufficient usability, look and feel and other user experience related aspects so that no retraining of operators need to be performed for those functions that do not change functionality from baseline to target.

District (DVLA) Import

> When importing data from the DCA or CVLA there might be mismatches between various categories and users known to the DVLA and the external source.

REQ. 165.   The existing "District Import" function in the baseline DVLA must be retained in the GUI.

REQ. 166.   During import of data, there must be a GUI dialogue where one must map unknown categories (i.e. externally made "Setup" categories to known DVLA categories.

REQ. 167.   For accountability purposes, prior to verifying data, there must be a GUI dialogue where the operator must map unknown users to known DVLA users.

Export

REQ. 168.   The existing "Export" function in the baseline DVLA must be retained in the GUI.

REQ. 169.   In case the DVLA is online and connected to the CVLA, there must be a GUI dialogue that reliably and securely exports all approved registration records (including history and state) to the CVLA over web services.

REQ. 170.   The audit information in the DVLA data must be retained when data is exported to the CVLA by any method.

3.13.18 VLA CVR non-functional requirements

High-availability(HA)

> *HA applies to the entire CVLA landscape, but as it is a non-functional section that is about more than compliance and design, HA has been placed under VLA CVR's responsibilities.*

High-availability has in this document two dimensions;

1. *Failover:* How to handle failures and system breakdown

2. *Response:* How to provide parallel services so that response time is optimal.

Both failover and response requirements are dependent on the degree of redundancy in the architecture. There are in this document six levels of redundancy. One might have redundancy on

1. **Consumer level.** Several clients are available in one or more locations.

2. **Producer level**. Several runtime components that expose business services, typically as part of an application server, are kept in synch in one or more locations.

3. **Information level**. Several runtime components that expose information services, typically a database process instance, are kept in synch in one or more locations.

4. **Persistence level**. Several files are kept in synch in one or more locations.

5. **Virtual Device level**. Blocks or raw devices are kept in synch in one or more locations.

6. **Physical Device level**. Blocks or raw devices are kept in synch in one or more locations.

Figure 20 : Redundancy levels

In this document redundancy implies state synchronization on that level for all levels except 1.

Failover

To achieve failover at a particular level you must have redundancy at that level.

With failover requirements we work with three dimensions, (i) the degree of automation, (ii) whether you might have state loss at failure and (iii) whether you might have user session loss.

1. **The degree of automation:** Is failover manual or automatic. With automatic failover when a resource fails, no human intervention is required to get a redundant unit to take over. Automatic failover implies master-master storage replication/sharing. A half-automatic approach is to allow for read-only access during recovery with a master-slave storage approach.

2. **State loss:** If a resource fails, one may have loss of or conflict with shared state, integrity or persisted data. It doesn't necessarily happen, but it may.

3. **User session loss:** This concerns session pickup. If sessions are picked up, then a user that is runtime dependent on a failing resource will not experience errors or timeouts as a consequence of the failure. A redundant resource will pick up the session, continue and the user will not notice. This assumes automatic failover. Note that one may have user errors due to state loss nevertheless.

Based on this, there is a stage model for failover behavior:

Stage	Automatic	Possible state loss	Possible user session loss
0. No failover	N/A	yes	yes
1. Manual failover	no	yes	yes
N/A	no	yes	no
2. Manual failover with no state loss	no	no	yes
N/A	no	no	no
3. Automatic failover	yes	yes	yes
4. Automatic failover with session pickup	yes	yes	no
5. Automatic failover with no state loss	yes	no	yes
6. Automatic failover with no state loss and session pickup	yes	no	no

REQ. 171.   The CVLA ecosystem shall in general be configured to support failover on redundancy levels 1 or above and efforts shall be made to make the ecosystem resilient against breakdowns, powercuts and component failure.

REQ. 172.   At the producer level, runtime components including the CVLAService, IdentityService, WebServer, the AFIS server with nodes and the LogService shall exhibit failover behavior at level 3 or above. There shall be no more than a quadruple of normal response times at the time of a component instance failing.

REQ. 173.   At the information level, runtime components shall exhibit failover behaviour at level 3 or above. There shall be no more than 8x of normal response times at the time of a component instance failing.

REQ. 174.   At the persistence level and below, there shall be failover behaviour at level 1 or above.

REQ. 175.   In the event of a system-wide power cut, the entire CVLA ecosystem shall reboot and restore all functionality when power comes back without operator assistance.

REQ. 176.   It shall be possible to have multiple CVLAClients working unhindered and connected at the same time.

REQ. 177.   The CVLA ecosystem shall in general be redundant on levels 1-6 to ensure optimal response times and on levels 2-6 there shall be state synchronization mechanisms in place to support the redundancy.

Response times

For the CVLA these are the production response time requirements:

Service	Average over working-hours	5% top average over working-hours	Average, max load	5% top average, max load
CVR registrations, setup	0.5 sec	2 secs	2 secs	5 secs
Reports (including web reports), Searches	2 secs	5 secs	5 secs	15 secs
Import/Export/Backup (fields + images)	300 voters/sec	25 voters/sec	25 voters/sec	3 voter/sec
Backup	1000 voter/sec	100 voters/sec	100 voters/sec	10 voters/sec
Identity and access control management	0.5 sec	2 sec	2 sec	5 secs
Login, authentication + authorization	0.2 sec	1 sec	1 sec	2 sec

The "max load" is defined as the 5% of the time over the week in question when the load on the database host and the CVLAService hosts combined where having the heaviest cpu+HDD activity in production.

"Average" usage pattern is defined to be 5 CVLAClient operators working of which (1 does export/import and 2 do fingerprint verification), 1 IdentityClient operator working, 5 web server users generating reports and 5 DVLAClients online doing either export or import.

REQ. 178.   The response times for the CVLA shall be as stipulated in the table above.

REQ. 179.   At the producer level, runtime components including the CVLAService, IdentityService, WebServer and the LogService shall run redundantly on different physical hosts (i.e. a clustered configuration).   There shall be load balancers for these services.

REQ. 180.   At the information level, runtime components shall run redundantly on different physical hosts (i.e. a clustered configuration).   There shall be load balancers for these services.

3.14.   Module: CVLA Id

This section defines the functional requirements for the new components IdentityService, IDClient and LogService. Note that the non-functional requirements are in general covered in section 3.7.3 and specifically in section 3.14.3.

3.14.1 IdentityService

The core services that the IdentityService must provide may be split into four categories:

- *Identity*: Core functionality for maintaining Principals (mainly Users), Roles and Permissions.

- *SingleSignOn* (SSO): Trust and state management for SSO

- *Access*: Core functionality for handling run time access requests, policies and protected resources.

- *Integration*: Functionality for communicating with other software components that manage identities and access information.
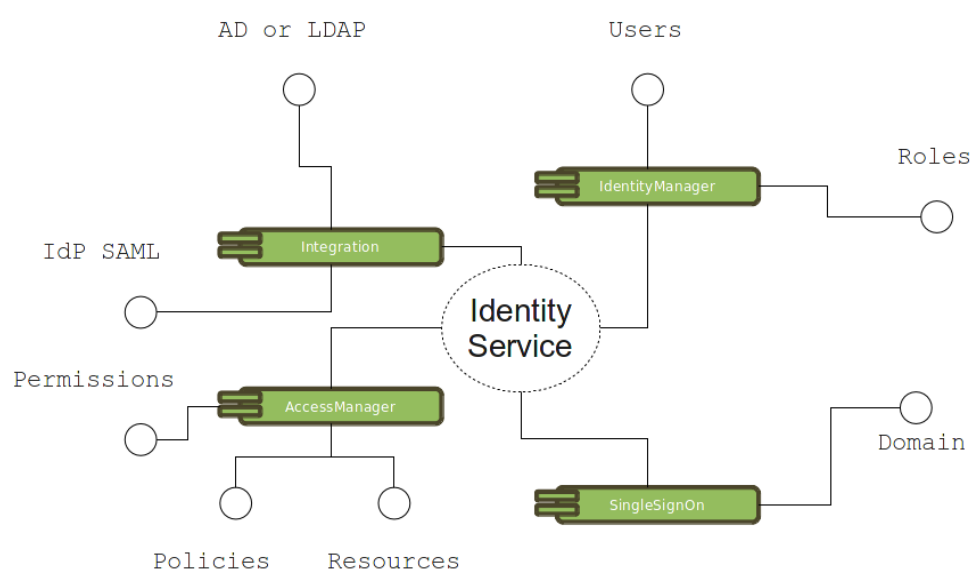
Figure 21 : IdentityService component collaboration sketch

REQ. 181.   There must be a set of services that that allow for the management (CRUD type) of Principals, Roles and Permissions and their relations.

REQ. 182.   There must be a set of services that that allow for access control based on Policies.

REQ. 183.   There must be a set of services that allow for information sharing of identity and access information over common, standard, industry wide mechanisms and standards, in particular LDAP and/or Active Directory.

REQ. 184.   There must be a set of services that that allow for Single SignOn (SSO), preferably zero SSO where applicable.

3.14.2 IDClient

The purpose of the IDClient is to provide an interface enabling users to exercise the IdentityServices. The principal functional areas are:

1. User, Role and Permissions management

2. Management of how identity information is exposed as integration services,

either/and as LDAP/AD and SAML 2.0 services

3. Management of resources to be protected and policies.

4. Single SignOn configuration

Roles and permissions

In the baseline CVLA there were two roles, the *Data Entry* and the *Data Approval* roles. For the target CVLA we need in addition to make a distinction between roles that deal with the *domain* (voters and their registration) and *system* tasks (data sharing, backup, configuration, identities, access and security). Thus we introduce a new role and rename the *Data Approval* role:

- *Data Entry:* An operator working with the domain whose primary function is to register voter registrations.

- *Domain Admin* (previously the *Data Approval* role): An operator working with the *domain* who has extended privileges to approve, edit and reconcile records. Typically the Chief Registration Officer and possibly the Assistant Registration Officer will be domain administrators.

- *System Admin*: An operator working with the *system* who has privileges to configure the system, do backups, transfer data, configure identity, access and security related matters.

In general the task sets between the domain operators and the system operators are disjoint. I.e. the *Data Entry* and the *Domain Admin* do not have system configuration privileges and the *System Admin* does not have privileges to view, edit or register voter records. See the following table for details:

Role/Function	Data Entry	Domain admin	System admin
Setup	(none)	All privileges on CVLAService (all menus except security)	All privileges on identity service and install configuration (everything under security)
Registration Form (CVR)	Can save, update, delete, undelete	All privileges: can Enter, Update, Approve, Disapprove, Delete and Search Registration Data	(none)
Reports	(none)	All privileges: can generate and print reports.	All privileges, as Domain admin.
Data	(none)	All privileges.	Privileges on infrastructure and backup matters
Verification	(none)	All privileges: can verify the biometric data such as finger print verification and verification from temp table	(none)

Role/Function	Data Entry	Domain admin	System admin
		and list the matching data in reports.	
Query to Excel	(none)	All privileges	(none)

Security

It is important that there is cohesiveness in the GUI, and that in some way identity, access and accountability functionality are visually and usage grouped. Thus, the functionality and client functionality may be integrated with the rest of the CVLAClient GUI for visual purposes if the Vendor is so inclined, but technically and logically, it should be an independent, decoupled client component that works against the IdentityService.

According to the above:

REQ. 185.   There must be GUI functions to create, edit and delete roles.

REQ. 186.   There must be GUI functions to create, edit and delete permissions.

REQ. 187.   There must be a GUI function for adding, viewing and removing one or more roles mapped to a user.

REQ. 188.   There must be facilities for adding, viewing and removing one or more permission mapped to a role.

REQ. 189.   Permissions must be linked to Policy Decision Points so that a PDP may on behalf of an enforcement point be able to decide whether a user with a set of roles and permissions are to be granted access to a particular service or not.

REQ. 190.   For usability purposes, identity, access and accountability functionality must be visually and usage grouped, making it easy to understand, use and navigate.

Integration services

This section deals with how the CVLA relates to LDAP as a source of user identities, how changes in that source can be known to the CVLA and how the CVLA may relate to external users requesting services, like the NIDMC.

There are essentially two use case sets, (IS1.x) how to manage the LDAP service and the other (IS2.x) covering how to provide federation services.

Note that the formal requirements and responsibility for realizing the use cases IS2.x are handled by the VLA Integration module, cf. section 3.12.

Use case IS.1.1 - LDAP administration:

Actors: Identity administrator

Flow: Select an IdentityService principal and LDAP user and accompanying attributes to be mapped.

Exceptional flow: Manage that mapping is invalid

Use case IS.1.2 - LDAP change:

Actors: External identity administrator

Flow: There is a change (new, update, delete) to a mapped LDAP user and the change must be reflected in the IdentityService identity store.

Use case IS.1.3 - Principal change:

Actors: Identity administrator

Flow: There is a change to a user (new, update, delete) in the IdentityService and the change must be reflected in the LDAP.

There might be additional use cases related to managing associated LDAP directories, depending on the implementation chosen.

Use case IS.2.1 - Identity Provider Trust:

Actors: Identity administrator, IdentityService as a service provider.

