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Understanding The Advancements in VVSG 2.0

How New Guidelines Improve Election Security, Accessibility and Transparency

Amid heightened scrutiny over election integrity and lack of public trust on election outcomes, the new Voluntary Voting System Guidelines (VVSG 2.0) ratified by United States Election Assistance Commission (EAC) in 2021 present a vital update to America's election infrastructure. As election jurisdictions across the country begin to roll out systems with these enhanced standards in 2025, they will introduce unprecedented rigor to our nation's voting systems.

Embracing a holistic approach to the election cycle, VVSG 2.0 meticulously outlines specific guidelines for each phase of the process from ballot layout through voting machine configuration to results and audit management. These guidelines comprehensively address the most critical functional aspects: enhancing security to protect against threats, increasing accessibility to ensure all voters can participate, and bolstering transparency to maintain public trust in the electoral system. By weaving these crucial threads throughout the fabric of the election cycle, the new guidelines signify a tailored upgrade to election systems.

With the EAC no longer accepting submissions to test new voting systems to VVSG 1.0 and VVSG 1.1, version 2.0 ushers in a robust framework for electoral integrity. This monumental update, almost a complete re-write, aims to reinforce public confidence in a system now fortified to meet current and future challenges to the democratic process.

While the new guidelines represent a significant advancement with numerous benefits, they also pose a considerable challenge for technology vendors with currently certified systems and the jurisdictions that utilize them. These parties must undertake a comprehensive overhaul of their existing systems to align with the updated standards within the coming years.

This document delineates the main enhancements and distinctions of VVSG 2.0 compared to its predecessors, providing a comprehensive analysis of how these updates will shape the future of voting in the United States.

Unpacking the new guidelines

Security Upgrades

- **Baked-in security safeguards.** The 2.0 standards require that essential system attributes, such as its security posture, must be fundamentally conceived from the inception of the system design and not be an afterthought. Prior VVSGs permitted system manufacturers to address security attributes later in the design process, leading to potential substandard implementations.

- **Mandatory software independence.** VVSG 2.0 raises the bar for election system security and transparency by instituting software independence as an unavoidable mandate. This pivot ensures that all election systems produce paper records that facilitate recount and audit processes irrespective of the software's reliability.

- **Specifying log events and action.** Contrasting with the more general nature of past guidelines, VVSG 2.0 prescribes a comprehensive inventory of events. All logins, and other events such as device configuration changes must be recorded in audit logs, ensuring an accurate and verifiable trail for every action taken within the voting system. VVSG 2.0 also requires that all error and warning messages displayed must come with straightforward instructions, helping voters and election officials effectively navigate and resolve challenges like system malfunctions or diminished system performance.

- **System access control.** Requirements for the architecture and management of system access control are more detailed than previous VVSG versions. For example, persons with authorization to change voting machine configurations and other functions critical to system security are mandated to log in via multi-factor authentication.

- **Physical security regulated.** The updated regulations tighten physical security measures for election materials, boosting the protection of ballot boxes, diligently tracking data connections, and eliminating unnecessary access ports on voting equipment. Moreover, they mandate proactive monitoring of these ports to safeguard against unauthorized use, whether the equipment is active or not.

- **Expanded specifications for data encryption and digital signatures.** The guidelines clearly define and expand specifications for data encryption and digital signatures. Furthermore, they require cryptographic protection for certain election artifacts, for digitally signed tabulation reports, and for data in-transit.

- **Opening the door for online voting.** VVSG 2.0 acknowledges the growing interest in the field for alternative remote voting systems such as online voting. In its provisions, it opens the door for certification of end-to-end (E2E) verifiable systems. Tailored for internet-based voting, these systems bypass the paper trail, employing mathematical proofs to assert software's independence and the accuracy of the election results.

User-Centric Accessibility for All

- **Enhancing the voter experience.** VVSG 2.0 exhibits an increased focus on the voter's experience, embedding mandatory specifications for system design centered around accessibility. For example, the guidelines include standards for device displays such as font, text size, audio, interaction control and navigation, scrolling, and ballot review. Four of the fifteen principles in VVSG 2.0 specifically and solely address usability and accessibility, showing the weight the EAC Commissioners placed behind their mandate for user centered design.

- **A homogeneous voting experience.** The new guidelines aim to eliminate segregated voting by giving all voters, regardless of their abilities, a consistent voting experience on the voting device they choose to use.

- **Incorporating federal accessibility standards.** The updated guidelines also require usability studies and consistent documentation of the user-centered design process by incorporating federal accessibility standards such as Section 508 and the Web Content Accessibility Guidelines (WCAG) 2.0.

Enhanced Auditability to Foster Public Trust

- **A more comprehensive and detailed approach.** VVSG 2.0 delineates the entire election process into well-defined and specific phases and steps, thereby facilitating the formulation of precise directives for each aspect of the election cycle. These aspects range from the importation of data from election management systems to the determination of ballot layouts, and from the tabulation of results to the conduct of election audits. Each procedure delineated within the guidelines is elaborated with precision, accompanied by the establishment of regulations to oversee their implementation.

- **Delineating a transparency trail.** VVSG 2.0 significantly modernized the integration of cybersecurity and auditing throughout the entire span of the electoral process. While earlier iterations of the VVSG offered limited provisions concerning post-election audits, the 2.0 guidelines mandate that systems generate comprehensive datasets requisite for conducting rigorous statistical audits (i.e. Risk Limiting Audits), as well as producing data outputs in standardized data formats. Furthermore, VVSG 2.0 articulates definitive measures to safeguard critical auditable information against unauthorized access, deletion, or alteration, ensuring the integrity and security of the election process.

- **Fostering voter oversight.** New guidelines requires that the public be able to evaluate voting system output, including its documentation package such as user guides.

- **Common formats for added transparency.** Every component of the voting system is now required to support both the import and export of data in a standardized Common Data Format (CDF) as stipulated by the National Institute of Standards and Technology (NIST). The adoption of the CDF enables thorough analysis and detailed examination of public election data. This advancement represents a substantial leap forward in promoting greater transparency and auditability within the electoral framework. Moreover, the data is exported in an accessible format throughout the process, ensuring that it is open, non-proprietary, and not obscured at any point, so election stakeholders can validate data integrity.

- **Increased voter privacy and vote secrecy.** To fortify voter privacy and ensure the secrecy of ballots, VVSG 2.0 imposes stringent rules. These regulations prevent any possibility of tracing a voter's identity to their ballot by prohibiting practices such as recording any information that could be used to identify a voter in any voting system component. Furthermore, systems are required to randomize the order of stored votes to enhance the protection of ballot confidentiality.

- **Defining what a readable mark is.** Previous VVSGs gave significant latitude to manufacturers to define what a 'readable mark' is on a paper ballot. The new guidelines clearly define specifications for a minimum readable mark.

Conclusion

Nearly twenty years have elapsed since the inaugural adoption of the Voluntary Voting System Guidelines 1.0, and even the slightly updated VVSG 1.1 has aged eight years. Considering the rapid technological advancements that have marked recent years, the introduction of enhanced guidelines is not only timely but essential. These updated provisions promise to fortify the pillars of election integrity across the United States, providing a robust framework to secure the democratic process against an ever-evolving landscape.

The leap from VVSG 1.0 to 2.0 exemplifies a proactive approach to contemporary election challenges, embracing forward-thinking solutions and affirming the United States' dedication to electoral excellence, security, and inclusivity.

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