OSET INSTITUTE
Briefing

Georgia State Election Technology Acquisition
Assessing Recent Legislation in Light of Planned Procurement

Prepared By:

Edward Perez
Global Director
Technology Development

Joy London
Associate General Counsel

Gregory Miller
Chief Operating Officer

March 2019

Executive Summary

Following the recent production of a Briefing on cost realities for the system of apparent choice in Georgia, the Institute took note of the apparent concerns over whether and to what extent recent state legislation (HB.316) ready for the Governor's signature would overly control the procurement options for Georgia's new voting system. This Briefing examines the legislation and parses language to clarify meaning in light of our particular domain expertise in election technology and technology public policy, and reviews the RFP to ascertain whether and to what extent its interplay with the legislation would unduly constrain procurement.

Importantly, our Briefing necessarily restricts our examination of HB.316 to the extent of its application to the acquisition of voting systems technology and does not address any other aspect of the legislation.

Findings

1. **HB.316 Protects Voters' Right to a Verifiable Ballot.** HB.316 is well drafted to protect a voter's right to ensure their ballot is counted as cast. In fact, it clearly constrains what kind of voting system technology can be acquired in order to ensure that Georgia voters can verify their ballot to be cast as accurately reflecting their intended choices.

2. **There is a Conflict Between HB.316 and the RFP as Drafted.** Accordingly, there is a constraint on the RFP as released by the requirements of HB.316 for "voter verifiable" ballots because the vast majority of Ballot Marking Devices (BMDs) in the marketplace do _not_ allow voters to verify the same choice data that the voting system in fact uses to tabulate votes.

v.7.5 March 2019   1

3. There is a Fundamental Definitional Problem. HB.316 does not define either "ballot" or "verifiable," therefore, it is unresolved whether the legislation adopts a formal or substantive definition of a ballot.

4. Strictly Construed, the RFP and HB.316 in Combination Greatly Constrains Technology Solution Options. Excepting two commercial solutions, a voter cannot verify the choices that are used for counting with today's BMDs, therefore, there is no way for the voter to verify what choices are actually being counted, and hence for the majority of solutions, the ballot cannot be said to be "verifiable" by the voter.

5. Strictly Construed ES&S ExpressVote, Dominion ImageCast X and Unisyn FreedomVote Product Cannot Qualify for Selection Under HB.316. As drafted, the RFP and HB.316 prohibit the selection of an ES&S system solution, and in fact, the Request For Proposal, in order to adhere to the letter of the new law of HB.316 would restrict the choice to a hybrid product offered by two vendors, Hart InterCivic or a traditional format ballot product from Clear Ballot.

Context

At the outset, it is important to contextualize the work in preparing this Briefing by the lead analyst Edward Perez, given his highly relevant credentials. Mr. Perez, a former Director of Product Management and also Manager of Professional Services for one of the three major commercial vendors, has for years provided analysis and responses to Request For Proposal (RFP) responses for major procurements of election technology, which required a strong understanding of solution architecture, contractual terms and requirements, and industry-standard terminology and practices. Moreover, Mr. Perez has and continues to perform competitive intelligence research, which has enabled him to become very familiar with product features, pricing, and service practices associated with all of the major vendors. In sum, he is uniquely qualified to provide a pragmatic, and intellectually honest analysis of the relevant RFP and HB.316 legislation.

Similarly, Gregory Miller, a co-founder of the Institute who is a veteran computer and software engineer and IP lawyer, and Joy London, an associate general counsel and public policy expert with the Institute, both bring over a decade of experience in the analysis of election administration related legislation and review of requests for information, proposals, and quotes for the acquisition of election administration technology.   In particular, Ms. London's work focuses on critical democracy infrastructure, election security, election law, public policy and international government relations, and she leads the Institutes on-going legislation monitoring and analysis services. She offers a particular view through the lens of cybersecurity, having earned a Masters in Cyber Policy & Risk Analysis from Utica College, and published the Capstone research paper: "*The Threat of Nation-State Hacking of State Voter Registration Databases in U.S. Presidential Elections.*"

It is equally important to note the non-profit nonpartisan Institute has no stake in the outcomes in Georgia, other than exercising its mission to help ensure the public interest in this decision that will materially affect the integrity of Georgia elections, and therefore inevitably affect national election results.

