Elections ACT

Enhancement of eVACS® for the 2024 ACT Legislative Assembly Election

Operational Concept Description

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eVACS®

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Where used in this Operational Concept Description, eVACS has the same meaning as eVACS®

eVACS® 2024 Upgraded Documentation Tree

- Contract with 2024 Upgrade requirements
- **Operational Concept Description**
- System Specification - Part 1 including 2024 upgrade requirements
- Interface Specification - Setup election
- Installation Manual
- User Manual - Election server
- User Manual - Ballot Viewer
- User Manual - Polling Place server
- User Manual - Telephone Voting server
- Multi Factor Authentication

Document Control Information

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Modifications

Date of this Revision	Version	Comment	Author	Reviewer	Release
2022-12-05	0.1	Initial Draft to reflect enhancements for 2024 based on OCD for 2020	CJB		
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Distribution

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Contents

1. Introduction

1.1 Overview

Electronic voting at selected polling places in the ACT was first introduced at the 2001 Legislative Assembly election, using the electronic voting and counting system known as eVACS®. Minor upgrades and enhancements were implemented for later Legislative Assembly elections, but following a review after the 2016 Legislative Assembly election, eVACS® was enhanced to provide an updated system with increased functionality and features. In particular, eVACS® was moved to a more contemporary platform (using the Ada language and touch screens for voters), with improvements in security, plus inclusion of a secure telephone voting module and incorporation of votes from an online Overseas Electronic voting (OSEV) system (Attachment B).

This Operational Concept Description (OCD) describes at a high level eVACS® as used for the 2020 ACT Legislative Assembly Election [1] and the enhancements for the 2024 Election [3].

1.2 Document Purpose

The purpose of this document is to provide Software Improvements Pty Ltd (SIPL) Project Team with a specification of the requirements for eVACS® 2024. The OCD will form the basis from which changes to eVACS®system requirements will be developed and then reflected, as appropriate, in detailed System Requirements and Interface Requirements Specification (IRS) documents.

1.3 Reference Documents

Documents referenced in this OCD include:

1. Software Improvements Pty Ltd, *Upgrade of eVACS® for the 2020 ACT Legislative Assembly Election Operational Concept Description*, Final version 1.2, December 2020

2. Contract – Electronic Voting and Counting System (eVACS®) Enhancements, Services and Support: ACTGS reference 636238 Final Version 23 July 2019, including the Statement of Requirements at Schedule 2 being a modified version of the Business Requirements Specification;

3. Variation to [2] in relation to the Electronic Voting and Counting System (eVACS) Enhancements, Services and Support, dated 6 July 2022.

1.4 Abbreviations / Terms

Abbreviation or Term	Meaning
ACT	Australian Capital Territory
ACTEC	ACT Electoral Commission (also EACT)
ACTGS	ACT Government Solicitor

Abbreviation or Term	Meaning
Ada	Ada is a structured, statically typed, imperative, and object-oriented high-level computer programming language
B&VI	Blind and Vision Impaired
CJB	Carol Boughton
CVB	Clive Boughton
DEC	Deputy Electoral Commissioner
EACT	Elections ACT
Early voting centre	A location in the ACT where voting is permissible prior to Election day and at which electronic voting is to be provided
eVACS® / eVACS	electronic Voting and Counting System
https	Hypertext Transfer Protocol Secure (HTTPS) refers to the protocol used to send data, specifically the encryption of that data, between a voting client (browser) and a polling place server with eVACS®. software installed.
ICT	Information and Communications Technology
IRS	Interface Requirements Specification
IT	Information Technology
IVR	Interactive Voice Response is a technology that allows telephone users to interact with a computer-operated telephone system through the use of a keypad.
LAN	Local Area Network
NDA	Non Disclosure Agreement
OCD	Operational Concept Description
OSEV	Overseas Electronic Voting
Polling place	Includes early voting centres and locations where voting occurs on Election day and at which electronic voting is to be provided
QR code	A form of 2-dimensional barcode (2D barcode)
RB	Russell Baird
SHA-256	Secure Hash Algorithm 256, a set of cryptographic hash functions
SIPL	Software Improvements Pty Ltd
SPARK	A formally defined computer language based on the Ada language, intended for the development of high integrity software used in systems where predictable and highly reliable operation is essential. Is especially used in safety critical systems.

