ENSURING FAIRNESS AND ACCURACY IN ELECTIONS INVOLVING ELECTRONIC VOTING SYSTEMS

HEARING

BEFORE THE

SUBCOMMITTEE ON INFORMATION POLICY, CENSUS, AND NATIONAL ARCHIVES

OF THE

COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM

HOUSE OF REPRESENTATIVES

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ENSURING FAIRNESS AND ACCURACY IN ELECTIONS INVOLVING ELECTRONIC VOTING SYSTEMS

WEDNESDAY, APRIL 18, 2007

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON INFORMATION POLICY, CENSUS, AND NATIONAL ARCHIVES,
COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM,
Washington, DC.

The subcommittee met, pursuant to notice, at 2 p.m. in room 2154, Rayburn House Office Building, Hon. Wm. Lacy Clay (chairman of the subcommittee) presiding.

Present: Representatives Clay, Hodes, Maloney, Sali, Turner, Yarmuth, and Watson.

Staff present: Tony Haywood, staff director and counsel; Alissa Bonner and Adam C. Bordes, professional staff members; Jean Gosa, clerk; Nidia Salazar, staff assistant; Leneal Scott, information systems manager; Jacy Dardine, intern; Jay O'Callaghan, minority professional staff member; John Cuaderes, minority senior investigator and policy advisor; and Benjamin Chance, minority clerk.

Mr. CLAY. The Subcommittee on Information Policy, Census, and National Archives of the Committee on Oversight and Government Reform will now come to order. Today's hearing will examine issues relating to ensuring fairness and accuracy in elections involving electronic voting systems.

Without objection, the Chair and ranking minority member will have 5 minutes to make opening statements, followed by opening statements not to exceed 3 minutes by any other Member who seeks recognition.

Without objection, Members or witnesses may have 5 legislative days to submit a written statement or extraneous material for the record.

Let me start off by saying good afternoon and welcome to today's hearing. As we enter the 2008 election season, it is essential that this subcommittee examine the use of modern electronic voting systems and the potential vulnerabilities associated with them. The principle of free and fair elections is the foundation of our democratic Government. The constitutional right to vote has enabled our Nation's citizens to be stakeholders in the greatest democratic experiment the world has ever known.

The need for uniform standards to govern Federal elections became painfully clear in the weeks following the 2000 Presidential

election in Florida. In response to news reports of hanging chads, invalid punch card ballots and insufficient controls over voter registration systems in Florida, Congress passed the Help America Vote Act of 2002. HAVA is the first comprehensive Federal law establishing requirements for the administration of Federal elections.

These requirements cover voting system standards and voter information and registration requirements. HAVA created the Election Assistance Commission to serve as a national clearinghouse for election information, to develop standards for electronic voting systems, and to assist State and local governments in their HAVA compliance efforts.

Research and development activities required by HAVA are carried out by the National Institute of Standards and Technology under the EAC's direction. To date, Congress has appropriated over $3 billion to the EAC for these activities. With grants from the EAC, many State and local jurisdictions have attempted to improve the reliability and accuracy of the voting process by replacing antiquated punch card or lever machine systems with electronic voting systems such as direct recording electronic or optical scan systems.

Unfortunately, numerous State and local governments have reported significant problems with electronic systems. The still-contested House election in Florida's 13th District is a prominent example of how in some instances electronic voting systems have produced unreliable results, raising concerns among voting system experts, and causing distrust among voters.

Accordingly, I believe we should pursue two major goals in moving forward with new electronic voting system requirements. First, we should utilize technology that provides an independent auditable voting record that can be verified by election officials, such as a paper audit trail for DREs. In addition, we should ensure that electronic voting system standards meet the need for adequate privacy safeguards and accessibility for the disabled. These efforts would help to ensure that every vote is accurately counted.

Second, we must try to make the process for testing software code more transparent. This would enable both the EAC and election officials to determine which products are the most secure, reliable and available in the marketplace. To do this, I believe the EAC and the NIST should search for new opportunities to partner with our federally funded research community in order to improve our vulnerability testing and certification practices.

Furthermore, the EAC should fully implement GAO's recommendations for strengthening the commission's efforts to become a true national clearinghouse for election administration.

Unfortunately, the technological challenges we face are compounded by problems with the EAC itself. Recent news reports indicate that the EAC has failed to carry out certain responsibilities required by HAVA. During the past week, the New York Times and other publications have reported that the EAC edited the findings of a Government-funded report on voter fraud to support partisan efforts to mislead the public on the pervasiveness of fraud.

Furthermore, we have learned that recent research on State voter ID standards conducted by Rutgers University for the EAC was rejected for questionable reasons. These developments suggest that the bipartisan EAC may be improperly politicizing their work.

At the very least, it appears that the EAC has strayed from its mandate to develop and disseminate vital information on major election-related topics to the public in an objective manner. As a result, I have serious concerns about how the EAC is handling its stewardship role within our Federal election system.

It is my hope that our witnesses today can address these issues and offer recommendations to remedy the challenges we face.

Testifying on our first panel will be Commissioner Gracia Hillman of the Election Assistance Commission, and Mr. Randolph Hite of the Government Accountability Office. Our second panel includes four distinguished witnesses from both the public and private sector: The Honorable Robin Carnahan, Missouri Secretary of State; Professor Avi Rubin of Johns Hopkins University; Mr. John Groh, vice president of Election Systems and Software, and chairman of the Election Technology Council; and Dr. Diane Golden of the Missouri Assistive Technology Council.

I welcome all of our witnesses and look forward to an informative and frank discussion on these issues.

Now I recognize the ranking member from Ohio, Mr. Turner.

[The prepared statement of Hon. Wm. Lacy Clay follows:]

Opening Statement of Rep. Wm. Lacy Clay (D-MO), Chairman

Subcommittee on Information Policy, Census, and National Archives

House Committee on Oversight and Government Reform

Hearing on "Electronic Voting"

April 18, 2007

Good afternoon and welcome to today's hearing. As we enter the 2008 election season, it is essential that this subcommittee examine the use of modern electronic voting systems, and the potential vulnerabilities associated with them.

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The need for uniform standards to govern federal elections became painfully clear in the weeks following the 2000 Presidential election in Florida. In response to news reports of "hanging chads," invalid punch card ballots, and insufficient controls over voter registration systems in Florida, Congress passed the Help America Vote Act of 2002, or HAVA.

HAVA is the first comprehensive federal law establishing requirements for the administration of federal elections. These requirements cover voting system standards, voter information, and registration requirements. HAVA created the Election Assistance Commission (EAC) to serve as a national clearinghouse for election information, to develop standards for electronic voting systems, and to assist state and local governments in their HAVA compliance efforts. Research and development activities required

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To date, Congress has appropriated over $3 billion to the EAC for these activities. With grants from the EAC, many state and local jurisdictions have attempted to improve the reliability and accuracy of the voting process by replacing antiquated punch card or lever machine systems with electronic voting systems, such as Direct Recording Electronic or Optical Scan systems.

Unfortunately, numerous state and local governments have reported significant problems with electronic voting systems. The still-contested House election in Florida's 13th District is a prominent example of how, in some instances, electronic voting systems have produced unreliable results, raising concerns among voting-system experts and causing distrust among voters.

Accordingly, I believe we should pursue two major goals in moving forward with new electronic voting system requirements. First, we should utilize technology that provides an independent auditable voting record that can be verified by election officials, such as a paper audit trail for DREs. In addition, we should ensure that electronic voting system standards meet the need for adequate privacy safeguards and accessibility for the disabled. These efforts would help to ensure that every vote is accurately counted.

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Furthermore, we've learned that recent research on state voter identification standards conducted by Rutgers University for the EAC was rejected for questionable reasons. These developments suggest that the bipartisan EAC may be improperly politicizing their work. At the very least, it appears that the EAC has strayed from its mandate to develop and disseminate vital information on major election-related topics to the public in an objective manner. As a result, I have serious concerns about how the EAC is handling its stewardship role within our federal election system.

It is my hope that our witnesses today can address these issues and offer recommendations to remedy the challenges we face. Testifying on our first panel will be Commissioner Gracia M. Hillman of the Election Assistance Commission, and Mr. Randolph Hite of the Government Accountability Office. Our second panel includes four distinguished witnesses from both the public and private sector: the Honorable Robin Carnahan, Missouri Secretary of State; Professor Avi Rubin of Johns Hopkins University; Mr. John Groh, Vice President of Election Systems and Software, and Chairman of the Election Technology Council; and Dr. Diane Golden of the Missouri Assistive Technology Council. I

welcome all of our witnesses and look forward to an informative and frank discussion of these issues.

Mr. TURNER. Thank you, Mr. Chairman. I appreciate your holding this very important hearing.

Since the 2000 Presidential race, the Federal Government has been actively involved in seeking a uniform, accessible solution that helps ensure better elections. While overall, voting systems may have improved, we should continue to investigate our voting systems and make improvements when the need arises.

After Congress passed the bipartisan legislation Help America Vote Act in 2002, complaints arose regarding direct recording electronic voting machines, which are commonly known as touch screen voting machines used for elections in the majority of States. The security and accuracy in vote recording on these machines are of particular concern. Also, some accounts claim the operation of DRE machines may be confusing for some. To that end, we should address and resolve these issues.

Mr. Chairman, this is one reason why today's hearing is so important. We need honest feedback and thorough analysis of any problems encountered in these new voting machines.

Mr. Chairman, I want to thank you for inviting a balanced panel that will give us all sides of the story.

I appreciate the witnesses' testimony and I yield back the balance of my time.

[The prepared statement of Hon. Michael R. Turner follows:]

Statement of Rep. Mike Turner
Ranking Republican Member
Subcommittee on Information Policy, Census and National Archives
April 18, 2007
Ensuring Fairness and Accuracy in Elections Involving Electronic Voting Systems

Thank you, Mr. Chairman, for holding this very important hearing.

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Mr. Chairman, I also want to thank you for inviting a balanced panel that can give us all sides of the story. I look forward all the witnesses testimony and yield back the balance of my time.

Mr. CLAY. Thank you very much, Mr. Turner.

Are there any other Members who would like to have an opening statement? Mrs. Maloney.

Mrs. MALONEY. Thank you, Mr. Chairman. I thank Chairman Clay and Ranking Member Turner for holding today's hearing about an issue that deeply concerns me, the accuracy of our Nation's voting systems.

Our representative democracy depends upon the integrity of the voting system, and it is imperative that the machines are secure and reliable. Questions have been raised about the security and reliability of electronic voting systems, including weak security controls and design flaws, among other concerns.

In the 2004 election, millions of voters used electronic voting machines that lacked a voter-verified paper audit trail. Nationwide, the problems included broken voting machines and inaccurately recorded votes, where in a few jurisdictions the votes were switched from John Kerry to George Bush and vice versa.

Maryland experienced so many problems with its electronic voting machines in the September 2006 primary that its Governor urged residents to vote with absentee ballots to ensure that their votes were counted.

I support requiring voting machines to have a voter-verifiable paper audit trail, and I am a cosponsor of H.R. 811, the Voter Confidence and Increased Accessibility Act, which would require a voter-verified permanent paper record or hard copy.

The American people also deserve to know who is manufacturing and controlling the voting machines they are using, and if these machines are at risk for outside manipulation.

Last year, I raised the possibility in front of the Committee on Foreign Investment in the United States Review Board of Smartmatic's purchase in 2005 of Sequoia Voting Machines because of my concerns that a foreign government—in this case, Venezuela—was investing in or owning the company that supplies voting machines for U.S. elections.

CFIUS looks at national security threats. I can't think of a larger national security threat than not having the total integrity of your voting machines.

For a few years, questions surrounded Smartmatic about its ownership and its possible ties and control by the Venezuelan government. In December, Smartmatic announced that it would sell Sequoia voting machines. There clearly were doubts about this company, and as long as those doubts lingered, many people would have legitimate questions about the integrity of those voting machines.

It is time to institute procedures that ensure that election results can be audited to ensure accuracy. If the American public does not have faith that their votes will be recorded accurately, they may decide to stay home on election day, which would undermine our democracy.

I look forward to hearing the witnesses. Again, I can't think of a more important issue that we could be looking at than the integrity of our voting machines.

Thank you.

[The prepared statement of Hon. Carolyn B. Maloney follows:]

Representative Carolyn B. Maloney (NY-14)
"Ensuring Fairness and Accuracy in Elections Involving Electronic Voting Systems"
April 18, 2007

I want to thank Chairman Clay
and Ranking Member Turner
for holding today's hearing
about an issue that deeply concerns me,
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Our representative democracy depends
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that ensure that election results can be audited
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If the American public does not have faith
that their votes will be recorded accurately,
they may decide to stay home on Election Day.

I look forward to hearing from the witnesses.

Thank you.

Mr. CLAY. Thank you so much, Mrs. Maloney, for your opening statement.

It is the policy of the committee to swear in all witnesses before they testify. I would like to ask you both to please stand and raise your right hands.

[Witnesses sworn.]

Mr. CLAY. Thank you. Let the record reflect that the witnesses answered in the affirmative.

Ms. Hillman, please proceed.

STATEMENTS OF GRACIA HILLMAN, COMMISSIONER, U.S. ELECTION ASSISTANCE COMMISSION; AND RANDOLPH HITE, DIRECTOR, INFORMATION TECHNOLOGY ARCHITECTURE AND SYSTEMS, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

STATEMENT OF GRACIA HILLMAN

Ms. HILLMAN. Thank you very much. Let me begin by saying that EAC has submitted for the record extensive testimony outlining the details of all of our programs that certify and test voting systems, including the hardware and software. My remarks will summarize some of the testimony.

Good afternoon, Chairman Clay, Ranking Member Turner and all members of the subcommittee. My name is Gracia Hillman and I am a member of the U.S. Election Assistance Commission. Mr. Chairman, you asked me here today to discuss issues concerning fairness and accuracy in elections that use electronic voting systems. Today's hearing adds an important discussion to this issue. Fairness and accuracy are crucial components in every facet of elections. This applies to voter registration, casting ballots, and certifying election results.

It is important to remember that whether we are discussing a ballot box, an optical scan machine, or an electronic touch screen voting system, people control fair and accurate elections. There are lots of discussions about whether we can or should trust electronic voting machines. States choose their voting systems and some are now switching to optical scan machines. However, we must remember that electronic technology is not exclusive to a touch screen voting system. The counting and casting of ballots on an optical scan machine is done electronically, so we must cast a critical eye on all voting technologies, and the system manufacturers and the testing laboratories must join us in that endeavor.

Mr. Chairman, it is not enough to only examine the device that people use to vote. We must remember that voting is a human exercise. To that end, EAC focuses on the technical functions and testing of voting systems, and at the same time, we examine the human management of elections. America is in a period of major changes in the technology of our voting system. We know that electronic voting systems bring advantages. For example, they enable us to meet the language and disability access requirements of HAVA, and they prevent people from over-voting a ballot.

However, if people do not trust these systems, if they believe the systems can be compromised, then the advantages do not mean very much. Nonetheless, it is important to point out that to compromise a voting system, and I am talking about any type of voting

system, you must have two things: knowledge of the system and unsupervised access to the machine and software.

Mr. Chairman, election officials follow security protocols to prevent that access. I mean, really, no voting system should be fully trusted unless election officials store them in a secure location, prevent tampering, conduct independent logic and accuracy testing, train its workers, audit the results, and let the public observe the entire process.

EAC publishes guidelines on how to secure voting systems. We emphasize that details and training matter in every facet of elections. Just one person forgetting one detail, like forgetting to bring election day supplies to the polling place or not even showing up to open the polls, can make or break an election.

Mr. Chairman, before closing I want to address the issue of paper trail printing devices for DRE machines. As you know, this device enables a voter to confirm his selections before casting the ballot and presumably the paper could be used in audits. I am not here to discuss whether Congress should mandate paper trail. I do want to point out that depending on what the particular requirements are, at least 180,000 DREs in this country would have to be replaced or upgraded.

When you combine the introduction of new equipment, earlier primaries, and the enormous tasks of recruiting and training poll workers to meet a Presidential election year deadline, which is only a year and a half from now, you have all of the ingredients for a recipe for colossal confusion. That is why we cannot discuss voting system technology in a vacuum. We must also discuss and consider the human element.

I have spent my entire career working to make sure all voters are treated fairly and that votes are counted accurately. It is useful to question the use of electronic voting systems. However, I urge you to not let electronic voting divert our attention from issues such as voter registration, participation and disenfranchisement.

It is my understanding that the committee likely has questions for me about EAC matters, namely our research and study work. I am prepared to answer your questions about my testimony today and all of our other work.

Thank you for this opportunity.

[The prepared statement of Ms. Hillman follows:]

Good afternoon Chairman Clay, Ranking Member Turner, and Members of the Subcommittee. I am pleased to be here this afternoon on behalf of the U.S. Election Assistance Commission (EAC) to discuss election integrity, the changes in voting that have been effectuated by the Help America Vote Act of 2002 (HAVA), and the role that EAC plays in supporting the States and local governments in implementing HAVA-compliant voting systems.

INTRODUCTION

EAC is a bipartisan commission consisting of four members: Donetta Davidson, Chair; Gracia Hillman, Caroline Hunter, and Rosemary Rodriguez. EAC's mission is to guide, assist, and direct the effective administration of Federal elections through funding, innovation, guidance, information and regulation. In doing so, EAC has focused on fulfilling its obligations under HAVA and the National Voter Registration Act (NVRA). EAC has employed four strategic objectives to meet these statutory requirements: Distribution and Management of HAVA Funds, Aiding in the Improvement of Voting Systems, National Clearinghouse of Election Information, and Guidance and Information to the States. The topic of this hearing involves our strategic efforts to aid in the improvement of voting systems and to provide guidance and information to States to assist in improving the voting process. These programs and EAC's efforts to assist States with implementing voting systems and procedures to safeguard those systems will be discussed in more detail below.

ELECTIONS: A COMPLEX EQUATION

Conducting elections is a complex process, involving many steps to ensure that eligible voters are able to cast a single ballot and that each vote is counted and reported accurately. A successful, accurate, open, accessible and secure election requires attention to several areas of election administration including the use of reliable, accurate voting systems and the development and implementation of a comprehensive voting process. Even before the voting process begins, election management efforts must ensure that there is a complete and accurate list of voters who are eligible to participate in the election. No one of these areas alone will ensure the integrity of an election. Each must work in tandem with the other to create an entire election process in which all voters can have confidence.

In addition to ensuring the successful operation of the entire election administration process, the public must be given access to each step of the process. EAC recommends that election officials allow the public to observe the steps taken to prepare for and conduct an election, including system set up and testing, vote tabulation and audits and recounts. After all, elections are about people. People set up and program voting machines and people cast votes on those same machines. To conduct a successful

election, the public must be educated about and have confidence in the election administration process.

VOTER REGISTRATION

The first step to having a successful, accurate and reliable election is to ensure that only eligible voters cast ballots. In most States, this begins with the process of registering those persons to vote. The National Voter Registration Act establishes the standard by which persons are registered to vote for Federal elections. And, HAVA significantly changed the means of maintaining, verifying, and managing that information.

Prior to HAVA, very few States administered the voter registration process. Voter registration was conducted by local election officials and voter registration lists were maintained by local election officials. HAVA required the establishment of a single, statewide voter registration list in each State. After HAVA, there is to be only one list that contains the names of all of the registered voters in the State, removing the possibility of multiple and outdated registrations.

States are required to maintain and administer these new voter registration lists, including the responsibility assigned by HAVA to verify voter registration information against other available State and Federal information. For example, new registrations must be verified against the information maintained by the Department of Motor Vehicles in the State and the Social Security Administration. State election officials are also required to compare the voter registration list against the death records maintained by the State's office of vital statistics.

To facilitate this type of review, voters are required to provide either a driver's license number or the last four digits of his/her social security number when registering. If the voter fails to provide this information, the election official is prohibited from processing the voter registration, unless the voter does not have either a social security number or a drivers' license number. Further, for voters who register to vote by mail, they must provide some proof of identity –a copy of the voter's driver's license, a utility bill, or other government document bearing the name and address of the voter. If the voter does not provide this information and if the voter's application cannot be verified using the social security number or driver's license number, the voter will have to provide some form of identification upon voting for the first time.

In 2005, EAC issued interpretive guidance concerning the construction and maintenance of these statewide voter registration lists. This guidance worked to assure that the requirements of HAVA were implemented properly and in a manner that maintained voter's rights in the registration process. For example, when voter registration verification shows a discrepancy between information provided by the voter and information available through other State and Federal databases, it is critical to involve

the voter in resolving the discrepancy. The voter is best equipped to determine whether the discrepancy is the result of a mistake, incorrect information in the other database, or some other problem. In 2007, EAC will continue its work to inform and educate the public on the interaction between HAVA and NVRA and to amend NVRA regulations, as necessary, to ensure the proper implementation of both Acts.

It is imperative to the election process to have an accurate list of persons who are eligible to cast ballots. This can be accomplished by operating a voter registration system that complies with HAVA and that is updated frequently so that duplicate and fraudulent registrations can be caught and remedied.

VOTING SYSTEMS

Voting system integrity requires an accurate, reliable, accessible and auditable voting system. There are various opinions on what constitutes accurate, reliable, accessible and auditable, but one clear source is the Help America Vote Act of 2002 (HAVA). HAVA establishes a number of requirements for voting systems, including that the system:

- Allow the voter the ability to change his or her selections prior to casting a vote;
- Notify the voter of an overvote and the consequences of casting an overvote;
- Provide a permanent paper record of the election that is auditable;
- Provide accessibility to individuals with disabilities including persons who are blind or visually impaired;
- Provide accessibility to persons for whom English is not their first language when required by Section 203 of the Voting Rights Act; and
- Meet or exceed the error rate as established in the 2002 Voting System Standards developed by the Federal Election Commission.

See HAVA Section 301; 42 U.S.C. Section 15481. This section requires that all voting systems used in an election for Federal office meet or exceed these requirements. States could use HAVA funding to purchase voting systems that meet or exceed these requirements. A chart showing the funds distributed to each State is found on EAC's Web site, www.eac.gov.

In addition, HAVA also required EAC to develop guidelines for testing voting systems and required EAC to establish a program for the testing of voting systems using federally accredited laboratories. These guidelines and testing and accreditation processes establish a means to determine whether voting systems meet the base-line requirements of HAVA and the more descriptive and demanding standards of the voluntary voting system guidelines developed by EAC. This process provides assurance to election officials and members of the public that the voting systems that they use will perform in a manner that is accurate, reliable, accessible and auditable.

Voluntary Voting System Guidelines (VVSG)

One of EAC's most important mandates is the testing, certification, decertification and recertification of voting system hardware and software. Fundamental to implementing this key function is the development of updated voting system guidelines, which prescribe the technical requirements for voting system performance and identify testing protocols to determine how well systems meet these requirements. EAC along with its Federal advisory committee, the Technical Guidelines Development Committee (TGDC), and the National Institute of Standards and Technology (NIST), work together to develop voluntary testing standards.

