

Analysis of the Integrity of Elections Bill

A/Prof Vanessa Teague*
Thinking Cybersecurity Pty. Ltd.
& Australian National University

September 6, 2021

Abstract

The Integrity of Elections Bill has two main parts: audits of the technology involved in elections, and measures for authenticating voters. It aims to improve the integrity of Australian elections in two ways:

- securing voter eligibility, and
- securing the electronic processing of votes.

While I support both aims, I do not believe the Bill meets its goals.

The first part of the bill concerns the auditing of electronic electoral processes. This is well-intentioned, but needs to be substantially amended to provide scrutineers with evidence of the accuracy of the election outcome. In Section 1 I list recommended changes, based on my research¹ on post-election auditing and my experience of pilot audits in the USA.

The clauses on voter identification may do considerable harm by wrongly excluding eligible voters. I have raised some specific questions in Section 2, but do not believe these measures should pass without thorough engagement with potentially-affected groups of voters.

*Vanessa Teague is an advisory board member of Verified Voting, a non-governmental US organization working toward accuracy, integrity and verifiability of elections.

¹Joint work with Michelle Blom, Andrew Conway, Philip Stark, Peter Stuckey and Damjan Vukcevic.

1 Audits of Electronic Electoral Processes

Australia has a proud tradition of open candidate-appointed election scrutineering. Allowing candidate-appointed scrutineers to observe all aspects of the electoral process has two substantial benefits.

- Scrutineers can identify problems that disadvantage their candidate, and have them addressed immediately.
- Scrutineers act as trusted proxies for their candidate's other supporters, and can attest to the election having been properly conducted, even when the candidate lost.

The current Australian Senate scanning and counting process achieves neither of these benefits. There is no manual count, except for first preferences—indeed, manual counting is probably no longer feasible. The process needs to be redesigned to allow for meaningful scrutineering in a new way. At present, the untransparent nature of the software process means that software errors or security problems might not be apparent to scrutineers or the AEC.

The counting step can be easily checked because the AEC publishes the digitized preferences (see below). However, the process of transforming paper ballots into digitized preferences cannot be double-checked without access to the paper ballots themselves. This is why a post-election audit of randomly selected paper ballots, in the presence of scrutineers, is necessary.²

Already the AEC engages trusted third parties to examine and test the system. This has many benefits, but should not be a substitute for candidate-appointed scrutineering. It is exceedingly difficult to elicit meaningful information about any of these audits.³ The Bill's proposal to add ASD and ANAO is harmless, and possibly beneficial, but unlikely to produce any more evidence to convince the public. While it may help to detect and correct some errors and vulnerabilities, no software audit guarantees that the software is perfect, nor that a malicious party has not modified it between the audit and the election.

Andrew Conway and I recently notified the AEC of a software bug in the

²See Teague V, Keyzer P. *Electronic Australian Elections: Verifiability of Accuracy is a Design Goal, which Must be Mandated by Law and Deliberately Designed into Electronic Electoral Processes*. LiC [Internet]. 2020 Nov.13 [cited 2021 Sep.6]; 37(1):42–5. Available from: <https://journals.latrobe.edu.au/index.php/law-in-context/article/view/119>

³For example, Senators across the political spectrum have asked for the best estimate of the error rate of the Senate ballot scanning solution. The AEC's most recent answer to Senator Roberts - that "Based upon IBM's outputs, it was stated the error rate appears to be < 0.5%," mirrors similarly vague wording given to Senator Waters two years earlier. I requested the documents associated with IBM's analysis via Freedom of Information, and received 106 pdf files in response, with no explanation of the methodology or description of the data. They seem to comprise records of testing for about 5000 ballots, of which over 200 are marked "ISSUE" or "HAS ISSUE" or "HAS ISSUES." I do not understand exactly what this data shows, or what experiment IBM conducted, or even whether the AEC's claim of a 0.5% error rate is per ballot or per number. If a mathematical scientist with 15 years of research experience in the field cannot understand their data analysis, this suggests that some better data analysis needs to be done.

