United States Election Assistance Commission
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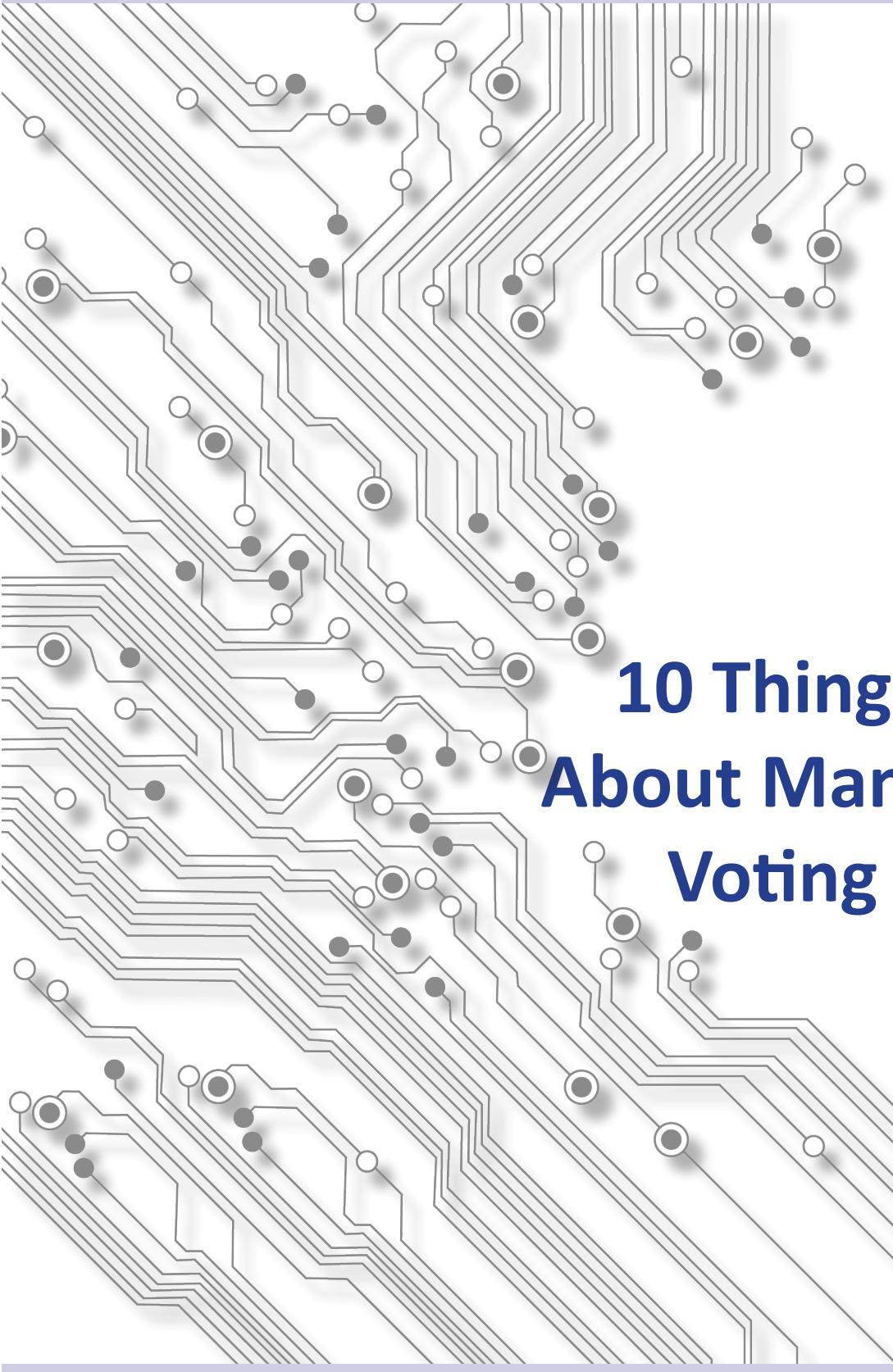
Managing Election Technology Series: #2



10 Things to Know About Managing Aging Voting Systems

The EAC's Managing Election Technology Series

> *"The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency."*
>
> ***--Bill Gates***

Overview

The Election Official of today is an Information Technology (IT) Manager – whether they think they are, whether they want to be, or whether they were trained to be. IT Management requires a unique set of attitudes, knowledge and skills in order to plan, direct, and control contemporary election administration. This series of guides to managing election technology identify the primary areas in which the effective Election Official must recognize their role as an IT manager and provides ideas and best practices to assist in accommodating the demands of the modern election's office.