History of Voting System Standards and Guidelines

The first set of national voting system standards (VSS) was created in 1990 by the Federal Election Commission (FEC). In 2002, FEC updated the standards and HAVA mandated that EAC develop a new iteration of the standards—which would be known as the Voluntary Voting System Guidelines (*VVSG)*—to address advancements in information security and computer technologies as well as improve usability.

HAVA mandated a 9-month period for the TGDC to develop the initial set of *VVSG*. The TGDC, working with NIST, technology experts, accessibility experts, and election officials, completed the first draft and delivered it to EAC in May 2005. In addition to providing technical support to the TGDC, NIST also reviewed the 2002 Voting System Standards (2002 VSS) to identify issues to be addressed in the 2005 guidelines, drafted core functional requirements, categorized requirements into related groups of functionality, identified security gaps, provided recommendations for implementing a voter-verifiable paper audit trail, and provided usability requirements. NIST also updated the *VVSG*'s conformance clause and glossary.

On December 13, 2005, EAC adopted the first iteration of the Voluntary Voting System Standards (VVSG). Before the adoption of the VVSG, EAC conducted a thorough and transparent public comment process. After conducting an initial review of the draft *VVSG*, EAC released the two-volume proposed guidelines for public comment for a period of 90 days; during this period, EAC received more than 6,000 comments. Each comment was reviewed and considered before the document was finalized and adopted. The agency also held public hearings about the *VVSG* in New York City, NY, Pasadena, CA, and Denver, CO.

The *VVSG* was an initial update to the 2002 Voting System Standards focusing primarily on improving the standards for accessibility, usability and security. The *VVSG* also establishes the testing methods for assessing whether a voting system meets the guidelines. In many areas, these guidelines provide more information and guidance than HAVA. For example, these testing guidelines incorporated standards for reviewing

voting systems equipped with voter verifiable paper audit trails (VVPAT) in recognition of the many States that now require this technology. Likewise, in the area of accessibility, the guidelines require that if the VVPAT is used as the official ballot, the paper record be made accessible to persons with disabilities, including persons with visual impairments or disabilities. Volume I of the *VVSG, Voting System Performance Guidelines,* includes new voluntary requirements for accessibility, usability, voting system software distribution, system setup validation, and wireless communications. It provides an overview of the voluntary requirements for independent verification systems, including voluntary requirements for a voter-verified paper audit trail for States that require this feature for their voting systems. Volume I also includes the requirement that all voting system vendors submit software to a national repository, which will allow local election officials to make sure the voting system software that they purchase is the same software that was certified.

Volume II of the *VVSG, National Certification Testing Guidelines,* describes the components of the national certification testing process for voting systems, which will be performed by independent voting system test labs accredited by EAC. EAC is mandated by HAVA to develop a national program to accredit test laboratories and certify, decertify, and recertify voting systems. The *VVSG* and the comments received from the public about the guidelines are available at www.eac.gov.

The Future of the Voluntary Voting System Guidelines

Significant work remains to be done to fully develop a comprehensive set of guidelines and testing methods for assessing voting systems and to ensure that they keep pace with technological advances. TGDC and NIST have been working since the development of the initial iteration of the VVSG in 2005 to revise that version and to completely review and update the 2002 Voting System Standards that were developed by the FEC. EAC expects to receive a draft of this document from NIST in July 2007.

In addition to this work, NIST is working to develop a uniform set of test methods that can be applied to the testing of voting equipment. Currently, accredited laboratories develop their own test methods to test voting equipment. After the completion of these uniform test methods, every accredited lab will use the same test to determine if a voting system conforms to the *VVSG*. This is a long and arduous process as test methods must be developed for each type and make of voting system. Work is beginning in 2007 on these methods, but will likely take several years to complete.

Voting system testing and certification and laboratory accreditation program

Accreditation of Voting System Testing Laboratories

HAVA Section 231 requires EAC and NIST to develop a national program for accrediting voting system testing laboratories. The National Voluntary Laboratory

Accreditation Program (NVLAP) of NIST provides for the initial screening and evaluation of testing laboratories and will perform periodic re-evaluation to verify that the labs continue to meet the accreditation criteria. When NIST has determined that a lab is competent to test systems, the NIST director recommends to EAC that a lab be accredited. EAC then makes the determination to accredit the lab. EAC issues an accreditation certificate to approved labs, maintains a register of accredited labs and posts this information on its website.

In July 2005, NVLAP advertised for the first class of testing laboratories to be reviewed under the NVLAP program and accredited by EAC. Five laboratories have applied for the accreditation program. Pre-assessments of these laboratories began in April 2006.

Because testing of voting systems could not be delayed, there had to be an interim review and accreditation of laboratories. At a public meeting in August 2005 held in Denver, the commissioners received a staff recommendation outlining the details of the interim accreditation program. The staff recommendation included a process in which the three laboratories previously accredited by NASED – CIBER, SysTest Labs, and Wyle Laboratories – would be allowed to apply for interim accreditation. In late 2005, EAC invited laboratories that were accredited through the National Association of State Election Directors (NASED) program as Independent Testing Authorities (ITAs) to apply for interim accreditation. All three ITAs applied for interim accreditation. Interim accreditation reviews by EAC contractors began in the spring 2006. Two of the ITAs were accredited on an interim basis. One laboratory is still under consideration for accreditation in the interim program. However, on February 8, 2007, EAC voted to terminate the interim laboratory accreditation program as EAC has received a recommendation from NIST regarding the accreditation of two laboratories that had undergone review through NVLAP.

On January 18, 2007, EAC received recommendations from NIST to accredit two test laboratories under EAC's new Voting System Certification and Laboratory Accreditation Program. NIST recommended that EAC accredit iBeta Quality Assurance and SysTest Labs to test voting systems against both the 2002 Voting System Standards and the 2005 Voluntary Voting System Guidelines. EAC conducted additional review of the recommended labs to address non-technical issues such as conflict of interest policies, organizational structure, and recordkeeping protocols. On February 21, 2007, EAC voted at a public meeting to accredit these two laboratories under its Voting System Certification and Laboratory Accreditation Program.

Voting System Certification

In 2007, EAC assumed the responsibility of certifying voting systems according to national testing guidelines. Previously, the National Association of State Election Directors (NASED) qualified voting systems to both the 1990 and 2002 Voting System

Standards. EAC's certification process constitutes the Federal government's first efforts to standardize the voting system industry.

In July 2006, EAC implemented its pre-election certification program, which only focused on reviewing changes or modifications that were necessary for modifications to systems that would be used during the November 2006 elections. Three modifications were reviewed and approved under the pre-election program. Those modifications were approved only conditionally. The condition was that the authorization for the modification expired after the 2006 election. After that, no modification will be considered unless the entire system has already received an EAC certification.

In October 2006, EAC published for public comment its post-election certification program. This program encompasses an expanded and detailed review of voting systems, utilizing accredited laboratories and technical reviewers. At a public meeting on December 7, 2006, EAC adopted its Voting System Certification Program, which became effective on January 1, 2007. Since that time, nine manufacturers have registered to participate in the EAC program. The registration process is antecedent and required prior to a manufacturer submitting a system for testing. Currently, nine manufacturers are registered with EAC. A list of registered manufacturers is available at www.eac.gov. Once the manufacturer is registered, it may submit systems for testing to an EAC-accredited testing laboratory. Reports from that laboratory's assessment are provided to EAC for review and action. The reports are reviewed by EAC technical reviewers. If the report is in order and the system is in conformance with the applicable voting system standards or guidelines, the technical reviewers will recommend that EAC grant the system certification. EAC's executive director will consider the recommendation and make the final decision regarding certification. Once certified, a system may bear an EAC certification sticker and may be marketed as having obtained EAC certification. The EAC's certification process include assessment of quality control, field monitoring, decertification of voting systems, and enhanced public access to certification information. For more information concerning EAC's Voting System Testing and Certification Program, see the program manual for this program, which is available on the EAC Web site, www.eac.gov.

Federal Process Adds Transparency and Accountability

The implementation of EAC's Laboratory Accreditation Program and Voting System Testing and Certification Program mark the first time that the Federal government has funded and tested both laboratories and voting systems. Both of these processes were previously conducted by NASED in a collaborative and voluntary effort. The Federal government's involvement in these processes will shed light on the rigorous process that ensures that our nation's voting systems are accurate, reliable and ready for service in any election. Unlike our predecessors, EAC is obligated to conduct accreditation and certification processes that are open and that share information about the results of those

tests with the public. EAC has developed its programs with the knowledge that public confidence is critical to the election process and that public confidence comes from public knowledge and understanding of the process. Information about EAC accredited laboratories is available on EAC's Web site, www.eac.gov. Similarly, information about EAC's testing and certification program and any systems that have been tested through that program also will be available on the EAC Web site.

State voting system testing

The requirements that States place on the type of voting equipment that can be used in each State are very important to implementing accurate and reliable voting systems. EAC's Voluntary Voting System Guidelines and its testing and certification program are voluntary. These programs were established in HAVA to allow States to voluntarily adopt the programs and thereby make those programs mandatory in the States that adopt them. Thus, it is State action that requires this important testing and certification process.

In addition to adopting the *VVSG* and testing and certification requirements, many States implement another layer of protection and voting integrity. Many States have their own testing and certification processes that they pair with the Federal (previously National) testing and certification process. The degree of intensity of these programs varies. Some test only to additional State requirements, while others essentially re-test to the same standards that were required under the Federal or National testing and certification program.

In addition to this type of testing and certification, States also conduct acceptance testing on voting systems when they are received from the manufacturer. This testing should determine that the voting system functions properly and that it has been configured in the way that the State requested through its purchase contract. Last, but certainly not least, States and local governments also conduct logic and accuracy testing on voting equipment prior to each election. In this testing, the voting system is loaded with the actual ballot and a test is performed to determine that the system is accurately recording votes on that ballot. This test is conducted using a controlled sample of votes, often times referred to as a "test deck." While test deck technically refers to a deck of optical scan or other paper ballots, the same concept applies to testing direct record electronic (DRE) voting systems by using a known series of votes.

Implementing Accurate and Reliable Voting Systems

In our opinion, a State or local government can ensure the accuracy and reliability of their voting systems by choosing to require the following processes that we have discussed. First, only use systems that have been tested and certified as meeting the requirements of HAVA and the applicable voting system standards or guidelines. Second, require that the manufacturer keep pace with changing technology and standards. Include in contract

terms provisions that require manufacturers to upgrade systems at a reasonable price. Third, to add another level of scrutiny, States should implement their own voting system testing and certification procedures. Even if it is only for those requirements that are unique to the State, the State should assure that the system can perform as desired. Fourth, conduct rigorous and independent acceptance testing. States and local governments should conduct their own testing, if necessary with the assistance of a third party technical advisor, to ensure that the acceptance testing process is independent. Acceptance tests should also be rigorous and put the equipment through the type of work that it is intended to perform in an election environment. If the equipment does not perform properly it should be rejected. Last, conduct logic and accuracy testing on every piece of voting equipment that is to be used in the election. All systems must be checked to assure that they are accurately counting votes. Where discrepancies arise, the system, programming, and paper and printing (where paper is used) should be checked and the problem resolved before the voting equipment is placed in service for the election.

While we state these suggested requirements emphatically, EAC wants to assure that it is clear that many States and local election jurisdictions have already implemented each and every one of these steps to ensure that their elections are conducted accurately and reliably. This commitment to detail by the nation's election officials is why exit polls showed that 88 percent of voters were reported to have confidence that their votes were counted accurately. Continued vigilance in this and other areas impacting election integrity will help to improve confidence in a process that already enjoys overwhelming success.

THE VOTING PROCESS

Once a State or local election jurisdiction has purchased a new voting system, there is still a great deal of work to be done to assure that elections are conducted properly. Purchasing the right system is in many ways the easy part. Using it properly takes time, planning, and persistent attention to detail.

Election officials must keep in mind that in order to successfully compromise a voting system during an election, a person must have knowledge of the system and access to the system while the election is taking place – a scenario that applies to ballot boxes or e-voting machines. Any discussion or policy about implementing a secure voting system must examine all aspects of the voting process. The bottom line is that real security for any type of voting system – electronic or paper-based – comes from systematic preparation. State officials should ensure that they:

- Prepare systems to prevent tampering;
- Prepare people to detect tampering;
- Prepare poll workers and law enforcement to react to tampering; and
- Prepare election officials to recover by auditing and investigating tampering.

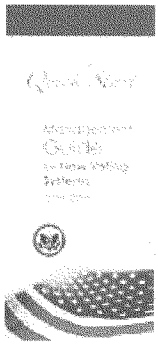
These fundamental election administration processes to protect the entire voting process will always be important, even as voting technology evolves. Focusing solely on the reliability of voting systems is not enough, and a Federal certification for the system cannot take the place of solid, thorough management procedures at the State and local levels to ensure the system is managed, tested, and operated properly. Achieving accurate and reliable election results will always be the combination of thorough testing of the equipment at multiple levels, training and resources for election officials and poll workers, and through election management guidelines for every aspect of election administration.

Management Guidelines

EAC is working to assist States and local election jurisdictions with identifying and managing all of the details surrounding the successful administration of elections. In 2005, EAC began work on a comprehensive set of management guidelines, collaborating with a group of experienced State and local election officials to provide subject matter expertise and to help develop the guidelines. The project focuses on developing procedures related to the use of voting equipment and procedures for all other aspects of the election administration process. These publications are intended to be a companion to the *VVSG* and assist States and local election jurisdictions with the appropriate implementation and management of their voting systems. The first set of election management guidelines will be completed in FY 2007; they will be available to all election officials to incorporate these procedures at the State and local levels.

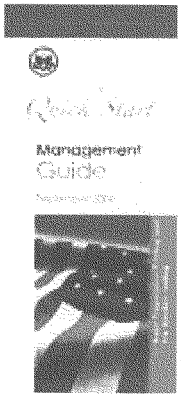
Four *Quick Start Guides* were distributed to election officials prior to the 2006 election. These guides are summaries of more extensive chapters of the Management Guidelines that will be released this year. The guides were sent to election officials throughout the nation and covered topics such as introducing a new voting system, ballot preparation, voting system security, and poll worker training. All *Quick Start* guides are available at www.eac.gov. A brief description of each *Quick Start* guide is provided below.

Quick Start Guide for New Voting Systems



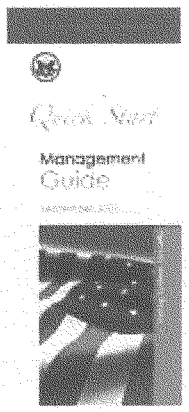
The guide provides a snapshot of processes and procedures election officials should use when introducing a new voting system. It covers receiving and testing of equipment; implementation tips, such as conducting a mock election and developing contingency plans; and programming. The guide also offers Election Day management strategies, including opening the polls, processing voters, and closing the polls.

Quick Start Guide for Ballot Preparation/ Printing and Pre-Election Testing



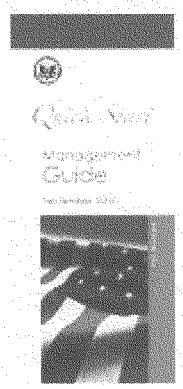
Ballot preparation and logic and accuracy testing are essential steps to ensure Election Day runs smoothly. The guide offers tips on preparing and printing ballots, which includes confirming that ballots conform to all applicable State laws as well as requiring a multilayered ballot proofing process at each stage of the design and production process. The guide also covers pre-election testing for hardware and software logic and accuracy.

Quick Start Guide for Voting System Security



The introduction of new equipment also ushered in concerns regarding voting system security. To address some of those concerns and to help election officials implement effective management procedures, the guide highlights priority items essential to securing these systems. It addresses software security, advising officials to be sure that the software installed on the systems is the exact version that has been certified. The guide advises officials to not install any software other than the voting system software on the vote tabulating computer; to verify that the voting system is not connected to any network outside the control of the election office; and to consider any results transmitted electronically to be unofficial and verify them against results contained on the media that are physically transported to the central office. Also included in the guide are recommendations regarding password maintenance, physical security, personnel security, and procedures to secure the equipment.

Quick Start Guide for Poll Workers



One of the most challenging tasks for election officials is recruiting and training poll workers. The guide contains information about identifying potential poll workers, effective training programs and techniques, as well as procedures to implement on Election Day.

A full range of Management Guideline documents will be developed to cover topics related to election administration, including:

- Pre-Election Testing

- Ballot Design
- Contingency/Disaster Planning
- Vote by Mail/Absentee Voting
- Military/Overseas Voting
- Polling Place/Vote Center Management

In addition, new *Quick Start* guides are planned for 2007, including guides on the following topics:

- Change Management
- Public Relations
- Contingency/Disaster Planning
- Certification
- Developing an Audit Trail

Proper management of elections is key to conducting a reliable, accurate, open and accessible election. Buying state of the art voting equipment with the latest security features is meaningless unless the door to the storehouse where the voting systems are kept is secured and locked. Similarly, equipment used to program voting systems should never be connected to the Internet. It is EAC's goal to communicate these suggestions and requirements to the election officials to help them increase the security and accuracy of their voting equipment by their practices and procedures.

Review of voting system operation

Good election management and administration includes a review of the voting system operation before, during and after the election. Whether using a recount, audit or parallel testing, it is critical to take steps to make sure that voting equipment performed properly and calculated votes properly.

Recounts and Audits

Recounts are a common method for reviewing the performance of voting equipment. Many States have laws that require recounts when certain conditions exist, such as a close race. Others have mandatory recounts of a certain percentage of ballots after every election regardless of the outcome. Some States refer to automatic recounts as audits. Regardless of whether it is an audit or a recount, the review of an election should be conducted with as much care as the election.

Whether optical scan or electronic, all voting systems produce a form of paper record that can be audited or recounted, a requirement of HAVA. Optical scan systems, obviously, use the paper ballots as the paper record that can be audited or recounted. Conversely, direct record electronic systems can use one of two paper sources for recounting or

auditing the election. Every DRE is required to produce a paper record suitable for auditing that shows every vote that was cast on the voting system. This record is produced in a randomized order to avoid association with a voter and is obtained from the internal memory of the DRE. Some DREs also have the ability to produce a voter verifiable paper audit trail (VVPAT). This paper record is produced from the computer's internal memory but is generated contemporaneously prior to the voter casting his/her ballot. It is verifiable by the voter; meaning that the voter can verify that the computer generated image on the screen is the same as the computer generated print out.

It is critical in a recount or audit situation to assure that the quality of the paper record is considered. With paper ballots, there may be a question of the intent of the voter if the ballot is not marked according to the ballot instructions. Similarly, because VVPATs are contemporaneously recorded, there can be paper jams, a lack of ink or other printer problems that result in the degradation of the paper record. The State or local election jurisdiction must take these realities into account and provide a means by which problems can be solved when they arise during a recount or audit.

Audits and recounts are frequently conducted on a manual basis. The ballots or paper records are hand counted by people. Another reality that must be addressed is that people make mistakes. There must be procedures and processes in place to reduce and catch the number of human counting errors.

Parallel testing

Parallel testing is a relatively new practice in monitoring the accuracy of an election. It is done simultaneously with the conduct of the election. Several voting systems are set up as "sample systems" and are voted on by election personnel during the course of the regularly scheduled election. Some States and local governments conduct parallel testing prior to the election. However, the process is the same. The machines are voted with a known set of votes, such as using a set of paper ballots from the absentee voting process. These votes are entered onto the DRE system and counted. The system is deemed to be operating properly if the hand count of the ballots and the computer tally are the same.

TRANSPARENCY AND ACCOUNTABILITY FOR THE PUBLIC

Implementing extensive management procedures for the entire election administration process is crucial to accurate and secure elections. The public must be informed about how elections are conducted to ensure they have confidence in the process, or all efforts to achieve election integrity will be lost.

Most voters are not familiar with the entire election administration process. Their interaction is usually limited to Election Day when they show up, in some cases provide identification, and are escorted to the booth where they cast their vote on a paper or

electronic system. The public is not engaged in the "behind the scenes" work that goes on to make the election that they are participating in run smoothly. They have not been involved in the months of planning that go into a smooth election. They never see the processes that are involved such as:

- qualifying candidates,
- laying out ballots,
- programming voting equipment,
- checking and double checking the ballots,
- training poll workers on the various election laws and voters rights, as well as the intricacies of how the voting equipment works,
- delivering the voting equipment,
- tabulating the results,
- reporting the results,
- recounting or auditing, and
- certifying the final totals.

Good and efficient election administration requires election officials to educate the public about the election process. One easy way to do that is for election officials to provide the public access to the process. Officials can make processes such as voting system set up, logic and accuracy testing, vote tabulation and recounts open to the public. This way the public can learn about the process while it is ongoing.

Another means is to provide educational materials to the media, government agencies, and to organizations that educate the public about voting. When implementing a new voting system it is critical to get information to the public about the new systems and how they work. In 2006, EAC distributed a Voter's Guide to Election Day for the public to provide information about election processes. The guide included information about:

- registering to vote,
- polling place information,
- absentee and early voting,
- provisional voting,
- voting systems,
- poll workers, and
- Election Day procedures.

This guide was generalized in order to be applicable to all 50 States, the District of Columbia and the four territories in terms of the way in which they conduct elections. The guide can also be used by States and local governments to develop similar, more specific pieces geared toward the way that elections are conducted in their jurisdiction, including localized information about registration and voting procedures, as well as the type of voting equipment that is used there.

EAC is also conducting a 2006 Voting Administration and Election Survey, which will include data from each State about registration, provisional voting, voting system usage and other election data sets to inform the public about how, where, and when we vote.

CONCLUSION

Elections are a complex equation of people, equipment and processes. All three pieces work together to ensure a successful, accurate and reliable election. HAVA was careful to address them all. Future work in elections must consider all aspects of election administration in order to result in increased confidence in the election process.

EAC appreciates the opportunity to provide this testimony. If you have any questions, I will be happy to address them.

Mr. CLAY. Thank you so much for your testimony, Ms. Hillman.

Mr. Hite, you may proceed. Would you summarize your testimony for us within 5 minutes?

STATEMENT OF RANDOLPH HITE

Mr. HITE. Yes, sir.

Thank you, Chairman Clay.

In the wake of the 2000 and 2004 elections, GAO looked at the national election process end to end, focusing on all aspects of it, including the use of electronic voting systems. Our most recent reports cast considerable light on the challenges associated with these systems, so my testimony today draws from those reports and I will summarize it by making five points.

Point one, although voting systems play a major role in elections, they are but one facet of a highly complex and decentralized election environment that depends on the effective interplay of people, processes and technology. As such, when I think of a "voting system" I think of not only the hardware and software, but also the persons who interact with them and the rules that govern this interaction.