Senate counting software,⁴ which breaks three-way ties for exclusion differently from the way specified in The *Electoral Act*. Fortunately, it does not seem to have affected any election results, though it has caused candidates to be excluded in the wrong order. The lesson here is that the internal software audits do not make the software perfect—nobody could have expected that they would—and the openly available list of preferences allows independent people (like us) to double check the count. This is a good thing, because it allows problems to be found and fixed.

Unfortunately, there is no equivalent way to double-check the Senate scanning process, because that would require access to the paper ballots from which the digitized preferences are derived. The aim of a post-election audit is to do this double-checking in the presence of scrutineers, so that scrutineers can verify the results and assess the rate of error. This is what the Bill should be clarified to require.

1.1 Post-election audits as candidate-appointed scrutiny

Post-election audits of paper ballots have become a standard part of the electoral process in many parts of the USA, where electronic scanning of paper ballots is common. Figure 1 shows a pilot audit I participated in, in San Francisco in 2019. The audit relied on our open-source Australian software.⁵ Any member of the public was allowed to come, observe, and check the computations, while the San Francisco electoral authorities compared randomly-selected paper ballots with their previously-published digitized preferences. This is a public process, which builds trust through an open examination of the evidence.

There is a very important distinction between testing a *system* to see if it seems to function properly, and randomly auditing the *paper ballots in a particular election* to see if the election results are right. The Bill is ambiguous about whether it requires only a system audit, or a post-election audit of the paper ballots. Only the latter gives genuine evidence of an accurate election result.

The Bill currently has important drafting problems.

- It does not state that the ANAO audit must examine a random sample of paper Senate ballots cast in the election. This may be the intention, but it is not explicit.
- It does not make it clear that scrutineers may observe the audit.
- It allows the ANAO audit report to be delivered privately to the Electoral Commissioner but not published—this does nothing for public trust.

⁴<https://github.com/AndrewConway/ConcreteSTV/raw/main/reports/RecommendedAmendmentsSenateCountingAndScrutiny.pdf>

⁵Blom, M., Conway, A., King, D., Sandrolini, L., Stark, P.B., Stuckey, P.J. and Teague, V., 2020. You can do RLAs for IRV: The Process Pilot of Risk-Limiting Audits for the San Francisco District Attorney 2019 Instant Runoff Vote. E-Vote-ID 2020, p.296. <https://arxiv.org/abs/2004.00235>

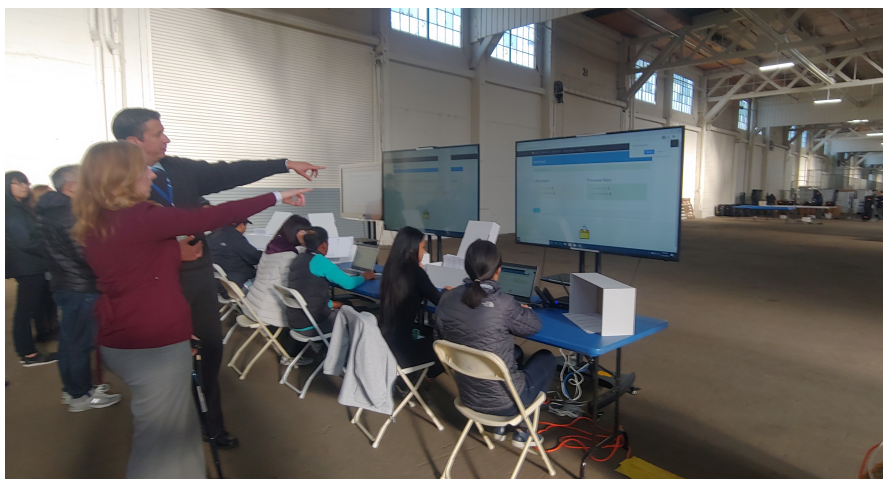


Figure 1: Post election audit pilot in San Francisco: an open process of comparing randomly-selected paper ballots with their previously-published digitized preferences, using open-source software partly designed and built in Australia.

- It allows the audit, and the corresponding report, to be delayed until 60 days after the return of the writs. This means that serious errors might be identified only after it is too late to petition to correct them.

Senator Larissa Waters’s proposed amendment⁶ to the *Electoral Legislation Amendment (Counting, Scrutiny and Operational Efficiencies) Bill 2021* is similar in intention but much better expressed.

