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28 March, 2017

Letter of Comment on the Audit Requirement in Senate Bill 406

The Honorable Anne R. Kaiser, Chair, Ways and Means Committee
The Honorable Alonzo T. Washington, Chair, Election Law Subcommittee
Maryland House of Delegates

Dear Chair Kaiser and Subcommittee Chair Washington,

We are a group of election integrity experts who have collectively been involved in dozens of election audits in dozens of jurisdictions. We note that the automated software audit of ballot images carried out by the state of Maryland in the 2016 election falls far short of best practice as recommended by, for example, the Presidential Commission on Election Administration [1] and the League of Women Voters [2]. We have written to the State Board of Elections and testified before it about this [3], and are writing again because we understand that the House is considering Senate Bill 406, which includes an amendment that would require exactly the same kind of audit statewide: an “independent automated software audit of the ballot images”.

Such an audit poses several problems:

Not independent: It is not clear that the proposed procedure can be referred to as an audit, because it cannot be independent of the voting technology, even if it is performed by a third party vendor. It relies on digital scans of the ballot—computer-generated and computer-manipulated data that are generated by the voting system and not verified by voters. Ballot scans, like all computer data, are vulnerable to error, alteration, deletion, and fabrication. The proposed procedure does not access the voter-verified paper ballots at all.

Cannot Detect Manipulation: The audit may be useful for detecting some types of error. However, in general it cannot, detect intentional alteration of ballot images.

Passing such an audit does not necessarily mean the results are correct: A finding of “no discrepancy” cannot verify the election outcome, because inaccuracies that arise from altered or erroneous scan data cannot be detected.

Not Transparent: It is not possible to observe an automated software audit, which transfers significant control to vendors. There is currently no standard for audit technology nor for testing third-party audit software. This might not matter in a fully transparent audit, but in this case, the public has no means to confirm whether the audit was conducted correctly. The state may find itself in a situation where the lack of transparency leads large numbers of voters to question election outcomes.

Given the strong opposition to this kind of audit among experts, and the importance of independent, public, and transparent audits to trustworthy and fair elections, we strongly recommend that the Maryland Legislature hold full hearings and perform a complete analysis on the risks, costs, and alternatives before passing audit legislation that is inadequate to ensure election integrity.

[1] <https://law.stanford.edu/sites/default/files/publication/466754/doc/slspublic/Amer%20Voting%20Expert%20draft%2001-04-14-1.pdf>

[2] http://lww.org/files/Report_ElectionAudits.pdf

[3] <http://www2.seas.gwu.edu/~poorvi/MarylandAudits>

Biographies

Harvie Branscomb is an electrical engineer, election technologist and election quality advocate. He has conducted numerous statutory election audits in Colorado. He has served as a credentialed watcher of elections across the state including several pilots of innovative tabulation and audit techniques. He served on several Colorado Secretary of State appointed advisory committees including one leading to the choice of the Uniform Voting System. Branscomb is a regular participant in public testimony on election rules and statutes. He is a board member of Coloradans For Voting Integrity. He is also CEO of StandbySoft LLC. Branscomb an A.B. Magna Cum Laude from Cornell University and S.M. (Master of Science) in Electrical Engineering and Computer Science from M.I.T.

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Joseph Kiniry, is the CEO and Chief Scientist of Free & Fair, a public benefit corporation whose goal is to foster trustworthy elections through trustworthy technology worldwide. He is also a Principal Investigator at Galois, where he leads programs in high assurance cryptography, rigorous engineering, and formal methods-based audits. His clients include federal agencies and large public corporations. Previously he was a Full Professor at the Technical University of Denmark (DTU). There, he was the Head of DTU's Software Engineering section. He also held a guest appointment at the IT University of Copenhagen. Kiniry has extensive experience in formal methods, high-assurance software engineering, foundations of computer science and mathematics, and information security. Specific areas that he has worked in include software verification foundations and tools, digital election systems and democracies, smart-cards, smart-phones, critical systems for nation states, and CAD systems for asynchronous hardware. He has fifteen years' experience in the design, development, support, and auditing of supervised and internet/remote electronic voting systems while he was a professor at various universities in Europe. He co-lead the DemTech research group at the IT University of Copenhagen and has served as an adviser to the Dutch, Irish, Danish, and U.S. governments in matters relating to electronic voting. Kiniry has a Ph.D. from California Institute of Technology (Caltech).