2.   Concept for eVACS® 2024

4.1 Background

The scope of eVACS® for the 2024 ACT Legislative Assembly Election is essentially the same as that used for the 2020 Election but with the addition of a separate module for viewing ballot details and layout, the introduction of multi-factor authentication on voting servers (polling place and telephone voting), the generation of tables for the Election Statistics Book, together with a number of improvements to the operations of eVACS®. A complete list of changes is provided at Attachment A.

Introduction of the Ballot Viewer module enables the manipulation of a range of variables (e.g. font size, column width, and row height) to enable the best display presentation of each electorate's ballot.

The inclusion of multi-factor authentication on the voting servers provides another level of security to the QR code introduced in 2020 and physical security in place since 2001.

Other improved security features introduced in 2020, are:

- o   Ensured only audited software is used for an election, and the software for different modules is generated by and installed via the election server
- o   Only menu driven functionality is available, with access controlled via official (master) QR codes
- o   Implemented https (with encryption) for all communications between voting clients and the polling place servers
    - ▪   https also used for communications between the telephone voting server and the IVR system
- o   Introduced QR codes for accessing the voting clients at polling places
- o   Vote data encrypted when being transferred from polling places for backup and counting
- o   Using SHA-2 algorithms for encryption
- o   Mandated the use of QR codes on the election server when vote data is being uploaded
- o   Implemented ACT government approved length passwords whenever passwords are used
- o   Used two-factor authentication for telephone voters
- o   Limited via the software the availability of ports on voting server hardware, noting that EACT also physically controlled unused ports.

Voter accessibility was improved via:

- •   adoption of touch screens, and
- •   introduction of telephone voting.

The inclusion into eVACS® of votes from the online Overseas Electronic Voting (OSEV) system was another avenue where ACT Electors overseas at the time of an election have a greater chance of their vote being accepted into the count rather than relying on postal voting.

4.2 Operational policies and constraints

For use in any Legislative Assembly election eVACS® must comply with the relevant legislation and other regulations. Such legislation governs:

- The format of ballots: order and arrangement of columns and rows
- Rotation of candidates on a ballot
- What constitutes a formal vote
- What types of informal votes can be accepted
- Counting procedures (including for telephone and overseas voting)
- Reporting
- Passwords and encryption algorithms that can be used

The following high-level constraints, or non-functional requirements, are existing features of eVACS®.

4.2.1 Constraints on electronic voting

- The system allows input of preferences using a standard telephone style keypad.
- The system ensures that two copies of the electronic voting data are recorded in separate locations within the polling place server immediately a vote is cast and confirmed by the voter.
  - In practice there are Master and Slave stores on each of two hard disks, providing four (4) copies of the votes database
- The system provides for the transfer of electronic voting information (not via the Internet or any publicly accessible network) from voting at early voting centres at the end of each early voting day and polling places at the end of voting on Election day to the vote counting system.
- The system is not connected to any outside network in any of the electronic voting centres and the central scrutiny centre, so that unauthorised access to the system is prevented.
- While the telephone voting server must be connected to the IVR servers supporting telephone connection, the telephone voting server is located in a secure environment and setup such that the only communications are via https to the IVR servers.
- The electronic voting interface incorporates recorded spoken instructions in English broadcast over disposable headphones for sight impaired people and for people with reading difficulties.
- For voters using a touch screen to vote, instructions are provided on each screen in the voting process in multiple languages (currently 12 plus English).

4.2.2 Constraints on electronic vote counting

- Configuration information provides for a complete backup of data relayed to or captured by the system.
- The system is capable of amendment to cater for enhancement and legislation changes.
- Programming code can be independently audited and available to scrutineers for verification and to ensure "what goes in is what comes out".
- Once verified and audits are complete, code is certified and locked before the start of an election so no further changes can be made.

4.3 Description of the system

4.3.1 The operational environment and its characteristics

The operational environment is substantially unchanged from the previous releases of eVACS®, except for the inclusion of two factor authentication on voting servers involving the use of encrypted USBs.

eVACS® requires the following hardware components:

- computers as servers capable of running Linux, includes election server, polling place servers and telephone voting server, and servers running Windows for the telephone voting IVR servers
- Printers (for printing 2D barcodes, scrutiny sheets and reports)
- All-in-one computers with touch screen for voting clients at polling places and the Ballot Viewer
- Telephone-style keypads (for all B&VI voting booths at polling places)
- Scanners with 2D barcode (QR code) reading capability (for voter authentication and for official access to menus on the voting clients, polling place servers, telephone voting server and the election server)
- Headphones (for use by vision-impaired voters)

