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Election Assistance Commission

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# The Future of Voting in California: The People, the Equipment, the Cost.

**“Taking Stock of the Post-HAVA Voting System and Election Administration Environment – *The U.S. Election Assistance Commission Certification Program*”**

California Secretary of State Public Meeting

February 8, 2010      Sacramento, CA



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## EAC Certified Voting Systems



| <u>Manufacturer</u> | <u>Voting System (Name/Version)</u> | <u>Testing Standard</u> | <u>VSTL</u> | <u>Testing Application</u> | <u>Test Plans (Status/Current Version/Date)</u>   | <u>Test Reports (Status/Current Version/Date)</u>  | <u>Certification Status</u>   |
|---------------------|-------------------------------------|-------------------------|-------------|----------------------------|---|--|---|
| ES&S                | Unity 3.2.0.0                       | 2002 VSS                | iBeta       | 3/19/2007                  | Approved - <a href="#">Version 2.0</a> (iBeta) - 4/03/2009  | Approved - <a href="#">Version 2.0</a> - 7/16/2009 | <b>Certified Voting System – Final Decision</b> 7/21/2009<br><a href="#">Certificate of Conformance</a><br><a href="#">Initial Decision on Certification</a> made on 7/20/2009  |
| MicroVote           | EMS Ver. 4.0                        | 2005 VVSG               | iBeta       | 7/17/2007                  | Approved - <a href="#">Version 3.0</a> (updated version 4.0 submitted with Test Report V.4.0) - 6/25/2008 | Approved - <a href="#">Version 5.0</a> - 3/02/2009 | <b>Certified Voting System – Final Decision</b> 2/6/2009<br><a href="#">Certificate of Conformance</a><br><a href="#">Initial Decision on Certification</a> made on 12/31/2008  |
| Premier (Diebold)   | Assure 1.2                          | 2002 VSS                | iBeta       | 4/5/2007                   | Approved - <a href="#">Version 2.0</a> (iBeta) - 4/06/2009  | Approved - <a href="#">Version 3.0</a> - 8/7/2009  | <b>Certified Voting System – Final Decision</b> 8/6/2009<br><a href="#">Certificate of Conformance</a><br><a href="#">Initial Decision on Certification</a> made on 8/3/2009    |
| Unisyn              | OpenElect Voting System             | 2005 VVSG               | Wyle        | 6/3/2008                   | Approved - <a href="#">Revision B</a> - 8/12/2009   | Approved - <a href="#">Revision B</a> - 1/16/2010  | <b>Certified Voting System – Final Decision</b> 1/12/2010<br><a href="#">Certificate of Conformance</a><br><a href="#">Initial Decision on Certification</a> made on 01/11/2010 |



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## EAC Testing Process - (in an ideal world)

1. Application for Testing
2. Creation, submission, and review of Test Plan
3. Creation, submission and review of test cases
4. Testing of the Voting System
5. Creation, submission and review of the Test Report

...although sometimes it goes more like [this](#).





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## Certification Challenges before 2010

- Time to certify voting systems
- Cost to certify voting systems
- Testing and Review Inconsistencies
- VSTL efficiency

These challenges have largely been addressed by the EAC.



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## Certification Challenges After 2010

- Commercial Off-the-Shelf (COTS) components
- Quality Assurance



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## COTS

**Definition:** The 2005 EAC Voluntary Voting System Guidelines (VVSG) define COTS as “Commercial, readily available hardware devices (such as card readers, printers or personal computers) or software products (such as operating systems, programming language compilers, or database management systems).”

### The Issue

Although not limited to one specific voting system manufacturer, the EAC’s recent experience during the latter stages of their certification effort with Elections Systems and Software (ES&S) are used to illustrate the issue.

The ES&S Unity 3.2 voting system certified by the EAC on July 21, 2009 contains in its system configuration several Dell COTS PCs. The specific models listed in the certification documentation are the Dell Latitude 600 Laptop, and the Dell GX 260 and GX 270 desktop computers.

EAC research found that Dell no longer manufactures any of the three PCs certified with the Unity 3.2 voting system.



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## COTS (cont.)

Because of the volatility of the commercial COTS PC market, the EAC is concerned that:

1. The utility of an EAC certification will be questioned if we certify systems that are literally unable to be built as certified.
2. Jurisdictions purchasing COTS PCS meeting the minimum specifications outlined by the manufacturer, but not tested with the system during EAC certification, may be faced with compatibility issues when an unknown COTS product is integrated into the "certified" voting system.

