The NC Coalition for Verified Voting
Joyce McCloy, Director
212 Evergreen Drive
Winston-Salem, North Carolina, 27106
www.ncvoter.net

North Carolina State Board of Elections
506 North Harrington St,
Raleigh, NC 27603

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Statewide Instant Runoff Voting for NC Court of Appeals

To the Members of the State Board of Elections:
Thank you for this opportunity to comment on the board's meeting today.

The State Board of Elections members are meeting to hold another vote either for or against the use an excel software macros to tally the statewide IRV contest for NC Court of Appeals.

Much rides on the results of this election. There can only be one vote, and that is "to follow the law", just as Chairman Larry Leake said in the last SBoE meeting on Sept 29, 2010.

There is no certified software to tally IRV. The voting vendor says: *"IRV is not an approved function at the federal or state level of current ES&S software, firmware or hardware. Subsequently, we will work at the direction of the SBE and counties to assist but cannot be held responsible for issues as a result of IRV.."*.~ Letter from PrintElect to the North Carolina State Board of Elections, dated August 31, 2010.[1]

North Carolina law requires voting systems to use either 1) federally certified voting systems, or 2) hand counted paper ballots. For touchscreen voting systems, the only legal tallying method for the IRV contest is a hand to eye count of the voter verified paper trail, also called VVPAT or RTAL Testing done by consultants or University professors is no substitute for the federal certification.

Consequences if the State Board of Elections votes to use the illegal excel software workaround:

- Use of illegal tallying methods will invite lawsuits from any of the 13 candidates in the IRV contest for NC Court of Appeals, as well as from any voter in with standing.
- The taxpayers will foot the bill if an election fiasco results, as the voting vendor cannot be held responsible for the use of illegal software the State Board of Elections has allowed.
- The use of excel spreadsheets invites error and will have no transparency for the voters.
- Without a hand to eye count, only an audit could provide any measure of transparency, but no one knows yet how to effectively audit a statewide IRV contest.
- The State Board of Elections would lose its creditability.

[1] Letter from PrintElect to the North Carolina State Board of Elections, dated August 31, 2010
http://www.ncvoter.net/downloads/PrintElectLetterAugust31_2010_not_legal

How can the state prove, to those who have standing, to all voters - that the automation is working properly and not committing fraud?

The Greensboro News and Record said

> *"An election train wreck may be unavoidable this November, but it shouldn't be allowed to happen again."* [2]

The State Board of Elections proposes to use an uncertified method of vote tabulation with DRE machines that allows for an "electronic sort" using uncertified software that requires five pages of over 100 single spaced instructions**.** There are over 100 steps in the process and one single keystroke error would change the outcome of the election, and audit data is deleted as steps are performed. Experts warn that this spreadsheet tallying method is error prone, lacks an audit trail, and is not good enough for elections. (See next page for expert opinion)

A widely-cited paper finds that around 90% of spreadsheets used in business organizations contained some error or another[3], and also reported that many developers and organizations are overconfident about the accuracy of their spreadsheet calculations.

Excel is a complex application and it can do peculiar unexpected things in certain conditions. Some examples: auto-incrementing numbers in a certain column when copying-and-pasting, interpreting data as a date when that was not intended, numbers with spaces in them being interpreted as strings and silently omitted from the calculation, cutting-and-pasting only copying to the displayed precision not to the precision of the underlying number, etc.

Any of these could at least theoretically cause issues despite the testing that NC State has performed, if the data inputs are "imperfect", since likely NC State tested with "perfect" inputs. As long as the state uses an Excel spreadsheet that isn't publicly available, there will be questions.

From an election transparency standpoint, the most important issue here is: can observers verify that the calculations were done properly? If the spreadsheet and its inputs are not released to the public, observers cannot, which erodes transparency.

If the State Board of Elections votes to break the law and allow the use of this uncertified software, then the SBOE should require that the spreadsheet macros and all of the data should be released to any individual who requests it, to enable observers to perform the calculations for themselves if they care. This approval should be time-limited.

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[2] Editorial: On the wrong track SATURDAY, SEPTEMBER 4, 2010
http://www.news-record.com/content/2010/09/03/article/editorial_on_the_wrong_track

[3] "What We Know About Spreadsheet Errors". Published in the Journal of End User Computing's Special issue on Scaling Up End User Development Volume 10, No 2. Spring 1998, pp. 15-21 Revised May 2008. Raymond R. Panko, University of Hawai'i, College of Business Administration
http://panko.shidler.hawaii.edu/ssr/Mypapers/whatknow.htm

Other Expert Opinions on using excel to tally elections

Date: Fri, 26 Dec 2008 11:05:03 -0800
From: Philip B. Stark <stark@stat.berkeley.edu>
Reply-To: stark@stat.berkeley.edu

To: Joyce McCloy <jmc27106@earthlink.net>, Rep. Verla Insko <Verlai@ncleg.net>
References: <49552090.1030004@earthlink.net>

Dear Rep. Insko and Joyce--

My previous email concerned Microsoft Excel in particular, and Mr. Capriglione's assertion that it is bug-free.

