#SFOpenVoting

Freeing the software that runs our elections

Strange Loop 2018

Roan Kattouw

Why an open source voting system?

- What is a voting system?

- Why is free software (especially) important here?

- What software exists already?

- What are we doing in San Francisco?

Why use software for elections?

Dear San Francisco Voter,   September 13, 2016

Big Ballots Are Back
While we've experienced them before, and successfully met the challenges they bring, all of us must prepare again to handle and vote another large, multi-card ballot.

This election, voters living in the odd-numbered Supervisorial districts will receive five ballot cards. Voters living in the even-numbered Supervisorial districts have it a bit easier since they will receive four-card ballots.

CITY AND COUNTY PROPOSITIONS
市縣提案

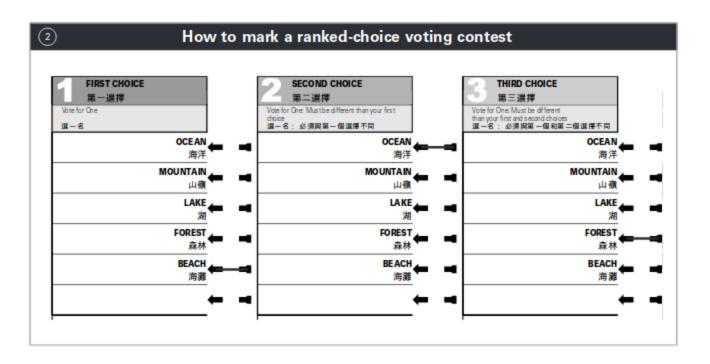|		
A	Shall the City authorize the San Francisco Public Utilities Commission to issue revenue bonds to build or improve the City's clean power facilities, with approval by two-thirds of the Board of Supervisors, and prohibit the PUC from financing construction of power plants that generate electricity from fossil fuels or nuclear power? 市府是否應在獲得市參議會三分之二的議員批准下，授權三藩市公共事業委員會發行收益公債來興建或改善本市的清潔能源設施，並且禁止公共事業委員會資助興建利用化石燃料或核能生產電力的電廠？	YES / 贊成 NO / 反對
B	Shall the City require appointed members of boards and commissions established by the Charter to forfeit their appointed seat when they file to run for state or local elective office? 市府是否應要求依市憲章設立之理事會和委員會的被任命成員在申請參加州或地方民選職位競選時，放棄被任命的席位？	YES / 贊成 NO / 反對
C	Shall the City impose a new gross receipts tax of 1% on revenues a business receives from leasing warehouse space in San Francisco, and 3.5% on revenues a business receives from leasing some commercial spaces in San Francisco, to fund quality early care and education for young children and for other public purposes? 市府是否應對企業在三藩市出租倉庫空間的所得，徵收一項新的1%營業總收入稅，並對企業在三藩市出租商業空間的所得，徵收3.5%的營業總收入稅，來資助優質托兒服務、幼兒教育以及其他公共用途？	YES / 贊成 NO / 反對
D	Shall the City impose a new gross receipts tax of 1.7% on revenues a business receives from leasing some commercial spaces in San Francisco, to fund homeless services, housing for extremely low- to middle-income households and for other public purposes? 市府是否應對企業在三藩市出租某些商業空間的所得，徵收一項新的1.7%營業總收入稅，來資助無家可歸者服務、收入極低至收入中等家庭的住房以及其他公共用途？	YES / 贊成 NO / 反對
E	Shall the City ordinance prohibiting the sale of flavored tobacco products in San Francisco take effect? 市府是否應讓禁止在三藩市銷售調味煙草產品的市法令生效？	YES / 贊成 NO / 反對
F	Shall the City establish, fund and run a program to provide legal representation for all residential tenants in San Francisco facing eviction? 市府是否應設立、資助並管理一項計劃，為三藩市所有面臨迫遷的住宅租客提供法律代表？	YES / 贊成 NO / 反對
G	Shall the City collect an annual tax of $298 per parcel for investment in education, subject to certain exemptions including those for senior citizens? 市府是否應向每地塊徵收298元年度稅金以用於教育投資，但有若干情況可獲豁免，包括長者？	YES / 贊成 NO / 反對
H	Shall the City set a policy for when police officers can use tasers and authorize the Police Department to purchase tasers for all officers, subject to specific conditions? 市府是否應制定政策規定警察何時可使用電擊槍，並在特定條款約束下授權警察局為所有警察購買電擊槍？	YES / 贊成 NO / 反對
I	Shall the City adopt a policy not to encourage professional sports teams from other cities to move to San Francisco and to oppose any sports team ownership group attempting to avoid payment of an outstanding public debt? 市府是否應採取政策，不鼓勵其他城市的職業球隊搬至三藩市，並反對任何球隊的所有權集團企圖逃避支付未償的公債？	YES / 贊成 NO / 反對

