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BUILDING SECURE AND TRANSPARENT ELECTIONS THROUGH STANDARD OPERATING PROCEDURES

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Building Secure and Transparent Elections through Standard Operating Procedures

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Short Bio

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Abstract:

Election reform has evolved since the 2000 election. One issue that has remained at the forefront of public debate is how to build confidence in the election process. The foundation for confidence is based on procedures for electoral security and transparency. In this article, the authors use legal theories of evidence and public administration theories related to standard operating procedures to consider how election fraud—and claims of fraud—can be prevented by having effective and rigorous chain of custody procedures. Using case studies, they show how such chains of custody can be implemented and examine which states have processes and procedures that promote the transparency that is critical for public examination of the electoral process. They conclude with consideration of best practices in this area.

For anyone who has ever watched an episode of *CSI* or remembers the O.J. Simpson murder trial, the idea of a chain of custody is familiar. Some item—a weapon, a DNA sample—is of interest to the police. The challenge is to preserve the item so that it can be produced in court later in the same condition as it was in at the crime scene. This is generally done by taking the item and recording its original condition—perhaps a photograph is taken or a written report describing the condition is made. Then, the item is secured in a container and sealed so that the item cannot be accessed without leaving evidence of tampering. Finally, each stage of this process is witnessed, often by various individuals who sign reports, seals, or logs that track the movements of the item of interest. When this process is followed correctly, neither side in the legal dispute can question the authenticity of the item; the item is legally recognized to be the original. This chain of custody process is designed to ensure that fraud is not perpetrated on the court—that the item produced in court is in fact the exact item found at the crime scene.

This process is common in the legal world and provides the item in question with evidentiary value; its providence can be traced and confirmed. The beauty of this process is that it is relatively simple to replicate in other settings; tracking and securing items through the use of seals, logs, and witnesses requires the establishment of appropriate processes and procedures. Achieving this goal of uniform treatment of evidence requires developing standard operating procedures that are followed whenever certain critical activities are conducted. These standard operating procedures are designed to ensure that, whenever critical actions and tasks are undertaken, the individuals at the scene know how to handle the item in question and the process for ensuring that the item is not in some way compromised.

Our interest here is in the use of chains of custody in election administration. Elections have many critical items, including ballots (paper or electronic) and signed voter registration lists

that need to be kept secure throughout the electoral process. However, basic processes and standard operating procedure have not been uniformly adopted across the various states for the security of the voting systems. As our research shows, many state laws assume a chain of custody process without defining one. We consider the important role that standard operating procedures play in ensuring that chain of custody procedures function correctly. We are especially cognizant of how election administration is a unique aspect of public administration. Elections are a critical activity of the government; however they are also an activity with unique principal-agent problems, and one where the key actors are not government officials but are essentially well-meaning volunteers (albeit paid volunteers). This creates unique challenges for election officials, who must ensure that the election system produces an outcome in which everyone can have faith. Fortunately, there are models for securing ballots and voting systems that provide a chain of custody for the ballots and machines and ensure that the votes produced at the end of the election are authentic. We consider how these models function and how standard operating procedures serve to ensure that elections are fair and transparent.

Chains of Custody

The concept of a "chain of custody" is a basic principle in the legal study of evidence. The following excerpt from *Evidence Law* provides a basic definition of the concept of a chain of custody (Park, Leonard, and Goldberg 2004, 565):

> A perfect demonstration of the chain of custody would include testimony about every link in the chain, from the moment the item was picked up at the scene of the event to the time it was offered into evidence. Each person who touched the exhibit would describe how and from whom it was received, where it was and what happened to it when in the witness' possession, and the

condition in which it was received and the condition in which it was delivered

to the next link in the chain. The witness would describe the precautions

taken to ensure there was no change in the condition of the exhibit and no

opportunity for someone not in the chain to have possession of the item.

Chains of custody are especially important for "fungible evidence, because these items

have no unique characteristics" (Giannelli 2006, 352). Fungible items should be kept in locked

or sealed containers (e.g., boxes or envelopes) that are also signed by the custodians. This

process ensures that the fungible items are neither contaminated nor misidentified. In addition,

chains of custody are critical "if the condition of the object, not merely its identity, is the relevant

issue" (Giannelli 2006, 353). Proper handling is central to the maintenance of a chain of custody

and there should be no major breaks in the chain of custody for any given item. In a real world

example of such a break in custody, drugs in a narcotics case were excluded from a trial when

six people handled three pills over a nine-day period. The problem was that there were no marks

made on the envelope containing the pills to show how they had been handled nor were there

marks on the pills to show they were the same pills that had been seized.[1]

Another key requirement for rigorous chains of custody is having a routine set of

procedures in the office—standard operating procedures—for the processing and handling of

items. This may include the use of documentary processes, such as the use of property receipts,

to show how an item was handled in the chain of custody. Appropriate chains of custody require

that the chain be kept diligently and adequately, but it does not have to be "infallible." For

example, the "mere possibility of [item] tampering [is an] insufficient basis for excluding

evidence."[2] The Seventh Circuit has ruled that "evidence kept in official custody is presumed to

be authentic absent specific evidence of tampering" and the First Circuit has noted that "the links

in a chain of custody need not be welded together but, rather, may be more loosely connected…chain-of-custody evidence must be adequate—not infallible."[3] Two key aspects involved in evaluating the adequacy of a chain of custody are (1) ensuring that there has not been an "abuse of discretion" by the government in handling the item in question—that is, they followed basic chain of custody rules—and (2) determining that there has not been bad faith or some proof of tampering in the handling of the evidence. Absent these problems, there is a general presumption that the evidence in question has integrity.[4]