The Issue of Aging Voting Systems

In its simplest terms, system lifecycle refers to the period of time during which IT hardware and software is going to remain useful to election officials. States and jurisdictions are facing the prospect of continuing to manage aging voting systems in an environment in which expectations for security and reliability of these systems has never been greater. While we know that no system's life can be extended indefinitely, we also know that in this time of dwindling budgets, State and local election officials must find suitable strategies for extending the useful life of voting systems.

In the years 2002 to 2005 there was an unprecedented surge in the acquisition of voting systems across this country. Old and antiquated systems and technologies were replaced with new systems. During this time election officials were focused on getting the systems rolled out, getting poll workers trained and getting voters familiar with the new systems. Because of the urgency of the task at hand systems were often deployed in a manner that gave little forethought to sustainability. Not unlike the American infrastructure of roads, bridges and water systems that are critical to the economy of this country, we need to vigilantly monitor our voting systems and diligently remediate the inevitable issues as they age.

One investment that has to be made when extending the life of an aging voting system is the time it takes to do more planning for the sustainability of the system. This means developing plans to monitor systems, talk with consultants and vendors, and ensure that the voting system is maintainable with limited risk. Planning also helps identify desired outcomes and necessary resources.

It is easier to justify expenditures for maintenance if they are part of an overall plan to extend the serviceable life of the voting system. Planning requires us to think about the resources and processes needed to achieve our goals. Planning requires us to communicate the intent and details of our plans to other stakeholders in elections. Your maintenance plan should not only include spare parts, equipment and materials, but also people, processes, resources, and outcomes. Where possible, dedicating one staff member's time to the effort can be useful, because that person can create a holistic view of the voting system management lifecycle and understand the complexities involved in monitoring and maintaining the system.

This paper discusses ways to extend the useful life of your voting system in your voting system in order to optimize your current investment and to bridge potential gaps until the decision is made to purchase a new system.

1. Evaluate your current system

Prior to moving forward with solutions, you must realistically evaluate your current system. A detailed system evaluation is not a trivial undertaking. It is likely that this process is beyond the technical capability of many small to medium sized jurisdictions unless done via a contract with the system manufacturer or third party. This process should include analyzing the life expectancy of every part in your voting system (specifically those items in the field, such as voting booths, tabulators/DRE's/BMDs, printers and EMS components). Although time consuming, an effective process will include reviewing system schematics, breaking down the schematics into individual components, and

assigning forecasted end of life periods for each part. Put simply, this process is intended to identify every part that might stop working EVEN if those parts are currently fully operational.

2. Focus on power

Batteries and external power supplies are likely to be one of the earliest components to fail as well as one of the most impactful. Equipment should be tested to determine weak power sources and identify those batteries and/or power supplies for immediate replacement. Running a stress test on your power supply requires putting a lot of load on it to see how it can handle it, and to see if you are coming up short in terms of voltage and amperage being delivered to your CPU, GPU, memory, and other components. Although not a true "stress test," a power supply can also be tested using a commercially available multimeter[1]. This task is somewhat complex, and a professional computer technician should be employed to conduct this test if the jurisdiction does not employ such a technician in-house. Make sure that the circuits being used to charge your units in storage have sufficient amperage for the job. Most election devices will pull 1 to 1.5 amps. If you have 15 units plugged into a single outlet, you have maxed out a 20-amp circuit.