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Mark Lindeman is a political scientist whose research includes public opinion, political behavior, and election verification issues. His work with post-election vote tabulation audits includes writing several co-authored methods papers; serving as executive editor of the 2012 white paper "Risk-Limiting Audits: Why and How" on behalf of a multidisciplinary working group; and advising officials and advocates in several states about audit implementation. He is co-author of *Public Opinion* (third edition: Perseus Westview, 2015). Lindeman has a Phd from Columbia University.

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Neal McBurnett is an independent consultant in election integrity and security. He has worked for Bell Labs, Internet2 and Databricks. He has worked to improve election integrity since 2002 by pioneering post-election audits, working with election administrators, legislators and secretaries of state. He did the first risk-limiting audit in Colorado, and collaborated on Colorado's Risk Limiting Audit project and ballot-level risk-limiting audits that reached new levels of efficiency and scale. He also audited the innovative Scantegrity end-to-end-verifiable election in Takoma Park MD in 2011, and is a member of the STAR-Vote design team.

McBurnett has also worked on data format standards for elections via the IEEE and the US Election Assistance Commission (EAC), and is active with the Election Verification Network. McBurnett has a BS in computer science from Brown University and an MS in computer science from University of California, Berkeley.

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Ronald L. Rivest is the Institute Professor of Computer Science in MIT's Dept. of Electrical Engineering and Computer Science. He is a member of MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL), a member of the lab's Theory of Computation Group and is a leader of its Cryptography and Information Security Group. He is a founder of RSA Data Security and an inventor of the RSA public-key cryptosystem, and a co-founder of Verisign and of Peppercoin. Professor Rivest has research interests in cryptography, computer and network security, voting systems, and algorithms. He is a member of the National Academy of Engineering, the National Academy of Sciences, and is a Fellow of the Association for Computing Machinery, the International Association for Cryptographic Research, and the American Academy of Arts and Sciences. He is also on the EPIC Advisory Board.

Together with Adi Shamir and Len Adleman, Rivest was awarded the 2000 IEEE Koji Kobayashi Computers and Communications Award and the Secure Computing Lifetime Achievement Award. He also received, together with Shamir and Adleman, the 2002 ACM Turing Award and the 2009 NEC C&C Prize. He received an honorary degree from the University of Rome. He is a Fellow of the World Technology Network and a Finalist for the 2002 World Technology Award for Communications Technology. In 2005, he received the MITX Lifetime Achievement Award; in 2007, he received both the Computers, Freedom and Privacy Conference "Distinguished Innovator" award and the Marconi Prize. In 2008, he received an honorary doctorate from the Louvain School of Engineering at the Universite Catholique de Louvain (UCL). In 2010, he was awarded MIT's Kilian Faculty Achievement Award. He has extensive experience in cryptographic design and cryptanalysis, and served as a Director of the International Association for Cryptologic Research, the organizing body for the Eurocrypt and Crypto conferences, and as a Director of the Financial Cryptography Association.

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E. John Sebes is one of the two original co-founders and Chief Technology Officer ("CTO") for the U.S. based non-profit public benefit corporation, the Open Source Election Technology Institute ("OSET"). He leads all aspects of technology strategy, vision, architecture, engineering and development for the TrustTheVote Project – the flagship effort of the Institute.

Sebes has been a software developer, technical consultant, and CTO, working in several areas—network infrastructure, application frameworks, embedded systems, critical infrastructure, datacenter operations—with strong common themes of risk management, security, privacy, and reliability. Innovation and tech transfer have been another consistent theme, in settings as varied as government-funded R&D, venture-backed start-ups, professional services, academia, and non-profits. Sebes is a co-author of 12 patents and 20+ publications.

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Pamela Smith is President of Verified Voting. She provides information and public testimony on verified voting issues at federal and state levels throughout the US, including to the US House of Representatives Committee on House Administration. She oversees an extensive information resource on election equipment and the regulations governing its use at the federal level and across the 50 states. Ms. Smith is co-editor of the "Principles and Best Practices for Post-Election Audits," co-author of "Counting Votes 2012: a State by State Look at Election Preparedness" and a contributing author for *Confirming Elections: Creating Confidence and Integrity through Election Auditing*.

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Howard Stanislevic has been a computer network engineer for over 25 years in NYC working in various industries including telecommunications, airlines and advertising. He has worked on such diverse projects as domestic satellite digital audio transmission systems and the Washington-Moscow "Hotline." In his spare time, he has worked with the Internet Engineering Task Force and has contributed to several Requests for Comments (RFCs—formalized peer-reviewed memoranda addressing and defining Internet standards). He has been studying the e-vote-counting problem since 2004, and has become a full-time advocate for verified elections (not just "verifiable" ones). He co-authored the first risk-based statistical audit law in the nation, NJ C.19:61-9 (PL 2007 Ch. 349) and papers on election auditing, voting system reliability and standards published by The American Statistical Association, Verified Voting and VoteTrustUSA. He has contributed to NY State's Voting System Standards and two drafts of NY's Election Auditing and Recanvass regulations.