There are interesting similarities and differences in the importance of chains of custody in an election setting relative to a legal setting. The standard for introducing evidence in a legal setting requires first that the chain of custody meet a certain minimum threshold. Once this threshold is met, the jury can determine if any questions with the chain of custody should cause the evidence to be discounted. Damning evidence against a defendant that has a weak chain of custody might be considered less damning when weighted in this manner. In an election, the same legal standard has to be considered. But in an election setting there is also another standard that has to be considered: does the custody of the election materials—especially the ballots and voting machines—meet a standard whereby the candidates and the voters are confident that the election outcome was fair? If the chain of custody is robust, then everyone can be confident, regardless of the outcome, that the ballots cast are the official ballots and the count is correct. If chain-of-custody procedures are weak or questionable, then the losing side may argue that the outcome is unjust.

There is research evidence showing that losers are generally disposed to be less confident in election outcomes than are winners. Weak procedures may serve to exacerbate the loss of confidence among those on the losing side in an election (e.g., Alvarez, Hall, Llewellyn 2007;

Hall, Monson, and Patterson 2007b). Ballots are the type of fungible item that requires a high

level of care for the authenticity of the item to be maintained. Moreover, the use of the secret

ballot means that voters cannot authenticate their own ballots later.[5] A voter therefore has to be

confident that the security of the ballot box is high and that that security remains high throughout

the election process—from when it is cast to when the election is certified and a winner chosen.

Breaks in the chain can break the confidence of voters and candidates.

Standard Operating Procedures and Election Administration

The maintenance of chains of custody requires having standard operating procedures for

the handling of items. Standard operating procedures (SOPs) form the basis for many

organizational activities and they may or may not be explicitly documented by an organization.

As Graham Allison (1969, 700) noted,

> Organizations must be capable of performing actions in which the behavior of
> large numbers of individuals is carefully coordinated. Assuming performance
> requires clusters of rehearsed SOPs for producing specific actions…each cluster
> comprises a "program" (in terms both of drama and computers) which the
> organization has available for dealing with a situation. The list of programs
> relevant to a type of activity….constitutes an organizational repertoire… When
> properly triggered, organizations execute programs… The more complex the
> action and the greater the number of individuals involved, the more important are
> programs and repertoires as determinants of organizational behavior.
>
> Allison goes on to note the benefits of SOPs. These include the reduction of uncertainty

regarding how to handle standard situations, an improvement in average organizational

performance in completing tasks involving SOPs, and an improvement in coordination among

organizational actors. The development of such SOPs is typically done as an iterative process (Johnson 1990). At the inception of a new organization or complex enterprise within an existing organization, the organization can either borrow SOPs from a similar organization/enterprise, or it can develop a set of simple SOPs that allow the organization to operate. However, simple SOPs can leave an organization in the position of having routines and procedures that treat all activities equally. An organization may need more complex SOPs that prioritize and structure its activities. The key here is for the organization to have experience, the ability to learn what is most important, and the ability to develop SOPs that routinize these activities. Such routines minimize uncertainty and create a stable operating environment for the organization.

Standard operating procedures are also critical to the theories behind high reliability organizations (HRO). As Laporte and Consolini (1991, 23-24) note,

> …HROs…are characterized by very clear, well-agreed-upon operational goals. In most regards, the organizations come close to meeting the conditions of closed rational systems, i.e., well-buffered, well-understood technology core requiring consistency and stability, for effective failure-free operations. Decision strategies for most situations are straightforward, well-programmed standard operating procedures (SOPs). In a sense, the only decision is which SOP to apply. In other words, there is only routine decisionmaking.

The work on HROs finds that, in addition to these SOPs, individuals also have to be in a position to take action to avoid problems that arise. Overhead management typically cannot address all contingencies as they arise. However, effective SOPs do play a critical role in ensuring that problems can be avoided as much as possible in the production of services, especially since much of this production is conducted during high-peak capacity for long periods.

Election administration is an activity where we expect high reliability. With polling place voting and ballot counting taking place in a very short timeframe, it requires near flawless peak capacity performance. It also occurs within a clear legal framework that is amenable to the development of SOPs and legal constraints on activities. Still, election administration lacks some of the features of a HRO; although complex, elections are not necessarily a tightly coupled activity, poll workers are not necessarily highly trained and the managers are not in a position to coordinate activities throughout the day. However, election administrators are in a position to build upon some of the features of these organizations. Specifically, HROs are organizations where redundancy is built into the organization's procedures: they have clear decision rules, there is a centralization of command decisions, and there is effective training to inculcate norms and values into the new members of the organization (Guy 1990; Laporte and Consolini 1991; Rijpma 1997).

As was noted at the outset, SOPs do not have to be formalized. However, in the case of chains of custody, law-based SOPs can be highly effective as they provide a legal framework for maintaining the documents in question and a minimum level of consistency across organizational units. In the case of elections, where a process is administered and implemented across numerous sub-organizations (the local election office), state election laws and regulations can provide a floor for basic SOPs. The advantage of having formalized SOPs is that they document the experience of the organization, which is especially important in organizations with high turnover and low levels of training. In addition, elections are not events that repeat with great regularity; formal SOPs provide for more robust, consistent performance over time. Typically, statutory language provides the broad framework for the activity in question; through regulatory activity, the agency can develop detailed SOPs to govern its activities. This legal framework is

beneficial for the development of SOPs because it provides legitimacy for the organization's actions to maintain chains of custody; it is acting within a clear legal mandate. It also formalizes the requirements on the actors implementing the activity. The answer to the question "Why do we do it this way?" is clear; we do it this way because the law requires it. Importantly, formalizing SOPs supports the learning process and allows agencies to learn over time.