Legislation Analysis

Question Presented

Does the statutory language of HB.316 restrict the choices of U.S. EAC-certified voting systems currently manufactured and sold by (1) ES&S ExpressVote, (2) Dominion's ImageCast X, (3) Unisyn FreedomVote, (4) Hart Verity Duo, and (5) Clear Ballot's Clear Access?

Discussion

Three of the five EAC-certified systems ((1) ES&S ExpressVote, (2) Dominion ImageCast X, and (3) Unisyn FreedomVote) under consideration by Georgia use Ballot Marking Devices (BMDs) to convert the voter's selections (of candidates and referenda options) viewed on the machines' screens to a barcode on a printed vote record, which is then fed into a scanner by the voter.

Although the printed vote record includes human-readable information that is supposed to show the votes cast by the voter, it is the barcode (*not readable by the voter*) that is digitally interpreted and counted by the scanner and is the basis for the ultimate tabulation of votes.

In contrast to the voting systems from ES&S, Dominion and Unisyn, the Hart Verity system tabulates voter choices based upon *optical character recognition* of *printed choice text* (*not barcodes*), and the Clear Ballot system tabulates machine-marked traditional format ballots based on marked ovals (*not barcodes*).

The question presented turns on whether any of the voting systems manufactured and sold by these vendors are, in fact, "voter-verifiable."

HB 316, p. 2, Section 1. §7.1 defines Electronic ballot marker (lines 43-48 with a focus on lines 45-48) as a device that:

> ". . . uses electronic technology to independently and privately mark a paper ballot at the direction of an elector, interpret ballot selection, **communicate such interpretation for the elector verification**, **and print an elector verifiable paper ballot**."

The language in §7.1 – "elector verification" and "print an elector verifiable paper ballot" does *not* define the means of "verification" or the process by which the elector's vote is "verifiable." Therefore, other statutory language within HB.316 must be examined to determine the lawmakers' statutory intent of the words "elector verification" and "elector verifiable."

HB.316 contains four (4) other relevant sections that can be used to determine the Georgia lawmakers' intent of the meaning of "elector verification" and "elector verifiable." All four sections use either the word "reading" or "readable" by electors.

HB.316, p. 11, Section 16. §3 – lines 344-345 of HB.316, it reads, in pertinent part:

> "Ballots printed by an electronic ballot marker shall be designed as prescribed by the Secretary of State to ensure the ease of **reading by electors**"

HB.316, p. 12, Section 18. §2 – lines 378-380

> ". . . provided, however, that such electronic ballot markers shall produce paper ballots which are marked with the elector's choices in a format **readable by the elector**."

HB.316, p. 13, Section 21. §(a) – lines 424-428

> "The ballots shall be printed . . . as will suit the construction of the ballot scanner, and in plain, clear type so as to be **easily readable by persons with normal vision** . . ."

HB.316, p. 16, Section 26. §(6) – lines 535-536

> "Produce a paper ballot which is marked with the elector's choices in a format **readable by the elector**."

Analysis and the Issue

Because HB.316 does not define either "ballot" or "verifiable," it is not immediately apparent whether the legislation adopts a **formal** or **substantive** definition of a ballot. In other words, a formal description of a ballot would simply specify (*as does Georgia Code § 21-2-280*) that a ballot may be electronic or printed on paper, without further specifying any requirements for how voter choices are to be counted or made available for verification by the voter.

On the other hand, a substantive definition of a ballot would go farther, and would conform with the common sense, plain-language understanding that the purpose of a ballot in the democratic voting process is to mark voter choices, which in turn serve as the basis for counting votes (*i.e.* "*tabulating*").

Furthermore, a substantive definition of a "*voter-verifiable*" ballot would require that the ballot support a voter's ability to verify *the choices <u>that will be counted</u>*, prior to casting the ballot.

