



Committee on Communicatios and Information Policy (CCIP)
Institute of Electrical and Electronics Engineers
1828 L St., NM, Suite 1202, Washington DC, 20036
Reply to both: drudolph@ieee.org, akm3@Cornell.edu

DRAFT for Comment: Position Statement (03-29-01):

A Systems Engineering Approach to U.S. Voting Technology Systems

The core technologies that enabled the US to put a man on the moon include systems engineering, quality assurance, human usability engineering, and information security technologies. The Institute of Electrical and Electronics Engineers - United States of America (IEEE-USA) strongly recommends that these same core technologies be used to develop and certify our voting processes and systems to a similar level of quality. In turn, their use implies a number of **Imperatives** and suggests a number of early **Insights**.

Imperatives: the voting systems of all states must be required through national legislation to meet the best-practices, performance standards of modern systems engineering. Next, among the most important precepts of usability engineering are that user-error is a system failure, and failure of multiple users to "follow instructions" is caused either by improper instructions or by improper system design. Both must be avoided.

Imperative: maintenance of voting privacy is absolutely essential. **Insights:** this requirement forecloses the use of the Internet for balloting, but not necessarily for support of voting administration where it may indeed be useful.

Imperatives: as a general rule, the interests of reliability, integrity, and security are better served by simplicity, than by complexity in the features of systems. This simplicity must extend also to those with visual and other impacting disabilities. Further, any technology adopted must allow for correction of clear voter errors at time of voting.

Insights: for those with visual impairment an oral feedback, via a headset, of the vote when entered may be appropriate. In fact, this or another form of immediate ballot feedback should be available to all voters.

Imperatives: the performance standards must also allow for manual counting of ballots as both a check on the integrity of electronic or other types of systems, and as a backup against system failure. **Insight:** research to date suggests that this is best achieved by creation of a paper record of each ballot at an appropriate stage of the balloting process.

Imperatives: the National Institutes of Standards and Technology (NIST) or an equivalent body must be given a permanent dual role: first, act as the expert body ensuring that all voting systems used by any jurisdiction is assessed and certified or not certified, against the nationally-mandated performance standards; and, second, ensure that, once created, nationally mandated standards are maintained current by incorporating changes in requirements appropriate to changing circumstances. Then, all voting systems of each state must be required to satisfy these evolving sets of systems engineering and quality assurance criteria. **Insight:** failure by any state to satisfy these sets of systems engineering and quality assurance performance standards, must be recognized as a violation of the constitutional requirement for “equal protection of laws” in the voting process.

Imperative: to achieve the agreed goals, each state must be required to ensure that all of its jurisdictions use systems certified by the oversight-agency. **Insight:** should any jurisdiction in a state fail to demonstrate certification under the nationally-mandated criteria, that entire state must be required to use hand-counted, paper ballots until the whole state is compliant.

Insights: it must be recognized that today there are existing standards for voting systems, including those promulgated by the Federal Election Commission (FEC). The latter include a process for qualifying systems as complying with its standards. The FEC standards, however, fall far short of the above stated goals. In the areas the FEC standards do address, they are out of date. There is no mandate that all jurisdictions in a state use only qualified systems. There is no process prohibiting use of systems that have been shown to be unreliable. In fact, there is no mandate at all; the system is voluntary. Further, we are informed that the FEC’s request for funding for revisions in both its voting systems, and its certification process, has been denied.

Imperative: an alternate approach must be instituted.