In the public sector, SOPs can come from statutory frameworks. Election laws can provide baseline requirements for maintaining the chain of custody for key election materials such as ballots and vote tallies. Given that ballots are used to determine winners and losers in the democratic process—and if there are disputes about who won, a legal process—having strong laws that provide guidance for maintaining the chain of custody can be critical. Laws can also signal what a state thinks is important in the area of SOPs and chains of custody. For example, several states do not legally require election officials to capture information about how many voters vote in the election (Alvarez, Ansolabehere and Stewart 2005). Without these data, it is not possible to have a basic reconciliation of votes cast and the number of voters who voted; there is no way to audit to ensure that extra ballots were not introduced into the voting process.

In elections, ballots are the key items that need to be kept secure throughout the voting process, from the printing of the ballots through the certification of the election results. All parties in the election—from the candidates and political parties to the voter on election day—want to be able to know that the votes counted in the election are the votes that were cast (that no errors nor fraud were introduced in the process) and that all ballots can be accounted for. It is possible to look to state laws and state regulations regarding the handling of ballots at different points in the electoral process to determine if a state has developed a legal framework to address the need for securing ballots. Our work in

this area focuses on nine key points in the election process when ballots are vulnerable: (1) ballot production, (2) pre-election ballot security, (3) pre-election voting equipment security, (4) in-precinct ballot security, (5) during election ballot security, (6) election night ballot security, (7) ballot security during ballot transit to the local election office, (8) early voting ballot security, and (9) absentee voting ballot security.[6] A review of the state laws and regulations in all 50 states that cover chains of custody shows that there is wide variation that exists in how such issues are handled. Some states have laws clearly noting that ballots are to be kept under seal or in a locked safe at various points in the process; other states have laws that are much less clear or are silent on ballot security. For exampleall states have to print ballots for their elections, yet many states do not have legal or regulatory requirements for maintaining the chain of custody of ballots at the start of the electoral process. Likewise, some states do not have formal procedures for maintaining custody of ballots in a polling place, even when the election ends.[7]

[Table 1 about here]

The completeness of state legal and regulatory structures that govern election administration differs dramatically across the states. In Figure 1, we see that only nine states have legal structure across eight or more of the critical points in the ballot security process. Most states fall into the category of having between five and seven of the nine security items covered in state law. Moreover, we see that most states create their legal framework through legislative enactments, not regulation. Regulations tend to clarify an existing legal structure although in two states the regulatory scheme is the sole basis for addressing one of these areas of concern.

Examining state laws illustrates two important points about elections and chains of custody. First, many states have not formalized their chains of custody SOPs into a statutory or regulatory form that can improve consistency from election to election and across electoral jurisdictions. Given that elections are multi-jurisdictional activities, such uniformity and consistency are important for the integrity of elections. Second, the lack of formalized SOPs means that training and local guidance are important to making the electoral process function effectively and in a manner that instills confidence. In the next two sections, we consider data from state and local rules and procedures to illustrate how chains of custody can be improved.

How Can Chains Be Broken?

One of the major problems that election administrators face is what social scientists call a "principal-agent" problem (Alvarez and Hall 2006). Take a typical, but stylized, election administration situation. The chief election official in a moderate-size county is faced with running an election involving a hundred voting precincts. She must then find these hundred sites (schools, churches, businesses, and private residences), all of which are outside of her direct control. She will need to recruit perhaps four to six individuals to staff each of the hundred voting locations. She will also need to recruit numerous individuals to get materials to each voting location before the election, to get the materials back from each voting location after the election, and to assist in election night and post-election canvass procedures.

In a typical employment situation, the employer structures the working relationship via some type of contract: the employer specifies the tasks to be done, the compensation for the

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work, and then sets up a monitoring system to insure that the employee does the task efficiently and effectively. However, the employee has the incentive to "shirk," to do the job with the least amount of effort, counter to the employer's goals. Herein lies the basic "principal-agent" problem, how can the employer set up this relationship to minimize shirking behavior, while also not incurring excessive compensation or monitoring costs? Election officials face this problem in a particularly severe way: they typically have few resources to adequately compensate the many individuals whom they rely on heavily for the proper conduct of an election, ranging from the individuals or entities who provide the space for each voting location, to the thousands involved in balloting and election logistics (Alvarez and Hall 2006). Unless the training is effective, the voters and poll workers alike may be less than confident in the election (Hall, Monson, and Patterson 2007a, 2007b). Furthermore, election officials have few resources to devote to monitoring, especially given that the bulk of the effort of conducting an election occurs on a single day (election day), often in large geographic locations.