- It clarifies that the digitized preferences must be published in advance.
- It specifically describes the random sampling of paper ballots and the direct comparison with their digitized preferences.
- It clarifies that scrutineers must have meaningful opportunity to observe.
- It has a 30-day deadline, inside the window in which a petition to correct errors may be lodged.

Recommendation: For post-election audits of the paper Senate ballots, adopt wording like Senator Waters’s proposal, explicitly specifying that the AEC must publish the digitized preferences in advance, that a random selection of paper ballots must be chosen, that scrutineers must be allowed to observe their comparison with the digitized preferences, and that this must occur before the expiry of the deadline for petitioning to correct problems.

⁶[https://parlinfo.aph.gov.au/parlInfo/download/legislation/amend/r6753_amend_5b6d1f0f-a1b7-4f30-9f54-5deea0455266/upload_pdf/1415%20CW%20Electoral%20Legislation%20Amendment%20\(Counting,%20Scrutiny%20and%20Operational%20Efficiencies\)%20Bill%202021_Waters.pdf;fileType=application%2Fpdf](https://parlinfo.aph.gov.au/parlInfo/download/legislation/amend/r6753_amend_5b6d1f0f-a1b7-4f30-9f54-5deea0455266/upload_pdf/1415%20CW%20Electoral%20Legislation%20Amendment%20(Counting,%20Scrutiny%20and%20Operational%20Efficiencies)%20Bill%202021_Waters.pdf;fileType=application%2Fpdf)

2 Questions about voter ID

The Bill's requirement for voters to bring identification might actually make elections less secure, by raising the risk that eligible people are wrongly turned away. Excluding eligible voters is as much of a security failure as including ineligible ones, with profound implications for the foundations of our democracy.

Establishing voter identity is challenging. The ideal would be a system that allowed every eligible voter to vote exactly once, while excluding everyone ineligible. Unfortunately, given that Australia has no secure national (or state) identity system, there is no simple solution that meets both objectives.

The Bill proposes to accept some quite easily-faked evidence of identity. This is probably well-intentioned, with the aim of making it easier for some voters who do not have formal identification, but I do not think the right balance between fraud prevention and accidental exclusion has been struck. Utility bills, for example, are often delivered electronically and hence require nothing more than a few minutes with a Word Processor to fake (I have included an electricity bill for the Prime Minister as a demonstration). The Bill is, therefore, not likely to be a significant deterrent to deliberate fraud. However, for those with limited technical skills, reduced access to technology, or insecure housing, there might be no easy way to acquire any of the accepted documents, even when the person is an eligible voter.

I am not a social or political scientist, but I think it is obvious that measures of this kind should not be introduced without the involvement of the people most likely to be negatively affected. I will leave the social justice questions to others, but even at a basic procedural level the Bill leaves many questions unanswered.

- Should the voting officer accept or reject a voter if their ID is valid but does not match their address on the Electoral Roll?
- If a person's ID is rejected, may they go to another polling place to try to get it accepted?
- Is there any method of appeal if a presented ID is rejected?
- Will there be penalties for presenting fake ID for truthful voting eligibility, for example, if an eligible voter pastes their name onto a gas bill at their address, even though they are not the person who pays the bill?
- Will there be penalties for electoral officials who knowingly reject valid ID?
- If the electoral officer knows the person, and the person is on the Electoral Roll, can the officer allow them to vote without valid ID? Must they?
- If an eligible voter has attempted to vote, but been turned away, can they be fined under compulsory voting rules?
- If eligible voters can prove they were wrongly excluded, and state they were intending to vote for a certain candidate, could that candidate present that as evidence to the Court of Disputed Returns?

3 Summary

The Bill's provisions for auditing election software need to be amended in order to provide genuine evidence that the election results are correct. In particular, there needs to be a random audit of the paper ballots, in the presence of scrutineers, in time for corrections to be made if problems are found.

I am concerned that the voter identification measures may make Australian elections less secure, by increasing the risk that eligible voters are excluded, without substantially deterring deliberate fraud. This deserves much more careful examination, with the involvement of affected communities of voters, before we can be confident that it excludes cheaters more than it excludes eligible voters.