EAC Technical Guidelines Development Committee
Subcommittee on Core Requirements and Testing

Merle S. King
Center for Election Systems
Kennesaw, Georgia
mking@kennesaw.edu

Thank you for the opportunity to address the Committee on Core Requirements and Testing.

My name is Merle King. As Chair of the Department of Computer Science and Information Systems at Kennesaw State University and Executive Director of the Georgia Center for Election Systems, I am both an academician and practitioner. My department also houses the Center for Information Security Education, and our institution is an NSA Center of Academic Excellence.

My remarks today assume the context of Georgia; our laws and practices. I will leave it to members of the committee to generalize my comments for application to the national case, if and where appropriate.

Before addressing the questions posed in the solicitation to attend this meeting, I would like to share some observations of a relative newcomer to elections.

1. There are many laws that govern the practice of elections and other laws that apply to the design and development of computer systems. The most important law in both arenas is the Law of Unintended Consequences.
2. Many technologists are comfortable with the use of analogies as models to explain and predict behavior of systems. Be cautious in the use of analogous reasoning when applied to elections. Elections are not like ATM machines. They are not like retail outlets. Elections are like…elections.
3. Election officials for the most part are incrementalists. Revolutionary approaches are rarely preferred over evolutionary approaches.
4. Election officials are pragmatists. A great deal of their work deals with exception handling. The pursuit of better systems has greater appeal than the pursuit of perfect systems.
5. There is no down time in elections. Not only do elections occur year round, the preparation for elections requires the equipment to be in frequent use, but even more frequent suspension. With requirements to distribute absentee ballots prior to the election, L&A, the election itself, then requirements to hold systems in abeyance through recounts, then start the cycle over for runoffs, any changes to an existing system must be shoehorned into this relentless cycle.
6. Understand the business models that prevail in this industry.
7. Understand the autonomy that jurisdictions possess.

Question 1 & 2

1a. What are the Functional Requirements of the Overall Voting System?

Ultimately, the functionality of a voting system is determined by evaluating the system's ability to implement the myriad federal, state and local laws, rules and regulations that apply to the jurisdiction. Functional Requirements in Georgia means that the system is capable of implementing the requirements of Georgia's election code.

The functional requirements of our current voting system was articulated in the 2002 RFP for a statewide voting system that resulting in the current deployment of over 25,000 DRE units with supporting paper absentee ballot optical scan units, election management system software and encoders. Those requirements exist as a separate document (65 pages). It contains many of the obvious requirements:

- FEC VSS Compliance and Qualification
- State of Georgia Certification
- Accuracy requirements
- Accommodate write-in votes
- Permit recounts
- Backup and recovery at the precinct, county and state levels
- Detailed print record of each ballot cast
- Tamper evident controls
- Prevent modifications of voter's vote after the ballot is cast
- Allow voters to review ballot before casting
- Support Provisional and Challenged ballots
- Support Absentee and Early Voting
- Alert voters to Undervotes and prohibit Overvotes
- Provide for accurate tabulation and reports
- Protect the secrecy of the vote
- Provide comprehensive Election Management Systems
- Provide an audit log to permit the audit of all operations
- Provide features to enhance voter comfort (fonts, colors, magnification)
- Provide features to ensure Disabled Voter full and independent access
- Transport and storage reasonably accomplished
- Software interface intuitive, learnable and teachable to poll workers and voters
- Training and education for election officials
- Documentation
- Warranty

Since our initial purchase and deployment of DREs, we have identified additional requirements for future acquisitions:

- Forward compatibility of existing products to future products
- Disclosure of manufacturing supply chain

- Non-disclosure agreements regarding source code and other trade secrets
- Integration with voter registration systems
- Expanded flexibility in report generation
- Power consumption and status indicators
- Improved methods for securing deployed units
- Maintenance documentation and training
- Sustainability criteria can differ from purchase criteria
- Explore printer relationships with and without the primary vendor

An acceptable practice in the formation of standards is to divorce the definition of the standard from its implementation. In theory this enables developers to consider optimal goals of the system without being limited by constraints and it optimizes the flexibility of the implementers in creating solutions. I am not sure this approach is a good fit to voting systems. The proliferation of proposed standards and performance requirements of voting systems that are routinely rejected by the election community, argues for less abstraction and more pragmatism. I would urge any standards developing group to consider models that concurrently consider constraints as well as requirements.

Testing of voting systems should be a primary responsibility of the jurisdiction. This issue is addressed by another committee, but it is also an aspect of requirements. Uniformity of systems at the Federal level of certification would argue for the efficiency of rigorous testing at that level. The variety of requirements that are unique to a jurisdiction is subject to historical precedent, state legislation, and local requirements. In the 2002 rollout, we failed over 1,000 pieces of equipment. These failures occurred for a variety of reasons ranging from boot failures to calibration errors to cracked cases.

The question also included people and processes in its scope. In Georgia we require election officials to complete 64 hours of training (with competency testing) that includes law, ethics, procedures, and knowledge of the DREs and the election management system. This creates a uniformity of knowledge throughout the counties, and provides us with valuable information regarding potential trouble spots.

Question 3

Can compensatory controls in Procedures and Processes overcome hardware and software deficiencies?

Compensatory controls can address some deficiencies in hardware and software design. It can be argued that the defense of the voting systems is best accomplished by an overlapping series of controls that are protective, detective and corrective.

Protective controls are those that prevent system anomalies. They are generally expensive to design and create, and problematic to implement. Protective controls should not be designed by those responsible for their implementation. They require

perfect knowledge of the future operating environment of the system. An example would be a hardened storage facility for DRE units. Training is another example of a protective control.

Detective controls are those that detect anomalies and direct the system to related corrective controls that return the system to an operational state. Detective controls are less expensive to design and implement.

In Georgia, our approach has been to focus on detective controls. We think of voting system controls as being tamper evident rather than tamper proof. Once we have detected an anomaly, the corrective control is implemented by the appropriate election official or by action of the State Election Board. An example would be the structured process of proofreading of a ballot that detects misspelling or other typographical errors.

Question 4

Should the overall System Requirements be independent of the Hardware and Software?

If not, why not?

There are core system requirements that will be universal to all voting systems. The complexity and lack of transparency of DREs requires additional considerations. This is especially true in the areas of training and testing.

Most of those here are familiar with the Georgia model. I would be happy to answer any questions regarding our implementation of a statewide, uniform voting system.