Mr. Capriglione's suggestion to use Lotus 123 would avoid Microsoft Excel's particular bugs, but those are only part of the problem.
Certainly, using *both* Excel and Lotus 123 and comparing the results would add some comfort--as would using OpenOffice Calc as a third check. (OpenOffice has the advantage that it is free, open source software.) I do not agree with Mr. Capriglione's characterization of the use of the software as simply verifying that 1+1=2. if the result of the calculation were known, there would be no need to do the calculation.

As Joyce knows, I have serious reservations regarding using _any_spreadsheet software for complex calculations like tabulating IRV voting. Here are some of them:

1) The procedure proposed is very complicated, with many manual steps.
Human error in such a complex task is almost inevitable. A slight slip can result in mis-copying data, overwriting data, hitting the wrong function, etc.

2) Spreadsheets mix data and programming. It is not possible to tell at a glance whether a cell in a spreadsheet is data or the result of a calculation. As a result, it is quite easy--deliberately or inadvertently--to corrupt a calculation or the data on which it is based. In principle that can be detected, but it requires additional scrutiny--such as clicking each cell and looking at what is displayed. And even that is not foolproof.

3) Because of the likelihood of error, using cut-and-paste, etc., as part of a "production" system is unheard of, in my experience. It is far preferable to use proper scientific software for calculations like this--especially because so much rides on the results. With proper software, the data are separated from the programming commands. Somebody can double check independently that the data were entered correctly (or exported correctly from the election management software), and that the programming is correct. The raw data can be made public so that others can replicate the calculation independently as a cross check. And, once the program is written, tested, and debugged, users of the software need only say "go," not perform step after step of error-prone data entry or manipulation.
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-- Philip B. Stark | Professor of Statistics | University of California Berkeley, CA
94720-3860 | 510-642-1430 | statistics.berkeley.edu/~stark

Tom Dahlberg of Dahlberg Business Logic Inc.
www.business-analysis-using-spreadsheets.com

As a 20 year veteran of software project management in business, here's the most succinct statement of my scepticism toward the Excel workaround in your state:

The Excel solution presents your state with two equally vicious choices. If the Excel algorithm is not automated the process will be vulnerable to human error at numerous points, and is not even in principle susceptible to review (which might involve more human error). The review is as likely to suffer from error as the original process. If it is automated (in Excel VBA or in any other programming language), it becomes susceptible to review only by experts, who, like the original developers, can manipulate the algorithm and perhaps even erase their tracks. In other words, automation of the algorithm makes it even more vulnerable, in principle, to fraud that not even other experts can corner.

We currently have automated vote counting, but it is very straightforward by comparison and can be checked by a manual recount. It's just counting. No complex rules are applied.
Election judges on site can see what is happening with physical ballots, even when they are counted automatically by scanners. But election judges cannot see into the calculation rules embedded in software without expertise, and even then, it can become very difficult to understand if the program has in fact consistently imposed the agreed upon rules. The more complicated the algorithm, the more impossible it becomes for people of good will to agree that the outcome is the one truly implied by the rules.

The primary goal of the voting system is to ensure the public's confidence in the results. The more complicated the voting algorithm, the more impossible it becomes for the voters themselves to understand and review the process -- whether it is automated or not. But the automation clearly increases the opportunity of "experts" to commit fraud.

Calculation rules can be placed in “arrays” and changed dynamically. The code that makes these dynamic changes could also be placed in temporary arrays and then erased at the end of the automated process, destroying any evidence that the rules were being manipulated in the first place. The implication of this is that any voting system that cannot be backed up by a simple, manual recount makes it impossible, in principle, to prevent fraud. If IRV is not susceptible to manual processing (within a reasonable amount of time) it makes the voting algorithm more vulnerable than ever to fraudulent manipulation. If the business rules operating in a software program cannot be applied manually to the process in question, as a quality and accuracy test, to every permutation of the use cases in question, then we can never be sure that the system has produced the right outcome. This is acceptable when we test software systems in business, since nothing as serious as the voter’s franchise is in question. But it is an unacceptable risk when the integrity of our democracy is in question.

How can the state prove, to those who have standing (all voters) consistent with the compelling state interest, that the automation is working properly and not committing fraud? And who has the burden of proof if not the election officials responsible for the integrity of the process?

Tom Dahlberg
Dahlberg Business Logic Inc.
www.business-analysis-using-spreadsheets.com
25270 Smithtown Road
Shorewood, MN 55331
Mobile: 952 237 3096