OPEN SOURCE VOTING SYSTEM
TECHNICAL ADVISORY COMMITTEE

ELECTIONS COMMISSION
City and County of San Francisco

Christopher Jerdonek, Chair
Larry Bafundo, Vice Chair
Carl Hage
Roan Kattouw
Tony Wasserman

Don Chan, Secretary

September 5, 2017

To: Elections Commission

From: Open Source Voting System Technical Advisory Committee (OSVTAC)

RE: OSVTAC Report #1 (September 2017)

This report is the first written report of the Open Source Voting System Technical Advisory Committee (OSVTAC, or TAC) to the Elections Commission.

The TAC Bylaws say, "the first report shall be due three months after the TAC is fully constituted." Since the Commission finalized the appointment of the TAC's fifth member on June 2, 2017, this report was due September 2, 2017 (which falls on a Saturday of Labor Day weekend).

Below is a description of the TAC's activities during the period covered by this report, which is up to and including the TAC's second meeting. Since the Committee approved this report during its second meeting, the report does not fully cover the second meeting. More information on the second meeting can go in the Committee's next report.

Meetings

The TAC has had two meetings so far: Wednesday, July 26 at 6:00 p.m. and Wednesday, August 30 at 6:00 p.m.

The approved minutes for the July 26 meeting are attached to this report.

Sunshine Ordinance

At the first meeting, Deputy City Attorney Joshua White presented an overview of the Sunshine Ordinance to the Committee members.

TAC Website

The TAC now has its own website separate from the Commission's website. It is located at: https://osvtac.github.io. The site is hosted on the popular open-source developer website GitHub (https://github.com), which hosts most open source projects in the world.

Using GitHub has a number of advantages. It gives the TAC more freedom to try new things and use modern tools. It makes the TAC (and consequently also San Francisco's open source voting project) more visible to the wider open source community. It is also more transparent as the "code" for the site is public and can be commented on.

A screenshot of the home page is attached to this report.

Email Addresses

Most of the TAC members elected to receive and use an SFGov email address for TAC-related business.

Vice Chair

At its first meeting, the TAC elected Larry Bafundo to be Vice Chair.

"Recommendations" Document

At its second meeting, the TAC approved the first version of its "Open Source Voting System Project Recommendations" document. This is included as an attachment to this report.

This document is a "living" document that the TAC will work on over time and that members of the public will be able to contribute to and provide feedback on. The model that TAC is using to work on the document is similar in certain ways to how open source software projects are conducted.

The document will be written incrementally and in public view. Just as TAC's website is hosted on GitHub, the Recommendations document will also be stored as its own project on GitHub. The TAC will also experiment with using GitHub's project management tools to solicit feedback and contributions from the public, namely its "issues" tracker and "pull request" workflow.