3. Track problem history

The most common method for tracking voting system assets in jurisdictions is still a manual comprehensive inventory using a spreadsheet. Manual asset tracking is both time consuming and expensive. Automated tools, including processes that integrate IT barcode scanning software that update into a system asset database can allow you to have an accurate, current inventory at all times. In addition, such systems can include asset check-in /check-out, maintenance schedules with automatic notification as well as detailed asset history, including downtime and repair history. With a record of downtime, the specific component that failed and the date and duration of the failure, you will not only be able to track individual component reliability over its life, but you may also be able to predict future reliability. You should also be able to calculate downtime costs and anticipate future costs. These statistics are invaluable in determining the useful life of any piece of voting equipment. When predicted maintenance costs exceed the cost of a new system, a decision to replace the voting system might be an easier pill to swallow.

4. Important maintenance and repair is not always technical

Some critical repairs include tightening loose screws, replacing the small Velcro strips that secure the legs of a voting system, and replacing small washers and nuts due to normal wear and tear caused by using, storing, and transporting the system. These types of repairs can be done in-house for minimal cost by even the smallest voting jurisdictions.

[1] A multimeter is an instrument designed to measure electric current, voltage, and usually resistance.

5. Certain external factors will be uncontrollable

No matter how carefully you plan, some factors impacting system sustainability will be outside of your control and that of your voting system vendor. A perfect example is the angst felt in 2012 when Microsoft announced the projected end date of operating system support provided for Windows XP in 2014. Know the difference between *end-of-life* (EOL) (the system is no longer supported by the vendor) and *end-of-serviceable-life* (the system no longer functions). There are many EOL'ed systems that function years or decades after support is terminated.

6. Proper storage can extend system life

When storing voting equipment you must consider the factors of temperature, humidity and dust. Proper storage of equipment can impact the sustainability of a system as much as deployment and use of the system. Although not always possible, look for a facility that offers climate-controlled storage. Using central air and heat, the temperature in such units is typically kept between 50 and 80 degrees. This prevents cracking and corrosion from damaging electrical components. (If you ever find that equipment has been stored in freezing temperatures, be sure to wait 48 hours for the device to warm up before turning it on!) Equally important is moisture control. Although climate control can reduce moisture somewhat, a facility that uses a dehumidifier to keep dampness out is important in humid climates or underground storage. When choosing a storage space, avoid ground-level or subterranean areas if possible.

7. Meet with your voting system vendor – early and often

Your voting system vendor will have historical insight into the issues you are facing with your voting system. They should also be able to tell you the current and future availability of consumables, spare parts and potential end-of-life (EOL) issues with your system. Vendors may also be able to share other customer's best practices for extending the life of your voting system. If there are alternate sources for replacement parts, those parts should be evaluated by the vendor before incorporating them into your system. Review your contract and RFP and make sure such communication is included in the vendor roles and responsibilities.

8. Use your informal network of fellow election officials – within and outside of your state

Discover what your colleagues are doing to extend the life of their systems. Election officials are famous for their innovative solutions and workarounds for solving tough problems. Ask your state election official association to sponsor workshops and presentations on preventative maintenance at your annual meetings.

9. Pollworker training

Evaluate your pollworker training materials. Do they know how to properly set up the equipment? Break it down? Pack and transport? Do you have a procedure to permit pollworkers to accurately and completely detail problems with voting equipment? Do you have a process to identify malfunctioning equipment

that is returned from the precinct and repair it? Defense is often the best offense, so if systems are well cared for during deployment, set up and take down then they are likely to last longer. Pollworkers are your eyes and ears on the ground – use them.

10. Logic and Accuracy Testing – last, best chance to catch malfunctioning equipment

Does your jurisdiction's L&A procedures test for the accuracy of the ballot AND the ability of the voting system to perform its job in the precinct? Evaluate your L&A procedures and consider including steps such as a visual inspection of the system to check for obvious damage to memory cards, pins and ports, screens, locks and other items that can identify units that need recalibration, cleaning, battery replacement[2], etc., before it is certified for use in the election.

[2] Be careful when storing old lithium batteries! Incidents have been reported in which old lithium batteries were stored together in a box and shorted to each other generating enough heat to cause a fire.