Point two, although security and reliability have arguably taken center stage in the debate surrounding electronic voting systems, other performance characteristics such as ease of use and cost should not be overlooked. For example, certain DREs have been found to have security vulnerabilities that can be exploited, such as unencrypted files and no or easily guessed passwords, and some lack a paper record.

At the same time, DREs can be more accommodating to voters with disabilities, and they can protect against common voter errors such as over-voting.

On the other hand, optical scan voting systems, particularly central count systems, have a lower capital cost than DREs and they offer a paper record. However, they can be more challenging for voters with certain types of disabilities, and they can create paper nightmares for jurisdictions that have to accommodate multiple languages.

Point three, voting system security and reliability is a function of how well each phase in the voting system life cycle is managed at all levels of government. Simply stated, the system life cycle begins with defining the standards that a system is to meet. It is followed by vendor development and associated vendor and government testing to ensure that the standards are met. It ends with government acquisition and operation and maintenance of the vendor systems. How well each of these phases is executed will largely dictate how securely and reliably the system performs on election day.

Since the 2004 elections, a range of concerns have been voiced about the extent to which the activities associated with each of these life cycle phases are being performed by all levels of government and the system manufacturers.

Point four, given the highly decentralized nature of elections, States and local jurisdictions play huge roles in the life cycle management of voting systems. However, they have not always ensured that important voting system management practices are employed.

Relative to the 2004 elections, we surveyed the 50 States and the District of Columbia, a sample of 788 local voting jurisdictions, and we visited 28 jurisdictions. According to the responses we received, outdated systems standards were sometimes being adopted and applied; certain types of testing were widely performed, while others were rarely performed; security management practices ranged from rigorous to ad hoc; and the nature and type of security controls ran the gamut.

Point five, the challenges associated with ensuring that electronic voting systems operate securely and reliably during an election are many and profound, but they are not like the challenges related to relying on technology to support any mission-critical government operation. However, the highly diffused and decentralized nature of elections, in my opinion, makes these challenges more formidable, as it requires the combined efforts of all levels of government.

HAVA established the EAC and assigned it certain responsibilities relative to these efforts. We have made recommendations to assist the EAC in this regard, which it agreed with. In general, these recommendations focused on introducing greater transparency and accountability into the EAC's activities by having them develop plans for each of its areas of responsibility, that is, plans that defined what actions will be done, when, at what cost, to what end, and what outcomes will be achieved.

To the EAC's credit, it has continued taking important action since our recommendations aimed at meetings its HAVA responsibilities. However, we have yet to see the kind of strategic planning that our recommendations envisioned.

This concludes my statement. I would be happy to answer any questions that you have.

[The prepared statement of Mr. Hite follows:]

United States Government Accountability Office

GAO

Testimony

Before the Subcommittee on Information Policy, Census, and National Archives, House Committee on Oversight and Government Reform

For Release on Delivery
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ELECTIONS

All Levels of Government Are Needed to Address Electronic Voting System Challenges

Statement of Randolph C. Hite, Director
Information Technology Architecture and Systems

GAO-07-741T

April 18, 2007

GAO
Accountability · Integrity · Reliability

Highlights

Highlights of GAO-07-741T, a report to the Subcommittee on Information Policy, Census, and National Archives, Committee on Oversight and Government Reform, House of Representatives

ELECTIONS

All Levels of Government Are Needed to Address Electronic Voting System Challenges

Why GAO Did This Study

Since the 2000 national elections, concerns have been raised by various groups regarding the election process, including voting technologies. Beginning in 2001, GAO published a series of reports examining virtually every aspect of the elections process. GAO's complement of reports was used by Congress in framing the Help America Vote Act of 2002, which, among other things, provided for replacement of older voting equipment with more modern electronic voting systems and established the Election Assistance Commission (EAC) to lead the nation's election reform efforts. GAO's later reports have raised concerns about the security and reliability of these electronic voting systems, examined the EAC's efforts to address these concerns, and surveyed state and local officials about practices used during the 2004 election, as well as plans for their systems for the 2006 election.

Using its published work on electronic voting systems, GAO was asked to testify on (1) the contextual role and characteristics of electronic voting systems, (2) the range of security and reliability concerns that have been reported about these systems, (3) the experiences and management practices of states and local jurisdictions regarding these systems, and (4) the longstanding and emerging challenges facing all levels of government in using these systems.

www.gao.gov/cgi-bin/getrpt?GAO-07-741T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Randolph C. Hite at (202) 512-3439 or hiter@gao.gov.

What GAO Found

Voting systems are one facet of a multifaceted, year-round elections process that involves the interplay of people, processes, and technology, and includes all levels of government. How well these systems play their role in an election depends in large part on how well they are managed throughout their life cycles, which begins with defining system standards; includes system design, development, and testing; and concludes with system operations. Important attributes of the systems' performance are security, reliability, ease of use, and cost effectiveness.

A range of groups knowledgeable about elections or voting systems have expressed concerns about the security and reliability of electronic voting systems; these concerns can be associated with stages in the system life cycle. Examples of concerns include vague or incomplete voting system standards, system design flaws, poorly developed security controls, incorrect system configurations, inadequate testing, and poor overall security management.

For the 2004 national elections, states' and local governments' responses to our surveys showed that they did not always ensure that important life cycle and security management practices were employed for their respective electronic voting systems. In particular, responses indicated that the most current standards were not always adopted and applied, security management practices and controls were employed to varying degrees, and certain types of system testing were not commonly performed. Moreover, jurisdictions' responses showed that they did not consistently monitor the performance of their systems.

In GAO's view, the challenges faced in acquiring and operating electronic voting systems are not unlike those faced by any technology user—adoption and application of well-defined system standards; effective integration of the technology with the people who operate it and the processes that govern the operation; rigorous and disciplined performance of system security and testing activities; reliable measurement of system performance; and the analytical basis for making informed, economically justified decisions about voting system investment options. These challenges are complicated by other conditions such as the distribution of responsibilities among various organizations and funding opportunities and constraints. Given the diffused and decentralized allocation of voting system roles and responsibilities across all levels of government, addressing these challenges will require the combined efforts of all levels of government, under the leadership of the EAC. To assist the EAC in executing its leadership role, GAO has previously made recommendations to the commission aimed at better planning its ongoing and future activities relative to, for example, system standards and information sharing. While the EAC agreed with the recommendations, it stated that its ability to effectively execute its role is constrained by a lack of adequate resources.

Abbreviations

COTS commercial off-the-shelf
DRE direct recording electronic
EAC Election Assistance Commission
FEC Federal Election Commission
GSA General Services Administration
HAVA Help America Vote Act of 2002
NIST National Institute of Standards and Technology

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April 18, 2007

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to participate in today's hearing on our nation's election system. As requested, my testimony will focus on our recent work on the security and reliability of electronic voting systems,[1] including the national certification and accreditation programs related to these systems and other efforts of the Election Assistance Commission (EAC).

During the 2000 national elections, concerns were raised about "hanging chads" and "butterfly ballots." In the 2004 and 2006 elections, concerns shifted to "software bugs" and "voter verifiable paper trails." In light of these and other election concerns, we produced a series of reports between 2001 and 2006 in which we examined virtually every aspect of the election process, including types of voting technology. We reported that the particular technology used to cast and count votes is a critical part of how elections are conducted, but it is only one facet of a multifaceted election process that involves the interplay of people, processes, and technology. Accordingly, we have long held the position that no voting technology, however well designed, can be a magic bullet that will solve all election problems.

My testimony today addresses four perspectives on the voting system environment: (1) the contextual role and characteristics of electronic voting systems, (2) the range of security and reliability concerns that have been reported about these systems, (3) the experiences and management practices of states and local jurisdictions regarding these systems, and (4) longstanding and emerging intergovernmental challenges in using these systems.

In preparing this testimony, we drew extensively from our published work on the election process.[2] In addition, we reviewed recent

[1] In this testimony, the term *electronic voting system* is used generically to refer to both optical scan systems and direct recording electronic systems, both of which depend on electronic technology. Each type of system is described more fully in the background section of this testimony.

[2] For example, GAO, *Elections: The Nation's Evolving Election System as Reflected in the November 2004 General Election,* GAO-06-450 (Washington, D.C.: June 6, 2006); *Elections: Federal Efforts to Improve Security and Reliability of Electronic Voting Systems Are Under Way, but Key Activities Need to Be*

The challenges confronting all levels of government in acquiring and operating voting systems for future elections are not unlike those faced by any technology user: adoption and consistent application of standards for system capabilities and performance; successful management and integration of the people, process, and technology components; rigorous and disciplined performance of testing and security activities; reliable measurement to determine whether the systems are performing as intended; and an analytical and economically justified basis for making informed decisions about voting system investment options. These challenges are heightened by other conditions common to both the national elections community and other information technology environments: the distribution of responsibilities among various organizations, technology changes, funding opportunities and constraints, emerging requirements and guidance, and public attention.

Given the diffused and decentralized allocation of voting system roles and responsibilities across all levels of government, addressing these challenges will require the combined efforts of all levels of government, under the leadership of the EAC. To assist the EAC in executing its leadership role, we previously made recommendations to the commission aimed at better planning its ongoing and future activities relative to, for example, system standards and information sharing. While the EAC agreed with the recommendations, it told us that its ability to effectively execute its role is constrained by a lack of resources. In our view, the adequacy of resources at its disposal and the degree of cooperation it receives from entities spanning all levels of government are critical elements in the commission's ability to perform its leadership role.

Background

Following the 2000 national elections, we produced a comprehensive series of reports covering our nation's election process that culminated with a capping report and framework for Congress to use to enact reforms for election administration.[3] Our reports were among the resources that Congress drew on in

[3]See, for example, GAO, *Elections: A Framework for Evaluating Reform Proposals*, GAO-02-90 (Washington, D.C.: Oct. 15, 2001).

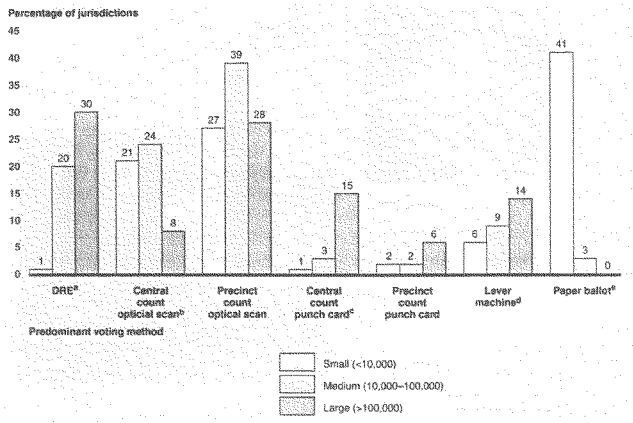
- testing, certifying, decertifying, and recertifying voting system hardware and software through accredited laboratories;
- making payments to states to help them improve elections in the areas of voting systems standards, provisional voting and voting information requirements, and computerized statewide voter registration lists; and
- making grants for research on voting technology improvements.

The act also established the Technical Guidelines Development Committee to support the EAC, making it responsible for recommending voluntary voting system guidelines to the EAC. The act assigned the National Institute of Standards and Technology (NIST) responsibility for providing technical support to the development committee and made the NIST Director the committee chair.

The EAC began operations in January 2004, initially focusing on the distribution of funds to help states meet HAVA's Title III requirements for uniform and nondiscriminatory election technology and administration, including the act's requirements pertaining to voting system standards, provisional voting, voting information, a computerized statewide voter registration list, and identification for first-time voters who register to vote by mail. Actions EAC has taken since 2004 to improve voting systems include

- publishing the *Best Practices Toolkit* and specialized management guides to assist states and local jurisdictions with managing election-related activities and equipment;
- issuing voting system standards in 2005, referred to as the *Voluntary Voting System Guidelines*;
- establishing procedures for certifying voting systems;
- establishing a program for accreditation of independent testing laboratories, with support from NIST's National Voluntary Laboratory Accreditation Program;
- disbursing to states approximately $2.3 billion in appropriations for the replacement of older voting equipment and election administration improvements under Title III of HAVA; and

Figur 1: Estimated Percentage of Jurisdictions Using Predominant Voting Methods in 2004, by Jurisdiction Size



Source: GAO 2005 survey of local election jurisdictions.

Source: GAO 2005 survey of local election jurisdictions.

Note: Percentages for predominant voting methods within each jurisdiction size may not add to 100 because of rounding.

[a]The differences between small jurisdictions and both medium and large jurisdictions are statistically significant.

[b]The differences between both small and medium jurisdictions and large jurisdictions are statistically significant.

[c]The differences between both small and medium jurisdictions and large jurisdictions are statistically significant.

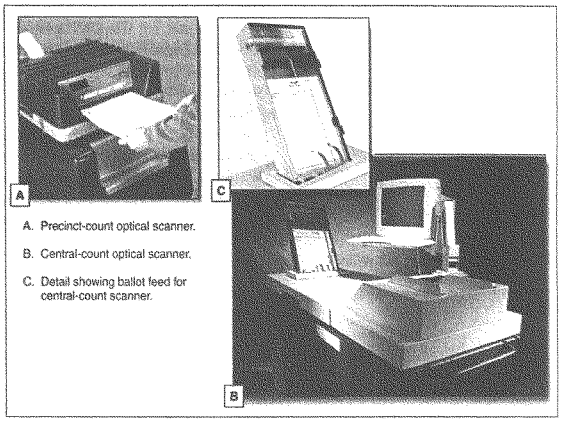
[d]The difference between small jurisdictions and large jurisdictions is statistically significant.

[e]The differences between small jurisdictions and both medium and large jurisdictions are statistically significant.

Optical Scan Systems

Optical scan voting systems use electronic technology to tabulate paper ballots. For the 2004 general election, we estimated that about 51 percent of all local jurisdictions used optical scan voting equipment predominantly.

Figure 2: Precinct-Count Optical Scan Tabulator and Central-Count Optical Scan Tabulator



A. Precinct-count optical scanner.

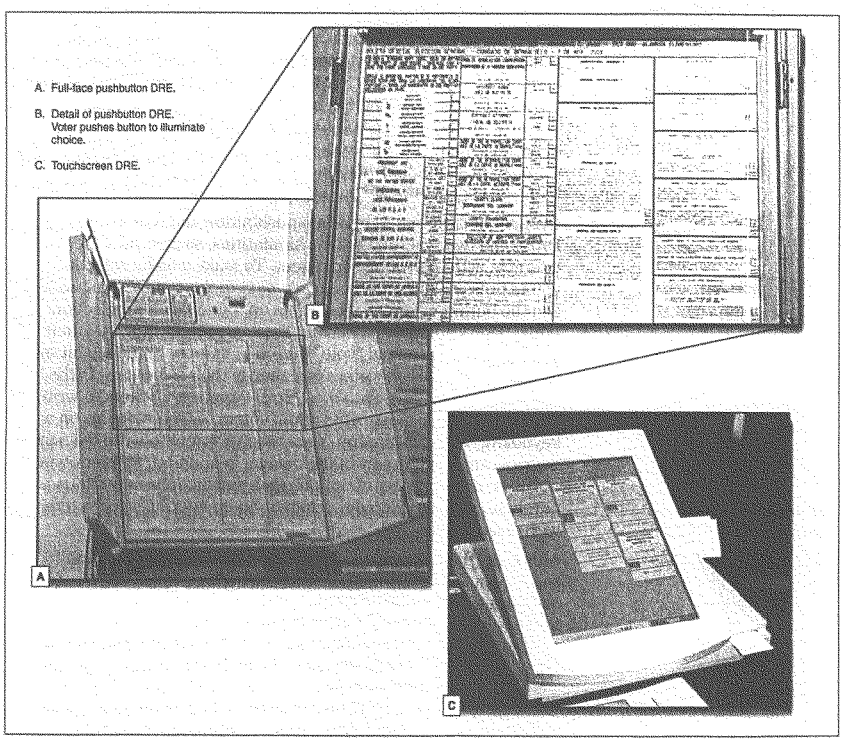
B. Central-count optical scanner.

C. Detail showing ballot feed for central-count scanner.

Source: Equipment vendors.

Software instructs the tabulation equipment to assign each vote (i.e., to assign valid marks on the ballot to the proper candidate or issue). In addition to identifying the particular contests and candidates, the software can be configured to capture, for example, straight party voting and vote-for-no-more-than-N contests. Precinct-based optical scanners can also be programmed to detect overvotes (where the voter, for example, votes for two candidates for one office, invalidating the vote) and undervotes (where the voter does not vote for all contests or issues on the ballot) and to take some action in response (rejecting the ballot, for instance), so that voters can fix their mistakes before leaving the polling place. If ballots are tabulated centrally, voters do not have the opportunity to detect and correct mistakes that may have been made. In addition, optical scan systems often use vote tally software to tally the vote totals from one or more vote tabulation devices.

Figur 3: DRE Pushbutton and DRE Touch Screen



Source: Local election officials and equipment vendor.

Pushbutton and touch screen units differ significantly in the way they present ballots to the voter. With the pushbutton type, all ballot information is presented on a single "full-face" ballot. For example,

means to open polls and to authorize voter access to ballots. For instance, smart cards on some DREs store program data on the election and are used to help set up the equipment; during setup, election workers verify that the card received is for the proper election. Other DREs are programmed to automatically activate when the voter inserts a smart card; the card brings up the correct ballot onto the screen.

DREs offer various configurations for tallying the votes. Some contain removable storage media that can be taken from the voting device and transported to a central location to be tallied. Others can be configured to electronically transmit the vote totals from the polling place to a central tally location. Vote tally software is often used to tally the vote totals from one or more units.

DREs were chosen as the predominant voting method by a relatively small overall proportion of local jurisdictions for the 2004 general election (7 percent overall). However, as previously shown in figure 1, large and medium jurisdictions identified DREs as their predominant voting method (estimated at 30 percent and 20 percent of jurisdictions, respectively) more often than small jurisdictions (estimated at 1 percent). DREs were the leading choice among voting methods for both large and medium jurisdictions that planned to acquire voting systems before the 2006 general election (an estimated 34 percent of jurisdictions in both size groups).

Contextual Role and Performance Characteristics of Electronic Voting Systems Are Important to Understanding Their Use

Voting systems are one facet of a multifaceted, continuous elections process that involves the interplay of people, processes, and technology. All levels of government—federal, state, and local—share responsibilities for aspects of elections and voting systems. Moreover, effective performance of these systems is a product of effective system life cycle management, which includes systems definition, development, acquisition, operations, testing, and management. Such performance can be viewed in terms of several characteristics, such as security, reliability, ease of use, and cost effectiveness.

process so that the details of administering elections are carried out at the city or county levels, and voting is done at the local level. This is important because local election jurisdictions number more than 10,000 and their size varies enormously—from a rural county with about 200 voters to a large urban county such as Los Angeles County, where the total number of registered voters for the 2000 elections exceeded the registered voter totals in 41 states.

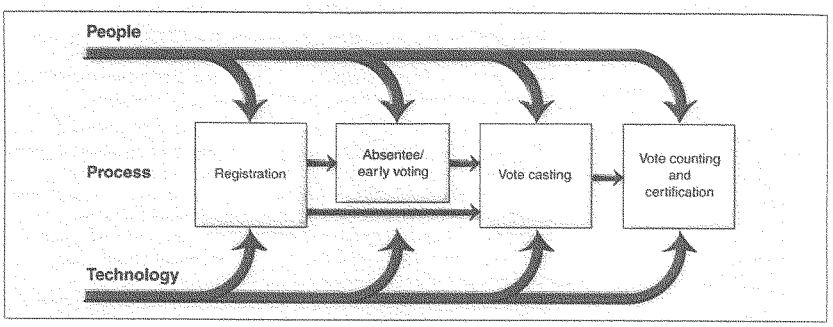
The size and demographics of a voting jurisdiction significantly affects the complexity of planning and conducting the election, as does the method used to cast and count votes. For example, jurisdictions using DRE systems may need to manage the electronic transmission of votes or vote counts, while jurisdictions using optical scan technology need to manage the transfer of the paper ballots this technology reads and tabulates. Jurisdictions using optical scan technology may also need to manage electronic transmissions if votes are counted at various locations and totals are electronically transmitted to a central tally point. No matter what technology is used, jurisdictions may need to provide ballot translations; however, the logistics of printing paper materials in a range of languages, as would be required for optical scan technology, is different from the logistics of programming translations into DRE units.

Some states do have statewide election systems so that every voting jurisdiction uses similar processes and equipment, but others do not. For instance, we reported in 2001 that in Pennsylvania, local election officials told us that there were 67 counties and consequently 67 different ways of handling elections.[13] In some states, such as Georgia, state law prescribes the use of common voting technology throughout the state while in other states, local election officials generally choose the voting technology to be used in their precincts, often from a list of state-certified options.

Regardless of levels of government, however, election administration is a year-round activity, involving varying sets of people performing the activities of each stage of the election process. These stages generally consist of the following:

[13]GAO-02-3.

Figure 4: Stages of Election Process



Source: GAO analysis.

Electronic voting systems are primarily involved in the last three stages, during which votes are recorded, cast, and counted. However, the type of system that a jurisdiction uses may affect earlier stages. For example, in a jurisdiction that uses optical scan systems, paper ballots like those used on Election Day may be mailed in the absentee voting stage. On the other hand, a jurisdiction that uses DRE technology would have to make a different provision for absentee voting.

Management of Electronic Voting System Performance Is a Continuous Process

The performance of any information technology system, including electronic voting systems, is heavily influenced by a number of factors, including how well the system is defined, developed, acquired, tested, and implemented.

Like any information technology product, a voting system starts with the explicit definition of what the system is to do and how well it is to do it. These requirements are then translated into design specifications that are used to develop the system. Electronic voting systems are typically developed by vendors and then purchased as commercial off-the-shelf (COTS) products and implemented by state and local election administrators. During the development,

choosing a vendor, writing and administering contracts, and testing the acquired system.

Operations. Operation of voting systems is typically the responsibility of local jurisdictions. These activities include setting up systems before voting, vote capture and counting during elections, recounts and system audits after elections, and storage of systems between elections. Among other things, this phase includes activities associated with the physical environments in which the system operates. These include ensuring the physical security of the polling place and voting equipment and controlling the chain of custody for voting system components and supplies. The operations phase also includes monitoring of the election process by use of system audit logs and backups, and the collection, analysis, reporting, and resolution of election problems.

Testing. As noted, testing is conducted by multiple entities throughout the life cycle of a voting system. Voting system vendors conduct testing during system development. National testing of systems is conducted by accredited independent testing authorities. Some states conduct testing before acquiring a system to determine how well it meets the specified performance parameters, or states may conduct certification testing to ensure that a system performs as specified by applicable laws and requirements. Once a voting system is delivered by the vendor, states and local jurisdictions may conduct acceptance testing to ensure that the system satisfies requirements. Finally, local jurisdictions typically conduct logic and accuracy tests prior to each election and sometimes subject portions of the system to parallel testing during each election.