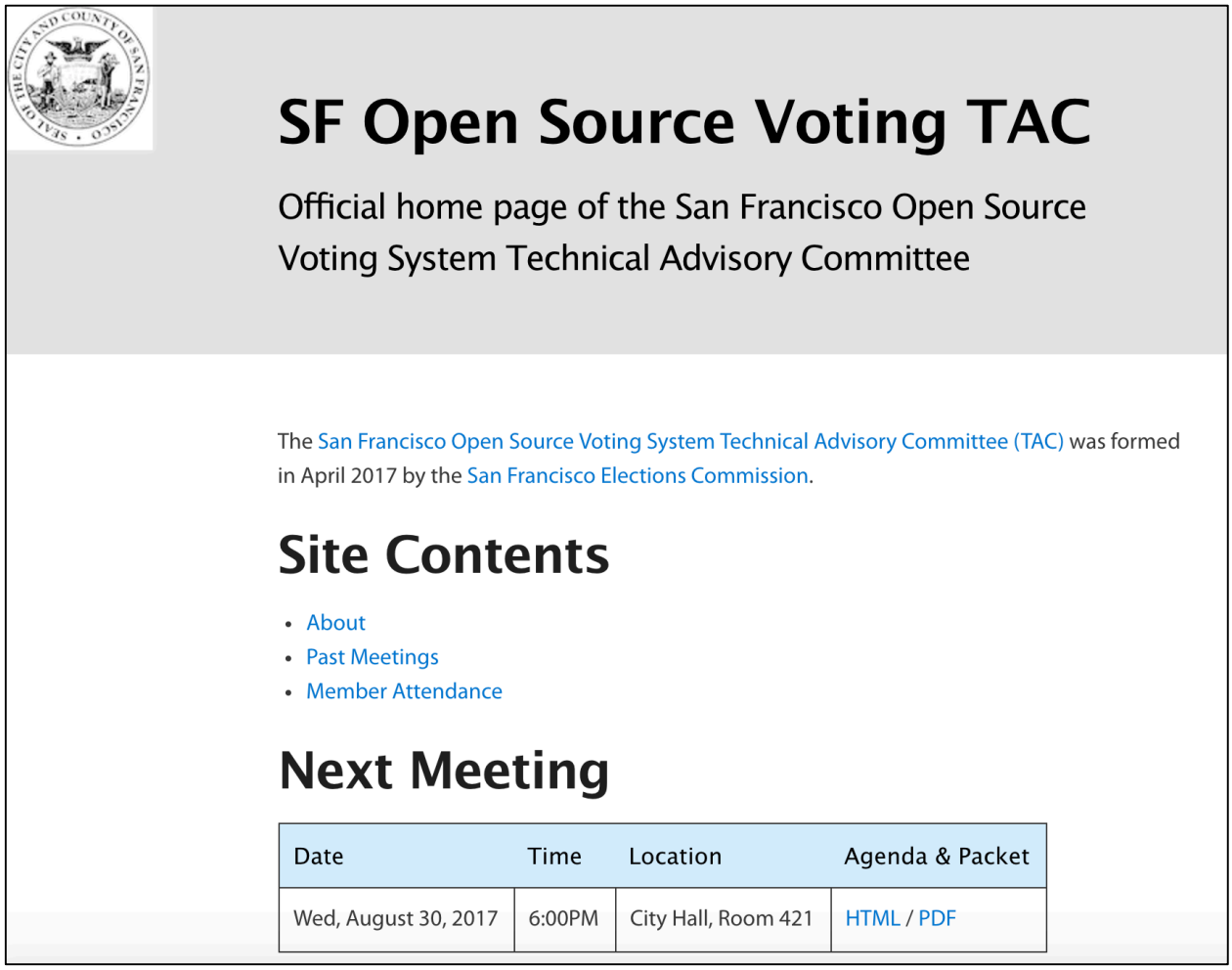
More information about this is included in the introductory sections of the Recommendations document.

Attachments

1. Screenshot of TAC website home page
2. Approved Minutes for TAC's July 26, 2017 Meeting
3. Approved "Open Source Voting System Project Recommendations" document (dated September 5, 2017)

Attachment 1

Screenshot of TAC website home page: https://osvtac.github.io



SF Open Source Voting TAC

Official home page of the San Francisco Open Source Voting System Technical Advisory Committee

The San Francisco Open Source Voting System Technical Advisory Committee (TAC) was formed in April 2017 by the San Francisco Elections Commission.

Site Contents

- About
- Past Meetings
- Member Attendance

Next Meeting

Date	Time	Location	Agenda & Packet
Wed, August 30, 2017	6:00PM	City Hall, Room 421	HTML / PDF

SF Open Source Voting TAC

Official home page of the San Francisco Open Source Voting System Technical Advisory Committee

Meeting Minutes: July 26, 2017

Open Source Voting System Technical Advisory Committee
Christopher Jerdonek, Chair
Larry Bafundo
Carl Hage
Roan Kattouw
Tony Wasserman

Elections Commission
City and County of San Francisco
Don Chan, Secretary

MEETING MINUTES

Open Source Voting System Technical Advisory Committee
of the San Francisco Elections Commission
Wednesday, July 26, 2017

Order of Business

1. **Call to Order & Roll Call**

   The meeting was called to order at 6:02 p.m. All members of the committee were present at roll call. Deputy City Attorney Josh White was also present.

2. **Introductions**

   Each member gave a short self-introduction about themself and their professional lives.

3. **General Public Comment**

Mr. Brent Turner commended the Committee members for participating in this important endeavor not just for San Francisco but for the nation in general.

4. **Sunshine Ordinance Overview**

   Presentation by Deputy City Attorney Joshua White regarding the Sunshine Ordinance, reviewing how the committee can and cannot communicate with each other in order to meet the restrictions on public meetings and public records. Highlighted points were to: not hold substantive discussions on a single topic with a quorum of the committee members, either en-masse, or in seriatim, either in oral or written fashion. Substantive discussions with a majority of the committee can only be held at a publicly noticed meeting.