4.3.2 Major system components

eVACS® includes the following software components:

- Election server for setup, counting and reporting (one instance)
- Electronic voting client (many instances per polling place)
- Electronic voting server (one instance per polling place)
- Electronic telephone voting server (one instance) with IVR server (one instance)
- Ballot viewer to review and adjust display presentation of each ballot (one instance)

The components interact as follows:

- Two bootable USB-FDs are required: one to setup the election server and the second to setup the ballot viewer.
- All information concerning the election is entered into the election server, which is used to generate installations for voting servers (polling place and telephone) connected to the election server via a restricted local area network.
- All instances of the voting (polling) place server are identical.
- Each group of electronic voting clients is installed from the voting server at a polling place via a restricted local area network.
- All instances of the voting client are identical.
- The telephone voting server interacts with the IVR component of the telephone voting system.
- The ballot viewer is setup for a specific election using information required to display ballots that is entered into the election server.
- Encrypted USBs are used for the transfer of vote data from voting servers to the Election Server and for the two factor authentication of voting servers.

4.3.3 Interfaces to external systems or procedures

Paper ballots

A combination of electronic voting and paper ballots is permissible. Each paper ballot should have the number of the rotation printed on it; this number is entered during the paper ballot scanning process.

Paper ballots are put into batches with unique identifiers for scanning. Electronic votes from scanning are uploaded to the eVACS® election server with identifiers based on the batch identifiers.

<u>Telephone voting system</u>

The telephone voting system comprising two operations:

    i)   registering to vote by telephone, and
    ii)   voting via telephone.

The registration process is a manual process in which electors call an EACT service and provide information to establish their identity and that they are on the electoral roll, a private Personal Identification Number (PIN) to be used later when voting, and an email address which is used to send a unique voting token to the elector. The PIN / voting token pair are used by the elector to authenticate themselves as a registered telephone voter. The PIN / voting token pairs are stored in the telephone voting server to support the authentication process.

<u>Overseas Electronic Voting (OSEV) System</u>

While the OSEV system is external to eVACS®, the electronic votes recorded via this system are transferred via encrypted USB-FDs to eVACS® for counting.

4.3.4 Capabilities/functions of eVACS®

4.3.4.1 Integrity of the software and the ballot data

- Software is provided on two bootable USB-FD (one for the Election Server and one for the ballot Viewer)
- Software components are loaded from the Election Server to the Voting Servers (Polling Place Servers and Telephone Voting Server) and from a Polling Place server to the voting clients at a polling place.. The integrity of such software components is enforced: once configured by officials for a particular election, it is not possible to make modifications to, or otherwise tamper with the software.
- The system does **not** allow ballots to be added, modified or deleted, other than by authenticated voters using the electronic voting client or telephone voting.
- The electronic voting system has a form of checking to verify that the voter's intention as expressed by their interaction with the client software is consistent with the vote recorded. **Note**: There is never a relationship between a voter's details and their vote.

4.3.4.2 Election setup

EACT officials provide the following election information to eVACS®:

1. name and date of the election
2. names of the electorates
3. number of seats per electorate
4. details of early voting and election day polling places, including batch numbers for paper ballots
5. details of barcodes (by polling place and electorate codes)
6. details of voting tokens for telephone voting (by electorate codes)
7. information about rotation of candidates on the ballot (Robson Rotation)
8. the form of the ballot papers
9. audio for vision-impaired voters and telephone voters
10. names of the parties
11. names of the candidates, identified by party (if any) or independent, and electorate
12. layout of each ballot (as determined via the ballot viewer)
13. 'keyfile' as part of the two-factor authentication on voting servers

Note: Daylight saving usually falls within the early voting period for an election. The date daylight saving commences in the ACT is available directly from the operating system when the hardware clocks are set to the correct time zone.

Setup procedures take place in two phases:

Phase 1 Election information items 1, 2, 3, 4, 5, 6, 7 and 8 are uploaded to eVACS®. Electorate and polling-place-specific barcodes, including Master Admin barcodes, are generated and exported for sending to a contractor for printing in 2D (QR code) format. Voting tokens are generated and stored ready for incorporation into the telephone voting server installation software, and exported to enable assignment to registered telephone voters.

