INDIANA'S VOTING MACHINES VULNERABLE TO SECURITY ISSUES

BACKGROUND

Efficient and accurate voting systems play a pivotal role in maintaining voter confidence in the election system. Russian interference in the 2016 U.S. presidential election and other incidents have emphasized the need for the country to rethink the security of its existing voting infrastructure. This can include ensuring safe and secure polling places, up-to-date voting equipment, and verifiable paper records of votes.

In 2019, voters in Indiana filed a federal suit to replace paperless voting machines in the state, which do not leave a paper trail of votes that were cast.[1] These paperless electronic machines rose to prominence after the Help America Vote Act banned the use of lever machines and punch cards in federal elections following the Florida recount controversy of 2000. However, concerns with these types of machines began to arise as early as the 2002 elections.[2] The 2019 Indiana lawsuit cited that the use of paperless electronic voting machines leaves Indiana vulnerable to security risks.

Given these issues, we examined data from the organization Verified Voting[3] to review the prevalence and types of voting equipment used in Indiana polling sites as of 2020. This brief further assesses the risks and implications

SUMMARY

- Although most of the voters in the United States vote using hand-marked ballots, the majority of Hoosier voters use direct-recording electronic (DRE) voting machines.
- DRE machines can be vulnerable to security risks, especially when they do not leave a paper record of votes that were cast.
- Nearly 60 percent of Indiana's voting machines are paperless.
- Indiana is only one of eight states that will use paperless voting machines in the November 2020 election.
- A lack of funding is a large factor in the state's delay in moving to paper-based voting systems.

of using paperless audit voting machines and provides recommendations to increase the security of Indiana elections in the future .
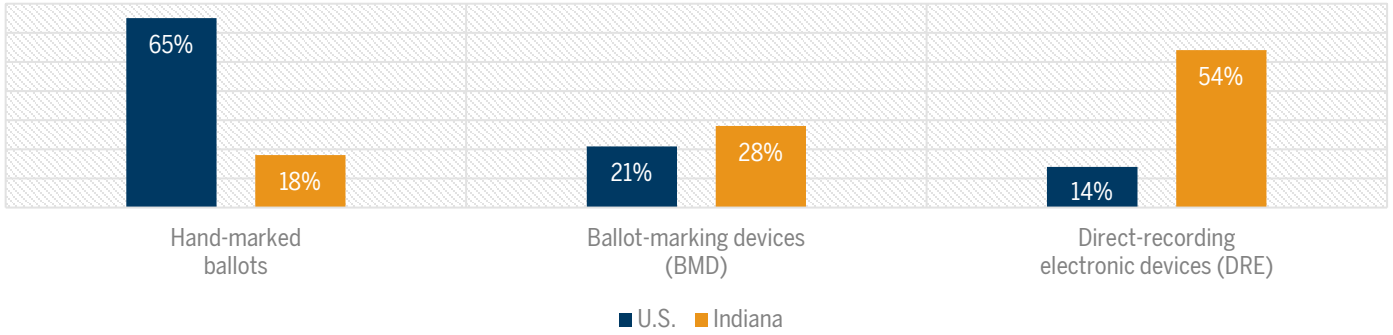
FINDINGS

Technologies for computer-assisted voting include optical scanners, ballot-marking devices (BMDs), and direct-record electronic (DRE) voting machines (Table 1).

TABLE 1. Types of voting machines used across the United States

TYPE OF VOTING EQUIPMENT[3]	DESCRIPTION
Optical/digital scan	Voters make their selection on paper ballots, which is then read by an optical or digital scanner and stored.
Ballot-marking device (BMD)	Voters make their selection through either a touch screen or mechanical input. This selection is not stored or counted on the machine itself. Rather, it is printed out so that it can be scanned by a reader.
Direct-recording electronic (DRE) voting machine, with verified voting paper audit trail (VVPAT)	Voters make their selection through a touch screen or push-button interface. Votes are stored in the computer memory. A paper record is used either by the voter to review the selection prior to casting the vote, or to facilitate a recount or audit.
Direct-recording electronic (DRE) voting machine, without VVPAT	Voters make their selection through a touch screen or push-button interface. Votes are stored in the computer memory and do not leave a paper record.