   For all written communications that deal with the work of the committee (by whatever means: electronic or hardcopy), it can possibly be considered public record and subject to public records requests.

   A question about doing collaborative work in docs via google docs? Deputy City Attorney White said that creating such documents that could be shared by every member of the committee and be edited would probably constitute a meeting. And despite it being a public document that everyone can share, it would not meet the public meetings notice requirement. If a document (or work product) were openly distributed, any reply to it would appear to be a substantive discussion, and not allowed.

   All of these restrictions are to preserve as open a process of government as possible so the public can be included in each step.

   Committee members asked if they could get individual city email addresses to use for their committee work, so it could be kept separate from their personal emails. Deputy City Attorney White will look into that.

   Public Comment: None.

5. **Committee Goals**

   President Jerdonek commented that this item was where the committee members could have a brainstorming session and offer ideas for what the committee should take up. He first recounted the past events leading to the committee's establishment. In 2011, the Voting Systems Task Force issued a report and recommendations on open source voting in San Francisco. In 2014, the Board of Supervisors passed a resolution supporting open source

voting. The Elections Commission passed a resolution in November 2015 regarding open source voting. A year ago, the Mayor and Board of Supervisors allocated $300,000 towards a planning phase for the project. The Department will hire a staff person to assist in voting system related tasks and enlist a contractor to develop a specific business model for what the project will look like and what it will take to implement it. This plan has to be ready by January 2018 for consideration of funding. Concurrent to that project, the Department must take steps to secure an elections system that can be utilized when the current contract with Dominion expires at the end of 2018, but one which will not conflict with the eventual open source system that is being developed.

President Jerdonek referred to some of the language in the Bylaws that addressed goals of the committee, and then he talked about some processes; suggesting that nothing in the process should be set in stone and unalterable; that there should always be room to revise and improve. Another thought was to have something like a body of resources and recommendations that can be publicly viewed and commented on. Also inviting subject matter experts to speak on specific topics.

Member Bafundo offered 3 goals: 1) informing the factors that will drive the decision that will fund the construction of the system, 2) describing the key parameters, decision points, and trade-offs, for example between security and accessibility, and 3) recommendations for an approach.

Member Hage commented that the committee could set technical requirements, for example auditability and trackability.

Member Wasserman asked if there would be a list of non-functional requirements vs. functional requirements (e.g. shall do this or that). But success or failure many times is based on the non-functional requirements.

Member Hage said it should be data-driven, defining a set of data and seeing how it goes from one step of the process to another: to seek smaller programs (less lines of code) to keep costs down, the problem being many parts of that are the property of private vendors

Member Bafundo commented that the committee should stay away from being overly prescriptive and maintain its role as guidance, therefore, setting parameters.

President Jerdonek said the committee should think about how to articulate things like this in a format that the Department can understand, and to concentrate on higher-level topics

focusing on what's appropriate for the phase that the Department is at now.

A question was asked about what the deliverables and target goals are. The question was answered that anything that is currently the responsibility of the Dominion system now, including hardware and software. It was suggested to possibly arrange a tour of the City's system to get a better picture of what elements are included.

There was a question of how far forward the committee should be looking in its recommendations. President Jerdonek thought not beyond current election laws (anticipating what future legal proscriptions may arise). But at the same time, not just focusing on San Francisco and State election laws, but federal laws also. Member Kattouw felt the committee should produce a set of design principles (and not a prescriptive solution) that speaks to modularity and accessibility in its approach.

The discussion was leaning toward the committee producing a document that laid out principles and not prescriptions that could be used to engage subject matter experts and the general public.

Public Comment: Commissioner Donaldson commented that it would be important to define statutorily what the scope and objectives of the committee are, keeping in mind that it cannot directly inject changes to extant contracts but can be a reference to developed materials/documents and recommend changes. He felt the committee could create a manifesto so to speak which lays out parameters, both functional and operational, including their principles, e.g. transparency, auditability.

Such a document could address the issues from an election cycle perspective and a voting cycle perspective (all the processes involved in holding an election vs all the steps in the actual voting process). He also thought it good for them to do the tour.