Phase 2 Election information items 9, 10, 11 and 12 are uploaded to eVACS®. The installation of voting servers can then be undertaken, including the installation for the telephone voting server.

The keyfile is uploaded to the election server as part of the installation for an election server.

4.3.4.3 Electronic voting

The following are key requirements for eVACS®:

- Each elector may vote at most once for the electorate in which they are enrolled.
- The ballot must appear to the voter without bias to a particular candidate or party.
- The ballot must be easily readable.
- Elector details are unknown to eVACS®.
- At the end of each day of early voting and Election day, electronic back-up copies (master and slave) of cumulative voting data held on the polling place server at each electronic polling place and the telephone voting server is to be available.
- Vote data must be transferrable to the vote counting system without being accidentally or deliberately lost, altered, copied or stolen.
- Vote data transfer must occur in a timely manner that ensures that the vote counting system is able to complete preference distribution of all votes cast electronically as soon as practicable on Election night.
- Once verified and audits are complete, code must be certified and locked so no further changes can be made.

There are 5 main screens displayed on the voting client during the electronic voting process:

i)   Welcome screen where a barcode is read to commence a voting session
ii)   Language selection screen
iii)   Main (voting screen) where voters select their candidate choices in order of preference, and can return to change their language of choice
iv)   Confirmation screen - where voters review their choices and either Confirm (with a second reading of their barcode) or return to change their choices
v)   Thank you for voting (Acknowledgement or Acceptance) screen – advising that the voter's vote has been accepted

Other screens are used to display error messages, for informal voting, or if the voter wants to hide their vote while they seek assistance from an official.

With a touch screen voters are able to touch a candidate's name/preference box and use screen buttons, such as 'Clear Choices', 'Undo Last Choice, for changing candidate selections, 'Hide My Vote' and 'Next', 'Go Back' to move between screens, or 'Change Language' to return to the language choice screen.

The setup for B&VI voters remains unchanged, with voters using a keypad to navigate and audio instructions in English to guide the voting process.

4.3.4.4 Scanning of paper ballots

For those electors who vote using a paper ballot the voting procedure and the collection of ballot papers remains unchanged. Similarly, the processes for obtaining electronic vote data from scanning of paper ballots are unchanged.

4.3.4.5 Counting and reporting

The vote counting program produces the required scrutiny sheets for the election. The program calculates preference distribution results using the data stored in the 'committed' votes database, which contains electronic votes (from polling places, telephone voting server and OSEV voting) and votes from scanning of preferences from paper ballots. Progressive reporting, from election night onwards, is possible during the process of scanning ballot papers.

The counting system can export its own vote data and import vote data generated by any electronic voting server (polling place, telephone voting and OSEV voting). Each ballot stored in the votes database is tagged in such a way as to prevent it from being uploaded more than once or counted twice.

The counting system can also be operated when a casual vacancy arises and a countback is required.

The following functional requirements apply to eVACS®:

- An audit trail for election results is essential.
- Election officials are able to test eVACS® under load conditions to the satisfaction of election participants prior to acceptance of the system.
- eVACS® shall be able to generate the election statistical tables published by Elections ACT for each ACT Legislative Assembly Election.

4.3.5 Performance characteristics

The following characteristics apply to eVACS®:

- After the electronic voting client is used to cast a vote, the voting client shall be ready for the next elector within a specified time.
- Display a particular coloured screen for an agreed period of time to visually indicate that an elector has successfully finalised the casting of their vote.
- The voting client Welcome screen shall remain visible for an extended period between voters.

4.3.6 Quality attributes

eVACS® programming code can be independently audited and available to scrutineers for verification and to ensure "what goes in is what comes out".

Excluding the Counting program which uses PostgreSQL stored procedures, as from 2020 eVACS® is written in the Ada language because of its inherent quality features:

- Clear and unambiguous syntax
- Strong typing
- No pointers
- Architecture that groups related entities together
- Object-oriented programming that encapsulates types
- Object construction controls

- Memory management
- Correct startup
- Safe and secure communication
- Concurrency within the language

The SPARK subset of Ada 2012 is currently not used for eVACS®, because the integrity of Ada together with the libraries built on a strong basis of integrity, was deemed adequate for the overall integrity of eVACS®.

4.3.7 Provisions for security and recovery

The following characteristics apply to eVACS®.

