

# Testimony on Election Security and Technology

Pennsylvania Senate State Government Committee  
Hearing on Election Security, March 18, 2024

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Good morning, Senators. Thank you for this opportunity to testify before the Pennsylvania Senate State Government Committee about election security.

My name is Kevin Skoglund. I am an expert in election security, cybersecurity, and voting technology. I am the President and Chief Technologist for Citizens for Better Elections, a non-partisan group based in Pennsylvania, and I am a poll worker in Montgomery County where I reside. My past work includes conducting voting system security research and providing advice as a subject matter expert. I gave advice to many Pennsylvania counties when they were selecting new voting systems to help them make informed purchases.

Election security requires considering a wide-range of threats to elections, from simple rain storms to sophisticated adversaries. With so many types of threats, it may be surprising to learn that the majority of the security risks can be mitigated through two measures: **resilience planning** and **evidence-based elections**. Most of my time as an election security expert is spent encouraging their use.

Resilience is the ability to withstand and recover from adverse events. In other words, if any threats appear, we don't want them to ruin our plans for a smooth election. Good resilience means detecting the adverse event quickly, responding to limit the damage it causes, and restoring normal operations with little downtime. Detect, respond, recover.

Resilience is a common concern in cybersecurity, but is especially important for elections. Election Day has limited hours and the election results could be impacted if some voters cannot cast ballots during those hours. County election officials routinely make resilience plans. They have to consider how a paper jam or a broken touchscreen can be fixed or replaced quickly. All voting systems in the U.S. are required to have a two-hour battery backup system so that a sudden loss of power doesn't prevent voting. These are important cybersecurity protections, even when they are low-tech solutions.

Evidence-based elections are the other risk mitigation I recommend. This is a model for elections in which the election outcomes can be verified by examining evidence. Evidence-based elections have three requirements. First, the election must collect trustworthy evidence of each voter's intent. In other words, we need paper ballots that accurately document the preferences of voters. Second, the election must preserve and protect that election evidence. We need a secure chain of custody to prevent tampering with the ballots. Third, the election should demonstrate that the election outcomes are

consistent with the election evidence. We can check the outcomes with routine risk-limiting audits that examine trustworthy paper ballots after each election. Evidence-based elections demonstrate to the public that the outcomes can be trusted.

These two measures are complimentary. Resilience planning ensures that all eligible voters can cast their ballots into the ballot box. Evidence-based elections ensure that the cast ballots in the ballot box are counted accurately. Together, they protect elections against the majority of threats—from rain storms to sophisticated adversaries.

Pennsylvania counties have adopted many best practices already. I am proud to see the progress that has been made over the last five years. Every county replaced their outdated, paperless voting machines. The Department of State introduced a pilot program for risk-limiting audits and has issued many important directives and useful guidance to counties. County election officials have worked hard to make significant changes, even as they dealt with a pandemic. However, there remains room for improvement in resilience planning, use of trustworthy paper ballots, secure chain of custody, and risk-limiting audits. I will give some examples.

In 2019, Citizens for Better Elections and the University of Pittsburgh Institute for Cyber Law, Policy, and Security analyzed the newly purchased voting systems across Pennsylvania.<sup>1</sup> We found that 47 counties purchased voting systems where most in-person voters mark a paper ballot by hand, while 20 counties purchased voting systems where all in-person voters are required to use a ballot marking device (BMD).<sup>2</sup> A BMD is usually a touchscreen computer where voters enter their choices and then it generates a paper ballot that has barcodes at the top and a text summary of vote selections at the bottom. A ballot scanner will count the barcodes, not the human-readable text. Our report concluded that the BMD-for-all systems cost twice as much as the hand-marked paper ballot systems. Those 20 counties spent as much taxpayer money as the other 47 counties combined.

Cost is not the only difference. The type of voting system also has important implications for election security. The 47 counties that picked hand-marked paper ballot systems are able to collect trustworthy evidence of each voter's preferences. Their voting systems are resilient. If the technology fails, a voter can still mark a ballot and deposit it in a secure compartment so it can be counted later. If the lines to vote become long, it is easy to open more spaces for voters to mark a ballot with a pen.

