Submission No 1

ADEQUACY OF THE FUNDING ALLOCATION OF THE NSW ELECTORAL COMMISSION FOR THE 2023 STATE GENERAL ELECTION

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Submission to the NSW JSCEM Inquiry into the adequacy of the funding allocation of the NSW Electoral Commission for the 2023 State General Election

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1 Introduction

iVote has had serious failures every time it has run. Some, such as the downtime in the last two days of the recent local govenrment elections, have been obvious; others have been more subtle.

- In 2015, iVote was subject to a security vulnerability that would have allowed an Internet-based attacker to take over a person's iVote session, then read and manipulate their vote [2]. The NSWEC repaired the server software, but according to the ABC more than 60,000 votes had been cast while it was vulnerable. In addition, a security feature intended for electors to verify their votes failed for more than 10% of attempts to use it.

- In March 2019, as a result of election transparency laws in Switzerland, my colleagues and I discovered a series of serious cryptographic errors affecting both the SwissPost and iVote systems [1]. Fortunately, the first was identified early enough for it to be corrected in NSW before election day. Unfortunately, the second error was detected close to NSW election day, and although the NSWEC did their best to correct

the problem, they chose not to make the software code available on reasonable terms until many months after the election. When this happened, it became clear that the system was still vulnerable.[1]

- In 2021, a source code audit commissioned by NSWEC found hard-coded passwords, naked SQL queries that could allow the erasure of votes, and variety of other problems [3]. They noted that the code was so complex that they could not be certain which code could be executed, and that the NSWEC's process did not adequately check that the code they had audited produced the executable supplied by the vendor and used for elections.

These failures have been interpreted through the years as a reason to give iVote's administrators and providers more money. None of this cash has solved any of iVote's fundamental design problems: it remains unreliable, unable to protect vote secrecy and, most importantly, incapable of detecting certain kinds of fraud or of producing verifiable evidence that such fraud has not occurred.

In August 2021, the electoral commissioner was arguing that a full postal/iVote LGE would be cheaper, clearly not accounting for the cost of re-running any elections [4]. By November 2021, he was arguing that the election's exposure to cyber risk was a reason to give the electoral commission more money [5]. Unfortunately this insight did not translate into any public-facing recommendations to voters that might have encouraged them to make better choices. I did not see any recommendation that people iVote early to spread the load, for example, which could have helped significantly. Even after the downtime had lasted for hours, the NSWEC Twitter account was still recommending that people patiently wait for iVote. If NSWEC had recommended people vote on paper if they could, the load would probably have been substantially lightened. (I know some skeptical geeks who ignored the comforting messages and went to a polling place to vote on paper. Many of those who were more trusting were not able to vote.)

The exposure of NSW elections to cyber risk is a consequence of the decision to run large numbers of votes over the Internet. The decision for the JSCEM is whether you are happy to allow the 2023 state election to be run the same way as the 2021 local government elections.

[1] Teague, 2019, "Faking an iVote decryption proof." https://www.thinkingcybersecurity.com/iVoteDecryptionProofCheat.pdf

2 Analysis of the impact of iVote's issues on the 2021 Local Government Elections

Everyone agrees that some people were excluded from voting due to the downtime of iVote's registration and voting services. However, it is very difficult to assess the impact of either the downtime or any other possible iVote problems, because by definition these problems relate to data that is not available for analysis—we cannot guess what a vote would have been if it was not recorded correctly.

The NSWEC has conducted a conservative analysis of the impact of iVote's downtime.[2] It assumes that the missing votes are distributed randomly, according to the same distribution as the votes that were successfully cast. Unsurprisingly, dropping votes that are the same as the successful votes makes very little difference to the outcome in most contests. NSWEC has therefore concluded that only three local council results were jeopardised by iVote's problems.

However, this analysis is highly dependent upon the assumption that the recorded iVotes are accurate, and that the missing ones match the ones that were recorded. These assumptions are not justified by evidence, particularly since there is no reason to think that the excluded people were randomly selected—those who were less mobile, further from a polling place, or less skeptical of NSWEC reassurance, may have been much less likely to successfully vote.