Management. Management processes ensure that each life cycle phase produces desirable outcomes and is conducted by the organization responsible for each life cycle phase. Voting system vendors manage the development phase, while states and/or local jurisdictions manage the acquisition and operations phases. Typical management activities that span the system life cycle include planning, configuration management, system performance review and evaluation, problem tracking and correction, human capital management, and user training. Management responsibilities related to security and reliability include program planning, disaster recovery and contingency planning, definition of security roles and

closeness of the election. Both optical scan and DRE systems are claimed to be highly accurate. Although voting equipment may be designed and developed to count votes as recorded with 100 percent accuracy, how well the equipment counts votes as intended by voters is a function not only of equipment design, but also of how procedures are followed by election officials, technicians, and voters. It is also important to limit system down time so that polling places can handle the volume of voter traffic.

Ease of Use. Ease of use (or user friendliness) depends largely on how voters interact physically and intellectually with the voting system. This interaction, commonly referred to as the human/machine interface, is a function of the system design and how it has been implemented. Ease of use depends on how well jurisdictions design ballots and educate voters on the use of the equipment. A voting system's ease of use affects accuracy (i.e., whether the voter's intent is captured), and it can also affect the efficiency of the voting process (confused voters take longer to vote). Accessibility by diverse types of voters, including those with disabilities, is a further aspect of ease of use.

Cost. For a given jurisdiction, the particular cost associated with an electronic voting system will depend on the requirements of the jurisdiction as well as the particular equipment chosen. Voting equipment costs vary among types of voting equipment and among different manufacturers and models of the same type of equipment. Some of these differences can be attributed to differences in what is included in the unit cost. In addition to the equipment unit cost, an additional cost for jurisdictions is the software that operates the equipment, prepares the ballots, and tallies the votes (and in some cases, prepares the election results reports). Other factors affecting the acquisition cost of voting equipment are the number and types of peripherals required. Once jurisdictions acquire the voting equipment, they also incur the cost to operate and maintain it, which can vary considerably.

reliability concerns merit the focused attention of federal, state, and local authorities responsible for election administration.

Inadequate National Standards

Appropriately defined and implemented standards for system functions and testing processes are essential to ensuring the security and reliability of voting systems across all phases of the elections process. States and local jurisdictions face the challenge of adapting to and consistently applying appropriate standards and guidance to address vulnerabilities and risks in their specific election environments. The national standards are voluntary—meaning that states are free to adopt them in whole or in part or reject them entirely.

The Federal Election Commission (FEC) issued a set of voluntary voting system standards in 1990 and revised them in 2002. These standards identify requirements for electronic voting systems. Computer security experts and others criticized the 2002 voting system standards for not containing requirements sufficient to ensure secure and reliable voting systems. Common concerns with the standards involved their vague and incomplete security provisions, inadequate provisions for some commercial products and networks, and inadequate documentation requirements.

In December 2005, EAC issued the *Voluntary Voting System Guidelines*, which includes additions and revisions for system functional requirements, performance characteristics, documentation requirements, and test evaluation criteria for the national certification of voting systems. These guidelines promote security measures that address gaps in prior standards and are applicable to more modern technologies, such as controls for software distribution and wireless operations.

As we previously reported, the 2005 *Voluntary Voting System Guidelines* do not take effect until December 2007. Moreover, this version of the standards does not comprehensively address voting technology issues. For instance, they do not address COTS devices (such as card readers, printers, or personal computers) or software products (such as operating systems or database management systems) that are used in voting systems without modification. This is significant because computer security experts have raised

design and development of secure and reliable electronic voting systems. Among other things, weak embedded security controls and audit trail design flaws were two major areas of concern:

- **Weak system security controls.** Some electronic voting systems reportedly have weak software and hardware security controls. Regarding software controls, many security examinations reported flaws in how controls were implemented in some DRE systems to prevent unauthorized access. For example, one model failed to password-protect the supervisor functions controlling key system capabilities; another relied on an easily guessed password to access these functions. If exploited, these weaknesses could damage the integrity of ballots, votes, and voting system software by allowing unauthorized modifications. Regarding physical hardware controls, several recent reports found that certain DRE models contained weaknesses in controls designed to protect the system. For instance, reviewers were concerned that a particular model of DRE was set up in such a way that if one machine was accidentally or intentionally unplugged from the others, voting functions on the other machines in the network would be disrupted. In addition, reviewers found that the switches used to turn a DRE system on or off, as well as those used to close the polls on a particular DRE terminal, were not protected.

- **Design flaws in developing voter-verified paper audit trails.** Establishing a voter-verified paper audit trail involves adding a paper printout to a DRE system so that a voter can review and verify his or her ballot. Some citizen advocacy groups, security experts, and elections officials advocate these audit trails as a protection against potential DRE flaws. However, other election officials and researchers have raised concerns about potential reliability and security flaws in the design of systems using voter-verified paper audit trails. If voting system mechanisms for protecting the paper audit trail were inadequate, an insider could associate voters with their individual paper ballots and votes, particularly if the system stored voter-verified ballots sequentially on a continuous roll of paper. If not protected, such information could breach voter privacy and confidentiality.

regional vote tabulation computer was connected to the Internet and that local officials had not updated it with several security patches, thus needlessly exposing the system to security threats. In addition, several reports indicated that some state and local jurisdictions did not always have procedures in place to detect problems with their electronic voting systems such as ensuring the number of votes cast matched the number of signatures on precinct sign-in sheets.

Inadequate Testing

Security experts and some election officials have expressed concerns that the tests performed by independent testing authorities and state and local election officials do not adequately assess electronic voting systems' security and reliability. These concerns are intensified by what some perceive as a lack of transparency in the testing process.

- **Inadequate security testing.** Many computer security experts expressed concerns with weak or insufficient system testing, source code reviews, and penetration testing. To illustrate their concerns, they pointed to the fact that most of the systems that exhibited the weak security controls previously cited had been nationally certified after testing by an independent testing authority. Security experts and others point to this as an indication that both the standards and the testing program are not rigorous enough with respect to security.

- **Lack of transparency in the testing process.** Security experts and some elections officials have raised concerns about a lack of transparency in the testing process. They note that the test plans used by the independent testing authorities, along with the test results, are treated as protected trade secrets and thus cannot be released to the public. Critics say that this lack of transparency hinders oversight and auditing of the testing process. This in turn makes it harder to determine the actual capabilities, potential vulnerabilities, and performance problems of a given system. Despite assertions by election officials and vendors that disclosing too much information about an electronic voting system could pose a security risk, one security

election comply with the 2002 voting system standards. Nine of these 28 states would also require their jurisdictions to apply the 1990 federal standards to new voting systems and 4 of the 28 would also require jurisdictions to use the 2005 voting system standards, which were in draft version at the time of our survey. (One other state also expected to apply the 2005 voting system standards.) Ten other of the 44 states reporting said that they expected to use hybrid standards that were based on one or more versions of the national standards, without specifying the composition of their hybrid, and 4 states planned to use the national standards in 2006, but did not specify a version. (Five states responded that they did not require their voting systems to comply with any version of the national standards or had not yet made a decision on compliance with the standards for 2006. One state did not respond.)

Jurisdictions Varied Widely in Applying Security Practices

Local jurisdictions varied widely in the nature and extent of their voting system security efforts and activities during the 2004 election. Our research on recommended security practices shows that effective system security management involves having, among other things, (1) defined policies governing such system controls as authorized functions and access and documented procedures for secure normal operations and incident management; (2) documented plans for implementing policies and procedures; (3) clearly assigned roles and responsibilities for system security; and (4) verified use of technical and procedural controls designed to reduce the risk of disruption, destruction, or unauthorized modification of systems and their information. Jurisdictions' efforts in each of these areas for the November 2004 general election are discussed here.

Policies and procedures. Many jurisdictions reported having written policies and procedures for certain aspects of security related to their voting systems, but others did not. Written security policies were more prevalent among large jurisdictions (an estimated 65 percent) than small jurisdictions (an estimated 41 percent). An estimated one-fifth of jurisdictions reported that they did not have written policies and procedures in place for transporting ballots or electronic memory, storing ballots, or electronic transmission of voted ballots to ensure ballot security. In

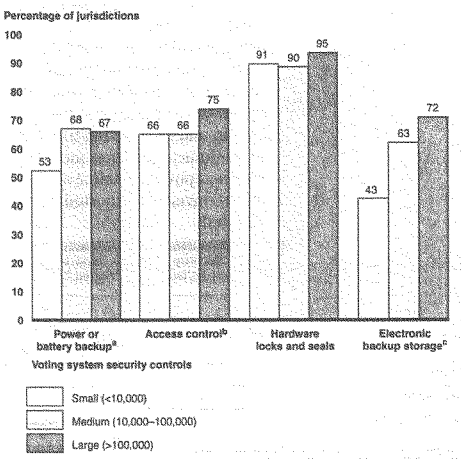
responsible for implementing security controls, while state officials were usually involved with developing security policy and guidance and monitoring local jurisdictions' implementation of security. Some jurisdictions reported that other entities performed tasks such as securing voting equipment during transport or storage and training election personnel for security awareness. Similarly, 26 states reported that security monitoring and evaluation was performed by two or more entities. In 22 states and the District of Columbia, responsibility for security monitoring and evaluation was shared between the state and local election officials. States also reported cases where other entities (e.g., independent consultants or vendors) were involved in monitoring and evaluating controls. The entities that were assigned tasks and responsibilities at the local jurisdictions we visited are described in table 1.

Table 1: V ting System Security Tasks and Responsibilities for the 2004 General Election Reported by Election Officials in Local Jurisdictions Visited by GAO

Examples of voting system security tasks identified by local officials	Performing entity		
	Local officials	State	Other entities
Secure ballot programming	X		
Sealing of voted ballots	X		
Secure storage of voting equipment	X		X (e.g., schools)
Video surveillance of stored equipment or ballots	X		
Access control to stored election materials	X		
Protection of voting equipment and materials during transport	X		X (e.g., law enforcement officials)
Inventory management of voting equipment and ballots	X		
Monitoring vote tallying systems for unauthorized connections	X		
Impoundment of election materials after elections	X		
Monitoring and testing of equipment accuracy before, during, and after elections	X	X	X
Security awareness training for election personnel	X	X	X
Certification of voting equipment	X	X	
Development of security policies and guidance for jurisdictions	X	X	
Monitoring implementation of security policies by jurisdictions	X	X	

Source: GAO analysis of documents provided by local jurisdictions we visited.

Figure 6: Estimated Use of Security Controls by Local Jurisdictions in the 2004 General Election, by Jurisdiction Size



Source: GAO 2005 survey of local election jurisdictions.

Note: More than one group may have been identified with security responsibilities.
[a]The difference between small jurisdictions and medium jurisdictions is statistically significant. The 95 percent confidence interval for small jurisdictions is plus or minus 8 percentage points.
[b]The 95 percent confidence interval for small jurisdictions is plus or minus 8 percentage points.
[c]The differences between small jurisdictions and both medium and large jurisdictions are statistically significant. The 95 percent confidence interval for small jurisdictions is plus or minus 8 percentage points.

Among the jurisdictions that we visited, election officials reported that various security measures were in use during the 2004 general election to safeguard voting equipment, ballots, and votes before, during, and after the election. However, the measures were not uniformly reported by officials in these jurisdictions, and officials in

unauthorized remote access, including locally controlled passwords, passwords that change for each access, and local control of communications connections. However, the percentage of jurisdictions with remote access may actually be higher because 7 to 8 percent of jurisdictions did not know if remote access was available for their systems.

Some Types of Testing Were Not Commonly Performed

To ensure that voting systems perform as intended, the systems must be effectively tested. Voting system test and evaluation can be grouped into various types, or stages: certification testing (national level), certification testing (state level), acceptance testing, readiness testing, parallel testing, and postelection voting system audits. Each of these tests has a specific purpose and is conducted at the national, state, or local level at a particular time in the election cycle. Table 3 summarizes these types of tests.

states and jurisdictions conducted parallel testing during elections or audits of voting systems following elections. State and local responses to our surveys are summarized here relative to each type of testing.

National certification. Most states continued to require that voting systems be nationally tested and certified. For voting systems being used for the first time in the 2004 general election, national certification testing was almost always uniformly required. In particular, 26 of 27 states using DRE for the first time in this election, as well as the District of Columbia, required their systems to be nationally certified, while 9 of the 10 states using punch card equipment for the first time and 30 of 35 states and the District of Columbia using optical scan equipment for the first time, reported such requirements. However, for the 2004 general election, we estimated that 68 percent of jurisdictions did not know whether their respective systems were nationally certified. This uncertainty surrounding the certification status of a specific version of voting system at the local level underscores our concern that even though voting system software may have been qualified and certified at the national or state levels, software changes and upgrades performed at the local level may not be.

State certification. For the November 2004 general election, 42 states and the District of Columbia reported that they required state certification of voting systems. Seven of these states purchased voting systems at the state level for local jurisdictions. Officials for the remaining states and the District of Columbia reported that responsibility for purchasing a state-certified voting system rested with the local jurisdiction. While state certification requirements often included national testing as well as confirmation of functionality for particular ballot conditions, some states also required additional features such as construction quality, transportation safety, and documentation. Among the remaining 8 states that did not require state certification, officials described other mechanisms to address the compliance of voting equipment with state-specific requirements, such as a state approval process or acceptance of voting equipment based on federal certification.

For the 2006 general election, 44 states reported that they would have requirements for certification of voting systems, 2 more states

systems at the state level, the local level, or both (one state did not require readiness testing). Most states (37) required local jurisdictions to perform readiness testing. However, 7 states reported that they performed their own readiness testing for the 2004 general election in addition to local testing. Five states and the District of Columbia reported that they had no requirements for local jurisdictions to perform readiness testing but conducted this testing themselves.

State laws or regulations in effect for the 2004 election typically had specific requirements for when readiness testing should be conducted and who was responsible for testing, sometimes including public demonstrations of voting system operations. We found that most jurisdictions conducted readiness testing, also known as logic and accuracy testing, for both the 2000 and 2004 general elections. Election officials in all of the local jurisdictions we visited following the 2004 election reported that they conducted readiness testing on their voting equipment using one or more approaches, such as diagnostic tests, integration tests, mock elections, and sets of test votes, or a combination of approaches.

Security testing. Security testing was reportedly performed by 17 states and the District of Columbia for the voting systems used in the 2004 general election, and 7 other states reported that they required local jurisdictions to conduct such testing. The remaining 22 states said that they did not conduct or require system security testing. (Three states reported that security testing was not applicable for their voting systems.) Moreover, we estimated that at least 19 percent of local jurisdictions nationwide (excluding jurisdictions that reported that they used paper ballots) did not conduct security testing for the systems they used in the November 2004 election. Although jurisdiction size was not a factor in whether security testing was performed, the percentage of jurisdictions performing security testing was notably higher when the predominant voting method was DRE (63 percent[25]) and lower for

[25]The 95 percent confidence interval for DRE is plus14 or minus15 percentage points.

for the 2004 general election varied in when and how these audits were to be conducted.

We estimated that 43 percent of jurisdictions that used voting systems for at least some of their voting conducted postelection voting system audits. This practice was much more prevalent at large and medium jurisdictions (62 percent and 55 percent, respectively) than small jurisdictions (34 percent).[29] We further estimated that these voting system audits were conducted more frequently in jurisdictions with central count optical scan voting methods (54 percent) than they were in jurisdictions with precinct count optical scan voting methods (35 percent).

Jurisdictions Did Not Consistently Monitor Voting System Performance

It is important that performance be measured during system operation. As we reported in 2001 and 2006, measuring how well voting systems perform during a given election allows local officials to better position themselves for ensuring that elections are conducted properly. Such measurement also provides the basis for knowing where performance needs, requirements, and expectations are not being met so that timely corrective action can be taken to ensure the security and reliability of the voting system. Jurisdictions without supporting measures for security and reliability may lack sufficient insight into their system operations.

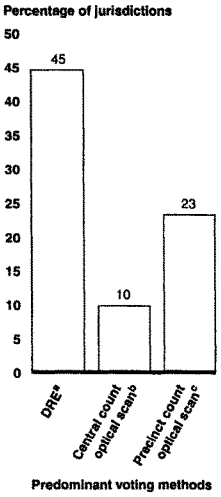
Overall, responses to our local jurisdiction survey show that large jurisdictions were most likely to record voting system performance and small jurisdictions were least likely. We estimated that 42 percent of jurisdictions overall monitored the accuracy of voting equipment in the 2004 general election. Other measures recorded were spoiled ballots (estimated at 50 percent of jurisdictions), undervotes (50 percent of jurisdictions),[30] and overvotes (49 percent of jurisdictions). During our visits to local jurisdictions, election officials in several jurisdictions told us that measuring overvotes was not a relevant performance indicator for jurisdictions using

[29]The 95 percent confidence interval for large jurisdictions is plus or minus 8 percentage points, and for small jurisdictions it is plus or minus 7 percentage points.
[30]An estimated 25 percent of respondents selected "not applicable" to the question on spoiled/ruined ballots in their survey response.

We estimated that 15 percent of jurisdictions measured voting system failure rates and 11 percent measured system downtime.[31] A higher percentage of large and medium jurisdictions collected these performance data than small jurisdictions. Collection of these data was also related to the predominant voting method used by a jurisdiction, with jurisdictions that predominantly used DREs more likely to collect system data than those that used precinct count or central count optical scan voting methods (an estimated 45 percent of jurisdictions versus 23 percent or 10 percent, respectively). Figure 8 shows the percentages of small, medium, and large jurisdictions that collected information on voting equipment failures and downtime. Figure 9 shows the percentages by predominant voting method of all jurisdictions that collected data on equipment failures.

[31]An estimated 66 percent of respondents selected the response "not applicable" for the survey questions on measurement of pieces of equipment that failed and equipment downtime.

Figure 9: Estimated Percentages of Jurisdictions that Collected Information n Voting Equipment Failures for the 2004 General Election, by Predominant V ting Method



Source: GAO 2005 survey of local election jurisdictions.

Note: The differences between DRE and both central count and precinct count optical scan voting methods are statistically significant.
[a]The 95 percent confidence interval for DRE is plus or minus 13 percentage points.
[b]The 95 percent confidence interval for central count optical scan percentages is plus 7 or minus 5 percentage points.
[c]The 95 percent confidence interval for precinct count optical scan percentages is plus 8 or minus 7 percentage points.

Further, an estimated 55 percent of all jurisdictions kept a written record of issues and problems that occurred on Election Day, which could be a potential source of performance data. Large jurisdictions were more likely to keep a written record of issues or problems that occurred on Election Day. Specifically, we estimated that 79 percent of large jurisdictions kept such records, compared with 59 percent

recommendations, it told us that its ability to effectively execute its role is resource constrained.

Establishing and Applying Current and Comprehensive Standards

The extent to which states and local jurisdictions adopt and consistently apply up-to-date voting system standards directly affects the security and reliability of voting systems during elections. For the 2006 general election, a substantial proportion of states and jurisdictions had yet to adopt the most current federal voting system standards or related performance measures, meaning that the systems they employ may not perform as securely and reliably as desired. Beyond this, decisions by states and local jurisdictions to apply these latest standards for the 2008 election present additional challenges such as (1) whether the systems can be tested and certified in time for the election and (2) adopting standards that are now undergoing revision rather than continued use of earlier standards or later adoption of even newer standards.

EAC plays an important role in ensuring the timely testing and certification of voting systems against the latest standards and in informing state and local decisions on whether to adopt these standards for the 2008 election. Accordingly, we have recommended that EAC define tasks and time frames for achieving the full operational capability of the national voting system certification program. These management elements would need to take into account estimating testing capacity and expected volume for the testing laboratory accreditation program, establishing protocols and time frames for reviewing certification packages, and setting norms for timely consideration and decision making regarding system certifications. Sharing this information with state and local election officials would help them to plan for system upgrades, testing, and state certification to meet their upcoming election cycles.

States and local jurisdictions must also consider the timely adoption of standards in light of the additional work that is currently under way and planned to address known weaknesses in the national standards. For example, in addition to establishing minimum functional and performance requirements for voting systems, standards can also be used to govern integration of election systems, such as the accuracy, reliability, privacy, and security of

of adapting and implementing the directives to meet the needs of their specific election environments.

Managing the People, Processes, and Technology as Components of the Overall Process

As previously stated, jurisdictions need to manage the triad of people, processes, and technology as interrelated and interdependent parts of the total voting process. Given the amount of time that remains between now and the November 2008 elections, jurisdictions' voting system performance is more likely to be influenced by improvements in poll worker system operation training, voter education about system use, and vote casting and counting procedures than by changes to the physical systems. The challenge for voting jurisdictions is thus to ensure that these people and process issues are dealt with effectively.

In this regard, the election management decisions and practices of states and local jurisdictions can benefit from the experiences and results of those with comparable election environments. In 2004 and again in 2006, EAC compiled such information into guidance documents for widespread use by election officials. However, as the election environment and voting systems continue to evolve, additional lessons and topics will undoubtedly surface. Accordingly, we have recommended that the EAC establish a process and schedule for periodically compiling and disseminating recommended practices for security and reliability across the system life cycle and that the practices be informed by information it collects on the problems and vulnerabilities of these systems. Incorporating the feedback obtained through actual voting system development, acquisition, preparation, and operations into practical guidance will allow the election community to be more robust and efficient.

Gathering and Using Reliable System Performance Measures and Data and Making Informed Investment Decisions

Reliable measures and objective data are needed for jurisdictions to know whether the technology they use is meeting the needs of the user communities (both the voters and the officials who administer the elections). While the vast majority of jurisdictions reported that they were satisfied with the performance of their respective

this link alone cannot make an election, it can break one. The problems that some jurisdictions have experienced and the serious concerns that have surfaced highlight the potential for continuing difficulties in upcoming national elections if these challenges are not effectively addressed. The EAC plays a vital role related to ensuring that election officials and voters are educated and well informed about the proper implementation and use of electronic voting systems and ensuring that jurisdictions take the appropriate steps—related to people, process, and technology—that are needed regarding security, testing, and operations. More strategically, the EAC needs to move swiftly to strengthen the voting system standards and the testing associated with enforcing them. However, the EAC alone cannot ensure that electronic voting system challenges are effectively addressed. State and local governments must also do their parts. Moreover, critical to the commission's ability to do its part will be the adequacy of resources at its disposal and the degree of cooperation it receives from entities at all levels of government.

Mr. Chairman, this concludes my statement. I would be pleased to answer any questions that you or other Members of the Subcommittee may have at this time.