- Two backup copies of the electronic voting data are recorded in separate locations within the polling place server immediately after a vote is cast and confirmed by the voter.
- At the end of each day of early voting, electronic back-up copies of voting data from each electronic polling place are generated.
- Electronic voting information is transferred (not via the Internet or any publicly accessible network) from early voting centres and electronic polling places at the end of voting on Election Day to the computer vote counting system.
- The storage and transfer of data operates securely in order to ensure data is not accidentally or deliberately lost, altered, copied or stolen.
- Backup of the election server is supported.
- A secure process is in place to support recovery and replacement of any failed disk in a voting server under strict control of EACT.
- Two factor authentication

4.4 User/affected personnel

The following categories of user are involved in the operation of eVACS®:

- Election officials
- Hardware and technical support
- Polling place officials
- Voters

Scanning operators are involved in scanning paper ballots, tbut have no involvement with eVACS®.

4.5 Support and maintenance

Support for EACT is negotiated on an as required basis.

EACT has included in the upgrade contract maintenance of the system in the year preceding the 2024 election to ensure the latest versions of software are incorporated in preparation for the election.

Such upgrades include:

- Linux Operating System
- PostgreSQL Database
- Ada Language
- Hardware computers/drivers

5. Operational scenarios

Sample interactions with various components of eVACS® are provided at a high level for electronic voting, including touch screen voting, keypad with audio voting and telephone voting. The examples are not intended to capture all possible interactions within each component, but rather act as an aid to understanding the broad scope of the system.

Detailed event-action lists are included in the Software System Specification.

5.1 Electronic voting

The following scenarios illustrates successful electronic voting by a voter. Treatment of error conditions (e.g. unsuccessful read of QR code on e-voting card) is omitted. There are three scenarios:

- Touch screen voting
- Keypad with audio voting
- Telephone voting

5.1.1 Touch screen voting

1. Voter has name marked off on electoral roll, receives e-voting card from polling official, and proceeds to electronic polling booth.
2. Voter sees Welcome message with option to scan e-voting card to commence
3. Voter places e-voting card under scanner. If valid e-voting card, 'select language' screen is displayed.
4. On selecting a language all instructions are displayed in that language and the Main Voting screen is displayed, with the entire ballot paper viewable on screen.
5. If the language is incorrect, selecting CHANGE LANGUAGE displays the select language screen to enable an alternative selection. After selection Main Voting screen is displayed.
6. Voter presses screen for desired first preference candidate. Preference box against Candidate name is highlighted and the number 1 appears in the box.
7. Voter then presses another candidate name for second preference and so on, with the number 2, etc appearing in the box next to the candidates in order chosen.
8. Voter presses NEXT. The vote confirmation screen is displayed, which lists the names and parties (if any) of the previously selected candidates in increasing order of preference.
9. Voter has option to GO BACK to Main Voting screen or to scan e-voting card to cast vote.
10. Voter places e-voting card under barcode reader. If the two barcode reads match, the vote is accepted and the vote acceptance screen is displayed.
11. After a timeout, the Welcome screen reappears.

5.1.2 Keypad with audio voting

1. Voter has name marked off on electoral roll, receives e-voting card (and headphones if required) from polling official, and proceeds to electronic polling booth.
2. Voter puts on headphones (and if necessary seeks assistance to plug in headphones) and hears welcome message and instructions to press any key to find out what it does (played in a loop), with message to scan e-voting card to commence voting.

3. Voter places e-voting card under barcode reader and If valid barcode the group heading where the cursor is randomly located is announced.
4. Voter navigates between groups by selecting the 4 (previous) or 6 (next) key, and up/down to candidates within a group by selecting the 2 (up) or 8(down) key.
5. When voter reaches first choice of candidate, audio announces the name of candidate and group, and when voter presses the SELECT (5) key, the name of candidate, group and the preference number, in this case 'one', are announced.
6. Voter navigates up/down between candidates and previous/next between groups and for each press of the Select key until they have selected all their preferences, numbered in increasing sequential order.
7. When all choices have been selected, the Voter presses the FINISH (#) key. The names of candidates and their groups and preference numbers are then announced in order commencing with their first preference.
8. If selection list is as the voter means to vote, the Voter places their e-voting card under the reader again. If the two barcode reads match, the vote is accepted.
9. Voter receives a message to say their vote has been accepted and thanking them for voting.
10. After a timeout, the welcome message is heard.