Flow: Manage a trust relationship to another identity provider.

Use case IS.2.2 - Assertion Mapping:

Actors: Identity administrator

Flow: Map a SAML assertion to an IdentityProvider permission and/or role.

Resource Management

Use Case RM.1.1 - Policy management

Actor: Access administrator

Flow: Manage (CRUD) a security policy

Use Case RM.1.2 - Resource management

Actor: Access administrator

Flow: Manage (CRUD) a resource so that it may be useful in a policy

Single SignOn

Use Case SSO.1.1 - Domain management

Actor: Access administrator

Flow: Manage which resources are included in an SSO domain governed by which identity provider.

REQ. 191.   Use cases IS1.1, 1.2 and 1.3 must be possible to perform in a user friendly way, similar in look and feel as for the CVLAClient and with devnagari text.

REQ. 192.   Use case SSO.1.1 must be possible to perform in a user friendly way, similar in look and feel as for the CVLAClient and with devnagari text.

REQ. 193.   Use cases RM1.1 and 1.2 must be possible to perform in a user friendly way, similar in look and feel as for the CVLAClient and with devnagari text.

REQ. 194.   For all use cases, there must be log entries with the
   LogService reflecting the acts.

3.14.3 CVLA Id non-functional requirements

Information model integrity

REQ. 195.   All passwords used by the VLAs shall be persisted as
   encrypted entities, using at a minimum a 2048 bit RSA encryption
   algorithm or equivalent.

CVLA Id security

The CVLA must have an appropriate design to deal with identity, access, accountability and audits.

Since the voting registry (VR) will be a critical factor during Nepal's elections as well as having the potential of being the core basis for a future citizen registry [a], it is vital that the data in the VR can be trusted. As mentioned, an important part of gaining trust in a database is that it is transparent that w.r.t. accessing, modifying and deleting each data element in the registry, it is clear how that happened, who did it, what the change was and when it happened. Furthermore one must have trust in that the mechanisms are tampering proof and cannot be bypassed. The baseline VLA applications have reasonable security and accountability mechanisms built in, but are probably too primitive to deal with a general, maintainable solution catering for a more sustainable identity model and a richer set of permissions and roles. This is an intermediary, quite common architectural blueprint for enhancing system integrity, security and accountability.

Technically, important components that underpin this, would be, at a minimum, some form of *independent* identity management, access and policy management, as well as facilities for comprehensive, independent logging and audit traces. In particular, the design principles must be adhered to.

REQ. 196.   All services   provided   by   the   CVLA   (CVLAService,
   IdentityService,   LogService)   shall   be   authenticated   and
   authorized by IdentityService as well as encrypted.

3.14.4 Policies, zones and communication dependencies

There are four security zones:

1. **External zone:** Clients outside the ENC IT's jurisdiction. The external zone have only access to the DMZ.

2. **Demilitarized zone (DMZ)**: Zone where services that are to be externally visible are exposed. All hosts are physically located in the CVLA data center. A subset of CVLAService services are exposed here. No IdentityService services are exposed. The hosts in the DMZ has access to a defined, mutually authenticated and transport layer constrained set of services in the Sanctum.

3. **Secure Clients zone**: Clients physically located in the CVLA data centre. Hosts in the Secure Clients zone has access to a defined, mutually authenticated and transport layer constrained set of services in the Sanctum.

4. The **Sanctum Zone**: A set of defined centralized CVLA servers physically located in the CVLA data centre.

Note that communication is

- *directed; the communication can only be initiated in the direction of the arrow. Replies are allowed the other way in the context of a temporary security context.*

- over TLS and mutually authenticated
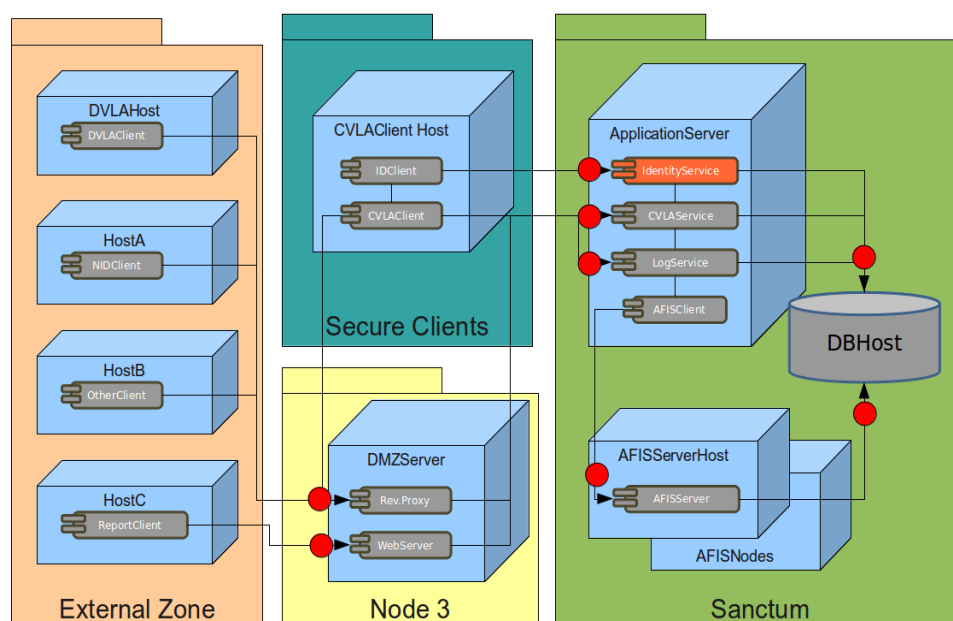
Figure 22 : Policy points and communication dependencies

In the Application Server we find the IdentityService that for convenience serves as both Policy Decision Point (PDP) and Policy Management Point (PMP). If during implementation the IdentityService, the PDP and PMP functionality is found more conveniently split up in several components on the application server, that is permissible. The Policy Enforcement Points (PEP) communicate with the PDP so as to allow or disallow particular requests.

The PMP is closely linked to the security GUI.

REQ. 197.   There must be a single Policy Management Point that deals with the configuration of identities, roles, permissions and policy. Preferably, the IdentityClient is the GUI front-end to the PMP and the IdentityService is the PMP.

REQ. 198.   There must be one or more Policy Decision Points that depend on the PMP for policy and identity information and make run time access decisions. The PDP must be easy to (re)configure without any recompilation or reassembly.

REQ. 199.   All CVLA services must be protected by a Policy Enforcement Point that prompts for authentication and grants access in depending on a PDP in accordance. The PDP must be easy to (re)configure without any recompilation or reassembly.

REQ. 200.   All communication outside of or going into/out of the Sanctum must be TLS based. All hosts, excluding the External Zone, must have, require and employ certificates as the basis for their counterpart transport-level identification.

REQ. 201.   The PMP must be able to synchronize (provision, reconciliate) or appear as an Active Directory or LDAP source for interoperability purposes. This appearance/synchronization must be easy to configure for non-technical end-users.

REQ. 202.   Access control to CVLA services must be policy based.

REQ. 203.   The web based application access control must be compliant with the general access control mechanisms outlined in section and must in particular depend on the common PEP and PDP mechanisms.

Identity and access control

Identity in the CVLA shall be based on an Identity and Access (IA) model that is based on Core RBAC principles [39], it shall be accessible over standards like the RBAC profile for XACML or similar and shall include

- *Principals:* mainly representations of physical persons as users.

- *Roles*: Principals may assume Roles. Some Roles may entail Permissions.

- *Permissions*: A label with attributes that specify constraints.

- *Policy*: A declarative constraint on identity and access entities and their relations.

The Government of Nepal's Data Architecture principles [c] constrain the requirements and solutions for a proper CVLA identity management solution. Principles #8 states that CVLA should provide role based access to data.

REQ. 204.   The Identity and Access model of the CVLA shall be declarative and run time modifiable. Declarative in this context means the business constrains shall be modelled, available and editable in human readable form separately from the run time executable, be based on a standard and modifications shall come into effect without having to reboot or recompile the system.

REQ. 205.   The Identity and Access model of the CVLA shall policy and RBAC based and comprise principals, roles and permissions.

DVLA & DCA identity security

There are no general, additional security requirements for the DVLA and DCA other than what the baseline editions feature and which are specifically mentioned as requirements in this document.

3.15. Module: CVLA Log

3.15.1 LogClient

The purpose of the LogClient is to provide an interface enabling users to exercise the LogServices. The following use cases shall be covered:

1. Select and maintain collections of principals to be logged

2. Select a set of services to be logged for a particular collection of principals

3. Select a set of database information model elements and operations to be logged for a particular collection of principals

4. Select a set of files/directories and operations to be logged for a particular collection of principals

5. Inspect logs. The inspection view may be filtered by area (service, database, file), by principal and timestamp range. The view shall be configurable w.r.t. what to include and it shall be possible to see the Principal (who did it), previous and new state (previous and new values for example), the time the act happened, and a description of the action or a reference preferably in a form that makes a meaningful replay possible.

REQ. 206.   It must be possible to select and maintain collections of principals to be logged.

REQ. 207.   It must be possible to select a set of services to be logged for a particular collection of principals.

REQ. 208.   There must be a log of CVLA database transactions, including a timestamp, which table, which principal and which values were accessed/written.

REQ. 209.   It must be possible to select a set of database information model elements and operations to be logged for a particular collection of principals.

REQ. 210.   It must be possible to select a set of files/directories and operations to be logged for a particular collection of principals.

REQ. 211.   It must be possible to inspect the logs.

REQ. 212.   The inspection view may be filtered by area (service, database, file).

REQ. 213.   The inspection view may be filtered by principal, role and timestamp range.

REQ. 214.   The view must be configurable w.r.t. what to include and it shall be possible to see the Principal (who did it), previous and new state (previous and new values for example), the time the act happened, and a description of the action or a reference preferably in a form that makes a meaningful replay possible.

REQ. 215.   The view must be integrated into the CVLA client GUI in visually similar manner as all other CVLA GUI functionality and be in Devnagari text.

REQ. 216.   There must be a new GUI dialogue that allows the user to in run time configure log levels and scope.

REQ. 217.   There must be a GUI allowing inspection of logs for all services (CVLAService, IdentityService, LogService configuration) and all database usage.

REQ. 218.   There must be a GUI function that allows the user to see a previous version of a voter record (cf. section 3.13.1), with the information as it appears on the Registration Form (section 3.2 in [b]) . It should be possible to browse previous records by moving backwards and forwards change-by-change as well as by a specified date. This requirement apply to CVLA and DVLA.

REQ. 219.   In the GUI, under Data->Export, DVLA voter record versions must be included when exporting data using any export method. For the CVLA, voter record versions shall not be included when exporting data.

3.15.2 LogService

There are essentially three main areas that need to be logged for auditing, accountability, robustness and debugging purposes;

- Service use, including Voter record related tasks, Identity and Access related tasks and Log/Audit related tasks.

- Logs of database access (CRUD)

- Logs of file access (CRUD)

For all these it is desirable to record the Principal (who did it), previous and new state (previous and new values for example), the time the act happened, and a description of the action or a reference preferably in a form that makes a meaningful replay possible.

Finally, it is important to be able to control what to log and to what an extent, preferably in run time.

REQ. 220.   It must be possible to log a use of a service (including CVLAService, LogService, Reversed Proxy, Web Server, IdentityServer, AFIS). The log entry shall feature the principal, the service, the values of the parameters (if any), the values of a reply (if any) and the time of invocation.

REQ. 221.   It must be possible to log access to a database. The log entry shall feature the principal, the operation (SQL/procedure call etc), any new values and/or constraints and the time of invocation.

REQ. 222.   It must be possible to log access to a database. The log entry shall feature any previous values.

REQ. 223.   It must be possible to log access to a part of a file system. The log entry shall feature the principal, the operation, new values and/or constraints and the time of invocation.

REQ. 224.   The scope and depth of logging shall be run time configurable. That includes creating, updating, reading and deleting what artefacts (services, files and database details

```
(schemas, tables, views, procedures)) shall be logged and what
type of operations (CRUD + relevant constraints) are to be logged
for what artefact.
```

REQ. 225.   For every update, modification or deletion of the record,
the new record version shall map to the VID, cf.

REQ. 226.   The RID shall be associated with the relevant voter
record version.

3.15.3 CVLA Log non-functional requirements

CVLA Log accountability

REQ. 227.   The log must be immutable by all under all circumstances,
except that the LogService shall be able to append the log with
new log messages.

3.16.   Module: VLA Matching/Verification

Verification is about finding and matching voter record including the process of de-duplication. The general procedure is to take a set of records that require checking and match those against a set of already verified and approved records. The incoming records that require checking and verification is denoted as the *domain*. The data set that is matched against, is denoted the *range*.

3.16.1 Finding matching records

There are activity flows for finding voter records given a key (i.e. NID, Citizenship ID or VID) or by searching on a combination of text fields.