Contact and Acknowledgments

For further information, please contact Randolph C. Hite at (202) 512-3439 or by e-mail at hiter@gao.gov. Other key contributors to this testimony were Nancy Glover, Paula Moore, Sushmita Srikanth and Kim Zelonis.

(310645)

Mr. CLAY. Thank you very much. Thank you both for your testimony.

Let me start with Mr. Hite. Mr. Hite, GAO's past work on electronic voting systems highlights the need for vendors and election officials to better manage this equipment throughout the product life cycle. Have there been adequate best practices or requirements promulgated under the VVSG guidelines or under HAVA for stakeholders to follow?

Mr. HITE. The voluntary voting system guidelines that you refer to in 2005, that take effect at the end of this year, is a vast improvement over the standards that were in place prior to this. Is it complete and comprehensive relative to the range of security provisions that need to be in the standards? No. It is a work in process in that regard, and it will need to evolve over time.

Mr. CLAY. Doesn't the lack of effective system standards hinder the implementation of stronger stewardship best practices?

Mr. HITE. Yes, sir. It is a key variable in that equation. It is actually a double-edged sword. On the one hand, you want to have the most up to date, robust, comprehensive standards that you can have. At the same time, you have to consider the capacity to implement those standards, and the impact it is going to have on the States and the jurisdictions out there to adjust their systems environment to comply with those standards. It is not something that can be done overnight.

So you are trying to balance the two from a practical standpoint in terms of the pace at which you are asking jurisdictions to improve, and their capacity to improve.

Mr. CLAY. Well, there is a problem that the standards were not put in place initially, and that people didn't have many guidelines to follow?

Mr. HITE. Absolutely. The root cause of this is that the standards were pretty much stagnant for virtually a decade. So we are trying to play catch-up relative to putting in place the kind of quality standards that are needed.

Mr. CLAY. Has NIST begun to research the larger issues of electronic voting system architecture, as opposed to testing and evaluation of current products on the market, in order to address the inherent vulnerabilities in the systems currently in use? Has that started to occur?

Mr. HITE. Sir, I don't have the answer to that because I don't know. It kind of relates to the point that we were making relative to creating more transparency around what is going to be done, when, relative to getting to the desired end with regard to standards in other areas.

Mr. CLAY. Thank you for that response.

Ms. Hillman, it has been stated that individuals with expertise and experience in assistive technology have not been involved in discussions regarding voting security and in judging conformance to accessibility standards. I know that Dr. Diane Golden, who will testify on the following panel, has provided testimony to the EAC and the TGDC.

Can you tell me, beyond this, to what extent has the EAC tried to involve experts from the assistive technology community in development of standards?

Ms. HILLMAN. Yes. On the Technical Guidelines Development Committee, there are two members representing the Access Board, and certainly concerns from the disability community are brought to discussions of the voluntary guidelines through their participation.

In addition, the EAC has met with members of the disability community. One of the members of our Board of Advisors represents the American Association of Persons with Disabilities. And we post all of our draft guidelines out for public comment. Of 6,000 comments we received, I know that several hundred came from members of the disability community.

Mr. CLAY. Thank you for that.

GAO has offered the EAC a list of open recommendations from its 2005 report on the reliability of e-voting systems. Some of these recommendations address critical topics such as the NIST's work on software assurance and interim standards for the certification of e-voting products. Does the EAC intend to implement all of the GAO's recommendations? What is the status of the commission's implementation efforts?

Ms. HILLMAN. As Mr. Hite indicated, we did agree with their recommendations and we are certainly working to make certain that our program to test and certify voting systems is done in a way that does two things. It provides the rigorous testing to assure election officials that the machines are compliant, and that the process is as open and understanding to the public so that we can get past some of the technicalities and the public can appreciate the benefits of the Federal Government testing and certifying machines.

The process is new. I think, as you know, the Election Assistance Commission was set up in a way that we lost a good year of operation before we could really begin our work, due to lack of funding. But once that began, we have caught up. Our certification program is in place. We have accredited laboratories that are poised and ready to begin that testing.

Mr. CLAY. Thank you for that response.

We have some additional Members that joined us. I will go to the gentleman from Kentucky, Mr. Yarmuth. I understand you have an opening statement.

Mr. YARMUTH. Thank you, Mr. Chairman. I will just submit it for the record. That will be fine. I appreciate it.

[The prepared statement of Hon. John A. Yarmuth follows:]

Congressman John Yarmuth (KY-3)

Information Policy, Census, and National Archives Subcommittee

"Ensuring Fairness and Accuracy in Elections Involving Electronic Voting Systems"

Wednesday, April 18, 2007 - 2:00 P. M.
2154 Rayburn HOB

"Mr. Chairman Clay and Ranking Member Turner, I want to thank you for conducting this hearing, which I consider to be of the highest importance to our democracy.

For more than two hundred years, America helped democracy spread, simply by leading by example, by shining a light on the vast potential of freedom. Now, as the current Administration pursues a more aggressive implementation of democratic elections throughout the world, we find ourselves in the precarious position of doubting our own system. With so many of our own citizens questioning whether or not their vote is counted, we are rapidly losing the capability to lead by example.

The problems are apparent - easily manipulated and faulty voting machines, inaccessibility, and even the expressed intent by the CEO of Diebold, which

manufactures voting machines, to "deliver" electoral votes for the President. And after numerous studies, the solutions are also apparent. What has not been apparent is the political will to act. While voter confidence waned, so too did the sacredness with which we hold American democracy.

I am hopeful that this hearing signals an end to that complacency and insecurity. I am joined by a growing number of my colleagues who recognize that the reliability and transparency of our election process is the cornerstone of the freedom upon which America was founded, and not until we can ensure the legitimacy of our democratic process will we again begin to live up to the standards and fulfill the dreams laid out by our founding fathers.

I look forward to hearing from our witnesses today to better understand the failures in our past, and to discover what else we can do to ensure success in the future.

Thanks, y'all."

Mr. CLAY. Would the gentleman care to ask questions?

Mr. YARMUTH. I think I will pass at this time. Thank you.

Mr. CLAY. OK.

The gentleman from New Hampshire, do you have an opening statement?

Mr. HODES. Thank you, Mr. Chairman. I do have a brief statement.

Mr. CLAY. You may proceed.

Mr. HODES. Thank you, Mr. Chairman.

I want to thank you for holding this important hearing on fairness and accuracy in elections, with a focus on electronic voting systems.

I also want to thank the panel for being here today. I look forward to hearing the rest of your testimony, and your testimony, sir.

Nothing is more critical to our democracy than the integrity of our elections. After punch card ballots proved to be ineffective for recounting votes in the 2000 Presidential election, Congress took an important step toward ensuring the accuracy of election results with the Help America Vote Act of 2002. In 2004, more voters than ever before used the optical scan voting system that produces individual paper ballots, but other electronic systems were shown to be flawed.

Today, the goal of effective standards for voting systems still faces serious obstacles. As we work to ensure the accuracy and security of Federal elections, we must be careful not to preempt State and local election systems. In my home State of New Hampshire, the optical scan systems, combined with hand counting procedures, have produced accurate election results. The Election Assistance Commission must ensure that new standards do not threaten existing voting systems that work.

Congress must remain committed to its role of oversight over voting system standards and ensure that critical decisions are made after careful consideration of possible consequences.

Finally, we must ensure that voting systems generate paper voting records that are not susceptible to hackers and electronic glitches.

Again, thank you for being here today. I look forward to hearing your thoughts as we consider these important issues.

Thank you, Mr. Chairman.

Mr. CLAY. Thank you very much.

The gentleman from Kentucky, would you care to ask questions?

The gentleman from New Hampshire, do you have questions for the witnesses? Mr. Hodes. You may proceed.

Mr. HODES. Thank you, Mr. Chairman.

Commissioner Hillman, I serve on the House Financial Services Committee. When one of my constituents goes to a bank and makes a transaction, they get a paper receipt, in addition to the electronic records the bank keeps. However, when a voter casts a ballot in some States with a direct record electronic voting system, there is no individual paper ballots that can be used if a recount is needed.

Isn't it true that some DRE systems only require one printout of all ballots cast, and not individual ballots that can be recounted?

Ms. HILLMAN. Sir, it is true that all DREs require the system to be able to print out a paper record of all transactions that hap-

pened on that machine. That information is contained within the system. Some of those systems have a printer to produce a paper trail and many do not.

Mr. HODES. Don't you think there should be a similar individual paper record system for all individual ballots in the transaction, especially since this isn't just a financial transaction, but voting is the basis for our system of democracy?

Ms. HILLMAN. EAC has made certain that our voting system standards include guidelines for the use of a printer to produce a paper trail. Many States through their legislative actions already require such a paper trail. HAVA allows the States to choose their own voting systems and to determine what type of machine they will use. So EAC accepts the responsibility to produce standards for all types of voting systems.

Mr. HODES. Has the EAC required individual paper records of each ballot cast?

Ms. HILLMAN. No, we have not required that.

Mr. HODES. Do you think that ought to happen?

Ms. HILLMAN. Congressman, I appreciate your question, but I am also respecting the role that HAVA prescribes to the EAC and to the States. It has left the decisionmaking of the manner in which voting systems will be used up to the States. So at this point, EAC has not seen it as its authority to tell States that it must use a paper trail.

Mr. HODES. So if the EAC doesn't have the authority and you have left it to the individual States, it is essentially up to Congress to legislate whether or not an individual paper record for each ballot cast needs to be produced for every voter.

Ms. HILLMAN. With due respect, it was Congress who left it up to the States to make the decision in the first place. EAC doesn't have that authority, so we are not telling the States that it is their responsibility. We are simply following what the Help America Vote Act provides for.

Mr. HODES. So my question was, therefore if Congress wanted to change it and require an individual paper record for each vote cast, it would be up to Congress to legislative that.

Ms. HILLMAN. It would, sir.

Mr. HODES. For Mr. Hite, a question for you, sir. It is my understanding that no one from the EAC has been asked to testify before Congress since 2004. In your opinion, has Congress done an effective job of providing oversight over the EAC and its critical work to improve Federal election accuracy in the last 5 years?

Mr. HITE. For an organization that works for the Congress, that is really a loaded question for me to have to respond to.

One point of clarification, the EAC has testified since 2004 before committees of Congress. I have sat beside the chairwoman here in doing that.

I would say that there has been extensive oversight with respect to elections since 2004. There is a proliferation of legislation associated with making changes to HAVA and other aspects of the election process. So I would compliment the Congress for the extent of the oversight that it has provided to this area.

Mr. HODES. I have one further question. Currently, it is my understanding that the GAO recently reported that 44 States have

laws requiring some form of compliance with Federal EAC VVSG guidelines or FEC voting system standards. What happens to States such as New York when voluntary guidelines become mandatory?

Mr. HITE. Are you asking if they are made mandatory by the State?

Mr. HODES. Yes.

Mr. HITE. Well, then the States have that prerogative to adopt the guidelines and to treat them by reference as mandatory requirements for their jurisdictions.

Mr. HODES. What are the consequences from a management perspective? It is my understanding that New York has not fully complied with HAVA with regard to accessible voting machines, but it doesn't have clear signals from the EAC as yet regarding what voting system would be appropriate. It is caught, at least as far as I understand it, between competing versions of the 2002 voting system standards, 2005 VVSG–1 and VVSG–2 in draft forms.

Mr. HITE. I don't believe New York is in any different position than other States. States have adopted different versions of the standards. Not all States have adopted the 2005 standards. Some are using a combination. Some are using the 2002 standards.

So they are all faced with this dilemma of which standards do we adopt, in light of the fact that standards are going to evolve. There is going to be a next version of the standards. So at what point do we adopt which version of the standard from a practical standpoint to implement the systems in that particular State or that particular jurisdiction?

Ms. HILLMAN. Sir, might I clarify about the standards?

Mr. HODES. Please. Thank you.

Ms. HILLMAN. Before the establishment of the Election Assistance Commission, the FEC had responsibility for adopting standards. The last set of standards adopted by FEC was in 2002, at the same time the Help America Vote Act was being debated by Congress. Those two things happened to come together at the same time, but they were complementary.

What EAC has done since then, as required by HAVA, is to develop what are now called the voluntary guidelines. Because we had very limited resources and time, working with NIST, we updated the 2002 guidelines on certain critical sections such as security and accessibility for persons with disabilities. We also did make sure that the 2005 guidelines included all the HAVA requirements.

Working with the States, it became important that the effective date of our 2005 standards be such that the States would have time to work with their suppliers to have systems that met the standards. So we made the standards fully effective December of this year.

In the meantime, States could still have their systems certified to the 2002 standards, but that was not an EAC responsibility. That was being done by an outside organization. Beginning January of this year, EAC has fully implemented its testing and certification program. We are now accrediting laboratories to test against both the 2002 standards, as well as our newer 2005 standards.

So it is true that for some States with laws that require the Federal standards, they are having to change their State law to accommodate that, but States have had 2 years to know what the requirements of our 2005 standards are before they become fully effective.

Mr. CLAY. Thank you, Mr. Hodes. I appreciate that.

Mr. HODES. Thank you, Mr. Chairman.

Mr. CLAY. Let me preface my next question, Ms. Hillman, by saying that I have the utmost regard for your lifetime history in protecting people's voting rights throughout this country. That is why the next question is rather troubling for me.

As you know, the New York Times and other newspapers have reported on EAC efforts to alter the findings of a report solicited by the Commission concerning the incidence of voter fraud. In fact, a New York Times editorial on Sunday, April 15th, points out that only 86 people were convicted of voter fraud since the Department of Justice began placing significant resources into investigating voter fraud more than 5 years ago.

While I recognize that you are only one member of the board, I think hearing your perspective on insight on how the EAC made these decisions would be helpful to us as an oversight body. The original draft report findings said that among experts, "There is widespread, but not unanimous agreement that there is little polling place fraud." While the final version stated that there is a great deal of debate on the pervasiveness of fraud.

Why were the original findings altered?

Ms. HILLMAN. Thank you for the question. Before I answer, let me just say that I have provided each member of the committee with a copy of a statement that I issued yesterday on this issue.

To put it in context, Mr. Chairman, the EAC commissioned two individuals to work as special government employees, to conduct research for us. We asked them to help define voter fraud and voter intimidation, so that in a future study everybody would know what we were studying; and second, to compile research that would inform EAC on a future study and to make recommendations from that research.

We did not have the time or the money to commission the kind of study that would have allowed conclusions to be presented. The consultants did provide a summary of conclusions. Quite frankly, what would have been helpful if that summary had said based on an interview with this person, it is documented that there are concerns about intimidation of minority voters in a particular State, and we think that is an issue the EAC should look into; or several of the people interviewed believe the following to be true and we think the EAC should study that.

And so some of the conclusions they presented, which were based on interviews with people, did not have data to support the conclusion. As much as I would like to sit here and say today that there is conclusionary evidence with respect to fraud and voter intimidation, that particular report does not provide us with that data.

Mr. CLAY. Were there anomalies or flawed research identified?

Ms. HILLMAN. The conclusions that you are referring to were based on interviews with people. In addition to those interviews, the researchers compiled several hundred court cases. They did ex-

tensive review of news clips and other articles. The conclusions were not tied to those clips and articles. And so at the time that EAC adopted its report in December, what I believe we were saying was, this is information that helps us define what we will study and flags for us the issues we need to look into.

I do not believe that the EAC could have reached agreement on the conclusions that were offered by the researchers without being able to validate those conclusions. And so as a result of the very serious allegations that have been made, EAC has asked its Inspector General to look into this matter on both the voter fraud and intimidation study, as well as the voter ID study so that Congress and the public and the commissioners can know what the circumstances were.

Mr. CLAY. I really find all of that peculiar that you all are going to an internal investigation about the actions that the Commission voted on. The Commission authorized the study by Rutgers University, and then rejected its findings on voter ID laws, citing flawed methodology. Perhaps there is something wrong in the process there as far as how you go out and get these studies?

Ms. HILLMAN. That would be a fair observation. With respect to the Rutgers study, I know that some of my colleagues believe that the methodology was flawed. I personally do not believe I could pass judgment on the methodology used by Rutgers. What I know is Rutgers didn't give me comparative data. For example, I will just use your State, and I am making this up. If Missouri had implemented new voter identification requirements in 2002 and there was an analysis of what those requirements were and turnout in 2004, it doesn't tell me if those requirements alone contributed to a rise or fall in voter participation unless I can look at it, compared to 2000.

Mr. CLAY. OK. I am not going to prolong this much further, but you know what the effects are.

Ms. HILLMAN. I absolutely do, sir.

Mr. CLAY. Are there intimidating effects of voter ID laws. I mean, it takes us back to reconstruction. It takes us back to figuring out how many jelly beans are in the jar, a literacy test. And that is the impact of voter ID laws. I am just surprised at the actions of the EAC when they are here to protect America's voter.

I will recognize Mr. Sali for 5 minutes, sir.

Mr. SALI. Thank you, Mr. Chairman.

Ms. Hillman, are the States going to be able to meet the requirements of the bill that is proposed by Mr. Holt before the 2008 elections?

Ms. HILLMAN. In my testimony, I did indicate that there will be at least 180,000 DRE voting systems in the country that would have to be upgraded or replaced, depending on the requirements of any legislation requiring VVPAT. And many States have expressed to us concern that they would be able to meet that requirement by the 2008 deadline.

Mr. SALI. Can you tell me what the major problems were that the election officials and poll workers had in the 2000 elections in transitioning to the new electronic voting devices and the requirements of the Help America Vote Act?

Ms. HILLMAN. Well, I think the overriding problem was one of time, and that is when the systems were received by the election officials using a brand new systems for the first time in an election, the training of the people who would use the system, the knowledge and experience to conduct the required independent logic and accuracy testing, the capacity to be able to test every machine. So a lot of what was experienced were human resource and financial resource limitations.

Mr. SALI. And we will be repeating those again for 2008 if we pass this bill. Is that correct?

Ms. HILLMAN. I certainly can't speak on behalf of the States, but I can say I have heard loudly and clearly from States a concern that unless such a requirement is phased in, States would have a major resource challenge to be able to meet any mandate.

Mr. SALI. Is it more expensive to meet language requirements for ballots on an optical scanner or on a DRE?

Ms. HILLMAN. It would be more expensive to do it on an optical scan because of the design and printing of the ballots. Whereas on the DRE, it is programming.

Mr. SALI. Mr. Hite, has the GAO looked at the fiscal impact on State and local governments if Congress passes this bill?

Mr. HITE. No, sir, we have not.

Mr. SALI. For either of you, are either of you aware of an instance where a case has been found and confirmed of an electronic voting machine that has been hacked into, if you will, during an election?

Ms. HILLMAN. I have not any information that would suggest that a DRE has been hacked into during an election while it was in the custody of an election official. There have been such experiments in controlled environments, which informs that the key to that would be knowledge of the system and access to the system.

Mr. SALI. Let me ask the question a little different way. Are either of you aware of a situation where an electronic voting machine was hacked and it changed the outcome of an election or was raised as an issue in an election?

Mr. HITE. No, sir.

Ms. HILLMAN. No.

Mr. SALI. That is all I have, Mr. Chairman.

[The prepared statement of Hon. Bill Sali follows:]

Opening Statement of Representative Bill Sali (ID)

Mr. Chairman,

My comments today are not directed at the witnesses or their testimonies. The proper working of voting machines is important, even essential, to representative self-government. Yet today's hearing is based on an assumption I cannot accept.

That assumption is this: It is the federal government's role to enact and enforce laws respecting state voting processes for elections to prevent presidential election controversies like that surrounding the election of 2000.

Mr. Chairman, I am troubled by that assumption. Our Constitution lays out the pattern for voting in executive office elections. At the same time, however, it provides Congress no authority to determine how states implement the Constitution's demands.

States are not merely administrative arms of the federal government. They do not exist simply to implement whatever ideas emanate from Capitol Hill or the White House.

State governments are far closer to those they represent and serve than are we. States are different. Geography, tradition and population size all animate differing approaches to how and where and by what means people vote. My home state of Idaho is mountainous and, in the winter, very cold.

Travel to Coeur d'Alene in January and I assure you that you won't be jogging in your gym shorts as you might in Yuma, Arizona.

All of our states have unique qualities that make them better suited than the "Washington Knows Best" crowd here in the heart of D.C. to determine how to provide their voters with accessible and reliable ways to vote, and to do so with confidence in the integrity of their own voting systems.

Electronic voting is but one means a state or a locality might wish to employ. There are a number of others. But what kind of machine, device or even paper card is used is up to the states.

But even more fundamentally, while Congress has a valid oversight function in enforcing federal laws, allow me to suggest that mandating a nationwide voting process, so comprehensive in scope that now we are discussing the mechanics of electronic voting apparatuses, is well beyond the purview of what the drafters and signers of the Constitution of our country ever envisioned.

We should be concerned with voter fraud, to be sure. I trust we are all chilled by the cynical comment of the ruthless dictator Josef Stalin: "The people who cast the votes don't decide an election, the people who count the votes do."

But the federal government's role in this matter should not diminish the rightful role of states in administering their own voting laws and practices.

Thank you, Mr. Chairman.

Mr. CLAY. Thank you so much, Mr. Sali.

Now, we will go to the gentleman from Kentucky, Mr. Yarmuth.

Mr. YARMUTH. Thank you, Mr. Chairman.

Could you, Ms. Hillman, offer us an opinion on how the EAC could alter the current accreditation and certification process in order for it to become more transparent and reliable?

Ms. HILLMAN. Are you talking about the accreditation of the laboratories and the certifying of the systems? We are in discussions with NIST about that. When we established our certification process, we were in fact following the standard protocols used by, for one example, NIST's Laboratory Accreditation Program. What we realized is that it will be useful to be able to provide updated information along the way before a laboratory is accredited, if people are interested in the status of that.

I am not sure what mechanism. We are looking at the posting of information on the Web site, but what mechanism would be useful and informative to be able to keep people informed because the process takes several months to accredit a laboratory.

And then similarly with the certification of the systems, the laboratories conduct the testing and then they provide a report to us. That report will be reviewed by technical reviewers at EAC before the recommendation comes for any certification. If there is concern that the machine go back for testing, that will be done.

So we are looking at the process to see what is appropriate within those stages to make information available to the public about what the laboratory recommendation is at the time that it is made.

Mr. YARMUTH. When you talk about 180,000 machines requiring updating to bring them into compliance with the requirements, and I guess part of it would depend on how extensive these 180,000 are or where they are, but would it make any sense to try to focus on the concentration of voting machines? Or are the electronic voting machines concentrated in, say, heavily populated areas?

I understand the problem of requiring a lot of new technology and updated technology in relatively small communities, and maybe in some rural States. Is that a factor in trying to get implementation of these requirements rolled out faster? Is that something that we should be interested in?