5.1.3 Telephone voting

Although the selection and confirmation of candidate preferences is the same for telephone voting as for keypad with audio voting (steps 4 to 9 above), they are repeated below (steps 6 to 11) for completeness.

1. Voter has previously registered for telephone voting, provided a private Personal Identification Number (PIN) and received an email with a unique voting token.
2. Voter calls the telephone voting number and selects 3 to vote (selecting 1 is registering to vote, selecting 2 plays voting instructions).
3. Voter hears message welcoming them to the ACT Legislative Assembly election, and they are asked to enter their PIN followed by their voting token.
4. If PIN and voting token pair match with a pair in the database, audio is played with instructions on how to vote by using the telephone keypad and when they are ready to vote to press 3 (Note: key 3 is used to Hide My Vote in the non B&VI system).
5. Voter presses 3 and audio is played announcing the electorate of the ballot paper and at which group the system is currently located.
6. Voter navigates between groups by selecting the 4 (previous) or 6 (next) key, and up/down to candidates within a group by selecting the 2 (up) or 8 (down) key.
7. When voter reaches first choice of candidate, audio announces the name of candidate and group, and when voter presses the SELECT (5) key, the name of candidate, group and the preference number, in this case 'one', are announced.
8. Voter navigates up/down between candidates and previous/next between groups and for each press of the Select (5) key until they have selected all their preferences, numbered in increasing sequential order.
9. When all choices have been selected, the Voter presses the FINISH (#) key. The names of candidates and their groups and preference number are then announced in order commencing with their first preference.
10. If selection list is as the voter means to vote, the Voter enters their PIN again. If the PIN is a match with that entered at the start of the voting session, the vote is accepted.
11. Voter receives a message to say their vote has been accepted and thanking them for voting.
12. The system then terminates the telephone connection.

Attachment A – Complete list of changes to be implemented in eVACS® for the 2024 ACT Legislative Assembly Election

Identifier (Contract #)	Description
	Setup and installation
1 (47)	Provide error prompts to identify where errors are in the Phase 1 and Phase 2 data uploads
2 (48)	Ensure compliance with new ACT Government passwords
3 (49)	Introduce asterisks in lieu of keystrokes when entering passwords
4 (50)	Introduce muti-factor authentication across the eVACS® system
	The voting process
5 (51)	Consistently and equally display party and candidate names
6 (52)	Allow for ability to customise long party names
7 (53)	Allow for ability to customise long candidate names
8 (54)	Allow for ability to display party name with a 'comma'
9 (55)	Separate language selection from eVACS® Welcome screen
10 (56)	Introduce on main voting screen a 'Change language' button
11 (57)	Set touchscreens to be awake for longer periods
12 (58)	Streamline the process for checking drive failure in a voting server
13 (59)	Include ability to re-print QR codes on polling place server (via menu option 6) when backing up votes
14 (60)	Delete PIN and voting token pair information from secure USB as soon as information is uploaded to Telephone Voting server
	Counting
15 (61)	Show date and time on Election Server screen when last count was made
16 (62)	Ability to re-print scrutiny sheets if an electorate count has already been run
17 (63)	Implement change to scrutiny sheet format

18 (64)	Change the eVACS® Table II scrutiny sheet to highlight in bold text the elected members and their elected position.
19 (65)	Produce scrutiny sheets in excel and PDF formats only.
	Reports
20 (66)	Amend eVACS® LAPPERDS output file (FirstPreference.txt) * (i) to show correct entries where there are zero votes received by candidates; (ii) fix errors in displaying candidate names; (iii) remove entries for electronic votes at static polling places; (iv) address scenarios where there are fewer than 20 votes received at a polling place for any electorate (both paper or electronic); and (v) allow central scrutiny results to be displayed for both paper and electronic votes (fewer than 20 votes for any electorate).
21 (67)	Polling place server error reports to capture the number of incomplete votes as well as the number of resets.
22 (68)	Provision eVACS® to produce the tables required for the election statistics book
23 (69)	Add an additional report to the statistics book to provide only total ACT early voting figures, electronic and paper votes.
24 (70)	Produce break in sequence and length of tables.
	Casual vacancy
25 (71)	Ensure lists of candidates do not roll off the screen when identify the candidates contenting the casual vacancy.
26 (72)	Scrutiny sheet be available as electronic files in excel format.
27 (73)	Casual vacancy scrutiny sheets can be re-printed.

= Contract number as in [3]

* = Details of the LAPPERDS output file are at Attachment C.