Match criteria

Formally, the criteria for whether there is a match or potential duplicate are that there is a match if:

- Two records have the same name and surname and
- The two records have the same father's name and
- The two records have the same citizenship certificate, comparing
  - Citizenship certificate issuing district
  - citizenship number
  - gender
  - date of birth
- The two records have the same face image and
- The two records have the same finger prints

Use cases

Name: UC_V Check whether Voter already Exists

Actors (roles); Domain Admin

Id	Task	Activity	Role	VLA Function
1	If the incoming record has one or more record ids (i.e. NID, Citizenship ID or VID), execute use case UC_Y.1. If not, execute use case UC_Z.1. Applies to both DVLA and CVLA.		Domain Admin	*N/A*

Name: UC_V.2 FindVoterById

Actors (roles); Domain Admin

Id	Task	Activity	Role	VLA Function
1	Enter one or more record Id's (i.e. NID, Citizenship ID or VID) and search for matches. Applies to both DVLA and CVLA.	V.2	Domain Admin	*New in Verification menu. Similar to Search ((cf. section 3.5 and 3.2.3 in the VLA user guides [b][e]), but applicable to incoming unapproved records (Import Information Model)*

Name: UC_V.1 FindVoterBySearch

Actors (roles); Domain Admin

Id	Task	Activity	Role	VLA Function
1	Enter one or more record fields and search for matches. Applies to both DVLA and CVLA.	V.1	Domain Admin	*New in Verification menu. Similar to Search ((cf. section 3.5 and 3.2.3 in the VLA user guides [b][e]), but applicable to incoming unapproved records (Import*

Id	Task	Activity	Role	VLA Function
				Information Model)

Name: UC_V.3 ManageSearchResults

Actors (roles); Domain Admin

Id	Task	Activity	Role	VLA Function
1	More than one record matched the incoming record. A manual resolution and edit of the records are necessary.	V.3	Domain Admin	*Exists, same as for activity C.2.*
2	Display the result. If no record matched the incoming record, regard it as a *NewRecord*.	V.4		*New in Verification menu. Similar to Search ((cf. section 3.5 and 3.2.3 in the VLA user guides [b][e]), but applicable to incoming unapproved records (Import Information Model)*

From these use case steps we derive a set of functional requirements:

REQ. 228.   In the Verification menu, there must be a search function that works on unapproved records (incoming, in Import Information Model) such that matches may be found using text fields. For activity V.1 wildcards must be possible to use. This functionality must be available in the CVLA and DVLA.

REQ. 229.   In the CVLA, the results of the search may be used for further biometric matching. Thus, the result set must be retained, and possible to inspect.

REQ. 230.   It must be possible to find incoming records (i.e. records in the *Import Information Model*) of any or all *RegistrationTypes*, try to match them with existing records and deal with the match results, as detailed in the sections "At the ECN datacentre" above. This functionality must be available in the CVLA.

REQ. 231.   In the CVLA each search result from activity V must be possible to be individually marked for biometric matching or simply accepted as verified (inserted from Import Information Model).

3.16.2 Central record matching

An implicit constraint is that AFIS matching (i.e. fingerprint search) is a resource intensive operation and thus to be used only when necessary and in an optimized way. Only records that have no match resulting from the text based matching process will be subject to a fingerprint search as a part of the record approval process. To match hardware and licenses, note that the fingerprint and face matching is to be a batch based process relying in the same fashion as for the baseline functionality on a 1:1 *verification* API call. Any 1:N and M:N biometric matching needs to be dependent on this.

In difference to the baseline functionality, the fingerprint and face search must be further optimized to ensure that no more records than necessary are considered in the matching process. The optimization process, as part of the search configuration and prior to the actual search is as follows;

1. A possible initial optimization on face recognition, to do away with a portion of candidate records.

2. Dismiss all records with non-matching gender (~50% prune)

3. Dismiss all fingerprints from non-matching finger (~75% prune)

4. Dismiss all non-matching finger print patterns (~75-80% prune)

For a M:N biometric matching this ensures that only 1/2*4*4)=1/32 records or better must be considered. Thus for a 15 million records 1:N match, you need to consider some 470 000 records during a single matching process instance.

Search configuration according to this optimization process, is named an *OptimizedBiometricMatch*. The thresholds underpinning the matching shall be possible to set on the fly.

REQ. 232. AFIS matching shall be improved from the baseline CVLA in line with and performance-wise not worse than outlined with the *OptimizedBiometricMatch* procedure.

Use case

Name: UC_W.1 Match record

Actors (roles); Domain Admin

Id	Task	Activity	Role	*VLA Function*
1	If the text based search resulted in a *NewRecord (no match found)*, collect for batch verification. Configure and execute a new fingerprint and face search.	W.1	Domain Admin	*Modify so that search is optimized and that there is an option to only apply for incoming NewRecords (cf. section 3.5 in the CVLA user guide [b])*

From these use case steps we derive a set of functional requirements:

REQ. 233.   The Verify from TempTable function must be modified to do an *OptimizedBiometricMatch* and optionally for incoming NewRecords only. The existing baseline search filter criteria must be retained. This functionality applies to the CVLA.

REQ. 234.   Any biometric matching functionality must comply with the available licenses, and hence must rely on *verification* API calls.

REQ. 235.   It shall be possible to do an M:N biometric matching, typically used prior to an election and in conjunction with closing the registry. It shall be possible to constrain the match, by a geographical criterion (district). It shall be possible to dismiss all members of M from the search that have already been M:N matched since a particular, specified, time. The normal CVLA response requirements, shall not apply during the M:N matching.   The   match   shall   follow   the   same *OptimizedBiometricMatch* criteria as for 1:N.

There are common requirements from this flow.

Verify Approved Records, step 1

There shall be a task flow as follows for the "Verify Approved records" function;

1. **Auto-match incoming records.** Unverified records (i.e. records that have been imported or transferred to the VLA) are auto-matched with existing record at the time they arrive. This shall be the default operation.

2. **Verify Approved Records (1).** Menu choice from the centrally available CVLA functions.

3. **Filter Records (2), manually match records (3).** There must be a way the operator may view unverified records (i.e. records that have been imported or transferred to the VLA). For each record the operator may mark the record for text field manual matching.

   - The baseline search constraints based on citizenship, geography (districts), 1:N and 1:1 search options should be retained when filtering the records.

4. **Select domain for AFIS matching (4).** After the field based duplicate search, the operator shall be able to select domain candidates for AFIS batch matching. The CVLA shall notify the operator of which records should be AFIS matched, in effect choosing all remaining NewRecords, although the operator should be able to include or exclude records at his/her discretion. This is in accordance with the lower part of the activity flow.

5. **Select *range* for AFIS matching (5)**. After a domain set has been determined, the operator selects a range set, i.e. the set of records that the domain will be matched against. One shall be able to select the full database of verified records or a constrained version by search (including citizenship and geography (districts) criteria).

- The operator then commences the M:N AFIS matching, spawning an OptimizedBiometricMatch by AFIS matching (6 as per below Figure 23). M is the domain set, determined in 3) above and N is the range set determined in 4) above.

6. **Accept as Verified records (7).** Finally, the operator may choose to accept none, any or all records as verified, at his/her discretion.
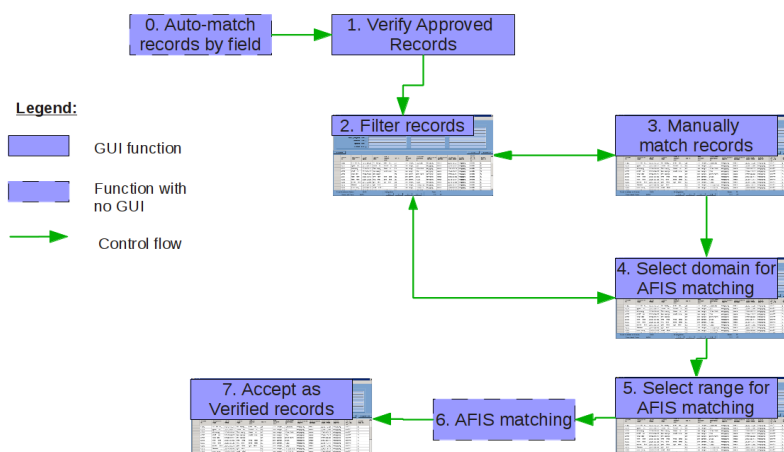
Figure 23 : Verification of approved CVLA records

The operator shall be able to name, save and load voter record sets from tasks 2, 3, 5 and 6 so they may be reused. The operator shall be able to individually select records for such sets and a saved set from one task shall be retrievable for a different task.

REQ. 236.   There must be a verification procedure that allows for field based and AFIS based matching.

REQ. 237.   The verification work must be procedurally supported, generally in line with the control flow defined above.

REQ. 238.   It must be possible to combine text field based and AFIS based matching including optimizing the matching process accordingly.

Filter records, step 2

The filter records GUI form is identical to the search form, but with the following additional actions/buttons for subform E:

- "Suggest match": This is a convenience function that finds suitable records that should be matched manually. It searches for records and then selects appropriate records for in the result set. The function that searches for records is based on a predefined static criterion, and then there is a function that selects from the result set the records that are reasonable manual verification candidates. The search criterion is the set of current records that are unverified. The selection is the set of records that have MatchState new or several. Manual matching itself is not initiated and the operator is free to amend the result selection as he/she sees fit.

- "Manual matching": This initiates manual, field based matching, step 3.

- "AFIS": This initiates AFIS matching, step 4 with the selected records as a starting point for domain selection.

REQ. 239.   It must be possible to select which records shall be subject to what kind of verification procedure (AFIS and/or text field based).

REQ. 240.   It must be possible to select which records shall be subject to what kind of verification procedure according to the GUI form and functionality specified above.

Manually match records, step 3

The task of this form is to use a found record as a basis for finding candidate matches. The form is similar to the search form, but with the following modifications;

A. General constraints
    Categories   Groups

F. Domain records
(list of the domain records, with match state, select row to prefill search fields)

B. Search fields
(prefilled by chosen domain record)

D. Search results

E. Result actions
    Save group   Export   Inspect   Suggest   Match   AFIS

Figure 24 : Manual field based matching

- There is a new subform F where the previously selected resultset is displayed. These are termed the "domain records". The operator may select a record from these. At selection, the search fields in subform B (for the category selected) are automatically filled, the latest search result for the domain record (if there is one) is refilled and any match modifications the operator did to the records are retained. The operator may thus go back and forth, selecting arbitrary records in subform F and inspecting the search results and match states until satisfied.

- There is no subform C.

- Subform E has a number of additional actions:

  - The inspect button will open the approval form, but as a read-only form (i.e. the disapprove button disabled)

  - A "suggest" button, which will select the most promising match candidate from the result set.

        ▪ A "match" button that will select the selected result set record as a unique match for the domain record. If several result records are selected, the user will be asked to confirm the match and if confirmed, the record match state will be "several".

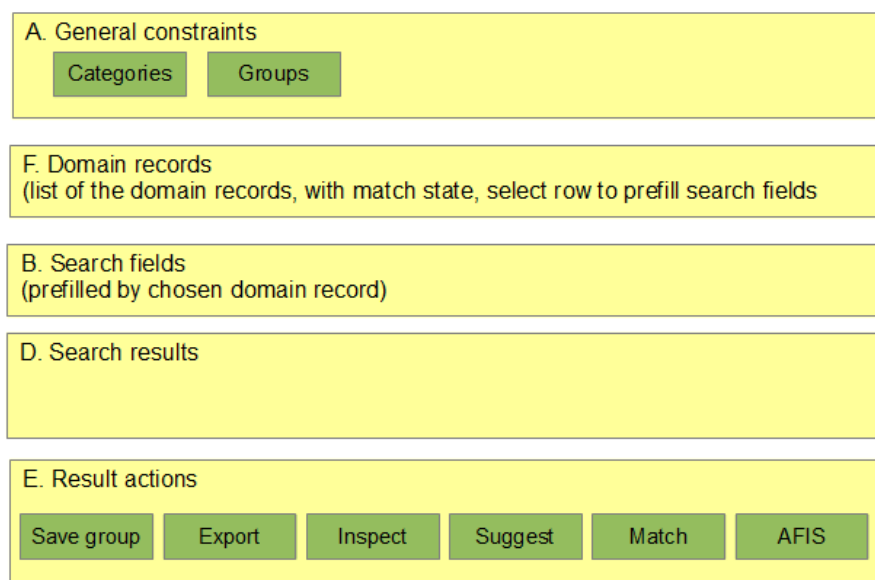   ▪ An "AFIS" button that will initiate the AFIS matching, step 4 with the domain records as a starting point for domain selection.

REQ. 241.   It must be possible to manually match records based on text fields according to the GUI form and functionality specified above.

Select domain for AFIS matching, step 4

The form in step 4 is intended to capture the records that are to be subject of an AFIS matching. These are termed the "domain records" for AFIS matching, the form is similar to the search form, but with the following modifications;

- In subform D, the resultset, is pre-filled with the result sets from the previous step.

- In subform E, there is a button named "AFIS range" that initiates step 5. The inspect button opens an approval form which is read-only, as in the previous step 3.

REQ. 242.   It must be possible to choose the set of domain records for AFIS matching according to the GUI form and functionality specified above.