The principal-agent problem has implications for the chain of custody issue. If election officials lack resources to adequately train the individuals involved in the conduct of an election, some of the workers may not understand appropriate chain of custody procedures (Hall, Monson, and Patterson 2007b). If election officials lack resources to compensate the election workers, the workers may pay insufficient attention to maintaining the chain of custody, or violate the chain of custody deliberately as they engage in activities that are unrelated to their election work. If election officials cannot adequately monitor election day workers, again, chain of custody procedures may be violated, either because election workers are deliberately shirking their duties or because their lack of training leads them to misunderstand the chain of custody, and allows election workers to make incorrect decisions about how to handle election materials in violation

of the chain of custody. These problems do not have to be a part of political manipulation of an election, or deliberate malfeasance; poorly trained election workers who lack supervision can violate the chain of custody without any incentive or desire on their part to actually affect the outcome of an election in any particular way.

We have recently seen a variety of real-world cases where the chain of custody issue has arisen in election administration, most likely due to poorly trained and supervised election workers. For example, in the 2006 spring primary in Cuyahoga County, Ohio, where we had access to a detailed precinct incident reporting system, we found that more than 15 percent of precincts reported a problem with seals and locks (ESI 2006, 60). The report noted this problem in detail:

> Incidents related to the seals on the voting machines, the printer canisters, and the bags in which post-election materials were to be returned to the election offices accounted for a small number of incidents. A total of 4.2 percent of all incidents were related to seals. Seals were reported broken on machines and canisters most often, with some precincts reporting that they could not seal all of their machines at the beginning of the election. The chain of custody of a voting machine and its ballots can be, in part, confirmed through the sealing and locking of the machine and the tracking of the seals and locks used. If after the election the authenticity of the seals and locks cannot be effectively known—or there are questions as to whether the machines were in fact even sealed and locked throughout the process—it raises questions about the balloting (both the electronic and the associated paper ballots).

The Cuyahoga incident reports provide quantitative data that gives us some perspective on how extensive such chain of custody issues can be.

In 2006, another type of chain of custody issue arose in Cook County, Illinois. Like Cuyahoga County, Cook County was implementing a new set of voting technologies and new procedures. However, the election officials there appear not to have foreseen that a previously effective procedure, election-night transmission of precinct tallies from the voting locations to the election tally center, might not work with the new voting technologies. In the 2006 primary it was reported that, in "dozens" of voting locations, the electronic transmission of precinct tallies on election night failed for the election workers. Reportedly, these problems arose either because the election worker could not merge the tallies from the two different voting systems in place in each voting location, or because the electronic transmission technology failed.[8] As the Chicago Tribune reported, "judges and election officials…blamed confusion in the primary election on vast numbers of poll workers who had not been trained for Cook County's complicated new electronic voting system. Most of them had barely studied machines that scanned paper ballots or enabled touch-screen voting. Many didn't see those devices--or the one used to combine and send their information--until Election Day."

With the failure of the electronic transmission procedures or technology, election workers resorted to many techniques to get tallies (and data cards from voting machines) to the central election counting location. Reports were that some workers took cabs, and no doubt other means of public and private transportation to get the data cards and tallies to election headquarters. Although the immediate coverage focused on the delays the problems produced in the early election-night tallies, subsequent coverage focused on the breakdown of the chain of custody in this election. Election workers, trying to do the right thing in the absence of training and supervision in this contingency, transported these important election materials in insecure ways.

Both the Chicago and Cook County election judge manuals for the March 2006 primary

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election state how ballots are to be secured. Election judges are clearly instructed on the

procedures for consolidating the results cartridges from both the electronic and optical scan

voting devices. However, the procedures in the manual assume that the cartridges are correctly

read by the activator and the results are appropriately consolidated. In that case, the procedures

state, "The result tapes will print and the election results will be transmitted downtown where the

vote totals for each race are tallied."[9] The procedures are silent as to what should happen if the

cartridge consolidation fails, the transmission fails, or the printing of the tallies fails. The

procedures do instruct election judges to put all materials into a series of envelopes and bags, and

that two election judges are to bring these materials to a "Receiving Station." Interestingly, the

Chicago Tribune reported that election judges were taking balloting materials "downtown," and

not to the "Receiving Station" (apparently especially the data cartridges). Based on the media

reports and comparison of the procedures published for the November 2006 election, there seems

to have been instances where appropriate chain of custody procedures were not followed. This

second example provides additional insight into how easy it is for procedural or technological

problems to produce potential breakdowns in the chain of custody.

Georgia Election Law and Chains of Custody

Shortly after the November 2000 election, Georgia's Secretary of State took a hard look

at the performance of voting equipment throughout the state and determined that it actually

faired worse than Florida's in the total number of undervoted races that appeared at the top of the

ballot. In response to those findings, steps were undertaken to unite Georgia's 159 counties with

a single statewide uniform system of voting. During the 2002 General Assembly session,

legislation was enacted that provided for the use of Direct Electronic Recording electronic voting

machines (DRE's) and a broad framework for the future implementation of a system that had yet

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to be selected. This enabling legislation detailed how the DREs must function, the required format of the ballot design, maintenance, and storage requirements, and basic procedures designed for the tabulation of votes.

In May of 2002, Georgia made its vendor selection and began implementing its uniform system of electronic voting. Previously, Georgia had four voting systems comprised of many different types of equipment developed by different vendors, and each system functioned in a different manner. Although each system had some sort of controlling legislation, it was difficult to maintain up-to-date legislation governing how each jurisdiction implemented its voting equipment. One challenge during this period was ensuring that all 159 counties used the system in a consistent manner. With Georgia's enabling legislation in place, the State Election Board developed rules, which have the effect of law, to define the use of the system with particular focus on the issues of security and transparency.