Attachment B – Enhancements implemented for 2020

Access passwords – to be accepted a password to meet ACT Government and ASD password security standards.

Audio – .WAV files to be used.

Audio files to be nested for easy identification of individual files by EACT staff

Autonomy – no details of an election to be hard coded into the software. Configuration of the system is to be possible with specific inputs as part of tailoring the system for a particular election. Such tailoring is to continue to be carried out by EACT staff without the need for intervention of SIPL staff.

Ballot layout – the layout of electronic ballots is currently fixed. As part of the setup process, the format of a ballot paper to be customisable for an election, including configuration of:

    i)   font size for candidate names
    ii)   font type, size and placement of text.

Ballot rotations - eVACS® allows for Robson Rotations based on 5 and 7 member electorates, although currently all electorates have only 5 members. Flexibility in having different numbers of members should not be deleted from the system; this includes allowing for input of number of members and the associated rotation sequences.

Barcodes– 1D barcodes used by voters to be replaced with 2D barcodes (QR codes).

Official, or master QR code, to be introduced for use by officials to access new menu for selection of appropriate reset options on voting clients with touch screens.

QR codes able to be prepared as postscript file for provision to contracted printer, as well as ready-for-printing inhouse.

Convert SHA-2 encrypted hash code output to QR code at polling place server to be read as input to election sever when uploading vote data.

Counting – provide for the calculation of vote values rounded down to 6 decimal places.

Counting to be based on Ada 2012 and stored procedures.

Note: Subsequently changed by EACT to rounding **up** to 6 decimal places. Post 2020 election, EACT reverted to rounding **down** to 6 decimal places.

Error codes – error codes to have a direct reference to the exact nature of the error. The nature of error and resolution actions to be detailed in system documentation. Refers to error codes that could be displayed on voting client screens

Hardware – dependencies on particular hardware configuration items to be minimised, for example, the existing eVACS® places requirements on the choice of printers.

Incorporation of touch screens for voting, noting that the use of a setup with a telephone-style keypad and audio instructions will continue to be available at each polling place for B&VI electors.

Unused ports on hardware at polling places to be decommissioned via the operating system.

Polling place and telephone voting servers to be capable of supporting printing of reports, hence the connection of a printer.

The absence of disk readers in modern hardware, challenges the continued use of WORM disks for installation of software on hardware and the transfer of data. Hence, disks to be replaced with secure USB memory sticks that support encryption of contents.

Multiple languages – the interfaces used by voters to be based on Unicode text and available in multiple languages, where the number and specific languages to be used can vary between elections.

Unicode text also to be used for all interfaces used by officials and the reports generated by the system.

Multiple polling place servers – currently the polling place servers, one per electorate, are created by loading a voting server installation created by the election setup server. This manual process is to be replaced with an automatic load process using an isolated LAN connected to the election setup server. As part of the installation process, automatic testing to ensure correct operation of the server is to be implemented.

Identification of the polling place of a particular voting server is to be undertaken after delivery to the polling place.

Multiple voting clients – each polling place has multiple identical voting clients connected via a LAN to the polling place server. The manual process of installing the voting client software onto hardware to be replaced with an automatic load and test process from the polling place server.

Network encryption – eVACS® currently uses http for communications across the LAN at each polling places. Update to https (currently based on TLS1.2) to ensure all these communications are encrypted.

Printing – In addition to scrutiny sheets, new reports to be printed include:

    i)   first preference count for each polling place and telephone voting after close of polling on Election day

    ii)   reports of errors, votes not concluded, languages used, and use of B&VI system printed individually and collectively

    iii)   SHA2 hash in QR code form in association with daily export of votes at polling places

    iv)   Scrutiny sheet preference tracking report (not provided)

Privacy – ensure no potential link between voter and their vote by eliminating any timestamp associated with a vote, shuffling votes within votes database on polling place server and encrypting votes with SHA-2 algorithm. (see also Vote data encryption)

Reports – the format of scrutiny sheets and other generated reports is currently fixed. The reporting software to be flexible enough to support a variety of different types of reports, noting that a number of additional reports are required:

    i)   frequency of types of error code experienced during polling

    ii)   number of electronic votes commenced but not concluded

    iii)   number of occurrences of selection of each language other than English

    iv)   number of occurrences system accessed by B&VI electors

v)   'result of count' (first preference count) undertaken after close of polling on Election day to be printable

vi)   report for import into LAPPERDS (see Appendix B for file format)

vii)   Scrutiny sheet preference tracking report

Scanning of paper ballots – scanning of paper ballots to continue outside of eVACS®. The electronic vote data obtained from scanning to continue to be imported into eVACS®.

