

# The Long View: Evidence-Based Elections

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## The future will be here any second now ...

### Strong Software Independence (Rivest & Wack)

An undetected error or change to its software cannot produce an undetectable change in the outcome, and we can find the correct outcome without re-running the election.

### Risk-limiting Audit

To pass, need strong statistical evidence that full hand count would find the same outcome—or a full hand count.

Large, known chance of requiring a full hand count if the outcome is wrong, no matter why.

*Risk* is biggest chance of not correcting a wrong outcome.

## Pilot risk-limiting audits

- Simple measures, super-majority measures, simple contests, vote-for- $k$  contests
- California pilots. Mix of voting technology, contest sizes, county sizes, contest types:  
Alameda 4c, Humboldt 3c, Marin 2e2c, Merced 2c, Monterey 1c, Orange 1c, San Luis Obispo 2c, Santa Cruz 1c, Stanislaus 1c, Ventura 1c, Yolo 2e3c
- Boulder, CO; Cuyahoga, OH
- NM: Everything but the risk limit.
- EAC funding for CA and CO; CA and CO laws
- 6/2012: Madera, Marin, Orange (entire ballot), Santa Cruz, . . .
- 11/2012: More.  $\geq 20$  counties in all under AB 2023

# Compliance audits: the glue

## Compliance audit

To pass, need convincing affirmative evidence that:

- All the right paper got generated (VMPB or VVPR)
- Enough paper survived intact—w/o additions, changes, or deletions—that it still shows who won (security, internal consistency, accounting)

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Other auditable issues for EI:

- Can register w/o too much friction
- Can vote w/o too much friction or coercion (available, informed, convenient, anonymous)
- Ballot usable (intelligible, accessible)

# Evidence-Based Elections

Evidence = Auditability + Auditing

## Resilient canvass framework (Benaloh et al.)

VVPR + compliance audit = strong software independence

strong software independence + risk-limiting audit  
= resilient canvass framework

Resilient canvass framework is “fault-tolerant.”

Large chance of correcting its own errors.

When it can't, it says so.

## Path to a future of Evidence-Based Elections (EBE)

- Strong evidence doesn't require radical transparency, just observing a few key processes
- VVPR, preferably “accessible” VMPB
- Systems that export CVRs.
- Certify things that have to work on election day—not tabulation accuracy
- Laws/regs to provide affirmative evidence outcome is right:  
Security, custody, compliance audits, risk-limiting audits  
(group is drafting model legislation for risk-limiting audits)
- Functional requirements, not dictating equipment or procedures
- Align incentives with need for evidence