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Given below is a suggestion for some contributions of the TAC in laying out some issues where decisions need to be made with a discussion of the tradeoffs in the choices. The idea is to lay out the issues, not necessarily make the decisions.

This is just a sample, a start, and possible format for the purposes of consideration by the TAC, not something proposed for adoption at this point.

Decisions and Tradeoffs for Voting Process and Equipment

Discussed below are some decisions to be made to implement open-source voting in San Francisco, with a discussions of the pro & con tradeoffs to be made for some alternatives.

There is no intention for the TAC to make these decisions or specific recommendations-- the intent is to present the options with some discussion.

Assumptions

- Votes are cast (recorded, submitted, and stored) on paper in a human-readable form.

- An electronic representation of ballots made either by voting machines or scanners serves only as a copy of the official paper ballot.

- Ballots are marked are on paper that meets the California regulations for printing (counterfeit resistance).

- Per Secretary of State regulations, ballots cast by voters with disabilities or overseas and military voters could use home computers to print ballots on ordinary paper, but returned via special mail envelopes. [A possible option.]

- Voting types to be considered:

    - Vote by mail
    - Vote on election day at a polling location (precinct voting)
    - Vote prior to election day at an early vote center
    - Vote by people with disabilities requiring special equipment (ballot marking device)

Decisions to be made

1. **Should precinct polling and vote centers use the same paper ballots as vote by mail?**

Background: If a voting machine is used to prepare ballots for printing, the paper ballots marked could use the same printing and layout as a vote-by mail ballot, or could have a simpler and shorter format listing just the contests and selected choices. The shorter format could be on smaller paper, possibly only a single sheet, vs a larger multipage scanned mail ballot. Voting machines (ballot marking devices) could be used only by voters with disabilities, while most voters at a precinct or vote center uses a normal mail ballot, or all voters there could use voting machines with printed ballots.

Mail-Only Format Pros:

- Only one style of ballot printing is required
- No need for precinct voters to use voting machines
- Central storage and recounting has all the same ballot size/type
- Reduced requirements for printers and possible problems with printer malfunction and paper jams.
- Mail ballot voting could be done with no electric power

Mail-Only Format Cons:

- Printing on large mail ballot paper, usually double sided requires special, possibly nonstandard, equipment.

2. **Should voting machines at a precinct or vote-center be used by all voters or only voters with special needs?**

Machines used by all non-mail voters Pros:

- Paper+Digital CVR has the highest security/integrity. Digital signatures can be printed on ballots to authenticate paper.
- Time to vote can be less than marking.
- Mistakes can be undone without needing another ballot to mark.
- Machines could read a QR code from a vote at home app to print a ballot immediately.
- Precinct vote counts are available at the end of the day without having to scan ballots centrally or at a precinct. (But scanning a ballot ID is required upon depositing the paper ballot to distinguish
cast vs abandoned ballots.)
- A separate non-mail ballot format from voting machines would be the same for ordinary voters and those with special needs.
- Extra machines provide redundancy vs a single disability-access machine.
- Vote centers could handle all ballot types without the need for a ballot on demand system.
- Election-day machines could only allow authorized write-ins to be recorded, simplifying write-in voting and enabling end of day totals that include write-ins.

Machines used by all non-mail voters Cons:

- Requires more equipment.
- More possible problems with paper jams and printer malfunction.

- Mail ballot processing is still a separate sizable operation

3. **If voters at precincts use mail ballots for marking, should ballots be scanned centrally or at the precinct/vote center?**

Precinct ballot scanner Pros:

- Overvotes/Undervotes and invalid or ambiguous marks can be reported by the scanner prior to submitting
- Precinct vote counts are available immediately at the end of the day
- Reduces the need for central scanning equipment

Precinct ballot scanner Cons:

- More equipment is required than central-only scanners
- If the scanner and ballot collection is integrated (the scanner feeds into a ballot collection bin), custom equipment may be required.
- Not required if all ballots are printed by a voting machine

4. **If a precinct scanner is used, does the scanner need to be integrated with a ballot collection bin?**

Background: Custom-built precinct ballot scanners sold by election vendors usually include a ballot collection bin within same box containing the scanner. The scanner feeds the ballot into the collection box, or else reverses the paper feed in case of an error detected. An integrated device likely means custom hardware vs COTS equipment.

5. **If a precinct scanner is used, does it need to include an imprinter to record a ballot/scan ID?**

Background: To match a specific paper ballot in a ballot box with a scanned CVR, either the order of insertion must be maintained, or a unique identifier associated with the scan needs to be added to the ballot. Alternatively, ordered ballots could be rescanned centrally during a recount or audit and matched as a batch with the original scan.

6. **If a voting machine is used to print ballots, does the ballot collection box need to have an integrated scanner?**

Background: Using a voting machine with voter-verified ballot does not constitute casting a ballot-- the act of submitting the ballot after verification is the cast ballot. Voters might choose to discard a ballot and revote, so a simple bar-code scanner is useful to match the electronic CVR with paper ballots submitted (i.e. exclude discarded ballots). Discarded ballots could be scanned instead, but a voter could still walk off with a ballot, or a ballot might not print correctly.

7. **Is voting equipment required to run off a battery (without outside AC power) for a set outage duration or all day?**

No outside power Pros:

- Eliminates extension cords and possible special power requirements.
- Voting can continue in a power outage.
- Some equipment (tablets and laptops) have a built in battery that can work during a power outage.

No outside power Cons:

- Limits the type of equipment used
- Might require special external batteries and power conversion

8. **What kind of printing technology should be used at a poll site or vote center?**

- Laser Printer (single/double sided)

  Pros:

  - High quality, durable printing
  - Toner lasts for a large number of pages
  - Fast printing

  Cons:

  - Requires AC power (limited life on backup power)
  - Tracking/replacing toner cartridges is required

- Ink Jet

  Pros:

  - Low power
  - Available as portable battery powered COTS

  Cons:

  - Ink cartridges drain quickly and dry out between elections
  - Ink can smear before drying
  - Head cleaning might be required

- Direct Thermal (on special paper)

  Pros:

  - Low power
  - No consumables that need monitoring and reloading

  Cons:

  - Requires special paper
  - Limited life - dissapearing ink
  - Temperature sensitive

- Lower resolution

- Thermal Transfer (uses a ribbon)
  Pros:

  - Low power
  - High quality printing

  Cons:

  - Ribbon usage needs to be tracked and replaced
  - Not normally used for letter size printers

9. **What size paper should be used for precinct voting and vote by mail?**

10. **What options should be provided to people with disabilities?**

    - Voting machines (BMD) at all precincts
    - Voting machines at selected precincts or vote centers with transportation provided
    - Vote by mail using home computer and printer

11. **Should "alternative format" printing used by voters with disabilities to vote by mail using home computers also be used for disability-access precinct voting?**

    Background: The California Secretary of State has approved 2 vendors that offer voting on a home computer with a ballot printed on ordinary paper and returned in a special envelope. This "alternative format" is approved for people with disabilities and military and overseas voters. Some states have used a similar system (e.g. Prime-III) for disability access voting at precincts.

12. **Does ballot collection order or CVR recordings need to be randomized to protect voter privacy (be disassociated by order of appearance at a precinct)?**