The key goal in drafting these rules was to ensure that there would be no question as to the intent and purpose of the rule and for them to be designed in a way that election officials could easily adapt. To that end, the Georgia State Election Board convenes an informal working group of its forward thinking election officials whenever proposing and reviewing newly proposed rules or rule revisions. The original set of rules adopted in 2002 included uniform definitions, detailed descriptions of required ballot design, storage, maintenance, logic and accuracy requirements, and tabulation procedures. Every year since, the rules have been tweaked and revised to ensure consistency and uniformity. Subsequent revisions and additions have focused on voting system security and include levels of detail designed to deter election fraud throughout the process. These security rules have proven to be cumbersome and time consuming to administer but have been demonstrably effective, adding a level of protection and

transparency that is vital to ensuring an election process that is reliable and trustworthy.

Before Georgia implemented its statewide uniform system, chain of custody procedures were relegated to individual counties, who developed procedures to fit their specific voting equipment. Today's rules are specific to one form of voting equipment and they are mandatory, not optional. These rules include documented evidence of storage, such as mandatory logs noting the location and custody of each voting unit and tabulation equipment.[10] Election officials are also required to submit a written request to the State prior to relocating tabulation servers and each move must be approved and reviewed. Oaths must be administered to any person who has contact with the voting equipment if such person is not an employee of the county elections office. In addition, the election official must maintain a log of all persons who are allowed access to the storage facility; this includes maintenance and emergency workers.

Much emphasis has been placed on the right of the public to observe all phases of the elections process. One such example is the rule regarding the "Logic and Accuracy" testing of voting equipment. The original rule, first adopted in 2002, has been revised to provide for greater transparency and public oversight while at the same time striking a necessary balance to protect the equipment from anyone who may wish to attempt fraud or deception during the critical phase of programming and sealing each unit. Tighter controls have also been placed upon the storage of voting equipment once units have been delivered to the polls. If secure storage space at the poll, with restricted access, is unavailable, election officials must provide interlocking padlocked cables to secure voting units. Poll officials are not allowed to use any voting unit whose seal numbers do not match those which were documented publicly during the "Logic and Accuracy" process without first notifying the elections office of the discrepancy.

Not only have the requirements been tightened for the actual voting units themselves but

also for every component of the voting system, including memory cards, voter access cards, unit keys and encoders. Poll officials and election technicians must sign a receipt for each item that is entrusted to them and, upon return of the equipment, they must account for each item. Any item not returned must be noted on a form specified by the Office of the Secretary of State and the form shall then be returned to the Secretary of State at the time of certification. Chain of custody rules also extend to the use of DRE's for in-person absentee voting. Even though these units remain in the control and possession of election officials at all times, specific rules have been adopted which call for documented evidence of use of each unit on a daily basis. For example, each day the election official is required to record the opening and closing public count totals on every unit. If at any time the opening number does not match that of the previous day's closing, the Secretary of State must be notified immediately and that unit cannot be used until the discrepancy can be resolved to the satisfaction of the Secretary of State.

Counties that have strictly adhered to the Georgia Election Code and the Rules of the State Election Board have found that, while the added controls can be time consuming and in some instances even costly to perform, the advantage far outweighs the difficulty. Election officials who have been called upon to validate their electoral process in court can present detailed logs and forms that clearly demonstrate a documented chain of custody and standard uniform operating procedures. These election officials consistently affirm the dedication exhibited by Georgia elections officials to prevent election fraud.

Chains of Custody in Travis County

Election officials in Travis County, Texas developed a chain of custody process for their election materials when they transitioned to new electronic voting equipment. Two events—the 2000 election contest in Florida and the events of September 11, 2001—served to shape this

effort. The goal was rather simple: "to make sure that [the] election was protected and the public could trust that it was safe, fair and accurate, no matter what happened [in Travis County] or anywhere in the world."[11] Achieving this goal required creating a process of understanding what it meant to hold an election in Travis County, identifying the threats that existed in this election process, and developing SOPs that mitigate these threats.

The centerpiece of the model used in Travis County is "the egg," shown in Figure 2. The egg is a metaphor for the election process; the center yoke representing the most fragile part of the election process, when ballots are being cast. The storage of machines between elections—at the top and bottom of the process—are also areas where there are lesser threats to the system. By identifying threats systematically, Travis County has been able to develop SOPs that fit their election operations and mitigate the specific threats that they face. They have addressed many relatively low-probability threats that could be devastating to an election and can be addressed with relatively low-cost solutions. For example, absentee ballots in Travis County are opened in a trailer outside the main election office. This ensures that any problem with the mail—such as someone putting anthrax or something that resembles anthrax into a letter—will not contaminate the entire election facility and undermine the ability to count ballots and operate the election.

[Figure 2 about here]

The efforts in Travis County have centered around three types of activities: transparency, testing, and security. These activities are all key parts of an efficient and effective voting process, as identified by the international election community. The Administration and Cost of Elections (ACE) Project has eight principles for effective vote counting. The normative theory

underlying this effort is "to establish and maintain public confidence in the electoral process, vote counting systems and procedures should incorporate the fundamental principles of vote counting in a democratic election."[12] Elections should (1) be transparent, (2) be secure, (3) be professionally run, (4) provide accurate results, (5) maintain voter ballot secrecy, (6) provide timely results, (7) have clear responsibility and accountability throughout the counting process, and (8) provide an equitable playing field to all election participants.

