



STATEMENT ON ELECTION PROCESS QUALITY ISSUES
American Society for Quality
December 14, 2000

With a presidential election just behind us, the true impact of elections process errors and the importance of continuous improvement to the process have become apparent to Americans, perhaps for the first time. The voting debacle in Florida has shed light on some fundamental and very serious deficiencies in our national election processes—deficiencies that are clearly quality problems. Therefore, the concepts, methods, and tools of quality management can and must provide the framework and basis for improvement.

The problem

All measuring systems have uncertainties and inherent levels of error. Among the five basic types of voting methods used in the United States (paper ballot, punch card, optical scan, lever machine, and electronic), the punch card systems have relatively high rates of built-in error. It came as a shock to many people to learn that punch card systems have an error rate of up to 5%—in other words, as many as one vote out of every 20 is never counted using these systems.

Across the state of Florida, nearly 4% of punch-card ballots were rejected in the recent election because the machines read them as blank or invalid. By contrast, the more modern, optical scanning systems in use in certain Florida polling precincts rejected only about 1.4% of the votes cast. At a time when many commercial organizations are striving for six-sigma quality levels, a ballot reject rate of 5% seems outrageously high, and even 1.4% should be viewed as unacceptable.

While much of the focus has been on Florida, the problems are not limited to that state. Nationwide, somewhere between 2.1 million and 2.8 million ballots were not counted in the presidential race, according to Curtis Gans, director of the Committee for the Study of the American Electorate.

Error rates built into the system mean that in a close race such as this, our voting systems lack the precision necessary to permit the clear, unambiguous determination of an election winner. We simply cannot measure that closely with our current systems. Mathematics professor John Allen Paulos of Temple University has likened it to “measuring bacteria with a yardstick.” We really do not know and cannot know

what the actual vote count was in the presidential election. A statewide vote difference in Florida of roughly 500 votes, or eight one-thousandths of a percent, is considerably smaller than the cumulative margin of error for all of the opportunities for error related to voting and vote counting. In Florida, then, the most meaningful way to describe the outcome is that it is a tie.

Sources of error

First and foremost, if an election is held to determine the will of the people, then the largest opportunity for error is rooted in the fact that approximately half of all eligible voters fail to vote. Without knowing who these people are there is no way to determine if they are a representative sample of all voters or if they represent one or more specific positions, and therefore the actual will of the people cannot be known. Turnout nationwide in the recent presidential election was about 51%, which means the winner was supported by less than 25% of the eligible voters.

The next area where errors can and do occur is the voting process. Because there is no national standard procedure, the likelihood of errors varies from jurisdiction to jurisdiction. According to Doug Lewis, the Director of the Voting Systems Secretariat, there are between 4000 and 5000 jurisdictions often with more than a hundred precincts each. Lewis said that while there are rigid processes in place in most jurisdictions to ensure the quality of the system, factors such as the punch card technology used in Palm Beach County, Florida, which is 40 years old, has numerous possibilities for error. For example, the cards could be too thick or the die used to punch out the chads (the little pieces that get punched out of the punch-card type ballot) could be inadequate in terms of shape or sharpness.

Another obvious opportunity for errors is the now infamous Palm Beach County butterfly ballot. If Murphy's law is a reasonable test of common sense in predicting errors (what can go wrong will go wrong) then this ballot, while essentially reasonable, also enabled a high number of miss hits or voting errors. Contributing to this sort of human error are environmental factors such as poor eyesight (especially prevalent with increasing age), poor lighting or inconsistent lighting in polling places, distracted people rushing to vote before work or while on their way home and needing to pick up children from child care, or feeling rushed because of long lines waiting to vote.

Another area for potential errors is in the counting of ballots. The example of the punch card ballots became front-page news, with elections staff holding ballots up to the light to determine the intent of individual voters. Mr. Lewis from the Voting Systems Secretariat, while believing that machine counting is accurate, stated again that the technology is not perfect. The cards could have been too thick and not allowed the chad to fully detach, or if the cards were not stored in the proper environmental conditions they

could have become wet or been exposed to too much humidity and therefore not counted accurately by the machines.

Concerning the first of these opportunities for error in determining the will of the people—low voter turnout—experience from the state of Oregon provides a good example of a process improvement. Voting in Oregon is done by mail. While the national average voter turnout in this 2000 presidential election was about 51%, in Oregon voter turnout was about 80%. The bottom line is that voter turnout can be improved.