Select range for AFIS matching, step 5

The form in step 5 is intended to capture the records that the domain records are going to be matched against. These are termed the "range records. This set could be the entire voter registry, or a subset filtered on some geographical constraint for example. The form is similar to the search form, but with the following modifications;

- In subform A there is an additional button named "All records" that invalidates subform B, C and D and makes the range the entire set of verified, current records.

- In subform E, there is a button named "Do optimized AFIS" that initiates step 6. The inspect button opens an approval form which is read-only, as in the previous step 3.

According to the above:

REQ. 243.   It must be possible choose the set of range records for AFIS matching according to the GUI form and functionality specified above.

AFIS Matching

REQ. 244.   The *OptimizedBiometricMatch* process must be accompanied by a GUI form informing the operator of the process status and allowing the operator to control the process.

REQ. 245.   There must be a continuously updated progress bar and an estimate of the time remaining.

REQ. 246. The estimate function must autocalibrate across multiple AFIS processes so as to over time improve its accuracy based on empirical samples from production.

REQ. 247. There must be a start button that starts the AFIS process. There shall be a cancel button that responds in less than 0.5 seconds and which cancels the AFIS process and let's the operator either go back to step 5 or press the start button again (restarting the process from where it stopped).
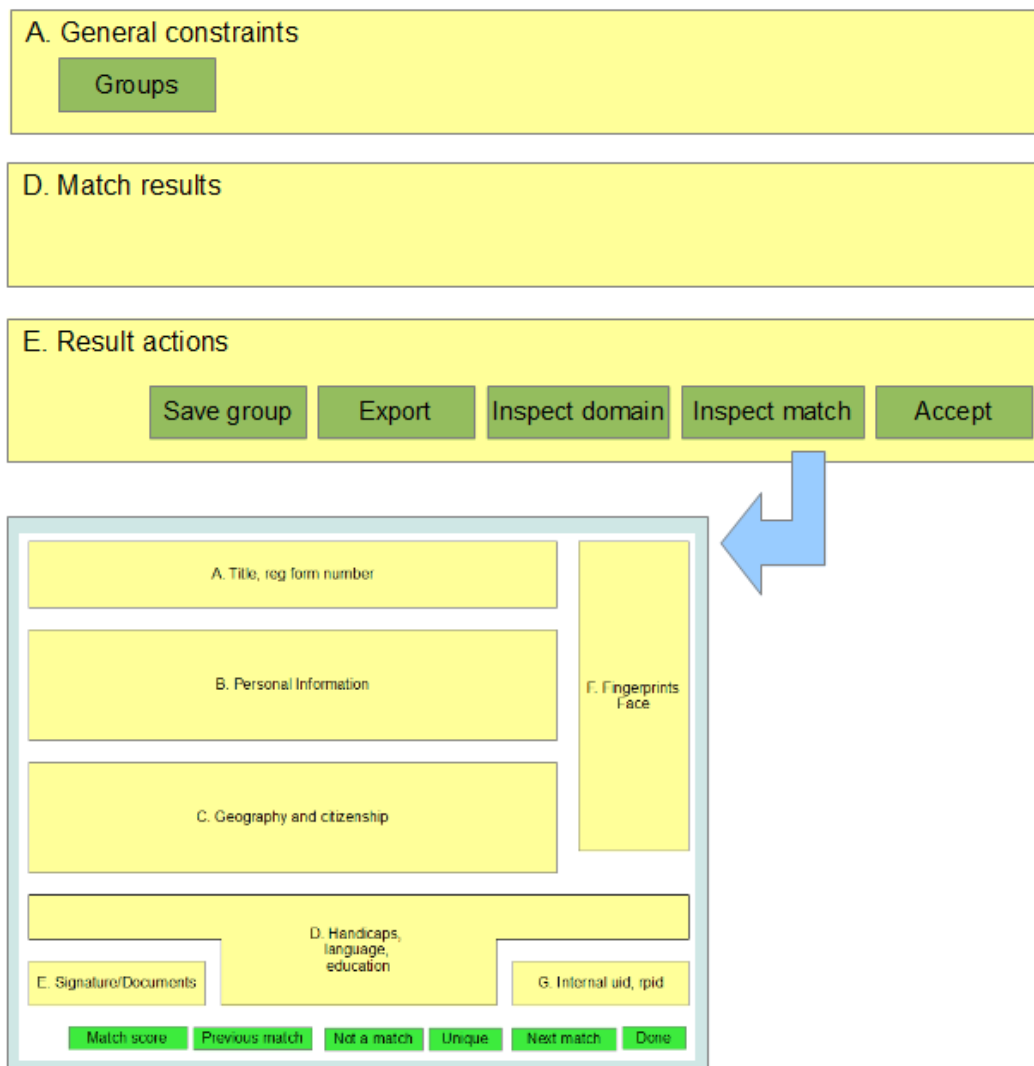
REQ. 248. There must be a threshold function similar to the CVLA baseline that allows the operator to change the sensitivity/specificity of the AFIS process. It shall be possible to set the setting for every time an *OptimizedBiometricMatch* process starts.

REQ. 249. It must be possible to save a threshold setting with an operator chosen name. It must be possible select a previously saved threshold setting so as to load or delete the saved setting.

Accept as verified records, step 7

All records that were subject to AFIS matching are presented for acceptance. The set of records is formed from three sources:

1. All records that were selected which had a MatchState of "unique" and an accompanying registration form that was not "new registration" in step 2

2. Domain records which had a MatchState of "unique" and an accompanying registration form that was not "new registration" in step 3

3. All domain records from step 4.

Figure 25 : Accept form with a inspect match subform

The operator may then review the match result set, inspect an individual match, select or deselect individual records and finally accept the selected records as verified. With respect to and based on the form, the form features:

- Subform A, but with no "categories" button.

- Subform D showing all domain records from the above three sources. The column showing accompanying registration form type shall be visible by default. Records shall be preselected according to the following rules:

  a. Select a registration record that has a "unique" match state and which has an accompanying registration form that was not "new registration".

  b. Select a registration record that has a "new" match state and which has an accompanying registration form that was "new registration".

  c. There shall be a column marked "accept matched" where the operator may select the matched record as the record to be

Page **116** of **152**

accepted instead of the default domain record. Only records which have unique matches may be selected.

- Subform E but with two inspect buttons and an "approve/acccept" button:

  - "Inspect domain record" – to view (r/o) the details of the record that was the subject of matching

  - "Inspect matched record" – to view (r/o) the details of the range record that matched the domain record. If there are several matches, all can be inspected successively (the operator may go back and forth between the several matches). A several match result cannot be accepted. Three new buttons shall be present on the inspect form:

    o "Match score" – display a list of numerical scores, normalized to the range [0,1] for each of the match criteria.

    o "Not a match" – will remove the match so that there is no link between the domain and range record.

    o "Unique match" – only selectable if several range records match the domain record. Will modify the match state to be "unique" and decouple other matched records from the domain record.

  - The accept button will insert all selected records as verified/approved records, updating the domain records accordingly.

    o As a default, it is the domain record that is accepted. That can be overridden by the operator, cf. above.

    o If a uniquely matched record is accepted, the most recent address of the two records shall be the recorded address.

According to the above:

REQ. 250. It must be possible to browse and choose the set of domain records that are to be accepted as verified records.

REQ. 251. It shall be possible to browse and choose the set of domain records that are to be accepted as verified records according to the GUI form and functionality specified above.

Re-verify Records

The task flow for "Re-verify Records" shall be similar to the "Verify Approved Records". The differences are that

- for step 2 and 4 the search must be based on verified records as opposed to unverified ones.

- for step 3 and 4 there are no *NewRecords* that plays a role in advising the operator.

REQ. 252. A task flow for the CVLA "Re-verify Records" shall accommodate the steps and GUI forms outlined above.

REQ. 253.   For "Re-verify Records" there shall be facilities for N:N matching.

3.16.3 DVLA Verification

The DVLA verification is identical to the CVLA verification, with the difference that only 1:M fingerprint de-duplication shall be possible.

REQ. 254.   It shall be possible choose a single domain record for AFIS matching according to the GUI form and functionality specified above.

3.16.4 DCA Verification

The DCA verification is a subset of the CVLA verification, where the text based deduplication is retained but the AFIS is omitted, cf. the figure below. Only "Verify Approved Records" shall apply and the range set shall be taken from approved records.
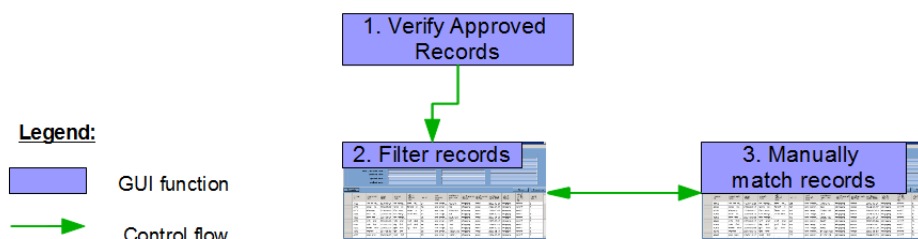
Figure 26 : DCA verification process

For step 3, the match form differs from the CVLA edition the following ways:

1. There is no AFIS button

2. The "match" button is renamed "correct" and if pressed, the range record will be deleted and the domain record will take its place.

According to the above:

REQ. 255.   A task flow for the DCA "Verify Approved Records" shall accommodate the steps and GUI form outlined above.

3.16.5 VLA Verification non-functional requirements

VLA Verification performance

REQ. 256.   The CVLA AFIS verification shall be able to de-duplicate through a 1:N identification process where N = 15 million records, 200 000 voters per second on average on a 24/7 average loaded CVLA production system.

REQ. 257.   The AFIS functionality must be possible to parallelize over an arbitrary number of cpu/host nodes. The AFIS performance must scale and be optimized according to the presently available hardware. The scalability must be built-in, not require any additional licenses and be easy to configure should the type and number of host nodes available change.

Product dependency

REQ. 258.   The AFIS matching (face and fingerprint) shall be based on Neurotechnologies Megamatcher 4.x.

3.17.   Training

REQ. 259.   Training requested involves specific Training programs for the following groups:

1. System support professionals (troubleshooting of the CVLA,DVLA and DCA,). Including TOT for technical staff.

2. Database administrators (maintenance, troubleshooting, security, auditing of database etc. plus AFIS software: de-duplication)

3. Network administrators (data transfer between district and HQ)

4. Managers (regarding the security of data and data sharing with other stakeholder)

5. On the job training for technical staff from the beginning until the end of the system development.

REQ. 260.   Specific Training Programs outlined above must involve at least the following general areas, allocating them as relevant to each training program above to allow the corresponding participants to fully perform their roles:

1. System Functionalities

2. Troubleshooting of the software,

3. Maintenance of the software,

4. Daily operation of the software

5. New development of software (reports, query, etc) including use of source codes and SDKs provided.

6. Training should also encompass 'train the trainer' type of content to ensure that the trained staff will have materials and be able to train further additional staff/operators if necessary.

REQ. 261.   For technical training the Vendor shall train the End User (ECN) designated Technicians and Staff to be able to fully manage the Solution provided in accordance to the requested implementation schedule for each of the modules that compose the system.

At the end of each phase/module or simultaneously to such phase, the training corresponding to such module or functionalities developed at that phase should be provided:

- Short briefing of the software development methodology and plan during initiation of software development.

- Users training, should be provided right upon finalization of the developed software.

- System administration, maintenance and troubleshooting training before delivering the final version of the software.

- Development environment training (backend database, software development tools, AFIS, API etc) during software implementation.

- Ensure the documentation, is relevant, useful and reflects the state of the system and what is being taught to the ECN.

REQ. 262. The duration of each of the specific Training Programs must be adapted to the needs and content proposed. It is hence to be proposed by the Proposers the curricula and schedule of each training. As an indication a training program is expected to last approximately 5-10 days for around 10-15 participants, including necessary practice sessions. The more complex trainings are expected to be if needed longer and ensuring in all cases good time for absorbing the necessary knowledge on the solution.

REQ. 263. During and after the conduction of the system implementation, data consolidation/management and duplicate analysis operations, the Vendor shall conduct on-the-job technical training for End User appointed technicians.

REQ. 264. When transferring the fully developed system to the End User, an exercise to identify any additional capacities and knowledge required to fully manage and maintain the system in the future will be conducted by the Vendor in collaboration with the End User. Such capacities and knowledge will be provided to the End User in the form of a final training.

REQ. 265. Trainings must be conducted in both Nepali and English.

REQ. 266. The required Teaching methods are Face to Face lectures with practical work in the classroom and on the ground.

REQ. 267. The Vendor is responsible to supply all necessary materials needed for the trainings, as per requested trainings above. These include but not restricted to:

- Learning materials and courses hand-outs,

- User Guides

- Troubleshooting schedules

- Reference materials

- Materials should also include the necessary to allow trained staff to train other staff in the future as needed.

- Software and license required for the training.

The Vendor shall provide the necessary printed copies for the scheduled training programs and an electronic version of all the training material, as well as, permission to reproduce and print as many copies as required for internal End User consumption.

