



Brief Synopsis of Departments of Technology and Elections Developing an Open Source Program to Conduct Risk-Limiting Audits for Ranked-Choice Voting Contests

In August, 2023, the Departments of Technology (DT) and Elections received a CIO 100 Award associated with the departments developing an open source risk-limiting auditing (RLA) tool capable of auditing ranked-choice voting contests. The intent of the award is to recognize organizations that utilize innovated technology that optimizes or creates new processes that improve relations with customers. For purposes of this award, the City's voters represent the customers for DT and Elections.

The RLA tool represents the first auditing program that can assess the accuracy of a voting system when counting and tabulating votes in ranked-choice voting contests. While DT and Elections directly received the CIO 100 Award regarding the technical aspects of the tool, recognition must also be given to Professor Philip Stark from UC Berkeley, and Professors Michelle Blom, Vanessa Teague from Melbourne University and Peter J. Stuckey from Monash University for their substantial efforts in resolving the mathematical challenges related RLAs for RCV contests. Also, the Australian team developed a prototype that allowed for field-testing their algorithms.

DT, Elections, and the Professors joined in conducting the first RLA for RCV contests in San Francisco after the November 2019 election. This pilot of the RLA program demonstrated that the algorithms were sound, and that the program required significant upgrades for both users and for public observation of an RLA. This first pilot also was limited to auditing vote-by-mail ballots since the program, and underlying math, required that each ballot card be given a unique ID during tabulation. After the ballots were tabulated, the prototype would randomly select ballot cards to hand-count votes for specific contests. If the results from these randomly-selected ballot cards were accurate within the algorithms' specific limits, then the RLA process supported that the voting system properly tabulated and reported election results.

After the first pilot of the RLA program, DT and Elections determined to develop a more user-friendly version. Developing an RLA tool that was more intuitive and informative to both users and observers would not only benefit San Francisco, but also other jurisdictions, especially those that conduct elections using the ranked-choice voting method.

Elections' personnel used an updated version of the RLA program to audit contests for the November 2022 election. While greatly improved, the program still required support from the developers and the users were unable to independently utilize the tools through the entire audit. Fortunately, while preparing the next iteration of the RLA program, Professor Stark determined an approach to combine the auditing of cards that are assigned an ID when tabulated, and cards without such IDs. In San Francisco, Professor Stark's approach will allow for auditing vote-by-mail ballots which are assigned specific IDs when tabulated in City Hall, and polling place ballots which have no IDs assigned when tabulated at the polling places.

After the March 2024 election, DT and Elections will pilot the most recent version of the RLA program. This pilot will be the first test of any RLA program that combines the auditing of vote-by-mail ballots and polling place ballots. However, the March 2024 election will not include RCV contests, prohibiting a testing of the full scope the RLA program. A full testing of the RLA program will occur after the November 2024 election which will include several local RCV contests to audit.

Ultimately, after the November 2024 election, DT and Elections intend to provide the program to other jurisdictions. Further, if California again allows for RLA to replace current post-election tally processes, DT and Elections will seek formal approval from the California Secretary of State to allow other counties to use the City's RLA open source program to certify election results.