

Electronic Voting Implementation Subcommittee

Final Report

During the May 2010 Annual Town Meeting, Wayland voters approved an article proposing the use of electronic voting during the 2011 Annual Town Meeting, accepting an offer of free equipment and services from Option Technology Interactive (OTI), a Florida company; the expected benefits are speed, accuracy, and privacy in voting. The Electronic Voting Implementation Subcommittee was established by Wayland's Moderator in August 2010 with the objective of successfully deploying electronic voting at the 2011 Annual Town Meeting. This Subcommittee held its first meeting on August 17th; its members are Dennis Berry, Blair Davies, Alan Reiss, Jon Sieber, Lois Toombs, Dave Bernstein (Chair), and Peter Gossels (ex officio). There have been two broad areas of focus: logistics, and security.

Preparation

The Subcommittee sought to identify and characterize every activity and task required to deploy electronic voting in the Wayland Middle School's Gymnasium and Auditorium. Site reviews conducted at the Middle School revealed the need for additional electrical power circuits, and identified the optimal locations for equipment and cable runs; the contributions of Patrick Morris and Albie Cincotti were essential to this process. Nothing but vote totals will be permanently recorded, so individual votes will remain private. The Subcommittee's analysis of the logistics of electronic voting is captured in an "Electronic Voting Procedures Handbook" with seven sections:

1. Roles and Responsibilities
2. Pre-Meeting and Pre-Session Tasks
3. In-Session Activities
4. Post-Session and Post-Meeting Tasks
5. Contingencies
6. Electronic Voting Help Desk
7. Responsibilities by role

The Handbook is provided as Appendix A of this report.

Since electronic voting is new to Wayland voters, training was identified as a critical pre-meeting activity. The Subcommittee developed a two-page "How to Vote Electronically" article that was posted on the Town's web site and distributed to local newspapers and online media beginning March 10th. A "How to Vote Electronically" video hosted by Wayland High School student Evan Barber was produced by WayCAM, and became available on-demand beginning March 21; this video was continuously broadcast as a public service announcement between programs. Evan's contribution and the contributions of WayCAM's Jim Mullane and Ken Isaacson are gratefully acknowledged. A one-page summary of "How to Vote Electronically" was developed for distribution at each session; Jon Sieber provided 1000 copies of this document.

To ensure the security and integrity of electronic voting, three members of the Subcommittee executed non-disclosure agreements with OTI that enabled a review of its security measures, and a collaborative approach toward improving those measures. No component of the electronic voting system would be connected to the internet, dramatically reducing the attack surface. Information traversing inter-room cables would be encrypted, and a realtime audit mechanism that uses the voting handset's display was incorporated to detect attempts at tampering.

Electronic Voting Implementation Subcommittee

Final Report

Deployment Notes and Observations

1. Installation

- Inter-room cables installed on Saturday 2011-04-02
- Check-in stations, servers, and system control installed on Wednesday 2011-04-06

2. Full Dress Rehearsal: 7:30 pm on Wednesday 2011-04-06

3. Session 1: 2011-04-07

- Rulers worked well to aid scanning during Check-in
- PowerPoint crashes introduced unexpected delays in starting several votes
- Terminating check-in while voting caused a backup in the check-in area during the initial test votes as new voters were still arriving in significant numbers
- Manual error at one of the check-in stations caused several handsets issued from that station to display “re-vote”
- Transferring the roster from the Check-in stations to the Electronic Voting system took too long
- ~20 handsets failed with “not connected” messages or “low battery” indications
- Voters were instructed to resolve problems by going to the Help desk rather than raising their hands for Teller support
- Voters expressed confusion as to when the “voting Window” was open
- 4 handsets were damaged (presumably by being dropped)
- All handsets were returned
- The Town Clerk was unable to see the “results monitor” to obtain the vote counts
- No voters asked to be seated in the “Manual Counting” zone
- OTI decided to return home on Monday 2011-04-11

4. Recovery and Preparation: 2011-04-08

- OTI eliminated PowerPoint crashes by disabling auto-recovery
- OTI checked all handset batteries and replaced 35

5. Session 2: 2011-04-10

- ~10 Voters saw “re-vote” messages in their handset displays on the initial test vote, and were issued new handsets; this continued in smaller numbers throughout the meeting
- Transferring the roster from the Check-in stations to the Electronic Voting system took too long
- No voters asked to be seated in the “Manual Counting” zone
- All handsets were returned

Electronic Voting Implementation Subcommittee

Final Report

6. Voting Statistics

- There were 37 electronic votes:

Date	Article	Aye	No	Abs	Total	Margin of Victory
2011-04-07	1	300	1		301	99%
	2	254	81	4	339	51%
	3	159	194		353	10%
		285	39		324	76%
	4	344	6	1	351	96%
	5	161	198		359	10%
		259	100		359	44%
	6	279	51		330	69%
		125	219		344	27%
		283	44		327	73%
		82	232		314	48%
		264	38		302	75%
		223	82	1	306	46%
	Adjourn	165	121		286	15%
2011-04-10		168	57	1	226	49%
		224	47	5	276	64%
		204	46	4	254	62%
		176	140	1	317	11%
		166	137	1	304	10%
		267	34		301	77%
		101	203	3	307	33%
		253	27	2	282	80%
		78	206	4	288	44%
		82	192	1	275	40%
		114	155	1	270	15%
		166	84	4	254	32%
		237	14	1	252	88%
		116	131	2	249	6%
		126	97		223	13%
		184	34		218	69%
		89	132		221	19%
		203	10	1	214	90%
		99	116		215	8%
		68	124		192	29%
		165	38		203	63%
	7	158	7	1	166	91%
	Adjourn	115	46		161	43%