The training venue and equipment will be provided by the End User or by UNDP Nepal.

REQ. 268.   An evaluation/test shall be held for all participants at the end of each specific training program. The evaluation criteria and methodology must be presented to End User for its prior approval. The actual evaluation shall be conducted by the supplier under the supervision and participation of End User. End User must be in a position (in future) to conduct their own training program and understand the entire process thereof.

> The outcome of the test will be indicative of the adequacy of the training conducted. Quality of the training will also be assessed through a satisfaction questionnaire that will be filled in by the participants and will be part of the evaluation of the Vendor's performance.
>
> End User approval on conducted training will be necessary as part of the sign off and payment for such service.

3.18.   Technical Support

REQ. 269.   Technical Support must be provided:

During all stages of implementation of the solution that take place in Kathmandu.

For a period of 12 months after the Solution modules are completed, implemented and delivered according to the requested schedule and once the relevant users are trained. Such period of time may be divided between:

i.   a more intense service level during the first six months of the period involving on-site follow up and assistance on a daily basis.

ii. a lower-level support service consisting of online support where repairs can be done by End User technicians once trained with instructions from the Vendor's technical office in Kathmandu, and on-call visits where remote problem shooting is not effective. All warranty obligations though must be fully covered during the contracted warranty period.

REQ. 270. Technical Support must cover in full, at the Vendor's cost, the resulting system (including any hardware and software), assisting the End User in conducting operations, and should include but not restricted to any repair, software patches, operational   guidance,   installation,   commissioning,   and

corrections needed on the system/solution provided to ensure its full functionality and compliance with the requirements.

REQ. 271.   Regarding the parts of the current system (to be enhanced through this exercise), ECN will provide the source code of the software to the Vendor who upon test and conformity with the code is requested to also ensure functionality and maintenance of any part of the current system remaining in the final solution/system provided as result of this RFP.

REQ. 272.   Technical Support Services must be provided by appointed technical office located in Kathmandu, either the Vendor's local office or the Vendor's local Partner's office.

REQ. 273.   Services must be provided in both Nepali and English, as requested.

REQ. 274.   Technical   Support   is   requested   to   be   provided expeditiously. Especially:

   1. Contact and availability of technical support will be guaranteed throughout working hours daily (7 days per week).

   2. The technical support service should ensure the replacement/repair of any faulty items/modules within 72 hours (not just working hours) from identification and/or communication of issues encountered.

   3. If required on specific occasions, the technical team should be available to travel to the district and assist/resolve problem as required at the registration district operational centre (travel and accommodation not to be included in the offer as it will be separately considered or provided by End User).

REQ. 275.   The Local Technical Service Centre must have sufficient capacity, personnel and equipment, to diagnose and rapidly repair/replace any faulty item within the stated period of 72 hours. It is the responsibility of the Vendor to ensure at all times enough resources are available to provide effectively such service.

3.19.   Warranty

REQ. 276.   Vendor shall provide 1 (one) year warranty for all the system (hardware and software) provided. Faulty hardware or software must be replaced/rectified expeditiously and as per timelines stated in Technical Support, at no cost.

REQ. 277.   Software maintenance and upgrades are to be included during the warranty period.

REQ. 278.   During the Warranty period, and in addition to the local support provided from Kathmandu, the Vendor will maintain technical support, for End user to report faulty items during Warranty, liaise on replacements/repairs, and for assistance, backing up the local technical support team.

3.20. Additional Requirements on Implementation

REQ. 279.   INSTALLATION, TESTING AND COMMISSIONING

1. The Vendor shall test the system as a whole and as specified to ensure that it is set-up properly and functions optimally. Before the system is commissioned, operational tests must be conducted on all modules and subsystems.

2. The Vendor shall use inspection and testing techniques which are consistent with the requirements of International standards Organisation on Quality Systems (ISO).

3. The Vendor shall at no extra cost to the Purchase rectify deficiencies detected during pre- commissioning of the system.

4. Failure of the subsystems or different components of the system would be deemed as failure for all other systems to pass the operational acceptance test.

REQ. 280.   LICENSES, SOURCE CODES AND INTELLECTUAL PROPERTY RIGHTS

i.   The Vendor warrants and represents that the ECN, as the End user will be granted the same rights granted to UNDP under the resulting contract in accordance with Article 11 of UNDP General Conditions of Contract attached hereto.

ii.   Ownership of the VLA in production, and the VLA SDK, all rights, titles and interest shall be fully vested in the ECN without further compensation.

iii.   For the VLA solution developed for this project, the Vendor shall assign property of all VLA Source Code, SDKs and licenses (free, perpetual and unrestricted licenses) and all intellectual rights to the UNDP and ECN.

iv.   There shall be no time or usage limitation on third party products or libraries the Vendor chooses to employ.

v.   Provision of licenses, SDKs and sources codes must guarantee the End User to be able to ensure independent maintenance and updating/modification of the VLA in the future. This includes the right of the End User to have a commercial third party (i.e. not only ECN staff) modify the software free from license or usage constraints from the Vendor or any product or library the Vendor has chosen to employ. The ECN shall not be subject to any future additional costs related to the use, maintenance or extensions of the VLA.

vi.   The ECN shall have exclusive and sole rights, ownership over the VLA software. No agreements, contract approval what so ever shall be required from the vender to use, modify and update the software. ECN may employ third person or company for its updates, modification and necessary changes in future.

REQ. 281.   IMPLEMENTATION STRATEGY AND PROJECT MANAGEMENT –
   RESPONSIBILITIES OF THE VENDOR

      i.   Project Implementation: The Vendor shall implement the project responding and complying with the TORs indicated. Implementation strategy shall be indicated in the proposal in order to achieve the specified functions.

     ii.   Project Management Method. Vendor upon signature of contract must further develop during the feasibility study an Inception Report, involving at least the following aspects (most of them should have already been addressed in the corresponding Proposal submitted):

        1. Overall implementation Plan as specified above

        2. Application manuals

        3. System interfacing Manuals

        4. Change Control Procedures

        5. Project Organisation charts

        6. Technology/Skills Transfer to the client plan as specified above

        7. Tasks, Time and Resource Schedules

        8. Roles and responsibilities of each of the Vendor's team members.

    iii.   The Vendor will be requested to submit to the Purchaser a progress report every two weeks, during the complete contract duration and a final end of contract report

REQ. 282.   ORGANISATION OF THE PROJECT TEAM AND BASIC SKILLS

Proposers must propose a team organizational structure that is in line with the scope of work described and in line with the specific requirements above. Proposers demonstrate and indicate how their proposed structure and skills will contribute to attaining the defined requirements.

The Vendor must ensure that the team members have the following minimum project related competences:

- Database management and appropriate programming skills for large databases exceeding at least 10,000,000 records

- Biometric matching systems development skills

- Identity and access control systems development skills

- Log, traceability and accountability system development skills

- System integration skills/interface based on open, non-proprietary standards skills

- Systems architectural design skills with emphasis on modular, component-based best practices based on open, non-proprietary standards and best practices aiming at avoiding vendor lock-in

- Iterative, test-based and agile software development methodology skills

- Project management and control skills for information systems

- Quality Assurance, Quality Control Skills

- Training, technological transfer and capacity building skills

- Corrective Action, Contingency planning and change control skills

During the project implementation period, there must be continuity of staff and changes in personnel are subject to consultation and approval by the Purchaser. The Purchaser shall reserve the right to ask for replacement or supplementary personnel if the need arises out of weakness in the project team.

Where the change is initiated by the Vendor for other reasons, the Purchaser will reserve the right to request that the incoming person(s) work with the out -going person for at least two weeks at the provider's expense prior to the replacement taking place.

The Vendor, together with declared Partner/s are expected to be self-sufficient throughout the duration of the contract in order to carry out the Terms of Reference of this requirement.

REQ. 283.   PROJECT SCHEDULE AND TIMELINES.

   The Vendor must provide an accurate project plan and GANT CHART schedule proving to meet the implementation timelines outlined in Annex 2 to this Section 3.

PLEASE SEE ANNEXES TO SECTION 3 IN SEPARATE DOCUMENT PROVIDED "Annexes to Section 3 RFP SRS Nepal 20130214", including link (http://esp.org.np/srs/ **) to a number of reference documents listed in the annexes.**

Section 4: Proposal Submission Form[5]

[insert: *Location*]
[insert: *Date*

To: [*insert: Name and Address of UNDP focal point]*

Dear Sir/Madam:

We, the undersigned, hereby offer to provide professional services for [insert: title of services] [insert: title of services] [insert: title of services] in accordance with your Request for Proposal dated [*insert: Date*] and our Proposal. We are hereby submitting our Proposal, which includes the Technical Proposal and Financial Proposal sealed under a separate envelope.

We hereby declare that :

a) All the information and statements made in this Proposal are true and we accept that any misrepresentation contained in it may lead to our disqualification;

b) We are currently not on the removed or suspended vendor list of the UN or other such lists of other UN agencies, nor are we associated with, any company or individual appearing on the 1267/1989 list of the UN Security Council;

c) We have no outstanding bankruptcy or pending litigation or any legal action that could impair our operation as a going concern; and

d) We do not employ, nor anticipate employing, any person who is or was recently employed by the UN or UNDP.

We confirm that we have read, understood and hereby accept the Terms of Reference describing the duties and responsibilities required of us in this RFP, and the General Terms and Conditions of UNDP's Contract for Professional Services.

We agree to abide by this Proposal for *[insert: period of validity as indicated in Data Sheet].*

We undertake, if our Proposal is accepted, to initiate the services not later than the date indicated in the Data Sheet.

We fully understand and recognize that UNDP is not bound to accept this proposal, that we shall bear all costs associated with its preparation and submission, and that UNDP

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[5] *No deletion or modification may be made in this form. Any such deletion or modification may lead to the rejection of the Proposal.*

will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the evaluation.

We remain,

Yours sincerely,

Authorized Signature [*In full and initials*]: _____

Name and Title of Signatory: _____

Name of Firm: _____

Contact Details: _____

Section 5: Proposer Information Forms

In this Section and Section 6, templates for some specific aspects are provided and Proposers are requested to use such formats where corresponding. The forms are not exhaustive and Proposers must ensure that all aspects are provided as requested in Section 2 Instructions to Proposers and Data Sheet, even not specifically included in the form, or no form is provided.

Proposer Information Form[6]

Date: *[insert date (as day, month and year] of Proposal Submission]*
RFP No.: *[insert number]*

Page _____of _____ pages

1. Proposer's Legal Name and type of Company: In case of Joint Venture (JV), legal name of each party:	

2. Ownership (Private/ Government corporation or Government-owned/controlled entity)

3. Country of Registration:

4. Year of Registration:

5. Countries of Operation	6. No. of staff in each Country	7.Years of Operation in each Country

8. Legal Address/es in Country/ies of Registration/Operation:

9. Value and Description of Top three (3) relevant Contracts for the past five (5) years (in addition to the relevant copies of the actual contracts or Purchase Orders). Further relevant experiences to be provided in same format, in a separate table.

Name of project	Client	Contract Value	Period of activity	Object and scope - Types of activities undertaken	Date Contracted and Date Completed	References Contact Details (Name, Phone, Email)
…						
…						
…						

10. Latest Credit Rating (if any)

1.   Brief description of litigation history (disputes, arbitration, claims, etc.), indicating current status and outcomes, if already resolved.

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[6] *The Proposer shall fill in this Form in accordance with the instructions. Apart from providing additional information, no alterations to its format shall be permitted and no substitutions shall be accepted.*

12. Proposer's Authorized Representative Information
Name: *[insert Authorized Representative's name]* Address: *[insert Authorized Representative's name]* Telephone/Fax numbers: *[insert Authorized Representative's name]* Email Address: *[insert Authorized Representative's name]*
13. Are you in the UNPD List 1267.1989 or UN Ineligibility List or Suspended or Removed from the UN Secretariat Procurement Division Vendor Roster? ☐ YES or ☐ NO
14. Are you in any of the situations of Conflict of Interest as per Clauses 5 and 6 of the Instructions to Proposers? If yes, provide details.   ☐ YES or ☐ NO
15, Do you adhere to the UNDP Suppliers Code of Conduct, as per Clause 8 of the Instructions to Proposers? ☐ YES or ☐ NO
16. Are you in any of the situations described in Clause 9 of the Instructions to Proposers? If yes, please provide details. ☐ YES or ☐ NO
17. Description of Management structure
18. Current business line/s (list)
19. Range of product and services categories (list)
20. Quality certifications (list)
21. Environmental certifications (list)
22. Attached are copies of original documents of: ☐ All eligibility, qualification, expertise and capacity document requirements listed in the Data Sheet, even if not referred to in this form. ☐ If Joint Venture/Consortium – copy of the Memorandum of Understanding/Agreement or Letter of Intent to form a JV/Consortium, or Registration of JV/Consortium, if registered ☐ If case of Government corporation or Government-owned/controlled entity, documents establishing legal and financial autonomy and compliance with commercial law.

