Maintaining Democratic Values in e-Voting with eVACS®

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Purpose of electronic election systems

- Improve accuracy
- Faster results
- Reduce costs
- Increase number of people who can vote without assistance - in secret
- Reduce potential for fraud or manipulation of votes
Supporting democratic principles

• Equality (in voting)
• Secrecy
• Security
• Transparency
eVACS®

- Is more than electronic voting
- Able to incorporate non-electronic votes
- Modular
- “Closed system”
Modular

- Set-up election
- Voting
- Entering non-electronic votes
- Counting & Reporting
Voting module

Voting Software  Voting Server  Voting Clients  Voters

Secure transfer of encrypted votes
Entering Non-electronic Votes

Voters → Ballot Papers → Votes scanned or data entered → Enter votes server → Enter votes software → Secure transfer of encrypted votes
Counting & Reporting

Counting software

Counting server

Encrypted votes from enter votes server

Encrypted votes from voting server

Election results
Set-up election

Set-up election server

Non-electronic vote entering software

Voting Software

Counting software
“Closed system”

• Set-up election generates software for specific election
  – Cannot be modified by vendor or election officials
eVACS® Hardware

• Does not require special equipment
• Can have a mixture of off-the-shelf hardware
• In-built flexibility
Equality

• Audio
• Multiple languages
• (Special) keypad
• Use in booth or at a table
• Automatic sequencing of numbered preferences
Secrecy

• Voting screen
• Fits in normal voting booth
• No clues as to how person is voting
  – Keypad navigation
  – Audio via headphones
• Vote ‘can be hidden’
• Voting without assistance
Security - Software

- Automated set-up
- Limited functionality
- Installation reformats
- Barcodes
- Only ‘completed’ votes stored
- Matching keystrokes with voter’s choices
- Isolated LAN
- No votes stored on voting machines
- Votes stored on secure server
- Separate databases
- Downloading
- Log of all activities
Security - Hardware

- Off-the-shelf equipment
- The ROC
Transparency

Level 1 - Code available
Level 2 - Correct operation
Level 3 - Version control
Level 4 - Controlled functionality
Level 5 - Integrity of votes and the electronic audit trail

Any particular level assumes compliance with all lower levels
Level 1 - Code Available

• Source code released
• Independent auditing
• Independent verification
Level 2 - Correct operation

- Ballots
- Voting
- Entering non-electronic votes
- Counting
- Reporting
Level 3 - Version control

• Software used can be shown to be exactly the same that passed levels 1 and 2

• Responsibility
  – Vendor (CM and VC)
  – Officials
  – Auditor
Level 4 - Controlled functionality

• Able to demonstrate
  – Resistant to tampering
  – Empty electronic ballot box
  – Number of votes in electronic ballot box
  – Initial results
  – Secure transfer
Level 5 - Integrity of votes

- None of the recorded votes are lost
- Only completed votes are recorded
- Electronic audit trail
Challenging the results

- Manual election - leads to expensive recounts

- Electronic election - evidence is readily available from the electronic audit trail
Voting is not everything

- Election set-up
- Inclusion of non-electronic votes
- Counting and reporting
- A ‘closed system’
Making every vote count is important

• Reflecting voters intentions
  – Unintentional informal voting
  – Accurate counting

• Long term consistency
  – ensuring democratic election principles continue to apply
Election Integrity

- Privacy during voting
- Authentication of the votes
- Avoidance of coercion
- Empty ballot box at start of polling
- Security of ballots
- One vote per person
Demonstrating Integrity

Minimum potential for error guaranteed if

- Compliance with all 5 levels of transparency
  – most easily achieved with use of high integrity language and application of sound software engineering principles, practices and processes

Maximum potential for (human) error even with

- Observation
- Manual checking
- Transparent process
Verifiability via Electronic Audit Trails

- Design
- Development
- Closed system
- Independent auditing

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\{ \text{Design} \, \text{Development} \, \text{Closed system} \, \text{Independent auditing} \} = \text{eVACS®}
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