Mindful of the distinction between a formal definition of a ballot, which focuses on the presentation of information (*e.g., a ballot marks voter choices electronically or on paper*), versus a substantive definition (*e.g., a ballot is a medium for marking voter choices that are to be counted, and those choices may or may not be transparent*), HB.316 is *unfortunately silent* on which definition of "ballot" is intended, or what "verifiable" means.

This gap is the crux of the issue, as some voting systems produce "ballots" that meet the formal definition, but not the substantive one, while other voting systems produce ballots that allow voters to review the choices that will, *strictly speaking*, serve as the basis for counting votes.

This distinction is all-important, because if the voter cannot verify the choices that are used *for counting*, then there is no way for the voter to know *what choices are being counted*.

Accordingly, such a "ballot" could not be said to be "voter-verifiable."

Details

Class 1: Electronic Marking Devices
ES&S ExpressVote, Dominion ImageCast X, Unisyn FreedomVote

Each of the electronic marking devices above produces a paper record that meets a formal definition of a "ballot" insofar as the paper record lists voter choices in a manner that is human-readable. And voters do have the opportunity to verify the choices printed on the paper. However, it is critical to note that the text that the voter can read is <u>not</u> used for purposes of counting the votes; instead, the ES&S, Dominion, and Unisyn voting systems count the "ballots" based on information that the voter cannot review, namely, choice information that is embedded in non-transparent barcodes. Accordingly, the human-readable text is a visual presentation

only, and does not rise to the functional level of providing information about voter marks and choices to the counting system. Stated another way, with these systems, it is as if the electronic marking device simultaneously generates *two* parallel "ballots," with greatly different functional "weight:"

1. One that is interpreted by the voting system, and which is <u>not</u> verifiable by the voter, and

2. Another that bears a *cosmetic resemblance* to a ballot, but because its voter choice data is meaningless to the voting system, and is not used for counting, it is unclear whether it constitutes a ballot at all, or whether it is merely a human-readable facsimile of the non-transparent, non-verifiable "ballot" that gets counted.

As a result, with these non-transparent marking devices, it can be said that only the small fraction of voters whose ballots might be reviewed by human eyes in the exceptional case of a manual audit were able to "verify" their choices on the printed record in a manner that was meaningful, and this happened only in the post-election review process. Outside of that small set of ballots, for all other voters, the information that they "verified" on the printed page was not used by the voting system at all; it was inert text on a printed page.

Class 2: Electronic Marking Devices
Hart Verity Duo, Clear Ballot Clear Access

Each of the electronic marking devices above produces a paper record that meets a substantive definition of a "ballot" that could also be said to be "voter-verifiable." This stems from the fact that their paper records list voter choices in a manner that is human-readable (either marked ovals, with Clear Ballot, or plaintext counted by OCR, with Hart), and *the choices that the voter has the opportunity to verify are the same choices that the voting system uses to count votes.* In this way, the voter has direct access to information about what choices are being counted, and whether they conform with the voter's intent.

Conclusion to the Question Presented

Does the statutory language of HB.316 restrict the choices of US EAC-certified voting systems currently manufactured and sold by (1) ES&S ExpressVote, (2) Dominion ImageCast X, (3) Unisyn FreedomVote, (4) Hart Verity Duo, and (5) Clear Ballot Clear Access?

The statutory language of HB.316 restricts Georgia's ability to select certain EAC-certified voting systems for purposes of a statewide voting system procurement.

Whether a formal presentation of marked voter choices is adequate to the meet the standard of "voter-verifiability," even if voting system does not count those choices, or whether "verifiability" requires that voters have the substantive opportunity to verify the same choice information that the voting system uses to count votes is a legal question that has not been answered. Answering that question touches upon a variety of other issues that must be tested, including:

1. What is the definition of a "ballot"?

2. Given HB.316's definition (line 31) of "Ballot marking device" as "a pen, pencil, or similar writing tool, or an electronic device designed for use in marking paper ballots <u>in a manner that is detected as a vote so cast</u> [emphasis added] and then counted by ballot

scanners," what does "detected" mean? For purposes of counting, is it acceptable for the voting system to "detect" only information that was not, strictly speaking, marked by the voter? Why or why not?