Ms. HILLMAN. One way to respond to your question, sir, would be to point out that the States of Maryland and Georgia currently use statewide DREs without a paper trail, and both of those States I think would be considered fairly heavily populated with major urban areas.

In addition to that, the other large system without the paper trail would be in the State of Florida. Beyond that, there are jurisdictions all across the country. What is important to look at would be the process a State would have to go through to be able to acquire the equipment that would be needed to produce the paper trail.

And so when I speak of the 180,000, depending on the technical requirements would determine whether a system would have to be upgraded or fully replaced, because some DRE systems do not have right now a printer that could be attached to produce the paper trail. So I think the timing and the requirements of it are important.

My own personal opinion is that the ultimate requirement should be in place with recognition if Congress were to pass the law, with recognition of how long should be allowed for States to meet that requirement.

Mr. YARMUTH. I yield back my time. Thank you.

Mr. CLAY. Thank you, Mr. Yarmuth.

Mr. Hodes.

Mr. HODES. Thank you, Mr. Chairman.

Commissioner Hillman, I am trying to understand as a new Member some of the political dynamics at work around the issues that you are dealing with. I would like your perspective.

I got a letter from my New Hampshire Secretary of State, Bill Gardner. He indicated to me that the National Association of Secretaries of State in 2005 passed a resolution calling on Congress not to reauthorize the EAC after the 2006 general election. He supported that resolution and supported sunsetting the EAC, as was apparently called for in the original HAVA Act.

My sense is that he is concerned that the EAC will usurp his right to control New Hampshire's successful paper ballot system. Can you offer me any of your thoughts on what relations have been between the EAC and the Secretaries of State, and how you have responded to the concerns of the Secretaries of State about ultimately who will control the integrity of the voting system and how it has worked?

Ms. HILLMAN. Thank you for the question. Let me begin by saying that the relationships with the National Association of Secretaries of State is a very healthy one. We were there the day that NASS adopted the resolution, and in fact we were testifying the same day that they made the information available to the House Committee on Administration.

What I will say from those discussions is that it was less about the role of EAC, because HAVA has been very, very clear about the delegation of responsibility for the administration of elections to the States; that the Election Assistance Commission was set up to assist the States in meeting the requirements of HAVA. Along the line, we have to gather information to do that. We do have full responsibility for the testing and certification of voting systems, but again, voluntary compliance on the part of the States.

We have a fiduciary responsibility to how States are expending the funds, and we do receive annual reports from the States, and our Inspector General is required to audit the States. But that is with respect to making certain that States have spent their money both in compliance with HAVA, as well as in compliance with their own State HAVA plan.

I do believe that I am not mis-stating this, that the States were more concerned about whether Congress would invest more authority in EAC, than to the authority that EAC has now, because we do not have the authority and we do not tell the States what types of systems they should use. We cannot even tell them what we think should be statewide standards for provisional voting. Again, that is left to the States. They determine the kind of testing and certification that will be done on the voting systems used in their States.

So I am hopeful. I do believe, based on the ongoing relations that we have with NASS, that issue is behind us. Although I will say that I know that election officials, State and local, are very concerned about what might be the next wave of election reform and what the requirements will be on those States.

Mr. HODES. So if I understand what you have said, from your perspective, the States' concern is that we in Congress would give more power to the EAC and that is what the Secretaries of State are concerned about.

Ms. HILLMAN. At that time. I do not believe that is a continued concern, but that was in February 2005. That was 2 years ago.

Mr. HODES. Have you heard any expressions of concern that the EAC is a creature, if you will, of the executive branch, with the President having the authority to appoint four commissioners with essentially de facto regulatory authority over the voting systems, although I hear your testimony that it is voluntary and you are providing assistance and guidance. But in essence, it seems you really are de facto having regulatory authority over the voting system.

Have you heard any concerns that there are four Presidential appointees, and that the Commission resides in the executive branch, say, as opposed to in Congress?

Ms. HILLMAN. I have heard those concerns, nothing that the EAC has been called upon to talk about necessarily. I think a review of HAVA would show that while the commissioners are Presidentially appointed, each commissioner candidate is recommended to the President by the leadership of both the House and the Senate.

Mr. HODES. Do you see any downside in moving the EAC to Congress in terms of where it resides, as opposed to the executive branch?

Ms. HILLMAN. I can't say that I am an expert in government operations, but it would seem to me that it might be difficult for some of the work assigned to EAC to be done outside of the Federal Government administration, for example, the issuance of requirements payments or any funds to the States and the monitoring of those funds, or the whole process of setting up the voting guidelines and doing the testing and the accreditation. I just don't know if a body of Congress should be responsible for accrediting laboratories, testing voting systems, and issuing the certifications. I don't know of anything that has existed like that. Generally, those functions are within Federal Government agencies.

Mr. HODES. Thank you.

Ms. HILLMAN. Sure.

Mr. HODES. Thank you, Mr. Chairman. I yield back.

Mr. CLAY. Thank you, Mr. Hodes.

Mrs. Maloney.

Mrs. MALONEY. Thank you, Mr. Chairman.

I would like to ask Commissioner Hillman, the CIBER assessment report submitted to the EAC last summer documented the entirely inadequate testing performed by CIBER and Wyle, for that matter, on software used in over 70 percent of the voting systems last November. These systems had been sold to counties as having been tested and certified to Federal voting system standards.

Once they learned that the software testing was woefully inadequate, did the EAC inform elected officials, not to mention the public, that would be using the equipment to count the votes?

Ms. HILLMAN. Thank you, Congresswoman. I am just going to glance at my counsel while I answer this question because what I understand is that the certification was to assess the capacity of CIBER to perform testing under our program. We did not in that process assess or evaluate work they had done previously, work that CIBER had done before EAC, what was done for the National Association of State Election Directors.

So the report to us did not include evaluation of work they had done previously, but rather whether or not they were capable to perform under our certification program.

Mrs. MALONEY. But didn't the report show that it was inadequately tested? That is the point. The point was that it showed it was inadequately tested. The question is, did you inform anybody that it was inadequately tested?

Ms. HILLMAN. Again, Congresswoman, I don't believe the report addressed prior work. It looked at their existing procedures against our requirements. So I don't believe the report that we received on CIBER informed us of inappropriate or inadequate things they had done prior to our program.

Mrs. MALONEY. I believe that it did, but we need to look at it further.

Let me just ask Richard Hite, in 2005 the GAO recommended that the EAC, "improved management support to State and local election officials by collaborating with the Technical Guidelines Development Committee and the National Institute of Standards and Technology to develop a process and associated timeframes for sharing information on the problems and vulnerabilities of voting systems." This is a GAO recommendation.

I would like to ask you, Mr. Hite, do you feel it is the role of the EAC to inform elected officials and the public of problems encountered with voting machines, even if those voting systems were not directly certified by the EAC? So should the EAC, if they are aware of problems, inform the public and elected officials?

Mr. HITE. As my written statement brings out, we believe that any information that the EAC becomes aware of that would be deemed credible and useful to election officials, regardless of the source, whether it is from a vendor, whether it from an independent authority, or whether it is from State and local jurisdictions, that information should be disseminated under their clearinghouse role.

Mrs. MALONEY. So particularly problems encountered with the machines should be definitely covered.

Mr. HITE. Yes.

Mrs. MALONEY. Absolutely, probably more than any other reason. So therefore, going back to my first question to Commissioner Hillman, it was my understanding the CIBER assessment report documented inadequate testing, so therefore shouldn't that then have been given to the counties and to the people with the voting machines? Maybe I will ask Mr. Hite the same question. Do you think they should have informed election officials and the public

that would be using these machines that the CIBER assessment report said they were inadequately tested?

Mr. HITE. For me to answer the question, I would have to have some knowledge into the particular reports that are being talked about. I have not seen those and I don't know the time line.

Mrs. MALONEY. OK, we will get them to you, then, and maybe you can get the answer back to us. OK? Thank you.

Mr. CLAY. Thank you very much, Mrs. Maloney.

Mrs. MALONEY. We have been called for a vote, Mr. Chairman. Are you aware?

Mr. CLAY. Yes, I am.

That will conclude the testimony from panel one. Thank you, Ms. Hillman and thank you, Mr. Hite, for your testimony. You may be excused.

Ms. HILLMAN. Thank you.

Mr. CLAY. I would like to now invite our second panel of witnesses to come forward. We have a series of six votes that follow. I would like to swear in the witnesses and possibly get their opening statements going. And then we will recess the hearing and reconvene. With six votes, it is going to take about an hour.

Mrs. MALONEY. An hour?

Mr. CLAY. An hour, I would bet you. So let's see what we can get in now.

If the next panel could come forward and make some brief opening statements, and then we will recess and make our votes.

Our second panel is here with us today to address issues relating to electronic voting. Our first witness is the Honorable Robin Carnahan, who is Missouri's Secretary of State. Our second witness is Avi Rubin, Ph.D, technical director of Information Security Institute, Department of Computer Science, Johns Hopkins University; and Mr. John S. Groh, vice president, Election Systems and Software International, and chairman, Election Technology Council. Our fourth and final witness is Ms. Diane Golden, Ph.D, director of the Missouri Assistive Technology Council, on behalf of the National Association of Assistive Technology Act Programs.

Welcome to all of you. It is the policy of the Committee on Oversight and Government Reform to swear in all witnesses before they testify. At this time, I would like to ask you to stand and raise your right hands.

[Witnesses sworn.]

Mr. CLAY. Thank you. Let the record reflect that all the witnesses answered in the affirmative.

We will start with Ms. Carnahan, if you could please give us a brief summary of your testimony.

STATEMENTS OF ROBIN CARNAHAN, SECRETARY OF STATE, STATE OF MISSOURI; AVI D. RUBIN, TECHNICAL DIRECTOR, INFORMATION SECURITY INSTITUTE, DEPARTMENT OF COMPUTER SCIENCE, JOHNS HOPKINS UNIVERSITY; JOHN S. GROH, VICE PRESIDENT, ELECTION SYSTEMS AND SOFTWARE INTERNATIONAL, AND CHAIRMAN, ELECTION TECHNOLOGY COUNCIL; AND DIANE GOLDEN, DIRECTOR, MISSOURI ASSISTIVE TECHNOLOGY COUNCIL, ON BEHALF OF THE NATIONAL ASSOCIATION OF ASSISTIVE TECHNOLOGY ACT PROGRAMS

STATEMENT OF ROBIN CARNAHAN

Ms. CARNAHAN. Thank you, Mr. Chairman. It is an honor to be here with you today. As one of your constituents, I am pleased to see you up in the Chair.

I am Secretary of State Robin Carnahan of Missouri. It is my job as the chief elections officials in my State to ensure that elections are run in a fair, secure, and accurate way. I want to share with you today some of the things that happened in the 2006 election.

By all accounts, the election in Missouri was one that was fair and accurate and secure. Over 2 million people voted. That was 53 percent of the vote. In most instances, it went efficiently and smoothly. This was particularly noteworthy because of all the changes that were required after the Help America Vote Act and the new machinery that was put in place.

I will be clear: elections in Missouri are run locally. They probably are that way in your State as well. Locally elected public officials run those elections in most places. In the larger metropolitan areas, there are appointed election boards. What we have done is documented the instances of problems that happened in the election, but also the successes. We put out a report about that, and we have a copy that we have submitted for the record. It is called Voters First: An Examination of the 2006 Mid-Term Election in Missouri.

The successes were clear. We were able to implement the HAVA changes in a way that was fair and accurate. We got rid of punch card ballots. We got the new optical scan and DRE equipment. This new equipment was accessible for people with disabilities. We had the most accurate voter lists we have ever had in the State of Missouri.

So there were significant improvements. But there were also some issues, and I want to identify what a couple of those were. The first and clearest and most obvious was that there were long lines at the polls. It took people a long time to vote. It stemmed from a number of things, in part because of the new machinery, in part because of a need for more training of poll workers, in part because there were some places that ran out of ballots.

We have a number of recommendations that we have put forward about how we can deal with those issues, including having early voting in our State, as well as ensuring that there are adequate numbers of paper ballots for every person that can go and vote there.

There were also some issues surrounding some of the new voting equipment. We have 116 election jurisdictions in Missouri. The pri-

mary voting system is an optical scan paper ballot. There is a DRE in every voting precinct, as required by HAVA. But unlike other States, we have paper trails for every vote that is cast in Missouri.

In the main, that equipment worked well. There were some problems, but in the main the equipment worked well. I will also tell you that we did a statewide recount already, using those paper trails, including the paper trail on the DRE machine in our August primary election. It did not change any results.

My recommendations on this front are that we need to have people obviously more familiar with the new machines and the poll workers in particular who are familiar.

Another common theme that we saw was that there was some misinformation. There were issues surrounding this in our State because there were changes in what the voting requirements were going to be and what kind of ID was required. One out of five complaints that we got in our office were about the wrong ID requirements being asked for at the polls.

There were a couple of registration issues that we saw, but there are a number of ways I think we can address those. Congressman, we have talked about those, some being automatic voter registration when you get a driver's license with the DMV, or also same day registration, which is being looked at in a number of States.

I know that you all are looking at a number of changes, the Holt bill and others, that will affect elections and how they are run. I would just stress to you to keep in mind the principles that the National Association of Secretaries of State have put forward. Let me just quickly go over those.

The first is to avoid preemption of State authority. Obviously, elections are run locally. If you all are going to take over the election process, that is a big change in our country and it will take money to do that. The second is provide reasonable timeframes for implementation, and don't do things that raise expectations that can't actually be met by the local election officials.

Third is to gather in put from people who actually run the elections on the ground before you make any of these changes. And of course, guarantee full funding for any mandates that come down. And finally, to encourage the use of maximum flexibility once you set the goal, let the States figure out how to meet those goals.

That is all I have to say today. I know that you all need to get away.

[The prepared statement of Ms. Carnahan follows:]

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TESTIMONY OF SECRETARY OF STATE ROBIN CARNAHAN

Information Policy, Census, and National Archives Subcommittee
"Ensuring Fairness and Accuracy in Elections Involving Electronic Voting Systems"
April 18, 2007

I want to thank the committee members and Congressman Clay for inviting me here to speak with you all today.

My name is Robin Carnahan, and I am the Secretary of State for the State of Missouri.

As the chief election official for the state of Missouri, it is my job to help ensure fair and accurate elections. Today, I'd like to share with you information on election administration in 2006 in Missouri – a year of many changes.

By all accounts, the 2006 elections in Missouri were fair, accurate and secure. In November, over two million voters, or 53 percent of Missouri's eligible voters, cast a ballot. In most areas, elections were smooth and efficient as well. This is particularly noteworthy because of the many federal law changes that were implemented for the first time in this election.

In Missouri, all elections are actually run at the local level, and we have 116 separate election jurisdictions in the state. So, the credit for this success is due to the hard work and dedication of Missouri's local election officials, their staff and our dedicated poll workers.

To document what happened in the election, my office drafted and released to the public a report called "Voters First: An Examination of the 2006 Midterm Election in Missouri." This report provided an examination of both the successes and the issues that voters and election officials encountered on and around Election Day.

First, the successes of the 2006 election included

- fair, accurate and secure elections;
- replacement of punch card ballot systems with printed paper optical scan ballots
- new voting equipment that is accessible to people with disabilities as well as
- the most accurate voter list Missouri has ever seen.
- Also, the absence of any reports of voter impersonation or voting fraud in the 2006 election in Missouri was notable.

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There are several recurring issues and themes that we were able to identify, and the report concluded with a number of recommendations to make improvements in those areas.

LONG LINES

First, one of the recurring complaints from all over the state was that many voters had to wait too long in line to vote. The long lines stemmed from a number of different issues, from a few polling places running out of ballots, to poll workers and voters learning to deal with new technology.

A recommendation to cut down on the long lines voters face on Election Day in Missouri is through Early Voting, as currently allowed by at least 30 other states.

NEW VOTING EQUIPMENT

Another recurring issue surrounded the new voting equipment.

The 2006 election was the first election in which all 116 Missouri local election authorities used some form of new voter technology in order to be in compliance with federal and state law. In Missouri, it is the ultimate responsibility of the local election authorities to choose and purchase the voting equipment used in their jurisdiction.

The Office of Secretary of State provided guidance to the local election authorities to help ensure that new voting equipment is secure, accessible, and accurate.

All Missouri counties used a combination of optical scan voting systems in which voters mark a printed paper ballot and that ballot is put into an optical scan machine for counting, as well as at least one DRE or "touch screen" voting machine with a voter-verified paper audit trail in every polling place.

So unlike in some other states, all votes cast in Missouri included a paper record of the vote.

Although we did receive a few reports of issues with both the optical scan and touch screen voting systems, overall new voting equipment worked well. The majority of Missouri voters voted on optical scan voting machines, and the remainder voted on DRE machines.

Missouri also conducted one statewide and a few legislative district recounts in 2006 using the new equipment. The recounts used the optical scan paper ballots and the voter verified paper audit trails and were thorough and accurate.

We made a few recommendations for improvements in this area to ensure transparency and voter confidence. First, enhance training materials for local election officials on current rules and procedures for testing and use of new voting systems, and second, develop methods to better educate voters about how to use new voting systems.

POLL WORKERS

Another common theme we noticed related to poll workers both in terms of numbers and training.

In an election full of changes and new voting equipment, Missouri's poll workers did an impressive job. But, we need more people, especially technologically savvy people, to get involved, so we recommended efforts like increasing recruitment, using students, and allowing poll workers a day off work with pay, just as if they were serving on jury duty.

VOTER MISINFORMATION
We also received a number of reports about voter misinformation in the 2006 election.

One month before the election, in October 2006, the Missouri Supreme Court upheld a lower court ruling that struck down as unconstitutional a photo ID law that was passed by the legislature.

Thus, it is particularly noteworthy that the type of voter fraud allegedly prevented by photo ID — voter impersonation at the polls — was not reported as a problem in Missouri.

However, there were reports of voter misinformation and nearly one out of every five complaints received by the Secretary of State's office concerned a voter being asked for the wrong type of identification at the polls on Election Day. Our recommendations include uniform voter education materials and greater poll worker training to address this issue.

VOTER REGISTRATION
Issues surrounding voter registration were reported in the press and to our office.

Since the 2004 election, much had been done to improve the voter registration process in Missouri. In addition to the new statewide voter registration database list, a new state law required that anyone being paid to register new voters must be registered with the Secretary of State's office.

One of our recommendations on this topic was to explore the feasibility of Election Day voter registration and/or automatic voter registration for those who are qualified to vote when they apply for licenses at Missouri DMV offices.

Also, in 2005, the Department of Justice sued the state of Missouri and the Secretary of State's office over alleged violations of the National Voter Registration Act. This past Friday, a federal judge ruled that my office not only complied with federal law with regard to voter registration lists, but also went beyond its requirements through our many efforts to assist the county clerks and election boards with their responsibilities. The ruling also confirmed that there is no evidence of voter fraud in Missouri.

I know that you are discussing a lot of important federal election reforms here in the Congress. As you discuss how best to proceed with legislation that would affect elections, I hope you will keep in mind these five principles adopted by The National Association of Secretaries of State

(NASS) regarding federal election reform efforts:

- Avoid preemptions of state authority.
- Provide reasonable timeframes for implementation.
- Gather input from state and local officials.
- Guarantee full funding for federal mandates.
- Allow for maximum flexibility for state implementation.

In closing, I want to thank you for inviting me here to testify before the committee today and for your work on these important issues. Ensuring both the integrity of our nation's elections and the confidence of the American people is a vital charge. I hope my comments help as you work to achieve these common goals.

Thank you.

Secretary of State Robin Carnahan
04/18/07

Mr. CLAY. Thank you so much, Madam Secretary, for that abbreviated presentation.

We will try Dr. Rubin, and see how far we can go. You may proceed.

STATEMENT OF AVI D. RUBIN

Mr. RUBIN. Thank you very much, Mr. Chairman and members of the committee.

My name is Avi Rubin. I am a computer science professor at Johns Hopkins University. My background and training are in the area of computer security. In 2003, I made electronic voting my primary research focus.

After reviewing the source code of the Diebold DRE voting machine and finding serious security problems there, I also published a report outlining the risks of these machines. After that, I became an election judge and worked two primaries and two general elections in Baltimore County to get a feeling for the process, and understand exactly how it works from a non-academic perspective.

I found that there were many other computer science professors around the country like myself who were working on electronic voting and for whom electronic voting was very important. We decided rather than duplicating effort and working everyone in their little island, to join forces and try to create a center to study electronic voting. We made a proposal to the National Science Foundation to establish the ACCURATE Center. The Center was funded to the tune of $7.5 million over 5 years. I am the director of ACCURATE.

Our main focus is to explore the design space of voting machines to better understand how the next generation of voting machines can be designed. We also perform outreach into the community by working on things like post-election audits like we had in Sarasota County that we were involved with, and working as election judges and poll workers and poll watchers.

Finally, we educate students by teaching courses that focus on issues related to electronic voting.

The discussion of voting machines has focused primarily on three types of technologies these days. Those are DREs, optical scan paper ballots, and DREs with a voter-verified paper record or paper trail. The primary difference between DREs and other voting systems is that a DRE is a software application running on a computer. It is typically running over the Windows operating system, although not all do. There are no ballots. The votes are kept on memory cards like the ones you might have in a digital camera, and there is another copy usually kept in the internal flash memory.

Now, optical scanners use software as well. DREs are not the only ones that use software. They use software to read the scanned images, to process the images, and to tally the votes. But there are two important differences between the software in a DRE and the software in an optical scanner. The first difference is the amount of software. A DRE utilizes tens of thousands of lines of code, and the DRE operating systems that these DRE applications run on top of are typically millions of lines of code. An optical scanner can be written on hundreds of lines of code, so it is much simpler and easier to analyze.

The second difference is that DREs produce no ballots, so they cannot be independently audited. Optical scanners can be audited and the ballots can be recounted.

Let me take these two differences one at a time. First, the amount of software. If you haven't programmed a computer, it is hard to appreciate how different software is from anything else. It is highly complex and they are hidden in our actions between components and software. This is why some of the problems you may run into in a software system might not be replicable. You might have one section of software in a particular State, and then another section of software in an another State, and that combination of States creates an unexpected output.

So you can find, and we often do see, that software systems can misbehave in surprising ways that cannot be reproduced and we cannot really understand exactly what happened. We can never know that a software system is free of bugs. In the discipline of software engineering, the No. 1 metric for how many bugs there in a program is the number of lines of code. More software means more bugs. So voting machines that have a lot of software are going to have a lot more bugs.

I run short contests in my class where I have the students write very small programs. I am talking five or six lines. And then I have other students in the class try to evaluate these programs and find any bugs that are inserted there on purpose. I overwhelmingly find that it is much easier to create software bugs and to hide bugs than it is to find them. Finding software bugs is not something that can be done scientifically. It is an art right now and it is an imperfect art.

