

Welcome to Voting Village 2026

Presented by
The Election Integrity Foundation

Reality, Pessimism, and Optimism in US Elections

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Two (Unsatisfying) Realities

- There are serious technical vulnerabilities in many parts of US election infrastructure that, if exploited, ***could*** alter election outcomes in (some) US jurisdictions

but also

- There's ***no credible evidence*** that these technical vulnerabilities have ever ***actually been exploited*** to alter the outcome of any US election

Three Problems

- (1) Hard: Improving *reality* - making elections more *trustworthy*
 - Great progress recently!
- (2) Harder: Cynical *pessimism*
 - Mistrust of (imperfect but improving) elections
- (3) Hardest: Unwarranted *optimism*
 - Demand for horribly untrustworthy election technology

Problem 1: Making Elections Trustworthy

Is the outcome correct?

Were the votes *recorded* correctly?

Were they *counted* correctly?

US Elections are *Hard*

- Every aspect of modern US elections is big and complex. Complex technology is *inherently* unreliable
- No do-overs. *Detecting* errors isn't sufficient. We have to *prevent* them.
- No “trusted third parties” to run elections for us. Has to satisfy people who don't trust one another.
- Secret, anonymous ballots required

A Dilemma

- Automation is essential to almost every facet of modern US elections
 - logistics, voter registration, ballot casting, ballot tallying, reporting, election management systems are largely computerized
- Computer automation is generally untrustworthy (fundamental problems)
 - Bad: flaws in voter registration, logistics, and election management systems can cause election-day *chaos*
 - Worse: flaws in ballot casting and tallying systems are potentially *fatal*, might result in incorrect election outcomes (maybe unrecoverable)
 - But: recent work by computer scientists focuses on this, and we've actually made great progress!

Computerized Voting

- In most of US, ballots are *tallied* by software
- In some systems, *ballot casting* also controlled by software
 - ballot display, processing input, storage of votes
- Software, in theory and practice, is *inherently unreliable*
- If you *lost* an election conducted with software, what might you point to?
- If you had to *defend* an election conducted with software?

Technology is Unreliable.

Two Possible Approaches

- ***Eliminate*** all defects (and vulnerabilities) in the tech
 - we don't know how to do this (in theory or in practice)
- Use technology in ways that ***tolerate*** (inevitable) flaws to still give us reliable ***outcomes*** in the presence of failure
 - Ron Rivest's "Software Independence" requirement
 - Philip Stark's "Risk Limiting Audits"

Tolerating Flawed Election Technology

- **Some** voting tech simply *can't* tolerate flaws
 - Vote-by-Internet, “DRE” (touchscreen) voting machines, etc.
 - Marked ballots exist *only* in electronic form, mediated through software
 - Software flaw or compromise means you can't be sure who won
- But **other** voting tech allows highly trustworthy elections even if the software and hardware is hacked or controlled by an adversary!
 - Achieved with combination of technology and processes:
 - Tech: Reliable artifact of votes (paper ballot marked directly by voter)
 - Process: Systematic, statistically rigorous post-election *audits* of a sample of ballots against machine tallies (“Risk Limiting Audits”)

The State of Election Security Today

- There are real problems; a few jurisdictions still use insecure election tech (but their numbers are shrinking)
- Risk Limiting Audits allow elections to tolerate insecure (paper ballot) tabulators
 - Not enough states do RLAs yet, but numbers are improving
- Some interesting open research problems, which are like catnip to computer scientists

Problem 2: Cynical Pessimism

Disinformation and Denialism

Misplaced Pessimism: Voter Skepticism & Disinformation

- Despite progress, increasing numbers of voters (across the political spectrum) believe elections are rigged
 - Common theme: election technology is being manipulated
- The specifics range from implausible to absolutely nuts, but are no longer fringe - has entered the mainstream
 - A prominent losing candidate fed these theories in 2020, but it's increasingly embraced by voters on all sides

Voter Skepticism in Practice



January 6, 2021 (photo By Tyler Merbler)

Problem 3:
Unwarranted Optimism
Blind Trust in Magic Tech

Unwarranted Optimism: Demand for Untrustworthy Tech

- “If I can bank on my smartphone, why can’t I vote on my smartphone?”
- Every expert on election tech (and the National Academies) thinks this is exceptionally dangerous
 - but a few companies market remote voting “solutions”
- Remote voting violates principle of “software independence”, makes assurance effectively impossible
- BUT, public really wants it, officials want to deliver it

Our Challenges

- Keep improving reality of election security
 - This is what technologists like us naturally do, we don't need much encouragement
- Better articulate the successes and risks (to election officials, voters, media, etc)
 - We've largely done a terrible job here