3. Given HB.316's definition (Line 53) "Optical scanning voting system" as "a system employing paper ballots on which electors cast votes with a ballot marking device or electronic ballot marker after which *votes are counted* [emphasis added] by ballot scanners," what constitutes a "vote" that must be counted? Is it only the information that the voter can verify, or something else? Why?

4. What constitutes a voter's "verification" of his or her "choices" or "vote"?

5. What is the legal status of encoded voter choice information that an automated voting system processes to produce results, when it is accompanied by additional text? If a voter cannot review and identify errors in the encoded information before casting the ballot, what are the implications under 52 U.S.C. 21081, Sec. (1)(A)(i) and (1)(A)(ii)? [2]

The questions must be addressed in a legal context. Then and only then can the courts determine whether a voting system that uses a BMD (*with or without a barcode*) meets the statutory intent in HB.316.

In a recent paper, [3] "*Election Security & the Right to Vote: Rights and Remedies Implicated by Election Hacking*" it is argued that the standard for a court's decision as to whether a BMD ballot like the one shown above should be decided on constitutional law—both federal and state.

To date the Institute knows of no litigation or case law that can resolve the questions likely to be presented by the combination of HB.316, the GA RFP for new systems acquisition, and the decisions that will be made as a result. However, considering this one publication, we can offer their following observations:

- "The Due Process Clause of the Fourteenth Amendment . . . protects against voting restrictions that render a voting system "fundamentally unfair."

- While "garden variety election irregularities" do not rise to that level, state election procedures and standards run afoul of due process if they "result in significant disenfranchisement and vote dilution."

---

[2] 52 U.S.C. 21081, Sec. (1)(A)(i) and (1)(A)(ii) provides in relevant part:
(a) Requirements. Each voting system used in an election for Federal office shall meet the following requirements:
(1) In general
(A) Except as provided in subparagraph (B), the voting system (including any lever voting system, optical scanning voting system, or direct recording electronic system) shall—
(i) permit the voter to verify (in a private and independent manner) the votes selected by the voter on the ballot before the ballot is cast and counted;
(ii) provide the voter with the opportunity (in a private and independent manner) to change the ballot or correct any error before the ballot is cast and counted (including the opportunity to correct the error through the issuance of a replacement ballot if the voter was otherwise unable to change the ballot or correct any error);

[3] Protect Democracy (November 2018). *Election Security & the Right to Vote: Rights and Remedies Implicated by Election Hacking*. Prepared by Altshuler Berzon, LLP. Last accessed on March 25, 2019
https://protectdemocracy.org/update/white-paper-rights-and-remedies-implicated-by-election-hacking/

- Courts have consistently held that once state actors have induced a voter's reliance on a particular manner of voting, invalidation of that voter's ballot is "fundamentally unfair."

- Courts thus attempt to police the line between "sporadic" or "episodic" errors in a voting system (held to be "garden variety" and therefore not a violation), and pervasive problems that permeate a voting system (or result in a substantial rate of error or risk of error) that rise to the level of a federal constitutional problem.

- Courts have also examined whether state procedures provide for adequate corrective measures to address the problem.

- Some federal courts have expressed a desire to avoid micromanaging election recounts that are also being managed by state courts, even where errors may be outcome determinative.

- As with many federal constitutional questions in the realm of voting, there is no bright-line rule.

- A hack targeting insufficiently secure voting machines, voter rolls, or tabulation devices might cause an election to be conducted in a fundamentally unfair manner if it:

    o (a) Led to excessive lines at polling places, requiring voters to wait for hours to cast a ballot;[4]

    o (b) Caused the loss of a significant percentage of ballots cast or appeared to "flip" a significant number of votes;[5]

    o (c) Prevented the counting of significant numbers of ballots cast by qualified voters;[6]

    or

    o (d) Prevented voters from casting a ballot due to malfunctioning or non-functioning machinery.[7]

- "The facts—in particular the scope of the problem created by hacking and the actions of the public officials in charge of the election before and after the hack—will make a great deal of difference."