Big ballots: November 2016 election

- 3 federal offices (President+VP, Senate, House)

- 3 state offices (Assembly, Senate, Judge)

- 4 city/regional offices

- 17 statewide propositions (51 through 67)

- 25 city/regional propositions (A through X and RR)

Big ballots: November 2016 election

- Up to 52 contests on one ballot

- 60 contests total

- 4-page double-sided ballot, 5th page in some districts

- 414k votes -> ~1.8M ballot cards

Ranked choice voting

- Board of Supervisors (30k-40k votes per district)
- Mayor (253k votes in June 2018)
- Requires algorithm to compute result

	Round 7			Round 8			Round 9		
	Votes	%	Transfer	Votes	%	Transfer	Votes	%	Transfer
MICHELLE BRAVO	0	0.00%	0	0	0.00%	0	0	0.00%	0
LONDON BREED	96392	39.22%	+6375	102767	43.27%	+13210	115977	50.55%	0
MARK LENO	64128	26.09%	+4579	68707	28.93%	+44724	113431	49.45%	0
JANE KIM	63261	25.74%	+2782	66043	27.81%	-66043	0	0.00%	0
RICHIE GREENBERG	0	0.00%	0	0	0.00%	0	0	0.00%	0
ANGELA ALIOTO	21981	8.94%	-21981	0	0.00%	0	0	0.00%	0

Reasons to use software

- Managing large amounts of data
    - 400k+ ballots with 50+ items -> ~20M total votes
    - Ranked-choice elimination rounds
- Inputting all that data
- Reducing voter error
    - Warn against / prevent invalid votes
- Accessibility features

Types of voting systems

- Hand-counted paper ballots

- Paper ballots with optical scan

- Direct recording (levers)

- Direct recording electronic (DRE)
    - With or without voter-verified paper audit trail (VVPAT)

DREs without paper trail are bad

- Even if the software is free and open! (Which it isn't)

- No way to audit the results, no recounts

- 14 states use this
  - Statewide in NJ, DE, SC, GA, LA
  - Some counties in PA, TX, KS, FL, TN, AR, IN, KY, MS
  - VA decertified DREs in 2017, switched in 2 months
  - Lawsuit against Georgia demanding paper ballots

- Banned in many countries, unconstitutional in Germany

Using software safely

- Use paper ballots
- Audit everything
    - CA: 1% audit
    - Emerging: Risk-Limiting Audit (RLA)
- Publish data
    - SF: detailed ranked-choice data
    - Future: images of every ballot scanned

What we use in San Francisco

- Proprietary system by Dominion (now Sequoia)

- Hand-marked paper ballots optically scanned at the precinct

- DREs with paper trail for accessible voting

- Vote-by-mail ballots scanned at City Hall

Voting system hardware

- Accessible voting device

- Precinct ballot scanner

- Central ballot scanner for vote-by-mail

Voting system software

- Ballot layout

- Ballot scanning and interpretation

- Ballot adjudication

- Tabulation
    - Non-trivial for ranked-choice elections

- Results reporting

- Audit assistance

Problems with proprietary systems

- Expensive (SF: $10M up front + $1.1M/year)