I see that I am running out of time. I know you have somewhere to be, so I am going to leave a lot of what I had to say for the question and answer. But let me just wrap up by pointing out that NIST defines the concept of software independence, which is that a previously undetected change or error in the software cannot cause an undetectable change or error in election outcome. I think that is the right standard. I think that there are going to be undetectable bugs in software systems and we cannot have them affect the outcome.

The only way that I know of right now to actually achieve software independence is with paper.

[The prepared statement of Mr. Rubin follows:]

Testimony, U.S. House Subcommittee on Information Policy, Census, and National Archives

Rayburn House Office Building, Washington D.C.

Dr. Aviel D. Rubin, Professor of Computer Science
April 18, 2007

My name is Avi Rubin. I am a Professor of Computer Science and Technical Director of the Information Security Institute at Johns Hopkins University. I am also President of Independent Security Evaluators, a computer security consulting firm. I am author or co-author of several widely used books on the subject of computer and network security. My latest book, *Brave New Ballot* (Random House, 2006) is on the security of electronic voting. I received my Ph.D. in Computer Science from the University of Michigan in 1994 in the field of Computer Security. I have been specializing in research issues related to electronic voting since 1997, and I am a member of the National Committee on Voting Integrity.

In 2003, I made electronic voting my primary research focus after reviewing the source code of the direct recording electronic (DRE) voting machines used in my state of Maryland. My research team identified numerous security problems with that system, and we published a report outlining the risks of using the Diebold machines in elections. Following this academic project, I volunteered to become an election judge in Baltimore County to gain hands on experience running elections, to inform my security research. I have worked the 2004 and 2006 primary and general elections, and I am signed up to be an election judge again in 2008.

Together with several colleagues from Berkeley, the University of Iowa, Rice University, Stanford, and SRI, I approached the National Science Foundation (NSF) to establish a center for studying electronic voting. The NSF funded A Center for Correct Usable Reliable Auditable and Transparent Elections (ACCURATE) at a total of $7.5 million over five years. I am the director of the center. Our focus is on exploring the design space for voting machines so we can better understand how the next generation of these machines must be constructed. Our investigators include a psychology professor, a law professor, and eight computer scientists. The three primary goals of ACCURATE are research, outreach, and teaching. Our research focuses on developing technologies that can improve voting systems. Our outreach effort focuses on working with the elections community to help them understand technology and policy issues. For example, we participated in post-election audits in 2006. Finally, we have designed curriculum to teach our students about the important issues in electronic voting.

Our ACCURATE research consists of several thrusts. One of our projects involves performing usability testing to compare different types of equipment. We can test design prototypes against human subjects to find out whether they are usable. We also provide coordinated responses to requests, such as those from the EAC. For example, we provided detailed comments on the proposed VVSG. In addition, we are performing basic research in computer security to create technology for future generations of voting systems. For more information about the activities of ACCURATE, our 2006 annual report, which lists all of the principal investigators, as part of my written testimony is available online.[1]

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[1] http://accurate-voting.org/wp-content/uploads/2007/02/AR.2007.pdf

The Maryland bills in the State House and Senate are similar to the bill proposed by US Representative Rush Holt (H.R. 811) and one that is expected from US Senator Dianne Feinstein. It is not too late to fix the problems with our voting systems before any more elections are run on insecure and non-auditable platforms. It should be noted that the best technology for voting is also one of the least expensive.

DREs with which so many jurisdictions like Maryland are now saddled, cannot be properly audited. However, audits are critical components of any security sensitive system. They provide assurance that a correct result was achieved. A proper audit has the following properties:

- External to the system. For example, printing the results from a DRE and counting them does not constitute an audit.
- Publicly observable
- Reproducible
- Well defined

The goal of an audit is not necessarily to obtain the same result as in the election, but rather, to have a process where increased accuracy can be achieved with an increase in effort. A proper audit capability can also result in better failure detection and recovery.

A paperless DRE cannot be properly audited. Period. There are no records external to the system, and electronic data cannot be publicly observable. Furthermore, a DRE with a voter verified paper record (VVPR) is not as good as a paper ballot system with precinct-level op-scan counting. Here are the properties of optically scanned paper ballots that make them superior to any form of DRE voting.

- Faster voting eliminates or minimizes long lines because voters do not have to wait for machines to fill out their ballots. Scanning paper ballots takes seconds, whereas voting on a DRE takes minutes.
- Even if the equipment fails, voters can keep voting. This is not true of DREs.
- The technology is cheaper, with only one scanner and one ballot marker needed per polling place.
- Audits are do-able, and much easier to perform than with commercial VVPR systems.
- Redundant tally issues (paper vs. electronic) are simpler than in VVPR systems.
- Ballot marking systems and external verification systems make paper ballot systems as accessible as DREs, and potentially more accessible that DREs with VVPR.
- It is easier to preserve privacy than with VVPR, because most VVPR solutions store the paper records sequentially.
- It is easier to use paper that is durable.
- The operation is simpler and more transparent to voters.
- Less software is required.
- The system is simpler to administer.

Finally, I believe that NIST provided the best guidance when they suggested that a voting system is Software Independent, "if a previously undetected change or error in its software cannot cause an undetectable change or error in an election outcome." Today's DREs are anything but software independent, and I believe the only way to achieve software independence today is with paper ballots.

Mr. CLAY. Thank you so much, Dr. Rubin, for that testimony.

Mr. Groh and Dr. Golden, the committee will recess now. We will reconvene very shortly after the final vote. If you could just bear with us, we will come back to you.

The committee stands in recess.

[Recess.]

Mr. CLAY. The Committee on Oversight and Government Reform will come to order. We left off with Mr. Rubin. We will go to Mr. Groh. You may present your testimony.

STATEMENT OF JOHN S. GROH

Mr. GROH. Thank you, and welcome back.

I will dispense with a little bit of my background and who I am, but I do represent the Election Technology Council as the chairman. The member companies of the Election Technology Council, we account for over 98 percent of the ballot tabulation in the United States. So this is made up of the people who are the stakeholders in supplying the technology to the election community.

The other point I would make is my voice today is also a voice of over 1,000 individuals that are citizens, voters and employees of these vendor companies, who live in over 33 States. So we have a large constituency of individuals that work in the voting industry and we are proud to have done that.

We all know that historically the 2000 election launched for the first time a national debate on elections. I think everybody was ready and it was well overdue that it happened. This was not a surprise at what happened in 2000 to any of the voting officials because they had been dealing with this for years.

But I want to remind the subcommittee of a couple of key dates, because I think we need to recognize that there were two events going on. One is there was an old system that all of us were operating under that was run by the National Association of State Election Directors. This was then propagated by the 2000 election. We had some changes. So I would remind you that in October 2002 is when HAVA passed, but it wasn't until March 2004 that the EAC first came into formation, a brand new agency. It was very, very difficult to get traction and get themselves going.

So there is a little bit of a reminder that the EAC has done a lot. Have they done everything they could do? Absolutely not, but they are on path to do all of it. It is just that they have a lot to do.

We as the vendor community, we believe that there was one single goal of HAVA. Actually, I would like to recant that and say I think there were two. One was to ensure that every vote counted, but I think a bigger one was to assure that every voter is able to vote unassisted. That has been one of the mantras of the vendor community, was to come up with methodologies to allow everybody to vote. The ETC is open to all companies that wish to be in this, so we are a pretty broad group of individuals that are in this.

I want to talk a little bit about a few areas that the committee has asked to hear about, and a couple that you haven't. We do know that one of them is time. Time is a very important element, and HAVA did not allow enough time. We would recommend that

anything that Congress does going forward, please allow enough time for local and State jurisdictions to implement that.

The second one would be the cost factor that goes into anything that is being mandated or required of State and local jurisdictions that in fact can happen.

And the third is to not give up and remove the accessible voting strides that we have made in the last 2 or 3 years with new technology that is out there.

Now, I will talk a little bit about some subjects that you had asked for a little more detail. One of them was the area of security. I am also going to talk about voting system certification, and then also I want to divert a little bit into source code and the area of the openness of source code.

One of the things around security that everybody is focused on is trying to make the technology be something that handles everything in the security. It can't. One must recognize that security is an end to end process and you account for the totality of circumstances that can impact the security element.

Prior speakers have all addressed that, and I think it is something that we, as election vendors, also understand that you have to have good practices. We have submitted along with our testimony, the testimony of Donetta Davidson, Chair of the EAC, that she provided I believe on March 15th. That is attached to my testimony as a supplement to it.

To quote what she had put in hers, that the fundamental election administration process is to protect the entire voting process will always be important, even as voting technology evolves. Focusing solely on the reliability of voting systems is not enough, and Federal certification for the system cannot take the place of solid, thorough management procedures at the State and local levels to enure the system is managed and tested properly. That is one of the things that we will continue to talk about in our dialog with different committees.

If I move over to the certification process, one of the things that certification is, they are on a path to launch a new certification program. They just haven't had enough time to get it implemented. All of us were working under the old certification process run by NASED. I have provided for you two diagrams, one pre-January 1, 2007, when EAC took over and has implemented a new certification process. I wanted you to have a view of what it was like before and what it is like as we look into the future. Please give the EAC enough time to implement that.

And the final one was on voting system source code. The ETC members are in agreement that we think there needs to be best practices put out there, and some type of an oversight of how source code is to be looked at. I have submitted, along with my testimony, from the ETC members that of Britain Williams, Kennesaw State University professor, with over 20 years of election experience. He has put together some recommendations. We embrace those as a good process to start that, and would ask the Chair and the committee to look at those.

With that, I am open to any questions you would have.

[The prepared statement of Mr. Groh follows:]

Testimony before the Subcommittee of Information Policy, Census, and National Archives, Committee on Oversight and Government Reform
April 18, 2007

John Groh, Chairman, Election Technology Council

My name is John Groh and I am a Senior Vice President with Election Systems & Software. I am here to provide testimony on behalf of the Election Technology Council (ETC). The Election Technology Council consists of companies which offer voting system technology hardware products, software and services to support the electoral process. These companies have organized as an association to work together to address common issues facing our industry. Membership in the ETC is open to any company in the election systems marketplace.

The historic General Election of 2000 led to the largest election reform legislation in the nation's history, "The Help America Vote Act" of 2002 (HAVA). At the very core of this sweeping legislation was one goal, ***"to ensure that every vote counts".*** This testimony is intended to provide insights and discussion points from the ETC members to concerns about the security and reliability of electronic voting systems, vulnerabilities in the development of system software code, and industry challenges to developing more reliable accreditation and certification programs for systems.

The members of the ETC have provided election services and products to thousands of voting jurisdictions over the past several years. In addition to providing equipment and services, ETC member companies invest millions of dollars in research and development every year to help improve the quality, accuracy and credibility of elections. Collectively we serve more than 95 percent of all election jurisdictions in the U.S. The members believe that elections should be accurate, secure, accessible and transparent and are dedicated to continuous improvement and the evolution of our products and services to continue in the achievement of our goals. The 2006 general election demonstrated the effective utilization of electronic voting stations (many with voter-verifiable paper audit trail printers) and optical scanners. The members of the ETC are committed to continuing to serve as stakeholders and partners with election officials to ensure that the mandates of HAVA are complied with in full.

Certification Processes

Election systems manufacturers continually conduct new product development to enhance current voting equipment and innovate the next generation of voting technology. This development process is driven by state and federal election laws and standards that establish specific voting system requirements.

Software / Firmware
After internal vendor development, documentation, and quality assurance, to be certified to federal voting systems standards, a voting system and its component parts must go through extensive testing conducted by EAC accredited Voting System Testing Laboratories (VSTL). VSTL's review line-by-line the software and firmware source code to ensure compliance with standards and overall integrity. Once complete, a VSTL will perform and witness the compilation of the source code into program executable files. VSTL's test the functionality of the voting equipment using compiled code to ensure it operates accurately - that votes are properly captured, results are properly reported, and data is properly retained. To pass the accuracy test, a system must tabulate 1.5 million votes with 100% accuracy.

Voting System Hardware
VSTL's test the operation of the voting system hardware to ensure it can withstand extreme environmental conditions and intensive human handling. If, at any point in the testing process, a VSTL identifies an issue that must be addressed, a product or component part is sent back to the vendor for additional development and resubmission through the whole VSTL testing process. Only after the system or component has passed every test is it deemed qualified for federal certification.

State-level Certification
Presently ~thirty-six states (36), federal certification is only a first step before a voting system can achieve state certification. In many cases, the state will carry out its own independent testing of the accuracy, security, and reliability of a system. State testing (which varies state-to-state) expands upon and enhances testing at the federal level. A state also will compare a product's features and functionality against state law and standards to ensure it complies. Many states require the vendor to escrow a copy of the certified system software.

Local Jurisdiction
Locally, after vendor production testing prior to shipping, the local election authorities conduct acceptance testing to ensure the voting system equipment

Secondly, the source code is provided to the Voting System Testing Laboratories (who are accredited by the EAC) for use in testing and certifying voting systems. ~Thirty-six (36) states also require the manufacturer's source code as part of their certification and review process; in every instance that source code is provided. Customers and/or states may also require the manufacturer's source code be escrowed with the code being provided under escrow agreements.

Also, after software is federally certified, election system vendors voluntarily submit the executable code to the National Software Reference Library, which archives a validation code for future reference. This allows any jurisdiction to verify the delivered system software against the archived validation code to ensure it is the certified version.

The ETC members believe that a good process for disclosed source would be like the attached the testimony concerning the Open Source Software debate from election expert Britain Williams, Ph.D. Dr. Williams is Professor Emeritus, Kennesaw State University whom has more than 20 years experience in computer based training. Dr. Williams's testimony is from the Election Subcommittee Hearing on Election Reform on March 15, 2007. (See attachment E)

Concluding Remarks:

In providing this testimony, our intention is to give feedback to the Subcommittee of Information Policy, Census, and National Archives, Committee on Oversight and Government Reform on the consequences to the vendor community and, as we see it, to the states and election jurisdictions - our valued customers whom we serve.

Above all, the ETC member companies and employees aim to be responsive to voters, local election officials, State and Federal government, and is committed to providing safe, secure, accurate, reliable and accessible voting systems. We are all involved in this process together, and by working together we can improve the process of voting, voter access and participation.

Mr. CLAY. Thank you very much for that testimony.

And last, but not least, Dr. Golden. Thank you for your patience and thank you for being here.

Ms. GOLDEN. Not a problem at all. You just saved the best for last, right? I assumed that.

STATEMENT OF DIANE GOLDEN

Ms. GOLDEN. I am here to talk about accessibility for people with disabilities. I am not here to support or oppose paper, electronic, combinations. It doesn't really matter to me as long as the system delivers accessibility for people with a broad range of disabilities.

A couple of principles. If indeed you are going to use a paper ballot for security reasons, and it is a determinant ballot of record that can be counted as an official ballot, then it has to be accessible. I can't emphasize that enough. There are actually, most recently a report by NIST to the Technical Guidelines Development Committee of the EAC that suggested that perhaps it wasn't important for people with disabilities to verify their paper ballot; that it would be enough for people without disabilities to verify ballots and that should be sufficient. I can just tell you in no uncertain terms that is not going to be sufficient.

If a paper ballot is going to be used, it needs to be able to deliver the same access features as one can get from an electronic ballot. Unfortunately, if I am the wet blanket in the room, electronic information is very, very easy to make accessible. Paper is much more challenging to be made accessible. In order to manipulate the information on paper, you pretty much have to convert it into an electronic form so that you can deliver accessible media and formats.

So what we are faced with right now are, as people have talked about previously, two primary voting systems: DRE electronic voting systems, with paper added in a printer form; or ballot marking devices where the vote starts and ends as paper. The person with a disability interacts with both of those electronically, so there is a wide range of access features. Blind people can use the tactile audio ballot. People with low vision can use enlarged print. People with motor disabilities can use switch input, large tactile input, and mark the ballot with very little motor skills involved.

Unfortunately, both of those current systems have glaring accessibility problems. If you start out with a base DRE and add a printer, the print on the paper needs to be accessible some way. The only way to do that is to scan it back in and reproduce it electronically so that someone with low vision can see it in large print, and someone who is blind can get it auditorily. Right now, we don't have any DREs with VVPATs that have that capacity. So for all of the jurisdictions that currently provide DREs with VVPATs, and Missouri is one of them, people with disabilities can't verify the print on that paper. If that becomes a determinative vote of record, then the person with the disability never was able to verify the actual vote.

Ballot marking devices have their own problem. The vote starts and ends paper, so I take my paper ballot, insert it into the ballot marking device. I interact with it electronically. It marks my ballot for me, but then it spits it back out to me and I have to physically handle it. I have to reinsert it in that machine or insert it in a pre-

cinct counter to verify. I may have to insert it in a ballot box to finally cast it. All of that takes motor skills that if I am a quadriplegic I don't have.

So for both of the systems that we have out there that have paper, we have access problems. The situation facing people with disabilities who have voted on paperless systems is they have had pretty much complete accessibility available. By adding paper back into the voting process, we have reintroduced access barriers.

Are they solvable? Yes. We can solve these. People have been doing assistive technology for years, and we have ways of solving these problems. As was pointed out, it is going to take time and money to do that. So in terms of any kind of paper mandate, whether it is at a State level, and Missouri is one of the States where we pretty much have a paper mandate, we need to address this and we need to address it quickly, and we need to make sure it gets done so that we have not again disenfranchised people with disabilities by deciding that paper is the way we need to go for security purposes.

With that, I will close and I am more than willing to answer questions.

[The prepared statement of Ms. Golden follows:]

Testimony before the C mmittee n Oversight and G vernment Ref rm
Information Policy, Census, and National Archives Subcommittee Hearing
Ensuring Fairness and Accuracy in Elections Involving Electronic Voting Systems
April 18, 2007

Presented by
Diane Cordry Golden, Ph.D.
Director, Missouri Assistive Technology
On behalf of the Association of Assistive Technology Act Programs

Chairman Clay and members of the committee, thank you for the invitation to testify today. My name is Diane Golden and I currently work as the Director of Missouri Assistive Technology, the congressionally mandated statewide program in Missouri that provides assistive technology, including computer adaptations, for individuals with all types of disabilities. In addition to program administration duties, I serve on the Board of the Association of Assistive Technology Act Programs and provide technical support to the National Disability Rights Network on voting equipment access issues. I currently serve on the Telecommunications and Electronic and Information Technology Advisory Committee of the U.S. Access Board working on revising the standards for information technology accessibility as required by Section 508 of the Rehabilitation Act. I have also provided invited testimony to the Election Assistance Commission (EAC) and the Technical Guidelines Development Committee (TGDC) on accessible voting systems.

Congress has recognized the need for specialized expertise in assistive technology by funding State Assistive Technology Programs in the 56 states and territories. These programs are required to address the assistive technology needs of individuals with all types of disabilities. A multitude of other federally funded programs focus on unique aspects of assistive technology and specific populations of individuals with disabilities. Historically in the discussions surrounding voting security and how to ensure accessibility, assistive technology expertise has not been effectively utilized. Individuals with unbiased knowledge and expertise in assistive technology have not typically been involved in discussions regarding voting security even though many proposed solutions impacted accessibility.

As a preface to these comments, I want to emphasize that the disability community shares the interest of all Americans in ensuring that elections are fair, secure and accurate. From a personal perspective, I do not support or oppose a requirement for paper ballots if deemed necessary to ensure security nor do I want to outlaw or promote any particular voting system. My expertise and focus is on accessibility. To that end, I am here today to identify issues critical to ensuring fair, accurate and accessible voting and to highlight the challenges posed by voting equipment current available. In considering accessibility of voting systems, the following three points are critical:

1) The determination of whether or not a voting system, with or without a paper ballot, is "accessible" (and therefore meets any legal requirements to be "accessible") should be based on conformance to a set of appropriately developed, nationally accepted, technical access standards. Such determinations should not be based on individual anecdotal experiences.

2) If the decision is made to require a paper ballot, as a determinative vote of record to ensure security, that paper ballot must be accessible. Accessibility cannot and should not be knowingly compromised in response to unreasonable concerns regarding security.

3) A robust testing process should be in place to verify that a voting system conforms to accepted access standards. The entity performing such testing must have comprehensive knowledge and understanding of accessibility features along with expertise and experience in assistive technology.

Status of Accessibility Standards and Conformance

The adoption of access standards as part of the Voluntary Voting System Guidelines (VVSG) required by HAVA has provided much needed direction regarding what is and is not considered to be "accessible." These access standards provide technical specifications regarding the access features that must be provided by a voting system for it to be considered an accessible system pursuant to HAVA requirements.

For example, the VVSG indicates that an accessible voting system must provide –

- An audio-tactile interface so that a blind voter can listen to the ballot and navigate/mark the ballot through tactile controls;
- Enlarged and enhanced text for individuals who have vision loss but cannot use an audio ballot;
- Simultaneous audio and enhanced visual display for individuals who have vision loss and those with print disabilities such as dyslexia; and
- A "non-manual" input option (usually dual switch) that allows individuals with very limited motor skills navigate/mark the ballot.

In reviewing products over the past several years, it appears that most of the access features required by the VVSG (excluding those related to accessibility of paper ballots) are being delivered by one or more direct response electronic (DRE) systems or ballot marking devices (BMD) with an electronic interface currently on the market. Features not currently available on existing products could be readily added as part of a redesign of the electronic interface of a DRE or BMD system. These electronic interfaces (absent paper ballots) that conform to the VVSG access standards deliver a wide range of access features that allow individuals with a variety of disabilities to vote secretly and independently, like all other Americans. As a result, many Americans with disabilities have enjoyed a certain level of accessibility in voting for the first time in their lives.

The Paper Challenge

If paper ballots are used to ensure security, those paper ballots must also be accessible to ensure the security of the entire election system and to uphold the rights of voters with disabilities to generate, verify and cast their vote privately and independently. Unfortunately, providing the same range of accessibility for a paper ballot, as is readily available with an electronic interface, is a bit more challenging, though not impossible. Two major shortcomings exist in current voting systems that use a paper ballot.

1) Direct electronic voting systems with voter verified paper audit trail (VVPAT) printers do not provide a mechanism for alternative access to the print on the

VVPAT. As a result, voters with vision disabilities cannot verify the paper ballot privately or independently.

2) Ballot marking devices require voters with disabilities to manually handle paper to verify and cast their ballot. As a result, voters with motor and other disabilities cannot verify or cast the paper ballot independently.