---

[4] See: _Ury v. Santee_, 303 F. Supp. 119, 124, 126 (N.D. Ill. 1969)

[5] See: _League of Women Voters_, 548 F.3d at 478 (stating that possibility that selections "jumped" from chosen candidate to another candidate on DRE implicated substantive due process if it occurred on significant scale).

[6] See: _NEOCH v. Husted_, 696 F.3d 580, 586 (6th Cir. 2012) (finding that although the number and frequency of voter disqualifications resulting from poll worker error varied from "county to county, the problem as a whole is systemic and statewide")

[7] See: _League of Women Voters of Ohio v. Brunner_, 548 F.3d 463, at 478 (6th Cir. 2008) (stating that possibility that selections "jumped" from chosen candidate to another candidate on DRE implicated substantive due process if it occurred on significant scale).

RFP Analysis

All documents associated with the State of Georgia's RFP for a Statewide Voting System (SVS) – including the RFP itself, all attachments, and technical requirements, have been carefully reviewed by the Institute resulting in the following overall findings:

1. The Georgia RFP uses industry-standard requirements, written in a non-exclusionary manner.

2. In general, the RFP is fair, straightforward, and generally unremarkable and what the Institute would expect for a statewide voting system.

3. Rather than being written in a manner that steers toward a favored outcome, it provides the candidate vendor wide latitude to present product, with almost no restrictive or prescriptive requirements, aside from uniform Ballot Marking Devices (BMDs) for all voters plus digital scanning equipment.

4. The one potential conflict of the RFP in the context of HB.316 is the requirement for "voter verifiable" ballots, whereas the majority of BMDs in the marketplace do not allow voters to verify the choice data that scanner utilizes to tabulate votes.

In general, it is the Institute's position that it is a problematic burden on the right to vote, as the analysis of HB.316 earlier implies, to require a voter to cast a ballot that they cannot visually verify because the ballot choices that are to be counted are actually encoded in a barcode. The barcode cannot be deciphered by human visual inspection. Accordingly, the voter—assuming they actually inspect the ballot—is left to assume the data encoded in the barcode identically matches the printed choices appearing in human readable text adjacent to the barcode. This approach appears to violate U.S. constitutional principles (*see footnote 4, supra*).

This issue arises in Attachment D, Mandatory Questions, *Voter-Handled Paper Ballot Verification* as follows:

> *The proposed SVS solution must provide a voter verifiable paper ballot for every vote cast. The proposed SVS must produce a physical, voter-handled ballot containing the voter's selections from the input made by the voter. It must also facilitate navigating, marking, and reviewing the displayed ballot on the Ballot Marking Device (BMD) that can be printed, scanned, imaged, and tabulated by the Polling Place Scanner (PPS) and Central Scanning Device (CSD).*

The relevant language in HB.316 includes:

*   Page 2, line 48: "*and print an elector verifiable paper ballot*"
*   Page 11, line 344: "*(3) Ballots printed by an electronic ballot marker shall be designed as prescribed by the Secretary of State to ensure ease of reading by electors.*"
*   Page 12, line 379: "*provided, however, that such electronic ballot markers shall produce paper ballots which are marked with the elector's choices in a format readable by the elector.*"
*   Page 13, line 425: "*in plain, clear type so as to be easily readable by persons with normal vision; provided, however, that red material shall not be used except that all*

ovals appearing on the ballot to indicate where a voter should mark to cast a vote may be printed in red ink."

- Page 16, line 535: *"Produce a paper ballot which is marked with the elector's choices in a format readable by the elector;"*

On a process note, the Institute also observes there is a moderate risk associated with the State attempting to complete the majority of its Phase 2 "Phased Rollout" in Q-1 of next year (2020). As the Institute reads the RFP, aside from the ten (10) pilot counties that will implement in November 2019, the State will roll out a new system to 149 of the 159 counties in a federal Presidential Primary. That is unusual, because States and counties typically avoid the introduction of new technology or procedures in high-profile federal elections.