Joint Venture Partner Information Form (if Registered)[7]

Date: *[insert date (as day, month and year) of Proposal Submission]*
RFP No.: *[insert number]*

Page _____ of_ _____ pages

1. Proposer's Legal Name: *[insert Proposer's legal name]*	
2. JV's Party legal name: *[insert JV's Party legal name]*	
3. JV's Party Country of Registration: *[insert JV's Party country of registration]*	
4. Year of Registration: *[insert Party's year of registration]*	

5. Countries of Operation	6. No. of staff in each Country	7.Years of Operation in each Country

8. Legal Address/es in Country/ies of Registration/Operation: *[insert Party's legal address in country of registration]*

9. Value and Description of Top three (3) relevant Contracts for the past five (5) years (in addition to the relevant copies of the actual contracts or Purchase Orders):

Name of project	Client	Contract Value	Period of activity	Object and scope - Types of activities undertaken	Date Contracted and Date Completed	References Contact Details (Name, Phone, Email)
…						
…						
…						

10. Latest Credit Rating (if any)

11.Brief description of litigation history (disputes, arbitration, claims, etc.), indicating current status and outcomes, if already resolved.

12. JV's Party Authorized Representative Information

Name: *[insert name of JV's Party authorized representative]*
Address: *[insert address of JV's Party authorized representative]*
Telephone/Fax numbers: *[insert telephone/fax numbers of JV's Party authorized representative]*
Email Address: *[insert email address of JV's Party authorized representative]*

13. Are you in the UNPD List 1267.1989 or UN Ineligibility List or Suspended or Removed from the

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[7] *The Proposer shall fill in this Form in accordance with the instructions. Apart from providing additional information, no alterations to its format shall be permitted and no substitutions shall be accepted.*

UN Secretariat Procurement Division Vendor Roster? ☐ YES or ☐ NO
14. Are you in any of the situations of Conflict of Interest as per Clauses 5 and 6 of the Instructions to Proposers? If yes, provide details.   ☐ YES or ☐ NO
15, Do you adhere to the UNDP Suppliers Code of Conduct, as per Clause 8 of the Instructions to Proposers?   ☐ YES or ☐ NO
16. Are you in any of the situations described in Clause 9 of the Instructions to Proposers? If yes, please provide details. ☐ YES or ☐ NO
17. Description of Management structure
18. Current business line/s (list)
19. Range of product and services categories (list)
20. Quality certifications (list)
21. Environmental certifications (list)
14.   Attached are copies of original documents of: [check the box(es) of the attached original documents]   ☐ All eligibility, qualification, expertise and capacity document requirements listed in the Data Sheet, even if not referred to in this form.   ☐ Articles of Incorporation or Registration of firm named in 2.   ☐ In case of government owned entity, documents establishing legal and financial autonomy and compliance with commercial law.

Section 6: Technical Forms

Templates for some specific aspects are here below provided and Proposers are requested to use such formats where corresponding:

Please use the format below to provide a summary of each CVs provided:

Name:	
Position for this Contract:	
Nationality:	
Contact information:	
Countries of Work Experience:	
Language Skills:	
Educational and other Qualifications:	
Summary of Experience: *Highlight experience in the region and on similar projects.*	

CVs including detailed experience should at least contain the following information in a clear manner or in the following format:

Relevant Experience (From most recent):		
Period: From – To	**Name of activity/ Project/ funding organisation, if applicable:**	**Job Title and Activities undertaken/Description of actual role performed:**
e.g. June 2004-January 2005		
Etc.		
Etc.		
References no.1 (minimum of 3):	*Name* *Designation* *Organization* *Contact Information – Address; Phone; Email; etc.*	
Reference no.2	*Name* *Designation* *Organization* *Contact Information – Address; Phone; Email; etc.*	
Reference no.3	*Name* *Designation* *Organization* *Contact Information – Address; Phone; Email; etc.*	

Section 7: Financial Proposal Form[8]

The Proposer is required to prepare the Financial Proposal in an envelope separate from the rest of the RFP as indicated in the Instruction to Proposers.

The Financial Proposal must provide a detailed cost breakdown. Provide separate figures for each functional grouping or category.

Any estimates for cost-reimbursable items, such as travel and out-of-pocket expenses, should be listed separately.

The format shown on the following pages is for use in preparing the Financial Proposal. The format is as well provided in Excel editable format to facilitate its completion as required.

A.   **Financial Proposal per Deliverables**

All prices in USD

LOT 1: Voter Registration System enhancement Solution

Ref. Modules	Components (all components as per specifications in Section 3 TORs - Supply Requirement)	Qty	Unit price	Total Price
Module 1: VLA Software Development, installation, testing, commissioning, and SDKs/codes of the complete system	PHASE I:	Offeror to state under following categories.		
	VLA CVR including: • Registration and approval functions. • Application layers. • Enhanced search and edit functionality. • All reporting as in baseline.	1 (LUMP SUM)		
	VLA Verification including: • Enhanced CVLA de-duplication functions. • Text based matching. • GUI verification functions.	1 (LUMP SUM)		

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[8] *No deletion or modification may be made in this form. Any such deletion or modification may lead to the rejection of the Proposal.*

CVLA Log including: • Database logging.	1 (LUMP SUM)		
CVLA ID including: • ID admin functions. • User credentials by password. • Ability to map users to roles. • Configurable identity sources.	1 (LUMP SUM)		
Project & Data Management, including all installation, testing, control, QA, project coordination, etc.	1 (LUMP SUM)		
Other components under vendor proposal.			
PHASE II:	Offeror to state under following categories.		
VLA Verification including: • Optimization of de-duplication functions. • Enhanced DVLA de-duplication functions.	1 (LUMP SUM)		
CVLA Log including: • Service level logging. • Enhanced database level logging. • GUI functionality through application layer for configuration, viewing and other functions.	1 (LUMP SUM)		
CVLA ID including: • GUI functionality at application layer to support ID admin functions. • Allow federation of ID from external providers. • Runtime components through single sign-on .	1 (LUMP SUM)		
Project & Data Management, including all installation, testing, control, QA, project coordination, etc.	1 (LUMP SUM)		
Other components as required under vendor proposal.			

	PHASE III:	Offeror to state under following categories.		
	VLA CVR including: • Continuous replication of data to second site. • Completion of all reporting functions including baseline & target. • Full CVR workflow support. • Full voter and identity common domain model employed. • Compliant with defined performance criteria.	1 (LUMP SUM)		
	VLA Integration including: • Service interface to administer role constraints. • Completion of common domain model to meet internal and external client requirements. • Common domain model operates through application layer.	1 (LUMP SUM)		
	Project & Data Management, including all installation, testing, control, QA, project coordination, etc.	1 (LUMP SUM)		
	Other components as required under vendor proposal.			
Module 2: Data Migration.	Data Migration, integration, Export, Import and exchange:	1 (LUMP SUM)		
Module 3: Hardware and licenses.	Hardware cost: breakdown to include all hardware items required to implement and support the proposed solution, including their installation and commissioning.	Offeror to state under following categories.		

	software licenses: breakdown to include all licenses for all off-the-shelf software incorporated in the solution, unlimited in time, as per specifications.	Offeror to state under following categories.		

LOT 1 TOTAL DAP Kathmandu, cleared and installed at ECN premises: | | |

LOT 2: Training

Ref. Modules	Components (all components as per specifications in Section 3 TORs - Supply Requirement)	Qty	Unit price	Total Price
Module: Specific Training Programs to be delivered in Kathmandu	System support training (troubleshooting of the CVLA,DVLA and DCA)	lump sum (breakdown to reflect both materials provision of training)		
	Database administrators training (maintenance, troubleshooting, security, auditing of database etc. plus AFIS software: de-duplication and configuration)	lump sum (breakdown to reflect both materials provision of training)		
	Network administrators training (data transfer between district and HQ and primary and backup sites)	lump sum (breakdown to reflect both materials provision of training)		
	Training of the trainers (TOT)	lump sum (breakdown to reflect both materials provision of training)		
	Managers / Administration training (regarding the security and auditing of data and data sharing with other stakeholder and its configuration)	lump sum (breakdown to reflect both materials provision of training)		
Module: Continuous on-the-job training and knowledge transfer	Continued on-the-job training and knowledge transfer from Contractor to Technicians and Software engineers in addition to above specific trainings to be conducted throughout all the operation, to ensure effective system operativity by the End User and sustainable capacity to manage the system in the future.	Offeror to state details and breakdown of quantity and prices		

	System transfer should as well occur before end of operation.			
LOT 2 TOTAL :				

LOT 3: Technical Support and Warranty

Ref. Modules	Components (all components as per specifications in Section 3 TORs - Supply Requirement)	Qty	Unit price	Total Price
Module: Technical Support and Warranty	Technical Support and Warranty services for a period of 12 months through a local technical centre in Kathmandu, under the responsibility of the Vendor, as per requirements in RFP document.	Offeror to state details and breakdown of price based on resources deployed.		
LOT 3 TOTAL :				

LOT 4: Final User manual and Technical documentation.

Ref. Modules	Components (all components as per specifications in Section 3 TORs - Supply Requirement)	Qty	Unit price	Total Price
Module:User manual and technical documentaiton including the source code	User manual, developers manual, training manual, source code with documentation, installation manual and any other relavent documents.	Offeror to state details and breakdown of quantity and prices		
LOT 4 TOTAL :				

TOTAL PROPOSAL (LOTS 1 + 2 + 3 +4) IN USD	

B.   **Cost Breakdown by Cost Component:**

UNDP shall use the below cost breakdown for price analysis purposes as well as calculation of corresponding price in the event that both parties would agree under the Contract to additional period of Services/deliverables.

Description of Activity	Remuneration per day	Total Period of Engagement	No. of Personnel	Total Rate for the Period
I. Professional Services LOT 1				
1. Services from Home Office				
a. Expertise 1 [specify]				
b. Expertise 2 [specify]				
c. … [specify]				
2. Services onsite (Nepal)				
a . Expertise 1 [specify]				
b. Expertise 2 [specify]				
c. … [specify]				
II. Professional Services LOT 2 - TRAINING				
1. Services from Home Office				
a. Expertise 1 [specify]				
b. Expertise 2 [specify]				
c. … [specify]				
2. Services onsite (Nepal)				
a . Expertise 1 [specify]				
b. Expertise 2 [specify]				
c. … [specify]				
II. Professional Services LOT 3 – TECHNICAL SUPPORT				
1. Services from Home Office				
a. Expertise 1 [specify]				
b. Expertise 2 [specify]				
c. … [specify]				
2. Services onsite (Nepal)				
a . Expertise 1 [specify]				
b. Expertise 2 [specify]				
c. … [specify]				

Out of Pocket Expenses	Cost Breakdown
1. Travel Costs	
2. Daily Allowance	
3. Communications	
4. Others	

Name of Authorized Representative:

Proposer:

Signature of the Authorized Representative   Date Signed

Section 8: FORM FOR PROPOSAL SECURITY

(This must be finalized using the official letterhead of the Issuing Bank. Except for indicated fields, no changes may be made on this template)

To: UNDP
        [Insert contact information as provided in Data Sheet]

WHEREAS [*name and address of Contractor*] (hereinafter called "the Proposer") has submitted a Proposal to UNDP dated Click here to enter a date., to execute Services …………….. (hereinafter called "the Proposal"):

AND WHEREAS it has been stipulated by you that the Proposer shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security in the event that the Proposer:

a) Fails to sign the Contract after UNDP has awarded it;
b) Withdraws its Proposal after the date of the opening of the Proposals;
c) Fails to comply with UNDP's variation of requirement, as per RFP instructions; or
d) Fails to furnish Performance Security, insurances, or other documents that UNDP may require as a condition to rendering the contract effective.

AND WHEREAS we have agreed to give the Proposer such this Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Proposer, up to a total of [*amount of guarantee*] [*in words and numbers*], such sum being payable in the types and proportions of currencies in which the Price Proposal is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of *[amount of guarantee as aforesaid]* without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

This guarantee shall be valid up to 30 days after the final date of validity of bids.

SIGNATURE AND SEAL OF THE GUARANTOR BANK

Date ....

Name of Bank ....

Address ....

United Nations Development Programme

Section 9: FORM FOR PERFORMANCE SECURITY[9]

(This must be finalized using the official letterhead of the Issuing Bank. Except for indicated fields, no changes may be made on this template)

To: UNDP
        [Insert contact information as provided in Data Sheet]

WHEREAS [*name and address of Contractor*] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. Click here to enter text.dated Click here to enter a date. , to execute Services …………….. (hereinafter called "the Contract"):

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract:

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of [*amount of guarantee*] [*in words and numbers*], such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of *[amount of guarantee as aforesaid*] without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

This guarantee shall be valid until a date 30 days from the date of issue by UNDP of a certificate of satisfactory performance and full completion of services by the Contractor.

SIGNATURE AND SEAL OF THE GUARANTOR BANK

Date ....

Name of Bank ....

Address ....

---

[9] *If the RFP requires the submission of a Performance Security, which shall be made a condition to the signing and effectivity of the contract, the Performance Security that the Proposer's Bank will issue shall use the contents of this template*

Section 10: Contract for Professional Services,

including UNDP General Terms and Conditions

THIS IS UNDP'S TEMPLATE FOR CONTRACT FOR THE PROPOSER'S REFERENCE. ADHERENCE TO ALL TERMS AND CONDITIONS IS MANDATORY.