The punch card technology used in Palm Beach County and in about a third of all voting precincts nationwide is more than 40 years old. The ballots used with optical scanning technology are not only easier to mark but are more accurate in the counting process. There are emerging electronic technologies that can reduce error rates further; however, these may be problematic in terms of security and in lacking an audit trail should a recount become necessary.

Ballots like the Palm Beach County butterfly ballot could be improved by applying the concepts of *poka-yoke* (mistake proofing) or signal detection theory to design experiments that accommodate voters of all ages and abilities. If every vote counts, and close elections make it absolutely clear that every vote should be counted, then it behooves us to take the time to make the voting process as mistake-proof as possible. It is not enough that most people had no problem when we can make it possible for all people to have no problem. As our population continues to get older it is critical that we make every effort to accommodate the disadvantages typical with increasing age.

Don't fix the blame—fix the process

As with most things, the system and its various processes, rather than people, contain the root causes for error, so it is usually nonproductive to look for someone to blame. Rather, it is important to ask how we can change those systems and processes to reduce or eliminate the opportunities for voting and counting errors. While it is not our place or intent to identify the specific improvements that should ultimately take place, it is clear that the application of quality concepts, methods, and tools can and should lead to improvements in all aspects of the elections process. Such an approach suggests several steps to take.

- 1.) ***Define what constitutes quality in the voting process.*** A useful starting point for improvement in our national voting process is to achieve consensus about the essential properties of a good election system and voting process. Consider the following four elements:
 - Accuracy: Votes must be recorded as intended by the voter, and it must be impossible to remove valid votes from an election tally.

- Democracy: Eligible voters can vote once and only once, while ineligible voters are barred from placing ballots.
 - Privacy: Votes should not be associated with individuals who cast the ballots and voters should not be able to show any other party the way they cast their vote.
 - Verifiability: Voters should be able to independently confirm that their votes were recorded correctly and a neutral party should be able to verify the total tally of election results.
- 2.) ***Seek relevant and reliable data.*** Determine what we know about current voting processes, about their process capability, and about problems with the processes. Valid, reliable data can cut through partisan political rhetoric and emotion-based appeals.
 - 3.) ***Examine all processes systemically.*** If the purpose of voting and tabulating votes is to accurately reflect the “will of the people,” then we must reduce errors from each step of the process rather than focusing just on ballots or just on vote counting technology.
 - 4.) ***Standardize election processes wherever possible.*** Standardization is an obvious improvement from a professional quality perspective. Nevertheless, we realize that there are a number of factors that would deter standardization, all of which will have to be considered in the forthcoming national debate over how to fix the system. For example, the costs for replacing obsolete voting technology are carried by local governments, which often do not have resources adequate to the task. And if it comes to a choice between fixing roads or replacing voting machinery, many municipalities will choose to make do with the existing technology. Some communities are less able to bear the costs. Should the votes of their citizens count for less? In addition, political barriers related to local control over election procedures and technologies will not be easily overcome, nor can they be ignored. Finally there is the question of how much standardization is actually desirable. At one time, punch-card voting machines were considered state-of-the-art, but to have mandated their use would have precluded or slowed the introduction of more reliable technologies. The competitive pressures that force continuous improvement in consumer products, such as television sets, for example, do not exist in the limited markets for public-sector technologies such as voting machines. Perhaps the goal should be uniform reliability of outcomes without dictating what technologies will be used to achieve that level of quality.
 - 5.) ***Develop the will to improve continuously and to apply needed resources to the task.***

A recommendation from the nation’s quality professionals

In order to accomplish these five objectives, the American Society for Quality recommends the creation of a nationwide, nonpartisan commission to examine problems of our current voting processes and to develop a just process for collecting, recording, counting, and reporting votes for national elections. We should develop the national will to ensure that this process will be fairly applied throughout every electoral district,

independent of the financial capability of that district, and make sure that our nation remains the world's role model for democratic governance. Because of the nature of the problems, the commission must include input from acknowledged experts in quality improvement who can apply knowledge of quality management and statistical thinking to the challenge of fixing our elections processes.

If the voice of the people is to be heard accurately, errors must be eliminated from all aspects of the voting process, and the best available path to removing those errors is through the application of the concepts, methods, and tools of quality improvement.

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611 East Wisconsin Avenue
P.O. Box 3005
Milwaukee, Wisconsin 53201-3005