Observations on Technical Requirements

The Institute offers additional notes below regarding technical requirements.

Attachment E – Mandatory Scored Response Worksheet

While not a significant factor, the requirement of 2.4 is atypical in elections: *"Define how the proposed EMS can be virtualized to run on GASOS and county virtual operating system (OS) environments."* The Institute has not seen an RFP express a preference for virtualizing EMS applications; such is novel and unusual—not that we disagree with the notion, rather that this is a new concept and there is no evidence in the RFP of expressed security, reliability, or other operational service level requirements for such a preference.

Attachment I – Election Management System

These are industry-standard, non-exclusionary requirements. Not all EMS systems have integrated text-to-speech capabilities (Page 2). However, a desire for "text-to-speech" capabilities in the election definition process is common.

Attachment J – Polling Place Scanner

These are industry-standard, non-exclusionary requirements.

Attachment K – Central Scanning Device

These are industry-standard, non-exclusionary requirements.

Attachment L – Ballot Marking Device

These are industry-standard, non-exclusionary requirements. However, it is noteworthy that even in the important BMD Section, the requirements leave the field open for a variety of implementations, including ES&S ExpressVote, Dominion ImageCast X, Unisyn FreedomVote, and Hart Verity Duo.

The Institute also notes that the RFP clearly indicates that the State wants BMDs and _separate_ scanners. Thus, the often heard concerns regarding all-in-one BMDs with scanners inside (a.k.a. the "*permission to cheat*"), which several good government organizations have brought to the attention of the Institute, while meritorious, are not applicable in this situation because those integrated devices have never been considered for Georgia and the RFP does not provide for them. In the professional opinion of the Institute, for the purposes

of addressing Georgia's HB.316 legislation and planned acquisition pursuant to the RFP analyzed, the all-in-one device option is a distraction.

Attachment M – EPoll Data Management System

These are industry-standard, non-exclusionary requirements, except for another atypical instance of a desire for virtualization: Page 3: "*Be virtualized to run on GASOS and county virtual operating system (OS) environments.*"

Attachment N – Electronic Poll Book

These are industry-standard, non-exclusionary requirements.

References

1. Georgia Secretary of State, *Current and Past Election Results*, http://sos.ga.gov/index.php/Elections/current_and_past_elections_results

2. Harvey, Chris (Georgia Director of Elections), Memorandum to Brad Raffensperger, (Georgia Secretary of State), *Statewide Voting System Pre-Printed Hand-Marked Ballot Solution*, February 25, 2019

3. Georgia Legislature (2019-2020 Session). *House Bill 316 (As passed by House and Senate)*; By: Representatives Fleming of the 121st, Jones of the 47th, Burns of the 159th, Rynders of the 152nd, Watson of the 172nd, and others. http://www.legis.ga.gov/Legislation/en-US/display/20192020/HB/316

4. State of Georgia (March 15, 2019). *Electronic Request for Proposal*, Event ID 47800-SOS0000037, *Statewide Voting System*. https://www.gpbnews.org/post/heres-request-proposals-replace-georgias-voting-machines including the following specific elements:
   a. Appendix A – Line Specifications
   b. Appendix B – Terms & Conditions
   c. eRFP
       i. Introduction
      ii. Instructions to Suppliers
     iii. General Business Requirements
      iv. eRFP Proposal (Bid) Factors
       v. Cost Proposal
      vi. Proposal Evaluation, Negotiations, and Award
     vii. Contract Terms and Conditions
    viii. Attachment B – Definitions
      ix. Attachment C – Background and Scope of Work
       x. Attachment D – Mandatory Response Worksheet
      xi. Attachment E – Mandatory Scored Response Worksheet
     xii. Attachment F – Cost Worksheet
    xiii. Attachment G – Litigation and Default
     xiv. Attachment H – References
      xv. Attachment I – Election Management System
     xvi. Attachment J – Polling Place Scanner

5. Election Systems & Software, *Response to State of Georgia Electronic Request for Information, New Voting System*, Event Number 47800-SOS0000035, August 24, 2018.