Philip B. Stark is Professor of Statistics Associate Dean of the Division of Mathematical and Physical Sciences, and Director of the Statistical Computing Facility at the University of California, Berkeley. Stark serves on the Board of Advisors of the US Election Assistance Commission. He developed the notion of "risk-limiting audits," which are now required by the state of Colorado (C.R.S. 1-7-515) and are part of audit-related legislation in California: California AB2023, SB360, AB44. He served on [California Secretary of State Bowen's Post Election Audit Standards Working Group](#). Stark has published more than one hundred fifty articles and books, served on the editorial board of several

scientific journals, and lectured at universities and professional societies in more than twenty-five countries. He has consulted for the U.S. Department of Justice, the Federal Trade Commission, the U.S. Department of Agriculture, the U.S. Census Bureau, the U.S. Department of Housing and Urban Development, the U.S. Department of Veterans Affairs, the California Attorney General, the California Highway Patrol, and the Illinois State Attorney. He has testified to the U.S. House of Representatives Subcommittee on the Census; the State of California Senate Committee on Elections, Reapportionment and Constitutional Amendments; the State of California Assembly Committee on Elections and Redistricting; and the State of California Senate Committee on Natural Resources. Stark received the University of California Chancellor's Award for Public Service for Research in the Public Interest and the Leamer-Rosenthal Prize for Transparency in Social Science.

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Paul Stokes spent most of his career at Sandia National Laboratories conducting research, development and analysis of technologies for arms control compliance verification and intelligence, and later at the International Atomic Energy Agency in Vienna, Austria, conducting nuclear inspections in Iraq, and at the Comprehensive Nuclear Test Ban Treaty Organization, also in Vienna, developing on-site inspection techniques.

Stokes has been engaged in election integrity activities since the 2004 election, when he worked with national organizations to pursue a recount, followed by support for legal action to investigate the accuracy of voting machines. Since that time, as coordinator for United Voters of New Mexico, Stokes has continued to work with state election officials and the Legislature to bring the uniform use of paper ballots throughout the state, and post-election audits to verify with high confidence the accuracy of voting machines. He continues to work on Election Integrity by advocating methods to improve voter access to the polls. Stokes has B.S. and M.S. degrees in Electrical Engineering from North Dakota State University and the University of New Mexico respectively.

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Poorvi L. Vora is Professor of Computer Science at The George Washington University. Her research focus has been on end-to-end independently verifiable (E2E) voting systems which enable voters and observers to audit election outcomes without requiring them to rely on the trustworthiness of election technology or unobserved election processes. Vora was a member of the team that deployed polling-place, paper-ballot-based, E2E voting system Scantegrity II in the Takoma Park elections of 2009 and 2011, and of the team that developed remote voting E2E system Remotegrity and accessible voting variant Audiotegrity, used in 2011. She has worked with the National Institute of Standards and Technology (NIST) on definitions of desired properties of E2E systems, and on information-theoretic models and measures of voting system security properties. Her research is funded by the National Science Foundation and the Maryland Procurement Office. Vora has a Ph.D from North Carolina State University.

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Luther Weeks is Executive Director of CT Voters Count. He is a retired software engineer, and a computer scientist who has been active for several years in voting integrity issues and citizen-lobbying the Connecticut Legislature and the U.S. Congress.

Weeks' efforts in Connecticut contributed to the passage of the paper record law in 2005 and the selection of optical-scan over DRE (touch screen) voting equipment in 2006. In 2007, he organized a coalition of citizens to observe Connecticut's post-election audits resulting in public legislative hearings across the state. He is also Executive Director of the [Connecticut Citizen Election Audit](#) and a Director of TrueVoteCT.

Spanning thirty-five years, Weeks led the initial implementations of database, personal computer, and artificial intelligence technologies for The Travelers, where he also led the evaluation and acquisition of commercial software. In the 1990's, for nine years, he was a field engineer and product manager for two data communications software start-ups. Weeks has a B.S. in Mathematics with distinction from Clarkson University and an M.S. Computer Science from Rensselaer Polytechnic Institute. He is Master Fellow of the Life (insurance) Management Institute.

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