To mitigate the potential negative impact of COTS use, DOD systems designers and project managers have implemented procedures such as:

- Market research, surveillance and investigation of commercial products and trends.
- Continuous assessments of the maintainability of COTS products.
- Developing close relationships with COTS manufacturers to better understand their product roadmap to choose products at the beginning of their lifecycle and plan for future upgrades.
- Work with manufacturers willing to implement design freezes on some COTS products to increase their lifecycle from the 12-18 month norm to 3 to 5 years.



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## COTS (cont.)

The EAC has a number of options may be worth exploring that would mitigate potential obsolescence and incompatibility issues while keeping testing and certification costs to a minimum. EAC practices in this area might include:

- Permitting manufacturers to certify a voting system with the specific model of PC used in system testing. Allow those models to be used in the future with more memory and larger hard drives (but not less) and remain EAC certified.
- For other models of PCs from the same vendor (Dell, HP, etc.) a new model might be added to the certified voting system based on a letter from the PC manufacturer warranting that the new model is equivalent to the model tested and does not add or remove functionality. The VSTL would then perform a simple specification review to confirm the accuracy of the letter.
- PCs from other vendors that are equivalent to the PC tested with the voting system could be added to the certified system based on:
  - A declaration of conformance from the PC vendor that the PC meets the same requirements as the PC tested. (Done in other industries)
  - A regression test by the VSTL running 1 election on the PC.



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## Quality Management/Assurance

What do we mean by “quality management?”

- The International Organization for Standardization (ISO) defines quality as the totality of characteristics of an entity that bear on its ability to satisfy **stated** or **implied** needs.
- Other experts define quality based on
  - conformance to requirements: meeting written specifications ( in our case, VVSG)
  - fitness for use: ensuring a product can be used as it was intended (Can it be used by election officials & does it count votes accurately?)



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## Quality Management/Assurance

Until the development of the EAC Certification program, quality assurance was confined to whatever practices were followed by the voting system manufacturer.

The EAC program monitors quality in EAC certified systems by:

1. Conducting manufacturing site reviews
2. Fielded system reviews
3. Receipt of anomaly reports from the manufacturers and from the field



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## Quality Management/Assurance

Modern quality management is a **process** that must be embraced by the manufacturer to be really successful.

A successful Quality management process for voting systems must include:

**Quality planning:** identifying which quality standards are relevant to the voting system development and how to satisfy them

**Quality assurance:** evaluating overall voting system performance to ensure the project will satisfy the relevant quality standards

**Quality control:** monitoring voting system performance to ensure that they comply with the relevant quality standards while identifying ways to improve overall quality



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## Quality Management/Assurance

Modern quality management:

- requires customer satisfaction
- prefers prevention to inspection
- recognizes management responsibility for quality



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## Quality Management/Assurance

Quality does come with a cost....

- The cost of quality is
  - the cost of conformance or delivering products that meet requirements and fitness for use
  - the cost of nonconformance or taking responsibility for failing to meeting quality expectations



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## Quality Management/Assurance

### Costs Per Hour of Downtime Caused by Software Defects

| <b>Business</b>                               | <b>Cost per Hour Downtime</b> |
|---|-------------------------------|
| Automated teller machines (medium-sized bank) | \$14,500                      |
| Package shipping service                      | \$28,250                      |
| Telephone ticket sales                        | \$69,000                      |
| Catalog sales center                          | \$90,000                      |
| Airline reservation center (small airline)    | \$89,500                      |

What is the “cost” of downtime for a voting system? How is it measured?



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## Quality Management/Assurance

Prof. Duane Truex of FIU has identified 5 cost categories related to quality:

- **Prevention cost:** the cost of planning and executing a project so it is error-free or within an acceptable error range
- **Appraisal cost:** the cost of evaluating processes and their outputs to ensure quality
- **Internal failure cost:** cost incurred to correct an identified defect before the customer receives the product
- **External failure cost:** cost that relates to all errors not detected and corrected before delivery to the customer
- **Measurement and test equipment costs:** capital cost of equipment used to perform prevention and appraisal activities



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## Quality Management/Assurance

- Quality assurance costs money.
- In these lean budgetary times, where will the money come from to improve the quality of our voting systems???



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