The VVSG requires that systems utilizing a voter verified paper ballot as a determinative vote of record ensure that the paper ballot itself (not the electronic ballot) is accessible to voters with vision disabilities. The VVSG also requires that voters with motor disabilities be able to submit/cast the paper ballot without assistance. This means –

- Voters with disabilities should not be required to handle a paper ballot at any point in the voting process;
- Blind voters should be able to generate their vote using an audio-tactile interface and then should be able to verify/edit and cast the content of the paper ballot using that same interface;
- Voters with low vision who used enhanced visual display on the screen of a voting system to generate their vote should have enhanced visual display available to verify/edit and cast the paper ballot; and
- Voters with motor limitations who used switch input (e.g. sip and puff) to generate their vote should be able to use that same switch input to verify/edit and cast the paper ballot.

Paper Ballot Accessibility Requirements

Accepted public policy dictates that accessibility levels not be rolled back or decreased over time. The current level of access delivered by current VVSG requirements for paper ballots, must be preserved. Individuals with disabilities who have used paperless voting systems should not experience a decrease in their ability to privately and independently vote due to the addition of a paper ballot requirement. In addition, the same level of accessibility should be required for either a paper ballot or an electronic vote record.

The most likely option for addressing access barriers in a DRE with VVPAT will be the utilization of a scanner capable of automatically converting the human readable text of the VVPAT into electronic text. That electronic text can then be used to generate audio/speech output (through text-to-speech software or other mechanism used by the core DRE system) and enhanced visual display (on the visual display of the DRE.) The base DRE system will already have the capacity to deliver audio/speech output and enhanced visual display as it does for an electronic vote record. The same output mechanisms can be used, but will be based on the scanned content of the VVPAT, instead of the content of the electronic ballot.

Some voting systems are using or considering use of bar coded information printed on a paper ballot to support automatic vote counting. While scanning bar code information is an attractive option to deliver accessibility, it is important to remember that voters with disabilities must be able to verify that information that is or can be the determinative vote record. If bar code data is the only print information that can or will be counted, then using bar code data as the content to be verified by voters with disabilities is appropriate. If however, the human-readable print is or can be a determinative vote record, then that print will need to be scanned and converted into accessible form so voters with disabilities, just like all other voters, can verify the human readable information.

The most likely option for addressing access barriers in a BMD will be the addition of an automatic paper handling mechanism. If the paper ballot can be manually fed into the system prior to beginning the vote process, and from that point on all paper handling is done via automatic feeding mechanisms, the access barrier will be eliminated.

While this all sounds complex, the technology to make this happen is either currently available or can be developed if manufactures are given adequate time and unreasonable design requirements are not imposed. For example, in recent deliberations it appears the TGDC is considering separate output hardware be required to deliver the accessible media. In other words, once the print content of the VVPAT or electronically marked ballot is scanned, it must be delivered to the voter through a separate output device from the one used to deliver information during vote generation.

So for a DRE with VVPAT that means a voter using the audio tactile ballot would have to unplug their headset from a jack on the machine used to generate the vote record and plug it into a jack on a physically separate machine to verify the scanned information of the paper ballot. For a voter who used large visual display on a DRE to generate the vote record, they would have to use a separate visual display to verify the VVPAT paper ballot. For a ballot marking device the situation is even more convoluted in that the voter would have to manually carry their marked paper ballot to a separate machine to have the scanning done and delivered to separate output devices. If this requirement is put in place, the time necessary to develop and deploy accessible voting systems will be significantly increased and during the interim individuals with disabilities will not have access to accessible vote verification and vote casting.

Independent Testing Labs

Testing entities entrusted with verifying voting system conformance to the access standards must have adequate knowledge and understanding of accessibility to do the job.
While the EAC has taken dramatic steps to improve the independent testing process for voting equipment, it is unclear what expertise and experience the testing labs have to adequately ensure compliance with the accessibility standards. Based on past experience with these same entities, it did not appear as if sufficient expertise existed to appropriately judge conformance to access standards. Time and time again, it was discovered that systems certified as conforming to existing Federal Election Commission access standards, in fact did not conform.

Summary

If Congress determines that in order to secure the voting process every voter must be able to verify and cast a paper ballot -- then *all* voters must be able to verify and cast paper ballots for our elections to be truly be secure. Moreover, verification measures must safeguard the rights voters with disabilities gained under HAVA and must allow all voters to verify their ballot privately and independently. A new access barrier should not be created by the addition of a verification requirement or a paper ballot mandate. Congress should not develop election access requirements to accommodate equipment vendors or the status of currently available voting products. Accessible verification technology will only develop if the law clearly requires it, and the technology will only be adequate if reasonable time and appropriate resources are allocated to support that development.

Mr. CLAY. Thank you very much, Dr. Golden.

Now, we will move to the question period. My first question is for both Dr. Rubin and Mr. Groh. Let me ask you, would you agree that a major flaw in the EAC's voting system guidelines is the lack of prescribed standards or guidance for testing or maintaining commercial off the shelf software or products in e-voting systems? And have you and your colleagues at the ACCURATE Center sought to offer recommendations for establishing such a requirement. I know Mr. Groh pointed to some documentation he was going to leave with the committee.

Mr. Rubin, first.

Mr. RUBIN. Thank you.

Sir, that is outside of the charter of what ACCURATE does. We have been funded by the National Science Foundation to do research, outreach and education. We did provide I believe a 40 page document of feedback to the EAC on their proposed VVSG. I don't think that software, whether COTS or whether a specific voting application software, can be tested for security the way you would test it for humidity or for dropping or for any other things like that. I think voting machines need to be red team tested and I don't feel that the VVSG offers the kind of standards that would need to be prescribed to properly test a system like this for security.

Mr. CLAY. Mr. Groh.

Mr. GROH. Again, I will not claim to be a computer scientist or expert, so I acquiesce a little bit to what Dr. Rubin would bring up. But I would like to answer from a different perspective. That is that the EAC was working as hard as they could, as fast as they could, trying to develop the 2005 voluntary voting system guidelines to replace the 2002. They almost had a challenge that was not going to be met. Part of that is when you begin to dig into this, there are many, many moving parts, and many, many individuals or stakeholders in this from voters to local election officials, Secretaries of State, the disability community, the vendors.

When that process took place, what they did is they had to rush that. So if you look at the time line that the NIST and the Technical Guidelines Development Committee worked under, they had to shortcut and come up with something to deliver in May 2005, so that they could get something implemented. They were racing to the finish line. They now have started on the second round of that, and they are going through the next iteration. I believe it is in that they will do a much better job of coming up with standards around it.

So a lot of the standards that you see were left off, were left off knowingly because they were going to be out of time, or they would have still not had them released.

Mr. CLAY. Thank you so much for that response.

Dr. Golden, can you specify how current and available technology can provide a verifiable audit trail for those needing assistance? Wouldn't the use of barcoded information from a paper ballot machine provide accessibility, while also ensuring the privacy of the voter's ballot? Are there other e-voting system options that can be employed in order to provide both accessibility and reliability in the voting process?

Ms. GOLDEN. Thanks for the question about barcoding, because that always seems to come up. The interesting scenario with barcoding is again, you have the DRE that has an electronic vote, and then there is a secondary or parallel paper printed vote over here. If there is a barcode printed on that paper ballot, then yes, a scanner can either read human readable text, OCR scanning, or it can read a barcode. If indeed a person with a disability is verifying what is in the barcode, and that is actually what is being counted, then yes, it works beautifully.

However, it the barcode isn't really the determinative ballot of record, if it is the human readable text, then the person with a disability needs to verify that human readable text. It could be that if the barcode is printed on the VVPAT specifically for the purpose of counting ballots, which is kind of I think why it was originally going to be placed there, it wasn't for accessibility purposes, if that is what is actually going to be counted by a scanner, then the person with a disability technically is the only one verifying what is going to be counted, because they are verifying what is in the barcode and all the sighted people are verifying the human readable print, and yet that is not what is being counted.

So I guess the answer is barcodes would be a great idea if that is what is being counted, then I actually think people with disabilities come out way ahead, because they are probably the only people verifying what is going to be the actual countable record.

So it all boils down to what is being counted, what really is the ballot, and what is going to be counted.

Mr. CLAY. Would you say that the most acceptable equipment now in the polling places would be the optical scan with the audible component on it? I mean, that is the one that election officials have demonstrated to me. They say that is the one that is widely accepted in the disabled community. Is that accurate?

Ms. GOLDEN. The two "types" of accessible machines most commonly used are the ballot marking device, which is what you are talking about, an electronic interface with an optical scan marked ballot; or a DRE with or without paper. They are probably about split even. I wouldn't have the data, but they are widely used, both of them, as accessible machines.

The problem is with a ballot marking device you are disenfranchising people with motor disabilities, because they cannot physically handle that paper ballot through the process. DRE with a VVPAT, you are disenfranchising people with vision loss because they can't see the print on that paper.

So in essence, your choices of accessible machines right now are which disability constituency group would you rather disenfranchise.

Mr. CLAY. That is a tough choice. [Laughter.]

Ms. GOLDEN. It is a great choice.

Mr. CLAY. Thank you for that response.

Dr. Rubin, in your testimony, you discuss various vulnerabilities identified in the DRE machines used in Maryland since 2002. Can you offer us some detailed examples of the types of vulnerabilities identified or malfunctions that occurred in Maryland?

Mr. RUBIN. Sure. I also want to take this opportunity to comment on something that came up earlier today, where Maryland was

used as an example of a place that would have to switch from DREs, part of that 180,000. The Maryland House and Senate have passed a bill to move by 2010 to all paper optical scan, so they would be going anyway, although the Governor has not signed that bill yet. I just wanted to mention that.

Working as a poll worker in Maryland, I encountered in the September 2006 primary a lot of issues that had to do with the reliability of the electronic poll books. That is what received a lot of press. That is separate from the DREs. That is what is used to sign people in.

There have been some problems of machine freezes, etc., but I don't know of any tangible, viewable security problem that has occurred. That said, I think that the kind of security problems that I worry about don't always manifest themselves in something noticeable.

So the thought that if one of these machines accidentally had the wrong vote tally, there would be no way to know it. I think this is what we are seeing that happened when something actually visible occurred in Sarasota County. What I ask myself is, how do we know that in Maryland there wasn't a problem that just didn't occur in a way that was visible? If 5 percent of the votes were recorded for the wrong candidate, and everything falls within statistical exit polls, we wouldn't know.

Mr. CLAY. That is troubling, what you just said. So do you believe that there is a rate of error as far as miscounting votes?

Mr. RUBIN. I don't actually believe that. My concern is that whenever there is an election, there is often a dispute. You have a loser. You have everyone except one usually loses. And so there is often a challenge to the election. There are a lot of people in the community that don't feel that the right answer was obtained. We have a tradition of having recounts. With the DREs as we use them in Maryland right now, there is no way to perform these recounts, and there is no way to gain any assurance.

That is a different question from, do I believe these mistakes have been occurring. I actually don't have any reason to believe that they have or have not been occurring, but I am concerned with the fact that we can never resolve an issue if a situation occurs where there is reason to doubt the outcome.

Mr. CLAY. And Maryland has attempted to correct this how?

Mr. RUBIN. So Maryland has had several times bills have come before the House and Senate. The most recent one calls for all paper ballots with ballot marking devices for accessibility, and optical scan for counting, and random audits. This bill, like I said, has passed the two houses in Maryland and is awaiting the Governor's signature.

Mr. CLAY. Thank you for that response.

Mr. Groh, to what extent have voting system manufacturers assessed their capacity to modify and upgrade voting systems for the 2008 election? And furthermore, what are manufacturers doing now to project future demands on their resources and address their needs?

Mr. GROH. I think the first thing that we have done is we have had a lot of sleepless nights. Part of it is when you don't know

what you are going to be doing because there is not clear direction. You then continue to worry about it.

All of us, though, are trying to come up with scenarios and try and second guess what those scenarios are, but until we know for a fact what things are going to be implemented, it is hard for us to hit a target that will move. In fact, that has been a lot of the issues that we were all challenged with during the implementation of the HAVA, of where people needed to get the products purchased and installed by January 1, 2006. That created a tremendous amount of a time constraint, and so many of us were rushing to the goal line when we would have liked to have had more time to have made corrections that we knew about, but we didn't have the time to do those things.

So today, many of us are trying to address issues we saw in the 2006 election to make sure that they are ready for 2008. We are trying to address that. You need to understand, to do anything for 2008, I need to be ready to implement from my company's perspective in about November or October of this year. The first elections are in February 2008.

We will be doing early balloting and voting on that will happen 45 days in advance. If you back up ballot layout, ballot proof, logic and accuracy, public testing and so forth in there, you run yourself out of time. So getting through a certification process on new technology between now and 2008, it is going to be impossible to do.

Mr. CLAY. In light of the dysfunctional processes identified in the current lab certification process for systems, what are your views on the EAC's current voting system certification process?

Mr. GROH. The process the EAC is implementing is a much more rigorous level. It is like, to use an analogy, it is like stepping from high school basketball to professional basketball. It has that kind of a differential.

To implement that, you can't implement it overnight. So they are going through a process right now of certifying the labs under a NIST program called NAVLAB, which is a national laboratory certification program that they put them through. That is the piece that you were challenging Commissioner Hillman to earlier about what they found out in their evaluation of CIBER to meet that new test lab process.

We right now are seeing from a manufacturer's standpoint there is a constraint or there is a keyhole that we are trying to go through in the test labs. There are only two of them available. We can't get all of our product, that is stacked up there like airplanes waiting to land, through those two. We know that NAVLAB will free that up, but you have to give them enough time to get the NAVLAB program in place to get enough laboratories available.

Mr. CLAY. Has the ETC developed its own recommendations for improving the system?

Mr. GROH. Yes, we have. We submitted from the May timeframe of 2005, when NIST and TGDC presented their recommendations on the VVSG, we were part of helping them develop and answer questions. We were allowed to provide comments, and we are continuing to work in the process of the new programs that they are looking at, the new VVSG standards and the certification process.

Mr. CLAY. As a final question for you, are the threats to voting system security changing? And what more needs to be done to understand and address the threats?

Mr. GROH. Dr. Rubin's ACCURATE organization is doing some of that because they are looking at how voting systems and the voter interface and interact. There are probably four or five other organizations that are doing the same thing.

From the vendors perspective, we do think this is an end to end process. So from the time that we develop a product, Q/A it, run it through certification, there are a whole group of other activities that happen that are all part of certification, such as the State level. There are 36 States that do their own State-level certification on that is an enhanced version of it over the EAC's process.

Additionally, there is acceptance testing done by the local election officials. There is chain of custody programs that they are implementing and putting into place under the EAC's guidance and direction.

But to me, the biggest security principle that we have in this is the fact that these voting systems are used widely across the United States. They are not all one uniform, unique system. It is impossible to get access to all of these systems, to get in there and do something with them, because they are all different from each other. So that alone creates a layer of security in here that people don't recognize or see that is there.

And then you have the citizenry that oversees it. The poll workers are voters and are citizens that are voting and using that. Hundreds of thousands of them work on this. You have local oversight into that through them.

Mr. CLAY. Thank you for that response.

Dr. Rubin, in yesterday's PC World, there was an article about research being conducted at University College Dublin in order to develop a more secure e-voting software architecture through the use of open source software. Can you offer us an opinion on how the EAC could alter the current accreditation and certification process in order for it to become more transparent and reliable?

Mr. RUBIN. Sure. I am familiar with that article. I think that a lot of the attention that has been placed by people who are described in that article on open source in my opinion are somewhat misguided. You can have all kinds of bugs and security flaws in software that is open source, just as you can in software that is not open source.

It is my belief that you are not necessarily much more likely to expect to find these problems in open source as you are in things that are not open source, because bugs are that difficult to find.

In terms of what the EAC can do, I think following NIST's advice and striving for software independence. If we had a software independence system as defined by NIST, then it wouldn't really matter if the software was that secure, and it wouldn't really matter if the software was open or not, because software independence means that you are not depending on the software for security.

So I don't want to sound like a broken record with respect to paper, but right now I can't think of a system that provides software independence that is not based on paper. I do think there are such systems in the works, and I am a big fan of the cryptographic

systems that are being developed. I don't think that they are ready to be deployed in any precincts right now, but someday they will be.

Mr. CLAY. Can you offer us an opinion on how the EAC could alter the current accreditation and certification process in order for it to become more transparent and reliable?

Mr. RUBIN. I think that several things could happen. The EAC could require what is known as red team testing of the machines, which is different from the kind of testing them to a standard, where you get security experts and software experts to have a field day with these things in the lab and try to break them and find out where the weaknesses are. I think that is the best way to test security these days.

Mr. CLAY. Thank you for that response.

Ms. Golden, as a final question, has the voting system vendor community been receptive to the needs of the disabled community? Are there adequate systems development efforts underway to improve the accessibility of voting systems under the new guidelines?

Ms. GOLDEN. Since I am sitting right next to Mr. Groh, I would never say no to that question, and in all fairness, the vendor community has I think worked very, very hard on accessibility.

I will say the progress has kind of been in fits and starts, but some of that was very legitimate. First off, we didn't have good accessibility standards until the VVSG came out, which does provide a robust set of access standards that they could actually build to.

In terms of accessibility, this is similar at least to architectural access. Until we had good architectural access standards that said door widths need to be X wide and slopes need to be this kind of slope, and grab rails need to go here, people didn't know how to build something accessible, so part of it had to do with standards.

Part of it, too, quite frankly, is the vendor community did what seemed logical, which was they went to constituency groups of people with disabilities and asked them what they wanted. The classic example that I always give is a vendor who went to a bunch of blind folks who were very competent technology users. What they wanted is going to be very different from what older blind people who are not very technology savvy are going to want and need. So they built the system, and it did work very, very well for blind people who were technology savvy. The older blind population had a heck of a time figuring out a 10 key pad and a this and a that.

So some of it, too, was just not being familiar with the disability community as a very diverse group of people. Someone with ALS is very different from someone who is blind, who is very different from someone with cerebral palsy. Knowing that whole population, I think it has been a bit of a learning curve for the vendor industry.

But yes, I would say they are very committed to it. I don't think anybody doesn't want people with disabilities to have a completely private independent vote.

Mr. CLAY. So the issues relevant to the disabled community are solvable by the industry, as long as they work together with the disabled community?

Ms. GOLDEN. Yes. And I think technologically, the solutions are there. It is just going to take us some time and money to get there,

and a clear vision. Part of this has been too, we are going to do electronic votes; no, we are going to go back to paper. If we had been focused on paper all along, we might have been a little further ahead in this game, but we have gone back and forth. If paper is the game, then we just need to make it accessible. We have a couple of big issues to solve, and somebody just needs to get down to it, and solve it and be done with it.

Mr. CLAY. Thank you.

Thank you for your response. Let me thank the panel for their response. I will allow anyone on the panel to make a closing statement, if you have any.

Dr. Rubin, you may proceed.

Mr. RUBIN. OK. There is one thing I didn't get to in my opening remarks. I wanted to point out that DREs did break ground in accessibility, but that the accessibility features are not particular to DRE, and some of this has come out. I think the same accessibility features can be obtained with op scan using ballot marking machines and accessible verification technologies. I agree that a lot of work needs to be done to make that happen so it is usable in a precinct.

I want to point out that the security community is not advocating compromising on accessibility, but rather preserving accessibility, but adding security and audit.

Mr. CLAY. Thank you for that.

Mr. Groh.

Mr. GROH. Yes. I would like to just close with a couple of things. The Election Technology member companies, we believe we are a stakeholder in this. The companies and all the employees that are involved in this, our aim has been always in the products that we build and the development we work with and the interfaces we have, whether it is with Secretaries of State or with the accessibility community, and that is a broad community. There are many, many organizations, but it has been to be responsive to all voters, the local election officials, State and Federal Government, and kind of in that order.

We are also committed to providing safe, accurate, secure and reliable, accessible voting systems, but we need to know what that target is and we will build it. People are saying, if you build this, we will buy it or we will come. So that is what we want, and we need those definable solutions.

The closing pieces would be you need to allow the time to do this. That has been, if I can say there is one root cause of many of the issues that we are dealing with today, we have never given it enough time to allow everybody to get to the table and hash and debate this out. There are many good ideas that can come out of that discussion, but we have always tried to do that in about a 2 month or 3 month window of time. It is not enough time.

The other one is to encourage you to make sure you consider funding responsiveness on this, because the No. 1 competitor that I have experience being in this business since 1995, was not another competitor. It was the local election official saying, I don't have enough money. They knew they wanted better election equipment, but they had a school or a library or a road that needed to be done.

HAVA allowed us to make a huge leap forward. Let's not throw that all away, but if we are going to spend the next round of money, let's do it very, very appropriately. We don't need to rush to the finish line on this one.

Mr. CLAY. Thank you so much, Mr. Groh.

Dr. Golden.

Ms. GOLDEN. Since everybody else did something, of course I can't be outdone. I might as well.

Mr. CLAY. You might as well. Please do.

Ms. GOLDEN. Just a couple of quick points.

One is to followup on a question you asked earlier about the Technical Guidelines Development Committee, and representation of accessibility interests. I talked with Commissioner Hillman a little bit after the closing of the first round. The disability community I think as a whole does have a bit of a concern with the degree to which accessibility interests are being discussed as part of the Technical Guidelines Development Committee. They are working on the next iteration of the VVSG, and yet again we are finding that security interests are trampling accessibility, for lack of a better way of describing it, and no one is at the table saying, wait a minute; I am not telling you not to do this, but if you do "A," you have again diminished accessibility.

The accessibility community just seems to always be playing catch-up behind the game. The train seems to be driven by the security issues, and it is always the afterthought, oh, oops, you mean if we require not only software independence, but hardware independence, then we also have caused another accessibility problem. Yes. So that continues to be a concern.

And the second issue has to do with the testing facilities and labs. The EAC has a new process, much more rigorous. We have not seen the outputs of that process yet, but in terms of accessibility, I guess I am fearful again that we are not going to be adequately represented in terms of the skills and expertise in those labs.

What I saw in the first round of conformance to the FEC 2002 access standards, I would get a report, worked with Secretary of State Carnahan and our group. Missouri does certify equipment, in addition to national certification. When we looked at the equipment, I would see the testing lab report and it would say this piece of equipment conformed to this access standard, and yet I could tell it didn't. The vendor could tell it didn't. And yet, the certification statement said, yes, it conformed.

So I am fearful, or at least I would like to hope that we have more expertise involved in judging conformance and evaluating conformance to the access standards. They are highly technical. You have to know something about people with disabilities and accessibility if you are going to judge conformance to those standards. I don't know enough about those labs to know if they have that kind of expertise or not, quite frankly.

Mr. CLAY. Thank you for that.

Let me thank this panel, and the previous panel, for their expert testimony today on such an important subject to this committee, to this Congress, and to the American public, so that they can have confidence in their vote and ensure that it is counted accurately,

and that they can have a better understanding of the electronic voting systems that each State administers.

So I want to say thank you to this panel and the previous panel for their testimony.

Without objection, the committee stands adjourned.

Thank you.

[Whereupon, at 5:55 p.m. the subcommittee was adjourned.]

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