Date _____

Dear Sir/Madam,

Ref.: _____/ _____/ _____ **[INSERT PROJECT NUMBER AND TITLE OR OTHER REFERENCE]**

The United Nations Development Programme (hereinafter referred to as "UNDP"), wishes to engage your [**company/organization/institution**], duly incorporated under the Laws of _____ **[INSERT NAME OF THE COUNTRY]** (hereinafter referred to as the "Contractor") in order to perform services in respect of _____ **[INSERT SUMMARY DESCRIPTION OF THE SERVICES]** (hereinafter referred to as the "Services"), in accordance with the following Contract:

1.   Contract Documents

1.1   This Contract is subject to the UNDP General Conditions for Professional Services attached hereto as Annex I. The provisions of such Annex shall control the interpretation of this Contract and in no way shall be deemed to have been derogated by the contents of this letter and any other Annexes, unless otherwise expressly stated under section 4 of this letter, entitled "Special Conditions".

1.2   The Contractor and UNDP also agree to be bound by the provisions contained in the following documents, which shall take precedence over one another in case of conflict in the following order:

    a)   this Letter;
    b) the Terms of Reference [ref. ......dated........], attached hereto as Annex II;
    c) the Contractor's Proposal [ref......, dated ....]
    d) The UNDP Request for Proposal [ref......, dated......]

1.3   All the above shall form the Contract between the Contractor and UNDP, superseding the contents of any other negotiations and/or agreements, whether oral or in writing, pertaining to the subject of this Contract.

2.   Obligations of the Contractor

2.1   The Contractor shall perform and complete the Services described in Annex II with due diligence and efficiency and in accordance with the Contract.

2.2   The Contractor shall provide the services of the following key personnel:

    Name   Specialization   Nationality   Period of service
    ....
    ....

2.3   Any changes in the above key personnel shall require prior written approval of _____ **[NAME and TITLE],** UNDP.

2.4   The Contractor shall also provide all technical and administrative support needed in order to ensure the timely and satisfactory performance of the Services.

2.5   The Contractor shall submit to UNDP the deliverables specified hereunder according to the following schedule:

[LIST DELIVERABLES]   **[INDICATE DELIVERY DATES]**

e.g.

Progress report   ../../….
……………   ../../….
Final report   ../../….

2.6   All reports shall be written in the English language, and shall describe in detail the services rendered under the Contract during the period of time covered in such report. All reports shall be transmitted by the Contractor by _____ **[MAIL, COURIER AND/OR FAX]** to the address specified in 9.1 below.

2.7   The Contractor represents and warrants the accuracy of any information or data provided to UNDP for the purpose of entering into this Contract, as well as the quality of the deliverables and reports foreseen under this Contract in accordance with the highest industry and professional standards.

3.   Price and Payment

3.1   In full consideration for the complete and satisfactory performance of the Services under this Contract, UNDP shall pay the Contractor a fixed contract price of _____ **[INSERT CURRENCY & AMOUNT IN FIGURES AND WORDS]**.

3.2   The price of this Contract is not subject to any adjustment or revision because of price or currency fluctuations or the actual costs incurred by the Contractor in the performance of the Contract.

3.3   Payments effected by UNDP to the Contractor shall be deemed neither to relieve the Contractor of its obligations under this Contract nor as acceptance by UNDP of the Contractor's performance of the Services.

3.4   UNDP shall effect payments to the Contractor after acceptance by UNDP of the invoices submitted by the Contractor to the address specified in 9.1 below, upon achievement of the corresponding milestones and for the following amounts:

MILESTONE   AMOUNT   TARGET DATE

Upon…..   ……   ./../….

………   ……   ../../….

Invoices shall indicate the milestones achieved and corresponding amount payable.

4.   Special conditions

4.1   The responsibility for the safety and security of the Contractor and its personnel and property, and of UNDP's property in the Contractor's custody, rests with the Contractor.

4.2   The advance payment to be made upon signature of the contract by both parties is contingent upon

receipt and acceptance by UNDP of a bank guarantee for the full amount of the advance payment issued by a Bank and in a form acceptable to UNDP.

4.3   The amounts of the payments referred to under section 3.6 above shall be subject to a deduction of _____ **[INSERT PERCENTAGE THAT THE ADVANCE REPRESENTS OVER THE TOTAL PRICE OF THE CONTRACT]** % (... percent) of the amount accepted for payment until the cumulative amount of the deductions so effected shall equal the amount of the advance payment.

4.4   Owing to [.........................], Article(s) [.........] of the General Conditions in Annex I shall be amended to read/be deleted.

5.   Submission of invoices

5.1   An original invoice shall be submitted by mail by the Contractor for each payment under the Contract to the following address:

        ....

5.2   Invoices submitted by fax shall not be accepted by UNDP.

6.   Time and manner of payment

6.1   Invoices shall be paid within thirty (30) days of the date of their acceptance by UNDP. UNDP shall make every effort to accept an invoice or so advise the Contractor of its non-acceptance within a reasonable time from receipt.

6.2   All payments shall be made by UNDP to the following Bank account of the Contractor:

        _____ **[NAME OF THE BANK]**

        _____ **[ACCOUNT NUMBER]**

        _____ **[ADDRESS OF THE BANK]**

7.   Entry into force. Time limits.

7.1   The Contract shall enter into force upon its signature by both parties.

7.2   The Contractor shall commence the performance of the Services not later than _____ **[INSERT DATE]** and shall complete the Services within _____ **[INSERT NUMBER OF DAYS OR MONTHS]** of such commencement.

7.3   All time limits contained in this Contract shall be deemed to be of the essence in respect of the performance of the Services.

8.   Modifications

8.1   Any modification to this Contract shall require an amendment in writing between both parties duly signed by the authorized representative of the Contractor and _____ **[NAME AND TITLE]** UNDP.

9.   Notifications

        For the purpose of notifications under the Contract, the addresses of UNDP and the Contractor are as follows:

For the UNDP:

Name
Designation
Address
Tel. No.
Fax. No.
Email address:

For the Contractor:

Name
Designation
Address
Tel. No.
Fax. No.
Email address:

If the above terms and conditions meet with your agreement as they are typed in this letter and in the Contract Documents, please initial every page of this letter and its attachments and return to this office one original of this Contract, duly signed and dated.

Yours sincerely,

[INSERT NAME AND DESIGNATION]

For **[INSERT NAME OF THE COMPANY/ORGANIZATION]**

Agreed and Accepted:

Signature _____
Name: _____
Title: _____
Date: _____

UNDP
GENERAL TERMS AND CONDITIONS OF CONTRACT FOR SERVICES

1.0 LEGAL STATUS:

The Contractor shall be considered as having the legal status of an independent contractor vis-à-vis the United Nations Development Programme (UNDP). The Contractor's personnel and sub-contractors shall not be considered in any respect as being the employees or agents of UNDP or the United Nations.

2.0 SOURCE OF INSTRUCTIONS:

The Contractor shall neither seek nor accept instructions from any authority external to UNDP in connection with the performance of its services under this Contract. The Contractor shall refrain from any action that may adversely affect UNDP or the United Nations and shall fulfill its commitments with the fullest regard to the interests of UNDP.

3.0 CONTRACTOR'S RESPONSIBILITY FOR EMPLOYEES:

The Contractor shall be responsible for the professional and technical competence of its employees and will select, for work under this Contract, reliable individuals who will perform effectively in the implementation of this Contract, respect the local customs, and conform to a high standard of moral and ethical conduct.

4.0 ASSIGNMENT:

The Contractor shall not assign, transfer, pledge or make other disposition of this Contract or any part thereof, or any of the Contractor's rights, claims or obligations under this Contract except with the prior written consent of UNDP.

5.0 SUB-CONTRACTING:

In the event the Contractor requires the services of sub-contractors, the Contractor shall obtain the prior written approval and clearance of UNDP for all sub-contractors. The approval of UNDP of a sub-contractor shall not relieve the Contractor of any of its obligations under this Contract. The terms of any sub-contract shall be subject to and conform to the provisions of this Contract.

6.0 OFFICIALS NOT TO BENEFIT:

The Contractor warrants that no official of UNDP or the United Nations has received or will be offered by the Contractor any direct or indirect benefit arising from this Contract or the award thereof. The Contractor agrees that breach of this provision is a breach of an essential term of this Contract.

7.0 INDEMNIFICATION:

The Contractor shall indemnify, hold and save harmless, and defend, at its own expense, UNDP, its officials, agents, servants and employees from and against all suits, claims, demands, and liability of any nature or kind, including their costs and expenses, arising out of acts or omissions of the Contractor, or the Contractor's employees, officers, agents or sub-contractors, in the performance of this Contract. This provision shall extend, inter alia, to claims and liability in the nature of workmen's compensation, products liability and liability arising out of the use of patented inventions or devices, copyrighted material or other intellectual property by the Contractor, its employees, officers, agents, servants or sub-contractors. The obligations under this Article do not lapse upon termination of this Contract.

8.0 INSURANCE AND LIABILITIES TO THIRD PARTIES:

8.1   The Contractor shall provide and thereafter maintain insurance against all risks in respect of its property and any equipment used for the execution of this Contract.

8.2   The Contractor shall provide and thereafter maintain all appropriate workmen's compensation insurance, or the equivalent, with respect to its employees to cover claims for personal injury or death in connection with this Contract.

8.3   The Contractor shall also provide and thereafter maintain liability insurance in an adequate amount to cover third party claims for death or bodily injury, or loss of or damage to property, arising from or in connection with the provision of services under this Contract or the operation of any vehicles, boats, airplanes or other equipment owned or leased by the Contractor or its agents, servants, employees or sub-contractors performing work or services in connection with this Contract.

8.4   Except for the workmen's compensation insurance, the insurance policies under this Article shall:

8.4.1   Name UNDP as additional insured;

8.4.2   Include a waiver of subrogation of the Contractor's rights to the insurance carrier against the UNDP;

8.4.3   Provide that the UNDP shall receive thirty (30) days written notice from the insurers prior to any cancellation or change of coverage.

8.5   The Contractor shall, upon request, provide the UNDP with satisfactory evidence of the insurance required under this Article.

9.0   ENCUMBRANCES/LIENS:

The Contractor shall not cause or permit any lien, attachment or other encumbrance by any person to be placed on file or to remain on file in any public office or on file with the UNDP against any monies due or to become due for any work done or materials furnished under this Contract, or by reason of any other claim or demand against the Contractor.

10.0   TITLE TO EQUIPMENT: Title to any equipment and supplies that may be furnished by UNDP shall rest with UNDP and any such equipment shall be returned to UNDP at the conclusion of this Contract or when no longer needed by the Contractor. Such equipment, when returned to UNDP, shall be in the same condition as when delivered to the Contractor, subject to normal wear and tear.   The Contractor shall be liable to compensate UNDP for equipment determined to be damaged or degraded beyond normal wear and tear.

11.0   COPYRIGHT, PATENTS AND OTHER PROPRIETARY RIGHTS:

11.1   Except as is otherwise expressly provided in writing in the Contract, the UNDP shall be entitled to all intellectual property and other proprietary rights including, but not limited to, patents, copyrights, and trademarks, with regard to products, processes, inventions, ideas, know-how, or documents and other materials which the Contractor has developed for the UNDP under the Contract and which bear a direct relation to or are produced or prepared or collected in consequence of, or during the course of, the performance of the Contract, and the Contractor acknowledges and agrees that such products, documents and other materials constitute works made for hire for the UNDP.

11.2   To the extent that any such intellectual property or other proprietary rights consist of any intellectual property or other proprietary rights of the Contractor: (i) that pre-existed the performance by the Contractor of its obligations under the Contract, or (ii) that the Contractor may develop or acquire, or may have developed or acquired, independently of the performance of its obligations under the Contract, the UNDP does not and shall not claim any ownership interest thereto, and the Contractor grants to the UNDP a

perpetual license to use such intellectual property or other proprietary right solely for the purposes of and in accordance with the requirements of the Contract.

11.3   At the request of the UNDP; the Contractor shall take all necessary steps, execute all necessary documents and generally assist in securing such proprietary rights and transferring or licensing them to the UNDP in compliance with the requirements of the applicable law and of the Contract.

11.4   Subject to the foregoing provisions, all maps, drawings, photographs, mosaics, plans, reports, estimates, recommendations, documents, and all other data compiled by or received by the Contractor under the Contract shall be the property of the UNDP, shall be made available for use or inspection by the UNDP at reasonable times and in reasonable places, shall be treated as confidential, and shall be delivered only to UNDP authorized officials on completion of work under the Contract.

12.0   USE OF NAME, EMBLEM OR OFFICIAL SEAL OF UNDP OR THE UNITED NATIONS:

The Contractor shall not advertise or otherwise make public the fact that it is a Contractor with UNDP, nor shall the Contractor, in any manner whatsoever use the name, emblem or official seal of UNDP or THE United Nations, or any abbreviation of the name of UNDP or United Nations in connection with its business or otherwise.