In Travis County, these various principles are achieved through specific SOPs. Take the issue of physical security. The county has an array of SOPs designed to promote a secure election environment. At the most basic level, there are procedures that govern who can have access to specific parts of the election offices. The public entry area is open to everyone. A next layer of the building is open only to election personnel who have specific keys. Still other parts of the facility are restricted to a smaller number of personnel. Finally, there is the area where the ballots and voting machines are stored. These areas cannot be opened by election officials— only the sheriff's department can open them. However, the sheriff's department cannot get to the room where these materials are located without being accompanied by an election official with access to the space where these items are stored. This two-key, two-person access rule creates a much higher level of security for the materials than would exist if a single individual could access these materials.

A second related issue is the testing of voting machines. Once an election is created, it is tested by election personnel, who vote the ballots and then ensure that the tabulation process works effectively. The county is also able to do a "hash code" test, where they can compare the software they are loading on the voting machines with the software that was certified and is on file with the National Institute of Standards and Technology (NIST). Such testing allows the

county to ensure that the version of the software that is loaded onto the voting machines and is used in the election is the certified version of the software and has not been tampered with.

The final issue is transparency. Travis County addresses this by making all key activities in the election process, such as the logic and accuracy testing of machines or the tabulation process, open to the public. Moreover, designated party officials specifically witness these activities, and are required to complete a form stating the activity that they have witnessed. In the event of a dispute, the county has witnesses and documentation that show who witnessed these key events and when, which provides documentation of a chain of custody of the election process. These documents are then stored within the physical security of the election office, again promoting the chain of custody of these documents.

Implications for Practice

Effective chain of custody rules provide all of the actors in the election process—candidates, parties, and voters alike—with confidence that the integrity of the voting process and the ballots produced in that process has been maintained. Maintaining the chain of custody will not completely eliminate the possibility for election fraud or election snafus; it will certainly minimize the chances that fraud or snafus can arise, and should help election officials and other interested parties determine where any malfeasance or other problems took place. After the election, the election official should be in a position to show to any interested party where the ballots or related election materials were in the process and who had custody over these items throughout all steps of the process. Outside observers should be able to trace the whereabouts of all election materials, before, during, and after the election --- and be able to replicate tabulations of election materials and ballots. There should never be a question regarding how ballots were stored or handled in such a situation because the election official will have put into place a

process that accounts for how such handling and storage will be done.

Development of a chain of custody plan does presume that the election official will think through the voting process from start to finish so that there are no breaks in the chain. In the examples provided above of voting in Cuyahoga County and Cook County, the problems associated with the chain of custody in the voting process occurred because the election officials had not attempted to implement the chain of custody rules for the new voting equipment prior to holding the election. Instead, the election officials either implemented old rules without considering how the new technology interacted with the new rules or implemented new rules without simulating how such rules would work in practice. Such problems strongly suggest that election officials had not trained poll workers clearly and carefully regarding how to implement the new rules. (If such training had been done, problems with the chain of custody would likely have been identified). Given preliminary evidence that has found that the voter-poll worker interaction is important to the confidence that the voter has in the fairness of the election process, such training is important for direct participants in the voting process to be confident that the election was conducted properly (Hall, Monson, and Patterson 2007a).

Election administrators should consider proceeding in two ways to develop and implement appropriate chain of custody procedures. First, they should audit the procedures in their own jurisdictions to determine exactly what procedures they have in place now to insure that they have a complete accounting in any election of the custody of all election materials, and that there has been appropriate supervision of all election materials before, during and after an election. The results of these custody audits will give election administrators the opportunity to implement improvements in their procedures, and to produce better contingency plans for when these procedures go awry. They should also recognize that the proliferation of absentee voting is

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creating new challenges for chains of custody because these ballots are out of the custody of the election officials for some period before being returned to be validated and counted.

Second, the election official community, perhaps under the auspices of the Election Assistance Commission, should study the chain of custody procedures currently in place across all election jurisdictions in the United States and then suggest best practices that election officials can use as models for their own jurisdictions. Similarly, such best practice studies should include international elections as well; lessons can be learned (both positive and negative) from the international experience and should be documented so that election administrators can learn from the experiences of others. Currently, organizations like the Election Center have started to stress chain of custody issues in their educational programs for election officials.

In the end, maintaining a thorough and appropriate chain of custody for election materials is one of the primary mechanisms that election officials can use to prevent election fraud and simple mistakes that can be perceived as fraud. In the event fraud is alleged, if there are strong controls and documentation of custody in place in a jurisdiction, forensic study of the controls and documentation may shed substantial light on whether fraud did occur and might help investigators identify the perpetrators. Furthermore, maintaining the custody of all election materials in an appropriate and controlled way should help election officials as they seek to demonstrate to their primary clients—voters, politicians, and the media—that the election process in their jurisdiction has integrity and that all concerned should be confident in the outcome of their administrative efforts.

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State v. Reese (56 Ohio App. 2d 278, 382 N.E. 2d 1193, 1194-1195.)

United States v. Myers (294 F.3d 203.)

United States v. Smith (70 Fed App. 359.)