Hand-marked ballots: U.S. 65%, Indiana 18%

Ballot-marking devices (BMD): U.S. 21%, Indiana 28%

Direct-recording electronic devices (DRE): U.S. 14%, Indiana 54%

■ U.S. ■ Indiana

Indiana has about 4.5 million registered voters. While most U.S. voters live in jurisdictions that use hand-marked ballots, most Indiana voters live in jurisdictions that use DREs (Figure 1). Indiana is one of only eight states to still use DRE machines without a verified voting paper audit trail (Table 2). In fact, almost 60 percent of all of the voting equipment used in Indiana does not have a paper record (Figure 2).

TABLE 2. States using voting equipment without a verified voting paper audit trail (2020)

STATE	PERCENTAGE OF JURISDICTIONS
Louisiana	100%
Mississippi	81%
New Jersey	81%
Tennessee	69%
Indiana	57%
Texas	37%
Kentucky	25%
Kansas	4%

FIGURE 2. Voting equipment in Indiana polling sites (2020)

- DREs without VVPAT — 57%
- DREs with VVPAT — 9%
- Ballot-marking devices — 8%
- Hand-marked ballots — 27%
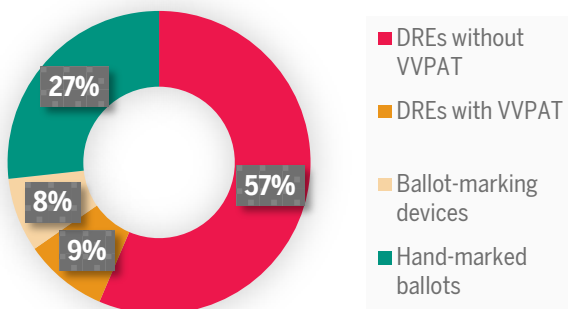
FIGURE 3. Voting equipment in Indiana polling sites (2020)

- DREs without VVPAT for all voters
- DREs with VVPAT for all voters
- BMDs for all voters
- Hand-marked paper ballots, DREs for accessibility without VVPAT
- Hand-marked paper ballots, BMDs for accessibility
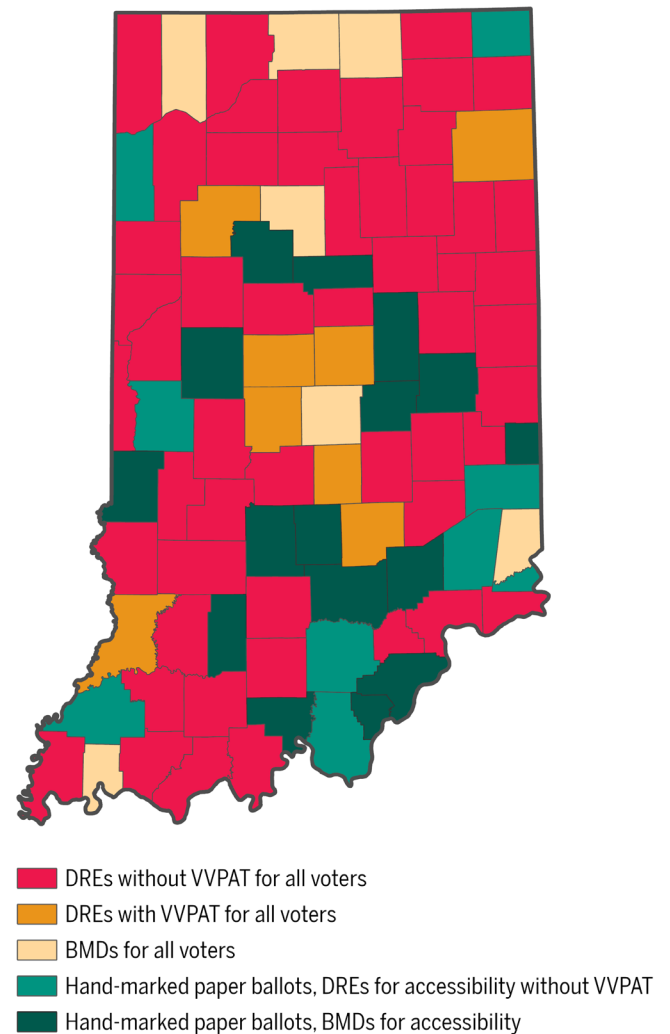
Marion County is the most populated county in Indiana, with about 641,000 voters. All polling sites in Marion County currently use BMDs (Figure 3). In contrast, Allen and Hamilton Counties—the counties with the third and fourth most registered voters—use DREs with VVPAT. However,

both counties only have about half of the registered voters in Marion County. Only 16 of Indiana's 92 counties (17 percent) use hand-marked paper ballots with BMDs.