6. Letter from election cybersecurity experts to GA SoS and SAFE Commission, 01/07/2019

7. Letter from the OSET Institute, Inc. to GA House of Representatives Subcommittee on Voting Technology of Government Affairs

8. Appel, Andrew (December 3, 2018). *Freedom to Tinker: "Why Voters Should Mark Ballots By Hand."* https://freedom-to-tinker.com/2018/12/03/why-voters-should-mark-ballots-by-hand/

9. Cooper, Taylor (March 26, 2019). The Brunswick News: *"Secretary of state meets with elections officials on Jekyll."* https://thebrunswicknews.com/news/local_news/secretary-of-state-meets-with-elections-officials-on-jekyll/article_fdd75020-df54-5fbc-a7d5-4d1644e14654.html

10. National Academies of Sciences, Engineering, and Medicine (2018). *Securing the Vote: Protecting American Democracy.* *https://www.nap.edu/catalog/25120/securing-the-vote-protecting-american-democracy*

11. Niesse, Mark (March 12, 2018). Atlanta Journal-Constitution: *"Georgia voting machine debate pits election officials vs. tech experts." https://www.ajc.com/news/state--regional-govt--politics/georgia-voting-machine-debate-pits-election-officials-tech-experts/XcY73sFwlRKQAw7NP0NvRL/*

12. Kaufmann, Johnny (February 27, 2019). WABE: *"Georgia House Passes Sweeping Election Overhaul."* https://www.wabe.org/georgia-house-passes-sweeping-election-overhaul/

13. McCord, Susan (August 31, 2018). Government Technology: *"Georgia Gets a Look at 2020 Voting System Options."* https://www.govtech.com/budget-finance/Georgia-Gets-a-Look-at-2020-Voting-System-Options.html

14. State of Georgia Secure, Accessible & Fair Elections (SAFE) Commission (2018). *Request for Information (RFI) for New Voting System.* http://sos.ga.gov/index.php/elections/secure_accessible__fair_elections_safe_commission

15. State of Georgia (March 15, 2019). *Electronic Request for Proposal*, Event ID 47800-SOS0000037, *Statewide Voting System.* https://www.gpbnews.org/post/heres-request-proposals-replace-georgias-voting-machines

About the Authors

Edward Perez is formerly director of product development for a major commercial voting system vendor. After retiring from the commercial sector, he joined the nonpartisan nonprofit OSET Institute as Global Director of Technology Development. He holds degrees in Government and Political Science from Georgetown University and the University of California at Berkeley and has over 16 years direct experience in the design, development, delivery, deployment and servicing of commercial voting systems.

Joy London is the Associate General Counsel and Director of International Development at the OSET Institute, where her work focuses on critical democracy infrastructure, election security, election law, public policy and international government relations. Ms. London earned her JD from Temple University School of Law and is licensed to practice law in the State of New York. Ms. London has held several positions at international law firms and at one of the Big-4 management consulting firms. She earned a Master of Professional Studies in Cyber Policy & Risk Analysis from Utica College, and published a Capstone research paper: *The Threat of Nation-State Hacking of State Voter Registration Databases in U.S. Presidential Elections.*

Gregory Miller is a co-founder and Chief Operating Officer of the U.S. based 501.c.3 nonprofit non-partisan OSET Institute. He is a trained computer scientist, with graduate business education, and a law degree focused on intellectual property, technology law, and public policy. Greg's technical background includes user interface design, object-oriented software development, TCP/IP networking, and distributed systems. Mr. Miller has been immersed in the administration and technology of elections for over 12 years, including poll work volunteer, polling place monitor, election observer, and assessing Requests For Proposal regarding election administration systems. Gregory is an election technology security advisor to organizations of the national security community and the United States Congress. Mr. Miller served on the San Francisco Voting Systems Task Force from 2010-2012.