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<sup>1</sup> "Pennsylvania County Voting Systems: An Analysis", Pitt Cyber and Citizens for Better Elections, 2019, <https://www.cyber.pitt.edu/votingsystemsanalysis>

<sup>2</sup> "Election Day Equipment in Pennsylvania", Verified Voting Map, <https://verifiedvoting.org/verifier/#mode/navigate/map/ppEquip/mapType/normal/year/2024/state/42>

On the other hand, the 20 counties that picked BMDs-for-all have increased security risks in several areas. First, these systems are less resilient. If the technology fails, a voter will need another way to mark a ballot. Voters can't write barcodes. If lines become long, it is difficult to add more BMDs. Second, the BMD is creating the ballot, not the voter. The BMD may not create the ballot correctly due to malfunction, misprogramming, or malfeasance. It becomes essential for every voter to double-check the BMD's work, but that's not easily done. Voters cannot read the barcodes that will be counted, and say they don't trust them. At the same time, studies have shown that voters are unlikely to check the human-readable text well enough to detect errors. We hope that these paper ballots contain the correct votes—just like we hoped that our paperless voting machines contained the correct votes—but they fall short of being trustworthy records we can use to verify it. Third, if there is a widespread problem with BMDs, the county has limited options. There is not enough time to perform tech support for major software issues, and taking BMDs out of service would impact voting. In short, BMDs are really expensive pens that may not always work as expected, yet voters in these 20 counties depend on them to cast ballots.

Northampton County had problems with their BMDs in November 2023 that show these concerns are not theoretical. I wrote a report that describes the events, the technical details, the security implications, and my recommendations.<sup>3</sup>

Northampton County is one of the 20 counties that requires all in-person voters to use a BMD. On Election Day, their BMDs printed ballots with the opposite of what some voters selected on the touchscreens. It created a lot of concern and confusion. Some polling places did not notice and kept voting. Some told voters to come back later. Some switched to emergency paper ballots but, with only 20 on hand, they quickly ran out. The County had no choice but to instruct polling places to continue using BMDs they knew were defective.

To get the ballot text to match the screen, some voters were advised to select the opposite of their vote choices on the touchscreen. That is creative and understandable, but tragic. The barcode and the ballot text did not match, and the barcode was counted. The ballot text that voters could see was irrelevant. Any voters who tried to work around the problem had their votes counted *against* their preferences.

The vote totals on the result tapes at the end of Election Day and during the post-election audit were also affected by the error. Northampton County officials decided to ignore the printed election results and to change the results to what they believed were the correct totals. When the County Council asked the County Executive if that action was legal, he

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<sup>3</sup> “Election Problems in Northampton County, PA in November 2023”, Kevin Skoglund, November 15, 2023, [https://securiosa.com/posts/northampton\\_problems\\_2023.html](https://securiosa.com/posts/northampton_problems_2023.html)

defended the choice by saying that it was legal because no one challenged it in court.<sup>4</sup> While that might ultimately have been the correct remedy, I find it concerning that it was unilaterally decided and not, for example, reviewed by a court.

The root cause of the problems in Northampton was a simple data entry error. The fact that this was one small error made by a person is in no way reassuring. It was a small thorn that brought down an elephant. It could easily happen in any election in any of the 20 counties that require all voters to use BMDs. In fact, Northampton County itself had already experienced a system-wide technical failure in 2019 due to another simple misconfiguration. It can happen again, and the next time could have an even bigger impact on an election and on the trust of the citizens of Pennsylvania.

Northampton's voters are understandably frustrated and many say they no longer trust their voting system. The Northampton Republican and Democratic Party Chairs pleaded with the County Council to take action to restore voter trust.<sup>5</sup> My report on the events in Northampton concludes with many recommendations to increase trust and resilience. I will refer you to the URL included in my written testimony rather than read them.

My overall recommendation to this committee and to the General Assembly is to work on measures that increase the resilience of elections and move all counties to evidence-based elections—trustworthy paper ballots, secure chain of custody, and routine risk-limiting audits. At the same time, it is important to consult with experts, the Department of State, county election officials, and other election stakeholders to ensure that any legislation will be well designed and effective.

Thank you again. I am happy to answer any questions you have.

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<sup>4</sup> “There is a legal process by which you challenge an election, and nobody filed a challenge to the election. So, necessarily, the election was lawfully conducted. [...] And had anybody filed a challenge as the law requires, [the logic behind the certified results] would have been demonstrated in court.”, Northampton County Executive Lamont McClure, December 7, 2023, <https://www.youtube.com/live/PimrFnTAdho?t=1432>

<sup>5</sup> Public Comments on December 7, 2023 by Northampton Republican Party Chair Glenn Geissinger, <https://www.youtube.com/live/PimrFnTAdho?t=439>

Public Comments on December 7, 2023 by Northampton Democratic Party Chair Matt Munsey, <https://www.youtube.com/live/PimrFnTAdho?t=1005>