Mr. Brent Turner mentioned some issues brought up by committee members such as reducing lines of code, and referred to Ka-Ping Yee as a resource for this. For database management, he named a David Webber as a resource. He suggested the committee talk with Brian Fox, another noted name in the open source community.

He wanted to hear the committee's position or thoughts on mobile voting (via smartphones, etc) because it is a subject not dealt with by the open source community.

He said that while auditability is fine, there is no substitute for first counts in the precincts. His

final points were to make sure the system was General Public License and not the Open Public License; and that it is open source and not disclosed.

6. **Administration**

President Jerdonek commented that the Bylaws say that another committee member needs to attend Elections Commission meetings to report on what the Committee is doing and to answer any questions. Member Kattouw offered to do that but can't attend August. Member Wasserman agreed to attend the August meeting. Further, the Bylaws state the Committee produces reports to the Commission every 3 months. For the first report (due Sept) it would have to be written before the August Commission meeting and presented then, and so will be fairly limited in scope. President Jerdonek offered to draft the first report and let the rest of the committee review it for revision and finalization at the August 30 Committee meeting.

He said that if committee members ever had materials for the Committee's agenda packet, to give them to himself or Secretary Chan for distribution.

The Committee website: President Jerdonek reviewed that the Commission's web page is part of the same system as the Department of Elections. It is a Drupal-based system, but he suggested using GitHub Pages. He offered to "stub" out a home page for the next meeting to review. This could serve as the City's first official page for the open source voting project.

How to solicit feedback from the public: have a document hosted on Github as its own Git repository, written in Markdown format. It would be a "living document" that the committee works on. People could issue "pull requests" to contribute pieces to the document and those could be discussed at a meeting, with any decisions made as to revising the document being an administratively easy task to perform.

President Jerdonek said that what San Francisco comes up with will basically be a guide for the rest of the nation as there is no other effort being carried out that is committed to an entirely open source system (Los Angeles and Travis Counties have not clearly stated they are targeting an open source system). A request was made for some background information on the New Hampshire system. President Jerdonek said he'd look into that. Another comment was made as to the scope of the San Francisco project, that if it was going to be developed with an eye to being a model for the rest of the nation, it would have to include elements addressing the particular laws and regulations for voting systems in each locale. Such a requirement would have to be specifically stated.

Member Bafundo asked whether we are dismissing the Los Angeles and Travis County efforts. President Jerdonek said they were not dismissing them but they have no assurances of being open source. He was open to collaborative work.

7. **Topics for future discussion**

   President Jerdonek said this agenda item was for the Committee to start thinking about how it wanted to organize a written document (e.g. sections and topics for them), and to come up with topics for future meetings.

   The following were suggested topics:

   - The results of the RFP: invite the winner to come to the Committee.
   - Speaking with someone from New Hampshire via video conference.
   - End-to-end verifiability, counties going to a vote-center model, procurement.
   - What requirements for an interim system will make phasing into open source easier.
   - Ways to implement and roll out the system incrementally, rather than a full-blown roll out. Interactions with other aspects of the interim system.
   - Open source not just about code, but documentation, testing, Creative Commons (e.g. Attributions License).
   - What recommendations are necessary now (in the development stage) so that long-term maintenance doesn't become a nightmare. Also: open-source governance.
   - President Jerdonek said there is no concrete project plan or timeline with milestones.
   - How to interact with the community.
   - Member Wasserman wanted clarity on the scope of the system's requirements that will be in the RFP, like whether it will ask for pieces that will be delivered sequentially, or will the entire system be completed at once.

   Member Kattouw mentioned that knowledge and understanding of how the elections are run in SF would beneficial to potential bidders for the development of the open source system.

Public Comment: Commissioner Donaldson said that EML should certainly be referenced. Also, video conferencing with experts should be pursued.

8. **Election of Vice-Chair**

   Member Bafundo expressed a willingness to serve as Vice Chair. President Jerdonek nominated Member Bafundo, and he accepted the nomination. There were no further nominations. The vote was unanimous to elect Member Bafundo as Vice Chair.

   No public comment.

Adjourned at 7:58 p.m.

SF Open Source Voting TAC

Official home page of the San Francisco Open Source Voting System Technical Advisory Committee

Open Source Voting System Project Recommendations

(Approved by OSVTAC on August 30, 2017.)