Figure 1: Number of States with Complete Statutory or Regulatory Chain of Custody Requirements
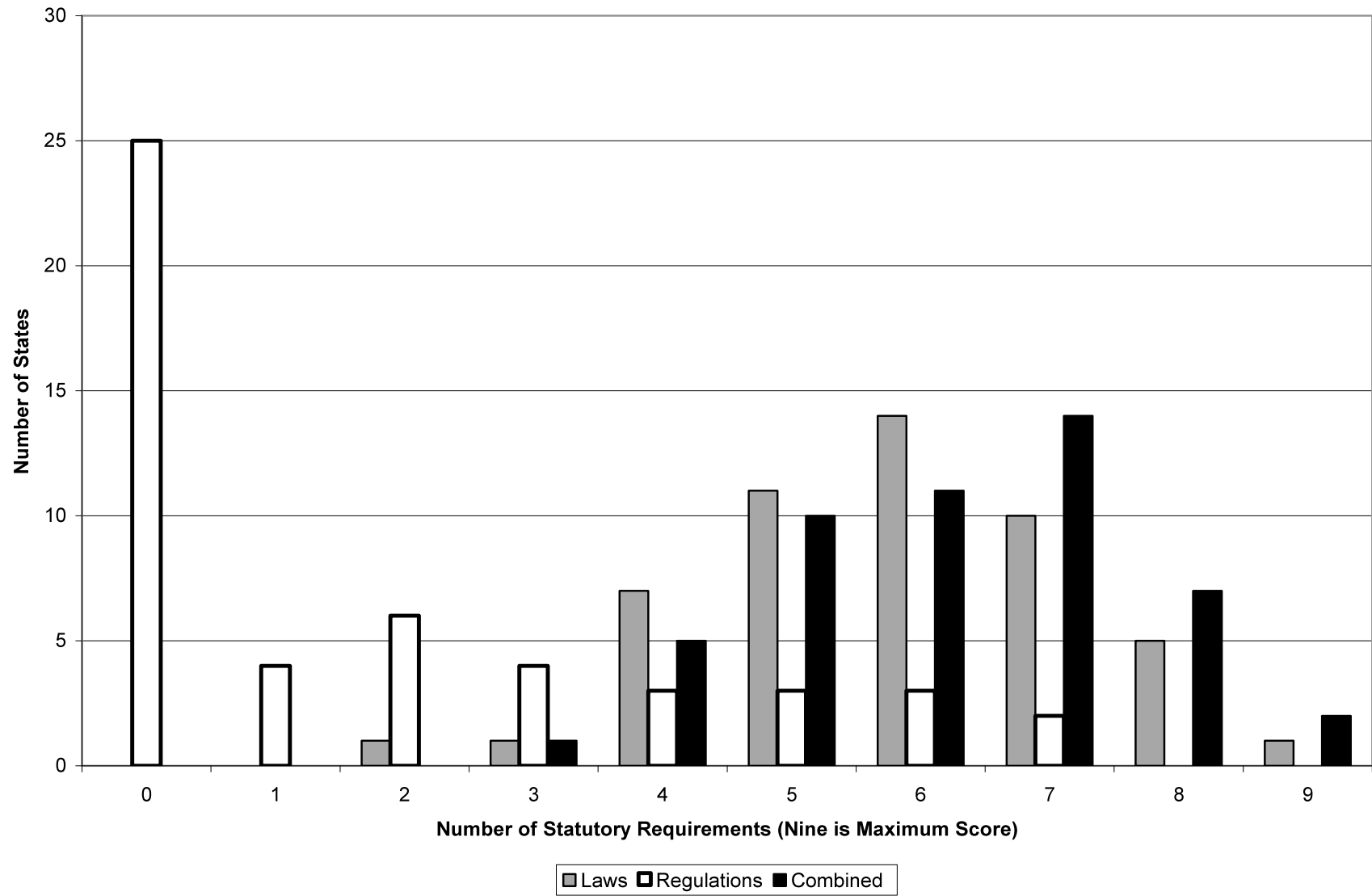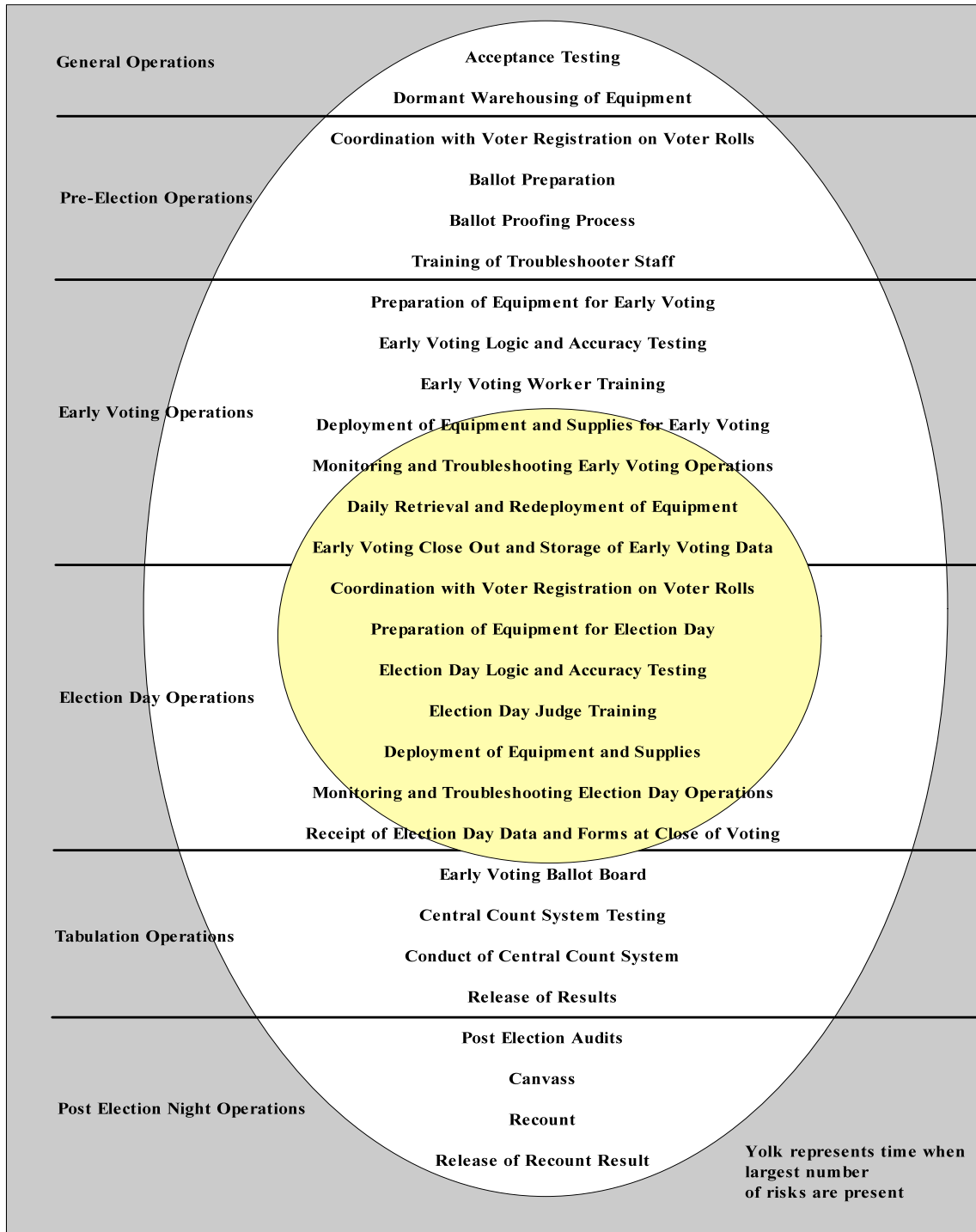
Figure 2: Travis County Risk Assessment Process