- Source code kept secret from public and city govt

- Making changes is hard / impossible

- Small market: 3 major vendors

- Vendor lock-in

- Security issues

Open source is important here

- Election software is critical infrastructure

- Trust in election integrity is important

- Antiquated voting tech is a problem
    - Often too expensive to replace

Practical advantages of open source

- Cheaper over time and across jurisdictions

- Innovation and adaptation easier and cheaper

- Investment for the common good
  - Developing jurisdiction spends more, others save
  - Need state/federal funding

Other free software efforts

Prime III / One4All

- Used in New Hampshire since 2016

- Prime III is GPLv3; One4All is NH's augmented version

- Accessible voting using COTS hardware

- Prints ballots; does not count votes

- QR code scanner to print pre-filled ballot from phone

ColoradoRLA

- Software facilitating risk-limiting audits

- Built in 2017 by FreeAndFair for Colorado under AGPLv3

- Phase 2 in progress

- Statistical method to verify optical scan accuracy

Risk limiting audits

- Software interpretation of ballot linked to ballot ID

- Small # of ballot IDs randomly selected

- Physical ballots located and compared to interpretation

- Repeat until probability of winner being wrong is low enough

Other projects

- Travis County, TX: STAR-Vote
  - Design for a full voting system
  - "with a view toward ultimately" releasing as open source
  - Abandoned in 2017
- Los Angeles County, CA: VSAP
  - Full "voter-centered" redesign, cost $282M
  - Will count mail votes in Nov 2018
  - Advertised as open source, but code is not available

San Francisco's project

SF project goals

- Open source from the start (GPLv3)

- Commercial, off-the-shelf (COTS) hardware

- Openly licensed documentation (CC-BY-SA)

- Cheap and easy to reuse

- Set a model for state, country

SF project history

- 2005 - Activists first introduce idea
- 2008 - BoS creates Voting Systems Task Force (VSTF)
- 2011 - VSTF recommends open source
- 2014 - Unanimous Board of Supervisors Resolution
- 2015 - Unanimous Elections Commission Resolution
- 2016 - Mayor & BoS budget $300K for planning phase
- 2017 - Commission forms Technical Advisory Committee
- 2018 - $1.7M budgeted for development

(Some) Supporters

ELECTRONIC FRONTIER FOUNDATION
DEFENDING YOUR RIGHTS IN THE DIGITAL WORLD

COMMON CAUSE
Holding Power Accountable

(GitHub)

CODE FOR SAN FRANCISCO

(Open Source Initiative)

(SF Tech Dems)

SAN FRANCISCO DEMOCRATIC PARTY

Harvey Milk
LGBT DEMOCRATIC CLUB

Verified Voting

FairVote
FOR A MORE PERFECT UNION

National Election Defense Coalition

Press coverage

CIVIL GRAND JURY | 2017-2018

CITY AND COUNTY OF SAN FRANCISCO

Open Source Voting in San Francisco

"If you want to go quickly, go alone. If you want to go far, go together."

Proposed first iteration

- Focus on vote-by-mail ballots (64.6% in June)
    - Scanner hardware+software
    - Software for layout encoding, tabulation, results reporting
    - (+batch management, auditing)
- ~6 devices instead of ~600
- Controlled conditions, highly trained operators
- Easier to phase in than precinct scanners, accessible devices
- Modular procurement

Current status

- OSVTAC meeting monthly, developing recommendations

- Feasibility study came back w/ deeply flawed report

- $1.7M in city budget for 2018-2020

- City hiring a project manager

- Proposal for state matching funds failed

How you can help

- Support
  - Sign up as a supporter, get email newsletter
  - Follow @SFOpenVoting on Twitter
- Contribute
  - Submit PRs to our recommendations: osvtac.github.io
  - Apply for / advertise project manager job: bit.ly/votingjob
- Advocate
  - Build support in your county/state
  - Contact elected officials, election administrators

Contact

- roan.kattouw@sfgov.org (committee)

- roan.kattouw@gmail.com (personal)

- @catrope on Twitter

Links

- https://osvtac.github.io

- Apply for the project manager job! bit.ly/votingjob

- Follow @SFOpenVoting on Twitter

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Includes material by Chris Jerdonek