Last update: September 5, 2017

Note: these recommendations are a work in progress and not yet complete.

This document contains the recommendations of San Francisco's Open Source Voting System Technical Advisory Committee (OSVTAC, or TAC) for the City and County of San Francisco's open source voting system project, as of the version date that appears above.

The committee started this document on August 30, 2017 and will continue to work on it over time.

Substantive updates to this document occur by a vote of the committee at a committee meeting. Meetings occur approximately once a month. To learn more about the committee, visit the committee's website at https://osvtac.github.io. To learn how to suggest changes to this document, view the README document in the GitHub repository containing the source files for these recommendations.

1. Background

To provide context to the recommendations in this document, this section describes some of the history of the open source voting topic in San Francisco government.

In May 2007, the San Francisco Elections Commission passed a resolution that, among other things, established a policy that the Department of Elections give priority to voting systems that "provide the maximum level of security and transparency possible consistent with the principles of public disclosure." However, like today, no certified open source voting systems were available at that time. In December 2007, the Department signed a contract for a new voting system that was proprietary. The Department still uses this system today. The contract for this system ends at the end of 2018.

In November 2008, the Board of Supervisors passed an ordinance creating a Voting Systems Task Force (VSTF) to provide the City with recommendations on voting systems and related matters, including "models for [the] development of a voting system including proprietary, disclosed and open source software and hardware approaches."

In June 2011, the VSTF issued its final report, "Recommendations on Voting Systems for the City and County of San Francisco" (57 pages). Here are two excerpts from the recommendation text that mention open source (from page 52):

> **2.5.4.3 Transparency, Source Code Disclosure, Licensing, and Contingency Planning**
>
> 6. The DOE should give strong preference to a voting system licensing structure that gives San Francisco all of the rights provided by an OSI-approved license, even if the system is maintained by an external party.
>
> …
>
> 8. San Francisco should be an active participant in the movement toward more open and transparent voting systems. We acknowledge the complexity of moving from the existing marketplace toward more innovative voting systems and urge San Francisco to move steadily toward the goal of transparency—even if it must do so in incremental steps.

In December 2014, the San Francisco Board of Supervisors unanimously passed a resolution supporting the creation of open source voting systems and requesting that the San Francisco

Local Agency Formation Commission (LAFCo) conduct a feasibility study. In October 2015, LAFCo issued its final report, "Study on Open Source Voting Systems" (37 pages).

In November 2015, the Elections Commission unanimously passed an Open Source Voting Systems Resolution requesting that the Mayor and Board of Supervisors initiate and fund a project to develop and certify an open source voting system.

In August 2016, San Francisco Mayor Ed Lee signed the City and County of San Francisco's two-year budget for the 2016-2017 and 2017-2018 fiscal years. The budget allocated $300,000 towards the planning phase of an open source voting system project. Below are two excerpts from the proposed budget document that reference the open source voting project.

The section for the Department of Elections references the project on pages 204-205:

> As the City's current voting system nears end-of-life, the proposed budget includes $300,000 towards planning and development of a new voting system based on open source software. If completed, San Francisco would be the first City to do this. Development of an open source voting system would enable the City to own the voting system's software and to have a choice of publicly releasing it under open source license. Additionally, other jurisdictions as well as the general people could use, participate, and improve the software.

The section for the Committee on Information Technology (COIT) includes the project as one of five highlighted projects out of twenty-four, alongside initiatives like the City's new Digital Services Team, cybersecurity, and improving the City's network (pages 447-448):

> ANNUAL PROJECTS
>
> …
>
> Over the two-year period, the proposed budget recommends $15.7 million of General Fund COIT allocation to support 24 projects. Below are a few highlighted projects.
>
> …
>
> OPEN SOURCE VOTING SYSTEM
>
> As the City's current voting system is aging, the Department of Elections is exploring an opportunity to develop a new voting system based on open source software. If completed, San Francisco would be the first city to do this. Development of an open source voting

> system would enable the City to own the voting system's software and have a choice of publicly releasing it under an open source license. Additionally, other jurisdictions as well as the general public could use and improve the software. The proposed budget supports initial project planning and scoping of this project.