Setup procedure – the existing eVACS® setup server comes with certain database tables already created; these tables to be created from data entered during the autonomous election setup procedures.

The change to daylight saving occurs during the early voting period for ACT Legislative Assembly elections. Date of change to be incorporated into required setup election data so that servers can automatically change the date during operations.

To support testing of the system, provide for the resetting of the date and time without needing to adjust the settings in the BIOS.

Software – All existing functionality to be migrated from 'C' to Ada 2012, with SPARK used to 'prove' the integrity of the software.

To that effect, the SPARK language subset of Ada 2012 should be adopted.

Provide for a version of the source code easily publishable on the Elections ACT website, as well providing to an independent code auditing company. (Subsequently code provided only under a Non Disclosure Agreement.

Provision of a transparent and controlled mechanism for recovering data from a failed hard drive.

Telephone voting server – incorporation of a telephone voting module requires inclusion of a telephone voting server. Although similar in purpose to a polling place server, because additional functionality is required, a separate telephone voting server installation and creation via the setup election server is necessary.

Vote data encryption – vote data to be encrypted in the polling place server database using SHA-2 algorithm and when exported.

Vote reconstruction – as part of confirming a vote, the current voting client sends to the voting server not only the list of preferences but also the list of keystrokes used to construct the vote. The voting server then 'reconstructs' the vote using the keystrokes and compares it with the list of preferences. Only if there is a match is the vote confirmed. (A failure to match should never occur.) This checking to be continued for the B&VI booth at the polling centres.

With the introduction of touch screens for voting, where used the list of keystrokes to be replaced with a list of screen touches for comparison with the preferences list.

Vote transfer – vote data to be encrypted for transfer from polling place server to election server, with mandated entry of 'hash code' before upload to election server possible.

Voting – display a particular coloured screen for an agreed period of time to visually indicate that an elector has successfully finalised the casting of their vote.

Preference box and candidate name to be a single touch element on touch screens.

Attachment C: Format of file for upload to LAPPERDS

The file format for the csv file output, to be uploaded to LAPPERDS, is defined by the EACT as follows.

- Format: CSV (comma separated values)
- Header row required (but column names not important)
- Name: FirstPreferences*.csv (the * part is optional and can be anything)
- Columns:

Position	Column heading	Mandatory?	Value/relation
1	PollingPlaceID	mandatory	qryELAPPSPollingPlaces-withpasswords.csv column 1
2	ElectorateID	mandatory	qryELAPPSElectorates.csv column 1
3	CandidateFirstName	mandatory	qryELAPPSCandidates.csv column 1
4	CandidateLastName	mandatory	qryELAPPSCandidates.csv column 2
5	PaperCount	optional	Paper first preference
6	ElectronicCount	optional	Electronic first preference

Clarifications
- It is a single file, but it can be uploaded multiple times.
- Two of the columns (Paper Count and Electronic Count) are optional, and if omitted will be considered zero. However, as with all CSV uploads, when a column value is omitted, the column must still be denoted with a comma.
- The required format for informal votes is to use the word "Informal" in place of both 'CandidateFirstName' and 'CandidateLastName' fields.
- The CSV file is just plain text.

Example content for a test file:

PollingPlaceID,ElectorateID,CandidateFirstName,CandidateLastName,PaperCount,ElectronicCount
103,2,Chris,Bourke,167,73
80,2,Yvette,Berry,320,
66,4,Informal,Informal,71,

Additional requirements:
- All candidates are to be included in the list; any candidate receiving no votes is to have zero in the list.
- Candidate names must be displayed with correct formatting:
  - Dominic DE, LUCA should be Dominic, DE LUCA
  - Yana del, VALLE should be Yana, del VALLE
- Do NOT include an entry for 'electronic votes' for any static polling place i.e. leave electronic votes column blank
- Electronic votes and paper votes re to be treated separately at a polling place so that any less 20 of either paper or electronic are excluded
- For Central Scrutiny electronic and paper votes must be identified separately; all electronic votes (all sources) for an electorate must be amalgamated; first preference counts must be displayed even if total electronic count is under 20.

– END OF DOCUMENT –