- The average electronic vote duration was 63 seconds.
- The voice vote for Article 18 on Monday 2011-04-11 led to a standing-counted vote with a 20% “Margin of Victory”; thus the 10 electronic votes with a “Margin of Victory” of less than 20% are shown highlighted in red font in the above table.

7. Public Hearing: 2011-04-14

- Video displays should show “what we’re voting on” and voting results
- Voting window indicator should be larger and green
- Electronic voting is inefficient for unanimous votes
- Consider closing the voting window after every handset has voted

Electronic Voting Implementation Subcommittee

Final Report

Recommendations

1. Lessons Learned

- Work directly with school personnel to determine exactly when rooms will be available for setup
- Use accurately-scaled diagrams when planning locations of equipment and tables
- Ensure that all handset batteries are fully charged
- Inform Tellers to obtain their handsets from the Help desk before check-in (verified in session 2)
- Provide the Help Desk with pre-activated handsets that can be immediately provided to voters with failed handsets without requiring the voter to check-out and the check-in with the replacement handset, recording the voter's name on a sheet of paper with the replacement handset's code (verified in session 2)
- Place "results monitor" between Moderator and Town Clerk (verified in session 2)
- Provide a visible indication of when the voting window is open (verified with a lamp in session 2)
- Training materials should explain how to power-on a handset
 - in case the voter is issued a handset that is not powered on
 - because handsets taken out of transceiver range for ~15 minutes will automatically power down
- Ensure that handsets display meaningful error messages, e.g. "user not registered"
- Electronic voting makes it more important to make clear the purpose of each vote

2. Essential Requirements of an Electronic Voting System

a. Proposal

- Propose full-service "cost-per-session" pricing parameterized by the maximum number of voters that must be accommodated and the number of Check-in Stations required
- Survive any single-point failure
- Support multi-venue meetings
- Utilize handsets that can
 - Display votes and error messages
 - Operate for at least 6 hours on a fully charged battery
 - Communicate with a transceiver within a 300 foot radius

b. Security

- Deploy without connection to the internet
- Employ VPN to encrypt messages carried over inter-room cables
- While the voting window is open, display each voter's most recent choice on the voter's handset; when the voting window closes, continue to display each voter's most recent choice until the Moderator declares the vote to be final
- Support a **Teller Audit** procedure that can be accomplished in 10 minutes or less
- Support a **Voter Audit** procedure that can be accomplished in 30 minutes or less

Electronic Voting Implementation Subcommittee

Final Report

c. Installation

- Install and test all required electronic voting equipment, including each handset's batteries
- Conduct a **full-dress rehearsal** the day before the first session
- Provision ready-to-issue Teller handsets (for **Teller Audit**)
- Provision ready-to-issue replacement handsets
- Enable the Moderator to specify the duration of the voting window to be 30 seconds or less

d. Check-In

- Maintain a **voting roster** and **voter-handset list** by scanning each voter's Massachusetts state barcode and assigned handset code - in parallel with the Town Meeting voter check-in procedure, and without creating a backup in the check-in process
- Permit voters to check-in after the meeting has started, and to check-in after having checked-out

e. Voting

- In preparation for a vote, be able to update the **voting roster** in 10 seconds or less
- While the voting window is open, display each voter's most recent choice on the voter's handset; when the voting window closes, continue to display each voter's most recent choice until the Moderator declares the vote to be final
- If during the voting window a voter press buttons other than 1, 2, or 3, display "re-vote" in the handset display
- If a voter whose handset is not in the **voting roster** attempts to vote, display "can't vote yet" in the handset display
- If an error occurs when a voter attempts to vote, display "get Help N" in the handset display, where N is an error code; provide a list of all valid error codes and an explanation and recommended corrective action for each
- Generate video output that clearly indicates whether the voting window is open or closed, and if open the time remaining until closure
- Accept manually-counted votes
- Generate video output that shows the final vote, including manually-counted votes (Aye, Nay, Abstain) and percentages (Aye % of total, Nay % of total, Abstain % of total)
- Expunge handset voting records after each vote

f. Check-out

- Recover handsets from voters leaving during a session and remove them from the **voting roster** within 10 minutes
- Recover handsets from voters leaving at the end of a session without creating a backup in voter departure
- Provide a list of all voters that did not return their assigned handset

g. De-installation

- Remove all electronic voting equipment

3. Next Steps (post-ELVIS)

- a. Funding
- b. Usage

Electronic Voting Implementation Subcommittee Final Report

Wayland Electronic Voting Implementation Committee

Dave Bernstein, Chair

Dennis Berry

Blair Davies

Alan Reiss

Jon Sieber

Lois Toombs