In April 2017, the Board of Supervisors approved the City's fourth Five-Year Information & Communication Technology (ICT) Plan for Fiscal Years 2018-22. The plan included the open source voting system project among four major IT projects under consideration for the future, alongside projects like Universal Broadband and Voice over Internet Protocol (VoIP). For example, on page 11:

> However, several future projects are currently being scoped out as potentially the City's next Major IT Project, including:
>
> …
>
> **Voting System Replacement:** The Department of Elections is currently investigating alternative voting systems, including the possibility of building an open-source system.

And on page 53:

> **Future Major IT Projects**
>
> In addition, the City has begun investigating what may become the next major technology project. Before beginning any new technology venture, the City recommends extensive planning and scoping to better understand the true cost of any new technology. The City has begun evaluating various different projects that may be considered as major investments, which include:
>
> …
>
> **Voting System Replacement:** The City's current voting system license is set to expire in 2018. Without a long-term contract in place, the City has an opportunity to pursue alternative voting systems that could promote transparency and more security. The City is currently investigating alternative options, including the possibility of building an open-source system.

In April 2017, the Elections Commission voted to create an Open Source Voting System

Technical Advisory Committee to "provide technical guidance, ideas, and support to the Elections Commission ('Commission') on ways to improve and help ensure the success of the City and County of San Francisco's open source voting system project." The Commission voted on the Committee's initial membership at its May meeting. The Committee was fully constituted on June 2, 2017, when the appointment of the fifth member was made final.

In May 2017, the Department of Elections issued an RFP for a contractor to "prepare a business case for developing an accessible, open source voting system." The RFP would use a portion of the $300,000 budgeted in August 2016. The contractor's deliverable will be due in January 2018, and it will inform the City's next budget process, which will begin around that time.

The Department of Elections' contract for its current voting system expires at the end of December 2018. The Director of Elections is aiming to lease an interim system from that point forward that can be used while an open source voting system is developed and certified. The RFP for the interim system may be issued as early as the fall of 2017.

2. Goals

This section discusses the goals, scope, and priorities of this document and the Committee.

The TAC's Bylaws say that the TAC's purpose is to "provide technical guidance, ideas, and support to the Elections Commission on ways to improve and help ensure the success of the City and County of San Francisco's open source voting system project." The focus of TAC's effort will be on establishing parameters and recommendations to guide the future development of the voting system.

The TAC will draw on its technical expertise, the expertise of other members in the community, and from similar efforts (including other open source voting efforts) to provide guidance in areas including but not limited to open source, requirements-gathering, design, architecture, development, documentation, security, testing, certification, manufacturing, deployment, system maintenance, strategies for procurement, and project management.

Scope

- This document will limit itself to current laws that San Francisco must satisfy, or to changes in law that San Francisco anticipates (e.g. possibly transitioning to the "vote center" model allowed by SB 450 of 2015-2016). In particular, the document will restrict itself to considering

paper-ballot systems.

- For the purposes of this document, "voting system" includes anything that is currently the responsibility of the voting system in use today. Responsibilities of a voting system include allowing voters to mark ballots (if not using pen and paper), counting ballots, reporting election results, and ensuring the integrity of the process. In addition, it may include ballot design and layout, as well as the functionality of a "remote accessible vote by mail system" as described in AB 2252 (2015-2016). It should also facilitate auditing the results of an election. The responsibilities of a voting system do not include the responsibilities of a voter registration system. The voting system may need to interoperate with the Department's election management system (EMS). If the ballots are pre-printed, the voting system need not be capable of printing ballots.

Priorities

- This document should prioritize high-level recommendations over low-level recommendations.
- This document should prioritize recommendations that are needed sooner rather than later.

Non-goals

- The Committee will not be designing or developing a voting system.
- The Committee will not be drafting detailed, low-level specs that the voting system should satisfy.
- The Committee will not be drafting an exhaustive list of requirements.
- The Committee will not make explicit attempts to accommodate internet voting in any form, nor voting methods not used in San Francisco. This does not preclude the Committee from recommending software designs or practices that could make such things easier to accommodate as a side effect.
- The Committee's recommendations will prioritize the voting system needs of San Francisco without emphasizing the needs of other jurisdictions. The needs of other jurisdictions will be considered insofar as it could help to develop and certify a system for use in San Francisco sooner (for example, if San Francisco were to collaborate with another jurisdiction and share costs). However, as stated in the previous point, this does not preclude recommending

designs and practices that could make it easier to accommodate other jurisdictions.