Andrew Conway and I have conducted an alternative analysis of the available vote data for the 2021 LGE. Our analysis makes no assumptions about the missing votes, instead simply examining the data to determine how many changes or omissions would be sufficient to have changed the outcomes.

Our main findings are:

- In 25 contests, the election outcome based only on paper ballots is different from the outcome that incorporates iVote ballots. This does not mean that the official results are wrong, but it does mean that iVotes affected outcomes.

- In most contests, including both mayoral and councillor contests, the number of vote-changes sufficient to alter the election outcome is less than the number of votes received from iVote.

[2] https://elections.nsw.gov.au/NSWEC/media/NSWEC/LGE21/iVote-Assessment-Methodology.pdf

- In 39 contests, the election outcome can be changed by adding fewer votes than the number that NSWEC acknowledges were excluded by iVote's known performance issue. This includes the 6 contests that the NSWEC acknowledges were affected, plus 33 others.

Note that the last fact was sufficient, in the case of the 2013 West Australian Senate ballot issue, to justify re-running the election. Although NSW electoral law is different, the mathematical fact is the same for both cases: enough votes are missing to have changed the outcomes.

More details are in our full report.[3] All our code is available at https://github.com/AndrewConway/ConcreteSTV.

The NSWEC's argument that most of these results should stand is strongly dependent on the assumption that the votes they excluded are the same as the votes they have. Our analysis shows that a much larger number of outcomes could have been affected by iVote.

3 Discussion

Verifiability, the opportunity for voters and scrutineers to verify that the election outcome accurately reflects the intentions of voters, is the core property necessary to support the announced election outcome with evidence. Providing this property online, for remote voting, with reasonable privacy and usability, is an unsolved problem. iVote falls far short—its primary risk is not downtime but undetectable fraud or software errors that impact outcomes. Even if the state election seemed to have been run without incident, a large number of iVotes would mean that it was not possible to determine, with any supporting evidence, who deserved to be elected.

There is no reason that Australian discussion on election integrity needs to descend into the sort of partisan toxicity we see in the United States. Recently the Australian Parliament passed the *Assurance of Senate Counting* Bill (2021)[4] with support from both major, and most minor, parties. This Act improves real and perceived election integrity, something that all Australians can agree to support.

The New South Wales Parliament could, similarly, decide to work together to improve election integrity in New South Wales, a decision that would benefit every candidate who deserves to be elected, regardless of political differences. Discontinuing iVote is the only way to ensure that another

[3] https://github.com/AndrewConway/ConcreteSTV/blob/main/reports/NSWLGE2021Report.pdf

[4] https://www.aph.gov.au/Parliamentary_Business/Bills_Legislation/Bills_Search_Results/Result?bId=r6810

iVote failure does not undermine the (real and perceived) integrity of the next NSW state election. The money required to rebuild trustworthy evidence-based electoral processes in NSW will be money well spent. Continuing with iVote will cost more.

4 Conclusion

If you give the NSWEC and the iVote vendor more money, iVote will almost certainly fail again anyway. The failure may or may not be as obvious as the recent LGE failure. The way to stop iVote's problems from undermining the integrity of the State election—as they have clearly undermined the recent local government elections—is to stop using iVote. Spend the money on trustworthy electoral processes instead.

References

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[3] David Hook and Carsten Schürmann. Review of the revised iVote 2021 system, 2021. https://www.elections.nsw.gov.au/NSWEC/media/NSWEC/Reports/iVote%20reports/demtech-source-code-review-report.pdf.

[4] Parliament of New South Wales. Schmidt, J, Testimony to budget estimates, Aug 2021. https://www.parliament.nsw.gov.au/lcdocs/transcripts/2634/Transcript%20-%20Budget%20Estimates%202021-2022%20-%2018%20August%202021%20-%20CORRECTED.pdf.

[5] Parliament of New South Wales. Schmidt, J, Testimony to budget estimates, Nov 2021. https://www.parliament.nsw.gov.au/lcdocs/transcripts/2740/CORRECTED%20Transcript%20-%20PC%201%20-%20Premier%20(Perrottet)%20-%204%20November%202021.pdf.