13.0   CONFIDENTIAL NATURE OF DOCUMENTS AND INFORMATION:

Information and data that is considered proprietary by either Party, and that is delivered or disclosed by one Party ("Discloser") to the other Party ("Recipient") during the course of performance of the Contract, and that is designated as confidential ("Information"), shall be held in confidence by that Party and shall be handled as follows:

13.1   The recipient ("Recipient") of such information shall:

13.1.1   use the same care and discretion to avoid disclosure, publication or dissemination of the Discloser's Information as it uses with its own similar information that it does not wish to disclose, publish or disseminate; and,

13.1.2   use the Discloser's Information solely for the purpose for which it was disclosed.

13.2   Provided that the Recipient has a written agreement with the following persons or entities requiring them to treat the Information confidential in accordance with the Contract and this Article 13, the Recipient may disclose Information to:

13.2.1   any other party with the Discloser's prior written consent; and,

13.2.2   the Recipient's employees, officials, representatives and agents who have a need to know such Information for purposes of performing obligations under the Contract, and employees officials, representatives and agents of any legal entity that it controls, controls it, or with which it is under common control, who have a need to know such Information for purposes of performing obligations under the Contract, provided that, for these purposes a controlled legal entity means:

13.2.2.1 a corporate entity in which the Party owns or otherwise controls, whether directly or indirectly, over fifty percent (50%) of voting shares thereof; or,

13.2.2.2 any entity over which the Party exercises effective managerial control; or,

13.2.2.3 for the UNDP, an affiliated Fund such as UNCDF, UNIFEM and UNV.

13.3   The Contractor may disclose Information to the extent required by law, provided that, subject to and without any waiver of the privileges and immunities of the United Nations, the Contractor will give the UNDP sufficient prior notice of a request for the disclosure of Information in order to allow the UNDP to have a reasonable opportunity to take protective measures or such other action as may be appropriate before any such disclosure is made.

13.4   The UNDP may disclose Information to the extent as required pursuant to the Charter of the UN, resolutions or regulations of the General Assembly, or rules promulgated by the Secretary-General.

13.5   The Recipient shall not be precluded from disclosing Information that is obtained by the Recipient from a third party without restriction, is disclosed by the Discloser to a third party without any obligation of confidentiality, is previously known by the Recipient, or at any time is developed by the Recipient completely independently of any disclosures hereunder.

13.6   These obligations and restrictions of confidentiality shall be effective during the term of the Contract, including any extension thereof, and, unless otherwise provided in the Contract, shall remain effective following any termination of the Contract.

14.0   **FORCE MAJEURE; OTHER CHANGES IN CONDITIONS**

14.1   In the event of and as soon as possible after the occurrence of any cause constituting force majeure, the Contractor shall give notice and full particulars in writing to the UNDP, of such occurrence or change if the Contractor is thereby rendered unable, wholly or in part, to perform its obligations and meet its responsibilities under this Contract. The Contractor shall also notify the UNDP of any other changes in conditions or the occurrence of any event that interferes or threatens to interfere with its performance of this Contract. On receipt of the notice required under this Article, the UNDP shall take such action as, in its sole discretion; it considers to be appropriate or necessary in the circumstances, including the granting to the Contractor of a reasonable extension of time in which to perform its obligations under this Contract.

14.2   If the Contractor is rendered permanently unable, wholly, or in part, by reason of force majeure to perform its obligations and meet its responsibilities under this Contract, the UNDP shall have the right to suspend or terminate this Contract on the same terms and conditions as are provided for in Article 15, "Termination", except that the period of notice shall be seven (7) days instead of thirty (30) days.

14.3   Force majeure as used in this Article means acts of God, war (whether declared or not), invasion, revolution, insurrection, or other acts of a similar nature or force.

14.4   The Contractor acknowledges and agrees that, with respect to any obligations under the Contract that the Contractor must perform in or for any areas in which the UNDP is engaged in, preparing to engage in, or disengaging from any peacekeeping, humanitarian or similar operations, any delays or failure to perform such obligations arising from or relating to harsh conditions within such areas or to any incidents of civil unrest occurring in such areas shall not, in and of itself, constitute force majeure under the Contract..

15.0   **TERMINATION**

15.1   Either party may terminate this Contract for cause, in whole or in part, upon thirty (30) days notice, in writing, to the other party.   The initiation of arbitral proceedings in accordance with Article 16.2 ("Arbitration"), below, shall not be deemed a termination of this Contract.

15.2   UNDP reserves the right to terminate without cause this Contract at any time upon 15 days prior written notice to the Contractor, in which case UNDP shall reimburse the Contractor for all reasonable costs incurred by the Contractor prior to receipt of the notice of termination.

15.3   In the event of any termination by UNDP under this Article, no payment shall be due from UNDP to

the Contractor except for work and services satisfactorily performed in conformity with the express terms of this Contract.

15.4 Should the Contractor be adjudged bankrupt, or be liquidated or become insolvent, or should the Contractor make an assignment for the benefit of its creditors, or should a Receiver be appointed on account of the insolvency of the Contractor, the UNDP may, without prejudice to any other right or remedy it may have under the terms of these conditions, terminate this Contract forthwith. The Contractor shall immediately inform the UNDP of the occurrence of any of the above events.

16.0   SETTLEMENT OF DISPUTES

16.1   Amicable Settlement: The Parties shall use their best efforts to settle amicably any dispute, controversy or claim arising out of this Contract or the breach, termination or invalidity thereof. Where the parties wish to seek such an amicable settlement through conciliation, the conciliation shall take place in accordance with the UNCITRAL Conciliation Rules then obtaining, or according to such other procedure as may be agreed between the parties.

16.2   Arbitration: Any dispute, controversy, or claim between the Parties arising out of the Contract or the breach, termination, or invalidity thereof, unless settled amicably under Article 16.1, above, within sixty (60) days after receipt by one Party of the other Party's written request for such amicable settlement, shall be referred by either Party to arbitration in accordance with the UNCITRAL Arbitration Rules then obtaining. The decisions of the arbitral tribunal shall be based on general principles of international commercial law. For all evidentiary questions, the arbitral tribunal shall be guided by the Supplementary Rules Governing the Presentation and Reception of Evidence in International Commercial Arbitration of the International Bar Association, 28 May 1983 edition. The arbitral tribunal shall be empowered to order the return or destruction of goods or any property, whether tangible or intangible, or of any confidential information provided under the Contract, order the termination of the Contract, or order that any other protective measures be taken with respect to the goods, services or any other property, whether tangible or intangible, or of any confidential information provided under the Contract, as appropriate, all in accordance with the authority of the arbitral tribunal pursuant to Article 26 ("Interim Measures of Protection") and Article 32 ("Form and Effect of the Award") of the UNCITRAL Arbitration Rules. The arbitral tribunal shall have no authority to award punitive damages. In addition, unless otherwise expressly provided in the Contract, the arbitral tribunal shall have no authority to award interest in excess of the London Inter-Bank Offered Rate ("LIBOR") then prevailing, and any such interest shall be simple interest only. The Parties shall be bound by any arbitration award rendered as a result of such arbitration as the final adjudication of any such dispute, controversy, or claim.

17.0   PRIVILEGES AND IMMUNITIES:

Nothing in or relating to this Contract shall be deemed a waiver, express or implied, of any of the privileges and immunities of the United Nations, including its subsidiary organs.

18.0   TAX EXEMPTION

18.1 Section 7 of the Convention on the Privileges and Immunities of the United Nations provides, inter-alia that the United Nations, including its subsidiary organs, is exempt from all direct taxes, except charges for public utility services, and is exempt from customs duties and charges of a similar nature in respect of articles imported or exported for its official use. In the event any governmental authority refuses to recognize the United Nations exemption from such taxes, duties or charges, the Contractor shall immediately consult with the UNDP to determine a mutually acceptable procedure.

18.2 Accordingly, the Contractor authorizes UNDP to deduct from the Contractor's invoice any amount representing such taxes, duties or charges, unless the Contractor has consulted with the UNDP before the payment thereof and the UNDP has, in each instance, specifically authorized the Contractor to pay such taxes, duties or charges under protest. In that event, the Contractor shall provide the UNDP with written evidence

that payment of such taxes, duties or charges has been made and appropriately authorized.

19.0   CHILD LABOUR

19.1   The Contractor represents and warrants that neither it, nor any of its suppliers is engaged in any practice inconsistent with the rights set forth in the Convention on the Rights of the Child, including Article 32 thereof, which, inter alia, requires that a child shall be protected from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical mental, spiritual, moral or social development.

19.2   Any breach of this representation and warranty shall entitle UNDP to terminate this Contract immediately upon   notice to the Contractor, at no cost to UNDP.

20.0   MINES:

20.1   The Contractor represents and warrants that neither it nor any of its suppliers is actively and directly engaged in patent activities, development, assembly, production, trade or manufacture of mines or in such activities in respect of components primarily utilized in the manufacture of Mines. The term "Mines" means those devices defined in Article 2, Paragraphs 1, 4 and 5 of Protocol II annexed to the Convention on Prohibitions and Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects of 1980.

20.2   Any breach of this representation and warranty shall entitle UNDP to terminate this Contract immediately upon notice to the Contractor, without any liability for termination charges or any other liability of any kind of UNDP.

21.0   OBSERVANCE OF THE LAW:

The Contractor shall comply with all laws, ordinances, rules, and regulations bearing upon the performance of its obligations under the terms of this Contract.

22.0   SEXUAL EXPLOITATION:

22.1   The Contractor shall take all appropriate measures to prevent sexual exploitation or abuse of anyone by it or by any of its employees or any other persons who may be engaged by the Contractor to perform any services under the Contract. For these purposes, sexual activity with any person less than eighteen years of age, regardless of any laws relating to consent, shall constitute the sexual exploitation and abuse of such person. In addition, the Contractor shall refrain from, and shall take all appropriate measures to prohibit its employees or other persons engaged by it from, exchanging any money, goods, services, offers of employment or other things of value, for sexual favors or activities, or from engaging in any sexual activities that are exploitive or degrading to any person. The Contractor acknowledges and agrees that the provisions hereof constitute an essential term of the Contract and that any breach of this representation and warranty shall entitle UNDP to terminate the Contract immediately upon notice to the Contractor, without any liability for termination charges or any other liability of any kind.

22.2   The UNDP shall not apply the foregoing standard relating to age in any case in which the Contractor's personnel or any other person who may be engaged by the Contractor to perform any services under the Contract is married to the person less than the age of eighteen years with whom sexual activity has occurred and in which such marriage is recognized as valid under the laws of the country of citizenship of such Contractor's personnel or such other person who may be engaged by the Contractor to perform any services under the Contract.

23.0   SECURITY:

23.1   The Contractor shall:

(a) Put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the services are being provided;

(b) Assume all risks and liabilities related to the Contractor's security, and the full implementation of the security plan.

23.2   UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this contract. Notwithstanding the foregoing, the Contractor shall remain solely responsible for the security of its personnel and for UNDP's property in its custody as set forth in paragraph 4.1 above.

24.0   AUDITS AND INVESTIGATIONS:

24.1   Each invoice paid by UNDP shall be subject to a post-payment audit by auditors, whether internal or external, of UNDP or the authorized agents of the UNDP at any time during the term of the Contract and for a period of three (3) years following the expiration or prior termination of the Contract. The UNDP shall be entitled to a refund from the Contractor for any amounts shown by such audits to have been paid by the UNDP other than in accordance with the terms and conditions of the Contract. Should the audit determine that any funds paid by UNDP have not been used as per contract clauses, the company shall reimburse such funds forthwith. Where the company fails to reimburse such funds, UNDP reserves the right to seek recovery and/or to take any other action as it deems necessary.

24.2   The Contractor acknowledges and agrees that, at anytime, UNDP may conduct investigations relating to any aspect of the Contract, the obligations performed under the Contract, and the operations of the Contractor generally. The right of UNDP to conduct an investigation and the Contractor's obligation to comply with such an investigation shall not lapse upon expiration or prior termination of the Contract. The Contractor shall provide its full and timely cooperation with any such inspections, post-payment audits or investigations. Such cooperation shall include, but shall not be limited to, the Contractor's obligation to make available its personnel and any documentation for such purposes and to grant to UNDP access to the Contractor's premises. The Contractor shall require its agents, including, but not limited to, the Contractor's attorneys, accountants or other advisers, to reasonably cooperate with any inspections, post-payment audits or investigations carried out by UNDP hereunder.

25.0   ANTI-TERRORISM:

25.1   The Contractor agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received under this Contract are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm. This provision must be included in all sub-contracts or sub-agreements entered into under this Contract.

26.0   AUTHORITY TO MODIFY:

Pursuant to the Financial Regulations and Rules of UNDP, only the UNDP Authorized Official possesses the authority to agree on behalf of UNDP to any modification of or change in this Agreement, to a waiver of any of its provisions or to any additional contractual relationship of any kind with the Contractor. Accordingly, no modification or change in this Contract shall be valid and enforceable against UNDP unless provided by an amendment to this Agreement signed by the Contractor and jointly by the UNDP Authorized Official.