3. Assumptions

This section lists certain assumptions the committee has made while drafting this document.

- The Department of Elections does not have the expertise to conduct the day-to-day management of the development and certification of an open source voting system.

4. Resources

This section contains links to other resources and documents that may be useful for the project.

1. **San Francisco**
   - The San Francisco Department of Elections' RFP for the planning phase: REG RFP #2017-01 ("Preparing a Business Case for Developing an Accessible, Open Source Voting System"). In particular, see the list of links in Section I.A. starting on page 5 of the RFP PDF.

2. **Procurement**
   - U.S. Digital Services' TechFAR Handbook
   - 18F's Modular Contracting page

3. **Related Software Projects for US Government Elections**
   - ColoradoRLA, Free & Fair
   - Voting Systems Assessment Project (VSAP), Los Angeles County
   - Prime III, Dr. Juan E. Gilbert
   - STAR-Vote, Travis County, TX

4. **Additional Links**
   - GitHub
   - National Institute of Standards and Technology (NIST)
     - NIST Voting Public Working Groups
     - VVSG Principles and Guidelines
   - Open Source Initiative (OSI)
   - OpenCount

5. Recommendations

Interim Voting System

- The contract for the interim system (i.e. the system to be used after 2018) should permit all possible combinations of phasing in an open-source system alongside it. Examples of possible combinations include:
  - using open-source components to scan vote-by-mail ballots and the interim system to scan precinct ballots, or vice versa;
  - using an open-source accessible voting device in conjunction with the interim system's precinct-based scanner, or vice versa;
  - scanning the ballots of the interim system using an open-source scanner;
  - tabulating ballots scanned by an open-source scanner using the interim system's tabulation software;
  - using an open-source reporting and/or tabulation system with the output from the interim system's scanners;
  - using open-source components alongside the interim system in some subset of precincts (e.g. for a pilot rollout); or
  - using open-source components alongside the interim system in all precincts (e.g. for an incremental roll-out of the open source system).
- The requirements for the interim system should include interoperability with other systems, and the interoperability formats should be documented so they don't need to be reverse-engineered.

Requirements-gathering

This section contains recommendations about gathering requirements. For recommendations in relation to specific requirements, see the Requirements section below.

[TODO]

Requirements

This section relates to specific requirements rather than the process of gathering or articulating requirements.

- California SB 450 ("Elections: vote by mail voting and mail ballot elections") authorizes counties to conduct elections using vote centers. The Department of Elections should develop a sense as soon as possible of the likelihood of using vote centers because that could affect the requirements and design of the system. Making this decision earlier could decrease costs since the design and development wouldn't have to cover multiple scenarios.
- [TODO: think about ballot-marking device vs. manually marked ballots, and ballot on-demand vs. pre-printed ballots.]
- [TODO: should end-to-end verifiability be a requirement?]

Project Management

- As soon as possible, the Department should develop and publicize a rough project plan and timeline for the development and certification of an open source system, for the case that the project is funded. It is okay for this plan to be tentative. It can be refined over time as more information becomes available. Articulating even a tentative plan would also help in crafting an RFP for the interim system.
- [TODO: think about the division of responsibilities between the City and vendor. For example, who should be responsible for project management—the City or a vendor?]
- [TODO: brainstorm and document various incremental / phased roll-out possibilities, and possibly recommend preferred options.]
- [TODO: provide specific recommendations around agile.]

Open Source

This section covers topics related to open source.

- The development of the software should be done in public from the first day of development.
- All software should be licensed under an OSI-approved software license from the first day of

development.

- In addition to the software being open source, project documentation should be openly licensed. This includes things like design documents, installation and setup documents, user manuals, and testing documents. [TODO: recommend particular licenses for documentation?]
- [TODO: provide recommendations related to managing community feedback and contributions during project development. Also think about whether contributor license agreements (CLA's) should be required.]

Procurement

[TODO]

Software architecture and design

[TODO]

Software development

[TODO]

Hardware design

[TODO]

Documentation

[TODO]

Security

[TODO]

Testing

[TODO]

Certification

[TODO]

Hardware manufacturing or assembly

[TODO]

Deployment

[TODO]

Software maintenance

[TODO]

Hardware maintenance

[TODO]

Published with GitHub Pages