IMPLICATIONS

Using voting machines without a paper audit trail can leave Indiana vulnerable to several election security issues. Without a paper record of votes that were cast, it can be difficult to detect breaches or errors in the system, or to verify vote totals if an issue is uncovered.[2] At a 2018 hacking conference, a computer scientist demonstrated that he could infiltrate a paperless DRE system to switch votes cast for one candidate into votes for the opponent. Because there was no paper trail of who voters selected on the ballot, there was no way to verify the true count of votes for each candidate.[4] These vulnerabilities were further highlighted in real-world cases during both the Georgia gubernatorial and Texas senate races of 2018. Complaints were filed in both states alleging that DREs used during the elections either deleted or switched votes, likely due to a software glitch blamed on outdated software and old machines.[5] These glitches due to old machines should be of concern in Indiana. In the 2016 election, 83 percent of Indiana counties used voting machines that were at least 8 years old.[6]

DISCUSSION

Since the foreign interference in the 2016 U.S. elections, the U.S. Senate intelligence committee acknowledged that paper-based systems, such as paper ballots and optical scanners, were the least susceptible to cyberattack.[7] In response to security concerns, a law passed in 2019 requires that all Indiana counties move to paper trail voting systems by 2030.[8] However, concerns have been raised that this timeline leaves elections vulnerable to security risks for the next 10 years.[9] Although some Indiana jurisdictions have made progress in moving to paper-based voting systems,[10] a lack of funding has been cited as a reason for other jurisdictions' delays in securing paper trail voting machines.[2] In 2018, the Indiana Secretary of State requested $75 million to update the state's voting machines with paper trail systems, but this amount was reduced to $6 million due to other state funding priorities. This amount will only update 10 percent of DREs in the

state with a paper trail audit system,[9] highlighting the need for further funding to be devoted to securing paper-based voting systems.

RECOMMENDATIONS

- Jurisdictions that are unable to update their machines prior to the November 2020 election, should take extra care in storing, maintaining, and testing machines before and after the election.
- Local officials should adopt effective practices for machine maintenance, as well as support the training of poll workers for tackling system failures and emergencies on the election day.
- Election officials should consider upgrading their plans for post-election audits to catch miscounting of votes or to find manipulated votes.

REFERENCES

1. Indiana Vote by Mail vs. Indiana Election Commission, 1:19-cv-4245 (Ind., U.S. District Court, Filed 2019). https://www.courthousenews.com/wp-content/uploads/2019/10/indiana-voting.pdf.
2. Gambhir, R. J. & Karsten, J. (2019). Why paper is considered state-of-the-art voting technology. *Brookings Institute*. https://www.brookings.edu/blog/techtank/2019/08/14/why-paper-is-considered-state-of-the-art-voting-technology/.
3. Verifier Tool (2020). *Verified Voting.* https://verifiedvoting.org/verifier/#mode/navigate/map/ppEquip/mapType/normal/year/2020.
4. Halpern, S. (2018). Election-hacking lessons from the 2018 DEF CON Hackers Conference. *The New Yorker*. https://www.newyorker.com/news/dispatch/election-hacking-lessons-from-the-2018-def-con-hackers-conference
5. Vasquez, C. & Choi, M. (2018). Voting machine errors already roil Texas and Georgia races. *Politico.* https://www.politico.com/story/2018/11/05/voting-machine-errors-texas-georgia-2018-elections-midterms-959980
6. Rabinowitz, K. (2018). Election security a high priority–Until it comes to paying for new voting machines. *ProPublica*. https://www.propublica.org/article/election-security-a-high-priority-until-it-comes-to-paying-for-new-voting-machines
7. *Report of the Select Committee on Intelligence United States Senate on Russian Active Measures Campaigns and Interference in the 2016 U.S. Election Volume 1, 58.*
8. Senate Bill 570. (2019). Indiana General Assembly. http://iga.in.gov/legislative/2019/bills/senate/570#digest-heading
9. Mack, J. L. (2019). Federal complaint filed to force upgrading Indiana voting machines by 2020 elections. *IndyStar.* https://www.indystar.com/story/news/politics/elections/2019/10/17/federal-complaint-force-upgrade-indiana-voting-machines/4006287002/
10. Geller, E., Jin, B., Hermani, J., & Farrell, M. B. (2019). The scramble to secure America's voting machines. *Politico.* https://www.politico.com/interactives/2019/election-security-americas-voting-machines/index.html

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