General Operations

Acceptance Testing

Dormant Warehousing of Equipment

Pre-Election Operations

Coordination with Voter Registration on Voter Rolls

Ballot Preparation

Ballot Proofing Process

Training of Troubleshooter Staff

Early Voting Operations

Preparation of Equipment for Early Voting

Early Voting Logic and Accuracy Testing

Early Voting Worker Training

Deployment of Equipment and Supplies for Early Voting

Monitoring and Troubleshooting Early Voting Operations

Daily Retrieval and Redeployment of Equipment

Early Voting Close Out and Storage of Early Voting Data

Coordination with Voter Registration on Voter Rolls

Preparation of Equipment for Election Day

Election Day Logic and Accuracy Testing

Election Day Judge Training

Election Day Operations

Deployment of Equipment and Supplies

Monitoring and Troubleshooting Election Day Operations

Receipt of Election Day Data and Forms at Close of Voting

Tabulation Operations

Early Voting Ballot Board

Central Count System Testing

Conduct of Central Count System

Release of Results

Post Election Night Operations

Post Election Audits

Canvass

Recount

Release of Recount Result

Yolk represents time when largest number of risks are present

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Endnotes:

[1] State v. Reese, 56 Ohio App. 2d 278, 382 N.E. 2d 1193, 1194-1195.

[2] Christopher B. Mueller and Laird C. Kirkpatrick, *Evidence,3rd ed.*, New York: Aspen Publishers, 2003, 1004.

[3] See, respectively, United States v. Smith, 70 Fed Appx. 359 and United States v. Myers, 294 F.3d 203.

[4] See Park et al, 2004, 566, especially footnote 23.

[5] Many states have laws, in fact, that invalidate any ballot that contains any sort of distinguishing or identifying symbol, word, or name written on it.

[6] We reviewed the legal and regulatory framework in each of the 50 states and the District of Columbia for a larger project examining vote counting and recounting provisions for the Election Assistance Commission. The data reported here do not necessarily reflect the views or opinions of the EAC nor do they necessarily reflect our recommendations to the EAC contained in reports and memoranda we have provided to the EAC.

[7] A table that contains the original data that are discussed in this section can be found online at http://www.votingtechnologyproject.org/media/documents/TransparentElections_Table1.pdf

[8] See http://electionupdates.caltech.edu/2006/03/ballot-chain-of-custody-questions-in.html for details and links to contemporary media coverage of these problems.

[9] This quote and the subsequent reference to receiving stations come from the *Suburban Cook County Election Judge Manual, Primary Election*, March 21, 2006, pages 107 and 108, respectively. The March 21, 2006 Chicago Board of Election Commissioners *Judge of Election Handbook* contains almost identical statements on this topic.

[10] See Rule 183-1-12-.02, available at http://rules.sos.state.ga.us/docs/183/1/12/02.pdf . This rule also covers the logic and accuracy testing discussed in the next paragraph.

[11] Here, we draw from Dana DeBouivoir, Travis County Clerk, "Method for Developing Security Procedures in a DRE Environment," an Election Center Professional Practices Submission, 2005 and from a two-day visit to Travis County. The quote is from page 1 and the "Egg" model discussed below also comes from this report, page 3.

[12] See http://www.aceproject.org/main/english/vc/vc20.htm